To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]
From: Koch, Kristine
Sent: Mon 3/24/2014 3:25:39 PM
Subject: RE: LSS/EPA Arkema sampling ideas before closeout
EPA_TWS5_Meeting_20140314v0_kgrev.pdf

Based upon page 45 of the attached document, our technology screen shows that much of the area will be dredged to some degree. This should be considered in any sampling design for this area. Do they have good dredge horizon samples at depth? If not, those would be really useful.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Sheldrake, Sean
Sent: Friday, March 21, 2014 10:03 AM
To: Cora, Lori; Humphrey, Chip; Koch, Kristine
Cc: Lance Peterson (PetersonLE@cdmsmith.com)
Subject: RE: LSS/EPA Arkema sampling ideas before closeout

Lori, It seems they were talking upstream of salt dock to outfall 004ish—not the full extent of the property (e.g. near RR bridge). S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Friday, March 21, 2014 9:59 AM
To: Sheldrake, Sean; Humphrey, Chip; Koch, Kristine
Cc: Lance Peterson (PetersonLE@cdmsmith.com)
Subject: RE: LSS/EPA Arkema sampling ideas before closeout

I have no comment on the nature of sampling that may be valuable, but do we know what they mean by "site"? Their property boundaries? Something else?

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Sheldrake, Sean
Sent: Friday, March 21, 2014 9:20 AM
To: Humphrey, Chip; Koch, Kristine; Cora, Lori
Cc: Lance Peterson (PetersonLE@cdmsmith.com)
Subject: LSS/EPA Arkema sampling ideas before closeout

All, A quick summary of the call Lance and I just had with LSS/Integral.

They suggest a workplan by 4/30 that would cover Bioassays/sediment chemistry across length of "site". We noted that we didn't see much value in doing bioassays where we see dredging as necessary, e.g. between the docks where it would be shocking to not have a dredging project.

We did suggest two sampling opportunities outside of likely dredging areas that would further pre-design efforts:

-Passive sampling (spme fiber)—I suggested this outside of areas likely to be dredged to get a better idea of ddx porewater lability relative to capping design where cap is stand alone or a post dredge necessity.

-NAPL coring. Recoring areas of disputed napl presence with better field oversight for the logging effort could save us unnecessary future, post ROD disagreements.

Let me know what you all think and we can either see what the workplan looks like, pull the plug now, or add more ideas that LSS might agree have pre-design utility.

Thanks!

S

Sean Sheldrake, Unit Diving Officer, RPM

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206.225.6528 cell

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http://www.epa.gov/region10/dive/

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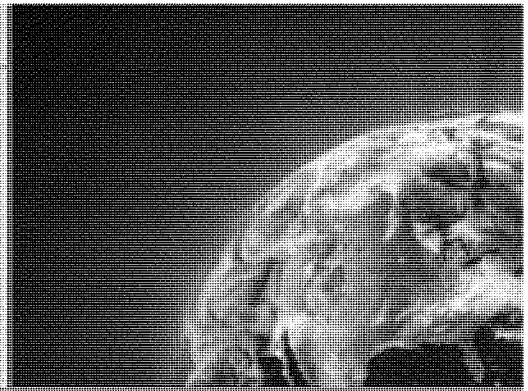
Portland Harbor Feasibility Study

EPA Stakeholder Meeting – Alternative Development and Basis for Evaluation



US EPA

Oregon Operations Office

Portland, Oregon

March 14, 2014

Time 9 AM PST

Agenda

- Schedule to Proposed Plan
- Follow up on COCs, RAOs, Bakground, PRGs and/or RALs (if needed)
- Alternative Assembly
- Alternative Screening Criteria
- Preliminary Comparisons
- Selection of Alternative(s) for Detailed Assessment
- Detailed Alternative Assessment Approach

Portland Harbor – Path to Plan

BRAs

Human Health

Receptor Scenarios

- Complete Pathways
- Relevant Area for Exposure Point Concentration Calcs

Ecological

Receptor Scenarios

- Complete Pathways
- Relevant Area for Exposure Point Concentration Calcs
- Benthic Tox
  - Predicted vs. Actual

HHRA-Complete
BERA-Dec 2013

RI

Characterization

Background Concentrations

Depositional Areas

Areal and vertical extent of COPCs

Summer 2014

FS

Screening of Technologies

Remedial Action Alternatives

RAOs

PRGs

RALs

Screen Alternatives

Detailed Alternative Analysis

Fall 2014

Proposed Plan

Basis for action

Preferred remedy components

Expected outcomes

Institutional Controls

Long Term Monitoring

Community Participation

Dec 2014

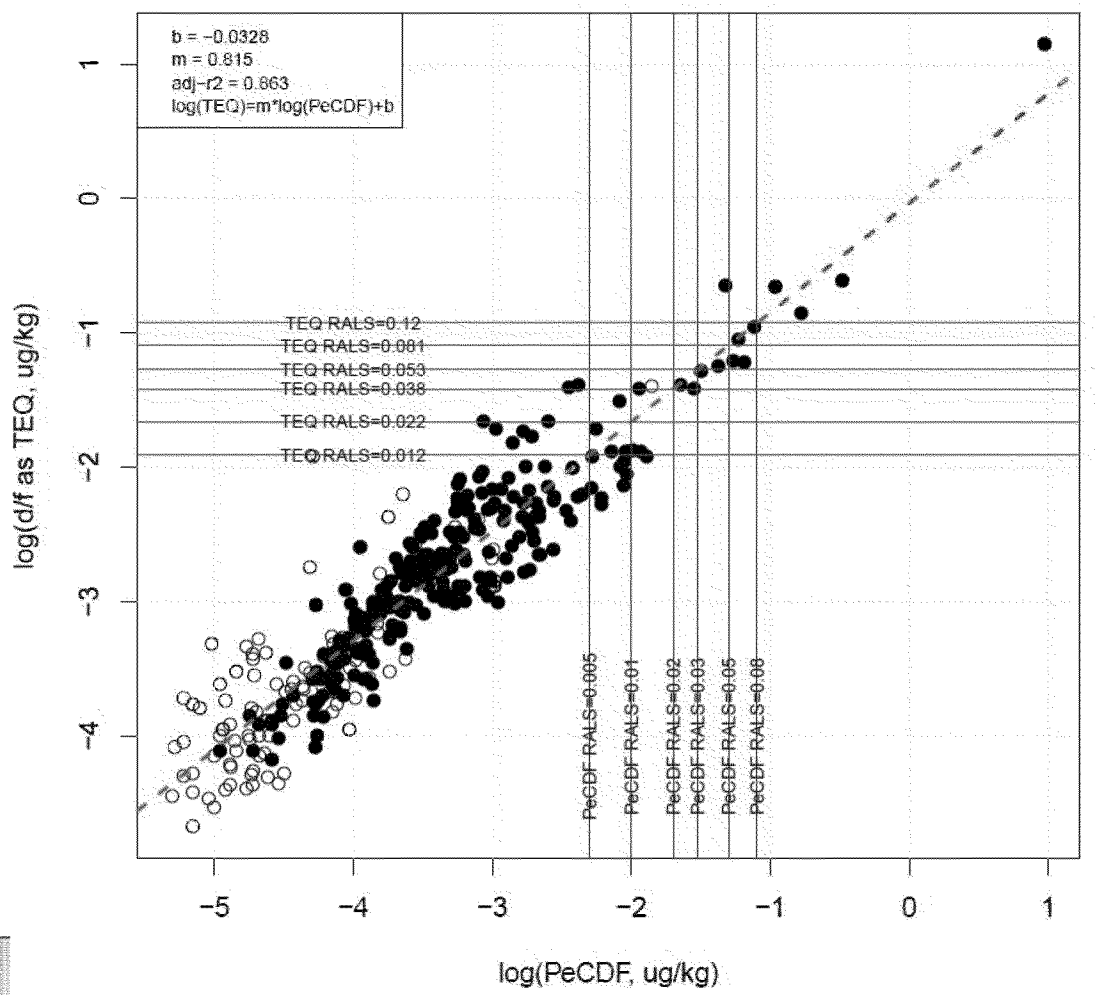
COC/RAO/Background/PRG/RAL

- Placeholder for follow up to November meeting (if needed)

Change in RAL COC from PeCDF to Dioxin/furans as TEQ

- D/F as TEQ better represents dioxin-like toxicity at site
- Approach to develop D/F TEQ RALs from PeCDF RALs
  - Log/log regression
  - Adjusted r2 =0.863
  - Detects only used for correlation
  - PeCDF footprints replicated by D/F as TEQ

Figure 1
Dioxin/Furans as TEQ to PeCDF RALs, Site-wide Surface Sediment



Change to Remedial Action Level COCs

Key COC Map RALs	RALs (ppb)					
	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
Carcinogenic PAHs (BaP Eq)	20,000	15,000	8,000	4,000	1,500	600
2,3,4,7,8-PeCDF	0.08	0.05	0.03	0.02	0.01	0.005
Dioxin/Furan as TEQ	0.12	0.081	0.053	0.038	0.022	0.012
Total DDx	650	550	450	300	160	40
Total PCBs	1,000	750	500	200	75	50
Benthic Toxicity	No toxicity in 10 years	No toxicity at year 0				
Benthic Toxicity	MQ>0.7; L2/L3 -- No toxicity at year 0					

Final Remedial Action Level COCs

Key COC Map RALs	RALs (ppb)					
	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G
Carcinogenic PAHs (BaP Eq)	20,000	15,000	8,000	4,000	1,500	600
Dioxin/Furan as TEQ	0.12	0.081	0.053	0.038	0.022	0.012
Total DDx	650	550	450	300	160	40
Total PCBs	1,000	750	500	200	75	50
Benthic Toxicity	MQ>0.7; L2/L3 -- No toxicity at year 0					

Scope of Alternative Assignment

- General Concepts
  - Remediation areas… where to remediate
    - RALs and Benthic Toxicity
    - LWG Interpolation
    - EPA Interpolation
  - How to remediate
    - Technology assignment and scoring
      - LWG Approach
      - EPA Approach

keg1

Where to remediate, acres

Total River ≈ 2580 acres (RM 11.8 to confluence)

Alternative	LWG	EPA
B	124	69
C	149	88
D	161	134
E	235	231
F	402	501
G	NA	840

Slide 9

keg1 Should figure out how much the Swan Island EMNR area affects these numbers and
u4eprkeg, 3/13/2014

keg8

Where to remediate, acres

Total River ≈ 2580 acres (RM 11.8 to confluence)

Alternative	LWG*	EPA*
B	46	60
C	69	70
D	78	113
E	146	181
F	307	417
G	NA	747

**Swan Island removed for comparison ranges from B=77 acres*

Slide 10

keg8 Should figure out how much the Swan Island EMNR area affects these numbers and
u4eprkeg, 3/13/2014

How to remediate – LW GApproach (Integrated and Removal)

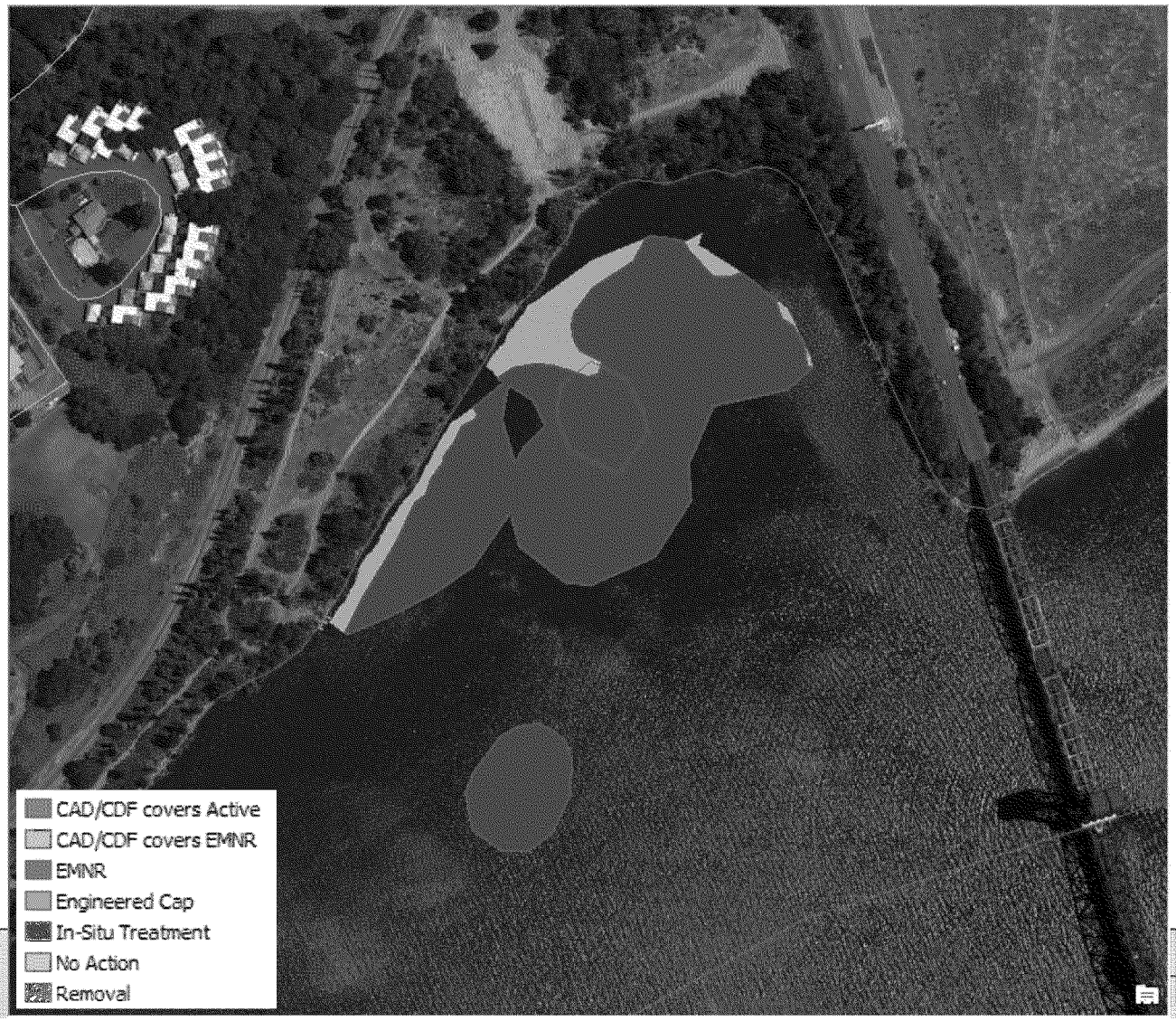
Table 7.2-1. Application of Technologies by subSMA Type for Comprehensive Alternatives

Sub SMA Type	SubSMA Label	SubSMA Description	Removal Focused	Integrated Cost Estimate A (1)	Integrated Cost Estimate B (2)
Channel	NC	Areas within the current federally authorized navigation channel	Removal	Removal	Removal
	FMD	Approach areas located between the NC areas and docks where shipping access is needed now or in the future	Removal	Removal	Removal
Structure	SS	Areas located beneath structures including a 5-foot offset from the structure face. The offset is based on the average DOI across the Study Area.	Cap	Cap	In situ Treatment
	SL	Areas where open water equipment is not accessible due to structures. Smaller water-based equipment would have to be used.	Removal	Cap	In situ Treatment
	SU	Areas where water-based equipment cannot reach but access from shore is feasible	Removal	Cap	In situ Treatment
	SN	Areas where no water-based equipment can reach and upland structures, utilities, and/or topography prevent access from shore	Cap	Cap	In situ Treatment
Other	OW	Areas where there is no restrictions to dredging or capping equipment	Removal	Cap	In situ Treatment
	-wz	Area above 0 NAVD88 subject to wind/wake waves.	Removal	Cap	Cap

Note:

Willamette Cove Area LWG Alt E Removal Focused

Willamette Cove Area LWG Alt E Integrated Focused



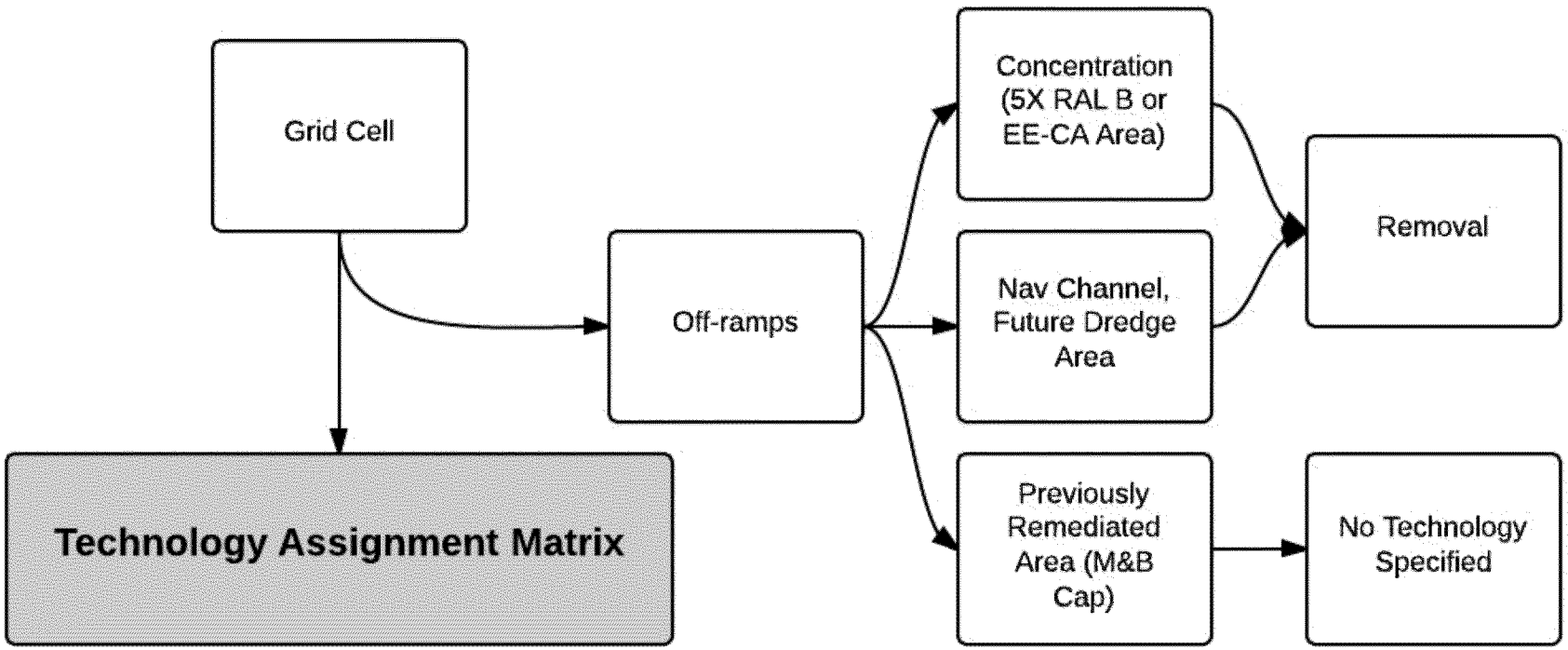
Issues with LWG approach

- Selection of technologies does not assess whether environmental conditions are conducive to or consistent with the approach
  - For example, in-situ treatment (application of organic carbon) can be selected in erosive or high slope areas
- In areas outside nav. channel/fmd, the remedial options are essentially "all dredging" or "all in-situ"
  - Creates a false choice… 100% dredge or 0% dredge
- Inconsistent with Guidance that emphasizes combination remedies and selection of technologies based on environmental conditions

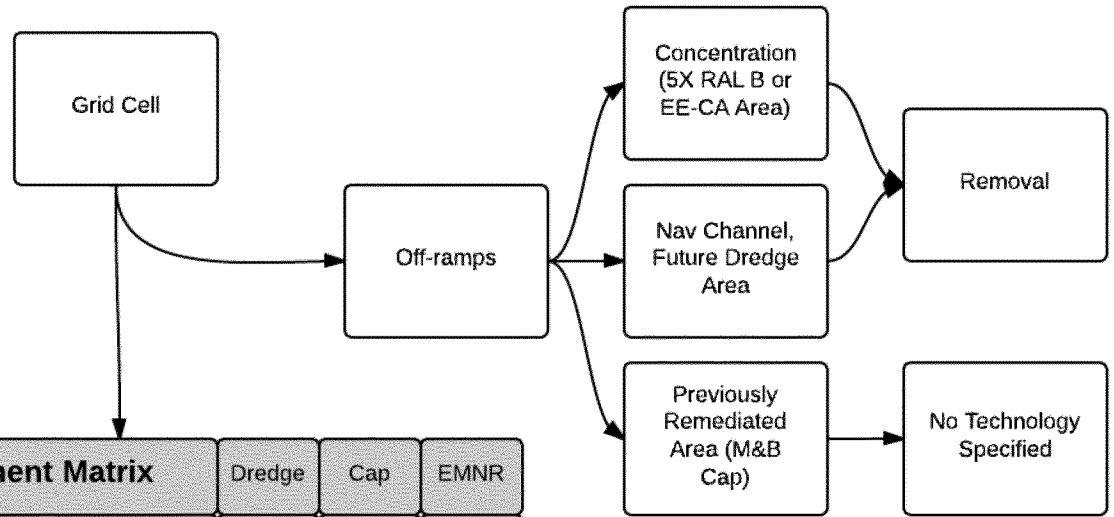
EPA Approach: Introduction

- **Objective:** Develop a process that evaluates remedies based on environmental conditions:
  - hydrodynamics, sediment bed characteristics, and anthropogenic conditions
- Uses a decision tree / multi-criteria decision approach to indicate an appropriate technology:
  - EMNR/in-situ treatment
  - Cap – engineered cap with/without active component
  - Dredging
- **Outcome:** Process indicates appropriate technology based on analysis… **It does not select a remedy**.

Overview of Technology Assignment Process: Off-ramps



Overview of Technology Assignment Process: Technology Assignment Matrix



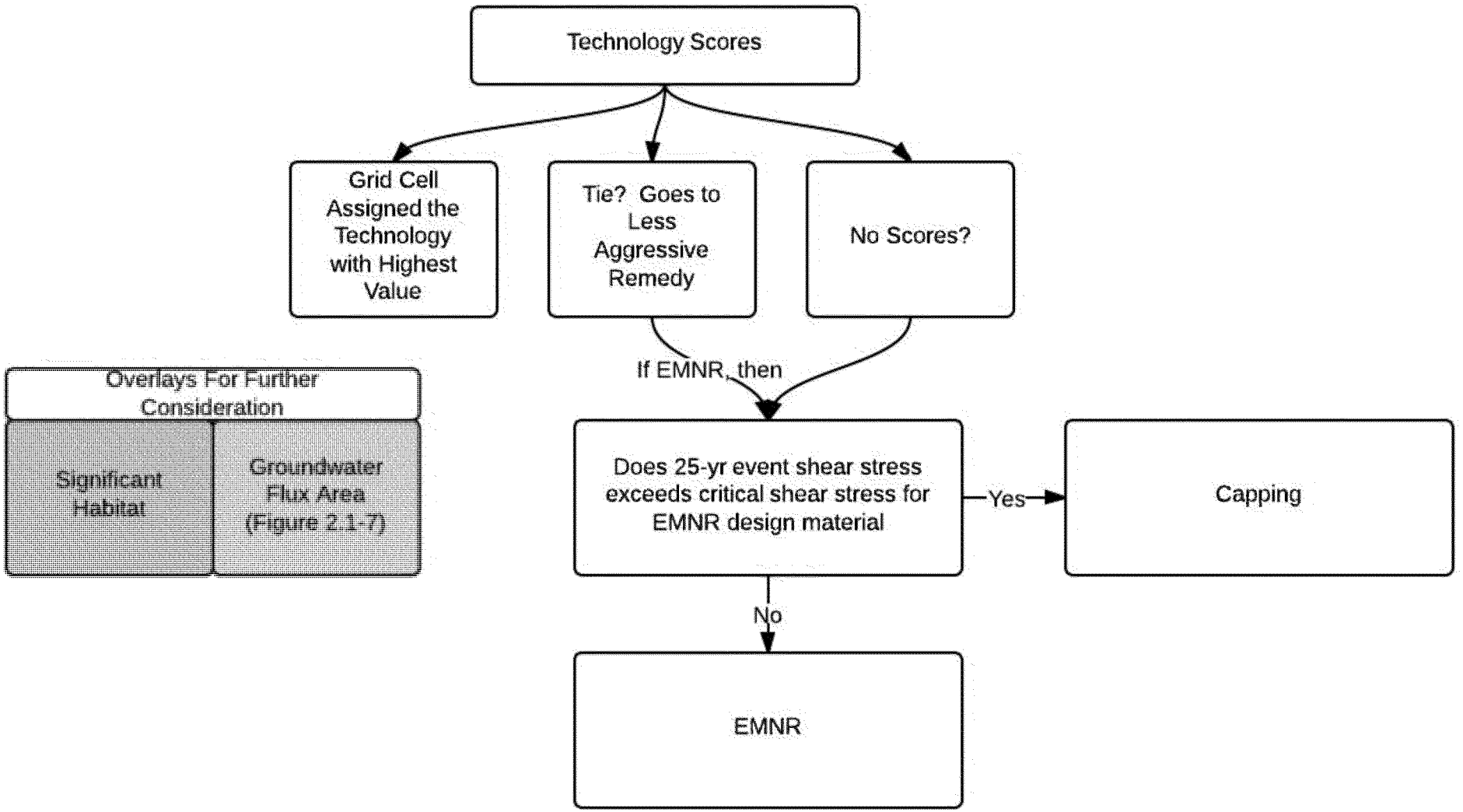
Technology Assignment Matrix		Dredge	Cap	EMNR
Hydrodynamics	Erosive or Wind/Wave Zone?	1	0	-1
	Depositional? (>2.5 cm/year or Subsurface:Surface Ratio >2)?	-1	1	1
	Shallow (<1 m)?	1	-1	0
Sediment Bed Characteristics	Slope >15%?	1	0	-1
	Rock, Cobble, Bedrock Present?	-1	1	1
Anthropogenic Influences	Structures/Pililngs?	-1	1	1
	Prop Wash Zone?	1	0	-1
	Moderate or Heavy Debris?	-1	1	1
	Technology Score	Sum Scores for Each Technology		

Technology Scoring

- +1 = criteria is consistent with or conducive to use of technology
- 0 = criteria is neutral to use of technology
- -1 = criteria is inconsistent or not conducive to use of technology

Technology Assignment Matrix		Dredge	Cap	EMNR
Hydrodynamics	Erosive or Wind/Wave Zone?	1	0	-1
	Depositional? (>2.5 cm/year or Subsurface:Surface Ratio >2)?	-1	1	1
	Shallow (<1 m)?	1	-1	0
Sediment Bed Characteristics	Slope >15%?	1	0	-1
	Rock, Cobble, Bedrock Present?	-1	1	1
Anthropogenic Influences	Structures/Pililngs?	-1	1	1
	Prop Wash Zone?	1	0	-1
	Moderate or Heavy Debris?	-1	1	1
	Technology Score	Sum Scores for Each Technology		

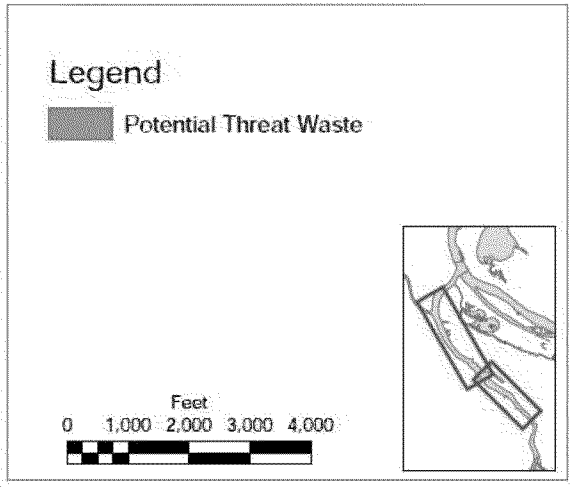
Overview of Technology Assignment Process: Scoring and Assignment



Off Ramps to Removal

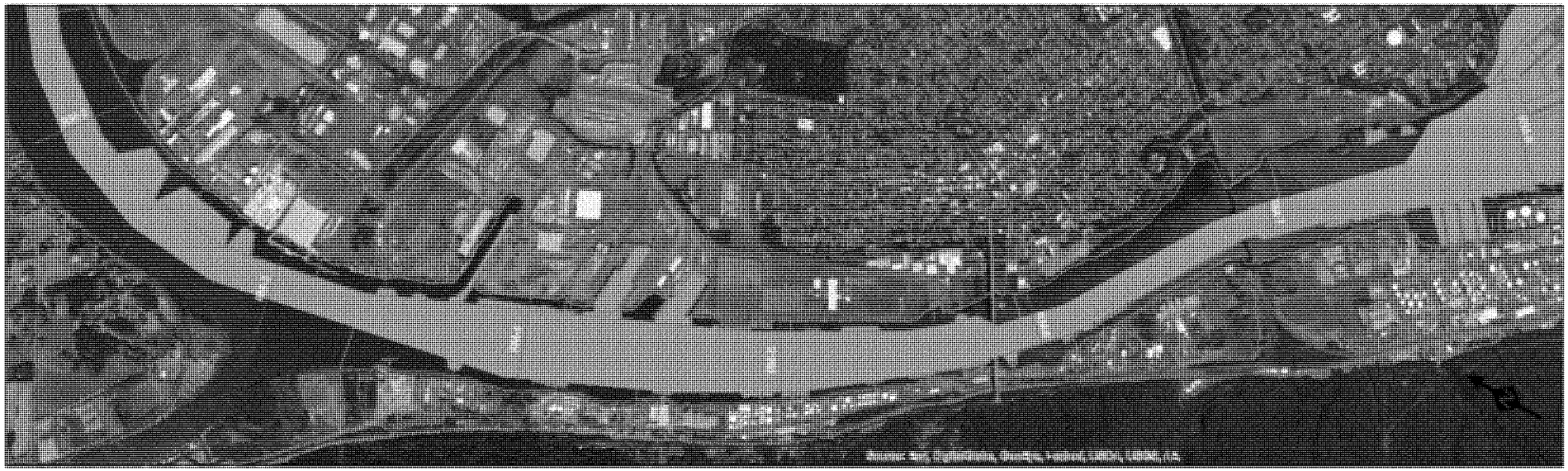
- Principal threat waste, substantial product, potential NAPL areas
  - Placeholder = 5 x RAL B
    - PCB = 5 ppm
    - DDx = 3.25 ppm
    - BaP eq = 100 ppm
    - Dioxin Furan as TEQ = 0.0006 ppm
  - EE/CA Areas – GASCO/Siltronic and Arkema
- Navigation channel and Future Maintenance Dredging areas
- Previously remediated areas (e.g. McCormick & Baxter)

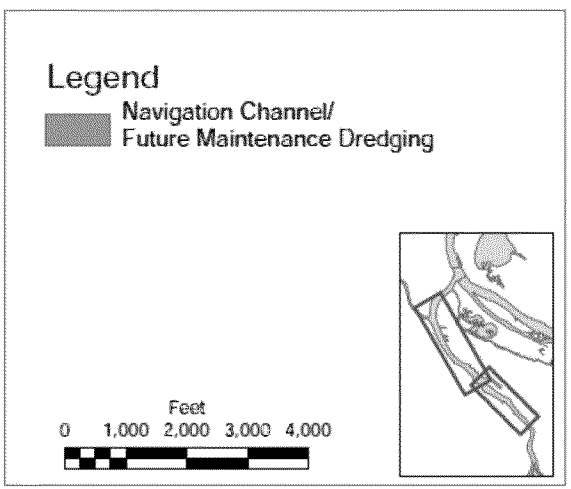
Principal Threat Waste



Potential Threat Waste

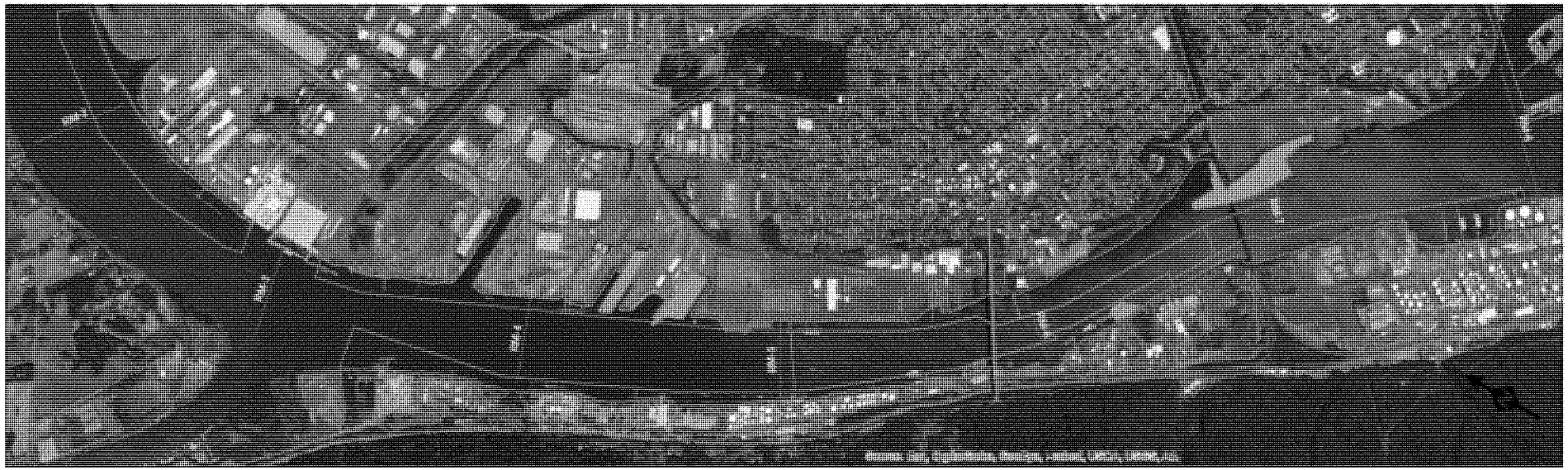
Nav Channel/Future Maintenance Dredging

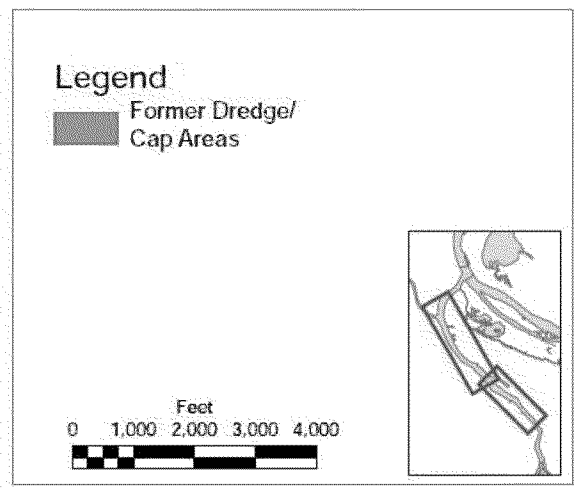




Navigation Channel/Future Maintenance Dredging

Previously Remediated Areas





Former Dredge/Cap Areas

Criteria definition - Hydrodynamics

- Layer 1 = Erosive OR Wind/Wave Zone
  - Erosive = shear stress exceeds critical shear stress for 2 year recurrence (flood) event – sediment texture as modeled by LWG
  - Wind/wave zone – n e a shore areas – l a y e provided by LWG as part of FS GIS data
- Layer 2 = Depositional
  - Either depositional (> 2.5cm/yr) May 2003 to 2009 Surveys (same period LWG preferred for model calibration)
    - OR
  - Average Subsurface/Surface RAL concentrations > 2
    - Interpolate 4 RAL Chemicals – s u rafc e vs. subsurface
    - Surface or subsurface must exceed RAL G
    - Average of remaining RAL ratios
- Layer 3 = Shallow
    - Shallow - <1 m at low water level, >2 feet NAVD 88

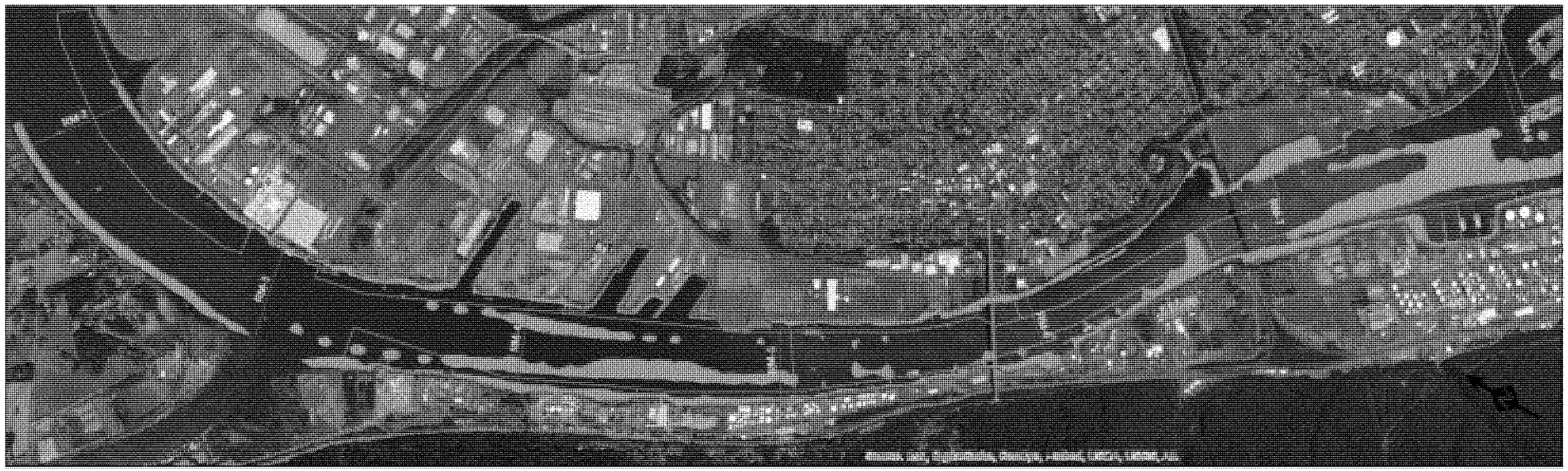
Criteria definition (cont.)

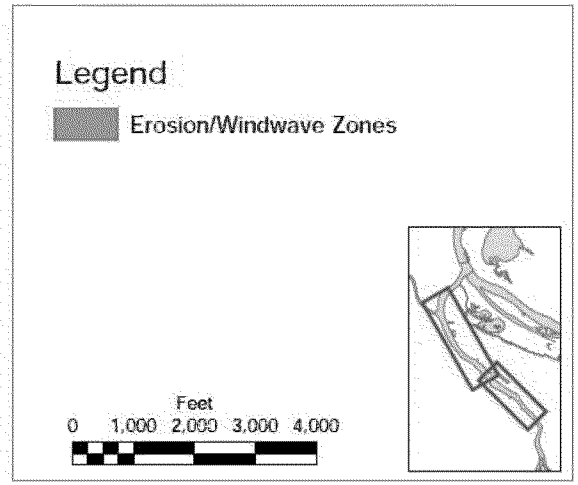
- Sediment Bed Characteristics
  - Slope > 15 % (Based on LWG 2009 Bathymetry)
  - Rock, Cobble, Bedrock within potential dredge prism
    - none identified by LWG after EPA request
- Anthropogenic Influences
  - Structures and Pilings (LWG provided + pilings and dolphins from debris layer, below) keg9
  - Prop Wash Zone – (LW Gprovided)
  - Debris as indicated by side/scan sonar (LWG provided layers)

Slide 25

keg9 Need to define process: show stats
u4eprkeg, 3/13/2014

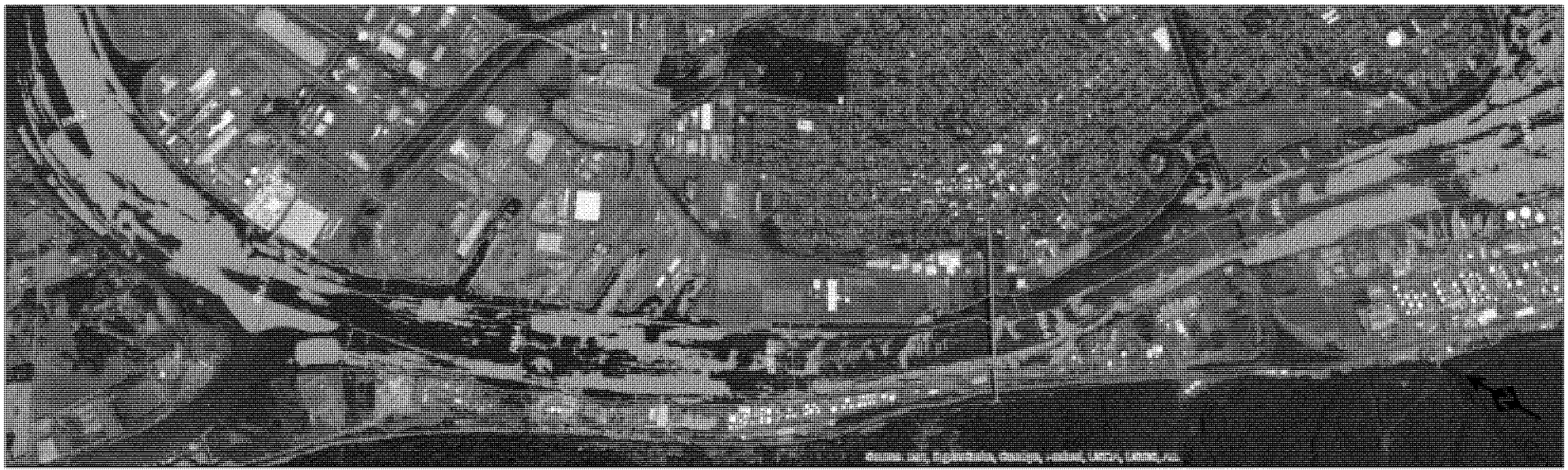
Hydrodynamics – E r o s i øæWind/Wave Zone

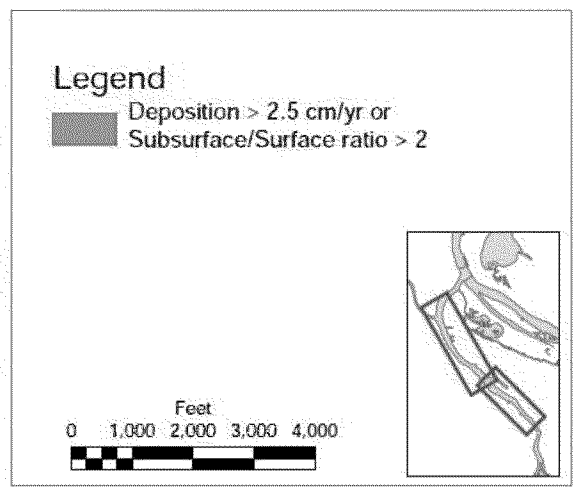




Erosion/Windwave Zones

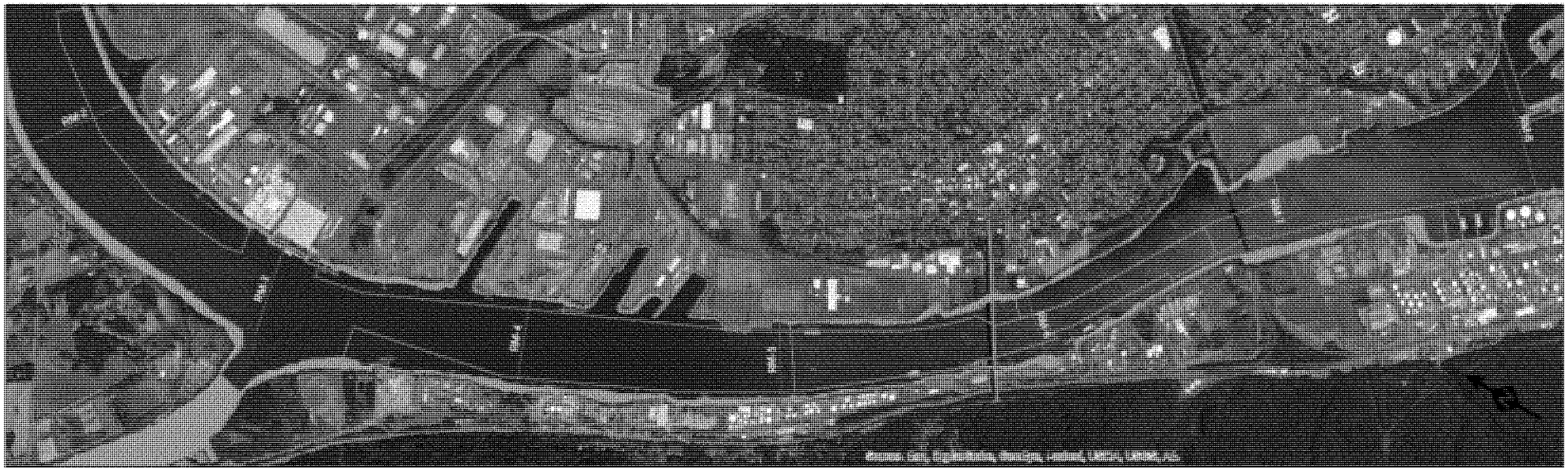
Hydrodynamics – Depositional

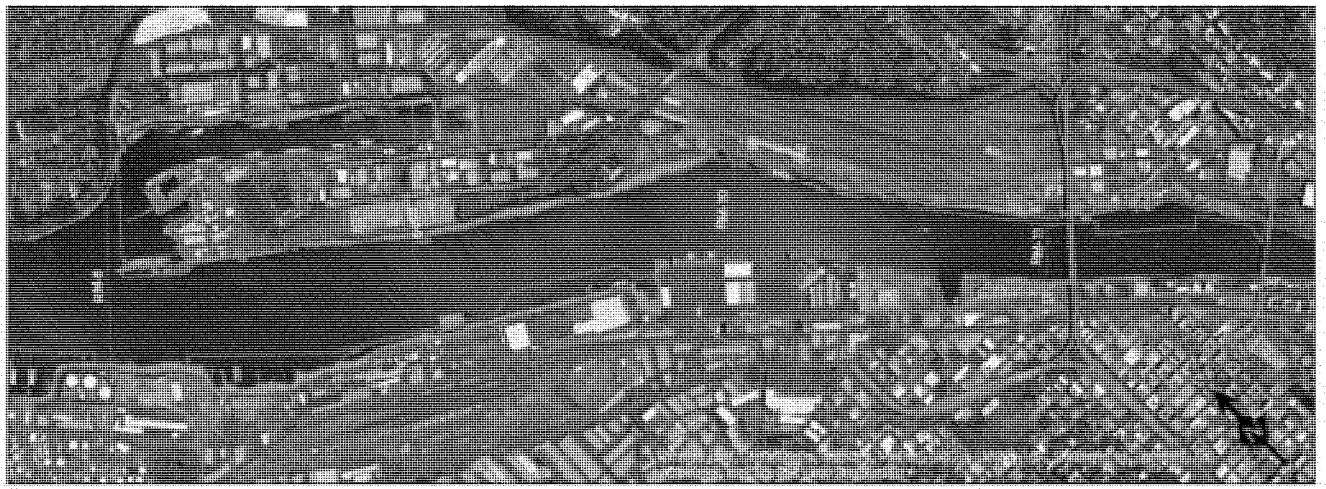


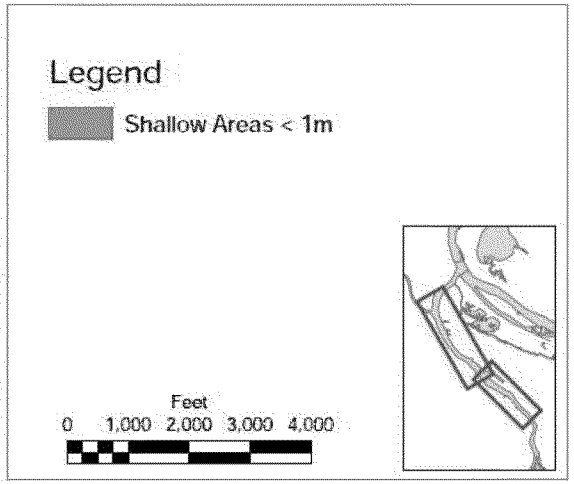


Depositional Areas

Hydrodynamics – Shallow Areas

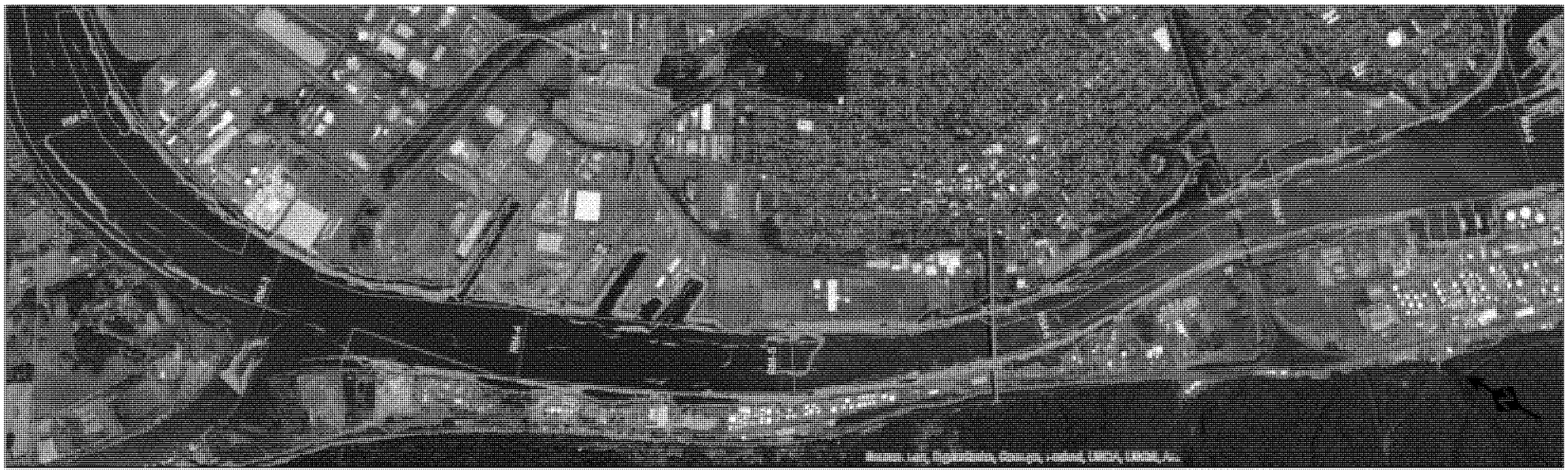


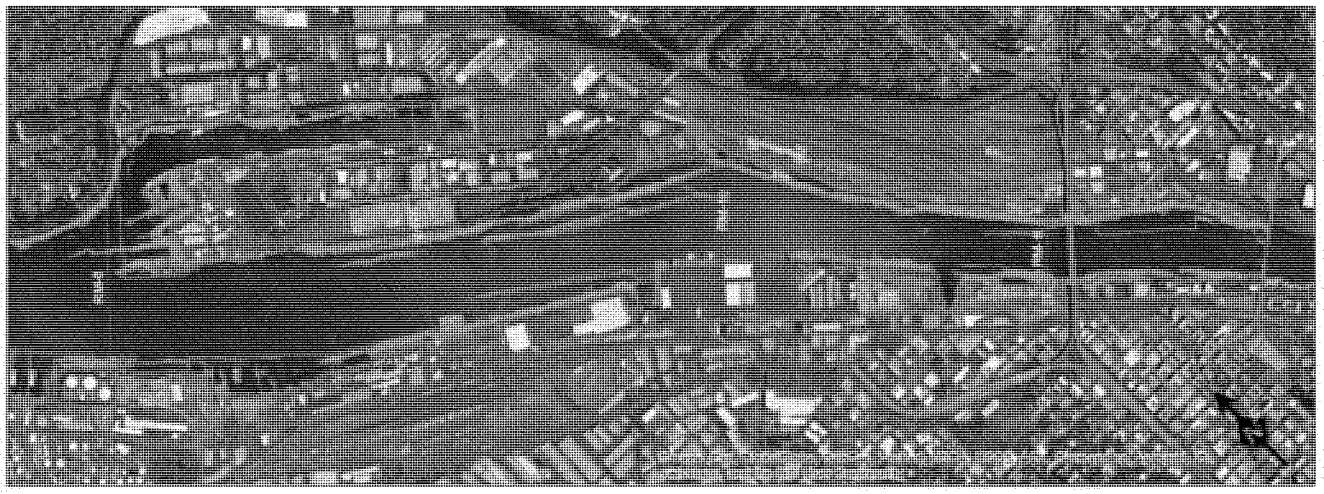


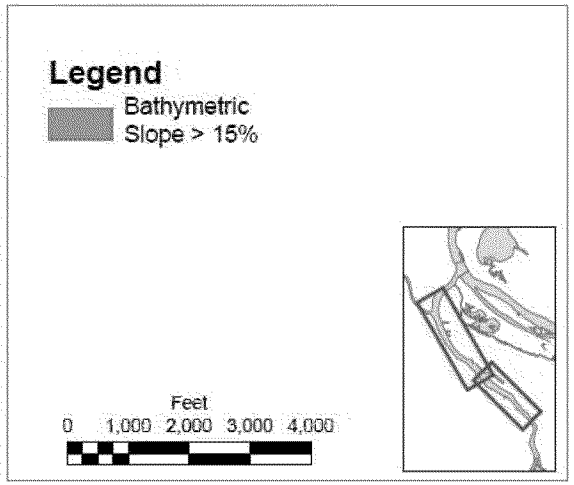


Shallow Areas

Sediment Bed Characteristics – Bathymetric Slope

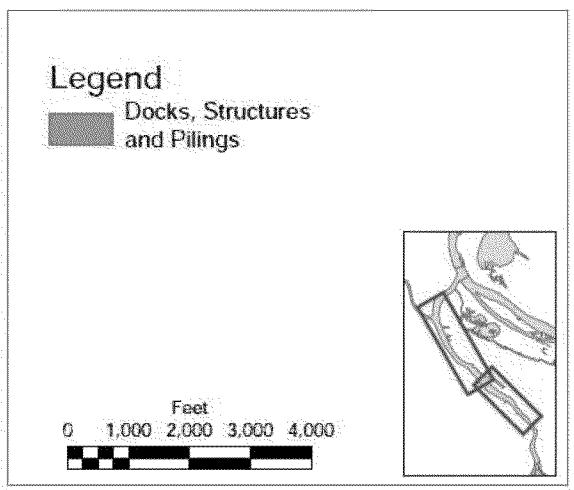






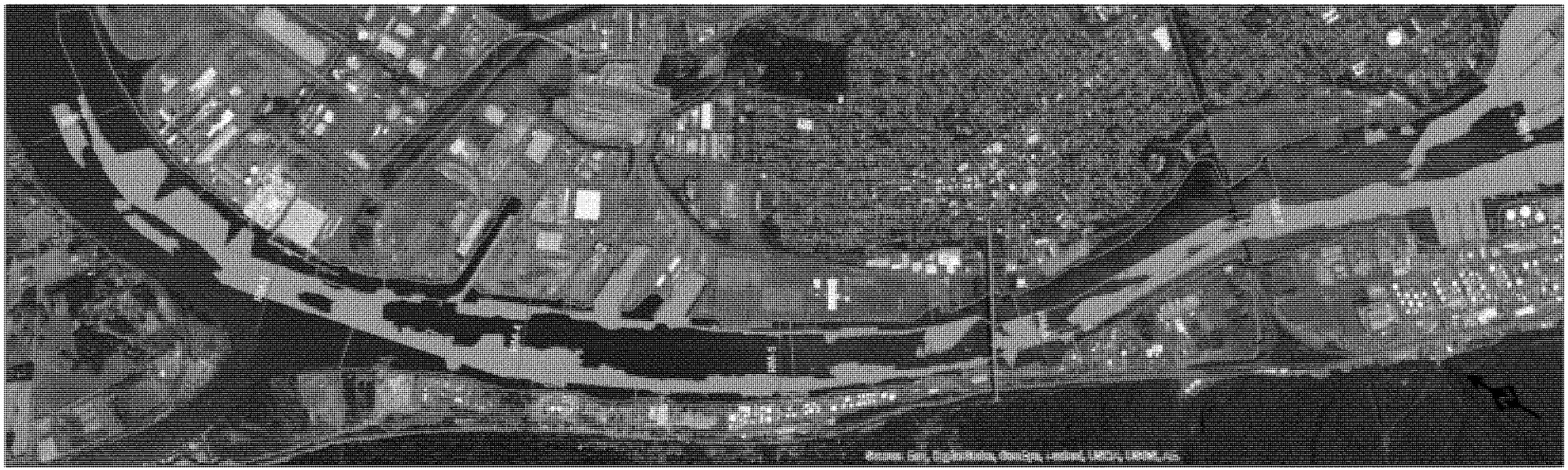
Bathymetric Slope

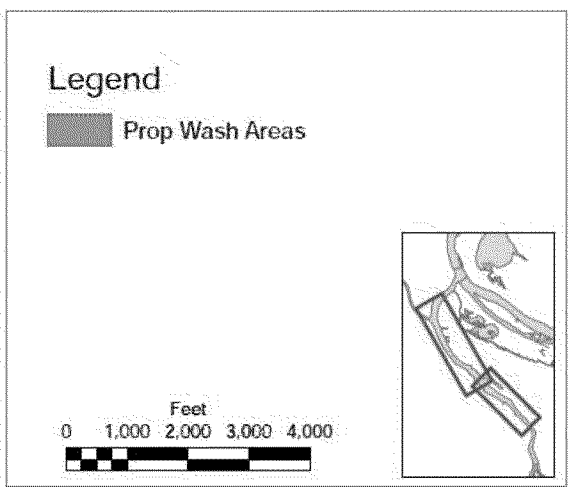
Anthropogenic – Structures and pilings



Docks, Structures and Pilings

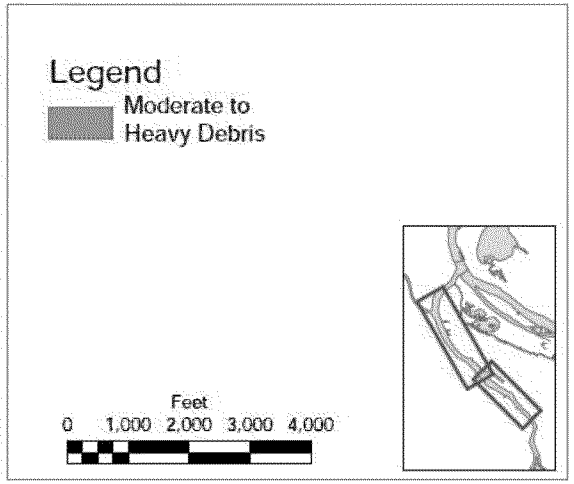
Anthropogenic – Prop Wash Areas





Prop Wash Areas

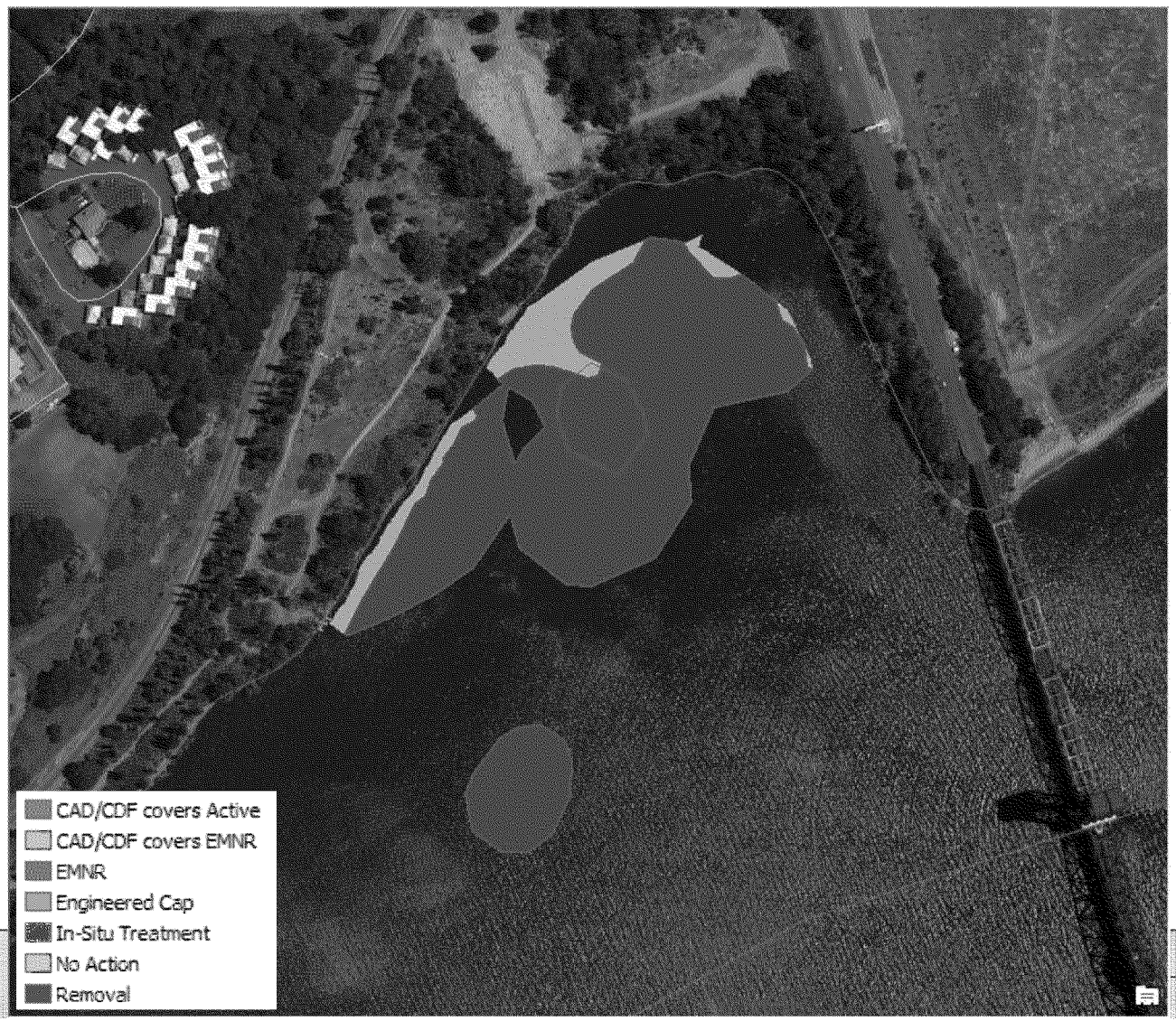
Anthropogenic – Debris



Debris

Willamette Cove Area LWG Alt E Removal Focused

Willamette Cove Area LWG Alt E Integrated Focused



Willamette Cove Area EPA Scoring over LWG Alt E SMA

RM 2E Area LWG Alt E Removal Focused

RM 2E Area LWG Alt E Integrated Focused

RM 2E Area EPA Scoring on LWG SMAs Alt E

RM 6-7W Area LWG Alt E Removal

keg3 Delineate CDF; make sure to apply consistently.
u4eprkeg, 3/13/2014

RM 6-7W Area LWG Alt E Integrated

RM 6-7W Area EPA Scoring on LWG SMAs Alt E

Slide 41

keg4 ID driver behind dredge area and capping/emnr areas.
u4eprkeg, 3/13/2014

keg5 Black out nav channel
u4eprkeg, 3/13/2014

keg6 specify cdf/cad
u4eprkeg, 3/13/2014

RM 11E Area LWG Alt E Removal

RM 11E Area LWG Alt E Integrated

RM 11E Area EPA Scoring on LWG SMAs Alt E

Technology Assignment Comparison

Focus on Alternative E

Excludes
Swan Island EMNR area
Area under CAD/CDFs

Total Size of LWG SMA's: 170 Acres

Nav Channel + FMD: 93.73 Acres

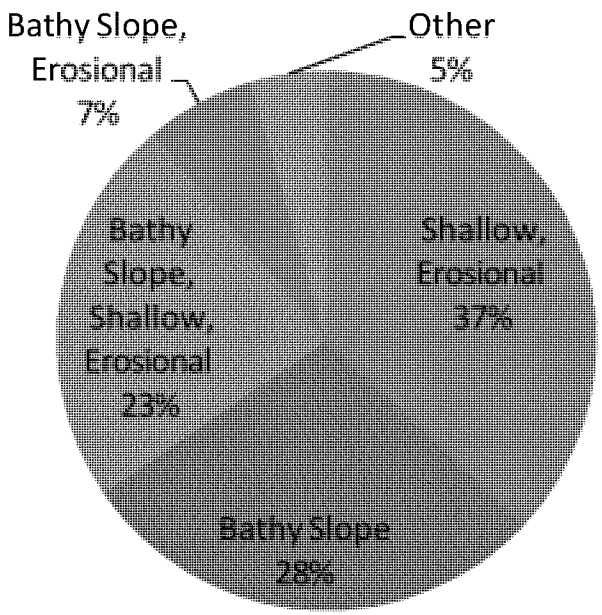
Remainder: 76.35 Acres

	Dredge	Cap	EMNR
LWG-I	0.0	21.7	54.6
LWG-R	65.6	10.6	0.13
EPA	46.1	19.5	10.7

The "diagnostics" should evaluate why these X acres were selected for dredging; i.e. what criteria scored.

Criteria Driving Dredge Determination

- In areas outside "off-ramps", dredging was selected due to these criteria:



- Primary drivers were: erosional, bathy slope, and shallow.
- Generally, multiple LoEs; single LoE in 32% of areas.

(Analysis uses LWG footprints for RAL E. Areas under CAD/CDF footprint not included)

Questions?

LWG CAD/CDF Sizes (Acres)

Alternative	Integrated	Removal
B	0	34
C	34	3.1
D	34	3.6
E	47	51
F	59	59

LWG FS Volume Calculation Approaches

Ref: Draft FS App G

$$V_{LWG}[cy] = (NV + AO)[cy] * (1 + EF) + \mathrm{RV}[cy]$$

$$V_{EPA}[cy] = (NV)[cy] * (\mathrm{NR})$$

where:

V_{LWG} = Volume in cubic yards (cy) as calculated using the LWG method

V_{EPA} = Volume in cy as calculated using the EPA method

NV = Neatline volume in cy

NR = Neatline ratio (1.5 to 2.0)

RV = Residuals volume in cy

AO = Allowable overdredge volume in cy

EF = Engineering factors (30% to 50%)

Volume Calculations (cont.)

- LWG Low estimates
  - Overdredge – 0.5 feet
  - Engineering Factor – 0 . 3
  - Residual Dredge Depth = 1 foot
- LWG High estimates
  - Overdredge – 2.0 feet
  - Engineering Factor – 0 . 5
  - Residual Dredge Depth = 1 foot
- EPA Low
  - Neatline ratio = 1.5
- EPA High
  - Neatline ratio = 2.0

LWG Volume Assumptions

LWG LOWER WILLAMETTE GROUP

Table 1. Summary of Technology Implementability Screening Results by subSMA Based on Site Uses and Physical Conditions (see Section 6.2 text for detailed descriptions of screening determinations).[1]

Label	Feature	Description	MNR[2]	EMNR	In Situ Treatment	Engineered and Active Capping	Full Removal	Ex Situ Treatment[5]
NC	Navigation Channel	Areas within the current federally authorized navigation channel.	YES	NO	NO	NO	YES	YES
FMD	Potential Future Maintenance Dredge Area	Approach areas located between the NC areas and docks where shipping access is needed now or in the future.	YES	POTENTIALLY	POTENTIALLY	SOME[3]	YES	YES
SS	Structure - Under	Areas located beneath structures including a 5 foot offset from the structure face. The offset is based on the average depth of impact across the Study Area.	YES	YES	YES	YES	LIMITED[4]	LIMITED[4]
SL	Structure – Limited Access	Areas where open water equipment is not accessible due to structures. Smaller water-based equipment would have to be used.	YES	YES	YES	YES	YES	YES
SU	Structure – Upland Removal	Areas where no water-based equipment can reach but access from shore is feasible.	YES	YES	YES	YES	YES	YES
SN	Structure – No Removal	Areas where access by water-based equipment is highly restricted and upland structures, utilities, and/or topography highly restrict access from shore.	YES	YES	YES	YES	NO	NO
OW	Open Water	Areas where there is no restrictions to dredging or capping equipment.	YES	YES	YES	YES	YES	YES
CAP	Remediation Cap	Existing Caps at Terminal 4 and McCormick and Baxter.	NO ACTION	NO ACTION	NO ACTION	NO ACTION	NO ACTION	NO ACTION
Other Considerations								
-wz	Wave Zone	Area above 0 NAVD88 subject to wake and wind generated waves.	YES	POTENTIALLY	POTENTIALLY	YES	YES	YES
-z	CDFs and CADs Footprints	Areas located beneath the potential CDF and/or CAD footprints.	IF CAD/CDF NOT CONSTRUCTED, SEE ABOVE DESIGNATIONS	IF CAD/CDF NOT CONSTRUCTED, SEE ABOVE DESIGNATIONS	IF CAD/CDF NOT CONSTRUCTED, SEE ABOVE DESIGNATIONS	IF CAD/CDF NOT CONSTRUCTED, SEE ABOVE DESIGNATIONS	IF CAD/CDF NOT CONSTRUCTED, SEE ABOVE DESIGNATIONS	IF CAD/CDF NOT CONSTRUCTED, SEE ABOVE DESIGNATIONS

Notes:

1 - All screening results in this table are for draft FS purposes only, and all technologies discussed here may be implementable under specific circumstances for specific SMAs as determined in remedial design.

2 - Per Section 6.2.2, the rate of MNR was found to be less certain in some small select areas of the Site, and some of these implementability factors were relevant to this determination. However, these small areas are not expected to significantly affect the overall course of natural recovery for the Site at spatial scales most relevant to the remediation goals (RGs). Consequently, MNR is shown to be generally implementable for all portions of the Site.

3 - Engineered caps were screened out for draft FS purposes for those FMD areas that are currently estimated to require navigation depths equal to the navigation channel (-40 feet CRD) or greater. Future development plans or more information during remedial design could redefine FMD areas so as to allow placement of an engineered cap in some or all of these areas.

4 - The SS designation includes some "light" structures that can be removed and reloacted to allow dredging underneath. These light structures are shown in Figure 5.4-1. Otherwise, removal was screened out as not implementable in SS areas.

5 - Ex situ treatment implementability is not typically controlled by the Site use and physical conditions in this table. Implementability issues related to removal before ex situ treatment are noted here. See Section 6.2.8.2 for more details on ex situ treatment implementability issues.

LWG and EPA Removal Focused and Integrated Disposal Volumes (cubic yards)

Removal Focused

Alt	B	C	D	E	F
LWG Low	581,100	842,000	1,000,200	2,001,000	4,445,800
LWG High	859,000	1,254,700	1,496,200	2,991,600	6,599,700
EPA Low	541,100	776,500	913,800	1,774,700	4,195,500
EPA High	783,100	1,126,400	1,321,200	2,596,000	6,182,300

Integrated

Alt	B	C	D	E	F
LWG Low	233,600	362,400	448,300	1,054,300	2,313,500
LWG High	369,100	563,600	699,000	1,610,300	3,498,200
EPA Low	198,300	313,800	386,900	936,500	2,129,200
EPA High	293,300	459,000	564,600	1,362,100	3,150,800

Ref: Draft FS App G, Table 5(LWG) Table 4 (EPA)

Initial Alternative Screening/Evaluation Criteria

- Implementability (covered during assembly)
- Effectiveness
- Cost

Next steps

- Need finality on:
  - RALs
  - Benthic Risk footprint
  - Interpolation procedure(s)
- Would like finality on:
  - EECA Footprints
  - ODEQ Hot Spot
  - CAD/CDF vs. Offsite Disposal
- Need to discuss:
  - t=0 vs. t>0 lines of evidence
  - Basis of alternative selction for detailed analysis
- Selection of Alternative(s) for Detailed assessment
- Cost assessment

Questions?

STOP – Misc Slides after this point…

Initial Alternative Screen/Evaluation Criterion: Effectiveness at t=0

- Post remedy SWAC based on following assumptions
- Dredging and capping replacement value of:
  - Zero (lower bound)+
  - Background
    - Background without outliers=1.5 * EPA Bkgd –Organics / = EPA Bkgd for Non-organics
    - Sediment Trap
  - Surrounding SWAC of non-remediated SDU+
  - LWG method – residuals/model/??? – 1 1ppb for PCB+
- EMNR
  - Zero (lower bound)
  - 50% of pre-remedial SWAC (based on 6-inch sand and 12-inch mixing zone)

Initial Alternative Screen/Eval Criterion- Effectiveness at t>0

- Mass balance approach (i.e. SEDCAM)
- t= 10, 30, 50, 100, 500??
  - Or 95% of Background Value
  - Or < 5% Change year to year
- Key inputs
  - Deposition rate = from 2003 to 2009 delta bathymetry
  - Mixing zone = 30 cm
  - Upstream input concentration
    - Zero (lower bound)
    - Background without outliers=1.5 * EPA Bkgd –Organics / = EPA Bkgd for Non-organics
    - Sediment trap? (representative?)

Results of preliminary alternative eval/screening

- Implementability
- Effectiveness; at
  - t= 0
  - t= 10, 25, 50, 100 years
- Costs

Cost

- Aggregate unit costs from LWG into key quantities
  - EMNR
    - 6 inches of sand
    - Area, acres
  - Capping
    - 12 inches sand
    - Geotextile
    - 12 inches rip-rap
    - Area, acres
  - Dredging
    - Depth of impact (RAL based)
    - Max depth
      - say 3 feet (if not PTM area)
      - Practical limit of dredging for PTM – 2 0ft?
    - Volume, cubic yards
- Economy of scale – c o n s i der interpolate using LWG costs

Comparative analysis of alternatives

- Qualitative or quantitative?
  - Pass fail
  - Grades – A to F
  - Score 0 to 10? 100?
- Weighting of criteria
  - Threshold
  - Balancing
  - Modifying
- Scoring of criteria
  - Qualitative
  - Quantitative

Detailed alternatives selection

- Scenarios
  - LWG – integrated
  - LWG – removal focused
  - EPA
- RAL Alternative
  - B, C, D, E, F, G (G=EPA only)

Detailed Analysis of Alternatives – Nine Criteria

- Threshold
  - Overall protection of human health and the environment
  - Compliance with ARARs
- Balancing
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility or volume
  - Short-term effectiveness
  - Implementability
  - Cost
- Modifying
  - State acceptance
  - Community acceptance

- ADDITIONAL ISSUES

5 x RAL B Stats (all units = ug/kg)

Interpolated data

- BaPEq
  - RAL B = 20,000 = 98.74%tile
  - 5 x RAL B = 100,000 = 99.79%tile
  - 99.8%tile = 101,731
  - 99.9%tile = 168,401
- Total PCBs
  - RAL B = 1,000 = 99.01%tile
  - 5 x RAL B = 5,000 = 99.85%tile
  - 99.8%tile = 4,000
  - 99.9%tile = 6,285

5 x RAL B Stats (all units = ug/kg)

Interpolated data

- Total DDx
  - RAL B = 650 = 99.59%tile
  - 5 x RAL B = 3250 = 99.88%tile
  - 99.8%tile = 1461
  - 99.9%tile = 3718
- Dioxin/furan as TEQ
  - RAL B = 0.12 = 99.77%tile
  - 5 x RAL B = 0.6 = 99.85%tile
  - 99.8%tile = 0.16
  - 99.9%tile = 1.7

99.85%tile as PTW Surrogate

(all units = ug/kg)

- BaPEq = 128,846
- Total PCBs = 4,953
- Total DDx = 2,309
- Dioxin/furan as TEQ = 0.5

Using this value identifies the hottest 3.876 acres for these COCs.

Using the 5 x RAL B, a total of 13.72 acres are identified

Using the 99.85%tile, a total of 12.82 acres are identified

Approximately 8-9 acres outside EECA areas

Potential Off Ramps to Site Specific Analyses (TBD)

- ODEQ Hot Spot ????
- Groundwater flux/source areas
  - GASCO/Siltronic, Arkema
- Significant/special habitat areas

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Alex Liverman (liverman.alex@deq.state.or.us)[liverman.alex@deq.state.or.us]; allenmc@cdm.com[allenmc@cdm.com]; audiehuber@ctuir.com[audiehuber@ctuir.com]; bayuk.dana@deq.state.or.us[bayuk.dana@deq.state.or.us]; schwarz.bob@deq.state.or.us[schwarz.bob@deq.state.or.us]; brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; callie@ridolfi.com[callie@ridolfi.com]; Conley, Alanna[conley.alanna@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; cunninghame@gorge.net[cunninghame@gorge.net]; Dan Hafley (HAFLEY.Dan@deq.state.or.us)[HAFLEY.Dan@deq.state.or.us]; erin.madden@gmail.com[erin.madden@gmail.com]; Fuentes, Rene[fuentes.rene@epa.gov]; Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Genevieve Angle (Genevieve.Angle@noaa.gov)[Genevieve.Angle@noaa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; jd@williamsjohnsonlaw.com[jd@williamsjohnsonlaw.com]; Jen Kassakian (jkassakian@indecon.com)[jkassakian@indecon.com]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; johnson.keith@deq.state.or.us[johnson.keith@deq.state.or.us]; jweis@hk-law.com[jweis@hk-law.com]; Kristin Callahan[kristin@ridolfi.com]; Koch, Kristine[Koch.Kristine@epa.gov]; Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]; matt@williamsjohnsonlaw.com[matt@williamsjohnsonlaw.com]; mcclincy.matt@deq.state.or.us[mcclincy.matt@deq.state.or.us]; tosm@yakamafish-nsn.gov[tosm@yakamafish-nsn.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Muza, Richard[Muza.Richard@epa.gov]; nancy.munn@noaa.gov[nancy.munn@noaa.gov]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; poulsen.mike@deq.state.or.us[poulsen.mike@deq.state.or.us]; Rachel DelVecchio (rdelvecchio@indecon.com)[rdelvecchio@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; ted_buerger@fws.gov[ted_buerger@fws.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Tom Gainer (gainer.tom@deq.state.or.us)[gainer.tom@deq.state.or.us]
From: Rose Longoria
Sent: Tue 3/18/2014 4:03:06 PM
Subject: Re: Ptld Harbor, EA talking points

Thank you Sean. The early action talking points are helpful.

Does EPA have any plans to engage the general public on the status of the Portland Harbor early actions? Or will these talking points continue to be used as responses to EA inquires and future meetings with the public?

--
Rose Longoria
Yakama Nation Fisheries

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From: "Sheldrake, Sean" <sheldrake.sean@epa.gov>
Date: Sunday, March 9, 2014 10:05 PM
To: "Alex Liverman (liverman.alex@deq.state.or.us)" <liverman.alex@deq.state.or.us>, "allenmc@cdm.com" <allenmc@cdm.com>, Audie Huber <AudieHuber@ctuir.com>, "bayuk.dana@deq.state.or.us" <bayuk.dana@deq.state.or.us>, Bob Schwarz <schwarz.bob@deq.state.or.us>, "brandy.humphreys@grandronde.org" <brandy.humphreys@grandronde.org>, Callie Ridolfi <callie@ridolfi.com>, "Conley, Alanna" <conley.alanna@epa.gov>, Lori Cora <cora.lori@epa.gov>, Brian Cunninghame

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Subject: Ptld Harbor, EA talking points

Hello everyone,

To follow up on our TCT call this past Wednesday as requested by ODEQ, here are the talking points we've been using in recent meetings. Please let me know if you have any questions.

Thank you.

S

Global points-

- Early action work has included in water removal of contaminated sediments, but also

collection of substantial, additional data at known hot spots that will help inform the Portland Harbor Feasibility study, and also will speed up post ROD design efforts to allow hot spots to be cleaned up as quickly post ROD as possible.

· EPA is directing internal resources to completing the harborwide FS as quickly as possible.

· It is important to ensure that early action work supports the Portland Harbor remedy selection process and does not conflict with it or divert attention away from finalizing the RI/FS.

Work that will continue until the ROD is issued, is recontamination analysis and review of upland source control work, which is critical for every hot spot site to ensure that work is as compatible as possible with what is contemplated in water under the ROD.

Site specific

T4

· Phase I removal work in 2008 addressed the highest risk hot spots.

· Monitoring work continues as well as mitigation for phase I removal dredging/capping work.

· 60% design information on a CDF in Slip 3 is being incorporated into the FS and administrative record as needed. This work is the reason a clear picture of the CDF concept exists for public consideration. Performance standards for this design are the highest of its kind to date in the NW.

Arkema

· Substantial data has been collected that will inform the alternatives evaluation in the Portland Harbor FS.

· The schedule for finalizing the RI/FS and issuing the ROD has overtaken performance of any early cleanup work at the Arkema site, therefore, there is no purpose for continued efforts to revise the EE/CA, and both parties have agreed that an EE/CA is no longer required under the AOC.

· While recontamination work is critical to go forward, if LSS doesn't support this via the AOC, it will proceed separately.

Gasco

· Fifteen thousand cubic yards of tar was removed from the river in 2005.

· A significant amount of additional data has been collected which will inform the alternatives evaluation in the Portland Harbor FS, and facilitate design work to happen more quickly post ROD.

· Recontamination work is continuing to ensure upland s/c is compatible with in water work. EPA has spent substantial time with the state in looking at groundwater treatment at the site, to mitigate the flux from a substantial upland source.

· There is interest in continuing the AOC work through to design, when appropriate by both EPA and the respondents.

The schedule for finalizing the RI/FS and issuing the ROD has overtaken the need for an EE/CA at the GASCO site. Therefore, there is no purpose for continue efforts to revise the EE/CA, and both parties have agreed that an EE/CA is no longer required under the AOC.

· Currently tasks are being segmented into what might be able to continue at each stage of the FS and ROD process.

· While an EE/CA will not be needed for the site, some other deliverable may be needed to continue to the eventual design process under the AOC.

11E

· Data continues to be collected to support the harborwide process (admin record incorporation). This early work will ensure that this hot spot is cleaned up as early as possible post ROD.

· Field work will likely occur through the fall will both provide information on PCB surface concentrations, dioxin/furan concentrations, but also relative bioavailability of the PCBs across the site.

Sean Sheldrake, Unit Diving Officer, RPM

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

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From: Sheldrake, Sean
Sent: Thur 3/6/2014 8:23:35 PM
Subject: 11e; Specific d/f analyses
RM11E_Dioxin_Analysis_05_Mar_14.pdf
Dioxin furan 3 6 14.pdf

Hello Jackie,

Please see the attached additional information regarding specific dioxin/furan analyses for discussion during our teleconference on Monday.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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Loutzenhiser
LSS, agent for Arkema, Inc.

Dear Mr. Loutzenhiser:

Re: Administrative Order on Consent for Removal Action; Docket No. CERCLA 10-2005-0191

I am writing to inform you that EPA is extending indefinitely the schedule for revision and resubmission of the draft Engineering Evaluation/Cost Analysis (EE/CA) under the Order referenced above. As discussed in a meeting on February 25, 2014 with Shawn Blocker, Sean Sheldrake, and Lori Cora, EPA is suspending completion of the EE/CA because the Portland Harbor Feasibility Study (FS) is under revision and EPA anticipates issuing a Record of Decision for the Portland Harbor Superfund Site, including the area adjacent to Arkema's facility, in 2015. EPA is focusing its staff and resources to finalize the Portland Harbor RI/FS in order to select a remedy for the Portland Harbor site including the Arkema early action area. After the remedy is selected, we anticipate discussing with Arkema a path forward for implementing the Portland Harbor remedy.

In the interim, all other commitments and obligations under the AOC will stay in force. As discussed, ongoing work and coordination with the upland source control actions will continue to be implemented under the AOC to evaluate recontamination potential. The work to be performed under the terms of the AOC is governed by the Statement of Work included as Attachment B to the AOC. As stated in Section I of the Statement of Work, the primary purposes of this Statement of Work (SOW) are: (1) to implement the Administrative Order on Consent for Removal Action (AOC); (2) facilitate and expedite the feasibility study and implementation of controls on upland sources to the Willamette River; and (3) expedite the characterization, feasibility study, cleanup alternatives analysis, and performance of cleanup on the principal threat in the intertidal area and submerged lands on and adjacent to the Arkema Site. Furthermore, the SOW establishes removal action objectives (RAOs) including RAO 7 which is to: Reduce contaminant flux from uplands, riverbank, and sediments so that recontamination of any sediment or riverbank caps put in place does not occur. EPA's review of the ongoing stormwater and groundwater hydraulic control measures at the Arkema site are being conducted in support of RAO 7. While a removal action is no longer envisioned for the Arkema site, the upland source control support is relevant to the Portland Harbor remedy selection process.

EPA is confident that suspending the schedule for revision and resubmittal of the draft EE/CA to focus on incorporating the results of the Arkema early action work into the Portland Harbor FS and focusing the early action efforts on the implementation of source control measures represents the most efficient path for evaluating and selecting a comprehensive remedy within the horizontal removal action area boundary and surrounding areas.

Finally, I am aware that LSS submitted a Dispute Statement to invoke dispute on several

issues related to EPA's comments on the draft EE/CA. Given that EPA does not seek a revised EE/CA, we would like to know within five days of receipt of this letter if you will agree to withdraw your dispute. If you will not withdraw your dispute, we will need to discuss what issues you seek a final decision from EPA's Office Director on and a schedule for EPA to provide its position to your issues for the Office Director's consideration.

Thank you for your attention to this matter. If you have any questions about this letter, please call Shawn Blocker, at , or have your attorney contact Lori Houck Cora, at 206 553-1115.

Sincerely,

Cami Grandinetti, Remedial Program Manager
Office of Environmental Cleanup

To: Peterson, Lance[PetersonLE@cdmsmith.com]
Cc: Cora, Lori[Cora.Lori@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Muza, Richard[Muza.Richard@epa.gov]
From: Sheldrake, Sean
Sent: Wed 3/5/2014 4:31:58 PM
Subject: FW: RM11E - proposed D/F analyses
RM11E_Dioxin_Analysis_04_Mar_14.pdf

Thanks Lance—the only comment I'd have is to add to "rationale" broad notes about use of the data for s/c recontamination evaluation, FS usage for alternative evaluation, proposed plan usage for proposed alternative details. This also advances post ROD work, but I'd rather leave that off our list for now to illustrate the more immediate uses for the data.

Other comments before we revise and send to the 11E group for the Monday call?

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Wednesday, March 05, 2014 7:30 AM
To: Sheldrake, Sean
Subject: RM11E - proposed D/F analyses

Sean, in preparation for the 3/10 RM11E dioxin/furan call, CDM prepared the attached memo with a proposal for additional D/F analysis in the RM11E Project Area. The RM11E Group will likely have their own proposal so we can use the final version of the attached as a rebuttal or you can provide it to theRM11E Group beforehand, depending on your preference.

Lance

==========

Lance E. Peterson, RG, LHG

Senior Project Manager

CDM Smith

14432 SE Eastgate Way, Suite 100, Bellevue, WA 98007

425-519-8300 (office) | 425-519-8382 (direct) | 425-417-5946 (mobile) | 425-746-0197 (fax)

mailto:petersonle@cdmsmith.com | cdmsmith.com

CDM Smith

Memorandum

To: *Sean Sheldrake, USEPA Region 10*

From: *Lance Peterson and Eric Blischke*

Date: *March 4, 2014*

Subject: *Dioxin and Furan Analysis at RM11E Project Area*

CDM Smith has reviewed existing dioxin and furan sediment data generated at the River Mile 11 East (RM11E) Project Area. The purpose of the evaluation was to determine whether additional dioxin and furan data were needed to support preliminary remedial design efforts at the RM11E Project Area. EPA recently developed a set of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin toxicity equivalent quotient (TCDD TEQ) remedial action levels (RALs) to better account for risks to human health associated with exposure to dioxins and furans at the Portland Harbor Site. As a result, this evaluation is focused on TCDD TEQ detected in surface and subsurface sediments and sediment traps at the RM11E Project Area. The distribution of RALs in the RM11E area is shown on **Figure 1**.

Review of Existing Data

TCDD TEQ was detected in surface sediments collected within the RM11E Project Area at concentrations ranging from 0.0314 to 21.6 nanograms per kilogram (ng/kg). The highest concentration (21.6 ng/kg) was detected in sample RM11E-G039 at approximately RM 11.45. The second highest concentration of 11.6 ng/kg was detected in sample RM11E-G033 collected immediately downstream of RM11E-G039.

RALs for TCDD TEQ are presented in **Table 1**. The TCDD TEQ concentration detections at the RM11E-G039 and RM11E-G033 locations exceed or are comparable to the Alternative G RAL of 12 ng/kg and the Alternative F RAL of 22 ng/kg.

TCDD TEQ was detected in subsurface sediment samples within the RM11E Project Area at concentrations up to 34.9 ng/kg. TCDD TEQ was detected above the Alternative F RAL in sediment cores RM11E-C003 and RM11E-C048 including at a concentration of 27.9 ng/kg in the 30.5 – 91.4 centimeter (cm) depth interval at RM11E-C003. Other detections greater than TCDD TEQ RALs were detected at depths greater than 91.4 cm.

TCDD TEQ was detected in RM11E sediment traps at concentrations ranging from 0.0775 to 4.73 ng/kg which is below the lowest TCDD TEQ RAL of 12 ng/kg (Alternative G).

Recommendation

Additional dioxin furan analysis is recommended in three locations within the RM11 Study Area to address three primary data gaps:

- Delineation of the detection of TCDD TEQ in surface sediment samples RM11E-G033 and RM11E-G039.
- Delineation of the detection of TCDD TEQ in shallow subsurface sediment sample RM11E-C003.
- The lack of dioxin furan data downstream of RM 11.

A summary of proposed changes to the sampling plan including rationale is presented in **Table 2**. Proposed sample locations are provided in the attached RM11E Work Plan **Figure 2**.

Table 1
TCDD TEQ RALs Established for Portland Harbor Site

Alternative	TCDD TEQ RAL	
	ng/kg	µg/kg
B	120	0.12
C	81	0.081
D	53	0.053
E	38	0.038
F	22	0.022
G	12	0.012

µg/kg – microgram per kilogram

Table 2
Proposed Dioxin Analysis at RM 11E Project Area

Location	Proposed Revision to Sampling Plan	Rationale
RM11E-G086	Add dioxin/furan analysis	Upstream delineation of TCDD TEQ detection of 21.6 ng/kg in surface sediments at location RM11E-G039.
Offshore of RM11E-G-039	Collect additional surface sediment sample for PCB and dioxin furan analysis.	Offshore delineation of TCDD TEQ detection of 21.6 ng/kg in surface sediments at location RM11E-G039.
RM11E-G083	Add dioxin/furan analysis	Downstream delineation of TCDD TEQ detection of 21.6 ng/kg in surface sediments at location RM11E-G039.
Offshore of RM11E-C003	Collect additional surface sample for PCB and dioxin furan analysis.	Offshore delineation of TCDD TEQ detection of 27.9 ng/kg in shallow subsurface sediments at sample location RM11E-C003.
RM11E-G075	Add dioxin/furan analysis	No dioxin/furan data downstream of RM 11 in RM11 E Project Area.
RM11E-G072	Add dioxin/furan analysis	No dioxin/furan data downstream of RM 11 in RM11 E Project Area.

Dioxin/Furans as TEQ

Memo Figure 1

0 200 400 800 1,200 1,600 Feet

Date: 2/24/2014

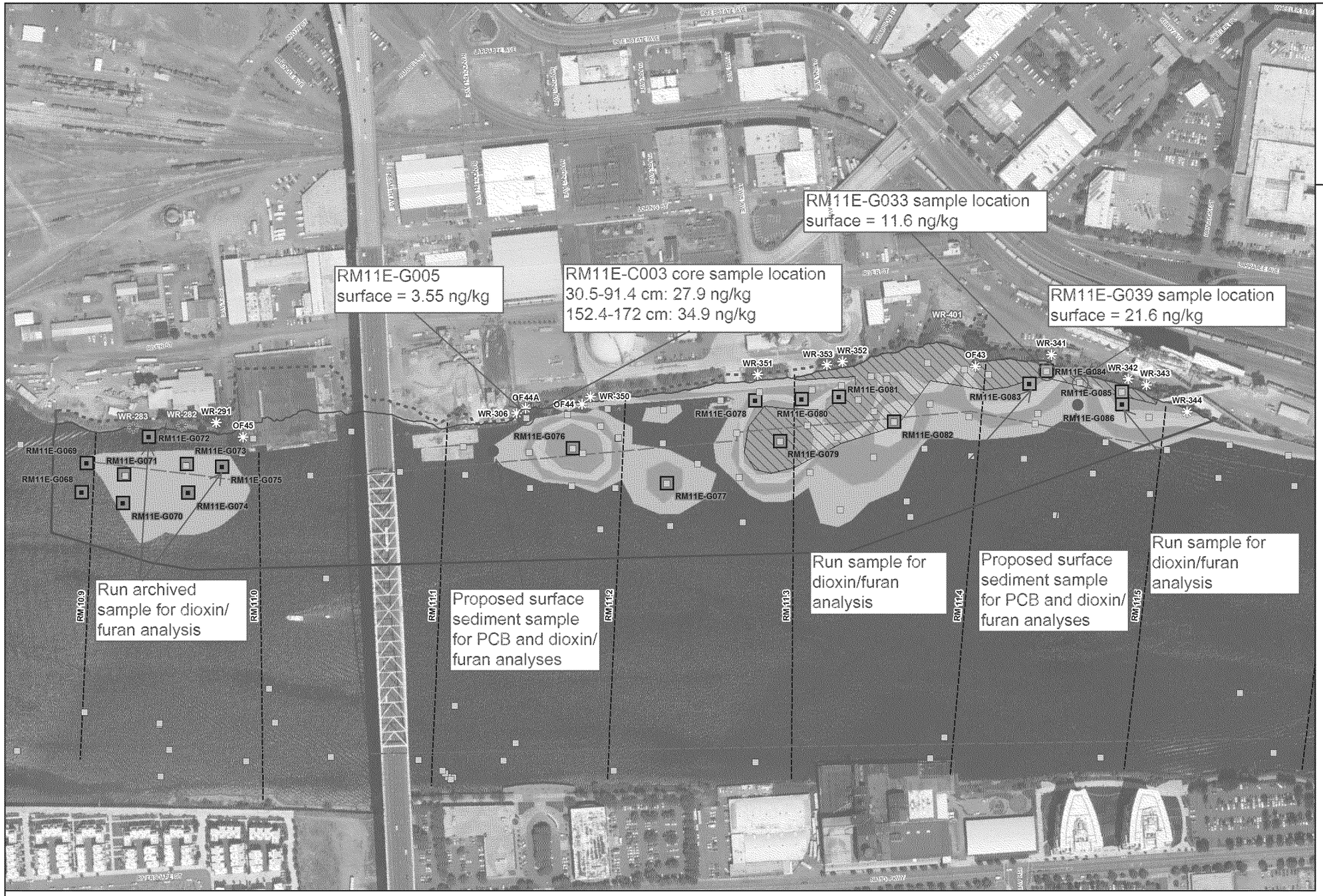

FIGURE 6-2
Proposed Surface Sediment Sampling Locations

River Mile 11 East
Supplemental RI/FS Work Plan

Willamette River
Portland, Oregon

LEGEND

Proposed Surface Sediment Sample

- Power Grab
- Manual Grab

Total PCBs in Surface Sediment (RAL Footprints)

- 75 - 200 ug/kg
- >200 - 500 ug/kg
- >500 - 750 ug/kg
- >750 - 1,000 ug/kg
- >1,000 ug/kg
- Comprehensive Benthic Risk Areas

All Other Features

- RM11E Project Area (dashed line indicates inferred top of bank)
- AOPC 25
- U.S. Army Corps of Engineers Navigation Channel
- River Mile Tenth (RM)
- Existing Surface Sediment Sample
- Active Outfall
- Inactive Outfall

MAP NOTES:
Date: October 2, 2013
AOPC = Area of Potential Concern
FS = Feasibility Study
RM = River Mile
PCB = Polychlorinated Biphenyl
1. The comprehensive benthic risk areas, and the AOPC 25 boundary is consistent with the information presented in the Draft FS report for the Portland Harbor (Anchor QEA et al., 2012).
2. The breakdown of total PCB concentrations is consistent with each of the remedial alternatives (B through F) presented in the Draft FS report for the Portland Harbor (Anchor QEA et al., 2012).
3. Source of existing sediment sample locations is LWG SCRA Combo database (dated July 7, 2009) and DPSC Field and Data Report (dated January 2009). Other sediment data might exist that are not included in the LWG SCRA Combo database or the DPSC Field and Data Report.

N

0 150 300
Feet

Memo Figure 2
Proposed Dioxin/Furan Analysis Locations

GSI Water Solutions, Inc.

File Path: P:\Portland\487-DOF\001-RM11E_RI_FS\Project_GIS\Project_mxds\Work_Plan\Final\Figure6-2_Proposed_Surf_Sed_Samp_Locs.mxd

To: Humphrey, Chip[Humphrey.Chip@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Sat 3/1/2014 2:39:51 AM
Subject: Re: Portland Harbor Weekly Updated FS Revision Process Matrix Table

Hi Chip, as discussed let's add a draft 404b1 memo with myself assigned for epa, peterson, stenberg for cdm(?)

Also draft ba review, same players.

S
Ps do you know if eric is waiting for the state hot spot review to generate a ptm memo? I'd like to get cdm started on this if we can and then combine with the state analysis, if that's ok with you and kristine. Let me know if I can get cdm started on this ...
Sean Sheldrake
Unit Diving Officer, RPM
206.553.1220 work cell
Like us on facebook!
https://www.facebook.com/epaDIVERS

From: Humphrey, Chip
Sent: Friday, February 28, 2014 4:59:21 PM
To: Penoyar, Susan
Cc: Tom Gainer (gainer.tom@deq.state.or.us); rose@yakamafish-nsn.gov; Erin Madden (erin.madden@gmail.com); Bob Dexter; Gail Fricano (gfricano@indecon.com); Koch, Kristine; Sheldrake, Sean; callie@ridolfi.com; Allen, Elizabeth; Shephard, Burt; Fuentes, Rene; Gustavson, Karl
Subject: FW: Portland Harbor Weekly Updated FS Revision Process Matrix Table

FS team –

Here is LWG's latest update of the FS revision matrix. Please note this is a draft and hasn't been reviewed by EPA or CDM for accuracy and completeness. We currently have March 18th as a placeholder for discussion of unresolved issues from the Feb 27th (COCs), March 4th (PRGs) and March 13th (RALs) meetings. March 27th is shown as the target date for the Principle Threat and Hot Spot discussion although we have advised LWG that EPA can't confirm that date at this time (DEQ has indicated that the Hot Spot information will be available in about 4 weeks). The MNR and other technology screening discussion is now targeted for April 1.

Chip

To: (Jackie.Wetzsteon@pacificorp.com)[Jackie.Wetzsteon@pacificorp.com]; Bill Ford (WFord@LATHROPGAGE.COM)[WFord@LATHROPGAGE.COM]; Dave Livesay[DLivesay@gsiws.com]; Erin Carroll Hughes[EcHughes@gsiws.com]; Jeff Groy (Jeff.Groy@cbs.com)[Jeff.Groy@cbs.com]; Kim Cox (Kim.Cox@portlandoregon.gov)[Kim.Cox@portlandoregon.gov]; Matt Wells (wells@tmw-law.com)[wells@tmw-law.com]; Nanci Klinger (N.Klinger@portlandoregon.gov)[N.Klinger@portlandoregon.gov]; Paul Fuglevand[pfuglevand@dofnw.com]
Cc: Alex Liverman (liverman.alex@deq.state.or.us)[liverman.alex@deq.state.or.us]; allenmc@cdm.com[allenmc@cdm.com]; audiehuber@ctuir.com[audiehuber@ctuir.com]; bayuk.dana@deq.state.or.us[bayuk.dana@deq.state.or.us]; schwarz.bob@deq.state.or.us[schwarz.bob@deq.state.or.us]; brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; callie@ridolfi.com[callie@ridolfi.com]; Conley, Alanna[conley.alanna@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; cunninghame@gorge.net[cunninghame@gorge.net]; Dan Hafley (HAFLEY.Dan@deq.state.or.us)[HAFLEY.Dan@deq.state.or.us]; erin.madden@gmail.com[erin.madden@gmail.com]; Fuentes, Rene[fuentes.rene@epa.gov]; Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Genevieve Angle (Genevieve.Angle@noaa.gov)[Genevieve.Angle@noaa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; jd@williamsjohnsonlaw.com[jd@williamsjohnsonlaw.com]; Jen Kassakian (jkassakian@indecon.com)[jkassakian@indecon.com]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; johnson.keith@deq.state.or.us[johnson.keith@deq.state.or.us]; jweis@hk-law.com[jweis@hk-law.com]; Kristin Callahan[kristin@ridolfi.com]; Koch, Kristine[Koch.Kristine@epa.gov]; Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]; matt@williamsjohnsonlaw.com[matt@williamsjohnsonlaw.com]; mcclincy.matt@deq.state.or.us[mcclincy.matt@deq.state.or.us]; tosm@yakamafish-nsn.gov[tosm@yakamafish-nsn.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Muza, Richard[Muza.Richard@epa.gov]; nancy.munn@noaa.gov[nancy.munn@noaa.gov]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; poulsen.mike@deq.state.or.us[poulsen.mike@deq.state.or.us]; Rachel DelVecchio (rdelvecchio@indecon.com)[rdelvecchio@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; ted_buerger@fws.gov[ted_buerger@fws.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Tom Gainer (gainer.tom@deq.state.or.us)[gainer.tom@deq.state.or.us]
From: Sheldrake, Sean
Sent: Tue 2/25/2014 5:22:59 PM
Subject: FW: Request for an Extension to the Informal Dispute Resolution Period (11e d/f data)
DioxinFuran_TEQ_RALs_wth_alts_SMA_maps.pdf
FinalDFasTEQtoPeCDFmemotoEPA_REV 1.pdf

Hello Jackie, Here are the D/F RALs as discussed. We'll await your proposed telecon dates to hold time to further discuss.

Let us know if you have any questions.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Wetzsteon, Jackie [mailto:Jackie.Wetzsteon@pacificorp.com]
Sent: Tuesday, February 04, 2014 8:44 AM
To: undisclosed-recipients
Subject: RE: Request for an Extension to the Informal Dispute Resolution Period (11e d/f data)

Thank you Sean. We look forward to receiving the revised dioxin/furan TCDD TEQ RALs from EPA as soon as possible. Also, thank you for clarifying the need to use the FS database as we move forward. So noted.

Jackie

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Friday, January 31, 2014 9:56 AM

To: Wetzsteon, Jackie
Cc: Alex Liverman (liverman.alex@deq.state.or.us); allenmc@cdm.com; audiehuber@ctuir.com; bayuk.dana@deq.state.or.us; schwarz.bob@deq.state.or.us; brandy.humphreys@grandronde.org; callie@ridolfi.com; Conley, Alanna; Cora, Lori; cunninghame@gorge.net; Dan Hafley (HAFLEY.Dan@deq.state.or.us); erin.madden@gmail.com; Fuentes, Rene; Gail Fricano (gfricano@indecon.com); Genevieve Angle (Genevieve.Angle@noaa.gov); Humphrey, Chip; jd@williamsjohnsonlaw.com; Jen Kassakian (jkassakian@indecon.com); Jeremy_Buck@fws.gov; johnson.keith@deq.state.or.us; jweis@hk-law.com; Kristin Callahan; Koch, Kristine; Lance Peterson (PetersonLE@cdmsmith.com); matt@williamsjohnsonlaw.com; mcclincy.matt@deq.state.or.us; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; Nancy.Munn@noaa.gov; peterson.Jennifer@deq.state.or.us; poulsen.mike@deq.state.or.us; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ted_buerger@fws.gov; tomd@ctsi.nsn.us; Tom Gainer (gainer.tom@deq.state.or.us); Wetzsteon, Jackie; Bill Ford (WFord@LATHROPGAGE.COM); Dave Livesay; Erin Carroll Hughes; Jeff Groy (Jeff.Groy@cbs.com); Kim Cox (Kim.Cox@portlandoregon.gov); Matt Wells (wells@tmw-law.com); Nanci Klinger (N.Klinger@portlandoregon.gov); Paul Fuglevand
Subject: RE: Request for an Extension to the Informal Dispute Resolution Period (11e d/f data)

Jackie,

Thank you for the productive call this week. Your request for extension is approved. One item we didn't cover on the call is that we need to use the FS datasets for analysis of the issue. In the RI, non-detects were treated as 0 in sums instead of ½ the detect. While we aren't requiring this data set be corrected in the RI, the FS database has sums based on using ½ ND values. Therefore, to ensure we're all using the same data as the harborwide process, the FS database is what needs to be used as we move forward.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Wetzsteon, Jackie [mailto:Jackie.Wetzsteon@pacificorp.com]
Sent: Thursday, January 30, 2014 1:07 PM
To: undisclosed-recipients@epamail.epa.gov
Subject: RE: Request for an Extension to the Informal Dispute Resolution Period

Hi Sean,

Thank you for taking the time to talk to the RM11E Group about the dioxin/furan directive yesterday. We thought the conference call was very productive and would like to confirm the path that we discussed during the call for moving forward.

•□□□□□□□ EPA will review their files to ensure that they have access to the data that was published in the *Supplemental Data Report: Bank Soil and Sediment Re-Analysis* (GSI, 2013)

•□□□□□□□ EPA is in the process of developing Dioxin/Furan TCDD TEQ RALS for the Portland Harbor Superfund Site and will provide them to the RM11E Group as soon as possible, or at the latest, by the end of February.

•□□□□□□□ EPA and the RM11E Group will evaluate the geographic distribution of the dioxin/furan data available for River Mile 11E. EPA and the RM11E Group will also compare the dataset to the newly developed Dioxin/Furan TCDD TEQ RALs when they are provided by EPA.

•□□□□□□□ Once the evaluation process is complete, EPA and the RM11E Group will participate in a conference call to identify any additional dioxin/furan data that are required to meet the objectives of the Recontamination Assessment and Implementability Study, and to inform remedy selection by EPA.

As discussed during the call, the informal dispute resolution period between EPA and the RM11E Group will continue to be extended during this evaluation period. EPA previously extended the deadline through our email exchange on January 21 and 22. We propose that the dispute resolution period now be extended to 2 weeks after the RM11E Group receives the newly adopted Dioxin/Furan TCDD TEQ RALS from EPA. This should give us enough time to review the information provided by EPA, compare it to the existing dataset, participate in 1 or 2 conference calls with EPA to discuss the results and reach agreement on any additional actions that may be warranted, and formalize the approach in a letter.

As you know, our diver collected sediment program is scheduled to occur between March 20th and 25th, 2014 and rescheduling is difficult because of the need to avoid shipping traffic. If it is determined that additional sediment sampling for dioxin/furans is warranted, this would be an ideal time to collect the samples. We hope that we are able to reach resolution with EPA on this issue in the near term so that the schedule for the delivery of the Field and Data Report as well as the other deliverables is not impacted.

Can you please confirm that the approach outlined above and that our request to extend the informal dispute resolution period to 2 weeks after we receive the newly developed Dioxin/Furan TCDD TEQ RALS is acceptable to EPA.

Thank you,

Jackie

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Wednesday, January 22, 2014 8:38 AM
To: Wetzsteon, Jackie
Cc: Wetzsteon, Jackie; Bill Ford (WFord@LATHROPGAGE.COM); Dave Livesay; Erin Carroll Hughes; Jeff Groy (Jeff.Groy@cbs.com); Kim Cox (Kim.Cox@portlandoregon.gov); Matt Wells (wells@tmw-law.com); Nanci Klinger (N.Klinger@portlandoregon.gov); Paul Fuglevand; Alex Liverman (liverman.alex@deq.state.or.us); allenmc@cdm.com; audiehuber@ctuir.com; bayuk.dana@deq.state.or.us; schwarz.bob@deq.state.or.us; brandy.humphreys@grandronde.org; callie@ridolfi.com; Conley, Alanna; Cora, Lori; cunninghame@gorge.net; Dan Hafley (HAFLEY.Dan@deq.state.or.us); erin.madden@gmail.com; Fuentes, Rene; Gail Fricano (gfricano@indecon.com); Genevieve Angle (Genevieve.Angle@noaa.gov); Humphrey, Chip;

jd@williamsjohnsonlaw.com; Jen Kassakian (jkassakian@indecon.com); Jeremy_Buck@fws.gov; johnson.keith@deq.state.or.us; jweis@hk-law.com; Kristin Callahan; Koch, Kristine; Lance Peterson (PetersonLE@cdmsmith.com); matt@williamsjohnsonlaw.com; mcclincy.matt@deq.state.or.us; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; Nancy.Munn@noaa.gov; peterson.Jennifer@deq.state.or.us; poulsen.mike@deq.state.or.us; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ted_buerger@fws.gov; tomd@ctsi.nsn.us; Tom Gainer (gainer.tom@deq.state.or.us)
Subject: RE: Request for an Extension to the Informal Dispute Resolution Period

Jackie,

Your request is granted. I'll check with my team and get back to you on 1/28 vs 1/29 for a telecon.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Wetzsteon, Jackie [mailto:Jackie.Wetzsteon@pacificorp.com]
Sent: Tuesday, January 21, 2014 4:56 PM
To: undisclosed-recipients@epamail.epa.gov
Subject: Request for an Extension to the Informal Dispute Resolution Period

Hi Sean,

As we discussed today on the phone, the RM11E Group is in the process of reviewing your letter of January 10, 2014, directing the analysis of dioxin and furans on the archived samples collected from the RM11E Project Area. As I explained, we have a number of questions regarding the information contained in paragraph 2 of the letter as well as some bigger picture questions that relate to the development of PRGs and RALs for the Portland Harbor Superfund Site. We plan to transmit a list of questions to you no later than Friday, January 24, 2014. We would like to schedule a conference call with EPA on Tuesday, January 28, 2014, or Wednesday, January 29, 2014 to walk through the questions and obtain some clarification from EPA.

To ensure that we are complying with the terms of the AOC and to allow time for discussion of the issues raised by your letter, the RM11E Group is requesting an extension to the informal dispute resolution period as described in Paragraph 52. As outlined above, we plan to provide EPA with a list of questions no later than January 24th and obtain input from EPA during the week of January 27th. It is our hope that we will be able to informally resolve any issues raised by the directive and subsequent discussions with EPA by February 7, 2014.

Can you please confirm that this schedule is acceptable to you and that EPA agrees to extend the informal dispute resolution period until February 7, 2014? Also, can you please advise us of your availability next week so that we can set up a conference call?

Thank you so much,

Jackie

Jackie Wetzsteon

PacifiCorp

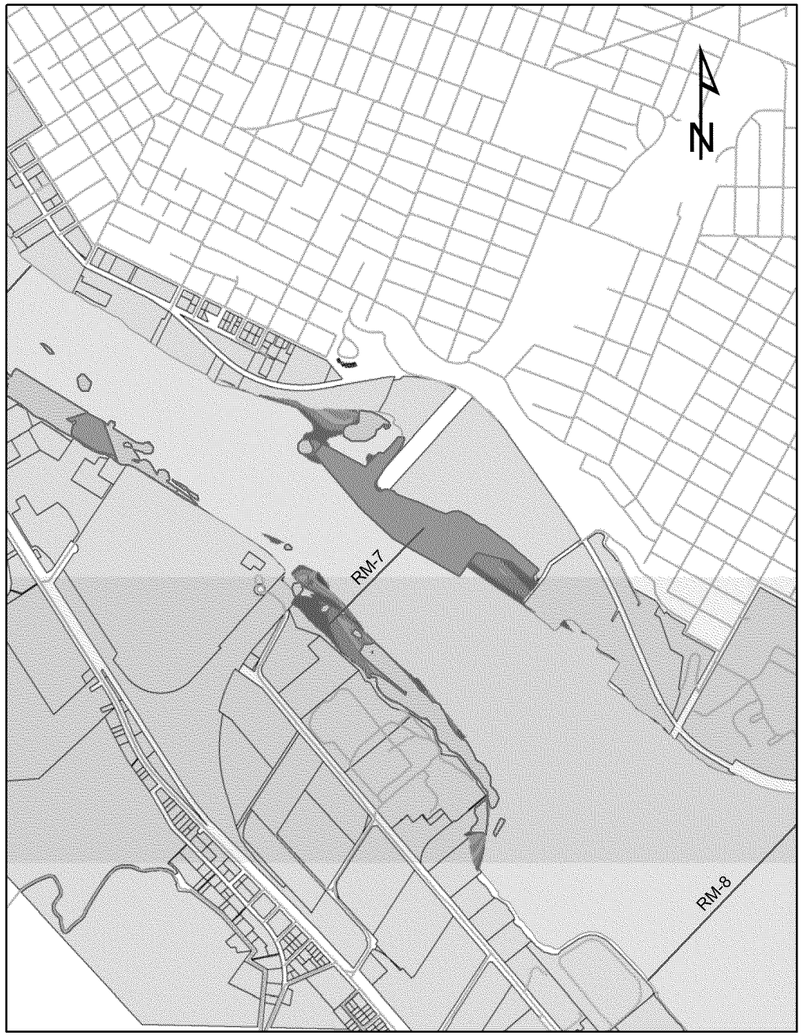
Strategic Policy and Environment

825 NE Multnomah, LCT 1500

Portland, OR 97232

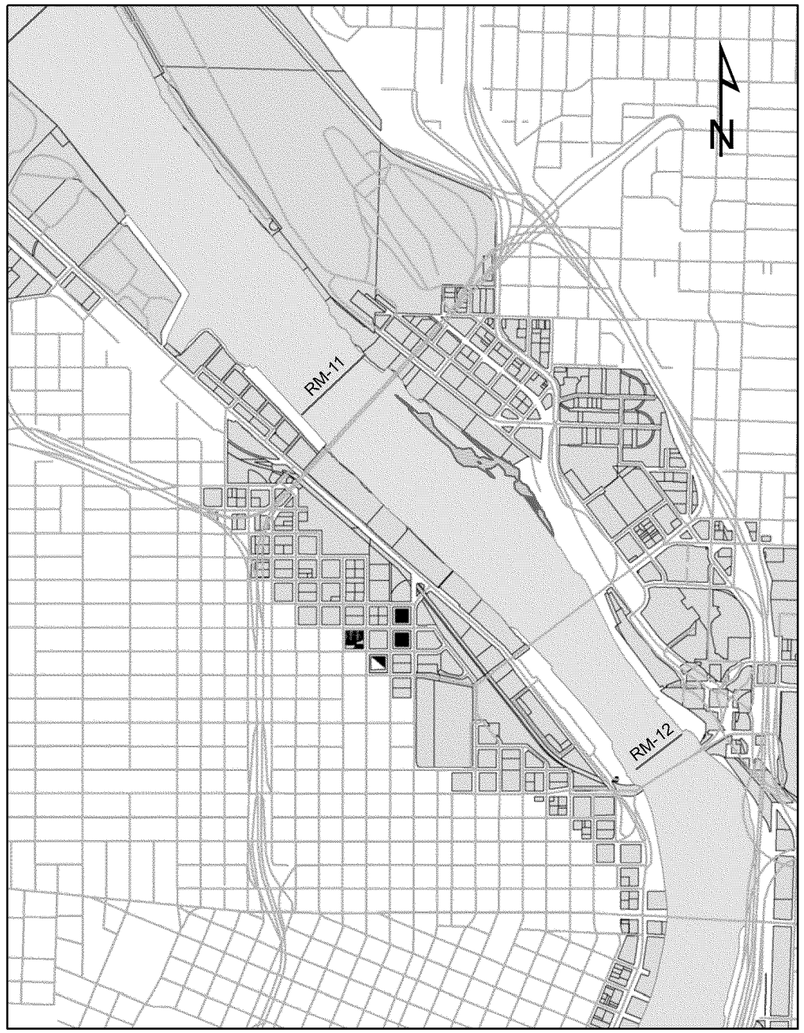
(503) 813 5036 (work)

(503) 961 3955 (cell)



River Mile 7

Swan Island



River Mile 11 East

Legend

Dioxin/Furans as TEQ RALs

- Alt G - 0.012 - 0.022
- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12
- Dredge Cap Areas
- Sediment Management Areas

EPA Alternative B Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

-- Working Draft for Discussion Only --
-- February 18, 2014 --

0 0.25 0.5 0.75 1 Miles

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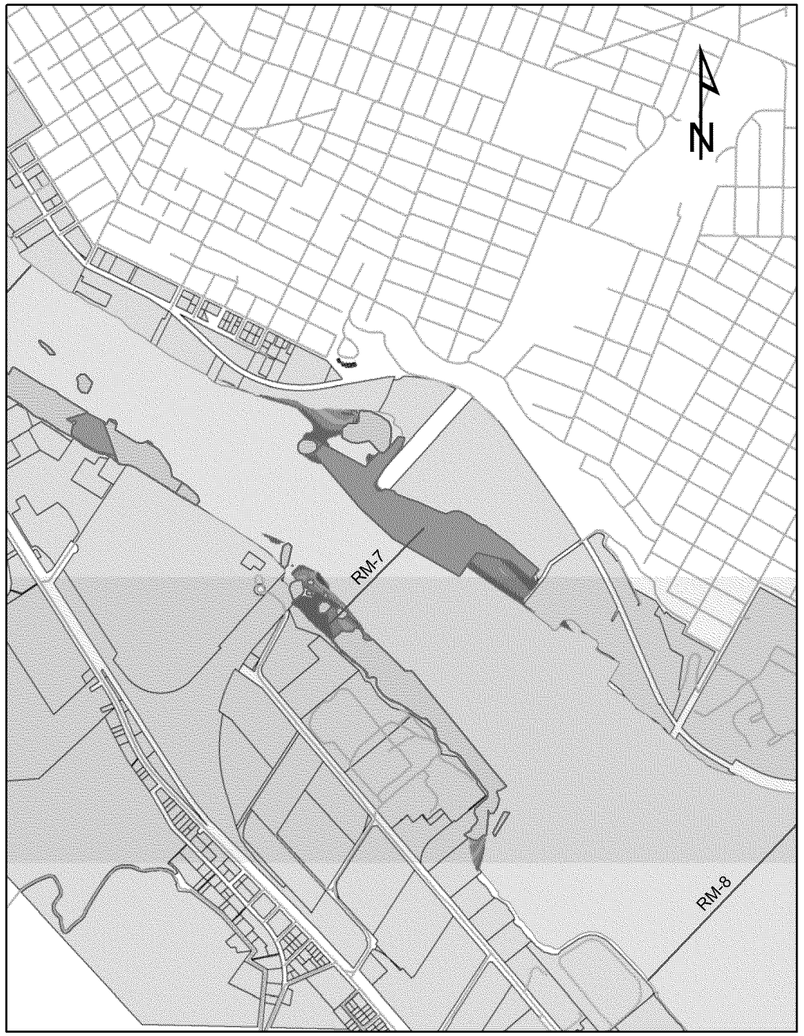
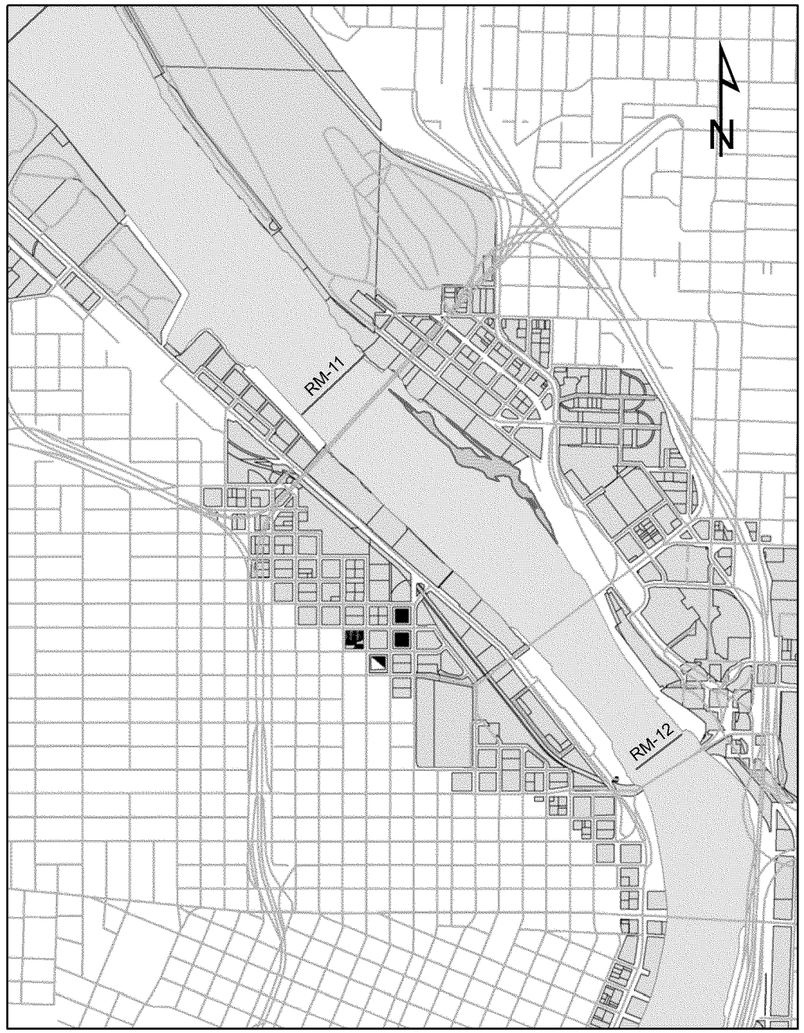


River Mile 7

Swan Island



River Mile 11 East

Legend

Dioxin/Furans as TEQ RALs

- Alt G - 0.012 - 0.022
- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12

- Dredge Cap Areas
- Sediment Management Areas

EPA Alternative C Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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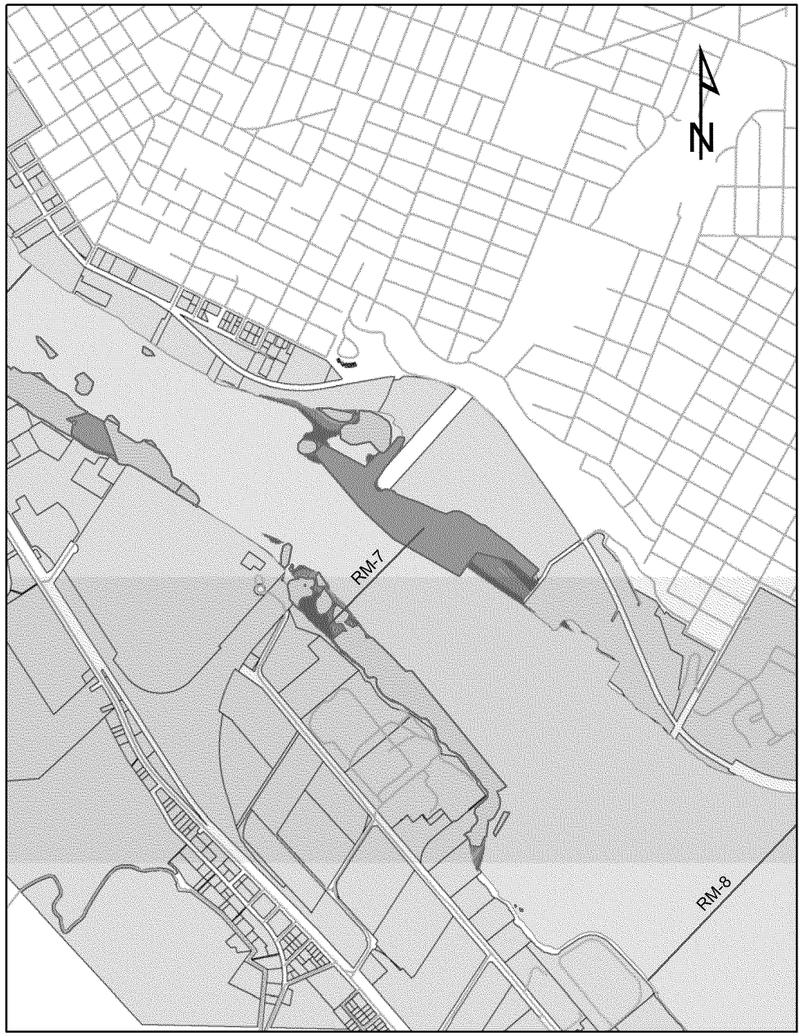

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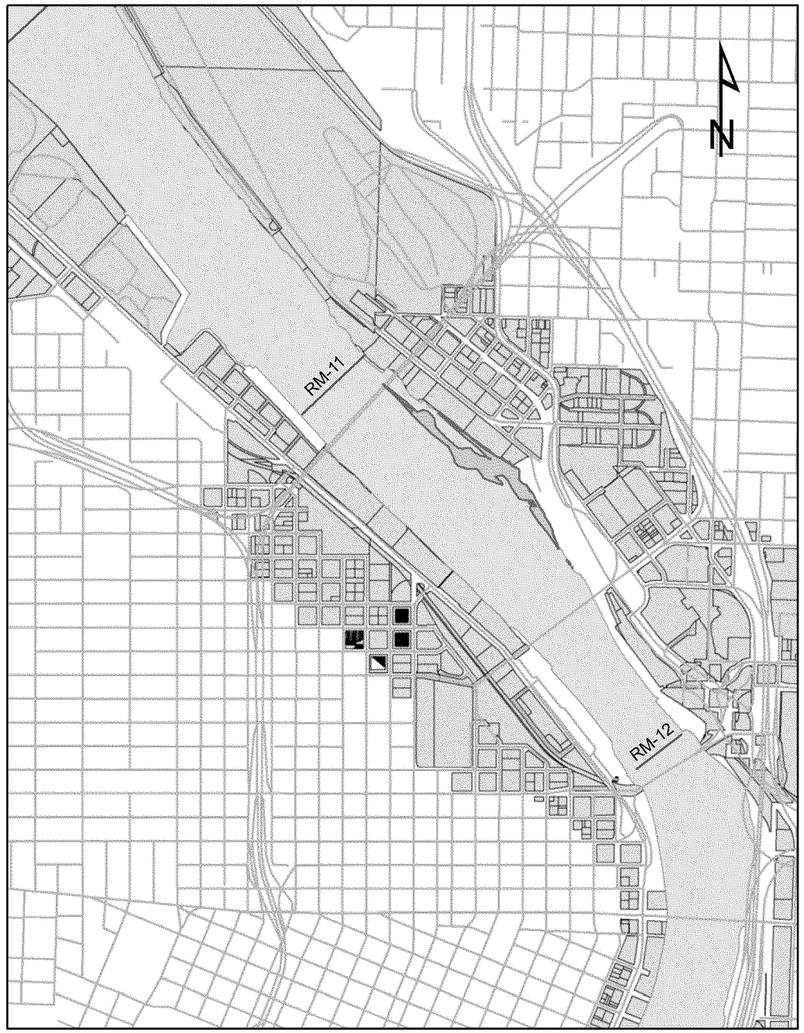
Swan Island



River Mile 11 East

Legend

Dioxin/Furans as TEQ RALs

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- Alt B - > 0.12

- Dredge Cap Areas
- Sediment Management Areas

EPA Alternative D Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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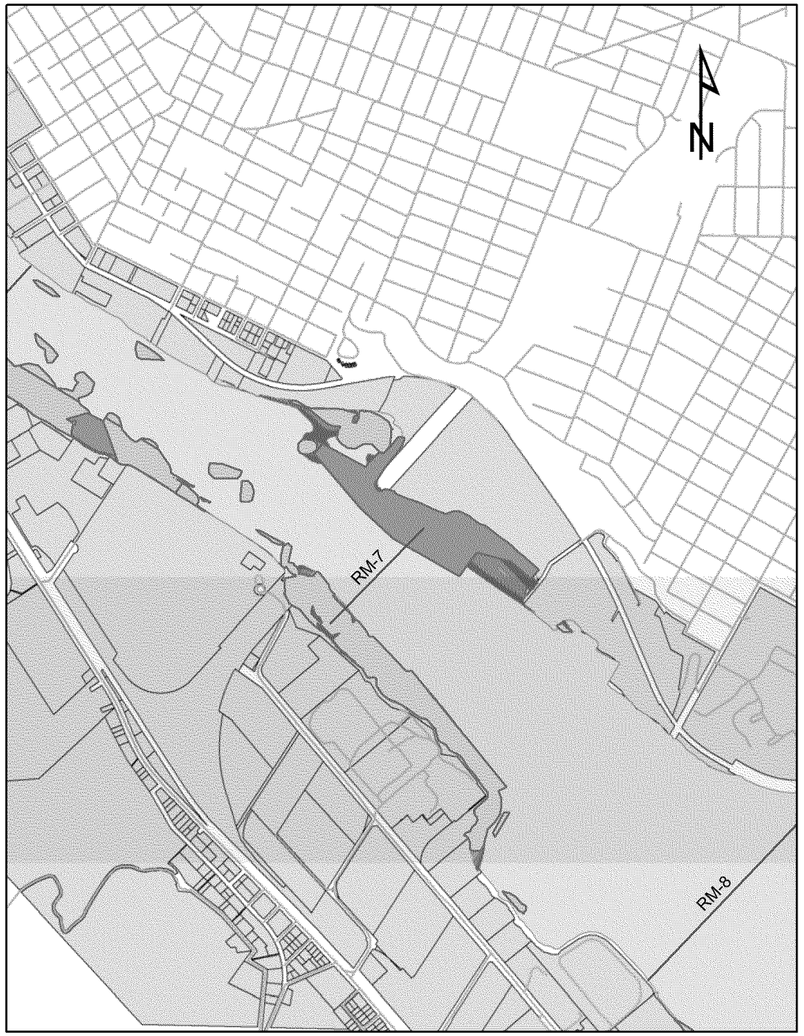
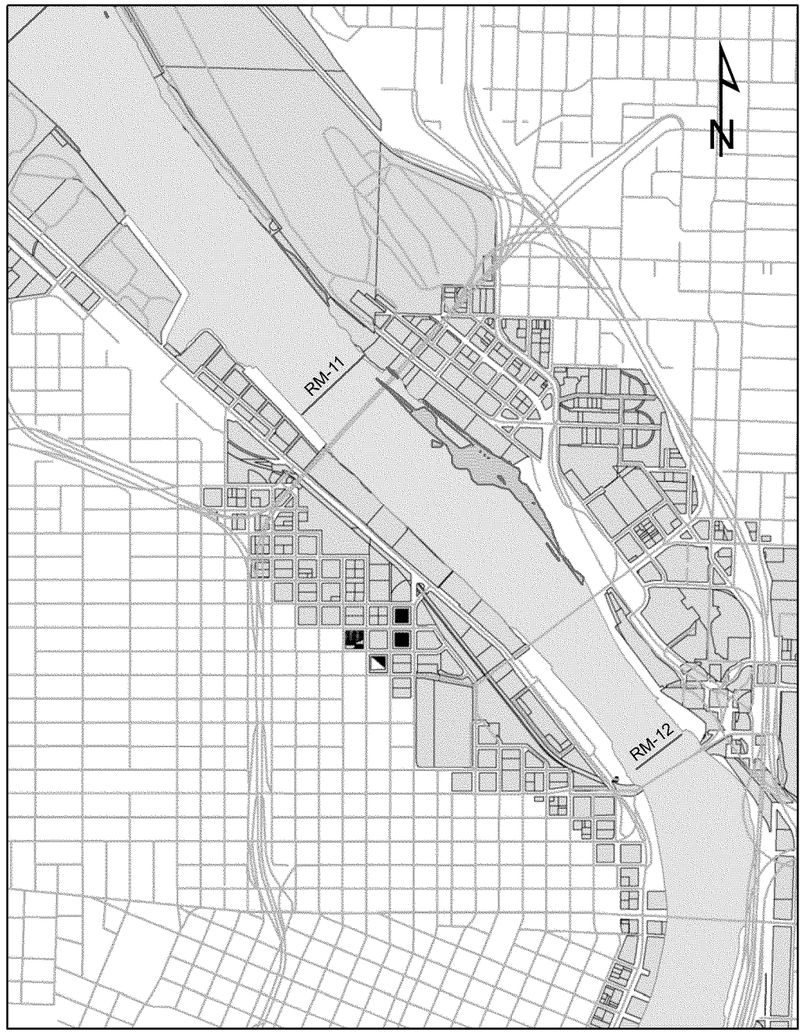


River Mile 7

Swan Island



River Mile 11 East

Legend

Dioxin/Furans as TEQ RALs

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- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12
- Dredge Cap Areas
- Sediment Management Areas

EPA Alternative E Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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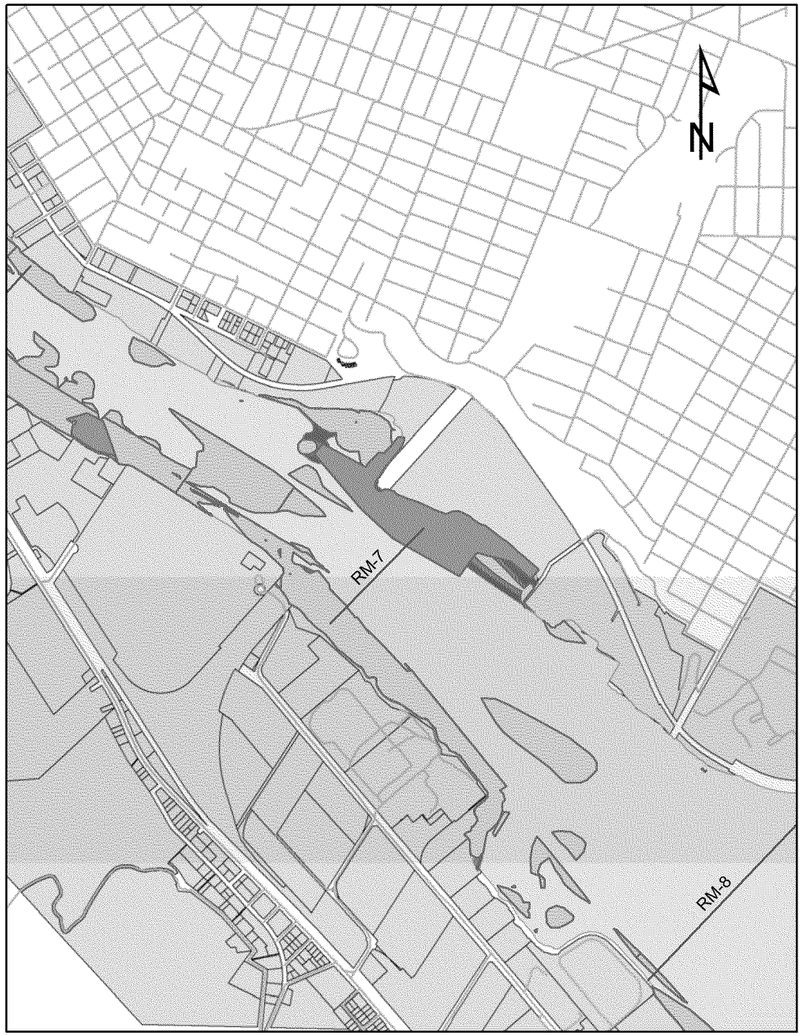
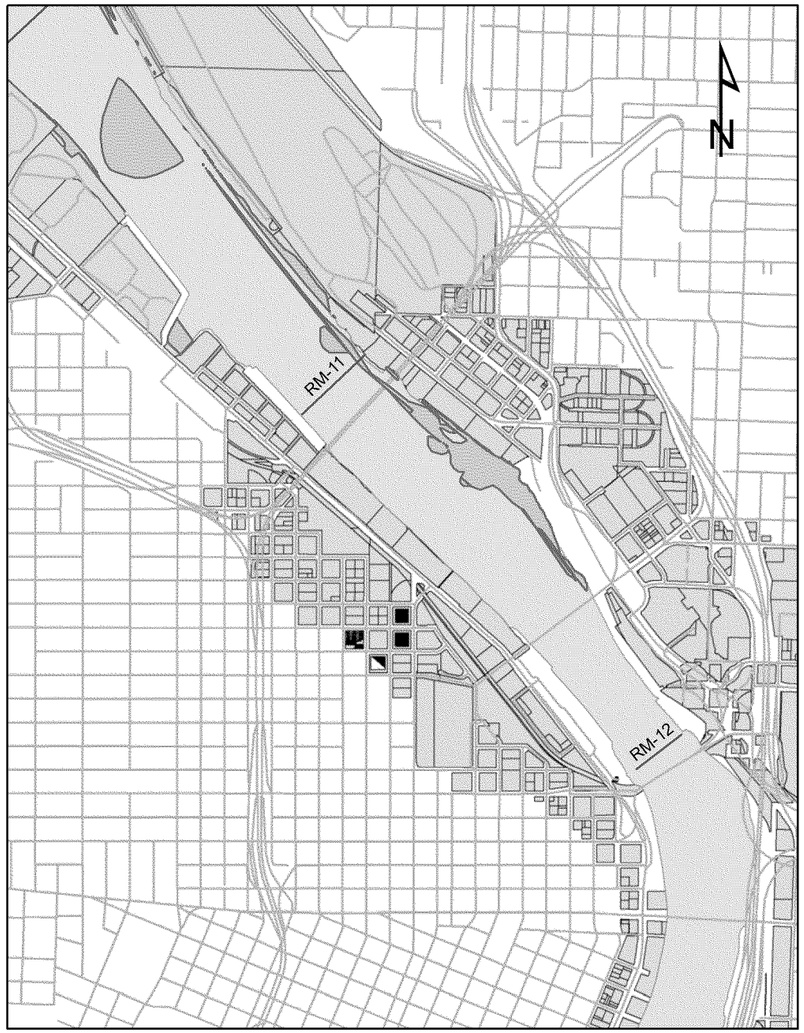


River Mile 7

Swan Island



River Mile 11 East

Legend

Dioxin/Furans as TEQ RALs

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- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12

- Dredge Cap Areas
- Sediment Management Areas

EPA Alternative F Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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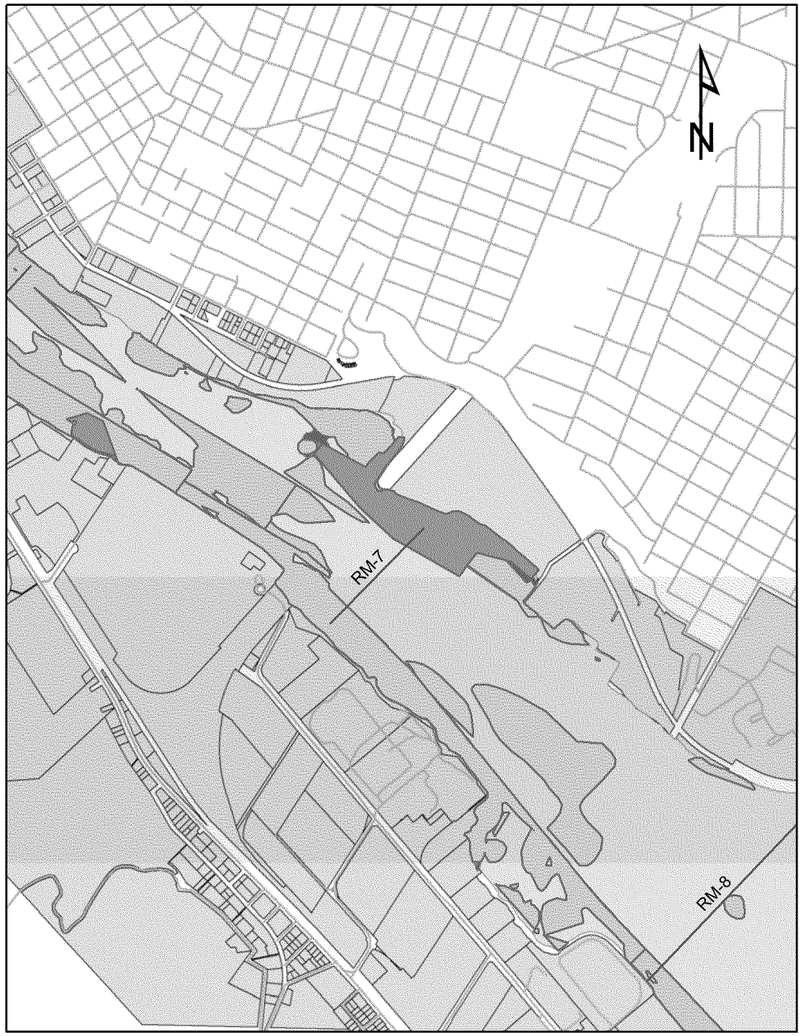
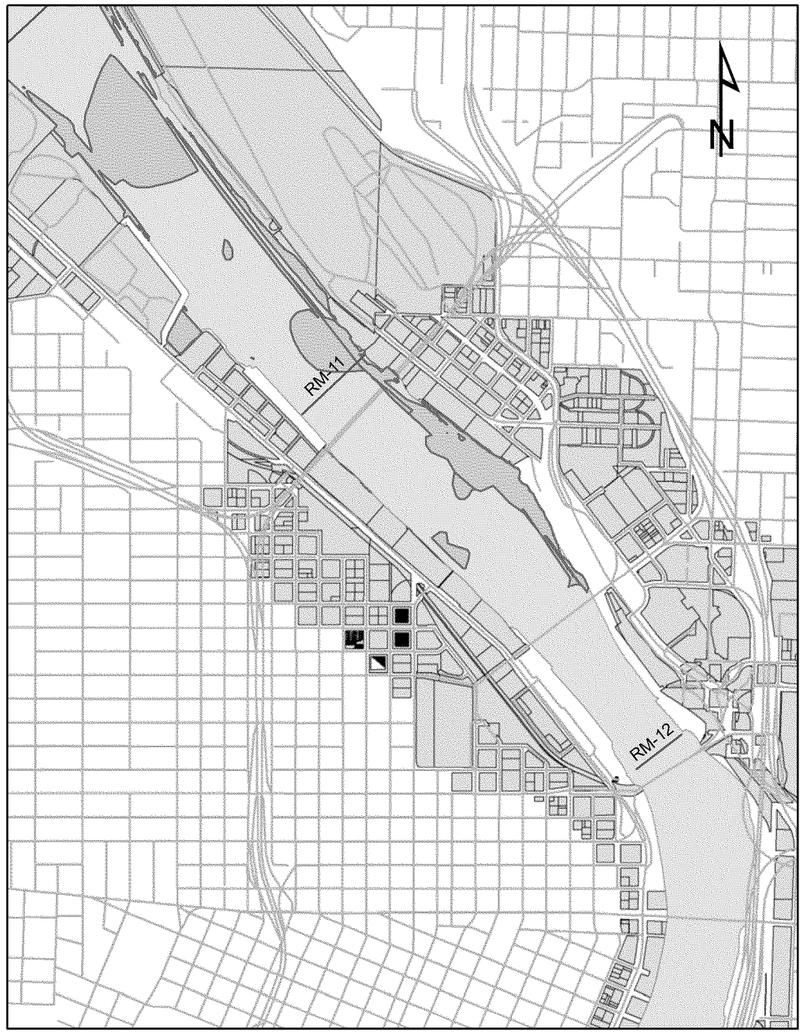


River Mile 7

Swan Island



River Mile 11 East

Legend

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- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12

- Dredge Cap Areas
- Sediment Management Areas

EPA Alternative G Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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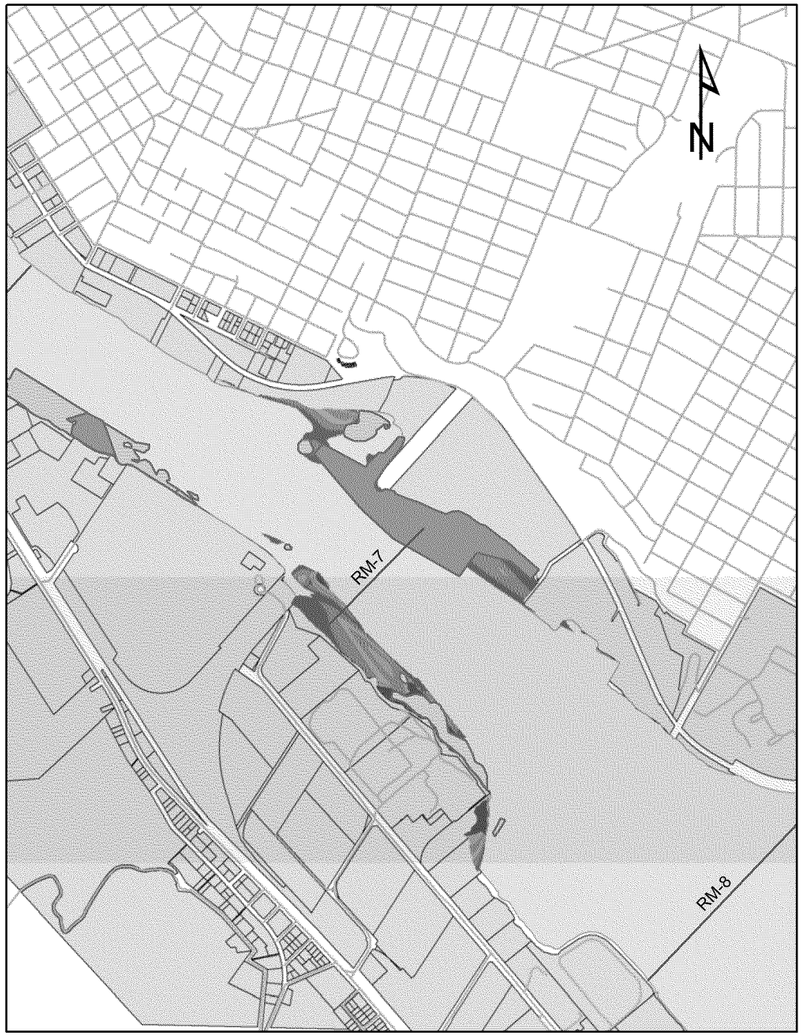

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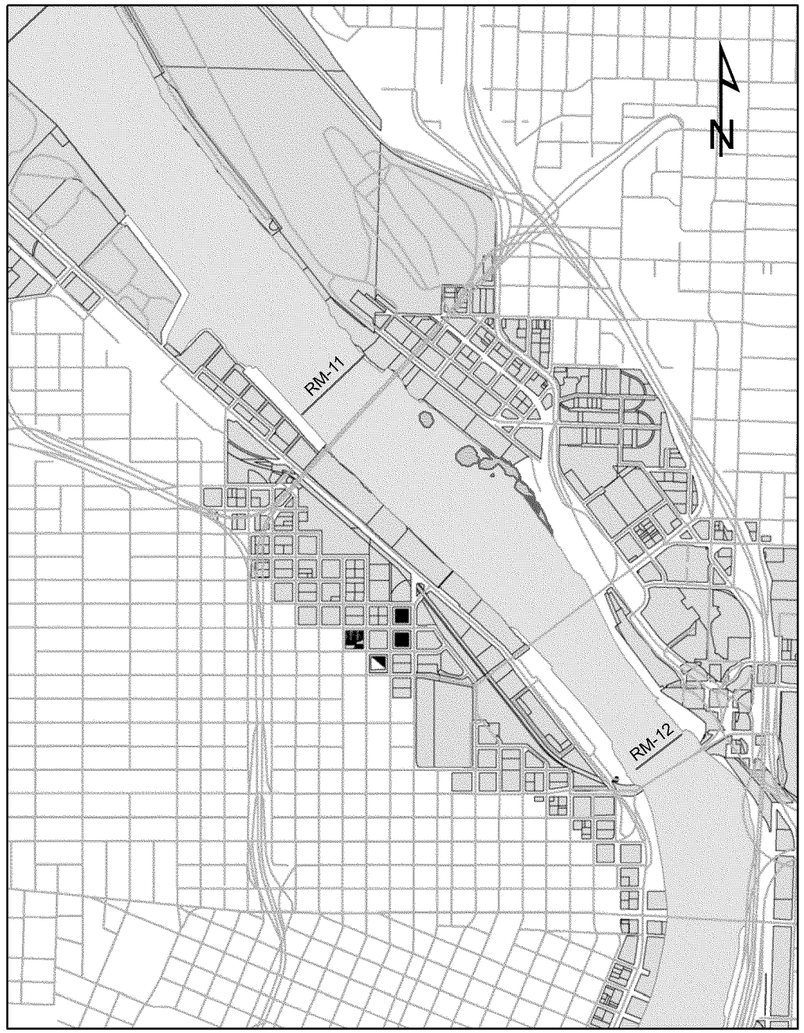
Swan Island



River Mile 11 East

Legend

Dioxin/Furans as TEQ RALs

- Alt G - 0.012 - 0.022
- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12
- Dredge Cap Areas
- Sediment Management Areas

LWG Alternative B Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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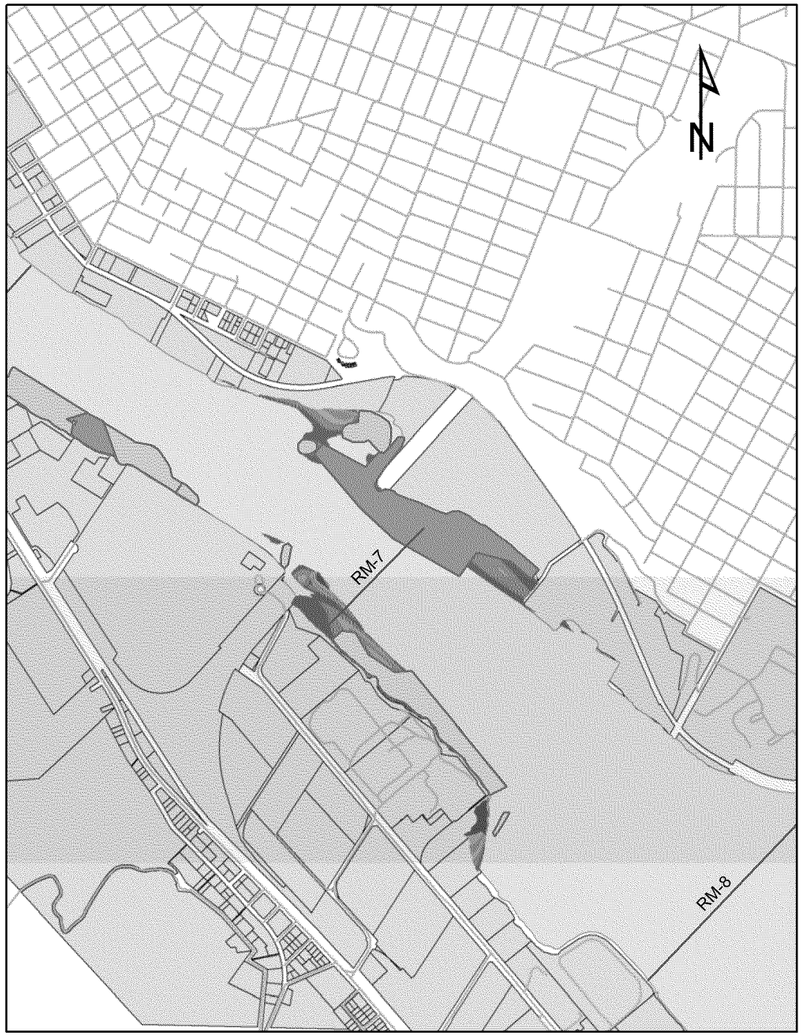
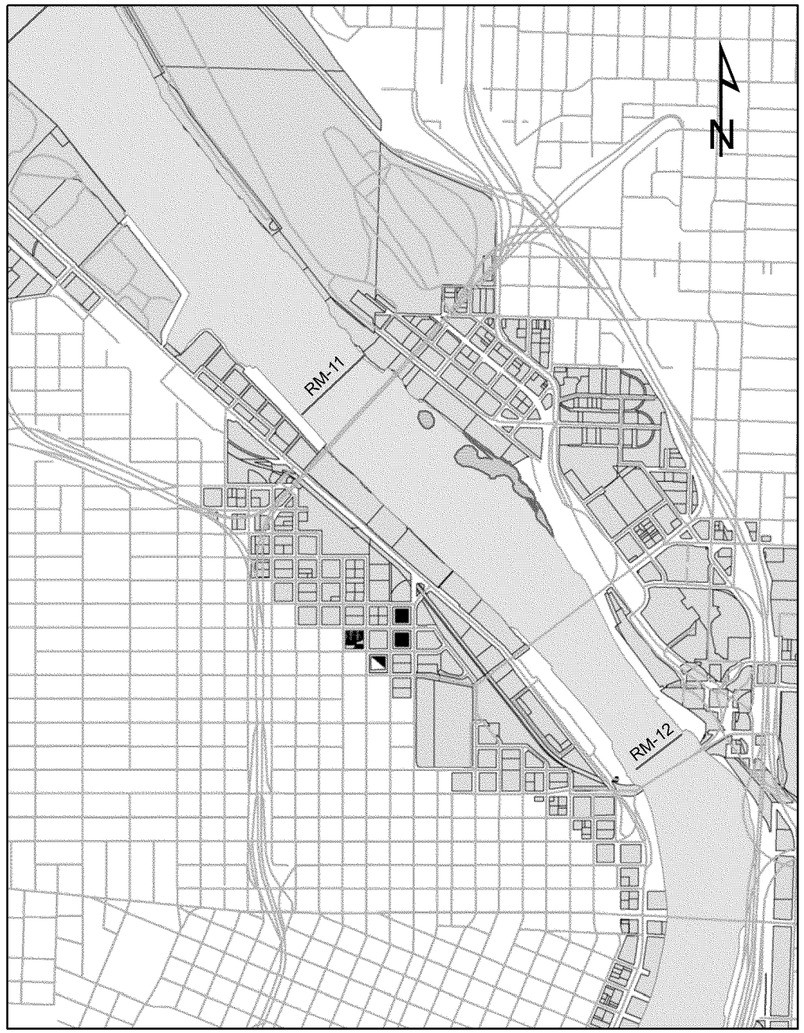
Date: 2/18/2014



River Mile 7

Swan Island



River Mile 11 East

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Dioxin/Furans as TEQ RALs

- Alt G - 0.012 - 0.022
- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12
- Dredge Cap Areas
- Sediment Management Areas

LWG Alternative C Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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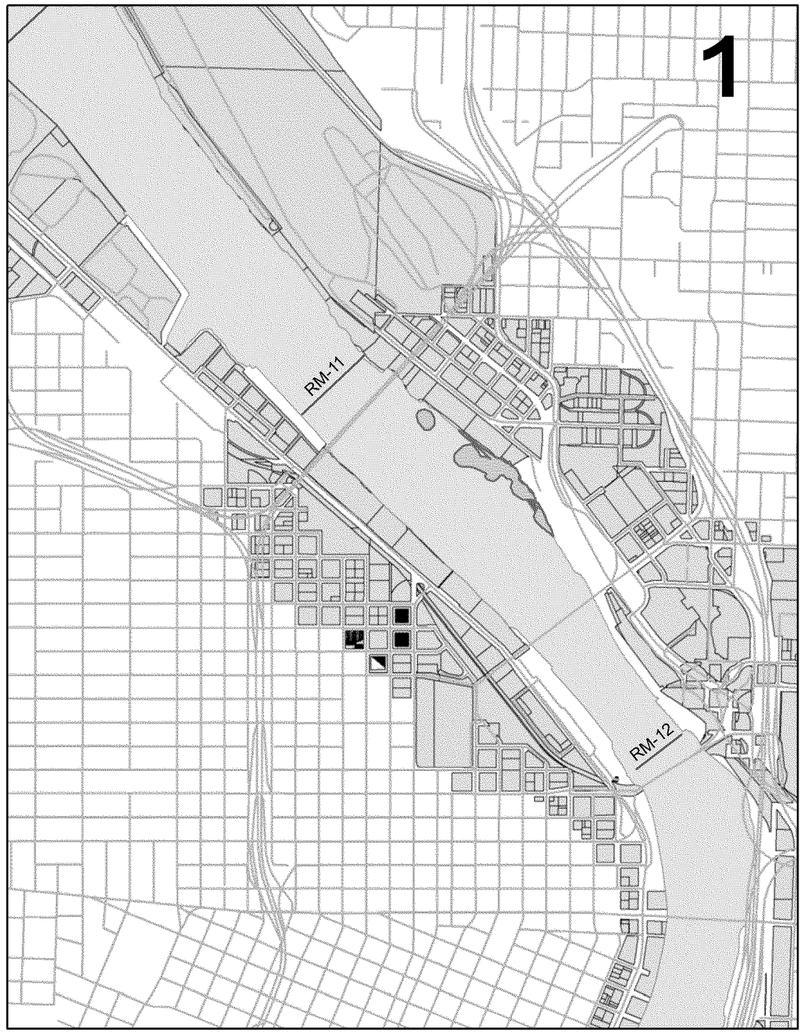

River Mile 11 East

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- Alt G - 0.012 - 0.022
- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
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- Alt C - 0.081 - 0.12
- Alt B - > 0.12
- Dredge Cap Areas
- Sediment Management Areas

LWG Alternative D Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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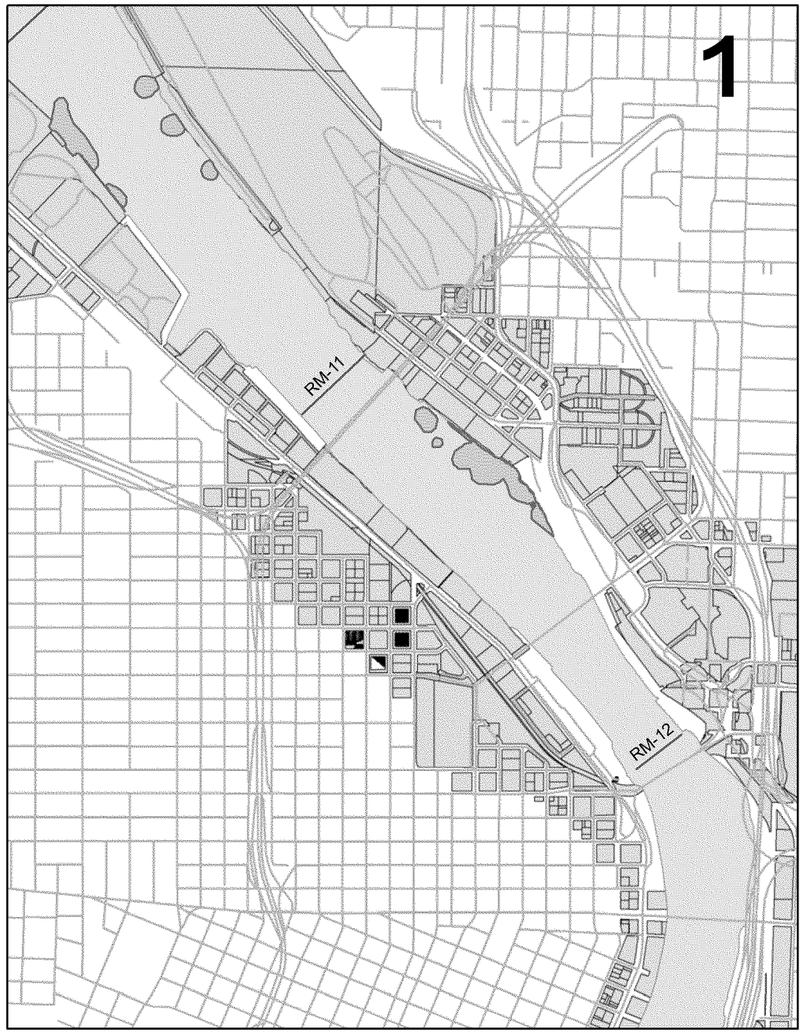

River Mile 11 East

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Dioxin/Furans as TEQ RALs

- Alt G - 0.012 - 0.022
- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12

- Dredge Cap Areas
- Sediment Management Areas

LWG Alternative E Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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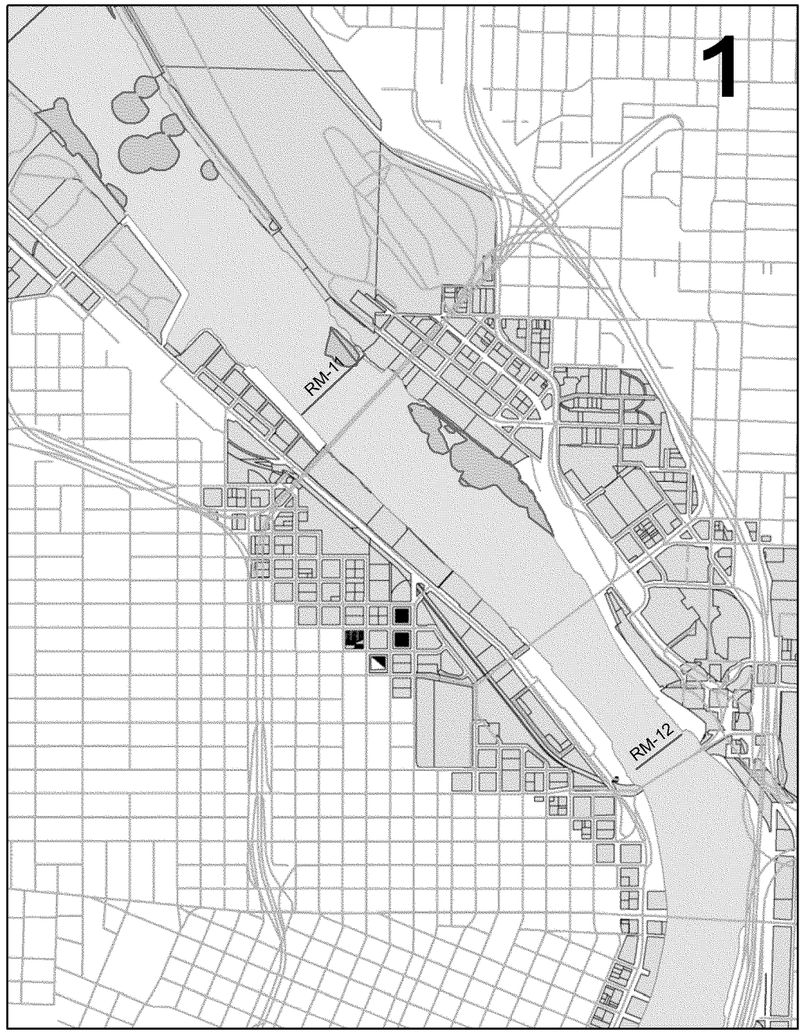
River Mile 7

Swan Island



River Mile 11 East

Legend

Dioxin/Furans as TEQ RALs

- Alt G - 0.012 - 0.022
- Alt F - 0.022 - 0.038
- Alt E - 0.038 - 0.053
- Alt D - 0.053 - 0.081
- Alt C - 0.081 - 0.12
- Alt B - > 0.12

- Dredge Cap Areas
- Sediment Management Areas

LWG Alternative F Sediment Management Areas Overlaying Dioxin/Furans as TEQ RALs

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Date: 2/18/2014

CDM Smith

Memorandum

To: *Chip Humphrey, USEPA Region 10*
Kristine Koch, USEPA Region 10

From: *Todd King*

Date: *February 18, 2014*

Subject: *Dioxin/Furans as TEQ RALs based on PeCDF RALs*

U.S. EPA originally selected 2,3,4,7,8-pentachlorodibenzofuran (PeCDF)[1] in July 2011 as one of four focused contaminants of concern (COCs) for which remedial action levels (RALs) would be developed to aid in evaluating the Feasibility Study (FS) alternatives for the Portland Harbor Superfund site.

PeCDF is predominantly found near the west side of river mile 7 of the site. Upon further review of the final baseline risk assessments and evaluation of other areas of the site, and considering the presence of other dioxin/furan congeners in those areas, U.S. EPA determined that the PeCDF RALs were not sufficient to represent risks posed by the site due to the other dioxin/furan congeners. Therefore mammalian 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) toxicity equivalent for dioxin/furan congeners (dioxin/furans as TEQ)[2] were selected as an alternate focused COC. Selection of this parameter better represents key risks associated with dioxin-like toxicity at the site.

For consistency with previous discussions with the Lower Willamette Group (LWG) with respect to the PeCDF RALs, and based on the strong correlation between detected surface sediment concentrations of PeCDF and calculated dioxin/furans as TEQ at river mile 7, new dioxin/furans as TEQ RALs were calculated as follows:

1) Log transform PeCDF and dioxin/furans as TEQ surface sediment concentrations

2) Plot log(PeCDF) versus log(dioxin/furans as TEQ) and calculate linear regression slope (m=0.815), intercept (b= -0.0328) and adjusted r-squared (r^2 = 0.863). See Figure 1 (Note: filled circles indicate detection of both parameters, open circles indicate one or both non-detect. Only both parameter detections were used for correlation).

---

[1] Chemical name "2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)" in the LWG FS database.
[2] Chemical name "LWG RA Total Dioxin/Furan TEQ 2005 (Mammal) (Calculated U = 1/2)" in the LWG FS database.

3) Dioxin/furans as TEQ RALs were calculated according to:

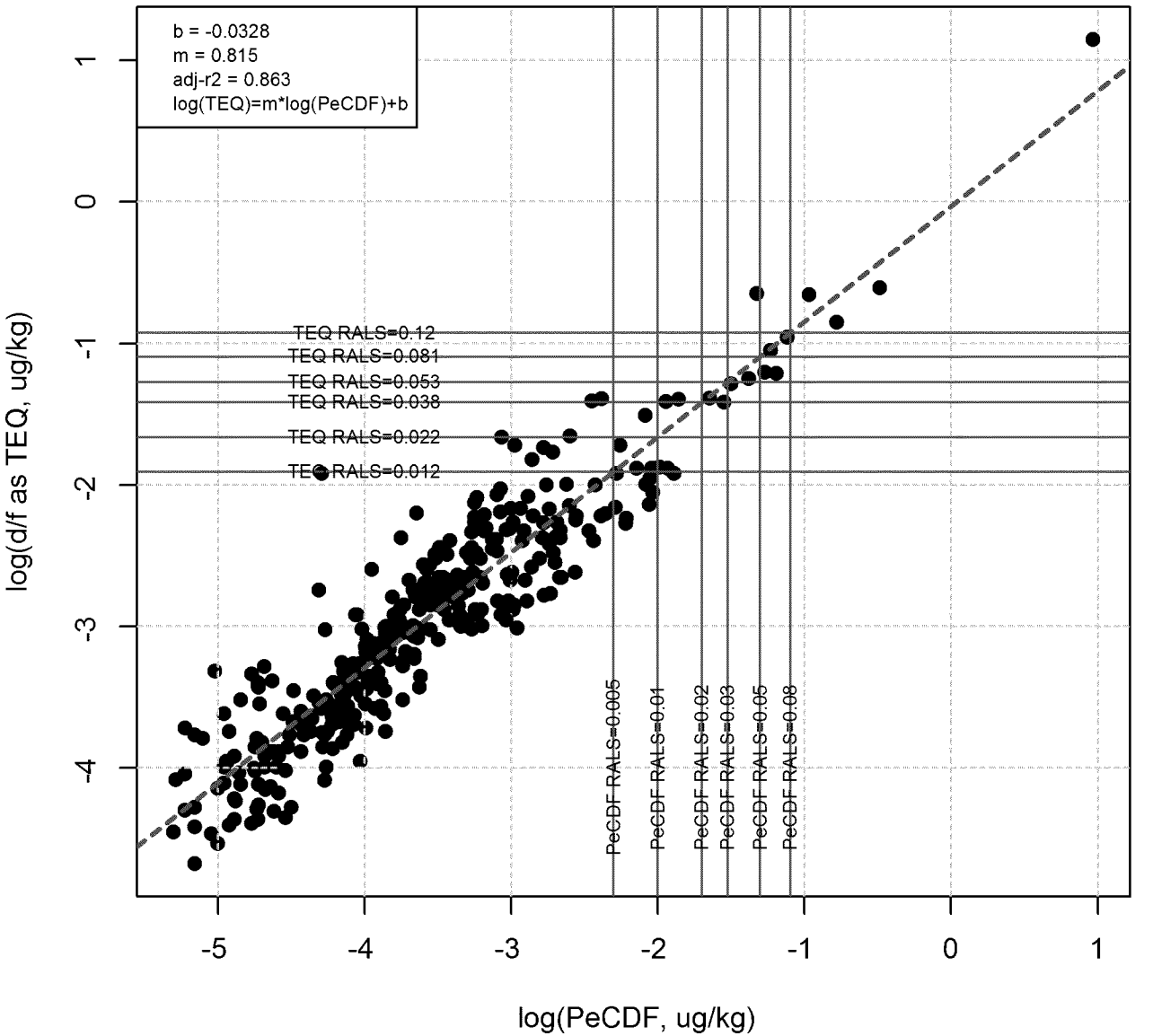
$$[illegible] = 10^{[\,[illegible]_{10}([illegible]) + [illegible]\,]}$$

The resulting dioxin/furans as TEQ RALs, base PeCDF RALs and respective alternatives are presented in Table 1.

Alternative	PeCDF RAL (µg/kg)	Dioxin/Furans as TEQ RAL (µg/kg)
B	0.08	0.12
C	0.05	0.081
D	0.03	0.053
E	0.02	0.038
F	0.01	0.022
G	0.005	0.012

Finally, a series of maps were created comparing the interpolated dioxin/furans as TEQ surface sediment concentrations with the calculated RALs to the LWG and EPA sediment management area footprints. See file "DioxinFuran_TEQ_RALs_wth_alts_SMA_maps.pdf".

Figure 1
Dioxin/Furans as TEQ to PeCDF RALs, Site-wide Surface Sediment



To: Cora, Lori[Cora.Lori@epa.gov]; Lance Peterson[PetersonLE@cdmsmith.com]
From: Sheldrake, Sean
Sent: Thur 2/20/2014 10:41:41 PM
Subject: Fw: Oregon Pesticide Rule and waste designation
OR_PesticideRuleAndWasteDesignationClarification.pdf

Fyi...
Sean Sheldrake
Unit Diving Officer, RPM
206.553.1220 work cell
Like us on facebook!
https://www.facebook.com/epaDIVERS

From: PENCE Holly <PENCE.Holly@deq.state.or.us>
Sent: Thursday, February 20, 2014 2:21:41 PM
To: Sheldrake, Sean
Cc: MCCLINCY Matt; JOHNSON Keith; OBRIEN Audrey
Subject: Oregon Pesticide Rule and waste designation

The attached is an electronic copy of a letter that will follow by postal mail to Mr. Sheldrake.

Holly Pence 503-229-5353
DEQ Northwest Region
Solid and Hazardous Waste Program Support
Solid Waste Permit Coordinator - Solid Waste Duty Officer

To: Humphrey, Chip[Humphrey.Chip@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 2/4/2014 8:15:34 PM
Subject: Draft FS Revision Process Framework
2014-02-04 Draft FS Revision Process Framework.docx

Chip and Lori, in preparation for the Senior Manager meeting, I've drafted this process (which replaces the LWG's process) which is meant to clarify how we will be engaging with the LWG and how the AOC fits into this engagement. Please look it over and provide me with your comments. We can discuss further tomorrow, but I wanted your input early.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

To: Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
Cc: Humphrey, Chip[Humphrey.Chip@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Koch, Kristine
Sent: Fri 1/24/2014 5:44:14 PM
Subject: PH Briefing on Monday
2012-30-20_Cover_TOC_Acronyms.pdf

All – I should have also attached a copy of the current FS outline so that you could see the difference. Here it is.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

PORTLAND HARBOR RI/FS

DRAFT FEASIBILITY STUDY

DRAFT

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This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

This pre deliverable electronic version provided to the EPA project team may contain formatting or other errors and will be replaced by the March 30, 2012 draft Feasibility Study.

March 30, 2012

Prepared for
The Lower Willamette Group

Prepared by
Anchor QEA, LLC

AQ11-12

RECOMMENDED FOR INCLUSION IN ADMINISTRATIVE RECORD

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ATTACHMENT – EXECUTIVE SUMMARY

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LIST OF ACRONYMS

µg/kg	micrograms per kilogram
2,3,7,8-TCDD	Tetrachlorodibenzo-p-dioxin
95 UPL	95th percentile upper prediction limit
AC	Activated Carbon
ACM	Active Channel Margin
ACPS	Activated Carbon Pilot Study
AOC	Administrative Order on Consent
AOPC	Area of Potential Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ATL	Acceptable Treatment Levels
AWQC	Ambient Water Quality Criteria
BA	Biological Assessment
BaP	Benzo(a)pyrene
BaPEq	Benzo(a)pyrene equivalent
BERA	Baseline Ecological Risk Assessment
BHHRA	Baseline Human Health Risk Assessment
BMP	Best Management Practice
CAD	Confined Aquatic Disposal
CAG	Community Advisory Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CDF	Confined Disposal Facility
cfs	cubic feet per second
CFR	Code of Federal Regulations
CH_4	Methane
CLE	Contingency Level Event
cm	centimeter
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO2-eq	Caron Dioxide Equivalent
COI	Chemical of Interest
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
cPAH	carcinogenic Polycyclic Aromatic Hydrocarbon
CRD	Columbia River Datum
CSM	Conceptual Site Model
CSO	Combined Sewer Overflow
CWA	Clean Water Act
cy	cubic yards
DDD	Dichloro-diphenyl-dichloroethane
DDE	Dichloro-diphenyl-dichloroethene
DDT	Dichloro-diphenyl-trichloroethane

DDx	2,4′ and 4,4′-DDD, -DDE, -DDT
DEQ	Oregon Department of Environmental Quality
DL	Detection Limit
DMR	Discharge Monitoring Report
DNAPL	Dense Non-Aqueous Phase Liquids
DOI	Depth of Impact
DRET	Dredge Elutriate Test
DSL	Oregon Department of State Lands
DW	Dry Weight
ECSI	Oregon Environmental Cleanup Site Inventory
EE/CA	Engineering Evaluation/Cost Analysis
EF	Engineering Factor
EMNR	Enhanced Monitored Natural Recovery
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentrations
ERAGS	Ecological Risk Assessment Guidance for Superfund
ESA	Endangered Species Act
FEMA	Federal Emergency Management Act
FPM	Floating Point Model
FMD	Future Maintenance Dredge Area
FS	Feasibility Study
$g/cm^2/d$	grams of sediment per square centimeter per day
GHG	Greenhouse Gas
GIS	Geographic Information System
GPS	Global Positioning System
GRA	General Response Actions
GWP	Global Warming Potential
HC	Hydrocarbons
HI	Hazard Index
HPAH	High Molecular Weight Polycyclic Aromatic Hydrocarbon
HQ	Hazard Quotient
HST	Hydrodynamic and Sediment Transport
H:V	Horizontal to Vertical
IC	Indicator Chemical
JSCS	Joint Source Control Strategy
L2	Level 2
L3	Level 3
LOE	Line of Evidence
LPAH	Low Molecular Weight Polycyclic Aromatic Hydrocarbon
LRM	Logistic Regression Model
LWG	Lower Willamette Group
MCL	Maximum Contaminant Level
mg/kg	milligram per kilogram
mg/L	milligram per liter
MGP	Manufactured Gas Plant

MNR	Monitored Natural Recovery
MOU	Memorandum of Understanding
mph	miles per hour
MQ	Mean Quotient
N_2O	Nitrous Oxide
NAPL	Non-Aqueous Phase Liquid
NAVD88	North American Vertical Datum of 1988
NC	Navigation Channel Area
NCP	National Contingency Plan
ng/g	nanograms per gram
ng/L	nanograms per liter
NGI	Norwegian Geotechnical Institute
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NN	Natural Neighbors
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen oxides (NOx)
NRC	National Research Council
NRDA	Natural Resource Damage Assessment
NRWQC	National Recommended Water Quality Criteria
NTCRA	Non-Time Critical Removal Action
NV	Neatline Volume
OAR	Oregon Administrative Regulations
OC	Organic Carbon
OCCRI	Oregon Climate Change Research Institute
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OHW	Ordinary High Water
OLW	Ordinary Low Water
OMMP	Operations, Maintenance and Monitoring Plan
OPA	Oil Pollution Act
ORS	Oregon Revised Statutes
OSWER	EPA Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbon
PBDE	Polybrominated Diphenyl Ethers
PCB	Polychlorinated Biphenyl
PCDD/F	Polychlorinated Dibenzo-p-dioxin/furan
2,3,4,7,8-PCDF	Polychlorinated Dibenzofuran
PHNRT	Portland Harbor Natural Resource Trustees
PM10	Particulate Matter Less than 10 Microns in Diameter
PM2.5	Particulate Matter Less than 2.5 Microns in Diameter
pMax	Maximum Probability of Toxicity
pg/g	picograms per gram

POTW	Publicly Owned Treatment Works
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
PTM	Principal Threat Material
QAPP	Quality Assurance Project Plan
RAL	Remedial Action Level
RAO	Remedial Action Objective
RBC	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RG	Remediation Goal
RHV	Relative Habitat Value
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
RISG	Ross Island Sand and Gravel Company
RM	River Mile
RME	Reasonable Maximum Exposure
RNA	Regulated Navigation Area
ROD	Record of Decision
RPD	Relative Percent Difference
RSET	Regional Sediment Evaluation Team
RSL	Regional Screening Levels
SCRA	Site Characterization and Risk Assessment
SDWA	Safe Drinking Water Act
Site	Portland Harbor Superfund Site
SMA	Sediment Management Area
SMU	Sediment Management Unit
SO_2	Sulfur Dioxide
SOW	Statement of Work
SPI	Sediment Profile Imaging
SPMD	Semi-Permeable Membrane Devices
S/S	stabilization/solidification
SQV	Sediment Quality Values
SVOC	Semivolatile Organic Compound
SWAC	Surface-area Weighted Average Concentration
TAT	Technical Assistance Team
TBC	To Be Considered
TBT	Tributyltin
TCDD	Tetrachlorodibenzo-p-dioxin
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TEF	Toxicity Equivalency Factor
TEQ	Toxic Equivalent

TI	Technical Impracticability
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
TTL	Target Tissue Levels
TZW	Transition Zone Water
UCL	Upper Confidence Limit
UPL	Upper Prediction Limit
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tanks
UTL	Upper Tolerance Limit
VOC	Volatile Organic Compound
WHO	World Health Organization
WQS	Oregon Water Quality Standards

To: Koch, Kristine[Koch.Kristine@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
Cc: Humphrey, Chip[Humphrey.Chip@epa.gov]; Peterson, Lance[PetersonLE@cdmsmith.com]
From: Sheldrake, Sean
Sent: Mon 11/25/2013 5:25:23 PM
Subject: RE: LSS-EPA Agreements - Arkema EE/CA Meeting, November 14, 2013
Final PH PRGs.xlsx

Thanks Kristine; we'll reference in our response then as we head to dispute on a short or long list…S

Sean Sheldrake, Unit Diving Officer, RPM

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http://www.epa.gov/region10/dive/

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From: Koch, Kristine
Sent: Monday, November 25, 2013 7:49 AM
To: Sheldrake, Sean; Cora, Lori
Cc: Humphrey, Chip
Subject: RE: LSS-EPA Agreements - Arkema EE/CA Meeting, November 14, 2013

PRGs are final…here is the table.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Sheldrake, Sean
Sent: Sunday, November 24, 2013 8:35 AM
To: Cora, Lori
Cc: Humphrey, Chip; Koch, Kristine
Subject: FW: LSS-EPA Agreements - Arkema EE/CA Meeting, November 14, 2013

Lori, I just wanted to make sure you saw this letter and that I make sure to put in place any process or deadlines you recommend –I'd like to give a bit more time to see if we can work thru more of the list if possible.

Thanks!

S

Sean Sheldrake, Unit Diving Officer, RPM

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: David Livermore [mailto:dlivermore@integral-corp.com]
Sent: Friday, November 22, 2013 5:20 PM
To: Sheldrake, Sean; Lance E. Peterson LHG (petersonle@cdm.com)
Cc: Todd Slater (todd.slater@total.com); Eron Dodak
Subject: LSS-EPA Agreements - Arkema EE/CA Meeting, November 14, 2013

Sean and Lance,

Attached is a letter that briefly summarizes the agreements from the November 14, 2013 meeting to discuss the EE/CA comments. Please let me know if you have any questions or clarifications. Thanks.

David

David Livermore, R.G., L.H.G. | Principal

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To: Ader, Mark[Ader.Mark@epa.gov]; Alex Liverman (liverman.alex@deq.state.or.us)[liverman.alex@deq.state.or.us]; allenmc@cdm.com[allenmc@cdm.com]; audiehuber@ctuir.com[audiehuber@ctuir.com]; bayuk.dana@deq.state.or.us[bayuk.dana@deq.state.or.us]; schwarz.bob@deq.state.or.us[schwarz.bob@deq.state.or.us]; brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; callie@ridolfi.com[callie@ridolfi.com]; Conley, Alanna[conley.alanna@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; cunninghame@gorge.net[cunninghame@gorge.net]; Dan Hafley (HAFLEY.Dan@deq.state.or.us)[HAFLEY.Dan@deq.state.or.us]; erin.madden@gmail.com[erin.madden@gmail.com]; Fuentes, Rene[fuentes.rene@epa.gov]; Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Genevieve Angle (Genevieve.Angle@noaa.gov)[Genevieve.Angle@noaa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; jd@williamsjohnsonlaw.com[jd@williamsjohnsonlaw.com]; Jen Kassakian (jkassakian@indecon.com)[jkassakian@indecon.com]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; johnson.keith@deq.state.or.us[johnson.keith@deq.state.or.us]; jweis@hk-law.com[jweis@hk-law.com]; Kristin Callahan[kristin@ridolfi.com]; Koch, Kristine[Koch.Kristine@epa.gov]; Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]; matt@williamsjohnsonlaw.com[matt@williamsjohnsonlaw.com]; mcclincy.matt@deq.state.or.us[mcclincy.matt@deq.state.or.us]; tosm@yakamafish-nsn.gov[tosm@yakamafish-nsn.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Muza, Richard[Muza.Richard@epa.gov]; Nancy.Munn@noaa.gov[Nancy.Munn@noaa.gov]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; poulsen.mike@deq.state.or.us[poulsen.mike@deq.state.or.us]; Rachel DelVecchio (rdelvecchio@indecon.com)[rdelvecchio@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; ted_buerger@fws.gov[ted_buerger@fws.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Tom Gainer (gainer.tom@deq.state.or.us)[gainer.tom@deq.state.or.us]
From: Sheldrake, Sean
Sent: Sun 11/24/2013 4:33:57 PM
Subject: FW: LSS-EPA Agreements - Arkema EE/CA Meeting, November 14, 2013
LSS-EPA Agreements_2013-11-14.pdf

Hello everyone, if you participated in the 11/14 meeting and have any difference recollections, please do let me know such that we can clarify issues when the next meeting is scheduled (likely Tuesday mid day this week). Thank you. S

Sean Sheldrake, Unit Diving Officer, RPM

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Cc: Todd Slater (todd.slater@total.com); Eron Dodak
Subject: LSS-EPA Agreements - Arkema EE/CA Meeting, November 14, 2013

Sean and Lance,

Attached is a letter that briefly summarizes the agreements from the November 14, 2013 meeting to discuss the EE/CA comments. Please let me know if you have any questions or clarifications. Thanks.

David

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To: Cora, Lori[Cora.Lori@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]
From: Koch, Kristine
Sent: Fri 11/8/2013 8:03:42 PM
Subject: RE: Can one of you tell me where in the BERA surface water samples were compared to aquatic WQS?
2011-08-29_DF RI_AppD5.1_Summary Stats Tables.pdf
2011-08-29_DF RI_AppD5.2_Figures.pdf

That would be Appendix D5

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From: Cora, Lori
Sent: Thursday, November 07, 2013 9:42 AM
To: Koch, Kristine; Humphrey, Chip
Subject: RE: Can one of you tell me where in the BERA surface water samples were compared to aquatic WQS?

Sorry to be a pest, but is there someplace in the RI, where surface water data was compared to aquatic water quality standards? The BERA, attachment 11 just compares to concentrations up river. If you tell me where to look, I'll go get it. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
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From: Koch, Kristine

Sent: Thursday, November 07, 2013 9:23 AM
To: Cora, Lori; Humphrey, Chip
Subject: RE: Can one of you tell me where in the BERA surface water samples were compared to aquatic WQS?

Attachment 10 or 11

Kristine Koch
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From: Cora, Lori
Sent: Thursday, November 07, 2013 9:14 AM
To: Koch, Kristine; Humphrey, Chip
Subject: Can one of you tell me where in the BERA surface water samples were compared to aquatic WQS?

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Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Black crappie (fillet without skin)																
Metals																
Mercury	mg/kg-Wet	4	4	100	0.067	0.101	FZ0609	0.086	0.088 V	0.0994 V	0.067	0.101	FZ0609	0.086	0.088 V	0.0994 V
Black crappie (fillet)																
Conventionals																
Lipids	percent-Wet	4	4	100	0.99	1.8	FZ0306	1.4	1.4 V	1.8 V	0.99	1.8	FZ0306	1.4	1.4 V	1.8 V
Total solids	percent-Wet	4	4	100	20.6 T	22.1	FZ0306	21.2	21.1 V	22 V	20.6 T	22.1	FZ0306	21.2	21.1 V	22 V
Metals																
Aluminum	mg/kg-Wet	4	4	100	3.04 JT	7.03 J	FZ0306	5.23	5.43 JV	6.92 JV	3.04 JT	7.03 J	FZ0306	5.23	5.43 JV	6.92 JV
Antimony	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.001 U	0.001 U	FZ0306; FZ0609	0.0005	0.0005 UV	0.0005 UV
Arsenic	mg/kg-Wet	4	4	100	0.1 J	0.18 T	FZ0609	0.14	0.14 V	0.18 V	0.1 J	0.18 T	FZ0609	0.14	0.14 V	0.18 V
Cadmium	mg/kg-Wet	4	2	50	0.001 JT	0.001 JT	FZ0306; FZ0609	0.001	0.001 JV	0.001 JV	0.001 JT	0.001 JT	FZ0306; FZ0609	0.00075	0.00075 JV	0.001 JV
Chromium	mg/kg-Wet	4	2	50	0.14	0.28	FZ0306	0.21	0.21 V	0.27 V	0.06 U	0.28	FZ0306	0.12	0.085 V	0.26 V
Copper	mg/kg-Wet	4	4	100	0.166	0.184 T	FZ0306; FZ0609	0.178	0.181 V	0.184 V	0.166	0.184 T	FZ0306; FZ0609	0.178	0.181 V	0.184 V
Lead	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.001 U	0.005 U	FZ0306	0.00113	0.00075 UV	0.00228 UV
Manganese	mg/kg-Wet	4	4	100	0.083 J	0.168 J	FZ0306	0.13	0.135 JV	0.164 JV	0.083 J	0.168 J	FZ0306	0.13	0.135 JV	0.164 JV
Nickel	mg/kg-Wet	4	2	50	0.057	0.064	FZ0306	0.0605	0.0605 V	0.0637 V	0.001 U	0.064	FZ0306	0.0305	0.0288 V	0.063 V
Selenium	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.3 U	0.4 UT	FZ0609	0.16	0.15 UV	0.19 UV
Silver	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.0002 U	0.0002 U	FZ0306; FZ0609	0.0001	0.0001 UV	0.0001 UV
Thallium	mg/kg-Wet	4	4	100	0.0046	0.0099 T	FZ0609	0.0071	0.00695 V	0.00947 V	0.0046	0.0099 T	FZ0609	0.0071	0.00695 V	0.00947 V
Zinc	mg/kg-Wet	4	4	100	7.45	9.03	FZ0306	8.23	8.22 V	8.98 V	7.45	9.03	FZ0306	8.23	8.22 V	8.98 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.95 U	1.9 U	FZ0306; FZ0609	0.83	0.95 UV	0.95 UV
Aroclor 1221	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.95 U	1.9 U	FZ0306; FZ0609	0.83	0.95 UV	0.95 UV
Aroclor 1232	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.95 U	1.9 U	FZ0306; FZ0609	0.83	0.95 UV	0.95 UV
Aroclor 1242	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.95 U	1.9 U	FZ0306; FZ0609	0.83	0.95 UV	0.95 UV
Aroclor 1248	µg/kg-Wet	4	4	100	6.6	16	FZ0609	10	9.4 V	15 V	6.6	16	FZ0609	10	9.4 V	15 V
Aroclor 1254	µg/kg-Wet	4	0	0	--	--	--	--	--	--	9.9 U	18 U	FZ0609	6.9	6.8 UV	8.7 UV
Aroclor 1260	µg/kg-Wet	4	4	100	13	16	FZ0609	14	13 V	16 V	13	16	FZ0609	14	13 V	16 V
Aroclor 1262	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.95 U	1.9 U	FZ0306; FZ0609	0.83	0.95 UV	0.95 UV
Aroclor 1268	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.95 U	1.9 U	FZ0306; FZ0609	0.83	0.95 UV	0.95 UV
Aroclors	µg/kg-Wet	4	4	100	19.6 T	32 T	FZ0609	24.1	22.4 V	30.6 V	19.6 T	32 T	FZ0609	24.1	22.4 V	30.6 V
Total PCBs[d]																
Total PCBs	µg/kg-Wet	4	4	100	19.6 T	32 T	FZ0609	24.1	22.4 V	30.6 V	19.6 T	32 T	FZ0609	24.1	22.4 V	30.6 V
Pesticides																
2,4'-DDD	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
2,4'-DDE	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
2,4'-DDT	µg/kg-Wet	4	2	50	1.1 NJ	1.1 NJ	FZ0609	1.1	1.1 JV	1.1 JV	1 U	1.1 NJ	FZ0609	0.8	0.8 JV	1.1 JV
4,4'-DDD	µg/kg-Wet	4	4	100	1.8 J	2.7 J	FZ0609	2.2	2.2 JV	2.7 JV	1.8 J	2.7 J	FZ0609	2.2	2.2 JV	2.7 JV
4,4'-DDE	µg/kg-Wet	4	4	100	5.5	7.8	FZ0609	6.7	6.8 V	7.7 V	5.5	7.8	FZ0609	6.7	6.8 V	7.7 V
4,4'-DDT	µg/kg-Wet	4	4	100	1.5 J	2.3 NJ	FZ0609	1.9	1.8 JV	2.3 JV	1.5 J	2.3 NJ	FZ0609	1.9	1.8 JV	2.3 JV
Aldrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
alpha-Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
beta-Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
cis-Chlordane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
cis-Nonachlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.2 U	1.6 U	FZ0306; FZ0609	0.74	0.78 UV	0.8 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Dieldrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Endosulfan sulfate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Endrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Endrin aldehyde	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Endrin ketone	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Heptachlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Heptachlor epoxide	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Methoxychlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Mirex	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Oxychlordane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Total Chlordanes	µg/kg-Wet	4	1	25	1.1 NJT	1.1 NJT	FZ0306	1.1	1.1 NJT	1.1 NJT	1.1 NJT	1.6 UT	FZ0609	0.81	0.78 UV	1.1 JV
Total Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1 UT	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	4	4	100	1.8 JT	2.7 JT	FZ0609	2.2	2.2 JV	2.7 JV	1.8 JT	2.7 JT	FZ0609	2.2	2.2 JV	2.7 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	8.8 JT	13.7 NJT	FZ0609	11.4	11.5 JV	13.5 JV	8.8 JT	13.7 NJT	FZ0609	11.4	11.5 JV	13.5 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	4	4	100	5.5 T	7.8 T	FZ0609	6.7	6.8 V	7.7 V	5.5 T	7.8 T	FZ0609	6.7	6.8 V	7.7 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	4	4	100	1.5 JT	3.4 NJT	FZ0609	2.4	2.4 JV	3.4 JV	1.5 JT	3.4 NJT	FZ0609	2.4	2.4 JV	3.4 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	8.8 JT	12.6 JT	FZ0609	10.8	10.9 JV	12.4 JV	8.8 JT	12.6 JT	FZ0609	10.8	10.9 JV	12.4 JV
Toxaphene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	50 UJ	83 U	FZ0306	29	25 UJV	39 UJV
trans-Chlordane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
trans-Nonachlor	µg/kg-Wet	4	1	25	1.1 NJ	1.1 NJ	FZ0306	1.1	1.1 NJ	1.1 NJ	1 U	1.1 NJ	FZ0306	0.65	0.5 UV	1 JV
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Hexachlorobutadiene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJ	1 UJ	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Hexachloroethane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJ	1 UJ	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Black crappie (whole body)																
Conventionals																
Lipids	percent-Wet	4	4	100	3.33 T	7.5 T	FZ0609	5.26	5.1 V	7.35 V	3.33 T	7.5 T	FZ0609	5.26	5.1 V	7.35 V
Total solids	percent-Wet	4	4	100	25.8 T	29.5	FZ0609	27.6	27.6 V	29.3 V	25.8 T	29.5	FZ0609	27.6	27.6 V	29.3 V
Metals																
Aluminum	mg/kg-Wet	4	4	100	5.8 J	68.9	FZ0609	22.4	7.4 JV	59.8 JV	5.8 J	68.9	FZ0609	22.4	7.4 JV	59.8 JV
Antimony	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.001 U	0.001 U	FZ0306; FZ0609	0.0005	0.0005 UV	0.0005 UV
Arsenic	mg/kg-Wet	4	4	100	0.185 T	0.42	FZ0609	0.279	0.255 V	0.401 V	0.185 T	0.42	FZ0609	0.279	0.255 V	0.401 V
Cadmium	mg/kg-Wet	4	4	100	0.003 J	0.006 J	FZ0609	0.00388	0.00325 JV	0.00563 JV	0.003 J	0.006 J	FZ0609	0.00388	0.00325 JV	0.00563 JV
Chromium	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.08 U	0.09 U	FZ0609	0.041	0.04 UV	0.044 UV
Copper	mg/kg-Wet	4	4	100	0.688	0.946	FZ0306	0.82	0.822 V	0.943 V	0.688	0.946	FZ0306	0.82	0.822 V	0.943 V
Lead	mg/kg-Wet	4	1	25	0.0185 JT	0.0185 JT	FZ0306	0.0185	0.0185 JT	0.0185 JT	0.004 UJ	0.0185 JT	FZ0306	0.00663	0.003 UJV	0.0163 JV
Manganese	mg/kg-Wet	4	4	100	2.8	3.41	FZ0306	3.12	3.14 V	3.4 V	2.8	3.41	FZ0306	3.12	3.14 V	3.4 V
Mercury	mg/kg-Wet	4	4	100	0.033	0.044	FZ0609	0.0394	0.0403 V	0.044 V	0.033	0.044	FZ0609	0.0394	0.0403 V	0.044 V
Nickel	mg/kg-Wet	4	4	100	0.33 JT	0.357 J	FZ0609	0.343	0.343 JV	0.356 JV	0.33 JT	0.357 J	FZ0609	0.343	0.343 JV	0.356 JV
Selenium	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.3 U	0.3 U	FZ0306; FZ0609	0.15	0.15 UV	0.15 UV
Silver	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.0004 U	0.002 U	FZ0306	0.000588	0.000575 UV	0.000978 UV
Thallium	mg/kg-Wet	4	4	100	0.006 T	0.0167	FZ0609	0.0108	0.0103 V	0.016 V	0.006 T	0.0167	FZ0609	0.0108	0.0103 V	0.016 V
Zinc	mg/kg-Wet	4	4	100	14.2 T	16.8	FZ0609	15.4	15.3 V	16.6 V	14.2 T	16.8	FZ0609	15.4	15.3 V	16.6 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	FZ0609	1.9	0.95 UV	4.2 UV
Aroclor 1221	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	FZ0609	1.9	0.95 UV	4.2 UV
Aroclor 1232	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	FZ0609	1.9	0.95 UV	4.2 UV
Aroclor 1242	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	FZ0609	1.9	0.95 UV	4.2 UV
Aroclor 1248	µg/kg-Wet	4	4	100	39	110	FZ0609	58	42 V	100 V	39	110	FZ0609	58	42 V	100 V
Aroclor 1254	µg/kg-Wet	4	0	0	--	--	--	--	--	--	67 U	130 U	FZ0609	45	40 UV	62 UV
Aroclor 1260	µg/kg-Wet	4	4	100	46	140	FZ0609	75	58 V	130 V	46	140	FZ0609	75	58 V	130 V
Aroclor 1262	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	FZ0609	1.9	0.95 UV	4.2 UV
Aroclor 1268	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	FZ0609	1.9	0.95 UV	4.2 UV
Aroclors	µg/kg-Wet	4	4	100	85 T	250 T	FZ0609	134	99.5 V	229 V	85 T	250 T	FZ0609	134	99.5 V	229 V
PCB Congeners																
PCB001	pg/g-Wet	2	2	100	6.85 J	21.9 J	FZ0609	14.4	14.4 JV	21.1 JV	6.85 J	21.9 J	FZ0609	14.4	14.4 JV	21.1 JV
PCB002	pg/g-Wet	2	2	100	2.44 J	2.48 J	FZ0609	2.46	2.46 JV	2.48 JV	2.44 J	2.48 J	FZ0609	2.46	2.46 JV	2.48 JV
PCB003	pg/g-Wet	2	2	100	4.66 J	8.7 J	FZ0609	6.68	6.68 JV	8.5 JV	4.66 J	8.7 J	FZ0609	6.68	6.68 JV	8.5 JV
PCB004	pg/g-Wet	4	4	100	218	596	FZ0609	351	296 V	559 V	218	596	FZ0609	351	296 V	559 V
PCB005	pg/g-Wet	4	0	0	--	--	--	--	--	--	2.39 U	5.8 U	FZ0306	2	1.95 UV	2.8 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB006	pg/g-Wet	4	4	100	16.8	50.6	FZ0609	36.4	39 JV	49.1 JV	16.8	50.6	FZ0609	36.4	39 JV	49.1 JV
PCB007	pg/g-Wet	4	4	100	4.82	13.9 J	FZ0306	9.75	10.1 JV	13.5 JV	4.82	13.9 J	FZ0306	9.75	10.1 JV	13.5 JV
PCB008	pg/g-Wet	4	4	100	92.7	441	FZ0609	256	246 V	416 V	92.7	441	FZ0609	256	246 V	416 V
PCB009	pg/g-Wet	4	3	75	4.81	12.7 J	FZ0306	8.87	9.11	12.3 JV	4.63 U	12.7 J	FZ0306	7.23	6.96 V	12.2 JV
PCB010	pg/g-Wet	4	4	100	9.77 J	28	FZ0609	15.7	12.5 JV	26.1 JV	9.77 J	28	FZ0609	15.7	12.5 JV	26.1 JV
PCB011	pg/g-Wet	4	4	100	171	588	FZ0609	337	295 JV	561 V	171	588	FZ0609	337	295 JV	561 V
PCB012 & 013	pg/g-Wet	4	2	50	16.5 J	46.2 J	FZ0609	31.4	31.4 JV	44.7 JV	9.79 U	46.2 J	FZ0609	18.1	10.7 JV	41.7 JV
PCB014	pg/g-Wet	4	0	0	--	--	--	--	--	--	3.14 U	5.81 U	FZ0306	2.25	2.25 UV	2.9 UV
PCB015	pg/g-Wet	4	4	100	47.7	130	FZ0609	94.1	99.3 V	128 V	47.7	130	FZ0609	94.1	99.3 V	128 V
PCB016	pg/g-Wet	4	4	100	111	278	FZ0306	207	220 V	270 V	111	278	FZ0306	207	220 V	270 V
PCB017	pg/g-Wet	4	4	100	297	1150	FZ0609	598	473 V	1060 V	297	1150	FZ0609	598	473 V	1060 V
PCB018 & 030	pg/g-Wet	4	4	100	202 J	451 J	FZ0306	357	388 JV	445 JV	202 J	451 J	FZ0306	357	388 JV	445 JV
PCB019	pg/g-Wet	4	4	100	356	901	FZ0609	524	420 V	837 V	356	901	FZ0609	524	420 V	837 V
PCB020 & 028	pg/g-Wet	4	4	100	1150 J	6090 J	FZ0609	2710	1800 JV	5450 JV	1150 J	6090 J	FZ0609	2710	1800 JV	5450 JV
PCB021 & 033	pg/g-Wet	4	4	100	197 J	569 J	FZ0609	405	427 JV	557 JV	197 J	569 J	FZ0609	405	427 JV	557 JV
PCB022	pg/g-Wet	4	4	100	252	1180	FZ0609	580	444 V	1070 V	252	1180	FZ0609	580	444 V	1070 V
PCB023	pg/g-Wet	4	0	0	--	--	--	--	--	--	3.58 U	7.19 U	FZ0306	2.72	2.75 UV	3.59 UV
PCB024	pg/g-Wet	4	4	100	5.27	14.2	FZ0306	10.3	11 JV	13.8 V	5.27	14.2	FZ0306	10.3	11 JV	13.8 V
PCB025	pg/g-Wet	4	4	100	93.5	558	FZ0609	221	116 V	492 V	93.5	558	FZ0609	221	116 V	492 V
PCB026 & 029	pg/g-Wet	4	4	100	202 J	1240 J	FZ0609	488	255 JV	1090 JV	202 J	1240 J	FZ0609	488	255 JV	1090 JV
PCB027	pg/g-Wet	4	4	100	60.8	309	FZ0609	140	94.5 V	279 V	60.8	309	FZ0609	140	94.5 V	279 V
PCB031	pg/g-Wet	4	4	100	903	4680	FZ0609	1990	1180 V	4160 V	903	4680	FZ0609	1990	1180 V	4160 V
PCB032	pg/g-Wet	4	4	100	180	1240	FZ0609	511	312 V	1110 V	180	1240	FZ0609	511	312 V	1110 V
PCB034	pg/g-Wet	4	4	100	4.05	18.4	FZ0609	9.07	6.91 V	16.8 V	4.05	18.4	FZ0609	9.07	6.91 V	16.8 V
PCB035	pg/g-Wet	4	1	25	5.33	5.33	FZ0609	5.33	5.33	5.33	2.34 U	5.62 U	FZ0306	2.87	2.49 UV	4.95 V
PCB036	pg/g-Wet	4	2	50	72	261	FZ0609	167	167 V	252 V	7.2 U	261	FZ0609	85.1	37.8 V	233 V
PCB037	pg/g-Wet	4	4	100	124	595	FZ0609	320	281 V	548 V	124	595	FZ0609	320	281 V	548 V
PCB038	pg/g-Wet	4	1	25	3.67	3.67	FZ0609	3.67	3.67	3.67	2.92 U	5.41 U	FZ0306	2.63	2.69 UV	3.53 V
PCB039	pg/g-Wet	4	4	100	5.56	27.2	FZ0609	13.6	10.8 V	24.8 V	5.56	27.2	FZ0609	13.6	10.8 V	24.8 V
PCB040 & 041 & 071	pg/g-Wet	4	4	100	716 J	2730 J	FZ0609	1270	817 JV	2450 JV	716 J	2730 J	FZ0609	1270	817 JV	2450 JV
PCB042	pg/g-Wet	4	4	100	446	1970	FZ0609	859	509 V	1750 V	446	1970	FZ0609	859	509 V	1750 V
PCB043	pg/g-Wet	4	4	100	72	245	FZ0609	127	94.8 V	225 V	72	245	FZ0609	127	94.8 V	225 V
PCB044 & 047 & 065	pg/g-Wet	4	4	100	2200 J	11000 J	FZ0609	4710	2820 JV	9820 JV	2200 J	11000 J	FZ0609	4710	2820 JV	9820 JV
PCB045 & 051	pg/g-Wet	4	4	100	295 J	1140 J	FZ0609	549	381 JV	1030 JV	295 J	1140 J	FZ0609	549	381 JV	1030 JV
PCB046	pg/g-Wet	4	4	100	43.5	134	FZ0609	80.4	72 V	126 V	43.5	134	FZ0609	80.4	72 V	126 V
PCB048	pg/g-Wet	4	4	100	224	798	FZ0609	401	290 V	725 V	224	798	FZ0609	401	290 V	725 V
PCB049 & 069	pg/g-Wet	4	4	100	1420 J	7390 J	FZ0609	3150	1900 JV	6610 JV	1420 J	7390 J	FZ0609	3150	1900 JV	6610 JV
PCB050 & 053	pg/g-Wet	4	4	100	226 J	795 J	FZ0609	399	287 JV	721 JV	226 J	795 J	FZ0609	399	287 JV	721 JV
PCB052	pg/g-Wet	4	4	100	2530	11900	FZ0609	5190	3170 V	10700 V	2530	11900	FZ0609	5190	3170 V	10700 V
PCB054	pg/g-Wet	4	4	100	46	113	FZ0609	71	62.5 V	107 V	46	113	FZ0609	71	62.5 V	107 V
PCB055	pg/g-Wet	4	0	0	--	--	--	--	--	--	4.82 U	8.91 U	FZ0306	3.55	3.66 UV	4.45 UV
PCB056	pg/g-Wet	4	4	100	683	3810	FZ0609	1530	813 V	3370 V	683	3810	FZ0609	1530	813 V	3370 V
PCB057	pg/g-Wet	4	4	100	10.6	69.8	FZ0609	27.2	14.2 JV	61.5 JV	10.6	69.8	FZ0609	27.2	14.2 JV	61.5 JV
PCB058	pg/g-Wet	4	3	75	13.5 J	32.2	FZ0609	19.8	13.6	30.3 V	10.9 U	32.2	FZ0609	16.2	13.6 JV	29.4 V
PCB059 & 062 & 075	pg/g-Wet	4	4	100	207 J	816 J	FZ0609	372	232 JV	728 JV	207 J	816 J	FZ0609	372	232 JV	728 JV
PCB060	pg/g-Wet	4	4	100	528	2870	FZ0609	1140	586 V	2540 V	528	2870	FZ0609	1140	586 V	2540 V
PCB061 & 070 & 074 & 076	pg/g-Wet	4	4	100	3630 J	20100 J	FZ0609	8320	4770 JV	17900 JV	3630 J	20100 J	FZ0609	8320	4770 JV	17900 JV
PCB063	pg/g-Wet	4	4	100	116	784	FZ0609	308	165 V	696 V	116	784	FZ0609	308	165 V	696 V
PCB064	pg/g-Wet	4	4	100	855	2960	FZ0609	1420	927 V	2660 V	855	2960	FZ0609	1420	927 V	2660 V
PCB066	pg/g-Wet	4	4	100	2480	12900	FZ0609	5340	2980 V	11500 V	2480	12900	FZ0609	5340	2980 V	11500 V
PCB067	pg/g-Wet	4	4	100	54.5	345	FZ0609	140	79.9 V	307 V	54.5	345	FZ0609	140	79.9 V	307 V
PCB068	pg/g-Wet	4	4	100	22.9 J	151	FZ0609	65.5	44 V	136 V	22.9 J	151	FZ0609	65.5	44 V	136 V
PCB072	pg/g-Wet	4	4	100	33.7	198	FZ0609	85.7	55.6 V	178 V	33.7	198	FZ0609	85.7	55.6 V	178 V
PCB073	pg/g-Wet	4	0	0	--	--	--	--	--	--	5.8 U	11.6 U	FZ0306	4.4	4.45 UV	5.79 UV
PCB077	pg/g-Wet	4	4	100	162	685	FZ0609	299	175 V	609 V	162	685	FZ0609	299	175 V	609 V
PCB078	pg/g-Wet	4	1	25	130	130	FZ0609	130	130	130	4.12 U	130	FZ0609	34.9	3.8 UV	111 V
PCB079	pg/g-Wet	4	4	100	43	149	FZ0609	78.1	60.2 V	138 V	43	149	FZ0609	78.1	60.2 V	138 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB080	pg/g-Wet	4	0	0	--	--	--	--	--	--	5.59 U	11.2 U	FZ0306	4.24	4.29 UV	5.59 UV
PCB081	pg/g-Wet	4	4	100	7.82	36	FZ0609	16.4	10.9 V	32.6 V	7.82	36	FZ0609	16.4	10.9 V	32.6 V
PCB082	pg/g-Wet	4	4	100	241	802	FZ0609	429	336 V	732 V	241	802	FZ0609	429	336 V	732 V
PCB083 & 099	pg/g-Wet	4	4	100	3620 J	11500 J	FZ0609	6180	4810 JV	10600 JV	3620 J	11500 J	FZ0609	6180	4810 JV	10600 JV
PCB084	pg/g-Wet	4	4	100	402	1240	FZ0609	697	572 V	1140 V	402	1240	FZ0609	697	572 V	1140 V
PCB085 & 116 & 117	pg/g-Wet	4	4	100	916 J	2690 J	FZ0609	1460	1120 JV	2470 JV	916 J	2690 J	FZ0609	1460	1120 JV	2470 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	4	4	100	2090 J	6990 J	FZ0609	3760	2980 JV	6460 JV	2090 J	6990 J	FZ0609	3760	2980 JV	6460 JV
PCB088 & 091	pg/g-Wet	4	4	100	395 J	1530 J	FZ0609	787	611 JV	1400 JV	395 J	1530 J	FZ0609	787	611 JV	1400 JV
PCB089	pg/g-Wet	4	4	100	14.2 J	57.5	FZ0609	27.3	18.7 V	52.3 V	14.2 J	57.5	FZ0609	27.3	18.7 V	52.3 V
PCB090 & 101 & 113	pg/g-Wet	4	4	100	4220 J	14500 J	FZ0609	7760	6160 JV	13400 JV	4220 J	14500 J	FZ0609	7760	6160 JV	13400 JV
PCB092	pg/g-Wet	4	4	100	852	2840	FZ0609	1530	1220 V	2630 V	852	2840	FZ0609	1530	1220 V	2630 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	4	4	100	1990 J	6880 J	FZ0609	3700	2970 JV	6330 JV	1990 J	6880 J	FZ0609	3700	2970 JV	6330 JV
PCB094	pg/g-Wet	4	4	100	15.4 J	69.5	FZ0609	33.8	25.2 V	63.2 V	15.4 J	69.5	FZ0609	33.8	25.2 V	63.2 V
PCB096	pg/g-Wet	4	4	100	14.5 J	60	FZ0609	30.3	23.4 V	54.8 V	14.5 J	60	FZ0609	30.3	23.4 V	54.8 V
PCB103	pg/g-Wet	4	4	100	65.5	261	FZ0609	138	112 V	242 V	65.5	261	FZ0609	138	112 V	242 V
PCB104	pg/g-Wet	4	1	25	8.36	8.36	FZ0609	8.36	8.36	8.36	7.38 U	13.7 U	FZ0306	6.41	6.8 UV	8.13 V
PCB105	pg/g-Wet	4	4	100	1920	4930	FZ0609	2790	2150 V	4530 V	1920	4930	FZ0609	2790	2150 V	4530 V
PCB106	pg/g-Wet	4	0	0	--	--	--	--	--	--	8.95 U	18 U	FZ0306	6.81	6.88 UV	8.99 UV
PCB107 & 124	pg/g-Wet	4	4	100	161 J	407 J	FZ0609	237	190 JV	377 JV	161 J	407 J	FZ0609	237	190 JV	377 JV
PCB109	pg/g-Wet	4	4	100	435	1230	FZ0609	695	558 V	1150 V	435	1230	FZ0609	695	558 V	1150 V
PCB110 & 115	pg/g-Wet	4	4	100	3330 J	8730 J	FZ0609	5160	4290 JV	8100 JV	3330 J	8730 J	FZ0609	5160	4290 JV	8100 JV
PCB111	pg/g-Wet	4	3	75	9.24	14.1	FZ0609	11.3	10.5	13.7 V	9.24	14.1	FZ0609	9.75	9.87 V	13.6 V
PCB112	pg/g-Wet	4	0	0	--	--	--	--	--	--	6.37 U	12.8 U	FZ0306	4.85	4.9 UV	6.39 UV
PCB114	pg/g-Wet	4	4	100	130	359	FZ0609	195	145 V	329 V	130	359	FZ0609	195	145 V	329 V
PCB118	pg/g-Wet	4	4	100	5140	12700	FZ0609	7380	5850 V	11800 V	5140	12700	FZ0609	7380	5850 V	11800 V
PCB120	pg/g-Wet	4	4	100	33	84.3	FZ0609	52.4	46.2 V	79.5 V	33	84.3	FZ0609	52.4	46.2 V	79.5 V
PCB121	pg/g-Wet	4	3	75	8.42 J	15.1	FZ0609	11.9	12.1	14.8 V	7.51 U	15.1	FZ0609	9.84	10.3 JV	14.7 V
PCB122	pg/g-Wet	4	4	100	39.1	135	FZ0609	70.8	54.6 V	123 V	39.1	135	FZ0609	70.8	54.6 V	123 V
PCB123	pg/g-Wet	4	4	100	93.2	263	FZ0609	145	112 V	243 V	93.2	263	FZ0609	145	112 V	243 V
PCB126	pg/g-Wet	4	4	100	13.1	25.3	FZ0609	17.5	15.8 V	24.2 V	13.1	25.3	FZ0609	17.5	15.8 V	24.2 V
PCB127	pg/g-Wet	4	1	25	23.5	23.5	FZ0609	23.5	23.5	23.5	9.52 U	23.5	FZ0609	11.4	8.75 UV	21.3 V
PCB128 & 166	pg/g-Wet	4	4	100	903 J	2070 J	FZ0609	1270	1050 JV	1930 JV	903 J	2070 J	FZ0609	1270	1050 JV	1930 JV
PCB129 & 138 & 160 & 163	pg/g-Wet	4	4	100	8210 J	20100 J	FZ0609	12600	11000 JV	19100 JV	8210 J	20100 J	FZ0609	12600	11000 JV	19100 JV
PCB130	pg/g-Wet	4	4	100	452	968	FZ0609	645	580 V	924 V	452	968	FZ0609	645	580 V	924 V
PCB131	pg/g-Wet	4	4	100	27.8 J	83	FZ0609	49.9	44.5 JV	78.3 V	27.8 J	83	FZ0609	49.9	44.5 JV	78.3 V
PCB132	pg/g-Wet	4	4	100	875	2710	FZ0609	1500	1220 V	2510 V	875	2710	FZ0609	1500	1220 V	2510 V
PCB133	pg/g-Wet	4	4	100	185	409	FZ0609	270	244 V	392 V	185	409	FZ0609	270	244 V	392 V
PCB134 & 143	pg/g-Wet	4	2	50	133 J	189 J	FZ0306	161	161 JV	186 JV	9.6 U	189 J	FZ0306	83	69.1 JV	181 JV
PCB135 & 151 & 154	pg/g-Wet	4	4	100	1790 J	5270 J	FZ0609	3030	2540 JV	4960 JV	1790 J	5270 J	FZ0609	3030	2540 JV	4960 JV
PCB136	pg/g-Wet	4	4	100	265	963	FZ0609	512	410 V	890 V	265	963	FZ0609	512	410 V	890 V
PCB137	pg/g-Wet	4	4	100	316	716	FZ0609	484	453 V	688 V	316	716	FZ0609	484	453 V	688 V
PCB139 & 140	pg/g-Wet	4	4	100	117 J	277 J	FZ0609	175	153 JV	263 JV	117 J	277 J	FZ0609	175	153 JV	263 JV
PCB141	pg/g-Wet	4	4	100	944	2920	FZ0609	1670	1410 V	2750 V	944	2920	FZ0609	1670	1410 V	2750 V
PCB142	pg/g-Wet	4	0	0	--	--	--	--	--	--	5.52 U	11.1 U	FZ0306	4.2	4.25 UV	5.54 UV
PCB144	pg/g-Wet	4	4	100	205	620	FZ0609	352	291 V	582 V	205	620	FZ0609	352	291 V	582 V
PCB145	pg/g-Wet	4	1	25	2.71	2.71	FZ0609	2.71	2.71	2.71	2.35 U	4.35 U	FZ0306	2.05	2.17 UV	2.63 V
PCB146	pg/g-Wet	4	4	100	1680	3960	FZ0609	2700	2570 V	3810 V	1680	3960	FZ0609	2700	2570 V	3810 V
PCB147 & 149	pg/g-Wet	4	4	100	3710 J	10600 J	FZ0609	6140	5130 JV	9980 JV	3710 J	10600 J	FZ0609	6140	5130 JV	9980 JV
PCB148	pg/g-Wet	4	4	100	30.6	72.4	FZ0609	46.1	40.8 V	69 V	30.6	72.4	FZ0609	46.1	40.8 V	69 V
PCB150	pg/g-Wet	4	4	100	9.91 J	41.3	FZ0609	22.2	18.7 V	38.5 V	9.91 J	41.3	FZ0609	22.2	18.7 V	38.5 V
PCB152	pg/g-Wet	4	2	50	7.14	13.9	FZ0609	10.5	10.5 V	13.6 V	7.14	13.9	FZ0609	7.87	6.2 V	12.9 V
PCB153 & 168	pg/g-Wet	4	4	100	8820 J	22700 J	FZ0609	14300	12900 JV	21700 JV	8820 J	22700 J	FZ0609	14300	12900 JV	21700 JV
PCB155	pg/g-Wet	4	2	50	5.21	5.99	FZ0609	5.6	5.6 V	5.95 V	5.21	7.97 U	FZ0306	4.78	4.6 V	5.87 V
PCB156	pg/g-Wet	4	4	100	512	1110	FZ0609	734	656 V	1060 V	512	1110	FZ0609	734	656 V	1060 V
PCB157	pg/g-Wet	4	4	100	111	230	FZ0609	154	137 V	219 V	111	230	FZ0609	154	137 V	219 V
PCB158	pg/g-Wet	4	4	100	717	1790	FZ0609	1100	944 V	1690 V	717	1790	FZ0609	1100	944 V	1690 V
PCB159	pg/g-Wet	4	4	100	44.7	103	FZ0609	63.4	53 V	96.6 V	44.7	103	FZ0609	63.4	53 V	96.6 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB161	pg/g-Wet	4	0	0	--	--	--	--	--	--	6.11 U	12.3 U	FZ0306	4.66	4.71 UV	6.14 UV
PCB162	pg/g-Wet	4	4	100	29.3	38.3	FZ0609	33.8	33.8 V	38.2 V	29.3	38.3	FZ0609	33.8	33.8 V	38.2 V
PCB164	pg/g-Wet	4	4	100	317	766	FZ0609	478	414 V	724 V	317	766	FZ0609	478	414 V	724 V
PCB165	pg/g-Wet	4	2	50	14.2	16.6	FZ0609	15.4	15.4 V	16.5 V	10 U	16.6	FZ0609	10.2	9.63 V	16.2 V
PCB167	pg/g-Wet	4	4	100	301	584	FZ0609	402	361 V	558 V	301	584	FZ0609	402	361 V	558 V
PCB169	pg/g-Wet	4	3	75	0.818 J	1.05	FZ0306	0.936	0.94	1.04 V	0.818 J	1.05	FZ0306	0.818	0.879 JV	1.03 V
PCB170	pg/g-Wet	4	4	100	1480	3330	FZ0609	2090	1780 V	3140 V	1480	3330	FZ0609	2090	1780 V	3140 V
PCB171 & 173	pg/g-Wet	4	4	100	508 J	1210 J	FZ0609	740	620 JV	1140 JV	508 J	1210 J	FZ0609	740	620 JV	1140 JV
PCB172	pg/g-Wet	4	4	100	335	681	FZ0609	468	427 V	652 V	335	681	FZ0609	468	427 V	652 V
PCB174	pg/g-Wet	4	4	100	859	2320	FZ0609	1350	1110 V	2170 V	859	2320	FZ0609	1350	1110 V	2170 V
PCB175	pg/g-Wet	4	4	100	80.3	174	FZ0609	114	101 V	166 V	80.3	174	FZ0609	114	101 V	166 V
PCB176	pg/g-Wet	4	4	100	106	277	FZ0609	165	139 V	261 V	106	277	FZ0609	165	139 V	261 V
PCB177	pg/g-Wet	4	4	100	977	2310	FZ0609	1440	1230 V	2180 V	977	2310	FZ0609	1440	1230 V	2180 V
PCB178	pg/g-Wet	4	4	100	486	1030	FZ0609	709	660 V	991 V	486	1030	FZ0609	709	660 V	991 V
PCB179	pg/g-Wet	4	4	100	354	906	FZ0609	557	485 V	856 V	354	906	FZ0609	557	485 V	856 V
PCB180 & 193	pg/g-Wet	4	4	100	4360 J	9420 J	FZ0609	6230	5560 JV	9000 JV	4360 J	9420 J	FZ0609	6230	5560 JV	9000 JV
PCB181	pg/g-Wet	4	4	100	16.8	33	FZ0609	23.6	22.3 V	31.7 V	16.8	33	FZ0609	23.6	22.3 V	31.7 V
PCB182	pg/g-Wet	4	4	100	23.1	38.3	FZ0609	29.1	27.4 JV	36.8 V	23.1	38.3	FZ0609	29.1	27.4 JV	36.8 V
PCB183 & 185	pg/g-Wet	4	4	100	1450 J	3340 J	FZ0609	2140	1890 JV	3180 JV	1450 J	3340 J	FZ0609	2140	1890 JV	3180 JV
PCB184	pg/g-Wet	4	0	0	--	--	--	--	--	--	6.46 U	13 U	FZ0306	4.92	4.98 UV	6.49 UV
PCB186	pg/g-Wet	4	0	0	--	--	--	--	--	--	3.72 U	7.47 U	FZ0306	2.83	2.86 UV	3.73 UV
PCB187	pg/g-Wet	4	4	100	3110	6600	FZ0609	4750	4650 V	6390 V	3110	6600	FZ0609	4750	4650 V	6390 V
PCB188	pg/g-Wet	4	2	50	9.23	15	FZ0609	12.1	12.1 V	14.7 V	9.23	15	FZ0609	9.57	8.14 V	14.1 V
PCB189	pg/g-Wet	4	4	100	56.8	107	FZ0609	74.3	66.6 V	101 V	56.8	107	FZ0609	74.3	66.6 V	101 V
PCB190	pg/g-Wet	4	4	100	324	761	FZ0609	468	394 V	716 V	324	761	FZ0609	468	394 V	716 V
PCB191	pg/g-Wet	4	4	100	74.4	159	FZ0609	103	89 V	150 V	74.4	159	FZ0609	103	89 V	150 V
PCB192	pg/g-Wet	4	0	0	--	--	--	--	--	--	3.36 U	6.74 U	FZ0306	2.55	2.58 UV	3.37 UV
PCB194	pg/g-Wet	4	4	100	521	899	FZ0609	683	656 V	877 V	521	899	FZ0609	683	656 V	877 V
PCB195	pg/g-Wet	4	4	100	229	430	FZ0609	300	271 V	412 V	229	430	FZ0609	300	271 V	412 V
PCB196	pg/g-Wet	4	4	100	336	627	FZ0609	452	423 V	609 V	336	627	FZ0609	452	423 V	609 V
PCB197 & 200	pg/g-Wet	4	4	100	75.4 J	139	FZ0609	101	94.7 JV	134 JV	75.4 J	139	FZ0609	101	94.7 JV	134 JV
PCB198 & 199	pg/g-Wet	4	4	100	794 J	1370	FZ0609	1070	1070 JV	1350 JV	794 J	1370	FZ0609	1070	1070 JV	1350 JV
PCB201	pg/g-Wet	4	4	100	91.3	170	FZ0609	128	125 V	167 V	91.3	170	FZ0609	128	125 V	167 V
PCB202	pg/g-Wet	4	4	100	189	355	FZ0609	272	272 V	352 V	189	355	FZ0609	272	272 V	352 V
PCB203	pg/g-Wet	4	4	100	536	957	FZ0609	721	696 V	935 V	536	957	FZ0609	721	696 V	935 V
PCB204	pg/g-Wet	4	0	0	--	--	--	--	--	--	8.88 U	17.8 U	FZ0306	6.75	6.83 UV	8.89 UV
PCB205	pg/g-Wet	4	4	100	25.3	50.6	FZ0609	35.1	32.3 V	48.8 V	25.3	50.6	FZ0609	35.1	32.3 V	48.8 V
PCB206	pg/g-Wet	4	4	100	188	313	FZ0609	250	249 V	308 V	188	313	FZ0609	250	249 V	308 V
PCB207	pg/g-Wet	4	4	100	34	45.1	FZ0609	39.7	39.9 V	44.7 V	34	45.1	FZ0609	39.7	39.9 V	44.7 V
PCB208	pg/g-Wet	4	4	100	90.1	102	FZ0609	96.5	97 V	102 V	90.1	102	FZ0609	96.5	97 V	102 V
PCB209	pg/g-Wet	4	4	100	81.4	99.6	FZ0609	90	89.5 V	98.1 V	81.4	99.6	FZ0609	90	89.5 V	98.1 V
Total PCB Congeners	pg/g-Wet	4	4	100	103000 JT	301000 JT	FZ0609	164000	126000 JV	278000 JV	103000 JT	301000 JT	FZ0609	164000	126000 JV	278000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	4	4	100	103 JT	301 JT	FZ0609	164	126 JV	278 JV	103 JT	301 JT	FZ0609	164	126 JV	278 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	4	4	100	781 JT	1900 JT	FZ0609	1120	906 JV	1760 JV	781 JT	1900 JT	FZ0609	1120	906 JV	1760 JV
Heptachlorobiphenylhomologs	pg/g-Wet	4	4	100	14700 JT	32700 JT	FZ0609	21500	19200 JV	31200 JV	14700 JT	32700 JT	FZ0609	21500	19200 JV	31200 JV
Hexachlorobiphenyl homologs	pg/g-Wet	4	4	100	31400 JT	79100 JT	FZ0609	48800	42400 JV	75000 JV	31400 JT	79100 JT	FZ0609	48800	42400 JV	75000 JV
Monochlorobiphenyl homologs	pg/g-Wet	2	2	100	14 JT	33.1 JT	FZ0609	23.6	23.6 JV	32.1 JV	14 JT	33.1 JT	FZ0609	23.6	23.6 JV	32.1 JV
Nonachlorobiphenyl homologs	pg/g-Wet	4	4	100	317 T	460 T	FZ0609	386	384 V	453 V	317 T	460 T	FZ0609	386	384 V	453 V
Octachlorobiphenyl homologs	pg/g-Wet	4	4	100	2810 JT	5000 T	FZ0609	3770	3630 JV	4880 JV	2810 JT	5000 T	FZ0609	3770	3630 JV	4880 JV
Pentachlorobiphenylhomologs	pg/g-Wet	4	4	100	26300 JT	78300 JT	FZ0609	43300	34300 JV	72400 JV	26300 JT	78300 JT	FZ0609	43300	34300 JV	72400 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	4	4	100	17500 JT	84300 JT	FZ0609	36000	21100 JV	75200 JV	17500 JT	84300 JT	FZ0609	36000	21100 JV	75200 JV
Trichlorobiphenyl homologs	pg/g-Wet	4	4	100	4220 JT	19500 JT	FZ0609	9170	6480 JV	17600 JV	4220 JT	19500 JT	FZ0609	9170	6480 JV	17600 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	4	4	100	0.093	0.22	FZ0609	0.171	0.185 V	0.218 V	0.093	0.22	FZ0609	0.171	0.185 V	0.218 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	0.879	6.52	FZ0306	2.71	1.72 V	5.83 V	0.879	6.52	FZ0306	2.71	1.72 V	5.83 V
Hexachlorodibenzofuran homologs	pg/g-Wet	4	4	100	0.681	1.51	FZ0609	1.07	1.04 V	1.44 V	0.681	1.51	FZ0609	1.07	1.04 V	1.44 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	1.01	2.74	FZ0306	1.64	1.41 V	2.58 V	1.01	2.74	FZ0306	1.64	1.41 V	2.58 V
Octachlorodibenzofuran	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.046 U	0.128 U	FZ0306	0.044	0.0445 UV	0.0614 UV
Octachlorodibenzo-p-dioxin	pg/g-Wet	4	1	25	1.21	1.21	FZ0609	1.21	1.21	1.21	0.364 U	1.21	FZ0609	0.476	0.256 UV	1.07 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	4	4	100	1.24	1.87	FZ0609	1.53	1.5 V	1.85 V	1.24	1.87	FZ0609	1.53	1.5 V	1.85 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	0.498	1.04	FZ0306	0.671	0.574 V	0.974 V	0.498	1.04	FZ0306	0.671	0.574 V	0.974 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	4	4	100	1.88	2.35	FZ0609	2.14	2.17 V	2.34 V	1.88	2.35	FZ0609	2.14	2.17 V	2.34 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	0.322	0.566	FZ0306	0.417	0.39 V	0.54 V	0.322	0.566	FZ0306	0.417	0.39 V	0.54 V
Total PCDD/F	pg/g-Wet	4	4	100	7.67 T	16.1 T	FZ0306	10.7	9.45 V	15.3 V	7.67 T	16.1 T	FZ0306	10.7	9.45 V	15.3 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	4	4	100	0.093	0.207	FZ0306	0.136	0.121 V	0.198 V	0.093	0.207	FZ0306	0.136	0.121 V	0.198 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.447	1.33	FZ0609	0.754	0.62 V	1.23 V	0.447	1.33	FZ0609	0.754	0.62 V	1.23 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	4	1	25	0.023 J	0.023 J	FZ0306	0.023	0.023 J	0.023 J	0.016 U	0.023 J	FZ0306	0.0118	0.008 UV	0.0208 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	4	4	100	0.119	0.186	FZ0609	0.155	0.157 V	0.183 V	0.119	0.186	FZ0609	0.155	0.157 V	0.183 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.115	0.172	FZ0306	0.136	0.128 JV	0.166 JV	0.115	0.172	FZ0306	0.136	0.128 JV	0.166 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	4	4	100	0.074	0.09	FZ0306	0.0818	0.0815 V	0.0891 V	0.074	0.09	FZ0306	0.0818	0.0815 V	0.0891 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.635	1.37	FZ0609	0.885	0.767 V	1.29 V	0.635	1.37	FZ0609	0.885	0.767 V	1.29 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	4	1	25	0.022 J	0.022 J	FZ0306	0.022	0.022 J	0.022 J	0.011 U	0.022 J	FZ0306	0.00963	0.0055 UV	0.0195 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.08	0.111	FZ0306	0.0903	0.085 V	0.108 V	0.08	0.111	FZ0306	0.0903	0.085 V	0.108 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	4	4	100	0.269	0.37	FZ0306	0.317	0.314 V	0.367 V	0.269	0.37	FZ0306	0.317	0.314 V	0.367 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.426	0.518	FZ0306	0.472	0.472 V	0.513 V	0.426	0.518	FZ0306	0.472	0.472 V	0.513 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	4	4	100	0.028 J	0.053	FZ0306	0.0423	0.044 V	0.0524 V	0.028 J	0.053	FZ0306	0.0423	0.044 V	0.0524 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	4	4	100	0.239	0.32	FZ0609	0.275	0.27 V	0.314 V	0.239	0.32	FZ0609	0.275	0.27 V	0.314 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	4	4	100	1.29	1.48	FZ0609	1.38	1.38 V	1.48 V	1.29	1.48	FZ0609	1.38	1.38 V	1.48 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.281	0.36	FZ0609	0.329	0.338 V	0.359 V	0.281	0.36	FZ0609	0.329	0.338 V	0.359 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	4	4	100	1.1 JT	1.26 JT	FZ0306	1.18	1.18 V	1.25 JV	1.1 JT	1.26 JT	FZ0306	1.18	1.18 V	1.25 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	4	4	100	2.81 JT	4.42 T	FZ0609	3.34	3.07 JV	4.23 JV	2.81 JT	4.42 T	FZ0609	3.34	3.07 JV	4.23 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	4	4	100	1.67 JT	3.22 T	FZ0609	2.16	1.88 V	3.05 V	1.67 JT	3.22 T	FZ0609	2.16	1.88 V	3.05 V
Pesticides																
2,4'-DDD	µg/kg-Wet	4	0	0	--	--	--	--	--	--	2 U	3.7 U	FZ0306	1.5	1.5 UV	1.8 UV
2,4'-DDE	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1.1 U	FZ0306; FZ0609	0.53	0.53 UV	0.55 UV
2,4'-DDT	µg/kg-Wet	4	3	75	4.7 NJ	6.6 NJ	FZ0609	5.4	5 NJ	6.4 JV	4.7 NJ	6.9 UT	FZ0609	4.9	4.9 JV	6.4 JV
4,4'-DDD	µg/kg-Wet	4	4	100	7.9 J	18.5 JT	FZ0609	12.1	11 JV	17.4 JV	7.9 J	18.5 JT	FZ0609	12.1	11 JV	17.4 JV
4,4'-DDE	µg/kg-Wet	4	4	100	37 J	80.5 T	FZ0609	55.6	52.5 V	78.5 V	37 J	80.5 T	FZ0609	55.6	52.5 V	78.5 V
4,4'-DDT	µg/kg-Wet	4	3	75	8.6 J	15 J	FZ0609	11	10 J	15 JV	6.3 UT	15 J	FZ0609	9.2	9.3 JV	14 JV
Aldrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJ	1.3 U	FZ0609	0.54	0.5 UJV	0.63 UJV
alpha-Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	4	1	25	1.4 NJ	1.4 NJ	FZ0609	1.4	1.4 NJ	1.4 NJ	1 U	1.4 NJ	FZ0609	0.73	0.5 UV	1.3 JV
beta-Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1.3 U	FZ0609	0.55	0.53 UV	0.64 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.5 UJ	3.8 U	FZ0609	1.1	0.95 UJV	1.8 UJV
cis-Chlordane	µg/kg-Wet	4	4	100	1.4 N	3.5 NJ	FZ0306	2.6	2.8 JV	3.5 JV	1.4 N	3.5 NJ	FZ0306	2.6	2.8 JV	3.5 JV
cis-Nonachlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	5.8 U	7.3 U	FZ0609	3.4	3.5 UV	3.6 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	4	1	25	2.3 NJ	2.3 NJ	FZ0609	2.3	2.3 NJ	2.3 NJ	1 U	7.3 UT	FZ0609	1.7	1.4 JV	3.4 JV
Dieldrin	µg/kg-Wet	4	1	25	2.5 NJ	2.5 NJ	FZ0609	2.5	2.5 NJ	2.5 NJ	1.8 U	14 UT	FZ0609	2.8	1.7 JV	6.3 JV
Endosulfan sulfate	µg/kg-Wet	4	1	25	1.1 NJ	1.1 NJ	FZ0306	1.1	1.1 NJ	1.1 NJ	1 UJ	12 UT	FZ0609	2	0.8 JV	5.3 JV
Endrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1.3 U	FZ0609	0.56	0.55 UV	0.64 UV
Endrin aldehyde	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJ	1.4 U	FZ0306	0.56	0.53 UJV	0.68 UV
Endrin ketone	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1.6 U	FZ0306	0.64	0.63 UV	0.79 UV
Heptachlor	µg/kg-Wet	4	1	25	1.8 N	1.8 N	FZ0306	1.8	1.8 N	1.8 N	1 U	1.8 N	FZ0306	0.86	0.58 UV	1.6 V
Heptachlor epoxide	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJ	1 UJ	FZ0306; FZ0609	0.5	0.5 UV	0.5 UJV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Methoxychlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	2.5 U	FZ0609	0.8	0.73 UV	1.2 UV
Mirex	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	FZ0306; FZ0609	0.5	0.5 UV	0.5 UV
Oxychlordane	µg/kg-Wet	4	2	50	2.2 NJ	2.3 N	FZ0306	2.3	2.3 JV	2.3 JV	1 U	2.3 N	FZ0306	1.4	1.4 JV	2.3 JV
Total Chlordanes	µg/kg-Wet	4	4	100	2.1 NJT	9.2 NJT	FZ0306	6.3	7 JV	9.2 JV	2.1 NJT	9.2 NJT	FZ0306	6.3	7 JV	9.2 JV
Total Endosulfan	µg/kg-Wet	4	1	25	1.1 NJT	1.1 NJT	FZ0306	1.1	1.1 NJT	1.1 NJT	1 UJT	12 UT	FZ0609	2.1	0.88 JV	5.3 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	4	4	100	7.9 JT	18.5 JT	FZ0609	12.1	11 JV	17.4 JV	7.9 JT	18.5 JT	FZ0609	12.1	11 JV	17.4 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	59.2 NJT	99.6 NJT	FZ0609	80.2	81 JV	99.5 JV	59.2 NJT	99.6 NJT	FZ0609	80.2	81 JV	99.5 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	4	4	100	37 JT	80.5 T	FZ0609	55.6	52.5 V	78.5 V	37 JT	80.5 T	FZ0609	55.6	52.5 V	78.5 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	4	3	75	13.3 NJT	21.6 NJT	FZ0609	16.6	15 NJT	20.9 JV	6.9 UT	21.6 NJT	FZ0609	13.3	14.2 JV	20.6 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	54.5 JT	99 JT	FZ0609	76.1	75.5 JV	98.1 JV	54.5 JT	99 JT	FZ0609	76.1	75.5 JV	98.1 JV
Toxaphene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	96 U	280 U	FZ0306	98	100 UV	130 UV
trans-Chlordane	µg/kg-Wet	4	1	25	3.7 N	3.7 N	FZ0609	3.7	3.7 N	3.7 N	1 U	3.7 N	FZ0609	1.4	0.6 UV	3.3 V
trans-Nonachlor	µg/kg-Wet	4	2	50	3.2 NJ	3.5 NJ	FZ0306	3.4	3.4 JV	3.5 JV	1.8 U	3.5 NJ	FZ0306	2.2	2.2 JV	3.5 JV
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	4	2	50	5.7 NT	8.1 N	FZ0609	6.9	6.9 V	8 V	1 U	8.1 N	FZ0609	3.7	3.1 V	7.7 V
Hexachlorobutadiene	µg/kg-Wet	4	3	75	1.3 NJ	2.3 NJ	FZ0609	1.7	1.4 NJ	2.2 JV	1 UJT	2.3 NJ	FZ0609	1.4	1.4 JV	2.2 JV
Hexachloroethane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJ	1 UJ	FZ0306; FZ0609	0.5	0.5 UJV	0.5 UJV
Brown bullhead (fillet without skin)																
Conventionals																
Lipids	percent-Wet	6	6	100	0.93	1.3	FZ0306	1.1	1 V	1.3 V	0.93	1.3	FZ0306	1.1	1 V	1.3 V
Total solids	percent-Wet	6	6	100	16.6	18.9	FZ0306	17.8	17.8 V	18.8 V	16.6	18.9	FZ0306	17.8	17.8 V	18.8 V
Metals																
Aluminum	mg/kg-Wet	6	6	100	1.95 J	10.6 J	FZ0609	5.46	4.67 JV	10 JV	1.95 J	10.6 J	FZ0609	5.46	4.67 JV	10 JV
Antimony	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.001 U	0.008 U	FZ0609	0.00108	0.0005 UV	0.00313 UV
Arsenic	mg/kg-Wet	6	6	100	0.02 J	0.02 J	FZ0306; FZ0609	0.02	0.02 JV	0.02 JV	0.02 J	0.02 J	FZ0306; FZ0609	0.02	0.02 JV	0.02 JV
Cadmium	mg/kg-Wet	6	5	83.3	0.001 J	0.001 J	FZ0306; FZ0609	0.001	0.001 J	0.001 JV	0.001 J	0.008 U	FZ0609	0.0015	0.001 JV	0.00325 JV
Chromium	mg/kg-Wet	6	3	50	0.05 J	0.23	FZ0306	0.12	0.08 J	0.22 JV	0.05 J	0.23	FZ0306	0.073	0.04 JV	0.19 JV
Copper	mg/kg-Wet	6	6	100	0.203	0.292	FZ0306	0.251	0.252 V	0.283 V	0.203	0.292	FZ0306	0.251	0.252 V	0.283 V
Lead	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.002 U	0.008 U	FZ0609	0.00183	0.00125 UV	0.00363 UV
Manganese	mg/kg-Wet	6	6	100	0.085	0.177	FZ0609	0.109	0.097 V	0.16 V	0.085	0.177	FZ0609	0.109	0.097 V	0.16 V
Mercury	mg/kg-Wet	6	6	100	0.035	0.094	FZ0609	0.0608	0.059 V	0.089 V	0.035	0.094	FZ0609	0.0608	0.059 V	0.089 V
Nickel	mg/kg-Wet	6	6	100	0.003 J	0.055	FZ0306	0.0205	0.014 JV	0.0485 JV	0.003 J	0.055	FZ0306	0.0205	0.014 JV	0.0485 JV
Selenium	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.2 U	0.2 U	FZ0306; FZ0609	0.1	0.1 UV	0.1 UV
Silver	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.0002 U	0.0002 U	FZ0306; FZ0609	0.0001	0.0001 UV	0.0001 UV
Thallium	mg/kg-Wet	6	6	100	0.0012 J	0.003 J	FZ0306	0.00208	0.0021 JV	0.00298 JV	0.0012 J	0.003 J	FZ0306	0.00208	0.0021 JV	0.00298 JV
Zinc	mg/kg-Wet	6	6	100	3.96 J	6.49 J	FZ0306	5.23	5.32 JV	6.25 JV	3.96 J	6.49 J	FZ0306	5.23	5.32 JV	6.25 JV
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 U	FZ0609	7	0.95 UV	19 UV
Aroclor 1221	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	140 U	FZ0609	17	0.95 UV	59 UV
Aroclor 1232	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	70 U	FZ0609	9.6	0.95 UV	31 UV
Aroclor 1242	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	40 UJ	FZ0609	7.1	0.95 UV	20 UJV
Aroclor 1248	µg/kg-Wet	6	4	67	15	24	FZ0306; FZ0609	20	21 V	24 V	15	71 UJ	FZ0609	23	23 V	33 JV
Aroclor 1254	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 U	390 UJ	FZ0609	59	22 UV	170 UJV
Aroclor 1260	µg/kg-Wet	6	6	100	22	1300 J	FZ0609	340	65 V	1100 JV	22	1300 J	FZ0609	340	65 V	1100 JV
Aroclor 1262	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 UJ	FZ0609	7	0.95 UV	19 UJV
Aroclor 1268	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 UJ	FZ0609	7	0.95 UV	19 UJV
Aroclors	µg/kg-Wet	6	6	100	37 T	1300 JT	FZ0609	354	86.5 V	1120 JV	37 T	1300 JT	FZ0609	354	86.5 V	1120 JV
Total PCBs[d]																
Total PCBs	µg/kg-Wet	6	6	100	37 T	1300 JT	FZ0609	354	86.5 V	1120 JV	37 T	1300 JT	FZ0609	354	86.5 V	1120 JV
Pesticides																
2,4'-DDD	µg/kg-Wet	6	2	33	1.1 NJ	1.4 NJ	FZ0609	1.3	1.3 JV	1.4 JV	1 U	8.6 UT	FZ0609	2	1.3 JV	4.3 UV
2,4'-DDE	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	7.5 UT	FZ0609	1.3	0.5 UJV	3.3 UV
2,4'-DDT	µg/kg-Wet	6	4	67	1.7 N	3.1 NJ	FZ0609	2.5	2.6 JV	3 JV	1.7 N	6.9 UT	FZ0609	2.6	2.6 JV	3.4 JV
4,4'-DDD	µg/kg-Wet	6	4	67	1.4 N	3.8 J	FZ0306	2.5	2.4 JV	3.6 JV	1.4 N	6.1 UT	FZ0609	2.7	2.9 JV	3.6 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
4,4'-DDE	µg/kg-Wet	6	6	100	6.6 J	26.5 JT	FZ0609	13.5	11.5 JV	23.6 JV	6.6 J	26.5 JT	FZ0609	13.5	11.5 JV	23.6 JV
4,4'-DDT	µg/kg-Wet	6	4	67	3.9 J	8.4 J	FZ0609	5.5	4.9 JV	7.9 JV	3.9 J	8.4 J	FZ0609	4.7	4.3 JV	7.6 JV
Aldrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	13 UT	FZ0609	1.8	0.5 UV	5.4 UV
alpha-Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	20 U	FZ0609	2.3	0.5 UV	8 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	6.4 UT	FZ0609	1.2	0.5 UV	2.9 UV
beta-Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	15 UT	FZ0609	1.9	0.5 UV	6.1 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	8.5 UT	FZ0609	1.4	0.6 UJV	3.7 UV
cis-Chlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	20 U	FZ0609	2.3	0.5 UV	8 UV
cis-Nonachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.1 U	7.1 UT	FZ0609	1.4	0.9 UV	3.2 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	7.3 UT	FZ0609	1.3	0.5 UV	3.2 UV
Dieldrin	µg/kg-Wet	6	1	17	2.1 NJ	2.1 NJ	FZ0306	2.1	2.1 NJ	2.1 NJ	1 U	14 UT	FZ0609	2.1	1.3 UV	5.8 JV
Endosulfan sulfate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	12 UT	FZ0609	1.7	0.5 UV	5 UV
Endrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	20 UT	FZ0609	2.3	0.5 UV	8 UV
Endrin aldehyde	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	8.5 UT	FZ0609	1.4	0.5 UJV	3.7 UV
Endrin ketone	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	7.5 UT	FZ0609	1.3	0.5 UV	3.3 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	9.6 UT	FZ0609	1.5	0.5 UV	4.1 UV
Heptachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	13 UT	FZ0609	1.8	0.5 UV	5.4 UV
Heptachlor epoxide	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	8 UT	FZ0609	1.3	0.5 UV	3.5 UV
Methoxychlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	4.8 UT	FZ0609	1.1	0.5 UJV	2.3 UV
Mirex	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	6.2 UT	FZ0609	1.2	0.5 UV	2.8 UV
Oxychlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	20 UT	FZ0609	2.3	0.5 UV	8 UV
Total Chlordanes	µg/kg-Wet	6	4	67	1.2 NJT	1.6 NJT	FZ0306; FZ0609	1.4	1.5 JV	1.6 JV	1.2 NJT	20 UT	FZ0609	3	1.6 JV	8 UV
Total Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UT	20 UT	FZ0609	2.3	0.5 UV	8 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	6	4	67	2.7 JT	3.8 JT	FZ0306	3.1	3 JV	3.7 JV	2.7 JT	8.6 UT	FZ0609	3.5	3.5 JV	4.3 UV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	12 JT	26.5 JT	FZ0609	20.9	21.4 JV	26.4 JV	12 JT	26.5 JT	FZ0609	20.9	21.4 JV	26.4 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	6	6	100	6.6 JT	26.5 JT	FZ0609	13.5	11.5 JV	23.6 JV	6.6 JT	26.5 JT	FZ0609	13.5	11.5 JV	23.6 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	6	4	66.7	5.6 NJT	11.5 NJT	FZ0609	7.98	7.4 JV	10.9 JV	5.6 NJT	11.5 NJT	FZ0609	6.42	6.35 JV	10.6 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	12 JT	26.5 JT	FZ0609	18.8	17.4 JV	25.7 JV	12 JT	26.5 JT	FZ0609	18.8	17.4 JV	25.7 JV
Toxaphene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	110 U	4700 U	FZ0609	510	83 UJV	1900 UV
trans-Chlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	8.4 UT	FZ0609	1.4	0.5 UV	3.7 UV
trans-Nonachlor	µg/kg-Wet	6	4	67	1.2 NJ	1.6 NJ	FZ0306; FZ0609	1.4	1.5 JV	1.6 JV	1.2 NJ	11 UT	FZ0609	2.2	1.6 JV	4.6 UV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	70 UT	FZ0306	20	17 UV	30 UV
Acenaphthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	97 UT	FZ0306	26	17 UV	47 UV
Acenaphthylene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	93 UT	FZ0306	30	29 UV	46 UV
Benzo(a)anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	76 UT	FZ0306	20	17 UV	33 UV
Benzo(a)pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	80 UT	FZ0306	24	17 UV	40 UV
Benzo(b)fluoranthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	63 UT	FZ0306	19	17 UV	28 UV
Benzo(g,h,i)perylene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UJT	33 UJT	FZ0306; FZ0609	17	17 UJV	17 UJV
Benzo(k)fluoranthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	73 UT	FZ0306	20	17 UV	32 UV
Chrysene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	80 UT	FZ0306	20	17 UV	34 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Fluoranthene	µg/kg-Wet	6	1	17	110 T	110 T	FZ0306	110	110 T	110 T	33 UT	110 T	FZ0306	44	32 UV	96 V
Fluorene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	87 UT	FZ0306	24	17 UV	42 UV
High Molecular Weight PAH	µg/kg-Wet	6	1	17	110 T	110 T	FZ0306	110	110 T	110 T	33 UT	110 T	FZ0306	44	32 UV	96 V
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Low Molecular Weight PAH	µg/kg-Wet	6	2	33	110 JT	140 T	FZ0306	130	130 JV	140 JV	33 UT	140 T	FZ0306	61	41 UV	130 JV
Naphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	73 UT	FZ0306	26	25 UV	36 UV
Phenanthrene	µg/kg-Wet	6	2	33	110 JT	140 T	FZ0306	130	130 JV	140 JV	33 UT	140 T	FZ0306	58	32 UV	130 JV
Pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	60 UT	FZ0306	22	21 UV	30 UV
Total BaPEq	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	80 UT	FZ0306	24.1	16.5 UV	39.6 UV
Total cPAHs	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	80 UT	FZ0306	24	17 UV	40 UV
Total PAHs	µg/kg-Wet	6	2	33	110 JT	250 T	FZ0306	180	180 JV	240 JV	33 UT	250 T	FZ0306	79	41 UV	220 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	6	1	17	100 T	100 T	FZ0306	100	100 T	100 T	100 T	220 UT	FZ0609	68	50 UV	110 V
Butylbenzyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Dibutyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Diethyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 U	170 U	FZ0306; FZ0609	85	85 UV	85 UV
Dimethyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 U	170 U	FZ0306; FZ0609	85	85 UV	85 UV
Di-n-octyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	96 UT	FZ0306	22	17 UV	40 UV
1,2-Diphenylhydrazine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 U	33 U	FZ0306; FZ0609	17	17 UV	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	66 UT	FZ0306	19	17 UV	29 UV
1,4-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	66 UT	FZ0306	19	17 UV	29 UV
2,4-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2,6-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2-Chloronaphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	66 UT	FZ0306	19	17 UV	29 UV
2-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	830 U	830 U	FZ0306; FZ0609	420	420 UV	420 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1700 U	1700 U	FZ0306; FZ0609	850	850 UV	850 UV
3-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	830 U	830 U	FZ0306; FZ0609	420	420 UV	420 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
4-Chloroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 UJT	170 UJT	FZ0306; FZ0609	85	85 UJV	85 UJV
4-Chlorophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	83 UT	83 UT	FZ0306; FZ0609	42	42 UV	42 UV
4-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	830 U	830 U	FZ0306; FZ0609	420	420 UV	420 UV
Aniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1700 U	1700 U	FZ0306; FZ0609	850	850 UV	850 UV
Azobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 U	170 U	FZ0306; FZ0609	85	85 UV	85 UV
Benzoic acid	µg/kg-Wet	6	0	0	--	--	--	--	--	--	8300 UJ	8300 UJ	FZ0306; FZ0609	4200	4200 UJV	4200 UJV
Benzyl alcohol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 U	170 U	FZ0306; FZ0609	85	85 UV	85 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 U	170 U	FZ0306; FZ0609	85	85 UV	85 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Carbazole	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Dibenzofuran	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	80 UT	FZ0306	24	17 UV	39 UV
Hexachlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UT	6.4 UT	FZ0609	1.2	0.5 UV	2.9 UV
Hexachlorobutadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJT	4.6 UT	FZ0609	1.1	0.5 UJV	2.2 UJV
Hexachlorocyclopentadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	830 U	830 U	FZ0306; FZ0609	420	420 UV	420 UV
Hexachloroethane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJT	13 UT	FZ0609	1.8	0.5 UJV	5.4 UJV
Isophorone	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1700 U	1700 U	FZ0306; FZ0609	850	850 UV	850 UV
Nitrobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 UT	170 UT	FZ0306; FZ0609	85	85 UV	85 UV
N-Nitrosodiphenylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 U	170 U	FZ0306; FZ0609	85	85 UV	85 UV
N-Nitrosodipropylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1700 U	1700 U	FZ0306; FZ0609	850	850 UV	850 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1700 U	1700 U	FZ0306; FZ0609	850	850 UV	850 UV
2,4,5-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	830 U	830 U	FZ0306; FZ0609	420	420 UV	420 UV
2,4,6-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2,4-Dichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2,4-Dimethylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	500 U	500 U	FZ0306; FZ0609	250	250 UV	250 UV
2-Chlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	57 UT	FZ0306	24	26 UV	28 UV
2-Methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 U	170 U	FZ0306; FZ0609	85	85 UV	85 UV
2-Nitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1700 U	1700 U	FZ0306; FZ0609	850	850 UV	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3300 U	3300 U	FZ0306; FZ0609	1700	1700 UV	1700 UV
4-Chloro-3-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
4-Methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
4-Nitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1700 U	1700 U	FZ0306; FZ0609	850	850 UV	850 UV
Pentachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	170 UT	190 UT	FZ0306	87	85 UV	93 UV

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					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Phenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Brown bullhead (whole body)																
Conventionals																
Lipids	percent-Wet	6	6	100	1.5 T	3.8	FZ0609	2.4	2.4 V	3.5 V	1.5 T	3.8	FZ0609	2.4	2.4 V	3.5 V
Total solids	percent-Wet	6	6	100	23.3	25.1	FZ0609	23.9	23.7 V	24.9 V	23.3	25.1	FZ0609	23.9	23.7 V	24.9 V
Metals																
Aluminum	mg/kg-Wet	6	6	100	4.2 J	31.7 J	FZ0609	9.8	5 JV	25.8 JV	4.2 J	31.7 J	FZ0609	9.8	5 JV	25.8 JV
Antimony	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.001 U	0.001 U	FZ0306; FZ0609	0.0005	0.0005 UV	0.0005 UV
Arsenic	mg/kg-Wet	6	6	100	0.04 J	0.08 J	FZ0609	0.0558	0.055 JV	0.075 JV	0.04 J	0.08 J	FZ0609	0.0558	0.055 JV	0.075 JV
Cadmium	mg/kg-Wet	6	6	100	0.008 J	0.014	FZ0306	0.0116	0.0125 JV	0.014 V	0.008 J	0.014	FZ0306	0.0116	0.0125 JV	0.014 V
Chromium	mg/kg-Wet	6	6	100	0.39	1.32	FZ0306	0.73	0.565 V	1.26 V	0.39	1.32	FZ0306	0.73	0.565 V	1.26 V
Copper	mg/kg-Wet	6	6	100	0.586	0.798	FZ0609	0.69	0.691 V	0.792 V	0.586	0.798	FZ0609	0.69	0.691 V	0.792 V
Lead	mg/kg-Wet	6	5	83.3	0.023	0.0435 T	FZ0609	0.0289	0.026	0.04 V	0.014 U	0.0435 T	FZ0609	0.0253	0.026 V	0.0391 V
Manganese	mg/kg-Wet	6	6	100	3.15	10.8 T	FZ0609	5.09	3.96 V	9.46 V	3.15	10.8 T	FZ0609	5.09	3.96 V	9.46 V
Mercury	mg/kg-Wet	6	6	100	0.025 T	0.054	FZ0306	0.0367	0.033 V	0.052 V	0.025 T	0.054	FZ0306	0.0367	0.033 V	0.052 V
Nickel	mg/kg-Wet	6	5	83.3	0.213 J	0.321 J	FZ0306	0.264	0.261 J	0.315 JV	0.213 J	0.328 UJT	FZ0609	0.248	0.249 JV	0.313 JV
Selenium	mg/kg-Wet	6	2	33	0.3 T	0.3 T	FZ0609	0.3	0.3 V	0.3 V	0.2 U	0.3 T	FZ0609	0.18	0.13 UV	0.3 V
Silver	mg/kg-Wet	6	1	16.7	0.00405 T	0.00405 T	FZ0609	0.00405	0.00405 T	0.00405 T	0.0021 U	0.00405 T	FZ0609	0.00162	0.0011 UV	0.00338 V
Thallium	mg/kg-Wet	6	4	66.7	0.002 J	0.0039 J	FZ0306	0.00295	0.00295 JV	0.00378 JV	0.0018 U	0.0039 J	FZ0306	0.00227	0.0024 JV	0.0037 JV
Zinc	mg/kg-Wet	6	6	100	12.7	15.6	FZ0609	14.1	14.3 V	15.4 V	12.7	15.6	FZ0609	14.1	14.3 V	15.4 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 U	FZ0609	6	3.7 UV	16 UV
Aroclor 1221	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 U	FZ0609	7.2	3.3 UV	18 UV
Aroclor 1232	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 U	FZ0609	6.6	4.6 UV	16 UV
Aroclor 1242	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 U	FZ0609	6.6	4.3 UV	17 UV
Aroclor 1248	µg/kg-Wet	6	3	50	23	64	FZ0609	41	36	61 V	23	64	FZ0609	31	24 V	57 V
Aroclor 1254	µg/kg-Wet	6	0	0	--	--	--	--	--	--	38 U	160 U	FZ0609	46	46 UV	75 UV
Aroclor 1260	µg/kg-Wet	6	6	100	44	1700	FZ0609	380	110 V	1300 JV	44	1700	FZ0609	380	110 V	1300 JV
Aroclor 1262	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 U	FZ0609	5.4	3.3 UV	15 UV
Aroclor 1268	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 U	FZ0609	5.4	3.3 UV	15 UV
Aroclors	µg/kg-Wet	6	6	100	67 T	1700 T	FZ0609	404	128 V	1350 JV	67 T	1700 T	FZ0609	404	128 V	1350 JV
PCB Congeners																
PCB001	pg/g-Wet	2	2	100	2.52 J	3.99	FZ0609	3.26	3.26 JV	3.92 JV	2.52 J	3.99	FZ0609	3.26	3.26 JV	3.92 JV
PCB002	pg/g-Wet	2	0	0	--	--	--	--	--	--	1.74 UJ	1.75 UJ	FZ0306	0.873	0.873 UJV	0.875 UJV
PCB003	pg/g-Wet	2	1	50	2.7 J	2.7 J	FZ0609	2.7	2.7 J	2.7 J	2.51 U	2.7 J	FZ0609	1.98	1.98 JV	2.63 JV
PCB004	pg/g-Wet	6	6	100	50.1	165	FZ0306	92.2	87.5 JV	149 V	50.1	165	FZ0306	92.2	87.5 JV	149 V
PCB005	pg/g-Wet	6	0	0	--	--	--	--	--	--	2.26 U	3.9 U	FZ0306	1.35	1.22 UJV	1.82 UJV
PCB006	pg/g-Wet	6	6	100	12.5 J	49.3	FZ0306	25.7	21.8 JV	44.8 V	12.5 J	49.3	FZ0306	25.7	21.8 JV	44.8 V
PCB007	pg/g-Wet	6	0	0	--	--	--	--	--	--	3.59 U	3.81 UJ	FZ0609	1.87	1.9 UJV	1.91 UJV
PCB008	pg/g-Wet	6	6	100	49.5 J	294	FZ0306	119	92 JV	252 V	49.5 J	294	FZ0306	119	92 JV	252 V
PCB009	pg/g-Wet	6	6	100	4.96 J	13.6	FZ0609	9.74	9.58 V	13.4 V	4.96 J	13.6	FZ0609	9.74	9.58 V	13.4 V
PCB010	pg/g-Wet	6	2	33.3	4.63	5.24	FZ0609	4.94	4.94 V	5.21 V	4.63	5.24	FZ0609	3.26	2.43 UJV	5.09 V
PCB011	pg/g-Wet	6	6	100	28.9 J	52.3 J	FZ0306	37.4	37.1 V	49.2 JV	28.9 J	52.3 J	FZ0306	37.4	37.1 V	49.2 JV
PCB012 & 013	pg/g-Wet	6	0	0	--	--	--	--	--	--	5.06 U	5.37 UJ	FZ0306; FZ0609	2.63	2.68 UV	2.69 UJV
PCB014	pg/g-Wet	6	0	0	--	--	--	--	--	--	2.97 U	3.56 U	FZ0306	1.58	1.58 UJV	1.73 UJV
PCB015	pg/g-Wet	6	6	100	4.26	48.5	FZ0306	14.2	8.57 JV	39 V	4.26	48.5	FZ0306	14.2	8.57 JV	39 V
PCB016	pg/g-Wet	6	6	100	88.6	321	FZ0306	186	167 V	305 V	88.6	321	FZ0306	186	167 V	305 V
PCB017	pg/g-Wet	6	6	100	155	447	FZ0306	281	249 V	433 V	155	447	FZ0306	281	249 V	433 V
PCB018 & 030	pg/g-Wet	6	6	100	223 J	792 J	FZ0306	519	512 JV	771 JV	223 J	792 J	FZ0306	519	512 JV	771 JV
PCB019	pg/g-Wet	6	6	100	52.7	120	FZ0306	82.9	77.5 V	116 V	52.7	120	FZ0306	82.9	77.5 V	116 V
PCB020 & 028	pg/g-Wet	6	6	100	1060 J	4120 J	FZ0609	2400	2340 JV	3710 JV	1060 J	4120 J	FZ0609	2400	2340 JV	3710 JV
PCB021 & 033	pg/g-Wet	6	6	100	79.4 J	454 J	FZ0306	221	183 JV	414 JV	79.4 J	454 J	FZ0306	221	183 JV	414 JV
PCB022	pg/g-Wet	6	6	100	213	969	FZ0609	507	472 V	855 V	213	969	FZ0609	507	472 V	855 V
PCB023	pg/g-Wet	6	0	0	--	--	--	--	--	--	3.68 U	3.9 U	FZ0306; FZ0609	1.91	1.95 UV	1.95 UV
PCB024	pg/g-Wet	6	5	83.3	10.5	16.5	FZ0609	12.7	11.6	15.9 V	5.04 U	16.5	FZ0609	11	11.5 V	15.8 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB025	pg/g-Wet	6	6	100	18	79.7	FZ0306	42.5	39.3 V	73.2 V	18	79.7	FZ0306	42.5	39.3 V	73.2 V
PCB026 & 029	pg/g-Wet	6	6	100	85.9 J	383 J	FZ0609	218	215 JV	351 JV	85.9 J	383 J	FZ0609	218	215 JV	351 JV
PCB027	pg/g-Wet	6	6	100	40.1	95.4	FZ0609	71.1	67.3 V	94.3 V	40.1	95.4	FZ0609	71.1	67.3 V	94.3 V
PCB031	pg/g-Wet	6	6	100	275	981	FZ0306	634	636 V	964 V	275	981	FZ0306	634	636 V	964 V
PCB032	pg/g-Wet	6	6	100	122	407	FZ0609	263	252 V	390 V	122	407	FZ0609	263	252 V	390 V
PCB034	pg/g-Wet	6	6	100	4.58	20.4	FZ0609	10.2	9.01 V	18.1 V	4.58	20.4	FZ0609	10.2	9.01 V	18.1 V
PCB035	pg/g-Wet	6	3	50	3.29	5.85	FZ0609	4.33	3.84	5.65 V	2.35 U	5.85	FZ0609	2.82	2.45 V	5.35 V
PCB036	pg/g-Wet	6	2	33.3	63.9	109	FZ0609	86.5	86.5 V	107 V	3.93 U	109	FZ0609	30.1	1.98 UV	97.7 V
PCB037	pg/g-Wet	6	6	100	18.9	95.5	FZ0306	39.4	27.5 V	82.2 V	18.9	95.5	FZ0306	39.4	27.5 V	82.2 V
PCB038	pg/g-Wet	6	0	0	--	--	--	--	--	--	2.77 U	2.94 U	FZ0609	1.44	1.46 UV	1.47 UV
PCB039	pg/g-Wet	6	6	100	4.43	14.7	FZ0609	7.49	6.64 V	12.9 V	4.43	14.7	FZ0609	7.49	6.64 V	12.9 V
PCB040 & 041 & 071	pg/g-Wet	6	6	100	447 J	1640 J	FZ0609	936	864 JV	1510 JV	447 J	1640 J	FZ0609	936	864 JV	1510 JV
PCB042	pg/g-Wet	6	6	100	230	854	FZ0609	476	444 V	765 V	230	854	FZ0609	476	444 V	765 V
PCB043	pg/g-Wet	6	6	100	44.5	234	FZ0609	119	111 V	205 V	44.5	234	FZ0609	119	111 V	205 V
PCB044 & 047 & 065	pg/g-Wet	6	6	100	1650 J	7940 J	FZ0609	4440	3960 JV	7620 JV	1650 J	7940 J	FZ0609	4440	3960 JV	7620 JV
PCB045 & 051	pg/g-Wet	6	6	100	94.7 J	409 J	FZ0609	234	216 JV	373 JV	94.7 J	409 J	FZ0609	234	216 JV	373 JV
PCB046	pg/g-Wet	6	6	100	35.3	114	FZ0609	69.5	65.9 V	106 V	35.3	114	FZ0609	69.5	65.9 V	106 V
PCB048	pg/g-Wet	6	6	100	122	580	FZ0609	302	278 V	513 V	122	580	FZ0609	302	278 V	513 V
PCB049 & 069	pg/g-Wet	6	6	100	790 J	3220 J	FZ0609	2070	2110 JV	3120 JV	790 J	3220 J	FZ0609	2070	2110 JV	3120 JV
PCB050 & 053	pg/g-Wet	6	6	100	43.8 J	189 J	FZ0609	122	127 JV	178 JV	43.8 J	189 J	FZ0609	122	127 JV	178 JV
PCB052	pg/g-Wet	6	6	100	992	3840	FZ0609	3000	3410 V	3820 V	992	3840	FZ0609	3000	3410 V	3820 V
PCB054	pg/g-Wet	6	6	100	33.4	85.2	FZ0609	56.4	55.4 V	82.1 V	33.4	85.2	FZ0609	56.4	55.4 V	82.1 V
PCB055	pg/g-Wet	6	0	0	--	--	--	--	--	--	4.56 U	6.85 U	FZ0609	2.54	2.41 UV	3.17 UV
PCB056	pg/g-Wet	6	6	100	357	1410	FZ0609	707	607 V	1270 V	357	1410	FZ0609	707	607 V	1270 V
PCB057	pg/g-Wet	6	6	100	6.26	29.4	FZ0609	16.4	14.1 V	27.8 V	6.26	29.4	FZ0609	16.4	14.1 V	27.8 V
PCB058	pg/g-Wet	6	3	50	12.4	239	FZ0609	91.9	24.2	218 V	5.97 U	239	FZ0609	47.5	7.84 V	185 V
PCB059 & 062 & 075	pg/g-Wet	6	6	100	115 J	470 J	FZ0609	268	269 JV	424 JV	115 J	470 J	FZ0609	268	269 JV	424 JV
PCB060	pg/g-Wet	6	6	100	391	1610	FZ0609	788	690 V	1400 V	391	1610	FZ0609	788	690 V	1400 V
PCB061 & 070 & 074 & 076	pg/g-Wet	6	6	100	1440 J	5580 J	FZ0609	3350	3140 JV	5210 JV	1440 J	5580 J	FZ0609	3350	3140 JV	5210 JV
PCB063	pg/g-Wet	6	6	100	83.1	370	FZ0609	203	188 V	333 V	83.1	370	FZ0609	203	188 V	333 V
PCB064	pg/g-Wet	6	6	100	538	2210	FZ0609	1200	1100 V	1980 V	538	2210	FZ0609	1200	1100 V	1980 V
PCB066	pg/g-Wet	6	6	100	1850	7300	FZ0609	4020	3850 V	6530 V	1850	7300	FZ0609	4020	3850 V	6530 V
PCB067	pg/g-Wet	6	6	100	10.2	52.5	FZ0609	27.7	27.4 V	47 V	10.2	52.5	FZ0609	27.7	27.4 V	47 V
PCB068	pg/g-Wet	6	6	100	26.4	184	FZ0609	75.8	55.6 V	161 V	26.4	184	FZ0609	75.8	55.6 V	161 V
PCB072	pg/g-Wet	6	6	100	30.3	113	FZ0609	65.8	55.3 V	108 V	30.3	113	FZ0609	65.8	55.3 V	108 V
PCB073	pg/g-Wet	6	2	33.3	59.4	59.7	FZ0609	59.6	59.6 V	59.7 V	6.29 U	59.7	FZ0609	22	3.16 UV	59.6 V
PCB077	pg/g-Wet	6	6	100	24.9	86.7	FZ0609	47.2	39.7 V	81.1 V	24.9	86.7	FZ0609	47.2	39.7 V	81.1 V
PCB078	pg/g-Wet	6	4	66.7	4.72	91.7	FZ0609	42.3	36.3 V	87.5 V	4.12 U	91.7	FZ0609	28.9	6.69 V	84.8 V
PCB079	pg/g-Wet	6	6	100	39.2	146	FZ0609	74.2	65.9 V	130 V	39.2	146	FZ0609	74.2	65.9 V	130 V
PCB080	pg/g-Wet	6	0	0	--	--	--	--	--	--	5.74 U	6.09 U	FZ0306; FZ0609	2.99	3.04 UV	3.05 UV
PCB081	pg/g-Wet	6	6	100	8.36	20.2	FZ0609	12.3	11.3 V	18.5 V	8.36	20.2	FZ0609	12.3	11.3 V	18.5 V
PCB082	pg/g-Wet	6	6	100	255	438	FZ0609	343	354 V	427 V	255	438	FZ0609	343	354 V	427 V
PCB083 & 099	pg/g-Wet	6	6	100	2030 J	11000 J	FZ0609	6170	6220 JV	9940 JV	2030 J	11000 J	FZ0609	6170	6220 JV	9940 JV
PCB084	pg/g-Wet	6	6	100	405	1070	FZ0609	767	761 V	1070 V	405	1070	FZ0609	767	761 V	1070 V
PCB085 & 116 & 117	pg/g-Wet	6	6	100	663 J	1920 J	FZ0306	1340	1400 JV	1870 JV	663 J	1920 J	FZ0306	1340	1400 JV	1870 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	6	6	100	1650 J	5390 J	FZ0609	3580	3770 JV	5120 JV	1650 J	5390 J	FZ0609	3580	3770 JV	5120 JV
PCB088 & 091	pg/g-Wet	6	6	100	251 J	995 J	FZ0609	701	789 JV	979 JV	251 J	995 J	FZ0609	701	789 JV	979 JV
PCB089	pg/g-Wet	6	6	100	15.5	36	FZ0609	25.2	25.8 JV	35 V	15.5	36	FZ0609	25.2	25.8 JV	35 V
PCB090 & 101 & 113	pg/g-Wet	6	6	100	2150 J	34900 J	FZ0609	10900	6950 JV	28300 JV	2150 J	34900 J	FZ0609	10900	6950 JV	28300 JV
PCB092	pg/g-Wet	6	6	100	774	5220	FZ0609	2350	1910 V	4570 V	774	5220	FZ0609	2350	1910 V	4570 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	6	6	100	1370 J	13400 J	FZ0609	5420	4510 JV	11500 JV	1370 J	13400 J	FZ0609	5420	4510 JV	11500 JV
PCB094	pg/g-Wet	6	6	100	20.9	85.2	FZ0609	53.2	54.2 V	84.3 V	20.9	85.2	FZ0609	53.2	54.2 V	84.3 V
PCB096	pg/g-Wet	6	6	100	14.4	53.7	FZ0609	33	30.7 V	53.1 V	14.4	53.7	FZ0609	33	30.7 V	53.1 V
PCB103	pg/g-Wet	6	6	100	57.8	416	FZ0609	176	151 V	365 V	57.8	416	FZ0609	176	151 V	365 V
PCB104	pg/g-Wet	6	3	50	9.17	10.4	FZ0609	9.85	9.99	10.4 V	7.02 U	10.4	FZ0609	6.74	6.44 V	10.3 V
PCB105	pg/g-Wet	6	6	100	1160	4350	FZ0306	3010	3160 V	4230 V	1160	4350	FZ0306	3010	3160 V	4230 V
PCB106	pg/g-Wet	6	0	0	--	--	--	--	--	--	9.19 U	9.76 U	FZ0609	4.78	4.87 UV	4.88 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB107 & 124	pg/g-Wet	6	6	100	59.6 J	232 J	FZ0609	124	116 JV	208 JV	59.6 J	232 J	FZ0609	124	116 JV	208 JV
PCB109	pg/g-Wet	6	6	100	384	1570	FZ0609	953	865 V	1510 V	384	1570	FZ0609	953	865 V	1510 V
PCB110 & 115	pg/g-Wet	6	6	100	3150 J	7770 J	FZ0609	6230	6910 JV	7720 JV	3150 J	7770 J	FZ0609	6230	6910 JV	7720 JV
PCB111	pg/g-Wet	6	6	100	10.9	58	FZ0609	23.5	16.3 V	50.3 V	10.9	58	FZ0609	23.5	16.3 V	50.3 V
PCB112	pg/g-Wet	6	0	0	--	--	--	--	--	--	6.54 U	6.94 U	FZ0306; FZ0609	3.4	3.46 UV	3.47 UV
PCB114	pg/g-Wet	6	6	100	76.2	362	FZ0306	216	222 V	333 V	76.2	362	FZ0306	216	222 V	333 V
PCB118	pg/g-Wet	6	6	100	3200	21400	FZ0609	11400	9680 V	20300 V	3200	21400	FZ0609	11400	9680 V	20300 V
PCB120	pg/g-Wet	6	6	100	40.2	297	FZ0609	111	70 V	258 V	40.2	297	FZ0609	111	70 V	258 V
PCB121	pg/g-Wet	6	6	100	6.54	26.4	FZ0609	15.6	14.7 V	25.9 V	6.54	26.4	FZ0609	15.6	14.7 V	25.9 V
PCB122	pg/g-Wet	6	6	100	39.6	87.1 J	FZ0609	71.9	76 V	87.1 JV	39.6	87.1 J	FZ0609	71.9	76 V	87.1 JV
PCB123	pg/g-Wet	6	6	100	60.3	365	FZ0306	174	158 V	318 V	60.3	365	FZ0306	174	158 V	318 V
PCB126	pg/g-Wet	6	6	100	13.9	42.1	FZ0609	27.1	23.4 V	41.6 V	13.9	42.1	FZ0609	27.1	23.4 V	41.6 V
PCB127	pg/g-Wet	6	4	66.7	15.7	48.4	FZ0609	27.1	22.1 V	45 V	9.56 U	48.4	FZ0609	19.7	17 V	42.8 V
PCB128 & 166	pg/g-Wet	6	6	100	1000 J	13700 J	FZ0609	4060	2230 JV	11100 JV	1000 J	13700 J	FZ0609	4060	2230 JV	11100 JV
PCB129 & 138 & 160 & 163	pg/g-Wet	6	6	100	8210 J	206000 J	FZ0609	52900	27400 JV	162000 JV	8210 J	206000 J	FZ0609	52900	27400 JV	162000 JV
PCB130	pg/g-Wet	6	6	100	505	7560	FZ0609	2010	1010 V	5960 V	505	7560	FZ0609	2010	1010 V	5960 V
PCB131	pg/g-Wet	6	6	100	31.7	398	FZ0609	115	59.2 V	325 V	31.7	398	FZ0609	115	59.2 V	325 V
PCB132	pg/g-Wet	6	6	100	1120	5370	FZ0609	2850	2520 V	5120 V	1120	5370	FZ0609	2850	2520 V	5120 V
PCB133	pg/g-Wet	6	6	100	185	3160	FZ0609	891	452 V	2560 V	185	3160	FZ0609	891	452 V	2560 V
PCB134 & 143	pg/g-Wet	6	4	66.7	210 J	3760 J	FZ0609	1220	460 JV	3300 JV	9.86 U	3760 J	FZ0609	817	213 JV	3000 JV
PCB135 & 151 & 154	pg/g-Wet	6	6	100	2140 J	46800 J	FZ0609	12100	5850 JV	37200 JV	2140 J	46800 J	FZ0609	12100	5850 JV	37200 JV
PCB136	pg/g-Wet	6	6	100	410	2870	FZ0609	1260	1030 V	2600 V	410	2870	FZ0609	1260	1030 V	2600 V
PCB137	pg/g-Wet	6	6	100	278	2600	FZ0306	1100	800 V	2330 V	278	2600	FZ0306	1100	800 V	2330 V
PCB139 & 140	pg/g-Wet	6	6	100	82.9 J	309 J	FZ0609	219	224 JV	301 JV	82.9 J	309 J	FZ0609	219	224 JV	301 JV
PCB141	pg/g-Wet	6	6	100	1210	29700	FZ0609	7700	4070 V	23500 V	1210	29700	FZ0609	7700	4070 V	23500 V
PCB142	pg/g-Wet	6	0	0	--	--	--	--	--	--	5.67 U	12.1 U	FZ0609	3.75	3.01 UV	5.73 UV
PCB144	pg/g-Wet	6	6	100	180	10100	FZ0609	2110	545 V	7820 V	180	10100	FZ0609	2110	545 V	7820 V
PCB145	pg/g-Wet	6	0	0	--	--	--	--	--	--	2.23 U	2.36 U	FZ0306; FZ0609	1.16	1.18 UV	1.18 UV
PCB146	pg/g-Wet	6	6	100	1820	47200	FZ0609	12200	5830 V	37600 V	1820	47200	FZ0609	12200	5830 V	37600 V
PCB147 & 149	pg/g-Wet	6	6	100	3530 J	104000 J	FZ0609	24200	9140 JV	81500 JV	3530 J	104000 J	FZ0609	24200	9140 JV	81500 JV
PCB148	pg/g-Wet	6	6	100	30.2	108	FZ0609	65.4	58.6 V	107 V	30.2	108	FZ0609	65.4	58.6 V	107 V
PCB150	pg/g-Wet	6	6	100	10.5	87	FZ0609	39.4	35 V	78.8 V	10.5	87	FZ0609	39.4	35 V	78.8 V
PCB152	pg/g-Wet	6	6	100	5.76	23.8	FZ0609	13.6	12.7 V	23 V	5.76	23.8	FZ0609	13.6	12.7 V	23 V
PCB153 & 168	pg/g-Wet	6	6	100	5470 J	285000 J	FZ0609	65800	23200 JV	224000 JV	5470 J	285000 J	FZ0609	65800	23200 JV	224000 JV
PCB155	pg/g-Wet	6	4	66.7	4.91	10	FZ0609	7.14	6.82 V	9.7 V	4.31 U	10	FZ0609	5.48	5.27 V	9.5 V
PCB156	pg/g-Wet	6	6	100	529	17200	FZ0609	4400	2210 V	13700 V	529	17200	FZ0609	4400	2210 V	13700 V
PCB157	pg/g-Wet	6	6	100	93.1	979	FZ0609	409	249 V	904 V	93.1	979	FZ0609	409	249 V	904 V
PCB158	pg/g-Wet	6	6	100	644	19500	FZ0609	4760	2280 V	15200 V	644	19500	FZ0609	4760	2280 V	15200 V
PCB159	pg/g-Wet	6	6	100	57.3	2450	FZ0609	532	152 V	1910 V	57.3	2450	FZ0609	532	152 V	1910 V
PCB161	pg/g-Wet	6	0	0	--	--	--	--	--	--	6.28 U	7.83 U	FZ0609	3.37	3.32 UV	3.77 UV
PCB162	pg/g-Wet	6	6	100	34.2	302	FZ0609	104	60.9 V	257 V	34.2	302	FZ0609	104	60.9 V	257 V
PCB164	pg/g-Wet	6	6	100	401	15200	FZ0609	3360	1260 V	11700 V	401	15200	FZ0609	3360	1260 V	11700 V
PCB165	pg/g-Wet	6	5	83.3	11.6	39.8	FZ0609	24.8	20.1	39.1 V	7.25 U	39.8	FZ0609	21.3	18.3 V	38.9 V
PCB167	pg/g-Wet	6	6	100	296	8270	FZ0609	2190	1070 V	6650 V	296	8270	FZ0609	2190	1070 V	6650 V
PCB169	pg/g-Wet	6	6	100	1.41	4.45	FZ0609	2.27	1.72 V	4.05 V	1.41	4.45	FZ0609	2.27	1.72 V	4.05 V
PCB170	pg/g-Wet	6	6	100	2080	99500	FZ0609	21800	7720 V	77300 V	2080	99500	FZ0609	21800	7720 V	77300 V
PCB171 & 173	pg/g-Wet	6	6	100	641 J	16700 J	FZ0609	4170	1960 JV	13200 JV	641 J	16700 J	FZ0609	4170	1960 JV	13200 JV
PCB172	pg/g-Wet	6	6	100	473	16300	FZ0609	3680	1360 V	12700 V	473	16300	FZ0609	3680	1360 V	12700 V
PCB174	pg/g-Wet	6	6	100	1460	72900	FZ0609	15000	3560 V	56300 V	1460	72900	FZ0609	15000	3560 V	56300 V
PCB175	pg/g-Wet	6	6	100	84.3	3770	FZ0609	831	270 V	2930 V	84.3	3770	FZ0609	831	270 V	2930 V
PCB176	pg/g-Wet	6	6	100	109	4880	FZ0609	1060	294 V	3830 V	109	4880	FZ0609	1060	294 V	3830 V
PCB177	pg/g-Wet	6	6	100	1450	59400	FZ0609	12300	3440 V	45800 V	1450	59400	FZ0609	12300	3440 V	45800 V
PCB178	pg/g-Wet	6	6	100	600	20100	FZ0609	4510	1460 V	15700 V	600	20100	FZ0609	4510	1460 V	15700 V
PCB179	pg/g-Wet	6	6	100	666	8470	FZ0609	2660	1660 V	7030 V	666	8470	FZ0609	2660	1660 V	7030 V
PCB180 & 193	pg/g-Wet	6	6	100	5890 J	294000 J	FZ0609	66700	22900 JV	231000 JV	5890 J	294000 J	FZ0609	66700	22900 JV	231000 JV
PCB181	pg/g-Wet	6	6	100	21.1	451	FZ0609	119	58.4 V	362 V	21.1	451	FZ0609	119	58.4 V	362 V
PCB182	pg/g-Wet	6	5	83.3	19.2 J	68.8	FZ0609	45.2	38.5	68.7 V	7.99 U	68.8	FZ0609	38.3	34.9 V	68.6 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB183 & 185	pg/g-Wet	6	6	100	1410 J	71700 J	FZ0609	15700	4990 JV	55800 JV	1410 J	71700 J	FZ0609	15700	4990 JV	55800 JV
PCB184	pg/g-Wet	6	1	16.7	10.3	10.3	FZ0609	10.3	10.3	10.3	6.64 U	10.3	FZ0609	4.58	3.51 UV	8.61 V
PCB186	pg/g-Wet	6	0	0	--	--	--	--	--	--	3.82 U	4.06 U	FZ0609	1.99	2.02 UV	2.03 UV
PCB187	pg/g-Wet	6	6	100	4220	163000	FZ0609	36900	12100 V	128000 V	4220	163000	FZ0609	36900	12100 V	128000 V
PCB188	pg/g-Wet	6	6	100	9.19	67.6	FZ0609	24.7	15.2 V	58 V	9.19	67.6	FZ0609	24.7	15.2 V	58 V
PCB189	pg/g-Wet	6	6	100	67.7	4140	FZ0609	909	277 V	3250 V	67.7	4140	FZ0609	909	277 V	3250 V
PCB190	pg/g-Wet	6	6	100	467	15600	FZ0609	3720	1620 V	12300 V	467	15600	FZ0609	3720	1620 V	12300 V
PCB191	pg/g-Wet	6	6	100	81	5110	FZ0609	1110	360 V	3980 V	81	5110	FZ0609	1110	360 V	3980 V
PCB192	pg/g-Wet	6	0	0	--	--	--	--	--	--	3.45 U	3.66 U	FZ0306; FZ0609	1.8	1.83 UV	1.83 UV
PCB194	pg/g-Wet	6	6	100	833	32700	FZ0609	7590	3020 V	25700 V	833	32700	FZ0609	7590	3020 V	25700 V
PCB195	pg/g-Wet	6	6	100	364	13300	FZ0609	3140	1300 V	10500 V	364	13300	FZ0609	3140	1300 V	10500 V
PCB196	pg/g-Wet	6	6	100	464	18400	FZ0609	4370	1760 V	14600 V	464	18400	FZ0609	4370	1760 V	14600 V
PCB197 & 200	pg/g-Wet	6	6	100	123 J	3460 J	FZ0609	801	308 JV	2700 JV	123 J	3460 J	FZ0609	801	308 JV	2700 JV
PCB198 & 199	pg/g-Wet	6	6	100	1240 J	33000 J	FZ0609	8030	3500 JV	26000 JV	1240 J	33000 J	FZ0609	8030	3500 JV	26000 JV
PCB201	pg/g-Wet	6	6	100	135	3940	FZ0609	940	352 V	3110 V	135	3940	FZ0609	940	352 V	3110 V
PCB202	pg/g-Wet	6	6	100	237	5010	FZ0609	1280	562 V	3970 V	237	5010	FZ0609	1280	562 V	3970 V
PCB203	pg/g-Wet	6	6	100	775	6940	FZ0609	2650	2110 V	5860 V	775	6940	FZ0609	2650	2110 V	5860 V
PCB204	pg/g-Wet	6	0	0	--	--	--	--	--	--	9.12 U	9.68 U	FZ0609	4.75	4.83 UV	4.84 UV
PCB205	pg/g-Wet	6	6	100	46.9	885	FZ0609	241	132 V	707 V	46.9	885	FZ0609	241	132 V	707 V
PCB206	pg/g-Wet	6	6	100	376	1770	FZ0609	821	691 V	1530 V	376	1770	FZ0609	821	691 V	1530 V
PCB207	pg/g-Wet	6	6	100	61.9	606	FZ0609	192	124 V	493 V	61.9	606	FZ0609	192	124 V	493 V
PCB208	pg/g-Wet	6	6	100	176	849	FZ0609	331	233 V	709 V	176	849	FZ0609	331	233 V	709 V
PCB209	pg/g-Wet	6	6	100	195	264	FZ0306	229	227 V	261 V	195	264	FZ0306	229	227 V	261 V
Total PCB Congeners	pg/g-Wet	6	6	100	83300 JT	1950000 JT	FZ0609	511000	251000 JV	1550000 JV	83300 JT	1950000 JT	FZ0609	511000	251000 JV	1550000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	6	6	100	83.3 JT	1950 JT	FZ0609	511	251 JV	1550 JV	83.3 JT	1950 JT	FZ0609	511	251 JV	1550 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	6	6	100	177 T	610 T	FZ0306	300	244 JV	537 V	177 T	610 T	FZ0306	300	244 JV	537 V
Heptachlorobiphenylhomologs	pg/g-Wet	6	6	100	19800 JT	856000 JT	FZ0609	191000	64900 JV	669000 JV	19800 JT	856000 JT	FZ0609	191000	64900 JV	669000 JV
Hexachlorobiphenyl homologs	pg/g-Wet	6	6	100	28600 JT	832000 JT	FZ0609	206000	95000 JV	656000 JV	28600 JT	832000 JT	FZ0609	206000	95000 JV	656000 JV
Monochlorobiphenyl homologs	pg/g-Wet	2	2	100	2.52 JT	6.69 JT	FZ0609	4.61	4.61 JV	6.48 JV	2.52 JT	6.69 JT	FZ0609	4.61	4.61 JV	6.48 JV
Nonachlorobiphenyl homologs	pg/g-Wet	6	6	100	614 T	3230 T	FZ0609	1350	1070 V	2730 V	614 T	3230 T	FZ0609	1350	1070 V	2730 V
Octachlorobiphenyl homologs	pg/g-Wet	6	6	100	4220 JT	118000 JT	FZ0609	29100	13100 JV	93300 JV	4220 JT	118000 JT	FZ0609	29100	13100 JV	93300 JV
Pentachlorobiphenylhomologs	pg/g-Wet	6	6	100	17900 JT	109000 JT	FZ0609	54200	49800 JV	95100 JV	17900 JT	109000 JT	FZ0609	54200	49800 JV	95100 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	6	6	100	9410 JT	37300 JT	FZ0609	22800	23000 JV	34800 JV	9410 JT	37300 JT	FZ0609	22800	23000 JV	34800 JV
Trichlorobiphenyl homologs	pg/g-Wet	6	6	100	2450 JT	8900 JT	FZ0609	5530	5220 JV	8380 JV	2450 JT	8900 JT	FZ0609	5530	5220 JV	8380 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	6	6	100	0.21	0.63	FZ0306	0.454	0.506 V	0.627 V	0.21	0.63	FZ0306	0.454	0.506 V	0.627 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	2.16	3.51	FZ0609	2.97	3.09 V	3.46 V	2.16	3.51	FZ0609	2.97	3.09 V	3.46 V
Hexachlorodibenzofuran homologs	pg/g-Wet	6	6	100	0.867	2.48	FZ0609	1.48	1.43 V	2.23 V	0.867	2.48	FZ0609	1.48	1.43 V	2.23 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	1.78	3.29	FZ0609	2.29	2.18 V	3.03 V	1.78	3.29	FZ0609	2.29	2.18 V	3.03 V
Octachlorodibenzofuran	pg/g-Wet	6	1	16.7	0.112	0.112	FZ0306	0.112	0.112	0.112	0.046 U	0.181 U	FZ0306	0.0654	0.071 UV	0.107 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	1.61	3.89	FZ0609	2.72	2.71 V	3.76 V	1.61	3.89	FZ0609	2.72	2.71 V	3.76 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	6	6	100	1.85	3.02	FZ0609	2.25	2.08 V	2.9 V	1.85	3.02	FZ0609	2.25	2.08 V	2.9 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	0.564	0.846	FZ0609	0.671	0.664 V	0.814 V	0.564	0.846	FZ0609	0.671	0.664 V	0.814 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	6	6	100	0.743	1.24	FZ0306	0.992	0.971 V	1.23 V	0.743	1.24	FZ0306	0.992	0.971 V	1.23 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	0.273	0.543	FZ0609	0.392	0.375 V	0.523 V	0.273	0.543	FZ0609	0.392	0.375 V	0.523 V
Total PCDD/F	pg/g-Wet	6	6	100	12.2 T	17.8 T	FZ0609	14.2	13.6 V	17.3 V	12.2 T	17.8 T	FZ0609	14.2	13.6 V	17.3 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	6	6	100	0.141	0.288	FZ0306	0.235	0.248 V	0.285 V	0.141	0.288	FZ0306	0.235	0.248 V	0.285 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	1.21	2.52	FZ0609	1.94	1.98 V	2.46 V	1.21	2.52	FZ0609	1.94	1.98 V	2.46 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	6	3	50	0.021 J	0.031	FZ0306	0.0263	0.027	0.0306 V	0.016 U	0.031	FZ0306	0.0172	0.0145 JV	0.03 V
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	6	6	100	0.215	0.966	FZ0609	0.384	0.267 V	0.811 V	0.215	0.966	FZ0609	0.384	0.267 V	0.811 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	0.224	0.296	FZ0306	0.256	0.249 V	0.293 V	0.224	0.296	FZ0306	0.256	0.249 V	0.293 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	6	6	100	0.108	0.286	FZ0609	0.152	0.129 V	0.249 V	0.108	0.286	FZ0609	0.152	0.129 V	0.249 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	1.05	2.19	FZ0609	1.53	1.49 V	2.03 V	1.05	2.19	FZ0609	1.53	1.49 V	2.03 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	6	4	66.7	0.011	0.017	FZ0609	0.0138	0.0135 V	0.0166 V	0.011	0.018 U	FZ0609	0.0119	0.012 V	0.0163 V
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	0.167	0.313	FZ0609	0.214	0.202 V	0.29 V	0.167	0.313	FZ0609	0.214	0.202 V	0.29 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	6	6	100	0.29	0.477	FZ0609	0.342	0.312 V	0.448 V	0.29	0.477	FZ0609	0.342	0.312 V	0.448 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	0.54	0.756	FZ0609	0.627	0.622 V	0.737 V	0.54	0.756	FZ0609	0.627	0.622 V	0.737 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	6	6	100	0.065 J	0.148	FZ0609	0.0928	0.0815 JV	0.137 V	0.065 J	0.148	FZ0609	0.0928	0.0815 JV	0.137 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	6	6	100	0.58	1.53	FZ0609	0.822	0.676 V	1.36 V	0.58	1.53	FZ0609	0.822	0.676 V	1.36 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	6	6	100	0.344	0.715	FZ0306	0.565	0.613 V	0.711 V	0.344	0.715	FZ0306	0.565	0.613 V	0.711 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	0.253	0.522	FZ0609	0.355	0.345 V	0.494 V	0.253	0.522	FZ0609	0.355	0.345 V	0.494 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	6	6	100	1.29 JT	2.12 JT	FZ0609	1.58	1.53 V	2.02 JV	1.29 JT	2.12 JT	FZ0609	1.58	1.53 V	2.02 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	6	6	100	2.92 T	8.16 JT	FZ0609	5.05	4.53 JV	7.68 JV	2.92 T	8.16 JT	FZ0609	5.05	4.53 JV	7.68 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	6	6	100	1.6 T	6.04 T	FZ0609	3.47	2.91 V	5.76 V	1.6 T	6.04 T	FZ0609	3.47	2.91 V	5.76 V
Pesticides																
2,4'-DDD	µg/kg-Wet	6	1	17	12 NJ	12 NJ	FZ0609	12	12 NJ	12 NJ	1.6 U	12 NJ	FZ0609	3.5	1.4 UV	10 JV
2,4'-DDE	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	7.5 UT	FZ0609	1.4	0.73 UJV	3.3 UV
2,4'-DDT	µg/kg-Wet	6	5	83	3.3 N	14 N	FZ0306	9.1	8.1 NJ	14 JV	3.3 N	14 N	FZ0306	8.2	8.1 JV	14 JV
4,4'-DDD	µg/kg-Wet	6	6	100	6.9 J	13	FZ0609	9.4	8.5 JV	13 V	6.9 J	13	FZ0609	9.4	8.5 JV	13 V
4,4'-DDE	µg/kg-Wet	6	6	100	29.5 JT	70	FZ0306	47.4	47.5 JV	67 V	29.5 JT	70	FZ0306	47.4	47.5 JV	67 V
4,4'-DDT	µg/kg-Wet	6	5	83	5.3 J	46	FZ0609	23	24	42 V	5.3 J	46	FZ0609	20	20 V	41 V
Aldrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	13 UT	FZ0609	1.8	0.5 UV	5.4 UV
alpha-Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	20 U	FZ0609	2.3	0.5 UV	8 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	6.4 UT	FZ0609	1.2	0.5 UV	2.9 UV
beta-Endosulfan	µg/kg-Wet	6	2	33	2.3 NJ	8.6 NJ	FZ0306	5.5	5.5 JV	8.3 JV	1 U	15 UT	FZ0609	3.9	2.4 JV	8.3 JV
beta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	8.5 UT	FZ0609	1.9	1.2 UJV	4 UV
cis-Chlordane	µg/kg-Wet	6	2	33	1.7 NJ	27	FZ0306	14	14 JV	26 JV	1 U	27	FZ0306	7	1.9 JV	23 V
cis-Nonachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3 UJ	11 UJ	FZ0306	3.7	4 UJV	5.2 UJV
delta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	7.3 UT	FZ0609	1.3	0.5 UV	3.2 UV
Dieldrin	µg/kg-Wet	6	2	33	1.2 NJ	2.6 NJ	FZ0306	1.9	1.9 JV	2.5 JV	1.2 NJ	14 UT	FZ0609	2.5	1.6 JV	5.9 JV
Endosulfan sulfate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	12 UT	FZ0609	1.7	0.5 UV	5 UV
Endrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	20 UT	FZ0609	2.4	0.55 UV	8 UV
Endrin aldehyde	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	8.5 UT	FZ0609	1.7	1.4 UJV	3.7 UV
Endrin ketone	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	7.5 UT	FZ0609	1.3	0.5 UJV	3.3 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	6	3	50	1.4 N	1.9 N	FZ0609	1.6	1.5 N	1.9 V	1 U	9.6 UT	FZ0609	2	1.7 V	4.1 UV
Heptachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	13 UT	FZ0609	1.8	0.5 UV	5.4 UV
Heptachlor epoxide	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	8 UT	FZ0609	1.3	0.5 UV	3.5 UV
Methoxychlor	µg/kg-Wet	6	1	17	1.1 NJ	1.1 NJ	FZ0306	1.1	1.1 NJ	1.1 NJ	1 UJ	4.8 UT	FZ0609	1.2	0.83 JV	2.3 UV
Mirex	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	6.2 UT	FZ0609	1.2	0.5 UV	2.8 UJV
Oxychlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	20 UT	FZ0609	2.3	0.5 UV	8 UJV
Total Chlordanes	µg/kg-Wet	6	4	67	1.8 NJT	67 T	FZ0306	20	5.5 JV	58 JV	1.8 NJT	67 T	FZ0306	16	5.9 JV	53 V
Total Endosulfan	µg/kg-Wet	6	2	33	2.3 NJT	8.6 NJT	FZ0306	5.5	5.5 JV	8.3 JV	1 UT	20 UT	FZ0609	4.3	2.4 JV	9.7 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	6	6	100	6.9 JT	25 NJT	FZ0609	11	8.5 JV	22 JV	6.9 JT	25 NJT	FZ0609	11	8.5 JV	22 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	37.5 JT	141 NJT	FZ0609	85.6	92.8 JV	131 JV	37.5 JT	141 NJT	FZ0609	85.6	92.8 JV	131 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	6	6	100	29.5 JT	70 T	FZ0306	47.4	47.5 JV	67 V	29.5 JT	70 T	FZ0306	47.4	47.5 JV	67 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	6	5	83.3	8.6 NJT	58 NJT	FZ0609	32.2	33.1 NJT	54 JV	6.9 UT	58 NJT	FZ0609	27.4	28.1 JV	53 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	37.5 JT	117 T	FZ0609	76	81.7 JV	111 JV	37.5 JT	117 T	FZ0609	76	81.7 JV	111 JV
Toxaphene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	120 U	5700 U	FZ0609	610	95 UV	2300 UJV
trans-Chlordane	µg/kg-Wet	6	1	17	25	25	FZ0306	25	25	25	1 U	25	FZ0306	5.5	1.3 UV	20 V
trans-Nonachlor	µg/kg-Wet	6	4	67	1.8 NJ	15	FZ0306	6.5	4.7 JV	14 JV	1.8 NJ	15	FZ0306	5.6	4.6 JV	13 JV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Acenaphthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Acenaphthylene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Benzo(a)anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Benzo(a)pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Benzo(b)fluoranthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Benzo(g,h,i)perylene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UJT	33 UJT	FZ0306; FZ0609	17	17 UJV	17 UJV
Benzo(k)fluoranthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Chrysene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Fluoranthene	µg/kg-Wet	6	1	17	40 T	40 T	FZ0306	40	40 T	40 T	33 UT	40 T	FZ0306	20	17 UV	34 V
Fluorene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
High Molecular Weight PAH	µg/kg-Wet	6	1	17	40 T	40 T	FZ0306	40	40 T	40 T	33 UT	49 UT	FZ0609	23	20 UV	36 V
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Low Molecular Weight PAH	µg/kg-Wet	6	1	17	60 T	60 T	FZ0306	60	60 T	60 T	33 UT	60 T	FZ0306	24	17 UV	49 V
Naphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Phenanthrene	µg/kg-Wet	6	1	17	60 T	60 T	FZ0306	60	60 T	60 T	33 UT	60 T	FZ0306	24	17 UV	49 V
Pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	49 UT	FZ0609	19	17 UV	24 UV
Total BaPEq	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	16.5	16.5 UV	16.5 UV
Total cPAHs	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Total PAHs	µg/kg-Wet	6	1	17	100 T	100 T	FZ0306	100	100 T	100 T	33 UT	100 T	FZ0306	33	20 UV	81 V
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	6	1	17	2700 T	2700 T	FZ0306	2700	2700 T	2700 T	98 UT	2700 T	FZ0306	490	50 UV	2000 V
Butylbenzyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Dibutyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Diethyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	FZ0306; FZ0609	83	85 UV	85 UV
Dimethyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	FZ0306; FZ0609	83	85 UV	85 UV
Di-n-octyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
1,2-Diphenylhydrazine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 U	33 U	FZ0306; FZ0609	17	17 UV	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
1,4-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2,4-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2,6-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2-Chloronaphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	820 U	830 U	FZ0306; FZ0609	410	420 UV	420 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	FZ0306; FZ0609	830	850 UV	850 UV
3-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	820 U	830 U	FZ0306; FZ0609	410	420 UV	420 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
4-Chloroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 UJT	170 UJT	FZ0306; FZ0609	83	85 UJV	85 UJV
4-Chlorophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	82 UT	83 UT	FZ0306; FZ0609	41	42 UV	42 UV
4-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	820 U	830 U	FZ0306; FZ0609	410	420 UV	420 UV
Aniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	FZ0306; FZ0609	830	850 UV	850 UV
Azobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	FZ0306; FZ0609	83	85 UV	85 UV
Benzoic acid	µg/kg-Wet	6	0	0	--	--	--	--	--	--	8200 UJ	8300 UJ	FZ0306; FZ0609	4100	4200 UJV	4200 UJV
Benzyl alcohol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	FZ0306; FZ0609	83	85 UV	85 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	FZ0306; FZ0609	83	85 UV	85 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Carbazole	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Dibenzofuran	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Hexachlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UT	33 UT	FZ0306; FZ0609	9.2	9.9 UV	17 UV
Hexachlorobutadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJT	4.6 UT	FZ0609	1.1	0.5 UJV	2.2 UV
Hexachlorocyclopentadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	820 U	830 U	FZ0306; FZ0609	410	420 UV	420 UV
Hexachloroethane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJT	33 UT	FZ0609	4.4	1.3 UJV	14 UV
Isophorone	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	FZ0306; FZ0609	820	800 UV	850 UV
Nitrobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 UT	170 UT	FZ0306; FZ0609	83	85 UV	85 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
N-Nitrosodiphenylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	FZ0306; FZ0609	83	85 UV	85 UV
N-Nitrosodipropylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	FZ0306; FZ0609	830	850 UV	850 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 UJ	1700 U	FZ0306; FZ0609	830	850 UV	850 UV
2,4,5-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	820 U	830 U	FZ0306; FZ0609	410	420 UV	420 UV
2,4,6-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2,4-Dichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
2,4-Dimethylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	490 U	500 U	FZ0306; FZ0609	250	250 UV	250 UV
2-Chlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	56 UT	FZ0609	18	17 UV	25 UV
2-Methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	FZ0306; FZ0609	83	85 UV	85 UV
2-Nitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	FZ0306; FZ0609	820	800 UV	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3300 U	3300 U	FZ0306; FZ0609	1700	1700 UV	1700 UV
4-Chloro-3-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
4-Methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	33 UT	33 UT	FZ0306; FZ0609	17	17 UV	17 UV
4-Nitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	FZ0306; FZ0609	830	850 UV	850 UV
Pentachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 UT	190 UT	FZ0609	87	85 UV	94 UV
Phenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	330 U	330 U	FZ0306; FZ0609	170	170 UV	170 UV
Carp (fillet without skin)																
Metals																
Mercury	mg/kg-Wet	6	6	100	0.074	0.191 T	FZ0306	0.127	0.115 V	0.19 V	0.074	0.191 T	FZ0306	0.127	0.115 V	0.19 V
Carp (fillet)																
Conventionals																
Lipids	percent-Wet	15	15	100	3.3 T	9.51	CP0004	6.03	5.72	9.37 V	3.3 T	9.51	CP0004	6.03	5.72	9.37 V
Total solids	percent-Wet	15	15	100	22.8	31.5	CP0004	26.6	26.5	30.3 V	22.8	31.5	CP0004	26.6	26.5	30.3 V
Metals																
Aluminum	mg/kg-Wet	15	15	100	1	2.8 T	CP0408	1.67	1.4	2.72 JV	1	2.8 T	CP0408	1.67	1.4	2.72 JV
Antimony	mg/kg-Wet	15	0	0	--	--	--	--	--	--	0.001 U	0.006 U	CP0004	0.0018	0.0025 UT	0.003 UV
Arsenic	mg/kg-Wet	15	15	100	0.04 J	0.21	CP0004	0.0967	0.075 JT	0.196 V	0.04 J	0.21	CP0004	0.0967	0.075 JT	0.196 V
Cadmium	mg/kg-Wet	15	11	73.3	0.002 J	0.009 J	FZ0609	0.00455	0.004 J	0.008 JV	0.002 J	0.009 J	FZ0609	0.00373	0.0035 JT	0.0076 JV
Chromium	mg/kg-Wet	15	4	26.7	0.12 J	1.49	FZ0306	0.628	0.45 V	1.37 V	0.07 U	1.49	FZ0306	0.204	0.05 UT	0.937 V
Copper	mg/kg-Wet	15	15	100	0.313	0.686	CP0004	0.459	0.428 T	0.656 V	0.313	0.686	CP0004	0.459	0.428 T	0.656 V
Lead	mg/kg-Wet	15	11	73.3	0.012	0.356	CP0812	0.0764	0.0516 T	0.217 V	0.004 U	0.356	CP0812	0.0567	0.0472	0.161 V
Manganese	mg/kg-Wet	15	15	100	0.191 T	2.81 T	CP0408	1.45	1.86	2.55 V	0.191 T	2.81 T	CP0408	1.45	1.86	2.55 V
Mercury	mg/kg-Wet	9	9	100	0.0411	0.0747	CP0004	0.0607	0.0615	0.0741 V	0.0411	0.0747	CP0004	0.0607	0.0615	0.0741 V
Nickel	mg/kg-Wet	15	14	93.3	0.012 J	0.396	CP0408	0.0706	0.0425 JV	0.195 V	0.002 U	0.396	CP0408	0.0659	0.04 J	0.18 V
Selenium	mg/kg-Wet	15	9	60	0.2 JT	0.3 JT	CP0004; CP0408	0.22	0.2 J	0.3 JV	0.2 JT	0.5 U	FZ0609	0.2	0.2 J	0.3 JV
Silver	mg/kg-Wet	15	0	0	--	--	--	--	--	--	0.0002 U	0.002 U	CP0004; CP0408; CP0812	0.00061	0.001 U	0.001 UV
Thallium	mg/kg-Wet	15	11	73.3	0.00075 JT	0.0062	CP0004	0.00241	0.0021 J	0.0053 JV	0.00075 JT	0.0062	CP0004	0.00187	0.00095 JT	0.00494 JV
Zinc	mg/kg-Wet	15	15	100	17.4 J	31	CP0408	25.7	24.8	30.7 V	17.4 J	31	CP0408	25.7	24.8	30.7 V
Butyltins																
Butyltin ion	µg/kg-Wet	9	2	22	0.35 J	1.2 NJ	CP0408	0.78	0.78 JV	1.2 JV	0.35 J	3.4 U	CP0812	0.54	0.28 U	1.5 JV
Dibutyltin ion	µg/kg-Wet	9	4	44	0.67 J	7.3	CP0812	2.8	1.6 JV	6.4 JV	0.67 J	7.3	CP0812	1.5	0.43 U	5 JV
Tetrabutyltin	µg/kg-Wet	9	0	0	--	--	--	--	--	--	0.43 U	2.2 U	CP0004; CP0408; CP0812	1	1.1 U	1.1 UV
Tributyltin ion	µg/kg-Wet	9	8	89	2.6 J	11	CP0812	5.4	4.4 JV	9.6 V	1.8 U	11	CP0812	4.9	4 JT	9.4 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3.8 U	41 U	FZ0609	12	15 UV	20 UV
Aroclor 1221	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3.8 U	38 U	FZ0306	12	14 UV	19 UV
Aroclor 1232	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3.8 U	84 U	FZ0609	19	19 UV	38 UV
Aroclor 1242	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3.8 U	57 UJ	FZ0609	14	18 UJV	26 UJV
Aroclor 1248	µg/kg-Wet	6	4	67	110	410	FZ0306	220	170 V	380 V	110	410	FZ0306	170	140 V	350 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Aroclor 1254	µg/kg-Wet	6	0	0	--	--	--	--	--	--	200 U	760 U	FZ0306	240	250 UJV	370 UJV
Aroclor 1260	µg/kg-Wet	6	6	100	230 J	1200 J	FZ0609	670	570 V	1200 JV	230 J	1200 J	FZ0609	670	570 V	1200 JV
Aroclor 1262	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3.8 U	38 U	FZ0306	12	14 UJV	19 UV
Aroclor 1268	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3.8 U	38 U	FZ0306	12	14 UJV	19 UV
Aroclors	µg/kg-Wet	6	6	100	350 T	1200 JT	FZ0609	812	865 V	1200 JV	350 T	1200 JT	FZ0609	812	865 V	1200 JV
PCB Congeners																
PCB001	pg/g-Wet	9	9	100	1.94	90 J	CP0408	14.7	3.74	61 JV	1.94	90 J	CP0408	14.7	3.74	61 JV
PCB002	pg/g-Wet	9	8	88.9	2.24	5.81 J	CP0004	3.62	3.19 JV	5.48 JV	2.24	68.4 U	CP0408	7.02	3.23 J	22.8 JV
PCB003	pg/g-Wet	9	5	55.6	1.88 T	10.1 JT	CP0812	5.16	2.58	9.82 JV	1.37 U	115 U	CP0408	9.49	2.51	38.5 JV
PCB004	pg/g-Wet	9	9	100	62.9 J	22100	CP0408	2560	101 J	13400 JV	62.9 J	22100	CP0408	2560	101 J	13400 JV
PCB005	pg/g-Wet	9	8	88.9	1.55 J	6.2 JT	CP0812	2.58	2.07 JV	5.11 JV	1.55 J	85.5 U	CP0408	7.04	2.26 J	28.1 JV
PCB006	pg/g-Wet	9	9	100	24.8 J	357	CP0408	89.1	50.5 J	285 JV	24.8 J	357	CP0408	89.1	50.5 J	285 JV
PCB007	pg/g-Wet	9	9	100	3.43 J	246	CP0408	32.4	6.06 J	152 JV	3.43 J	246	CP0408	32.4	6.06 J	152 JV
PCB008	pg/g-Wet	9	9	100	118 J	577	CP0408	262	191 J	559 JV	118 J	577	CP0408	262	191 J	559 JV
PCB009	pg/g-Wet	9	9	100	8.25 J	153 J	CP0408	30.3	13.2 J	104 JV	8.25 J	153 J	CP0408	30.3	13.2 J	104 JV
PCB010	pg/g-Wet	9	9	100	5.03 J	4350	CP0408	492	7.57 J	2620 JV	5.03 J	4350	CP0408	492	7.57 J	2620 JV
PCB011	pg/g-Wet	9	9	100	85.3 J	745 J	CP0004	368	382 J	667 JV	85.3 J	745 J	CP0004	368	382 J	667 JV
PCB012 & 013	pg/g-Wet	9	9	100	8.01 J	592	CP0408	79	14.6 JT	366 JV	8.01 J	592	CP0408	79	14.6 JT	366 JV
PCB014	pg/g-Wet	9	1	11.1	0.521 JT	0.521 JT	CP0812	0.521	0.521 JT	0.521 JT	0.43 UJ	145 U	CP0408	8.37	0.309 UJ	43.8 UJV
PCB015	pg/g-Wet	9	8	88.9	15.5	87.6 J	CP0004	38.7	31.8 V	75.4 JV	15.5	102 U	CP0408	40.1	32.1	73.6 JV
PCB016	pg/g-Wet	9	9	100	102 J	1480	CP0408	300	157 J	994 V	102 J	1480	CP0408	300	157 J	994 V
PCB017	pg/g-Wet	9	9	100	154 J	48400	CP0408	5650	337 JT	29200 V	154 J	48400	CP0408	5650	337 JT	29200 V
PCB018 & 030	pg/g-Wet	9	9	100	361 J	8330	CP0408	1400	548 JT	5350 V	361 J	8330	CP0408	1400	548 JT	5350 V
PCB019	pg/g-Wet	9	9	100	175 J	127000	CP0408	14500	262 T	76700 JV	175 J	127000	CP0408	14500	262 T	76700 JV
PCB020 & 028	pg/g-Wet	9	9	100	1200 J	12100	CP0408	3280	2270	8470 JV	1200 J	12100	CP0408	3280	2270	8470 JV
PCB021 & 033	pg/g-Wet	9	9	100	291 J	9370	CP0408	1500	521	5910 JV	291 J	9370	CP0408	1500	521	5910 JV
PCB022	pg/g-Wet	9	9	100	298 J	815 JT	CP0812	578	568	759 JV	298 J	815 JT	CP0812	578	568	759 JV
PCB023	pg/g-Wet	9	8	88.9	1.45 J	2.68 JT	CP0812	2.1	2.23 JV	2.67 JV	1.45 J	115 U	CP0408	8.26	2.24 J	35.6 JV
PCB024	pg/g-Wet	9	8	88.9	6.14 J	16.3 JT	CP0812	10.8	10.5 JV	15.1 JV	6.14 J	72.6 U	CP0408	13.6	10.9	28.3 JV
PCB025	pg/g-Wet	9	9	100	105 J	9370	CP0408	1190	181 T	5730 JV	105 J	9370	CP0408	1190	181 T	5730 JV
PCB026 & 029	pg/g-Wet	9	9	100	218 J	6820	CP0408	1070	346 J	4330 JV	218 J	6820	CP0408	1070	346 J	4330 JV
PCB027	pg/g-Wet	9	9	100	59.2 J	40400	CP0408	4600	99 J	24300 JV	59.2 J	40400	CP0408	4600	99 J	24300 JV
PCB031	pg/g-Wet	9	9	100	789 J	3800	CP0408	1670	1440	3140 JV	789 J	3800	CP0408	1670	1440	3140 JV
PCB032	pg/g-Wet	9	9	100	158 J	24900	CP0408	3040	336 JT	15100 JV	158 J	24900	CP0408	3040	336 JT	15100 JV
PCB034	pg/g-Wet	9	9	100	7.75 J	215	CP0408	36.2	15.4 JT	137 V	7.75 J	215	CP0408	36.2	15.4 JT	137 V
PCB035	pg/g-Wet	9	6	66.7	0.785 JT	4.25 J	CP0408	2.56	2.69 JV	4.03 JV	0.46 UJ	188 U	CP0408	12.3	2.21 T	58.1 JV
PCB036	pg/g-Wet	9	6	66.7	0.575 J	1.6	CP0408	1.07	0.96 JV	1.56 JV	0.575 J	162 U	CP0408	9.81	0.945 J	49.2 V
PCB037	pg/g-Wet	9	8	88.9	60.4	214	CP0004	114	103 V	190 V	60.4	214	CP0004	108	93.3 T	186 V
PCB038	pg/g-Wet	9	5	55.6	0.682 J	2.58 J	CP0408	1.54	1.28 JT	2.45 JV	0.682 J	601 U	CP0408	34.5	1.23 T	181 JV
PCB039	pg/g-Wet	9	9	100	5.13 J	156 J	CP0408	27.2	12.5 J	99.9 JV	5.13 J	156 J	CP0408	27.2	12.5 J	99.9 JV
PCB040 & 041 & 071	pg/g-Wet	9	9	100	913	59100	CP0408	7830	1590 T	36200 V	913	59100	CP0408	7830	1590 T	36200 V
PCB042	pg/g-Wet	9	9	100	476	14700	CP0408	2330	855	9240 V	476	14700	CP0408	2330	855	9240 V
PCB043	pg/g-Wet	9	9	100	81.7	11700	CP0408	1410	135 J	7090 V	81.7	11700	CP0408	1410	135 J	7090 V
PCB044 & 047 & 065	pg/g-Wet	9	9	100	3210	979000	CP0408	113000	4900	590000 V	3210	979000	CP0408	113000	4900	590000 V
PCB045 & 051	pg/g-Wet	9	9	100	329	271000	CP0408	30700	766 J	163000 V	329	271000	CP0408	30700	766 J	163000 V
PCB046	pg/g-Wet	9	9	100	47.5	10200	CP0408	1210	87.1	6160 JV	47.5	10200	CP0408	1210	87.1	6160 JV
PCB048	pg/g-Wet	9	9	100	264	8140	CP0408	1300	493	5120 V	264	8140	CP0408	1300	493	5120 V
PCB049 & 069	pg/g-Wet	9	9	100	2210	239000	CP0408	29900	3050	146000 V	2210	239000	CP0408	29900	3050	146000 V
PCB050 & 053	pg/g-Wet	9	9	100	295	191000	CP0408	21900	785 T	115000 V	295	191000	CP0408	21900	785 T	115000 V
PCB052	pg/g-Wet	9	9	100	3470	158000	CP0408	22400	4820	98400 V	3470	158000	CP0408	22400	4820	98400 V
PCB054	pg/g-Wet	9	9	100	49.5	66700	CP0408	7520	96 T	40200 JV	49.5	66700	CP0408	7520	96 T	40200 JV
PCB055	pg/g-Wet	9	8	88.9	105	196	CP0408	161	174 JV	194 V	105	196	CP0408	153	166 T	194 V
PCB056	pg/g-Wet	9	9	100	698	1620 J	CP0004	1330	1390	1600 JV	698	1620 J	CP0004	1330	1390	1600 JV
PCB057	pg/g-Wet	9	9	100	11.3	2580	CP0408	303	19.6 T	1560 V	11.3	2580	CP0408	303	19.6 T	1560 V
PCB058	pg/g-Wet	9	8	88.9	20.8	36.6 T	CP0812	26.9	24.8 JV	35.8 V	20.8	172 U	CP0408	33.5	26.2	66.2 V
PCB059 & 062 & 075	pg/g-Wet	9	9	100	212	42300	CP0408	5000	359	25600 V	212	42300	CP0408	5000	359	25600 V
PCB060	pg/g-Wet	9	9	100	426	1040	CP0408	800	842	1010 V	426	1040	CP0408	800	842	1010 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB061 & 070 & 074 & 076	pg/g-Wet	9	9	100	3910	14100	CP0408	7540	6850 T	12100 V	3910	14100	CP0408	7540	6850 T	12100 V
PCB063	pg/g-Wet	9	9	100	111	2220	CP0408	432	217 J	1440 V	111	2220	CP0408	432	217 J	1440 V
PCB064	pg/g-Wet	9	9	100	814	3940	CP0408	1800	1600 T	3160 V	814	3940	CP0408	1800	1600 T	3160 V
PCB066	pg/g-Wet	9	9	100	2530	23900	CP0408	6600	4800 J	16500 V	2530	23900	CP0408	6600	4800 J	16500 V
PCB067	pg/g-Wet	9	8	88.9	45.4	101	CP0004	82.7	85 V	98.6 JV	45.4	152 U	CP0408	82	83.2 T	98.2 JV
PCB068	pg/g-Wet	9	9	100	45.9	8740	CP0408	1040	66 J	5300 V	45.9	8740	CP0408	1040	66 J	5300 V
PCB072	pg/g-Wet	9	9	100	54.7	2450	CP0408	346	71.7	1520 V	54.7	2450	CP0408	346	71.7	1520 V
PCB073	pg/g-Wet	9	9	100	74.4	24000	CP0408	2780	103 J	14500 V	74.4	24000	CP0408	2780	103 J	14500 V
PCB077	pg/g-Wet	9	8	88.9	104	255	CP0004	189	177 V	254 V	104	255	CP0004	178	169	254 V
PCB078	pg/g-Wet	9	2	22.2	4.3	4.33 T	CP0812	4.32	4.32 V	4.33 V	3.21 U	154 U	CP0408	11.4	3.8 U	47.9 V
PCB079	pg/g-Wet	9	9	100	51.9	1640	CP0408	262	83.9	1040 JV	51.9	1640	CP0408	262	83.9	1040 JV
PCB080	pg/g-Wet	9	0	0	--	--	--	--	--	--	2.56 UT	147 U	CP0408	10.2	2.2 UJ	45.6 UV
PCB081	pg/g-Wet	9	8	88.9	7.22	14.8	CP0408	11.8	12 V	14.4 V	7.22	173 U	CP0408	20.1	12.1	57.8 V
PCB082	pg/g-Wet	9	9	100	491	2670	CP0408	980	799	2010 V	491	2670	CP0408	980	799	2010 V
PCB083 & 099	pg/g-Wet	9	9	100	5770	315000	CP0408	42100	7610	194000 V	5770	315000	CP0408	42100	7610	194000 V
PCB084	pg/g-Wet	9	9	100	892	39800	CP0408	5600	1340	24700 V	892	39800	CP0408	5600	1340	24700 V
PCB085 & 116 & 117	pg/g-Wet	9	9	100	1230	19100	CP0408	3710	1860 T	12300 V	1230	19100	CP0408	3710	1860 T	12300 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	9	9	100	4190	130000	CP0408	19800	5720	81300 V	4190	130000	CP0408	19800	5720	81300 V
PCB088 & 091	pg/g-Wet	9	9	100	1040	90400	CP0408	11600	1340	55700 V	1040	90400	CP0408	11600	1340	55700 V
PCB089	pg/g-Wet	9	9	100	29.2	774	CP0408	125	48.4	487 V	29.2	774	CP0408	125	48.4	487 V
PCB090 & 101 & 113	pg/g-Wet	9	9	100	9630	528000	CP0408	71800	11400	328000 V	9630	528000	CP0408	71800	11400	328000 V
PCB092	pg/g-Wet	9	9	100	1700	140000	CP0408	17900	2110	85800 V	1700	140000	CP0408	17900	2110	85800 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	9	9	100	4680	578000	CP0408	71100	5620	353000 V	4680	578000	CP0408	71100	5620	353000 V
PCB094	pg/g-Wet	9	9	100	45.6	41600	CP0408	4710	97.2	25000 V	45.6	41600	CP0408	4710	97.2	25000 V
PCB096	pg/g-Wet	9	9	100	24	14500	CP0408	1660	59.4	8740 V	24	14500	CP0408	1660	59.4	8740 V
PCB103	pg/g-Wet	9	9	100	130	44900	CP0408	5270	260	27200 V	130	44900	CP0408	5270	260	27200 V
PCB104	pg/g-Wet	9	9	100	12.1	11800	CP0408	1330	20.6	7090 V	12.1	11800	CP0408	1330	20.6	7090 V
PCB105	pg/g-Wet	9	9	100	2010	16400	CP0408	4650	3210	11500 V	2010	16400	CP0408	4650	3210	11500 V
PCB106	pg/g-Wet	9	7	77.8	11.1	20.7	CP0408	15.6	13.6 T	20.6 V	11.1	346 U	CP0408	32	13.6 T	112 V
PCB107 & 124	pg/g-Wet	9	9	100	240	1360	CP0408	449	345	978 V	240	1360	CP0408	449	345	978 V
PCB109	pg/g-Wet	9	9	100	660	6960	CP0408	1610	994 T	4690 V	660	6960	CP0408	1610	994 T	4690 V
PCB110 & 115	pg/g-Wet	9	9	100	6800	114000	CP0408	21600	9680	74500 V	6800	114000	CP0408	21600	9680	74500 V
PCB111	pg/g-Wet	9	8	88.9	14.1	1070	CP0408	158	27.2 V	712 V	14.1	1070	CP0408	142	24.2	661 V
PCB112	pg/g-Wet	9	1	11.1	31600	31600	CP0408	31600	31600	31600	3.01 UT	31600	CP0408	3510	2.85 U	19000 V
PCB114	pg/g-Wet	9	8	88.9	161	310 T	CP0812	234	229 V	298 V	161	431 U	CP0408	232	217	296 V
PCB118	pg/g-Wet	9	9	100	7000	92100	CP0408	19400	10500	61100 V	7000	92100	CP0408	19400	10500	61100 V
PCB120	pg/g-Wet	9	9	100	58.7	2870	CP0408	414	99.2	1790 V	58.7	2870	CP0408	414	99.2	1790 V
PCB121	pg/g-Wet	9	9	100	12.3	4700	CP0408	546	23	2840 V	12.3	4700	CP0408	546	23	2840 V
PCB122	pg/g-Wet	9	8	88.9	58.1	108	CP0004	85	83.3 V	105 V	58.1	142 U	CP0408	83.4	80.2	105 V
PCB123	pg/g-Wet	9	9	100	141	1420	CP0408	322	195	940 V	141	1420	CP0408	322	195	940 V
PCB126	pg/g-Wet	9	1	11.1	19.2 T	19.2 T	CP0812	19.2	19.2 T	19.2 T	11.6 U	168 U	CP0408	19.5	11.1 UT	58.1 V
PCB127	pg/g-Wet	9	8	88.9	12.8	25.3	CP0004	18	16.3 V	25.2 V	12.8	137 U	CP0408	23.6	16.3	51.2 V
PCB128 & 166	pg/g-Wet	9	9	100	2100	70300	CP0408	10500	2680	44300 V	2100	70300	CP0408	10500	2680	44300 V
PCB129 & 138 & 160 & 163	pg/g-Wet	9	9	100	19400	1810000	CP0408	230000	28100	1120000 V	19400	1810000	CP0408	230000	28100	1120000 V
PCB130	pg/g-Wet	9	9	100	1010	43500	CP0408	6130	1230	27200 V	1010	43500	CP0408	6130	1230	27200 V
PCB131	pg/g-Wet	9	9	100	107	6620	CP0408	888	148	4100 V	107	6620	CP0408	888	148	4100 V
PCB132	pg/g-Wet	9	9	100	3300	267000	CP0408	34700	4300	165000 V	3300	267000	CP0408	34700	4300	165000 V
PCB133	pg/g-Wet	9	9	100	379	30400	CP0408	3980	553	18800 V	379	30400	CP0408	3980	553	18800 V
PCB134 & 143	pg/g-Wet	9	9	100	631	66100	CP0408	8290	846	40500 V	631	66100	CP0408	8290	846	40500 V
PCB135 & 151 & 154	pg/g-Wet	9	9	100	4790	678000	CP0408	84000	7530	416000 V	4790	678000	CP0408	84000	7530	416000 V
PCB136	pg/g-Wet	9	9	100	993	152000	CP0408	18900	1790	93200 V	993	152000	CP0408	18900	1790	93200 V
PCB137	pg/g-Wet	9	9	100	565	14600	CP0408	2290	710	9240 V	565	14600	CP0408	2290	710	9240 V
PCB139 & 140	pg/g-Wet	9	9	100	199	8590	CP0408	1220	296	5310 V	199	8590	CP0408	1220	296	5310 V
PCB141	pg/g-Wet	9	9	100	2570	374000	CP0408	46400	4820	230000 V	2570	374000	CP0408	46400	4820	230000 V
PCB142	pg/g-Wet	9	0	0	--	--	--	--	--	--	3 UT	343 U	CP0408	22.8	3.6 U	108 UV
PCB144	pg/g-Wet	9	9	100	565	73000	CP0408	9200	1030	45000 V	565	73000	CP0408	9200	1030	45000 V
PCB145	pg/g-Wet	9	9	100	4.29	366	CP0408	47.5	5.84	226 V	4.29	366	CP0408	47.5	5.84	226 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB146	pg/g-Wet	9	9	100	3600	262000	CP0408	34800	5440	163000 V	3600	262000	CP0408	34800	5440	163000 V
PCB147 & 149	pg/g-Wet	9	9	100	11400	1240000	CP0408	158000	16200	767000 V	11400	1240000	CP0408	158000	16200	767000 V
PCB148	pg/g-Wet	9	9	100	49.3	7400	CP0408	913	83	4520 V	49.3	7400	CP0408	913	83	4520 V
PCB150	pg/g-Wet	9	9	100	29.4	6340	CP0408	767	57.6	3860 V	29.4	6340	CP0408	767	57.6	3860 V
PCB152	pg/g-Wet	9	9	100	12.3	7860	CP0408	898	22.1	4740 V	12.3	7860	CP0408	898	22.1	4740 V
PCB153 & 168	pg/g-Wet	9	9	100	21500	2410000	CP0408	302000	33200	1480000 V	21500	2410000	CP0408	302000	33200	1480000 V
PCB155	pg/g-Wet	9	9	100	6.74	2210	CP0408	253	9.93	1330 V	6.74	2210	CP0408	253	9.93	1330 V
PCB156 & 157	pg/g-Wet	9	9	100	1470	92800	CP0408	12300	1880	57500 V	1470	92800	CP0408	12300	1880	57500 V
PCB158	pg/g-Wet	9	9	100	1580	132000	CP0408	17000	2340	81500 V	1580	132000	CP0408	17000	2340	81500 V
PCB159	pg/g-Wet	9	9	100	106	23400	CP0408	2860	299	14400 V	106	23400	CP0408	2860	299	14400 V
PCB161	pg/g-Wet	9	8	88.9	42.5	146 T	CP0812	69.7	62 V	122 V	42.5	246 U	CP0408	75.6	75.2	137 V
PCB162	pg/g-Wet	9	8	88.9	53.4	98.2 T	CP0812	70	67.8 V	91 V	53.4	1180 U	CP0408	128	68.5	393 V
PCB164	pg/g-Wet	9	9	100	739	71100	CP0408	9150	1110	44000 V	739	71100	CP0408	9150	1110	44000 V
PCB165	pg/g-Wet	9	8	88.9	18.4	79.6 T	CP0812	35.2	25.7 V	69.4 V	18.4	276 U	CP0408	46.6	27.2	115 V
PCB167	pg/g-Wet	9	9	100	677	41800	CP0408	5560	888	25900 V	677	41800	CP0408	5560	888	25900 V
PCB169	pg/g-Wet	9	0	0	--	--	--	--	--	--	11 U	2370 U	CP0408	143	14.8 U	722 UV
PCB170	pg/g-Wet	9	9	100	3420	673000	CP0408	83100	9240	413000 V	3420	673000	CP0408	83100	9240	413000 V
PCB171 & 173	pg/g-Wet	9	9	100	1120	201000	CP0408	25100	3080	124000 V	1120	201000	CP0408	25100	3080	124000 V
PCB172	pg/g-Wet	9	9	100	745	109000	CP0408	13900	1970	67400 V	745	109000	CP0408	13900	1970	67400 V
PCB174	pg/g-Wet	9	9	100	2350	446000	CP0408	55800	6570	275000 V	2350	446000	CP0408	55800	6570	275000 V
PCB175	pg/g-Wet	9	9	100	171	25700	CP0408	3240	408	15900 V	171	25700	CP0408	3240	408	15900 V
PCB176	pg/g-Wet	9	9	100	395	65300	CP0408	8210	1040	40200 V	395	65300	CP0408	8210	1040	40200 V
PCB177	pg/g-Wet	9	9	100	2580	416000	CP0408	51900	6090	256000 V	2580	416000	CP0408	51900	6090	256000 V
PCB178	pg/g-Wet	9	9	100	1070	142000	CP0408	17900	2140	87300 V	1070	142000	CP0408	17900	2140	87300 V
PCB179	pg/g-Wet	9	9	100	1390	219000	CP0408	27300	3080	134000 V	1390	219000	CP0408	27300	3080	134000 V
PCB180 & 193	pg/g-Wet	9	9	100	9570	1850000	CP0408	230000	29600	1140000 V	9570	1850000	CP0408	230000	29600	1140000 V
PCB181	pg/g-Wet	9	9	100	33.5	2740	CP0408	361	56.6 T	1690 V	33.5	2740	CP0408	361	56.6 T	1690 V
PCB182	pg/g-Wet	9	9	100	34.4	2840	CP0408	389	77.3	1780 V	34.4	2840	CP0408	389	77.3	1780 V
PCB183 & 185	pg/g-Wet	9	9	100	3310	551000	CP0408	68800	8630	339000 V	3310	551000	CP0408	68800	8630	339000 V
PCB184	pg/g-Wet	9	8	88.9	5.42	9.01	CP0408	7.43	7.54 V	8.97 V	5.42	64.1 U	CP0408	10.2	7.99	22.8 V
PCB186	pg/g-Wet	9	8	88.9	0.452 J	1.62	CP0408	1.09	1.04 JV	1.58 V	0.452 J	42.7 U	CP0408	3.34	1.12 JT	13.5 V
PCB187	pg/g-Wet	9	9	100	8720	1100000	CP0408	139000	18600	679000 V	8720	1100000	CP0408	139000	18600	679000 V
PCB188	pg/g-Wet	9	9	100	13.2	1350	CP0408	173	24.9	827 V	13.2	1350	CP0408	173	24.9	827 V
PCB189	pg/g-Wet	9	9	100	151	22700	CP0408	2850	353	14000 V	151	22700	CP0408	2850	353	14000 V
PCB190	pg/g-Wet	9	9	100	891	129000	CP0408	16200	2010	79400 V	891	129000	CP0408	16200	2010	79400 V
PCB191	pg/g-Wet	9	9	100	153	28700	CP0408	3580	451	17700 V	153	28700	CP0408	3580	451	17700 V
PCB192	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.211 U	85.5 U	CP0408	4.96	0.238 U	25.8 UV
PCB194	pg/g-Wet	9	9	100	1640	300000	CP0408	37700	4870	185000 V	1640	300000	CP0408	37700	4870	185000 V
PCB195	pg/g-Wet	9	9	100	740	121000	CP0408	15300	2110	74800 V	740	121000	CP0408	15300	2110	74800 V
PCB196	pg/g-Wet	9	9	100	769	141000	CP0408	18000	2520	87200 V	769	141000	CP0408	18000	2520	87200 V
PCB197 & 200	pg/g-Wet	9	9	100	226	33300	CP0408	4300	698	20600 V	226	33300	CP0408	4300	698	20600 V
PCB198 & 199	pg/g-Wet	9	9	100	2140	254000	CP0408	33100	5260	157000 V	2140	254000	CP0408	33100	5260	157000 V
PCB201	pg/g-Wet	9	9	100	225	29700	CP0408	3850	627	18400 V	225	29700	CP0408	3850	627	18400 V
PCB202	pg/g-Wet	9	9	100	553	42200	CP0408	5650	1050	26200 V	553	42200	CP0408	5650	1050	26200 V
PCB203	pg/g-Wet	9	9	100	1400	162000	CP0408	21300	3690	101000 V	1400	162000	CP0408	21300	3690	101000 V
PCB204	pg/g-Wet	9	8	88.9	1.24	4.14	CP0408	2.3	2.12 JV	3.63 V	1.24	50.7 U	CP0408	4.86	2.13 JT	16.9 V
PCB205	pg/g-Wet	9	9	100	96	15900	CP0408	2000	279	9810 V	96	15900	CP0408	2000	279	9810 V
PCB206	pg/g-Wet	9	9	100	734	43100	CP0408	5970	1270	27000 V	734	43100	CP0408	5970	1270	27000 V
PCB207	pg/g-Wet	9	9	100	102	5800	CP0408	815	184	3630 V	102	5800	CP0408	815	184	3630 V
PCB208	pg/g-Wet	9	9	100	298	6290	CP0408	1150	521 T	4070 V	298	6290	CP0408	1150	521 T	4070 V
PCB209	pg/g-Wet	9	9	100	349	1110	CP0408	599	515	976 V	349	1110	CP0408	599	515	976 V
Total PCB Congeners	pg/g-Wet	9	9	100	210000 JT	19700000 JT	CP0408	2520000	308000 JT	12100000 JV	210000 JT	19700000 JT	CP0408	2520000	308000 JT	12100000 JV
Total PCBs[e]																
Total PCBs	µg/kg-Wet	15	15	100	210 JT	19700 JT	CP0408	1840	431 JT	6750 JV	210 JT	19700 JT	CP0408	1840	431 JT	6750 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	9	9	100	488 JT	28500 JT	CP0408	3960	861 JT	17600 JV	488 JT	28500 JT	CP0408	3960	861 JT	17600 JV
Heptachlorobiphenylhomologs	pg/g-Wet	9	9	100	36100 JT	5990000 T	CP0408	748000	93400 T	3680000 V	36100 JT	5990000 T	CP0408	748000	93400 T	3680000 V
Hexachlorobiphenyl homologs	pg/g-Wet	9	9	100	78500 T	7890000 T	CP0408	1000000	115000 T	4870000 V	78500 T	7890000 T	CP0408	1000000	115000 T	4870000 V
Monochlorobiphenyl homologs	pg/g-Wet	9	9	100	4.18 T	90 JT	CP0408	20.8	10.3 T	66.2 JV	4.18 T	90 JT	CP0408	20.8	10.3 T	66.2 JV
Nonachlorobiphenyl homologs	pg/g-Wet	9	9	100	1130 T	55200 T	CP0408	7930	1950 T	34700 V	1130 T	55200 T	CP0408	7930	1950 T	34700 V
Octachlorobiphenyl homologs	pg/g-Wet	9	9	100	7790 T	1100000 T	CP0408	141000	21100 T	681000 V	7790 T	1100000 T	CP0408	141000	21100 T	681000 V
Pentachlorobiphenylhomologs	pg/g-Wet	9	9	100	49900 T	2230000 T	CP0408	311000	64500 T	1380000 V	49900 T	2230000 T	CP0408	311000	64500 T	1380000 V
Tetrachlorobiphenyl homologs	pg/g-Wet	9	9	100	21400 T	2140000 T	CP0408	269000	35400 T	1300000 V	21400 T	2140000 T	CP0408	269000	35400 T	1300000 V
Trichlorobiphenyl homologs	pg/g-Wet	9	9	100	4250 JT	293000 JT	CP0408	38900	8060 JT	180000 JV	4250 JT	293000 JT	CP0408	38900	8060 JT	180000 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	9	9	100	0.529	1.57	CP0004	1.04	0.985 T	1.51 V	0.529	1.57	CP0004	1.04	0.985 T	1.51 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	9	100	2.9	7.69	CP0408	5.82	5.55	7.49 V	2.9	7.69	CP0408	5.82	5.55	7.49 V
Hexachlorodibenzofuran homologs	pg/g-Wet	9	9	100	1.71	7.73	CP0408	3.64	2.91 T	6.63 V	1.71	7.73	CP0408	3.64	2.91 T	6.63 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	9	100	2.49	5.18	CP0408	4.23	4.33	5.15 V	2.49	5.18	CP0408	4.23	4.33	5.15 V
Octachlorodibenzofuran	pg/g-Wet	9	9	100	0.084 J	0.217 J	CP0004	0.137	0.136 J	0.207 JV	0.084 J	0.217 J	CP0004	0.137	0.136 J	0.207 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	2.28	7.49	CP0408	5.43	5.45	7.45 V	2.28	7.49	CP0408	5.43	5.45	7.45 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	9	9	100	1.85 T	8.18	CP0408	4.1	2.69 T	8.08 V	1.85 T	8.18	CP0408	4.1	2.69 T	8.08 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	9	100	0.732	1.28	CP0408	0.981	0.976 T	1.24 V	0.732	1.28	CP0408	0.981	0.976 T	1.24 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	9	9	100	1.42 T	7.45	CP0408	3.66	3.12	7.04 V	1.42 T	7.45	CP0408	3.66	3.12	7.04 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	9	100	0.446 T	0.932	CP0408	0.577	0.501 T	0.85 V	0.446 T	0.932	CP0408	0.577	0.501 T	0.85 V
Total PCDD/F	pg/g-Wet	9	9	100	16.6 JT	43.8 JT	CP0408	29.6	26.5 JT	43.2 JV	16.6 JT	43.8 JT	CP0408	29.6	26.5 JT	43.2 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	9	9	100	0.348	0.962	CP0408	0.691	0.689 T	0.958 V	0.348	0.962	CP0408	0.691	0.689 T	0.958 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	2.8	7.52	CP0408	5.63	5.31	7.33 V	2.8	7.52	CP0408	5.63	5.31	7.33 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	9	9	100	0.024 J	0.256	CP0408	0.0697	0.045 J	0.189 JV	0.024 J	0.256	CP0408	0.0697	0.045 J	0.189 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	9	9	100	0.314	4.15	CP0408	1.25	0.471	3.54 V	0.314	4.15	CP0408	1.25	0.471	3.54 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	0.495	0.976	CP0408	0.798	0.815 T	0.974 V	0.495	0.976	CP0408	0.798	0.815 T	0.974 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	9	9	100	0.164	0.849	CP0408	0.415	0.271	0.829 V	0.164	0.849	CP0408	0.415	0.271	0.829 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	1.63	3.7	CP0408	2.94	3.01	3.69 V	1.63	3.7	CP0408	2.94	3.01	3.69 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	9	8	88.9	0.009 J	0.033 J	CP0408	0.0161	0.014 JV	0.0295 JV	0.009 J	0.033 J	CP0408	0.0154	0.013 J	0.029 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	0.248	0.4 T	CP0812	0.343	0.336	0.396 V	0.248	0.4 T	CP0812	0.343	0.336	0.396 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	9	9	100	0.222 T	3.42	CP0408	0.986	0.372	2.98 V	0.222 T	3.42	CP0408	0.986	0.372	2.98 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	0.732	1.22	CP0408	0.957	0.934 T	1.2 V	0.732	1.22	CP0408	0.957	0.934 T	1.2 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	9	9	100	0.089 J	0.318	CP0408	0.171	0.16	0.271 V	0.089 J	0.318	CP0408	0.171	0.16	0.271 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	9	9	100	0.538	3.21	CP0408	1.31	0.851	2.88 V	0.538	3.21	CP0408	1.31	0.851	2.88 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	9	9	100	0.908 T	6.48	CP0408	2.68	1.98	6.08 V	0.908 T	6.48	CP0408	2.68	1.98	6.08 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	0.372	0.877	CP0408	0.525	0.448 T	0.801 V	0.372	0.877	CP0408	0.525	0.448 T	0.801 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	9	9	100	1.88 JT	4.37 JT	CP0408	2.83	2.44 JT	4.3 JV	1.88 JT	4.37 JT	CP0408	2.83	2.44 JT	4.3 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	9	9	100	2.36 JT	11.7 JT	CP0408	4.42	3.15 JT	8.98 JV	2.36 JT	11.7 JT	CP0408	4.42	3.15 JT	8.98 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	9	9	100	0.386 T	8.02 T	CP0408	1.59	0.562 T	5.8 V	0.386 T	8.02 T	CP0408	1.59	0.562 T	5.8 V
Pesticides																
2,4'-DDD	µg/kg-Wet	15	11	73.3	1.49 T	48.7	CP0408	11.5	4.43	34.3 V	1.49 T	48.7	CP0408	9.63	4.3 UT	28.5 V
2,4'-DDE	µg/kg-Wet	15	9	60	0.24 T	5.5	CP0408	1.47	0.693	4.44 V	0.24 T	7.5 UT	FZ0609	1.92	2 UT	4.28 V
2,4'-DDT	µg/kg-Wet	15	10	66.7	0.149 J	24 N	FZ0306	6	0.682 V	22.1 V	0.149 J	24 N	FZ0306	5.15	3.45 UT	21 V
4,4'-DDD	µg/kg-Wet	15	15	100	9.97 T	153	CP0408	40.4	26.5 JT	110 V	9.97 T	153	CP0408	40.4	26.5 JT	110 V
4,4'-DDE	µg/kg-Wet	15	15	100	35.2 T	247	CP0408	92	84.3	169 JV	35.2 T	247	CP0408	92	84.3	169 JV
4,4'-DDT	µg/kg-Wet	15	10	66.7	0.179 J	39 NJ	FZ0306	7.46	0.704 V	30.4 JV	0.179 J	39 NJ	FZ0306	6.02	3.15 UT	25.6 JV
Aldrin	µg/kg-Wet	15	9	60	0.046 J	0.119 J	CP0408	0.0845	0.079 J	0.117 JV	0.046 J	13 UT	FZ0609	1.34	0.114 J	5.38 UV
alpha-Endosulfan	µg/kg-Wet	15	10	66.7	0.157 JT	4.1 NJ	FZ0306	0.604	0.192 JV	2.43 JV	0.157 JT	20 U	FZ0609	1.8	0.255 J	6.43 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	15	6	40	0.0177 JT	0.0403 J	CP0408	0.0272	0.0254 JV	0.0379 JV	0.0177 JT	6.4 UT	FZ0609	0.973	0.0308 J	3.2 UV
beta-Endosulfan	µg/kg-Wet	15	3	20	0.0679 J	0.111 J	CP0408	0.0861	0.0794 JT	0.108 JV	0.0621 U	15 UT	FZ0609	1.4	0.082 U	5.68 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	15	6	40	0.00836 J	0.0231 J	CP0408	0.0143	0.0143 JV	0.0213 JV	0.00836 J	8.5 UT	FZ0609	1.17	0.0159 J	4.25 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
cis-Chlordane	µg/kg-Wet	15	10	66.7	2.12	4.3 NJ	FZ0306	3.01	2.75 V	3.96 JV	2.12	20 UJ	FZ0609	3.4	2.7	6.43 UJV
cis-Nonachlor	µg/kg-Wet	15	9	60	1.2	1.91	CP0004	1.46	1.39	1.84 V	1.2	17 U	FZ0306	2.63	1.74	5.03 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	15	0	0	--	--		--	--	--	0.00167 U	7.3 UT	FZ0609	1.02	0.00173 U	3.65 UV
Dieldrin	µg/kg-Wet	15	9	60	1.29 T	2.3	CP0408	1.68	1.62	2.19 V	1.29 T	14 UT	FZ0609	2.48	2 UT	5.53 UV
Endosulfan sulfate	µg/kg-Wet	15	8	53.3	0.136 J	0.476 J	CP0004	0.289	0.281 JV	0.463 JV	0.136 J	12 UT	FZ0609	1.42	0.438 J	5.23 UV
Endrin	µg/kg-Wet	15	6	40	0.00691 J	0.0223 J	CP0408	0.0172	0.02 JV	0.0219 JV	0.00691 J	31 UJT	FZ0306	2.44	0.0208 J	11.7 UJV
Endrin aldehyde	µg/kg-Wet	15	2	13.3	0.00157 JT	0.00338 J	CP0004	0.00248	0.00248 JV	0.00329 JV	0.00107 U	8.5 UT	FZ0609	1.1	0.00198 U	4.25 UV
Endrin ketone	µg/kg-Wet	15	2	13.3	0.00106 J	0.00669 J	CP0004	0.00388	0.00388 JV	0.00641 JV	0.00106 J	7.5 UT	FZ0609	1.04	0.0414 U	3.75 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	15	8	53.3	0.0196 JT	0.0356 J	CP0408	0.0259	0.0256 JV	0.0339 JV	0.0196 JT	9.6 UT	FZ0609	1.19	0.0308 J	4.8 UV
Heptachlor	µg/kg-Wet	15	0	0	--	--		--	--	--	0.00461 UT	13 UT	FZ0609	1.3	0.0061 U	5.38 UV
Heptachlor epoxide	µg/kg-Wet	15	9	60	0.0682 J	0.151 J	CP0004	0.105	0.0832 JT	0.149 JV	0.0682 J	8 UT	FZ0609	1.13	0.146 J	4 UV
Methoxychlor	µg/kg-Wet	15	2	13.3	0.00688 JT	7.2 NJ	FZ0306	3.6	3.6 JV	6.84 JV	0.00241 U	7.2 NJ	FZ0306	1.23	0.0243 UT	3.84 JV
Mirex	µg/kg-Wet	6	0	0	--	--		--	--	--	4 UJ	6.2 UT	FZ0306; FZ0609	2.6	2.6 UJV	3.1 UV
Oxychlordane	µg/kg-Wet	15	9	60	0.282 JT	0.385	CP0408	0.32	0.312 J	0.368 JV	0.282 JT	20 UT	FZ0609	1.72	0.343 J	6.43 UV
Total Chlordanes	µg/kg-Wet	15	10	66.7	4.3 NJT	12 T	CP0408	9.15	9.09 JV	11.9 JV	4.3 NJT	20 UJT	FZ0609	8.26	8.64 JT	11.9 JV
Total Endosulfan	µg/kg-Wet	15	10	66.7	0.183 JT	4.1 NJT	FZ0306	0.861	0.561 JV	2.59 JV	0.183 JT	20 UT	FZ0609	1.97	0.68 JT	6.43 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	15	15	100	11.5 T	202 T	CP0408	48.9	26.5 JT	139 V	11.5 T	202 T	CP0408	48.9	26.5 JT	139 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	15	15	100	47.3 JT	494 T	CP0408	151	132 JT	324 V	47.3 JT	494 T	CP0408	151	132 JT	324 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	15	15	100	35.4 T	253 T	CP0408	93	85.1 T	170 JV	35.4 T	253 T	CP0408	93	85.1 T	170 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	15	10	66.7	0.328 JT	63 NJT	FZ0306	13.5	1.39 V	52.5 JV	0.328 JT	63 NJT	FZ0306	10.1	3.45 UT	46.6 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	99.5 JT	173 JT	FZ0306	139	141 JV	169 JV	99.5 JT	173 JT	FZ0306	139	141 JV	169 JV
Toxaphene	µg/kg-Wet	6	0	0	--	--		--	--	--	580 UJ	2600 UJ	FZ0609	640	360 UJV	1300 UJV
trans-Chlordane	µg/kg-Wet	15	9	60	1.09	1.9	CP0408	1.52	1.49	1.9 V	1.09	8.4 UT	FZ0609	2.01	1.89	4.2 UV
trans-Nonachlor	µg/kg-Wet	15	9	60	2.56	4.41	CP0408	3.52	3.46	4.4 V	2.56	11 UT	FZ0306; FZ0609	3.65	3.46	5.5 UV
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	9	9	100	1.5	5.9	CP0408	3.4	3.3	5.7 V	1.5	5.9	CP0408	3.4	3.3	5.7 V
2-Methylnaphthalene	µg/kg-Wet	9	9	100	1.2	3.7	CP0408	2.5	2.4	3.7 V	1.2	3.7	CP0408	2.5	2.4	3.7 V
Acenaphthene	µg/kg-Wet	9	9	100	4.2	84	CP0408	21	12	64 V	4.2	84	CP0408	21	12	64 V
Acenaphthylene	µg/kg-Wet	9	9	100	1	4.1	CP0408	2	1.5 T	3.8 V	1	4.1	CP0408	2	1.5 T	3.8 V
Anthracene	µg/kg-Wet	9	9	100	1.4	9	CP0408	3.7	2.4	7.8 V	1.4	9	CP0408	3.7	2.4	7.8 V
Benzo(a)anthracene	µg/kg-Wet	9	1	11.1	0.28 J	0.28 J	CP0004	0.28	0.28 J	0.28 J	0.066 U	0.28 J	CP0004	0.0604	0.033 U	0.181 JV
Benzo(a)pyrene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	0.081 U	0.081 U	CP0004; CP0408; CP0812	0.0405	0.0405 U	0.0405 UV
Benzo(b)fluoranthene	µg/kg-Wet	9	1	11	0.32 J	0.32 J	CP0004	0.32	0.32 J	0.32 J	0.07 U	0.32 J	CP0004	0.067	0.035 U	0.21 JV
Benzo(g,h,i)perylene	µg/kg-Wet	9	1	11.1	0.17 J	0.17 J	CP0004	0.17	0.17 J	0.17 J	0.073 U	0.17 J	CP0004	0.0513	0.0365 U	0.117 JV
Benzo(k)fluoranthene	µg/kg-Wet	9	1	11.1	0.18 J	0.18 J	CP0004	0.18	0.18 J	0.18 J	0.056 U	0.18 J	CP0004	0.0449	0.028 U	0.119 JV
Chrysene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	0.076 U	0.38 U	CP0004	0.0549	0.038 U	0.129 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	9	1	11.1	0.075 J	0.075 J	CP0004	0.075	0.075 J	0.075 J	0.059 U	0.075 J	CP0004	0.0346	0.0295 U	0.0568 JV
Dibenzothiophene	µg/kg-Wet	9	8	88.9	0.33 J	3	CP0408	1.19	0.855 V	2.72 V	0.074 UT	3	CP0408	1.06	0.71	2.68 V
Fluoranthene	µg/kg-Wet	9	6	67	2.6	5.4	CP0408	3.8	3.5 V	5.2 V	0.86 U	5.4	CP0408	2.7	3	5.1 V
Fluorene	µg/kg-Wet	9	9	100	1.6	13	CP0408	5.4	3.9	12 V	1.6	13	CP0408	5.4	3.9	12 V
High Molecular Weight PAH	µg/kg-Wet	9	9	100	0.64 T	9.2 T	CP0408	5.1	6.2 T	9 V	0.64 T	9.2 T	CP0408	5.1	6.2 T	9 V
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	9	1	11.1	0.12 J	0.12 J	CP0004	0.12	0.12 J	0.12 J	0.064 U	0.12 J	CP0004	0.0418	0.032 U	0.0848 JV
Low Molecular Weight PAH	µg/kg-Wet	9	9	100	11 T	130 T	CP0408	42	35 T	110 V	11 T	130 T	CP0408	42	35 T	110 V
Naphthalene	µg/kg-Wet	9	4	44	2.6	6.8	CP0408	4.8	4.9 V	6.8 V	1.8 U	6.8	CP0408	2.7	1.1 U	6.7 V
Phenanthrene	µg/kg-Wet	9	5	56	4.9	13	CP0408	8.8	7.5	13 V	1.7 U	13	CP0408	5.5	4.9	13 V
Pyrene	µg/kg-Wet	9	9	100	0.64	4.5	CP0004	2.4	2.6	4.3 V	0.64	4.5	CP0004	2.4	2.6	4.3 V
Total BaPEq	µg/kg-Wet	9	1	11.1	0.149 JT	0.149 JT	CP0004	0.149	0.149 JT	0.149 JT	0.081 UT	0.149 JT	CP0004	0.0526	0.0405 UT	0.106 JV
Total cPAHs	µg/kg-Wet	9	1	11.1	0.98 JT	0.98 JT	CP0004	0.98	0.98 JT	0.98 JT	0.081 UT	0.98 JT	CP0004	0.145	0.0405 UT	0.604 JV
Total PAHs	µg/kg-Wet	9	9	100	11 T	140 T	CP0408	47	41 T	120 V	11 T	140 T	CP0408	47	41 T	120 V
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	9	0	0	--	--	--	--	--	--	66 U	66 U	CP0004; CP0408; CP0812	33	33 U	33 UV
Butylbenzyl phthalate	µg/kg-Wet	9	0	0	--	--	--	--	--	--	7.3 U	7.3 U	CP0004; CP0408; CP0812	3.7	3.7 U	3.7 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Dibutyl phthalate	µg/kg-Wet	9	0	0	--	--	--	--	--	--	40 U	110 U	CP0004; CP0812	33	28 U	55 UV
Diethyl phthalate	µg/kg-Wet	9	0	0	--	--	--	--	--	--	13 U	30 U	CP0004	8.8	8 UT	13 UV
Dimethyl phthalate	µg/kg-Wet	9	0	0	--	--	--	--	--	--	7.7 U	7.7 U	CP0004; CP0408; CP0812	3.9	3.9 U	3.9 UV
Di-n-octyl phthalate	µg/kg-Wet	9	0	0	--	--	--	--	--	--	11 U	11 U	CP0004; CP0408; CP0812	5.5	5.5 U	5.5 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	9.8 U	9.8 U	CP0004; CP0408; CP0812	4.9	4.9 U	4.9 UV
1,2-Dichlorobenzene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	11 U	11 U	CP0004; CP0408; CP0812	5.5	5.5 U	5.5 UV
1,3-Dichlorobenzene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	11 U	11 U	CP0004; CP0408; CP0812	5.5	5.5 U	5.5 UV
1,4-Dichlorobenzene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	11 U	11 U	CP0004; CP0408; CP0812	5.5	5.5 U	5.5 UV
2,4-Dinitrotoluene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	15 U	15 U	CP0004; CP0408; CP0812	7.5	7.5 U	7.5 UV
2,6-Dinitrotoluene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	14 U	14 U	CP0004; CP0408; CP0812	7	7 U	7 UV
2-Chloronaphthalene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	6.7 U	6.7 U	CP0004; CP0408; CP0812	3.4	3.4 U	3.4 UV
2-Nitroaniline	µg/kg-Wet	9	0	0	--	--	--	--	--	--	31 U	31 U	CP0004; CP0408; CP0812	16	16 U	16 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	8	0	0	--	--	--	--	--	--	1000 U	1000 U	CP0004; CP0408; CP0812	500	500 UV	500 UV
3-Nitroaniline	µg/kg-Wet	9	0	0	--	--	--	--	--	--	400 U	400 U	CP0004; CP0408; CP0812	200	200 U	200 UV
4-Bromophenylphenyl ether	µg/kg-Wet	9	0	0	--	--	--	--	--	--	6.9 U	6.9 U	CP0004; CP0408; CP0812	3.5	3.5 U	3.5 UV
4-Chloroaniline	µg/kg-Wet	9	0	0	--	--	--	--	--	--	400 U	400 U	CP0004; CP0408; CP0812	200	200 U	200 UV
4-Chlorophenylphenyl ether	µg/kg-Wet	9	0	0	--	--	--	--	--	--	6.4 U	6.4 U	CP0004; CP0408; CP0812	3.2	3.2 U	3.2 UV
4-Nitroaniline	µg/kg-Wet	9	0	0	--	--	--	--	--	--	400 U	400 U	CP0004; CP0408; CP0812	200	200 U	200 UV
Aniline	µg/kg-Wet	9	0	0	--	--	--	--	--	--	800 UJ	800 UJ	CP0004; CP0408; CP0812	400	400 UJ	400 UV
Azobenzene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	40 U	40 U	CP0004; CP0408; CP0812	20	20 U	20 UV
Benzoic acid	µg/kg-Wet	9	0	0	--	--	--	--	--	--	400 U	400 U	CP0004; CP0408; CP0812	200	200 U	200 UV
Benzyl alcohol	µg/kg-Wet	9	5	56	23 J	37 T	CP0812	30	30 J	36 JV	22 U	37 T	CP0812	22	23 J	36 JV
Bis(2-chloroethoxy)methane	µg/kg-Wet	9	0	0	--	--	--	--	--	--	8.3 U	8.3 U	CP0004; CP0408; CP0812	4.2	4.2 U	4.2 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	9	0	0	--	--	--	--	--	--	13 U	13 U	CP0004; CP0408; CP0812	6.5	6.5 U	6.5 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	9	0	0	--	--	--	--	--	--	13 U	13 U	CP0004; CP0408; CP0812	6.5	6.5 U	6.5 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Dibenzofuran	µg/kg-Wet	9	9	100	0.58	3.6	CP0408	1.7	1.1	3.3 V	0.58	3.6	CP0408	1.7	1.1	3.3 V
Hexachlorobenzene	µg/kg-Wet	15	11	73.3	1.5	140 T	FZ0609	14.9	2.28	72.1 V	1.5	140 T	FZ0609	11.6	2.22	44.9 V
Hexachlorobutadiene	µg/kg-Wet	15	8	53.3	0.00456 JT	0.172 J	CP0408	0.0604	0.0264 JV	0.161 JV	0.00456 JT	4.6 UT	FZ0609	0.873	0.141 J	2.3 UV
Hexachlorocyclopentadiene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	1000 U	1000 U	CP0004; CP0408; CP0812	500	500 U	500 UV
Hexachloroethane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	4 UJ	20 U	CP0004; CP0408; CP0812	7.4	10 UT	10 UV
Isophorone	µg/kg-Wet	9	3	33	9.3 J	9.8 J	CP0004	9.5	9.4 J	9.8 JV	9.2 U	9.8 J	CP0004	6.2	4.6 U	9.6 JV
Nitrobenzene	µg/kg-Wet	9	0	0	--	--	--	--	--	--	12 U	12 U	CP0004; CP0408; CP0812	6	6 U	6 UV
N-Nitrosodimethylamine	µg/kg-Wet	9	0	0	--	--	--	--	--	--	40 U	40 U	CP0004; CP0408; CP0812	20	20 U	20 UV
N-Nitrosodiphenylamine	µg/kg-Wet	9	0	0	--	--	--	--	--	--	6.6 U	6.6 U	CP0004; CP0408; CP0812	3.3	3.3 U	3.3 UV
N-Nitrosodipropylamine	µg/kg-Wet	9	0	0	--	--	--	--	--	--	22 U	22 U	CP0004; CP0408; CP0812	11	11 U	11 UV
Phenols																
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	20 U	20 U	CP0004; CP0408; CP0812	10	10 U	10 UV
2,4,5-Trichlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	14 U	14 U	CP0004; CP0408; CP0812	7	7 U	7 UV
2,4,6-Trichlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	9.1 U	9.1 U	CP0004; CP0408; CP0812	4.6	4.6 U	4.6 UV
2,4-Dichlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	9.5 U	9.5 U	CP0004; CP0408; CP0812	4.8	4.8 U	4.8 UV
2,4-Dimethylphenol	µg/kg-Wet	8	0	0	--	--	--	--	--	--	19 UJ	19 UJ	CP0004; CP0408; CP0812	9.5	9.5 UJV	9.5 UJV
2-Chlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	7.5 U	7.5 U	CP0004; CP0408; CP0812	3.8	3.8 U	3.8 UV
2-Methylphenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	8.2 UJ	8.2 UJ	CP0004; CP0408; CP0812	4.1	4.1 UJ	4.1 UV
2-Nitrophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	12 U	12 U	CP0004; CP0408; CP0812	6	6 U	6 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	400 U	400 U	CP0004; CP0408; CP0812	200	200 U	200 UV
4-Chloro-3-methylphenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	6.8 U	6.8 U	CP0004; CP0408; CP0812	3.4	3.4 U	3.4 UV
4-Methylphenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	7.7 UJ	7.7 UJ	CP0004; CP0408; CP0812	3.9	3.9 UJ	3.9 UV
4-Nitrophenol	µg/kg-Wet	9	8	89	12 J	19 J	CP0004	14	14 JV	18 JV	9.9 U	19 J	CP0004	13	13 J	17 JV
Pentachlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	30 U	30 U	CP0004; CP0408; CP0812	15	15 U	15 UV
Phenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	45 U	63 U	CP0004	24	23 U	28 UV
Carp (whole body)																
Conventionals																
Lipids	percent-Wet	15	15	100	5.6 T	13 T	FZ0609	8.84	8.49 T	12.2 V	5.6 T	13 T	FZ0609	8.84	8.49 T	12.2 V
Total solids	percent-Wet	15	15	100	28	33.5	FZ0609	30.8	31.1 T	33.4 V	28	33.5	FZ0609	30.8	31.1 T	33.4 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Metals																
Aluminum	mg/kg-Wet	15	15	100	34 T	134	FZ0306	76.7	66 T	124 V	34 T	134	FZ0306	76.7	66 T	124 V
Antimony	mg/kg-Wet	15	3	20	0.0038 JT	0.0064 JT	CP0408	0.0051	0.0051 JT	0.00627 JV	0.001 UT	0.0064 JT	CP0408	0.00221	0.0018 UT	0.00549 JV
Arsenic	mg/kg-Wet	15	15	100	0.034 JT	0.23 T	CP0004	0.133	0.125 JT	0.223 V	0.034 JT	0.23 T	CP0004	0.133	0.125 JT	0.223 V
Cadmium	mg/kg-Wet	15	15	100	0.034 T	0.108	FZ0306	0.06	0.061 JT	0.0905 V	0.034 T	0.108	FZ0306	0.06	0.061 JT	0.0905 V
Chromium	mg/kg-Wet	15	15	100	0.23 T	2.02	FZ0306	0.84	0.74	1.66 V	0.23 T	2.02	FZ0306	0.84	0.74	1.66 V
Copper	mg/kg-Wet	15	15	100	0.897 T	1.42 T	CP0004; FZ0306	1.12	1.08 T	1.42 V	0.897 T	1.42 T	CP0004; FZ0306	1.12	1.08 T	1.42 V
Lead	mg/kg-Wet	15	15	100	0.0823 T	1.09 T	CP0812	0.203	0.133 JT	0.472 V	0.0823 T	1.09 T	CP0812	0.203	0.133 JT	0.472 V
Manganese	mg/kg-Wet	15	15	100	4.65	8.53	FZ0306	6.36	6.2 T	8.1 V	4.65	8.53	FZ0306	6.36	6.2 T	8.1 V
Mercury	mg/kg-Wet	16	16	100	0.029	0.0571 T	CP0004	0.0447	0.0456 V	0.0558 V	0.029	0.0571 T	CP0004	0.0447	0.0456 V	0.0558 V
Nickel	mg/kg-Wet	15	15	100	0.28 JT	1.37 J	FZ0306	0.562	0.51 JT	0.995 JV	0.28 JT	1.37 J	FZ0306	0.562	0.51 JT	0.995 JV
Selenium	mg/kg-Wet	15	15	100	0.27 JT	0.4	FZ0609	0.32	0.3 JT	0.39 JV	0.27 JT	0.4	FZ0609	0.32	0.3 JT	0.39 JV
Silver	mg/kg-Wet	15	13	86.7	0.0027 JT	0.0165	FZ0609	0.00745	0.0054 T	0.0155 V	0.0027 JT	0.0165	FZ0609	0.0068	0.0054 T	0.0154 V
Thallium	mg/kg-Wet	15	15	100	0.00062 JT	0.0054 JT	CP0004	0.00248	0.0016 J	0.00526 JV	0.00062 JT	0.0054 JT	CP0004	0.00248	0.0016 J	0.00526 JV
Zinc	mg/kg-Wet	15	15	100	71.2 T	113 T	CP0408	91.9	89.9 T	112 V	71.2 T	113 T	CP0408	91.9	89.9 T	112 V
Butyltins																
Butyltin ion	µg/kg-Wet	9	8	89	1.1 JT	27 T	CP0812	5.2	1.9 JV	19 JV	1.1 JT	27 T	CP0812	4.7	1.7 JT	18 JV
Dibutyltin ion	µg/kg-Wet	9	9	100	0.73 JT	5.1 JT	CP0004	1.9	1.5 JT	4.4 JV	0.73 JT	5.1 JT	CP0004	1.9	1.5 JT	4.4 JV
Tetrabutyltin	µg/kg-Wet	9	0	0	--	--	--	--	--	--	1.8 UT	2.2 UT	CP0004; CP0408; CP0812	1.1	1.1 UT	1.1 UV
Tributyltin ion	µg/kg-Wet	9	9	100	2.7 JT	8.6 T	CP0812	5.6	5.9 JT	8.4 JV	2.7 JT	8.6 T	CP0812	5.6	5.9 JT	8.4 JV
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	6	0	0	--	--	--	--	--	--	9.5 U	470 U	FZ0306	52	21 UV	180 UV
Aroclor 1221	µg/kg-Wet	6	0	0	--	--	--	--	--	--	9.5 U	390 U	FZ0306	51	29 UV	160 UV
Aroclor 1232	µg/kg-Wet	6	0	0	--	--	--	--	--	--	9.5 U	550 U	FZ0306	66	27 UV	220 UV
Aroclor 1242	µg/kg-Wet	6	0	0	--	--	--	--	--	--	9.5 U	630 UJ	FZ0306	69	25 UV	250 UJV
Aroclor 1248	µg/kg-Wet	6	3	50	60	270	FZ0609	150	110	250 V	60	730 UJ	FZ0306	160	100 V	340 JV
Aroclor 1254	µg/kg-Wet	6	0	0	--	--	--	--	--	--	140 U	5200 UJ	FZ0306	620	280 UV	2000 UJV
Aroclor 1260	µg/kg-Wet	6	6	100	170	6500 J	FZ0306	1600	720 V	5200 JV	170	6500 J	FZ0306	1600	720 V	5200 JV
Aroclor 1262	µg/kg-Wet	6	0	0	--	--	--	--	--	--	9.5 U	190 UJ	FZ0306	25	14 UV	76 UJV
Aroclor 1268	µg/kg-Wet	6	0	0	--	--	--	--	--	--	9.5 U	190 UJ	FZ0306	25	14 UV	76 UJV
Aroclors	µg/kg-Wet	6	6	100	230 T	6500 JT	FZ0306	1640	850 V	5150 JV	230 T	6500 JT	FZ0306	1640	850 V	5150 JV
PCB Congeners																
PCB001	pg/g-Wet	14	14	100	2.76 JT	143 JT	CP0408	18.4	5.12 JV	70.9 JV	2.76 JT	143 JT	CP0408	18.4	5.12 JV	70.9 JV
PCB002	pg/g-Wet	14	13	92.9	1.63	7.34 JT	CP0004	4.2	4.03 JT	6.91 JV	1.63	39.4 UT	CP0408	5.31	4.29 JV	11.7 JV
PCB003	pg/g-Wet	14	13	92.9	1.75 J	17.8	FZ0306	5.58	2.8 J	16.7 JV	1.75 J	58.5 UT	CP0408	7.28	2.88 JV	21.8 V
PCB004	pg/g-Wet	15	15	100	92.8 JT	31800 T	CP0408	2650	175 JT	13400 V	92.8 JT	31800 T	CP0408	2650	175 JT	13400 V
PCB005	pg/g-Wet	15	11	73.3	1.61 JT	9.73 JT	CP0812	3.45	2.87 JT	6.98 JV	1.61 JT	87.3 UT	CP0408	5.74	2.76	19.9 JV
PCB006	pg/g-Wet	15	15	100	20.5	554 T	CP0408	115	62.7 JT	370 JV	20.5	554 T	CP0408	115	62.7 JT	370 JV
PCB007	pg/g-Wet	15	14	93.3	4.59 JT	365 T	CP0408	37.4	8.62 V	166 V	3.82 U	365 T	CP0408	35	8.04	151 V
PCB008	pg/g-Wet	15	15	100	90.2	1060	FZ0306	389	255 JT	954 V	90.2	1060	FZ0306	389	255 JT	954 V
PCB009	pg/g-Wet	15	15	100	6.45 J	235 JT	CP0408	47.7	23.2	204 JV	6.45 J	235 JT	CP0408	47.7	23.2	204 JV
PCB010	pg/g-Wet	15	15	100	5.33 JT	6140 T	CP0408	461	14.1	2250 V	5.33 JT	6140 T	CP0408	461	14.1	2250 V
PCB011	pg/g-Wet	15	15	100	184	1690 JT	CP0408	486	356 JT	1090 JV	184	1690 JT	CP0408	486	356 JT	1090 JV
PCB012 & 013	pg/g-Wet	15	13	86.7	4.99 JT	248 J	FZ0306	48.4	18.6 J	215 JV	4.99 JT	248 J	FZ0306	42.4	18.1 JT	210 JV
PCB014	pg/g-Wet	15	1	6.67	1.97 JT	1.97 JT	CP0812	1.97	1.97 JT	1.97 JT	0.553 U	102 UT	CP0408	5.06	1.9 UJT	17.2 UV
PCB015	pg/g-Wet	15	14	93.3	10.3 T	118 JT	CP0004	51.7	43.6 V	102 JV	10.3 T	118 JT	CP0004	51.9	44.3 T	100 JV
PCB016	pg/g-Wet	15	15	100	150	1700 T	CP0408	372	290 JT	835 V	150	1700 T	CP0408	372	290 JT	835 V
PCB017	pg/g-Wet	15	15	100	231	58500 T	CP0408	5360	588	27900 V	231	58500 T	CP0408	5360	588	27900 V
PCB018 & 030	pg/g-Wet	15	15	100	547 J	10400 T	CP0408	2000	985 JT	7850 JV	547 J	10400 T	CP0408	2000	985 JT	7850 JV
PCB019	pg/g-Wet	15	15	100	221 JT	179000 T	CP0408	14700	390 JT	77000 V	221 JT	179000 T	CP0408	14700	390 JT	77000 V
PCB020 & 028	pg/g-Wet	15	15	100	1970 J	16200 T	CP0408	4670	3130 JT	12400 JV	1970 J	16200 T	CP0408	4670	3130 JT	12400 JV
PCB021 & 033	pg/g-Wet	15	15	100	361 J	11700 T	CP0408	1600	736 T	4890 JV	361 J	11700 T	CP0408	1600	736 T	4890 JV
PCB022	pg/g-Wet	15	15	100	391	1500 JT	CP0812	858	861	1330 JV	391	1500 JT	CP0812	858	861	1330 JV
PCB023	pg/g-Wet	15	12	80	1.83 JT	108 JT	CP0408	12.3	3.2 JV	53.1 JV	1.83 JT	108 JT	CP0408	10.3	3.09 JT	38.1 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB024	pg/g-Wet	15	12	80	6.73	33 JT	CP0812	17.1	15.2 V	29.7 JV	4.78 U	34.3 UT	CP0408	15.2	14.5	28.8 JV
PCB025	pg/g-Wet	15	15	100	108	11700 T	CP0408	1360	271 T	7210 V	108	11700 T	CP0408	1360	271 T	7210 V
PCB026 & 029	pg/g-Wet	15	15	100	285 J	9220 T	CP0408	1500	542 JT	6930 JV	285 J	9220 T	CP0408	1500	542 JT	6930 JV
PCB027	pg/g-Wet	15	15	100	82.5	49100 T	CP0408	4740	208 T	28000 V	82.5	49100 T	CP0408	4740	208 T	28000 V
PCB031	pg/g-Wet	15	15	100	1330	6610	FZ0306	2700	2050 T	5670 V	1330	6610	FZ0306	2700	2050 T	5670 V
PCB032	pg/g-Wet	15	15	100	247	28100 T	CP0408	3760	567	23100 V	247	28100 T	CP0408	3760	567	23100 V
PCB034	pg/g-Wet	15	15	100	9.61 J	350 T	CP0408	45.6	21 JT	155 V	9.61 J	350 T	CP0408	45.6	21 JT	155 V
PCB035	pg/g-Wet	15	7	46.7	2.75 T	3.45 JT	CP0408	3.04	3.03 T	3.38 JV	0.745 U	130 UT	CP0408	6.47	2.75 T	21.9 JV
PCB036	pg/g-Wet	15	6	40	2.05 T	3.01 JT	CP0812	2.34	2.21 JV	2.88 JV	0.684 U	178 UT	CP0408	7.92	2.08 UJT	29.1 UV
PCB037	pg/g-Wet	15	15	100	71.2	242 T	CP0004	137	139	201 V	71.2	242 T	CP0004	137	139	201 V
PCB038	pg/g-Wet	15	11	73.3	1.3 J	751 T	CP0408	76.5	2.96 JT	405 V	1.3 J	751 T	CP0408	56.5	2.16 T	267 V
PCB039	pg/g-Wet	15	15	100	8.76 JT	245 JT	CP0408	36	17.8	120 JV	8.76 JT	245 JT	CP0408	36	17.8	120 JV
PCB040 & 041 & 071	pg/g-Wet	15	15	100	1530 T	77700 T	CP0408	8710	2340 J	40800 JV	1530 T	77700 T	CP0408	8710	2340 J	40800 JV
PCB042	pg/g-Wet	15	15	100	838 T	17300 T	CP0408	2550	1250 T	8840 V	838 T	17300 T	CP0408	2550	1250 T	8840 V
PCB043	pg/g-Wet	15	15	100	135	13700 T	CP0408	1190	230 T	4910 V	135	13700 T	CP0408	1190	230 T	4910 V
PCB044 & 047 & 065	pg/g-Wet	15	15	100	5020 T	1210000 T	CP0408	101000	8590 J	499000 JV	5020 T	1210000 T	CP0408	101000	8590 J	499000 JV
PCB045 & 051	pg/g-Wet	15	15	100	558 J	296000 T	CP0408	23200	1200 J	114000 JV	558 J	296000 T	CP0408	23200	1200 J	114000 JV
PCB046	pg/g-Wet	15	15	100	76.2	10600 T	CP0408	997	141 T	4980 V	76.2	10600 T	CP0408	997	141 T	4980 V
PCB048	pg/g-Wet	15	15	100	487 T	9570 T	CP0408	1430	739	4620 V	487 T	9570 T	CP0408	1430	739	4620 V
PCB049 & 069	pg/g-Wet	15	15	100	3750 T	289000 T	CP0408	31000	6110 T	152000 JV	3750 T	289000 T	CP0408	31000	6110 T	152000 JV
PCB050 & 053	pg/g-Wet	15	15	100	509 T	209000 T	CP0408	22200	1340 T	136000 JV	509 T	209000 T	CP0408	22200	1340 T	136000 JV
PCB052	pg/g-Wet	15	15	100	5710 T	189000 T	CP0408	30700	8510 T	162000 V	5710 T	189000 T	CP0408	30700	8510 T	162000 V
PCB054	pg/g-Wet	15	15	100	67.6 T	96200 T	CP0408	8420	161 T	47900 V	67.6 T	96200 T	CP0408	8420	161 T	47900 V
PCB055	pg/g-Wet	15	8	53.3	31.6 T	299 T	CP0408	181	238 V	297 V	4.57 U	529 UT	CP0408	115	37.4 T	295 V
PCB056	pg/g-Wet	15	15	100	1060 T	2750	FZ0306	1830	1890 T	2400 V	1060 T	2750	FZ0306	1830	1890 T	2400 V
PCB057	pg/g-Wet	15	15	100	15.2 T	3620 T	CP0408	285	29 JT	1280 V	15.2 T	3620 T	CP0408	285	29 JT	1280 V
PCB058	pg/g-Wet	15	12	80	16.7	39.8 T	CP0812	28.3	27.4 JV	38.6 V	5.68 U	500 UT	CP0408	39.9	26.2 JT	103 V
PCB059 & 062 & 075	pg/g-Wet	15	15	100	390 T	49900 T	CP0408	4130	589 T	18400 JV	390 T	49900 T	CP0408	4130	589 T	18400 JV
PCB060	pg/g-Wet	15	15	100	698 T	2370	FZ0306	1250	1140	1900 V	698 T	2370	FZ0306	1250	1140	1900 V
PCB061 & 070 & 074 & 076	pg/g-Wet	15	15	100	5260 T	25000 J	FZ0306	11300	9860 J	22200 JV	5260 T	25000 J	FZ0306	11300	9860 J	22200 JV
PCB063	pg/g-Wet	15	15	100	165 T	3000 T	CP0408	516	310	1390 V	165 T	3000 T	CP0408	516	310	1390 V
PCB064	pg/g-Wet	15	15	100	1370 T	6500	FZ0306	2770	2430 T	5500 V	1370 T	6500	FZ0306	2770	2430 T	5500 V
PCB066	pg/g-Wet	15	15	100	3590 T	34700 T	CP0408	8750	6300 T	22000 V	3590 T	34700 T	CP0408	8750	6300 T	22000 V
PCB067	pg/g-Wet	15	15	100	70.9 T	1200 JT	CP0408	254	134 JT	990 JV	70.9 T	1200 JT	CP0408	254	134 JT	990 JV
PCB068	pg/g-Wet	15	15	100	75.1 T	14300 T	CP0408	1140	128 T	5090 V	75.1 T	14300 T	CP0408	1140	128 T	5090 V
PCB072	pg/g-Wet	15	15	100	88.9 T	3460 T	CP0408	411	132	1730 V	88.9 T	3460 T	CP0408	411	132	1730 V
PCB073	pg/g-Wet	15	11	73.3	19.8 T	28800 T	CP0408	3170	59.9 T	17100 V	0.61 U	28800 T	CP0408	2330	28.5 T	12400 V
PCB077	pg/g-Wet	15	14	93.3	136 T	311	FZ0306	237	241 V	310 V	136 T	533 UT	CP0408	239	254 T	310 V
PCB078	pg/g-Wet	15	2	13.3	2.91 T	3.29 T	CP0408	3.1	3.1 V	3.27 V	2.91 T	561 UT	CP0408	21.6	2.91 T	88.1 UV
PCB079	pg/g-Wet	15	15	100	93.5 T	2410 T	CP0408	342	155 T	1230 V	93.5 T	2410 T	CP0408	342	155 T	1230 V
PCB080	pg/g-Wet	15	0	0	--	--	--	--	--	--	3.23 UT	475 UT	CP0408	18.6	2.89 U	74.9 UV
PCB081	pg/g-Wet	15	14	93.3	4.83 T	22.1	FZ0306	12.2	11 V	21.4 V	4.83 T	531 UT	CP0408	29.1	11 T	95.1 V
PCB082	pg/g-Wet	15	15	100	752	4210 T	CP0408	1480	1130 T	3850 V	752	4210 T	CP0408	1480	1130 T	3850 V
PCB083 & 099	pg/g-Wet	15	15	100	8260 T	414000 T	CP0408	42700	12800 T	166000 JV	8260 T	414000 T	CP0408	42700	12800 T	166000 JV
PCB084	pg/g-Wet	15	15	100	1430 T	48900 T	CP0408	6230	2080 T	26900 V	1430 T	48900 T	CP0408	6230	2080 T	26900 V
PCB085 & 116 & 117	pg/g-Wet	15	15	100	2030 T	27500 T	CP0408	4790	2620 J	14800 JV	2030 T	27500 T	CP0408	4790	2620 J	14800 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	15	15	100	6670 T	173000 T	CP0408	24400	9630 T	97900 JV	6670 T	173000 T	CP0408	24400	9630 T	97900 JV
PCB088 & 091	pg/g-Wet	15	15	100	1550 T	109000 T	CP0408	12500	2920 J	60100 JV	1550 T	109000 T	CP0408	12500	2920 J	60100 JV
PCB089	pg/g-Wet	15	15	100	49.3 T	991 T	CP0408	153	66.1 T	593 V	49.3 T	991 T	CP0408	153	66.1 T	593 V
PCB090 & 101 & 113	pg/g-Wet	15	15	100	13600 T	701000 T	CP0408	84600	24600 T	381000 JV	13600 T	701000 T	CP0408	84600	24600 T	381000 JV
PCB092	pg/g-Wet	15	15	100	2510 T	185000 T	CP0408	18600	4440 T	81100 V	2510 T	185000 T	CP0408	18600	4440 T	81100 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	15	15	100	7390 T	685000 T	CP0408	71100	13100 T	352000 JV	7390 T	685000 T	CP0408	71100	13100 T	352000 JV
PCB094	pg/g-Wet	15	15	100	72.6 T	50200 T	CP0408	4100	183 T	21100 V	72.6 T	50200 T	CP0408	4100	183 T	21100 V
PCB096	pg/g-Wet	15	15	100	41.7 T	16500 T	CP0408	1540	116	8450 V	41.7 T	16500 T	CP0408	1540	116	8450 V
PCB103	pg/g-Wet	15	15	100	215 T	54500 T	CP0408	4600	605 T	20900 V	215 T	54500 T	CP0408	4600	605 T	20900 V
PCB104	pg/g-Wet	15	15	100	13.6	17100 T	CP0408	1290	30.4 T	6390 V	13.6	17100 T	CP0408	1290	30.4 T	6390 V
PCB105	pg/g-Wet	15	15	100	3120	23600 T	CP0408	6500	4690 T	17300 V	3120	23600 T	CP0408	6500	4690 T	17300 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB106	pg/g-Wet	15	8	53.3	4.37 T	106	FZ0306	19	6.67 V	72.4 V	1.58 U	568 UT	CP0408	31	5.29 T	159 V
PCB107 & 124	pg/g-Wet	15	15	100	317 T	2690 T	CP0408	688	449 T	2140 JV	317 T	2690 T	CP0408	688	449 T	2140 JV
PCB109	pg/g-Wet	15	15	100	941 T	11400 T	CP0408	2160	1320	6370 V	941 T	11400 T	CP0408	2160	1320	6370 V
PCB110 & 115	pg/g-Wet	15	15	100	10100 T	164000 T	CP0408	33000	15500 T	139000 JV	10100 T	164000 T	CP0408	33000	15500 T	139000 JV
PCB111	pg/g-Wet	15	15	100	11.2	1740 T	CP0408	166	41.2 T	712 V	11.2	1740 T	CP0408	166	41.2 T	712 V
PCB112	pg/g-Wet	15	1	6.67	45300 T	45300 T	CP0408	45300	45300 T	45300 T	2.25 U	45300 T	CP0408	3020	2.19 UT	13600 V
PCB114	pg/g-Wet	15	15	100	218	909	FZ0306	384	336 T	669 V	218	909	FZ0306	384	336 T	669 V
PCB118	pg/g-Wet	15	15	100	10800 T	133000 T	CP0408	26700	14800 T	92300 V	10800 T	133000 T	CP0408	26700	14800 T	92300 V
PCB120	pg/g-Wet	15	15	100	78.1 T	4220 T	CP0408	480	177 T	1830 V	78.1 T	4220 T	CP0408	480	177 T	1830 V
PCB121	pg/g-Wet	15	15	100	16.6	6160 T	CP0408	519	42.9 T	2540 V	16.6	6160 T	CP0408	519	42.9 T	2540 V
PCB122	pg/g-Wet	15	15	100	73.2	519 T	CP0408	166	134	402 V	73.2	519 T	CP0408	166	134	402 V
PCB123	pg/g-Wet	15	15	100	178	2260 T	CP0408	431	276 T	1210 V	178	2260 T	CP0408	431	276 T	1210 V
PCB126	pg/g-Wet	15	9	60	26.8	112	FZ0306	45.4	36.1 T	89.8 V	21.9 UT	1220 UT	CP0408	72.4	29.1 T	261 V
PCB127	pg/g-Wet	15	15	100	12.6 T	667 T	CP0408	79.8	31	300 V	12.6 T	667 T	CP0408	79.8	31	300 V
PCB128 & 166	pg/g-Wet	15	15	100	2550 J	88100 T	CP0408	11900	4320 T	49300 JV	2550 J	88100 T	CP0408	11900	4320 T	49300 JV
PCB129 & 138 & 160 & 163	pg/g-Wet	15	15	100	25700 T	2210000 T	CP0408	240000	49000 T	1110000 JV	25700 T	2210000 T	CP0408	240000	49000 T	1110000 JV
PCB130	pg/g-Wet	15	15	100	1270 T	57900 T	CP0408	7200	2160 T	31300 V	1270 T	57900 T	CP0408	7200	2160 T	31300 V
PCB131	pg/g-Wet	15	15	100	151 T	8740 T	CP0408	1080	267	5280 V	151 T	8740 T	CP0408	1080	267	5280 V
PCB132	pg/g-Wet	15	15	100	4310 T	324000 T	CP0408	40400	8590 T	211000 V	4310 T	324000 T	CP0408	40400	8590 T	211000 V
PCB133	pg/g-Wet	15	15	100	495 T	40700 T	CP0408	4520	1080 T	20800 V	495 T	40700 T	CP0408	4520	1080 T	20800 V
PCB134 & 143	pg/g-Wet	15	15	100	828 J	84000 T	CP0408	9220	1680 J	47300 JV	828 J	84000 T	CP0408	9220	1680 J	47300 JV
PCB135 & 151 & 154	pg/g-Wet	15	15	100	7120 T	829000 T	CP0408	90200	16300 T	450000 JV	7120 T	829000 T	CP0408	90200	16300 T	450000 JV
PCB136	pg/g-Wet	15	15	100	1520 T	175000 T	CP0408	22200	3850 T	125000 V	1520 T	175000 T	CP0408	22200	3850 T	125000 V
PCB137	pg/g-Wet	15	15	100	673 T	20500 T	CP0408	2600	992 T	8930 V	673 T	20500 T	CP0408	2600	992 T	8930 V
PCB139 & 140	pg/g-Wet	15	15	100	274 T	11200 T	CP0408	1380	466 T	5470 JV	274 T	11200 T	CP0408	1380	466 T	5470 JV
PCB141	pg/g-Wet	15	15	100	3300 T	474000 T	CP0408	52100	8300 T	268000 V	3300 T	474000 T	CP0408	52100	8300 T	268000 V
PCB142	pg/g-Wet	15	0	0	--	--	--	--	--	--	1.78 U	2320 UT	CP0408	84.6	3.04 U	394 UV
PCB144	pg/g-Wet	15	15	100	881 T	94200 T	CP0408	11200	1980 T	59200 V	881 T	94200 T	CP0408	11200	1980 T	59200 V
PCB145	pg/g-Wet	15	14	93.3	2.52 JT	525 T	CP0408	47.9	6.03 V	233 JV	2.52 JT	525 T	CP0408	44.9	5.95 T	211 JV
PCB146	pg/g-Wet	15	15	100	4650 T	348000 T	CP0408	40100	9760 T	180000 V	4650 T	348000 T	CP0408	40100	9760 T	180000 V
PCB147 & 149	pg/g-Wet	15	15	100	15100 T	1480000 T	CP0408	175000	33900 J	902000 JV	15100 T	1480000 T	CP0408	175000	33900 J	902000 JV
PCB148	pg/g-Wet	15	15	100	74.9 T	9890 T	CP0408	977	204 T	4470 V	74.9 T	9890 T	CP0408	977	204 T	4470 V
PCB150	pg/g-Wet	15	15	100	45.2 T	7800 T	CP0408	890	137 T	4860 V	45.2 T	7800 T	CP0408	890	137 T	4860 V
PCB152	pg/g-Wet	15	15	100	17.3 T	9140 T	CP0408	811	42.7	4340 V	17.3 T	9140 T	CP0408	811	42.7	4340 V
PCB153 & 168	pg/g-Wet	15	15	100	26800 T	2890000 T	CP0408	304000	54100 T	1410000 JV	26800 T	2890000 T	CP0408	304000	54100 T	1410000 JV
PCB155	pg/g-Wet	15	15	100	7.66	3270 T	CP0408	260	13.8 T	1290 V	7.66	3270 T	CP0408	260	13.8 T	1290 V
PCB156	pg/g-Wet	6	6	100	1650	31600	FZ0306	7860	2920 V	25200 V	1650	31600	FZ0306	7860	2920 V	25200 V
PCB156 & 157	pg/g-Wet	9	9	100	2030 T	132000 T	CP0408	17500	2790 T	82200 V	2030 T	132000 T	CP0408	17500	2790 T	82200 V
PCB157	pg/g-Wet	6	6	100	272	2180	FZ0306	682	411 V	1760 V	272	2180	FZ0306	682	411 V	1760 V
PCB158	pg/g-Wet	15	15	100	2030 T	171000 T	CP0408	18800	3940 T	89400 V	2030 T	171000 T	CP0408	18800	3940 T	89400 V
PCB159	pg/g-Wet	15	15	100	159	30100 T	CP0408	3300	514 T	17200 V	159	30100 T	CP0408	3300	514 T	17200 V
PCB161	pg/g-Wet	15	8	53.3	12.1 T	45.1 T	CP0812	21.1	18.2 V	38.6 V	1.2 U	1620 UT	CP0408	70.7	12.5 T	289 UV
PCB162	pg/g-Wet	15	14	93.3	59.4 T	459	FZ0306	120	93.2 V	248 V	59.4 T	2100 UT	CP0408	182	93.4 T	636 V
PCB164	pg/g-Wet	15	15	100	951 T	93700 T	CP0408	11300	2110 T	59500 V	951 T	93700 T	CP0408	11300	2110 T	59500 V
PCB165	pg/g-Wet	15	15	100	17.8	2820 T	CP0408	294	57.4 T	1430 V	17.8	2820 T	CP0408	294	57.4 T	1430 V
PCB167	pg/g-Wet	15	15	100	936 T	59100 T	CP0408	6370	1480 T	28900 V	936 T	59100 T	CP0408	6370	1480 T	28900 V
PCB169	pg/g-Wet	15	6	40	3.18	15.3	FZ0306	5.96	4.34 V	12.8 V	3.18	2570 UT	CP0408	99.9	14.9 UT	419 UV
PCB170	pg/g-Wet	15	15	100	5300 T	963000 T	CP0408	97400	15200	488000 V	5300 T	963000 T	CP0408	97400	15200	488000 V
PCB171 & 173	pg/g-Wet	15	15	100	1550 T	279000 T	CP0408	29100	4780 J	147000 JV	1550 T	279000 T	CP0408	29100	4780 J	147000 JV
PCB172	pg/g-Wet	15	15	100	1080 T	162000 T	CP0408	17500	2900	89600 V	1080 T	162000 T	CP0408	17500	2900	89600 V
PCB174	pg/g-Wet	15	15	100	3260 T	579000 T	CP0408	69800	11800 T	378000 V	3260 T	579000 T	CP0408	69800	11800 T	378000 V
PCB175	pg/g-Wet	15	15	100	236 T	36500 T	CP0408	4020	732	20500 V	236 T	36500 T	CP0408	4020	732	20500 V
PCB176	pg/g-Wet	15	15	100	593 T	84400 T	CP0408	9640	1670	49900 V	593 T	84400 T	CP0408	9640	1670	49900 V
PCB177	pg/g-Wet	15	15	100	3610 T	510000 T	CP0408	55400	10100	278000 V	3610 T	510000 T	CP0408	55400	10100	278000 V
PCB178	pg/g-Wet	15	15	100	1570 T	181000 T	CP0408	20000	4340 T	97200 V	1570 T	181000 T	CP0408	20000	4340 T	97200 V
PCB179	pg/g-Wet	15	15	100	1970 T	260000 T	CP0408	30600	5480 T	163000 V	1970 T	260000 T	CP0408	30600	5480 T	163000 V
PCB180 & 193	pg/g-Wet	15	15	100	15000 T	2380000 T	CP0408	247000	43400 J	1220000 JV	15000 T	2380000 T	CP0408	247000	43400 J	1220000 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB181	pg/g-Wet	15	15	100	46.6 T	4070 T	CP0408	425	95	1970 V	46.6 T	4070 T	CP0408	425	95	1970 V
PCB182	pg/g-Wet	15	15	100	22.3 T	3820 T	CP0408	412	127	1670 V	22.3 T	3820 T	CP0408	412	127	1670 V
PCB183 & 185	pg/g-Wet	15	15	100	4560 T	739000 T	CP0408	77800	13500 J	384000 JV	4560 T	739000 T	CP0408	77800	13500 J	384000 JV
PCB184	pg/g-Wet	15	12	80	7.07 T	69.4	FZ0306	16.3	11.7 V	41.4 V	7.07 T	69.4	FZ0306	15	11.4 T	34.7 V
PCB186	pg/g-Wet	15	9	60	0.658 JT	25.9	FZ0306	3.78	0.996 T	16.2 V	0.658 JT	36.2 UT	CP0408	4.14	1.59 T	20.4 V
PCB187	pg/g-Wet	15	15	100	12500 T	1410000 T	CP0408	147000	32200 T	688000 V	12500 T	1410000 T	CP0408	147000	32200 T	688000 V
PCB188	pg/g-Wet	15	15	100	18.3 T	2020 T	CP0408	250	37.5 T	1400 V	18.3 T	2020 T	CP0408	250	37.5 T	1400 V
PCB189	pg/g-Wet	15	15	100	207 T	34300 T	CP0408	3380	523 T	16600 V	207 T	34300 T	CP0408	3380	523 T	16600 V
PCB190	pg/g-Wet	15	15	100	1340 T	199000 T	CP0408	20200	3220 T	101000 V	1340 T	199000 T	CP0408	20200	3220 T	101000 V
PCB191	pg/g-Wet	15	15	100	244 T	41600 T	CP0408	4450	684	23300 V	244 T	41600 T	CP0408	4450	684	23300 V
PCB192	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.955 U	53.8 UT	CP0408	3.13	1.15 UT	10.3 UV
PCB194	pg/g-Wet	15	15	100	2640 T	429000 T	CP0408	43200	6310 T	216000 V	2640 T	429000 T	CP0408	43200	6310 T	216000 V
PCB195	pg/g-Wet	15	15	100	1030	174000 T	CP0408	18200	2540 T	94100 V	1030	174000 T	CP0408	18200	2540 T	94100 V
PCB196	pg/g-Wet	15	15	100	1410 T	212000 T	CP0408	23200	3760	120000 V	1410 T	212000 T	CP0408	23200	3760	120000 V
PCB197 & 200	pg/g-Wet	15	15	100	370 T	46700 T	CP0408	5510	1030 J	29100 JV	370 T	46700 T	CP0408	5510	1030 J	29100 JV
PCB198 & 199	pg/g-Wet	15	15	100	3670 T	378000 T	CP0408	42600	8260 J	212000 JV	3670 T	378000 T	CP0408	42600	8260 J	212000 JV
PCB201	pg/g-Wet	15	15	100	340 T	40600 T	CP0408	4650	886 T	23700 V	340 T	40600 T	CP0408	4650	886 T	23700 V
PCB202	pg/g-Wet	15	15	100	841 T	58000 T	CP0408	6630	1550	31300 V	841 T	58000 T	CP0408	6630	1550	31300 V
PCB203	pg/g-Wet	15	15	100	2400 T	245000 T	CP0408	27300	5120	135000 V	2400 T	245000 T	CP0408	27300	5120	135000 V
PCB204	pg/g-Wet	15	11	73.3	1.63 T	68.6 JT	CP0408	10.9	3.63 JT	44.2 JV	1.63 T	68.6 JT	CP0408	9.47	4.08 JT	34.4 JV
PCB205	pg/g-Wet	15	15	100	154	19700 T	CP0408	2100	385 T	10400 V	154	19700 T	CP0408	2100	385 T	10400 V
PCB206	pg/g-Wet	15	15	100	935 T	48400 T	CP0408	6110	1780	28200 V	935 T	48400 T	CP0408	6110	1780	28200 V
PCB207	pg/g-Wet	15	15	100	138 T	7860 T	CP0408	940	238	4360 V	138 T	7860 T	CP0408	940	238	4360 V
PCB208	pg/g-Wet	15	15	100	415 T	8460 T	CP0408	1450	708 T	5280 V	415 T	8460 T	CP0408	1450	708 T	5280 V
PCB209	pg/g-Wet	15	15	100	469 T	1590 T	CP0408	829	762	1260 V	469 T	1590 T	CP0408	829	762	1260 V
Total PCB Congeners	pg/g-Wet	15	15	100	295000 JT	25100000 JT	CP0408	2760000	574000 JT	13200000 JV	295000 JT	25100000 JT	CP0408	2760000	574000 JT	13200000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	15	15	100	295 JT	25100 JT	CP0408	2760	574 JT	13200 JV	295 JT	25100 JT	CP0408	2760	574 JT	13200 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	15	15	100	528 JT	41900 JT	CP0408	4280	1060 JT	18300 JV	528 JT	41900 JT	CP0408	4280	1060 JT	18300 JV
Heptachlorobiphenylhomologs	pg/g-Wet	15	15	100	53100 JT	7870000 T	CP0408	835000	147000 T	4150000 JV	53100 JT	7870000 T	CP0408	835000	147000 T	4150000 JV
Hexachlorobiphenyl homologs	pg/g-Wet	15	15	100	103000 JT	9650000 T	CP0408	1070000	208000 JT	5160000 JV	103000 JT	9650000 T	CP0408	1070000	208000 JT	5160000 JV
Monochlorobiphenyl homologs	pg/g-Wet	14	14	100	7.82 JT	143 JT	CP0408	27.5	10.7 JV	85.5 JV	7.82 JT	143 JT	CP0408	27.5	10.7 JV	85.5 JV
Nonachlorobiphenyl homologs	pg/g-Wet	15	15	100	1490 T	64700 T	CP0408	8500	2720 T	37800 V	1490 T	64700 T	CP0408	8500	2720 T	37800 V
Octachlorobiphenyl homologs	pg/g-Wet	15	15	100	13000 JT	1600000 JT	CP0408	173000	30500 JT	870000 JV	13000 JT	1600000 JT	CP0408	173000	30500 JT	870000 JV
Pentachlorobiphenylhomologs	pg/g-Wet	15	15	100	74800 T	2880000 T	CP0408	352000	111000 T	1520000 JV	74800 T	2880000 T	CP0408	352000	111000 T	1520000 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	15	15	100	34300 T	2590000 JT	CP0408	267000	52100 T	1270000 JV	34300 T	2590000 JT	CP0408	267000	52100 T	1270000 JV
Trichlorobiphenyl homologs	pg/g-Wet	15	15	100	6060 JT	383000 JT	CP0408	43800	11100 JT	204000 JV	6060 JT	383000 JT	CP0408	43800	11100 JT	204000 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	15	15	100	1.01	7.13 J	FZ0609	2.37	1.87 T	4.82 JV	1.01	7.13 J	FZ0609	2.37	1.87 T	4.82 JV
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	15	100	5.03 T	18.3	FZ0609	11.5	12.3 T	17.6 V	5.03 T	18.3	FZ0609	11.5	12.3 T	17.6 V
Hexachlorodibenzofuran homologs	pg/g-Wet	15	15	100	1.61	13	FZ0306	5.41	4.44 T	12.4 V	1.61	13	FZ0306	5.41	4.44 T	12.4 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	15	100	3.07	10.1	FZ0609	6.31	6.43 T	8.83 V	3.07	10.1	FZ0609	6.31	6.43 T	8.83 V
Octachlorodibenzofuran	pg/g-Wet	15	15	100	0.224 JT	0.993 JT	CP0004	0.512	0.462 JT	0.859 JV	0.224 JT	0.993 JT	CP0004	0.512	0.462 JT	0.859 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	15	15	100	6.26 T	36.7	FZ0609	17.3	17.2 T	32.8 V	6.26 T	36.7	FZ0609	17.3	17.2 T	32.8 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	15	15	100	2.24	16.3	FZ0306	5.98	4.25 T	13.4 V	2.24	16.3	FZ0306	5.98	4.25 T	13.4 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	15	100	0.714	2.2	FZ0609	1.41	1.39 T	2 V	0.714	2.2	FZ0609	1.41	1.39 T	2 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	15	15	100	2.06 T	9.84 T	CP0408	4.04	3.43	8.49 V	2.06 T	9.84 T	CP0408	4.04	3.43	8.49 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	15	100	0.492	1.21 T	CP0408	0.78	0.715 T	1.18 V	0.492	1.21 T	CP0408	0.78	0.715 T	1.18 V
Total PCDD/F	pg/g-Wet	15	15	100	26.1 T	90.7 JT	CP0408	55.7	53.3 JT	83.8 JV	26.1 T	90.7 JT	CP0408	55.7	53.3 JT	83.8 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	15	15	100	0.537	3.14	FZ0609	1.29	1.15 T	2.21 V	0.537	3.14	FZ0609	1.29	1.15 T	2.21 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	15	15	100	4.47	15	FZ0609	9.77	11 T	14.4 V	4.47	15	FZ0609	9.77	11 T	14.4 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	15	15	100	0.0274 JT	0.466 T	CP0408	0.133	0.085	0.346 JV	0.0274 JT	0.466 T	CP0408	0.133	0.085	0.346 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	15	15	100	0.32	8.17	FZ0306	1.96	0.839	7.23 V	0.32	8.17	FZ0306	1.96	0.839	7.23 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	15	15	100	0.419	1.51	FZ0609	1.05	1.17 T	1.47 V	0.419	1.51	FZ0609	1.05	1.17 T	1.47 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	15	15	100	0.165	1.96	FZ0306	0.629	0.415	1.57 V	0.165	1.96	FZ0306	0.629	0.415	1.57 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	15	15	100	2.01	6.66	FZ0609	4.3	4.51 T	6.14 V	2.01	6.66	FZ0609	4.3	4.51 T	6.14 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	15	13	86.7	0.00791 JT	0.057	FZ0306	0.0258	0.0245 JT	0.0514 JV	0.00791 JT	0.057	FZ0306	0.0233	0.019 JT	0.0505 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	15	15	100	0.261	0.772	FZ0609	0.489	0.472 T	0.686 V	0.261	0.772	FZ0609	0.489	0.472 T	0.686 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	15	15	100	0.369 T	4.8 T	CP0408	1.16	0.581	3.7 V	0.369 T	4.8 T	CP0408	1.16	0.581	3.7 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	15	15	100	0.695	2.08	FZ0609	1.36	1.33	1.92 V	0.695	2.08	FZ0609	1.36	1.33	1.92 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	15	15	100	0.097	0.486 T	CP0408	0.264	0.245 T	0.482 V	0.097	0.486 T	CP0408	0.264	0.245 T	0.482 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	15	15	100	0.764	12.7	FZ0306	2.43	1.3	7.08 V	0.764	12.7	FZ0306	2.43	1.3	7.08 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	15	15	100	1.25 T	8.99 T	CP0408	2.91	2.28	7.63 V	1.25 T	8.99 T	CP0408	2.91	2.28	7.63 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	15	15	100	0.457	1.12 T	CP0408	0.707	0.633 T	1.09 V	0.457	1.12 T	CP0408	0.707	0.633 T	1.09 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	15	15	100	1.98 T	8.53 T	FZ0306	4.11	3.35 JT	6.97 JV	1.98 T	8.53 T	FZ0306	4.11	3.35 JT	6.97 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	15	15	100	3.18 JT	24.7 T	FZ0306	8.66	7.22 JT	19.7 JV	3.18 JT	24.7 T	FZ0306	8.66	7.22 JT	19.7 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	15	15	100	0.57 T	16.2 T	FZ0306	4.55	3.65 T	12.9 V	0.57 T	16.2 T	FZ0306	4.55	3.65 T	12.9 V
Pesticides																
2,4'-DDD	µg/kg-Wet	15	12	80	2.2 T	81.5 JT	FZ0306	24.1	12.4 JV	80.1 JV	2.2 T	81.5 JT	FZ0306	20.1	5.32 T	79.8 JV
2,4'-DDE	µg/kg-Wet	15	9	60	0.35 JT	7.9 T	CP0408	2.09	0.895 T	6.2 V	0.35 JT	7.9 T	CP0408	2.12	1.06 T	5 V
2,4'-DDT	µg/kg-Wet	15	10	66.7	0.0468 JT	23 NJ	FZ0306	3.77	0.183 V	15.8 JV	0.0468 JT	23 NJ	FZ0306	3.67	3.45 UT	11.7 JV
4,4'-DDD	µg/kg-Wet	15	15	100	14.5 T	206 T	CP0408	55	27.8 T	153 V	14.5 T	206 T	CP0408	55	27.8 T	153 V
4,4'-DDE	µg/kg-Wet	15	15	100	56.1 T	310 T	CP0408	127	105 JT	275 JV	56.1 T	310 T	CP0408	127	105 JT	275 JV
4,4'-DDT	µg/kg-Wet	15	10	66.7	0.0585 JT	24 J	FZ0306	3.51	0.216 JV	15.7 JV	0.0585 JT	24 J	FZ0306	3.39	3.07 JT	11.1 JV
Aldrin	µg/kg-Wet	15	9	60	0.059 JT	0.163 JT	CP0812	0.12	0.11 JT	0.162 JV	0.059 JT	13 UT	FZ0306	1.17	0.16 JT	5.42 UV
alpha-Endosulfan	µg/kg-Wet	15	10	66.7	0.22 JT	3.6 NJ	FZ0609	0.622	0.273 JV	2.19 JV	0.22 JT	20 UJ	FZ0306	1.42	0.33 JT	5.52 JV
alpha-Hexachlorocyclohexane	µg/kg-Wet	15	9	60	0.027 JT	0.0499 JT	CP0408	0.0349	0.0331 JT	0.0461 JV	0.027 JT	6.4 UT	FZ0306; FZ0609	0.781	0.0405 JT	3.2 UV
beta-Endosulfan	µg/kg-Wet	15	4	26.7	0.0588 JT	0.116 JT	CP0812	0.0791	0.0707 JV	0.109 JV	0.0588 JT	15 UT	FZ0306; FZ0609	2.1	0.0865 UT	7.5 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	15	9	60	0.012 JT	0.042 JT	CP0408	0.0193	0.016 JT	0.036 JV	0.012 JT	8.5 UT	FZ0306; FZ0609	1.06	0.027 JT	4.25 UV
cis-Chlordane	µg/kg-Wet	15	12	80	2.8 NJ	8.3 N	FZ0609	4.04	3.73 V	6.17 V	2.8 NJ	20 U	FZ0306	4.36	3.87 T	8.81 V
cis-Nonachlor	µg/kg-Wet	15	9	60	1.6 T	2.33 T	CP0408	1.99	1.9 JT	2.32 V	1.6 T	17 U	FZ0306	2.94	2.3 T	5.03 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	15	5	33.3	0.00225 JT	0.00395 JT	CP0408	0.00293	0.0025 JT	0.00388 JV	0.00222 UT	7.3 UT	FZ0306; FZ0609	0.821	0.0036 JT	3.65 UV
Dieldrin	µg/kg-Wet	15	9	60	1.9 T	3 T	CP0408	2.32	2.2 T	2.89 V	1 UJ	14 UT	FZ0306	2.73	2.35 T	5.57 UV
Endosulfan sulfate	µg/kg-Wet	15	9	60	0.241 JT	0.558 JT	CP0004	0.373	0.325 T	0.555 JV	0.241 JT	12 UT	FZ0306	1.29	0.5 UJT	5.27 UV
Endrin	µg/kg-Wet	15	9	60	0.0156 JT	0.0294 JT	CP0408	0.0231	0.0242 JT	0.0289 JV	0.0156 JT	20 UT	FZ0306	1.34	0.0281 JT	6.46 UV
Endrin aldehyde	µg/kg-Wet	15	2	13.3	0.00224 JT	0.00743 JT	CP0004	0.00484	0.00484 JV	0.00717 JV	0.00224 JT	8.5 UT	FZ0306; FZ0609	0.963	0.00743 JT	4.25 UV
Endrin ketone	µg/kg-Wet	15	3	20	0.00087 JT	0.015 JT	CP0812	0.00776	0.00741 JT	0.0142 JV	0.00087 JT	7.5 UT	FZ0306; FZ0609	0.839	0.0179 UT	3.75 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	15	9	60	0.0169 JT	0.0459 JT	CP0408	0.0312	0.0343 JT	0.0425 JV	0.0169 JT	9.6 UT	FZ0306; FZ0609	1.2	0.0374 JT	4.8 UV
Heptachlor	µg/kg-Wet	15	5	33.3	0.00346 JT	0.00713 JT	CP0812	0.00507	0.00433 JT	0.00709 JV	0.00335 UT	13 UT	FZ0306	1.1	0.0126 UT	5.42 UV
Heptachlor epoxide	µg/kg-Wet	15	9	60	0.112 JT	0.209 JT	CP0004	0.147	0.129 JT	0.196 JV	0.112 JT	8 UT	FZ0306; FZ0609	0.955	0.176 JT	4 UV
Methoxychlor	µg/kg-Wet	15	2	13.3	0.00617 JT	4.2 N	FZ0306	2.1	2.1 JV	3.99 JV	0.00216 UT	4.8 UT	FZ0306; FZ0609	1.06	0.015 UT	2.94 V
Mirex	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 UJ	6.2 UT	FZ0306; FZ0609	1.9	2 UV	3.1 UV
Oxychlordane	µg/kg-Wet	15	10	66.7	0.361 JT	1.1 NJ	FZ0306	0.508	0.47 JV	0.848 JV	0.361 JT	20 UT	FZ0306	1.64	0.493 JT	6.46 UV
Total Chlordanes	µg/kg-Wet	15	12	80	3.2 NJT	15.4 JT	CP0408	12	13 JV	15.3 JV	3.2 NJT	20 UT	FZ0306	10.8	12 JT	15.3 JV
Total Endosulfan	µg/kg-Wet	15	10	66.7	0.53 JT	3.6 NJT	FZ0609	0.99	0.683 JV	2.39 JV	0.53 JT	20 UJT	FZ0306	2.56	0.802 JT	8.25 UJV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	15	15	100	16.7 T	285 T	CP0408	74.3	38 JT	205 JV	16.7 T	285 T	CP0408	74.3	38 JT	205 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	15	15	100	73.3 JT	615 JT	CP0408	208	156 JT	486 JV	73.3 JT	615 JT	CP0408	208	156 JT	486 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	15	15	100	56.5 JT	318 T	CP0408	129	105 JT	277 JV	56.5 JT	318 T	CP0408	129	105 JT	277 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	15	10	66.7	0.105 JT	47 NJT	FZ0306	7.29	0.384 JV	31.4 JV	0.105 JT	47 NJT	FZ0306	6.01	3.45 UT	22.8 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	132 JT	350 JT	FZ0306	186	156 JV	310 JV	132 JT	350 JT	FZ0306	186	156 JV	310 JV
Toxaphene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	420 UJ	6900 U	FZ0306	1000	480 UJV	2900 UV
trans-Chlordane	µg/kg-Wet	15	9	60	1.7 T	2.5 T	CP0408	2.05	2.08 T	2.44 V	1 UJ	8.4 UT	FZ0306; FZ0609	2.27	2.08 T	4.2 UV
trans-Nonachlor	µg/kg-Wet	15	10	66.7	3.31 T	10 NJ	FZ0306	5.4	5.11 V	8.14 JV	3.31 T	11 UT	FZ0306; FZ0609	5.19	5.32 T	7.11 JV
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	9	9	100	2.4 T	12 JT	CP0408	5.4	4.6 T	10 JV	2.4 T	12 JT	CP0408	5.4	4.6 T	10 JV
2-Methylnaphthalene	µg/kg-Wet	15	10	67	1.9 T	38 T	FZ0609	7.6	4.3 V	24 V	1.9 T	38 T	FZ0609	10	5.5 JT	23 V
Acenaphthene	µg/kg-Wet	15	11	73	4.4 T	120 T	CP0408	39	27 T	98 V	4.4 T	120 T	CP0408	33	16 T	89 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Acenaphthylene	µg/kg-Wet	15	9	60	0.4 T	4.2 JT	CP0408	1.6	1.3 JT	3.5 JV	0.4 T	33 UT	FZ0306; FZ0609	7.4	2.5 T	17 UV
Anthracene	µg/kg-Wet	15	9	60	0.5 T	7.6 JT	CP0408	2.7	2.4 T	6.3 JV	0.5 T	33 UT	FZ0306; FZ0609	8.1	4.3 T	17 UV
Benzo(a)anthracene	µg/kg-Wet	15	1	6.67	0.32 JT	0.32 JT	CP0004	0.32	0.32 JT	0.32 JT	0.066 UT	33 UT	FZ0306; FZ0609	6.62	0.55 UT	16.5 UV
Benzo(a)pyrene	µg/kg-Wet	15	1	6.67	0.54 JT	0.54 JT	CP0812	0.54	0.54 JT	0.54 JT	0.081 UT	33 UT	FZ0306; FZ0609	6.68	0.65 UT	16.5 UV
Benzo(b)fluoranthene	µg/kg-Wet	15	2	13	0.34 JT	1 JT	CP0812	0.67	0.67 JV	0.97 JV	0.07 UT	33 UT	FZ0306; FZ0609	6.7	1 JT	17 UV
Benzo(g,h,i)perylene	µg/kg-Wet	15	2	13.3	0.32 JT	0.56 JT	CP0812	0.44	0.44 JV	0.548 JV	0.073 UT	33 UT	FZ0306; FZ0609	6.66	0.56 JT	16.5 UV
Benzo(k)fluoranthene	µg/kg-Wet	14	2	14.3	0.26 JT	0.41 JT	CP0812	0.335	0.335 JV	0.403 JV	0.056 UT	33 UT	FZ0306; FZ0609	7.02	0.43 JV	16.5 UV
Chrysene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.076 UT	33 UT	FZ0306; FZ0609	6.66	0.6 UT	16.5 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	15	2	13.3	0.24 JT	0.25 JT	CP0812	0.245	0.245 JV	0.25 JV	0.059 UT	33 UT	FZ0306; FZ0609	6.6	0.45 UT	16.5 UV
Dibenzothiophene	µg/kg-Wet	9	9	100	0.14 JT	21 JT	CP0812	3.7	1.7 T	15 JV	0.14 JT	21 JT	CP0812	3.7	1.7 T	15 JV
Fluoranthene	µg/kg-Wet	15	6	40	1.1 T	24 JT	CP0408	8.2	5.3 V	20 JV	0.53 UT	33 UT	FZ0306; FZ0609	9.8	9.8 T	19 JV
Fluorene	µg/kg-Wet	15	10	67	1.6 JT	53 T	FZ0609	14	8.1 V	40 V	1.6 JT	53 T	FZ0609	14	16 UT	33 V
High Molecular Weight PAH	µg/kg-Wet	15	9	60	0.33 T	31 JT	CP0408	8	6 T	23 JV	0.33 T	33 UT	FZ0306; FZ0609	11	12 T	21 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	15	2	13.3	0.27 JT	0.6 JT	CP0812	0.435	0.435 JV	0.584 JV	0.064 UT	33 UT	FZ0306; FZ0609	6.64	0.6 JT	16.5 UV
Low Molecular Weight PAH	µg/kg-Wet	15	11	73.3	11 JT	222 JT	FZ0609	79	50 T	201 JV	11 JT	222 JT	FZ0609	62.2	38 JT	193 JV
Naphthalene	µg/kg-Wet	15	7	47	2.5 T	56 JT	FZ0609	20	7.6 T	53 JV	2 UT	56 JT	FZ0609	14	7.6 T	49 JV
Phenanthrene	µg/kg-Wet	15	5	33	2.7 T	16 T	CP0408	10	9.9 T	16 V	2.3 UT	33 UT	FZ0306; FZ0609	10	14 T	17 UV
Pyrene	µg/kg-Wet	15	9	60	0.33 T	7.3 T	CP0408	2	1.4 T	5.4 V	0.33 T	33 UT	FZ0306; FZ0609	7.6	2.6 T	17 UV
Total BaPEq	µg/kg-Wet	15	2	13.3	0.336 JT	0.954 JT	CP0812	0.645	0.645 JV	0.923 JV	0.081 UT	33 UT	FZ0306; FZ0609	6.71	0.954 JT	16.5 UV
Total cPAHs	µg/kg-Wet	15	2	13.3	1.4 JT	2.8 JT	CP0812	2.1	2.1 JV	2.73 JV	0.081 UT	33 UT	FZ0306; FZ0609	6.9	1.4 JT	16.5 UV
Total PAHs	µg/kg-Wet	15	11	73.3	11 JT	222 JT	FZ0609	85.5	53 JT	206 JV	11 JT	222 JT	FZ0609	67	42 JT	200 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	66 UT	99 UT	FZ0306	39	33 UT	49 UV
Butylbenzyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	7.3 UJT	660 U	FZ0306	130	3.7 UT	330 UV
Dibutyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	22 UT	660 U	FZ0306	140	20 UT	330 UV
Diethyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	16 UT	330 U	FZ0306; FZ0609	72	17 UT	170 UV
Dimethyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	7.7 UT	330 U	FZ0306; FZ0609	67	3.9 UT	170 UV
Di-n-octyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 UT	660 U	FZ0306	130	5.5 UT	330 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	9.8 UT	33 UT	FZ0306; FZ0609	9.4	4.9 UT	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 UT	33 UT	FZ0306; FZ0609	9.7	5.5 UT	17 UV
1,2-Diphenylhydrazine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 U	33 U	FZ0306; FZ0609	16	16 UV	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 UT	33 UT	FZ0306; FZ0609	9.7	5.5 UT	17 UV
1,4-Dichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 UT	33 UT	FZ0306; FZ0609	9.7	5.5 UT	17 UV
2,4-Dinitrotoluene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	15 UT	33 UT	FZ0306; FZ0609	11	7.5 UT	17 UV
2,6-Dinitrotoluene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	14 UT	33 UT	FZ0306; FZ0609	11	7 UT	17 UV
2-Chloronaphthalene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	6.7 UT	33 UT	FZ0306; FZ0609	8.4	3.4 UT	17 UV
2-Nitroaniline	µg/kg-Wet	15	0	0	--	--	--	--	--	--	31 UT	1600 U	FZ0306; FZ0609	330	16 UT	800 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	14	0	0	--	--	--	--	--	--	1000 UT	3300 U	FZ0306; FZ0609	980	500 UV	1700 UV
3-Nitroaniline	µg/kg-Wet	14	0	0	--	--	--	--	--	--	400 UT	1600 U	FZ0306; FZ0609	460	200 UV	800 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	15	0	0	--	--	--	--	--	--	6.9 UT	33 UT	FZ0306; FZ0609	8.5	3.5 UT	17 UV
4-Chloroaniline	µg/kg-Wet	14	0	0	--	--	--	--	--	--	160 UT	400 UT	CP0004; CP0408; CP0812	150	200 UV	200 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	15	0	0	--	--	--	--	--	--	6.4 UT	82 UT	FZ0306	18	3.2 UT	41 UV
4-Nitroaniline	µg/kg-Wet	14	0	0	--	--	--	--	--	--	400 UT	1600 U	FZ0306; FZ0609	460	200 UV	800 UV
Aniline	µg/kg-Wet	13	0	0	--	--	--	--	--	--	800 UT	1700 U	FZ0306; FZ0609	570	400 UT	850 UV
Azobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	40 UT	330 U	FZ0306; FZ0609	76	20 UT	170 UV
Benzoic acid	µg/kg-Wet	15	7	47	360 JT	470 JT	CP0004	410	420 JT	460 JV	360 JT	8300 U	FZ0306; FZ0609	1900	450 JT	4200 UV
Benzyl alcohol	µg/kg-Wet	15	5	33	26 JT	80 JT	CP0004	39	31 T	70 JV	26 JT	660 U	FZ0306	160	80 JT	330 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	310 U	330 U	FZ0306; FZ0609	160	160 UV	170 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	15	5	33	9.8 JT	30 JT	CP0004	20	22 JT	29 JV	8.3 UT	330 U	FZ0306; FZ0609	72	27 JT	170 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	15	0	0	--	--	--	--	--	--	13 UT	33 UT	FZ0306; FZ0609	10	6.5 UT	17 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	9	0	0	--	--	--	--	--	--	13 UT	13 UT	CP0004; CP0408; CP0812	6.5	6.5 UT	6.5 UV
Carbazole	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	FZ0306; FZ0609	16	16 UV	17 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Dibenzofuran	µg/kg-Wet	15	9	60	0.72 JT	6 JT	CP0408	2.6	1.2 T	5.6 JV	0.72 JT	33 UT	FZ0306; FZ0609	8	5 T	17 UV
Hexachlorobenzene	µg/kg-Wet	15	9	60	2 T	4.46 T	CP0408	3	3.09 T	4.01 V	2 T	32 UT	FZ0306	3.85	3.2 UT	7.92 V
Hexachlorobutadiene	µg/kg-Wet	15	9	60	0.00475 JT	0.263 JT	CP0408	0.0789	0.0267 JT	0.233 JV	0.00475 JT	4.6 UT	FZ0306; FZ0609	0.827	0.188 JT	2.3 UV
Hexachlorocyclopentadiene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	1000 UT	1600 U	FZ0306; FZ0609	620	500 UT	800 UV
Hexachloroethane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	2 UJT	20 UT	CP0004; CP0408; CP0812	8.1	10 UT	10 UV
Isophorone	µg/kg-Wet	15	3	20	5.9 JT	5.9 JT	CP0004; CP0408	5.9	5.9 JT	5.9 JV	5.9 JT	1700 U	FZ0306; FZ0609	340	5.9 JT	850 UV
Nitrobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	12 UT	33 UT	FZ0306; FZ0609	10	6 UT	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	15	0	0	--	--	--	--	--	--	40 UT	160 UJT	FZ0306; FZ0609	44	20 UT	80 UJV
N-Nitrosodiphenylamine	µg/kg-Wet	15	0	0	--	--	--	--	--	--	6.6 UJT	330 U	FZ0306; FZ0609	66	3.3 UT	170 UV
N-Nitrosodipropylamine	µg/kg-Wet	15	0	0	--	--	--	--	--	--	22 UT	33 UJT	FZ0306; FZ0609	13	11 UT	17 UJV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3100 U	3300 U	FZ0306; FZ0609	1600	1600 UV	1700 UV
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	20 UT	20 UT	CP0004; CP0408; CP0812	10	10 UT	10 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3100 U	3300 U	FZ0306; FZ0609	1600	1600 UV	1700 UV
2,4,5-Trichlorophenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	14 UT	1600 U	FZ0306; FZ0609	320	7 UT	800 UV
2,4,6-Trichlorophenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	9.1 UT	33 UT	FZ0306; FZ0609	9.2	4.6 UT	17 UV
2,4-Dichlorophenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	9.5 UT	33 UT	FZ0306; FZ0609	9.3	4.8 UT	17 UV
2,4-Dimethylphenol	µg/kg-Wet	14	0	0	--	--	--	--	--	--	19 UJT	990 U	FZ0306	210	9.5 UJV	490 UV
2,4-Dinitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	6200 U	6600 U	FZ0306	3200	3200 UV	3300 UV
2-Chlorophenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	7.5 UT	33 UT	FZ0306; FZ0609	8.7	3.8 UT	17 UV
2-Methylphenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	8.2 UJT	330 U	FZ0306; FZ0609	67	4.1 UT	170 UV
2-Nitrophenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	12 UT	1700 U	FZ0306; FZ0609	340	6 UT	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	400 UT	6600 U	FZ0306	1400	200 UT	3300 UV
4-Chloro-3-methylphenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	6.8 UT	660 U	FZ0306	130	3.4 UT	330 UV
4-Methylphenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	7.7 UJT	33 UT	FZ0306; FZ0609	8.7	3.9 UT	17 UV
4-Nitrophenol	µg/kg-Wet	15	8	53	7.1 JT	9.5 JT	CP0812	8.1	7.7 JV	9.3 JV	7.1 JT	3300 U	FZ0306; FZ0609	650	9 JT	1700 UV
Pentachlorophenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	30 UT	160 UT	FZ0306; FZ0609	41	15 UT	80 UV
Phenol	µg/kg-Wet	15	1	6.7	43 JT	43 JT	CP0812	43	43 JT	43 JT	43 JT	660 U	FZ0306	140	25 UT	330 UV
Chinook (whole body)																
Conventionals																
Lipids	percent-Wet	15	15	100	1.5	3.6	03R125	2.2	1.8	3.4 V	1.5	3.6	03R125	2.2	1.8	3.4 V
Total solids	percent-Wet	15	15	100	18	22.4	02R112	20.3	19.7	22.3 V	18	22.4	02R112	20.3	19.7	22.3 V
Metals																
Aluminum	mg/kg-Wet	15	15	100	3.18	19.6	02R113	8.44	6.27 J	17.2 V	3.18	19.6	02R113	8.44	6.27 J	17.2 V
Antimony	mg/kg-Wet	15	0	0	--	--	--	--	--	--	0.001 U	0.00429 U	T01	0.000866	0.00078 U	0.00174 UV
Arsenic	mg/kg-Wet	15	15	100	0.0465	0.25	03R125	0.11	0.0663	0.215 V	0.0465	0.25	03R125	0.11	0.0663	0.215 V
Cadmium	mg/kg-Wet	15	15	100	0.00965	0.027	02R102	0.0145	0.0125	0.0249 V	0.00965	0.027	02R102	0.0145	0.0125	0.0249 V
Chromium	mg/kg-Wet	15	3	20	0.09 J	0.19	02R113	0.13	0.11	0.182 V	0.054 UT	0.19	02R113	0.0501	0.0296 U	0.134 V
Copper	mg/kg-Wet	15	15	100	0.755	2.15	02R102	1.13	1.07	1.93 V	0.755	2.15	02R102	1.13	1.07	1.93 V
Lead	mg/kg-Wet	15	3	20	0.01 J	0.015 J	02R102	0.013	0.014 J	0.0149 JV	0.006 UJ	0.0741 U	T02	0.0141	0.0131 U	0.0308 UV
Manganese	mg/kg-Wet	6	6	100	1.4	1.81	02R113; 03R118	1.62	1.63 V	1.81 V	1.4	1.81	02R113; 03R118	1.62	1.63 V	1.81 V
Mercury	mg/kg-Wet	15	15	100	0.0101 J	0.02	02R102	0.0139	0.0124	0.0193 V	0.0101 J	0.02	02R102	0.0139	0.0124	0.0193 V
Nickel	mg/kg-Wet	15	15	100	0.202	0.492 J	02R102	0.294	0.283	0.455 JV	0.202	0.492 J	02R102	0.294	0.283	0.455 JV
Selenium	mg/kg-Wet	15	9	60	0.072 JT	0.273	T02	0.16	0.15	0.257 V	0.072 JT	0.4 U	02R102; 02R112	0.159	0.15 U	0.245 V
Silver	mg/kg-Wet	15	0	0	--	--	--	--	--	--	0.0012 U	0.00299 U	T01	0.00104	0.00105 U	0.00147 UV
Thallium	mg/kg-Wet	6	6	100	0.005	0.0105	02R112	0.0068	0.00595 V	0.00998 V	0.005	0.0105	02R112	0.0068	0.00595 V	0.00998 V
Zinc	mg/kg-Wet	15	15	100	24	33.3	02R112; 02R113	29.5	29.6	33.3 V	24	33.3	02R112; 02R113	29.5	29.6	33.3 V
Butyltins																
Butyltin ion	µg/kg-Wet	8	3	38	2.6 J	5.4 J	T03	4.2	4.6	5.3 JV	0.98 U	5.4 J	T03	2	0.78 UV	5.1 JV
Dibutyltin ion	µg/kg-Wet	8	0	0	--	--	--	--	--	--	0.77 U	2.3 U	T03	0.65	0.5 UV	1.1 UV
Tetrabutyltin	µg/kg-Wet	8	0	0	--	--	--	--	--	--	0.15 U	0.38 U	T03	0.11	0.083 UV	0.17 UV
Tributyltin ion	µg/kg-Wet	8	8	100	1.3 J	4.1 J	T02	2.5	2.1 JV	4.1 JV	1.3 J	4.1 J	T02	2.5	2.1 JV	4.1 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	1.9 U	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.95	0.95 UV	0.95 UV
Aroclor 1221	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	1.9 U	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.95	0.95 UV	0.95 UV
Aroclor 1232	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	1.9 U	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.95	0.95 UV	0.95 UV
Aroclor 1242	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 UJ	1.9 UJ	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.95	0.95 UV	0.95 UJV
Aroclor 1248	µg/kg-Wet	6	6	100	13 J	72 J	02R112	34	33 V	64 JV	13 J	72 J	02R112	34	33 V	64 JV
Aroclor 1254	µg/kg-Wet	6	0	0	--	--	--	--	--	--	23 UJ	78 UJ	02R112	21	20 UV	35 UJV
Aroclor 1260	µg/kg-Wet	6	6	100	17 J	28 J	02R112	22	22 V	27 JV	17 J	28 J	02R112	22	22 V	27 JV
Aroclor 1262	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 UJ	1.9 UJ	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.95	0.95 UV	0.95 UJV
Aroclor 1268	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 UJ	1.9 UJ	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.95	0.95 UV	0.95 UJV
Aroclors	µg/kg-Wet	6	6	100	30 JT	100 JT	02R112	56	56 V	90 JV	30 JT	100 JT	02R112	56	56 V	90 JV
PCB Congeners																
PCB001	pg/g-Wet	9	9	100	4.09	26.2	T03	11.9	6.51	25.4 V	4.09	26.2	T03	11.9	6.51	25.4 V
PCB002	pg/g-Wet	9	8	88.9	0.602	1.26	T03	0.848	0.687 V	1.25 V	0.556 U	1.26	T03	0.785	0.662	1.24 V
PCB003	pg/g-Wet	9	9	100	1.51	5.17	T03	2.87	2.04	5 V	1.51	5.17	T03	2.87	2.04	5 V
PCB004	pg/g-Wet	9	9	100	49.2	238	T03	108	55.3	228 V	49.2	238	T03	108	55.3	228 V
PCB005	pg/g-Wet	9	9	100	1.47	6.43	T03	3.52	3.16	6.25 V	1.47	6.43	T03	3.52	3.16	6.25 V
PCB006	pg/g-Wet	9	9	100	16.7	101	T03	44.9	31.4	95.5 V	16.7	101	T03	44.9	31.4	95.5 V
PCB007	pg/g-Wet	9	9	100	3.16	11.7	T03	6.77	6.2	11.2 V	3.16	11.7	T03	6.77	6.2	11.2 V
PCB008	pg/g-Wet	9	9	100	89.5	346	T03	189	157	344 V	89.5	346	T03	189	157	344 V
PCB009	pg/g-Wet	9	9	100	5.59	21.1	T03	11.9	10.2	20.5 V	5.59	21.1	T03	11.9	10.2	20.5 V
PCB010	pg/g-Wet	9	9	100	1.95	6.39	T03	3.5	2.53	6.09 V	1.95	6.39	T03	3.5	2.53	6.09 V
PCB011	pg/g-Wet	9	9	100	5.02	9.25	T02	7.37	8.46	9.13 V	5.02	9.25	T02	7.37	8.46	9.13 V
PCB012 & 013	pg/g-Wet	9	9	100	1.18	4.05	T03	2.4	2.28	3.91 V	1.18	4.05	T03	2.4	2.28	3.91 V
PCB014	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.553 U	0.617 U	T02	0.295	0.292 U	0.308 UV
PCB015	pg/g-Wet	9	9	100	11.5	32.8	T03	20.1	16.7	32.2 V	11.5	32.8	T03	20.1	16.7	32.2 V
PCB016	pg/g-Wet	9	9	100	62.1	148	T02	108	127	143 V	62.1	148	T02	108	127	143 V
PCB017	pg/g-Wet	9	9	100	108	380	T03	228	229	356 V	108	380	T03	228	229	356 V
PCB018 & 030	pg/g-Wet	9	9	100	158	454	T02	312	348	442 V	158	454	T02	312	348	442 V
PCB019	pg/g-Wet	9	9	100	45.4	208	T03	90.1	61.7	188 V	45.4	208	T03	90.1	61.7	188 V
PCB020 & 028	pg/g-Wet	9	9	100	820	2470	T02	1360	1110	2260 V	820	2470	T02	1360	1110	2260 V
PCB021 & 033	pg/g-Wet	9	9	100	209	535	T02	325	300	497 V	209	535	T02	325	300	497 V
PCB022	pg/g-Wet	9	9	100	128	315	T02	204	195	303 V	128	315	T02	204	195	303 V
PCB023	pg/g-Wet	9	8	88.9	0.432 J	1.53	T02	0.833	0.647 V	1.44 V	0.432 J	1.53	T02	0.784	0.558	1.42 V
PCB024	pg/g-Wet	9	9	100	2.78	9.25	T02	5.84	6.11	8.98 V	2.78	9.25	T02	5.84	6.11	8.98 V
PCB025	pg/g-Wet	9	9	100	35.7	99.6	T03	62.6	64.4	91.2 V	35.7	99.6	T03	62.6	64.4	91.2 V
PCB026 & 029	pg/g-Wet	9	9	100	92.7	270	T02	164	160	245 V	92.7	270	T02	164	160	245 V
PCB027	pg/g-Wet	9	9	100	15.5	51.7	T03	34.9	37	51.3 V	15.5	51.7	T03	34.9	37	51.3 V
PCB031	pg/g-Wet	9	9	100	487	1260	T02	746	652	1130 V	487	1260	T02	746	652	1130 V
PCB032	pg/g-Wet	9	9	100	78.7	312	T02	193	233	296 V	78.7	312	T02	193	233	296 V
PCB034	pg/g-Wet	9	9	100	1.71	5.35	T02	3.07	2.53	4.98 V	1.71	5.35	T02	3.07	2.53	4.98 V
PCB035	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.667 U	0.744 U	T02	0.355	0.352 U	0.372 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB036	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.52 U	0.58 U	T01; T02	0.277	0.275 U	0.29 UV
PCB037	pg/g-Wet	9	9	100	41	92.8	T03	57.5	56.9	82.1 V	41	92.8	T03	57.5	56.9	82.1 V
PCB038	pg/g-Wet	9	6	66.7	0.623	3.27	T02	2.04	2.33 V	3.06 V	0.623	3.27	T02	1.59	1.25	2.93 V
PCB039	pg/g-Wet	9	9	100	3.11	16	T02	7.95	5.53	14.4 V	3.11	16	T02	7.95	5.53	14.4 V
PCB040 & 041 & 071	pg/g-Wet	9	9	100	386	1410	T02	776	720	1340 V	386	1410	T02	776	720	1340 V
PCB042	pg/g-Wet	9	9	100	143	610	T02	322	273	593 V	143	610	T02	322	273	593 V
PCB043	pg/g-Wet	9	9	100	17.9	95.1	T02	44.2	30.9	83.1 V	17.9	95.1	T02	44.2	30.9	83.1 V
PCB044 & 047 & 065	pg/g-Wet	9	9	100	1080	3660	T03	2420	2480	3460 V	1080	3660	T03	2420	2480	3460 V
PCB045 & 051	pg/g-Wet	9	9	100	91.4	789	T03	349	293	698 V	91.4	789	T03	349	293	698 V
PCB046	pg/g-Wet	9	9	100	12.3	60.3	T02	33.3	31.9	59.9 V	12.3	60.3	T02	33.3	31.9	59.9 V
PCB048	pg/g-Wet	9	9	100	103	547	T02	262	175	504 V	103	547	T02	262	175	504 V
PCB049 & 069	pg/g-Wet	9	9	100	651	2230	T03	1460	1460	2160 V	651	2230	T03	1460	1460	2160 V
PCB050 & 053	pg/g-Wet	9	9	100	68.2	512	T03	243	221	463 V	68.2	512	T03	243	221	463 V
PCB052	pg/g-Wet	9	9	100	1090	3670	T02	2180	2270	3400 V	1090	3670	T02	2180	2270	3400 V
PCB054	pg/g-Wet	9	9	100	5.81	81.6	T03	24.9	8.5	71.9 V	5.81	81.6	T03	24.9	8.5	71.9 V
PCB055	pg/g-Wet	9	9	100	18.9	50.8	T02	29.5	29.7	44.6 V	18.9	50.8	T02	29.5	29.7	44.6 V
PCB056	pg/g-Wet	9	9	100	68.8	265	T02	164	206	252 V	68.8	265	T02	164	206	252 V
PCB057	pg/g-Wet	9	9	100	3.82	17.4	T02	9.55	10.1	16.4 V	3.82	17.4	T02	9.55	10.1	16.4 V
PCB058	pg/g-Wet	9	6	66.7	2.82	8.11	T02	5.4	5.4 V	7.45 V	1.25 U	8.11	T02	3.82	5.22	7.05 V
PCB059 & 062 & 075	pg/g-Wet	9	9	100	82.5	298	T02	160	141	275 V	82.5	298	T02	160	141	275 V
PCB060	pg/g-Wet	9	9	100	184	978	T02	510	348	958 V	184	978	T02	510	348	958 V
PCB061 & 070 & 074 & 076	pg/g-Wet	9	9	100	1440	5100	T02	2900	2610	4750 V	1440	5100	T02	2900	2610	4750 V
PCB063	pg/g-Wet	9	9	100	43.5	167	T02	94.2	75.3	159 V	43.5	167	T02	94.2	75.3	159 V
PCB064	pg/g-Wet	9	9	100	286	1450	T02	744	541	1370 V	286	1450	T02	744	541	1370 V
PCB066	pg/g-Wet	9	9	100	974	3820	T02	2140	1870	3680 V	974	3820	T02	2140	1870	3680 V
PCB067	pg/g-Wet	9	9	100	25.5	66.3	T02	42	42	59.8 V	25.5	66.3	T02	42	42	59.8 V
PCB068	pg/g-Wet	9	8	88.9	10.5	41.7	T03	20.9	16 V	39.4 V	1.71 U	41.7	T03	18.7	14.4	39 V
PCB072	pg/g-Wet	9	9	100	13.7	34.8	T03	23.1	22.1	31.7 V	13.7	34.8	T03	23.1	22.1	31.7 V
PCB073	pg/g-Wet	9	9	100	4.33	49.9	T03	19.1	15.4	43.8 V	4.33	49.9	T03	19.1	15.4	43.8 V
PCB077	pg/g-Wet	9	9	100	53.9	127	T02	91.2	96.9	125 V	53.9	127	T02	91.2	96.9	125 V
PCB078	pg/g-Wet	9	0	0	--	--	--	--	--	--	1.11 U	4.29 U	T02	1.15	1.03 U	1.91 UV
PCB079	pg/g-Wet	9	9	100	21.6	62.7	T03	38.1	35.7	57.1 V	21.6	62.7	T03	38.1	35.7	57.1 V
PCB080	pg/g-Wet	9	0	0	--	--	--	--	--	--	1.61 U	3.84 U	T02	1.11	0.91 U	1.7 UV
PCB081	pg/g-Wet	9	0	0	--	--	--	--	--	--	5.18 U	12.9 U	T02	4.79	5.15 U	6.27 UV
PCB082	pg/g-Wet	9	9	100	138	365	T03	266	300	359 V	138	365	T03	266	300	359 V
PCB083 & 099	pg/g-Wet	9	9	100	1720	4670	T03	2780	2600	4170 V	1720	4670	T03	2780	2600	4170 V
PCB084	pg/g-Wet	9	9	100	168	474	T03	339	375	449 V	168	474	T03	339	375	449 V
PCB085 & 116 & 117	pg/g-Wet	9	9	100	451	1070	T03	743	794	995 V	451	1070	T03	743	794	995 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	9	9	100	1280	3340	T03	2220	2300	3020 V	1280	3340	T03	2220	2300	3020 V
PCB088 & 091	pg/g-Wet	9	9	100	220	1140	T03	569	468	1060 V	220	1140	T03	569	468	1060 V
PCB089	pg/g-Wet	9	9	100	8.89	37.5	T02	21	18.9	36.7 V	8.89	37.5	T02	21	18.9	36.7 V
PCB090 & 101 & 113	pg/g-Wet	9	9	100	2930	8060	T03	5170	4170	7910 V	2930	8060	T03	5170	4170	7910 V
PCB092	pg/g-Wet	9	9	100	490	1430	T03	902	746	1420 V	490	1430	T03	902	746	1420 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	9	9	100	1170	4440	T03	2460	2060	4190 V	1170	4440	T03	2460	2060	4190 V
PCB094	pg/g-Wet	9	9	100	8.8	48.2	T03	24.8	13.3	47.6 V	8.8	48.2	T03	24.8	13.3	47.6 V
PCB096	pg/g-Wet	9	9	100	4.61	56.5	T03	21.2	12.7	49 V	4.61	56.5	T03	21.2	12.7	49 V
PCB103	pg/g-Wet	9	9	100	23.9	192	T03	80.9	34.5	181 V	23.9	192	T03	80.9	34.5	181 V
PCB104	pg/g-Wet	9	9	100	0.97	17.2	T03	5.76	2.18	14.2 V	0.97	17.2	T03	5.76	2.18	14.2 V
PCB105	pg/g-Wet	9	9	100	780	1930	T03	1460	1590	1900 V	780	1930	T03	1460	1590	1900 V
PCB106	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.552 U	3.37 U	T01	0.952	0.93 U	1.57 UV
PCB107 & 124	pg/g-Wet	9	9	100	78.4	186	T03	125	122	168 V	78.4	186	T03	125	122	168 V
PCB109	pg/g-Wet	9	9	100	201	438	T03	298	278	404 V	201	438	T03	298	278	404 V
PCB110 & 115	pg/g-Wet	9	9	100	2130	5290	T03	3620	3450	5220 V	2130	5290	T03	3620	3450	5220 V
PCB111	pg/g-Wet	9	9	100	3.81	15.5	T03	8.19	4.74	15 V	3.81	15.5	T03	8.19	4.74	15 V
PCB112	pg/g-Wet	9	5	55.6	18.1	185	T01	56.3	25	154 V	0.689 U	185	T01	31.7	18.1	123 V
PCB114	pg/g-Wet	9	9	100	49.6	120	T02	95.8	108	120 V	49.6	120	T02	95.8	108	120 V
PCB118	pg/g-Wet	9	9	100	2500	5880	T03	4040	4060	5320 V	2500	5880	T03	4040	4060	5320 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB120	pg/g-Wet	9	9	100	15.7	67.1	T03	34.6	19.1	65.3 V	15.7	67.1	T03	34.6	19.1	65.3 V
PCB121	pg/g-Wet	9	9	100	2.81	20.9	T03	9.05	3.87	19.8 V	2.81	20.9	T03	9.05	3.87	19.8 V
PCB122	pg/g-Wet	9	9	100	6.94	17.2	T01	12.1	11.4	16.8 V	6.94	17.2	T01	12.1	11.4	16.8 V
PCB123	pg/g-Wet	9	9	100	42.5	102	T03	77.8	82.8	96.6 V	42.5	102	T03	77.8	82.8	96.6 V
PCB126	pg/g-Wet	9	9	100	10.7	35.3	T02	17.5	14.9	29.3 V	10.7	35.3	T02	17.5	14.9	29.3 V
PCB127	pg/g-Wet	9	9	100	5.97	15.5	T03	9.38	8.5	14.3 V	5.97	15.5	T03	9.38	8.5	14.3 V
PCB128 & 166	pg/g-Wet	9	9	100	608	1790	T03	1050	864	1740 V	608	1790	T03	1050	864	1740 V
PCB129 & 138 & 160 & 163	pg/g-Wet	9	9	100	6890	26900	T01	13200	8210	25700 V	6890	26900	T01	13200	8210	25700 V
PCB130	pg/g-Wet	9	9	100	287	857	T03	510	398	853 V	287	857	T03	510	398	853 V
PCB131	pg/g-Wet	9	9	100	21.7	92.3	T01	45.4	31.1	83.8 V	21.7	92.3	T01	45.4	31.1	83.8 V
PCB132	pg/g-Wet	9	9	100	804	4900	T01	1930	1170	4380 V	804	4900	T01	1930	1170	4380 V
PCB133	pg/g-Wet	9	9	100	125	409	T03	240	140	400 V	125	409	T03	240	140	400 V
PCB134 & 143	pg/g-Wet	9	9	100	140	735	T01	323	198	687 V	140	735	T01	323	198	687 V
PCB135 & 151 & 154	pg/g-Wet	9	9	100	1400	7550	T01	3540	1890	7470 V	1400	7550	T01	3540	1890	7470 V
PCB136	pg/g-Wet	9	9	100	253	1700	T01	643	332	1520 V	253	1700	T01	643	332	1520 V
PCB137	pg/g-Wet	9	9	100	168	357	T03	241	237	325 V	168	357	T03	241	237	325 V
PCB139 & 140	pg/g-Wet	9	9	100	56.4	176	T03	99.3	83.9	163 V	56.4	176	T03	99.3	83.9	163 V
PCB141	pg/g-Wet	9	9	100	1170	6660	T01	2560	1380	5800 V	1170	6660	T01	2560	1380	5800 V
PCB142	pg/g-Wet	9	1	11.1	3.4	3.4	T02	3.4	3.4	3.4	1.35 U	4.96 U	T01	1.67	1.21 U	3.03 V
PCB144	pg/g-Wet	9	9	100	191	1060	T01	415	236	941 V	191	1060	T01	415	236	941 V
PCB145	pg/g-Wet	9	8	88.9	0.49	1.54	T01	0.956	0.852 V	1.54 V	0.49	1.54	T01	0.889	0.727	1.54 V
PCB146	pg/g-Wet	9	9	100	1160	4500	T03	2420	1430	4320 V	1160	4500	T03	2420	1430	4320 V
PCB147 & 149	pg/g-Wet	9	9	100	3340	19700	T01	8840	4720	19100 V	3340	19700	T01	8840	4720	19100 V
PCB148	pg/g-Wet	9	9	100	11	87.9	T03	37.3	16.2	85.6 V	11	87.9	T03	37.3	16.2	85.6 V
PCB150	pg/g-Wet	9	9	100	4.56	68.6	T03	25.6	6.06	67.7 V	4.56	68.6	T03	25.6	6.06	67.7 V
PCB152	pg/g-Wet	9	9	100	1.25	17.7	T03	7.25	1.92	17.3 V	1.25	17.7	T03	7.25	1.92	17.3 V
PCB153 & 168	pg/g-Wet	9	9	100	7470	31300	T01	15300	8790	29900 V	7470	31300	T01	15300	8790	29900 V
PCB155	pg/g-Wet	9	9	100	1.63	6.51	T03	3.72	2.3	6.26 V	1.63	6.51	T03	3.72	2.3	6.26 V
PCB156 & 157	pg/g-Wet	9	9	100	517	1690	T01	826	656	1440 V	517	1690	T01	826	656	1440 V
PCB158	pg/g-Wet	9	9	100	517	2080	T01	967	669	1870 V	517	2080	T01	967	669	1870 V
PCB159	pg/g-Wet	9	9	100	50.1	400	T01	143	67.7	348 V	50.1	400	T01	143	67.7	348 V
PCB161	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.967 U	3.48 U	T01	0.983	0.68 U	1.73 UV
PCB162	pg/g-Wet	9	9	100	17.9	40.6	T03	27.1	25.3	39.6 V	17.9	40.6	T03	27.1	25.3	39.6 V
PCB164	pg/g-Wet	9	9	100	349	1690	T01	715	421	1540 V	349	1690	T01	715	421	1540 V
PCB165	pg/g-Wet	9	9	100	4.9	27	T03	13	5.51	26.5 V	4.9	27	T03	13	5.51	26.5 V
PCB167	pg/g-Wet	9	9	100	224	684	T01	380	314	659 V	224	684	T01	380	314	659 V
PCB169	pg/g-Wet	9	0	0	--	--	--	--	--	--	7.14 U	49.2 U	T01	8.91	5.75 U	20.5 UV
PCB170	pg/g-Wet	9	9	100	1920	12500	T01	4650	2200	11200 V	1920	12500	T01	4650	2200	11200 V
PCB171 & 173	pg/g-Wet	9	9	100	451	3480	T01	1160	508	2960 V	451	3480	T01	1160	508	2960 V
PCB172	pg/g-Wet	9	9	100	386	2130	T01	854	394	1940 V	386	2130	T01	854	394	1940 V
PCB174	pg/g-Wet	9	9	100	1170	10400	T01	3570	1550	9080 V	1170	10400	T01	3570	1550	9080 V
PCB175	pg/g-Wet	9	9	100	66.1	404	T01	160	82.6	368 V	66.1	404	T01	160	82.6	368 V
PCB176	pg/g-Wet	9	9	100	99.5	1070	T01	313	133	868 V	99.5	1070	T01	313	133	868 V
PCB177	pg/g-Wet	9	9	100	961	7280	T01	2830	1200	6830 V	961	7280	T01	2830	1200	6830 V
PCB178	pg/g-Wet	9	9	100	407	2090	T01	964	463	2030 V	407	2090	T01	964	463	2030 V
PCB179	pg/g-Wet	9	9	100	334	3030	T01	1040	435	2660 V	334	3030	T01	1040	435	2660 V
PCB180 & 193	pg/g-Wet	9	9	100	5410	31300	T01	12500	7140	28300 V	5410	31300	T01	12500	7140	28300 V
PCB181	pg/g-Wet	9	9	100	10.7	47.4	T02	27.5	28.5	43.4 V	10.7	47.4	T02	27.5	28.5	43.4 V
PCB182	pg/g-Wet	9	9	100	8.78	48.5	T03	24.6	14.8	47.3 V	8.78	48.5	T03	24.6	14.8	47.3 V
PCB183 & 185	pg/g-Wet	9	9	100	1390	8900	T01	3390	1780	7980 V	1390	8900	T01	3390	1780	7980 V
PCB184	pg/g-Wet	9	9	100	1.59	3.61	T03	2.54	2.38	3.55 V	1.59	3.61	T03	2.54	2.38	3.55 V
PCB186	pg/g-Wet	9	6	66.7	0.182 J	0.79	T02	0.461	0.46 JV	0.743 V	0.068 U	0.79	T02	0.34	0.27 J	0.715 V
PCB187	pg/g-Wet	9	9	100	2770	15400	T03	7090	3900	14800 V	2770	15400	T03	7090	3900	14800 V
PCB188	pg/g-Wet	9	9	100	2.95	23.1	T03	10.1	3.71	22.9 V	2.95	23.1	T03	10.1	3.71	22.9 V
PCB189	pg/g-Wet	9	9	100	66.2	360	T01	145	72.6	324 V	66.2	360	T01	145	72.6	324 V
PCB190	pg/g-Wet	9	9	100	393	2490	T01	975	501	2280 V	393	2490	T01	975	501	2280 V
PCB191	pg/g-Wet	9	9	100	78.1	478	T01	181	91.6	422 V	78.1	478	T01	181	91.6	422 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB192	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.105 U	1.23 U	T01; T02	0.53	0.585 U	0.615 UV
PCB194	pg/g-Wet	9	9	100	725	4700	T01	1830	942	4180 V	725	4700	T01	1830	942	4180 V
PCB195	pg/g-Wet	9	9	100	254	1980	T01	730	339	1760 V	254	1980	T01	730	339	1760 V
PCB196	pg/g-Wet	9	9	100	359	2520	T01	940	479	2200 V	359	2520	T01	940	479	2200 V
PCB197 & 200	pg/g-Wet	9	9	100	62.2	578	T01	197	90.5	489 V	62.2	578	T01	197	90.5	489 V
PCB198 & 199	pg/g-Wet	9	9	100	845	4590	T01	1970	1010	4270 V	845	4590	T01	1970	1010	4270 V
PCB201	pg/g-Wet	9	9	100	72	458	T01	181	88.4	405 V	72	458	T01	181	88.4	405 V
PCB202	pg/g-Wet	9	9	100	145	569	T01	297	175	563 V	145	569	T01	297	175	563 V
PCB203	pg/g-Wet	9	9	100	518	2930	T01	1280	742	2730 V	518	2930	T01	1280	742	2730 V
PCB204	pg/g-Wet	9	8	88.9	0.294 J	1.32	T02	0.831	0.847 V	1.24 V	0.294 J	1.32	T02	0.76	0.839	1.22 V
PCB205	pg/g-Wet	9	9	100	37.9	246	T01	96.6	50.8	219 V	37.9	246	T01	96.6	50.8	219 V
PCB206	pg/g-Wet	9	9	100	194	704	T01	374	318	636 V	194	704	T01	374	318	636 V
PCB207	pg/g-Wet	9	9	100	22.8	91.5	T01	46.1	32.3	83.2 V	22.8	91.5	T01	46.1	32.3	83.2 V
PCB208	pg/g-Wet	9	9	100	64.4	156	T01	95.2	85.6	143 V	64.4	156	T01	95.2	85.6	143 V
PCB209	pg/g-Wet	9	9	100	31.9	92.8	T02	56.2	45.7	86.3 V	31.9	92.8	T02	56.2	45.7	86.3 V
Total PCB Congeners	pg/g-Wet	9	9	100	72300 JT	277000 JT	T01	147000	111000 T	265000 JV	72300 JT	277000 JT	T01	147000	111000 T	265000 JV
Total PCBs[e]																
Total PCBs	µg/kg-Wet	15	15	100	30 JT	277 JT	T01	111	97.1 T	255 JV	30 JT	277 JT	T01	111	97.1 T	255 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	9	9	100	193 T	771 T	T03	398	296 T	754 V	193 T	771 T	T03	398	296 T	754 V
Heptachlorobiphenylhomologs	pg/g-Wet	9	9	100	16300 T	100000 T	T01	39900	20200 T	91900 V	16300 T	100000 T	T01	39900	20200 T	91900 V
Hexachlorobiphenyl homologs	pg/g-Wet	9	9	100	26500 T	115000 T	T01	54500	32100 T	109000 V	26500 T	115000 T	T01	54500	32100 T	109000 V
Monochlorobiphenyl homologs	pg/g-Wet	9	9	100	5.6 T	32.7 T	T03	15.5	9.15 T	31.6 V	5.6 T	32.7 T	T03	15.5	9.15 T	31.6 V
Nonachlorobiphenyl homologs	pg/g-Wet	9	9	100	282 T	952 T	T01	515	435 T	861 V	282 T	952 T	T01	515	435 T	861 V
Octachlorobiphenyl homologs	pg/g-Wet	9	9	100	3040 T	18600 T	T01	7530	3860 T	16800 V	3040 T	18600 T	T01	7530	3860 T	16800 V
Pentachlorobiphenylhomologs	pg/g-Wet	9	9	100	15400 T	38600 T	T03	25400	22700 T	36700 V	15400 T	38600 T	T03	25400	22700 T	36700 V
Tetrachlorobiphenyl homologs	pg/g-Wet	9	9	100	7980 T	24700 T	T02	15100	15300 T	23200 V	7980 T	24700 T	T02	15100	15300 T	23200 V
Trichlorobiphenyl homologs	pg/g-Wet	9	9	100	2330 T	6320 T	T02	3910	3880 T	5830 V	2330 T	6320 T	T02	3910	3880 T	5830 V
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	9	9	100	0.521	2.61	T01	1.47	1.44	2.39 V	0.521	2.61	T01	1.47	1.44	2.39 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	9	100	3.23	12.4	T02	8.14	8.42	11.5 V	3.23	12.4	T02	8.14	8.42	11.5 V
Hexachlorodibenzofuran homologs	pg/g-Wet	9	9	100	0.893	2.05	T02	1.46	1.47	1.97 V	0.893	2.05	T02	1.46	1.47	1.97 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	9	100	1.8	8.02	T02	3.73	3.14	6.64 V	1.8	8.02	T02	3.73	3.14	6.64 V
Octachlorodibenzofuran	pg/g-Wet	9	9	100	0.432 J	2.03 J	T01	1.13	1 J	1.87 JV	0.432 J	2.03 J	T01	1.13	1 J	1.87 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	5.24	20.8	T01	14.2	15.7	20.2 V	5.24	20.8	T01	14.2	15.7	20.2 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	9	9	100	0.805	4.27	T02	1.95	1.39	3.9 V	0.805	4.27	T02	1.95	1.39	3.9 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	9	100	0.619	2.29	T02	0.982	0.817	1.82 V	0.619	2.29	T02	0.982	0.817	1.82 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	9	9	100	0.333	4.5	T02	1.72	0.517	4.48 V	0.333	4.5	T02	1.72	0.517	4.48 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	9	7	77.8	0.252	0.876	T02	0.425	0.371	0.767 V	0.0577 U	0.876	T02	0.337	0.276	0.73 V
Total PCDD/F	pg/g-Wet	9	9	100	21.3 JT	42.4 JT	T02	35.1	36.1 JT	42 JV	21.3 JT	42.4 JT	T02	35.1	36.1 JT	42 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	9	9	100	0.288 J	1.14 J	T01	0.664	0.652 J	0.988 JV	0.288 J	1.14 J	T01	0.664	0.652 J	0.988 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	2.39	11.2	T02	6.02	6.1	9.67 V	2.39	11.2	T02	6.02	6.1	9.67 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	9	4	44.4	0.063 J	0.084 J	T01	0.0735	0.0735 JV	0.083 JV	0.0565 U	0.084 J	T01	0.0497	0.0375 U	0.0812 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	9	9	100	0.122 J	0.946 J	T02	0.34	0.215 J	0.818 JV	0.122 J	0.946 J	T02	0.34	0.215 J	0.818 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	9	7	77.8	0.249 J	0.429 J	T03	0.337	0.34 J	0.418 JV	0.19 U	0.429 J	T03	0.288	0.306 J	0.415 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	9	9	100	0.086 J	0.346 J	T02	0.156	0.124 J	0.284 JV	0.086 J	0.346 J	T02	0.156	0.124 J	0.284 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	1.09 J	6.91	T02	2.21	1.58	5.22 V	1.09 J	6.91	T02	2.21	1.58	5.22 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	9	0	0	--	--	--	--	--	--	0.0535 U	0.0597 U	T02	0.0285	0.0283 U	0.0298 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	0.265 J	0.759 J	T03	0.473	0.451 J	0.66 JV	0.265 J	0.759 J	T03	0.473	0.451 J	0.66 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	9	8	88.9	0.077 J	2.03	T02	0.704	0.199 JV	1.88 V	0.077 J	2.03	T02	0.633	0.143 J	1.86 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	9	9	100	0.569 J	2.29	T02	0.931	0.763 J	1.8 JV	0.569 J	2.29	T02	0.931	0.763 J	1.8 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	9	8	88.9	0.112 J	0.218 J	T02	0.157	0.148 JV	0.216 JV	0.101 U	0.218 J	T02	0.145	0.135 J	0.215 JV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	9	9	100	0.253 J	1.85	T02	0.723	0.369 J	1.65 V	0.253 J	1.85	T02	0.723	0.369 J	1.65 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	9	9	100	0.312	4.86	T02	1.8	0.541	4.81 V	0.312	4.86	T02	1.8	0.541	4.81 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	9	7	77.8	0.252	0.876	T02	0.417	0.371	0.75 V	0.252	0.876	T02	0.361	0.276	0.708 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	9	9	100	1.2 JT	4.37 JT	T02	2.1	1.74 JT	3.9 JV	1.2 JT	4.37 JT	T02	2.1	1.74 JT	3.9 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	9	9	100	2.67 JT	6.1 JT	T02	4.07	4 JT	6.03 JV	2.67 JT	6.1 JT	T02	4.07	4 JT	6.03 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	9	9	100	1.23 T	3.75 T	T02	1.97	1.73 T	3.15 V	1.23 T	3.75 T	T02	1.97	1.73 T	3.15 V
Pesticides																
2,4'-DDD	µg/kg-Wet	15	7	47	2.6 NJ	13	T02	7.2	5.1 NJ	13 V	1 U	13	T02	3.6	0.7 U	12 V
2,4'-DDE	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.16 U	6.2 U	T03	0.68	0.5 UT	1.7 UV
2,4'-DDT	µg/kg-Wet	15	10	67	1.7 NJ	10	T02	5.4	3.3 JV	10 V	1.7 NJ	19 UT	02R113	4.8	2.9 NJ	10 V
4,4'-DDD	µg/kg-Wet	15	15	100	1 J	130	T02	27	4.6 N	120 V	1 J	130	T02	27	4.6 N	120 V
4,4'-DDE	µg/kg-Wet	15	15	100	7	93	T02	30	19 T	92 V	7	93	T02	30	19 T	92 V
4,4'-DDT	µg/kg-Wet	15	13	87	4.2	38	T02	15	10	38 V	4.2	38	T02	15	9.5 UT	38 V
Aldrin	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.16 U	1.2 U	T02	0.31	0.28 U	0.53 UV
alpha-Endosulfan	µg/kg-Wet	15	3	20	0.22 NJ	0.88 J	T02	0.57	0.6 NJ	0.85 JV	0.18 U	1.1 U	03R125; T02	0.38	0.5 U	0.68 JV
alpha-Hexachlorocyclohexane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.33 U	1 U	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.3	0.18 U	0.5 UV
beta-Endosulfan	µg/kg-Wet	15	5	33	1.6	4.3 N	02R102	2.9	3.1 NJ	4.1 V	0.26 U	19 UT	02R113	1.9	0.6 U	5.9 V
beta-Hexachlorocyclohexane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.33 U	1.2 UT	02R113	0.38	0.5 U	0.57 UV
cis-Chlordane	µg/kg-Wet	15	7	47	0.23 J	1.6 N	03R125	0.74	0.59 NJ	1.5 V	0.12 U	1.6 N	03R125	0.52	0.5 UJ	1.5 V
cis-Nonachlor	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.27 U	17 U	T01	1.8	1.3 U	5.6 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	15	2	13	0.38 J	0.44 J	T03	0.41	0.41 JV	0.44 JV	0.22 U	1.1 U	T02	0.35	0.44 J	0.52 UV
Dieldrin	µg/kg-Wet	15	6	40	0.23 J	2.6 N	03R125	1.6	1.7 V	2.5 V	0.22 U	2.7 U	02R112; 04R126	1	0.85 UT	2.3 V
Endosulfan sulfate	µg/kg-Wet	15	3	20	0.96 J	1 J	T02	0.98	0.99 J	1 JV	0.2 UJ	1 J	02R102; 02R112; 02R113; 03R118; 03R125; 04R126;	0.44	0.5 U	0.99 JV
Endrin	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.076 U	1.1 U	T01; T03	0.364	0.5 U	0.55 UV
Endrin aldehyde	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.19 U	3.5 U	T01	0.6	0.55 U	1.2 UV
Endrin ketone	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.41 U	3 U	T01	0.5	0.5 U	0.97 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.18 U	1.1 U	T01; T02; T03	0.35	0.5 U	0.55 UV
Heptachlor	µg/kg-Wet	15	3	20	0.39 J	1.2	T03	0.78	0.76 J	1.2 JV	0.33 U	1.2	T03	0.51	0.5 UT	0.89 JV
Heptachlor epoxide	µg/kg-Wet	15	8	53	1.3	2.1 NJ	T01	1.7	1.6 V	2.1 JV	0.93 U	2.1 NJ	T01	1.1	1.3	2 JV
Methoxychlor	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.34 U	19 U	02R112; 02R113	1.8	0.6 U	9.5 UV
Mirex	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	1 U	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.5	0.5 UV	0.5 UV
Oxychlordane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.4 U	1 U	02R102; 02R112; 02R113; 03R118; 03R125; 04R126	0.32	0.21 U	0.5 UV
Total Chlordanes	µg/kg-Wet	15	12	80	0.59 NJT	7.8 NJT	03R125	3.2	2.54 JV	7.69 JV	0.59 NJT	19 UT	02R112; 02R113	4.12	3.92 JT	9.5 UV
Total Endosulfan	µg/kg-Wet	15	8	53.3	0.22 NJT	4.3 NT	02R102	2.42	2.5 JV	3.95 V	0.22 NJT	19 UT	02R113	2.08	1.56 NJT	5.86 V
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	15	15	100	1.6 T	143 T	T02	30.2	5.2 JT	135 V	1.6 T	143 T	T02	30.2	5.2 JT	135 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	15	15	100	16.9 NJT	284 T	T02	77.4	32.5 NJT	276 V	16.9 NJT	284 T	T02	77.4	32.5 NJT	276 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	15	15	100	7 T	93 T	T02	30	19 T	92 V	7 T	93 T	T02	30	19 T	92 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	15	14	93.3	6.1 NJT	48 T	T02	18.2	10.8 JV	48 V	6.1 NJT	48 T	T02	17.6	10.7 JT	48 V
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	15	15	100	14.4 T	261 T	T02	70.5	29.4 JT	253 V	14.4 T	261 T	T02	70.5	29.4 JT	253 V
Toxaphene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	61 UT	310 U	T01	67	55 U	130 UV
trans-Chlordane	µg/kg-Wet	15	6	40	2 NJ	4	T03	2.9	2.9 JV	3.7 V	1 U	4	T03	1.7	1.4 U	3.2 V
trans-Nonachlor	µg/kg-Wet	15	10	67	0.7 J	3.3 NJ	03R125; 04R126	1.6	1.2 JV	3.3 JV	0.7 J	19 UT	02R112; 02R113	2.5	1.1 J	9.5 UV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	15	9	60	4.3	6.9	T01; T03	5.3	5.5	6.9 V	4.3	33 UT	02R113; 03R118; 04R126	9.7	6.9	17 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Acenaphthene	µg/kg-Wet	15	9	60	0.63	1	T01	0.78	0.77	0.97 V	0.63	41 UT	02R102	7.5	0.93	19 UV
Acenaphthylene	µg/kg-Wet	15	9	60	0.22 J	0.47 J	T01	0.34	0.33 J	0.44 JV	0.22 J	33 UT	02R113; 03R118; 04R126	6.7	0.4 J	17 UV
Anthracene	µg/kg-Wet	15	9	60	0.24 J	0.45 J	T01	0.33	0.33 J	0.43 JV	0.24 J	33 UT	02R113; 03R118; 04R126	6.7	0.39 J	17 UV
Benzo(a)anthracene	µg/kg-Wet	15	2	13	0.2 J	0.21 J	T02	0.21	0.21 JV	0.21 JV	0.13 U	33 UT	02R113; 03R118; 04R126	6.5	0.2 J	17 UV
Benzo(a)pyrene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.13 U	33 UT	02R113; 03R118; 04R126	6.5	0.065 U	17 UV
Benzo(b)fluoranthene	µg/kg-Wet	15	6	40	0.16 J	0.32 J	T01	0.23	0.24 JV	0.31 JV	0.16 J	33 UT	02R113; 03R118; 04R126	6.6	0.26 J	17 UV
Benzo(g,h,i)perylene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.18 U	33 UT	02R113; 03R118; 04R126	6.5	0.09 U	17 UV
Benzo(k)fluoranthene	µg/kg-Wet	15	5	33	0.15 J	0.33 J	T01	0.2	0.18 J	0.3 JV	0.14 U	33 UT	02R113; 03R118; 04R126	6.6	0.2 J	17 UV
Chrysene	µg/kg-Wet	15	3	20	0.28 J	0.94	T01	0.52	0.35 J	0.88 JV	0.2 U	33 UT	02R113; 03R118; 04R126	6.6	0.35 J	17 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	15	3	20	0.15 J	0.2 J	T02	0.18	0.19 J	0.2 JV	0.12 U	33 UT	02R113; 03R118; 04R126	6.5	0.19 J	17 UV
Fluoranthene	µg/kg-Wet	15	8	53	0.46 J	1.5	T01	0.9	0.95 V	1.4 V	0.37 U	33 UT	02R113; 03R118; 04R126	7	1.1	17 UV
Fluorene	µg/kg-Wet	15	9	60	0.52	0.75	T01	0.62	0.64	0.75 V	0.52	33 UT	02R113; 03R118; 04R126	6.8	0.74	17 UV
High Molecular Weight PAH	µg/kg-Wet	15	8	53.3	0.93 JT	3.8 JT	T01	2.03	1.72 JV	3.5 JV	0.37 UT	33 UT	02R113; 03R118; 04R126	7.56	2.94 JT	16.5 UV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.17 U	33 UT	02R113; 03R118; 04R126	6.5	0.085 U	17 UV
Low Molecular Weight PAH	µg/kg-Wet	15	10	66.7	8.38 JT	33 T	02R113	14.6	12.5 JV	25.8 JV	8.38 JT	41 UT	02R102	15.7	16 UT	24.3 V
Naphthalene	µg/kg-Wet	15	8	53	3.8	33 T	02R113	8.4	5.1 V	24 V	2.9 U	33 T	02R113; 03R118; 04R126	10	5.8	21 V
Phenanthrene	µg/kg-Wet	15	9	60	0.88	1.9	T01	1.4	1.4	1.9 V	0.88	33 UT	02R113; 03R118; 04R126	7.3	1.8	17 UV
Pyrene	µg/kg-Wet	15	8	53	0.31 J	0.77	T02	0.51	0.44 JV	0.76 V	0.29 U	33 UT	02R113; 03R118; 04R126	6.7	0.74	17 UV
Total BaPEq	µg/kg-Wet	15	8	53.3	0.002 JT	0.249 JT	T02	0.0915	0.0345 JV	0.241 JV	0.002 JT	33 UT	02R113; 03R118; 04R126	6.52	0.225 JT	16.5 UV
Total cPAHs	µg/kg-Wet	15	8	53	0.15 JT	1.6 JT	T01	0.61	0.39 JV	1.4 JV	0.15 JT	33 UT	02R113; 03R118; 04R126	6.8	1.1 JT	17 UV
Total PAHs	µg/kg-Wet	15	10	66.7	9.96 JT	33 T	02R113	16.2	14.3 JV	26.2 JV	9.96 JT	41 UT	02R102	16.7	16 UT	24.3 V
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	11	0	0	--	--	--	--	--	--	95 UT	860 UT	04R126	160	55 U	400 UV
Butylbenzyl phthalate	µg/kg-Wet	11	4	36	160 J	220	T01	190	190 V	220 V	160 J	3700 U	04R126	660	190	1800 UV
Dibutyl phthalate	µg/kg-Wet	11	2	18	33 J	48 J	T01	41	41 JV	47 JV	31 U	520 U	02R112	150	170 UT	260 UV
Diethyl phthalate	µg/kg-Wet	11	0	0	--	--	--	--	--	--	18 U	1300 U	02R112	120	80 UT	400 UV
Dimethyl phthalate	µg/kg-Wet	11	0	0	--	--	--	--	--	--	9.8 U	170 U	02R113	51	80 U	83 UV
Di-n-octyl phthalate	µg/kg-Wet	11	0	0	--	--	--	--	--	--	25 U	560 U	02R113	140	160 U	280 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	11	0	0	--	--	--	--	--	--	19 U	140 U	T03	23	16 UT	63 UV
1,2-Dichlorobenzene	µg/kg-Wet	11	0	0	--	--	--	--	--	--	23 U	170 U	T03	26	16 UT	75 UV
1,2-Diphenylhydrazine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 U	33 U	02R113; 03R118; 04R126	16	16 UV	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	11	0	0	--	--	--	--	--	--	21 UJ	150 UJ	T03	24	16 UT	68 UJV
1,4-Dichlorobenzene	µg/kg-Wet	11	0	0	--	--	--	--	--	--	21 UJ	150 UJ	T03	24	16 UT	68 UJV
2,4-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	32 UT	85 UT	03R125	30	33 UV	41 UV
2,6-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	02R113; 03R118; 04R126	16	16 UV	17 UV
2-Chloronaphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	02R113; 03R118; 04R126	16	16 UV	17 UV
2-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	790 U	830 U	02R113	400	400 UV	410 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	02R113	810	800 UV	840 UV
3-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	790 U	830 U	02R113	400	400 UV	410 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	02R113; 03R118; 04R126	16	16 UV	17 UV
4-Chloroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 UT	170 UT	02R113	81	80 UV	84 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	79 UT	83 UT	02R113	40	40 UV	41 UV
4-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	790 U	830 U	02R113	400	400 UV	410 UV
Azobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	02R113	81	80 UV	84 UV
Benzyl alcohol	µg/kg-Wet	11	4	36	55 J	200 J	T03	97	67 JV	180 JV	55 J	330 U	02R113; 03R118; 04R126	130	160 U	180 JV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	02R113	81	80 UV	84 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 U	170 U	02R113	81	80 UV	84 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	02R113; 03R118; 04R126	16	16 UV	17 UV
Carbazole	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	02R113; 03R118; 04R126	16	16 UV	17 UV
Dibenzofuran	µg/kg-Wet	15	9	60	0.55	0.9	T01	0.72	0.68	0.89 V	0.55	33 UT	02R113; 03R118; 04R126	6.9	0.88	17 UV
Hexachlorobenzene	µg/kg-Wet	15	9	60	0.62 J	1.2	T02	0.85	0.83 J	1.1 JV	0.62 J	33 UT	04R126	3.4	0.83 J	16 UV
Hexachlorobutadiene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	1 UJT	1.1 U	T01; T02; T03	0.53	0.55 U	0.55 UV
Hexachlorocyclopentadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	790 U	830 U	02R113	400	400 UV	410 UV
Hexachloroethane	µg/kg-Wet	11	0	0	--	--	--	--	--	--	1 UJT	120 U	T03	12	0.5 UJT	53 UV
Nitrobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	02R113; 03R118; 04R126	16	16 UV	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	160 UJT	170 UJT	02R102; 02R113	82	80 UJV	85 UJV
N-Nitrosodiphenylamine	µg/kg-Wet	11	0	0	--	--	--	--	--	--	19 U	170 U	02R113	58	80 U	83 UV
N-Nitrosodipropylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	33 UT	02R113; 03R118; 04R126	16	16 UV	17 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	02R113	810	800 UV	840 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	02R113	810	800 UV	840 UV
2,4,5-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	790 U	830 U	02R113	400	400 UV	410 UV
2,4,6-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	51 UT	02R102	18	17 UV	23 UV
2,4-Dichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	41 UT	02R102	17	17 UV	20 UV
2,4-Dimethylphenol	µg/kg-Wet	11	0	0	--	--	--	--	--	--	25 U	500 U	02R113	150	240 UT	250 UV
2,4-Dinitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3100 U	3300 U	02R113; 03R118; 04R126	1600	1600 UV	1700 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2-Chlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	31 UT	44 UT	02R102	17	17 UV	21 UV
2-Methylphenol	µg/kg-Wet	11	0	0	--	--	--	--	--	--	110 U	720 U	T03	120	80 U	320 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3100 UT	3300 U	02R113; 03R118; 04R126	1600	1600 UV	1700 UV
4-Chloro-3-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	310 UT	330 U	02R113; 03R118; 04R126	160	160 UV	170 UV
4-Methylphenol	µg/kg-Wet	11	0	0	--	--	--	--	--	--	29 U	210 U	T03	30	16 UT	93 UV
4-Nitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1600 U	1700 U	02R113	810	800 UV	840 UV
Pentachlorophenol	µg/kg-Wet	11	1	9.1	400 J	400 J	T01	400	400 J	400 J	60 U	420 U	T03	120	80 UT	310 JV
Phenol	µg/kg-Wet	11	1	9.1	38 J	38 J	T01	38	38 J	38 J	33 U	330 U	02R113; 03R118; 04R126	110	160 UT	170 UV
Lamprey Ammocoetes and Macropthalmia																
Conventionals																
Lipids	percent-Wet	6	6	100	3.68	9.84	LTMC1	6.55	5.78 V	9.84 V	3.68	9.84	LTMC1	6.55	5.78 V	9.84 V
Total solids	percent-Wet	4	4	100	23.7	29.6	LTMC1	26.8	27 V	29.6 V	23.7	29.6	LTMC1	26.8	27 V	29.6 V
Metals																
Aluminum	mg/kg-Wet	4	4	100	2.3	281	LTAC2	117	93.3 V	266 V	2.3	281	LTAC2	117	93.3 V	266 V
Antimony	mg/kg-Wet	4	3	75	0.003 J	0.004 J	LTAC2	0.00333	0.003 J	0.0039 JV	0.002 U	0.004 J	LTAC2	0.00275	0.003 JV	0.00385 JV
Arsenic	mg/kg-Wet	4	4	100	0.05 J	0.19	LTAC2	0.12	0.12 JV	0.18 V	0.05 J	0.19	LTAC2	0.12	0.12 JV	0.18 V
Cadmium	mg/kg-Wet	4	4	100	0.002 J	0.005	LTAC2	0.003	0.0025 JV	0.0047 JV	0.002 J	0.005	LTAC2	0.003	0.0025 JV	0.0047 JV
Chromium	mg/kg-Wet	4	4	100	0.13 J	0.32	LTAC2	0.25	0.27 V	0.31 V	0.13 J	0.32	LTAC2	0.25	0.27 V	0.31 V
Copper	mg/kg-Wet	4	4	100	3.08	6.2	LTMC1	4.27	3.9 V	5.89 V	3.08	6.2	LTMC1	4.27	3.9 V	5.89 V
Lead	mg/kg-Wet	4	4	100	0.0331	0.153	LTAC2	0.0823	0.0715 V	0.144 V	0.0331	0.153	LTAC2	0.0823	0.0715 V	0.144 V
Mercury	mg/kg-Wet	2	2	100	0.217	0.355	LTAC2	0.286	0.286 V	0.348 V	0.217	0.355	LTAC2	0.286	0.286 V	0.348 V
Nickel	mg/kg-Wet	4	4	100	0.129	0.292	LTAC2	0.21	0.209 V	0.284 V	0.129	0.292	LTAC2	0.21	0.209 V	0.284 V
Selenium	mg/kg-Wet	4	4	100	0.27	0.37	LTAC2	0.32	0.31 V	0.36 V	0.27	0.37	LTAC2	0.32	0.31 V	0.36 V
Silver	mg/kg-Wet	4	4	100	0.0215	0.0352	LTAC2	0.0304	0.0324 V	0.035 V	0.0215	0.0352	LTAC2	0.0304	0.0324 V	0.035 V
Zinc	mg/kg-Wet	4	4	100	19	26.7	LTA3M2	24.4	25.9 V	26.7 V	19	26.7	LTA3M2	24.4	25.9 V	26.7 V
Butyltins																
Butyltin ion	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.22 U	0.22 U	LTAC2	0.11	0.11 U	0.11 U
Dibutyltin ion	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.33 U	0.33 U	LTAC2	0.17	0.17 U	0.17 U
Tetrabutyltin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.83 U	0.83 U	LTAC2	0.42	0.42 U	0.42 U
Tributyltin ion	µg/kg-Wet	1	1	100	4.1	4.1	LTAC2	4.1	4.1	4.1	4.1	4.1	LTAC2	4.1	4.1	4.1
PCB Congeners																
PCB001	pg/g-Wet	6	6	100	4.32 J	30.3 J	LTAC2	15.5	11.5 V	30.1 JV	4.32 J	30.3 J	LTAC2	15.5	11.5 V	30.1 JV
PCB002	pg/g-Wet	6	6	100	11.2	50.9 J	LT002	26.4	27.8 V	45.3 JV	11.2	50.9 J	LT002	26.4	27.8 V	45.3 JV
PCB003	pg/g-Wet	6	6	100	2.26 J	20.4	LTMC1	8.76	5.62 V	18.9 V	2.26 J	20.4	LTMC1	8.76	5.62 V	18.9 V
PCB004	pg/g-Wet	6	6	100	195 J	2610	LTAC2	876	638 V	2190 V	195 J	2610	LTAC2	876	638 V	2190 V
PCB005	pg/g-Wet	6	3	50	3.73	7.89	LTMC1	5.26	4.17	7.52 V	0.675 U	7.89	LTMC1	3.16	2.85 V	6.96 V
PCB006	pg/g-Wet	6	6	100	18.6	247	LTMC1	111	85.5 V	233 V	18.6	247	LTMC1	111	85.5 V	233 V
PCB007	pg/g-Wet	6	5	83.3	3.91	31.3	LTMC1	18.1	19.2	29 V	3.91	31.3	LTMC1	15.7	17.9 V	28.4 V
PCB008	pg/g-Wet	6	6	100	74	876	LTMC1	447	364 V	870 V	74	876	LTMC1	447	364 V	870 V
PCB009	pg/g-Wet	6	6	100	4.48	51.3	LTMC1	22.8	23 V	45.1 V	4.48	51.3	LTMC1	22.8	23 V	45.1 V
PCB010	pg/g-Wet	6	6	100	6.68	64.4	LTAC2	28.4	28 V	56.9 V	6.68	64.4	LTAC2	28.4	28 V	56.9 V
PCB011	pg/g-Wet	6	6	100	830	2640	LTA3M2	1630	1370 V	2620 V	830	2640	LTA3M2	1630	1370 V	2620 V
PCB012 & 013	pg/g-Wet	6	6	100	37.7	113	LTMC1	66.2	58.8 V	106 V	37.7	113	LTMC1	66.2	58.8 V	106 V
PCB014	pg/g-Wet	6	2	33.3	1.96	2.62	LTMC1	2.29	2.29 V	2.59 V	0.616 U	2.62	LTMC1	1.06	0.568 UV	2.46 V
PCB015	pg/g-Wet	6	6	100	67.7	665	LTMC1	306	237 V	622 V	67.7	665	LTMC1	306	237 V	622 V
PCB016	pg/g-Wet	6	6	100	103	945	LTMC1	480	425 V	895 V	103	945	LTMC1	480	425 V	895 V
PCB017	pg/g-Wet	6	6	100	455	3250	LTA3M2	1780	1970 V	3090 V	455	3250	LTA3M2	1780	1970 V	3090 V
PCB018 & 030	pg/g-Wet	6	6	100	295	3080	LTMC1	1560	1700 V	2820 V	295	3080	LTMC1	1560	1700 V	2820 V
PCB019	pg/g-Wet	6	6	100	554	6030	LTA3M2	2760	2150 V	5740 V	554	6030	LTA3M2	2760	2150 V	5740 V
PCB020 & 028	pg/g-Wet	6	6	100	1080	11400	LTMC1	4830	3370 V	10600 V	1080	11400	LTMC1	4830	3370 V	10600 V
PCB021 & 033	pg/g-Wet	6	6	100	362	1770	LTMC1	1030	1120 V	1640 V	362	1770	LTMC1	1030	1120 V	1640 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB022	pg/g-Wet	6	6	100	287	2300	LTMC1	1060	878 V	2120 V	287	2300	LTMC1	1060	878 V	2120 V
PCB023	pg/g-Wet	6	5	83.3	1	3.93	LTMC1	2.53	3.01	3.8 V	1	3.93	LTMC1	2.22	2.24 V	3.76 V
PCB024	pg/g-Wet	6	6	100	5.91	44.8	LTMC1	21.1	20.5 V	39.7 V	5.91	44.8	LTMC1	21.1	20.5 V	39.7 V
PCB025	pg/g-Wet	6	6	100	141	711	LTMC1	423	438 V	698 V	141	711	LTMC1	423	438 V	698 V
PCB026 & 029	pg/g-Wet	6	6	100	201	1430	LTMC1	718	689 V	1330 V	201	1430	LTMC1	718	689 V	1330 V
PCB027	pg/g-Wet	6	6	100	104	929	LTA3M2	457	483 V	852 V	104	929	LTA3M2	457	483 V	852 V
PCB031	pg/g-Wet	6	6	100	829	6340	LTMC1	3090	2560 V	6000 V	829	6340	LTMC1	3090	2560 V	6000 V
PCB032	pg/g-Wet	6	6	100	261	2410	LTMC1	1320	1300 V	2390 V	261	2410	LTMC1	1320	1300 V	2390 V
PCB034	pg/g-Wet	6	6	100	7.19	73.3	LTMC1	34.1	23.3 V	71.1 V	7.19	73.3	LTMC1	34.1	23.3 V	71.1 V
PCB035	pg/g-Wet	6	6	100	11.6	40.2	LTMC1	24.7	22.2 V	39.2 V	11.6	40.2	LTMC1	24.7	22.2 V	39.2 V
PCB036	pg/g-Wet	6	5	83.3	7.07	15.6	LTA3M2	12	12.4	15.4 V	0.82 U	15.6	LTA3M2	10.1	11.3 V	15.4 V
PCB037	pg/g-Wet	6	6	100	180	1500	LTMC1	720	538 V	1450 V	180	1500	LTMC1	720	538 V	1450 V
PCB038	pg/g-Wet	6	2	33.3	5.94	14.7	LTMC1	10.3	10.3 V	14.3 V	1.84 U	14.7	LTMC1	5.11	3.82 V	12.6 V
PCB039	pg/g-Wet	6	6	100	13.2	110	LTMC1	53	35.8 V	109 V	13.2	110	LTMC1	53	35.8 V	109 V
PCB040 & 041 & 071	pg/g-Wet	6	6	100	1130	11200	LTMC1	5190	3740 V	10900 V	1130	11200	LTMC1	5190	3740 V	10900 V
PCB042	pg/g-Wet	6	6	100	459	4990	LTAC2	2310	1450 V	4970 V	459	4990	LTAC2	2310	1450 V	4970 V
PCB043	pg/g-Wet	6	6	100	75.8	750	LTAC2; LTMC1	359	240 V	750 V	75.8	750	LTAC2; LTMC1	359	240 V	750 V
PCB044 & 047 & 065	pg/g-Wet	6	6	100	3090	23500	LTMC1	12900	12200 V	23300 V	3090	23500	LTMC1	12900	12200 V	23300 V
PCB045 & 051	pg/g-Wet	6	6	100	677	6640	LTA3M2	3190	2860 V	6210 V	677	6640	LTA3M2	3190	2860 V	6210 V
PCB046	pg/g-Wet	6	6	100	110	1150	LTMC1	535	480 V	1080 V	110	1150	LTMC1	535	480 V	1080 V
PCB048	pg/g-Wet	6	6	100	319	2980	LTAC2	1440	988 V	2970 V	319	2980	LTAC2	1440	988 V	2970 V
PCB049 & 069	pg/g-Wet	6	6	100	2010	16700	LTAC2	8930	8630 V	16300 V	2010	16700	LTAC2	8930	8630 V	16300 V
PCB050 & 053	pg/g-Wet	6	6	100	618	10600	LTA3M2	3950	3220 V	9130 V	618	10600	LTA3M2	3950	3220 V	9130 V
PCB052	pg/g-Wet	6	6	100	3390	27300	LTAC2	14800	13900 V	27000 V	3390	27300	LTAC2	14800	13900 V	27000 V
PCB054	pg/g-Wet	6	6	100	155	2820	LTA3M2	907	571 V	2350 V	155	2820	LTA3M2	907	571 V	2350 V
PCB055	pg/g-Wet	6	3	50	35	208	LTAC2	138	171	204 V	1.08 U	208	LTAC2	69.8	19.3 V	199 V
PCB056	pg/g-Wet	6	6	100	592	8320	LTMC1	3620	1870 V	8310 V	592	8320	LTMC1	3620	1870 V	8310 V
PCB057	pg/g-Wet	6	6	100	12.6	68.2	LTAC2	34.7	26.2 V	66.8 V	12.6	68.2	LTAC2	34.7	26.2 V	66.8 V
PCB058	pg/g-Wet	6	4	66.7	10.1	44.6	LTMC1	28.8	30.3 V	43.6 V	1.13 U	44.6	LTMC1	19.4	16.4 V	42.9 V
PCB059 & 062 & 075	pg/g-Wet	6	6	100	227	1670	LTAC2; LTMC1	853	660 V	1670 V	227	1670	LTAC2; LTMC1	853	660 V	1670 V
PCB060	pg/g-Wet	6	6	100	299	4530	LTAC2	1810	989 V	4320 V	299	4530	LTAC2	1810	989 V	4320 V
PCB061 & 070 & 074 & 076	pg/g-Wet	6	6	100	3310	37600	LTAC2	15200	9200 V	35200 V	3310	37600	LTAC2	15200	9200 V	35200 V
PCB063	pg/g-Wet	6	6	100	94.2	877	LTAC2	372	254 V	821 V	94.2	877	LTAC2	372	254 V	821 V
PCB064	pg/g-Wet	6	6	100	762	10800	LTAC2	4580	2500 V	10600 V	762	10800	LTAC2	4580	2500 V	10600 V
PCB066	pg/g-Wet	6	6	100	1650 J	23800	LTAC2	9330	5170 V	22400 V	1650 J	23800	LTAC2	9330	5170 V	22400 V
PCB067	pg/g-Wet	6	6	100	62.6	408	LTAC2	199	151 V	396 V	62.6	408	LTAC2	199	151 V	396 V
PCB068	pg/g-Wet	6	6	100	37.4	136	LTA3M2	92.8	101 V	132 V	37.4	136	LTA3M2	92.8	101 V	132 V
PCB072	pg/g-Wet	6	6	100	47.1	188	LTAC2	122	130 V	186 V	47.1	188	LTAC2	122	130 V	186 V
PCB073	pg/g-Wet	6	5	83.3	36.2	463	LTA3M2	158	98	391 V	1.37 U	463	LTA3M2	132	95 V	373 V
PCB077	pg/g-Wet	6	6	100	119	1140	LTAC2	504	330 V	1100 V	119	1140	LTAC2	504	330 V	1100 V
PCB078	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.899 U	7.03 U	BTFLP	1.22	0.778 UV	2.97 UV
PCB079	pg/g-Wet	6	6	100	31.6	169	LTAC2	94.5	85 V	166 V	31.6	169	LTAC2	94.5	85 V	166 V
PCB080	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.804 U	6.41 U	BTFLP	1.11	0.698 UV	2.7 UV
PCB081	pg/g-Wet	6	6	100	3.88	39.2	LTAC2	17	10.8 V	37.6 V	3.88	39.2	LTAC2	17	10.8 V	37.6 V
PCB082	pg/g-Wet	6	6	100	262	1980	LTAC2	1010	783 V	1980 V	262	1980	LTAC2	1010	783 V	1980 V
PCB083 & 099	pg/g-Wet	6	6	100	2450	12500	LTAC2	6980	6780 V	12000 V	2450	12500	LTAC2	6980	6780 V	12000 V
PCB084	pg/g-Wet	6	6	100	789	4520	LTAC2; LTMC1	2520	2220 V	4520 V	789	4520	LTAC2; LTMC1	2520	2220 V	4520 V
PCB085 & 116 & 117	pg/g-Wet	6	6	100	615	4030	LTAC2	1980	1660 V	3840 V	615	4030	LTAC2	1980	1660 V	3840 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	6	6	100	2150	12400	LTAC2	6800	6060 V	12200 V	2150	12400	LTAC2	6800	6060 V	12200 V
PCB088 & 091	pg/g-Wet	6	6	100	687	3810	LTA3M2	2440	2690 V	3720 V	687	3810	LTA3M2	2440	2690 V	3720 V
PCB089	pg/g-Wet	6	6	100	32.8	381	LTAC2	170	117 V	369 V	32.8	381	LTAC2	170	117 V	369 V
PCB090 & 101 & 113	pg/g-Wet	6	6	100	4440	20900	LTAC2	12800	13400 V	20200 V	4440	20900	LTAC2	12800	13400 V	20200 V
PCB092	pg/g-Wet	6	6	100	913	3620	LTAC2	2390	2640 V	3520 V	913	3620	LTAC2	2390	2640 V	3520 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	6	6	100	3420	17000	LTAC2	11600	13100 V	17000 V	3420	17000	LTAC2	11600	13100 V	17000 V
PCB094	pg/g-Wet	6	6	100	67.2	697	LTA3M2	280	218 V	595 V	67.2	697	LTA3M2	280	218 V	595 V
PCB096	pg/g-Wet	6	6	100	53.7	618	LTA3M2	265	222 V	543 V	53.7	618	LTA3M2	265	222 V	543 V
PCB103	pg/g-Wet	6	6	100	141	1430	LTA3M2	560	460 V	1200 V	141	1430	LTA3M2	560	460 V	1200 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB104	pg/g-Wet	6	6	100	18.2	231	LTA3M2	78.7	56.6 V	190 V	18.2	231	LTA3M2	78.7	56.6 V	190 V
PCB105	pg/g-Wet	6	6	100	826	4670	LTAC2	2430	1950 V	4590 V	826	4670	LTAC2	2430	1950 V	4590 V
PCB106	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.872 U	12 U	BTFLP	1.68	0.895 UV	4.83 UV
PCB107 & 124	pg/g-Wet	6	6	100	119	574	LTAC2	311	271 V	556 V	119	574	LTAC2	311	271 V	556 V
PCB109	pg/g-Wet	6	6	100	275	1230	LTAC2	671	602 V	1180 V	275	1230	LTAC2	671	602 V	1180 V
PCB110 & 115	pg/g-Wet	6	6	100	3230	15500	LTMC1	9080	8840 V	15200 V	3230	15500	LTMC1	9080	8840 V	15200 V
PCB111	pg/g-Wet	6	5	83.3	7.89	30.5	LTA3M2	19.8	17.2	30 V	7.89	30.5	LTA3M2	17.4	16.2 V	29.9 V
PCB112	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.545 U	2.45 U	BTFLP	0.728	0.703 UV	1.17 UV
PCB114	pg/g-Wet	6	6	100	65.7	434	LTAC2	204	162 V	407 V	65.7	434	LTAC2	204	162 V	407 V
PCB118	pg/g-Wet	6	6	100	2740	12600	LTAC2	6810	6210 V	11900 V	2740	12600	LTAC2	6810	6210 V	11900 V
PCB120	pg/g-Wet	6	6	100	28.5	84.3	LTA3M2	57.2	57.3 V	81 V	28.5	84.3	LTA3M2	57.2	57.3 V	81 V
PCB121	pg/g-Wet	6	6	100	10.7	111	LTA3M2	41.2	32 V	93.5 V	10.7	111	LTA3M2	41.2	32 V	93.5 V
PCB122	pg/g-Wet	6	6	100	27.2	180	LTAC2	91	65.6 V	180 V	27.2	180	LTAC2	91	65.6 V	180 V
PCB123	pg/g-Wet	6	6	100	48.2	303	LTAC2	148	121 V	288 V	48.2	303	LTAC2	148	121 V	288 V
PCB126	pg/g-Wet	6	6	100	8.68	29.8	LTAC2	18.1	15.7 V	29.7 V	8.68	29.8	LTAC2	18.1	15.7 V	29.7 V
PCB127	pg/g-Wet	6	5	83.3	4.02	10.7	LTMC1	7.45	8.31	10.5 V	4.02	12.9 U	BTFLP	7.28	7.38 V	10.4 V
PCB128 & 166	pg/g-Wet	6	6	100	331	878	LTMC1	644	682 V	872 V	331	878	LTMC1	644	682 V	872 V
PCB129 & 138 & 160 & 163	pg/g-Wet	6	6	100	3580	11500	LTA3M2	7400	7360 V	10800 V	3580	11500	LTA3M2	7400	7360 V	10800 V
PCB130	pg/g-Wet	6	6	100	239	592	LTA3M2	455	492 V	591 V	239	592	LTA3M2	455	492 V	591 V
PCB131	pg/g-Wet	6	6	100	35.9	122	LTMC1	84.9	90.1 V	122 V	35.9	122	LTMC1	84.9	90.1 V	122 V
PCB132	pg/g-Wet	6	6	100	761	2890	LTA3M2	1810	1790 V	2760 V	761	2890	LTA3M2	1810	1790 V	2760 V
PCB133	pg/g-Wet	6	6	100	150	537	LTA3M2	314	298 V	483 V	150	537	LTA3M2	314	298 V	483 V
PCB134 & 143	pg/g-Wet	6	6	100	209	746	LTA3M2	475	470 V	709 V	209	746	LTA3M2	475	470 V	709 V
PCB135 & 151 & 154	pg/g-Wet	6	6	100	1860	7760	LTA3M2	4370	4100 V	6990 V	1860	7760	LTA3M2	4370	4100 V	6990 V
PCB136	pg/g-Wet	6	6	100	549	2950	LTA3M2	1500	1330 V	2620 V	549	2950	LTA3M2	1500	1330 V	2620 V
PCB137	pg/g-Wet	6	6	100	136	386	LTAC2	266	273 V	380 V	136	386	LTAC2	266	273 V	380 V
PCB139 & 140	pg/g-Wet	6	6	100	73.9	204	LTA3M2	153	170 V	202 V	73.9	204	LTA3M2	153	170 V	202 V
PCB141	pg/g-Wet	6	6	100	683	2640	LTA3M2	1570	1530 V	2450 V	683	2640	LTA3M2	1570	1530 V	2450 V
PCB142	pg/g-Wet	6	1	16.7	4.36	4.36	LTMC1	4.36	4.36	4.36	0.645 U	6.81 U	BTFLP	1.75	0.978 UV	4.12 V
PCB144	pg/g-Wet	6	6	100	227	910	LTA3M2	552	546 V	843 V	227	910	LTA3M2	552	546 V	843 V
PCB145	pg/g-Wet	6	6	100	1.37	5.4	LTAC2	3.61	3.5 V	5.32 V	1.37	5.4	LTAC2	3.61	3.5 V	5.32 V
PCB146	pg/g-Wet	6	6	100	987	3040	LTA3M2	1980	2030 V	2810 V	987	3040	LTA3M2	1980	2030 V	2810 V
PCB147 & 149	pg/g-Wet	6	6	100	3310	14800	LTA3M2	7910	7160 V	13300 V	3310	14800	LTA3M2	7910	7160 V	13300 V
PCB148	pg/g-Wet	6	6	100	34	171	LTA3M2	87.2	78.5 V	155 V	34	171	LTA3M2	87.2	78.5 V	155 V
PCB150	pg/g-Wet	6	6	100	26	206	LTA3M2	88.2	81.9 V	177 V	26	206	LTA3M2	88.2	81.9 V	177 V
PCB152	pg/g-Wet	6	6	100	11.8	89.6	LTA3M2	36.1	28.9 V	75.9 V	11.8	89.6	LTA3M2	36.1	28.9 V	75.9 V
PCB153 & 168	pg/g-Wet	6	6	100	5590	17400	LTA3M2	11000	10600 V	16200 V	5590	17400	LTA3M2	11000	10600 V	16200 V
PCB155	pg/g-Wet	6	6	100	6.04	31	LTA3M2	13.8	11.9 V	27 V	6.04	31	LTA3M2	13.8	11.9 V	27 V
PCB156 & 157	pg/g-Wet	6	6	100	292	780	LTMC1	581	612 V	779 V	292	780	LTMC1	581	612 V	779 V
PCB158	pg/g-Wet	6	6	100	324	987	LTA3M2	689	717 V	957 V	324	987	LTA3M2	689	717 V	957 V
PCB159	pg/g-Wet	6	6	100	15.8	59.1	LTA3M2	32.9	29.3 V	53.7 V	15.8	59.1	LTA3M2	32.9	29.3 V	53.7 V
PCB161	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.436 U	4.76 U	BTFLP	0.784	0.559 UV	1.96 UV
PCB162	pg/g-Wet	6	6	100	15.2	32.9	LTAC2	23.7	22.9 V	32.8 V	15.2	32.9	LTAC2	23.7	22.9 V	32.8 V
PCB164	pg/g-Wet	6	6	100	142	557	LTA3M2	316	284 V	522 V	142	557	LTA3M2	316	284 V	522 V
PCB165	pg/g-Wet	6	6	100	8	56.4	LTA3M2	24.7	21.9 V	49.3 V	8	56.4	LTA3M2	24.7	21.9 V	49.3 V
PCB167	pg/g-Wet	6	6	100	144	341	LTAC2	266	283 V	341 V	144	341	LTAC2	266	283 V	341 V
PCB169	pg/g-Wet	6	0	0	--	--	--	--	--	--	2.12 U	6.39 U	BTFLP	1.78	1.52 UV	2.89 UV
PCB170	pg/g-Wet	6	6	100	382	1400	LTA3M2	812	770 V	1270 V	382	1400	LTA3M2	812	770 V	1270 V
PCB171 & 173	pg/g-Wet	6	6	100	142	528	LTA3M2	308	296 V	478 V	142	528	LTA3M2	308	296 V	478 V
PCB172	pg/g-Wet	6	6	100	163	509	LTA3M2	306	299 V	465 V	163	509	LTA3M2	306	299 V	465 V
PCB174	pg/g-Wet	6	6	100	360	1490	LTA3M2	817	741 V	1350 V	360	1490	LTA3M2	817	741 V	1350 V
PCB175	pg/g-Wet	6	6	100	37.1	134	LTA3M2	77.9	75.8 V	122 V	37.1	134	LTA3M2	77.9	75.8 V	122 V
PCB176	pg/g-Wet	6	6	100	92.3	365	LTA3M2	204	195 V	328 V	92.3	365	LTA3M2	204	195 V	328 V
PCB177	pg/g-Wet	6	6	100	372	1310	LTA3M2	748	705 V	1180 V	372	1310	LTA3M2	748	705 V	1180 V
PCB178	pg/g-Wet	6	6	100	281	981	LTA3M2	565	547 V	880 V	281	981	LTA3M2	565	547 V	880 V
PCB179	pg/g-Wet	6	6	100	341	1400	LTA3M2	771	710 V	1260 V	341	1400	LTA3M2	771	710 V	1260 V
PCB180 & 193	pg/g-Wet	6	6	100	1690	5440	LTA3M2	3280	3170 V	4960 V	1690	5440	LTA3M2	3280	3170 V	4960 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB181	pg/g-Wet	6	6	100	7.02	15.2	LTAC2	11.7	12.4 V	15.2 V	7.02	15.2	LTAC2	11.7	12.4 V	15.2 V
PCB182	pg/g-Wet	6	6	100	7.43	21.6	LTA3M2	13.4	12.6 V	20.1 V	7.43	21.6	LTA3M2	13.4	12.6 V	20.1 V
PCB183 & 185	pg/g-Wet	6	6	100	666	2300	LTA3M2	1350	1320 V	2090 V	666	2300	LTA3M2	1350	1320 V	2090 V
PCB184	pg/g-Wet	6	6	100	2.9	6.36	LTA3M2	4.06	3.78 V	5.86 V	2.9	6.36	LTA3M2	4.06	3.78 V	5.86 V
PCB186	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.16 U	0.533 U	BTFLP	0.12	0.0923 UV	0.227 UV
PCB187	pg/g-Wet	6	6	100	1340	4530	LTA3M2	2640	2540 V	4080 V	1340	4530	LTA3M2	2640	2540 V	4080 V
PCB188	pg/g-Wet	6	6	100	6.93	37.5	LTA3M2	17.2	14.9 V	32.9 V	6.93	37.5	LTA3M2	17.2	14.9 V	32.9 V
PCB189	pg/g-Wet	6	6	100	23.9	67.5	LTA3M2	44.2	43.3 V	63.1 V	23.9	67.5	LTA3M2	44.2	43.3 V	63.1 V
PCB190	pg/g-Wet	6	6	100	127	418	LTA3M2	248	242 V	381 V	127	418	LTA3M2	248	242 V	381 V
PCB191	pg/g-Wet	6	6	100	17.1	65	LTA3M2	37.6	35.8 V	58.9 V	17.1	65	LTA3M2	37.6	35.8 V	58.9 V
PCB192	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.32 U	1.24 U	BTFLP	0.255	0.185 UV	0.519 UV
PCB194	pg/g-Wet	6	6	100	206	616	LTA3M2	388	371 V	571 V	206	616	LTA3M2	388	371 V	571 V
PCB195	pg/g-Wet	6	6	100	61.7	183	LTA3M2	114	109 V	168 V	61.7	183	LTA3M2	114	109 V	168 V
PCB196	pg/g-Wet	6	6	100	78.7	243	LTA3M2	152	149 V	223 V	78.7	243	LTA3M2	152	149 V	223 V
PCB197 & 200	pg/g-Wet	6	6	100	29.5	91.6	LTA3M2	57.4	56.9 V	84.3 V	29.5	91.6	LTA3M2	57.4	56.9 V	84.3 V
PCB198 & 199	pg/g-Wet	6	6	100	228	645	LTA3M2	411	390 V	603 V	228	645	LTA3M2	411	390 V	603 V
PCB201	pg/g-Wet	6	6	100	39.6	118	LTA3M2	75.4	73.4 V	109 V	39.6	118	LTA3M2	75.4	73.4 V	109 V
PCB202	pg/g-Wet	6	6	100	122	291	LTA3M2	198	189 V	274 V	122	291	LTA3M2	198	189 V	274 V
PCB203	pg/g-Wet	6	6	100	206	572	LTA3M2	373	366 V	531 V	206	572	LTA3M2	373	366 V	531 V
PCB204	pg/g-Wet	6	4	66.7	0.381 J	0.521 J	LTA3M2	0.436	0.421 JV	0.512 JV	0.381 J	2.14 U	LT002	0.503	0.421 JV	0.933 JV
PCB205	pg/g-Wet	6	6	100	7.2	20.1	LTA3M2	12.9	12.5 V	18.6 V	7.2	20.1	LTA3M2	12.9	12.5 V	18.6 V
PCB206	pg/g-Wet	6	6	100	85.1	132	LTA3M2	110	116 V	130 V	85.1	132	LTA3M2	110	116 V	130 V
PCB207	pg/g-Wet	6	6	100	14.1	23.6	LTA3M2	18.4	18.9 V	22.7 V	14.1	23.6	LTA3M2	18.4	18.9 V	22.7 V
PCB208	pg/g-Wet	6	6	100	45	65.3	BTFLP	58.1	62.8 V	65.2 V	45	65.3	BTFLP	58.1	62.8 V	65.2 V
PCB209	pg/g-Wet	6	6	100	75.8	125	BTFLP	95.4	93.6 V	117 V	75.8	125	BTFLP	95.4	93.6 V	117 V
Total PCB Congeners	pg/g-Wet	6	6	100	80600 JT	399000 JT	LTAC2	242000	241000 JV	395000 JV	80600 JT	399000 JT	LTAC2	242000	241000 JV	395000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	6	6	100	80.6 JT	399 JT	LTAC2	242	241 JV	395 JV	80.6 JT	399 JT	LTAC2	242	241 JV	395 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	6	6	100	1680 JT	5530 T	LTMC1	3500	3190 V	5490 V	1680 JT	5530 T	LTMC1	3500	3190 V	5490 V
Heptachlorobiphenylhomologs	pg/g-Wet	6	6	100	6060 T	21000 T	LTA3M2	12200	11800 V	19000 V	6060 T	21000 T	LTA3M2	12200	11800 V	19000 V
Hexachlorobiphenyl homologs	pg/g-Wet	6	6	100	19700 T	70400 T	LTA3M2	42600	41300 V	64900 V	19700 T	70400 T	LTA3M2	42600	41300 V	64900 V
Monochlorobiphenyl homologs	pg/g-Wet	6	6	100	18.8 JT	78.3 T	LTMC1	50.7	50.3 JV	76.9 JV	18.8 JT	78.3 T	LTMC1	50.7	50.3 JV	76.9 JV
Nonachlorobiphenyl homologs	pg/g-Wet	6	6	100	147 T	221 T	LTA3M2	186	198 V	218 V	147 T	221 T	LTA3M2	186	198 V	218 V
Octachlorobiphenyl homologs	pg/g-Wet	6	6	100	979 T	2780 JT	LTA3M2	1780	1730 JV	2570 JV	979 T	2780 JT	LTA3M2	1780	1730 JV	2570 JV
Pentachlorobiphenylhomologs	pg/g-Wet	6	6	100	23500 T	116000 T	LTAC2	69700	70000 V	114000 V	23500 T	116000 T	LTAC2	69700	70000 V	114000 V
Tetrachlorobiphenyl homologs	pg/g-Wet	6	6	100	21000 T	185000 T	LTAC2	91400	75600 V	181000 V	21000 T	185000 T	LTAC2	91400	75600 V	181000 V
Trichlorobiphenyl homologs	pg/g-Wet	6	6	100	5210 T	37600 T	LTMC1	20400	20600 V	36000 V	5210 T	37600 T	LTMC1	20400	20600 V	36000 V
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	6	6	100	4.34	6.76	BTFLP	5.55	5.72 V	6.67 V	4.34	6.76	BTFLP	5.55	5.72 V	6.67 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	9.87	13.9	LTAC2	11.8	11.9 V	13.6 V	9.87	13.9	LTAC2	11.8	11.9 V	13.6 V
Hexachlorodibenzofuran homologs	pg/g-Wet	6	6	100	10.2	16.7	LTA3M2	12.8	11.6 V	16.6 V	10.2	16.7	LTA3M2	12.8	11.6 V	16.6 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	4.19	7.2	LTA3M2	5.82	5.75 V	7.02 V	4.19	7.2	LTA3M2	5.82	5.75 V	7.02 V
Octachlorodibenzofuran	pg/g-Wet	6	4	66.7	1.62 J	2.78	BTFLP	2.21	2.21 JV	2.76 JV	0.666 U	2.78	BTFLP	1.59	1.71 JV	2.74 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	10.4	27.4	LTA3M2	19.6	21.2 V	27.3 V	10.4	27.4	LTA3M2	19.6	21.2 V	27.3 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	6	6	100	7.89	12.4	LTA3M2	10.3	10.3 V	12.4 V	7.89	12.4	LTA3M2	10.3	10.3 V	12.4 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	0.947	1.87	LTA3M2	1.41	1.33 V	1.84 V	0.947	1.87	LTA3M2	1.41	1.33 V	1.84 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	6	6	100	7.33	12	LTMC1	9.16	9.06 V	11.5 V	7.33	12	LTMC1	9.16	9.06 V	11.5 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	6	6	100	0.839	1.33	LTA3M2	1.07	1.07 V	1.27 V	0.839	1.33	LTA3M2	1.07	1.07 V	1.27 V
Total PCDD/F	pg/g-Wet	6	6	100	69.1 JT	90.1 JT	LTAC2	78.9	78.7 V	87.8 JV	69.1 JT	90.1 JT	LTAC2	78.9	78.7 V	87.8 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	6	6	100	1.25 J	1.82	BTFLP	1.55	1.56 JV	1.82 V	1.25 J	1.82	BTFLP	1.55	1.56 JV	1.82 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	7.82	11	LTA3M2	9.81	10 V	11 V	7.82	11	LTA3M2	9.81	10 V	11 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	6	1	16.7	0.182 J	0.182 J	BTFLP	0.182	0.182 J	0.182 J	0.143 U	0.281 U	LTA3M2	0.115	0.109 UV	0.172 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	6	6	100	0.599 J	1.44	LTMC1	0.999	0.993 JV	1.37 JV	0.599 J	1.44	LTMC1	0.999	0.993 JV	1.37 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	0.66 J	1.17 J	LTA3M2	0.865	0.829 JV	1.13 JV	0.66 J	1.17 J	LTA3M2	0.865	0.829 JV	1.13 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	6	6	100	0.32 J	0.63 J	LTMC1	0.462	0.437 JV	0.616 JV	0.32 J	0.63 J	LTMC1	0.462	0.437 JV	0.616 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	2.31	4.19	LTA3M2	3.1	2.8 V	4.13 V	2.31	4.19	LTA3M2	3.1	2.8 V	4.13 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	6	1	16.7	0.058 J	0.058 J	BTFLP	0.058	0.058 J	0.058 J	0.058 J	0.13 U	LT002	0.0562	0.057 JV	0.0634 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	6	5	83.3	0.642 J	1.31 J	LTA3M2	0.978	1.01 J	1.28 JV	0.642 J	1.31 J	LTA3M2	0.886	0.899 JV	1.27 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	6	6	100	0.353 J	1.45	LTMC1	0.792	0.744 JV	1.29 JV	0.353 J	1.45	LTMC1	0.792	0.744 JV	1.29 JV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	0.871 J	1.87	LTA3M2	1.24	1.11 JV	1.79 V	0.871 J	1.87	LTA3M2	1.24	1.11 JV	1.79 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	6	0	0	--	--	--	--	--	--	0.246 U	0.492 U	LTA3M2	0.18	0.17 UV	0.24 UV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	6	6	100	0.648 J	1.43	LTMC1	0.983	0.945 JV	1.35 JV	0.648 J	1.43	LTMC1	0.983	0.945 JV	1.35 JV
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	6	6	100	1.17	4.06	LTMC1	2.31	2.27 V	3.64 V	1.17	4.06	LTMC1	2.31	2.27 V	3.64 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	6	6	100	0.419	0.819	LTA3M2	0.574	0.52 V	0.797 V	0.419	0.819	LTA3M2	0.574	0.52 V	0.797 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	6	6	100	2.36 JT	4.18 JT	LTA3M2	3.11	2.78 JV	4.16 JV	2.36 JT	4.18 JT	LTA3M2	3.11	2.78 JV	4.16 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	6	6	100	3.47 JT	7.61 JT	LTMC1	5.29	5.5 JV	7.25 JV	3.47 JT	7.61 JT	LTMC1	5.29	5.5 JV	7.25 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	6	6	100	1.01 T	3.68 T	LTAC2	2.18	1.89 V	3.64 V	1.01 T	3.68 T	LTAC2	2.18	1.89 V	3.64 V
Pesticides																
2,4'-DDD	µg/kg-Wet	6	6	100	2.37	14.1	LTMC1	7.2	6.72 V	12.5 V	2.37	14.1	LTMC1	7.2	6.72 V	12.5 V
2,4'-DDE	µg/kg-Wet	6	6	100	0.473	1.38	LTMC1	0.986	0.996 V	1.33 V	0.473	1.38	LTMC1	0.986	0.996 V	1.33 V
2,4'-DDT	µg/kg-Wet	6	6	100	0.679	2.79	LTMC1	1.52	1.35 V	2.66 V	0.679	2.79	LTMC1	1.52	1.35 V	2.66 V
4,4'-DDD	µg/kg-Wet	6	6	100	12.7	54.7	LTMC1	30.7	28.8 V	48.9 V	12.7	54.7	LTMC1	30.7	28.8 V	48.9 V
4,4'-DDE	µg/kg-Wet	6	6	100	23.5	39.6	LTMC1	34.1	36.3 V	39.2 V	23.5	39.6	LTMC1	34.1	36.3 V	39.2 V
4,4'-DDT	µg/kg-Wet	6	6	100	2.23	8.65	LTMC1	4.71	4.13 V	8.11 V	2.23	8.65	LTMC1	4.71	4.13 V	8.11 V
Aldrin	µg/kg-Wet	6	6	100	0.874	1.82	LT002	1.6	1.76 V	1.82 V	0.874	1.82	LT002	1.6	1.76 V	1.82 V
alpha-Endosulfan	µg/kg-Wet	6	6	100	0.23	1.19	LTA3M2	0.656	0.562 V	1.17 V	0.23	1.19	LTA3M2	0.656	0.562 V	1.17 V
alpha-Hexachlorocyclohexane	µg/kg-Wet	6	5	83.3	0.016 J	0.0467 J	LTA3M2	0.0303	0.033 J	0.0443 JV	0.016 J	0.0467 J	LTA3M2	0.029	0.0277 JV	0.0437 JV
beta-Endosulfan	µg/kg-Wet	6	5	83.3	0.132 J	0.431	LTA3M2	0.308	0.327	0.425 V	0.132 J	0.431	LTA3M2	0.273	0.288 JV	0.424 V
beta-Hexachlorocyclohexane	µg/kg-Wet	6	6	100	0.0079 J	0.0257 J	LTMC1	0.0163	0.0158 JV	0.025 JV	0.0079 J	0.0257 J	LTMC1	0.0163	0.0158 JV	0.025 JV
cis-Chlordane	µg/kg-Wet	6	6	100	3.74	9.37	LT002	6.55	6.34 V	9.34 V	3.74	9.37	LT002	6.55	6.34 V	9.34 V
cis-Nonachlor	µg/kg-Wet	6	6	100	1.45	3.4	LT002	2.18	1.94 V	3.25 V	1.45	3.4	LT002	2.18	1.94 V	3.25 V
delta-Hexachlorocyclohexane	µg/kg-Wet	6	3	50	0.00245 J	0.00318 J	LTA3M2	0.00293	0.00316 J	0.00318 JV	0.0018 U	0.006 U	BTFLP	0.0024	0.00273 JV	0.00318 JV
Dieldrin	µg/kg-Wet	6	6	100	0.89	6.38	LTMC1	3.24	2.55 V	6.15 V	0.89	6.38	LTMC1	3.24	2.55 V	6.15 V
Endosulfan sulfate	µg/kg-Wet	6	6	100	0.353	1.31	LTMC1	0.877	0.931 V	1.25 V	0.353	1.31	LTMC1	0.877	0.931 V	1.25 V
Endrin	µg/kg-Wet	6	4	66.7	0.00987 J	0.0376 J	LTA3M2	0.0221	0.0206 JV	0.0366 JV	0.00987 J	0.0416 U	LTMC1	0.0206	0.0177 UV	0.036 JV
Endrin aldehyde	µg/kg-Wet	6	0	0	--	--	--	--	--	--	0.00794 U	0.0574 UJ	LT002	0.0204	0.0222 UJV	0.0275 UJV
Endrin ketone	µg/kg-Wet	6	2	33.3	0.00382 J	0.008 J	BTFLP	0.00591	0.00591 JV	0.00779 JV	0.00358 U	0.0479 U	LTA3M2	0.0135	0.0147 JV	0.0235 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	6	4	66.7	0.0181 J	0.0696 J	LTA3M2	0.0495	0.0552 JV	0.0688 JV	0.0181 J	0.0696 J	LTA3M2	0.0372	0.0321 JV	0.0683 JV
Heptachlor	µg/kg-Wet	6	5	83.3	0.0163 J	0.049 J	LTA3M2	0.0313	0.0245 J	0.0481 JV	0.011 U	0.049 J	LTA3M2	0.027	0.0233 JV	0.0479 JV
Heptachlor epoxide	µg/kg-Wet	6	6	100	0.0466 J	0.326	LTMC1	0.169	0.149 JV	0.313 V	0.0466 J	0.326	LTMC1	0.169	0.149 JV	0.313 V
Methoxychlor	µg/kg-Wet	6	3	50	0.129 J	0.238	LTA3M2	0.177	0.164	0.231 V	0.0223 U	0.238	LTA3M2	0.0965	0.0764 JV	0.22 V
Oxychlordane	µg/kg-Wet	6	6	100	0.169 J	0.616	LTMC1	0.375	0.302 JV	0.616 V	0.169 J	0.616	LTMC1	0.375	0.302 JV	0.616 V
Total Chlordanes	µg/kg-Wet	6	6	100	12.5 JT	29.3 JT	LT002	20.1	19.2 JV	28.8 JV	12.5 JT	29.3 JT	LT002	20.1	19.2 JV	28.8 JV
Total Endosulfan	µg/kg-Wet	6	6	100	0.715 JT	2.82 T	LTMC1	1.79	1.78 JV	2.79 V	0.715 JT	2.82 T	LTMC1	1.79	1.78 JV	2.79 V
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	6	6	100	15.1 T	68.8 T	LTMC1	37.9	35.1 V	61.1 V	15.1 T	68.8 T	LTMC1	37.9	35.1 V	61.1 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	42.3 T	121 T	LTMC1	79.1	79.7 V	111 V	42.3 T	121 T	LTMC1	79.1	79.7 V	111 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	6	6	100	24 T	41 T	LTMC1	35.1	37.3 V	40.5 V	24 T	41 T	LTMC1	35.1	37.3 V	40.5 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	6	6	100	2.95 T	11.4 T	LTMC1	6.22	5.87 V	10.5 V	2.95 T	11.4 T	LTMC1	6.22	5.87 V	10.5 V
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	38.8 T	103 T	LTMC1	69.5	70.2 V	95.7 V	38.8 T	103 T	LTMC1	69.5	70.2 V	95.7 V
trans-Chlordane	µg/kg-Wet	6	6	100	2.85	6.83	LTA3M2	4.84	4.85 V	6.75 V	2.85	6.83	LTA3M2	4.84	4.85 V	6.75 V
trans-Nonachlor	µg/kg-Wet	6	6	100	4.33	9.68	LT002	6.2	5.63 V	9.16 V	4.33	9.68	LT002	6.2	5.63 V	9.16 V
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	3	3	100	1.8 J	3.4	LTAC2	2.6	2.5	3.3 V	1.8 J	3.4	LTAC2	2.6	2.5	3.3 V
Acenaphthene	µg/kg-Wet	3	3	100	2	24	LTAC2	16	21	24 V	2	24	LTAC2	16	21	24 V
Acenaphthylene	µg/kg-Wet	3	3	100	2.6	3.9	LTMC1	3.3	3.3	3.8 V	2.6	3.9	LTMC1	3.3	3.3	3.8 V
Anthracene	µg/kg-Wet	3	3	100	12	40	LTMC1	24	20	38 V	12	40	LTMC1	24	20	38 V
Benzo(a)anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.19 U	1 U	LTA3M2	0.33	0.4 U	0.49 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Benzo(a)pyrene	µg/kg-Wet	3	1	33	0.47 J	0.47 J	LTAC2	0.47	0.47 J	0.47 J	0.22 U	0.47 J	LTAC2	0.23	0.11 U	0.43 JV
Benzo(b)fluoranthene	µg/kg-Wet	3	2	67	0.25 J	0.7 J	LTAC2	0.48	0.48 JV	0.68 JV	0.2 U	0.7 J	LTAC2	0.35	0.25 J	0.66 JV
Benzo(g,h,i)perylene	µg/kg-Wet	3	1	33	0.5 J	0.5 J	LTAC2	0.5	0.5 J	0.5 J	0.2 U	0.5 J	LTAC2	0.23	0.1 U	0.46 JV
Benzo(k)fluoranthene	µg/kg-Wet	3	1	33	0.26 J	0.26 J	LTAC2	0.26	0.26 J	0.26 J	0.19 U	0.26 J	LTAC2	0.15	0.095 U	0.24 JV
Chrysene	µg/kg-Wet	3	2	67	0.24 J	0.27 J	LTMC1	0.26	0.26 JV	0.27 JV	0.17 U	0.27 J	LTMC1	0.2	0.24 J	0.27 JV
Dibenzo(a,h)anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.28 U	0.28 U	LTA3M2; LTAC2; LTMC1	0.14	0.14 U	0.14 UV
Fluoranthene	µg/kg-Wet	3	3	100	4.8	85	LTAC2	42	35	80 V	4.8	85	LTAC2	42	35	80 V
Fluorene	µg/kg-Wet	3	3	100	4.1	20	LTAC2; LTMC1	15	20	20 V	4.1	20	LTAC2; LTMC1	15	20	20 V
High Molecular Weight PAH	µg/kg-Wet	3	3	100	7.8 JT	160 JT	LTAC2	75	56 JT	150 JV	7.8 JT	160 JT	LTAC2	75	56 JT	150 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	3	2	67	0.22 J	0.44 J	LTAC2	0.33	0.33 JV	0.43 JV	0.2 U	0.44 J	LTAC2	0.25	0.22 J	0.42 JV
Low Molecular Weight PAH	µg/kg-Wet	3	3	100	40 T	190 JT	LTMC1	120	120 T	180 JV	40 T	190 JT	LTMC1	120	120 T	180 JV
Naphthalene	µg/kg-Wet	3	3	100	2.6	3.7	LTAC2	3.2	3.2	3.7 V	2.6	3.7	LTAC2	3.2	3.2	3.7 V
Phenanthrene	µg/kg-Wet	3	3	100	14	96	LTMC1	51	43	91 V	14	96	LTMC1	51	43	91 V
Pyrene	µg/kg-Wet	3	3	100	2.8	68	LTAC2	30	20	63 V	2.8	68	LTAC2	30	20	63 V
Total BaPEq	µg/kg-Wet	3	3	100	0.00024 JT	0.587 JT	LTAC2	0.212	0.0473 JT	0.533 JV	0.00024 JT	0.587 JT	LTAC2	0.212	0.0473 JT	0.533 JV
Total cPAHs	µg/kg-Wet	3	3	100	0.24 JT	1.9 JT	LTAC2	0.96	0.74 JT	1.8 JV	0.24 JT	1.9 JT	LTAC2	0.96	0.74 JT	1.8 JV
Total PAHs	µg/kg-Wet	3	3	100	48 JT	270 JT	LTAC2	190	240 JT	270 JV	48 JT	270 JT	LTAC2	190	240 JT	270 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	1	1	100	170 J	170 J	LTAC2	170	170 J	170 J	170 J	170 J	LTAC2	170	170 J	170 J
Butylbenzyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	7.3 U	7.3 U	LTAC2	3.7	3.7 U	3.7 U
Dibutyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	16 U	16 U	LTAC2	8	8 U	8 U
Diethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	660 U	660 U	LTAC2	330	330 U	330 U
Dimethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	7.7 U	7.7 U	LTAC2	3.9	3.9 U	3.9 U
Di-n-octyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	LTAC2	5.5	5.5 U	5.5 U
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	9.8 U	9.8 U	LTAC2	4.9	4.9 U	4.9 U
1,2-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	LTAC2	5.5	5.5 U	5.5 U
1,3-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	LTAC2	5.5	5.5 U	5.5 U
1,4-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	LTAC2	5.5	5.5 U	5.5 U
Benzyl alcohol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	22 U	22 U	LTAC2	11	11 U	11 U
Hexachlorobenzene	µg/kg-Wet	6	6	100	1.25	4.62	LTA3M2	2.84	2.82 V	4.48 V	1.25	4.62	LTA3M2	2.84	2.82 V	4.48 V
Hexachlorobutadiene	µg/kg-Wet	3	1	33.3	0.0962 J	0.0962 J	LTMC1	0.0962	0.0962 J	0.0962 J	0.0442 UJ	10 U	LTAC2	1.71	0.0962 J	4.51 JV
Hexachloroethane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	20 U	20 U	LTAC2	10	10 U	10 U
N-Nitrosodiphenylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	6.6 U	6.6 U	LTAC2	3.3	3.3 U	3.3 U
Phenols																
2,4-Dimethylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	19 U	19 U	LTAC2	9.5	9.5 U	9.5 U
2-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.2 U	8.2 U	LTAC2	4.1	4.1 U	4.1 U
4-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	7.7 U	7.7 U	LTAC2	3.9	3.9 U	3.9 U
Pentachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	30 U	30 U	LTAC2	15	15 U	15 U
Phenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	45 U	45 U	LTAC2	23	23 U	23 U
Largescale sucker (whole body)																
Conventionals																
Lipids	percent-Wet	6	6	100	5.4 T	8.7 T	03R014	7.56	7.85 V	8.68 V	5.4 T	8.7 T	03R014	7.56	7.85 V	8.68 V
Total solids	percent-Wet	6	6	100	26.6	30.3	03R014	28.8	29 V	30.2 V	26.6	30.3	03R014	28.8	29 V	30.2 V
Metals																
Aluminum	mg/kg-Wet	6	6	100	76.9 J	154 J	08R010	127	137 JV	153 JV	76.9 J	154 J	08R010	127	137 JV	153 JV
Antimony	mg/kg-Wet	6	6	100	0.001 J	0.003 J	03R014; 09R006	0.00225	0.00225 JV	0.003 JV	0.001 J	0.003 J	03R014; 09R006	0.00225	0.00225 JV	0.003 JV
Arsenic	mg/kg-Wet	6	6	100	0.18	0.27	03R014; 05R006	0.233	0.228 V	0.27 V	0.18	0.27	03R014; 05R006	0.233	0.228 V	0.27 V
Cadmium	mg/kg-Wet	6	6	100	0.015 J	0.0325 JT	08R010	0.0206	0.0185 JV	0.0301 JV	0.015 J	0.0325 JT	08R010	0.0206	0.0185 JV	0.0301 JV
Chromium	mg/kg-Wet	6	6	100	0.38	2.77 T	08R010	1.12	0.69 V	2.52 V	0.38	2.77 T	08R010	1.12	0.69 V	2.52 V
Copper	mg/kg-Wet	6	6	100	0.735	1.1 T	08R010	0.901	0.907 V	1.05 V	0.735	1.1 T	08R010	0.901	0.907 V	1.05 V
Lead	mg/kg-Wet	6	6	100	0.064	0.191 T	08R010	0.122	0.114 V	0.187 V	0.064	0.191 T	08R010	0.122	0.114 V	0.187 V
Manganese	mg/kg-Wet	6	6	100	10.7 J	13.4 J	05R006	12.2	12.1 JV	13.3 JV	10.7 J	13.4 J	05R006	12.2	12.1 JV	13.3 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Mercury	mg/kg-Wet	6	6	100	0.045	0.085	07R009	0.0677	0.0725 V	0.0835 V	0.045	0.085	07R009	0.0677	0.0725 V	0.0835 V
Nickel	mg/kg-Wet	6	6	100	0.29	0.81	09R006	0.463	0.395 V	0.749 V	0.29	0.81	09R006	0.463	0.395 V	0.749 V
Selenium	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.3 U	0.3 U	03R014; 05R006; 07R009; 08R010; 09R006	0.15	0.15 UV	0.15 UV
Silver	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.0003 UJ	0.0074 UJ	03R014; 09R006	0.00267	0.00323 UJV	0.0037 UJV
Thallium	mg/kg-Wet	6	6	100	0.0015 J	0.0038 J	03R014	0.00248	0.0024 JV	0.00363 JV	0.0015 J	0.0038 J	03R014	0.00248	0.0024 JV	0.00363 JV
Zinc	mg/kg-Wet	6	6	100	17.1	19.7 T	08R010	17.9	17.8 V	19.3 V	17.1	19.7 T	08R010	17.9	17.8 V	19.3 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	78 U	07R009	15	11 UV	36 UV
Aroclor 1221	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	140 U	07R009	22	11 UV	61 UV
Aroclor 1232	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	150 U	07R009	24	11 UV	67 UV
Aroclor 1242	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	120 U	07R009	21	11 UJV	54 UV
Aroclor 1248	µg/kg-Wet	6	4	67	45	1400 J	03R014	480	240 V	1200 JV	45	1400 J	03R014	360	150 V	1100 JV
Aroclor 1254	µg/kg-Wet	6	0	0	--	--	--	--	--	--	61 U	1500 UJ	03R014	310	220 UV	680 UJV
Aroclor 1260	µg/kg-Wet	6	6	100	50	1400	07R009	500	380 V	1200 JV	50	1400	07R009	500	380 V	1200 JV
Aroclor 1262	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 UJ	03R014; 07R009	8.4	3.8 UV	19 UJV
Aroclor 1268	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.9 U	38 UJ	03R014; 07R009	8.4	3.8 UV	19 UJV
Aroclors	µg/kg-Wet	6	6	100	95 T	2020 JT	03R014	819	540 V	1870 JV	95 T	2020 JT	03R014	819	540 V	1870 JV
Total PCBs[d]																
Total PCBs	µg/kg-Wet	6	6	100	95 T	2020 JT	03R014	819	540 V	1870 JV	95 T	2020 JT	03R014	819	540 V	1870 JV
Pesticides																
2,4'-DDD	µg/kg-Wet	6	2	33	16 NJ	40 T	08R010	28	28 JV	39 JV	7.8 U	40 T	08R010	12	4.3 UV	34 JV
2,4'-DDE	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	7.5 UT	07R009	2.3	2 UV	3.7 UV
2,4'-DDT	µg/kg-Wet	6	3	50	9.3 NJ	50 T	08R010	24	14 NJ	46 JV	6.9 UT	50 T	08R010	14	6.4 JV	41 JV
4,4'-DDD	µg/kg-Wet	6	6	100	20	150 T	08R010	54.4	36 JV	127 V	20	150 T	08R010	54.4	36 JV	127 V
4,4'-DDE	µg/kg-Wet	6	6	100	79	185 T	08R010	121	106 JV	179 V	79	185 T	08R010	121	106 JV	179 V
4,4'-DDT	µg/kg-Wet	6	5	83.3	17 JT	245 T	08R010	70.4	31 T	202 JV	6.3 UT	245 T	08R010	59.2	29 V	192 JV
Aldrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	13 UT	07R009	2.5	2 UV	5.4 UV
alpha-Endosulfan	µg/kg-Wet	6	1	17	11 N	11 N	03R014	11	11 N	11 N	1.4 U	20 U	07R009	4.6	2 UV	11 V
alpha-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	6.4 UT	07R009	2	2 UV	2.9 UV
beta-Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.2 U	15 UT	07R009	2.7	2 UV	6.1 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	3.3 UJ	8.5 UT	07R009	2.3	2 UV	3.7 UV
cis-Chlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	2 U	20 U	07R009	3.2	2 UV	8 UV
cis-Nonachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.1 UT	17 U	03R014	4.7	3.6 UV	7.8 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	7.3 UT	07R009	2	2 UV	3.2 UV
Dieldrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	14 UT	03R014; 07R009	3.8	3.1 UV	7 UV
Endosulfan sulfate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.3 U	12 UT	07R009	2.4	2 UV	5 UV
Endrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	31 UT	03R014	5.3	2 UV	14 UV
Endrin aldehyde	µg/kg-Wet	6	0	0	--	--	--	--	--	--	2 U	8.5 UT	07R009	2.2	2 UV	3.7 UV
Endrin ketone	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	7.5 UT	07R009	2	2 UV	3.3 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	6	1	17	4.5 NJ	4.5 NJ	03R014	4.5	4.5 NJ	4.5 NJ	3.5 U	9.6 UT	07R009	2.8	2 UV	4.7 JV
Heptachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	13 UT	07R009	2.5	2 UV	5.4 UV
Heptachlor epoxide	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	8 UT	07R009	2.1	2 UV	3.5 UV
Methoxychlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	2.5 U	4.8 UT	03R014; 07R009; 08R010	2.1	2.2 UV	2.4 UV
Mirex	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	6.2 UT	07R009	1.9	2 UV	2.8 UV
Oxychlordane	µg/kg-Wet	6	1	17	2.3 N	2.3 N	05R006	2.3	2.3 N	2.3 N	2.3 N	20 UT	07R009	3.4	2 UV	8.1 V
Total Chlordanes	µg/kg-Wet	6	2	33	8.6 NJT	9.6 NJT	03R014	9.1	9.1 JV	9.6 JV	7.1 UT	20 UT	07R009	7	7.1 JV	9.9 JV
Total Endosulfan	µg/kg-Wet	6	1	17	11 NT	11 NT	03R014	11	11 NT	11 NT	1.4 UT	20 UT	07R009	4.6	2 UV	11 V
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	6	6	100	27.5 JT	190 T	08R010	63.8	38.5 JV	157 V	27.5 JT	190 T	08R010	63.8	38.5 JV	157 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	143 JT	670 T	08R010	256	177 JV	557 JV	143 JT	670 T	08R010	256	177 JV	557 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	6	6	100	79 T	185 T	08R010	121	106 JV	179 V	79 T	185 T	08R010	121	106 JV	179 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	6	5	83.3	17 JT	295 T	08R010	85.1	36.3 NJT	245 JV	6.9 UT	295 T	08R010	71.5	33.7 JV	233 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	126 T	580 T	08R010	235	170 JV	490 JV	126 T	580 T	08R010	235	170 JV	490 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Toxaphene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	200 U	3500 U	07R009	580	350 UV	1500 UV
trans-Chlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1 U	8.4 UT	03R014; 07R009	2.5	2 UV	4.2 UV
trans-Nonachlor	µg/kg-Wet	6	2	33	6.3 NJ	9.6 NJ	03R014	8	8 JV	9.4 JV	4 UT	11 UT	07R009; 09R006	5.6	5.5 UV	8.8 JV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	6	1	17	49 T	49 T	07R009	49	49 T	49 T	26 UT	49 T	07R009	20	16 UV	41 V
Acenaphthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	65 UT	07R009	18	16 UV	29 UV
Acenaphthylene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Benzo(a)anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Benzo(a)pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Benzo(b)fluoranthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Benzo(g,h,i)perylene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Benzo(k)fluoranthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Chrysene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Fluoranthene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Fluorene	µg/kg-Wet	6	2	33	42 JT	44 JT	07R009	43	43 JV	44 JV	26 UT	44 JT	07R009	24	16 UV	44 JV
High Molecular Weight PAH	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Low Molecular Weight PAH	µg/kg-Wet	6	2	33.3	42 JT	147 JT	07R009	94.5	94.5 JV	142 JV	26 UT	147 JT	07R009	41.1	15.8 UV	121 JV
Naphthalene	µg/kg-Wet	6	1	17	54 T	54 T	07R009	54	54 T	54 T	26 UT	54 T	07R009	21	16 UV	45 V
Phenanthrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Pyrene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Total BaPEq	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14.4	14 UV	16.4 UV
Total cPAHs	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Total PAHs	µg/kg-Wet	6	2	33.3	42 JT	147 JT	07R009	94.5	94.5 JV	142 JV	26 UT	147 JT	07R009	41.1	15.8 UV	121 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	6	2	33	800 T	3000 JT	08R010	1900	1900 JV	2900 JV	78 UT	3000 JT	08R010	660	49 UV	2500 JV
Butylbenzyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	260 U	330 U	03R014	140	140 UV	160 UV
Dibutyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	260 U	520 U	03R014	160	140 UV	240 UV
Diethyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 U	1600 U	03R014	190	70 UV	620 UV
Dimethyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 U	170 U	03R014	73	70 UV	84 UV
Di-n-octyl phthalate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	260 U	1100 U	03R014	210	140 UV	450 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
1,2-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
1,2-Diphenylhydrazine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 U	33 U	03R014	14	14 UV	16 UV
1,3-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
1,4-Dichlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
2,4-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	66 UT	03R014	17	14 UV	29 UV
2,6-Dinitrotoluene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
2-Chloronaphthalene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
2-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	650 U	830 U	03R014	360	350 UV	410 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1300 U	1700 U	03R014	730	700 UV	840 UV
3-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	650 U	830 U	03R014	360	350 UV	410 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
4-Chloroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 UT	170 UT	03R014	73	70 UV	84 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	65 UT	83 UT	03R014	36	35 UV	41 UV
4-Nitroaniline	µg/kg-Wet	6	0	0	--	--	--	--	--	--	650 U	830 U	03R014	360	350 UV	410 UV
Azobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 U	170 U	03R014	73	70 UV	84 UV
Benzyl alcohol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	260 U	330 U	03R014	140	140 UV	160 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 U	170 U	03R014	73	70 UV	84 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 U	170 U	03R014	73	70 UV	84 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	95 UT	09R006	20	16 UV	40 UV
Carbazole	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Dibenzofuran	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	39 UT	05R006	17	17 UV	19 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Hexachlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	32 UT	05R006	4.5	2 UV	13 UV
Hexachlorobutadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1.1 UJT	4.6 UT	07R009	1.8	2 UV	2.2 UV
Hexachlorocyclopentadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	650 U	830 U	03R014	360	350 UV	410 UV
Hexachloroethane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	2.6 UJT	33 UT	03R014	6.6	6.5 UV	14 UV
Nitrobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
N-Nitrosodimethylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 UJT	170 UJT	03R014	73	70 UJV	84 UJV
N-Nitrosodiphenylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 U	170 U	03R014	73	70 UV	84 UV
N-Nitrosodipropylamine	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1300 U	1700 U	03R014	730	700 UV	840 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1300 U	1700 U	03R014	730	700 UV	840 UV
2,4,5-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	650 U	830 U	03R014	360	350 UV	410 UV
2,4,6-Trichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
2,4-Dichlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
2,4-Dimethylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	390 U	500 U	03R014	220	210 UV	250 UV
2,4-Dinitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	2600 UJ	3300 U	03R014	1400	1400 UJV	1600 UJV
2-Chlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
2-Methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 U	170 U	03R014	73	70 UV	84 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	2600 U	3300 U	03R014	1400	1400 UV	1600 UV
4-Chloro-3-methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	260 U	330 U	03R014	140	140 UV	160 UV
4-Methylphenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	26 UT	33 UT	03R014	14	14 UV	16 UV
4-Nitrophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	1300 U	1700 U	03R014	730	700 UV	840 UV
Pentachlorophenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	130 UT	170 UT	03R014	73	70 UV	84 UV
Phenol	µg/kg-Wet	6	0	0	--	--	--	--	--	--	260 U	330 U	03R014	140	140 UV	160 UV
Northern pikeminnow (whole body)																
Conventionals																
Lipids	percent-Wet	6	6	100	2.3 T	8.1 T	03R014	5.3	5.2 V	7.7 V	2.3 T	8.1 T	03R014	5.3	5.2 V	7.7 V
Total solids	percent-Wet	6	6	100	25.6	31.6	08R010	28.1	27.8 V	31 V	25.6	31.6	08R010	28.1	27.8 V	31 V
Metals																
Aluminum	mg/kg-Wet	6	3	50	1.4 J	2.8 J	09R006	1.9	1.5 J	2.7 JV	0.7 UJT	2.8 J	09R006	1.2	0.95 JV	2.5 JV
Antimony	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.001 U	0.002 U	03R014; 05R006	0.000667	0.0005 UV	0.001 UV
Arsenic	mg/kg-Wet	6	6	100	0.19	0.36 T	03R014	0.26	0.23 V	0.36 V	0.19	0.36 T	03R014	0.26	0.23 V	0.36 V
Cadmium	mg/kg-Wet	6	6	100	0.007 J	0.012 J	05R006	0.00975	0.01 JV	0.0119 JV	0.007 J	0.012 J	05R006	0.00975	0.01 JV	0.0119 JV
Chromium	mg/kg-Wet	6	5	83	0.09 J	0.67	07R009	0.4	0.55	0.66 V	0.08 U	0.67	07R009	0.34	0.33 JV	0.65 V
Copper	mg/kg-Wet	6	6	100	0.575 T	0.89	09R006	0.661	0.6 V	0.848 V	0.575 T	0.89	09R006	0.661	0.6 V	0.848 V
Lead	mg/kg-Wet	6	4	66.7	0.008	0.016	07R009	0.0118	0.0115 V	0.0157 V	0.005 UT	0.016	07R009	0.00883	0.0085 V	0.0155 V
Manganese	mg/kg-Wet	6	6	100	1.05 J	1.97 J	08R010	1.59	1.6 JV	1.95 JV	1.05 J	1.97 J	08R010	1.59	1.6 JV	1.95 JV
Mercury	mg/kg-Wet	6	6	100	0.146 T	0.494	07R009	0.28	0.25 V	0.468 V	0.146 T	0.494	07R009	0.28	0.25 V	0.468 V
Nickel	mg/kg-Wet	6	6	100	0.119 J	0.461 J	07R009	0.259	0.246 JV	0.422 JV	0.119 J	0.461 J	07R009	0.259	0.246 JV	0.422 JV
Selenium	mg/kg-Wet	6	2	33	0.3	0.4	03R014	0.35	0.35 V	0.4 V	0.3	0.4	03R014	0.22	0.15 UV	0.38 V
Silver	mg/kg-Wet	6	0	0	--	--	--	--	--	--	0.0013 U	0.0052 U	05R006	0.00108	0.000775 UV	0.00219 UV
Thallium	mg/kg-Wet	6	5	83.3	0.0018 J	0.004 J	03R014	0.00267	0.0026 J	0.00377 JV	0.0012 U	0.004 J	03R014	0.00233	0.00235 JV	0.00371 JV
Zinc	mg/kg-Wet	6	6	100	16.4	20	08R010	18	17.9 V	19.9 V	16.4	20	08R010	18	17.9 V	19.9 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.6 U	36 U	07R009	9.8	9.5 UV	17 UV
Aroclor 1221	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.6 U	79 U	07R009	17	9.5 UV	38 UV
Aroclor 1232	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.6 U	62 U	07R009	13	9.5 UV	28 UV
Aroclor 1242	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.6 U	44 U	07R009	11	9.5 UV	21 UV
Aroclor 1248	µg/kg-Wet	6	4	67	150	170	09R006	160	160 V	170 V	150	170	08R010; 09R006	130	150 V	170 V
Aroclor 1254	µg/kg-Wet	6	0	0	--	--	--	--	--	--	270 U	940 U	07R009	230	200 UV	410 UV
Aroclor 1260	µg/kg-Wet	6	6	100	220	1800	07R009	730	620 V	1600 V	220	1800	07R009	730	620 V	1600 V
Aroclor 1262	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.6 U	36 U	07R009	9	9.5 UV	16 UV
Aroclor 1268	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.6 U	36 U	07R009	9	9.5 UV	16 UV
Aroclors	µg/kg-Wet	6	6	100	370 T	1800 T	07R009	833	690 V	1600 V	370 T	1800 T	07R009	833	690 V	1600 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total PCBs[d]																
Total PCBs	µg/kg-Wet	6	6	100	370 T	1800 T	07R009	833	690 V	1600 V	370 T	1800 T	07R009	833	690 V	1600 V
Pesticides																
2,4'-DDD	µg/kg-Wet	6	1	17	29 T	29 T	07R009	29	29 T	29 T	4.5 UT	29 T	07R009	8	4.3 UV	23 V
2,4'-DDE	µg/kg-Wet	6	1	17	53 T	53 T	07R009	53	53 T	53 T	4 UT	53 T	07R009	12	3.8 UV	41 V
2,4'-DDT	µg/kg-Wet	6	1	17	91 T	91 T	07R009	91	91 T	91 T	6.9 UT	91 T	07R009	19	3.5 UV	71 V
4,4'-DDD	µg/kg-Wet	6	5	83.3	17 NJ	48 T	05R006	38.9	43 T	47.6 V	6.1 UT	48 T	05R006	32.9	41.8 V	47.5 V
4,4'-DDE	µg/kg-Wet	6	6	100	82	545 T	07R009	252	218 V	485 V	82	545 T	07R009	252	218 V	485 V
4,4'-DDT	µg/kg-Wet	6	1	17	53 J	53 J	08R010	53	53 J	53 J	6.3 UT	53 J	08R010	11	3.2 UV	41 JV
Aldrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	13 UT	07R009	4.2	4.9 UV	6.1 UV
alpha-Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 U	19 U	07R009	4.7	4.9 UV	8.4 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.1	3.2 UV	4.5 UV
beta-Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	15 UT	07R009	4.4	4.9 UV	6.9 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.6	4.3 UV	4.7 UV
cis-Chlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	6.4 U	19 U	07R009	5.4	5 UV	8.4 UV
cis-Nonachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	7.1 UT	9.8 U	08R010	3.8	3.6 UV	4.6 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.3	3.7 UV	4.6 UV
Dieldrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4.9 UT	14 UT	03R014; 07R009	5.2	5 UV	7 UV
Endosulfan sulfate	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	12 UT	07R009	4.1	4.9 UV	5.8 UV
Endrin	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	19 UT	07R009	4.7	4.9 UV	8.4 UV
Endrin aldehyde	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.6	4.3 UV	4.7 UV
Endrin ketone	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.4	3.8 UV	4.6 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.9	4.8 UV	4.9 UV
Heptachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	13 UT	07R009	4.2	4.9 UV	6.1 UV
Heptachlor epoxide	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.5	4 UV	4.7 UV
Methoxychlor	µg/kg-Wet	6	1	17	17 JT	17 JT	05R006	17	17 JT	17 JT	4.8 UT	17 JT	05R006	5.3	2.4 UV	14 JV
Mirex	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3	3.1 UV	4.5 UV
Oxychlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	19 UT	07R009	4.7	4.9 UV	8.4 UV
Total Chlordanes	µg/kg-Wet	6	0	0	--	--	--	--	--	--	11 UT	19 UT	07R009	6.4	5.5 UV	8.9 UV
Total Endosulfan	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	19 UT	07R009	4.7	4.9 UV	8.4 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	6	5	83.3	17 NJT	72 T	07R009	44.7	46 T	67.2 V	8.6 UT	72 T	07R009	38	43.3 V	66 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	145 T	761 T	07R009	322	261 V	659 V	145 T	761 T	07R009	322	261 V	659 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	6	6	100	82 T	598 T	07R009	261	218 V	525 V	82 T	598 T	07R009	261	218 V	525 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	6	2	33	53 JT	91 T	07R009	72	72 JV	89 JV	6.9 UT	91 T	07R009	26	3.5 UV	82 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	6	6	100	145 T	588 T	07R009	293	261 V	529 V	145 T	588 T	07R009	293	261 V	529 V
Toxaphene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	730 U	2300 U	07R009	620	580 UV	1000 UV
trans-Chlordane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.6	4.2 UV	4.7 UV
trans-Nonachlor	µg/kg-Wet	6	0	0	--	--	--	--	--	--	11 UT	14 U	08R010	5.8	5.5 UV	6.6 UV
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UT	9.8 U	08R010	3.1	3.2 UV	4.5 UV
Hexachlorobutadiene	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UJT	9.8 UJ	08R010	2.6	2.3 UV	4.3 UJV
Hexachloroethane	µg/kg-Wet	6	0	0	--	--	--	--	--	--	4 UJT	13 UT	07R009	4.4	4.9 UJV	6.1 UJV
Peamouth (whole body)																
Conventionals																
Lipids	percent-Wet	4	4	100	6.93 T	10.7 T	05R006	8.93	9.05 V	10.6 V	6.93 T	10.7 T	05R006	8.93	9.05 V	10.6 V
Total solids	percent-Wet	4	4	100	28.8	30.7	05R006	29.8	29.9 V	30.6 V	28.8	30.7	05R006	29.8	29.9 V	30.6 V
Metals																
Aluminum	mg/kg-Wet	4	4	100	15.1 J	185	03R014	109	118 V	184 V	15.1 J	185	03R014	109	118 V	184 V
Antimony	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.003 U	0.005 U	08R010; 09R006	0.002	0.002 UV	0.0025 UV
Arsenic	mg/kg-Wet	4	4	100	0.35	0.48	08R010	0.43	0.44 V	0.48 V	0.35	0.48	08R010	0.43	0.44 V	0.48 V
Cadmium	mg/kg-Wet	4	4	100	0.021	0.053	09R006	0.032	0.027 V	0.0493 V	0.021	0.053	09R006	0.032	0.027 V	0.0493 V
Chromium	mg/kg-Wet	4	3	75	0.2	0.49	03R014	0.3	0.21	0.46 V	0.09 U	0.49	03R014	0.24	0.21 V	0.45 V
Copper	mg/kg-Wet	4	4	100	0.73	1.61	03R014	1.21	1.25 V	1.59 V	0.73	1.61	03R014	1.21	1.25 V	1.59 V
Lead	mg/kg-Wet	4	4	100	0.031	10.6	03R014	2.7	0.079 V	9.03 V	0.031	10.6	03R014	2.7	0.079 V	9.03 V
Manganese	mg/kg-Wet	4	4	100	2.91 J	11.1 J	05R006	6.68	6.35 JV	10.7 JV	2.91 J	11.1 J	05R006	6.68	6.35 JV	10.7 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Mercury	mg/kg-Wet	4	4	100	0.031	0.054	09R006	0.0383	0.034 V	0.0512 V	0.031	0.054	09R006	0.0383	0.034 V	0.0512 V
Nickel	mg/kg-Wet	4	4	100	0.27 J	0.482 J	03R014	0.386	0.397 JV	0.477 JV	0.27 J	0.482 J	03R014	0.386	0.397 JV	0.477 JV
Selenium	mg/kg-Wet	4	4	100	0.3	0.4	03R014; 05R006	0.35	0.35 V	0.4 V	0.3	0.4	03R014; 05R006	0.35	0.35 V	0.4 V
Silver	mg/kg-Wet	4	0	0	--	--	--	--	--	--	0.001 U	0.0043 U	03R014	0.00166	0.002 UV	0.00214 UV
Thallium	mg/kg-Wet	4	4	100	0.0073	0.0093	05R006	0.00828	0.00825 V	0.00929 V	0.0073	0.0093	05R006	0.00828	0.00825 V	0.00929 V
Zinc	mg/kg-Wet	4	4	100	23.1	25.2	08R010	24.1	24.1 V	25.1 V	23.1	25.2	08R010	24.1	24.1 V	25.1 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	05R006; 09R006	2.9	2.9 UV	4.8 UV
Aroclor 1221	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	05R006; 09R006	2.9	2.9 UV	4.8 UV
Aroclor 1232	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	05R006; 09R006	2.9	2.9 UV	4.8 UV
Aroclor 1242	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	05R006; 09R006	2.9	2.9 UV	4.8 UV
Aroclor 1248	µg/kg-Wet	4	4	100	64	150	09R006	91	74 V	140 V	64	150	09R006	91	74 V	140 V
Aroclor 1254	µg/kg-Wet	4	0	0	--	--	--	--	--	--	110 U	180 U	09R006	66	60 UV	86 UV
Aroclor 1260	µg/kg-Wet	4	4	100	68	140	09R006	97	90 V	140 V	68	140	09R006	97	90 V	140 V
Aroclor 1262	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	05R006; 09R006	2.9	2.9 UV	4.8 UV
Aroclor 1268	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.9 U	9.5 U	05R006; 09R006	2.9	2.9 UV	4.8 UV
Aroclors	µg/kg-Wet	4	4	100	138 T	290 T	09R006	187	161 V	273 V	138 T	290 T	09R006	187	161 V	273 V
Total PCBs[d]																
Total PCBs	µg/kg-Wet	4	4	100	138 T	290 T	09R006	187	161 V	273 V	138 T	290 T	09R006	187	161 V	273 V
Pesticides																
2,4'-DDD	µg/kg-Wet	4	0	0	--	--	--	--	--	--	4 UT	8.6 UT	05R006	2.8	2.5 UV	4.1 UV
2,4'-DDE	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	2.1 UT	09R006	0.73	0.68 UV	1 UV
2,4'-DDT	µg/kg-Wet	4	1	25	5.7 JT	5.7 JT	03R014	5.7	5.7 JT	5.7 JT	5.7 JT	6.9 UJT	05R006; 08R010; 09R006	4	3.5 UJV	5.4 JV
4,4'-DDD	µg/kg-Wet	4	4	100	11.1 T	29.5 T	09R006	22.5	24.8 JV	28.8 JV	11.1 T	29.5 T	09R006	22.5	24.8 JV	28.8 JV
4,4'-DDE	µg/kg-Wet	4	4	100	109 T	185 T	09R006	132	118 JV	176 JV	109 T	185 T	09R006	132	118 JV	176 JV
4,4'-DDT	µg/kg-Wet	4	2	50	6.4 JT	7 T	05R006	6.7	6.7 JV	7 JV	6.3 UJT	7 T	05R006	4.9	4.8 JV	6.9 JV
Aldrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1.7 UT	08R010	0.61	0.55 UV	0.81 UV
alpha-Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 U	1 U	03R014; 05R006; 08R010; 09R006	0.5	0.5 UV	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1 UT	03R014; 05R006; 08R010; 09R006	0.5	0.5 UV	0.5 UV
beta-Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1.2 UT	09R006	0.53	0.5 UV	0.59 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	2.4 UT	4.1 UT	03R014	1.6	1.6 UV	2 UV
cis-Chlordane	µg/kg-Wet	4	2	50	3.1 N	3.4 N	05R006	3.3	3.3 V	3.4 V	1.7 U	3.4 N	05R006	2.1	2.2 V	3.4 V
cis-Nonachlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	5.2 UT	7.1 UT	05R006; 09R006	3.1	3.2 UV	3.6 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.3 UT	2.2 UT	09R006	0.9	0.93 UV	1.1 UV
Dieldrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1.4 UT	3.3 UT	09R006	1.1	1 UV	1.6 UV
Endosulfan sulfate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1 UT	03R014; 05R006; 08R010; 09R006	0.5	0.5 UV	0.5 UV
Endrin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1 UT	03R014; 05R006; 08R010; 09R006	0.5	0.5 UV	0.5 UV
Endrin aldehyde	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1.6 UT	03R014	0.59	0.53 UV	0.76 UV
Endrin ketone	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJT	1 UJT	03R014; 05R006; 08R010; 09R006	0.5	0.5 UJV	0.5 UJV
gamma-Hexachlorocyclohexane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	3.3 UT	03R014	1.1	1 UV	1.6 UV
Heptachlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	2.3 UT	03R014	0.84	0.85 UV	1.1 UV
Heptachlor epoxide	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1 UT	03R014; 05R006; 08R010; 09R006	0.5	0.5 UV	0.5 UV
Methoxychlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	4.8 UT	05R006	1	0.63 UV	2.1 UV
Mirex	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1.2 UT	08R010	0.53	0.5 UV	0.59 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Oxychlordane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1 UT	03R014; 05R006; 08R010; 09R006	0.5	0.5 UV	0.5 UV
Total Chlordanes	µg/kg-Wet	4	2	50	3.1 NT	3.4 NT	05R006	3.3	3.3 V	3.4 V	3.1 NT	11 UT	03R014	3.7	3.3 V	5.2 V
Total Endosulfan	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	1.2 UT	09R006	0.53	0.5 UV	0.59 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	4	4	100	11.1 T	29.5 T	09R006	22.5	24.8 JV	28.8 JV	11.1 T	29.5 T	09R006	22.5	24.8 JV	28.8 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	132 JT	215 T	09R006	160	146 JV	205 JV	132 JT	215 T	09R006	160	146 JV	205 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	4	4	100	109 T	185 T	09R006	132	118 JV	176 JV	109 T	185 T	09R006	132	118 JV	176 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	4	2	50	7 T	12.1 JT	03R014	9.55	9.55 JV	11.8 JV	6.9 UJT	12.1 JT	03R014	6.5	5.23 JV	11.3 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	127 JT	215 T	09R006	159	146 JV	205 JV	127 JT	215 T	09R006	159	146 JV	205 JV
Toxaphene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	98 U	190 U	09R006	71	70 UV	92 UV
trans-Chlordane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UT	5.6 UT	09R006	1.3	0.95 UV	2.6 UV
trans-Nonachlor	µg/kg-Wet	4	0	0	--	--	--	--	--	--	3.6 UT	11 UT	03R014; 05R006; 09R006	4.6	5.5 UV	5.5 UV
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	4	3	75	5.7 NT	7.3 NT	03R014	6.2	5.7 NT	7.1 V	3.8 UT	7.3 NT	03R014	5.2	5.7 V	7.1 V
Hexachlorobutadiene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1 UJT	1 UJT	03R014; 05R006; 08R010; 09R006	0.5	0.5 UJV	0.5 UJV
Hexachloroethane	µg/kg-Wet	4	2	50	2.6 NJT	3.7 NJT	03R014	3.2	3.2 JV	3.6 JV	1 UJT	3.7 NJT	03R014	1.8	1.6 JV	3.5 JV
Sculpin (whole body)																
Conventionals																
Lipids	percent-Wet	42	42	100	2.2 T	6	03R001	4.11	4.1 V	5.5 V	2.2 T	6	03R001	4.11	4.1 V	5.5 V
Total solids	percent-Wet	42	42	100	20.8	27.2	06R004	24.6	24.8 V	26.5 V	20.8	27.2	06R004	24.6	24.8 V	26.5 V
Metals																
Aluminum	mg/kg-Wet	42	39	92.9	10.1 J	79.8 J	SP09W	23.7	21.7	37.1 JV	10.1 J	79.8 J	SP09W	23.1	21.6 JV	36.3 JV
Antimony	mg/kg-Wet	42	3	7.14	0.005 JT	0.025 J	SP09W	0.0117	0.005 JT	0.023 JV	0.001 U	0.025 J	SP09W	0.00212	0.001 UV	0.00498 JV
Arsenic	mg/kg-Wet	42	42	100	0.13	0.35	SP10W	0.22	0.22 V	0.33 V	0.13	0.35	SP10W	0.22	0.22 V	0.33 V
Cadmium	mg/kg-Wet	42	42	100	0.003 J	0.022	02R015	0.00776	0.0065 JV	0.0189 V	0.003 J	0.022	02R015	0.00776	0.0065 JV	0.0189 V
Chromium	mg/kg-Wet	42	26	62	0.1 J	0.6	SP09W	0.24	0.2 JV	0.4 V	0.07 U	0.6	SP09W	0.16	0.14 V	0.4 V
Copper	mg/kg-Wet	42	42	100	0.856 T	7.16	SP10W	1.67	1.26 V	3.76 V	0.856 T	7.16	SP10W	1.67	1.26 V	3.76 V
Lead	mg/kg-Wet	42	41	97.6	0.0149 J	0.96 J	04R002	0.105	0.056	0.255 J	0.0149 J	0.96 J	04R002	0.107	0.0575 V	0.252 JV
Manganese	mg/kg-Wet	42	42	100	1.66	5.79	02R015	2.65	2.46 V	3.87 V	1.66	5.79	02R015	2.65	2.46 V	3.87 V
Mercury	mg/kg-Wet	43	43	100	0.025	0.127 T	SP07E	0.0499	0.042	0.0859 V	0.025	0.127 T	SP07E	0.0499	0.042	0.0859 V
Nickel	mg/kg-Wet	42	36	85.7	0.153 T	1.01	SP04W	0.33	0.312 V	0.563 V	0.08 U	1.01	SP04W	0.291	0.296 V	0.478 V
Selenium	mg/kg-Wet	42	4	9.5	0.2	0.3	02R001; 02R015; 03R004	0.28	0.3 V	0.3 V	0.1 U	0.3	02R001; 02R015; 03R001; 03R004; 03R032; 03R034; 04R002; 04R003; 05R001; 05R020; 06R001; 06R002; 06R004; 08R001; 08R002; 08R003; SP04W; SP07E	0.13	0.13 UV	0.3 V
Silver	mg/kg-Wet	42	1	2.38	0.0067	0.0067	08R002	0.0067	0.0067	0.0067	0.0007 U	0.0067	08R002	0.00108	0.000875 UV	0.00179 UV
Thallium	mg/kg-Wet	42	41	97.6	0.002 J	0.0136	SP10W	0.00504	0.004 J	0.0124	0.0018 U	0.0136	SP10W	0.00494	0.004 JV	0.0124 V
Zinc	mg/kg-Wet	42	42	100	11.7	18	04R002; 09R001	15	15.2 V	17.5 V	11.7	18	04R002; 09R001	15	15.2 V	17.5 V
Butyltins																
Butyltin ion	µg/kg-Wet	16	0	0	--	--	--	--	--	--	0.55 U	0.74 U	SP04W	0.28	0.28 UV	0.3 UV
Dibutyltin ion	µg/kg-Wet	16	0	0	--	--	--	--	--	--	0.85 U	3.5 U	SP04W	0.59	0.43 UV	1.2 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Tetrabutyltin	µg/kg-Wet	16	0	0	--	--	--	--	--	--	2.2 U	2.2 U	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08E; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	1.1	1.1 UV	1.1 UV
Tributyltin ion	µg/kg-Wet	16	5	31	2.3 J	6.2 T	SP12WA	3.6	2.8 J	5.8 JV	1.8 U	6.2 T	SP12WA	1.7	0.9 UV	4.6 JV
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1.9 U	85 U	09R001	9.7	4.8 UV	29 UV
Aroclor 1221	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1.9 U	180 U	09R001	16	4.8 UV	64 UV
Aroclor 1232	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1.9 U	94 U	06R004	12	4.8 UV	42 UV
Aroclor 1242	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1.9 UJ	92 UJ	06R004	10	4.8 UJV	27 UJV
Aroclor 1248	µg/kg-Wet	26	19	73	27 T	2600	02R015	330	86 J	2000 JV	27 T	2600	02R015	260	83 JV	1500 JV
Aroclor 1254	µg/kg-Wet	26	0	0	--	--	--	--	--	--	50 UJ	2100 U	02R015	140	67 UJV	580 UJV
Aroclor 1260	µg/kg-Wet	26	26	100	62 J	2300	06R002	320	130 JV	740 V	62 J	2300	06R002	320	130 JV	740 V
Aroclor 1262	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1.9 UJ	38 UJ	02R001; 02R015; 03R034; 06R002; 06R004; 08R003; 09R001	7.9	4.8 UJV	19 UJV
Aroclor 1268	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1.9 UJ	38 UJ	02R001; 02R015; 03R034; 06R002; 06R004; 08R003; 09R001	7.9	4.8 UJV	19 UJV
Aroclors	µg/kg-Wet	26	26	100	62 JT	3360 T	02R015	562	266 JV	2320 JV	62 JT	3360 T	02R015	562	266 JV	2320 JV
PCB Congeners																
PCB001	pg/g-Wet	23	20	87	1.37 J	209 T	03R004	18.8	7.94 V	46.4 V	1.37 J	209 T	03R004	16.6	7.38	35.3 V
PCB002	pg/g-Wet	23	4	17.4	1.07 J	9.48 T	03R004	3.41	1.54 JV	8.3 JV	1.07 J	9.48 T	03R004	1.53	1.14 U	1.7 UV
PCB003	pg/g-Wet	23	2	8.7	2.28 J	28.1 T	03R004	15.2	15.2 JV	26.8 JV	1.42 U	28.1 T	03R004	2.9	1.92 U	2.43 UV
PCB004	pg/g-Wet	25	25	100	17 T	3290 T	03R004	611	207	2420 V	17 T	3290 T	03R004	611	207	2420 V
PCB005	pg/g-Wet	25	7	28	1.46 J	89.1 T	03R004	18.4	5.72 J	67.7 V	1.46 J	89.1 T	03R004	6.4	1.99 U	15.5 V
PCB006	pg/g-Wet	25	25	100	6.77 T	1140 T	03R004	105	31.3	306 V	6.77 T	1140 T	03R004	105	31.3	306 V
PCB007	pg/g-Wet	25	9	36	4.77 J	173 T	03R004	28.8	10.8	113 V	2.57 U	173 T	03R004	11.8	2.42 U	22.6 V
PCB008	pg/g-Wet	25	24	96	20.7	4870 T	03R004	395	103 V	1030 V	17.9 UT	4870 T	03R004	379	99.6	1020 V
PCB009	pg/g-Wet	25	19	76	4.43 J	361 T	03R004	36.6	9.51 J	126 V	3.49 U	361 T	03R004	28.3	6.23	89.8 V
PCB010	pg/g-Wet	25	22	88	4.23 J	261	06R002	38	10.6 V	162 V	2.93 U	261	06R002	33.7	8.6	151 V
PCB011	pg/g-Wet	25	12	48	33.7	208	SP01W	99.2	67.1 V	191 V	17.1 U	208	SP01W	57.6	27.9 U	176 JV
PCB012 & 013	pg/g-Wet	25	7	28	2.01 J	48 JT	03R004	12.8	6.54 J	37.5 JV	2.01 J	48 JT	03R004	5.32	2.45 U	12.6 JV
PCB014	pg/g-Wet	25	0	0	--	--	--	--	--	--	0.629 U	5.78 U	02R001	2.18	2.44 U	2.85 UV
PCB015	pg/g-Wet	25	11	44	9.07	787 T	03R004	99.6	28	434 V	3.64 U	787 T	03R004	46.2	6.6 U	74 V
PCB016	pg/g-Wet	25	24	96	20.8 T	5550 T	03R004	488	139 V	1350 V	20.8 T	5550 T	03R004	470	133	1310 V
PCB017	pg/g-Wet	25	25	100	47.3 T	8680 T	03R004	1300	335	6460 V	47.3 T	8680 T	03R004	1300	335	6460 V
PCB018 & 030	pg/g-Wet	25	25	100	76.7 T	17500 JT	03R004	1690	435	5130 JV	76.7 T	17500 JT	03R004	1690	435	5130 JV
PCB019	pg/g-Wet	25	23	92	76.5	14500	SP11E	1300	234	4860 V	11.1 UT	14500	SP11E	1190	225	4570 V
PCB020 & 028	pg/g-Wet	25	25	100	313 T	51500 JT	03R004	5670	1390 J	28900 JV	313 T	51500 JT	03R004	5670	1390 J	28900 JV
PCB021 & 033	pg/g-Wet	25	25	100	52.7 T	12400 JT	03R004	1070	285	3540 JV	52.7 T	12400 JT	03R004	1070	285	3540 JV
PCB022	pg/g-Wet	25	25	100	48 T	8770 T	03R004	732	190	2020 V	48 T	8770 T	03R004	732	190	2020 V
PCB023	pg/g-Wet	25	7	28	1.31	36.2 T	03R004	9.75	3.94	30.3 V	1.31	36.2 T	03R004	4.18	1.96 U	14.1 JV
PCB024	pg/g-Wet	25	18	72	1.73 JT	290 T	03R004	32.4	7.95 V	121 V	1.53 U	290 T	03R004	23.9	5.34 J	82.5 V
PCB025	pg/g-Wet	25	25	100	15.5 T	1560 T	03R004	199	55.6	1200 V	15.5 T	1560 T	03R004	199	55.6	1200 V
PCB026 & 029	pg/g-Wet	25	25	100	55.2 T	6340 JT	03R004	627	183 J	1910 JV	55.2 T	6340 JT	03R004	627	183 J	1910 JV
PCB027	pg/g-Wet	25	23	92	28.8	3430	SP11E	371	126	1340 V	7.92 UT	3430	SP11E	342	86.6	1260 V
PCB031	pg/g-Wet	25	25	100	161 T	24700 T	03R004	2010	537	4950 V	161 T	24700 T	03R004	2010	537	4950 V
PCB032	pg/g-Wet	25	25	100	33.3 T	5860 T	03R004	901	204	3900 V	33.3 T	5860 T	03R004	901	204	3900 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB034	pg/g-Wet	25	23	92	2.07 JT	108 T	03R004	18.8	8.1	55.1 V	2.07 JT	108 T	03R004	17.5	7.72	54.1 V
PCB035	pg/g-Wet	25	6	24	0.487	16.6	SP08W	6.49	4.5 JV	15.1 V	0.487	16.6	SP08W	3.19	2.39 J	9.66 V
PCB036	pg/g-Wet	25	2	8	0.825 J	198	09R002	99.4	99.4 JV	188 JV	0.825 J	198	09R002	10.4	2.74 U	3.62 UV
PCB037	pg/g-Wet	25	25	100	11.9 T	2240 T	03R004	188	46.5	698 V	11.9 T	2240 T	03R004	188	46.5	698 V
PCB038	pg/g-Wet	25	10	40	1.99 J	93.5	02R001	21.5	10.8 JV	68.2 V	1.67 U	93.5	02R001	9.57	2.15 U	36 V
PCB039	pg/g-Wet	25	21	84	1.97 JT	294	02R001	45	11.1	211 T	1.97 JT	294	02R001	38.4	10.6	193 V
PCB040 & 041 & 071	pg/g-Wet	25	25	100	112 T	35200 J	02R001	3840	755 J	14800 JV	112 T	35200 J	02R001	3840	755 J	14800 JV
PCB042	pg/g-Wet	25	25	100	51.6 T	15300	02R001	1700	277	7900 V	51.6 T	15300	02R001	1700	277	7900 V
PCB043	pg/g-Wet	25	25	100	15.3 T	4620	02R001	454	79.6	1860 V	15.3 T	4620	02R001	454	79.6	1860 V
PCB044 & 047 & 065	pg/g-Wet	25	25	100	551 T	115000 J	02R001	15200	3980	53200 JV	551 T	115000 J	02R001	15200	3980	53200 JV
PCB045 & 051	pg/g-Wet	25	23	92	115	13400	SP11E	1570	435 J	5100 JV	26.7 UT	13400	SP11E	1440	416	4950 JV
PCB046	pg/g-Wet	25	22	88	10.2	999	SP11E	152	38.3 V	727 V	3.62 UT	999	SP11E	135	29 J	683 V
PCB048	pg/g-Wet	25	25	100	46.7 T	11100	02R001	1400	277	7890 V	46.7 T	11100	02R001	1400	277	7890 V
PCB049 & 069	pg/g-Wet	25	25	100	381 T	99300 J	02R001	10400	2090	31800 JV	381 T	99300 J	02R001	10400	2090	31800 JV
PCB050 & 053	pg/g-Wet	25	19	76	92.3	28700	SP11E	2020	294	4500 JV	13.1 UT	28700	SP11E	1540	215	1760 JV
PCB052	pg/g-Wet	25	25	100	704 T	153000	02R001	17100	2990	66100 V	704 T	153000	02R001	17100	2990	66100 V
PCB054	pg/g-Wet	25	22	88	32.1	5970	SP11E	442	69.8 V	1410 V	3.32 UT	5970	SP11E	390	65.6	1280 V
PCB055	pg/g-Wet	25	0	0	--	--	--	--	--	--	0.966 U	23.1 U	SP09W	4.69	4.41 U	10.1 UV
PCB056	pg/g-Wet	25	25	100	56.9 T	5580	02R001	772	281	3980 V	56.9 T	5580	02R001	772	281	3980 V
PCB057	pg/g-Wet	25	18	72	3.39 JT	251	02R001	55.9	22.5 V	231 V	3.39 JT	251	02R001	41.8	13.2	210 V
PCB058	pg/g-Wet	25	11	44	5.82	108	02R001	28	12.1	87.5 V	3.04 UT	108	02R001	15.5	6.85 U	60.5 V
PCB059 & 062 & 075	pg/g-Wet	25	25	100	37.2 T	8600 J	02R001	957	234	3540 JV	37.2 T	8600 J	02R001	957	234	3540 JV
PCB060	pg/g-Wet	25	25	100	169 T	40000	02R001	3280	574	14100 V	169 T	40000	02R001	3280	574	14100 V
PCB061 & 070 & 074 & 076	pg/g-Wet	25	25	100	1100 T	126000 J	02R001	12900	3180	46700 JV	1100 T	126000 J	02R001	12900	3180	46700 JV
PCB063	pg/g-Wet	25	25	100	47.8 T	6450	02R001	615	144	2100 V	47.8 T	6450	02R001	615	144	2100 V
PCB064	pg/g-Wet	25	25	100	159 T	60900	02R001	5100	803	19700 V	159 T	60900	02R001	5100	803	19700 V
PCB066	pg/g-Wet	25	25	100	849 T	189000	02R001	15400	2880	56000 V	849 T	189000	02R001	15400	2880	56000 V
PCB067	pg/g-Wet	25	22	88	8.38 T	730 T	03R004	139	55.9 V	500 V	8.38 T	730 T	03R004	123	47.1	484 V
PCB068	pg/g-Wet	25	24	96	6.84	338	SP11E	55.7	35.6 V	132 V	6.84	338	SP11E	53.8	31.1	130 V
PCB072	pg/g-Wet	25	25	100	20.2 T	799	02R001	129	57.6	443 V	20.2 T	799	02R001	129	57.6	443 V
PCB073	pg/g-Wet	25	15	60	5.96 JT	1520	SP11E	195	58.9	907 V	4.17 U	1520	SP11E	118	22.5	552 V
PCB077	pg/g-Wet	25	25	100	36.4 T	1700	02R001	248	106	1190 V	36.4 T	1700	02R001	248	106	1190 V
PCB078	pg/g-Wet	25	0	0	--	--	--	--	--	--	0.953 U	22 U	SP09W	4.45	3.77 U	9.87 UV
PCB079	pg/g-Wet	25	24	96	9.21 T	582	SP11E	95	26.1 V	442 V	9.21 T	582	SP11E	91.4	25.4	426 V
PCB080	pg/g-Wet	25	0	0	--	--	--	--	--	--	1.22 U	19.8 U	SP09W	4.39	4.43 U	8.68 UV
PCB081	pg/g-Wet	25	9	36	2.49	58	02R001	17.1	6.82	55.1 V	2.49	58	02R001	10.2	6.82	43.2 V
PCB082	pg/g-Wet	25	25	100	22.6 T	1830	02R001	345	106	1200 V	22.6 T	1830	02R001	345	106	1200 V
PCB083 & 099	pg/g-Wet	25	25	100	2000 T	114000 J	02R001	17400	7200 J	55700 JV	2000 T	114000 J	02R001	17400	7200 J	55700 JV
PCB084	pg/g-Wet	25	25	100	47.2 T	9190	SP11E	961	264	3440 V	47.2 T	9190	SP11E	961	264	3440 V
PCB085 & 116 & 117	pg/g-Wet	25	25	100	607 T	47200 J	02R001	4930	1460	12800 JV	607 T	47200 J	02R001	4930	1460	12800 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	25	25	100	606 T	51300 J	02R001	8340	2580 J	39300 JV	606 T	51300 J	02R001	8340	2580 J	39300 JV
PCB088 & 091	pg/g-Wet	25	25	100	67.7 T	17100	SP11E	1740	470 J	6380 JV	67.7 T	17100	SP11E	1740	470 J	6380 JV
PCB089	pg/g-Wet	25	22	88	2.72 JT	833	02R001	94.5	14.9 V	334 V	2.72 JT	833	02R001	83.7	14.4	327 V
PCB090 & 101 & 113	pg/g-Wet	25	25	100	1400 T	257000	SP11E	25600	6700 J	85000 JV	1400 T	257000	SP11E	25600	6700 J	85000 JV
PCB092	pg/g-Wet	25	25	100	406 T	39400	SP11E	5140	1590	20100 V	406 T	39400	SP11E	5140	1590	20100 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	25	25	100	557 T	131000	SP11E	11500	2720	33300 JV	557 T	131000	SP11E	11500	2720	33300 JV
PCB094	pg/g-Wet	25	20	80	3.71 J	3540	SP11E	201	19.7 V	277 V	1.83 UT	3540	SP11E	162	12	96.9 V
PCB096	pg/g-Wet	25	23	92	14.5	3310	SP11E	262	59.2	858 V	5 UT	3310	SP11E	242	48.1	805 V
PCB103	pg/g-Wet	25	25	100	12.1 T	3700	SP11E	360	100	1510 V	12.1 T	3700	SP11E	360	100	1510 V
PCB104	pg/g-Wet	25	15	60	2.86 J	454	SP11E	56.8	10.6	294 V	1.97 UT	454	SP11E	35.6	6.38	191 V
PCB105	pg/g-Wet	25	25	100	1230 T	57700	02R001	7770	2770	20500 V	1230 T	57700	02R001	7770	2770	20500 V
PCB106	pg/g-Wet	25	1	4	16.6 J	16.6 J	06R002	16.6	16.6 J	16.6 J	1.95 U	156 U	SP11E	9.75	6.3 U	16.2 JV
PCB107 & 124	pg/g-Wet	25	25	100	51.1	2010 J	02R001	369	156	1240 JV	51.1	2010 J	02R001	369	156	1240 JV
PCB109	pg/g-Wet	25	25	100	262 T	9880	02R001	1470	537	3320 V	262 T	9880	02R001	1470	537	3320 V
PCB110 & 115	pg/g-Wet	25	25	100	1110 T	117000	SP11E	15700	3950 J	70300 JV	1110 T	117000	SP11E	15700	3950 J	70300 JV
PCB111	pg/g-Wet	25	23	92	5.86 JT	136	SP11E	30.8	16.4	122 V	5.86 JT	136	SP11E	28.9	14.4	115 V
PCB112	pg/g-Wet	25	1	4	1790	1790	06R002	1790	1790	1790	1.39 U	1790	06R002	74.4	1.63 U	14 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB114	pg/g-Wet	25	25	100	99.6 T	4890	02R001	574	232	1630 V	99.6 T	4890	02R001	574	232	1630 V
PCB118	pg/g-Wet	25	25	100	3860 T	129000	02R001	22000	7850	69100 V	3860 T	129000	02R001	22000	7850	69100 V
PCB120	pg/g-Wet	25	25	100	21.2 T	598	SP11E	113	61	319 V	21.2 T	598	SP11E	113	61	319 V
PCB121	pg/g-Wet	25	24	96	2.67 JT	419	06R002	48.8	14.2 V	242 V	2.67 JT	419	06R002	47	12.6 T	232 V
PCB122	pg/g-Wet	25	15	60	13.1	255	02R001	67.1	28.4	239 V	8.91 UT	255	02R001	46.1	22.6	203 V
PCB123	pg/g-Wet	25	25	100	68.9 T	2760	02R001	342	136	687 V	68.9 T	2760	02R001	342	136	687 V
PCB126	pg/g-Wet	25	9	36	22.1	177	02R001	60	58.2	132 V	9.38 UT	210 U	SP11E	31.7	11.6 U	96.8 V
PCB127	pg/g-Wet	25	22	88	14 T	235	SP11E	57.3	27.7 V	196 V	1.95 U	235	SP11E	51.3	24.5	181 V
PCB128 & 166	pg/g-Wet	25	25	100	807 T	44000	SP11E	5470	2350 J	13200 JV	807 T	44000	SP11E	5470	2350 J	13200 JV
PCB129 & 138 & 160 & 163	pg/g-Wet	25	25	100	6820 T	902000	SP11E	76100	31800	253000 JV	6820 T	902000	SP11E	76100	31800	253000 JV
PCB130	pg/g-Wet	25	25	100	119 T	19600	SP11E	1640	450	3850 V	119 T	19600	SP11E	1640	450	3850 V
PCB131	pg/g-Wet	25	22	88	4.04 JT	1980	SP11E	135	24.9 V	202 V	4.04 JT	1980	SP11E	119	19.2	189 V
PCB132	pg/g-Wet	25	24	96	265	147000	SP11E	7480	993 V	5330 V	127 UT	147000	SP11E	7180	991	5240 V
PCB133	pg/g-Wet	25	25	100	145 T	10600	SP11E	1080	482	3150 V	145 T	10600	SP11E	1080	482	3150 V
PCB134 & 143	pg/g-Wet	25	25	100	33.9 T	24000	SP11E	1310	236	1990 JV	33.9 T	24000	SP11E	1310	236	1990 JV
PCB135 & 151 & 154	pg/g-Wet	25	25	100	996 T	341000	SP11E	21700	4760	56100 JV	996 T	341000	SP11E	21700	4760	56100 JV
PCB136	pg/g-Wet	25	25	100	111 T	113000	SP11E	5630	744	6540 V	111 T	113000	SP11E	5630	744	6540 V
PCB137	pg/g-Wet	25	25	100	322 T	5390	02R001	1430	658	4030 V	322 T	5390	02R001	1430	658	4030 V
PCB139 & 140	pg/g-Wet	25	25	100	89.3 T	2230	SP11E	548	269 J	1670 JV	89.3 T	2230	SP11E	548	269 J	1670 JV
PCB141	pg/g-Wet	25	25	100	604 T	239000	SP11E	15100	3410	41000 V	604 T	239000	SP11E	15100	3410	41000 V
PCB142	pg/g-Wet	25	3	12	13.8	49.9	07R006	26.6	16.2	46.5 V	1.55 U	149 U	SP11E	9.72	4.62 U	43.2 V
PCB144	pg/g-Wet	25	25	100	54.4 T	47500	SP11E	2530	346	4830 V	54.4 T	47500	SP11E	2530	346	4830 V
PCB145	pg/g-Wet	25	7	28	1.17 J	9.73	06R002	4.42	3.28	9.23 V	0.622 U	9.73	06R002	2.08	1.17 J	7.43 V
PCB146	pg/g-Wet	25	25	100	1160 T	142000	SP11E	11600	4160	29800 V	1160 T	142000	SP11E	11600	4160	29800 V
PCB147 & 149	pg/g-Wet	25	25	100	409 T	426000	SP11E	20800	2730 J	18500 JV	409 T	426000	SP11E	20800	2730 J	18500 JV
PCB148	pg/g-Wet	25	22	88	4.89 JT	715	SP11E	102	42.6 V	446 V	4.89 JT	715	SP11E	90.5	36.8	406 V
PCB150	pg/g-Wet	25	19	76	1.8 J	716	SP11E	48.1	7.26	104 V	0.867 UT	716	SP11E	37.6	6.87	35.9 V
PCB152	pg/g-Wet	25	22	88	6.25	1830	SP11E	128	22.7 V	452 V	3.07 UT	1830	SP11E	114	18.1	393 V
PCB153 & 168	pg/g-Wet	25	25	100	7780 T	1160000	SP11E	93300	28500	316000 JV	7780 T	1160000	SP11E	93300	28500	316000 JV
PCB155	pg/g-Wet	25	18	72	5.6 JT	278	06R002	35.2	11.6 V	142 V	5.6 JT	278	06R002	26.7	9.35	103 V
PCB156	pg/g-Wet	9	9	100	1620	15300	06R002	5050	3990	12100 V	1620	15300	06R002	5050	3990	12100 V
PCB156 & 157	pg/g-Wet	16	16	100	757 T	56700	SP11E	5120	1210 V	17100 V	757 T	56700	SP11E	5120	1210 V	17100 V
PCB157	pg/g-Wet	9	9	100	236	1490	02R001	706	787	1270 V	236	1490	02R001	706	787	1270 V
PCB158	pg/g-Wet	25	25	100	556 T	78000	SP11E	6530	2880	18500 V	556 T	78000	SP11E	6530	2880	18500 V
PCB159	pg/g-Wet	25	24	96	8.01 T	13200	SP11E	629	47.2 V	637 V	8.01 T	13200	SP11E	604	45.6 T	611 V
PCB161	pg/g-Wet	25	0	0	--	--	--	--	--	--	1.36 U	102 U	SP11E	5.3	3.34 U	6.09 UV
PCB162	pg/g-Wet	25	25	100	32.4 T	790	SP11E	127	68.4	285 V	32.4 T	790	SP11E	127	68.4	285 V
PCB164	pg/g-Wet	25	25	100	167 T	52200	SP11E	3230	802	6110 V	167 T	52200	SP11E	3230	802	6110 V
PCB165	pg/g-Wet	25	24	96	6.46 JT	342	SP11E	49.5	22.8 V	193 V	6.46 JT	342	SP11E	47.7	22.5	188 V
PCB167	pg/g-Wet	25	25	100	242 T	20500	SP11E	1790	642	4320 V	242 T	20500	SP11E	1790	642	4320 V
PCB169	pg/g-Wet	25	9	36	1.25	6.39	06R002	2.67	2.1	5.63 V	1.25	1010 U	SP11E	25.1	3.38 U	14.1 UV
PCB170	pg/g-Wet	25	25	100	1540	320000	SP11E	25800	5280	128000 V	1540	320000	SP11E	25800	5280	128000 V
PCB171 & 173	pg/g-Wet	25	25	100	475	136000	SP11E	9320	1580	39300 JV	475	136000	SP11E	9320	1580	39300 JV
PCB172	pg/g-Wet	25	25	100	296	79200	SP11E	5610	994 T	21500 V	296	79200	SP11E	5610	994 T	21500 V
PCB174	pg/g-Wet	25	24	96	203	259000	SP11E	12600	883 V	18100 V	153 UT	259000	SP11E	12100	866	17300 V
PCB175	pg/g-Wet	25	25	100	32.8 T	17800	SP11E	1060	145	3620 V	32.8 T	17800	SP11E	1060	145	3620 V
PCB176	pg/g-Wet	25	20	80	34.5	30700	SP11E	1710	80 V	3050 V	11.5 UT	30700	SP11E	1370	75.3	1330 V
PCB177	pg/g-Wet	25	25	100	177 T	201000	SP11E	10600	1000 T	29900 V	177 T	201000	SP11E	10600	1000 T	29900 V
PCB178	pg/g-Wet	25	25	100	347 T	93900	SP11E	6250	1200	21700 V	347 T	93900	SP11E	6250	1200	21700 V
PCB179	pg/g-Wet	25	25	100	159 T	164000	SP11E	8450	868	19400 V	159 T	164000	SP11E	8450	868	19400 V
PCB180 & 193	pg/g-Wet	25	25	100	4360	838000	SP11E	68600	14900	323000 JV	4360	838000	SP11E	68600	14900	323000 JV
PCB181	pg/g-Wet	25	24	96	16.9 T	1290	07R006	189	69.6 V	1130 V	15.8 U	1290	07R006	182	59	1100 V
PCB182	pg/g-Wet	25	23	92	14.3 T	620	SP11E	84.8	40	309 V	14.3 T	620	SP11E	79	38.6	293 V
PCB183 & 185	pg/g-Wet	25	25	100	1170 T	277000	SP11E	20500	3950	91700 JV	1170 T	277000	SP11E	20500	3950	91700 JV
PCB184	pg/g-Wet	25	18	72	3.69 JT	66.9	SP11E	13.9	8.86 V	42.4 V	3.69 JT	66.9	SP11E	11.4	7.86	34.1 V
PCB186	pg/g-Wet	25	2	8	7.65	13.9	07R006	10.8	10.8 V	13.6 V	0.81 U	13.9	07R006	2.11	0.72 U	6.9 V
PCB187	pg/g-Wet	25	25	100	1710	412000	SP11E	30600	6290	119000 V	1710	412000	SP11E	30600	6290	119000 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB188	pg/g-Wet	25	21	84	4.9 J	323	SP11E	35.6	13.2	135	3.67 UT	323	SP11E	30.7	12	117 V
PCB189	pg/g-Wet	25	25	100	57.7	15300	SP11E	1020	204	3340 V	57.7	15300	SP11E	1020	204	3340 V
PCB190	pg/g-Wet	25	25	100	422	87400	SP11E	6700	1310	31900 V	422	87400	SP11E	6700	1310	31900 V
PCB191	pg/g-Wet	25	25	100	86.5	19000	SP11E	1360	265	5800 V	86.5	19000	SP11E	1360	265	5800 V
PCB192	pg/g-Wet	25	0	0	--	--	--	--	--	--	0.731 U	8.44 U	SP11E	1.75	1.45 U	3.35 UV
PCB194	pg/g-Wet	25	25	100	517	183000	SP11E	12400	2130	52100 V	517	183000	SP11E	12400	2130	52100 V
PCB195	pg/g-Wet	25	25	100	248	97600	SP11E	6080	978	20500 V	248	97600	SP11E	6080	978	20500 V
PCB196	pg/g-Wet	25	25	100	371	124000	SP11E	7850	1200	29500 V	371	124000	SP11E	7850	1200	29500 V
PCB197 & 200	pg/g-Wet	25	25	100	46.7 T	19300	SP11E	1060	146 J	2580 JV	46.7 T	19300	SP11E	1060	146 J	2580 JV
PCB198 & 199	pg/g-Wet	25	25	100	548	207000	SP11E	12800	2070 J	44800 JV	548	207000	SP11E	12800	2070 J	44800 JV
PCB201	pg/g-Wet	25	25	100	47.9 T	22100	SP11E	1310	208	4440 V	47.9 T	22100	SP11E	1310	208	4440 V
PCB202	pg/g-Wet	25	25	100	217	32400	SP11E	2280	615	7080 V	217	32400	SP11E	2280	615	7080 V
PCB203	pg/g-Wet	25	25	100	612	140000	SP11E	9510	2120	35200 V	612	140000	SP11E	9510	2120	35200 V
PCB204	pg/g-Wet	25	5	20	1.02 J	40.2	07R006	9.86	2.43	32.8 JV	0.504 UT	40.2	07R006	4	1.19 U	8.88 UV
PCB205	pg/g-Wet	25	25	100	30.3	11400	SP11E	711	116	2390 V	30.3	11400	SP11E	711	116	2390 V
PCB206	pg/g-Wet	25	25	100	181	31300	SP11E	2280	820	6580 V	181	31300	SP11E	2280	820	6580 V
PCB207	pg/g-Wet	25	25	100	31.5	4790	SP11E	353	117	1030 V	31.5	4790	SP11E	353	117	1030 V
PCB208	pg/g-Wet	25	25	100	57.6	5430	SP11E	431	174	1040 V	57.6	5430	SP11E	431	174	1040 V
PCB209	pg/g-Wet	25	25	100	68.3	785	07R006	217	154	560 V	68.3	785	07R006	217	154	560 V
Total PCB Congeners	pg/g-Wet	25	25	100	55800 JT	8770000 JT	SP11E	787000	277000 JT	2350000 JV	55800 JT	8770000 JT	SP11E	787000	277000 JT	2350000 JV
Total PCBs[e]																
Total PCBs	µg/kg-Wet	42	42	100	55.8 JT	8770 JT	SP11E	628	192 JV	2420 JV	55.8 JT	8770 JT	SP11E	628	192 JV	2420 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	25	25	100	85.5 T	11000 JT	03R004	1270	421 T	2680 JV	85.5 T	11000 JT	03R004	1270	421 T	2680 JV
Heptachlorobiphenylhomologs	pg/g-Wet	25	25	100	12700 JT	2950000 T	SP11E	210000	42600 T	857000 JV	12700 JT	2950000 T	SP11E	210000	42600 T	857000 JV
Hexachlorobiphenyl homologs	pg/g-Wet	25	25	100	21200 JT	3850000 T	SP11E	284000	94800 T	801000 JV	21200 JT	3850000 T	SP11E	284000	94800 T	801000 JV
Monochlorobiphenyl homologs	pg/g-Wet	23	21	91.3	1.07 JT	247 T	03R004	20	7.83 T	37.8 T	1.07 JT	247 T	03R004	18.4	7.38 T	35.6 JV
Nonachlorobiphenyl homologs	pg/g-Wet	25	25	100	271 T	41500 T	SP11E	3060	1120 T	8550 V	271 T	41500 T	SP11E	3060	1120 T	8550 V
Octachlorobiphenyl homologs	pg/g-Wet	25	25	100	2730 T	837000 T	SP11E	54000	9780 JT	199000 JV	2730 T	837000 T	SP11E	54000	9780 JT	199000 JV
Pentachlorobiphenylhomologs	pg/g-Wet	25	25	100	12500 JT	792000 T	SP11E	125000	44900 JT	579000 JV	12500 JT	792000 T	SP11E	125000	44900 JT	579000 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	25	25	100	4370 JT	881000 JT	02R001	93400	19300 T	287000 JV	4370 JT	881000 JT	02R001	93400	19300 T	287000 JV
Trichlorobiphenyl homologs	pg/g-Wet	25	25	100	841 JT	149000 JT	03R004	16500	5090 JT	51000 JV	841 JT	149000 JT	03R004	16500	5090 JT	51000 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	25	25	100	0.197 T	12.3	SP07E	1.29	0.41	4.92 V	0.197 T	12.3	SP07E	1.29	0.41	4.92 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	25	25	100	0.588	38	SP07E	4.39	2.03	16.3 V	0.588	38	SP07E	4.39	2.03	16.3 V
Hexachlorodibenzofuran homologs	pg/g-Wet	25	25	100	0.409	89.2	07R006	6.15	1.02	20.6 V	0.409	89.2	07R006	6.15	1.02	20.6 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	25	25	100	0.436	12.2	SP07E	1.72	1.03	3.84 V	0.436	12.2	SP07E	1.72	1.03	3.84 V
Octachlorodibenzofuran	pg/g-Wet	25	25	100	0.064 JT	1.87	SP07E	0.349	0.153 J	1.49 V	0.064 JT	1.87	SP07E	0.349	0.153 J	1.49 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	25	25	100	1.2	132	SP07E	12.3	4.19	39.6 V	1.2	132	SP07E	12.3	4.19	39.6 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	25	25	100	0.505	117	07R006	8.46	1.26	32.9 V	0.505	117	07R006	8.46	1.26	32.9 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	25	25	100	0.187	1.51 T	06R002	0.516	0.371	1.4 V	0.187	1.51 T	06R002	0.516	0.371	1.4 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	25	25	100	0.705 T	117	07R006	7.67	2.26	16.3 V	0.705 T	117	07R006	7.67	2.26	16.3 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	25	25	100	0.1	0.553	SP08W	0.265	0.256	0.469 V	0.1	0.553	SP08W	0.265	0.256	0.469 V
Total PCDD/F	pg/g-Wet	25	25	100	5.27 JT	388 T	07R006	43.1	12.2 JT	207 V	5.27 JT	388 T	07R006	43.1	12.2 JT	207 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	25	25	100	0.082 J	4.27	SP07E	0.507	0.171	2.25 V	0.082 J	4.27	SP07E	0.507	0.171	2.25 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	25	25	100	0.427	26.1	SP07E	2.8	1.26	6.63 V	0.427	26.1	SP07E	2.8	1.26	6.63 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	25	21	84	0.01 J	1.6	07R006	0.121	0.022 J	0.26	0.007 U	1.6	07R006	0.103	0.022 J	0.235 V
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	25	25	100	0.079 J	77.1	07R006	3.69	0.216	5.48 V	0.079 J	77.1	07R006	3.69	0.216	5.48 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	25	24	96	0.045 J	0.336	SP07E	0.122	0.089 JV	0.307 V	0.045 J	0.336	SP07E	0.119	0.086	0.307 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	25	25	100	0.035 J	9.01	07R006	0.559	0.09 J	1.34 V	0.035 J	9.01	07R006	0.559	0.09 J	1.34 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	25	25	100	0.285	8.99	SP07E	1.16	0.698	2.7 V	0.285	8.99	SP07E	1.16	0.698	2.7 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	25	4	16	0.016 J	0.444	07R006	0.167	0.105 V	0.405 V	0.007 U	0.444	07R006	0.0326	0.00515 U	0.152 V
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	25	25	100	0.048 J	0.609	SP07E	0.153	0.102	0.406 V	0.048 J	0.609	SP07E	0.153	0.102	0.406 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	25	25	100	0.109 J	86	07R006	4.27	0.333	6.26 V	0.109 J	86	07R006	4.27	0.333	6.26 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	25	25	100	0.187	1.46 T	06R002	0.473	0.354	1.18 V	0.187	1.46 T	06R002	0.473	0.354	1.18 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	25	24	96	0.024 J	0.84	07R006	0.146	0.0495 V	0.723 V	0.024 J	0.84	07R006	0.142	0.047 J	0.717 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	25	25	100	0.157	25.3	07R006	1.81	0.414	4.2 V	0.157	25.3	07R006	1.81	0.414	4.2 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	25	25	100	0.577 T	123	07R006	7.46	1.76	17.5 V	0.577 T	123	07R006	7.46	1.76	17.5 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	25	25	100	0.1	0.553	SP08W	0.238	0.208	0.448 V	0.1	0.553	SP08W	0.238	0.208	0.448 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	25	25	100	0.528 JT	31.8 T	07R006	2.75	1.08 JT	4.76 JV	0.528 JT	31.8 T	07R006	2.75	1.08 JT	4.76 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	25	25	100	0.86 JT	40.4 T	07R006	6.13	2.45 JT	21.9 JV	0.86 JT	40.4 T	07R006	6.13	2.45 JT	21.9 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	25	25	100	0.194 T	24.1 T	02R001	3.38	0.568 T	8.59 V	0.194 T	24.1 T	02R001	3.38	0.568 T	8.59 V
Pesticides																
2,4'-DDD	µg/kg-Wet	42	20	47.6	0.0819 JT	71 T	07R006	6.99	0.802 V	34.9 JV	0.0819 JT	71 T	07R006	4.36	1.13 UV	17.4 JV
2,4'-DDE	µg/kg-Wet	42	19	45.2	0.0995 J	27 T	07R006	2.92	0.404 J	15.3 JV	0.0995 J	27 T	07R006	2.21	0.7 UJV	7.74 JV
2,4'-DDT	µg/kg-Wet	42	33	78.6	0.181 JT	325 T	07R006	20.4	5.4 NJ	69.9 JV	0.181 JT	325 T	07R006	16.8	3.45 UV	61.1 JV
4,4'-DDD	µg/kg-Wet	42	35	83.3	1.03 T	305 T	07R006	21.8	6.7 N	101 JV	1.03 T	305 T	07R006	18.7	5.7 V	81.1 V
4,4'-DDE	µg/kg-Wet	42	35	83.3	8.11	630 T	07R006	48.7	22.1	181 JV	8.11	630 T	07R006	42.3	20.3 V	154 V
4,4'-DDT	µg/kg-Wet	42	37	88.1	2.06	1700 T	07R006	73.1	15.1	158 JV	2.06	1700 T	07R006	64.8	11.2 JV	132 JV
Aldrin	µg/kg-Wet	42	12	28.6	0.00532 J	0.0348 J	SP08W	0.0144	0.012 JV	0.0285 JV	0.00532 J	13 UT	03R034; 06R002	0.989	0.5 UV	4.66 UV
alpha-Endosulfan	µg/kg-Wet	42	4	9.52	0.0606 J	0.124 J	SP06W	0.0888	0.0853 JV	0.119 JV	0.0356 U	20 U	06R002	1.07	0.5 UV	3.53 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	42	9	21.4	0.00763 JT	0.0232 J	SP07W	0.0167	0.0173 J	0.023 JV	0.00763 JT	9.6 U	09R002	0.776	0.5 UV	2 UV
beta-Endosulfan	µg/kg-Wet	42	1	2.38	0.0684 J	0.0684 J	SP07W	0.0684	0.0684 J	0.0684 J	0.0366 U	15 UT	06R002	0.947	0.5 UV	2 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	42	16	38.1	0.00782 J	6.2 NJ	03R002	2.94	3.6 JV	5.53 JV	0.00228 U	9.6 U	09R002	2.22	2.2 JV	4.79 JV
cis-Chlordane	µg/kg-Wet	42	30	71.4	1.26	16 NJ	07R006	3.42	2.96 V	4.73 JV	1.26	20 U	06R002	3.26	2.62 V	4.99 JV
cis-Nonachlor	µg/kg-Wet	42	16	38.1	0.866	1.61	SP10E	1.16	1.18 V	1.4 V	0.866	11 U	06R001	2.27	2 UJV	4.19 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	42	5	11.9	0.00242 J	1.6 NJ	06R001	0.535	0.0674 JT	1.48 JV	0.00105 U	9.6 U	09R002	0.819	0.5 UJV	2 UV
Dieldrin	µg/kg-Wet	42	30	71.4	0.867 J	24 JT	02R001	4.56	2.04 V	17.2 JV	0.867 J	24 JT	02R001	4.55	2.38 JV	15 JV
Endosulfan sulfate	µg/kg-Wet	42	18	42.9	0.377 JT	1.3 NJ	03R001	0.71	0.603 JV	1.22 JV	0.377 JT	12 UT	05R001; 06R002; 08R001	1.34	0.603 JV	5.94 UV
Endrin	µg/kg-Wet	42	9	21.4	0.00812 JT	0.0348 J	SP08W	0.0181	0.0165 J	0.0311 JV	0.00686 U	31 UT	02R001; 02R015; 03R034	1.98	0.525 UV	15.2 UV
Endrin aldehyde	µg/kg-Wet	42	0	0	--	--	--	--	--	--	0.0165 U	9.6 U	09R002	1.09	0.65 UJV	4.25 UV
Endrin ketone	µg/kg-Wet	42	1	2.38	0.00173 J	0.00173 J	SP10E	0.00173	0.00173 J	0.00173 J	0.00122 U	9.6 U	09R002	0.789	0.5 UJV	2 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	42	20	47.6	0.0133 JT	3.1 NJ	03R004	1.06	1.15 JV	2.72 JV	0.00834 U	9.6 U	05R001; 06R002; 09R002	1.35	1.15 JV	4.8 UV
Heptachlor	µg/kg-Wet	42	2	4.76	0.00686 J	0.00861 J	SP09W	0.00774	0.00774 JV	0.00852 JV	0.00158 U	13 UT	06R002	0.848	0.5 UV	2 UV
Heptachlor epoxide	µg/kg-Wet	42	15	35.7	0.057 JT	3.2 NJ	03R001	0.553	0.0882 J	2.36 JV	0.0457 UJ	9.6 U	09R002	1.08	0.5 UV	4 UV
Methoxychlor	µg/kg-Wet	42	13	31	0.00381 J	7.6 N	04R003	2.13	1.7 NJ	4.96 JV	0.00381 J	9.6 U	09R002	1.44	1.45 JV	3.19 JV
Mirex	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1 U	9.6 U	09R002	1.3	0.53 UV	3.1 UV
Oxychlordane	µg/kg-Wet	42	16	38.1	0.226 J	0.876	SP08W	0.425	0.401 JV	0.619 V	0.226 J	20 UT	06R002	1.11	0.5 UV	2.29 UJV
Total Chlordanes	µg/kg-Wet	42	30	71.4	2.5 NJT	16 NJT	07R006	8.65	8.84 JV	13.3 JV	2.5 NJT	20 UT	06R002	7.29	8.37 JV	11.9 V
Total Endosulfan	µg/kg-Wet	42	18	42.9	0.377 JT	1.3 NJT	03R001	0.734	0.655 JV	1.22 JV	0.377 JT	20 UT	06R002	1.61	0.862 JV	5.94 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	42	35	83.3	1.11 JT	376 T	07R006	25.8	7.12 T	123 JV	1.11 JT	376 T	07R006	22	6.07 V	98.5 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	42	42	100	12.7 JT	3060 T	07R006	144	37.9 JV	550 JV	12.7 JT	3060 T	07R006	144	37.9 JV	550 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	42	35	83.3	8.25 JT	657 T	07R006	50.3	22.3 T	191 JV	8.25 JT	657 T	07R006	43.7	20.7 JV	161 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	42	38	90.5	2.33 T	2030 T	07R006	89.1	16.1 V	185 JV	2.33 T	2030 T	07R006	80.9	11.5 JV	162 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	26	26	100	16 JT	2640 T	07R006	181	44.1 JV	502 JV	16 JT	2640 T	07R006	181	44.1 JV	502 JV
Toxaphene	µg/kg-Wet	26	0	0	--	--	--	--	--	--	79 U	4500 U	06R002	230	85 UV	910 UJV
trans-Chlordane	µg/kg-Wet	42	17	40.5	0.54	4.4 NJ	03R002	1.32	1.09	2.9 JV	0.54	9.6 U	09R002	1.51	1.24 V	4.2 UV
trans-Nonachlor	µg/kg-Wet	42	26	61.9	2.38	6.5 NJ	03R002	4.19	3.95 V	6.03 JV	2.38	11 UT	05R001; 06R002; 06R004; 07R003; 09R001	3.94	3.95 V	5.79 JV
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	16	16	100	0.85	67	SP06W	6.8	3.1 V	20 V	0.85	67	SP06W	6.8	3.1 V	20 V
2-Methylnaphthalene	µg/kg-Wet	42	16	38	1	38	SP06W	5.3	3.2 V	13 V	1	38	SP06W	11	15 UV	17 UV
Acenaphthene	µg/kg-Wet	42	26	62	0.9	140	SP06W	23	6.9 V	54 JV	0.9	140	SP06W	21	15 UV	50 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Acenaphthylene	µg/kg-Wet	42	12	28.6	0.43 J	4.9	SP06W	1.2	0.74 V	3.09 V	0.069 U	33 UT	02R015; 03R004; 06R002	9.77	14.5 UV	16.5 UV
Anthracene	µg/kg-Wet	42	16	38	0.23 J	6.4	SP06W	1.6	1.1 V	5.2 V	0.23 J	33 UT	02R015; 03R004; 06R002	10	15 UV	17 UV
Benzo(a)anthracene	µg/kg-Wet	42	4	9.52	0.63	2.5	SP06W	1.21	0.85 V	2.26 V	0.066 U	33 UT	02R015; 03R004; 06R002	9.55	14.5 UV	16.5 UV
Benzo(a)pyrene	µg/kg-Wet	42	1	2.38	1.2 J	1.2 J	SP08E	1.2	1.2 J	1.2 J	0.081 U	33 UT	02R015; 03R004; 06R002	9.47	14.5 UV	16.5 UV
Benzo(b)fluoranthene	µg/kg-Wet	42	1	2.4	2.1	2.1	SP06W	2.1	2.1	2.1	0.07 U	33 UT	02R015; 03R004; 06R002	9.5	15 UV	17 UV
Benzo(g,h,i)perylene	µg/kg-Wet	42	2	4.76	0.62	1.4	SP06W	1.01	1.01 V	1.36 V	0.073 U	33 UT	02R015; 03R004; 06R002	9.5	14.5 UV	16.5 UV
Benzo(k)fluoranthene	µg/kg-Wet	42	1	2.38	1.5	1.5	SP06W	1.5	1.5	1.5	0.056 U	33 UT	02R015; 03R004; 06R002	9.48	14.5 UV	16.5 UV
Chrysene	µg/kg-Wet	42	4	9.52	0.72	3.7	SP06W	1.56	0.905 V	3.28 V	0.076 U	33 UT	02R015; 03R004; 06R002	9.59	14.5 UV	16.5 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	0.059 U	33 UT	02R015; 03R004; 06R002	9.45	14.5 UV	16.5 UV
Dibenzothiophene	µg/kg-Wet	16	10	62.5	0.48 J	7	SP06W	1.68	1.07 V	4.79 V	0.074 U	7	SP06W	1.06	0.78 V	3.33 V
Fluoranthene	µg/kg-Wet	42	13	31	0.75	15	SP06W	3.5	2.2 T	9.5 V	0.09 U	33 UT	02R015; 03R004; 06R002	11	15 UV	17 UV
Fluorene	µg/kg-Wet	42	13	31	1.4	35	SP06W	8.6	3.9	34 V	0.15 U	35	SP06W	12	15 UV	17 UV
High Molecular Weight PAH	µg/kg-Wet	42	15	35.7	0.62 T	38 T	SP06W	6.28	4.4 T	16 V	0.098 UT	38 T	SP06W	11.7	14.5 UV	16.5 UV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	0.064 U	33 UT	02R015; 03R004; 06R002	9.45	14.5 UV	16.5 UV
Low Molecular Weight PAH	µg/kg-Wet	42	26	61.9	7.2 JT	510 T	SP06W	48.6	30 V	110 JV	7.2 JT	510 T	SP06W	37.1	17.3 V	49.8 JV
Naphthalene	µg/kg-Wet	42	17	40	1.3	250	SP06W	19	2.3	84 V	1.3	250	SP06W	17	15 UV	17 UV
Phenanthrene	µg/kg-Wet	42	16	38	0.93	33	SP06W	6.8	4.2 V	20 V	0.93	33	02R015; 03R004; 06R002; SP06W	12	15 UV	17 UV
Pyrene	µg/kg-Wet	42	10	23.8	0.77	12	SP06W	3.04	1.65 V	8.71 V	0.098 U	33 UT	02R015; 03R004; 06R002; 08R003	10.2	14.5 UV	16.5 UV
Total BaPEq	µg/kg-Wet	42	5	11.9	0.0639 T	1.2 JT	SP08E	0.383	0.0879 T	1.06 JV	0.0639 T	33 UT	02R015; 03R004; 06R002	9.48	14.5 UV	16.5 UV
Total cPAHs	µg/kg-Wet	42	5	11.9	1.2 JT	9.8 T	SP06W	3.18	1.6 T	8.2 V	0.081 UT	33 UT	02R015; 03R004; 06R002	9.82	14.5 UV	16.5 UV
Total PAHs	µg/kg-Wet	42	26	61.9	7.8 JT	550 T	SP06W	52.3	31 JV	111 V	7.8 JT	550 T	SP06W	39.3	19 V	49.9 V
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	42	7	17	73 J	28000 JT	08R003	5400	110 J	22000 JV	66 U	28000 JT	08R003	970	72 JV	390 UV
Butylbenzyl phthalate	µg/kg-Wet	42	0	0	--	--	--	--	--	--	7.3 U	330 UJ	02R015; 03R004; 04R004; 06R002; 08R003	97	150 UV	170 UV
Dibutyl phthalate	µg/kg-Wet	42	0	0	--	--	--	--	--	--	16 U	330 U	02R015; 03R004; 04R004; 06R002; 08R003	100	150 UV	170 UV
Diethyl phthalate	µg/kg-Wet	42	0	0	--	--	--	--	--	--	11 UT	170 U	03R004; 04R004; 06R002; 08R003	51	70 UV	85 UV
Dimethyl phthalate	µg/kg-Wet	42	0	0	--	--	--	--	--	--	7.7 U	170 U	03R004; 04R004; 06R002; 08R003	49	70 UV	85 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Di-n-octyl phthalate	µg/kg-Wet	42	1	2.4	600 J	600 J	02R001	600	600 J	600 J	11 U	600 J	02R001	110	150 UJV	170 UJV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	9.8 U	33 UT	02R015; 03R004; 06R002	11	15 UV	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	11 U	33 UT	02R015; 03R004; 06R002	12	15 UV	17 UV
1,2-Diphenylhydrazine	µg/kg-Wet	26	0	0	--	--	--	--	--	--	27 U	33 U	02R015; 03R004; 06R002	15	16 UV	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	11 U	33 UT	02R015; 03R004; 06R002	12	15 UV	17 UV
1,4-Dichlorobenzene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	11 U	33 UT	02R015; 03R004; 06R002	12	15 UV	17 UV
2,4-Dinitrotoluene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	15 U	68 UT	06R002	18	16 UV	32 UJV
2,6-Dinitrotoluene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	14 U	33 UT	02R015; 03R004; 06R002	12	15 UV	17 UV
2-Chloronaphthalene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	6.7 U	33 UT	02R015; 03R004; 06R002	11	15 UV	17 UV
2-Nitroaniline	µg/kg-Wet	42	0	0	--	--	--	--	--	--	31 U	830 U	03R004; 04R004; 06R002; 08R003	240	360 UV	420 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	41	0	0	--	--	--	--	--	--	1000 U	1700 U	03R004; 04R004; 06R002; 08R003	670	700 UJ	850 U
3-Nitroaniline	µg/kg-Wet	41	0	0	--	--	--	--	--	--	400 U	830 U	03R004; 04R004; 06R002; 08R003	320	360 U	420 U
4-Bromophenyl phenyl ether	µg/kg-Wet	42	0	0	--	--	--	--	--	--	6.9 U	33 UT	02R015; 03R004; 06R002	11	15 UV	17 UV
4-Chloroaniline	µg/kg-Wet	42	0	0	--	--	--	--	--	--	140 UT	400 UJ	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08E; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	120	80 UV	200 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	42	0	0	--	--	--	--	--	--	6.4 U	83 UT	03R004; 06R002	25	36 UV	41 UV
4-Nitroaniline	µg/kg-Wet	41	0	0	--	--	--	--	--	--	400 U	830 U	03R004; 04R004; 06R002; 08R003	320	360 U	420 U
Aniline	µg/kg-Wet	15	0	0	--	--	--	--	--	--	800 U	800 U	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	400	400 U	400 UV
Azobenzene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	40 U	170 U	03R004; 04R004; 06R002; 08R003	55	70 UV	85 UV
Benzoic acid	µg/kg-Wet	16	2	13	430	520	SP04W	480	480 V	520 V	400 U	520	SP04W	230	200 UV	450 V
Benzyl alcohol	µg/kg-Wet	42	10	24	22 J	36 J	SP01W	28	28 JV	34 JV	22 J	330 U	02R015; 03R004; 04R004; 06R002; 08R003	100	150 UV	170 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	26	0	0	--	--	--	--	--	--	140 U	170 U	03R004; 04R004; 06R002; 08R003	77	80 UV	85 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	42	0	0	--	--	--	--	--	--	8.3 U	170 U	03R004; 04R004; 06R002; 08R003	49	70 UV	85 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	42	0	0	--	--	--	--	--	--	13 U	33 UT	02R015; 03R004; 06R002	12	15 UV	17 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	16	0	0	--	--	--	--	--	--	13 U	13 U	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08E; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	6.5	6.5 UV	6.5 UV
Carbazole	µg/kg-Wet	26	0	0	--	--	--	--	--	--	27 UT	33 UT	02R015; 03R004; 06R002	15	16 UV	17 UV
Dibenzofuran	µg/kg-Wet	42	15	36	0.62	33 T	06R004	4.3	2	14 V	0.13 U	33 T	02R015; 03R004; 06R002; 06R004	11	15 UV	17 UV
Hexachlorobenzene	µg/kg-Wet	42	16	38.1	0.691	2.08 T	SP12WA	1.45	1.44 V	1.87 V	0.691	33 UT	03R004	6.07	2 UV	16 UV
Hexachlorobutadiene	µg/kg-Wet	42	3	7.14	0.00737 JT	2 JT	06R001	0.704	0.105 J	1.81 JV	0.00653 UJ	33 UT	03R004	1.8	0.5 UJV	5 UV
Hexachlorocyclopentadiene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	680 U	1000 U	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08E; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	430	410 UV	500 UV
Hexachloroethane	µg/kg-Wet	42	0	0	--	--	--	--	--	--	1 UJT	33 UT	03R004	5.7	3.4 UJV	14 UV
Isophorone	µg/kg-Wet	16	0	0	--	--	--	--	--	--	9.2 U	9.2 U	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08E; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	4.6	4.6 UV	4.6 UV
Nitrobenzene	µg/kg-Wet	42	0	0	--	--	--	--	--	--	12 U	33 UT	02R015; 03R004; 06R002	12	15 UV	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	42	0	0	--	--	--	--	--	--	40 U	770 U	02R001	62	70 UV	85 UJV
N-Nitrosodiphenylamine	µg/kg-Wet	42	0	0	--	--	--	--	--	--	6.6 U	170 UJ	03R004; 04R004; 06R002; 08R003	49	70 UJV	85 UJV
N-Nitrosodipropylamine	µg/kg-Wet	42	0	0	--	--	--	--	--	--	22 U	33 UT	02R015; 03R004; 06R002	14	15 UV	17 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1400 U	1700 UJ	03R004; 04R004; 06R002; 08R003	770	800 UV	850 UJV
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	16	0	0	--	--	--	--	--	--	20 U	20 U	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08E; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	10	10 UV	10 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	26	0	0	--	--	--	--	--	--	1400 U	1700 U	03R004; 04R004; 06R002; 08R003	770	800 UV	850 UV
2,4,5-Trichlorophenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	14 U	830 U	03R004; 04R004; 06R002; 08R003	240	360 UV	420 UV
2,4,6-Trichlorophenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	9.1 U	52 UT	04R003	11	15 UV	17 UV
2,4-Dichlorophenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	9.5 U	33 UT	02R015; 03R004; 06R002	11	15 UV	17 UV
2,4-Dimethylphenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	19 UJ	500 U	03R004; 04R004; 06R002; 08R003	150	220 UV	250 UV
2,4-Dinitrophenol	µg/kg-Wet	40	0	0	--	--	--	--	--	--	800 U	3300 UJ	02R015; 03R004; 06R002	1100	1500 UV	1700 UJV
2-Chlorophenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	7.5 U	33 UT	02R015; 03R004; 06R002; 08R003	11	15 UV	17 UV
2-Methylphenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	8.2 U	170 U	03R004; 04R004; 06R002; 08R003	49	70 UV	85 UV
2-Nitrophenol	µg/kg-Wet	16	0	0	--	--	--	--	--	--	12 U	12 U	SP01E; SP01W; SP03E; SP04W; SP05E; SP06W; SP07E; SP07W; SP08E; SP08W; SP09W; SP10E; SP10W; SP11E; SP12E; SP12WA	6	6 UV	6 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	400 U	3300 U	02R015; 03R004; 04R004; 06R002; 08R003	1000	1500 UV	1700 UV
4-Chloro-3-methylphenol	µg/kg-Wet	42	1	2.4	12 J	12 J	SP05E	12	12 J	12 J	6.8 U	330 U	02R015; 03R004; 04R004; 06R002; 08R003	97	150 UV	170 UV
4-Methylphenol	µg/kg-Wet	42	2	4.8	20 J	62 T	02R015	41	41 JV	60 JV	7.7 U	62 T	02R015	12	15 UV	17 UV
4-Nitrophenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	9.9 U	1700 U	03R004; 04R004; 06R002; 08R003	480	700 UV	850 UV
Pentachlorophenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	30 U	170 UT	03R004; 06R002	53	70 UV	80 UV
Phenol	µg/kg-Wet	42	0	0	--	--	--	--	--	--	45 U	330 U	02R015; 03R004; 04R004; 06R002; 08R003	100	150 UV	170 UV
Smallmouth bass (fillet without skin)																
Metals																
Mercury	mg/kg-Wet	5	5	100	0.071	0.129 T	03R014	0.0946	0.087	0.126 V	0.071	0.129 T	03R014	0.0946	0.087	0.126 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Smallmouth bass (fillet)																
Conventionals																
Lipids	percent-Wet	23	23	100	0.32	1.48	SB09E	1.05	1.05	1.38 V	0.32	1.48	SB09E	1.05	1.05	1.38 V
Total solids	percent-Wet	23	23	100	21.3	26.1 T	SB04E	24.4	24.8	26 V	21.3	26.1 T	SB04E	24.4	24.8	26 V
Metals																
Aluminum	mg/kg-Wet	23	23	100	0.7	7.15 J	06R024	2.07	1.4 T	4.07 JV	0.7	7.15 J	06R024	2.07	1.4 T	4.07 JV
Antimony	mg/kg-Wet	23	1	4.35	0.005 JT	0.005 JT	SB09E	0.005	0.005 JT	0.005 JT	0.001 U	0.005 JT	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E	0.00224	0.0025 UJ	0.0025 UJV
Arsenic	mg/kg-Wet	23	23	100	0.14	0.34	SB02E	0.19	0.18	0.29 V	0.14	0.34	SB02E	0.19	0.18	0.29 V
Cadmium	mg/kg-Wet	23	2	8.7	0.001 J	0.001 J	06R024; 08R032	0.001	0.001 JV	0.001 JV	0.001 J	0.003 U	SB011E; SB03E; SB07W	0.001	0.001 U	0.0015 UV
Chromium	mg/kg-Wet	23	2	8.7	0.2 J	0.9	SB09W	0.55	0.55 JV	0.87 JV	0.06 U	0.9	SB09W	0.09	0.05 U	0.19 JV
Copper	mg/kg-Wet	23	23	100	0.187	1.12	05R006	0.395	0.344	0.89 V	0.187	1.12	05R006	0.395	0.344	0.89 V
Lead	mg/kg-Wet	23	19	82.6	0.007 T	0.518	SB03E	0.0471	0.013	0.102 V	0.002 U	0.518	SB03E	0.0392	0.011	0.055 V
Manganese	mg/kg-Wet	23	23	100	0.076	0.546	SB07W	0.34	0.375	0.529 V	0.076	0.546	SB07W	0.34	0.375	0.529 V
Mercury	mg/kg-Wet	18	18	100	0.0591 J	0.349 J	SB09W	0.171	0.174 JV	0.261 JV	0.0591 J	0.349 J	SB09W	0.171	0.174 JV	0.261 JV
Nickel	mg/kg-Wet	23	23	100	0.004 J	0.224	05R006	0.0596	0.05 J	0.131 JV	0.004 J	0.224	05R006	0.0596	0.05 J	0.131 JV
Selenium	mg/kg-Wet	23	1	4.3	4.5	4.5	SB011W	4.5	4.5	4.5	0.1 UJ	4.5	SB011W	0.27	0.05 U	0.15 UV
Silver	mg/kg-Wet	23	1	4.35	0.002 J	0.002 J	SB02E	0.002	0.002 J	0.002 J	0.0002 U	0.002 J	SB011E; SB02E; SB03E; SB04E; SB07W	0.000567	0.0005 U	0.001 UV
Thallium	mg/kg-Wet	23	23	100	0.002 J	0.0102	03R014	0.00387	0.0033 J	0.00752 V	0.002 J	0.0102	03R014	0.00387	0.0033 J	0.00752 V
Zinc	mg/kg-Wet	23	23	100	7.12	10.9 J	05R006	8.65	8.63 T	9.61 JV	7.12	10.9 J	05R006	8.65	8.63 T	9.61 JV
Butyltins																
Butyltin ion	µg/kg-Wet	18	0	0	--	--	--	--	--	--	0.11 U	0.19 U	SB05W	0.057	0.055 UV	0.061 UV
Dibutyltin ion	µg/kg-Wet	18	16	89	0.25 J	0.92 J	SB06E	0.5	0.44 JV	0.89 JV	0.17 U	0.92 J	SB06E	0.46	0.43 JV	0.89 JV
Tetrabutyltin	µg/kg-Wet	18	0	0	--	--	--	--	--	--	0.43 U	0.43 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	0.22	0.22 UV	0.22 UV
Tributyltin ion	µg/kg-Wet	18	4	22	0.48 J	0.92 JT	SB04E	0.68	0.66 JV	0.89 JV	0.35 U	0.92 JT	SB04E	0.29	0.18 UV	0.77 JV
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.9 U	1.9 U	03R014; 05R006; 06R024; 08R032; 09R006	0.95	0.95 U	0.95 UV
Aroclor 1221	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.9 U	1.9 U	03R014; 05R006; 06R024; 08R032; 09R006	0.95	0.95 U	0.95 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Aroclor 1232	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.9 U	1.9 U	03R014; 05R006; 06R024; 08R032; 09R006	0.95	0.95 U	0.95 UV
Aroclor 1242	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.9 U	1.9 U	03R014; 05R006; 06R024; 08R032; 09R006	0.95	0.95 U	0.95 UV
Aroclor 1248	µg/kg-Wet	5	5	100	19	34	09R006	26	26	33 V	19	34	09R006	26	26	33 V
Aroclor 1254	µg/kg-Wet	5	0	0	--	--	--	--	--	--	27 U	57 U	08R032	21	19 U	28 UV
Aroclor 1260	µg/kg-Wet	5	5	100	19	62	08R032	36	34	57 V	19	62	08R032	36	34	57 V
Aroclor 1262	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.9 U	1.9 U	03R014; 05R006; 06R024; 08R032; 09R006	0.95	0.95 U	0.95 UV
Aroclor 1268	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.9 U	1.9 U	03R014; 05R006; 06R024; 08R032; 09R006	0.95	0.95 U	0.95 UV
Aroclors	µg/kg-Wet	5	5	100	39 T	93 T	08R032	62	60 T	89 V	39 T	93 T	08R032	62	60 T	89 V
PCB Congeners																
PCB001	pg/g-Wet	18	10	55.6	0.858 J	18.6	SB02E	4.38	2.47 JV	13.1 V	0.858 J	18.6	SB02E	2.86	1.29 UJV	8.13 V
PCB002	pg/g-Wet	18	2	11.1	0.775 JT	1.39	SB02E	1.08	1.08 JV	1.36 JV	0.707 U	3.39 UJ	SB04W	1.11	1.15 UV	1.44 JV
PCB003	pg/g-Wet	18	4	22.2	1.81 JT	9.67	SB02E	4.01	2.28 JV	8.58 JV	0.667 U	9.67	SB02E	2.03	1.92 UJV	3.49 JV
PCB004	pg/g-Wet	18	16	88.9	18.7	726	SB011E	116	48.4 V	507 JV	8.93 UJ	726	SB011E	104	45.2 JV	478 JV
PCB005	pg/g-Wet	18	2	11.1	1.38 JT	2.18 J	SB02E	1.78	1.78 JV	2.14 JV	1.38 JT	11.7 U	SB06E	3.44	3.6 UJV	5.04 UV
PCB006	pg/g-Wet	18	10	55.6	4.25	75.6 J	SB02E	24.9	17.9 V	59.9 JV	4.25	75.6 J	SB02E	15.6	5.88 V	45.9 JV
PCB007	pg/g-Wet	18	3	16.7	2.65 J	7.56	SB09W	5.16	5.28 J	7.33 JV	2.5 U	11.2 U	SB06E	3.83	3.98 UV	5.89 V
PCB008	pg/g-Wet	18	16	88.9	14.5	219 J	SB02E	63	30.3 JV	203 JV	5.57 UJ	219 J	SB02E	56.5	26.2 V	201 JV
PCB009	pg/g-Wet	18	5	27.8	2.43 J	17.7	SB011E	10.2	10.9	16.6 JV	2.43 J	17.7	SB011E	5.38	4.28 UV	13.1 JV
PCB010	pg/g-Wet	18	3	16.7	7.75 T	47.3	SB011E	23.7	16.1 J	44.2 JV	1.8 U	47.3	SB011E	6.82	4.23 UJV	20.8 JV
PCB011	pg/g-Wet	18	16	88.9	13.4	75.8	SB011E	39.1	37.3 V	68.3 V	11.1 U	75.8	SB011E	35.8	34.3 V	67.3 V
PCB012 & 013	pg/g-Wet	18	3	16.7	2.94 JT	10 J	SB011E	6.39	6.22 J	9.62 JV	2.79 U	11.4 U	SB06E	4.04	3.86 UV	6.79 JV
PCB014	pg/g-Wet	18	0	0	--	--	--	--	--	--	0.662 UJ	11.1 U	SB06E	3.3	3.36 UJV	4.78 UV
PCB015	pg/g-Wet	18	6	33.3	6.47	49.1	SB02E	29.7	32.6 V	48.4 V	4.65 UT	49.1	SB02E	13.3	5.58 UV	46.6 V
PCB016	pg/g-Wet	18	18	100	7.56	296	SB09W	60.2	30.1 JV	195 V	7.56	296	SB09W	60.2	30.1 JV	195 V
PCB017	pg/g-Wet	18	18	100	20.9	1170	SB011E	196	79.2 V	591 V	20.9	1170	SB011E	196	79.2 V	591 V
PCB018 & 030	pg/g-Wet	18	18	100	30.8	844	SB09W	208	86.2 V	585 V	30.8	844	SB09W	208	86.2 V	585 V
PCB019	pg/g-Wet	18	18	100	19.8	1850	SB011E	207	87.4 JV	569 V	19.8	1850	SB011E	207	87.4 JV	569 V
PCB020 & 028	pg/g-Wet	18	18	100	156	2860	SB09W	760	364 V	2730 JV	156	2860	SB09W	760	364 V	2730 JV
PCB021 & 033	pg/g-Wet	18	18	100	29	1120	SB09W	181	94.1 JV	568 V	29	1120	SB09W	181	94.1 JV	568 V
PCB022	pg/g-Wet	18	18	100	25.4	785	SB09W	137	73.7 JV	403 V	25.4	785	SB09W	137	73.7 JV	403 V
PCB023	pg/g-Wet	18	2	11.1	1.15 J	1.63 JT	SB04E	1.39	1.39 JV	1.61 JV	1.15 J	3.93 U	SB05W	1.74	1.92 UV	1.96 UV
PCB024	pg/g-Wet	18	12	66.7	0.706 J	9.8	SB09W	3.81	2.04 JV	9.68 V	0.706 J	9.8	SB09W	2.8	1.28 JV	9.62 V
PCB025	pg/g-Wet	18	18	100	9.12	171	SB011E	45.3	24.1 V	163 V	9.12	171	SB011E	45.3	24.1 V	163 V
PCB026 & 029	pg/g-Wet	18	18	100	21.5	401	SB09W	108	50.2 V	366 V	21.5	401	SB09W	108	50.2 V	366 V
PCB027	pg/g-Wet	18	18	100	4.79 J	490	SB011E	57.5	20.2 V	170 V	4.79 J	490	SB011E	57.5	20.2 V	170 V
PCB031	pg/g-Wet	18	18	100	65.6	1870	SB09W	340	173 V	930 JV	65.6	1870	SB09W	340	173 V	930 JV
PCB032	pg/g-Wet	18	18	100	16	444	SB011E	117	51.7 V	411 JV	16	444	SB011E	117	51.7 V	411 JV
PCB034	pg/g-Wet	18	14	77.8	0.92 J	10.1	SB09W	3.41	2.51 JV	8.46 JV	0.92 J	10.1	SB09W	3	2.5 JV	7.96 JV
PCB035	pg/g-Wet	18	1	5.56	7.78 J	7.78 J	SB02E	7.78	7.78 J	7.78 J	4.26 UJ	7.78 J	SB02E	3.2	3.15 UV	3.89 JV
PCB036	pg/g-Wet	18	0	0	--	--	--	--	--	--	0.854 UJ	5.54 U	SB05W	2.41	2.71 UV	2.77 UV
PCB037	pg/g-Wet	18	18	100	12.8	304 T	SB04E	59.9	24.6 V	233 V	12.8	304 T	SB04E	59.9	24.6 V	233 V
PCB038	pg/g-Wet	18	1	5.56	1.66 J	1.66 J	SB07E	1.66	1.66 J	1.66 J	0.7 U	4.37 U	SB05W	1.69	1.95 UJV	2.18 UV
PCB039	pg/g-Wet	18	11	61.1	1.28 J	20.5 J	SB02E	5.61	2.79 J	17.1 JV	0.956 U	20.5 J	SB02E	3.91	1.75 JV	14.7 JV
PCB040 & 041 & 071	pg/g-Wet	18	18	100	109	2750	SB02E	522	226 V	1560 V	109	2750	SB02E	522	226 V	1560 V
PCB042	pg/g-Wet	18	18	100	56.5	1570	SB02E	274	131 V	822 V	56.5	1570	SB02E	274	131 V	822 V
PCB043	pg/g-Wet	18	18	100	10.8	252	SB02E	51.5	24.7 V	167 V	10.8	252	SB02E	51.5	24.7 V	167 V
PCB044 & 047 & 065	pg/g-Wet	18	18	100	413	19700	SB011E	2710	965 V	9510 V	413	19700	SB011E	2710	965 V	9510 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB045 & 051	pg/g-Wet	18	18	100	33	2100	SB011E	282	105 V	778 V	33	2100	SB011E	282	105 V	778 V
PCB046	pg/g-Wet	18	18	100	5.16 J	114	SB02E	30.7	18.1 V	89.4 V	5.16 J	114	SB02E	30.7	18.1 V	89.4 V
PCB048	pg/g-Wet	18	18	100	41	1010	SB02E	194	86.7 V	639 V	41	1010	SB02E	194	86.7 V	639 V
PCB049 & 069	pg/g-Wet	18	18	100	238	5410	SB011E	1250	577 V	5320 V	238	5410	SB011E	1250	577 V	5320 V
PCB050 & 053	pg/g-Wet	18	18	100	29.6	2330	SB011E	258	98 V	718 V	29.6	2330	SB011E	258	98 V	718 V
PCB052	pg/g-Wet	18	18	100	462	9170	SB02E	2010	844 V	7580 V	462	9170	SB02E	2010	844 V	7580 V
PCB054	pg/g-Wet	18	18	100	3.95 J	571	SB011E	54.9	18.6 V	186 V	3.95 J	571	SB011E	54.9	18.6 V	186 V
PCB055	pg/g-Wet	18	7	38.9	8.64	480	SB02E	84.9	12	347 V	3.63 UT	480	SB02E	34.7	2.82 UV	105 V
PCB056	pg/g-Wet	18	18	100	53.6	2090	SB02E	295	115 V	1210 V	53.6	2090	SB02E	295	115 V	1210 V
PCB057	pg/g-Wet	18	17	94.4	1.33 J	32.4 T	SB04E	9.67	3.79 J	28.4 V	1.33 J	32.4 T	SB04E	9.21	3.7 JV	28.2 V
PCB058	pg/g-Wet	18	10	55.6	1.75 J	20	SB02E	6.1	3.47 JV	15.7 V	1.44 U	20	SB02E	4.2	2.65 JV	11.9 V
PCB059 & 062 & 075	pg/g-Wet	18	18	100	26.2	625	SB02E	138	57.1 V	478 V	26.2	625	SB02E	138	57.1 V	478 V
PCB060	pg/g-Wet	18	18	100	84.7	3400	SB02E	428	152 V	1300 V	84.7	3400	SB02E	428	152 V	1300 V
PCB061 & 070 & 074 & 076	pg/g-Wet	18	18	100	553	13600	SB02E	2210	998 V	6760 V	553	13600	SB02E	2210	998 V	6760 V
PCB063	pg/g-Wet	18	18	100	22.5	486	SB02E	91	43.9 V	296 V	22.5	486	SB02E	91	43.9 V	296 V
PCB064	pg/g-Wet	18	18	100	116	3900	SB02E	551	248 V	1750 V	116	3900	SB02E	551	248 V	1750 V
PCB066	pg/g-Wet	18	18	100	446	16700	SB02E	2160	888 V	6550 V	446	16700	SB02E	2160	888 V	6550 V
PCB067	pg/g-Wet	18	18	100	6.1	128	SB011E	33.7	15.7 V	104 V	6.1	128	SB011E	33.7	15.7 V	104 V
PCB068	pg/g-Wet	18	18	100	6.54	188	SB011E	29.6	12.9 V	120 V	6.54	188	SB011E	29.6	12.9 V	120 V
PCB072	pg/g-Wet	18	18	100	8.92	88	SB011E	24.7	14.2 V	69.2 V	8.92	88	SB011E	24.7	14.2 V	69.2 V
PCB073	pg/g-Wet	18	4	22.2	14.8	449	SB011E	175	118 V	409 V	2.94 UT	449	SB011E	40.4	2.17 UV	220 V
PCB077	pg/g-Wet	18	18	100	19.9	463	SB02E	72.8	27.8 V	241 V	19.9	463	SB02E	72.8	27.8 V	241 V
PCB078	pg/g-Wet	18	1	5.56	6.47	6.47	SB02E	6.47	6.47	6.47	3.22 U	6.47	SB02E	2.46	2.37 UV	3.38 V
PCB079	pg/g-Wet	18	16	88.9	6.28	164	SB02E	31.9	16.6 V	90 V	6.28	164	SB02E	28.9	14.1 V	80.1 V
PCB080	pg/g-Wet	18	0	0	--	--	--	--	--	--	2.59 U	5.12 U	SB011E	1.79	1.87 UV	1.99 UV
PCB081	pg/g-Wet	18	4	22.2	2.74 J	17.1	SB02E	8.15	6.37 JV	16 V	1.21 U	17.1	SB02E	3.16	1.66 UV	11.1 V
PCB082	pg/g-Wet	18	18	100	46.9	817	SB02E	193	92.6 V	618 V	46.9	817	SB02E	193	92.6 V	618 V
PCB083 & 099	pg/g-Wet	18	18	100	1000	9520 T	SB04E	3040	1690 V	9320 V	1000	9520 T	SB04E	3040	1690 V	9320 V
PCB084	pg/g-Wet	18	18	100	88.1	1060 T	SB04E	332	163 V	1030 V	88.1	1060 T	SB04E	332	163 V	1030 V
PCB085 & 116 & 117	pg/g-Wet	18	18	100	271	3850	SB02E	803	453 V	2820 V	271	3850	SB02E	803	453 V	2820 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	18	18	100	538	6170	SB02E	1850	982 V	6050 V	538	6170	SB02E	1850	982 V	6050 V
PCB088 & 091	pg/g-Wet	18	18	100	109	2760	SB011E	455	214 V	1330 V	109	2760	SB011E	455	214 V	1330 V
PCB089	pg/g-Wet	18	18	100	2.99 J	87.9	SB02E	15.8	8.3 V	45.9 V	2.99 J	87.9	SB02E	15.8	8.3 V	45.9 V
PCB090 & 101 & 113	pg/g-Wet	18	18	100	1160	28200	SB011E	4600	2400 V	13900 V	1160	28200	SB011E	4600	2400 V	13900 V
PCB092	pg/g-Wet	18	18	100	217	3950	SB011E	830	471 V	2510 V	217	3950	SB011E	830	471 V	2510 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	18	18	100	553	14900	SB011E	2300	1170 V	6640 V	553	14900	SB011E	2300	1170 V	6640 V
PCB094	pg/g-Wet	18	16	88.9	5.5 J	210	SB011E	26.3	10.1 V	89.4 V	2.62 U	210	SB011E	23.6	8.68 V	73.3 V
PCB096	pg/g-Wet	18	18	100	4.6 J	185	SB011E	24.5	11.1 V	69.4 V	4.6 J	185	SB011E	24.5	11.1 V	69.4 V
PCB103	pg/g-Wet	18	18	100	17.4	789	SB011E	88.2	38.3 V	282 V	17.4	789	SB011E	88.2	38.3 V	282 V
PCB104	pg/g-Wet	18	13	72.2	1.92 J	64.3	SB011E	9.41	2.58 J	39.2 V	0.681 U	64.3	SB011E	7.04	2.36 JV	28.7 V
PCB105	pg/g-Wet	18	18	100	448	6720	SB02E	1520	778 V	5250 V	448	6720	SB02E	1520	778 V	5250 V
PCB106	pg/g-Wet	18	2	11.1	2.94 J	34.7	SB02E	18.8	18.8 JV	33.1 JV	1.95 U	34.7	SB02E	3.18	1.02 UV	7.7 JV
PCB107 & 124	pg/g-Wet	18	18	100	30.6	340	SB02E	97.8	50.8 V	330 V	30.6	340	SB02E	97.8	50.8 V	330 V
PCB109	pg/g-Wet	18	18	100	132	1200	SB02E	336	215 V	1130 V	132	1200	SB02E	336	215 V	1130 V
PCB110 & 115	pg/g-Wet	18	18	100	900	10400 T	SB04E	3000	1540 V	9760 V	900	10400 T	SB04E	3000	1540 V	9760 V
PCB111	pg/g-Wet	18	17	94.4	2.6 J	29.9	SB011E	7.42	4.43 J	22.1 V	2.6 J	29.9	SB011E	7.09	4.39 JV	21.6 V
PCB112	pg/g-Wet	18	0	0	--	--	--	--	--	--	1.49 U	208 U	SB07E	6.89	1.08 UV	18.3 UV
PCB114	pg/g-Wet	18	16	88.9	37	475	SB02E	115	69.7 V	405 V	37	475	SB02E	110	69.7 V	395 V
PCB118	pg/g-Wet	18	18	100	1310	14700 T	SB04E	4400	2580 V	14600 V	1310	14700 T	SB04E	4400	2580 V	14600 V
PCB120	pg/g-Wet	18	17	94.4	8.54	96	SB011E	24.2	17.7	52.8 V	8.54	96	SB011E	23.2	16.3 V	50.1 V
PCB121	pg/g-Wet	18	17	94.4	2.17 J	89.1	SB011E	10.5	3.74 J	40.8 V	2.17 J	89.1	SB011E	10.1	3.73 JV	37.8 V
PCB122	pg/g-Wet	18	16	88.9	9.15	87.1	SB02E	27.3	16.4 V	77.1 V	3.12 U	87.1	SB02E	24.7	14.2 V	75.8 V
PCB123	pg/g-Wet	18	16	88.9	31	345	SB02E	81.5	42.4 V	249 V	26.7 U	345	SB02E	74	42 V	236 V
PCB126	pg/g-Wet	18	2	11.1	3.95 J	7.75	SB09W	5.85	5.85 JV	7.56 JV	3.02 U	22.9 U	SB011E	4.16	2.83 UV	10.5 UV
PCB127	pg/g-Wet	18	11	61.1	3.92 J	28.2	SB011E	9.73	7.16	21.3 V	2.08 U	28.2	SB011E	6.96	5.69 JV	16.4 V
PCB128 & 166	pg/g-Wet	18	18	100	283	5130	SB011E	1020	554 V	3720 V	283	5130	SB011E	1020	554 V	3720 V
PCB129 & 138 & 160 & 163	pg/g-Wet	18	18	100	2420	139000	SB011E	15200	6330 V	41200 V	2420	139000	SB011E	15200	6330 V	41200 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB130	pg/g-Wet	18	18	100	113	3800	SB011E	494	235 V	1340 V	113	3800	SB011E	494	235 V	1340 V
PCB131	pg/g-Wet	18	18	100	7.4	422	SB011E	46.3	17.2 V	140 V	7.4	422	SB011E	46.3	17.2 V	140 V
PCB132	pg/g-Wet	18	18	100	235	12800	SB011E	1380	541 V	3960 V	235	12800	SB011E	1380	541 V	3960 V
PCB133	pg/g-Wet	18	18	100	53.4	2060	SB011E	259	140 V	721 V	53.4	2060	SB011E	259	140 V	721 V
PCB134 & 143	pg/g-Wet	18	18	100	47.5	3260	SB011E	321	108 V	852 V	47.5	3260	SB011E	321	108 V	852 V
PCB135 & 151 & 154	pg/g-Wet	18	18	100	468	32800	SB011E	3280	1200 V	8770 V	468	32800	SB011E	3280	1200 V	8770 V
PCB136	pg/g-Wet	18	18	100	99.3	5810	SB011E	597	214 V	1580 V	99.3	5810	SB011E	597	214 V	1580 V
PCB137	pg/g-Wet	18	18	100	103	1400 T	SB04E	346	211 V	1120 V	103	1400 T	SB04E	346	211 V	1120 V
PCB139 & 140	pg/g-Wet	18	18	100	31.8	339 T	SB04E	93.7	62.5 V	288 V	31.8	339 T	SB04E	93.7	62.5 V	288 V
PCB141	pg/g-Wet	18	18	100	284	24200	SB011E	2280	768 V	6090 V	284	24200	SB011E	2280	768 V	6090 V
PCB142	pg/g-Wet	18	0	0	--	--	--	--	--	--	1.59 U	9.23 U	SB011E	1.39	1.2 UV	2.01 UV
PCB144	pg/g-Wet	18	18	100	55.6	5320	SB011E	465	148 V	1290 V	55.6	5320	SB011E	465	148 V	1290 V
PCB145	pg/g-Wet	18	5	27.8	0.512 J	3 JT	SB04E	1.92	2.61 JT	2.97 JV	0.512 J	3 JT	SB04E	1.14	0.98 UV	2.87 JV
PCB146	pg/g-Wet	18	18	100	474	23000	SB011E	2720	1380 V	7390 V	474	23000	SB011E	2720	1380 V	7390 V
PCB147 & 149	pg/g-Wet	18	18	100	790	80800	SB011E	6700	1840 V	18300 V	790	80800	SB011E	6700	1840 V	18300 V
PCB148	pg/g-Wet	18	18	100	6.24	112	SB011E	20	12.9 V	59.6 V	6.24	112	SB011E	20	12.9 V	59.6 V
PCB150	pg/g-Wet	18	17	94.4	2.46 J	174	SB011E	17.1	5.32 J	57.6 V	2.46 J	174	SB011E	16.4	5.19 JV	50.3 V
PCB152	pg/g-Wet	18	14	77.8	1.58 J	76.9	SB011E	11	4.55 JV	41.5 V	1.44 U	76.9	SB011E	8.96	3.1 JV	30.6 V
PCB153 & 168	pg/g-Wet	18	18	100	2720	209000	SB011E	20200	6850 V	55800 V	2720	209000	SB011E	20200	6850 V	55800 V
PCB155	pg/g-Wet	18	16	88.9	1.57 J	37	SB011E	6.42	2.95 JV	25.8 V	1.57 J	37	SB011E	5.83	2.91 JV	24.3 V
PCB156 & 157	pg/g-Wet	18	18	100	251	9620	SB011E	1260	576 V	3940 V	251	9620	SB011E	1260	576 V	3940 V
PCB158	pg/g-Wet	18	18	100	210	9990	SB011E	1140	476 V	3400 V	210	9990	SB011E	1140	476 V	3400 V
PCB159	pg/g-Wet	18	18	100	9.98	2250	SB011E	165	28.4 V	492 V	9.98	2250	SB011E	165	28.4 V	492 V
PCB161	pg/g-Wet	18	2	11.1	12.4	18.4	SB02E	15.4	15.4 V	18.1 V	2.39 U	18.4	SB02E	3.24	1.73 UV	13.3 V
PCB162	pg/g-Wet	18	17	94.4	9.19	136	SB011E	28.4	17.5	91.9 V	2.16 U	136	SB011E	26.9	17 V	89.2 V
PCB164	pg/g-Wet	18	18	100	92.2	8630	SB011E	770	257 V	2060 V	92.2	8630	SB011E	770	257 V	2060 V
PCB165	pg/g-Wet	18	14	77.8	2.76 J	112	SB011E	16.3	6.05 JV	63.5 V	2.48 U	112	SB011E	13.1	5.31 JV	48.6 V
PCB167	pg/g-Wet	18	18	100	88.3	3920	SB011E	479	238 V	1320 V	88.3	3920	SB011E	479	238 V	1320 V
PCB169	pg/g-Wet	18	0	0	--	--	--	--	--	--	1.49 U	190 U	SB011E	8.69	2.51 UV	23.1 UV
PCB170	pg/g-Wet	18	18	100	604	59600	SB011E	5450	1530 V	16500 V	604	59600	SB011E	5450	1530 V	16500 V
PCB171 & 173	pg/g-Wet	18	18	100	165	14100	SB011E	1330	446 V	3780 V	165	14100	SB011E	1330	446 V	3780 V
PCB172	pg/g-Wet	18	18	100	104	12800	SB011E	1100	298 V	3250 V	104	12800	SB011E	1100	298 V	3250 V
PCB174	pg/g-Wet	18	18	100	253	53700	SB011E	3930	679 V	12000 V	253	53700	SB011E	3930	679 V	12000 V
PCB175	pg/g-Wet	18	18	100	21.7	3010	SB011E	250	63 V	763 V	21.7	3010	SB011E	250	63 V	763 V
PCB176	pg/g-Wet	18	18	100	28.8	5420	SB011E	387	68 V	1140 V	28.8	5420	SB011E	387	68 V	1140 V
PCB177	pg/g-Wet	18	18	100	257	36400	SB011E	3010	803 V	9670 V	257	36400	SB011E	3010	803 V	9670 V
PCB178	pg/g-Wet	18	18	100	149	15700	SB011E	1390	406 V	4160 V	149	15700	SB011E	1390	406 V	4160 V
PCB179	pg/g-Wet	18	18	100	117	12100	SB011E	1050	308 V	2870 V	117	12100	SB011E	1050	308 V	2870 V
PCB180 & 193	pg/g-Wet	18	18	100	1660	208000	SB011E	18400	4460 V	56600 V	1660	208000	SB011E	18400	4460 V	56600 V
PCB181	pg/g-Wet	18	18	100	6.05	218	SB011E	35.4	15.1 V	123 V	6.05	218	SB011E	35.4	15.1 V	123 V
PCB182	pg/g-Wet	18	14	77.8	4.65 J	32.4 T	SB04E	12.6	10.4 V	27.9 V	3.61 U	32.4 T	SB04E	10.2	8.57 V	26.5 V
PCB183 & 185	pg/g-Wet	18	18	100	468	48300	SB011E	4400	1300 V	13000 V	468	48300	SB011E	4400	1300 V	13000 V
PCB184	pg/g-Wet	18	17	94.4	1.03 J	8.72	SB011E	2.55	1.92 J	5.26 JV	1.03 J	8.72	SB011E	2.46	1.91 JV	5.04 JV
PCB186	pg/g-Wet	18	2	11.1	0.262 J	0.821 JT	SB04E	0.542	0.542 JV	0.793 JV	0.262 J	1.46 U	SB05W; SB09W	0.669	0.718 UV	0.744 JV
PCB187	pg/g-Wet	18	18	100	992	113000	SB011E	10400	3070 V	32200 V	992	113000	SB011E	10400	3070 V	32200 V
PCB188	pg/g-Wet	18	18	100	2.26 J	95.6	SB011E	11.4	4.85 JV	35.8 V	2.26 J	95.6	SB011E	11.4	4.85 JV	35.8 V
PCB189	pg/g-Wet	18	18	100	18.6	2600	SB011E	226	57.4 V	711 V	18.6	2600	SB011E	226	57.4 V	711 V
PCB190	pg/g-Wet	18	18	100	131	15000	SB011E	1330	354 V	3870 V	131	15000	SB011E	1330	354 V	3870 V
PCB191	pg/g-Wet	18	18	100	30.5	3610	SB011E	313	78.2 V	938 V	30.5	3610	SB011E	313	78.2 V	938 V
PCB192	pg/g-Wet	18	0	0	--	--	--	--	--	--	0.31 U	2.91 U	SB010E; SB05W; SB09W	1.26	1.43 UV	1.46 UV
PCB194	pg/g-Wet	18	18	100	190	39500	SB011E	3260	688 V	10000 V	190	39500	SB011E	3260	688 V	10000 V
PCB195	pg/g-Wet	18	18	100	86.7	16200	SB011E	1360	315 V	4310 V	86.7	16200	SB011E	1360	315 V	4310 V
PCB196	pg/g-Wet	18	18	100	106	19000	SB011E	1630	401 V	5030 V	106	19000	SB011E	1630	401 V	5030 V
PCB197 & 200	pg/g-Wet	18	18	100	21.9	4270	SB011E	332	66.8 V	980 V	21.9	4270	SB011E	332	66.8 V	980 V
PCB198 & 199	pg/g-Wet	18	18	100	229	36200	SB011E	3200	829 V	9750 V	229	36200	SB011E	3200	829 V	9750 V
PCB201	pg/g-Wet	18	18	100	28.3	4230	SB011E	371	93.7 V	1180 V	28.3	4230	SB011E	371	93.7 V	1180 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB202	pg/g-Wet	18	18	100	64.8	5650	SB011E	552	160 V	1610 V	64.8	5650	SB011E	552	160 V	1610 V
PCB203	pg/g-Wet	18	18	100	172	17200	SB011E	1660	470 V	4860 V	172	17200	SB011E	1660	470 V	4860 V
PCB204	pg/g-Wet	18	5	27.8	0.347 J	5.35 J	SB011E	2.29	1.22 J	4.97 JV	0.216 U	5.35 J	SB011E	1.19	0.998 UV	3.72 JV
PCB205	pg/g-Wet	18	18	100	9.92	1510	SB011E	128	31.5 V	367 V	9.92	1510	SB011E	128	31.5 V	367 V
PCB206	pg/g-Wet	18	18	100	72.3	4560	SB011E	558	164 V	2390 V	72.3	4560	SB011E	558	164 V	2390 V
PCB207	pg/g-Wet	18	18	100	12.2	973	SB011E	110	31.4 V	374 V	12.2	973	SB011E	110	31.4 V	374 V
PCB208	pg/g-Wet	18	18	100	24.3	948	SB011E	143	52 V	593 V	24.3	948	SB011E	143	52 V	593 V
PCB209	pg/g-Wet	18	18	100	35	346 T	SB04E	91.3	62.2 V	209 V	35	346 T	SB04E	91.3	62.2 V	209 V
Total PCB Congeners	pg/g-Wet	18	18	100	27000 JT	1480000 JT	SB011E	166000	74100 JV	427000 JV	27000 JT	1480000 JT	SB011E	166000	74100 JV	427000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	23	23	100	27 JT	1480 JT	SB011E	144	65.8 JT	238 JV	27 JT	1480 JT	SB011E	144	65.8 JT	238 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	18	18	100	24.3 JT	1020 JT	SB011E	227	107 V	897 JV	24.3 JT	1020 JT	SB011E	227	107 V	897 JV
Heptachlorobiphenylhomologs	pg/g-Wet	18	18	100	5210 JT	604000 T	SB011E	53000	13900 JV	162000 JV	5210 JT	604000 T	SB011E	53000	13900 JV	162000 JV
Hexachlorobiphenyl homologs	pg/g-Wet	18	18	100	9020 JT	584000 T	SB011E	59300	23400 JV	155000 JV	9020 JT	584000 T	SB011E	59300	23400 JV	155000 JV
Monochlorobiphenyl homologs	pg/g-Wet	18	10	55.6	0.858 JT	29.7 T	SB02E	6.21	3.55 JV	19.9 JV	0.858 JT	29.7 T	SB02E	4.19	1.93 UJV	11.2 JV
Nonachlorobiphenyl homologs	pg/g-Wet	18	18	100	112 T	6480 T	SB011E	811	246 V	3360 V	112 T	6480 T	SB011E	811	246 V	3360 V
Octachlorobiphenyl homologs	pg/g-Wet	18	18	100	918 T	144000 JT	SB011E	12500	3160 JV	37600 JV	918 T	144000 JT	SB011E	12500	3160 JV	37600 JV
Pentachlorobiphenylhomologs	pg/g-Wet	18	18	100	7210 JT	91600 T	SB011E	24200	12800 JV	75000 JV	7210 JT	91600 T	SB011E	24200	12800 JV	75000 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	18	18	100	3210 T	71200 T	SB02E	13800	6020 JV	48500 V	3210 T	71200 T	SB02E	13800	6020 JV	48500 V
Trichlorobiphenyl homologs	pg/g-Wet	18	18	100	425 JT	9590 T	SB09W	2490	1170 JV	7050 JV	425 JT	9590 T	SB09W	2490	1170 JV	7050 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	18	0	0	--	--	--	--	--	--	0.007 UT	0.066 U	SB07W	0.0131	0.0095 UV	0.0279 UV
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	18	6	33.3	0.025	0.174 T	SB04E	0.0632	0.0375 V	0.15 V	0.0149 U	0.174 T	SB04E	0.0364	0.025 V	0.0907 V
Hexachlorodibenzofuran homologs	pg/g-Wet	18	18	100	0.037	7.4	SB07W	0.547	0.138 V	1.37 V	0.037	7.4	SB07W	0.547	0.138 V	1.37 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	18	18	100	0.0485 T	0.782	SB07E	0.163	0.116 V	0.436 V	0.0485 T	0.782	SB07E	0.163	0.116 V	0.436 V
Octachlorodibenzofuran	pg/g-Wet	18	4	22.2	0.007 J	0.016 J	SB07W	0.013	0.0146 JV	0.0159 JV	0.007 J	0.016 J	SB07W	0.00716	0.0066 UV	0.0152 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	18	1	5.56	0.392 T	0.392 T	SB04E	0.392	0.392 T	0.392 T	0.025 U	0.392 T	SB04E	0.0557	0.0273 UV	0.19 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	18	18	100	0.145	32.4	SB07W	2.26	0.394 V	5.98 V	0.145	32.4	SB07W	2.26	0.394 V	5.98 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	18	18	100	0.067	1.86	SB07E	0.219	0.112 V	0.457 V	0.067	1.86	SB07E	0.219	0.112 V	0.457 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	18	18	100	0.199 T	16.8	SB07W	1.43	0.393 V	4.58 V	0.199 T	16.8	SB07W	1.43	0.393 V	4.58 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	18	18	100	0.055	0.256	SB09W	0.1	0.0853 V	0.232 V	0.055	0.256	SB09W	0.1	0.0853 V	0.232 V
Total PCDD/F	pg/g-Wet	18	18	100	0.662 JT	56.9 JT	SB07W	4.76	1.4 JV	12.3 JV	0.662 JT	56.9 JT	SB07W	4.76	1.4 JV	12.3 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	18	0	0	--	--	--	--	--	--	0.007 U	0.043 U	SB07W	0.00811	0.00675 UV	0.0164 UV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	18	5	27.8	0.021 J	0.136 JT	SB04E	0.05	0.031 J	0.116 JV	0.021 J	0.136 JT	SB04E	0.0302	0.021 JV	0.0578 JV
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	18	1	5.56	0.012 J	0.012 J	SB07W	0.012	0.012 J	0.012 J	0.012 J	0.0143 U	SB010W; SB011E; SB02E; SB03E; SB03W; SB04W; SB05W; SB06E; SB06W; SB07E; SB08W; SB09E	0.00741	0.00715 UV	0.00788 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	18	18	100	0.013 J	5.88	SB07W	0.378	0.041 JV	1.07 V	0.013 J	5.88	SB07W	0.378	0.041 JV	1.07 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	18	11	61.1	0.0105 JT	0.078 J	SB07E	0.0273	0.018 JT	0.0665 JV	0.01 U	0.078 J	SB07E	0.0195	0.0125 JV	0.0585 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	18	16	88.9	0.007 J	1.32	SB07W	0.101	0.0205 JV	0.365 JV	0.007 J	1.32	SB07W	0.0907	0.0175 JV	0.237 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	18	18	100	0.0405 JT	0.61	SB07E	0.13	0.092 JV	0.351 V	0.0405 JT	0.61	SB07E	0.13	0.092 JV	0.351 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	18	1	5.56	0.034 J	0.034 J	SB07W	0.034	0.034 J	0.034 J	0.0102 U	0.034 J	SB07W	0.00674	0.00515 UV	0.00948 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	18	13	72.2	0.007 J	0.094 J	SB07E	0.0215	0.0115 JT	0.0622 JV	0.007 J	0.094 J	SB07E	0.0167	0.01 JV	0.0489 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	18	18	100	0.031 JT	13.4	SB07W	0.859	0.072 JV	2.58 V	0.031 JT	13.4	SB07W	0.859	0.072 JV	2.58 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	18	18	100	0.067 J	1.86	SB07E	0.219	0.112 JV	0.457 V	0.067 J	1.86	SB07E	0.219	0.112 JV	0.457 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	18	11	61.1	0.007 J	0.133 J	SB07W	0.024	0.013 J	0.079 JV	0.007 J	0.133 J	SB07W	0.0168	0.0085 JV	0.0412 JV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	18	18	100	0.079 J	18.8	SB07W	1.26	0.168 V	3.26 V	0.079 J	18.8	SB07W	1.26	0.168 V	3.26 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	18	18	100	0.152 T	17.4	SB07W	1.4	0.325 V	4.75 V	0.152 T	17.4	SB07W	1.4	0.325 V	4.75 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	18	18	100	0.055	0.256	SB09W	0.1	0.0853 V	0.232 V	0.055	0.256	SB09W	0.1	0.0853 V	0.232 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	18	18	100	0.187 JT	8.74 JT	SB07W	0.928	0.369 JV	3.27 JV	0.187 JT	8.74 JT	SB07W	0.928	0.369 JV	3.27 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	18	18	100	0.325 JT	8.91 JT	SB07W	1.24	0.601 JV	3.45 JV	0.325 JT	8.91 JT	SB07W	1.24	0.601 JV	3.45 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	18	18	100	0.0672 T	1.04 T	SB09W	0.315	0.152 JV	0.931 V	0.0672 T	1.04 T	SB09W	0.315	0.152 JV	0.931 V
Pesticides																
2,4'-DDD	µg/kg-Wet	23	19	82.6	0.104 J	17.8	SB07W	1.65	0.519	4.6 V	0.104 J	17.8	SB07W	1.46	0.55 U	3.05 V
2,4'-DDE	µg/kg-Wet	23	18	78.3	0.034 J	2.28	SB07W	0.264	0.125 JV	0.863 V	0.034 J	2.28	SB07W	0.315	0.149 J	0.602 V
2,4'-DDT	µg/kg-Wet	23	23	100	0.075 J	13.3	SB07W	1.65	0.225 T	5.14 JV	0.075 J	13.3	SB07W	1.65	0.225 T	5.14 JV
4,4'-DDD	µg/kg-Wet	23	23	100	0.64	44.9	SB07W	4.67	2.55	9.09 V	0.64	44.9	SB07W	4.67	2.55	9.09 V
4,4'-DDE	µg/kg-Wet	23	23	100	4.95	56.6	SB07W	13.1	10.1	24.6 V	4.95	56.6	SB07W	13.1	10.1	24.6 V
4,4'-DDT	µg/kg-Wet	23	23	100	0.585	45.7	SB07W	4.94	1.29	10.6 V	0.585	45.7	SB07W	4.94	1.29	10.6 V
Aldrin	µg/kg-Wet	23	6	26.1	0.005 J	0.011 J	SB09W	0.00664	0.00589 JV	0.00998 JV	0.00334 U	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.12	0.0206 U	0.5 UV
alpha-Endosulfan	µg/kg-Wet	23	0	0	--	--	--	--	--	--	0.00574 UT	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.12	0.01 U	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	23	5	21.7	0.00394 JT	0.006 J	SB09E	0.00488	0.005 JT	0.00584 JV	0.00355 U	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.112	0.00394 JT	0.5 UV
beta-Endosulfan	µg/kg-Wet	23	0	0	--	--	--	--	--	--	0.0287 U	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.126	0.022 U	0.5 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	23	4	17.4	0.00279 J	4.5 N	03R014	1.13	0.005 JV	3.83 V	0.00163 U	4.5 N	03R014	0.287	0.0055 UT	0.5 UV
cis-Chlordane	µg/kg-Wet	23	18	78.3	0.159 J	0.469	SB09W	0.29	0.294 JV	0.426 V	0.159 J	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.336	0.311 J	0.5 UV
cis-Nonachlor	µg/kg-Wet	23	18	78.3	0.151 J	0.4 JT	SB04E	0.261	0.251 JV	0.352 JV	0.151 J	2.9 U	03R014; 05R006	0.45	0.257 J	1.43 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	23	0	0	--	--	--	--	--	--	0.001 U	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.11	0.001 U	0.5 UV
Dieldrin	µg/kg-Wet	23	21	91.3	0.183	3.3 NJ	03R014	0.555	0.364	1.4 NJ	0.183	3.3 NJ	03R014	0.55	0.369	1.36 JV
Endosulfan sulfate	µg/kg-Wet	23	12	52.2	0.048 J	0.11 J	SB05W	0.0795	0.0765 JV	0.109 JV	0.048 J	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.162	0.076 J	0.5 UV
Endrin	µg/kg-Wet	23	6	26.1	0.003 J	0.011 J	SB011W	0.00577	0.00475 JV	0.01 JV	0.003 J	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.111	0.003 J	0.5 UV
Endrin aldehyde	µg/kg-Wet	23	2	8.7	1.5 NJ	2 NJ	03R014	1.75	1.75 JV	1.98 JV	0.00236 U	2 NJ	03R014	0.225	0.0097 U	1.4 JV
Endrin ketone	µg/kg-Wet	23	1	4.35	0.0108 JT	0.0108 JT	SB010E	0.0108	0.0108 JT	0.0108 JT	0.00136 UT	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.121	0.00975 U	0.5 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	23	7	30.4	0.003 J	0.011 JT	SB010E	0.00614	0.005 J	0.0104 JV	0.003 J	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.113	0.0045 U	0.5 UV
Heptachlor	µg/kg-Wet	23	1	4.35	0.005 J	0.005 J	SB011W	0.005	0.005 J	0.005 J	0.00322 UT	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.116	0.0156 U	0.5 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Heptachlor epoxide	µg/kg-Wet	23	17	73.9	0.01 J	0.0272 J	SB02E	0.0173	0.0169 J	0.0249 JV	0.01 J	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.122	0.018 J	0.5 UV
Methoxychlor	µg/kg-Wet	23	0	0	--	--	--	--	--	--	0.011 U	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.117	0.00575 UT	0.5 UV
Mirex	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1 U	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.5	0.5 U	0.5 UV
Oxychlordane	µg/kg-Wet	23	15	65.2	0.108 J	0.29 J	SB09W	0.164	0.158 J	0.219 JV	0.108 J	1 U	03R014; 05R006; 06R024; 08R032; 09R006	0.226	0.174 J	0.5 UV
Total Chlordanes	µg/kg-Wet	23	21	91.3	0.915 JT	4.1 NJT	03R014	1.75	1.51 JT	3 NJT	0.915 JT	4.1 NJT	03R014	1.69	1.51 JT	2.95 JV
Total Endosulfan	µg/kg-Wet	23	12	52.2	0.048 JT	0.11 JT	SB05W	0.0795	0.0765 JV	0.109 JV	0.048 JT	1 UT	03R014; 05R006; 06R024; 08R032; 09R006	0.163	0.077 JT	0.5 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	23	23	100	0.744 JT	62.7 T	SB07W	6.04	2.94 T	12.1 V	0.744 JT	62.7 T	SB07W	6.04	2.94 T	12.1 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	23	23	100	6.41 JT	181 T	SB07W	26	15.5 JT	47.7 JV	6.41 JT	181 T	SB07W	26	15.5 JT	47.7 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	23	23	100	4.98 JT	58.9 T	SB07W	13.4	10.3 JT	24.7 V	4.98 JT	58.9 T	SB07W	13.4	10.3 JT	24.7 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	23	23	100	0.674 JT	59 T	SB07W	6.58	1.54 JT	15.1 JV	0.674 JT	59 T	SB07W	6.58	1.54 JT	15.1 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	5	5	100	21.1 JT	37.4 JT	03R014	26.9	24.8 JT	35.7 JV	21.1 JT	37.4 JT	03R014	26.9	24.8 JT	35.7 JV
Toxaphene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	72 U	180 U	03R014	58	55 U	85 UV
trans-Chlordane	µg/kg-Wet	23	18	78.3	0.042 J	0.231 J	SB09W	0.1	0.0925 JV	0.153 JV	0.042 J	2.4 U	03R014	0.226	0.105 J	0.68 UV
trans-Nonachlor	µg/kg-Wet	23	21	91.3	0.439 J	4.1 NJ	03R014	1.08	0.761 J	3 NJ	0.439 J	4.1 NJ	03R014	1.06	0.761 J	2.88 JV
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	18	15	83	0.31 J	2.4	SB03E	0.81	0.59 T	1.8 V	0.3 U	2.4	SB03E	0.7	0.51 JV	1.6 V
2-Methylnaphthalene	µg/kg-Wet	18	16	89	0.45 J	2.9	SB03E	1	0.8 JV	2.1 V	0.44 U	2.9	SB03E	0.93	0.71 JV	2 V
Acenaphthene	µg/kg-Wet	18	2	11	2.6	5.4	SB06W	4	4 V	5.3 V	0.34 U	5.4	SB06W	0.83	0.48 UV	3 V
Acenaphthylene	µg/kg-Wet	18	13	72.2	0.14 J	2.5	SB08W	0.522	0.26 J	1.84 V	0.069 U	2.5	SB08W	0.387	0.19 JV	1.57 V
Anthracene	µg/kg-Wet	18	10	56	0.44 J	3.6	SB08W	1.1	0.66 V	2.9 V	0.15 U	3.6	SB08W	0.66	0.46 JV	2.2 V
Benzo(a)anthracene	µg/kg-Wet	18	8	44.4	0.14 J	2.6	SB08W	0.875	0.545 JV	2.36 V	0.066 U	2.6	SB08W	0.407	0.033 UV	2.01 V
Benzo(a)pyrene	µg/kg-Wet	18	5	27.8	0.091 J	2.5	SB08W	1.1	0.48	2.44 V	0.081 U	2.5	SB08W	0.335	0.0405 UV	2.25 V
Benzo(b)fluoranthene	µg/kg-Wet	18	6	33	0.13 J	1.7	SB08W	0.78	0.65 JV	1.6 V	0.07 U	1.7	SB08W	0.28	0.035 UV	1.4 V
Benzo(g,h,i)perylene	µg/kg-Wet	18	6	33.3	0.084 J	2	SB05W; SB08W	0.873	0.53 JV	2 V	0.073 U	2	SB05W; SB08W	0.315	0.0365 UV	2 V
Benzo(k)fluoranthene	µg/kg-Wet	18	6	33.3	0.096 J	1.4	SB08W	0.606	0.42 JV	1.35 V	0.056 U	1.4	SB08W	0.221	0.028 UV	1.23 V
Chrysene	µg/kg-Wet	18	9	50	0.092 J	6.2	SB03E	1.51	0.61 JT	4.88 V	0.076 U	6.2	SB03E	0.775	0.065 JV	3.4 V
Dibenzo(a,h)anthracene	µg/kg-Wet	18	3	16.7	0.15 JT	0.24 J	SB08W	0.19	0.18 J	0.234 JV	0.059 U	0.24 J	SB08W	0.0563	0.0295 UV	0.189 JV
Dibenzothiophene	µg/kg-Wet	18	12	66.7	0.13 J	2.1	SB08W	0.74	0.415 JV	1.88 V	0.074 U	2.1	SB08W	0.506	0.285 JV	1.76 V
Fluoranthene	µg/kg-Wet	18	10	56	1.4	12	SB08W	3.8	2.2 V	10 V	0.42 U	12	SB08W	2.3	1.5 V	8.6 V
Fluorene	µg/kg-Wet	18	4	22	1.6	2.8	SB06W	2.2	2.2 V	2.8 V	0.49 U	2.8	SB06W	0.81	0.46 UV	2.5 V
High Molecular Weight PAH	µg/kg-Wet	18	11	61	0.92 JT	40 JT	SB08W	10	2.9 JT	35 JV	0.42 UT	40 JT	SB08W	6.3	1.5 V	31 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	18	7	38.9	0.079 J	1.9	SB08W	0.727	0.35 JT	1.84 V	0.064 U	1.9	SB08W	0.302	0.032 UV	1.73 V
Low Molecular Weight PAH	µg/kg-Wet	18	18	100	0.58 JT	43 T	SB08W	7.8	2.9 JV	24 V	0.58 JT	43 T	SB08W	7.8	2.9 JV	24 V
Naphthalene	µg/kg-Wet	18	18	100	0.52 J	11	SB08W	1.7	0.81 JV	4.1 V	0.52 J	11	SB08W	1.7	0.81 JV	4.1 V
Phenanthrene	µg/kg-Wet	18	8	44	2.7	22	SB08W	7.6	4.8 V	19 V	0.36 U	22	SB08W	3.8	1.2 UV	14 V
Pyrene	µg/kg-Wet	18	4	22.2	2.8	13	SB08W	7.15	6.4 V	12.3 V	0.098 U	13	SB08W	1.77	0.3 UV	9.26 V
Total BaPEq	µg/kg-Wet	18	9	50	0.00799 JT	3.38 JT	SB08W	0.866	0.135 JT	3.18 JV	0.00799 JT	3.38 JT	SB08W	0.453	0.0405 UV	2.96 JV
Total cPAHs	µg/kg-Wet	18	9	50	0.17 JT	13 JT	SB08W	4.45	3.1 JT	12.2 JV	0.081 UT	13 JT	SB08W	2.24	0.105 JV	11.3 JV
Total PAHs	µg/kg-Wet	18	18	100	0.58 JT	84 JT	SB08W	14	6.2 JV	55 JV	0.58 JT	84 JT	SB08W	14	6.2 JV	55 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	18	3	17	69 J	130 J	SB09E	97	93 J	130 JV	66 U	130 J	SB09E	44	33 UV	99 JV
Butylbenzyl phthalate	µg/kg-Wet	18	0	0	--	--	--	--	--	--	7.3 U	7.3 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.7	3.7 UV	3.7 UV
Dibutyl phthalate	µg/kg-Wet	18	3	17	39	43	SB04W	40	39	43 V	37 U	91 U	SB09E	29	27 UV	43 V
Diethyl phthalate	µg/kg-Wet	18	1	5.6	17 J	17 J	SB04W	17	17 J	17 J	8.8 UT	36 U	SB011W	8.2	6.8 UV	17 JV
Dimethyl phthalate	µg/kg-Wet	18	0	0	--	--	--	--	--	--	7.7 U	7.7 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.9	3.9 UV	3.9 UV
Di-n-octyl phthalate	µg/kg-Wet	18	0	0	--	--	--	--	--	--	11 U	11 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	5.5	5.5 UV	5.5 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	9.8 U	9.8 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	4.9	4.9 UV	4.9 UV
1,2-Dichlorobenzene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	11 U	11 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	5.5	5.5 UV	5.5 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,3-Dichlorobenzene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	11 U	11 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	5.5	5.5 UV	5.5 UV
1,4-Dichlorobenzene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	11 U	11 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	5.5	5.5 UV	5.5 UV
2,4-Dinitrotoluene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	15 U	15 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	7.5	7.5 UV	7.5 UV
2,6-Dinitrotoluene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	14 U	14 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	7	7 UV	7 UV
2-Chloronaphthalene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	6.7 U	6.7 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.4	3.4 UV	3.4 UV
2-Nitroaniline	µg/kg-Wet	18	0	0	--	--	--	--	--	--	31 U	31 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	16	16 UV	16 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
3,3'-Dichlorobenzidine	µg/kg-Wet	17	0	0	--	--	--	--	--	--	1000 U	1000 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09W	500	500 U	500 UV
3-Nitroaniline	µg/kg-Wet	18	0	0	--	--	--	--	--	--	400 U	400 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	200	200 UV	200 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	18	0	0	--	--	--	--	--	--	6.9 U	6.9 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.5	3.5 UV	3.5 UV
4-Chloroaniline	µg/kg-Wet	18	0	0	--	--	--	--	--	--	400 U	400 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	200	200 UV	200 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	18	0	0	--	--	--	--	--	--	6.4 U	6.4 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.2	3.2 UV	3.2 UV
4-Nitroaniline	µg/kg-Wet	18	0	0	--	--	--	--	--	--	400 U	400 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	200	200 UV	200 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Aniline	µg/kg-Wet	17	0	0	--	--	--	--	--	--	800 U	800 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09W	400	400 U	400 UV
Azobenzene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	40 U	40 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	20	20 UV	20 UV
Benzoic acid	µg/kg-Wet	18	0	0	--	--	--	--	--	--	400 U	400 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	200	200 UV	200 UV
Benzyl alcohol	µg/kg-Wet	18	10	56	23 J	29 J	SB07E	26	25 JV	29 JV	22 U	29 J	SB07E	19	23 JV	28 JV
Bis(2-chloroethoxy)methane	µg/kg-Wet	18	0	0	--	--	--	--	--	--	8.3 U	8.3 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	4.2	4.2 UV	4.2 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	18	0	0	--	--	--	--	--	--	13 U	13 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	6.5	6.5 UV	6.5 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	18	0	0	--	--	--	--	--	--	13 U	13 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	6.5	6.5 UV	6.5 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Dibenzofuran	µg/kg-Wet	18	0	0	--	--	--	--	--	--	0.19 U	0.67 U	SB08W	0.21	0.2 UV	0.31 UV
Hexachlorobenzene	µg/kg-Wet	23	18	78.3	0.24 J	0.876	SB07W	0.389	0.346 JV	0.575 V	0.24 J	1.3 U	03R014	0.42	0.371 J	0.637 V
Hexachlorobutadiene	µg/kg-Wet	23	5	21.7	0.006 JT	0.167 J	SB07W	0.043	0.0131 JT	0.138 JV	0.004 UJ	1 UJ	03R014; 05R006; 06R024; 08R032; 09R006	0.122	0.0075 UJ	0.5 UJV
Hexachlorocyclopentadiene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	1000 U	1000 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	500	500 UV	500 UV
Hexachloroethane	µg/kg-Wet	23	0	0	--	--	--	--	--	--	1 UJ	20 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	7.9	10 U	10 UV
Isophorone	µg/kg-Wet	18	0	0	--	--	--	--	--	--	9.2 U	9.2 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	4.6	4.6 UV	4.6 UV
Nitrobenzene	µg/kg-Wet	18	0	0	--	--	--	--	--	--	12 U	12 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	6	6 UV	6 UV
N-Nitrosodimethylamine	µg/kg-Wet	18	0	0	--	--	--	--	--	--	40 U	40 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	20	20 UV	20 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
N-Nitrosodiphenylamine	µg/kg-Wet	18	0	0	--	--	--	--	--	--	6.6 U	6.6 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.3	3.3 UV	3.3 UV
N-Nitrosodipropylamine	µg/kg-Wet	18	0	0	--	--	--	--	--	--	22 U	22 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	11	11 UV	11 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	40 UT	40 UT	SB04E	20	20 UT	20 UT
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	20 U	20 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	10	10 UV	10 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	40 UT	40 UT	SB04E	20	20 UT	20 UT
2,4,5-Trichlorophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	14 U	14 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	7	7 UV	7 UV
2,4,6-Trichlorophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	9.1 U	9.1 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	4.6	4.6 UV	4.6 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2,4-Dichlorophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	9.5 U	9.5 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	4.8	4.8 UV	4.8 UV
2,4-Dinitrophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	800 U	800 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	400	400 UV	400 UV
2-Chlorophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	7.5 U	7.5 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.8	3.8 UV	3.8 UV
2-Methylphenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	8.2 U	8.2 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	4.1	4.1 UV	4.1 UV
2-Nitrophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	12 U	12 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	6	6 UV	6 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	400 U	400 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	200	200 UV	200 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
4-Chloro-3-methylphenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	6.8 U	6.8 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.4	3.4 UV	3.4 UV
4-Methylphenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	7.7 U	7.7 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	3.9	3.9 UV	3.9 UV
4-Nitrophenol	µg/kg-Wet	18	1	5.6	13 J	13 J	SB04W	13	13 J	13 J	9.9 UT	15 U	SB05W; SB06E; SB07E	6.7	6.5 UV	8.3 JV
Pentachlorophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	30 U	30 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	15	15 UV	15 UV
Phenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	45 U	45 U	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	23	23 UV	23 UV
Smallmouth bass (whole body)																
Conventionals																
Lipids	percent-Wet	32	32	100	1.5 T	7.2 T	04R023	5.39	5.45 V	6.78 V	1.5 T	7.2 T	04R023	5.39	5.45 V	6.78 V
Total solids	percent-Wet	32	32	100	21.5	32	08R032	28.9	29.1 V	31 V	21.5	32	08R032	28.9	29.1 V	31 V
Metals																
Aluminum	mg/kg-Wet	32	32	100	2.12 J	11 JT	04R023; SB010E	5.29	4.79 JV	10.6 JV	2.12 J	11 JT	04R023; SB010E	5.29	4.79 JV	10.6 JV
Antimony	mg/kg-Wet	32	5	15.6	0.001 J	5.9 JT	SB010E	1.19	0.0057 JT	4.73 JV	0.001 J	5.9 JT	SB010E	0.188	0.0025 UJV	0.0205 JV
Arsenic	mg/kg-Wet	32	32	100	0.16 T	0.39	03R014	0.248	0.238 V	0.349 V	0.16 T	0.39	03R014	0.248	0.238 V	0.349 V
Cadmium	mg/kg-Wet	32	26	81.3	0.002 J	0.2 T	SB010E	0.0136	0.0043 JV	0.0213 JV	0.002 J	0.2 T	SB010E	0.0113	0.004 JV	0.018 JV
Chromium	mg/kg-Wet	32	21	65.6	0.13 JT	1.14	08R010	0.409	0.3	1.03	0.06 U	1.14	08R010	0.285	0.16 JV	1 V
Copper	mg/kg-Wet	32	32	100	0.365	1.92 T	SB010E	0.805	0.749 V	1.41 V	0.365	1.92 T	SB010E	0.805	0.749 V	1.41 V
Lead	mg/kg-Wet	32	32	100	0.0048 J	1100 JT	SB010E	34.7	0.014 V	4.05 V	0.0048 J	1100 JT	SB010E	34.7	0.014 V	4.05 V
Manganese	mg/kg-Wet	32	32	100	0.445 J	3.14 T	SB010E	1.7	1.82 V	2.84 V	0.445 J	3.14 T	SB010E	1.7	1.82 V	2.84 V
Mercury	mg/kg-Wet	32	32	100	0.0509 JT	0.166 JT	SB09W	0.0934	0.0899 JV	0.144 JV	0.0509 JT	0.166 JT	SB09W	0.0934	0.0899 JV	0.144 JV
Nickel	mg/kg-Wet	32	25	78.1	0.045 JT	0.2	04R023	0.117	0.13	0.188 JV	0.02 U	0.2	04R023	0.0959	0.0792 JV	0.185 JV
Selenium	mg/kg-Wet	32	4	13	0.3 T	1.2 T	SB011W	0.55	0.35 V	1.1 V	0.17 UT	1.2 T	SB011W	0.17	0.13 UV	0.35 V
Silver	mg/kg-Wet	32	9	28.1	0.0013 JT	0.064 T	SB010E	0.0091	0.0023 JT	0.0397 JV	0.0002 U	0.064 T	SB010E	0.00363	0.0016 JV	0.00339 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Thallium	mg/kg-Wet	32	32	100	0.002 J	0.0085	03R014	0.00413	0.0036 JV	0.0077 V	0.002 J	0.0085	03R014	0.00413	0.0036 JV	0.0077 V
Zinc	mg/kg-Wet	32	32	100	10.8 T	16.3	03R014	13.2	12.9 V	16 V	10.8 T	16.3	03R014	13.2	12.9 V	16 V
Butyltins																
Butyltin ion	µg/kg-Wet	18	0	0	--	--	--	--	--	--	0.4 UT	0.46 UT	SB05W	0.22	0.22 UV	0.23 UV
Dibutyltin ion	µg/kg-Wet	18	16	89	0.37 JT	1.1 JT	SB08E	0.52	0.43 JV	0.84 JV	0.37 JT	1.1 JT	SB08E	0.5	0.43 JV	0.8 JV
Tetrabutyltin	µg/kg-Wet	18	0	0	--	--	--	--	--	--	1.6 UT	1.8 UT	SB011E; SB011W; SB03W; SB04E; SB05W; SB06E; SB06W; SB07W; SB08E	0.87	0.88 UV	0.9 UV
Tributyltin ion	µg/kg-Wet	18	4	22	0.78 JT	1.6 JT	SB04E	1	0.84 JV	1.5 JV	0.78 JT	4.9 UT	SB08E	0.88	0.7 UV	1.7 JV
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	14	0	0	--	--	--	--	--	--	4.7 U	190 U	08R010	22	12 UV	95 UV
Aroclor 1221	µg/kg-Wet	14	0	0	--	--	--	--	--	--	4.6 U	190 U	08R010	25	19 UV	95 UV
Aroclor 1232	µg/kg-Wet	14	1	7.1	12 J	12 J	06R024	12	12 J	12 J	7.6 U	190 U	08R010	25	19 UV	95 UV
Aroclor 1242	µg/kg-Wet	14	0	0	--	--	--	--	--	--	5.8 U	190 UJ	08R010	23	18 UJV	95 UJV
Aroclor 1248	µg/kg-Wet	14	8	57	120	460	03R014	300	300 JV	440 JV	23 U	520 UJ	08R010	210	220 JV	430 JV
Aroclor 1254	µg/kg-Wet	14	0	0	--	--	--	--	--	--	83 U	2200 UJ	08R010	280	200 UJV	810 UJV
Aroclor 1260	µg/kg-Wet	14	14	100	90 J	4500 J	08R010	940	400 JV	3700 JV	90 J	4500 J	08R010	940	400 JV	3700 JV
Aroclor 1262	µg/kg-Wet	14	0	0	--	--	--	--	--	--	3.8 U	190 UJ	08R010	22	7.1 UV	95 UJV
Aroclor 1268	µg/kg-Wet	14	0	0	--	--	--	--	--	--	3.8 U	190 UJ	08R010	22	7.1 UV	95 UJV
Aroclors	µg/kg-Wet	14	14	100	90 JT	4500 JT	08R010	1110	780 JV	3720 JV	90 JT	4500 JT	08R010	1110	780 JV	3720 JV
PCB Congeners																
PCB001	pg/g-Wet	28	28	100	2.98 JT	113 T	SB02E	15.4	7.71 JV	43.9 JV	2.98 JT	113 T	SB02E	15.4	7.71 JV	43.9 JV
PCB002	pg/g-Wet	28	16	57.1	1.06 JT	8.47 T	SB02E	2.85	1.95 JV	6.71 V	1.06 JT	47 UT	SB011E	2.87	1.54 JV	7.65 V
PCB003	pg/g-Wet	28	24	85.7	1.35 JT	59.4 T	SB02E	7.52	3.17 JV	16 JV	1.35 JT	62.8 UT	SB011E	7.7	3.03 JV	26 JV
PCB004	pg/g-Wet	32	32	100	64.6 T	4260 T	SB011E	567	393 V	1510 JV	64.6 T	4260 T	SB011E	567	393 V	1510 JV
PCB005	pg/g-Wet	32	17	53.1	1.96 JT	21.9	04R023	6.86	4.66	19.1 V	1.96 JT	101 UT	SB011E	6.44	3.16 V	20 V
PCB006	pg/g-Wet	32	32	100	11 JT	482 JT	SB02E	88.3	43.8 JV	298 V	11 JT	482 JT	SB02E	88.3	43.8 JV	298 V
PCB007	pg/g-Wet	32	27	84.4	4.9 JT	56.3 T	SB09W	15.1	8.56 T	45.9 JV	3.16 UJT	91.5 UT	SB011E	14.6	8.29 V	48 V
PCB008	pg/g-Wet	32	32	100	36.3 T	1540 T	SB09W	353	183 V	1390 JV	36.3 T	1540 T	SB09W	353	183 V	1390 JV
PCB009	pg/g-Wet	32	30	93.8	2.56 JT	94.1 T	SB09W	25.5	14.5 V	87.9 JV	2.56 JT	94.1 T	SB09W	24.1	13.5 V	87.4 JV
PCB010	pg/g-Wet	32	31	96.9	4.73 JT	277 T	SB011E	31.3	18.1 T	66.4 JV	4.42 UJT	277 T	SB011E	30.4	18.1 V	65.1 JV
PCB011	pg/g-Wet	32	32	100	69.6 T	468 T	SB011E	187	187 V	303 V	69.6 T	468 T	SB011E	187	187 V	303 V
PCB012 & 013	pg/g-Wet	32	24	75	6.06 JT	52.9 JT	SB011E	13.4	8.99 JV	28 JV	4.46 UJT	52.9 JT	SB011E	10.8	7.63 JV	26.3 JV
PCB014	pg/g-Wet	32	0	0	--	--	--	--	--	--	0.375 U	95.4 UT	SB011E	3.65	2.27 UV	4.74 UV
PCB015	pg/g-Wet	32	32	100	15.2 T	429 T	SB02E	92.1	57.7 V	280 V	15.2 T	429 T	SB02E	92.1	57.7 V	280 V
PCB016	pg/g-Wet	32	32	100	48 T	2570 T	SB09W	475	302 V	1420 V	48 T	2570 T	SB09W	475	302 V	1420 V
PCB017	pg/g-Wet	32	32	100	125 T	6060 T	SB011E	1230	785 V	3670 JV	125 T	6060 T	SB011E	1230	785 V	3670 JV
PCB018 & 030	pg/g-Wet	32	32	100	174 T	7420 T	SB09W	1550	1010 JV	4560 JV	174 T	7420 T	SB09W	1550	1010 JV	4560 JV
PCB019	pg/g-Wet	32	32	100	137 T	9930 T	SB011E	1080	642 V	2400 V	137 T	9930 T	SB011E	1080	642 V	2400 V
PCB020 & 028	pg/g-Wet	32	32	100	916 T	24200 T	SB09W	5720	3170 V	18400 JV	916 T	24200 T	SB09W	5720	3170 V	18400 JV
PCB021 & 033	pg/g-Wet	32	32	100	148 JT	8920 T	SB09W	1190	646 JV	3460 JV	148 JT	8920 T	SB09W	1190	646 JV	3460 JV
PCB022	pg/g-Wet	32	32	100	148 T	6200 T	SB09W	947	557 V	2550 JV	148 T	6200 T	SB09W	947	557 V	2550 JV
PCB023	pg/g-Wet	32	16	50	1.83	22.3 T	SB09W	5.74	4.29 JV	15.2 V	1.83	55.7 UT	SB011E	4.6	1.99 UV	17.1 V
PCB024	pg/g-Wet	32	29	90.6	1.36 JT	83.9 T	SB09W	20.2	14.4	58.6 V	1.36 JT	83.9 T	SB09W	18.9	13.8 V	54.9 V
PCB025	pg/g-Wet	32	32	100	50.9 T	2520	07R009	350	179 V	1110 V	50.9 T	2520	07R009	350	179 V	1110 V
PCB026 & 029	pg/g-Wet	32	32	100	117 T	5210 J	07R009	891	437 JV	2840 V	117 T	5210 J	07R009	891	437 JV	2840 V
PCB027	pg/g-Wet	32	32	100	26.5 JT	2560 T	SB011E	291	164 V	665 JV	26.5 JT	2560 T	SB011E	291	164 V	665 JV
PCB031	pg/g-Wet	32	32	100	362 T	16700 T	SB09W	2640	1610 V	7010 JV	362 T	16700 T	SB09W	2640	1610 V	7010 JV
PCB032	pg/g-Wet	32	32	100	92.5 T	3220 T	SB09W	800	456 V	2730 JV	92.5 T	3220 T	SB09W	800	456 V	2730 JV
PCB034	pg/g-Wet	32	32	100	3.32 JT	86.8 T	SB09W	18	11.5 JV	44.2 JV	3.32 JT	86.8 T	SB09W	18	11.5 JV	44.2 JV
PCB035	pg/g-Wet	32	5	15.6	4.75 JT	51.9	03R014	25.4	22	47.3 V	0.401 U	68.4 UT	SB011E	6.91	3.17 UV	31.3 V
PCB036	pg/g-Wet	32	4	12.5	11.5	825	03R014	378	338 V	759 V	0.395 U	825	03R014	50.1	2.74 UV	333 V
PCB037	pg/g-Wet	32	32	100	60.3 T	2000 T	SB09W	364	192 V	1480 V	60.3 T	2000 T	SB09W	364	192 V	1480 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB038	pg/g-Wet	32	20	62.5	1.99 JT	29.3 T	SB02E	8.87	5.64 JV	26.5 V	1.83 UT	59.2 UT	SB011E	7.14	3.51 JV	27.7 V
PCB039	pg/g-Wet	32	26	81.3	3.3 JT	154 JT	SB02E	35.2	17.4 JV	122 V	3.3 JT	154 JT	SB02E	30.2	14 JV	114 V
PCB040 & 041 & 071	pg/g-Wet	32	32	100	691 T	19800 T	SB02E	3670	2220 JV	10800 JV	691 T	19800 T	SB02E	3670	2220 JV	10800 JV
PCB042	pg/g-Wet	32	32	100	323 T	12600 T	SB02E	2150	1120 V	6400 V	323 T	12600 T	SB02E	2150	1120 V	6400 V
PCB043	pg/g-Wet	32	32	100	45.9 T	1940 T	SB02E	367	204 V	977 V	45.9 T	1940 T	SB02E	367	204 V	977 V
PCB044 & 047 & 065	pg/g-Wet	32	32	100	3390 T	89700 T	SB011E	16700	10800 JV	46100 JV	3390 T	89700 T	SB011E	16700	10800 JV	46100 JV
PCB045 & 051	pg/g-Wet	32	32	100	212 T	9690 T	SB011E	1680	1140 JV	4150 V	212 T	9690 T	SB011E	1680	1140 JV	4150 V
PCB046	pg/g-Wet	32	32	100	31.2 JT	989 T	SB02E	213	141 V	608 V	31.2 JT	989 T	SB02E	213	141 V	608 V
PCB048	pg/g-Wet	32	32	100	221 T	8280 T	SB02E	1560	842 V	4520 V	221 T	8280 T	SB02E	1560	842 V	4520 V
PCB049 & 069	pg/g-Wet	32	32	100	2230 T	50200 T	SB02E	9890	7110 JV	24600 JV	2230 T	50200 T	SB02E	9890	7110 JV	24600 JV
PCB050 & 053	pg/g-Wet	32	32	100	187 T	10500 T	SB011E	1430	912 JV	3180 V	187 T	10500 T	SB011E	1430	912 JV	3180 V
PCB052	pg/g-Wet	32	32	100	3480 T	77800 T	SB02E	15300	10200 V	38100 V	3480 T	77800 T	SB02E	15300	10200 V	38100 V
PCB054	pg/g-Wet	32	32	100	27.3 T	3040 T	SB011E	256	126 V	664 V	27.3 T	3040 T	SB011E	256	126 V	664 V
PCB055	pg/g-Wet	32	13	40.6	4.11 T	351 T	SB09W	96.6	58.4	289 V	1.94 U	351 T	SB09W	42.7	2.73 UV	196 V
PCB056	pg/g-Wet	32	32	100	302 T	12100 T	SB02E	1820	950 V	7070 V	302 T	12100 T	SB02E	1820	950 V	7070 V
PCB057	pg/g-Wet	32	32	100	9.36 JT	183 T	SB02E	56.2	30.9 V	151 V	9.36 JT	183 T	SB02E	56.2	30.9 V	151 V
PCB058	pg/g-Wet	32	22	68.8	2.26 JT	575	09R006	99.3	24.9 JV	478 V	2.26 JT	575	09R006	71	15 JV	373 V
PCB059 & 062 & 075	pg/g-Wet	32	32	100	181 T	4880 T	SB02E	957	626 JV	2330 JV	181 T	4880 T	SB02E	957	626 JV	2330 JV
PCB060	pg/g-Wet	32	32	100	454 T	21200 T	SB02E	2950	1460 V	8690 V	454 T	21200 T	SB02E	2950	1460 V	8690 V
PCB061 & 070 & 074 & 076	pg/g-Wet	32	32	100	3650 T	92800 T	SB02E	15900	8680 V	47300 JV	3650 T	92800 T	SB02E	15900	8680 V	47300 JV
PCB063	pg/g-Wet	32	32	100	155 T	3580 T	SB02E	704	422 V	1800 V	155 T	3580 T	SB02E	704	422 V	1800 V
PCB064	pg/g-Wet	32	32	100	667 T	31700 T	SB02E	4440	2230 V	12600 V	667 T	31700 T	SB02E	4440	2230 V	12600 V
PCB066	pg/g-Wet	32	32	100	2710 T	110000 T	SB02E	14900	7790 V	41900 V	2710 T	110000 T	SB02E	14900	7790 V	41900 V
PCB067	pg/g-Wet	32	32	100	39.7 T	811 T	SB09W	205	144 V	572 V	39.7 T	811 T	SB09W	205	144 V	572 V
PCB068	pg/g-Wet	32	32	100	51.1 T	826 T	SB011E	163	121 V	546 V	51.1 T	826 T	SB011E	163	121 V	546 V
PCB072	pg/g-Wet	32	32	100	56.2 T	638	07R009	189	137 V	465 V	56.2 T	638	07R009	189	137 V	465 V
PCB073	pg/g-Wet	32	11	34.4	5.62 T	2610 T	SB011E	350	86 T	1510 V	0.613 U	2610 T	SB011E	122	3.13 UV	326 V
PCB077	pg/g-Wet	32	32	100	131 T	3200 T	SB02E	463	252 V	1400 V	131 T	3200 T	SB02E	463	252 V	1400 V
PCB078	pg/g-Wet	32	6	18.8	3.75 T	637	03R014	116	14 V	483 V	1.96 U	637	03R014	25.8	2.42 UV	43.1 V
PCB079	pg/g-Wet	32	32	100	42.9 T	509 T	SB011E	167	131 V	485 V	42.9 T	509 T	SB011E	167	131 V	485 V
PCB080	pg/g-Wet	32	0	0	--	--	--	--	--	--	1.83 U	120 UT	SB011E	4.09	2.08 UV	3.37 UV
PCB081	pg/g-Wet	32	18	56.3	8.64 JT	133 T	SB02E	32.4	14.7 V	97.3 V	5.42 UT	140 UT	SB011E	23	12.2 JV	79.5 V
PCB082	pg/g-Wet	32	32	100	249 T	5450 T	SB02E	1200	785 V	3130 V	249 T	5450 T	SB02E	1200	785 V	3130 V
PCB083 & 099	pg/g-Wet	32	32	100	6730 T	72200 J	08R010	22800	16900 JV	57700 V	6730 T	72200 J	08R010	22800	16900 JV	57700 V
PCB084	pg/g-Wet	32	32	100	548 T	7670 T	SB02E	2310	1570 V	5830 V	548 T	7670 T	SB02E	2310	1570 V	5830 V
PCB085 & 116 & 117	pg/g-Wet	32	32	100	1750 T	26900 T	SB02E	5520	3900 JV	13400 JV	1750 T	26900 T	SB02E	5520	3900 JV	13400 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	32	32	100	3400 T	48100 T	SB02E	13300	9170 JV	31100 JV	3400 T	48100 T	SB02E	13300	9170 JV	31100 JV
PCB088 & 091	pg/g-Wet	32	32	100	824 T	13100 T	SB011E	3210	2210 JV	9910 JV	824 T	13100 T	SB011E	3210	2210 JV	9910 JV
PCB089	pg/g-Wet	32	32	100	18.1 JT	632 T	SB02E	109	67.9 V	334 V	18.1 JT	632 T	SB02E	109	67.9 V	334 V
PCB090 & 101 & 113	pg/g-Wet	32	32	100	8110 T	147000 J	08R010	34500	21800 V	113000 JV	8110 T	147000 J	08R010	34500	21800 V	113000 JV
PCB092	pg/g-Wet	32	32	100	1790 T	29700	08R010	6520	4260 V	16500 V	1790 T	29700	08R010	6520	4260 V	16500 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	32	32	100	4390 T	67600 T	SB011E	15800	10400 V	42700 JV	4390 T	67600 T	SB011E	15800	10400 V	42700 JV
PCB094	pg/g-Wet	32	32	100	17.6 T	1050 T	SB011E	137	76.9 V	453 V	17.6 T	1050 T	SB011E	137	76.9 V	453 V
PCB096	pg/g-Wet	32	32	100	38 T	986 T	SB011E	165	112 V	443 V	38 T	986 T	SB011E	165	112 V	443 V
PCB103	pg/g-Wet	32	32	100	117 T	4100	08R010	666	395 V	2700 V	117 T	4100	08R010	666	395 V	2700 V
PCB104	pg/g-Wet	32	31	96.9	4.45 JT	384 T	SB011E	37.6	15.1	147 V	4.45 JT	384 T	SB011E	36.5	15.1 V	138 V
PCB105	pg/g-Wet	32	32	100	3380 T	45500 T	SB02E	10100	7450 V	24500 V	3380 T	45500 T	SB02E	10100	7450 V	24500 V
PCB106	pg/g-Wet	32	2	6.25	3.08 JT	13 T	SB02E	8.04	8.04 JV	12.5 JV	1.43 U	417 UT	SB011E	9.87	3.25 JV	9.54 V
PCB107 & 124	pg/g-Wet	32	32	100	216 T	2420 T	SB02E	632	404 JV	1690 V	216 T	2420 T	SB02E	632	404 JV	1690 V
PCB109	pg/g-Wet	32	32	100	823 T	7030 T	SB02E	2410	1880 V	5830 V	823 T	7030 T	SB02E	2410	1880 V	5830 V
PCB110 & 115	pg/g-Wet	32	32	100	5470 T	64800 T	SB02E	21000	14200 JV	56400 JV	5470 T	64800 T	SB02E	21000	14200 JV	56400 JV
PCB111	pg/g-Wet	32	32	100	15.2 T	299	08R010	58.9	34.6 JV	187 V	15.2 T	299	08R010	58.9	34.6 JV	187 V
PCB112	pg/g-Wet	32	2	6.25	117	173	09R006	145	145 V	170 V	0.842 U	173	09R006	12.3	1.4 UV	68.9 V
PCB114	pg/g-Wet	32	31	96.9	260 T	3440 T	SB02E	767	586	1900 V	260 T	3440 T	SB02E	748	585 V	1870 V
PCB118	pg/g-Wet	32	32	100	10200 T	97900 T	SB02E	30900	22100 V	75500 V	10200 T	97900 T	SB02E	30900	22100 V	75500 V
PCB120	pg/g-Wet	32	32	100	77.3 T	1510	08R010	244	145 V	705 V	77.3 T	1510	08R010	244	145 V	705 V
PCB121	pg/g-Wet	32	32	100	10.8 T	419 T	SB011E	60.9	34.1 V	220 V	10.8 T	419 T	SB011E	60.9	34.1 V	220 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB122	pg/g-Wet	32	31	96.9	44.4 T	507 T	SB02E	123	81.1 T	290 V	30.7 UT	507 T	SB02E	120	79.8 V	290 V
PCB123	pg/g-Wet	32	32	100	169 T	2500 T	SB02E	499	348 V	1230 V	169 T	2500 T	SB02E	499	348 V	1230 V
PCB126	pg/g-Wet	32	25	78.1	11.7 JT	158 T	SB02E	56.4	49.4	103 V	11.7 JT	510 UT	SB011E	56.2	42.9 V	128 V
PCB127	pg/g-Wet	32	29	90.6	16.8 JT	5370	09R006	327	50.4	1480 V	9.74 U	5370	09R006	297	48.7 V	1170 V
PCB128 & 166	pg/g-Wet	32	32	100	2390 T	29300 J	08R010	7070	4830 JV	19500 V	2390 T	29300 J	08R010	7070	4830 JV	19500 V
PCB129 & 138 & 160 & 163	pg/g-Wet	32	32	100	19500 T	613000 T	SB011E	102000	48600 JV	455000 JV	19500 T	613000 T	SB011E	102000	48600 JV	455000 JV
PCB130	pg/g-Wet	32	32	100	825 T	17500 T	SB011E	3210	1880 V	11700 V	825 T	17500 T	SB011E	3210	1880 V	11700 V
PCB131	pg/g-Wet	32	32	100	54.6 T	1850 T	SB011E	271	133 V	990 V	54.6 T	1850 T	SB011E	271	133 V	990 V
PCB132	pg/g-Wet	32	32	100	1780 T	62200	08R010	9520	4540 V	47000 V	1780 T	62200	08R010	9520	4540 V	47000 V
PCB133	pg/g-Wet	32	32	100	469 T	9600 T	SB011E	1810	1090 V	7210 V	469 T	9600 T	SB011E	1810	1090 V	7210 V
PCB134 & 143	pg/g-Wet	32	31	96.9	355 T	15200 T	SB011E	2040	885 J	9960 JV	10.3 U	15200 T	SB011E	1980	850 JV	9790 JV
PCB135 & 151 & 154	pg/g-Wet	32	32	100	4740 T	169000 T	SB011E	25000	11000 JV	127000 JV	4740 T	169000 T	SB011E	25000	11000 JV	127000 JV
PCB136	pg/g-Wet	32	32	100	874 T	36000	08R010	4750	2020 V	23900 V	874 T	36000	08R010	4750	2020 V	23900 V
PCB137	pg/g-Wet	32	32	100	793 T	8020 T	SB04E	2180	1670 V	4130 V	793 T	8020 T	SB04E	2180	1670 V	4130 V
PCB139 & 140	pg/g-Wet	32	32	100	292 T	3840 J	08R010	819	591 JV	1940 JV	292 T	3840 J	08R010	819	591 JV	1940 JV
PCB141	pg/g-Wet	32	32	100	2460 T	109000 T	SB011E	15200	6480 V	77600 V	2460 T	109000 T	SB011E	15200	6480 V	77600 V
PCB142	pg/g-Wet	32	0	0	--	--	--	--	--	--	1.34 U	245 UT	SB011E	7.59	3.18 UV	13.4 UV
PCB144	pg/g-Wet	32	32	100	465 T	27500 T	SB011E	3190	1230 V	16900 V	465 T	27500 T	SB011E	3190	1230 V	16900 V
PCB145	pg/g-Wet	32	21	65.6	0.943 JT	17.3 JT	SB04E	5.73	4.11	11.7 T	0.943 JT	61.1 UT	SB011E	5.1	3.31 JV	14.2 JV
PCB146	pg/g-Wet	32	32	100	3980 T	110000 T	SB011E	19100	10400 V	86700 V	3980 T	110000 T	SB011E	19100	10400 V	86700 V
PCB147 & 149	pg/g-Wet	32	32	100	6410 T	355000 T	SB011E	36800	16300 V	154000 JV	6410 T	355000 T	SB011E	36800	16300 V	154000 JV
PCB148	pg/g-Wet	32	32	100	58.4 T	1210	08R010	189	121 V	542 V	58.4 T	1210	08R010	189	121 V	542 V
PCB150	pg/g-Wet	32	32	100	22.1 JT	838 T	SB011E	111	53.7 V	474 V	22.1 JT	838 T	SB011E	111	53.7 V	474 V
PCB152	pg/g-Wet	32	32	100	12 T	394 T	SB011E	66.5	38.3 JV	263 V	12 T	394 T	SB011E	66.5	38.3 JV	263 V
PCB153 & 168	pg/g-Wet	32	32	100	22800 T	763000 T	SB011E	125000	63700 JV	581000 JV	22800 T	763000 T	SB011E	125000	63700 JV	581000 JV
PCB155	pg/g-Wet	32	32	100	9.67	202 T	SB07E	31.7	17.9 V	104 V	9.67	202 T	SB07E	31.7	17.9 V	104 V
PCB156	pg/g-Wet	14	14	100	2510 T	29200	08R010	7780	4440 V	26900 V	2510 T	29200	08R010	7780	4440 V	26900 V
PCB156 & 157	pg/g-Wet	18	18	100	1790 T	50400 T	SB011E	8100	4540 V	21800 V	1790 T	50400 T	SB011E	8100	4540 V	21800 V
PCB157	pg/g-Wet	14	14	100	425 T	2000	08R010	863	665 V	1670 V	425 T	2000	08R010	863	665 V	1670 V
PCB158	pg/g-Wet	32	32	100	1590 T	47100 T	SB011E	7950	4180 V	36200 V	1590 T	47100 T	SB011E	7950	4180 V	36200 V
PCB159	pg/g-Wet	32	31	96.9	69.6 T	3370	08R010	444	212 T	1990 V	5.38 U	3370	08R010	430	202 V	1940 V
PCB161	pg/g-Wet	32	2	6.25	4.65 T	8.55 T	SB02E	6.6	6.6 V	8.36 V	0.905 U	167 UT	SB011E	5.92	3.07 UV	9.92 V
PCB162	pg/g-Wet	32	32	100	63.5 T	785 T	SB011E	189	124 V	499 V	63.5 T	785 T	SB011E	189	124 V	499 V
PCB164	pg/g-Wet	32	32	100	731 T	39100 T	SB011E	4390	1890 V	18500 V	731 T	39100 T	SB011E	4390	1890 V	18500 V
PCB165	pg/g-Wet	32	32	100	18.4 T	616 T	SB011E	85.8	48.5 JV	318 V	18.4 T	616 T	SB011E	85.8	48.5 JV	318 V
PCB167	pg/g-Wet	32	32	100	661 T	20600 T	SB011E	3160	1720 V	11500 V	661 T	20600 T	SB011E	3160	1720 V	11500 V
PCB169	pg/g-Wet	32	14	43.8	2.37	6.52	08R010	3.72	3.22 V	6.29 V	2.37	351 UT	SB011E	17	6.34 V	50.2 UV
PCB170	pg/g-Wet	32	32	100	4370 T	271000 T	SB011E	35600	12700 V	186000 V	4370 T	271000 T	SB011E	35600	12700 V	186000 V
PCB171 & 173	pg/g-Wet	32	32	100	1360 T	71600 T	SB011E	9640	3310 JV	55000 JV	1360 T	71600 T	SB011E	9640	3310 JV	55000 JV
PCB172	pg/g-Wet	32	32	100	817 T	58300 T	SB011E	6560	2520 V	31300 V	817 T	58300 T	SB011E	6560	2520 V	31300 V
PCB174	pg/g-Wet	32	32	100	1870 T	245000 T	SB011E	18600	5020 V	81200 V	1870 T	245000 T	SB011E	18600	5020 V	81200 V
PCB175	pg/g-Wet	32	32	100	178 T	14000 T	SB011E	1410	495 V	6800 V	178 T	14000 T	SB011E	1410	495 V	6800 V
PCB176	pg/g-Wet	32	32	100	232 T	25000 T	SB011E	1930	535 V	9020 V	232 T	25000 T	SB011E	1930	535 V	9020 V
PCB177	pg/g-Wet	32	32	100	1960 T	182000 T	SB011E	17700	5610 V	89700 V	1960 T	182000 T	SB011E	17700	5610 V	89700 V
PCB178	pg/g-Wet	32	32	100	1270 T	66500 T	SB011E	7780	3210 V	34600 V	1270 T	66500 T	SB011E	7780	3210 V	34600 V
PCB179	pg/g-Wet	32	32	100	978 T	58300 T	SB011E	7160	2290 V	42300 V	978 T	58300 T	SB011E	7160	2290 V	42300 V
PCB180 & 193	pg/g-Wet	32	32	100	13000 T	953000 T	SB011E	108000	40700 JV	485000 JV	13000 T	953000 T	SB011E	108000	40700 JV	485000 JV
PCB181	pg/g-Wet	32	32	100	43.6 T	1160 T	SB011E	233	123 V	866 V	43.6 T	1160 T	SB011E	233	123 V	866 V
PCB182	pg/g-Wet	32	31	96.9	31 T	780	08R010	115	76.3	302 V	20.5 UT	780	08R010	112	71.4 V	294 V
PCB183 & 185	pg/g-Wet	32	32	100	3660 T	237000 T	SB011E	28100	10100 V	141000 JV	3660 T	237000 T	SB011E	28100	10100 V	141000 JV
PCB184	pg/g-Wet	32	32	100	1.34 JT	56.8	08R010	15	12.3 V	31.8 JV	1.34 JT	56.8	08R010	15	12.3 V	31.8 JV
PCB186	pg/g-Wet	32	2	6.25	0.594 JT	0.745 JT	SB04E	0.67	0.67 JV	0.737 JV	0.48 U	15.9 UT	SB011E	1.4	0.748 JV	2.07 UV
PCB187	pg/g-Wet	32	32	100	7920 T	561000 T	SB011E	58500	23100 V	229000 V	7920 T	561000 T	SB011E	58500	23100 V	229000 V
PCB188	pg/g-Wet	32	32	100	17.9 T	567 T	SB011E	73	37.4 V	261 V	17.9 T	567 T	SB011E	73	37.4 V	261 V
PCB189	pg/g-Wet	32	32	100	157 T	12300 T	SB011E	1400	506 V	6800 V	157 T	12300 T	SB011E	1400	506 V	6800 V
PCB190	pg/g-Wet	32	32	100	1030 T	71500 T	SB011E	8300	2970 V	40300 V	1030 T	71500 T	SB011E	8300	2970 V	40300 V
PCB191	pg/g-Wet	32	32	100	205 T	16600 T	SB011E	1800	644 V	8580 V	205 T	16600 T	SB011E	1800	644 V	8580 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB192	pg/g-Wet	32	0	0	--	--	--	--	--	--	0.52 U	18.3 UT	SB011E	1.72	1.48 UV	1.87 UV
PCB194	pg/g-Wet	32	32	100	1570 T	146000 T	SB011E	15900	5450 V	70800 V	1570 T	146000 T	SB011E	15900	5450 V	70800 V
PCB195	pg/g-Wet	32	32	100	737 T	61300 T	SB011E	6930	2490 V	33500 V	737 T	61300 T	SB011E	6930	2490 V	33500 V
PCB196	pg/g-Wet	32	32	100	869 T	84100 T	SB011E	9050	3100 V	41700 V	869 T	84100 T	SB011E	9050	3100 V	41700 V
PCB197 & 200	pg/g-Wet	32	32	100	175 T	18300 T	SB011E	1550	490 JV	6350 JV	175 T	18300 T	SB011E	1550	490 JV	6350 JV
PCB198 & 199	pg/g-Wet	32	32	100	1880 T	157000 T	SB011E	16200	6260 JV	63900 JV	1880 T	157000 T	SB011E	16200	6260 JV	63900 JV
PCB201	pg/g-Wet	32	32	100	241 T	18600 T	SB011E	1860	661 V	7500 V	241 T	18600 T	SB011E	1860	661 V	7500 V
PCB202	pg/g-Wet	32	32	100	522 T	24100 T	SB011E	2910	1220 V	10800 V	522 T	24100 T	SB011E	2910	1220 V	10800 V
PCB203	pg/g-Wet	32	32	100	1260 T	77400 T	SB011E	9490	3600 V	40200 V	1260 T	77400 T	SB011E	9490	3600 V	40200 V
PCB204	pg/g-Wet	32	15	46.9	2.29 JT	19.8 JT	SB07W	6.42	3.61	16.9 JV	1.76 UT	19.8 JT	SB07W	4.75	4 JV	14.9 V
PCB205	pg/g-Wet	32	32	100	82.9 T	5760 T	SB011E	686	249 V	3370 V	82.9 T	5760 T	SB011E	686	249 V	3370 V
PCB206	pg/g-Wet	32	32	100	446 T	15600 T	SB011E	2570	1260 V	11200 V	446 T	15600 T	SB011E	2570	1260 V	11200 V
PCB207	pg/g-Wet	32	32	100	83.5 T	3310 T	SB011E	463	225 V	1640 V	83.5 T	3310 T	SB011E	463	225 V	1640 V
PCB208	pg/g-Wet	32	32	100	160 T	3380 T	SB04E	685	387 V	2500 V	160 T	3380 T	SB04E	685	387 V	2500 V
PCB209	pg/g-Wet	32	32	100	145 T	1370 T	SB04E	379	297 V	861 V	145 T	1370 T	SB04E	379	297 V	861 V
Total PCB Congeners	pg/g-Wet	32	32	100	205000 JT	6600000 JT	SB011E	1050000	543000 JV	3950000 JV	205000 JT	6600000 JT	SB011E	1050000	543000 JV	3950000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	32	32	100	205 JT	6600 JT	SB011E	1050	543 JV	3950 JV	205 JT	6600 JT	SB011E	1050	543 JV	3950 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	32	32	100	263 JT	5520 JT	SB011E	1370	961 JV	4060 JV	263 JT	5520 JT	SB011E	1370	961 JV	4060 JV
Heptachlorobiphenylhomologs	pg/g-Wet	32	32	100	39400 JT	2840000 T	SB011E	313000	117000 JV	1450000 JV	39400 JT	2840000 T	SB011E	313000	117000 JV	1450000 JV
Hexachlorobiphenyl homologs	pg/g-Wet	32	32	100	73400 JT	2460000 T	SB011E	383000	191000 JV	1730000 JV	73400 JT	2460000 T	SB011E	383000	191000 JV	1730000 JV
Monochlorobiphenyl homologs	pg/g-Wet	28	28	100	3.18 JT	181 T	SB02E	23.5	11.8 JV	50.8 JV	3.18 JT	181 T	SB02E	23.5	11.8 JV	50.8 JV
Nonachlorobiphenyl homologs	pg/g-Wet	32	32	100	690 T	22200 T	SB011E	3720	1960 V	15300 V	690 T	22200 T	SB011E	3720	1960 V	15300 V
Octachlorobiphenyl homologs	pg/g-Wet	32	32	100	7380 T	593000 JT	SB011E	64600	23500 JV	278000 JV	7380 T	593000 JT	SB011E	64600	23500 JV	278000 JV
Pentachlorobiphenylhomologs	pg/g-Wet	32	32	100	51500 JT	518000 T	SB02E	173000	122000 JV	463000 JV	51500 JT	518000 T	SB02E	173000	122000 JV	463000 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	32	32	100	20900 JT	523000 T	SB02E	96300	65500 JV	237000 JV	20900 JT	523000 T	SB02E	96300	65500 JV	237000 JV
Trichlorobiphenyl homologs	pg/g-Wet	32	32	100	2490 JT	82000 T	SB09W	17600	10500 JV	48200 JV	2490 JT	82000 T	SB09W	17600	10500 JV	48200 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	32	24	75	0.107	1.65 T	SB011W	0.524	0.355 V	1.38 V	0.016 U	1.65 T	SB011W	0.405	0.237 V	1.31 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	32	31	96.9	0.0916 T	3.48	07R009	0.91	0.486 T	2.52 V	0.0916 T	3.48	07R009	0.885	0.478 V	2.47 V
Hexachlorodibenzofuran homologs	pg/g-Wet	32	32	100	0.317	48.7 T	SB07W	3.22	1.25 V	6.7 V	0.317	48.7 T	SB07W	3.22	1.25 V	6.7 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	32	32	100	0.482 T	6.85	07R009	1.73	1.2 V	5.37 V	0.482 T	6.85	07R009	1.73	1.2 V	5.37 V
Octachlorodibenzofuran	pg/g-Wet	32	10	31.3	0.0119 JT	0.258	07R009	0.132	0.13 JV	0.25 V	0.0119 JT	0.258	07R009	0.0606	0.0205 JV	0.24 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	32	10	31.3	0.404	4.44	07R009	2.38	2.25 V	4.41 V	0.191 UT	4.44	07R009	0.95	0.386 UV	3.79 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	32	32	100	1.25 T	185 T	SB07W	10.4	3.03 V	20.4 V	1.25 T	185 T	SB07W	10.4	3.03 V	20.4 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	32	32	100	0.482 T	12.8 T	SB07E	1.38	0.89 V	2.41 V	0.482 T	12.8 T	SB07E	1.38	0.89 V	2.41 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	32	32	100	0.693	108 T	SB07W	6.89	2.66 V	13 V	0.693	108 T	SB07W	6.89	2.66 V	13 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	32	32	100	0.35 T	1.75 T	SB09W	0.674	0.536 V	1.54 V	0.35 T	1.75 T	SB09W	0.674	0.536 V	1.54 V
Total PCDD/F	pg/g-Wet	32	32	100	4.74 T	345 JT	SB07W	26.3	13.7 V	48 V	4.74 T	345 JT	SB07W	26.3	13.7 V	48 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	32	19	59.4	0.039 J	0.398 T	SB011W	0.204	0.149	0.395 V	0.039 J	0.398 T	SB011W	0.134	0.113 JV	0.394 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	32	29	90.6	0.0696 JT	2.58	07R009	0.622	0.35 T	1.78 V	0.0696 JT	2.58	07R009	0.572	0.34 V	1.65 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	32	17	53.1	0.0154 JT	0.193 JT	SB07W	0.0409	0.023	0.101 JV	0.0127 UT	0.193 JT	SB07W	0.026	0.0157 JV	0.0702 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	32	32	100	0.053	39.5 T	SB07W	1.71	0.341 V	1.82 V	0.053	39.5 T	SB07W	1.71	0.341 V	1.82 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	32	31	96.9	0.059	0.634 JT	SB07E	0.192	0.159	0.425 V	0.059	0.634 JT	SB07E	0.187	0.159 V	0.422 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	32	32	100	0.027 J	7.46 T	SB07W	0.392	0.126 JV	0.593 V	0.027 J	7.46 T	SB07W	0.392	0.126 JV	0.593 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	32	32	100	0.332 JT	5.55	07R009	1.32	0.845 JV	4.22 V	0.332 JT	5.55	07R009	1.32	0.845 JV	4.22 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	32	12	37.5	0.00722 JT	0.292 JT	SB07W	0.0366	0.0107 JV	0.145 JV	0.00722 JT	0.292 JT	SB07W	0.0171	0.0055 UV	0.0231 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	32	30	93.8	0.0202 JT	0.665 JT	SB07E	0.12	0.0752 JV	0.305 JV	0.0202 JT	0.665 JT	SB07E	0.114	0.0722 JV	0.296 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	32	32	100	0.147	74.3 T	SB07W	3.18	0.492 V	3.91 V	0.147	74.3 T	SB07W	3.18	0.492 V	3.91 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	32	32	100	0.469 JT	12.8 T	SB07E	1.36	0.883 V	2.37 V	0.469 JT	12.8 T	SB07E	1.36	0.883 V	2.37 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	32	32	100	0.021	0.99 JT	SB07W	0.114	0.0695 JV	0.243 V	0.021	0.99 JT	SB07W	0.114	0.0695 JV	0.243 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	32	32	100	0.57 JT	108 T	SB07W	5.48	1.28 V	9.13 V	0.57 JT	108 T	SB07W	5.48	1.28 V	9.13 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	32	32	100	0.497	110 T	SB07W	6.36	2.01 V	12.3 V	0.497	110 T	SB07W	6.36	2.01 V	12.3 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	32	32	100	0.313 T	1.72 T	SB09W	0.641	0.517 V	1.42 V	0.313 T	1.72 T	SB09W	0.641	0.517 V	1.42 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	32	32	100	1.26 JT	51.9 JT	SB07W	4.77	2.69 JV	11.3 JV	1.26 JT	51.9 JT	SB07W	4.77	2.69 JV	11.3 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	32	32	100	2.09 JT	56.7 JT	SB07W	10.9	9.31 V	19.9 JV	2.09 JT	56.7 JT	SB07W	10.9	9.31 V	19.9 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	32	32	100	0.524 T	21 T	SB02E	6.16	5.15 V	13.5 V	0.524 T	21 T	SB02E	6.16	5.15 V	13.5 V
Pesticides																
2,4'-DDD	µg/kg-Wet	32	21	65.6	0.553 JT	133 T	SB07W	13.6	4.11 T	29 T	0.553 JT	133 T	SB07W	10.2	4.3 UV	29 V
2,4'-DDE	µg/kg-Wet	32	18	56.3	0.18 JT	18.4 T	SB07W	2.12	0.884 JV	6.97 V	0.18 JT	18.4 T	SB07W	2.25	1.42 JV	4.29 V
2,4'-DDT	µg/kg-Wet	32	20	62.5	0.0537 JT	96.7 T	SB07W	9.46	1.51 JV	33.3 V	0.0537 JT	96.7 T	SB07W	7.21	3.45 UV	23.4 V
4,4'-DDD	µg/kg-Wet	32	32	100	3.64 T	385 T	SB07W	42.1	25.3 JV	111 V	3.64 T	385 T	SB07W	42.1	25.3 JV	111 V
4,4'-DDE	µg/kg-Wet	32	32	100	26.6 T	456 T	SB07W	114	92.1 JV	204 V	26.6 T	456 T	SB07W	114	92.1 JV	204 V
4,4'-DDT	µg/kg-Wet	32	27	84.4	0.704 T	366 T	SB07W	36.4	10.3 T	120 V	0.704 T	366 T	SB07W	31.2	8.44 V	112 V
Aldrin	µg/kg-Wet	32	15	46.9	0.0104 JT	0.04 JT	SB09E; SB09W	0.0222	0.0199 JT	0.04 JV	0.0104 JT	13 UT	08R010	1.12	0.0369 JV	5.68 UV
alpha-Endosulfan	µg/kg-Wet	32	1	3.13	8.4 J	8.4 J	08R010	8.4	8.4 J	8.4 J	0.024 UT	20 U	08R010	1.3	0.0163 UV	6.53 JV
alpha-Hexachlorocyclohexane	µg/kg-Wet	32	15	46.9	0.016 JT	0.042 JT	SB07W	0.0282	0.027 JT	0.0392 JV	0.016 JT	6.4 UT	08R010	0.862	0.0363 JV	3.2 UV
beta-Endosulfan	µg/kg-Wet	32	8	25	0.07 JT	0.09 JT	SB04W	0.0781	0.0762 JV	0.0886 JV	0.063 UT	20 UT	08R010	1.37	0.084 JV	7.25 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	32	8	25	0.0056 T	0.036 JT	SB07W	0.0161	0.014 JV	0.0318 JV	0.0056 T	8.5 UT	06R024; 07R009; 08R010; 08R032; 09R006	1.29	0.0215 JV	4.25 UV
cis-Chlordane	µg/kg-Wet	32	20	62.5	1.32 JT	5.6 NJ	07R009	2.43	2.14 JV	5.41 JV	1.2 UJ	20 U	08R010	2.78	2.02 JV	7.58 JV
cis-Nonachlor	µg/kg-Wet	32	18	56.3	1.32 JT	2.89 JT	SB09W	1.91	1.89 JV	2.39 JV	1.32 JT	7.1 UT	03R014; 04R023; 05R006; 06R024; 07R009; 08R010; 08R032; 09R006	2.63	2.3 JV	3.55 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	32	0	0	--	--	--	--	--	--	0.0018 UT	7.3 UT	08R010	0.89	0.0022 UV	3.65 UV
Dieldrin	µg/kg-Wet	32	19	59.4	1.38 T	7.3 JT	08R032	2.43	2.19 T	3.38 JV	1.38 T	20 UT	08R010	4	2.68 V	8.52 JV
Endosulfan sulfate	µg/kg-Wet	32	18	56.3	0.22 JT	0.684 T	SB03E	0.425	0.406 V	0.621 JV	0.22 JT	20 UT	08R010	1.57	0.505 JV	7.25 UV
Endrin	µg/kg-Wet	32	15	46.9	0.013 JT	0.054 JT	SB011W	0.0224	0.017 JT	0.0372 JV	0.013 JT	31 UT	03R014; 04R023	2.2	0.03 JV	12.5 UV
Endrin aldehyde	µg/kg-Wet	32	2	6.25	0.0052 JT	0.00621 JT	SB03W	0.00571	0.00571 JV	0.00616 JV	0.00465 UT	20 UT	08R010	1.37	0.00995 UV	6.84 UV
Endrin ketone	µg/kg-Wet	32	4	12.5	0.0035 JT	0.0153 JT	SB02E	0.00837	0.00734 JV	0.0145 JV	0.0014 UT	20 UT	08R010	1.29	0.0122 UV	6.56 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	32	12	37.5	0.014 JT	0.035 JT	SB06E; SB07W	0.0244	0.0235 JV	0.035 JV	0.014 JT	9.6 UT	04R023; 08R010	1.1	0.0325 JV	4.8 UV
Heptachlor	µg/kg-Wet	32	9	28.1	0.0057 JT	0.0272 JT	SB03W	0.0114	0.00995 JT	0.0218 JV	0.0039 UT	13 UT	08R010	1.13	0.0139 JV	5.68 UV
Heptachlor epoxide	µg/kg-Wet	32	18	56.3	0.073 JT	0.18 JT	SB02E	0.113	0.105 JV	0.155 JV	0.073 JT	8 UT	08R010	1.03	0.15 JV	4 UV
Methoxychlor	µg/kg-Wet	32	0	0	--	--	--	--	--	--	0.0116 UT	20 UT	08R010	1.48	0.0263 UV	5.82 UV
Mirex	µg/kg-Wet	14	0	0	--	--	--	--	--	--	1 UJT	6.2 UT	08R010	1.9	2 UV	3.1 UV
Oxychlordane	µg/kg-Wet	32	18	56.3	0.75 JT	2.6 JT	SB09W	1.23	1.18 JV	1.71 JV	0.75 JT	32 UT	05R006	2.5	1.44 JV	10 UV
Total Chlordanes	µg/kg-Wet	32	20	62.5	5.4 NJT	21.7 JT	SB09W	11	10.8 JV	14.9 JV	5.4 NJT	32 UT	05R006	9.5	9.85 JV	15.2 JV
Total Endosulfan	µg/kg-Wet	32	19	59.4	0.22 JT	8.4 JT	08R010	0.878	0.482 JT	1.47 JV	0.22 JT	20 UT	08R010	1.55	0.588 JV	6.53 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	32	32	100	4.19 JT	518 T	SB07W	51	26 V	140 V	4.19 JT	518 T	SB07W	51	26 V	140 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	32	32	100	34.5 JT	1460 T	SB07W	203	136 JV	411 V	34.5 JT	1460 T	SB07W	203	136 JV	411 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	32	32	100	26.8 JT	474 T	SB07W	115	93.3 JV	204 V	26.8 JT	474 T	SB07W	115	93.3 JV	204 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	32	27	84.4	0.758 JT	463 T	SB07W	43.4	11.7 JT	147 JV	0.758 JT	463 T	SB07W	37.2	10 JV	135 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	14	14	100	65 JT	378 T	07R009	198	178 JV	349 V	65 JT	378 T	07R009	198	178 JV	349 V
Toxaphene	µg/kg-Wet	14	0	0	--	--	--	--	--	--	350 UJ	6100 U	08R010	750	320 UJV	2900 UV
trans-Chlordane	µg/kg-Wet	32	18	56.3	0.37 JT	1.76 JT	SB09W	0.698	0.667 JV	1.01 JV	0.37 JT	8.4 UT	03R014; 04R023; 08R010	1.47	0.773 JV	4.2 UV
trans-Nonachlor	µg/kg-Wet	32	18	56.3	3.75 JT	10.7 T	SB09W	5.75	5.54 JV	7.64 V	3.75 JT	11 UT	03R014; 04R023; 05R006; 06R024; 07R009; 08R010; 08R032; 09R006	5.56	5.5 UV	6.88 V
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	18	15	83	0.6 T	10 T	SB06W	2.7	2.2 T	5.7 JV	0.6 T	10 T	SB06W	2.6	2.1 V	4.9 V
2-Methylnaphthalene	µg/kg-Wet	32	21	66	0.81 JT	59 T	07R009	12	3.1 JT	46 T	0.81 JT	59 T	07R009	13	5.7 JV	45 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Acenaphthene	µg/kg-Wet	32	22	69	1.7 JT	95 T	07R009	17	7.1 V	56 V	1.7 JT	95 T	07R009	17	13 V	49 V
Acenaphthylene	µg/kg-Wet	32	14	44	0.14 JT	2.9 JT	SB06W	0.85	0.57 JV	2.3 JV	0.14 JT	33 UT	07R009; 08R010	7.1	1.7 JV	16 UV
Anthracene	µg/kg-Wet	32	17	53	0.26 T	6.8 T	SB06W	1.6	1.2 JT	4.2 V	0.26 T	33 UT	07R009; 08R010	7.6	3.4 JV	16 UV
Benzo(a)anthracene	µg/kg-Wet	32	8	25	0.14 JT	1.1 T	SB09E	0.47	0.34 JV	1 V	0.14 JT	33 UT	07R009; 08R010	6.9	0.76 V	16 UV
Benzo(a)pyrene	µg/kg-Wet	32	5	16	0.15 JT	1.3 T	SB09E	0.64	0.66 T	1.2 V	0.15 JT	33 UT	07R009; 08R010	6.9	0.8 V	16 UV
Benzo(b)fluoranthene	µg/kg-Wet	32	6	19	0.14 JT	1 JT	SB09E	0.46	0.4 JV	0.91 JV	0.14 JT	33 UT	07R009; 08R010	6.9	0.55 V	16 UV
Benzo(g,h,i)perylene	µg/kg-Wet	32	6	19	0.13 JT	2.5 T	SB08W	0.8	0.4 JV	2.2 V	0.13 JT	33 UT	07R009; 08R010	7	0.9 V	16 UV
Benzo(k)fluoranthene	µg/kg-Wet	32	6	19	0.11 JT	0.92 T	SB09E	0.37	0.28 JV	0.83 V	0.11 JT	33 UT	07R009; 08R010	6.9	0.46 V	16 UV
Chrysene	µg/kg-Wet	32	9	28	0.14 JT	2 T	SB03E	0.67	0.27 JT	1.7 V	0.14 JT	33 UT	07R009; 08R010	7	1.2 V	16 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	32	3	9.4	0.13 JT	0.16 JT	SB08W	0.14	0.13 JT	0.16 JV	0.13 JT	33 UT	07R009; 08R010	6.8	0.23 UV	16 UV
Dibenzothiophene	µg/kg-Wet	18	12	67	0.27 T	11 T	SB06W	2.6	1.3 JV	8.4 V	0.23 UT	11 T	SB06W	1.8	0.97 JV	6.9 V
Fluoranthene	µg/kg-Wet	32	11	34	0.61 T	36 T	04R023	9.7	9.5 T	26 V	0.4 UT	36 T	04R023	9.7	12 V	17 UV
Fluorene	µg/kg-Wet	32	20	63	3.1 T	69 T	07R009	13	5.3 V	50 V	3.1 T	69 T	07R009	13	12 V	39 JV
High Molecular Weight PAH	µg/kg-Wet	32	12	38	0.86 JT	75 T	04R023	21	12 JV	74 JV	0.4 UT	75 T	04R023	14	15 UV	46 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	32	7	22	0.12 JT	1.8 JT	SB08W	0.58	0.18 JT	1.6 JV	0.12 JT	33 UT	07R009; 08R010	6.9	0.86 V	16 UV
Low Molecular Weight PAH	µg/kg-Wet	32	25	78.1	11 JT	308 T	07R009	61.4	31 JT	234 JV	11 JT	308 T	07R009	51.4	25.5 JV	201 JV
Naphthalene	µg/kg-Wet	32	20	63	0.73 JT	86 T	07R009	10	1.7 JV	53 V	0.73 JT	86 T	07R009	12	7.1 JV	35 V
Phenanthrene	µg/kg-Wet	32	20	63	3.6 T	85 T	07R009	20	9.6 V	53 V	3.6 T	85 T	07R009	18	16 UV	50 V
Pyrene	µg/kg-Wet	32	7	22	2.2 T	49 T	SB08W	17	8.6 T	46 V	0.32 UT	49 T	SB08W	10	9.8 V	27 V
Total BaPEq	µg/kg-Wet	32	9	28.1	0.0121 JT	1.64 JT	SB09E	0.525	0.192 JT	1.56 JV	0.0121 JT	33 UT	07R009; 08R010	6.95	1.19 JV	16.2 UV
Total cPAHs	µg/kg-Wet	32	9	28	0.26 JT	6.8 JT	SB09E	2.5	1.5 JT	6.5 JV	0.25 UT	33 UT	07R009; 08R010	7.5	4.8 JV	16 UV
Total PAHs	µg/kg-Wet	32	25	78.1	11 JT	308 T	07R009	71.5	39 JT	238 JV	11 JT	308 T	07R009	59.3	29 JV	212 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	31	6	19	44 JT	87000 JT	04R023	21000	2800 V	73000 JV	44 JT	87000 JT	04R023	4100	48 UT	17000 JV
Butylbenzyl phthalate	µg/kg-Wet	32	0	0	--	--	--	--	--	--	7.3 UT	330 U	07R009; 08R010	70	3.7 UV	160 UV
Dibutyl phthalate	µg/kg-Wet	32	3	9.4	27 T	37 T	SB011E; SB011W	34	37 T	37 V	22 UT	330 U	07R009; 08R010	78	33 V	160 UV
Diethyl phthalate	µg/kg-Wet	32	1	3.1	10 JT	10 JT	SB04W	10	10 JT	10 JT	10 JT	160 U	06R024; 07R009; 08R010; 08R032; 09R006	38	9.8 JV	80 UV
Dimethyl phthalate	µg/kg-Wet	32	0	0	--	--	--	--	--	--	7.7 UT	160 U	06R024; 07R009; 08R010; 08R032; 09R006	36	3.9 UV	80 UV
Di-n-octyl phthalate	µg/kg-Wet	32	3	9.4	460 T	2100 T	04R023	1200	1100	2000 V	11 UT	2100 T	04R023	170	5.5 UV	750 V
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	9.8 UT	33 UT	07R009; 08R010	9.5	4.9 UV	16 UV
1,2-Dichlorobenzene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	11 UT	33 UT	07R009; 08R010	9.8	5.5 UV	16 UV
1,2-Diphenylhydrazine	µg/kg-Wet	14	0	0	--	--	--	--	--	--	25 U	33 U	07R009; 08R010	15	16 UV	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	11 UT	33 UT	07R009; 08R010	9.8	5.5 UV	16 UV
1,4-Dichlorobenzene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	11 UT	33 UT	07R009; 08R010	9.8	5.5 UV	16 UV
2,4-Dinitrotoluene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	15 UT	33 UT	07R009; 08R010	11	7.5 UV	16 UV
2,6-Dinitrotoluene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	14 UT	33 UT	07R009; 08R010	11	7 UV	16 UV
2-Chloronaphthalene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	6.7 UT	33 UT	07R009; 08R010	8.6	3.4 UV	16 UV
2-Nitroaniline	µg/kg-Wet	32	0	0	--	--	--	--	--	--	31 UT	820 U	07R009; 08R010	180	16 UV	400 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	31	0	0	--	--	--	--	--	--	1000 UT	1600 U	06R024; 07R009; 08R010; 08R032; 09R006	620	500 UT	800 UV
3-Nitroaniline	µg/kg-Wet	31	0	0	--	--	--	--	--	--	400 UT	820 U	07R009; 08R010	280	200 UT	410 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	32	0	0	--	--	--	--	--	--	6.9 UT	33 UT	07R009; 08R010	8.7	3.5 UV	16 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
4-Chloroaniline	µg/kg-Wet	31	0	0	--	--	--	--	--	--	130 UT	400 UT	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09W	140	200 UT	200 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	32	0	0	--	--	--	--	--	--	6.4 UT	82 UT	07R009; 08R010	19	3.2 UV	40 UV
4-Nitroaniline	µg/kg-Wet	31	0	0	--	--	--	--	--	--	400 UT	820 U	07R009; 08R010	280	200 UT	410 UV
Aniline	µg/kg-Wet	29	0	0	--	--	--	--	--	--	800 UT	1700 U	03R014; 04R023; 05R006; 07R009; 08R010; 08R032	580	400 UT	850 UV
Azobenzene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	40 UT	160 U	06R024; 07R009; 08R010; 08R032; 09R006	45	20 UV	80 UV
Benzoic acid	µg/kg-Wet	32	16	50	350 JT	610 JT	SB011W; SB02E	470	460 JV	610 JV	350 JT	8300 U	03R014; 04R023; 05R006; 07R009; 08R010; 08R032	2100	600 JV	4200 UV
Benzyl alcohol	µg/kg-Wet	32	16	50	14 JT	33 JT	SB09E	27	27 JV	32 JV	14 JT	330 U	07R009; 08R010	81	32 JV	160 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	14	0	0	--	--	--	--	--	--	130 U	160 U	06R024; 07R009; 08R010; 08R032; 09R006	76	78 UV	80 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	32	16	50	10 JT	22 JT	SB011W	14	13 JV	19 JV	8.3 UT	160 U	06R024; 07R009; 08R010; 08R032; 09R006	40	17 JV	80 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	32	0	0	--	--	--	--	--	--	13 UT	33 UT	07R009; 08R010	10	6.5 UV	16 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	18	0	0	--	--	--	--	--	--	13 UT	13 UT	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	6.5	6.5 UV	6.5 UV
Carbazole	µg/kg-Wet	14	0	0	--	--	--	--	--	--	25 UT	33 UT	07R009; 08R010	15	16 UV	17 UV
Dibenzofuran	µg/kg-Wet	32	19	59	0.67 JT	52 T	07R009	7.1	2.3 T	49 V	0.67 JT	52 T	07R009	10	3.2 JV	31 V
Hexachlorobenzene	µg/kg-Wet	32	18	56.3	1.67 T	4.79 T	SB07W	2.2	1.99 JV	3.08 V	1 UT	6.4 UT	03R014; 04R023; 05R006; 07R009; 08R010; 08R032; 09R006	2.51	2.34 JV	3.2 UV
Hexachlorobutadiene	µg/kg-Wet	32	11	34.4	0.0052 JT	1.4 JT	SB07W	0.19	0.048 JT	0.825 JV	0.0052 JT	4.6 UT	04R023; 05R006; 08R010	0.943	0.2 JV	2.3 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Hexachlorocyclopentadiene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	630 UJ	1000 UT	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	450	500 UV	500 UV
Hexachloroethane	µg/kg-Wet	32	0	0	--	--	--	--	--	--	1 UJT	20 UT	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	6.7	10 UV	10 UV
Isophorone	µg/kg-Wet	32	0	0	--	--	--	--	--	--	9.2 UT	1700 U	03R014; 04R023; 05R006; 07R009; 08R010; 08R032	370	4.6 UV	850 UV
Nitrobenzene	µg/kg-Wet	32	0	0	--	--	--	--	--	--	12 UT	54 UT	SB03W	15	16 UV	23 UV
N-Nitrosodimethylamine	µg/kg-Wet	32	0	0	--	--	--	--	--	--	40 UT	170 UT	04R023	45	20 UV	82 UJV
N-Nitrosodiphenylamine	µg/kg-Wet	32	0	0	--	--	--	--	--	--	6.6 UT	160 U	06R024; 07R009; 08R010; 08R032; 09R006	35	3.3 UV	80 UV
N-Nitrosodipropylamine	µg/kg-Wet	32	0	0	--	--	--	--	--	--	22 UT	33 UJT	07R009; 08R010	13	11 UV	16 UJV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	14	0	0	--	--	--	--	--	--	1300 U	1600 U	06R024; 07R009; 08R010; 08R032; 09R006	760	780 UV	800 UV
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	18	0	0	--	--	--	--	--	--	20 UT	20 UT	SB010E; SB010W; SB011E; SB011W; SB02E; SB03E; SB03W; SB04E; SB04W; SB05W; SB06E; SB06W; SB07E; SB07W; SB08E; SB08W; SB09E; SB09W	10	10 UV	10 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	14	0	0	--	--	--	--	--	--	1300 U	1600 U	06R024; 07R009; 08R010; 08R032; 09R006	760	780 UV	800 UV
2,4,5-Trichlorophenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	14 UT	820 U	07R009; 08R010	170	7 UV	400 UV
2,4,6-Trichlorophenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	9.1 UT	33 UT	07R009; 08R010	9.3	4.6 UV	16 UV
2,4-Dichlorophenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	9.5 UT	33 UT	07R009; 08R010	9.4	4.8 UV	16 UV
2,4-Dimethylphenol	µg/kg-Wet	14	0	0	--	--	--	--	--	--	380 U	490 U	07R009; 08R010	230	230 UV	250 UV
2,4-Dinitrophenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	800 UT	3300 U	07R009; 08R010	900	400 UV	1600 UV
2-Chlorophenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	7.5 UT	33 UT	07R009; 08R010	8.9	3.8 UV	16 UV
2-Methylphenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	8.2 UT	160 U	06R024; 07R009; 08R010; 08R032; 09R006	36	4.1 UV	80 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2-Nitrophenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	12 UT	1700 U	03R014; 04R023; 05R006; 07R009; 08R010; 08R032	370	6 UV	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	400 UT	3300 U	07R009; 08R010	790	200 UV	1600 UV
4-Chloro-3-methylphenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	6.8 UT	330 U	07R009; 08R010	69	3.4 UV	160 UV
4-Methylphenol	µg/kg-Wet	32	3	9.4	11 JT	13 JT	SB010E; SB09E	12	13 JT	13 JV	7.7 UT	33 UT	07R009; 08R010	9.7	12 JV	16 UV
4-Nitrophenol	µg/kg-Wet	32	6	19	7.1 JT	14 JT	SB06W	12	13 JV	14 JV	7.1 JT	1600 U	06R024; 07R009; 08R010; 08R032; 09R006	340	13 JV	800 UV
Pentachlorophenol	µg/kg-Wet	32	0	0	--	--	--	--	--	--	30 UT	160 UT	06R024; 07R009; 08R010; 08R032; 09R006	42	15 UV	80 UV
Phenol	µg/kg-Wet	32	1	3.1	270 T	270 T	SB010E	270	270 T	270 T	45 UT	330 U	07R009; 08R010	90	43 UV	170 UV
Sturgeon (fillet without skin)																
Conventionals																
Lipids	percent-Wet	5	5	100	0.83	3.4	RM 3.5-9.2	2	1.6	3.3 V	0.83	3.4	RM 3.5-9.2	2	1.6	3.3 V
Metals																
Aluminum	mg/kg-Wet	5	1	20	2.15	2.15	RM 3.5-9.2	2.15	2.15	2.15	1.96 U	2.15	RM 3.5-9.2	1.25	1.05 U	1.93 V
Antimony	mg/kg-Wet	5	0	0	--	--	--	--	--	--	0.078 U	0.0835 UT	RM 3.5-9.2	0.0404	0.0408 U	0.0416 UV
Arsenic	mg/kg-Wet	5	5	100	0.157	0.538	RM 3.5-9.2	0.342	0.314	0.515 V	0.157	0.538	RM 3.5-9.2	0.342	0.314	0.515 V
Barium	mg/kg-Wet	5	4	80	0.0588	0.0952 T	RM 3.5-9.2	0.0748	0.0727 V	0.092 V	0.0488 U	0.0952 T	RM 3.5-9.2	0.0647	0.0714	0.0909 V
Beryllium	mg/kg-Wet	5	0	0	--	--	--	--	--	--	0.0039 U	0.00428 UT	RM 3.5-9.2	0.00204	0.00204 U	0.00213 UV
Cadmium	mg/kg-Wet	5	0	0	--	--	--	--	--	--	0.00975 U	0.0105 UT	RM 3.5-9.2	0.00506	0.0051 U	0.00523 UV
Calcium	mg/kg-Wet	5	5	100	52.6 T	63.9	RM 3.5-9.2	56.5	56.5	62.4 V	52.6 T	63.9	RM 3.5-9.2	56.5	56.5	62.4 V
Chromium	mg/kg-Wet	5	5	100	0.412	3.25	RM 3.5-9.2	1.55	1.17 T	3.07 V	0.412	3.25	RM 3.5-9.2	1.55	1.17 T	3.07 V
Cobalt	mg/kg-Wet	5	5	100	0.134 T	0.403	RM 3.5-9.2	0.283	0.349	0.398 V	0.134 T	0.403	RM 3.5-9.2	0.283	0.349	0.398 V
Copper	mg/kg-Wet	5	5	100	0.127	0.253	RM 3.5-9.2	0.189	0.169	0.249 V	0.127	0.253	RM 3.5-9.2	0.189	0.169	0.249 V
Iron	mg/kg-Wet	5	5	100	3.24	15.6	RM 3.5-9.2	8.2	6.89 T	14.7 V	3.24	15.6	RM 3.5-9.2	8.2	6.89 T	14.7 V
Lead	mg/kg-Wet	5	1	20	0.0165	0.0165	RM 3.5-9.2	0.0165	0.0165	0.0165	0.00975 U	0.0165	RM 3.5-9.2	0.00733	0.0051 U	0.0143 V
Magnesium	mg/kg-Wet	5	5	100	225	239	RM 3.5-9.2	232	231 T	238 V	225	239	RM 3.5-9.2	232	231 T	238 V
Manganese	mg/kg-Wet	5	5	100	0.302	1.07	RM 3.5-9.2	0.521	0.396	0.955 V	0.302	1.07	RM 3.5-9.2	0.521	0.396	0.955 V
Mercury	mg/kg-Wet	5	5	100	0.0963	0.322 T	RM 3.5-9.2	0.242	0.263	0.319 V	0.0963	0.322 T	RM 3.5-9.2	0.242	0.263	0.319 V
Nickel	mg/kg-Wet	5	5	100	0.0351	1.65	RM 3.5-9.2	0.727	0.586 T	1.58 V	0.0351	1.65	RM 3.5-9.2	0.727	0.586 T	1.58 V
Potassium	mg/kg-Wet	5	5	100	3530 T	4180	RM 3.5-9.2	3980	4080	4170 V	3530 T	4180	RM 3.5-9.2	3980	4080	4170 V
Selenium	mg/kg-Wet	5	5	100	0.31 T	0.532	RM 3.5-9.2	0.422	0.464	0.524 V	0.31 T	0.532	RM 3.5-9.2	0.422	0.464	0.524 V
Silver	mg/kg-Wet	5	0	0	--	--	--	--	--	--	0.00975 U	0.0105 UT	RM 3.5-9.2	0.00506	0.0051 U	0.00523 UV
Sodium	mg/kg-Wet	5	5	100	365 J	475 JT	RM 3.5-9.2	400	384 J	461 JV	365 J	475 JT	RM 3.5-9.2	400	384 J	461 JV
Thallium	mg/kg-Wet	5	0	0	--	--	--	--	--	--	0.0488 U	0.0528 U	RM 3.5-9.2	0.0253	0.0255 U	0.0263 UV
Vanadium	mg/kg-Wet	5	0	0	--	--	--	--	--	--	0.078 U	0.0835 UT	RM 3.5-9.2	0.0404	0.0408 U	0.0416 UV
Zinc	mg/kg-Wet	5	5	100	2.08	2.93 T	RM 3.5-9.2	2.56	2.55	2.89 V	2.08	2.93 T	RM 3.5-9.2	2.56	2.55	2.89 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	5	0	0	--	--	--	--	--	--	4.5 U	9.3 UT	RM 3.5-9.2	2.8	2.3 UT	4.2 UV
Aroclor 1221	µg/kg-Wet	5	0	0	--	--	--	--	--	--	9.1 U	19 UT	RM 3.5-9.2	5.6	4.6 UT	8.6 UV
Aroclor 1232	µg/kg-Wet	5	0	0	--	--	--	--	--	--	4.5 U	9.3 UT	RM 3.5-9.2	2.8	2.3 UT	4.2 UV
Aroclor 1242	µg/kg-Wet	5	0	0	--	--	--	--	--	--	4.5 U	9.3 UT	RM 3.5-9.2	2.8	2.3 UT	4.2 UV
Aroclor 1248	µg/kg-Wet	5	0	0	--	--	--	--	--	--	4.5 U	9.3 UT	RM 3.5-9.2	2.8	2.3 UT	4.2 UV
Aroclor 1254	µg/kg-Wet	5	0	0	--	--	--	--	--	--	4.5 U	9.3 UT	RM 3.5-9.2	2.8	2.3 UT	4.2 UV
Aroclor 1260	µg/kg-Wet	5	5	100	43	430 JT	RM 3.5-9.2	133	51.5 JT	362 JV	43	430 JT	RM 3.5-9.2	133	51.5 JT	362 JV
Aroclor 1262	µg/kg-Wet	5	0	0	--	--	--	--	--	--	4.5 U	9.3 UT	RM 3.5-9.2	2.8	2.3 UT	4.2 UV
Aroclor 1268	µg/kg-Wet	5	0	0	--	--	--	--	--	--	4.5 U	9.3 UT	RM 3.5-9.2	2.8	2.3 UT	4.2 UV
Aroclors	µg/kg-Wet	5	5	100	43 T	430 JT	RM 3.5-9.2	133	51.5 JT	362 JV	43 T	430 JT	RM 3.5-9.2	133	51.5 JT	362 JV
PCB Congeners																
PCB001	pg/g-Wet	5	5	100	0.566 J	1.8	RM 3.5-9.2	1.04	0.953	1.63 V	0.566 J	1.8	RM 3.5-9.2	1.04	0.953	1.63 V
PCB002	pg/g-Wet	5	5	100	0.347 T	1.25 J	RM 3.5-9.2	0.84	0.864	1.18 JV	0.347 T	1.25 J	RM 3.5-9.2	0.84	0.864	1.18 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB003	pg/g-Wet	5	5	100	0.644 T	4.62 J	RM 3.5-9.2	2.39	1.72	4.39 JV	0.644 T	4.62 J	RM 3.5-9.2	2.39	1.72	4.39 JV
PCB004	pg/g-Wet	5	5	100	45.4	68.3	RM 3.5-9.2	53.8	49.5	66.1 V	45.4	68.3	RM 3.5-9.2	53.8	49.5	66.1 V
PCB005	pg/g-Wet	5	2	40	0.1	0.134	RM 3.5-9.2	0.117	0.117 V	0.132 V	0.0998 U	0.371 UT	RM 3.5-9.2	0.105	0.1	0.175 V
PCB006	pg/g-Wet	5	5	100	2.93	6.13 JT	RM 3.5-9.2	4.47	4.87	5.89 JV	2.93	6.13 JT	RM 3.5-9.2	4.47	4.87	5.89 JV
PCB007	pg/g-Wet	5	5	100	0.255	0.577 T	RM 3.5-9.2	0.439	0.504	0.573 V	0.255	0.577 T	RM 3.5-9.2	0.439	0.504	0.573 V
PCB008	pg/g-Wet	5	5	100	27.2	55.5 T	RM 3.5-9.2	36.5	33.9	52 V	27.2	55.5 T	RM 3.5-9.2	36.5	33.9	52 V
PCB009	pg/g-Wet	5	5	100	1.62	2.91 T	RM 3.5-9.2	2.07	1.92	2.78 V	1.62	2.91 T	RM 3.5-9.2	2.07	1.92	2.78 V
PCB010	pg/g-Wet	5	5	100	2.39	3.65	RM 3.5-9.2	3.15	3.3	3.64 V	2.39	3.65	RM 3.5-9.2	3.15	3.3	3.64 V
PCB011	pg/g-Wet	5	5	100	14.9 J	48	RM 3.5-9.2	32.1	34.3 J	45.5 V	14.9 J	48	RM 3.5-9.2	32.1	34.3 J	45.5 V
PCB012 & 013	pg/g-Wet	5	5	100	0.801	1.86	RM 3.5-9.2	1.32	1.39	1.81 V	0.801	1.86	RM 3.5-9.2	1.32	1.39	1.81 V
PCB014	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.0812 U	0.385 UT	RM 3.5-9.2	0.0759	0.0496 U	0.165 UV
PCB015	pg/g-Wet	5	5	100	2.35	11 T	RM 3.5-9.2	5.14	4.41	9.81 V	2.35	11 T	RM 3.5-9.2	5.14	4.41	9.81 V
PCB016	pg/g-Wet	5	5	100	9.62	30.2	RM 3.5-9.2	16.6	13.8	27.6 V	9.62	30.2	RM 3.5-9.2	16.6	13.8	27.6 V
PCB017	pg/g-Wet	5	5	100	51.2	104	RM 3.5-9.2	69	58.9 T	99.1 V	51.2	104	RM 3.5-9.2	69	58.9 T	99.1 V
PCB018 & 030	pg/g-Wet	5	5	100	177	322	RM 3.5-9.2	224	205 T	305 V	177	322	RM 3.5-9.2	224	205 T	305 V
PCB019	pg/g-Wet	5	5	100	96.4	299	RM 3.5-9.2	175	164 T	279 V	96.4	299	RM 3.5-9.2	175	164 T	279 V
PCB020 & 028	pg/g-Wet	5	5	100	604	1280	RM 3.5-9.2	847	696 T	1220 V	604	1280	RM 3.5-9.2	847	696 T	1220 V
PCB021 & 033	pg/g-Wet	5	5	100	27.9	80.3	RM 3.5-9.2	50.7	46.1 T	75.6 V	27.9	80.3	RM 3.5-9.2	50.7	46.1 T	75.6 V
PCB022	pg/g-Wet	5	5	100	56	106	RM 3.5-9.2	74.9	69.2	101 V	56	106	RM 3.5-9.2	74.9	69.2	101 V
PCB023	pg/g-Wet	5	4	80	0.162 J	0.346	RM 3.5-9.2	0.253	0.252 JV	0.332 JV	0.162 J	0.346	RM 3.5-9.2	0.219	0.249 JT	0.328 JV
PCB024	pg/g-Wet	5	5	100	0.95	1.64 JT	RM 3.5-9.2	1.37	1.43	1.64 JV	0.95	1.64 JT	RM 3.5-9.2	1.37	1.43	1.64 JV
PCB025	pg/g-Wet	5	5	100	15.1	61.3	RM 3.5-9.2	27	18.3 T	54 V	15.1	61.3	RM 3.5-9.2	27	18.3 T	54 V
PCB026 & 029	pg/g-Wet	5	5	100	33.3 T	59.7	RM 3.5-9.2	45.6	46.7	58.3 V	33.3 T	59.7	RM 3.5-9.2	45.6	46.7	58.3 V
PCB027	pg/g-Wet	5	5	100	30.7 T	72.1	RM 3.5-9.2	41.7	33.5	65.6 V	30.7 T	72.1	RM 3.5-9.2	41.7	33.5	65.6 V
PCB031	pg/g-Wet	5	5	100	236	718	RM 3.5-9.2	402	397 T	658 V	236	718	RM 3.5-9.2	402	397 T	658 V
PCB032	pg/g-Wet	5	5	100	68	182	RM 3.5-9.2	113	98.3 T	174 V	68	182	RM 3.5-9.2	113	98.3 T	174 V
PCB034	pg/g-Wet	5	5	100	2.76	5.31	RM 3.5-9.2	3.58	2.88 T	5.07 V	2.76	5.31	RM 3.5-9.2	3.58	2.88 T	5.07 V
PCB035	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.115 U	0.234 UT	RM 3.5-9.2	0.079	0.064 U	0.113 UV
PCB036	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.105 U	0.202 UT	RM 3.5-9.2	0.07	0.057 U	0.0977 UV
PCB037	pg/g-Wet	5	5	100	3.79	19.5 T	RM 3.5-9.2	10.4	10.1	17.7 V	3.79	19.5 T	RM 3.5-9.2	10.4	10.1	17.7 V
PCB038	pg/g-Wet	5	2	40	0.571 JT	0.605	RM 3.5-9.2	0.588	0.588 JV	0.603 JV	0.11 U	0.605	RM 3.5-9.2	0.276	0.088 U	0.598 JV
PCB039	pg/g-Wet	5	5	100	1.43 JT	4.24	RM 3.5-9.2	2.85	2.78	4.14 V	1.43 JT	4.24	RM 3.5-9.2	2.85	2.78	4.14 V
PCB040 & 041 & 071	pg/g-Wet	5	5	100	157 T	672	RM 3.5-9.2	324	265	609 V	157 T	672	RM 3.5-9.2	324	265	609 V
PCB042	pg/g-Wet	5	5	100	68.6 T	168	RM 3.5-9.2	129	146	167 V	68.6 T	168	RM 3.5-9.2	129	146	167 V
PCB043	pg/g-Wet	5	5	100	38.8 T	74.1	RM 3.5-9.2	51.5	42	72 V	38.8 T	74.1	RM 3.5-9.2	51.5	42	72 V
PCB044 & 047 & 065	pg/g-Wet	5	5	100	1350 T	11000	RM 3.5-9.2	3630	1520	9360 V	1350 T	11000	RM 3.5-9.2	3630	1520	9360 V
PCB045 & 051	pg/g-Wet	5	5	100	137	1330	RM 3.5-9.2	413	182 T	1120 V	137	1330	RM 3.5-9.2	413	182 T	1120 V
PCB046	pg/g-Wet	5	5	100	14.9 T	36.9	RM 3.5-9.2	23	19.3	34.7 V	14.9 T	36.9	RM 3.5-9.2	23	19.3	34.7 V
PCB048	pg/g-Wet	5	5	100	51 T	119	RM 3.5-9.2	82.1	68.9	117 V	51 T	119	RM 3.5-9.2	82.1	68.9	117 V
PCB049 & 069	pg/g-Wet	5	5	100	593	4310	RM 3.5-9.2	1710	1000 T	3840 V	593	4310	RM 3.5-9.2	1710	1000 T	3840 V
PCB050 & 053	pg/g-Wet	5	5	100	198	1550	RM 3.5-9.2	558	346 T	1330 V	198	1550	RM 3.5-9.2	558	346 T	1330 V
PCB052	pg/g-Wet	5	5	100	1650	6760	RM 3.5-9.2	3210	1980 T	6190 V	1650	6760	RM 3.5-9.2	3210	1980 T	6190 V
PCB054	pg/g-Wet	5	5	100	16.5	83	RM 3.5-9.2	38.8	30 T	74.7 V	16.5	83	RM 3.5-9.2	38.8	30 T	74.7 V
PCB055	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.567 U	5.23 U	RM 3.5-9.2	1.03	0.75 U	2.33 UV
PCB056	pg/g-Wet	5	5	100	24.6 T	97.2	RM 3.5-9.2	57.8	51	93.4 V	24.6 T	97.2	RM 3.5-9.2	57.8	51	93.4 V
PCB057	pg/g-Wet	5	4	80	2.45	7.57	RM 3.5-9.2	4.51	4.01 V	7.24 V	2.29 UT	7.57	RM 3.5-9.2	3.84	2.68	7.12 V
PCB058	pg/g-Wet	5	2	40	2.19	3.13	RM 3.5-9.2	2.66	2.66 V	3.08 V	0.576 U	5.17 U	RM 3.5-9.2	1.86	2.19	3.02 V
PCB059 & 062 & 075	pg/g-Wet	5	5	100	76.6 T	232	RM 3.5-9.2	131	97.1	218 V	76.6 T	232	RM 3.5-9.2	131	97.1	218 V
PCB060	pg/g-Wet	5	5	100	281	734	RM 3.5-9.2	417	330 T	673 V	281	734	RM 3.5-9.2	417	330 T	673 V
PCB061 & 070 & 074 & 076	pg/g-Wet	5	5	100	1450	4000	RM 3.5-9.2	2260	1550 T	3750 V	1450	4000	RM 3.5-9.2	2260	1550 T	3750 V
PCB063	pg/g-Wet	5	5	100	80.8	234	RM 3.5-9.2	131	88.6 T	221 V	80.8	234	RM 3.5-9.2	131	88.6 T	221 V
PCB064	pg/g-Wet	5	5	100	366	1110	RM 3.5-9.2	636	481 T	1040 V	366	1110	RM 3.5-9.2	636	481 T	1040 V
PCB066	pg/g-Wet	5	5	100	927	2470	RM 3.5-9.2	1500	1120 T	2370 V	927	2470	RM 3.5-9.2	1500	1120 T	2370 V
PCB067	pg/g-Wet	5	4	80	8.04	36.6	RM 3.5-9.2	17	11.6 V	33.4 V	2 UT	36.6	RM 3.5-9.2	13.8	8.07	32.3 V
PCB068	pg/g-Wet	5	5	100	20.2	167	RM 3.5-9.2	59.2	27.3 T	145 V	20.2	167	RM 3.5-9.2	59.2	27.3 T	145 V
PCB072	pg/g-Wet	5	5	100	15.5	87	RM 3.5-9.2	37.4	21.4	78.2 V	15.5	87	RM 3.5-9.2	37.4	21.4	78.2 V
PCB073	pg/g-Wet	5	4	80	13.9	179	RM 3.5-9.2	59.9	23.3 V	156 V	0.135 UT	179	RM 3.5-9.2	47.9	21.3	148 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB077	pg/g-Wet	5	5	100	6.64	17.4	RM 3.5-9.2	12.2	10.5	17.2 V	6.64	17.4	RM 3.5-9.2	12.2	10.5	17.2 V
PCB078	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.591 U	5.45 U	RM 3.5-9.2	1.07	0.78 U	2.42 UV
PCB079	pg/g-Wet	5	5	100	11.4 T	44.6	RM 3.5-9.2	23.8	22.8	41 V	11.4 T	44.6	RM 3.5-9.2	23.8	22.8	41 V
PCB080	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.537 U	4.96 U	RM 3.5-9.2	0.966	0.71 U	2.2 UV
PCB081	pg/g-Wet	5	5	100	0.834 T	3.52	RM 3.5-9.2	2.18	2.49	3.46 V	0.834 T	3.52	RM 3.5-9.2	2.18	2.49	3.46 V
PCB082	pg/g-Wet	5	5	100	16.5 JT	91	RM 3.5-9.2	51.8	39.1	89.9 V	16.5 JT	91	RM 3.5-9.2	51.8	39.1	89.9 V
PCB083 & 099	pg/g-Wet	5	5	100	3110	16800	RM 3.5-9.2	6860	3370 T	15000 V	3110	16800	RM 3.5-9.2	6860	3370 T	15000 V
PCB084	pg/g-Wet	5	5	100	176 T	700	RM 3.5-9.2	358	278	646 V	176 T	700	RM 3.5-9.2	358	278	646 V
PCB085 & 116 & 117	pg/g-Wet	5	5	100	710 T	1960	RM 3.5-9.2	1200	771	1930 V	710 T	1960	RM 3.5-9.2	1200	771	1930 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	5	5	100	1170 T	6540	RM 3.5-9.2	2640	1390	5810 V	1170 T	6540	RM 3.5-9.2	2640	1390	5810 V
PCB088 & 091	pg/g-Wet	5	5	100	366	4220	RM 3.5-9.2	1250	392 T	3550 V	366	4220	RM 3.5-9.2	1250	392 T	3550 V
PCB089	pg/g-Wet	5	5	100	3.01 T	10.5	RM 3.5-9.2	6.85	7.09	10.1 V	3.01 T	10.5	RM 3.5-9.2	6.85	7.09	10.1 V
PCB090 & 101 & 113	pg/g-Wet	5	5	100	3000	33200	RM 3.5-9.2	10400	3990 T	28300 V	3000	33200	RM 3.5-9.2	10400	3990 T	28300 V
PCB092	pg/g-Wet	5	5	100	875	7570	RM 3.5-9.2	2520	943 T	6510 V	875	7570	RM 3.5-9.2	2520	943 T	6510 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	5	5	100	1910	22000	RM 3.5-9.2	6590	2240	18500 V	1910	22000	RM 3.5-9.2	6590	2240	18500 V
PCB094	pg/g-Wet	5	5	100	22.7	432	RM 3.5-9.2	117	38	358 V	22.7	432	RM 3.5-9.2	117	38	358 V
PCB096	pg/g-Wet	5	5	100	9.98 T	74.9	RM 3.5-9.2	26	15.3	63.9 V	9.98 T	74.9	RM 3.5-9.2	26	15.3	63.9 V
PCB103	pg/g-Wet	5	5	100	71.2	1310	RM 3.5-9.2	353	112	1090 V	71.2	1310	RM 3.5-9.2	353	112	1090 V
PCB104	pg/g-Wet	5	5	100	3.22	42.2	RM 3.5-9.2	13.5	5.93 T	35.8 V	3.22	42.2	RM 3.5-9.2	13.5	5.93 T	35.8 V
PCB105	pg/g-Wet	5	5	100	990	2630	RM 3.5-9.2	1610	1160 T	2540 V	990	2630	RM 3.5-9.2	1610	1160 T	2540 V
PCB106	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.677 U	2.42 U	RM 3.5-9.2	0.848	0.85 UT	1.18 UV
PCB107 & 124	pg/g-Wet	5	5	100	14.4	37.6	RM 3.5-9.2	24.1	19.3 T	36.8 V	14.4	37.6	RM 3.5-9.2	24.1	19.3 T	36.8 V
PCB109	pg/g-Wet	5	5	100	294	1230	RM 3.5-9.2	582	324 T	1140 V	294	1230	RM 3.5-9.2	582	324 T	1140 V
PCB110 & 115	pg/g-Wet	5	5	100	2040	13100	RM 3.5-9.2	5100	2380 T	11600 V	2040	13100	RM 3.5-9.2	5100	2380 T	11600 V
PCB111	pg/g-Wet	5	5	100	5.62 JT	58.8	RM 3.5-9.2	20.2	9.57	50.8 V	5.62 JT	58.8	RM 3.5-9.2	20.2	9.57	50.8 V
PCB112	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.161 U	1.32 UT	RM 3.5-9.2	0.323	0.228 U	0.623 UV
PCB114	pg/g-Wet	5	5	100	76.8	204	RM 3.5-9.2	127	92.2 T	198 V	76.8	204	RM 3.5-9.2	127	92.2 T	198 V
PCB118	pg/g-Wet	5	5	100	1160	5010	RM 3.5-9.2	2530	2100 T	4630 V	1160	5010	RM 3.5-9.2	2530	2100 T	4630 V
PCB120	pg/g-Wet	5	5	100	14.6	174	RM 3.5-9.2	53.5	21.3	148 V	14.6	174	RM 3.5-9.2	53.5	21.3	148 V
PCB121	pg/g-Wet	5	4	80	9.43	23.2	RM 3.5-9.2	14.4	12.5 V	21.8 V	0.445 U	23.2	RM 3.5-9.2	11.6	11.4	21.3 V
PCB122	pg/g-Wet	5	2	40	2.53	4.48	RM 3.5-9.2	3.51	3.51 V	4.38 V	0.727 U	4.48	RM 3.5-9.2	1.94	1.34 U	4.09 V
PCB123	pg/g-Wet	5	5	100	26	57	RM 3.5-9.2	38.4	37.1	54.7 V	26	57	RM 3.5-9.2	38.4	37.1	54.7 V
PCB126	pg/g-Wet	5	4	80	1.74 T	4.85	RM 3.5-9.2	3.3	3.31 V	4.7 V	1.74 T	4.85	RM 3.5-9.2	2.85	2.77	4.65 V
PCB127	pg/g-Wet	5	2	40	9.34 T	27.1	RM 3.5-9.2	18.2	18.2 V	26.2 V	1.69 U	27.1	RM 3.5-9.2	7.94	1.3 U	23.5 V
PCB128 & 166	pg/g-Wet	5	5	100	584	4480	RM 3.5-9.2	1560	700 T	3860 V	584	4480	RM 3.5-9.2	1560	700 T	3860 V
PCB129 & 138 & 160 & 163	pg/g-Wet	5	5	100	8050 T	96300	RM 3.5-9.2	28500	9320	81200 V	8050 T	96300	RM 3.5-9.2	28500	9320	81200 V
PCB130	pg/g-Wet	5	5	100	311 T	2970	RM 3.5-9.2	998	415	2560 V	311 T	2970	RM 3.5-9.2	998	415	2560 V
PCB131	pg/g-Wet	5	5	100	14 T	183	RM 3.5-9.2	56.3	19.4	156 V	14 T	183	RM 3.5-9.2	56.3	19.4	156 V
PCB132	pg/g-Wet	5	5	100	724 T	14200	RM 3.5-9.2	3670	797	11700 V	724 T	14200	RM 3.5-9.2	3670	797	11700 V
PCB133	pg/g-Wet	5	5	100	188 T	1630	RM 3.5-9.2	543	237	1400 V	188 T	1630	RM 3.5-9.2	543	237	1400 V
PCB134 & 143	pg/g-Wet	5	5	100	152 T	1780	RM 3.5-9.2	515	170	1480 V	152 T	1780	RM 3.5-9.2	515	170	1480 V
PCB135 & 151 & 154	pg/g-Wet	5	5	100	2410 T	38100	RM 3.5-9.2	10600	3060	31800 V	2410 T	38100	RM 3.5-9.2	10600	3060	31800 V
PCB136	pg/g-Wet	5	5	100	281	5280	RM 3.5-9.2	1410	431	4370 V	281	5280	RM 3.5-9.2	1410	431	4370 V
PCB137	pg/g-Wet	5	5	100	254 T	930	RM 3.5-9.2	508	335	887 V	254 T	930	RM 3.5-9.2	508	335	887 V
PCB139 & 140	pg/g-Wet	5	5	100	97.2 T	677	RM 3.5-9.2	262	139	597 V	97.2 T	677	RM 3.5-9.2	262	139	597 V
PCB141	pg/g-Wet	5	5	100	1140	20300	RM 3.5-9.2	5440	1340	16900 V	1140	20300	RM 3.5-9.2	5440	1340	16900 V
PCB142	pg/g-Wet	5	0	0	--	--	--	--	--	--	1.41 U	2.2 UT	RM 3.5-9.2	0.885	0.88 U	1.07 UV
PCB144	pg/g-Wet	5	5	100	168	4550	RM 3.5-9.2	1140	233	3750 V	168	4550	RM 3.5-9.2	1140	233	3750 V
PCB145	pg/g-Wet	5	4	80	0.348	3.04	RM 3.5-9.2	1.3	0.904 V	2.77 V	0.0255 UT	3.04	RM 3.5-9.2	1.04	0.587	2.68 V
PCB146	pg/g-Wet	5	5	100	1740	18200	RM 3.5-9.2	5630	2100	15400 V	1740	18200	RM 3.5-9.2	5630	2100	15400 V
PCB147 & 149	pg/g-Wet	5	5	100	3310	70500	RM 3.5-9.2	18900	5150 T	58600 V	3310	70500	RM 3.5-9.2	18900	5150 T	58600 V
PCB148	pg/g-Wet	5	5	100	27.7 T	363	RM 3.5-9.2	115	51	310 V	27.7 T	363	RM 3.5-9.2	115	51	310 V
PCB150	pg/g-Wet	5	5	100	12.5	263	RM 3.5-9.2	68.8	20.8	217 V	12.5	263	RM 3.5-9.2	68.8	20.8	217 V
PCB152	pg/g-Wet	5	5	100	5.28	91.3	RM 3.5-9.2	25.2	8.89	75.9 V	5.28	91.3	RM 3.5-9.2	25.2	8.89	75.9 V
PCB153 & 168	pg/g-Wet	5	5	100	10700 T	116000	RM 3.5-9.2	34600	11700	97600 V	10700 T	116000	RM 3.5-9.2	34600	11700	97600 V
PCB155	pg/g-Wet	5	5	100	4.92	24.3	RM 3.5-9.2	11.1	9.36 T	21.5 V	4.92	24.3	RM 3.5-9.2	11.1	9.36 T	21.5 V
PCB156	pg/g-Wet	5	5	100	461 T	5220	RM 3.5-9.2	1610	563	4420 V	461 T	5220	RM 3.5-9.2	1610	563	4420 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB157	pg/g-Wet	5	5	100	75.7 T	335	RM 3.5-9.2	156	89.4	307 V	75.7 T	335	RM 3.5-9.2	156	89.4	307 V
PCB158	pg/g-Wet	5	5	100	677 T	8950	RM 3.5-9.2	2630	819	7540 V	677 T	8950	RM 3.5-9.2	2630	819	7540 V
PCB159	pg/g-Wet	5	5	100	48.7	955	RM 3.5-9.2	254	71.3 T	791 V	48.7	955	RM 3.5-9.2	254	71.3 T	791 V
PCB161	pg/g-Wet	5	0	0	--	--	--	--	--	--	1.03 U	1.6 UT	RM 3.5-9.2	0.646	0.64 U	0.781 UV
PCB162	pg/g-Wet	5	5	100	22.2	98.6	RM 3.5-9.2	44.6	26.9 T	89.1 V	22.2	98.6	RM 3.5-9.2	44.6	26.9 T	89.1 V
PCB164	pg/g-Wet	5	5	100	276	4350	RM 3.5-9.2	1220	346	3640 V	276	4350	RM 3.5-9.2	1220	346	3640 V
PCB165	pg/g-Wet	5	5	100	10.4 JT	76.2	RM 3.5-9.2	27.6	14.1	66.2 V	10.4 JT	76.2	RM 3.5-9.2	27.6	14.1	66.2 V
PCB167	pg/g-Wet	5	5	100	10.3	54.6	RM 3.5-9.2	26.4	20.4 T	50.4 V	10.3	54.6	RM 3.5-9.2	26.4	20.4 T	50.4 V
PCB169	pg/g-Wet	5	5	100	0.862	2.06	RM 3.5-9.2	1.44	1.52 T	1.98 V	0.862	2.06	RM 3.5-9.2	1.44	1.52 T	1.98 V
PCB170	pg/g-Wet	5	5	100	1770	37100	RM 3.5-9.2	9480	2200 T	30500 V	1770	37100	RM 3.5-9.2	9480	2200 T	30500 V
PCB171 & 173	pg/g-Wet	5	5	100	626	12400	RM 3.5-9.2	3160	741	10200 V	626	12400	RM 3.5-9.2	3160	741	10200 V
PCB172	pg/g-Wet	5	5	100	399	6420	RM 3.5-9.2	1750	514	5330 V	399	6420	RM 3.5-9.2	1750	514	5330 V
PCB174	pg/g-Wet	5	5	100	1090	29600	RM 3.5-9.2	7390	1560 T	24300 V	1090	29600	RM 3.5-9.2	7390	1560 T	24300 V
PCB175	pg/g-Wet	5	5	100	90.8	1600	RM 3.5-9.2	428	123	1320 V	90.8	1600	RM 3.5-9.2	428	123	1320 V
PCB176	pg/g-Wet	5	5	100	85.4	3570	RM 3.5-9.2	845	165 T	2910 V	85.4	3570	RM 3.5-9.2	845	165 T	2910 V
PCB177	pg/g-Wet	5	5	100	1140	21700	RM 3.5-9.2	5670	1500	17900 V	1140	21700	RM 3.5-9.2	5670	1500	17900 V
PCB178	pg/g-Wet	5	5	100	605	7960	RM 3.5-9.2	2290	773	6660 V	605	7960	RM 3.5-9.2	2290	773	6660 V
PCB179	pg/g-Wet	5	5	100	475	9830	RM 3.5-9.2	2570	715	8120 V	475	9830	RM 3.5-9.2	2570	715	8120 V
PCB180 & 193	pg/g-Wet	5	5	100	6260	97400	RM 3.5-9.2	26500	7680	80800 V	6260	97400	RM 3.5-9.2	26500	7680	80800 V
PCB181	pg/g-Wet	5	5	100	14.3 T	179	RM 3.5-9.2	52.7	18.7	150 V	14.3 T	179	RM 3.5-9.2	52.7	18.7	150 V
PCB182	pg/g-Wet	5	4	80	20.1	168	RM 3.5-9.2	63.3	32.5 V	149 V	0.224 UT	168	RM 3.5-9.2	50.6	23.5	143 V
PCB183 & 185	pg/g-Wet	5	5	100	1860	30900	RM 3.5-9.2	8380	2410	25600 V	1860	30900	RM 3.5-9.2	8380	2410	25600 V
PCB184	pg/g-Wet	5	5	100	3.66	16.8	RM 3.5-9.2	7.68	7.1 T	14.9 V	3.66	16.8	RM 3.5-9.2	7.68	7.1 T	14.9 V
PCB186	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.0496 U	0.596 U	RM 3.5-9.2	0.0963	0.0399 U	0.255 UV
PCB187	pg/g-Wet	5	5	100	4260 T	57900	RM 3.5-9.2	17200	6530	48700 V	4260 T	57900	RM 3.5-9.2	17200	6530	48700 V
PCB188	pg/g-Wet	5	5	100	8.5 T	78.2	RM 3.5-9.2	26.1	11.7	66.9 V	8.5 T	78.2	RM 3.5-9.2	26.1	11.7	66.9 V
PCB189	pg/g-Wet	5	5	100	64.2	1190	RM 3.5-9.2	315	84.4 T	983 V	64.2	1190	RM 3.5-9.2	315	84.4 T	983 V
PCB190	pg/g-Wet	5	5	100	349	7300	RM 3.5-9.2	1900	506	6010 V	349	7300	RM 3.5-9.2	1900	506	6010 V
PCB191	pg/g-Wet	5	5	100	89.5	1640	RM 3.5-9.2	433	115	1350 V	89.5	1640	RM 3.5-9.2	433	115	1350 V
PCB192	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.059 U	0.695 U	RM 3.5-9.2	0.111	0.0475 U	0.296 UV
PCB194	pg/g-Wet	5	5	100	900	15300	RM 3.5-9.2	4190	1300	12700 V	900	15300	RM 3.5-9.2	4190	1300	12700 V
PCB195	pg/g-Wet	5	5	100	340	6010	RM 3.5-9.2	1600	429	4960 V	340	6010	RM 3.5-9.2	1600	429	4960 V
PCB196	pg/g-Wet	5	5	100	499	8990	RM 3.5-9.2	2430	740	7450 V	499	8990	RM 3.5-9.2	2430	740	7450 V
PCB197 & 200	pg/g-Wet	5	5	100	101	1990	RM 3.5-9.2	537	145	1650 V	101	1990	RM 3.5-9.2	537	145	1650 V
PCB198 & 199	pg/g-Wet	5	5	100	1180	15400	RM 3.5-9.2	4530	1730	12900 V	1180	15400	RM 3.5-9.2	4530	1730	12900 V
PCB201	pg/g-Wet	5	5	100	132	1760	RM 3.5-9.2	509	183	1470 V	132	1760	RM 3.5-9.2	509	183	1470 V
PCB202	pg/g-Wet	5	5	100	279 T	2490	RM 3.5-9.2	834	398	2130 V	279 T	2490	RM 3.5-9.2	834	398	2130 V
PCB203	pg/g-Wet	5	5	100	766	10300	RM 3.5-9.2	2990	1120	8610 V	766	10300	RM 3.5-9.2	2990	1120	8610 V
PCB204	pg/g-Wet	5	5	100	0.931	4.24	RM 3.5-9.2	1.74	1.08 JT	3.69 V	0.931	4.24	RM 3.5-9.2	1.74	1.08 JT	3.69 V
PCB205	pg/g-Wet	5	5	100	37.4	728	RM 3.5-9.2	198	62.9	603 V	37.4	728	RM 3.5-9.2	198	62.9	603 V
PCB206	pg/g-Wet	5	5	100	343 T	2540	RM 3.5-9.2	919	453	2210 V	343 T	2540	RM 3.5-9.2	919	453	2210 V
PCB207	pg/g-Wet	5	5	100	53.3	354	RM 3.5-9.2	132	71.5	308 V	53.3	354	RM 3.5-9.2	132	71.5	308 V
PCB208	pg/g-Wet	5	5	100	118 T	698	RM 3.5-9.2	301	203	625 V	118 T	698	RM 3.5-9.2	301	203	625 V
PCB209	pg/g-Wet	5	5	100	129 T	500	RM 3.5-9.2	323	329	497 V	129 T	500	RM 3.5-9.2	323	329	497 V
Total PCB Congeners	pg/g-Wet	5	5	100	84700	964000	RM 3.5-9.2	289000	96200	812000 V	84700	964000	RM 3.5-9.2	289000	96200	812000 V
Total PCBs[c]																
Total PCBs	µg/kg-Wet	5	5	100	84.7	964	RM 3.5-9.2	289	96.2	812 V	84.7	964	RM 3.5-9.2	289	96.2	812 V
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	5	5	100	88.2	170 T	RM 3.5-9.2	128	141	166 V	88.2	170 T	RM 3.5-9.2	128	141	166 V
Heptachlorobiphenylhomologs	pg/g-Wet	5	5	100	20000	327000	RM 3.5-9.2	88400	25400	271000 V	20000	327000	RM 3.5-9.2	88400	25400	271000 V
Hexachlorobiphenyl homologs	pg/g-Wet	5	5	100	32700	417000	RM 3.5-9.2	121000	37100	350000 V	32700	417000	RM 3.5-9.2	121000	37100	350000 V
Monochlorobiphenyl homologs	pg/g-Wet	5	5	100	0.864	3.59	RM 3.5-9.2	2.28	1.81 T	3.54 V	0.864	3.59	RM 3.5-9.2	2.28	1.81 T	3.54 V
Nonachlorobiphenyl homologs	pg/g-Wet	5	5	100	518 T	3600	RM 3.5-9.2	1350	727	3140 V	518 T	3600	RM 3.5-9.2	1350	727	3140 V
Octachlorobiphenyl homologs	pg/g-Wet	5	5	100	4270	62900	RM 3.5-9.2	17800	6110	52400 V	4270	62900	RM 3.5-9.2	17800	6110	52400 V
Pentachlorobiphenylhomologs	pg/g-Wet	5	5	100	16800	117000	RM 3.5-9.2	42400	19200 T	102000 V	16800	117000	RM 3.5-9.2	42400	19200 T	102000 V
Tetrachlorobiphenyl homologs	pg/g-Wet	5	5	100	8200	33000	RM 3.5-9.2	15500	8950 T	30200 V	8200	33000	RM 3.5-9.2	15500	8950 T	30200 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Trichlorobiphenyl homologs	pg/g-Wet	5	5	100	1450	3020	RM 3.5-9.2	2110	1850 T	2940 V	1450	3020	RM 3.5-9.2	2110	1850 T	2940 V
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	5	5	100	0.171	0.862	RM 3.5-9.2	0.339	0.228 T	0.736 V	0.171	0.862	RM 3.5-9.2	0.339	0.228 T	0.736 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	5	100	0.202	5.39	RM 3.5-9.2	1.53	0.623 T	4.48 V	0.202	5.39	RM 3.5-9.2	1.53	0.623 T	4.48 V
Hexachlorodibenzofuran homologs	pg/g-Wet	5	5	100	0.105	2.49	RM 3.5-9.2	0.777	0.355	2.12 V	0.105	2.49	RM 3.5-9.2	0.777	0.355	2.12 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	5	100	0.094	3.78	RM 3.5-9.2	1.02	0.467	3.14 V	0.094	3.78	RM 3.5-9.2	1.02	0.467	3.14 V
Octachlorodibenzofuran	pg/g-Wet	5	1	20	0.369	0.369	RM 3.5-9.2	0.369	0.369	0.369	0.049 U	0.369	RM 3.5-9.2	0.105	0.041 U	0.307 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	0.304	8.08	RM 3.5-9.2	2.42	1.28 JT	6.73 V	0.304	8.08	RM 3.5-9.2	2.42	1.28 JT	6.73 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	5	5	100	0.116	0.998	RM 3.5-9.2	0.449	0.413	0.913 V	0.116	0.998	RM 3.5-9.2	0.449	0.413	0.913 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	4	80	0.0615 T	0.368	RM 3.5-9.2	0.166	0.117 V	0.332 V	0.02 U	0.368	RM 3.5-9.2	0.135	0.106	0.32 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	5	5	100	0.584	1.08	RM 3.5-9.2	0.841	0.844 T	1.07 V	0.584	1.08	RM 3.5-9.2	0.841	0.844 T	1.07 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	5	100	0.06	0.234	RM 3.5-9.2	0.139	0.134	0.224 V	0.06	0.234	RM 3.5-9.2	0.139	0.134	0.224 V
Total PCDD/F	pg/g-Wet	5	5	100	1.64 T	23.2 T	RM 3.5-9.2	7.72	4.45 T	19.7 V	1.64 T	23.2 T	RM 3.5-9.2	7.72	4.45 T	19.7 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	5	5	100	0.135	0.542	RM 3.5-9.2	0.229	0.155	0.468 V	0.135	0.542	RM 3.5-9.2	0.229	0.155	0.468 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	0.202	5.39	RM 3.5-9.2	1.53	0.623 T	4.48 V	0.202	5.39	RM 3.5-9.2	1.53	0.623 T	4.48 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	5	1	20	0.092	0.092	RM 3.5-9.2	0.092	0.092	0.092	0.02 U	0.092	RM 3.5-9.2	0.0282	0.012 U	0.077 V
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	5	3	60	0.0635 T	0.393	RM 3.5-9.2	0.217	0.195	0.373 V	0.036 U	0.393	RM 3.5-9.2	0.144	0.0635 T	0.353 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	5	3	60	0.068	0.315	RM 3.5-9.2	0.152	0.074	0.291 V	0.02 U	0.315	RM 3.5-9.2	0.0967	0.068	0.267 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	5	4	80	0.073 T	0.213	RM 3.5-9.2	0.123	0.103 V	0.198 V	0.047 U	0.213	RM 3.5-9.2	0.103	0.091	0.193 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	0.073	3.28	RM 3.5-9.2	0.86	0.351	2.71 V	0.073	3.28	RM 3.5-9.2	0.86	0.351	2.71 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.019 U	0.02 U	RM 3.5-9.2	0.0097	0.0095 U	0.01 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	0.021	0.187	RM 3.5-9.2	0.0772	0.048	0.168 V	0.021	0.187	RM 3.5-9.2	0.0772	0.048	0.168 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	5	5	100	0.0975 T	0.37	RM 3.5-9.2	0.192	0.151	0.341 V	0.0975 T	0.37	RM 3.5-9.2	0.192	0.151	0.341 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	5	4	80	0.0615 T	0.368	RM 3.5-9.2	0.166	0.117 V	0.332 V	0.044 U	0.368	RM 3.5-9.2	0.137	0.106	0.32 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	5	3	60	0.028	0.114	RM 3.5-9.2	0.0583	0.033	0.106 V	0.02 U	0.114	RM 3.5-9.2	0.0391	0.028	0.0978 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	5	3	60	0.182	0.477	RM 3.5-9.2	0.311	0.273	0.457 V	0.083 U	0.477	RM 3.5-9.2	0.208	0.182	0.436 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	5	5	100	0.584	1.08	RM 3.5-9.2	0.835	0.844 T	1.07 V	0.584	1.08	RM 3.5-9.2	0.835	0.844 T	1.07 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	0.06	0.234	RM 3.5-9.2	0.139	0.134	0.224 V	0.06	0.234	RM 3.5-9.2	0.139	0.134	0.224 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.135 T	1.33 T	RM 3.5-9.2	0.564	0.516 T	1.18 V	0.135 T	1.33 T	RM 3.5-9.2	0.564	0.516 T	1.18 V
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.618 JT	1.45 T	RM 3.5-9.2	1.06	1.07 T	1.45 V	0.618 JT	1.45 T	RM 3.5-9.2	1.06	1.07 T	1.45 V
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.12 T	0.874 T	RM 3.5-9.2	0.501	0.559 T	0.822 V	0.12 T	0.874 T	RM 3.5-9.2	0.501	0.559 T	0.822 V
PBDE Congeners																
PBDE007	pg/g-Wet	1	1	100	14.9	14.9	RM 3.5-9.2	14.9	14.9	14.9	14.9	14.9	RM 3.5-9.2	14.9	14.9	14.9
PBDE008 & PBDE011	pg/g-Wet	1	1	100	16.7	16.7	RM 3.5-9.2	16.7	16.7	16.7	16.7	16.7	RM 3.5-9.2	16.7	16.7	16.7
PBDE010	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.572 U	0.572 U	RM 3.5-9.2	0.286	0.286 U	0.286 U
PBDE012 & 013	pg/g-Wet	1	1	100	139 J	139 J	RM 3.5-9.2	139	139 J	139 J	139 J	139 J	RM 3.5-9.2	139	139 J	139 J
PBDE015	pg/g-Wet	1	1	100	41.4	41.4	RM 3.5-9.2	41.4	41.4	41.4	41.4	41.4	RM 3.5-9.2	41.4	41.4	41.4
PBDE017 & 025	pg/g-Wet	5	5	100	38.7 T	93.4	RM 3.5-9.2	60.9	56.2	88 V	38.7 T	93.4	RM 3.5-9.2	60.9	56.2	88 V
PBDE028 & PBDE033	pg/g-Wet	5	5	100	538 T	5320	RM 3.5-9.2	2680	2080	4950 V	538 T	5320	RM 3.5-9.2	2680	2080	4950 V
PBDE030	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.961 U	8.56 U	RM 3.5-9.2	1.6	0.965 U	3.71 UV
PBDE032	pg/g-Wet	5	1	20	1.18	1.18	RM 3.5-9.2	1.18	1.18	1.18	1.18	6.63 U	RM 3.5-9.2	1.41	1.11 U	2.89 V
PBDE035	pg/g-Wet	5	5	100	1.75 JT	10.7	RM 3.5-9.2	6.2	6.29	10.2 V	1.75 JT	10.7	RM 3.5-9.2	6.2	6.29	10.2 V
PBDE037	pg/g-Wet	5	4	80	1.45 T	3.01	RM 3.5-9.2	2.12	2.02 V	2.94 V	1.45 T	4.46 U	RM 3.5-9.2	2.14	2.23 U	2.92 V
PBDE047	pg/g-Wet	5	5	100	10800	33200	RM 3.5-9.2	18300	14200	30600 V	10800	33200	RM 3.5-9.2	18300	14200	30600 V
PBDE049	pg/g-Wet	5	5	100	581 T	1500	RM 3.5-9.2	1060	1180	1480 V	581 T	1500	RM 3.5-9.2	1060	1180	1480 V
PBDE051	pg/g-Wet	5	5	100	47.4 T	114	RM 3.5-9.2	83.4	103	112 V	47.4 T	114	RM 3.5-9.2	83.4	103	112 V
PBDE066	pg/g-Wet	5	5	100	89.4 T	398	RM 3.5-9.2	201	143	368 V	89.4 T	398	RM 3.5-9.2	201	143	368 V
PBDE071	pg/g-Wet	5	5	100	11 T	57.1	RM 3.5-9.2	26.4	20.7	51.8 V	11 T	57.1	RM 3.5-9.2	26.4	20.7	51.8 V
PBDE075	pg/g-Wet	5	5	100	19.7 T	54.3	RM 3.5-9.2	34.3	31.7	51.9 V	19.7 T	54.3	RM 3.5-9.2	34.3	31.7	51.9 V
PBDE077	pg/g-Wet	5	4	80	0.87	1.75	RM 3.5-9.2	1.4	1.49 V	1.74 V	0.69 U	1.75	RM 3.5-9.2	1.19	1.29	1.74 V
PBDE079	pg/g-Wet	5	5	100	21 JT	83.1	RM 3.5-9.2	35.8	23.5	72.2 JV	21 JT	83.1	RM 3.5-9.2	35.8	23.5	72.2 JV
PBDE085	pg/g-Wet	5	1	20	0.748	0.748	RM 3.5-9.2	0.748	0.748	0.748	0.58 U	1.96 U	RM 3.5-9.2	0.65	0.748	0.949 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PBDE099	pg/g-Wet	5	5	100	196	692	RM 3.5-9.2	344	298 T	619 V	196	692	RM 3.5-9.2	344	298 T	619 V
PBDE100	pg/g-Wet	5	5	100	2570 T	6920	RM 3.5-9.2	4600	4650	6700 V	2570 T	6920	RM 3.5-9.2	4600	4650	6700 V
PBDE105	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.729 U	2.33 U	RM 3.5-9.2	0.709	0.515 UT	1.14 UV
PBDE116	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.893 U	3.28 U	RM 3.5-9.2	0.911	0.63 UT	1.57 UV
PBDE119 & 120	pg/g-Wet	5	5	100	38.7 T	114	RM 3.5-9.2	74.4	80	110 V	38.7 T	114	RM 3.5-9.2	74.4	80	110 V
PBDE126	pg/g-Wet	5	5	100	12.8	35.3	RM 3.5-9.2	22.6	22.8	34 V	12.8	35.3	RM 3.5-9.2	22.6	22.8	34 V
PBDE128	pg/g-Wet	5	5	100	0.482 J	2.15	RM 3.5-9.2	1.28	1.49	2.02 V	0.482 J	2.15	RM 3.5-9.2	1.28	1.49	2.02 V
PBDE138 & PBDE166	pg/g-Wet	5	4	80	0.106	0.654	RM 3.5-9.2	0.38	0.38 JV	0.614 V	0.106	0.654	RM 3.5-9.2	0.318	0.371 J	0.601 V
PBDE140	pg/g-Wet	5	5	100	0.364	1.95 T	RM 3.5-9.2	1.28	1.52	1.92 V	0.364	1.95 T	RM 3.5-9.2	1.28	1.52	1.92 V
PBDE153	pg/g-Wet	5	5	100	217	1030	RM 3.5-9.2	642	603 T	1020 V	217	1030	RM 3.5-9.2	642	603 T	1020 V
PBDE154	pg/g-Wet	5	5	100	890 T	3210	RM 3.5-9.2	1870	2160	3010 V	890 T	3210	RM 3.5-9.2	1870	2160	3010 V
PBDE155	pg/g-Wet	5	5	100	124 T	406	RM 3.5-9.2	263	259	404 V	124 T	406	RM 3.5-9.2	263	259	404 V
PBDE181	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.16 U	0.27 U	RM 3.5-9.2	0.11	0.113 U	0.135 UV
PBDE183	pg/g-Wet	5	5	100	1	11.8	RM 3.5-9.2	6.79	7.43 T	11.1 V	1	11.8	RM 3.5-9.2	6.79	7.43 T	11.1 V
PBDE190	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.239 U	0.401 U	RM 3.5-9.2	0.161	0.168 U	0.198 UV
PBDE203	pg/g-Wet	5	5	100	0.626	3.32	RM 3.5-9.2	1.98	1.85 J	3.15 JV	0.626	3.32	RM 3.5-9.2	1.98	1.85 J	3.15 JV
PBDE206	pg/g-Wet	5	5	100	3.2 J	5.01 J	RM 3.5-9.2	3.96	3.86 JT	4.84 JV	3.2 J	5.01 J	RM 3.5-9.2	3.96	3.86 JT	4.84 JV
PBDE207	pg/g-Wet	5	5	100	3.23	6.66	RM 3.5-9.2	4.61	4.26	6.32 V	3.23	6.66	RM 3.5-9.2	4.61	4.26	6.32 V
PBDE208	pg/g-Wet	5	5	100	3.25 J	5.12	RM 3.5-9.2	3.9	3.9 J	4.88 V	3.25 J	5.12	RM 3.5-9.2	3.9	3.9 J	4.88 V
PBDE209	pg/g-Wet	5	5	100	48.3	87.1	RM 3.5-9.2	66.3	67.9 T	84.9 V	48.3	87.1	RM 3.5-9.2	66.3	67.9 T	84.9 V
Pesticides																
2,4'-DDD	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.95 U	4.7 U	RM 3.5-9.2	1.2	0.85 U	2.2 UV
2,4'-DDE	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.44 U	2.2 U	RM 3.5-9.2	0.64	0.48 UT	1.1 UV
2,4'-DDT	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.23 U	19 U	RM 3.5-9.2	3.1	2 UT	8.3 UV
4,4'-DDD	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.91 UT	24 U	RM 3.5-9.2	5.8	5 U	11 UV
4,4'-DDE	µg/kg-Wet	5	5	100	27.5 JT	94 J	RM 3.5-9.2	50.3	51 J	85.4 JV	27.5 JT	94 J	RM 3.5-9.2	50.3	51 J	85.4 JV
4,4'-DDT	µg/kg-Wet	5	5	100	10 J	74 J	RM 3.5-9.2	27	13 J	65 JV	10 J	74 J	RM 3.5-9.2	27	13 J	65 JV
Aldrin	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.47 U	1 U	RM 3.5-9.2	0.42	0.46 UT	0.5 UV
alpha-Endosulfan	µg/kg-Wet	5	1	20	1.1 J	1.1 J	RM 3.5-9.2	1.1	1.1 J	1.1 J	0.91 U	1.1 J	RM 3.5-9.2	0.6	0.48 U	0.98 JV
alpha-Hexachlorocyclohexane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.23 U	1 U	RM 3.5-9.2	0.4	0.46 UT	0.5 UV
beta-Endosulfan	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.6 U	4.3 U	RM 3.5-9.2	1.9	1.8 UT	2.1 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.23 U	1 U	RM 3.5-9.2	0.4	0.46 UT	0.5 UV
cis-Chlordane	µg/kg-Wet	5	4	80	2.5 J	5.6 J	RM 3.5-9.2	4.1	4.2 JV	5.6 JV	2.5 J	5.6 J	RM 3.5-9.2	3.6	3 J	5.5 JV
delta-Hexachlorocyclohexane	µg/kg-Wet	5	1	20	1.9 J	1.9 J	RM 3.5-9.2	1.9	1.9 J	1.9 J	0.47 U	1.9 J	RM 3.5-9.2	0.71	0.46 UT	1.6 JV
Dieldrin	µg/kg-Wet	5	2	40	0.67 J	1.4 J	RM 3.5-9.2	1	1 JV	1.4 JV	0.67 J	1.4 J	RM 3.5-9.2	0.7	0.5 U	1.3 JV
Endosulfan sulfate	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.6 U	3.8 U	RM 3.5-9.2	1.8	1.8 UT	1.9 UV
Endrin	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.95 U	5.5 U	RM 3.5-9.2	1.6	1.9 UT	2.7 UV
Endrin aldehyde	µg/kg-Wet	4	0	0	--	--	--	--	--	--	3.6 U	3.8 U	RM 3.5-9.2	1.8	1.8 UV	1.9 UV
Endrin ketone	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.93 U	3.8 U	RM 3.5-9.2	1.6	1.8 U	1.9 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.23 U	1 U	RM 3.5-9.2	0.4	0.46 UT	0.5 UV
Heptachlor	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.5 U	1.6 U	RM 3.5-9.2	0.54	0.46 UT	0.79 UV
Heptachlor epoxide	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.23 U	1 U	RM 3.5-9.2	0.4	0.46 UT	0.5 UV
Methoxychlor	µg/kg-Wet	5	1	20	4.4 JT	4.4 JT	RM 3.5-9.2	4.4	4.4 JT	4.4 JT	3.6 U	4.4 JT	RM 3.5-9.2	2.4	1.9 U	3.9 JV
Total Chlordanes	µg/kg-Wet	5	4	80	2.5 JA	5.6 JA	RM 3.5-9.2	4.1	4.2 JV	5.6 JV	2.5 JA	5.6 JA	RM 3.5-9.2	3.6	3 JA	5.5 JV
Total Endosulfan	µg/kg-Wet	5	1	20	1.1 JT	1.1 JT	RM 3.5-9.2	1.1	1.1 JT	1.1 JT	1.1 JT	4.3 UT	RM 3.5-9.2	1.7	1.8 UT	2.1 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.1 UT	24 UT	RM 3.5-9.2	5.8	5 UT	11 UV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	5	5	100	38 JT	125 JT	RM 3.5-9.2	77.7	64 JT	124 JV	38 JT	125 JT	RM 3.5-9.2	77.7	64 JT	124 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	5	5	100	27.5 JT	94 JT	RM 3.5-9.2	50.3	51 JT	85.4 JV	27.5 JT	94 JT	RM 3.5-9.2	50.3	51 JT	85.4 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	5	5	100	10 JT	74 JT	RM 3.5-9.2	27	13 JT	65 JV	10 JT	74 JT	RM 3.5-9.2	27	13 JT	65 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	5	5	100	38 J	125 J	RM 3.5-9.2	77.7	64 J	124 JV	38 J	125 J	RM 3.5-9.2	77.7	64 J	124 JV
trans-Chlordane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.91 UT	2.2 U	RM 3.5-9.2	0.72	0.55 U	1.1 UV
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	5	3	60	2.7 J	3.9 JT	RM 3.5-9.2	3.5	3.9 J	3.9 JV	2.7 J	3.9 JT	RM 3.5-9.2	2.9	2.7 J	3.9 JV
2-Methylnaphthalene	µg/kg-Wet	5	1	20	4.4	4.4	RM 3.5-9.2	4.4	4.4	4.4	3.8 U	4.4	RM 3.5-9.2	2.4	2 U	3.9 V
Acenaphthene	µg/kg-Wet	5	3	60	2.1 J	8.4	RM 3.5-9.2	4.6	3.4 JT	7.9 JV	2.1 J	8.4	RM 3.5-9.2	3.6	2.1 J	7.4 JV
Acenaphthylene	µg/kg-Wet	5	1	20	1 J	1 J	RM 3.5-9.2	1	1 J	1 J	1 J	3.9 U	RM 3.5-9.2	1.7	1.9 U	1.9 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	**Units**	**# Analyzed**	**# Detected**	**% Detected**	**Minimum[a]**	**Maximum[a]**	**Maximum Location**	**Mean**	**Median[b]**	**95th[b]**	**Minimum (full DL)[a]**	**Maximum (full DL)[a]**	**Maximum Location**	**Mean (half DL)**	**Median (half DL)[b]**	**95th (half DL)[b]**
Anthracene	µg/kg-Wet	5	1	20	5.1	5.1	RM 3.5-9.2	5.1	5.1	5.1	3.8 U	5.1	RM 3.5-9.2	2.6	2 U	4.5 V
Benzo(a)anthracene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	15 U	16 U	RM 3.5-9.2	7.6	7.5 U	7.9 UV
Benzo(a)pyrene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Benzo(b)fluoranthene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	7.8 U	RM 3.5-9.2	3.8	3.8 UT	3.9 UV
Benzo(b+k)fluoranthene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	7.8 U	RM 3.5-9.2	3.8	3.8 UT	3.9 UV
Benzo(g,h,i)perylene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Benzo(k)fluoranthene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Chrysene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Fluoranthene	µg/kg-Wet	5	2	40	0.9 J	1.3 JT	RM 3.5-9.2	1.1	1.1 JV	1.3 JV	0.9 J	3.9 U	RM 3.5-9.2	1.6	1.9 U	1.9 UV
Fluorene	µg/kg-Wet	5	1	20	5.2	5.2	RM 3.5-9.2	5.2	5.2	5.2	3.8 U	5.2	RM 3.5-9.2	2.6	2 U	4.6 V
High Molecular Weight PAH	µg/kg-Wet	5	2	40	0.9 JT	2.5 JT	RM 3.5-9.2	1.7	1.7 JV	2.4 JV	0.9 JT	15 UT	RM 3.5-9.2	5.2	7.5 UT	7.5 UV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Low Molecular Weight PAH	µg/kg-Wet	5	3	60	3.1 JT	23.1 T	RM 3.5-9.2	9.87	3.4 JT	21.1 JV	3.1 JT	23.1 T	RM 3.5-9.2	6.72	3.1 JT	19.2 JV
Naphthalene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 UT	4.9 U	RM 3.5-9.2	2.1	2.1 U	2.4 UV
Phenanthrene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	5.8 U	RM 3.5-9.2	2.1	2 U	2.7 UV
Pyrene	µg/kg-Wet	5	1	20	1.2 JT	1.2 JT	RM 3.5-9.2	1.2	1.2 JT	1.2 JT	1.2 JT	16 U	RM 3.5-9.2	6.3	7.5 U	7.9 UV
Total BaPEq	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 UT	3.9 UT	RM 3.5-9.2	1.92	1.9 UT	1.95 UV
Total cPAHs	µg/kg-Wet	5	0	0	--	--	--	--	--	--	15 UT	16 UT	RM 3.5-9.2	7.6	7.5 UT	7.9 UV
Total PAHs	µg/kg-Wet	5	3	60	4 JT	23.1 T	RM 3.5-9.2	11	5.9 JT	21.4 JV	4 JT	23.1 T	RM 3.5-9.2	9.6	7.5 UT	20 V
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
1,2-Dichlorobenzene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
1,3-Dichlorobenzene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
1,4-Dichlorobenzene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
2,4-Dinitrotoluene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	8 U	RM 3.5-9.2	3.9	3.9 U	4 UV
2,6-Dinitrotoluene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
2-Chloronaphthalene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	7.8 U	RM 3.5-9.2	3.8	3.8 UT	3.9 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	5	0	0	--	--	--	--	--	--	15 U	16 U	RM 3.5-9.2	7.6	7.5 U	7.9 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Carbazole	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	7.8 U	RM 3.5-9.2	3.8	3.8 UT	3.9 UV
Dibenzofuran	µg/kg-Wet	5	3	60	0.8 J	3.6 J	RM 3.5-9.2	1.8	0.9 JT	3.3 JV	0.8 J	3.9 U	RM 3.5-9.2	1.8	1.9 U	3.3 JV
Diphenyl	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Hexachlorobenzene	µg/kg-Wet	5	3	60	1.5 J	1.6 JT	RM 3.5-9.2	1.6	1.6 J	1.6 JV	1.5 J	3.9 U	RM 3.5-9.2	1.7	1.6 JT	1.9 UV
Hexachlorobutadiene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Hexachloroethane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
N-Nitrosodiphenylamine	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Retene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 U	RM 3.5-9.2	1.9	1.9 UT	2 UV
Phenols																
2,4,5-Trichlorophenol	µg/kg-Wet	5	0	0	--	--	--	--	--	--	15 U	16 UJ	RM 3.5-9.2	7.6	7.5 U	7.9 UJV
2,4,6-Trichlorophenol	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	7.8 UJ	RM 3.5-9.2	3.8	3.8 UT	3.9 UJV
2,4-Dichlorophenol	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 UJ	RM 3.5-9.2	1.9	1.9 UT	2 UJV
2,4-Dimethylphenol	µg/kg-Wet	5	0	0	--	--	--	--	--	--	3.8 U	3.9 UJ	RM 3.5-9.2	1.9	1.9 UT	2 UJV
2-Chlorophenol	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	7.8 UJ	RM 3.5-9.2	3.8	3.8 UT	3.9 UJV
2-Nitrophenol	µg/kg-Wet	5	0	0	--	--	--	--	--	--	7.6 U	7.8 UJ	RM 3.5-9.2	3.8	3.8 UT	3.9 UJV
Phenol	µg/kg-Wet	5	0	0	--	--	--	--	--	--	16 UJ	77 U	RM 3.5-9.2	21	21 U	36 UV
Sturgeon (whole body)																
Conventionals																
Lipids	percent-Wet	15	15	100	2.59	8.45	STWB02	5.29	4.59	8.33 V	2.59	8.45	STWB02	5.29	4.59	8.33 V
Total solids	percent-Wet	15	15	100	24.5	31.3	STWB03	27.5	26.6	31.1 V	24.5	31.3	STWB03	27.5	26.6	31.1 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Metals																
Aluminum	mg/kg-Wet	15	15	100	0.76 J	51.8 J	STWB03	4.8	1 J	18.4 JV	0.76 J	51.8 J	STWB03	4.8	1 J	18.4 JV
Antimony	mg/kg-Wet	15	0	0	--	--	--	--	--	--	0.005 U	0.006 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.00273	0.0025 U	0.003 UV
Arsenic	mg/kg-Wet	15	15	100	0.298 T	1.06	STWB03	0.594	0.56	0.913 V	0.298 T	1.06	STWB03	0.594	0.56	0.913 V
Cadmium	mg/kg-Wet	15	15	100	0.003 J	0.019 T	STWB04	0.0076	0.006	0.0155 V	0.003 J	0.019 T	STWB04	0.0076	0.006	0.0155 V
Chromium	mg/kg-Wet	15	2	13.3	0.2 J	40.2	STWB01	20.2	20.2 JV	38.2 JV	0.1 U	40.2	STWB01	2.74	0.05 U	12.2 JV
Copper	mg/kg-Wet	15	15	100	0.544	0.959	STWB01	0.791	0.816	0.945 V	0.544	0.959	STWB01	0.791	0.816	0.945 V
Lead	mg/kg-Wet	15	15	100	0.007	0.024	STWB01	0.0138	0.012	0.0219 V	0.007	0.024	STWB01	0.0138	0.012	0.0219 V
Mercury	mg/kg-Wet	15	15	100	0.034	0.14 T	STWB04	0.0545	0.046	0.0917 V	0.034	0.14 T	STWB04	0.0545	0.046	0.0917 V
Nickel	mg/kg-Wet	15	1	6.67	0.461	0.461	STWB01	0.461	0.461	0.461	0.061 U	0.461	STWB01	0.0755	0.047 U	0.19 V
Selenium	mg/kg-Wet	15	15	100	0.2 J	0.4	STWB01; STWB04	0.29	0.3	0.4 V	0.2 J	0.4	STWB01; STWB04	0.29	0.3	0.4 V
Silver	mg/kg-Wet	15	13	86.7	0.001 J	0.004 JT	STWB04	0.00223	0.002 J	0.0034 JV	0.001 J	0.004 JT	STWB04	0.00207	0.002 J	0.0033 JV
Zinc	mg/kg-Wet	15	15	100	7.39	11.9	STWB02	9.53	9.61	11.8 V	7.39	11.9	STWB02	9.53	9.61	11.8 V
Butyltins																
Butyltin ion	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.11 U	0.98 U	STWB03	0.17	0.13 U	0.34 UV
Dibutyltin ion	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.17 U	0.85 U	STWB02; STWB04; STWB05	0.2	0.085 U	0.43 UV
Tetrabutyltin	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.43 U	2.2 U	STWB02; STWB04; STWB05	0.51	0.22 U	1.1 UV
Tributyltin ion	µg/kg-Wet	15	4	27	0.61 J	1.1	STWB05	0.78	0.7 JV	1 JV	0.35 U	1.8 U	STWB02; STWB04; STWB05	0.58	0.69 J	0.96 V
PCB Congeners																
PCB001	pg/g-Wet	15	1	6.67	5.04 J	5.04 J	STWB05	5.04	5.04 J	5.04 J	0.264 U	5.04 J	STWB05	0.576	0.272 U	1.8 JV
PCB002	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.127 U	0.954 UJ	STWB05	0.134	0.108 U	0.27 UJV
PCB003	pg/g-Wet	15	2	13.3	0.5	1.01 J	STWB05	0.755	0.755 JV	0.985 JV	0.28 U	1.01 J	STWB05	0.311	0.264 U	0.653 JV
PCB004	pg/g-Wet	15	15	100	2.11	63.9 J	STWB05	10.8	7.18	32.7 JV	2.11	63.9 J	STWB05	10.8	7.18	32.7 JV
PCB005	pg/g-Wet	15	1	6.67	0.422 J	0.422 J	STWB05	0.422	0.422 J	0.422 J	0.08 U	0.422 J	STWB05	0.138	0.122 UJ	0.242 JV
PCB006	pg/g-Wet	15	14	93.3	0.359 JT	10 J	STWB05	1.54	0.828 JV	4.72 JV	0.289 U	10 J	STWB05	1.45	0.757 J	4.32 JV
PCB007	pg/g-Wet	15	10	66.7	0.112 J	1.6 J	STWB05	0.317	0.18 JV	1 JV	0.112 J	1.6 J	STWB05	0.252	0.158 U	0.67 JV
PCB008	pg/g-Wet	15	14	93.3	3.9	39 J	STWB05	11	7.69 JV	30.8 JV	1.86 U	39 J	STWB05	10.3	6.97	30.2 JV
PCB009	pg/g-Wet	15	13	86.7	0.185 JT	2.46 J	STWB05	0.561	0.395 J	1.52 JV	0.185 JT	2.46 J	STWB05	0.508	0.354 J	1.36 JV
PCB010	pg/g-Wet	15	13	86.7	0.256 J	2.86 J	STWB05	0.683	0.478 J	1.85 JV	0.217 U	2.86 J	STWB05	0.608	0.417 J	1.68 JV
PCB011	pg/g-Wet	15	15	100	3.98	18.6	STWB03	8.86	9.1	16.7 V	3.98	18.6	STWB03	8.86	9.1	16.7 V
PCB012 & 013	pg/g-Wet	15	13	86.7	0.174 J	1.24 J	STWB05	0.536	0.5 J	0.958 JV	0.174 J	1.24 J	STWB05	0.488	0.486 J	0.911 JV
PCB014	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.352 U	0.428 UJ	STWB05	0.204	0.207 UJ	0.214 UJV
PCB015	pg/g-Wet	15	3	20	1.8	4.65 J	STWB05	3.46	3.92	4.58 JV	0.626 UT	4.65 J	STWB05	1.17	0.635 U	4.14 JV
PCB016	pg/g-Wet	15	13	86.7	1.19 T	40.9 J	STWB05	4.94	1.73	18.9 JV	0.562 U	40.9 J	STWB05	4.33	1.48 J	15.3 JV
PCB017	pg/g-Wet	15	15	100	1.63	138 J	STWB05	15.2	5.77	53.4 JV	1.63	138 J	STWB05	15.2	5.77	53.4 JV
PCB018 & 030	pg/g-Wet	15	15	100	22.1	210 J	STWB05	69.3	55.7	153 JV	22.1	210 J	STWB05	69.3	55.7	153 JV
PCB019	pg/g-Wet	15	15	100	8.49	66.8 J	STWB05	24	13.5	64.3 JV	8.49	66.8 J	STWB05	24	13.5	64.3 JV
PCB020 & 028	pg/g-Wet	15	15	100	338	1340 T	STWB04	727	639	1130 JV	338	1340 T	STWB04	727	639	1130 JV
PCB021 & 033	pg/g-Wet	15	9	60	6.62 T	152 J	STWB05	31	13.2	104 JV	0.456 U	152 J	STWB05	18.7	7.49	68.8 JV
PCB022	pg/g-Wet	15	15	100	7.2	122 J	STWB05	31.1	23.4	75.2 JV	7.2	122 J	STWB05	31.1	23.4	75.2 JV
PCB023	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.28 U	0.546 UJ	STWB05	0.169	0.164 UJ	0.201 UJV
PCB024	pg/g-Wet	15	3	20	0.125 J	2.52 J	STWB05	1.04	0.488	2.32 JV	0.125 J	2.52 J	STWB05	0.289	0.104 UJ	1.1 JV
PCB025	pg/g-Wet	15	15	100	4.34	37.7 J	STWB05	10.8	8.48 J	22.9 JV	4.34	37.7 J	STWB05	10.8	8.48 J	22.9 JV
PCB026 & 029	pg/g-Wet	15	15	100	2.48	125 J	STWB05	19.4	11.5	60.2 JV	2.48	125 J	STWB05	19.4	11.5	60.2 JV
PCB027	pg/g-Wet	15	15	100	3.91	42.5 J	STWB05	12.2	9.71 T	25.7 JV	3.91	42.5 J	STWB05	12.2	9.71 T	25.7 JV
PCB031	pg/g-Wet	15	15	100	154	526 J	STWB05	303	255 T	507 JV	154	526 J	STWB05	303	255 T	507 JV
PCB032	pg/g-Wet	15	15	100	17.6	99.5 J	STWB05	37.8	30.2	83.6 JV	17.6	99.5 J	STWB05	37.8	30.2	83.6 JV
PCB034	pg/g-Wet	15	15	100	0.979	9.54 J	STWB05	3.3	3.06 J	6.47 JV	0.979	9.54 J	STWB05	3.3	3.06 J	6.47 JV
PCB035	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.293 U	0.553 UJ	STWB05	0.255	0.267 UT	0.277 UJV
PCB036	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.394 U	0.478 UJ	STWB05	0.228	0.231 U	0.239 UJV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB037	pg/g-Wet	15	15	100	1.91	16.5	STWB02	5.39	3.92	12.3 V	1.91	16.5	STWB02	5.39	3.92	12.3 V
PCB038	pg/g-Wet	15	2	13.3	0.926	5.94 J	STWB05	3.43	3.43 JV	5.69 JV	0.311 U	5.94 J	STWB05	0.655	0.182 UJ	2.43 JV
PCB039	pg/g-Wet	15	12	80	0.431 J	3.27	STWB01	1.57	1.59 V	2.56 V	0.431 J	3.27	STWB01	1.46	1.44	2.37 V
PCB040 & 041 & 071	pg/g-Wet	15	15	100	34.5	1100	STWB05	208	151	511 V	34.5	1100	STWB05	208	151	511 V
PCB042	pg/g-Wet	15	15	100	12.9	597	STWB05	94.1	63.5	250 V	12.9	597	STWB05	94.1	63.5	250 V
PCB043	pg/g-Wet	15	15	100	16.7	86.5	STWB05	39.9	35.8	68.2 V	16.7	86.5	STWB05	39.9	35.8	68.2 V
PCB044 & 047 & 065	pg/g-Wet	15	15	100	825	2970	STWB05	1570	1370	2800 V	825	2970	STWB05	1570	1370	2800 V
PCB045 & 051	pg/g-Wet	15	15	100	48.6	263	STWB05	117	90.7	192 V	48.6	263	STWB05	117	90.7	192 V
PCB046	pg/g-Wet	15	15	100	2.69	37.8	STWB05	9.69	7.6	21.8 V	2.69	37.8	STWB05	9.69	7.6	21.8 V
PCB048	pg/g-Wet	15	15	100	7.65	360	STWB05	48	22.7	140 V	7.65	360	STWB05	48	22.7	140 V
PCB049 & 069	pg/g-Wet	15	15	100	693	2090	STWB05	1240	1270 T	1810 V	693	2090	STWB05	1240	1270 T	1810 V
PCB050 & 053	pg/g-Wet	15	15	100	95.3	325	STWB05	196	165 T	291 V	95.3	325	STWB05	196	165 T	291 V
PCB052	pg/g-Wet	15	15	100	1280	3640	STWB05	2110	2030 T	3280 V	1280	3640	STWB05	2110	2030 T	3280 V
PCB054	pg/g-Wet	15	15	100	2.75	20.2 T	STWB04	6.99	6.44	14.7 V	2.75	20.2 T	STWB04	6.99	6.44	14.7 V
PCB055	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.439 U	0.589 U	STWB02	0.242	0.238 U	0.277 UV
PCB056	pg/g-Wet	15	14	93.3	4.99	295	STWB05	48.1	28 V	145 V	0.829 U	295	STWB05	45	24.5	133 V
PCB057	pg/g-Wet	15	15	100	1.32	10.4	STWB05	4.38	4.07	7.13 V	1.32	10.4	STWB05	4.38	4.07	7.13 V
PCB058	pg/g-Wet	15	14	93.3	1.54	14.2	STWB05	6.25	5.7 V	10.9 V	0.495 UT	14.2	STWB05	5.85	5.1	10.7 V
PCB059 & 062 & 075	pg/g-Wet	15	15	100	61.6	269	STWB05	118	103 T	186 V	61.6	269	STWB05	118	103 T	186 V
PCB060	pg/g-Wet	15	15	100	364	954 T	STWB04	551	530 T	799 V	364	954 T	STWB04	551	530 T	799 V
PCB061 & 070 & 074 & 076	pg/g-Wet	15	15	100	1150	3990 T	STWB04	2200	1980 T	3820 V	1150	3990 T	STWB04	2200	1980 T	3820 V
PCB063	pg/g-Wet	15	15	100	88	308 T	STWB04	143	123 T	227 V	88	308 T	STWB04	143	123 T	227 V
PCB064	pg/g-Wet	15	15	100	593	1550	STWB05	909	843	1330 V	593	1550	STWB05	909	843	1330 V
PCB066	pg/g-Wet	15	15	100	1050	3160 T	STWB04	2010	1860 T	3070 V	1050	3160 T	STWB04	2010	1860 T	3070 V
PCB067	pg/g-Wet	15	13	86.7	2.08 T	14	STWB05	5.14	4.08	11 JV	0.496 U	14	STWB05	4.5	3.98 NJ	10.5 JV
PCB068	pg/g-Wet	15	15	100	24.7	93.4 T	STWB04	55.2	46.7	87.8 V	24.7	93.4 T	STWB04	55.2	46.7	87.8 V
PCB072	pg/g-Wet	15	15	100	17.7	63.6	STWB05	39.1	36.8	58.6 V	17.7	63.6	STWB05	39.1	36.8	58.6 V
PCB073	pg/g-Wet	15	13	86.7	7.47	28.7 T	STWB04	16.2	15.8	25 V	0.365 U	28.7 T	STWB04	14.1	15.2 T	24.4 V
PCB077	pg/g-Wet	15	15	100	6.45	39.3	STWB02	21.9	18.5	38.2 V	6.45	39.3	STWB02	21.9	18.5	38.2 V
PCB078	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.396 U	0.592 U	STWB02	0.237	0.237 U	0.283 UV
PCB079	pg/g-Wet	15	15	100	4.24	71.4	STWB05	20.8	18.3	40.3 V	4.24	71.4	STWB05	20.8	18.3	40.3 V
PCB080	pg/g-Wet	15	2	13.3	0.841 T	1.36	STWB05	1.1	1.1 V	1.33 V	0.323 U	1.36	STWB05	0.329	0.222 U	0.997 V
PCB081	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.327 U	2.95 UT	STWB04	0.818	0.805 UT	1.46 UV
PCB082	pg/g-Wet	15	15	100	6.14	358	STWB05	46.4	25.2	136 V	6.14	358	STWB05	46.4	25.2	136 V
PCB083 & 099	pg/g-Wet	15	15	100	3030	11100 T	STWB04	4630	4330	7040 V	3030	11100 T	STWB04	4630	4330	7040 V
PCB084	pg/g-Wet	15	15	100	166	810	STWB05	341	283	555 V	166	810	STWB05	341	283	555 V
PCB085 & 116 & 117	pg/g-Wet	15	15	100	887	2650 T	STWB04	1310	1290	1930 V	887	2650 T	STWB04	1310	1290	1930 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	15	15	100	783	3120	STWB05	1530	1460	2650 V	783	3120	STWB05	1530	1460	2650 V
PCB088 & 091	pg/g-Wet	15	15	100	510	1090	STWB05	750	749	1060 V	510	1090	STWB05	750	749	1060 V
PCB089	pg/g-Wet	15	15	100	0.74	34.6	STWB05	6.36	4.79 T	15.5 V	0.74	34.6	STWB05	6.36	4.79 T	15.5 V
PCB090 & 101 & 113	pg/g-Wet	15	15	100	3070	10100 T	STWB04	4870	4640	8160 V	3070	10100 T	STWB04	4870	4640	8160 V
PCB092	pg/g-Wet	15	15	100	854	2640 T	STWB04	1300	1190	1900 V	854	2640 T	STWB04	1300	1190	1900 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	15	15	100	1960	4760 T	STWB04	2880	2750	4130 V	1960	4760 T	STWB04	2880	2750	4130 V
PCB094	pg/g-Wet	15	15	100	15.8	54.5	STWB05	35.6	38.2	52.1 V	15.8	54.5	STWB05	35.6	38.2	52.1 V
PCB096	pg/g-Wet	15	15	100	3.42	22.3	STWB02	11.2	11.2	21 V	3.42	22.3	STWB02	11.2	11.2	21 V
PCB103	pg/g-Wet	15	15	100	46.2	177 T	STWB04	78.7	70.9	123 V	46.2	177 T	STWB04	78.7	70.9	123 V
PCB104	pg/g-Wet	15	15	100	1.98	9.92 T	STWB04	3.74	3.21	6.53 V	1.98	9.92 T	STWB04	3.74	3.21	6.53 V
PCB105	pg/g-Wet	15	15	100	1390	4640 T	STWB04	2190	2100	3280 V	1390	4640 T	STWB04	2190	2100	3280 V
PCB106	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.326 U	0.642 UT	STWB04	0.239	0.224 U	0.32 UV
PCB107 & 124	pg/g-Wet	15	15	100	8.88	40.2 T	STWB04	23.7	20.4	38 V	8.88	40.2 T	STWB04	23.7	20.4	38 V
PCB109	pg/g-Wet	15	15	100	369	1420 T	STWB04	577	494	920 V	369	1420 T	STWB04	577	494	920 V
PCB110 & 115	pg/g-Wet	15	15	100	2770	8090	STWB05	4750	4200	6980 V	2770	8090	STWB05	4750	4200	6980 V
PCB111	pg/g-Wet	15	14	93.3	8.46	36.5 JT	STWB04	13.1	11.8 V	22.3 JV	0.264 U	36.5 JT	STWB04	12.2	11.6	21.2 JV
PCB112	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.173 U	2.81 U	STWB01	0.23	0.0945 U	0.89 UV
PCB114	pg/g-Wet	15	15	100	78.5	411 T	STWB04	145	128	254 V	78.5	411 T	STWB04	145	128	254 V
PCB118	pg/g-Wet	15	15	100	997	5910 T	STWB04	2470	2240	4130 V	997	5910 T	STWB04	2470	2240	4130 V
PCB120	pg/g-Wet	15	14	93.3	14.3	69.5 JT	STWB04	29	28.1 V	47.7 JV	0.249 U	69.5 JT	STWB04	27.1	27.2	46.1 JV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB121	pg/g-Wet	15	14	93.3	4.73	26.2 JT	STWB04	8.54	7.2 V	15.6 JV	0.264 U	26.2 JT	STWB04	7.98	6.87	14.8 JV
PCB122	pg/g-Wet	15	1	6.67	3.58	3.58	STWB05	3.58	3.58	3.58	0.363 UT	3.58	STWB05	0.498	0.259 U	1.33 V
PCB123	pg/g-Wet	15	2	13.3	58.6	89.3 T	STWB04	74	74 V	87.8 V	23.2 U	89.3 T	STWB04	31.2	22.1 UT	67.8 V
PCB126	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.665 U	2.42 UT	STWB04	0.665	0.625 U	1.19 UV
PCB127	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.343 U	0.679 UT	STWB04	0.256	0.242 U	0.338 UV
PCB128 & 166	pg/g-Wet	15	15	100	785	2570 T	STWB04	1170	1100	1740 V	785	2570 T	STWB04	1170	1100	1740 V
PCB129 & 138 & 160 & 163	pg/g-Wet	15	15	100	7440	35200 T	STWB04	11500	10200	18700 V	7440	35200 T	STWB04	11500	10200	18700 V
PCB130	pg/g-Wet	15	15	100	456	1490 T	STWB04	683	629	1010 V	456	1490 T	STWB04	683	629	1010 V
PCB131	pg/g-Wet	15	15	100	16.6	60.8	STWB05	32.5	32.5	51.4 V	16.6	60.8	STWB05	32.5	32.5	51.4 V
PCB132	pg/g-Wet	15	15	100	877	2410 T	STWB04	1540	1420	2320 V	877	2410 T	STWB04	1540	1420	2320 V
PCB133	pg/g-Wet	15	15	100	183	774 T	STWB04	284	254	444 V	183	774 T	STWB04	284	254	444 V
PCB134 & 143	pg/g-Wet	15	14	93.3	85.7	361	STWB05	198	195 V	309 JV	0.461 U	361	STWB05	184	194	305 JV
PCB135 & 151 & 154	pg/g-Wet	15	15	100	2050	7730 T	STWB04	3270	3040	4990 V	2050	7730 T	STWB04	3270	3040	4990 V
PCB136	pg/g-Wet	15	15	100	252	731 T	STWB04	444	443	651 V	252	731 T	STWB04	444	443	651 V
PCB137	pg/g-Wet	15	15	100	273	1550 T	STWB04	474	373	987 V	273	1550 T	STWB04	474	373	987 V
PCB139 & 140	pg/g-Wet	15	15	100	113	375 T	STWB04	182	177	266 V	113	375 T	STWB04	182	177	266 V
PCB141	pg/g-Wet	15	15	100	821	4200 T	STWB04	1320	1080	2310 V	821	4200 T	STWB04	1320	1080	2310 V
PCB142	pg/g-Wet	15	1	6.67	1.17	1.17	STWB05	1.17	1.17	1.17	0.46 U	1.33 U	STWB04	0.51	0.454 U	0.816 V
PCB144	pg/g-Wet	15	15	100	160	710 T	STWB04	262	239	413 V	160	710 T	STWB04	262	239	413 V
PCB145	pg/g-Wet	15	15	100	0.638	1.97	STWB05	1.24	1.17	1.88 V	0.638	1.97	STWB05	1.24	1.17	1.88 V
PCB146	pg/g-Wet	15	15	100	1620	8050 T	STWB04	2560	2200	4330 V	1620	8050 T	STWB04	2560	2200	4330 V
PCB147 & 149	pg/g-Wet	15	15	100	4460	13800 T	STWB04	6680	6330	9420 V	4460	13800 T	STWB04	6680	6330	9420 V
PCB148	pg/g-Wet	15	15	100	26.4	90.6 T	STWB04	42.7	37.7	63.1 V	26.4	90.6 T	STWB04	42.7	37.7	63.1 V
PCB150	pg/g-Wet	15	15	100	14.5	35 T	STWB04	22.6	22.3	32.3 V	14.5	35 T	STWB04	22.6	22.3	32.3 V
PCB152	pg/g-Wet	15	14	93.3	3.91	13.3 T	STWB04	7.82	7.35 V	11.9 V	0.125 U	13.3 T	STWB04	7.3	7.33	11.8 V
PCB153 & 168	pg/g-Wet	15	15	100	7920	45100 T	STWB04	12700	10400	22700 V	7920	45100 T	STWB04	12700	10400	22700 V
PCB155	pg/g-Wet	15	15	100	5.74	20.2 T	STWB04	8.22	7.75	12.2 V	5.74	20.2 T	STWB04	8.22	7.75	12.2 V
PCB156 & 157	pg/g-Wet	15	15	100	614	3360 T	STWB04	1030	807	2150 V	614	3360 T	STWB04	1030	807	2150 V
PCB158	pg/g-Wet	15	15	100	594	2760 T	STWB04	957	830	1630 V	594	2760 T	STWB04	957	830	1630 V
PCB159	pg/g-Wet	15	15	100	45.1	226 T	STWB04	73	61.6	131 V	45.1	226 T	STWB04	73	61.6	131 V
PCB161	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.32 U	0.886 U	STWB04	0.305	0.297 U	0.437 UV
PCB162	pg/g-Wet	15	15	100	25.8	121 T	STWB04	42.5	37.7	75.8 V	25.8	121 T	STWB04	42.5	37.7	75.8 V
PCB164	pg/g-Wet	15	15	100	343	1280 T	STWB04	524	467	821 V	343	1280 T	STWB04	524	467	821 V
PCB165	pg/g-Wet	15	15	100	8.81	46.4 T	STWB04	15.1	12.8	25.7 V	8.81	46.4 T	STWB04	15.1	12.8	25.7 V
PCB167	pg/g-Wet	15	15	100	5.57	63.2 T	STWB04	19.9	16.9	38.5 V	5.57	63.2 T	STWB04	19.9	16.9	38.5 V
PCB169	pg/g-Wet	15	0	0	--	--	--	--	--	--	1.95 U	19.6 UT	STWB04	2.42	2.06 U	4.86 UV
PCB170	pg/g-Wet	15	15	100	952	8960 T	STWB04	1960	1480	4540 V	952	8960 T	STWB04	1960	1480	4540 V
PCB171 & 173	pg/g-Wet	15	15	100	412	2310 T	STWB04	670	551	1320 V	412	2310 T	STWB04	670	551	1320 V
PCB172	pg/g-Wet	15	15	100	207	1830 T	STWB04	436	326	987 V	207	1830 T	STWB04	436	326	987 V
PCB174	pg/g-Wet	15	15	100	880	4850 T	STWB04	1410	1090	2730 V	880	4850 T	STWB04	1410	1090	2730 V
PCB175	pg/g-Wet	15	15	100	56.2	400 T	STWB04	99.3	74.1	213 V	56.2	400 T	STWB04	99.3	74.1	213 V
PCB176	pg/g-Wet	15	15	100	130	432 T	STWB04	200	186	295 V	130	432 T	STWB04	200	186	295 V
PCB177	pg/g-Wet	15	15	100	1050	5140 T	STWB04	1590	1280	2960 V	1050	5140 T	STWB04	1590	1280	2960 V
PCB178	pg/g-Wet	15	15	100	475	2620 T	STWB04	762	605	1410 V	475	2620 T	STWB04	762	605	1410 V
PCB179	pg/g-Wet	15	15	100	467	1630 T	STWB04	825	779	1270 V	467	1630 T	STWB04	825	779	1270 V
PCB180 & 193	pg/g-Wet	15	15	100	2860	33000 T	STWB04	6090	4000	15800 V	2860	33000 T	STWB04	6090	4000	15800 V
PCB181	pg/g-Wet	15	15	100	15.2	91.2 T	STWB04	25	19.2	54.2 V	15.2	91.2 T	STWB04	25	19.2	54.2 V
PCB182	pg/g-Wet	15	15	100	11.3	57.2 T	STWB04	18.3	14.7	34.8 V	11.3	57.2 T	STWB04	18.3	14.7	34.8 V
PCB183 & 185	pg/g-Wet	15	15	100	1030	7630 T	STWB04	1810	1320	4050 V	1030	7630 T	STWB04	1810	1320	4050 V
PCB184	pg/g-Wet	15	15	100	5.62	13.6 T	STWB04	7.73	7.46 T	10.4 V	5.62	13.6 T	STWB04	7.73	7.46 T	10.4 V
PCB186	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.115 U	0.196 U	STWB03	0.0692	0.063 U	0.0924 UV
PCB187	pg/g-Wet	15	15	100	2720	22700 T	STWB04	4940	3610	11200 V	2720	22700 T	STWB04	4940	3610	11200 V
PCB188	pg/g-Wet	15	15	100	8.25	40.3 T	STWB04	12.8	10.6	22.7 V	8.25	40.3 T	STWB04	12.8	10.6	22.7 V
PCB189	pg/g-Wet	15	15	100	35.8	329 T	STWB04	69.8	47.1	161 V	35.8	329 T	STWB04	69.8	47.1	161 V
PCB190	pg/g-Wet	15	15	100	320	2150 T	STWB04	519	397	1110 V	320	2150 T	STWB04	519	397	1110 V
PCB191	pg/g-Wet	15	15	100	40.3	432 T	STWB04	82.9	52.9	217 V	40.3	432 T	STWB04	82.9	52.9	217 V
PCB192	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.207 U	0.252 U	STWB05	0.121	0.122 U	0.126 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB194	pg/g-Wet	15	15	100	312	5040 T	STWB04	888	524	2510 V	312	5040 T	STWB04	888	524	2510 V
PCB195	pg/g-Wet	15	15	100	192	1820 T	STWB04	371	249	923 V	192	1820 T	STWB04	371	249	923 V
PCB196	pg/g-Wet	15	15	100	180 T	2550 T	STWB04	434	272	1250 V	180 T	2550 T	STWB04	434	272	1250 V
PCB197 & 200	pg/g-Wet	15	15	100	78.2	432 T	STWB04	128	106	249 V	78.2	432 T	STWB04	128	106	249 V
PCB198 & 199	pg/g-Wet	15	15	100	567	6180 T	STWB04	1190	803	3110 V	567	6180 T	STWB04	1190	803	3110 V
PCB201	pg/g-Wet	15	15	100	97.1 T	688 T	STWB04	166	127	345 V	97.1 T	688 T	STWB04	166	127	345 V
PCB202	pg/g-Wet	15	15	100	280	1240 T	STWB04	409	351	712 V	280	1240 T	STWB04	409	351	712 V
PCB203	pg/g-Wet	15	15	100	362 T	3130 T	STWB04	718	510	1730 V	362 T	3130 T	STWB04	718	510	1730 V
PCB204	pg/g-Wet	15	14	93.3	0.552	1.83 T	STWB04	0.856	0.797 V	1.32 V	0.462 U	1.83 T	STWB04	0.814	0.789	1.28 V
PCB205	pg/g-Wet	15	15	100	21.2	186 T	STWB04	41.6	30.9	102 V	21.2	186 T	STWB04	41.6	30.9	102 V
PCB206	pg/g-Wet	15	15	100	145	1150 T	STWB04	287	210	668 V	145	1150 T	STWB04	287	210	668 V
PCB207	pg/g-Wet	15	15	100	29	229 T	STWB04	51.7	40.3	120 V	29	229 T	STWB04	51.7	40.3	120 V
PCB208	pg/g-Wet	15	15	100	80.5 T	486 T	STWB04	136	106	298 V	80.5 T	486 T	STWB04	136	106	298 V
PCB209	pg/g-Wet	15	15	100	79.4	299	STWB04	136	111	296 V	79.4	299	STWB04	136	111	296 V
Total PCB Congeners	pg/g-Wet	15	15	100	69100 JT	325000 JT	STWB04	114000	97400 NJT	186000 JV	69100 JT	325000 JT	STWB04	114000	97400 NJT	186000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	15	15	100	69.1 JT	325 JT	STWB04	114	97.4 NJT	186 JV	69.1 JT	325 JT	STWB04	114	97.4 NJT	186 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	15	15	100	6.93 T	139 JT	STWB05	33.9	25.9 JT	90.8 JV	6.93 T	139 JT	STWB05	33.9	25.9 JT	90.8 JV
Heptachlorobiphenylhomologs	pg/g-Wet	15	15	100	12500 T	94600 T	STWB04	21500	16200 T	48000 V	12500 T	94600 T	STWB04	21500	16200 T	48000 V
Hexachlorobiphenyl homologs	pg/g-Wet	15	15	100	29200 T	133000 JT	STWB04	46100	42200 T	73000 JV	29200 T	133000 JT	STWB04	46100	42200 T	73000 JV
Monochlorobiphenyl homologs	pg/g-Wet	15	2	13.3	0.5 T	6.05 JT	STWB05	3.28	3.28 JV	5.77 JV	0.32 UT	6.05 JT	STWB05	0.672	0.272 UT	2.16 JV
Nonachlorobiphenyl homologs	pg/g-Wet	15	15	100	258 T	1870 T	STWB04	475	356 T	1090 V	258 T	1870 T	STWB04	475	356 T	1090 V
Octachlorobiphenyl homologs	pg/g-Wet	15	15	100	2280 T	21300 T	STWB04	4350	3080 T	10900 V	2280 T	21300 T	STWB04	4350	3080 T	10900 V
Pentachlorobiphenylhomologs	pg/g-Wet	15	15	100	17500 T	54500 JT	STWB04	28000	26200 T	43900 JV	17500 T	54500 JT	STWB04	28000	26200 T	43900 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	15	15	100	6470 T	21600 T	STWB05	11800	10700 JT	19000 JV	6470 T	21600 T	STWB05	11800	10700 JT	19000 JV
Trichlorobiphenyl homologs	pg/g-Wet	15	15	100	648 T	2620 JT	STWB05	1280	1020 JT	2200 JV	648 T	2620 JT	STWB05	1280	1020 JT	2200 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	15	11	73.3	0.062	0.275	STWB04	0.155	0.137	0.256 V	0.062	0.275	STWB04	0.133	0.12 T	0.248 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	14	93.3	0.31 T	1.17	STWB05	0.623	0.614 V	0.926 V	0.237 U	1.17	STWB05	0.589	0.592	0.908 V
Hexachlorodibenzofuran homologs	pg/g-Wet	15	15	100	0.117	0.838	STWB04	0.438	0.344	0.793 V	0.117	0.838	STWB04	0.438	0.344	0.793 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	15	100	0.07	0.755	STWB02	0.32	0.24	0.663 V	0.07	0.755	STWB02	0.32	0.24	0.663 V
Octachlorodibenzofuran	pg/g-Wet	15	0	0	--	--	--	--	--	--	0.108 UT	0.313 U	STWB04	0.0927	0.083 U	0.152 UV
Octachlorodibenzo-p-dioxin	pg/g-Wet	15	14	93.3	0.579 J	2.1 J	STWB05	1.06	1.02 JV	1.68 JV	0.579 J	2.1 J	STWB05	1.02	1.01 J	1.65 JV
Pentachlorodibenzofuranhomologs	pg/g-Wet	15	15	100	0.194	1.46 T	STWB04	0.83	0.726	1.45 V	0.194	1.46 T	STWB04	0.83	0.726	1.45 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	9	60	0.091	0.248	STWB02	0.149	0.137	0.229 V	0.091	0.248	STWB02	0.119	0.097	0.215 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	15	15	100	3.24	8.43	STWB02	5.15	4.93	7.13 V	3.24	8.43	STWB02	5.15	4.93	7.13 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	15	7	46.7	0.173 T	0.291	STWB01	0.244	0.246	0.287 V	0.0457 U	0.291	STWB01	0.126	0.0249 U	0.281 V
Total PCDD/F	pg/g-Wet	15	15	100	4.32 JT	13.9 JT	STWB02	8.62	8.21 JT	12.9 JV	4.32 JT	13.9 JT	STWB02	8.62	8.21 JT	12.9 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	15	8	53.3	0.069 J	0.217 J	STWB04	0.151	0.15 JV	0.205 JV	0.069 J	0.255 U	STWB05	0.125	0.12 JT	0.193 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	15	14	93.3	0.31 JT	1.03 J	STWB05	0.592	0.575 JV	0.877 JV	0.237 U	1.03 J	STWB05	0.56	0.573 J	0.866 JV
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	15	4	26.7	0.057 J	0.098 J	STWB05	0.071	0.0645 JV	0.0934 JV	0.051 UT	0.125 U	STWB04	0.0553	0.061 U	0.0763 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	15	11	73.3	0.051 J	0.5 JT	STWB04	0.159	0.141 J	0.348 JV	0.051 J	0.5 JT	STWB04	0.136	0.107 J	0.287 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	15	5	33.3	0.081 J	0.106 J	STWB05	0.0958	0.097 J	0.106 JV	0.058 U	0.231 U	STWB02	0.0659	0.0555 U	0.109 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	15	8	53.3	0.065 J	0.17 JT	STWB04	0.119	0.115 JV	0.161 JV	0.065 J	0.178 U	STWB02	0.0899	0.089 U	0.151 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	15	11	73.3	0.125 J	0.573 J	STWB02	0.32	0.319 J	0.547 JV	0.125 J	0.573 J	STWB02	0.272	0.24 J	0.536 JV
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	15	1	6.67	0.051 J	0.051 J	STWB04	0.051	0.051 J	0.051 J	0.051 J	0.089 U	STWB02	0.0434	0.0439 U	0.0465 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	15	8	53.3	0.07 J	0.182 J	STWB02	0.0998	0.0895 JV	0.159 JV	0.07 J	0.182 J	STWB02	0.0779	0.073 JT	0.136 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	15	15	100	0.194 J	0.906 JT	STWB04	0.447	0.453 J	0.748 JV	0.194 J	0.906 JT	STWB04	0.447	0.453 J	0.748 JV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	15	9	60	0.091 J	0.248 J	STWB02	0.149	0.137 J	0.229 JV	0.067 U	0.248 J	STWB02	0.116	0.0985 U	0.215 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	15	2	13.3	0.043 JT	0.059 JT	STWB05	0.051	0.051 JV	0.0582 JV	0.043 JT	0.108 U	STWB04	0.0468	0.0505 U	0.0555 JV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	15	13	86.7	0.176 J	0.545 J	STWB02	0.332	0.305 J	0.493 JV	0.176 J	0.545 J	STWB02	0.304	0.294 J	0.484 JV
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	15	15	100	3.19	8.17	STWB02	4.89	4.38	6.99 V	3.19	8.17	STWB02	4.89	4.38	6.99 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	15	7	46.7	0.173 JT	0.291	STWB01	0.244	0.246 J	0.287 V	0.119 U	0.356 U	STWB02	0.169	0.173 JT	0.281 V

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	15	15	100	0.35 JT	1.33 JT	STWB02	0.849	0.945 JT	1.22 JV	0.35 JT	1.33 JT	STWB02	0.849	0.945 JT	1.22 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	15	15	100	0.492 JT	1.57 JT	STWB04	1.03	1.1 JT	1.56 JV	0.492 JT	1.57 JT	STWB04	1.03	1.1 JT	1.56 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	15	15	100	0.098 T	0.446 T	STWB04	0.18	0.168 T	0.284 V	0.098 T	0.446 T	STWB04	0.18	0.168 T	0.284 V
Pesticides																
2,4'-DDD	µg/kg-Wet	15	15	100	1.51	4.53	STWB02	2.61	1.97	4.46 V	1.51	4.53	STWB02	2.61	1.97	4.46 V
2,4'-DDE	µg/kg-Wet	15	15	100	0.173 JT	0.957	STWB05	0.52	0.408	0.937 V	0.173 JT	0.957	STWB05	0.52	0.408	0.937 V
2,4'-DDT	µg/kg-Wet	15	15	100	0.653	2.87	STWB01	1.71	1.41	2.82 V	0.653	2.87	STWB01	1.71	1.41	2.82 V
4,4'-DDD	µg/kg-Wet	15	15	100	9.2	24.9	STWB02	16.4	14	23.4 V	9.2	24.9	STWB02	16.4	14	23.4 V
4,4'-DDE	µg/kg-Wet	15	15	100	59.1	156 T	STWB04	91.8	93.3 T	125 V	59.1	156 T	STWB04	91.8	93.3 T	125 V
4,4'-DDT	µg/kg-Wet	15	15	100	2.61	7.49	STWB02	4.4	4.06	6.49 V	2.61	7.49	STWB02	4.4	4.06	6.49 V
Aldrin	µg/kg-Wet	15	13	86.7	0.0103 J	0.0554 J	STWB01	0.0306	0.0273 J	0.0546 JV	0.0103 J	0.0554 J	STWB01	0.0283	0.0266 J	0.0545 JV
alpha-Endosulfan	µg/kg-Wet	15	15	100	0.108 JT	0.803	STWB04	0.353	0.292 JT	0.705 V	0.108 JT	0.803	STWB04	0.353	0.292 JT	0.705 V
alpha-Hexachlorocyclohexane	µg/kg-Wet	15	15	100	0.013 J	0.0505 J	STWB02	0.0282	0.025 J	0.0464 JV	0.013 J	0.0505 J	STWB02	0.0282	0.025 J	0.0464 JV
beta-Endosulfan	µg/kg-Wet	15	12	80	0.142 JT	0.368 J	STWB04	0.224	0.2 JV	0.329 JV	0.142 JT	0.368 J	STWB04	0.2	0.197 J	0.318 JV
beta-Hexachlorocyclohexane	µg/kg-Wet	15	6	40	0.00592 JT	0.025 J	STWB03	0.0163	0.0191 JV	0.0242 JV	0.00592 JT	0.0281 U	STWB02	0.0102	0.00683 JT	0.0228 JV
cis-Chlordane	µg/kg-Wet	15	15	100	1.45	4.81 T	STWB04	2.64	2.49 T	3.82 V	1.45	4.81 T	STWB04	2.64	2.49 T	3.82 V
cis-Nonachlor	µg/kg-Wet	15	15	100	1	3.43 T	STWB04	1.57	1.46 T	2.32 V	1	3.43 T	STWB04	1.57	1.46 T	2.32 V
delta-Hexachlorocyclohexane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.0237 U	0.0599 U	STWB05	0.028	0.0296 U	0.0299 UV
Dieldrin	µg/kg-Wet	15	15	100	1.24	3.11	STWB04	1.96	1.89 T	2.87 V	1.24	3.11	STWB04	1.96	1.89 T	2.87 V
Endosulfan sulfate	µg/kg-Wet	15	15	100	0.747	2.23	STWB04	1.34	1.35	1.94 V	0.747	2.23	STWB04	1.34	1.35	1.94 V
Endrin	µg/kg-Wet	15	11	73.3	0.0314 JT	0.107 J	STWB02	0.0654	0.073 J	0.0994 JV	0.0291 U	0.107 J	STWB02	0.0549	0.0526 J	0.0963 JV
Endrin aldehyde	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.002 UT	0.0848 U	STWB05	0.0334	0.042 U	0.0424 UV
Endrin ketone	µg/kg-Wet	15	3	20	0.008 J	0.012 J	STWB04	0.0104	0.0112 J	0.0119 JV	0.008 J	0.0848 U	STWB05	0.0351	0.042 U	0.0424 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	15	13	86.7	0.0123 J	0.0618 J	STWB02	0.0331	0.033 J	0.0544 JV	0.0123 J	0.0618 J	STWB02	0.0303	0.0256 J	0.0532 JV
Heptachlor	µg/kg-Wet	15	1	6.67	0.0033 J	0.0033 J	STWB02	0.0033	0.0033 J	0.0033 J	0.0033 J	0.0649 U	STWB05	0.0148	0.0131 U	0.0322 UV
Heptachlor epoxide	µg/kg-Wet	15	15	100	0.16 J	0.5	STWB02	0.302	0.267 J	0.49 V	0.16 J	0.5	STWB02	0.302	0.267 J	0.49 V
Methoxychlor	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.0198 U	0.0499 U	STWB04; STWB05	0.0234	0.0247 U	0.025 UV
Oxychlordane	µg/kg-Wet	15	15	100	0.224 J	1.02 T	STWB04	0.397	0.41	0.62 V	0.224 J	1.02 T	STWB04	0.397	0.41	0.62 V
Total Chlordanes	µg/kg-Wet	15	15	100	6.22 JT	20.4 T	STWB04	9.98	9.27 JT	14.7 V	6.22 JT	20.4 T	STWB04	9.98	9.27 JT	14.7 V
Total Endosulfan	µg/kg-Wet	15	15	100	1.07 JT	3.4 JT	STWB04	1.87	1.6 JT	2.9 JV	1.07 JT	3.4 JT	STWB04	1.87	1.6 JT	2.9 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	15	15	100	10.7 T	29.4 T	STWB02	19	16 T	27.9 V	10.7 T	29.4 T	STWB02	19	16 T	27.9 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	15	15	100	77.9 T	176 JT	STWB04	118	124 T	158 JV	77.9 T	176 JT	STWB04	118	124 T	158 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	15	15	100	59.5 T	156 JT	STWB04	92.3	94.1 T	125 JV	59.5 T	156 JT	STWB04	92.3	94.1 T	125 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	15	15	100	3.26 T	10.2 T	STWB02	6.11	5.82 T	9.31 V	3.26 T	10.2 T	STWB02	6.11	5.82 T	9.31 V
trans-Chlordane	µg/kg-Wet	15	15	100	0.769	1.88	STWB02	1.23	1.18 T	1.79 V	0.769	1.88	STWB02	1.23	1.18 T	1.79 V
trans-Nonachlor	µg/kg-Wet	15	15	100	2.59	9.8 T	STWB04	4.15	3.91	6.31 V	2.59	9.8 T	STWB04	4.15	3.91	6.31 V
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	15	15	100	0.75 J	4.6	STWB03	1.6	1.4	3 V	0.75 J	4.6	STWB03	1.6	1.4	3 V
Acenaphthene	µg/kg-Wet	15	7	47	0.27 J	29	STWB03	4.9	0.47 JT	21 V	0.11 U	29	STWB03	2.3	0.055 U	11 V
Acenaphthylene	µg/kg-Wet	15	5	33.3	0.39 JT	1.1	STWB04	0.704	0.58	1.08 V	0.069 U	1.1	STWB04	0.258	0.0345 U	1.03 V
Anthracene	µg/kg-Wet	15	7	46.7	0.16 J	1.2	STWB05	0.659	0.65	1.14 V	0.065 U	1.2	STWB05	0.325	0.0325 U	1.05 V
Benzo(a)anthracene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.066 U	0.066 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.033	0.033 U	0.033 UV
Benzo(a)pyrene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.081 U	0.081 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.0405	0.0405 U	0.0405 UV
Benzo(b)fluoranthene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.07 U	0.07 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.035	0.035 U	0.035 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Benzo(g,h,i)perylene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.073 U	0.073 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.0365	0.0365 U	0.0365 UV
Benzo(k)fluoranthene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.056 U	0.056 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.028	0.028 U	0.028 UV
Chrysene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.076 U	0.076 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.038	0.038 U	0.038 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.059 U	0.059 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.0295	0.0295 U	0.0295 UV
Fluoranthene	µg/kg-Wet	15	2	13	0.79	0.82	STWB01	0.81	0.81 V	0.82 V	0.09 U	0.82	STWB01	0.15	0.045 U	0.8 V
Fluorene	µg/kg-Wet	15	3	20	0.22 J	5	STWB03	1.8	0.27 JT	4.5 JV	0.15 U	5	STWB03	0.43	0.075 U	1.7 JV
High Molecular Weight PAH	µg/kg-Wet	15	2	13.3	0.82 T	1.6 T	STWB03	1.21	1.21 V	1.56 V	0.098 UT	1.6 T	STWB03	0.204	0.049 UT	1.05 V
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.064 U	0.064 U	STWB01; STWB02; STWB03; STWB04; STWB05	0.032	0.032 U	0.032 UV
Low Molecular Weight PAH	µg/kg-Wet	15	15	100	1.1 T	59 T	STWB03	9	6.4 JT	28 JV	1.1 T	59 T	STWB03	9	6.4 JT	28 JV
Naphthalene	µg/kg-Wet	15	8	53	4.1	14	STWB03	6.4	5.2 V	12 V	0.4 U	14	STWB03	3.8	4.1	9.4 V
Phenanthrene	µg/kg-Wet	15	10	67	0.37 J	5.3	STWB03	1.1	0.67 V	3.5 V	0.36 U	5.3	STWB03	0.82	0.48 JT	2.5 V
Pyrene	µg/kg-Wet	15	1	6.67	0.78	0.78	STWB03	0.78	0.78	0.78	0.098 U	0.78	STWB03	0.0977	0.049 U	0.268 V
Total BaPEq	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.081 UT	0.081 UT	STWB01; STWB02; STWB03; STWB04; STWB05	0.0405	0.0405 UT	0.0405 UV
Total cPAHs	µg/kg-Wet	15	0	0	--	--	--	--	--	--	0.081 UT	0.081 UT	STWB01; STWB02; STWB03; STWB04; STWB05	0.0405	0.0405 UT	0.0405 UV
Total PAHs	µg/kg-Wet	15	15	100	1.1 T	61 T	STWB03	9.2	6.4 JT	28 JV	1.1 T	61 T	STWB03	9.2	6.4 JT	28 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	15	4	27	67 J	300	STWB04	150	110 JV	280 JV	66 U	300	STWB04	63	33 U	190 JV
Butylbenzyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	7.3 U	7.3 U	STWB01; STWB02; STWB03; STWB04; STWB05	3.7	3.7 U	3.7 UV
Dibutyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	16 U	240 U	STWB05	47	48 UT	99 UV
Diethyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	9.7 U	37 U	STWB01	9.3	6.5 U	17 UV
Dimethyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	7.7 U	7.7 U	STWB01; STWB02; STWB03; STWB04; STWB05	3.9	3.9 U	3.9 UV
Di-n-octyl phthalate	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 U	11 U	STWB01; STWB02; STWB03; STWB04; STWB05	5.5	5.5 U	5.5 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	9.8 U	9.8 U	STWB01; STWB02; STWB03; STWB04; STWB05	4.9	4.9 U	4.9 UV
1,2-Dichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 U	11 U	STWB01; STWB02; STWB03; STWB04; STWB05	5.5	5.5 U	5.5 UV

Table D5.1-1. Summary Statistics for All Analytes for Study Area Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,3-Dichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 U	11 U	STWB01; STWB02; STWB03; STWB04; STWB05	5.5	5.5 U	5.5 UV
1,4-Dichlorobenzene	µg/kg-Wet	15	0	0	--	--	--	--	--	--	11 U	11 U	STWB01; STWB02; STWB03; STWB04; STWB05	5.5	5.5 U	5.5 UV
Benzyl alcohol	µg/kg-Wet	15	15	100	48	75 JT	STWB04	62	64	72 JV	48	75 JT	STWB04	62	64	72 JV
Hexachlorobenzene	µg/kg-Wet	15	15	100	0.911	2.38	STWB02	1.47	1.35	2.12 V	0.911	2.38	STWB02	1.47	1.35	2.12 V
Hexachlorobutadiene	µg/kg-Wet	15	7	46.7	0.004 J	0.00863 J	STWB03	0.00606	0.00577 JT	0.00817 JV	0.004 J	0.0395 UJ	STWB01	0.00617	0.0056 J	0.012 JV
Hexachloroethane	µg/kg-Wet	15	0	0	--	--	--	--	--	--	20 U	20 U	STWB01; STWB02; STWB03; STWB04; STWB05	10	10 U	10 UV
N-Nitrosodiphenylamine	µg/kg-Wet	15	0	0	--	--	--	--	--	--	6.6 U	6.6 U	STWB01; STWB02; STWB03; STWB04; STWB05	3.3	3.3 U	3.3 UV
Phenols																
2-Methylphenol	µg/kg-Wet	15	2	13	8.5 J	9.9 J	STWB05	9.2	9.2 JV	9.8 JV	8.2 U	9.9 J	STWB05	4.8	4.1 U	8.9 JV
4-Methylphenol	µg/kg-Wet	15	3	20	8.3 J	19 J	STWB03	13	13 J	18 JV	7.7 U	19 J	STWB03	5.8	3.9 U	15 JV
Pentachlorophenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	30 U	30 U	STWB01; STWB02; STWB03; STWB04; STWB05	15	15 U	15 UV
Phenol	µg/kg-Wet	15	0	0	--	--	--	--	--	--	45 U	170 U	STWB03; STWB05	49	41 U	85 UV

Notes:

[a] Whenever several result values match maximum or minimum value, qualifier preference has been given in the following order: U over J over A over N over T over no qualification.

[b] Median is the exact result value ranking as the 0.50 percentile in an ascending list of all results, and 95th percentile is the exact result value of the 0.95 ranking result. When the ascending list of all results doesn't produce an exact match to the corresponding percentile rank, average of two adjacent results ranking closest to 0.50 percentile is the median, and an interpolated value is the 95th percentile. Such median or 95th percentile value is always qualified with "V". It is qualified with "U" if both results ranking immediately above and below the corresponding percentile are "U" qualified, and with "J" if at least one of the results is "J" qualified.

[c] Total PCBs are total PCB congeners.

[d] Total PCBs are total Aroclors.

[e] Total PCBs are total PCB congeners whenever available and total Aroclors if not.

Reason codes for qualifiers:

A - Total value based on limited number of analytes.
J - The associated numerical value is an estimated quantity.
N - Presumptive evidence of presence of material; identification of the compound is not definitive.
T - The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte). Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for the Round 2 data.
U - The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
V - Median or 95th percentile obtained through interpolation.

-- data not available.
BaPEq - benzo(a)pyrene equivalent
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DL - detection limit
ND - non-detect
PAH - polycyclic aromatic hydrocarbon
PBDE - polybrominated diphenyl ether
PCB - polychlorinated biphenyl
PCDD/Fs - dioxins/furans
TEQ - toxicity equivalent

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Chinook (stomach contents)																
PCB Congeners																
PCB001	pg/g-Wet	5	5	100	4.38 J	48.7	T03	21.1	19.2	44.5 V	4.38 J	48.7	T03	21.1	19.2	44.5 V
PCB002	pg/g-Wet	5	2	40	3.35	4.69	T02	4.02	4.02 V	4.62 V	3.35	4.69	T02	2.73	2.02 U	4.42 V
PCB003	pg/g-Wet	5	2	40	5.4	24.8	T03	15.1	15.1 V	23.8 V	5.21 U	24.8	T03	8.91	5.4	21.4 V
PCB004	pg/g-Wet	5	5	100	23.7	371	T03	136	84.6	322 V	23.7	371	T03	136	84.6	322 V
PCB005	pg/g-Wet	5	1	20	3.02	3.02	T01	3.02	3.02	3.02	2.76 U	5.83 U	T03	2.31	2.5 U	3 V
PCB006	pg/g-Wet	5	5	100	9.54	146	T03	51.2	29.2	129 V	9.54	146	T03	51.2	29.2	129 V
PCB007	pg/g-Wet	5	4	80	4.12 J	17.6	T03	11.6	12.3 V	17.5 V	4.12 J	17.6	T03	9.68	7.93	17.4 V
PCB008	pg/g-Wet	5	5	100	42.2	491	T03	205	162	448 V	42.2	491	T03	205	162	448 V
PCB009	pg/g-Wet	5	3	60	10.4	29.5	T03	20.1	20.5	28.6 V	2.77 U	29.5	T03	12.7	10.4	27.7 V
PCB010	pg/g-Wet	5	4	80	3.57	10.4	T03	6.18	5.37 V	9.86 V	2.02 U	10.4	T03	5.14	3.97	9.67 V
PCB011	pg/g-Wet	5	5	100	109	729	T01	361	332	674 V	109	729	T01	361	332	674 V
PCB012 & 013	pg/g-Wet	5	4	80	5.78 J	31.5	T03	18.8	19 V	30.4 V	5.78 J	31.5	T03	16	13.9	30 V
PCB014	pg/g-Wet	5	0	0	--	--	--	--	--	--	3.11 U	6.02 U	T01	2.22	2.38 U	2.9 UV
PCB015	pg/g-Wet	5	5	100	67.2	395	T03	209	203	372 V	67.2	395	T03	209	203	372 V
PCB016	pg/g-Wet	5	5	100	56.4	356	T02	181	192	330 V	56.4	356	T02	181	192	330 V
PCB017	pg/g-Wet	5	5	100	89	534	T02	302	280	518 V	89	534	T02	302	280	518 V
PCB018 & 030	pg/g-Wet	5	5	100	155	789	T02	452	452	761 V	155	789	T02	452	452	761 V
PCB019	pg/g-Wet	5	5	100	36.7	136	T03	68	62.8	122 V	36.7	136	T03	68	62.8	122 V
PCB020 & 028	pg/g-Wet	5	5	100	675	1800	T02	1330	1400	1760 V	675	1800	T02	1330	1400	1760 V
PCB021 & 033	pg/g-Wet	5	5	100	113	453	T02	275	285	433 V	113	453	T02	275	285	433 V
PCB022	pg/g-Wet	5	5	100	155	413	T02	279	280	395 V	155	413	T02	279	280	395 V
PCB023	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.67 U	6.32 U	T01	1.47	0.855 U	3.03 UV
PCB024	pg/g-Wet	5	5	100	1.83 J	8.37	T02; T03	5.64	6.02	8.37 V	1.83 J	8.37	T02; T03	5.64	6.02	8.37 V
PCB025	pg/g-Wet	5	5	100	35.3	114	T03	69.5	59.7	109 V	35.3	114	T03	69.5	59.7	109 V
PCB026 & 029	pg/g-Wet	5	5	100	86.8	231	T03	143	106	225 V	86.8	231	T03	143	106	225 V
PCB027	pg/g-Wet	5	5	100	18.3	63.8	T03	40.2	46.7	61.1 V	18.3	63.8	T03	40.2	46.7	61.1 V
PCB031	pg/g-Wet	5	5	100	461	1070	T03	818	941	1060 V	461	1070	T03	818	941	1060 V
PCB032	pg/g-Wet	5	5	100	94.9	294	T03	234	256	293 V	94.9	294	T03	234	256	293 V
PCB034	pg/g-Wet	5	2	40	2.98	3.17	T01	3.08	3.08 V	3.16 V	1.45 U	3.73 U	T02	1.93	1.87 U	3.13 V
PCB035	pg/g-Wet	5	4	80	4.76	14.5	T01	10.5	11.3 V	14.3 V	4.76	14.5	T01	9.04	9.36	14.2 V
PCB036	pg/g-Wet	5	1	20	5.3	5.3	T01	5.3	5.3	5.3	1.01 U	5.3	T01	1.79	0.865 U	4.56 V
PCB037	pg/g-Wet	5	5	100	121	377	T01	286	336	376 V	121	377	T01	286	336	376 V
PCB038	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.96 U	3.71 U	T02	0.961	0.735 U	1.73 UV
PCB039	pg/g-Wet	5	3	60	3.53 J	7.58	T02	5.42	5.16	7.34 V	3.53 J	14.1 U	T02	5.1	5.16	7.47 V
PCB040 & 041 & 071	pg/g-Wet	5	5	100	480	1150	T02	707	550	1080 V	480	1150	T02	707	550	1080 V
PCB042	pg/g-Wet	5	5	100	196	783	T02	380	269	711 V	196	783	T02	380	269	711 V
PCB043	pg/g-Wet	5	5	100	19.7	63.9	T02	35.2	24.3	60.3 V	19.7	63.9	T02	35.2	24.3	60.3 V
PCB044 & 047 & 065	pg/g-Wet	5	5	100	1090	3100	T02	2020	1730	3040 V	1090	3100	T02	2020	1730	3040 V
PCB045 & 051	pg/g-Wet	5	5	100	97.5	479	T03	265	221	468 V	97.5	479	T03	265	221	468 V
PCB046	pg/g-Wet	5	4	80	17.5	70.7	T02	48.3	52.5 V	68.9 V	17.5	70.7	T02	41.6	46.5	68.3 V
PCB048	pg/g-Wet	5	5	100	129	536	T02	246	154	482 V	129	536	T02	246	154	482 V
PCB049 & 069	pg/g-Wet	5	5	100	884	1940	T02	1330	1050	1910 V	884	1940	T02	1330	1050	1910 V
PCB050 & 053	pg/g-Wet	5	5	100	68.1	338	T03	192	180	325 V	68.1	338	T03	192	180	325 V
PCB052	pg/g-Wet	5	5	100	1190	3010	T02	1810	1580	2810 V	1190	3010	T02	1810	1580	2810 V
PCB054	pg/g-Wet	5	5	100	4.56	38.9	T03	12.5	5.32	32.8 V	4.56	38.9	T03	12.5	5.32	32.8 V
PCB055	pg/g-Wet	5	4	80	13.4	30.6	T02	21.7	21.5 V	29.6 V	13.4	30.6	T02	18.9	18.7	29.3 V
PCB056	pg/g-Wet	5	5	100	237	623	T02	432	358	620 V	237	623	T02	432	358	620 V
PCB057	pg/g-Wet	5	5	100	3.78	7.46	T02	5.22	4.45	7.24 V	3.78	7.46	T02	5.22	4.45	7.24 V
PCB058	pg/g-Wet	5	4	80	2.17 J	4.2	T03	2.97	2.76 JV	3.99 JV	2.17 J	4.2	T03	2.7	2.72 J	3.92 JV
PCB059 & 062 & 075	pg/g-Wet	5	5	100	93.6	223	T02	144	130	212 V	93.6	223	T02	144	130	212 V
PCB060	pg/g-Wet	5	5	100	191	568	T02	362	338	545 V	191	568	T02	362	338	545 V
PCB061 & 070 & 074 & 076	pg/g-Wet	5	5	100	1540	2800	T02	2160	2350	2720 V	1540	2800	T02	2160	2350	2720 V
PCB063	pg/g-Wet	5	5	100	41.7	92.3	T02	66.5	72.9	89.7 V	41.7	92.3	T02	66.5	72.9	89.7 V
PCB064	pg/g-Wet	5	5	100	389	1100	T02	704	636	1040 V	389	1100	T02	704	636	1040 V
PCB066	pg/g-Wet	5	5	100	825	2060	T02	1440	1280	2020 V	825	2060	T02	1440	1280	2020 V
PCB067	pg/g-Wet	5	5	100	21	44.4	T02	35.1	35.8	43.9 V	21	44.4	T02	35.1	35.8	43.9 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB068	pg/g-Wet	5	5	100	7.65	25.3	T03	13.6	8.62	23.8 V	7.65	25.3	T03	13.6	8.62	23.8 V
PCB072	pg/g-Wet	5	5	100	10.8	28.7	T01	18	17.2	27.3 V	10.8	28.7	T01	18	17.2	27.3 V
PCB073	pg/g-Wet	5	3	60	4.79	20.1	T03	10	5.14	18.6 V	4.79	20.1	T03	8.15	5.25 U	17.2 V
PCB077	pg/g-Wet	5	5	100	75.6	211	T02	126	115	197 V	75.6	211	T02	126	115	197 V
PCB078	pg/g-Wet	5	0	0	--	--	--	--	--	--	5.06 U	9.78 U	T01	3.62	3.88 U	4.71 UV
PCB079	pg/g-Wet	5	5	100	13.4	20.7	T02	17.6	17.6	20.6 V	13.4	20.7	T02	17.6	17.6	20.6 V
PCB080	pg/g-Wet	5	0	0	--	--	--	--	--	--	8.78 U	17 U	T01	6.27	6.7 U	8.19 UV
PCB081	pg/g-Wet	5	1	20	10.3	10.3	T02	10.3	10.3	10.3	3.21 U	10.3	T02	4.03	2.51 U	8.9 V
PCB082	pg/g-Wet	5	5	100	117	290	T02	209	215	280 V	117	290	T02	209	215	280 V
PCB083 & 099	pg/g-Wet	5	5	100	1050	2170	T03	1660	1770	2100 V	1050	2170	T03	1660	1770	2100 V
PCB084	pg/g-Wet	5	5	100	218	390	T02	299	319	380 V	218	390	T02	299	319	380 V
PCB085 & 116 & 117	pg/g-Wet	5	5	100	303	667	T02	496	514	643 V	303	667	T02	496	514	643 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	5	5	100	917	1700	T02	1310	1290	1630 V	917	1700	T02	1310	1290	1630 V
PCB088 & 091	pg/g-Wet	5	5	100	210	600	T03	345	253	567 V	210	600	T03	345	253	567 V
PCB089	pg/g-Wet	5	3	60	11.1	38.8	T02	22.2	16.6	36.6 V	7.93 U	38.8	T02	16.1	11.1	34.4 V
PCB090 & 101 & 113	pg/g-Wet	5	5	100	2240	4410	T03	2970	2810	4110 V	2240	4410	T03	2970	2810	4110 V
PCB092	pg/g-Wet	5	5	100	386	752	T03	471	393	687 V	386	752	T03	471	393	687 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	5	5	100	1120	3010	T03	1660	1260	2760 V	1120	3010	T03	1660	1260	2760 V
PCB094	pg/g-Wet	5	3	60	12.2	18.4	T03	15.7	16.4	18.2 V	8.09 U	18.4	T03	11	12.2	18 V
PCB096	pg/g-Wet	5	5	100	5.7	22.2	T03	11.5	9.96	20 V	5.7	22.2	T03	11.5	9.96	20 V
PCB103	pg/g-Wet	5	5	100	16.5	101	T03	37.3	22.9	85.6 V	16.5	101	T03	37.3	22.9	85.6 V
PCB104	pg/g-Wet	5	2	40	1.09 J	1.42 J	T01	1.26	1.26 JV	1.4 JV	0.586 U	4.97 U	T03	1.18	1.09 J	2.27 JV
PCB105	pg/g-Wet	5	5	100	550	1230	T01	889	762	1220 V	550	1230	T01	889	762	1220 V
PCB106	pg/g-Wet	5	0	0	--	--	--	--	--	--	3.03 U	5.84 U	T01	2.16	2.32 U	2.81 UV
PCB107 & 124	pg/g-Wet	5	5	100	64.1	128	T01	98.3	102	124 V	64.1	128	T01	98.3	102	124 V
PCB109	pg/g-Wet	5	5	100	113	286	T01	178	172	266 V	113	286	T01	178	172	266 V
PCB110 & 115	pg/g-Wet	5	5	100	1920	2620	T03	2190	2140	2530 V	1920	2620	T03	2190	2140	2530 V
PCB111	pg/g-Wet	5	3	60	1.54 J	7.7	T03	3.73	1.96 J	7.13 JV	1.54 J	7.7	T03	3.11	1.96 J	6.84 V
PCB112	pg/g-Wet	5	0	0	--	--	--	--	--	--	2.65 U	5.12 U	T01	1.89	2.03 U	2.47 UV
PCB114	pg/g-Wet	5	5	100	33.3	80.3	T01	57	50.6	79.6 V	33.3	80.3	T01	57	50.6	79.6 V
PCB118	pg/g-Wet	5	5	100	1630	3610	T01	2340	2220	3390 V	1630	3610	T01	2340	2220	3390 V
PCB120	pg/g-Wet	5	5	100	7.66	32.1	T03	16.3	10.3	30.1 V	7.66	32.1	T03	16.3	10.3	30.1 V
PCB121	pg/g-Wet	5	3	60	2.35 J	7.94	T03	5.2	5.3	7.68 V	1.74 U	7.94	T03	3.47	2.35 J	7.41 V
PCB122	pg/g-Wet	5	5	100	13.6	35.9	T01	25.8	25.9	34.8 V	13.6	35.9	T01	25.8	25.9	34.8 V
PCB123	pg/g-Wet	5	5	100	37.5	64.7	T02	49.6	43.9	63.8 V	37.5	64.7	T02	49.6	43.9	63.8 V
PCB126	pg/g-Wet	5	4	80	5	17	T02	11.9	12.7 V	16.5 V	5	17	T02	10	11.6	16.4 V
PCB127	pg/g-Wet	5	3	60	3.33 J	5.53	T01	4.38	4.29	5.41 V	1.66 U	5.53	T01	3.11	3.33 J	5.28 V
PCB128 & 166	pg/g-Wet	5	5	100	337	1010	T03	571	391	961 V	337	1010	T03	571	391	961 V
PCB129 & 138 & 160 & 163	pg/g-Wet	5	5	100	2890	14600	T03	6560	4010	13300 V	2890	14600	T03	6560	4010	13300 V
PCB130	pg/g-Wet	5	5	100	143	514	T03	279	165	493 V	143	514	T03	279	165	493 V
PCB131	pg/g-Wet	5	5	100	15.7	61.5	T03	28.8	21.2	54.2 V	15.7	61.5	T03	28.8	21.2	54.2 V
PCB132	pg/g-Wet	5	5	100	540	2710	T03	1080	726	2330 V	540	2710	T03	1080	726	2330 V
PCB133	pg/g-Wet	5	5	100	49.6	262	T03	130	74	248 V	49.6	262	T03	130	74	248 V
PCB134 & 143	pg/g-Wet	5	5	100	88.6	381	T03	164	117	331 V	88.6	381	T03	164	117	331 V
PCB135 & 151 & 154	pg/g-Wet	5	5	100	850	5000	T03	1850	1190	4260 V	850	5000	T03	1850	1190	4260 V
PCB136	pg/g-Wet	5	5	100	141	960	T03	357	224	824 V	141	960	T03	357	224	824 V
PCB137	pg/g-Wet	5	5	100	90.4	186	T01	132	108	183 V	90.4	186	T01	132	108	183 V
PCB139 & 140	pg/g-Wet	5	4	80	37.4	80.7	T03	53.3	47.5 V	76.4 V	37.4	80.7	T03	46.7	43.1	74.9 V
PCB141	pg/g-Wet	5	5	100	466	3700	T03	1360	781	3210 V	466	3700	T03	1360	781	3210 V
PCB142	pg/g-Wet	5	0	0	--	--	--	--	--	--	2.19 U	4.79 U	T01	1.61	1.36 U	2.31 UV
PCB144	pg/g-Wet	5	5	100	90.8	702	T03	242	149	593 V	90.8	702	T03	242	149	593 V
PCB145	pg/g-Wet	5	3	60	0.28 J	0.985 J	T01	0.627	0.616 J	0.948 JV	0.28 J	5 U	T03	0.934	0.616 J	2.2 JV
PCB146	pg/g-Wet	5	5	100	563	2970	T03	1320	736	2710 V	563	2970	T03	1320	736	2710 V
PCB147 & 149	pg/g-Wet	5	5	100	1930	12400	T03	4570	3120	10600 V	1930	12400	T03	4570	3120	10600 V
PCB148	pg/g-Wet	5	4	80	6.93	29.7	T03	14.4	10.4 V	27.3 V	6.65 U	29.7	T03	12.2	7.43	26.4 V
PCB150	pg/g-Wet	5	4	80	3.1 J	21.6	T03	7.97	3.59 JV	19 JV	3.1 J	21.6	T03	6.71	3.19 J	18.1 JV
PCB152	pg/g-Wet	5	3	60	1.21 J	5.65	T03	3.15	2.58 J	5.34 JV	1.21 J	5.65	T03	2.25	1.21 J	5.04 JV
PCB153 & 168	pg/g-Wet	5	5	100	2760	17700	T03	7440	4470	15900 V	2760	17700	T03	7440	4470	15900 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB155	pg/g-Wet	5	1	20	2.47 J	2.47 J	T03	2.47	2.47 J	2.47 J	0.769 U	2.66 U	T01	1.04	0.535 U	2.24 JV
PCB156 & 157	pg/g-Wet	5	5	100	199	715	T01	401	306	673 V	199	715	T01	401	306	673 V
PCB158	pg/g-Wet	5	5	100	233	1080	T03	528	354	996 V	233	1080	T03	528	354	996 V
PCB159	pg/g-Wet	5	5	100	18.4	180	T03	65.6	47.8	154 V	18.4	180	T03	65.6	47.8	154 V
PCB161	pg/g-Wet	5	0	0	--	--		--	--	--	2.8 U	5.42 U	T01	2	2.15 U	2.61 UV
PCB162	pg/g-Wet	5	4	80	12.3	26.3	T03	19.1	19 V	26.2 V	7 U	26.3	T03	16	12.6	26.1 V
PCB164	pg/g-Wet	5	5	100	141	944	T03	383	257	826 V	141	944	T03	383	257	826 V
PCB165	pg/g-Wet	5	3	60	3.7 J	12	T03	8.9	11	11.9 V	2.76 U	12	T03	5.9	3.7 J	11.8 V
PCB167	pg/g-Wet	5	5	100	76.2	418	T03	219	140	400 V	76.2	418	T03	219	140	400 V
PCB169	pg/g-Wet	5	0	0	--	--		--	--	--	1.07 U	8.85 U	T03	1.86	0.97 U	4.08 UV
PCB170	pg/g-Wet	5	5	100	598	5340	T03	2070	997	4790 V	598	5340	T03	2070	997	4790 V
PCB171 & 173	pg/g-Wet	5	5	100	159	1480	T03	553	345	1290 V	159	1480	T03	553	345	1290 V
PCB172	pg/g-Wet	5	5	100	125	1060	T03	449	252	971 V	125	1060	T03	449	252	971 V
PCB174	pg/g-Wet	5	5	100	453	4600	T03	1620	1180	3920 V	453	4600	T03	1620	1180	3920 V
PCB175	pg/g-Wet	5	5	100	23.4	204	T03	79.2	40	182 V	23.4	204	T03	79.2	40	182 V
PCB176	pg/g-Wet	5	5	100	38.5	429	T03	148	95.3	366 V	38.5	429	T03	148	95.3	366 V
PCB177	pg/g-Wet	5	5	100	364	3030	T03	1210	708	2720 V	364	3030	T03	1210	708	2720 V
PCB178	pg/g-Wet	5	5	100	160	1170	T03	513	325	1070 V	160	1170	T03	513	325	1070 V
PCB179	pg/g-Wet	5	5	100	150	1310	T03	493	309	1140 V	150	1310	T03	493	309	1140 V
PCB180 & 193	pg/g-Wet	5	5	100	1530	15000	T03	5670	2720	13400 V	1530	15000	T03	5670	2720	13400 V
PCB181	pg/g-Wet	5	4	80	13.4	20.7	T02	17.9	18.7 V	20.5 V	7.13 U	20.7	T02	15	17.9	20.4 V
PCB182	pg/g-Wet	5	3	60	5.18	26	T03	12.7	6.9	24.1 V	5.18	26	T03	9.27	5.18	22.2 V
PCB183 & 185	pg/g-Wet	5	5	100	454	4410	T03	1610	938	3840 V	454	4410	T03	1610	938	3840 V
PCB184	pg/g-Wet	5	1	20	1.22 J	1.22 J	T01	1.22	1.22 J	1.22 J	1.22 J	4.73 U	T03	1.13	0.765 U	2.14 JV
PCB186	pg/g-Wet	5	0	0	--	--		--	--	--	0.712 U	5.17 U	T01	1.57	1.47 U	2.49 UV
PCB187	pg/g-Wet	5	5	100	1510	8210	T03	3440	2460	7270 V	1510	8210	T03	3440	2460	7270 V
PCB188	pg/g-Wet	5	4	80	1.35 J	9.4	T03	4.33	3.29 JV	8.68 V	1.35 J	9.4	T03	3.67	1.96 J	8.44 V
PCB189	pg/g-Wet	5	5	100	21.3	157	T03	73.1	41.1	148 V	21.3	157	T03	73.1	41.1	148 V
PCB190	pg/g-Wet	5	5	100	123	1110	T03	445	244	1000 V	123	1110	T03	445	244	1000 V
PCB191	pg/g-Wet	5	5	100	24.2	225	T03	87.4	44.2	202 V	24.2	225	T03	87.4	44.2	202 V
PCB192	pg/g-Wet	5	0	0	--	--		--	--	--	6.22 U	12 U	T01	4.44	4.76 U	5.78 UV
PCB194	pg/g-Wet	5	5	100	252	1980	T03	892	455	1860 V	252	1980	T03	892	455	1860 V
PCB195	pg/g-Wet	5	5	100	105	821	T03	354	205	754 V	105	821	T03	354	205	754 V
PCB196	pg/g-Wet	5	5	100	130	1040	T03	444	220	956 V	130	1040	T03	444	220	956 V
PCB197 & 200	pg/g-Wet	5	5	100	30.7	243	T03	102	88.6	213 V	30.7	243	T03	102	88.6	213 V
PCB198 & 199	pg/g-Wet	5	5	100	354	2120	T03	1070	727	2010 V	354	2120	T03	1070	727	2010 V
PCB201	pg/g-Wet	5	5	100	29.5	190	T03	86.8	50.8	176 V	29.5	190	T03	86.8	50.8	176 V
PCB202	pg/g-Wet	5	5	100	58.3	333	T03	189	156	319 V	58.3	333	T03	189	156	319 V
PCB203	pg/g-Wet	5	5	100	207	1460	T03	647	395	1340 V	207	1460	T03	647	395	1340 V
PCB204	pg/g-Wet	5	1	20	0.71 J	0.71 J	T03	0.71	0.71 J	0.71 J	0.21 U	0.739 U	T02	0.355	0.327 U	0.642 JV
PCB205	pg/g-Wet	5	5	100	14.8	97.1	T03	46.3	27.6	91.6 V	14.8	97.1	T03	46.3	27.6	91.6 V
PCB206	pg/g-Wet	5	5	100	139	445	T01	249	203	416 V	139	445	T01	249	203	416 V
PCB207	pg/g-Wet	5	5	100	16	49.2	T01	30.5	21.4	48.5 V	16	49.2	T01	30.5	21.4	48.5 V
PCB208	pg/g-Wet	5	5	100	38.9	143	T01	74.3	62.8	129 V	38.9	143	T01	74.3	62.8	129 V
PCB209	pg/g-Wet	5	5	100	31.9	157	T01	85.1	98	147 V	31.9	157	T01	85.1	98	147 V
Total PCB Congeners	pg/g-Wet	5	5	100	53800 JT	162000 JT	T03	83900	59800 JT	147000 JV	53800 JT	162000 JT	T03	83900	59800 JT	147000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	5	5	100	53.8 JT	162 JT	T03	83.9	59.8 JT	147 JV	53.8 JT	162 JT	T03	83.9	59.8 JT	147 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	5	5	100	535 JT	1600 T	T03	1000	985 T	1530 V	535 JT	1600 T	T03	1000	985 T	1530 V
Heptachlorobiphenylhomologs	pg/g-Wet	5	5	100	5760 JT	47800 T	T03	18500	10900 JT	42300 V	5760 JT	47800 T	T03	18500	10900 JT	42300 V
Hexachlorobiphenyl homologs	pg/g-Wet	5	5	100	11700 JT	66500 T	T03	27800	17500 JT	58900 JV	11700 JT	66500 T	T03	27800	17500 JT	58900 JV
Monochlorobiphenyl homologs	pg/g-Wet	5	5	100	4.38 JT	73.5 T	T03	28.7	22.6 T	65.3 V	4.38 JT	73.5 T	T03	28.7	22.6 T	65.3 V
Nonachlorobiphenyl homologs	pg/g-Wet	5	5	100	194 T	637 T	T01	354	287 T	594 V	194 T	637 T	T01	354	287 T	594 V
Octachlorobiphenyl homologs	pg/g-Wet	5	5	100	1180 T	8280 T	T03	3830	2280 T	7710 V	1180 T	8280 T	T03	3830	2280 T	7710 V
Pentachlorobiphenylhomologs	pg/g-Wet	5	5	100	11700 JT	19400 T	T03	15300	14900 JT	18800 JV	11700 JT	19400 T	T03	15300	14900 JT	18800 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	5	5	100	8250 JT	18300 JT	T02	12600	12300 T	17500 JV	8250 JT	18300 JT	T02	12600	12300 T	17500 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Trichlorobiphenyl homologs	pg/g-Wet	5	5	100	2270 JT	5860 T	T03	4490	4510 T	5820 V	2270 JT	5860 T	T03	4490	4510 T	5820 V
PCDD/Fs																
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.0889 A	1.85 A	T02	1.08	1.3 A	1.8 V	0.0889 A	1.85 A	T02	1.08	1.3 A	1.8 V
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.0889 T	1.85 T	T02	1.08	1.3 T	1.8 V	0.0889 T	1.85 T	T02	1.08	1.3 T	1.8 V
Pesticides																
2,4'-DDD	µg/kg-Wet	5	5	100	0.0924 J	23.5 NJ	T02	5.85	0.419 NJ	19.8 JV	0.0924 J	23.5 NJ	T02	5.85	0.419 NJ	19.8 JV
2,4'-DDE	µg/kg-Wet	5	5	100	0.0289 J	3.78	T02	1.37	0.0713 NJ	3.61 JV	0.0289 J	3.78	T02	1.37	0.0713 NJ	3.61 JV
2,4'-DDT	µg/kg-Wet	5	5	100	0.149 J	16.3	T02	4.66	0.21 J	14.3 JV	0.149 J	16.3	T02	4.66	0.21 J	14.3 JV
4,4'-DDD	µg/kg-Wet	5	5	100	0.528	113 NJ	T02	28.1	2.04	95 JV	0.528	113 NJ	T02	28.1	2.04	95 JV
4,4'-DDE	µg/kg-Wet	5	5	100	4.96 NJ	144 NJ	T02	47.8	9.16	130 JV	4.96 NJ	144 NJ	T02	47.8	9.16	130 JV
4,4'-DDT	µg/kg-Wet	5	5	100	0.969	53.1	T02	18.8	1.29 J	50 JV	0.969	53.1	T02	18.8	1.29 J	50 JV
Aldrin	µg/kg-Wet	5	2	40	0.00576 J	0.0426 J	T02	0.0242	0.0242 JV	0.0408 JV	0.00576 J	0.0426 J	T02	0.0175	0.0167 U	0.0376 JV
alpha-Endosulfan	µg/kg-Wet	5	1	20	0.724 J	0.724 J	T02	0.724	0.724 J	0.724 J	0.141 U	0.724 J	T02	0.284	0.245 U	0.633 JV
alpha-Hexachlorocyclohexane	µg/kg-Wet	5	3	60	0.0317 J	0.0748 J	T02	0.0462	0.0322 J	0.0705 JV	0.0298 U	0.0748 J	T02	0.0339	0.0317 J	0.0663 JV
beta-Endosulfan	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.198 U	0.561 U	T02	0.194	0.22 U	0.276 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	5	1	20	0.215 J	0.215 J	T02	0.215	0.215 J	0.215 J	0.0225 U	0.215 J	T02	0.0616	0.0299 U	0.179 JV
cis-Chlordane	µg/kg-Wet	5	5	100	0.183 J	1.39	T02	0.626	0.358 J	1.29 V	0.183 J	1.39	T02	0.626	0.358 J	1.29 V
cis-Nonachlor	µg/kg-Wet	5	5	100	0.124 J	0.416 J	T02	0.278	0.301 J	0.415 JV	0.124 J	0.416 J	T02	0.278	0.301 J	0.415 JV
delta-Hexachlorocyclohexane	µg/kg-Wet	5	1	20	0.0972 J	0.0972 J	T02	0.0972	0.0972 J	0.0972 J	0.0024 U	0.0972 J	T02	0.0233	0.0036 U	0.0801 JV
Dieldrin	µg/kg-Wet	5	5	100	0.471 J	2.92	T02	1.48	1.58	2.7 V	0.471 J	2.92	T02	1.48	1.58	2.7 V
Endosulfan sulfate	µg/kg-Wet	5	4	80	0.232 J	0.713 J	T02	0.51	0.547 JV	0.708 JV	0.232 J	0.782 U	T01	0.486	0.414 J	0.706 JV
Endrin	µg/kg-Wet	5	3	60	0.0172 J	0.212 J	T02	0.0874	0.033 J	0.194 JV	0.0066 U	0.212 J	T02	0.0548	0.0172 J	0.176 JV
Endrin aldehyde	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.0166 U	0.0769 U	T02	0.0183	0.0143 U	0.0348 UV
Endrin ketone	µg/kg-Wet	5	1	20	0.0854 J	0.0854 J	T02	0.0854	0.0854 J	0.0854 J	0.0043 U	0.0854 J	T02	0.0198	0.00375 U	0.0693 JV
gamma-Hexachlorocyclohexane	µg/kg-Wet	5	1	20	0.128 J	0.128 J	T02	0.128	0.128 J	0.128 J	0.0194 U	0.128 J	T02	0.0412	0.0218 U	0.109 JV
Heptachlor	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.00687 U	0.293 U	T02	0.0431	0.0064 U	0.128 UV
Heptachlor epoxide	µg/kg-Wet	5	5	100	0.0666 J	0.312 J	T02	0.153	0.154 J	0.281 JV	0.0666 J	0.312 J	T02	0.153	0.154 J	0.281 JV
Methoxychlor	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.014 U	0.35 U	T02	0.0472	0.0219 U	0.145 UV
Oxychlordane	µg/kg-Wet	5	3	60	0.172 J	0.868	T03	0.489	0.427 J	0.824 JV	0.172 J	0.868	T03	0.398	0.332 U	0.78 JV
Total Chlordanes	µg/kg-Wet	5	5	100	1.08 JT	4.61 JT	T02	2.67	2.98 JT	4.36 JV	1.08 JT	4.61 JT	T02	2.67	2.98 JT	4.36 JV
Total Endosulfan	µg/kg-Wet	5	4	80	0.232 JT	1.44 JT	T02	0.692	0.547 JV	1.33 JV	0.232 JT	1.44 JT	T02	0.631	0.414 JT	1.29 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	5	5	100	0.62 JT	137 NJT	T02	34	2.43 NJT	115 JV	0.62 JT	137 NJT	T02	34	2.43 NJT	115 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	5	5	100	8.88 JT	327 NJT	T02	107	12.7 JT	297 JV	8.88 JT	327 NJT	T02	107	12.7 JT	297 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	5	5	100	5.03 NJT	147 NJT	T02	49.2	9.21 JT	133 JV	5.03 NJT	147 NJT	T02	49.2	9.21 JT	133 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	5	5	100	1.18 JT	69.4 T	T02	23.5	1.5 JT	64.3 JV	1.18 JT	69.4 T	T02	23.5	1.5 JT	64.3 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	5	5	100	8.26 JT	295 JT	T02	94.8	12.2 T	266 JV	8.26 JT	295 JT	T02	94.8	12.2 T	266 JV
trans-Chlordane	µg/kg-Wet	5	5	100	0.126 J	1.09	T02	0.462	0.262 J	1.01 JV	0.126 J	1.09	T02	0.462	0.262 J	1.01 JV
trans-Nonachlor	µg/kg-Wet	5	5	100	0.452 J	1.37	T02	1.02	1.29	1.36 V	0.452 J	1.37	T02	1.02	1.29	1.36 V
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	5	1	20	41.5	41.5	T02	41.5	41.5	41.5	12 U	41.5	T02	13.9	7.25 U	34.8 V
Acenaphthene	µg/kg-Wet	5	5	100	4.44 J	131	T02	32.3	7.35 J	107 V	4.44 J	131	T02	32.3	7.35 J	107 V
Acenaphthylene	µg/kg-Wet	5	3	60	0.738 J	6.99 J	T02	3.24	2 J	6.49 JV	0.738 J	6.99 J	T02	2.27	1.02 U	5.99 JV
Anthracene	µg/kg-Wet	5	5	100	1.3 J	225	T02	49.3	6.47 J	182 V	1.3 J	225	T02	49.3	6.47 J	182 V
Benzo(a)anthracene	µg/kg-Wet	5	5	100	1.89 J	77.8	T02	21.2	7.67 J	64.6 V	1.89 J	77.8	T02	21.2	7.67 J	64.6 V
Benzo(a)pyrene	µg/kg-Wet	5	2	40	2.26 J	20.7	T02	11.5	11.5 JV	19.8 JV	1.63 U	20.7	T02	5.67	2.26 J	17.1 V
Benzo(b)fluoranthene	µg/kg-Wet	5	5	100	2.85 J	35.3	T02	15.3	11.2	31.8 V	2.85 J	35.3	T02	15.3	11.2	31.8 V
Benzo(g,h,i)perylene	µg/kg-Wet	5	2	40	6.04 J	7.3 J	T02	6.67	6.67 JV	7.24 JV	2.44 U	7.3 J	T02	3.88	2.83 U	7.05 JV
Benzo(j+k)fluoranthene	µg/kg-Wet	5	5	100	1.95 J	23.8	T02	9.02	7.04 J	20.5 V	1.95 J	23.8	T02	9.02	7.04 J	20.5 V
Chrysene	µg/kg-Wet	5	5	100	6.97 J	97.7	T02	39.7	29.4	86.6 V	6.97 J	97.7	T02	39.7	29.4	86.6 V
Dibenzo(a,h)anthracene	µg/kg-Wet	5	2	40	0.905 J	2.68 J	T02	1.79	1.79 JV	2.59 JV	0.486 U	2.68 J	T02	0.916	0.465 U	2.33 JV
Fluoranthene	µg/kg-Wet	5	5	100	20.5 J	475 J	T02	146	75.1 J	402 JV	20.5 J	475 J	T02	146	75.1 J	402 JV
Fluorene	µg/kg-Wet	5	5	100	5.31 J	143	T02	35.6	8.15 J	118 V	5.31 J	143	T02	35.6	8.15 J	118 V
High Molecular Weight PAH	µg/kg-Wet	5	5	100	49.9 JT	1050 JT	T02	338	200 JT	892 JV	49.9 JT	1050 JT	T02	338	200 JT	892 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	5	3	60	4.64 J	8.51 J	T02	6.05	5 J	8.16 JV	1.86 U	8.51 J	T02	4.21	4.64 J	7.81 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Low Molecular Weight PAH	µg/kg-Wet	5	5	100	45.7 JT	1410 JT	T02	347	72.3 JT	1160 JV	45.7 JT	1410 JT	T02	347	72.3 JT	1160 JV
Naphthalene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	27.3 U	38.8 UJ	T02	17.1	18.8 U	19.3 UJV
Phenanthrene	µg/kg-Wet	5	5	100	33.9	862	T02	220	53.8	710 V	33.9	862	T02	220	53.8	710 V
Pyrene	µg/kg-Wet	5	5	100	15.7 J	301 J	T02	95	60.1 J	254 JV	15.7 J	301 J	T02	95	60.1 J	254 JV
Total BaPEq	µg/kg-Wet	5	5	100	0.5 JT	35.9 JT	T02	9.46	3.77 JT	29.8 JV	0.5 JT	35.9 JT	T02	9.46	3.77 JT	29.8 JV
Total cPAHs	µg/kg-Wet	5	5	100	14 JT	270 JT	T02	95	65 JT	230 JV	14 JT	270 JT	T02	95	65 JT	230 JV
Total PAHs	µg/kg-Wet	5	5	100	95.5 JT	2460 JT	T02	685	272 JT	2050 JV	95.5 JT	2460 JT	T02	685	272 JT	2050 JV
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	5	5	100	0.469	1.66	T02	0.932	0.849	1.54 V	0.469	1.66	T02	0.932	0.849	1.54 V
Hexachlorobutadiene	µg/kg-Wet	5	1	20	0.0412 J	0.0412 J	T01	0.0412	0.0412 J	0.0412 J	0.0302 U	0.179 U	T02	0.0482	0.0412 J	0.0876 UV
Clam (Corbicula spp. – body without shell)																
Conventionals																
Lipids	percent-Wet	45	45	100	0.837 T	4.63	FC028	2.19	2.09	3.33 V	0.837 T	4.63	FC028	2.19	2.09	3.33 V
Total solids	percent-Wet	41	41	100	10.2	17.1	FC024	13.8	14.2	15.9	10.2	17.1	FC024	13.8	14.2	15.9
Metals																
Aluminum	mg/kg-Wet	41	41	100	20.5	202	FC026	91.5	76.5 JT	195 J	20.5	202	FC026	91.5	76.5 JT	195 J
Antimony	mg/kg-Wet	41	16	39	0.001 JT	0.004 J	FC022	0.00192	0.002 JV	0.00325 JV	0.001 JT	0.006 U	FC026	0.0014	0.001 JT	0.003 U
Arsenic	mg/kg-Wet	41	41	100	0.615	1.25	FC002	0.902	0.909	1.07	0.615	1.25	FC002	0.902	0.909	1.07
Cadmium	mg/kg-Wet	41	41	100	0.035 J	0.218	FC002	0.086	0.076	0.154 J	0.035 J	0.218	FC002	0.086	0.076	0.154 J
Chromium	mg/kg-Wet	41	41	100	0.4	1.05 T	FC0061	0.615	0.62	0.92	0.4	1.05 T	FC0061	0.615	0.62	0.92
Copper	mg/kg-Wet	41	41	100	4.57	13.5	FC023	8.99	9.26	11.6	4.57	13.5	FC023	8.99	9.26	11.6
Lead	mg/kg-Wet	41	41	100	0.024	0.316	07R006	0.0918	0.071	0.192	0.024	0.316	07R006	0.0918	0.071	0.192
Manganese	mg/kg-Wet	13	13	100	3.89	7.82	CA03W	6.05	6.54	7.8 V	3.89	7.82	CA03W	6.05	6.54	7.8 V
Mercury	mg/kg-Wet	38	38	100	0.005 JT	0.0263 J	CA11E	0.0119	0.0107 JV	0.0247 JV	0.005 JT	0.0263 J	CA11E	0.0119	0.0107 JV	0.0247 JV
Nickel	mg/kg-Wet	41	41	100	0.151	0.485 J	FC030	0.293	0.297 J	0.441 J	0.151	0.485 J	FC030	0.293	0.297 J	0.441 J
Selenium	mg/kg-Wet	41	39	95.1	0.069	0.22 T	CA01E; CA03W	0.13	0.12	0.211 V	0.069	0.22 T	CA01E; CA03W	0.127	0.115	0.21
Silver	mg/kg-Wet	41	41	100	0.0201	0.101	FC031	0.0515	0.05	0.0792 T	0.0201	0.101	FC031	0.0515	0.05	0.0792 T
Thallium	mg/kg-Wet	13	13	100	0.00035 JT	0.00218 JT	CA01E	0.00114	0.0011 J	0.00207 JV	0.00035 JT	0.00218 JT	CA01E	0.00114	0.0011 J	0.00207 JV
Zinc	mg/kg-Wet	41	41	100	19.6	54	FC023	33.1	31.8 T	46.9	19.6	54	FC023	33.1	31.8 T	46.9
Butyltins																
Butyltin ion	µg/kg-Wet	37	24	64.9	1	97	FC023	7.15	2.9 JV	8.24 JV	0.061 U	97	FC023	4.79	1.8	7.52 JV
Dibutyltin ion	µg/kg-Wet	37	30	81.1	1.1	560	FC023	24.5	3.55 V	35.1 V	1.1	560	FC023	20	3.1	20.4 V
Tetrabutyltin	µg/kg-Wet	37	0	0	--	--	--	--	--	--	0.067 U	5 U	CA02W	0.713	0.0335 UT	2.45 UV
Tributyltin ion	µg/kg-Wet	37	22	59	2.5	530	FC023	34	6.5 V	62 V	1.8 U	530	FC023	21	3.7	39 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.9 U	20 U	06R002	5.2	4.8 U	9.5 UV
Aroclor 1221	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.9 U	12 U	06R002	3.9	4.8 U	5.9 UV
Aroclor 1232	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.9 U	34 U	06R002	7.6	4.8 U	16 UV
Aroclor 1242	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.9 U	28 U	06R002	6.6	4.8 U	13 UV
Aroclor 1248	µg/kg-Wet	3	2	67	39	120	07R006	80	80 V	120 V	39	120	07R006	60	39	110 V
Aroclor 1254	µg/kg-Wet	3	0	0	--	--	--	--	--	--	53 U	81 U	07R006	33	32 U	40 UV
Aroclor 1260	µg/kg-Wet	3	2	67	23 J	77	06R002	50	50 JV	74 JV	22 U	77	06R002	37	23 J	72 JV
Aroclor 1262	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.9 U	9.5 U	07R006	2.2	0.95 U	4.4 UV
Aroclor 1268	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.9 U	9.5 U	07R006	2.2	0.95 U	4.4 UV
Aroclors	µg/kg-Wet	3	3	100	62 JT	120 T	07R006	86	77 T	120 V	62 JT	120 T	07R006	86	77 T	120 V
PCB Congeners																
PCB001	pg/g-Wet	36	35	97.2	2.25	91.6	FC002	15.5	7.61	56.2 JV	2.25	91.6	FC002	15.1	7.42 V	55.3 JV
PCB002	pg/g-Wet	38	28	73.7	1.15 J	6.62 J	FC032	2.59	2.24 JV	5.65 V	1.15 J	6.62 J	FC032	2.33	2.06 V	4.75 V
PCB003	pg/g-Wet	38	21	55.3	1.3	41.4 J	FC032	5.65	3.08	11.1	1.27 U	41.4 J	FC032	3.69	1.65 UV	11 V
PCB004	pg/g-Wet	38	38	100	119	47000 J	FC016	3230	616 JV	12300 JV	119	47000 J	FC016	3230	616 JV	12300 JV
PCB005	pg/g-Wet	41	35	85.4	0.675	36.9 J	FC005	5.19	2.56	23.2 V	0.675	36.9 J	FC005	4.76	2.29	21.6
PCB006	pg/g-Wet	41	41	100	14.3	698 J	FC032	116	51	451 J	14.3	698 J	FC032	116	51	451 J
PCB007	pg/g-Wet	41	40	97.6	0.734	51.5 J	FC005	6.54	2.09 V	21.2 V	0.734	51.5 J	FC005	6.39	1.91	20.2
PCB008	pg/g-Wet	41	41	100	27.8 J	1900 J	FC005	275	105 J	1210 T	27.8 J	1900 J	FC005	275	105 J	1210 T
PCB009	pg/g-Wet	41	41	100	1.04 J	83.5 J	FC005	10.5	3.14	47.3 J	1.04 J	83.5 J	FC005	10.5	3.14	47.3 J

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB010	pg/g-Wet	41	41	100	0.939 J	709 J	FC016	36.2	6.84	90.5 JT	0.939 J	709 J	FC016	36.2	6.84	90.5 JT
PCB011	pg/g-Wet	41	41	100	148 J	1690 T	CA01E	542	436	1200	148 J	1690 T	CA01E	542	436	1200
PCB012 & 013	pg/g-Wet	41	41	100	6.44	492 J	FC016	42.5	18.6 J	118 T	6.44	492 J	FC016	42.5	18.6 J	118 T
PCB014	pg/g-Wet	41	0	0	--	--	--	--	--	--	0.524 U	18.4 UJ	FC032	0.63	0.372 UJ	0.885 UJ
PCB015	pg/g-Wet	41	41	100	15.4	1040	FC005	146	57.6 J	671 J	15.4	1040	FC005	146	57.6 J	671 J
PCB016	pg/g-Wet	41	41	100	85.8 J	5570	FC028	602	308	2270	85.8 J	5570	FC028	602	308	2270
PCB017	pg/g-Wet	41	41	100	128 J	20400	FC016	1710	555 J	6190	128 J	20400	FC016	1710	555 J	6190
PCB018 & 030	pg/g-Wet	41	41	100	183 J	11900	FC028	1390	674	4580	183 J	11900	FC028	1390	674	4580
PCB019	pg/g-Wet	40	40	100	48.2	57300	FC016	2670	474 JV	6020 JV	48.2	57300	FC016	2670	474 JV	6020 JV
PCB020 & 028	pg/g-Wet	41	41	100	180	11200	FC028	1490	661 J	7810 T	180	11200	FC028	1490	661 J	7810 T
PCB021 & 033	pg/g-Wet	41	41	100	69	5450	FC028	701	291 J	3420 T	69	5450	FC028	701	291 J	3420 T
PCB022	pg/g-Wet	41	41	100	133 J	6490	FC028	742	380	2960 T	133 J	6490	FC028	742	380	2960 T
PCB023	pg/g-Wet	41	21	51.2	0.234 J	9.85	FC005	2.09	0.842	8.21	0.221 UJ	13 UJ	FC032	1.37	0.408 J	7.5 T
PCB024	pg/g-Wet	41	14	34.1	1.53	47.8	FC005	12.1	5.59 V	45.7 JV	0.257 U	47.8	FC005	4.32	0.371 UJ	16 J
PCB025	pg/g-Wet	41	41	100	25.5	2610	FC016	245	105 J	910	25.5	2610	FC016	245	105 J	910
PCB026 & 029	pg/g-Wet	41	41	100	47.6	1840	FC028	294	134	1370 T	47.6	1840	FC028	294	134	1370 T
PCB027	pg/g-Wet	41	41	100	44.9	22100	FC016	978	238	1230	44.9	22100	FC016	978	238	1230
PCB031	pg/g-Wet	41	41	100	125	9640	FC028	1150	479	6110 T	125	9640	FC028	1150	479	6110 T
PCB032	pg/g-Wet	41	41	100	34.7	2620	FC016	410	176 J	1450 T	34.7	2620	FC016	410	176 J	1450 T
PCB034	pg/g-Wet	41	41	100	0.887	57.2	FC028	6.55	3.23 J	23.9 T	0.887	57.2	FC028	6.55	3.23 J	23.9 T
PCB035	pg/g-Wet	41	41	100	7.43	150	FC005	24.1	13.6	99.7	7.43	150	FC005	24.1	13.6	99.7
PCB036	pg/g-Wet	41	34	82.9	1.24	5.41 J	FC011	2.78	2.57 V	4.11 V	0.827 U	11.7 UJ	FC032	2.6	2.48	4.16
PCB037	pg/g-Wet	41	41	100	46.3	2500	FC028	365	161	1840 T	46.3	2500	FC028	365	161	1840 T
PCB038	pg/g-Wet	41	33	80.5	0.852	110	FC016	7.29	2.71	15 V	0.561 U	110	FC016	6.07	2.16	15
PCB039	pg/g-Wet	41	41	100	3.09	149	FC028	20.6	12	71.2	3.09	149	FC028	20.6	12	71.2
PCB040 & 041 & 071	pg/g-Wet	41	41	100	277	11200	FC016	1810	996	5690 T	277	11200	FC016	1810	996	5690 T
PCB042	pg/g-Wet	41	41	100	350	7610	FC002	1540	859	4980 T	350	7610	FC002	1540	859	4980 T
PCB043	pg/g-Wet	41	39	95.1	12.5 JT	1090	FC016	109	45.4	407 V	0.393 U	1090	FC016	104	44.5	387
PCB044 & 047 & 065	pg/g-Wet	41	41	100	1250	90400	FC016	7870	3850	21100	1250	90400	FC016	7870	3850	21100
PCB045 & 051	pg/g-Wet	41	41	100	93	38300	FC016	1940	594	3140	93	38300	FC016	1940	594	3140
PCB046	pg/g-Wet	41	41	100	13.3	968	FC016	113	55	414	13.3	968	FC016	113	55	414
PCB048	pg/g-Wet	41	41	100	128	4700	FC028	656	382	2390 T	128	4700	FC028	656	382	2390 T
PCB049 & 069	pg/g-Wet	41	41	100	380	25100	FC016	2780	1410	7800	380	25100	FC016	2780	1410	7800
PCB050 & 053	pg/g-Wet	41	41	100	190	56700	FC016	3200	924	3350	190	56700	FC016	3200	924	3350
PCB052	pg/g-Wet	41	41	100	836	19800	FC016	3820	2060	14000 T	836	19800	FC016	3820	2060	14000 T
PCB054	pg/g-Wet	41	41	100	1.91	8720	FC016	317	55.2	371 J	1.91	8720	FC016	317	55.2	371 J
PCB055	pg/g-Wet	41	21	51.2	8.32	110	FC005	31.7	17.7	94.6 JT	0.676 U	110	FC005	16.7	8.32	93.3
PCB056	pg/g-Wet	41	41	100	231	7700	FC028	1120	630	3260 T	231	7700	FC028	1120	630	3260 T
PCB057	pg/g-Wet	41	41	100	1.59	553	FC016	27.3	8.72	62.5	1.59	553	FC016	27.3	8.72	62.5
PCB058	pg/g-Wet	41	17	41.5	2.77	44.3	FC028	12.3	8.05	40.7 V	0.669 U	44.3	FC028	5.94	1.5 U	20.3
PCB059 & 062 & 075	pg/g-Wet	41	41	100	63.7	6900	FC016	502	221	1460 T	63.7	6900	FC016	502	221	1460 T
PCB060	pg/g-Wet	41	41	100	83.4	3130	FC028	448	239	1510	83.4	3130	FC028	448	239	1510
PCB061 & 070 & 074 & 076	pg/g-Wet	41	41	100	938	29000	FC028	4220	2810	16300 T	938	29000	FC028	4220	2810	16300 T
PCB063	pg/g-Wet	41	41	100	21.4	733	FC028	116	78.1	366 T	21.4	733	FC028	116	78.1	366 T
PCB064	pg/g-Wet	41	41	100	183	5470	FC028	931	559	4020	183	5470	FC028	931	559	4020
PCB066	pg/g-Wet	41	41	100	565	17400	FC028	2660	1690	7720 T	565	17400	FC028	2660	1690	7720 T
PCB067	pg/g-Wet	41	41	100	17.3	879	FC016	129	66.3	435 T	17.3	879	FC016	129	66.3	435 T
PCB068	pg/g-Wet	41	41	100	7.95	1220	FC016	76.4	32.4	191	7.95	1220	FC016	76.4	32.4	191
PCB072	pg/g-Wet	41	41	100	8.85	373	FC016	52.7	29.3	129	8.85	373	FC016	52.7	29.3	129
PCB073	pg/g-Wet	41	24	58.5	10.1 J	1970	FC016	128	22.3 V	230 V	0.462 U	1970	FC016	75.1	11.2	180
PCB077	pg/g-Wet	41	41	100	40.9	1270	FC028	194	122	609 T	40.9	1270	FC028	194	122	609 T
PCB078	pg/g-Wet	41	0	0	--	--	--	--	--	--	0.607 U	20.2 UJ	FC032	1.04	0.63 U	1.93 U
PCB079	pg/g-Wet	41	41	100	21.4	512	FC016	104	59.5	308	21.4	512	FC016	104	59.5	308
PCB080	pg/g-Wet	41	4	9.76	0.693	1.46 T	FC0271	0.974	0.872 V	1.4 V	0.558 U	35 UJ	FC032	1.38	1.05 U	1.68 U
PCB081	pg/g-Wet	41	23	56.1	2.76	49.8	FC028	10.4	6.51	34.8 V	1.33 U	49.8	FC028	6.88	3.85 UT	20.5 T
PCB082	pg/g-Wet	41	41	100	108 T	1930 T	FC0061	381	250	1360	108 T	1930 T	FC0061	381	250	1360
PCB083 & 099	pg/g-Wet	41	41	100	1070	53800	FC016	5240	2650	10300	1070	53800	FC016	5240	2650	10300
PCB084	pg/g-Wet	41	41	100	251	5610	FC016	1020	581	2680	251	5610	FC016	1020	581	2680

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB085 & 116 & 117	pg/g-Wet	41	41	100	234	3380 T	FC0061	851	575	2800	234	3380 T	FC0061	851	575	2800
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	41	41	100	1040	20500	FC016	4340	2650	12700	1040	20500	FC016	4340	2650	12700
PCB088 & 091	pg/g-Wet	41	41	100	217	13700	FC016	1430	678	3960	217	13700	FC016	1430	678	3960
PCB089	pg/g-Wet	41	41	100	9.45	204	FC002	44.5	28.2	167 T	9.45	204	FC002	44.5	28.2	167 T
PCB090 & 101 & 113	pg/g-Wet	41	41	100	1800	73300	FC016	9100	4930	28600 T	1800	73300	FC016	9100	4930	28600 T
PCB092	pg/g-Wet	41	41	100	342	23500	FC016	1990	884	4880	342	23500	FC016	1990	884	4880
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	41	41	100	1850	122000	FC016	10300	4640	26900 T	1850	122000	FC016	10300	4640	26900 T
PCB094	pg/g-Wet	41	41	100	7.31	6640	FC016	261	71.2	483	7.31	6640	FC016	261	71.2	483
PCB096	pg/g-Wet	41	41	100	5.3	1930	FC016	113	37.5	269	5.3	1930	FC016	113	37.5	269
PCB103	pg/g-Wet	41	41	100	19.4	6500	FC016	403	146	1120	19.4	6500	FC016	403	146	1120
PCB104	pg/g-Wet	41	41	100	0.697	2330	FC016	86	17 T	112	0.697	2330	FC016	86	17 T	112
PCB105	pg/g-Wet	41	41	100	506	7190 T	FC0061	1530	1140	4980	506	7190 T	FC0061	1530	1140	4980
PCB106	pg/g-Wet	41	1	2.44	88	88	FC016	88	88	88	0.586 U	88	FC016	3.18	0.695 U	2.44 U
PCB107 & 124	pg/g-Wet	41	41	100	47.9	898 T	FC0061	165	114	463	47.9	898 T	FC0061	165	114	463
PCB109	pg/g-Wet	41	41	100	117	1730 T	FC0061	425	297 T	1120	117	1730 T	FC0061	425	297 T	1120
PCB110 & 115	pg/g-Wet	41	41	100	1550	28200 T	FC0061	6010	3960	13500	1550	28200 T	FC0061	6010	3960	13500
PCB111	pg/g-Wet	41	38	92.7	3.25	357	FC016	23.8	9.84 V	50.6 V	1.47 U	357	FC016	22.1	9.58	48.4
PCB112	pg/g-Wet	41	1	2.44	4750	4750	FC016	4750	4750	4750	0.598 U	4750	FC016	117	0.525 U	3.62 U
PCB114	pg/g-Wet	41	40	97.6	27.9	383 T	FC0061	90.1	64.8 V	333 V	27.9	383 T	FC0061	88.8	64.3	333
PCB118	pg/g-Wet	41	41	100	1900	32700 T	FC0061	6840	4290	18900	1900	32700 T	FC0061	6840	4290	18900
PCB120	pg/g-Wet	41	41	100	11.1	854	FC016	79.3	35.8	192	11.1	854	FC016	79.3	35.8	192
PCB121	pg/g-Wet	41	40	97.6	4.07	879	FC016	43.6	13.5 V	82.1 V	1.19 U	879	FC016	42.5	13.4	74.7
PCB122	pg/g-Wet	41	41	100	13.2	231 T	FC0061	47.2	33.9	161	13.2	231 T	FC0061	47.2	33.9	161
PCB123	pg/g-Wet	41	41	100	31.8	519	FC002	124	78.7	326	31.8	519	FC002	124	78.7	326
PCB126	pg/g-Wet	41	39	95.1	3.48	38.9 T	FC0061	11	8.27	26.8 V	3.48	77.7 U	FC016	11.6	8.27	27
PCB127	pg/g-Wet	41	32	78	1.7	56.5	FC016	6.99	4.05 V	15.7 V	1.15 U	56.5	FC016	5.8	2.8 T	9.8
PCB128 & 166	pg/g-Wet	41	41	100	291	7440	FC016	1030	581	2710	291	7440	FC016	1030	581	2710
PCB129 & 138 & 160 & 163	pg/g-Wet	41	41	100	3080	226000	FC016	17400	7280	49400	3080	226000	FC016	17400	7280	49400
PCB130	pg/g-Wet	41	41	100	149	6170	FC016	678	337	1720	149	6170	FC016	678	337	1720
PCB131	pg/g-Wet	41	41	100	28.1	1140	FC016	131	64	294	28.1	1140	FC016	131	64	294
PCB132	pg/g-Wet	41	41	100	586	29700	FC016	3220	1450	9630	586	29700	FC016	3220	1450	9630
PCB133	pg/g-Wet	41	41	100	51.6	6580	FC016	445	190	1030	51.6	6580	FC016	445	190	1030
PCB134 & 143	pg/g-Wet	41	41	100	113	11200	FC016	776	317	1740	113	11200	FC016	776	317	1740
PCB135 & 151 & 154	pg/g-Wet	41	41	100	818	110000	FC016	8350	3160	26200	818	110000	FC016	8350	3160	26200
PCB136	pg/g-Wet	41	41	100	209	22200	FC016	1840	706	5150	209	22200	FC016	1840	706	5150
PCB137	pg/g-Wet	41	40	97.6	40.8	1220	FC016	173	102 V	329 V	40.8	1220	FC016	170	96.6	304
PCB139 & 140	pg/g-Wet	41	41	100	40	1460	FC016	180	95.7	458	40	1460	FC016	180	95.7	458
PCB141	pg/g-Wet	41	41	100	96.1	7570	FC016	613	227	1770	96.1	7570	FC016	613	227	1770
PCB142	pg/g-Wet	41	7	17.1	0.711	5.67	FC018	2.3	1.51	5.32 JV	0.327 UT	77.6 U	FC032	3.13	0.995 UT	13.3 U
PCB144	pg/g-Wet	41	41	100	80.4	10100	FC016	773	296	2250	80.4	10100	FC016	773	296	2250
PCB145	pg/g-Wet	41	33	80.5	0.755	61.6	FC016	3.9	1.6	6.44 V	0.242 U	61.6	FC016	3.5	1.55	7.67 T
PCB146	pg/g-Wet	41	41	100	565	43300	FC016	3660	1560	10200	565	43300	FC016	3660	1560	10200
PCB147 & 149	pg/g-Wet	41	41	100	2070	179000	FC016	14800	5840	45200	2070	179000	FC016	14800	5840	45200
PCB148	pg/g-Wet	41	41	100	8.84	2220	FC016	136	53.6	353	8.84	2220	FC016	136	53.6	353
PCB150	pg/g-Wet	41	41	100	6.08	1310	FC016	100	37.2	338	6.08	1310	FC016	100	37.2	338
PCB152	pg/g-Wet	41	41	100	1.9	1390	FC016	60.7	17 JT	137	1.9	1390	FC016	60.7	17 JT	137
PCB153 & 168	pg/g-Wet	41	41	100	5000	561000	FC016	35400	14200	66300	5000	561000	FC016	35400	14200	66300
PCB155	pg/g-Wet	41	41	100	1.68	477	FC016	20.7	6.48	31.1	1.68	477	FC016	20.7	6.48	31.1
PCB156 & 157	pg/g-Wet	41	41	100	154	9210	FC016	822	386	2360 T	154	9210	FC016	822	386	2360 T
PCB158	pg/g-Wet	41	41	100	248	15200	FC016	1340	577	3350	248	15200	FC016	1340	577	3350
PCB159	pg/g-Wet	41	40	97.6	5.58	965	FC016	62.2	23 V	185 V	5.58	965	FC016	60.9	22.5	185
PCB161	pg/g-Wet	41	0	0	--	--	--	--	--	--	0.37 U	55.4 U	FC032	1.99	0.346 U	9.5 U
PCB162	pg/g-Wet	41	37	90.2	5.37	75.1 T	FC0061	16.1	11.2	37.8 V	5.37	75.1 T	FC0061	16.3	12.4	37.5
PCB164	pg/g-Wet	41	41	100	108	8550	FC016	725	307	2230	108	8550	FC016	725	307	2230
PCB165	pg/g-Wet	41	40	97.6	4.02	766	FC016	42.1	14.9 V	89.7 V	1.97 U	766	FC016	41.1	14.7	84.1
PCB167	pg/g-Wet	41	41	100	167	9090	FC016	826	435	2270 T	167	9090	FC016	826	435	2270 T
PCB169	pg/g-Wet	41	1	2.44	3.57	3.57	FC031	3.57	3.57	3.57	1.99 U	230 U	FC016	6.81	2.52 U	20.2 U
PCB170	pg/g-Wet	41	41	100	108	18400	FC016	1210	389	3370	108	18400	FC016	1210	389	3370

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB171 & 173	pg/g-Wet	41	41	100	138	26200	FC016	1590	551	3650	138	26200	FC016	1590	551	3650
PCB172	pg/g-Wet	41	41	100	14.9	2420	FC016	154	53.6	409	14.9	2420	FC016	154	53.6	409
PCB174	pg/g-Wet	41	41	100	119	17700	FC016	1300	473	4190	119	17700	FC016	1300	473	4190
PCB175	pg/g-Wet	41	41	100	23.1	4970	FC016	279	93	624	23.1	4970	FC016	279	93	624
PCB176	pg/g-Wet	41	41	100	69.8	12300	FC016	795	277	2330	69.8	12300	FC016	795	277	2330
PCB177	pg/g-Wet	41	41	100	311	52400	FC016	3260	1180	8350	311	52400	FC016	3260	1180	8350
PCB178	pg/g-Wet	41	41	100	170	25900	FC016	1670	654	4280	170	25900	FC016	1670	654	4280
PCB179	pg/g-Wet	41	41	100	249	41900	FC016	2710	971	7770	249	41900	FC016	2710	971	7770
PCB180 & 193	pg/g-Wet	41	41	100	802	89400	FC016	6300	2510	11700	802	89400	FC016	6300	2510	11700
PCB181	pg/g-Wet	41	41	100	3.75	475	FC016	28.9	12.2	68.6	3.75	475	FC016	28.9	12.2	68.6
PCB182	pg/g-Wet	41	30	73.2	3.95	268	FC016	20.9	7.86 V	52.7 V	0.394 U	268	FC016	15.4	5.66	44.8
PCB183 & 185	pg/g-Wet	41	41	100	410	64400	FC016	4060	1390	9500	410	64400	FC016	4060	1390	9500
PCB184	pg/g-Wet	41	40	97.6	2.34	59.4	FC016	5.8	3.76 V	11 V	2.34	59.4	FC016	5.71	3.69	11
PCB186	pg/g-Wet	41	5	12.2	0.172 J	1.28	FC018	0.533	0.313 J	1.16 V	0.152 U	10.7 U	FC032	0.438	0.319 U	1.28
PCB187	pg/g-Wet	41	41	100	1030	105000	FC016	8250	3410	24000	1030	105000	FC016	8250	3410	24000
PCB188	pg/g-Wet	41	41	100	2	433	FC016	29	10.7	84.8	2	433	FC016	29	10.7	84.8
PCB189	pg/g-Wet	41	41	100	3.99	736	FC016	42.8	13.1	92.2	3.99	736	FC016	42.8	13.1	92.2
PCB190	pg/g-Wet	41	41	100	97.3	18500	FC016	1080	351	2220	97.3	18500	FC016	1080	351	2220
PCB191	pg/g-Wet	41	41	100	13.1	3060	FC016	171	52.2	389	13.1	3060	FC016	171	52.2	389
PCB192	pg/g-Wet	41	0	0	--	--	--	--	--	--	0.176 U	24.8 U	FC032	0.92	0.745 U	0.96 U
PCB194	pg/g-Wet	41	41	100	20.1	2490	FC016	168	50.9	429	20.1	2490	FC016	168	50.9	429
PCB195	pg/g-Wet	41	41	100	56.1	10100	FC016	588	181	1260	56.1	10100	FC016	588	181	1260
PCB196	pg/g-Wet	41	41	100	37.1	6870	FC016	399	123	839	37.1	6870	FC016	399	123	839
PCB197 & 200	pg/g-Wet	41	41	100	22.3	4130	FC016	231	75.9	534	22.3	4130	FC016	231	75.9	534
PCB198 & 199	pg/g-Wet	41	41	100	81.4	10100	FC016	672	250	1610	81.4	10100	FC016	672	250	1610
PCB201	pg/g-Wet	41	41	100	43.6	7300	FC016	397	134	775	43.6	7300	FC016	397	134	775
PCB202	pg/g-Wet	41	41	100	107	8040	FC016	626	305	1460	107	8040	FC016	626	305	1460
PCB203	pg/g-Wet	41	41	100	179	20000	FC016	1300	497	2480	179	20000	FC016	1300	497	2480
PCB204	pg/g-Wet	41	27	65.9	0.157 J	5.92	FC016	0.762	0.404 J	3.11 V	0.134 UT	30 U	FC032	0.926	0.3 J	3.77
PCB205	pg/g-Wet	41	41	100	8.61	1710	FC016	92.1	26.6	181	8.61	1710	FC016	92.1	26.6	181
PCB206	pg/g-Wet	41	41	100	33.5	1660	FC016	156	77.4	470	33.5	1660	FC016	156	77.4	470
PCB207	pg/g-Wet	41	41	100	7.06	396	FC016	31.6	16	71.7	7.06	396	FC016	31.6	16	71.7
PCB208	pg/g-Wet	41	41	100	15	400	FC016	62.2	37.1	128 T	15	400	FC016	62.2	37.1	128 T
PCB209	pg/g-Wet	41	41	100	21.4	534	FC028	57.1	42.7	85.2	21.4	534	FC028	57.1	42.7	85.2
Total PCB Congeners	pg/g-Wet	41	41	100	39100 JT	2650000 JT	FC016	234000	108000 JT	513000 T	39100 JT	2650000 JT	FC016	234000	108000 JT	513000 T
Total PCBs[d]																
Total PCBs	µg/kg-Wet	44	44	100	39.1 JT	2650 JT	FC016	224	105 JV	505 V	39.1 JT	2650 JT	FC016	224	105 JV	505 V
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	41	41	100	399 JT	49300 JT	FC016	4170	1620 T	10900 T	399 JT	49300 JT	FC016	4170	1620 T	10900 T
Heptachlorobiphenylhomologs	pg/g-Wet	41	41	100	3570 T	485000 T	FC016	32900	12400 T	83000 T	3570 T	485000 T	FC016	32900	12400 T	83000 T
Hexachlorobiphenyl homologs	pg/g-Wet	41	41	100	14000 T	1270000 T	FC016	93600	38000 T	232000 T	14000 T	1270000 T	FC016	93600	38000 T	232000 T
Monochlorobiphenyl homologs	pg/g-Wet	38	37	97.4	3.48 JT	116 JT	FC032	19.8	10 T	62.2 V	2.62 UT	116 JT	FC032	19.3	10 V	59.4 V
Nonachlorobiphenyl homologs	pg/g-Wet	41	41	100	56 T	2450 T	FC016	249	130 T	792 T	56 T	2450 T	FC016	249	130 T	792 T
Octachlorobiphenyl homologs	pg/g-Wet	41	41	100	556 JT	70800 T	FC016	4480	1590 T	9550 T	556 JT	70800 T	FC016	4480	1590 T	9550 T
Pentachlorobiphenylhomologs	pg/g-Wet	41	41	100	11600 T	382000 T	FC016	51100	27800 T	124000 T	11600 T	382000 T	FC016	51100	27800 T	124000 T
Tetrachlorobiphenyl homologs	pg/g-Wet	41	41	100	5730 T	279000 T	FC016	34800	18500 T	105000 T	5730 T	279000 T	FC016	34800	18500 T	105000 T
Trichlorobiphenyl homologs	pg/g-Wet	41	41	100	1300 T	114000 T	FC016	12800	5180 T	51200 T	1300 T	114000 T	FC016	12800	5180 T	51200 T

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	39	39	100	0.215	10.1	FC032	2.48	1.5	7.95 V	0.215	10.1	FC032	2.48	1.5	7.95 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	39	39	100	3.18	34.1	FC019	8.63	6.24	19.9 V	3.18	34.1	FC019	8.63	6.24	19.9 V
Hexachlorodibenzofuran homologs	pg/g-Wet	39	39	100	0.636	26.9	FC008	3.63	2.2	8.19 V	0.636	26.9	FC008	3.63	2.2	8.19 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	39	39	100	0.741	7.22	FC032	2.9	2.31	6.16 V	0.741	7.22	FC032	2.9	2.31	6.16 V
Octachlorodibenzofuran	pg/g-Wet	39	32	82.1	0.508 J	8.46 J	FC032	1.85	1.15 JV	5.56 V	0.508 J	8.46 J	FC032	1.59	1.05 J	4.39 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	39	39	100	8.65	110	FC019	25.8	16.9	95.6 V	8.65	110	FC019	25.8	16.9	95.6 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	39	39	100	1.28	43	FC008	6.14	3.44	18.6 V	1.28	43	FC008	6.14	3.44	18.6 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	39	38	97.4	0.063	2.53	FC015	1.14	1.11 V	2.35 V	0.063	2.53	FC015	1.13	1.08	2.34 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	39	39	100	4.05	56.4	FC018	12.9	10.3 T	24.1 V	4.05	56.4	FC018	12.9	10.3 T	24.1 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	39	39	100	3.21 T	13.6	FC017	6.76	6.22	11.2 V	3.21 T	13.6	FC017	6.76	6.22	11.2 V
Total PCDD/F	pg/g-Wet	39	39	100	25.3 JT	189 T	FC019	71.9	53.5 JT	172 JV	25.3 JT	189 T	FC019	71.9	53.5 JT	172 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	39	24	61.5	0.215 J	3.77 J	FC032	0.958	0.52 JV	2.11 V	0.215 J	3.77 J	FC032	0.712	0.432 JT	2.08 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	39	39	100	1.24 J	16.1 J	FC032	4.06	3.01	9.34 V	1.24 J	16.1 J	FC032	4.06	3.01	9.34 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	39	10	25.6	0.058 J	0.454 J	FC018	0.13	0.0935 JV	0.324 JV	0.053 U	2.2 U	FC032	0.111	0.0695 U	0.194 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	39	34	87.2	0.066 JT	4.8	FC018	0.52	0.167 JV	2.36 JV	0.066 JT	4.8	FC018	0.485	0.161 J	1.95 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	39	26	66.7	0.058 JT	0.248 J	FC029	0.129	0.114 JV	0.226 JV	0.058 JT	2.77 U	FC032	0.141	0.0905 JT	0.229 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	39	10	25.6	0.059 J	0.868 J	FC018	0.211	0.1 JV	0.656 JV	0.053 U	1.57 U	FC032	0.114	0.061 J	0.436 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	39	36	92.3	0.247 JT	1.82 J	FC032	0.681	0.566 JV	1.51 V	0.247 JT	1.82 J	FC032	0.646	0.468 J	1.49 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	39	0	0	--	--	--	--	--	--	0.057 U	2.22 U	FC032	0.0929	0.0665 U	0.101 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	39	30	76.9	0.058 J	0.939 J	FC032	0.247	0.185 JV	0.517 JV	0.058 J	0.939 J	FC032	0.212	0.161 J	0.494 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	39	29	74.4	0.057 J	7.01	FC018	0.648	0.205 JT	2.87 V	0.057 J	7.01	FC018	0.528	0.15 J	2.01 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	39	22	56.4	0.098 J	0.544 J	FC015	0.248	0.224 JV	0.445 JV	0.096 U	1.96 U	FC032	0.205	0.161 JT	0.458 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	39	7	17.9	0.086 JT	0.426 J	FC018	0.164	0.116 JT	0.364 JV	0.07 UT	1.84 U	FC032	0.101	0.058 U	0.24 JV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	39	25	64.1	0.124 J	6.33	FC008	0.989	0.364 J	5.31 V	0.115 U	6.33	FC008	0.71	0.238 J	3.34 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	39	35	89.7	0.316 J	24.4	FC018	2.59	1.29	9.03 V	0.316 J	24.4	FC018	2.37	1.28	6.66 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	39	4	10.3	0.165 J	0.432	FC017	0.257	0.216 JV	0.405 V	0.116 UT	1.05 U	FC028	0.186	0.146 U	0.442 UV
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	39	39	100	0.0963 JT	5.45 JT	FC018	0.802	0.437 JT	3.2 JV	0.0963 JT	5.45 JT	FC018	0.802	0.437 JT	3.2 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	42	42	100	0.286 JA	6.53 JT	FC018	2.1	1.72 JV	5.27 JV	0.286 JA	6.53 JT	FC018	2.1	1.72 JV	5.27 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	41	41	100	0.458 T	5.32 T	FC0061	1.38	1 T	3.23 T	0.458 T	5.32 T	FC0061	1.38	1 T	3.23 T
Pesticides																
2,4'-DDD	µg/kg-Wet	44	44	100	0.349	82 T	07R006	6.31	2.19 V	24.9 JV	0.349	82 T	07R006	6.31	2.19 V	24.9 JV
2,4'-DDE	µg/kg-Wet	44	43	97.7	0.0978 J	12.5 JT	07R006	1.06	0.441	3.34 V	0.0978 J	12.5 JT	07R006	1.05	0.455 V	3.33 V
2,4'-DDT	µg/kg-Wet	44	43	97.7	0.119 J	39 T	07R006	2.44	0.558	11.7 V	0.119 J	39 T	07R006	2.43	0.561 V	11.4 V
4,4'-DDD	µg/kg-Wet	44	44	100	1.28	160 T	07R006	17	7.61 V	80 V	1.28	160 T	07R006	17	7.61 V	80 V
4,4'-DDE	µg/kg-Wet	44	44	100	4.79	94.5 T	07R006	16.5	12.2 V	53.9 V	4.79	94.5 T	07R006	16.5	12.2 V	53.9 V
4,4'-DDT	µg/kg-Wet	44	43	97.7	0.345	75 T	07R006	5.71	1.56	30.7 V	0.345	75 T	07R006	5.67	1.57 V	30 V
Aldrin	µg/kg-Wet	44	40	90.9	0.11 J	5.07	FC028	0.361	0.224 JV	0.405 V	0.0901 U	5.07	FC028	0.365	0.227 JV	0.524 V
alpha-Endosulfan	µg/kg-Wet	44	37	84.1	0.084 J	0.244	FC029	0.143	0.138 J	0.223 V	0.072 U	1 U	06R002; 07R003; 07R006	0.162	0.139 JV	0.462 V
alpha-Hexachlorocyclohexane	µg/kg-Wet	44	13	29.5	0.00569 JT	0.0205 J	FC029	0.0124	0.0128 J	0.0195 JV	0.00569 JT	1.06 U	FC032	0.0549	0.00669 JV	0.5 UV
beta-Endosulfan	µg/kg-Wet	44	36	81.8	0.124 J	0.262	FC029	0.175	0.16 JV	0.254 V	0.067 U	2.1 UT	07R006	0.201	0.16 JV	0.472 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	44	1	2.27	1.2 NJ	1.2 NJ	06R002	1.2	1.2 NJ	1.2 NJ	0.00303 U	8.5 UT	07R006	0.159	0.0209 UV	0.477 UJV
cis-Chlordane	µg/kg-Wet	44	42	95.5	0.447 J	5.12	FC028	1.14	0.895 V	2.18 V	0.447 J	5.12	FC028	1.11	0.881 V	2.15 V
cis-Nonachlor	µg/kg-Wet	44	41	93.2	0.216 J	1.08	FC028	0.454	0.404 J	0.759	0.216 J	12 U	07R003	0.654	0.415 JV	1.07 V
delta-Hexachlorocyclohexane	µg/kg-Wet	44	7	15.9	0.00102 JT	0.00425 J	FC017	0.00208	0.00142 J	0.00418 JV	0.000983 U	1 U	06R002; 07R003; 07R006	0.0442	0.00142 JV	0.448 UV
Dieldrin	µg/kg-Wet	44	41	93.2	0.338 J	2.62	FC028	0.824	0.732	1.19	0.338 J	2.62	FC028	0.801	0.717 V	1.18 JV
Endosulfan sulfate	µg/kg-Wet	44	37	84.1	0.287 J	1	FC028	0.635	0.665	0.897 V	0.205 U	1	06R002; 07R003; 07R006; FC028	0.581	0.57 V	0.894 V
Endrin	µg/kg-Wet	44	19	43.2	0.00549 J	0.0635 J	FC028	0.0186	0.0101 JT	0.0554 JV	0.00315 U	2.4 UT	07R006	0.0618	0.00945 JV	0.435 JV
Endrin aldehyde	µg/kg-Wet	44	1	2.27	0.39 J	0.39 J	07R003	0.39	0.39 J	0.39 J	0.015 U	1 UJ	06R002; 07R006	0.054	0.00995 UV	0.355 JV
Endrin ketone	µg/kg-Wet	44	12	27.3	0.00183 JT	0.0136 J	FC020	0.00457	0.00343 JV	0.0108 JV	0.00127 U	1 U	06R002; 07R003; 07R006	0.056	0.00367 JV	0.475 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	44	36	81.8	0.018 J	0.0837 J	FC017	0.0559	0.0633 JV	0.079 JV	0.018 J	1 U	06R002; 07R003; 07R006	0.0877	0.0633 JV	0.463 UV
Heptachlor	µg/kg-Wet	44	19	43.2	0.0073 J	0.419 J	FC017	0.0408	0.0139 J	0.0899 JV	0.00457 U	1 U	06R002; 07R003; 07R006	0.0555	0.00901 JV	0.488 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Heptachlor epoxide	µg/kg-Wet	44	39	88.6	0.033 J	2.1 N	06R002	0.143	0.0552 J	0.229 JV	0.027 U	8 UT	07R006	0.22	0.0538 JV	1.12 JV
Methoxychlor	µg/kg-Wet	44	2	4.55	0.0937 J	0.323	FC011	0.208	0.208 JV	0.312 JV	0.0114 U	1.6 UJ	06R002	0.0652	0.013 UV	0.473 JV
Mirex	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	06R002; 07R003; 07R006	0.5	0.5 U	0.5 UV
Oxychlordane	µg/kg-Wet	44	33	75	0.0415 J	0.105 J	FC017	0.0688	0.064 J	0.101 JV	0.0382 U	1.13 U	FC032	0.104	0.0627 JV	0.5 UV
Total Chlordanes	µg/kg-Wet	44	44	100	1.1 NJT	16 JT	FC028	3.72	3.17 JV	6.23 JV	1.1 NJT	16 JT	FC028	3.72	3.17 JV	6.23 JV
Total Endosulfan	µg/kg-Wet	44	40	90.9	0.087 JT	1.47 T	FC028	0.877	0.881 JV	1.35 V	0.087 JT	2.1 UT	07R006	0.847	0.854 JV	1.35 V
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	44	44	100	1.63 T	242 T	07R006	23.4	10.2 V	105 JV	1.63 T	242 T	07R006	23.4	10.2 V	105 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	44	44	100	7.44 JT	463 JT	07R006	48.9	23.6 V	175 JV	7.44 JT	463 JT	07R006	48.9	23.6 V	175 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	44	44	100	4.89 JT	107 JT	07R006	17.5	12.6 V	59.9 V	4.89 JT	107 JT	07R006	17.5	12.6 V	59.9 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	44	43	97.7	0.464 JT	114 T	07R006	8.15	2.05 T	42.4 V	0.464 JT	114 T	07R006	8.06	2.07 V	41.4 V
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	34	34	100	7.16 T	330 T	07R006	45.2	20.9 V	175 V	7.16 T	330 T	07R006	45.2	20.9 V	175 V
Toxaphene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	50 U	140 U	06R002	53	65 U	70 UV
trans-Chlordane	µg/kg-Wet	44	43	97.7	0.324 J	5.57	FC028	0.907	0.679	1.77 JV	0.324 J	5.57	FC028	0.898	0.673 V	1.76 JV
trans-Nonachlor	µg/kg-Wet	44	42	95.5	0.607	4.15	FC028	1.34	1.16 V	2.67 JV	0.607	4.15	FC028	1.3	1.12 V	2.6 JV
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	10	9	90	0.81 J	1.7	CA04W; CA05W	1.2	1.2	1.7 V	0.6 U	1.7	CA04W; CA05W	1.1	1.1 JV	1.7 V
2-Methylnaphthalene	µg/kg-Wet	42	38	90	1.2 JT	22	FC025	2.8	1.8 V	5.8 V	0.88 U	33 UT	06R002	3.7	1.8 JV	16 UV
Acenaphthene	µg/kg-Wet	42	38	90.5	0.22 JT	61	FC015	4.15	1.2 V	21 V	0.091 U	61	FC015	5.24	1.25 V	21 V
Acenaphthylene	µg/kg-Wet	42	33	78.6	0.28 JT	14	FC014; FC015	2.26	1.4	8.36 V	0.092 U	33 UT	06R002	2.93	1.25 V	15.4 V
Anthracene	µg/kg-Wet	42	39	92.9	1.1	78	FC015	9.47	5.2	33.5 V	1.1	78	FC015	9.94	5.35 V	29.7 V
Benzo(a)anthracene	µg/kg-Wet	42	40	95.2	1.9	670	FC014	61.3	18 V	183 V	1.9	670	FC014	59.2	17.5 V	160 V
Benzo(a)pyrene	µg/kg-Wet	42	36	86	0.32 J	490	FC015	34	4.6 V	160 V	0.16 U	490	FC015	30	4.6 V	59 V
Benzo(b)fluoranthene	µg/kg-Wet	42	35	83.3	0.955 T	460	FC015	36.3	5.1	176 V	0.43 U	460	FC015	31.4	5.1 V	65.8 V
Benzo(e)pyrene	µg/kg-Wet	10	10	100	1.2	11	CA05W	4.2	3 V	10 V	1.2	11	CA05W	4.2	3 V	10 V
Benzo(g,h,i)perylene	µg/kg-Wet	42	35	83.3	0.485 JT	230	FC014; FC015	16.8	2.7	85.1 V	0.42 U	230	FC014; FC015	17.3	2.5 V	78 UV
Benzo(k)fluoranthene	µg/kg-Wet	42	33	79	0.47 JT	310	FC015	24	3.5	140 V	0.21 U	310	FC015	20	3.2 V	42 V
C1-Chrysene	µg/kg-Wet	10	9	90	5.1 J	23	CA05W	11	9.3 J	19 V	0.16 U	23	CA05W	9.7	8.7 JV	19 V
C1-Dibenzothiophene	µg/kg-Wet	10	5	50	3 JT	12	CA05W	7.2	7 J	12 V	0.15 U	12	CA05W	3.6	1.5 JV	11 V
C1-Fluoranthene/pyrene	µg/kg-Wet	10	10	100	6.8 J	39	CA05W	18	18 V	34 V	6.8 J	39	CA05W	18	18 V	34 V
C1-Fluorene	µg/kg-Wet	10	7	70	2.5 J	9 J	CA05W	5.6	5.7 J	8.3 JV	0.3 U	9 J	CA05W	4	4.8 JV	8 JV
C1-Phenanthrene/anthracene	µg/kg-Wet	10	10	100	5.3 J	28	CA05W	13	13 V	23 V	5.3 J	28	CA05W	13	13 V	23 V
C2-Chrysene	µg/kg-Wet	10	2	20	26	51	CA12E	39	39 V	50 V	0.15 U	51	CA12E	7.8	0.08 UV	40 V
C2-Dibenzothiophene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	0.15 U	0.15 U	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	0.075	0.075 UV	0.075 UV
C2-Fluoranthene/pyrene	µg/kg-Wet	10	6	60	7.6 JT	22	CA05W	12	9.5 JV	20 V	0.2 U	22	CA05W	7.2	7.7 JV	19 V
C2-Fluorene	µg/kg-Wet	10	9	90	4.5 J	16	CA03W; CA05W	10	10	16 V	0.3 U	16	CA03W; CA05W	9.2	9.8 JV	16 V
C2-Naphthalene	µg/kg-Wet	10	9	90	1.5 J	6.1 J	CA05W	3.9	3.5 J	5.9 JV	0.8 U	6.1 J	CA05W	3.5	3.3 JV	5.9 JV
C2-Phenanthrene/anthracene	µg/kg-Wet	10	10	100	9.3 J	49	CA05W	25	27 V	41 V	9.3 J	49	CA05W	25	27 V	41 V
C3-Chrysene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	0.15 U	0.16 U	CA01E; CA03W; CA04W; CA10W; CA11E; CA12W	0.078	0.08 UV	0.08 UV
C3-Dibenzothiophene	µg/kg-Wet	10	4	40	4.7 J	8.4 J	CA03W	5.9	5.3 JV	8 JV	0.15 U	8.4 J	CA03W	2.4	0.075 UV	7.2 JV
C3-Fluoranthene/pyrene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	0.19 U	0.2 U	CA01E; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	0.1	0.1 UV	0.1 UV
C3-Fluorene	µg/kg-Wet	10	7	70	7.7 J	21	CA03W; CA05W	16	15	21 V	0.3 U	21	CA03W; CA05W	11	14 V	21 V
C3-Naphthalene	µg/kg-Wet	10	9	90	2.4 J	15	CA05W	8.3	8.6 J	13 V	0.8 U	15	CA05W	7.5	8.1 JV	13 V
C3-Phenanthrene/anthracene	µg/kg-Wet	10	10	100	9.2 J	36	CA05W	20	19 V	32 V	9.2 J	36	CA05W	20	19 V	32 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
C4-Chrysene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	0.15 U	0.16 U	CA01E; CA03W; CA04W; CA10W; CA11E; CA12W	0.078	0.08 UV	0.08 UV
C4-Naphthalene	µg/kg-Wet	10	8	80	4.7 J	24	CA05W	15	13 V	23 V	0.8 U	24	CA05W	12	11 JV	23 V
C4-Phenanthrene/anthracene	µg/kg-Wet	10	10	100	9.5 J	25	CA05W	16	15 V	24 V	9.5 J	25	CA05W	16	15 V	24 V
Chrysene	µg/kg-Wet	42	40	95	3.2	560	FC014; FC015	63	25 V	170 V	3.2	560	FC014; FC015	61	23 V	150 V
Dibenzo(a,h)anthracene	µg/kg-Wet	42	11	26	0.5 J	43	FC015	8.9	1.3	40 V	0.11 U	43	FC015	3.5	0.11 UV	16 UV
Dibenzothiophene	µg/kg-Wet	10	5	50	0.7 JT	3.2	CA04W	1.8	1.4	3 V	0.15 U	3.2	CA04W	0.94	0.39 JV	2.8 V
Fluoranthene	µg/kg-Wet	42	42	100	5.5	770	FC014	96	50 V	250 V	5.5	770	FC014	96	50 V	250 V
Fluorene	µg/kg-Wet	42	39	92.9	0.63 J	36	FC015	4.5	2.5	16.4 V	0.63 J	36	FC015	5.32	2.95 V	16.5 UV
High Molecular Weight PAH	µg/kg-Wet	42	42	100	16 JT	4450 T	FC014	421	151 JV	1050 V	16 JT	4450 T	FC014	421	151 JV	1050 V
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	42	29	69	0.15 J	170	FC015	14	2.5	100 V	0.13 U	170	FC015	11	1.7 V	16 UV
Low Molecular Weight PAH	µg/kg-Wet	42	39	92.9	6.1 JT	542 T	FC015	61	30.5 T	247 V	6.1 JT	542 T	FC015	58.2	29.3 V	234 V
Naphthalene	µg/kg-Wet	42	5	12	2.6	78	CA12E	25	9	69 V	0.97 UT	78	CA12E	4.9	0.93 UV	16 UV
Perylene	µg/kg-Wet	10	6	60	0.26 J	1.3	CA04W	0.67	0.6 JV	1.2 V	0.13 U	1.3	CA04W	0.43	0.27 JV	1.2 V
Phenanthrene	µg/kg-Wet	42	39	93	2.7	300	FC015	35	16	160 V	2.7	300	FC015	34	16 V	160 V
Pyrene	µg/kg-Wet	42	42	100	4.9	850	FC014	102	48 V	278 V	4.9	850	FC014	102	48 V	278 V
Total BaPEq	µg/kg-Wet	42	40	95.2	0.194 T	663 T	FC015	43.5	6.69 V	118 V	0.194 T	663 T	FC015	42.2	7.38 V	89.8 V
Total cPAHs	µg/kg-Wet	42	40	95	5.7 T	2700 T	FC015	220	59 JV	600 V	5.7 T	2700 T	FC015	210	57 JV	500 V
Total PAHs	µg/kg-Wet	42	42	100	22 JT	4980 T	FC015	478	181 JV	1170 V	22 JT	4980 T	FC015	478	181 JV	1170 V
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	41	7	17	77 J	150 J	CA05W; CA12E	120	120 J	150 JV	53 U	340 UT	07R006	54	33 U	150 J
Butylbenzylphthalate	µg/kg-Wet	41	0	0	--	--	--	--	--	--	7.3 U	330 U	06R002	19	7 U	160 U
Dibutyl phthalate	µg/kg-Wet	41	1	2.4	1300	1300	FC022	1300	1300	1300	16 U	1300	FC022	57	8 U	240 U
Diethyl phthalate	µg/kg-Wet	41	0	0	--	--	--	--	--	--	11 U	160 U	06R002; 07R003; 07R006	14	8 U	80 U
Dimethyl phthalate	µg/kg-Wet	41	0	0	--	--	--	--	--	--	5.1 U	160 U	06R002; 07R003; 07R006	9.2	3.9 U	80 U
Di-n-octyl phthalate	µg/kg-Wet	41	0	0	--	--	--	--	--	--	11 U	640 U	FC026	30	6.5 U	200 UT
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	41	0	0	--	--	--	--	--	--	9.8 U	33 UT	06R002	6.9	5 U	16 UT
1,2-Dichlorobenzene	µg/kg-Wet	41	0	0	--	--	--	--	--	--	11 U	33 UT	06R002	8	6 UJ	16 UJ
1,2-Diphenylhydrazine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	31 U	33 U	06R002	16	16 U	16 UV
1,3-Dichlorobenzene	µg/kg-Wet	41	0	0	--	--	--	--	--	--	11 UJ	33 UT	06R002	7.6	5.5 U	16 UT
1,4-Dichlorobenzene	µg/kg-Wet	41	0	0	--	--	--	--	--	--	11 UJ	33 UT	06R002	7.6	5.5 U	16 UT
2,4-Dinitrotoluene	µg/kg-Wet	13	0	0	--	--	--	--	--	--	15 U	74 UT	07R003	14	7.5 U	34 UV
2,6-Dinitrotoluene	µg/kg-Wet	13	0	0	--	--	--	--	--	--	14 U	33 UT	06R002	9.1	7 U	16 UV
2-Chloronaphthalene	µg/kg-Wet	13	0	0	--	--	--	--	--	--	6.7 U	33 UT	06R002	6.3	3.4 U	16 UV
2-Nitroaniline	µg/kg-Wet	13	0	0	--	--	--	--	--	--	31 U	820 U	06R002	100	16 U	410 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	13	0	0	--	--	--	--	--	--	1000 U	1600 U	06R002; 07R003; 07R006	570	500 U	800 UV
3-Nitroaniline	µg/kg-Wet	13	0	0	--	--	--	--	--	--	400 U	820 U	06R002	250	200 U	410 UV
4-Bromophenylphenyl ether	µg/kg-Wet	13	0	0	--	--	--	--	--	--	6.9 U	33 UT	06R002	6.3	3.5 U	16 UV
4-Chloroaniline	µg/kg-Wet	13	0	0	--	--	--	--	--	--	160 UT	400 U	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	170	200 U	200 UV
4-Chlorophenylphenyl ether	µg/kg-Wet	13	0	0	--	--	--	--	--	--	6.4 U	82 UT	06R002	12	3.2 U	41 UV
4-Nitroaniline	µg/kg-Wet	13	0	0	--	--	--	--	--	--	400 U	820 U	06R002	250	200 U	410 UV
Aniline	µg/kg-Wet	10	1	10	800 JT	800 JT	CA01E	800	800 JT	800 JT	800 JT	800 JT	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	440	400 UV	620 JV
Azobenzene	µg/kg-Wet	13	0	0	--	--	--	--	--	--	40 U	160 U	06R002; 07R003; 07R006	34	20 U	80 UV
Benzoic acid	µg/kg-Wet	10	10	100	1900	5900	CA03W	3800	3800 V	5600 V	1900	5900	CA03W	3800	3800 V	5600 V
Benzyl alcohol	µg/kg-Wet	41	31	75.6	8.6 J	1300 T	07R003	69.3	18 J	115 JV	6.7 U	1300 T	07R003	62	13.5 JT	155 U

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	160 U	160 U	06R002; 07R003; 07R006	80	80 UT	80 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	13	1	7.7	46	46	CA03W	46	46	46	8.3 U	160 U	06R002; 07R003; 07R006	25	4.2 U	80 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	13	0	0	--	--	--	--	--	--	13 U	33 UT	06R002	8.7	6.5 U	16 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	13 U	13 U	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	6.5	6.5 UV	6.5 UV
Carbazole	µg/kg-Wet	3	0	0	--	--	--	--	--	--	31 UT	33 UT	06R002	16	16 UT	16 UV
Dibenzofuran	µg/kg-Wet	42	35	83.3	0.46 J	17	FC025	1.71	1.1	3.31 V	0.071 U	33 UT	06R002	2.57	1.1 V	16 UV
Hexachlorobenzene	µg/kg-Wet	45	41	91.1	0.373	1.07	FC017	0.611	0.624	0.839 J	0.373	12 U	FC009	0.788	0.629	1.02 V
Hexachlorobutadiene	µg/kg-Wet	41	5	12.2	0.00344 JT	0.025 J	FC014	0.00939	0.00527 J	0.0219 JV	0.00344 JT	23 U	FC011	3.57	4.25 U	8.5 U
Hexachlorocyclopentadiene	µg/kg-Wet	13	0	0	--	--	--	--	--	--	780 U	1000 U	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	480	500 U	500 UV
Hexachloroethane	µg/kg-Wet	41	0	0	--	--	--	--	--	--	8.5 UJ	33 UT	06R002	7.3	8.5 U	12 U
Isophorone	µg/kg-Wet	10	0	0	--	--	--	--	--	--	9.2 U	9.2 U	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	4.6	4.6 UV	4.6 UV
Nitrobenzene	µg/kg-Wet	13	10	77	78	520	CA03W	250	210 V	470 V	33 UT	520	CA03W	190	190	450 V
N-Nitrosodimethylamine	µg/kg-Wet	13	0	0	--	--	--	--	--	--	40 U	780 U	07R006	59	20 U	220 UV
N-Nitrosodiphenylamine	µg/kg-Wet	41	0	0	--	--	--	--	--	--	6.6 U	160 U	06R002; 07R003; 07R006	11	4.8 U	80 U
N-Nitrosodipropylamine	µg/kg-Wet	13	0	0	--	--	--	--	--	--	22 U	33 UT	06R002	12	11 U	16 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1600 U	1600 U	06R002; 07R003; 07R006	800	800 UT	800 UV
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	20 U	20 U	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	10	10 UV	10 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1600 U	1600 U	06R002; 07R003; 07R006	800	800 UT	800 UV
2,4,5-Trichlorophenol	µg/kg-Wet	13	0	0	--	--	--	--	--	--	14 U	820 U	06R002	98	7 U	410 UV
2,4,6-Trichlorophenol	µg/kg-Wet	13	0	0	--	--	--	--	--	--	9.1 U	33 UT	06R002	7.2	4.6 U	16 UV
2,4-Dichlorophenol	µg/kg-Wet	13	0	0	--	--	--	--	--	--	9.5 U	33 UT	06R002	7.3	4.8 U	16 UV
2,4-Dimethylphenol	µg/kg-Wet	41	0	0	--	--	--	--	--	--	13 U	490 U	06R002; 07R003	26	9.5 U	240 U
2,4-Dinitrophenol	µg/kg-Wet	13	0	0	--	--	--	--	--	--	800 U	3300 U	06R002	680	400 U	1600 UV
2-Chlorophenol	µg/kg-Wet	13	0	0	--	--	--	--	--	--	7.5 U	33 UT	06R002	6.6	3.8 U	16 UV
2-Methylphenol	µg/kg-Wet	41	0	0	--	--	--	--	--	--	8.2 U	160 U	06R002; 07R003; 07R006	32	27 U	80 U
2-Nitrophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	12 U	12 U	CA01E; CA02W; CA03W; CA04W; CA05E; CA05W; CA10W; CA11E; CA12E; CA12W	6	6 UV	6 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	13	0	0	--	--	--	--	--	--	400 U	3300 U	06R002	520	200 U	1600 UV
4-Chloro-3-methylphenol	µg/kg-Wet	13	0	0	--	--	--	--	--	--	6.8 U	330 U	06R002	40	3.4 U	160 UV
4-Methylphenol	µg/kg-Wet	41	0	0	--	--	--	--	--	--	7.7 U	40 U	FC011	9	7.5 U	16 UT
4-Nitrophenol	µg/kg-Wet	13	1	7.7	19 J	19 J	CA02W	19	19 J	19 J	9.9 U	1600 U	06R002; 07R003; 07R006	190	5 U	800 UV
Pentachlorophenol	µg/kg-Wet	13	1	7.7	30 JT	30 JT	CA01E	30	30 JT	30 JT	30 JT	160 UT	06R002; 07R003; 07R006	31	15 U	80 UV
Phenol	µg/kg-Wet	41	1	2.4	2600 T	2600 T	07R003	2600	2600 T	2600 T	17 U	2600 T	07R003	85	17 U	160 U

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Clam (Corbicula spp. – depurated w/o shell)																
Conventionals																
Lipids	percent-Wet	5	5	100	1	2.14	CA02W	1.63	1.62	2.1 V	1	2.14	CA02W	1.63	1.62	2.1 V
Total solids	percent-Wet	5	5	100	10.7	16.3	CA02W	13.2	13.3	15.8 V	10.7	16.3	CA02W	13.2	13.3	15.8 V
Metals																
Aluminum	mg/kg-Wet	5	5	100	21.3 J	61.8 J	CA12E	36.9	32.4 J	58.9 JV	21.3 J	61.8 J	CA12E	36.9	32.4 J	58.9 JV
Antimony	mg/kg-Wet	5	0	0	--	--	--	--	--	--	0.002 U	0.004 U	CA10W	0.0014	0.0015 U	0.0019 UV
Arsenic	mg/kg-Wet	5	5	100	0.76	1.35	CA02W	0.949	0.819	1.28 V	0.76	1.35	CA02W	0.949	0.819	1.28 V
Cadmium	mg/kg-Wet	5	5	100	0.052 J	0.104 J	CA01E	0.081	0.09 J	0.103 JV	0.052 J	0.104 J	CA01E	0.081	0.09 J	0.103 JV
Chromium	mg/kg-Wet	5	5	100	0.4	0.5	CA02W; CA10W; CA12E	0.46	0.5	0.5 V	0.4	0.5	CA02W; CA10W; CA12E	0.46	0.5	0.5 V
Copper	mg/kg-Wet	5	5	100	6.85	9.03	CA02W	7.63	7.59	8.75 V	6.85	9.03	CA02W	7.63	7.59	8.75 V
Lead	mg/kg-Wet	5	5	100	0.023	0.114	CA12E	0.0564	0.054	0.103 V	0.023	0.114	CA12E	0.0564	0.054	0.103 V
Manganese	mg/kg-Wet	5	5	100	4.06	5.06	CA10W	4.57	4.48	5.05 V	4.06	5.06	CA10W	4.57	4.48	5.05 V
Mercury	mg/kg-Wet	4	4	100	0.0156 J	0.0223 J	CA02W; CA12E	0.0199	0.0209 JV	0.0223 JV	0.0156 J	0.0223 J	CA02W; CA12E	0.0199	0.0209 JV	0.0223 JV
Nickel	mg/kg-Wet	5	5	100	0.121	0.204	CA10W	0.179	0.194	0.202 V	0.121	0.204	CA10W	0.179	0.194	0.202 V
Selenium	mg/kg-Wet	5	5	100	0.12	0.18 J	CA10W	0.15	0.15	0.18 JV	0.12	0.18 J	CA10W	0.15	0.15	0.18 JV
Silver	mg/kg-Wet	5	5	100	0.0211	0.0753	CA12E	0.0479	0.056	0.0726 V	0.0211	0.0753	CA12E	0.0479	0.056	0.0726 V
Thallium	mg/kg-Wet	5	5	100	0.0006 J	0.0027 J	CA02W	0.00144	0.001 J	0.00256 JV	0.0006 J	0.0027 J	CA02W	0.00144	0.001 J	0.00256 JV
Zinc	mg/kg-Wet	5	5	100	19.3	27.9	CA10W	22.9	22.4	27.1 V	19.3	27.9	CA10W	22.9	22.4	27.1 V
Butyltins																
Butyltin ion	µg/kg-Wet	4	2	50	1.5 J	2.8 J	CA01E	2.2	2.2 JV	2.7 JV	1.3 U	4.4 U	CA02W	1.8	1.9 JV	2.7 JV
Dibutyltin ion	µg/kg-Wet	4	0	0	--	--	--	--	--	--	2 U	6.7 U	CA02W	1.6	1 UV	3 UV
Tetrabutyltin	µg/kg-Wet	4	0	0	--	--	--	--	--	--	5 U	17 U	CA02W	4	2.5 UV	7.6 UV
Tributyltin ion	µg/kg-Wet	4	0	0	--	--	--	--	--	--	4 U	14 U	CA02W	3.3	2.1 UV	6.3 UV
PCB Congeners																
PCB001	pg/g-Wet	5	5	100	3.56	592	CA10W	129	12.8	479 V	3.56	592	CA10W	129	12.8	479 V
PCB002	pg/g-Wet	5	2	40	6.72	17.7	CA10W	12.2	12.2 V	17.2 V	1.91 U	17.7	CA10W	5.56	1.31 U	15.5 V
PCB003	pg/g-Wet	5	1	20	39.5	39.5	CA10W	39.5	39.5	39.5	2.03 U	39.5	CA10W	8.84	1.23 U	31.9 V
PCB004	pg/g-Wet	5	5	100	220	26600	CA11E	7050	1230	22600 V	220	26600	CA11E	7050	1230	22600 V
PCB005	pg/g-Wet	5	4	80	1.56	48.1	CA10W	14.4	3.97 V	41.5 V	1.46 U	48.1	CA10W	11.7	3.55	39.4 V
PCB006	pg/g-Wet	5	5	100	30	1140	CA10W	300	112	940 V	30	1140	CA10W	300	112	940 V
PCB007	pg/g-Wet	5	5	100	0.963	5.63	CA10W	3.43	2.88	5.48 V	0.963	5.63	CA10W	3.43	2.88	5.48 V
PCB008	pg/g-Wet	5	5	100	42.4	698	CA10W	253	157	605 V	42.4	698	CA10W	253	157	605 V
PCB009	pg/g-Wet	5	5	100	1.59	12.7	CA10W	6.18	5.22	11.5 V	1.59	12.7	CA10W	6.18	5.22	11.5 V
PCB010	pg/g-Wet	5	5	100	2.94	231	CA11E	68.4	17.1	201 V	2.94	231	CA11E	68.4	17.1	201 V
PCB011	pg/g-Wet	5	5	100	571	1620	CA02W	1060	1060	1580 V	571	1620	CA02W	1060	1060	1580 V
PCB012 & 013	pg/g-Wet	5	5	100	9.21	76.3	CA10W	36.1	25.1	70.3 V	9.21	76.3	CA10W	36.1	25.1	70.3 V
PCB014	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.526 U	1.4 U	CA11E	0.386	0.302 U	0.638 UV
PCB015	pg/g-Wet	5	5	100	21.1	76.8	CA10W	48	57.5	73.4 V	21.1	76.8	CA10W	48	57.5	73.4 V
PCB016	pg/g-Wet	5	5	100	177	564	CA01E	384	473	548 V	177	564	CA01E	384	473	548 V
PCB017	pg/g-Wet	5	5	100	218	7670	CA11E	2390	946	6620 V	218	7670	CA11E	2390	946	6620 V
PCB018 & 030	pg/g-Wet	5	5	100	380	1400	CA11E	1100	1270	1390 V	380	1400	CA11E	1100	1270	1390 V
PCB019	pg/g-Wet	5	5	100	108	19600	CA11E	4370	485	15900 V	108	19600	CA11E	4370	485	15900 V
PCB020 & 028	pg/g-Wet	5	5	100	258	880	CA01E	547	494	857 V	258	880	CA01E	547	494	857 V
PCB021 & 033	pg/g-Wet	5	5	100	145	415	CA01E	279	244	406 V	145	415	CA01E	279	244	406 V
PCB022	pg/g-Wet	5	5	100	168	641	CA01E	373	416	607 V	168	641	CA01E	373	416	607 V
PCB023	pg/g-Wet	5	1	20	0.584 J	0.584 J	CA02W	0.584	0.584 J	0.584 J	0.432 U	0.665 U	CA11E	0.33	0.261 U	0.534 JV
PCB024	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.263 U	0.272 U	CA11E; CA12E	0.134	0.133 U	0.136 UV
PCB025	pg/g-Wet	5	5	100	67.1	515	CA11E	190	127	439 V	67.1	515	CA11E	190	127	439 V
PCB026 & 029	pg/g-Wet	5	5	100	58.1	233	CA11E	178	208	231 V	58.1	233	CA11E	178	208	231 V
PCB027	pg/g-Wet	5	5	100	82.3	4130	CA11E	1090	321	3440 V	82.3	4130	CA11E	1090	321	3440 V
PCB031	pg/g-Wet	5	5	100	148	569	CA01E	366	360	560 V	148	569	CA01E	366	360	560 V
PCB032	pg/g-Wet	5	5	100	167	1010	CA11E	408	270	892 V	167	1010	CA11E	408	270	892 V
PCB034	pg/g-Wet	5	5	100	0.989	4.23	CA01E	2.72	3.12	4.11 V	0.989	4.23	CA01E	2.72	3.12	4.11 V
PCB035	pg/g-Wet	5	5	100	7.24	17.1	CA02W	11.9	12.6	16.6 V	7.24	17.1	CA02W	11.9	12.6	16.6 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB036	pg/g-Wet	5	4	80	2.24	3.95	CA02W	3.02	2.94 V	3.87 V	0.607 U	3.95	CA02W	2.47	2.45	3.85 V
PCB037	pg/g-Wet	5	5	100	57.7	249	CA01E	145	152	241 V	57.7	249	CA01E	145	152	241 V
PCB038	pg/g-Wet	5	4	80	1.15	4.96	CA01E	3.26	3.47 V	4.84 V	0.895 U	4.96	CA01E	2.7	2.75	4.81 V
PCB039	pg/g-Wet	5	5	100	4.04	22.4	CA01E	11.4	9.55	20.5 V	4.04	22.4	CA01E	11.4	9.55	20.5 V
PCB040 & 041 & 071	pg/g-Wet	5	5	100	593	2180	CA11E	1340	1080	2110 V	593	2180	CA11E	1340	1080	2110 V
PCB042	pg/g-Wet	5	5	100	421	2430	CA01E	1220	1020	2200 V	421	2430	CA01E	1220	1020	2200 V
PCB043	pg/g-Wet	5	3	60	36	67.3	CA01E	49	43.8	65 V	0.415 U	67.3	CA01E	29.5	36	62.6 V
PCB044 & 047 & 065	pg/g-Wet	5	5	100	3160	8120	CA11E	5740	4940	8080 V	3160	8120	CA11E	5740	4940	8080 V
PCB045 & 051	pg/g-Wet	5	5	100	508	5220	CA11E	1750	699	4510 V	508	5220	CA11E	1750	699	4510 V
PCB046	pg/g-Wet	5	5	100	27.5	126	CA11E	66.6	54.1	116 V	27.5	126	CA11E	66.6	54.1	116 V
PCB048	pg/g-Wet	5	5	100	138	797	CA01E	411	391	731 V	138	797	CA01E	411	391	731 V
PCB049 & 069	pg/g-Wet	5	5	100	933	4830	CA11E	2070	1680	4220 V	933	4830	CA11E	2070	1680	4220 V
PCB050 & 053	pg/g-Wet	5	5	100	970	17400	CA11E	4500	1360	14200 V	970	17400	CA11E	4500	1360	14200 V
PCB052	pg/g-Wet	5	5	100	955	8030	CA11E	3780	3400	7300 V	955	8030	CA11E	3780	3400	7300 V
PCB054	pg/g-Wet	5	5	100	29.1	754	CA11E	181	39.3	614 V	29.1	754	CA11E	181	39.3	614 V
PCB055	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.579 U	1.8 U	CA10W	0.522	0.448 U	0.826 UV
PCB056	pg/g-Wet	5	5	100	235	1320	CA01E	598	579	1170 V	235	1320	CA01E	598	579	1170 V
PCB057	pg/g-Wet	5	5	100	1.86	9.67	CA01E	5.71	5.84	8.99 V	1.86	9.67	CA01E	5.71	5.84	8.99 V
PCB058	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.542 U	1.78 U	CA10W	0.507	0.442 U	0.817 UV
PCB059 & 062 & 075	pg/g-Wet	5	5	100	107	439	CA01E	255	258	415 V	107	439	CA01E	255	258	415 V
PCB060	pg/g-Wet	5	5	100	86	479	CA01E	216	192	430 V	86	479	CA01E	216	192	430 V
PCB061 & 070 & 074 & 076	pg/g-Wet	5	5	100	875	3460	CA01E	2160	2020	3440 V	875	3460	CA01E	2160	2020	3440 V
PCB063	pg/g-Wet	5	5	100	29.9	94.8	CA01E	56.3	60.2	87.9 V	29.9	94.8	CA01E	56.3	60.2	87.9 V
PCB064	pg/g-Wet	5	5	100	175	990	CA01E	512	558	905 V	175	990	CA01E	512	558	905 V
PCB066	pg/g-Wet	5	5	100	527	2810	CA01E	1420	1420	2560 V	527	2810	CA01E	1420	1420	2560 V
PCB067	pg/g-Wet	5	5	100	21.8	83.3	CA01E	52.5	55.3	78.2 V	21.8	83.3	CA01E	52.5	55.3	78.2 V
PCB068	pg/g-Wet	5	5	100	21.5	93.7	CA11E	38.9	27.9	80.8 V	21.5	93.7	CA11E	38.9	27.9	80.8 V
PCB072	pg/g-Wet	5	5	100	10.8	51.4	CA11E	26.1	24.1	46 V	10.8	51.4	CA11E	26.1	24.1	46 V
PCB073	pg/g-Wet	5	2	40	37.1	168	CA11E	103	103 V	161 V	0.464 U	168	CA11E	41.2	0.235 U	142 V
PCB077	pg/g-Wet	5	5	100	43.1	196	CA01E	94	80.2	178 V	43.1	196	CA01E	94	80.2	178 V
PCB078	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.52 U	1.71 U	CA10W	0.494	0.424 U	0.785 UV
PCB079	pg/g-Wet	5	5	100	34.9	83	CA01E	62.4	62	82.6 V	34.9	83	CA01E	62.4	62	82.6 V
PCB080	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.472 U	1.55 U	CA10W	0.447	0.385 U	0.712 UV
PCB081	pg/g-Wet	5	0	0	--	--	--	--	--	--	1.58 U	7.72 U	CA01E	2.25	2.16 U	3.61 UV
PCB082	pg/g-Wet	5	5	100	80.8	392	CA10W	199	142	362 V	80.8	392	CA10W	199	142	362 V
PCB083 & 099	pg/g-Wet	5	5	100	1250	4720	CA11E	3120	3100	4670 V	1250	4720	CA11E	3120	3100	4670 V
PCB084	pg/g-Wet	5	5	100	223	1090	CA10W	618	645	1020 V	223	1090	CA10W	618	645	1020 V
PCB085 & 116 & 117	pg/g-Wet	5	5	100	230	997	CA10W	581	452	956 V	230	997	CA10W	581	452	956 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	5	5	100	1290	4920	CA10W	3190	3720	4680 V	1290	4920	CA10W	3190	3720	4680 V
PCB088 & 091	pg/g-Wet	5	5	100	449	3280	CA11E	1180	678	2830 V	449	3280	CA11E	1180	678	2830 V
PCB089	pg/g-Wet	5	5	100	8.4	49.2	CA01E	26.4	22.8	46 V	8.4	49.2	CA01E	26.4	22.8	46 V
PCB090 & 101 & 113	pg/g-Wet	5	5	100	3560	15700	CA11E	7390	5170	14300 V	3560	15700	CA11E	7390	5170	14300 V
PCB092	pg/g-Wet	5	5	100	505	2300	CA11E	1090	753	2100 V	505	2300	CA11E	1090	753	2100 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	5	5	100	4090	23000	CA11E	9020	5720	20000 V	4090	23000	CA11E	9020	5720	20000 V
PCB094	pg/g-Wet	5	5	100	32.7	340	CA11E	108	44.2	289 V	32.7	340	CA11E	108	44.2	289 V
PCB096	pg/g-Wet	5	5	100	21.1	239	CA11E	71.3	27.1	200 V	21.1	239	CA11E	71.3	27.1	200 V
PCB103	pg/g-Wet	5	5	100	69.6	1350	CA11E	341	99.9	1100 V	69.6	1350	CA11E	341	99.9	1100 V
PCB104	pg/g-Wet	5	5	100	6.44	149	CA11E	38.6	8.27	124 V	6.44	149	CA11E	38.6	8.27	124 V
PCB105	pg/g-Wet	5	5	100	522	2210	CA10W	1140	883	2030 V	522	2210	CA10W	1140	883	2030 V
PCB106	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.491 U	2.86 U	CA10W	0.664	0.369 U	1.34 UV
PCB107 & 124	pg/g-Wet	5	5	100	48.9	216	CA10W	112	86.7	199 V	48.9	216	CA10W	112	86.7	199 V
PCB109	pg/g-Wet	5	5	100	129	394	CA10W	246	253	371 V	129	394	CA10W	246	253	371 V
PCB110 & 115	pg/g-Wet	5	5	100	2000	7510	CA10W	4740	4300	7410 V	2000	7510	CA10W	4740	4300	7410 V
PCB111	pg/g-Wet	5	2	40	5.98	31.2	CA11E	18.6	18.6 V	29.9 V	3.21 U	31.2	CA11E	8.55	2.19 U	26.2 V
PCB112	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.528 U	2.74 U	CA11E	0.762	0.525 U	1.34 UV
PCB114	pg/g-Wet	5	4	80	31.8	124	CA10W	71	64.1 V	117 V	31.8	124	CA10W	61.5	47.7	115 V
PCB118	pg/g-Wet	5	5	100	2620	8510	CA10W	5250	5330	7990 V	2620	8510	CA10W	5250	5330	7990 V
PCB120	pg/g-Wet	5	5	100	17.9	122	CA11E	42.6	23.3	103 V	17.9	122	CA11E	42.6	23.3	103 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB121	pg/g-Wet	5	5	100	4.22	147	CA11E	34.8	6.54	120 V	4.22	147	CA11E	34.8	6.54	120 V
PCB122	pg/g-Wet	5	5	100	13.4	41.2	CA10W	25	19.6	39.7 V	13.4	41.2	CA10W	25	19.6	39.7 V
PCB123	pg/g-Wet	5	5	100	43.3	153	CA01E	95.4	84.6	149 V	43.3	153	CA01E	95.4	84.6	149 V
PCB126	pg/g-Wet	5	3	60	3.98	9.38	CA01E	6.73	6.83	9.13 V	3.98	9.38	CA01E	5.43	3.98	8.87 V
PCB127	pg/g-Wet	5	4	80	1.63	6.81	CA10W	3.48	2.74 V	6.29 V	1.63	6.81	CA10W	3.03	2.16	6.11 V
PCB128 & 166	pg/g-Wet	5	5	100	381	1310	CA11E	720	464	1260 V	381	1310	CA11E	720	464	1260 V
PCB129 & 138 & 160 & 163	pg/g-Wet	5	5	100	5120	34500	CA11E	12900	7710	29800 V	5120	34500	CA11E	12900	7710	29800 V
PCB130	pg/g-Wet	5	5	100	211	843	CA11E	397	241	769 V	211	843	CA11E	397	241	769 V
PCB131	pg/g-Wet	5	5	100	35.1	173	CA11E	79.2	44.3	159 V	35.1	173	CA11E	79.2	44.3	159 V
PCB132	pg/g-Wet	5	5	100	804	6550	CA11E	2320	1280	5650 V	804	6550	CA11E	2320	1280	5650 V
PCB133	pg/g-Wet	5	5	100	87.2	866	CA11E	265	126	724 V	87.2	866	CA11E	265	126	724 V
PCB134 & 143	pg/g-Wet	5	5	100	175	1240	CA11E	449	234	1070 V	175	1240	CA11E	449	234	1070 V
PCB135 & 151 & 154	pg/g-Wet	5	5	100	1560	17700	CA11E	5390	3040	14800 V	1560	17700	CA11E	5390	3040	14800 V
PCB136	pg/g-Wet	5	5	100	417	4340	CA11E	1350	705	3640 V	417	4340	CA11E	1350	705	3640 V
PCB137	pg/g-Wet	5	5	100	49.7	218	CA10W	113	105	197 V	49.7	218	CA10W	113	105	197 V
PCB139 & 140	pg/g-Wet	5	5	100	40.4	277	CA11E	119	73.5	250 V	40.4	277	CA11E	119	73.5	250 V
PCB141	pg/g-Wet	5	5	100	127	996	CA11E	378	308	859 V	127	996	CA11E	378	308	859 V
PCB142	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.611 U	1.7 U	CA11E	0.487	0.449 U	0.781 UV
PCB144	pg/g-Wet	5	5	100	146	1780	CA11E	548	316	1490 V	146	1780	CA11E	548	316	1490 V
PCB145	pg/g-Wet	5	4	80	1.3	3.55	CA11E	2.07	1.71 V	3.33 V	0.256 U	3.55	CA11E	1.68	1.31	3.26 V
PCB146	pg/g-Wet	5	5	100	958	7700	CA11E	2530	1260	6500 V	958	7700	CA11E	2530	1260	6500 V
PCB147 & 149	pg/g-Wet	5	5	100	3950	34800	CA11E	11600	7110	29400 V	3950	34800	CA11E	11600	7110	29400 V
PCB148	pg/g-Wet	5	5	100	16.2	317	CA11E	83.3	29.9	261 V	16.2	317	CA11E	83.3	29.9	261 V
PCB150	pg/g-Wet	5	5	100	14.9	360	CA11E	91.3	24.6	296 V	14.9	360	CA11E	91.3	24.6	296 V
PCB152	pg/g-Wet	5	5	100	7.39	86.5	CA11E	27.1	11.5	73.7 V	7.39	86.5	CA11E	27.1	11.5	73.7 V
PCB153 & 168	pg/g-Wet	5	5	100	11600	83000	CA11E	27700	14800	69800 V	11600	83000	CA11E	27700	14800	69800 V
PCB155	pg/g-Wet	5	5	100	2.54	48.9	CA11E	13.1	3.49	40.7 V	2.54	48.9	CA11E	13.1	3.49	40.7 V
PCB156 & 157	pg/g-Wet	5	5	100	255	1410	CA11E	606	339	1270 V	255	1410	CA11E	606	339	1270 V
PCB158	pg/g-Wet	5	5	100	333	2540	CA11E	949	549	2210 V	333	2540	CA11E	949	549	2210 V
PCB159	pg/g-Wet	5	5	100	7.27	91.6	CA11E	28.9	17.7	77.2 V	7.27	91.6	CA11E	28.9	17.7	77.2 V
PCB161	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.44 U	1.19 U	CA11E	0.343	0.315 U	0.547 UV
PCB162	pg/g-Wet	5	4	80	5.73	16.2	CA11E	11.7	12.5 V	16.2 V	5.11 U	16.2	CA11E	9.91	9.14	16.1 V
PCB164	pg/g-Wet	5	5	100	139	1310	CA11E	457	286	1120 V	139	1310	CA11E	457	286	1120 V
PCB165	pg/g-Wet	5	5	100	4.61	112	CA11E	28.2	7.62	91.9 V	4.61	112	CA11E	28.2	7.62	91.9 V
PCB167	pg/g-Wet	5	5	100	352	1520	CA11E	639	399	1330 V	352	1520	CA11E	639	399	1330 V
PCB169	pg/g-Wet	5	0	0	--	--	--	--	--	--	2.52 U	20.6 U	CA11E	3.42	1.89 U	8.69 UV
PCB170	pg/g-Wet	5	5	100	130	2130	CA11E	638	324	1800 V	130	2130	CA11E	638	324	1800 V
PCB171 & 173	pg/g-Wet	5	5	100	259	3480	CA11E	1020	508	2900 V	259	3480	CA11E	1020	508	2900 V
PCB172	pg/g-Wet	5	5	100	19.5	222	CA11E	71.8	41.5	189 V	19.5	222	CA11E	71.8	41.5	189 V
PCB174	pg/g-Wet	5	5	100	167	2580	CA11E	767	378	2170 V	167	2580	CA11E	767	378	2170 V
PCB175	pg/g-Wet	5	5	100	37	600	CA11E	169	77.9	498 V	37	600	CA11E	169	77.9	498 V
PCB176	pg/g-Wet	5	5	100	135	1940	CA11E	552	247	1610 V	135	1940	CA11E	552	247	1610 V
PCB177	pg/g-Wet	5	5	100	560	8050	CA11E	2310	1110	6680 V	560	8050	CA11E	2310	1110	6680 V
PCB178	pg/g-Wet	5	5	100	265	4240	CA11E	1190	538	3510 V	265	4240	CA11E	1190	538	3510 V
PCB179	pg/g-Wet	5	5	100	468	6360	CA11E	1860	964	5290 V	468	6360	CA11E	1860	964	5290 V
PCB180 & 193	pg/g-Wet	5	5	100	1540	17000	CA11E	5300	2860	14300 V	1540	17000	CA11E	5300	2860	14300 V
PCB181	pg/g-Wet	5	5	100	4.94	27.6	CA11E	11.1	6.2	24.3 V	4.94	27.6	CA11E	11.1	6.2	24.3 V
PCB182	pg/g-Wet	5	1	20	20.6	20.6	CA11E	20.6	20.6	20.6	0.402 U	20.6	CA11E	4.28	0.204 U	16.5 V
PCB183 & 185	pg/g-Wet	5	5	100	669	9750	CA11E	2780	1270	8100 V	669	9750	CA11E	2780	1270	8100 V
PCB184	pg/g-Wet	5	5	100	2.35	8.21	CA11E	3.96	2.84	7.29 V	2.35	8.21	CA11E	3.96	2.84	7.29 V
PCB186	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.157 U	0.423 U	CA11E	0.12	0.102 U	0.195 UV
PCB187	pg/g-Wet	5	5	100	1680	22200	CA11E	6430	3020	18400 V	1680	22200	CA11E	6430	3020	18400 V
PCB188	pg/g-Wet	5	5	100	3.88	89.1	CA11E	23.8	6.9	74.2 V	3.88	89.1	CA11E	23.8	6.9	74.2 V
PCB189	pg/g-Wet	5	5	100	5.06	81.9	CA11E	23.5	12.4	68.1 V	5.06	81.9	CA11E	23.5	12.4	68.1 V
PCB190	pg/g-Wet	5	5	100	161	2220	CA11E	664	306	1870 V	161	2220	CA11E	664	306	1870 V
PCB191	pg/g-Wet	5	5	100	20.6	319	CA11E	93.7	44.5	268 V	20.6	319	CA11E	93.7	44.5	268 V
PCB192	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.311 U	0.881 U	CA01E	0.224	0.16 U	0.393 UV
PCB194	pg/g-Wet	5	5	100	24.3	391	CA11E	113	53.2	328 V	24.3	391	CA11E	113	53.2	328 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB195	pg/g-Wet	5	5	100	77.5	1480	CA11E	407	189	1230 V	77.5	1480	CA11E	407	189	1230 V
PCB196	pg/g-Wet	5	5	100	44.2	683	CA11E	205	105	575 V	44.2	683	CA11E	205	105	575 V
PCB197 & 200	pg/g-Wet	5	5	100	30.7	415	CA11E	123	65	346 V	30.7	415	CA11E	123	65	346 V
PCB198 & 199	pg/g-Wet	5	5	100	82.4	918	CA11E	307	205	784 V	82.4	918	CA11E	307	205	784 V
PCB201	pg/g-Wet	5	5	100	60.4	733	CA11E	222	124	613 V	60.4	733	CA11E	222	124	613 V
PCB202	pg/g-Wet	5	5	100	170	1670	CA11E	524	207	1410 V	170	1670	CA11E	524	207	1410 V
PCB203	pg/g-Wet	5	5	100	264	2670	CA11E	858	490	2250 V	264	2670	CA11E	858	490	2250 V
PCB204	pg/g-Wet	5	2	40	0.21 J	0.307 J	CA12E	0.259	0.259 JV	0.302 JV	0.21 J	0.687 U	CA11E	0.221	0.21 J	0.336 JV
PCB205	pg/g-Wet	5	5	100	11.3	241	CA11E	63.6	26	198 V	11.3	241	CA11E	63.6	26	198 V
PCB206	pg/g-Wet	5	5	100	34.9	245	CA11E	86.4	43.3	211 V	34.9	245	CA11E	86.4	43.3	211 V
PCB207	pg/g-Wet	5	5	100	7.12	57.3	CA11E	19.1	9.13	48.7 V	7.12	57.3	CA11E	19.1	9.13	48.7 V
PCB208	pg/g-Wet	5	5	100	14.4	53.5	CA11E	25.5	16.5	48.3 V	14.4	53.5	CA11E	25.5	16.5	48.3 V
PCB209	pg/g-Wet	5	5	100	16.2	34.9	CA10W	23.5	21.5	32.9 V	16.2	34.9	CA10W	23.5	21.5	32.9 V
Total PCB Congeners	pg/g-Wet	5	5	100	82600 JT	480000 T	CA11E	183000	110000 JT	415000 V	82600 JT	480000 T	CA11E	183000	110000 JT	415000 V
Total PCBs[c]																
Total PCBs	µg/kg-Wet	5	5	100	82.6 JT	480 T	CA11E	183	110 JT	415 V	82.6 JT	480 T	CA11E	183	110 JT	415 V
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	5	5	100	991 T	27700 T	CA11E	8830	3130 T	24100 V	991 T	27700 T	CA11E	8830	3130 T	24100 V
Heptachlorobiphenylhomologs	pg/g-Wet	5	5	100	6160 T	81300 T	CA11E	23900	11700 T	67800 V	6160 T	81300 T	CA11E	23900	11700 T	67800 V
Hexachlorobiphenyl homologs	pg/g-Wet	5	5	100	26900 T	204000 T	CA11E	69800	39300 T	173000 V	26900 T	204000 T	CA11E	69800	39300 T	173000 V
Monochlorobiphenyl homologs	pg/g-Wet	5	5	100	3.56 T	649 T	CA10W	141	13.3 T	525 V	3.56 T	649 T	CA10W	141	13.3 T	525 V
Nonachlorobiphenyl homologs	pg/g-Wet	5	5	100	57.3 T	356 T	CA11E	131	66.8 T	308 V	57.3 T	356 T	CA11E	131	66.8 T	308 V
Octachlorobiphenyl homologs	pg/g-Wet	5	5	100	768 JT	9200 T	CA11E	2820	1660 JT	7690 V	768 JT	9200 T	CA11E	2820	1660 JT	7690 V
Pentachlorobiphenylhomologs	pg/g-Wet	5	5	100	17800 T	70100 T	CA11E	38700	33200 T	66200 V	17800 T	70100 T	CA11E	38700	33200 T	66200 V
Tetrachlorobiphenyl homologs	pg/g-Wet	5	5	100	11600 T	51200 T	CA11E	26600	22400 T	47000 V	11600 T	51200 T	CA11E	26600	22400 T	47000 V
Trichlorobiphenyl homologs	pg/g-Wet	5	5	100	2050 T	35800 T	CA11E	11800	7110 T	30300 V	2050 T	35800 T	CA11E	11800	7110 T	30300 V
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	5	5	100	0.554	1.09	CA10W	0.771	0.736	1.05 V	0.554	1.09	CA10W	0.771	0.736	1.05 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	5	100	2.62	5.04	CA10W	3.28	2.81	4.67 V	2.62	5.04	CA10W	3.28	2.81	4.67 V
Hexachlorodibenzofuran homologs	pg/g-Wet	5	5	100	0.743	1.34	CA10W	0.953	0.875	1.26 V	0.743	1.34	CA10W	0.953	0.875	1.26 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	5	100	0.402	1.82	CA10W	1.06	1.09	1.74 V	0.402	1.82	CA10W	1.06	1.09	1.74 V
Octachlorodibenzofuran	pg/g-Wet	5	4	80	0.431 J	0.785 J	CA10W	0.57	0.532 JV	0.751 JV	0.431 J	1.44 U	CA02W	0.6	0.559 J	0.772 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	7.1	13.8	CA10W	9.88	8.88	13.3 V	7.1	13.8	CA10W	9.88	8.88	13.3 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	5	5	100	1.12	2.23	CA10W	1.58	1.4	2.16 V	1.12	2.23	CA10W	1.58	1.4	2.16 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	5	100	0.132	0.72	CA10W	0.386	0.427	0.668 V	0.132	0.72	CA10W	0.386	0.427	0.668 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	5	5	100	4.89	9.61	CA01E	7.31	8.45	9.38 V	4.89	9.61	CA01E	7.31	8.45	9.38 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	5	5	100	3.35	7.21	CA10W	4.88	4.32	6.96 V	3.35	7.21	CA10W	4.88	4.32	6.96 V
Total PCDD/F	pg/g-Wet	5	5	100	24.3 JT	42.5 JT	CA10W	30.6	29.3 JT	40.2 JV	24.3 JT	42.5 JT	CA10W	30.6	29.3 JT	40.2 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	5	4	80	0.215 J	0.322 J	CA10W	0.279	0.29 JV	0.32 JV	0.214 U	0.322 J	CA10W	0.245	0.27 J	0.32 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	1.3 J	1.93	CA10W	1.51	1.38 J	1.86 JV	1.3 J	1.93	CA10W	1.51	1.38 J	1.86 JV
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.165 U	0.171 U	CA11E; CA12E	0.0842	0.084 U	0.0855 UV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	5	3	60	0.059 J	0.107 J	CA10W	0.0867	0.094 J	0.106 JV	0.059 J	0.107 J	CA10W	0.0668	0.059 J	0.104 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	5	4	80	0.065 J	0.081 J	CA10W	0.0728	0.0725 JV	0.0798 JV	0.065 J	0.096 U	CA02W	0.0678	0.072 J	0.0794 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	5	1	20	0.069 J	0.069 J	CA02W	0.069	0.069 J	0.069 J	0.069 J	0.138 U	CA12E	0.068	0.0685 U	0.069 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	5	3	60	0.234 J	0.36 J	CA10W	0.299	0.304 J	0.354 JV	0.234 J	0.36 J	CA10W	0.233	0.234 J	0.349 JV
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.119 U	0.123 U	CA11E; CA12E	0.0606	0.0605 U	0.0615 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	5	5	100	0.101 J	0.156 J	CA02W	0.114	0.104 J	0.146 JV	0.101 J	0.156 J	CA02W	0.114	0.104 J	0.146 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	5	2	40	0.055 J	0.132 J	CA02W	0.0935	0.0935 JV	0.128 JV	0.055 J	0.154 U	CA12E	0.0785	0.0765 U	0.121 JV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	5	3	60	0.084 J	0.135 J	CA12E	0.103	0.09 J	0.131 JV	0.084 J	0.146 U	CA10W	0.0864	0.084 J	0.126 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.06 U	0.085 U	CA11E	0.0377	0.038 U	0.0421 UV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	5	4	80	0.117 J	0.241 J	CA01E	0.187	0.195 JV	0.234 JV	0.1 U	0.241 J	CA01E	0.16	0.193 J	0.232 JV
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	5	4	80	0.424	1.34	CA02W	0.74	0.599 V	1.25 V	0.424	1.41 U	CA01E	0.733	0.705 U	1.22 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	5	0	0	--	--	--	--	--	--	0.204 U	0.497 U	CA12E	0.183	0.17 U	0.245 UV
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.139 JT	0.367 JT	CA02W	0.229	0.22 JT	0.339 JV	0.139 JT	0.367 JT	CA02W	0.229	0.22 JT	0.339 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.422 JT	1.4 JT	CA01E	0.877	0.741 JT	1.36 JV	0.422 JT	1.4 JT	CA01E	0.877	0.741 JT	1.36 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	5	5	100	0.283 T	1.2 T	CA01E	0.647	0.521 T	1.13 V	0.283 T	1.2 T	CA01E	0.647	0.521 T	1.13 V
Pesticides																
2,4'-DDD	µg/kg-Wet	5	5	100	0.277	2.9	CA02W	1.29	0.541	2.8 V	0.277	2.9	CA02W	1.29	0.541	2.8 V
2,4'-DDE	µg/kg-Wet	5	5	100	0.0868 J	0.468	CA02W	0.255	0.194 J	0.46 V	0.0868 J	0.468	CA02W	0.255	0.194 J	0.46 V
2,4'-DDT	µg/kg-Wet	5	5	100	0.132 J	0.576	CA02W	0.301	0.187 J	0.548 V	0.132 J	0.576	CA02W	0.301	0.187 J	0.548 V
4,4'-DDD	µg/kg-Wet	5	5	100	0.997	7.89	CA02W	3.56	2	7.47 V	0.997	7.89	CA02W	3.56	2	7.47 V
4,4'-DDE	µg/kg-Wet	5	5	100	4.05	14.8	CA02W	8.92	7.98	14.5 V	4.05	14.8	CA02W	8.92	7.98	14.5 V
4,4'-DDT	µg/kg-Wet	5	5	100	0.501	1.12	CA02W	0.753	0.617	1.09 V	0.501	1.12	CA02W	0.753	0.617	1.09 V
Aldrin	µg/kg-Wet	5	3	60	0.173 J	0.278 J	CA02W	0.213	0.187 J	0.269 JV	0.0679 U	0.278 J	CA02W	0.142	0.173 J	0.26 JV
alpha-Endosulfan	µg/kg-Wet	5	2	40	0.081 J	0.121 J	CA10W	0.101	0.101 JV	0.119 JV	0.061 U	0.121 J	CA10W	0.0667	0.055 U	0.113 JV
alpha-Hexachlorocyclohexane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.00606 U	0.0158 U	CA02W	0.00497	0.00469 U	0.00735 UV
beta-Endosulfan	µg/kg-Wet	5	2	40	0.103 J	0.164 J	CA12E	0.134	0.134 JV	0.161 JV	0.103 J	0.164 J	CA12E	0.0954	0.0805 U	0.152 JV
beta-Hexachlorocyclohexane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.00289 U	0.00702 U	CA02W	0.00223	0.00208 U	0.00327 UV
cis-Chlordane	µg/kg-Wet	5	5	100	0.39 J	0.868	CA02W	0.621	0.648	0.826 V	0.39 J	0.868	CA02W	0.621	0.648	0.826 V
cis-Nonachlor	µg/kg-Wet	5	5	100	0.18 J	0.425 J	CA02W	0.306	0.325 J	0.411 JV	0.18 J	0.425 J	CA02W	0.306	0.325 J	0.411 JV
delta-Hexachlorocyclohexane	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.0737 U	0.0763 U	CA12E	0.0375	0.0373 U	0.0381 UV
Dieldrin	µg/kg-Wet	5	5	100	0.339 J	0.593 J	CA02W	0.49	0.504 J	0.592 JV	0.339 J	0.593 J	CA02W	0.49	0.504 J	0.592 JV
Endosulfan sulfate	µg/kg-Wet	5	4	80	0.226 J	0.406 J	CA02W	0.3	0.284 JV	0.388 JV	0.226 J	0.406 J	CA02W	0.268	0.282 J	0.382 JV
Endrin	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.006 U	0.022 U	CA02W	0.0072	0.007 U	0.0109 UV
Endrin aldehyde	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.104 U	0.108 U	CA11E; CA12E	0.0531	0.053 U	0.054 UV
Endrin ketone	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.006 U	0.108 U	CA12E	0.0429	0.0525 U	0.0538 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	5	4	80	0.0224 J	0.0367 J	CA10W	0.0303	0.0311 JV	0.0361 JV	0.0191 U	0.0367 J	CA10W	0.0262	0.0293 J	0.0359 JV
Heptachlor	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.00511 U	0.0104 U	CA10W	0.00377	0.00361 U	0.00502 UV
Heptachlor epoxide	µg/kg-Wet	5	5	100	0.025 J	0.045 J	CA02W	0.037	0.037 J	0.0446 JV	0.025 J	0.045 J	CA02W	0.037	0.037 J	0.0446 JV
Methoxychlor	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.0613 U	0.0636 U	CA12E	0.0312	0.0311 U	0.0318 UV
Oxychlordane	µg/kg-Wet	5	4	80	0.0417 J	0.0749 J	CA02W	0.0573	0.0563 JV	0.0738 JV	0.032 U	0.0749 J	CA02W	0.049	0.0452 J	0.0734 JV
Total Chlordanes	µg/kg-Wet	5	5	100	1.35 JT	3.11 JT	CA02W	2.26	2.46 JT	2.98 JV	1.35 JT	3.11 JT	CA02W	2.26	2.46 JT	2.98 JV
Total Endosulfan	µg/kg-Wet	5	5	100	0.121 JT	0.446 JT	CA12E	0.334	0.366 JT	0.438 JV	0.121 JT	0.446 JT	CA12E	0.334	0.366 JT	0.438 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	5	5	100	1.27 T	10.8 T	CA02W	4.85	2.54 T	10.3 V	1.27 T	10.8 T	CA02W	4.85	2.54 T	10.3 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	5	5	100	6.04 JT	27.8 T	CA02W	15.1	11.4 JT	26.9 V	6.04 JT	27.8 T	CA02W	15.1	11.4 JT	26.9 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	5	5	100	4.14 JT	15.3 T	CA02W	9.17	8.17 JT	14.9 V	4.14 JT	15.3 T	CA02W	9.17	8.17 JT	14.9 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	5	5	100	0.633 JT	1.7 T	CA02W	1.06	0.792 JT	1.64 V	0.633 JT	1.7 T	CA02W	1.06	0.792 JT	1.64 V
trans-Chlordane	µg/kg-Wet	5	5	100	0.259 J	0.621	CA02W	0.439	0.464 J	0.594 JV	0.259 J	0.621	CA02W	0.439	0.464 J	0.594 JV
trans-Nonachlor	µg/kg-Wet	5	5	100	0.521	1.12	CA02W	0.843	0.913	1.09 V	0.521	1.12	CA02W	0.843	0.913	1.09 V
Polycyclic Aromatic Hydrocarbons																
1-Methylnaphthalene	µg/kg-Wet	5	2	40	0.77 J	1 J	CA02W	0.89	0.89 JV	0.99 JV	0.6 U	1 J	CA02W	0.53	0.3 U	0.95 JV
2-Methylnaphthalene	µg/kg-Wet	5	3	60	0.97 J	1.6 J	CA02W	1.3	1.2 J	1.6 JV	0.88 U	1.6 J	CA02W	0.93	0.97 J	1.5 JV
Acenaphthene	µg/kg-Wet	5	4	80	0.36 J	4.8	CA02W	1.6	0.56 JV	4.2 JV	0.22 U	4.8	CA02W	1.3	0.43 J	4 JV
Acenaphthylene	µg/kg-Wet	5	3	60	0.17 J	0.62 J	CA02W	0.34	0.23 J	0.58 JV	0.14 U	0.62 J	CA02W	0.23	0.17 J	0.54 JV
Anthracene	µg/kg-Wet	5	5	100	1.2 J	4.4	CA02W	2	1.3	3.9 V	1.2 J	4.4	CA02W	2	1.3	3.9 V
Benzo(a)anthracene	µg/kg-Wet	5	5	100	1.6	8.2	CA02W	3.7	2.9	7.4 V	1.6	8.2	CA02W	3.7	2.9	7.4 V
Benzo(a)pyrene	µg/kg-Wet	5	3	60	0.31 J	0.43 J	CA01E; CA11E	0.39	0.43 J	0.43 JV	0.2 U	0.43 J	CA01E; CA11E	0.28	0.31 J	0.43 JV
Benzo(b)fluoranthene	µg/kg-Wet	5	3	60	0.9 J	1.8	CA02W	1.2	0.97 J	1.7 JV	0.52 U	1.8	CA02W	0.84	0.9 J	1.6 JV
Benzo(e)pyrene	µg/kg-Wet	5	5	100	1.3	4.6	CA02W	2.2	1.6	4.2 V	1.3	4.6	CA02W	2.2	1.6	4.2 V
Benzo(g,h,i)perylene	µg/kg-Wet	5	1	20	0.86 J	0.86 J	CA02W	0.86	0.86 J	0.86 J	0.38 U	0.86 J	CA02W	0.34	0.22 U	0.74 JV
Benzo(k)fluoranthene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.12 U	0.64 U	CA02W	0.19	0.2 U	0.3 UV
C1-Chrysene	µg/kg-Wet	5	5	100	5.4 J	14	CA02W	7.5	5.8 J	13 JV	5.4 J	14	CA02W	7.5	5.8 J	13 JV
C1-Dibenzothiophene	µg/kg-Wet	5	2	40	5.1 J	10 J	CA02W	7.6	7.6 JV	9.8 JV	0.15 U	10 J	CA02W	3.1	0.09 U	9 JV
C1-Fluoranthene/pyrene	µg/kg-Wet	5	5	100	6.9 J	28	CA02W	14	10 J	26 V	6.9 J	28	CA02W	14	10 J	26 V
C1-Fluorene	µg/kg-Wet	5	4	80	1.8 J	7 J	CA02W	3.7	3.1 JV	6.6 JV	0.37 U	7 J	CA02W	3	1.9 J	6.4 JV
C1-Phenanthrene/anthracene	µg/kg-Wet	5	5	100	5.9 J	25	CA02W	11	6.3 J	22 V	5.9 J	25	CA02W	11	6.3 J	22 V
C2-Chrysene	µg/kg-Wet	5	4	80	28	62	CA02W	43	40 V	59 V	0.19 U	62	CA02W	34	39	58 V
C2-Dibenzothiophene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.15 U	0.19 U	CA02W	0.082	0.075 U	0.094 UV
C2-Fluoranthene/pyrene	µg/kg-Wet	5	1	20	12 J	12 J	CA02W	12	12 J	12 J	0.2 U	12 J	CA02W	2.5	0.1 U	9.6 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
C2-Fluorene	µg/kg-Wet	5	5	100	5.5 J	16	CA02W	8.2	5.9 J	14 JV	5.5 J	16	CA02W	8.2	5.9 J	14 JV
C2-Naphthalene	µg/kg-Wet	5	4	80	1.3 J	4.2 J	CA02W	2.2	1.7 JV	3.9 JV	0.97 U	4.2 J	CA02W	1.9	1.5 J	3.7 JV
C2-Phenanthrene/anthracene	µg/kg-Wet	5	5	100	10 J	42	CA02W	22	21	38 V	10 J	42	CA02W	22	21	38 V
C3-Chrysene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.16 U	0.2 U	CA02W	0.087	0.08 U	0.099 UV
C3-Dibenzothiophene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.15 U	0.19 U	CA02W	0.082	0.075 U	0.094 UV
C3-Fluoranthene/pyrene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.2 U	0.25 U	CA02W	0.11	0.1 U	0.12 UV
C3-Fluorene	µg/kg-Wet	5	3	60	5.6 J	11	CA01E	8.7	9.4 J	11 JV	0.3 U	11	CA01E	5.3	5.6 J	11 JV
C3-Naphthalene	µg/kg-Wet	5	5	100	2 J	8.1 J	CA02W	4.2	3.5 J	7.4 JV	2 J	8.1 J	CA02W	4.2	3.5 J	7.4 JV
C3-Phenanthrene/anthracene	µg/kg-Wet	5	5	100	9.1 J	25	CA02W	16	16	23 V	9.1 J	25	CA02W	16	16	23 V
C4-Chrysene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.16 U	0.2 U	CA02W	0.087	0.08 U	0.099 UV
C4-Naphthalene	µg/kg-Wet	5	5	100	2.9 J	15	CA02W	7.2	6.1 J	13 JV	2.9 J	15	CA02W	7.2	6.1 J	13 JV
C4-Phenanthrene/anthracene	µg/kg-Wet	5	5	100	10 J	17	CA02W; CA12E	14	13	17 V	10 J	17	CA02W; CA12E	14	13	17 V
Chrysene	µg/kg-Wet	5	5	100	3.7	16	CA02W	7.3	4.2	14 V	3.7	16	CA02W	7.3	4.2	14 V
Dibenzo(a,h)anthracene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	0.12 U	0.15 U	CA02W; CA10W	0.066	0.06 U	0.075 UV
Dibenzothiophene	µg/kg-Wet	5	3	60	0.34 J	2.1	CA02W	0.93	0.36 J	1.9 JV	0.15 U	2.1	CA02W	0.59	0.34 J	1.8 JV
Fluoranthene	µg/kg-Wet	5	5	100	5.9	84	CA02W	27	9.9	73 V	5.9	84	CA02W	27	9.9	73 V
Fluorene	µg/kg-Wet	5	5	100	0.6 J	4.7	CA02W	1.7	0.82 J	4.1 V	0.6 J	4.7	CA02W	1.7	0.82 J	4.1 V
High Molecular Weight PAH	µg/kg-Wet	5	5	100	18 JT	180 JT	CA02W	62	24 JT	160 JV	18 JT	180 JT	CA02W	62	24 JT	160 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	5	1	20	0.3 J	0.3 J	CA02W	0.3	0.3 J	0.3 J	0.13 U	0.3 J	CA02W	0.12	0.065 U	0.26 JV
Low Molecular Weight PAH	µg/kg-Wet	5	5	100	4.6 JT	41 JT	CA02W	15	8 JT	35 JV	4.6 JT	41 JT	CA02W	15	8 JT	35 JV
Naphthalene	µg/kg-Wet	5	0	0	--	--	--	--	--	--	1.6 U	3.3 U	CA10W	1.2	1.2 U	1.6 UV
Perylene	µg/kg-Wet	5	1	20	0.91 J	0.91 J	CA02W	0.91	0.91 J	0.91 J	0.13 U	0.91 J	CA02W	0.24	0.065 U	0.74 JV
Phenanthrene	µg/kg-Wet	5	5	100	2.6	25	CA02W	8.7	4.2	22 V	2.6	25	CA02W	8.7	4.2	22 V
Pyrene	µg/kg-Wet	5	5	100	5.9	68	CA02W	22	7	59 V	5.9	68	CA02W	22	7	59 V
Total BaPEq	µg/kg-Wet	5	5	100	0.294 T	1.05 JT	CA02W	0.695	0.691 JT	1.03 JV	0.294 T	1.05 JT	CA02W	0.695	0.691 JT	1.03 JV
Total cPAHs	µg/kg-Wet	5	5	100	6.2 JT	26 JT	CA02W	12	7.1 T	24 JV	6.2 JT	26 JT	CA02W	12	7.1 T	24 JV
Total PAHs	µg/kg-Wet	5	5	100	23 JT	220 JT	CA02W	76	30 JT	190 JV	23 JT	220 JT	CA02W	76	30 JT	190 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	4	2	50	89 J	190 J	CA12E	140	140 JV	180 JV	66 U	190 J	CA12E	87	63 JV	170 JV
Butylbenzylphthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	7.3 U	8.2 U	CA02W	3.8	3.7 UV	4 UV
Dibutyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	16 U	18 U	CA02W	8.3	8 UV	8.9 UV
Diethyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	13 U	26 U	CA02W	10	10 UV	13 UV
Dimethyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	7.7 U	8.6 U	CA02W	4	3.9 UV	4.2 UV
Di-n-octyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	13 U	CA02W	5.8	5.5 UV	6.4 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	9.8 U	11 U	CA02W	5.1	4.9 UV	5.4 UV
1,2-Dichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	13 U	CA02W	5.8	5.5 UV	6.4 UV
1,3-Dichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	13 U	CA02W	5.8	5.5 UV	6.4 UV
1,4-Dichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	13 U	CA02W	5.8	5.5 UV	6.4 UV
2,4-Dinitrotoluene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	15 U	17 U	CA02W	7.8	7.5 UV	8.4 UV
2,6-Dinitrotoluene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	14 U	16 U	CA02W	7.3	7 UV	7.9 UV
2-Chloronaphthalene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	6.7 U	7.5 U	CA02W	3.5	3.4 UV	3.7 UV
2-Nitroaniline	µg/kg-Wet	4	0	0	--	--	--	--	--	--	31 U	35 U	CA02W	16	16 UV	17 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1000 U	1200 U	CA02W	530	500 UV	590 UV
3-Nitroaniline	µg/kg-Wet	4	0	0	--	--	--	--	--	--	400 U	450 U	CA02W	210	200 UV	220 UV
4-Bromophenylphenyl ether	µg/kg-Wet	4	0	0	--	--	--	--	--	--	6.9 U	7.7 U	CA02W	3.6	3.5 UV	3.8 UV
4-Chloroaniline	µg/kg-Wet	4	0	0	--	--	--	--	--	--	400 U	450 U	CA02W	210	200 UV	220 UV
4-Chlorophenylphenyl ether	µg/kg-Wet	4	0	0	--	--	--	--	--	--	6.4 U	7.2 U	CA02W	3.3	3.2 UV	3.5 UV
4-Nitroaniline	µg/kg-Wet	4	0	0	--	--	--	--	--	--	400 U	450 U	CA02W	210	200 UV	220 UV
Aniline	µg/kg-Wet	4	0	0	--	--	--	--	--	--	800 U	890 U	CA02W	410	400 UV	440 UV
Azobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	40 U	45 U	CA02W	21	20 UV	22 UV
Benzoic acid	µg/kg-Wet	4	4	100	1900	3200	CA02W	2700	2900 V	3200 V	1900	3200	CA02W	2700	2900 V	3200 V
Benzyl alcohol	µg/kg-Wet	4	1	25	27 J	27 J	CA12E	27	27 J	27 J	22 U	27 J	CA12E	15	12 UV	25 JV
Bis(2-chloroethoxy)methane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	8.3 U	9.3 U	CA02W	4.3	4.2 UV	4.6 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	4	0	0	--	--	--	--	--	--	13 U	15 U	CA02W	6.8	6.5 UV	7.4 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	4	0	0	--	--	--	--	--	--	13 U	15 U	CA02W	6.8	6.5 UV	7.4 UV
Dibenzofuran	µg/kg-Wet	5	5	100	0.43 J	1.3	CA02W	0.68	0.57 J	1.2 JV	0.43 J	1.3	CA02W	0.68	0.57 J	1.2 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Hexachlorobenzene	µg/kg-Wet	5	5	100	0.428	0.663	CA10W	0.534	0.548	0.64 V	0.428	0.663	CA10W	0.534	0.548	0.64 V
Hexachlorobutadiene	µg/kg-Wet	5	1	20	0.00977 J	0.00977 J	CA02W	0.00977	0.00977 J	0.00977 J	0.00453 UJ	0.00988 UJ	CA10W	0.00472	0.00428 UJ	0.0088 JV
Hexachlorocyclopentadiene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	1000 U	1200 U	CA02W	530	500 UV	590 UV
Hexachloroethane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	20 U	23 U	CA02W	10	10 UV	11 UV
Isophorone	µg/kg-Wet	4	0	0	--	--	--	--	--	--	9.2 U	11 U	CA02W	4.8	4.6 UV	5.4 UV
Nitrobenzene	µg/kg-Wet	4	4	100	60	290	CA01E	130	91 V	260 V	60	290	CA01E	130	91 V	260 V
N-Nitrosodimethylamine	µg/kg-Wet	4	0	0	--	--	--	--	--	--	40 U	45 U	CA02W	21	20 UV	22 UV
N-Nitrosodiphenylamine	µg/kg-Wet	4	0	0	--	--	--	--	--	--	6.6 U	7.4 U	CA02W	3.4	3.3 UV	3.6 UV
N-Nitrosodipropylamine	µg/kg-Wet	4	0	0	--	--	--	--	--	--	22 U	25 U	CA02W	11	11 UV	12 UV
Phenols																
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	20 U	23 U	CA02W	10	10 UV	11 UV
2,4,5-Trichlorophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	14 U	16 U	CA02W	7.3	7 UV	7.9 UV
2,4,6-Trichlorophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	9.1 U	11 U	CA02W	4.8	4.6 UV	5.4 UV
2,4-Dichlorophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	9.5 U	11 U	CA02W	4.9	4.8 UV	5.4 UV
2,4-Dimethylphenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	19 U	22 U	CA02W	9.9	9.5 UV	11 UV
2,4-Dinitrophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	800 U	890 U	CA02W	410	400 UV	440 UV
2-Chlorophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	7.5 U	8.4 U	CA02W	3.9	3.8 UV	4.1 UV
2-Methylphenol	µg/kg-Wet	4	1	25	9.7 J	9.7 J	CA02W	9.7	9.7 J	9.7 J	8.2 U	9.7 J	CA02W	5.5	4.1 UV	8.9 JV
2-Nitrophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	12 U	14 U	CA02W	6.3	6 UV	6.9 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	400 U	450 U	CA02W	210	200 UV	220 UV
4-Chloro-3-methylphenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	6.8 U	7.6 U	CA02W	3.5	3.4 UV	3.7 UV
4-Methylphenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	7.7 U	8.6 U	CA02W	4	3.9 UV	4.2 UV
4-Nitrophenol	µg/kg-Wet	4	1	25	11 J	11 J	CA12E	11	11 J	11 J	9.9 U	11 J	CA02W; CA12E	6.6	5.2 UV	10 JV
Pentachlorophenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	30 U	34 U	CA02W	16	15 UV	17 UV
Phenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	45 U	50 U	CA02W	23	23 UV	25 UV
Crayfish (whole body)																
Conventionals																
Lipids	percent-Wet	36	36	100	0.16	1.3	08R001	0.812	0.815 V	1.14 V	0.16	1.3	08R001	0.812	0.815 V	1.14 V
Total solids	percent-Wet	36	36	100	22.9	30.7	08R001	26.4	26.6 V	28.7 V	22.9	30.7	08R001	26.4	26.6 V	28.7 V
Metals																
Aluminum	mg/kg-Wet	36	36	100	35 J	203	07R004	91.2	86.5 JV	147 V	35 J	203	07R004	91.2	86.5 JV	147 V
Antimony	mg/kg-Wet	36	26	72.2	0.004 J	0.02 J	05R003	0.00792	0.0065 JV	0.0148 JV	0.004 J	0.02 J	05R003	0.00643	0.006 JV	0.0143 JV
Arsenic	mg/kg-Wet	36	35	97.2	0.235 T	0.5 J	07R004	0.344	0.35 J	0.422 JV	0.235 T	0.5 J	07R004	0.339	0.35 JV	0.42 JV
Cadmium	mg/kg-Wet	36	36	100	0.007 J	0.036 J	05R003	0.017	0.016 JV	0.0293 JV	0.007 J	0.036 J	05R003	0.017	0.016 JV	0.0293 JV
Chromium	mg/kg-Wet	36	36	100	0.09 J	0.9	02R001; 05R003; 06R001; 07R004	0.43	0.4 V	0.9 V	0.09 J	0.9	02R001; 05R003; 06R001; 07R004	0.43	0.4 V	0.9 V
Copper	mg/kg-Wet	36	36	100	10.4	20.2 T	CR11E	14.8	15 JV	17.9 V	10.4	20.2 T	CR11E	14.8	15 JV	17.9 V
Lead	mg/kg-Wet	36	36	100	0.041 J	1.3 JT	04R002	0.137	0.096 JV	0.232 JV	0.041 J	1.3 JT	04R002	0.137	0.096 JV	0.232 JV
Manganese	mg/kg-Wet	36	36	100	24.9	213	06R004	124	127 V	195 V	24.9	213	06R004	124	127 V	195 V
Mercury	mg/kg-Wet	36	36	100	0.0189	0.041	06R001	0.0281	0.0269 V	0.0391 V	0.0189	0.041	06R001	0.0281	0.0269 V	0.0391 V
Nickel	mg/kg-Wet	36	35	97.2	0.18	0.83	07R006	0.371	0.341 T	0.562 JV	0.18	0.83	07R006	0.365	0.331 V	0.56 JV
Selenium	mg/kg-Wet	36	2	5.6	0.21	0.39	CR08W	0.3	0.3 V	0.38 V	0.06 UT	0.39	CR08W	0.14	0.15 UV	0.17 V
Silver	mg/kg-Wet	36	25	69.4	0.0154 J	0.0472 J	04R003	0.0307	0.03 J	0.0451 JV	0.0154 J	0.0472 J	04R003	0.0257	0.0263 JV	0.0439 JV
Thallium	mg/kg-Wet	36	29	80.6	0.0015 J	0.0079 J	02R001	0.00345	0.0028 J	0.00692 JV	0.0015 J	0.0079 J	02R001	0.00304	0.00248 JV	0.00685 JV
Zinc	mg/kg-Wet	36	36	100	13.7 J	20.3 J	06R004	17	17 JV	19.8 V	13.7 J	20.3 J	06R004	17	17 JV	19.8 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Butyltins																
Butyltin ion	µg/kg-Wet	9	8	89	0.2 J	4.6 J	CR06W	0.84	0.28 JV	3.2 JV	0.11 U	4.6 J	CR06W	0.75	0.28 J	3 JV
Dibutyltin ion	µg/kg-Wet	9	6	67	0.33 J	330	CR06W	55	0.48 JV	250 JV	0.17 U	330	CR06W	37	0.35 JT	200 JV
Tetrabutyltin	µg/kg-Wet	9	0	0	--	--	--	--	--	--	0.43 U	0.43 U	CR01EA; CR01W; CR05W; CR06W; CR08W; CR10W; CR11E; CR12E; CR12W	0.22	0.22 U	0.22 UV
Tributyltin ion	µg/kg-Wet	9	5	56	0.56 J	2.3	CR06W	1.3	1.3 J	2.2 V	0.35 U	2.3	CR06W	0.8	0.56 J	2 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	27	0	0	--	--	--	--	--	--	0.95 U	9.7 U	03R005	1	0.48 U	3 UV
Aroclor 1221	µg/kg-Wet	27	0	0	--	--	--	--	--	--	0.95 U	26 U	03R005	2.4	1.8 U	5.9 UV
Aroclor 1232	µg/kg-Wet	27	0	0	--	--	--	--	--	--	0.95 U	30 U	03R005	1.9	0.65 U	6.9 UV
Aroclor 1242	µg/kg-Wet	27	0	0	--	--	--	--	--	--	0.95 U	18 U	03R005	1.4	0.5 U	4 UV
Aroclor 1248	µg/kg-Wet	27	0	0	--	--	--	--	--	--	0.95 U	30 U	03R005	2.9	0.95 U	10 UV
Aroclor 1254	µg/kg-Wet	27	0	0	--	--	--	--	--	--	1 U	61 U	03R005	4.7	2.9 U	11 UV
Aroclor 1260	µg/kg-Wet	27	12	44	16	280	03R005	64	44 JV	190 V	1.4 U	280	03R005	29	2.5 U	95 V
Aroclor 1262	µg/kg-Wet	27	0	0	--	--	--	--	--	--	0.95 U	9.5 U	03R005	0.81	0.48 U	1.6 UV
Aroclor 1268	µg/kg-Wet	27	0	0	--	--	--	--	--	--	0.95 U	9.5 U	03R005	0.81	0.48 U	1.6 UV
Aroclors	µg/kg-Wet	27	12	44	16 T	280 T	03R005	64	44 JV	190 V	1.7 UT	280 T	03R005	29	3.5 UT	95 V
PCB Congeners																
PCB001	pg/g-Wet	19	12	63.2	0.138 J	10600	06R031	885	1.46 JV	4770 JV	0.138 J	10600	06R031	559	1.99 U	1060 JV
PCB002	pg/g-Wet	19	6	31.6	0.129 J	15.7	06R031	2.98	0.252 JV	12.1 V	0.107 U	15.7	06R031	1.6	0.925 UJ	3.1 V
PCB003	pg/g-Wet	19	9	47.4	0.176 J	862	06R031	97.8	3 T	519 JV	0.129 U	862	06R031	47	2.41 U	90.6 JV
PCB004	pg/g-Wet	19	14	73.7	0.588	10200	06R031	737	6.19 JV	3590 V	0.588	10200	06R031	544	6.3 U	1050 V
PCB005	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.193 U	4.43 U	06R004	0.975	1.2 U	2.19 UV
PCB006	pg/g-Wet	19	9	47.4	0.603	541	06R031	68.2	5.21	338 V	0.327 U	541	06R031	33.2	3.25 U	83.8 V
PCB007	pg/g-Wet	19	1	5.26	7.88 J	7.88 J	06R031	7.88	7.88 J	7.88 J	0.184 UT	7.88 J	06R031	1.85	1.9 U	3.95 JV
PCB008	pg/g-Wet	19	14	73.7	0.621	3070	06R031	227	3.94 JV	1090 V	0.621	3070	06R031	169	4.73 U	332 V
PCB009	pg/g-Wet	19	9	47.4	0.426 J	23.8	06R031	9.83	8.41	22.7 V	0.331 U	23.8	06R031	5.26	2.3 U	21.4 V
PCB010	pg/g-Wet	19	2	10.5	0.705 T	386	06R031	193	193 V	367 V	0.552 U	386	06R031	22.1	2.41 U	42.6 V
PCB011	pg/g-Wet	19	12	63.2	12.8	118 J	06R031	37.8	30.2 V	86.8 JV	12.8	118 J	06R031	30.7	21.3	67 JV
PCB012 & 013	pg/g-Wet	19	8	42.1	1.03 J	30.3 J	06R031	7.41	4.78 JV	22.5 JV	0.704 U	30.3 J	06R031	4.65	2.88 T	10.2 JV
PCB014	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.428 U	5.81 U	06R004	1.28	1.57 U	2.88 UV
PCB015	pg/g-Wet	19	19	100	5.61	478	03R004	105	44.1	338 V	5.61	478	03R004	105	44.1	338 V
PCB016	pg/g-Wet	19	8	42.1	6.61	38.7	03R004	18.7	14.8 V	35.6 V	0.571 U	38.7	03R004	8.7	4.2 U	30.7 V
PCB017	pg/g-Wet	19	16	84.2	0.782	537	06R031	48.2	10.7 V	168 V	0.782	537	06R031	41.1	3.96 T	94.5 V
PCB018 & 030	pg/g-Wet	19	17	89.5	3.5	363 J	03R004	68.6	25.6 J	210 JV	3.5	363 J	03R004	62.2	20 T	191 JV
PCB019	pg/g-Wet	19	14	73.7	0.362 J	534	06R031	46.5	5.99 JV	223 V	0.362 J	534	06R031	35	3.55 U	103 V
PCB020 & 028	pg/g-Wet	19	19	100	25.1 J	2250 J	02R001	484	181 J	2050 JV	25.1 J	2250 J	02R001	484	181 J	2050 JV
PCB021 & 033	pg/g-Wet	19	12	63.2	2.06	98.2 J	03R005	39	29.5 JV	95.8 JV	0.544 UT	98.2 J	03R005	25.8	5.85 U	94.2 JV
PCB022	pg/g-Wet	19	11	57.9	1.68 T	52.9	CR08W	23.8	18.7	52.3 V	0.803 U	52.9	CR08W	14.6	3.83 U	51.8 V
PCB023	pg/g-Wet	19	2	10.5	0.313 JT	0.412 J	CR08W	0.363	0.363 JV	0.407 JV	0.313 JT	7.19 U	06R004	1.59	1.94 U	3.56 UV
PCB024	pg/g-Wet	19	2	10.5	0.084 JT	1.23	CR08W	0.657	0.657 JV	1.17 JV	0.053 U	9.3 U	06R004	1.99	2.51 U	4.61 UV
PCB025	pg/g-Wet	19	14	73.7	0.554 J	38.2	06R031	11.6	5.6 V	32.9 V	0.554 J	38.2	06R031	9.11	2.83 U	30.9 V
PCB026 & 029	pg/g-Wet	19	17	89.5	3.11	219 J	03R004	50.7	29.3 J	149 JV	3.11	219 J	03R004	46.2	22.4 J	141 JV
PCB027	pg/g-Wet	19	13	68.4	0.255 J	159	06R031	16.5	6.26	70.3 V	0.234 U	159	06R031	12.1	3.46 U	26 V
PCB031	pg/g-Wet	19	18	94.7	5.11	389	03R004	97.2	22.7 V	334 V	5.11	389	03R004	92.4	18.9	331 V
PCB032	pg/g-Wet	19	14	73.7	0.493 J	260	06R031	29.9	9.18 V	112 V	0.435 U	260	06R031	22.7	3.7 U	55.4 V
PCB034	pg/g-Wet	19	9	47.4	0.102 J	5.96	06R031	1.92	0.851 T	5.2 V	0.102 J	5.96	06R031	1.86	1.6 U	4.26 V
PCB035	pg/g-Wet	19	6	31.6	0.497 J	8.65	03R004	2.49	0.599 JV	7.51 JV	0.362 U	8.65	03R004	1.63	1.17 U	4.54 JV
PCB036	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.107 U	7.28 U	06R004	1.54	1.97 U	3.61 UV
PCB037	pg/g-Wet	19	19	100	13.7	905	03R004	200	78.3	827 V	13.7	905	03R004	200	78.3	827 V
PCB038	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.072 UT	5.41 U	06R004	1.17	1.46 U	2.68 UV
PCB039	pg/g-Wet	19	8	42.1	0.415 JT	5.84	02R001	1.88	0.467 JV	5.54 V	0.405 U	7.14 U	06R004	2.18	1.95 U	5.08 V
PCB040 & 041 & 071	pg/g-Wet	19	16	84.2	2.14	108 J	02R001	35	14.1 JV	99.1 JV	2.14	108 J	02R001	30.9	9.05 U	97.3 JV
PCB042	pg/g-Wet	19	16	84.2	1.32	79.7	02R001	25	8.63 V	73.2 V	1.32	79.7	02R001	21.9	5.6 U	71.9 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB043	pg/g-Wet	19	10	52.6	0.213 J	17.6	02R001	5.4	0.863 V	17.4 V	0.213 J	17.6	02R001	5.08	3.81 U	17.2 V
PCB044 & 047 & 065	pg/g-Wet	19	18	94.7	20.4	1600 T	CR11E	261	128 JV	681 JV	20.4	1600 T	CR11E	249	111	627 JV
PCB045 & 051	pg/g-Wet	19	15	78.9	1.12 J	62.9 J	06R031	20.7	24.4 J	50.2 JV	1.12 J	62.9 J	06R031	18.4	10.8 U	46.6 JV
PCB046	pg/g-Wet	19	9	47.4	0.275 J	12.6	02R001	4.17	2.15 T	10.7 V	0.192 U	12.6	02R001	3.5	2.6 U	8.32 V
PCB048	pg/g-Wet	19	15	78.9	1.02	50.9	03R004	17.2	3.08 T	47.7 V	1.02	50.9	03R004	15	7.4 U	46.8 V
PCB049 & 069	pg/g-Wet	19	18	94.7	6.09	293 J	02R001	82.7	37.7 JV	228 JV	6.09	293 J	02R001	78.9	29.7 J	224 JV
PCB050 & 053	pg/g-Wet	19	14	73.7	0.968 J	83.1 T	CR11E	22.5	13.4 V	69.1 JV	0.968 J	83.1 T	CR11E	19.2	10.8 U	63.7 JV
PCB052	pg/g-Wet	19	19	100	14	660	03R005	157	100	474 V	14	660	03R005	157	100	474 V
PCB054	pg/g-Wet	19	8	42.1	0.154 J	20.8 T	CR11E	5.2	0.764 V	19.5 V	0.077 U	20.8 T	CR11E	3.7	2.17 U	17.6 V
PCB055	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.828 U	8.92 U	06R004	2.01	2.41 U	4.42 UV
PCB056	pg/g-Wet	19	15	78.9	1.98	185	02R001	36.9	6.61	122 V	1.24 UT	185	02R001	29.7	6.37	105 V
PCB057	pg/g-Wet	19	13	68.4	0.355 J	9.9	03R004	3.6	1.02	9.74 V	0.355 J	9.9	03R004	3.76	4.44 U	9.67 V
PCB058	pg/g-Wet	19	8	42.1	0.467 J	9.32	03R004	2.76	0.773 JV	9.03 V	0.467 J	11.1 U	06R004	3.16	2.99 U	8.57 V
PCB059 & 062 & 075	pg/g-Wet	19	13	68.4	0.829 J	31 J	03R004	11.5	2.98	30.7 JV	0.829 J	31 J	03R004	10.8	9.95 U	30.6 JV
PCB060	pg/g-Wet	19	19	100	7.47	1230	02R001	133	32.7	338 V	7.47	1230	02R001	133	32.7	338 V
PCB061 & 070 & 074 & 076	pg/g-Wet	19	19	100	106	5360 J	02R001	961	347	2340 JV	106	5360 J	02R001	961	347	2340 JV
PCB063	pg/g-Wet	19	19	100	10.2	319	02R001	68.3	32.9	173 V	10.2	319	02R001	68.3	32.9	173 V
PCB064	pg/g-Wet	19	17	89.5	2.23	120	02R001	29.6	9.56	87.8 V	2.23	120	02R001	27	5.22	83.7 V
PCB066	pg/g-Wet	19	19	100	143	7680	02R001	1140	456	2710 V	143	7680	02R001	1140	456	2710 V
PCB067	pg/g-Wet	19	13	68.4	0.769	34.4	03R004	9.51	2.24	27.6 V	0.769	34.4	03R004	8.37	6.35 U	24.2 V
PCB068	pg/g-Wet	19	17	89.5	3.66	228 T	CR11E	27.3	16.3	69.9 V	3.66	228 T	CR11E	25	12.6	50.2 V
PCB072	pg/g-Wet	19	14	73.7	1.3	36.3 T	CR11E	8.16	4.23 V	27.1 V	1.3	36.3 T	CR11E	7.28	4.82 U	23.6 V
PCB073	pg/g-Wet	19	3	15.8	0.488 T	34.5 T	CR11E	12.1	1.42	31.2 V	0.262 U	34.5 T	CR11E	4.31	3.16 U	8.67 V
PCB077	pg/g-Wet	19	19	100	13.1	945	02R001	118	46	283 V	13.1	945	02R001	118	46	283 V
PCB078	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.442 U	7.64 U	06R004	1.67	2.06 U	3.78 UV
PCB079	pg/g-Wet	19	14	73.7	1.66	39.8	03R005	10.7	6.56 V	32.1 V	1.66	39.8	03R005	8.37	2.9 T	29.1 V
PCB080	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.511 U	11.2 U	06R004	2.4	3.03 U	5.56 UV
PCB081	pg/g-Wet	19	18	94.7	0.763	42.9	02R001	5.66	2.19 V	15 V	0.566 U	42.9	02R001	5.38	2.06	13.4 V
PCB082	pg/g-Wet	19	14	73.7	1.61	49.2	02R001	14.4	7.04 V	47.5 V	1.61	49.2	02R001	11.9	5.25 U	46.9 V
PCB083 & 099	pg/g-Wet	19	19	100	65.2 J	7500 T	CR11E	1150	519 J	3670 JV	65.2 J	7500 T	CR11E	1150	519 J	3670 JV
PCB084	pg/g-Wet	19	16	84.2	2.84	120	03R005	23.1	10.7 V	66.8 V	2.84	120	03R005	20.8	9.39	56.2 V
PCB085 & 116 & 117	pg/g-Wet	19	19	100	27.4	1050 T	CR11E	176	75.7 J	567 JV	27.4	1050 T	CR11E	176	75.7 J	567 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	19	18	94.7	26.3	852 J	03R005	201	101 JV	737 JV	26.3	852 J	03R005	191	81.7 J	731 JV
PCB088 & 091	pg/g-Wet	19	16	84.2	2.57	107 T	CR11E	27.3	18.6 JV	96.8 JV	2.57	107 T	CR11E	24.2	10.9 J	94.8 JV
PCB089	pg/g-Wet	19	3	15.8	0.304 JT	1.94	CR08W	0.91	0.485 JT	1.79 JV	0.156 U	8.89 U	06R004	1.97	2.4 U	4.4 UV
PCB090 & 101 & 113	pg/g-Wet	19	19	100	67	3650 T	CR11E	544	291 J	1900 JV	67	3650 T	CR11E	544	291 J	1900 JV
PCB092	pg/g-Wet	19	18	94.7	6.99	315 T	CR11E	71	41.9 V	303 V	6.99	315 T	CR11E	67.5	38.2	302 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	19	18	94.7	18.9	1250 T	CR11E	220	115 JV	973 JV	18.9	1250 T	CR11E	210	106 J	957 JV
PCB094	pg/g-Wet	19	8	42.1	0.174 J	11.7 T	CR11E	2.04	0.512 JV	8.21 V	0.174 J	11.7 T	CR11E	2.68	2.45 U	5.23 V
PCB096	pg/g-Wet	19	5	26.3	0.111 J	8.17 T	CR11E	2.03	0.428 JT	6.8 V	0.102 U	11.9 U	06R004	2.96	3.22 U	6.17 V
PCB103	pg/g-Wet	19	15	78.9	0.891	130 T	CR11E	15.6	5.17	54.5 V	0.891	130 T	CR11E	13.1	4.17 U	32.9 V
PCB104	pg/g-Wet	19	2	10.5	0.909	5.11 T	CR11E	3.01	3.01 V	4.9 V	0.053 U	13.7 U	06R004	3.13	3.71 U	6.76 UV
PCB105	pg/g-Wet	19	19	100	57.5	4240 T	CR11E	680	298	2690 V	57.5	4240 T	CR11E	680	298	2690 V
PCB106	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.566 U	18 U	06R004	3.8	4.86 U	8.91 UV
PCB107 & 124	pg/g-Wet	19	13	68.4	5.28	268 T	CR11E	47	15.4 T	171 JV	5.28	268 T	CR11E	37.3	17.4 U	123 JV
PCB109	pg/g-Wet	19	19	100	53.9	1450 T	CR11E	282	157	842 V	53.9	1450 T	CR11E	282	157	842 V
PCB110 & 115	pg/g-Wet	19	19	100	18.9	602 J	03R005	113	52.5 J	332 JV	18.9	602 J	03R005	113	52.5 J	332 JV
PCB111	pg/g-Wet	19	10	52.6	0.964	43.3 T	CR11E	7.9	2.27 V	30.9 V	0.964	43.3 T	CR11E	5.98	2.84 U	18.5 V
PCB112	pg/g-Wet	19	1	5.26	13.6	13.6	CR06W	13.6	13.6	13.6	0.235 U	13.6	CR06W	3.35	3.47 U	7.12 V
PCB114	pg/g-Wet	19	19	100	14.6	488 T	CR11E	100	50.5	397 V	14.6	488 T	CR11E	100	50.5	397 V
PCB118	pg/g-Wet	19	19	100	586	23900 T	CR11E	3660	1620	11100 V	586	23900 T	CR11E	3660	1620	11100 V
PCB120	pg/g-Wet	19	18	94.7	3.94	108 T	CR11E	19.7	11.1 V	57.7 V	3.94	108 T	CR11E	18.8	10.6	54.7 V
PCB121	pg/g-Wet	19	4	21.1	0.231 J	59.4 T	CR11E	15.6	1.38 JV	50.8 V	0.203 U	59.4 T	CR11E	4.85	2.04 U	9.32 V
PCB122	pg/g-Wet	19	8	42.1	2.3	58.6 T	CR11E	27.5	20.7 V	57.6 V	0.657 U	58.6 T	CR11E	15.1	5.9 U	56.1 V
PCB123	pg/g-Wet	19	19	100	11.8	315	02R001	72.1	34.8	257 V	11.8	315	02R001	72.1	34.8	257 V
PCB126	pg/g-Wet	19	19	100	1.4	25.9	02R001	7.29	4.18 T	23.1 V	1.4	25.9	02R001	7.29	4.18 T	23.1 V
PCB127	pg/g-Wet	19	11	57.9	1.54	53.6 T	CR11E	11.4	4.55	36.3 V	1.54	53.6 T	CR11E	9.67	4.84 U	22.4 V
PCB128 & 166	pg/g-Wet	19	18	94.7	6.54	239 T	CR11E	53.9	28 JV	199 JV	6.54	239 T	CR11E	51.4	25.4	197 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB129 & 138 & 160 & 163	pg/g-Wet	19	19	100	588	104000 T	CR11E	8250	2130 J	23600 JV	588	104000 T	CR11E	8250	2130 J	23600 JV
PCB130	pg/g-Wet	19	19	100	18.2	2650 T	CR11E	239	74.1	718 V	18.2	2650 T	CR11E	239	74.1	718 V
PCB131	pg/g-Wet	19	11	57.9	0.48 J	30.5 T	CR11E	6.48	1.79	26.4 V	0.48 J	30.5 T	CR11E	5.7	3.06 U	23.1 V
PCB132	pg/g-Wet	19	19	100	6.78	407 T	CR11E	69.2	35.4	284 V	6.78	407 T	CR11E	69.2	35.4	284 V
PCB133	pg/g-Wet	19	19	100	14.3	1860 T	CR11E	167	59.6	417 V	14.3	1860 T	CR11E	167	59.6	417 V
PCB134 & 143	pg/g-Wet	19	16	84.2	2.52	462 T	CR11E	54.5	16.3 JV	221 JV	2.52	462 T	CR11E	47.4	15.7	173 JV
PCB135 & 151 & 154	pg/g-Wet	19	18	94.7	28.8	4820 T	CR11E	473	152 V	1440 JV	28.8	4820 T	CR11E	449	149 T	1240 JV
PCB136	pg/g-Wet	19	19	100	5.5	860 T	CR11E	74	24.6	207 V	5.5	860 T	CR11E	74	24.6	207 V
PCB137	pg/g-Wet	19	19	100	52.9	2280 T	CR11E	343	160	982 V	52.9	2280 T	CR11E	343	160	982 V
PCB139 & 140	pg/g-Wet	19	13	68.4	2.79	125 T	CR11E	23.7	9.23	82.9 JV	2.79	125 T	CR11E	18.5	7.75 U	61.8 JV
PCB141	pg/g-Wet	19	16	84.2	12.8	1400 T	CR11E	176	51.4 V	735 V	8.37 U	1400 T	CR11E	149	46.8 T	602 V
PCB142	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.538 U	11.1 U	06R004	2.5	3 U	5.51 UV
PCB144	pg/g-Wet	19	18	94.7	3.69	641 T	CR11E	62	19.4 V	212 V	3.69	641 T	CR11E	59	17.5 T	186 V
PCB145	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.056 U	4.36 U	06R004	0.934	1.18 U	2.16 UV
PCB146	pg/g-Wet	19	19	100	232	34300 T	CR11E	2940	900	7820 V	232	34300 T	CR11E	2940	900	7820 V
PCB147 & 149	pg/g-Wet	19	19	100	54.8	6830 T	CR11E	702	260	2260 JV	54.8	6830 T	CR11E	702	260	2260 JV
PCB148	pg/g-Wet	19	11	57.9	0.574	55.3 T	CR11E	7.5	1.53 T	32.6 V	0.574	55.3 T	CR11E	5.78	2.45 U	14.5 V
PCB150	pg/g-Wet	19	9	47.4	0.201 J	25.1 T	CR11E	4.32	0.91 T	16.9 V	0.201 J	25.1 T	CR11E	2.71	1.08 U	6.57 V
PCB152	pg/g-Wet	19	3	15.8	0.072 J	3.31 T	CR11E	1.18	0.152 JT	2.99 JV	0.061 U	10.5 U	06R004	2.34	2.86 U	5.21 UV
PCB153 & 168	pg/g-Wet	19	19	100	991	222000 T	CR11E	17700	4380	49800 JV	991	222000 T	CR11E	17700	4380	49800 JV
PCB155	pg/g-Wet	19	7	36.8	0.267 J	26.5 T	CR11E	4.42	0.483 J	19.3 V	0.233 U	26.5 T	CR11E	3.25	2.17 U	6.24 V
PCB156	pg/g-Wet	10	10	100	207	1790	03R005	592	490 V	1310 V	207	1790	03R005	592	490 V	1310 V
PCB156 & 157	pg/g-Wet	9	9	100	112	15100 T	CR11E	2100	317	9760 V	112	15100 T	CR11E	2100	317	9760 V
PCB157	pg/g-Wet	10	10	100	26.9	258	03R005	79.8	57.9 V	196 V	26.9	258	03R005	79.8	57.9 V	196 V
PCB158	pg/g-Wet	19	18	94.7	16.6	1730 T	CR11E	179	61.6 V	741 V	8.88 U	1730 T	CR11E	170	61.5	683 V
PCB159	pg/g-Wet	19	13	68.4	1.09	214 T	CR11E	26.5	4.36 T	114 V	1.09	214 T	CR11E	19.3	4.36 T	64.6 V
PCB161	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.221 U	12.3 U	06R004	2.64	3.32 U	6.11 UV
PCB162	pg/g-Wet	19	15	78.9	4.53	195 T	CR11E	29.5	14.6	93.1 V	4.53	195 T	CR11E	24.6	11.1	64 V
PCB164	pg/g-Wet	19	18	94.7	9.64	1310 T	CR11E	113	25 V	379 V	9.64	1310 T	CR11E	107	23.3	324 V
PCB165	pg/g-Wet	19	11	57.9	0.896	108 T	CR11E	14.5	3.47	61.9 V	0.896	108 T	CR11E	9.94	3.47	25 V
PCB167	pg/g-Wet	19	19	100	53.2	6290 T	CR11E	607	186	1570 V	53.2	6290 T	CR11E	607	186	1570 V
PCB169	pg/g-Wet	19	4	21.1	0.539 J	1.67	09R002	1.14	1.18 V	1.65 V	0.43 U	79.6 UT	CR11E	2.82	0.368 U	5.99 UV
PCB170	pg/g-Wet	19	19	100	135	54700 T	CR11E	4050	675	12100 V	135	54700 T	CR11E	4050	675	12100 V
PCB171 & 173	pg/g-Wet	19	18	94.7	19.2	5400 T	CR11E	412	77.4 JV	1380 JV	19.2	5400 T	CR11E	391	69 J	1150 JV
PCB172	pg/g-Wet	19	19	100	20.2	8450 T	CR11E	562	95 T	1470 V	20.2	8450 T	CR11E	562	95 T	1470 V
PCB174	pg/g-Wet	19	19	100	17.8	6200 T	CR11E	491	86.2	1420 V	17.8	6200 T	CR11E	491	86.2	1420 V
PCB175	pg/g-Wet	19	17	89.5	6.56	2470 T	CR11E	189	31.8	716 V	6.56	2470 T	CR11E	170	22.5	497 V
PCB176	pg/g-Wet	19	18	94.7	2.24	438 T	CR11E	40.7	11.4 V	127 V	2.24	438 T	CR11E	38.7	11	109 V
PCB177	pg/g-Wet	19	19	100	78	22200 T	CR11E	1530	204	3910 V	78	22200 T	CR11E	1530	204	3910 V
PCB178	pg/g-Wet	19	19	100	15.8	8040 T	CR11E	677	95.3	2750 V	15.8	8040 T	CR11E	677	95.3	2750 V
PCB179	pg/g-Wet	19	18	94.7	6.31	1230 T	CR11E	103	24.1 V	311 V	6.31	1230 T	CR11E	98.2	22.6	257 V
PCB180 & 193	pg/g-Wet	19	19	100	780	275000 T	CR11E	22100	3850 J	67900 JV	780	275000 T	CR11E	22100	3850 J	67900 JV
PCB181	pg/g-Wet	19	17	89.5	2.27	315 T	CR11E	35.8	12.6	115 V	2.27	315 T	CR11E	32.7	11.2	90.4 V
PCB182	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.331 U	14.7 U	06R004	3.05	3.98 U	7.31 UV
PCB183 & 185	pg/g-Wet	19	19	100	95.2	40200 T	CR11E	2910	442 J	9210 JV	95.2	40200 T	CR11E	2910	442 J	9210 JV
PCB184	pg/g-Wet	19	3	15.8	0.185 J	3.55 T	CR11E	1.35	0.32 JT	3.23 JV	0.159 U	13 U	06R004	2.89	3.52 U	6.46 UV
PCB186	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.318 U	7.48 U	06R004	1.59	2.02 U	3.71 UV
PCB187	pg/g-Wet	19	19	100	531	149000 T	CR11E	12300	2130	39500 V	531	149000 T	CR11E	12300	2130	39500 V
PCB188	pg/g-Wet	19	8	42.1	1.23	111 T	CR11E	18.4	3.5 V	76.9 V	1.2 U	111 T	CR11E	10.6	3.88 U	23.2 V
PCB189	pg/g-Wet	19	19	100	8.22	3210 T	CR11E	251	49.4	685 V	8.22	3210 T	CR11E	251	49.4	685 V
PCB190	pg/g-Wet	19	19	100	35.1	13200 T	CR11E	922	120	2530 V	35.1	13200 T	CR11E	922	120	2530 V
PCB191	pg/g-Wet	19	19	100	11	4030 T	CR11E	313	49.6	945 V	11	4030 T	CR11E	313	49.6	945 V
PCB192	pg/g-Wet	19	0	0	--	--	--	--	--	--	0.511 U	6.75 U	06R004	1.49	1.82 U	3.34 UV
PCB194	pg/g-Wet	19	19	100	65.4	35000 T	CR11E	2680	400	9310 V	65.4	35000 T	CR11E	2680	400	9310 V
PCB195	pg/g-Wet	19	19	100	25.9	14700 T	CR11E	1090	151	3620 V	25.9	14700 T	CR11E	1090	151	3620 V
PCB196	pg/g-Wet	19	19	100	44.9	23500 T	CR11E	1800	260	6240 V	44.9	23500 T	CR11E	1800	260	6240 V
PCB197 & 200	pg/g-Wet	19	17	89.5	4.05	1770 T	CR11E	151	27.4	633 JV	4.05	1770 T	CR11E	136	19.9 J	491 JV
PCB198 & 199	pg/g-Wet	19	19	100	81.5	34500 T	CR11E	2730	395 J	10200 JV	81.5	34500 T	CR11E	2730	395 J	10200 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB201	pg/g-Wet	19	19	100	12.2	4560 T	CR11E	367	53	1370 V	12.2	4560 T	CR11E	367	53	1370 V
PCB202	pg/g-Wet	19	18	94.7	9.95	2140 T	CR11E	203	41.5 V	873 V	9.95	2140 T	CR11E	193	39.3	798 V
PCB203	pg/g-Wet	19	19	100	20.5	11600 T	CR11E	753	88.8	1800 V	20.5	11600 T	CR11E	753	88.8	1800 V
PCB204	pg/g-Wet	19	3	15.8	0.165 J	5.42 T	CR11E	1.99	0.397 JT	4.92 JV	0.051 U	17.8 U	06R004	3.94	4.84 U	8.86 UV
PCB205	pg/g-Wet	19	14	73.7	1.29	983 T	CR11E	88.1	13.3 V	402 V	1.29	983 T	CR11E	67	9.65 U	179 V
PCB206	pg/g-Wet	19	19	100	9.75	2730 T	CR11E	215	58.2	628 V	9.75	2730 T	CR11E	215	58.2	628 V
PCB207	pg/g-Wet	19	18	94.7	5.23	988 T	CR11E	99	26.6 V	394 V	5.23	988 T	CR11E	94.1	22	359 V
PCB208	pg/g-Wet	19	19	100	8.02	658 T	CR11E	75.7	29	288 V	8.02	658 T	CR11E	75.7	29	288 V
PCB209	pg/g-Wet	19	19	100	11.5	288	CR08W	55.5	31.6	126 V	11.5	288	CR08W	55.5	31.6	126 V
Total PCB Congeners	pg/g-Wet	19	19	100	7140 JT	1190000 JT	CR11E	104000	31500 NJT	305000 JV	7140 JT	1190000 JT	CR11E	104000	31500 NJT	305000 JV
Total PCBs[d]																
Total PCBs	µg/kg-Wet	36	26	72.2	7.14 JT	1190 JT	CR11E	86	34.9 JV	176 JV	1.7 UT	1190 JT	CR11E	62.6	23.2 JV	114 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	19	19	100	15.1 T	14500 JT	06R031	898	56.7 T	1980 JV	15.1 T	14500 JT	06R031	898	56.7 T	1980 JV
Heptachlorobiphenylhomologs	pg/g-Wet	19	19	100	1860 T	594000 T	CR11E	46800	8290 JT	145000 JV	1860 T	594000 T	CR11E	46800	8290 JT	145000 JV
Hexachlorobiphenyl homologs	pg/g-Wet	19	19	100	2390 JT	408000 T	CR11E	33500	8650 JT	94700 JV	2390 JT	408000 T	CR11E	33500	8650 JT	94700 JV
Monochlorobiphenyl homologs	pg/g-Wet	19	13	68.4	0.138 JT	11500 T	06R031	888	3.06 T	4610 JV	0.138 JT	11500 T	06R031	608	2.41 UT	1160 JV
Nonachlorobiphenyl homologs	pg/g-Wet	19	19	100	23.2 T	4380 T	CR11E	384	117 T	1270 V	23.2 T	4380 T	CR11E	384	117 T	1270 V
Octachlorobiphenyl homologs	pg/g-Wet	19	19	100	266 T	129000 T	CR11E	9830	1400 JT	34000 JV	266 T	129000 T	CR11E	9830	1400 JT	34000 JV
Pentachlorobiphenylhomologs	pg/g-Wet	19	19	100	1100 JT	45900 JT	CR11E	7400	3370 T	22000 JV	1100 JT	45900 JT	CR11E	7400	3370 T	22000 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	19	19	100	342 JT	17500 JT	02R001	3130	1500 JT	7740 JV	342 JT	17500 JT	02R001	3130	1500 JT	7740 JV
Trichlorobiphenyl homologs	pg/g-Wet	19	19	100	55.9 JT	4230 JT	03R004	1050	374 JT	3680 JV	55.9 JT	4230 JT	03R004	1050	374 JT	3680 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	19	19	100	0.091	8.62	07R006	1.32	0.628	4.12 V	0.091	8.62	07R006	1.32	0.628	4.12 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	19	19	100	1.28	22.6	06R004	6.21	4.55	16.8 V	1.28	22.6	06R004	6.21	4.55	16.8 V
Hexachlorodibenzofuran homologs	pg/g-Wet	19	19	100	0.321	34.6	07R006	3.48	0.989	13.8 V	0.321	34.6	07R006	3.48	0.989	13.8 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	19	19	100	0.319	3.98	07R006	1.56	1.29	3.94 V	0.319	3.98	07R006	1.56	1.29	3.94 V
Octachlorodibenzofuran	pg/g-Wet	19	12	63.2	0.263 JT	6.08	07R006	1.64	1.2 V	4.25 V	0.147 U	6.08	07R006	1.08	0.759	3.08 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	19	19	100	3.08	57.2	06R031	17.5	9.96	52.1 V	3.08	57.2	06R031	17.5	9.96	52.1 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	19	19	100	0.793	89.2	07R006	8.62	2.79 T	25.4 V	0.793	89.2	07R006	8.62	2.79 T	25.4 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	19	19	100	0.184 T	1.34	08R003	0.503	0.409	1.12 V	0.184 T	1.34	08R003	0.503	0.409	1.12 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	19	19	100	1.12	105	07R006	8.43	2.71	17 V	1.12	105	07R006	8.43	2.71	17 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	19	19	100	0.18	0.947	06R004	0.539	0.527	0.854 V	0.18	0.947	06R004	0.539	0.527	0.854 V
Total PCDD/F	pg/g-Wet	19	19	100	9.46 T	281 T	07R006	49.2	34.9 T	131 V	9.46 T	281 T	07R006	49.2	34.9 T	131 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	19	16	84.2	0.11 J	4.71	07R006	0.704	0.423 V	2.43 V	0.11 J	4.71	07R006	0.604	0.301	1.97 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	19	19	100	0.533	8.73	06R031	2.45	2.06	5.18 V	0.533	8.73	06R031	2.45	2.06	5.18 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	19	14	73.7	0.0125 JT	2.15	07R006	0.191	0.033 JV	0.829 V	0.011 U	2.15	07R006	0.143	0.028 J	0.32 V
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	19	17	89.5	0.033 J	23.2	07R006	1.72	0.171 T	6.92 V	0.033 J	23.2	07R006	1.54	0.139	4.88 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	19	15	78.9	0.0215 JT	0.131	08R003	0.0577	0.047	0.111 V	0.016 U	0.131	08R003	0.0488	0.034	0.105 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	19	13	68.4	0.02 J	4.72	07R006	0.503	0.0905 JT	2.26 V	0.02 J	4.72	07R006	0.352	0.047 J	1.04 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	19	19	100	0.066 J	1.26	06R031	0.322	0.254	0.771 V	0.066 J	1.26	06R031	0.322	0.254	0.771 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	19	4	21.1	0.01 J	0.339	07R006	0.106	0.037 V	0.297 V	0.01 J	0.339	07R006	0.0264	0.0055 U	0.087 V
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	19	14	73.7	0.061	0.22	09R002	0.129	0.104 V	0.206 V	0.039 U	0.22	09R002	0.101	0.093 J	0.201 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	19	19	100	0.054 JT	36.8	07R006	2.33	0.213	5.79 V	0.054 JT	36.8	07R006	2.33	0.213	5.79 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	19	19	100	0.074 J	0.439	06R031	0.187	0.173	0.393 V	0.074 J	0.439	06R031	0.187	0.173	0.393 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	19	17	89.5	0.016 J	0.79	07R006	0.1	0.039 J	0.37 V	0.013 U	0.79	07R006	0.0907	0.036 J	0.317 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	19	19	100	0.076 J	18.7	07R006	1.34	0.236	3.22 V	0.076 J	18.7	07R006	1.34	0.236	3.22 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	19	19	100	0.181 T	79.2	07R006	5.09	0.722	11.5 V	0.181 T	79.2	07R006	5.09	0.722	11.5 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	19	18	94.7	0.051	0.252	06R004	0.132	0.117 V	0.232 V	0.051	0.252	06R004	0.127	0.113	0.23 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	19	19	100	0.203 JT	18.2 T	07R006	1.58	0.588 JT	3.49 V	0.203 JT	18.2 T	07R006	1.58	0.588 JT	3.49 V
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	19	19	100	0.476 JT	19 T	07R006	2.53	1.63 T	5.95 JV	0.476 JT	19 T	07R006	2.53	1.63 T	5.95 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	19	19	100	0.172 T	3.89 T	CR11E	0.951	0.477 T	3.2 V	0.172 T	3.89 T	CR11E	0.951	0.477 T	3.2 V
Pesticides																
2,4'-DDD	µg/kg-Wet	36	10	27.8	0.00571 T	4.3 NJ	07R006	0.464	0.0209 JV	2.43 JV	0.00571 T	4.3 NJ	07R006	0.504	0.5 UV	0.625 UJV
2,4'-DDE	µg/kg-Wet	36	12	33.3	0.00196 JT	3.3 NJ	04R003	0.482	0.00938 JV	2.26 JV	0.00196 JT	3.3 NJ	04R003	0.508	0.5 UJV	1.1 JV
2,4'-DDT	µg/kg-Wet	36	19	52.8	1.1 NJ	9.5 NJ	02R015	3.05	2.1 N	7.79 JV	0.00969 UT	9.5 NJ	02R015	1.92	1.45 JV	6.85 JV
4,4'-DDD	µg/kg-Wet	36	14	38.9	0.0309 JT	17 NJ	07R006	2.52	0.223 JV	12.2 JV	0.0309 JT	17 NJ	07R006	1.29	0.5 UJV	4.73 JV
4,4'-DDE	µg/kg-Wet	36	36	100	1.05 T	51	07R006	5.27	3.45 JV	10.4 JV	1.05 T	51	07R006	5.27	3.45 JV	10.4 JV
4,4'-DDT	µg/kg-Wet	36	9	25	0.0982 J	14 J	07R003	4.88	2.3 NJ	12.4 JV	0.0113 U	14 J	07R003	1.68	0.5 UV	9.63 V
Aldrin	µg/kg-Wet	36	1	2.78	0.037 J	0.037 J	CR08W	0.037	0.037 J	0.037 J	0.00171 UT	2 U	07R003	0.39	0.5 UV	0.5 UV
alpha-Endosulfan	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.00624 U	2 U	07R003	0.393	0.5 UV	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	36	3	8.33	0.00201 J	0.00284 JT	CR10W	0.00245	0.00251 J	0.00281 JV	0.000938 UT	2 U	07R003	0.398	0.5 UV	0.5 UV
beta-Endosulfan	µg/kg-Wet	36	11	30.6	1 N	3.1 J	03R004	1.67	1.6 N	2.65 JV	0.0128 U	3.1 J	03R004	0.766	0.5 UJV	2.13 JV
beta-Hexachlorocyclohexane	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.00245 U	2 UJ	07R003	0.389	0.5 UV	0.5 UV
cis-Chlordane	µg/kg-Wet	36	9	25	0.0114 J	0.0666 J	CR08W	0.0255	0.02 J	0.0514 JV	0.0114 J	2 UJ	07R003	0.395	0.5 UV	0.5 UV
cis-Nonachlor	µg/kg-Wet	36	9	25	0.043 JT	0.105 J	CR08W	0.0684	0.0607 J	0.104 JV	0.043 JT	2.3 U	07R006	0.459	0.5 UJV	0.95 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.000531 U	2.8 U	05R001	0.421	0.5 UV	0.625 UV
Dieldrin	µg/kg-Wet	36	8	22.2	0.00943 JT	0.0471 J	CR08W	0.0177	0.0146 JV	0.0364 JV	0.00943 JT	2 UJ	07R003	0.393	0.5 UV	0.5 UV
Endosulfan sulfate	µg/kg-Wet	36	1	2.78	0.00531 J	0.00531 J	CR01W	0.00531	0.00531 J	0.00531 J	0.0044 UT	2 UJ	07R003	0.393	0.5 UV	0.5 UV
Endrin	µg/kg-Wet	36	6	16.7	0.00121 J	2.8 NJ	03R005	1.37	1.25 JV	2.55 JV	0.00111 U	2.8 NJ	03R005	0.556	0.5 UJV	1.43 JV
Endrin aldehyde	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.0915 UT	2 UJ	07R003	0.404	0.5 UJV	0.525 UV
Endrin ketone	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.0915 UT	2 UJ	07R003	0.401	0.5 UV	0.5 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.00156 U	2 U	07R003	0.39	0.5 UV	0.5 UV
Heptachlor	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.000801 U	2 U	07R003	0.389	0.5 UV	0.5 UV
Heptachlor epoxide	µg/kg-Wet	36	4	11.1	0.000587 JT	0.00176 J	CR08W	0.00116	0.00115 JV	0.00172 JV	0.000579 U	2 U	07R003	0.389	0.5 UV	0.5 UV
Methoxychlor	µg/kg-Wet	36	0	0	--	--	--	--	--	--	0.00119 UT	2 U	07R003	0.395	0.5 UV	0.5 UV
Mirex	µg/kg-Wet	27	0	0	--	--	--	--	--	--	1 UJ	2 UJ	07R003	0.52	0.5 UJ	0.5 UJV
Oxychlordane	µg/kg-Wet	36	5	13.9	0.00827 JT	0.0327 J	CR08W	0.0147	0.00991 J	0.0289 JV	0.00827 JT	2 U	07R003	0.392	0.5 UJV	0.5 UJV
Total Chlordanes	µg/kg-Wet	36	14	38.9	0.164 JT	2.7 NJT	04R004	0.749	0.358 JV	2.18 JV	0.164 JT	2.7 NJT	04R004	0.663	0.5 UJV	1.45 JV
Total Endosulfan	µg/kg-Wet	36	12	33.3	0.00531 JT	3.1 JT	03R004	1.53	1.5 V	2.61 JV	0.00531 JT	3.1 JT	03R004	0.766	0.5 UJV	2.13 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	36	14	38.9	0.0366 JT	21.3 NJT	07R006	2.86	0.283 JV	13.7 JV	0.0366 JT	21.3 NJT	07R006	1.42	0.5 UJV	4.73 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	36	36	100	1.12 JT	84.9 NJT	07R006	9.38	5.9 JV	22.3 JV	1.12 JT	84.9 NJT	07R006	9.38	5.9 JV	22.3 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	36	36	100	1.06 JT	51 T	07R006	5.44	3.5 JV	10.4 JV	1.06 JT	51 T	07R006	5.44	3.5 JV	10.4 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	36	21	58.3	0.0982 JT	17.5 NJT	07R003	4.85	3 NJT	12.6 NT	0.0113 UT	17.5 NJT	07R003	3.14	1.8 JV	10.3 V
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	27	27	100	1.6 JT	78 JT	07R006	9.15	4.8 JT	26.9 JV	1.6 JT	78 JT	07R006	9.15	4.8 JT	26.9 JV
Toxaphene	µg/kg-Wet	27	0	0	--	--	--	--	--	--	50 UJ	350 U	03R005	40	25 U	75 UJV
trans-Chlordane	µg/kg-Wet	36	6	16.7	0.0629 J	2.7 NJ	04R004	1.34	1.2 JV	2.5 JV	0.00544 UT	2.7 NJ	04R004	0.544	0.5 UJV	1.45 JV
trans-Nonachlor	µg/kg-Wet	36	9	25	0.0908 J	0.292 J	CR08W	0.166	0.14 J	0.276 JV	0.0908 J	2 UJ	07R003	0.431	0.5 UJV	0.5 UJV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	36	3	8.3	0.47 J	1.1 J	CR06W	0.69	0.5 J	1 JV	0.44 U	73 UT	04R003; 06R031	13	17 UV	23 UV
Acenaphthene	µg/kg-Wet	36	7	19	0.15 JT	4.2	CR06W	1	0.35 J	3.2 V	0.11 U	83 UT	03R005	14	17 UV	21 UV
Acenaphthylene	µg/kg-Wet	36	3	8.33	0.14 J	1.1	CR06W	0.48	0.2 J	1.01 JV	0.069 U	90 UT	03R005	13	16.5 UV	17 UV
Anthracene	µg/kg-Wet	36	9	25	0.095 J	2.9	CR06W	0.494	0.17 J	1.91 JV	0.095 J	37 UT	07R004	12.3	16.5 UV	16.5 UV
Benzo(a)anthracene	µg/kg-Wet	36	2	5.6	7.5	80 JT	06R004	44	44 JV	76 JV	0.2 U	80 JT	06R004	14	17 UV	17 UV
Benzo(a)pyrene	µg/kg-Wet	36	9	25	0.12 J	7.5	CR06W	1.1	0.28 J	4.7 V	0.12 J	37 UT	07R004	12	17 UV	17 UV
Benzo(b)fluoranthene	µg/kg-Wet	36	1	2.8	5.3	5.3	CR06W	5.3	5.3	5.3	0.17 UT	63 UT	06R004	13	17 UV	17 UV
Benzo(g,h,i)perylene	µg/kg-Wet	36	1	2.8	5.6	5.6	CR06W	5.6	5.6	5.6	0.14 UT	70 UT	03R003	13	17 UV	17 UJV
Benzo(k)fluoranthene	µg/kg-Wet	36	2	5.56	0.57	5	CR06W	2.79	2.79 V	4.78 V	0.056 U	77 UT	06R004	13	16.5 UV	17 UV
Chrysene	µg/kg-Wet	36	2	5.6	12	87 T	06R004	50	50 V	83 V	0.21 UT	87 T	06R004	15	17 UV	17 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	36	1	2.78	0.71	0.71	CR06W	0.71	0.71	0.71	0.059 U	37 UT	07R004	12.2	16.5 UV	16.5 UV
Fluoranthene	µg/kg-Wet	36	4	11	12	130 T	06R004	86	100 JV	130 V	0.38 UT	130 T	06R004	26	17 UV	97 JV
Fluorene	µg/kg-Wet	36	9	25	0.16 J	1.8	CR06W	0.51	0.23 JT	1.4 V	0.16 J	70 UT	03R005; 06R031	13	17 UV	23 UV
High Molecular Weight PAH	µg/kg-Wet	36	12	33	0.12 JT	380 JT	06R004	60	0.43 JV	260 JV	0.12 JT	380 JT	06R004	37	17 UV	110 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	36	1	2.8	5.3	5.3	CR06W	5.3	5.3	5.3	0.1 UT	37 UT	07R004	12	17 UV	17 UV
Low Molecular Weight PAH	µg/kg-Wet	36	10	28	0.8 JT	97 T	06R004	13	1.4 JV	63 JV	0.8 JT	97 T	06R004	24	17 UV	45 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Naphthalene	µg/kg-Wet	36	9	25	0.47 JT	2.9 J	CR06W	0.82	0.6 J	2 JV	0.47 JT	82 UT	07R004	20	17 UV	35 UV
Phenanthrene	µg/kg-Wet	36	2	5.6	7.6	97 T	06R004	52	52 V	93 V	0.46 UT	97 T	06R004	16	17 UV	43 UV
Pyrene	µg/kg-Wet	36	3	8.3	15	83 T	06R004	53	60 T	81 V	0.35 UT	83 T	06R004	18	17 UV	39 V
Total BaPEq	µg/kg-Wet	35	10	28.6	0.12 JT	10.1 T	CR06W	2.04	0.293 JV	9.2 JV	0.12 JT	37 UT	07R004	12.2	16.5 UT	16.5 UV
Total cPAHs	µg/kg-Wet	36	10	28	0.12 JT	170 JT	06R004	22	0.3 JV	110 JV	0.12 JT	170 JT	06R004	18	17 UV	25 V
Total PAHs	µg/kg-Wet	36	12	33.3	0.99 JT	477 JT	06R004	71.2	2.7 JV	308 JV	0.99 JT	477 JT	06R004	43.4	16.5 UV	116 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	36	0	0	--	--	--	--	--	--	66 U	270 UJT	07R006	58	50 UJV	100 UV
Butylbenzylphthalate	µg/kg-Wet	36	3	8.3	15 J	71 T	CR11E	38	27 J	67 JV	7.3 U	370 U	07R004	130	170 UV	170 UV
Dibutyl phthalate	µg/kg-Wet	36	0	0	--	--	--	--	--	--	52 U	650 U	08R003	150	170 UV	250 UV
Diethyl phthalate	µg/kg-Wet	36	0	0	--	--	--	--	--	--	11 U	950 U	08R003	81	85 UV	140 UV
Dimethyl phthalate	µg/kg-Wet	36	0	0	--	--	--	--	--	--	7.7 U	190 U	07R004	65	85 UV	85 UV
Di-n-octyl phthalate	µg/kg-Wet	36	0	0	--	--	--	--	--	--	11 U	1300 U	08R002	150	170 UV	280 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	9.8 U	37 UT	07R004	13	17 UV	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	11 U	37 UT	07R004	14	17 UV	17 UV
1,2-Diphenylhydrazine	µg/kg-Wet	27	0	0	--	--	--	--	--	--	17 U	37 U	07R004	16	17 U	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	11 U	37 UT	07R004	14	17 UV	17 UV
1,4-Dichlorobenzene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	11 U	37 UT	07R004	14	17 UV	17 UV
2,4-Dinitrotoluene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	15 U	73 UT	08R003	16	17 UV	33 UV
2,6-Dinitrotoluene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	14 U	37 UT	07R004	14	17 UV	17 UV
2-Chloronaphthalene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	6.7 U	66 UT	03R003	14	17 UV	17 UV
2-Nitroaniline	µg/kg-Wet	36	0	0	--	--	--	--	--	--	31 U	930 U	07R004	320	420 UV	420 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	36	0	0	--	--	--	--	--	--	1000 UJ	1900 U	07R004	760	850 UV	850 UV
3-Nitroaniline	µg/kg-Wet	36	0	0	--	--	--	--	--	--	400 U	930 U	07R004	360	420 UV	420 UV
4-Bromophenylphenyl ether	µg/kg-Wet	36	0	0	--	--	--	--	--	--	6.9 U	37 UT	07R004	13	17 UV	17 UV
4-Chloroaniline	µg/kg-Wet	36	0	0	--	--	--	--	--	--	83 UT	400 U	CR01EA; CR01W; CR05W; CR06W; CR08W; CR10W; CR11E; CR12E; CR12W	110	85 UV	200 UV
4-Chlorophenylphenyl ether	µg/kg-Wet	36	0	0	--	--	--	--	--	--	6.4 U	93 UT	07R004	31	42 UV	42 UV
4-Nitroaniline	µg/kg-Wet	36	0	0	--	--	--	--	--	--	400 U	930 U	07R004	360	420 UV	420 UV
Aniline	µg/kg-Wet	36	0	0	--	--	--	--	--	--	800 UJ	1900 U	07R004	710	800 UV	850 UV
Azobenzene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	40 U	190 U	07R004	69	85 UV	85 UV
Benzoic acid	µg/kg-Wet	36	0	0	--	--	--	--	--	--	400 U	9400 UJ	07R004	3100	4000 UV	4200 UV
Benzyl alcohol	µg/kg-Wet	36	2	5.6	26 J	28 J	CR01EA	27	27 JV	28 JV	22 U	370 U	07R004	130	170 UV	170 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	27	0	0	--	--	--	--	--	--	160 U	190 U	07R004	85	85 U	85 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	36	0	0	--	--	--	--	--	--	8.3 U	190 U	07R004	65	85 UV	85 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	36	0	0	--	--	--	--	--	--	13 U	37 UT	07R004	14	17 UV	17 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	9	0	0	--	--	--	--	--	--	13 U	13 U	CR01EA; CR01W; CR05W; CR06W; CR08W; CR10W; CR11E; CR12E; CR12W	6.5	6.5 U	6.5 UV
Carbazole	µg/kg-Wet	27	0	0	--	--	--	--	--	--	17 UT	37 UT	07R004	16	17 UT	17 UV
Dibenzofuran	µg/kg-Wet	36	8	22	0.13 J	0.48	CR08W	0.25	0.21 JV	0.45 JV	0.13 J	66 UT	03R004	13	17 UV	17 UV
Hexachlorobenzene	µg/kg-Wet	36	9	25	0.0357 JT	0.0911 J	CR12W	0.0569	0.0509 J	0.0885 JV	0.0357 JT	2 UT	07R003	0.403	0.5 UV	0.5 UV
Hexachlorobutadiene	µg/kg-Wet	36	3	8.33	0.0017 J	0.00209 J	CR01EA	0.00189	0.00189 JT	0.00207 JV	0.0013 UJ	10 U	CR01W; CR06W	0.67	0.5 UJV	2 UJV
Hexachlorocyclopentadiene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	820 U	1000 U	CR01EA; CR01W; CR05W; CR06W; CR08W; CR10W; CR11E; CR12E; CR12W	440	420 UJV	500 UV
Hexachloroethane	µg/kg-Wet	36	0	0	--	--	--	--	--	--	1 UJT	37 UT	07R004	8.9	10 UV	17 UV
Isophorone	µg/kg-Wet	36	0	0	--	--	--	--	--	--	9.2 U	1900 U	07R004	610	800 UV	850 UV
Nitrobenzene	µg/kg-Wet	36	0	0	--	--	--	--	--	--	12 U	37 UT	07R004; 09R001	14	17 UV	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	36	0	0	--	--	--	--	--	--	40 U	190 UT	07R004	69	85 UJV	85 UJV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
N-Nitrosodiphenylamine	µg/kg-Wet	36	0	0	--	--	--	--	--	--	6.6 U	190 U	07R004	64	85 UV	85 UV
N-Nitrosodipropylamine	µg/kg-Wet	36	0	0	--	--	--	--	--	--	17 UT	37 UT	07R004	15	17 UV	17 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	27	0	0	--	--	--	--	--	--	1600 U	1900 U	07R004	850	850 U	850 UV
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	9	0	0	--	--	--	--	--	--	20 U	20 U	CR01EA; CR01W; CR05W; CR06W; CR08W; CR10W; CR11E; CR12E; CR12W	10	10 U	10 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	27	0	0	--	--	--	--	--	--	1600 U	1900 U	07R004	850	850 U	850 UV
2,4,5-Trichlorophenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	14 U	930 U	07R004	310	420 UV	420 UV
2,4,6-Trichlorophenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	9.1 U	37 UT	07R004	13	17 UV	17 UV
2,4-Dichlorophenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	9.5 U	37 UT	07R004	13	17 UV	17 UV
2,4-Dimethylphenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	19 U	560 U	07R004	190	250 UV	250 UV
2,4-Dinitrophenol	µg/kg-Wet	12	0	0	--	--	--	--	--	--	800 U	3300 U	08R002; 08R003; 09R001; 09R002	920	400 UV	1700 UV
2-Chlorophenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	7.5 U	67 UT	08R003	19	17 UV	32 UV
2-Methylphenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	8.2 U	190 U	07R004	65	85 UV	85 UV
2-Nitrophenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	12 U	1900 U	07R004	610	800 UV	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	400 UJ	3700 U	07R004	1300	1700 UV	1700 UV
4-Chloro-3-methylphenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	6.8 U	370 U	07R004	130	170 UV	170 UV
4-Methylphenol	µg/kg-Wet	36	2	5.6	33 T	190 T	03R004	110	110 V	180 V	7.7 U	190 T	03R004	30	17 UV	61 UV
4-Nitrophenol	µg/kg-Wet	36	0	0	--	--	--	--	--	--	10 U	1900 U	07R004	640	850 UV	850 UV
Pentachlorophenol	µg/kg-Wet	36	1	2.8	130 T	130 T	08R003	130	130 T	130 T	30 UJ	190 UT	07R004	69	85 UV	88 UV
Phenol	µg/kg-Wet	36	9	25	45 J	520	03R004	110	61 J	350 JV	45 J	520	03R004	150	170 UV	170 UV
Epibenthic invertebrates (whole body)																
Conventionals																
Total solids	percent-Wet	2	2	100	12.9	13.3 T	MIT001	13.1	13.1 V	13.3 V	12.9	13.3 T	MIT001	13.1	13.1 V	13.3 V
Metals																
Aluminum	mg/kg-Wet	2	2	100	446	1420	MIT009	933	933 V	1370 V	446	1420	MIT009	933	933 V	1370 V
Antimony	mg/kg-Wet	2	1	50	0.0022 J	0.0022 J	MIT009	0.0022	0.0022 J	0.0022 J	0.0011 U	0.0022 J	MIT009	0.00138	0.00138 JV	0.00212 JV
Arsenic	mg/kg-Wet	2	2	100	0.349	0.45	MIT001	0.4	0.4 V	0.445 V	0.349	0.45	MIT001	0.4	0.4 V	0.445 V
Cadmium	mg/kg-Wet	2	2	100	0.0321	0.0366	MIT009	0.0344	0.0344 V	0.0364 V	0.0321	0.0366	MIT009	0.0344	0.0344 V	0.0364 V
Chromium	mg/kg-Wet	2	2	100	0.64	1.73	MIT009	1.19	1.19 V	1.68 V	0.64	1.73	MIT009	1.19	1.19 V	1.68 V
Copper	mg/kg-Wet	2	2	100	3.01 J	6 J	MIT001	4.51	4.51 JV	5.85 JV	3.01 J	6 J	MIT001	4.51	4.51 JV	5.85 JV
Lead	mg/kg-Wet	2	2	100	0.245 J	1.06 J	MIT009	0.653	0.653 JV	1.02 JV	0.245 J	1.06 J	MIT009	0.653	0.653 JV	1.02 JV
Nickel	mg/kg-Wet	2	2	100	0.401	1.12	MIT009	0.761	0.761 V	1.08 V	0.401	1.12	MIT009	0.761	0.761 V	1.08 V
Selenium	mg/kg-Wet	2	2	100	0.04 J	0.06	MIT001	0.05	0.05 JV	0.059 JV	0.04 J	0.06	MIT001	0.05	0.05 JV	0.059 JV
Silver	mg/kg-Wet	2	2	100	0.0235 J	0.0287 J	MIT001	0.0261	0.0261 JV	0.0284 JV	0.0235 J	0.0287 J	MIT001	0.0261	0.0261 JV	0.0284 JV
Zinc	mg/kg-Wet	2	2	100	12.6 J	24.8 J	MIT009	18.7	18.7 JV	24.2 JV	12.6 J	24.8 J	MIT009	18.7	18.7 JV	24.2 JV
PCB Congeners																
PCB001	pg/g-Wet	7	7	100	8.94	34.3	MIT356	25.1	26.9	34 V	8.94	34.3	MIT356	25.1	26.9	34 V
PCB002	pg/g-Wet	7	7	100	0.872	3.3 J	MIT007	2.34	2.55	3.22 JV	0.872	3.3 J	MIT007	2.34	2.55	3.22 JV
PCB003	pg/g-Wet	7	7	100	3.59	14.6	MIT007	10.4	10.7	14.3 V	3.59	14.6	MIT007	10.4	10.7	14.3 V
PCB004	pg/g-Wet	7	7	100	83.4	1290	MIT004	304	148	965 V	83.4	1290	MIT004	304	148	965 V
PCB005	pg/g-Wet	7	7	100	0.988	4.79	MIT810	3.37	3.32	4.74 V	0.988	4.79	MIT810	3.37	3.32	4.74 V
PCB006	pg/g-Wet	7	7	100	14.7	79.6	MIT009	40	40.3	69.7 V	14.7	79.6	MIT009	40	40.3	69.7 V
PCB007	pg/g-Wet	7	7	100	3.46	12.8	MIT004	8.53	9.48	12.2 V	3.46	12.8	MIT004	8.53	9.48	12.2 V
PCB008	pg/g-Wet	7	7	100	70.1	259	MIT009	171	170	249 V	70.1	259	MIT009	171	170	249 V
PCB009	pg/g-Wet	7	7	100	4.97	15.7	MIT009	12.1	13.7	15.7 V	4.97	15.7	MIT009	12.1	13.7	15.7 V
PCB010	pg/g-Wet	7	7	100	3.11	71.2	MIT004	14.8	5.99	51.9 V	3.11	71.2	MIT004	14.8	5.99	51.9 V
PCB011	pg/g-Wet	7	7	100	40.4	223	MIT356	148	139	222 V	40.4	223	MIT356	148	139	222 V
PCB012 & 013	pg/g-Wet	7	7	100	8.41	27.9	MIT004	15.4	12.3	26.9 V	8.41	27.9	MIT004	15.4	12.3	26.9 V
PCB014	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.382 U	3.4 U	MIT007	0.473	0.253 U	1.32 UV
PCB015	pg/g-Wet	7	7	100	52.1	156	MIT009	85.2	75.3	143 V	52.1	156	MIT009	85.2	75.3	143 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB016	pg/g-Wet	7	7	100	33.5	115	MIT009	71	68.7	110 V	33.5	115	MIT009	71	68.7	110 V
PCB017	pg/g-Wet	7	7	100	74.5	1440	MIT004	361	179	1110 V	74.5	1440	MIT004	361	179	1110 V
PCB018 & 030	pg/g-Wet	7	7	100	90.6	396	MIT009	241	236	369 V	90.6	396	MIT009	241	236	369 V
PCB019	pg/g-Wet	7	7	100	84.2	5150	MIT004	849	167	3660 V	84.2	5150	MIT004	849	167	3660 V
PCB020 & 028	pg/g-Wet	7	7	100	225	948	MIT009	605	538	890 V	225	948	MIT009	605	538	890 V
PCB021 & 033	pg/g-Wet	7	7	100	62.1	352	MIT009	183	154	323 V	62.1	352	MIT009	183	154	323 V
PCB022	pg/g-Wet	7	7	100	42.7	281	MIT009	131	124	257 V	42.7	281	MIT009	131	124	257 V
PCB023	pg/g-Wet	7	4	57.1	0.233 J	1.84	MIT004	0.835	0.634 V	1.67 V	0.233 J	3.57 U	MIT007	0.791	0.592	1.82 V
PCB024	pg/g-Wet	7	6	85.7	1.83 J	6.11	MIT009	3.54	3.48 V	5.53 V	0.847 U	6.11	MIT009	3.09	3.26	5.42 V
PCB025	pg/g-Wet	7	7	100	20	243	MIT004	78.3	48.3	201 V	20	243	MIT004	78.3	48.3	201 V
PCB026 & 029	pg/g-Wet	7	7	100	31.1	214	MIT004	115	92.2	206 V	31.1	214	MIT004	115	92.2	206 V
PCB027	pg/g-Wet	7	7	100	16.9	731	MIT004	132	35.2	525 V	16.9	731	MIT004	132	35.2	525 V
PCB031	pg/g-Wet	7	7	100	165	881	MIT009	448	388	793 V	165	881	MIT009	448	388	793 V
PCB032	pg/g-Wet	7	7	100	50.7	498	MIT004	173	111	416 V	50.7	498	MIT004	173	111	416 V
PCB034	pg/g-Wet	7	7	100	1.14 J	5.99	MIT004	3.3	3.39	5.36 V	1.14 J	5.99	MIT004	3.3	3.39	5.36 V
PCB035	pg/g-Wet	7	6	85.7	4.35	11.2	MIT009	7.16	7.16 V	10.6 V	4 U	11.2	MIT009	6.43	6.44	10.4 V
PCB036	pg/g-Wet	7	3	42.9	1.61	2.52	MIT356	2.1	2.17	2.49 V	0.528 U	2.52	MIT356	1.15	0.56 U	2.42 V
PCB037	pg/g-Wet	7	7	100	30.9	176	MIT009	98.2	86.6	172 V	30.9	176	MIT009	98.2	86.6	172 V
PCB038	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.306 U	2.65 U	MIT007	0.398	0.222 U	1.03 UV
PCB039	pg/g-Wet	7	4	57.1	3.43	4.71	MIT810	4.17	4.27 V	4.65 V	0.292 U	4.71	MIT810	2.54	3.43	4.6 V
PCB040 & 041 & 071	pg/g-Wet	7	7	100	150	1390	MIT004	515	384	1130 V	150	1390	MIT004	515	384	1130 V
PCB042	pg/g-Wet	7	7	100	62.1	296	MIT004	206	212	284 V	62.1	296	MIT004	206	212	284 V
PCB043	pg/g-Wet	7	6	85.7	26.1	241	MIT004	72.1	39.7 V	194 V	7.74 U	241	MIT004	62.4	38.1	184 V
PCB044 & 047 & 065	pg/g-Wet	7	7	100	905	26100	MIT004	4970	1440	19000 V	905	26100	MIT004	4970	1440	19000 V
PCB045 & 051	pg/g-Wet	7	7	100	134	5380	MIT004	972	243	3900 V	134	5380	MIT004	972	243	3900 V
PCB046	pg/g-Wet	7	7	100	11.1	163	MIT004	43.7	28.1	124 V	11.1	163	MIT004	43.7	28.1	124 V
PCB048	pg/g-Wet	7	7	100	38.8	199	MIT001	147	156	192 V	38.8	199	MIT001	147	156	192 V
PCB049 & 069	pg/g-Wet	7	7	100	583	5830	MIT004	1550	808	4500 V	583	5830	MIT004	1550	808	4500 V
PCB050 & 053	pg/g-Wet	7	7	100	123	4080	MIT004	760	243	2940 V	123	4080	MIT004	760	243	2940 V
PCB052	pg/g-Wet	7	7	100	608	3850	MIT004	1550	1310	3160 V	608	3850	MIT004	1550	1310	3160 V
PCB054	pg/g-Wet	7	7	100	14.9	1900	MIT004	301	35	1350 V	14.9	1900	MIT004	301	35	1350 V
PCB055	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.985 U	8.78 U	MIT007	1.22	0.655 U	3.42 UV
PCB056	pg/g-Wet	7	7	100	64.8	589	MIT001	297	339	527 V	64.8	589	MIT001	297	339	527 V
PCB057	pg/g-Wet	7	5	71.4	3.77	99.3	MIT004	24.1	5.52	80.9 V	1.74 U	99.3	MIT004	17.6	4.72	71.6 V
PCB058	pg/g-Wet	7	5	71.4	2.87	4.65	MIT356	3.63	3.67	4.48 V	1.95 U	4.65	MIT356	2.95	3.16	4.4 V
PCB059 & 062 & 075	pg/g-Wet	7	7	100	44.1	863	MIT004	197	93.6	641 V	44.1	863	MIT004	197	93.6	641 V
PCB060	pg/g-Wet	7	7	100	33.8	327	MIT001	159	157	288 V	33.8	327	MIT001	159	157	288 V
PCB061 & 070 & 074 & 076	pg/g-Wet	7	7	100	461	2060	MIT001	1310	1490	1910 V	461	2060	MIT001	1310	1490	1910 V
PCB063	pg/g-Wet	7	7	100	16.1	72.7	MIT004	44.7	39.3	69.8 V	16.1	72.7	MIT004	44.7	39.3	69.8 V
PCB064	pg/g-Wet	7	7	100	126	614	MIT001	372	411	564 V	126	614	MIT001	372	411	564 V
PCB066	pg/g-Wet	7	7	100	293	1590	MIT001	886	837	1420 V	293	1590	MIT001	886	837	1420 V
PCB067	pg/g-Wet	7	7	100	9.6	114	MIT004	38.4	30.7	89.3 V	9.6	114	MIT004	38.4	30.7	89.3 V
PCB068	pg/g-Wet	7	7	100	8.62	268	MIT004	52.1	19	194 V	8.62	268	MIT004	52.1	19	194 V
PCB072	pg/g-Wet	7	7	100	12.9	83.6	MIT004	26.5	19	64.5 V	12.9	83.6	MIT004	26.5	19	64.5 V
PCB073	pg/g-Wet	7	6	85.7	14.1	644	MIT004	127	25.3 V	490 V	0.869 U	644	MIT004	109	24.5	459 V
PCB077	pg/g-Wet	7	7	100	20	83.9	MIT001	49.4	54.3	76 V	20	83.9	MIT001	49.4	54.3	76 V
PCB078	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.786 U	5.53 U	MIT007	0.83	0.462 U	2.19 UV
PCB079	pg/g-Wet	7	7	100	8.49	31.7	MIT004	17.4	15.3	28.5 V	8.49	31.7	MIT004	17.4	15.3	28.5 V
PCB080	pg/g-Wet	7	0	0	--	--	--	--	--	--	1.08 U	9.59 U	MIT007	1.33	0.715 U	3.73 UV
PCB081	pg/g-Wet	7	0	0	--	--	--	--	--	--	1.66 U	5.14 U	MIT001	1.34	1.17 U	2.23 UV
PCB082	pg/g-Wet	7	6	85.7	41.5	163	MIT002	103	105 V	155 V	41.5	163	MIT002	94.2	87.7	153 V
PCB083 & 099	pg/g-Wet	7	7	100	1060	10100	MIT004	2640	1480	7570 V	1060	10100	MIT004	2640	1480	7570 V
PCB084	pg/g-Wet	7	7	100	98.5	801	MIT004	328	286	667 V	98.5	801	MIT004	328	286	667 V
PCB085 & 116 & 117	pg/g-Wet	7	7	100	165	702	MIT004	384	356	650 V	165	702	MIT004	384	356	650 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	7	7	100	557	3660	MIT004	1360	1020	2940 V	557	3660	MIT004	1360	1020	2940 V
PCB088 & 091	pg/g-Wet	7	7	100	299	2990	MIT004	774	397	2290 V	299	2990	MIT004	774	397	2290 V
PCB089	pg/g-Wet	7	6	85.7	7.5	12.3	MIT001	10	10.1 V	12.3 V	1.91 U	12.3	MIT001	8.71	8.53	12.3 V
PCB090 & 101 & 113	pg/g-Wet	7	7	100	1630	14200	MIT004	3950	2290	10800 V	1630	14200	MIT004	3950	2290	10800 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB092	pg/g-Wet	7	7	100	361	4810	MIT004	1100	530	3550 V	361	4810	MIT004	1100	530	3550 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	7	7	100	1080	15400	MIT004	3500	1740	11300 V	1080	15400	MIT004	3500	1740	11300 V
PCB094	pg/g-Wet	7	7	100	17.4	1370	MIT004	223	35.6	973 V	17.4	1370	MIT004	223	35.6	973 V
PCB096	pg/g-Wet	7	7	100	10.7	329	MIT004	63.3	24	238 V	10.7	329	MIT004	63.3	24	238 V
PCB103	pg/g-Wet	7	7	100	23.9	1090	MIT004	208	66.9	800 V	23.9	1090	MIT004	208	66.9	800 V
PCB104	pg/g-Wet	7	7	100	2.68	498	MIT004	77.7	8.99	352 V	2.68	498	MIT004	77.7	8.99	352 V
PCB105	pg/g-Wet	7	7	100	207	662	MIT001	415	359	644 V	207	662	MIT001	415	359	644 V
PCB106	pg/g-Wet	7	1	14.3	22.1	22.1	MIT004	22.1	22.1	22.1	0.382 U	22.1	MIT004	3.56	0.246 U	16 V
PCB107 & 124	pg/g-Wet	7	7	100	28.8	84.3	MIT001	57.9	55.4	82.1 V	28.8	84.3	MIT001	57.9	55.4	82.1 V
PCB109	pg/g-Wet	7	7	100	95.8	278	MIT004	150	134	247 V	95.8	278	MIT004	150	134	247 V
PCB110 & 115	pg/g-Wet	7	7	100	1200	3740	MIT004	2150	2100	3380 V	1200	3740	MIT004	2150	2100	3380 V
PCB111	pg/g-Wet	7	4	57.1	2.76	56	MIT004	17.5	5.63 V	48.8 V	1.42 U	56	MIT004	10.8	2.76	41.7 V
PCB112	pg/g-Wet	7	1	14.3	725	725	MIT004	725	725	725	0.339 U	725	MIT004	104	0.248 U	508 V
PCB114	pg/g-Wet	7	7	100	10.5	43.9	MIT001	25.2	21.7	40.5 V	10.5	43.9	MIT001	25.2	21.7	40.5 V
PCB118	pg/g-Wet	7	7	100	800	2490	MIT004	1410	1160	2280 V	800	2490	MIT004	1410	1160	2280 V
PCB120	pg/g-Wet	7	7	100	6.82	111	MIT004	29.3	16.9	86.4 V	6.82	111	MIT004	29.3	16.9	86.4 V
PCB121	pg/g-Wet	7	6	85.7	4.8	168	MIT004	33.7	6.61 V	129 V	1.46 U	168	MIT004	29	5.68	121 V
PCB122	pg/g-Wet	7	5	71.4	16.7	32.8	MIT001	22.2	20.6	31.1 V	1.03 U	32.8	MIT001	16.7	16.7	30.3 V
PCB123	pg/g-Wet	7	6	85.7	15.4	41.1	MIT001	26.5	26.3 V	38.9 V	11.7 U	41.1	MIT001	23.6	24.5	38.4 V
PCB126	pg/g-Wet	7	5	71.4	2.28 J	4.54	MIT009	3.39	3.08	4.47 V	2.28 J	6.55 U	MIT004	3.17	3.08	4.44 V
PCB127	pg/g-Wet	7	1	14.3	12.4	12.4	MIT004	12.4	12.4	12.4	0.463 U	12.4	MIT004	2.27	0.307 U	9.3 V
PCB128 & 166	pg/g-Wet	7	7	100	235	1610	MIT004	499	307	1250 V	235	1610	MIT004	499	307	1250 V
PCB129 & 138 & 160 & 163	pg/g-Wet	7	7	100	2400	42800	MIT004	9150	3160	31900 V	2400	42800	MIT004	9150	3160	31900 V
PCB130	pg/g-Wet	7	7	100	122	1200	MIT004	317	164	919 V	122	1200	MIT004	317	164	919 V
PCB131	pg/g-Wet	7	7	100	5.83	79.3	MIT004	22.3	9.84	62.4 V	5.83	79.3	MIT004	22.3	9.84	62.4 V
PCB132	pg/g-Wet	7	7	100	495	6220	MIT004	1530	702	4770 V	495	6220	MIT004	1530	702	4770 V
PCB133	pg/g-Wet	7	7	100	46.5	1100	MIT004	229	79.9	814 V	46.5	1100	MIT004	229	79.9	814 V
PCB134 & 143	pg/g-Wet	7	7	100	73.6	1620	MIT004	336	125	1190 V	73.6	1620	MIT004	336	125	1190 V
PCB135 & 151 & 154	pg/g-Wet	7	6	85.7	872	20000	MIT004	4450	1140 V	15600 V	3.23 U	20000	MIT004	3820	1080	14800 V
PCB136	pg/g-Wet	7	7	100	182	3360	MIT004	719	296	2470 V	182	3360	MIT004	719	296	2470 V
PCB137	pg/g-Wet	7	7	100	53.3	446	MIT004	137	79.9	354 V	53.3	446	MIT004	137	79.9	354 V
PCB139 & 140	pg/g-Wet	7	7	100	38.2	279	MIT004	82.7	50.2	217 V	38.2	279	MIT004	82.7	50.2	217 V
PCB141	pg/g-Wet	7	7	100	436	9970	MIT004	1970	501	7360 V	436	9970	MIT004	1970	501	7360 V
PCB142	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.403 U	3.02 U	MIT004	0.605	0.32 U	1.46 UV
PCB144	pg/g-Wet	7	7	100	85.5	1570	MIT004	332	107	1170 V	85.5	1570	MIT004	332	107	1170 V
PCB145	pg/g-Wet	7	2	28.6	0.853	8.67	MIT004	4.76	4.76 V	8.28 V	0.502 U	8.67	MIT004	1.67	0.52 U	6.32 V
PCB146	pg/g-Wet	7	7	100	435	7310	MIT004	1660	655	5580 V	435	7310	MIT004	1660	655	5580 V
PCB147 & 149	pg/g-Wet	7	7	100	1900	34600	MIT004	7270	2230	25800 V	1900	34600	MIT004	7270	2230	25800 V
PCB148	pg/g-Wet	7	7	100	5.96	331	MIT004	65	19.4	245 V	5.96	331	MIT004	65	19.4	245 V
PCB150	pg/g-Wet	7	7	100	4.32	183	MIT004	39.6	14	138 V	4.32	183	MIT004	39.6	14	138 V
PCB152	pg/g-Wet	7	7	100	3.29	268	MIT004	44.8	8.84	191 V	3.29	268	MIT004	44.8	8.84	191 V
PCB153 & 168	pg/g-Wet	7	7	100	2340	49600	MIT004	10200	2990	36900 V	2340	49600	MIT004	10200	2990	36900 V
PCB155	pg/g-Wet	7	5	71.4	2.1	109	MIT004	24.3	3.47	87.9 V	0.649 U	109	MIT004	17.5	3.11	77.4 V
PCB156 & 157	pg/g-Wet	7	7	100	171	2250	MIT004	517	238	1660 V	171	2250	MIT004	517	238	1660 V
PCB158	pg/g-Wet	7	7	100	196	2810	MIT004	639	263	2110 V	196	2810	MIT004	639	263	2110 V
PCB159	pg/g-Wet	7	7	100	15.7	555	MIT004	104	21.3	408 V	15.7	555	MIT004	104	21.3	408 V
PCB161	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.404 U	3.06 U	MIT007	0.539	0.237 U	1.4 UV
PCB162	pg/g-Wet	7	4	57.1	5.27	46.9	MIT004	16.8	7.51 V	41 V	4.75 U	46.9	MIT004	10.9	5.27	35.2 V
PCB164	pg/g-Wet	7	7	100	155	2570	MIT004	552	190	1920 V	155	2570	MIT004	552	190	1920 V
PCB165	pg/g-Wet	7	7	100	1.55	106	MIT004	19.3	4.35	76.9 V	1.55	106	MIT004	19.3	4.35	76.9 V
PCB167	pg/g-Wet	7	7	100	70.5	1050	MIT004	234	94.7	778 V	70.5	1050	MIT004	234	94.7	778 V
PCB169	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.678 U	15.9 U	MIT004	1.98	1.07 U	6.16 UV
PCB170	pg/g-Wet	7	7	100	476	17100	MIT004	3140	665	12600 V	476	17100	MIT004	3140	665	12600 V
PCB171 & 173	pg/g-Wet	7	7	100	152	4710	MIT004	892	186	3480 V	152	4710	MIT004	892	186	3480 V
PCB172	pg/g-Wet	7	7	100	88.4	2670	MIT004	498	105	1970 V	88.4	2670	MIT004	498	105	1970 V
PCB174	pg/g-Wet	7	7	100	420	16300	MIT004	2980	551	12000 V	420	16300	MIT004	2980	551	12000 V
PCB175	pg/g-Wet	7	7	100	23.7	700	MIT004	131	26.6	514 V	23.7	700	MIT004	131	26.6	514 V
PCB176	pg/g-Wet	7	7	100	42.6	1740	MIT004	323	78.7	1270 V	42.6	1740	MIT004	323	78.7	1270 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB177	pg/g-Wet	7	7	100	313	10500	MIT004	1990	425	7760 V	313	10500	MIT004	1990	425	7760 V
PCB178	pg/g-Wet	7	7	100	129	4160	MIT004	788	176	3060 V	129	4160	MIT004	788	176	3060 V
PCB179	pg/g-Wet	7	7	100	179	6920	MIT004	1290	323	5030 V	179	6920	MIT004	1290	323	5030 V
PCB180 & 193	pg/g-Wet	7	7	100	1250	43200	MIT004	7960	1630	31900 V	1250	43200	MIT004	7960	1630	31900 V
PCB181	pg/g-Wet	7	6	85.7	4.25	95.5	MIT004	24.1	7.16 V	78.1 V	4.25	95.5	MIT004	21	5.32	74.6 V
PCB182	pg/g-Wet	7	6	85.7	5.97	94.6	MIT004	23.4	7.72 V	75.4 V	4.02 U	94.6	MIT004	20.3	7.17	71.5 V
PCB183 & 185	pg/g-Wet	7	7	100	431	14800	MIT004	2720	496	10900 V	431	14800	MIT004	2720	496	10900 V
PCB184	pg/g-Wet	7	5	71.4	0.45 J	7.46	MIT004	2.4	1.28	6.34 V	0.45 J	7.46	MIT004	1.83	0.987	5.77 V
PCB186	pg/g-Wet	7	1	14.3	0.908	0.908	MIT356	0.908	0.908	0.908	0.328 U	2.92 U	MIT007	0.506	0.244 U	1.29 V
PCB187	pg/g-Wet	7	7	100	809	26500	MIT004	4980	1030	19500 V	809	26500	MIT004	4980	1030	19500 V
PCB188	pg/g-Wet	7	7	100	1.49	68	MIT004	13.6	3.63	50.6 V	1.49	68	MIT004	13.6	3.63	50.6 V
PCB189	pg/g-Wet	7	6	85.7	12.6	481	MIT004	99.3	17.6 V	374 V	12.6	481	MIT004	86.4	16.1	353 V
PCB190	pg/g-Wet	7	7	100	91.6	3870	MIT004	714	132	2860 V	91.6	3870	MIT004	714	132	2860 V
PCB191	pg/g-Wet	7	7	100	20.3	698	MIT004	131	26.5	516 V	20.3	698	MIT004	131	26.5	516 V
PCB192	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.763 U	6.79 U	MIT007	0.944	0.505 U	2.64 UV
PCB194	pg/g-Wet	7	7	100	127	4350	MIT004	817	159	3230 V	127	4350	MIT004	817	159	3230 V
PCB195	pg/g-Wet	7	7	100	66.3	2230	MIT004	421	81.6	1660 V	66.3	2230	MIT004	421	81.6	1660 V
PCB196	pg/g-Wet	7	7	100	91.5	3020	MIT004	556	105	2220 V	91.5	3020	MIT004	556	105	2220 V
PCB197 & 200	pg/g-Wet	7	7	100	18.4	881	MIT004	165	36.2	646 V	18.4	881	MIT004	165	36.2	646 V
PCB198 & 199	pg/g-Wet	7	7	100	162	5060	MIT004	968	237	3750 V	162	5060	MIT004	968	237	3750 V
PCB201	pg/g-Wet	7	7	100	21.2	782	MIT004	149	35.3	574 V	21.2	782	MIT004	149	35.3	574 V
PCB202	pg/g-Wet	7	7	100	38.4	1060	MIT004	214	61.6	785 V	38.4	1060	MIT004	214	61.6	785 V
PCB203	pg/g-Wet	7	7	100	123	3830	MIT004	733	162	2840 V	123	3830	MIT004	733	162	2840 V
PCB204	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.108 U	8.22 U	MIT007	0.885	0.438 U	3.09 UV
PCB205	pg/g-Wet	7	7	100	6.41	235	MIT004	45.6	8.64	177 V	6.41	235	MIT004	45.6	8.64	177 V
PCB206	pg/g-Wet	7	7	100	34.6	527	MIT004	129	59.5	404 V	34.6	527	MIT004	129	59.5	404 V
PCB207	pg/g-Wet	7	7	100	4.65	100	MIT004	22.5	9.75	74.8 V	4.65	100	MIT004	22.5	9.75	74.8 V
PCB208	pg/g-Wet	7	7	100	9.87	98	MIT004	31.1	23	76.4 V	9.87	98	MIT004	31.1	23	76.4 V
PCB209	pg/g-Wet	7	7	100	11.2	32.9	MIT356	19.4	15.8	31.9 V	11.2	32.9	MIT356	19.4	15.8	31.9 V
Total PCB Congeners	pg/g-Wet	7	7	100	33100 JT	498000 T	MIT004	112000	45600 T	372000 V	33100 JT	498000 T	MIT004	112000	45600 T	372000 V
Total PCBs[c]																
Total PCBs	µg/kg-Wet	7	7	100	33.1 JT	498 T	MIT004	112	45.6 T	372 V	33.1 JT	498 T	MIT004	112	45.6 T	372 V
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	7	7	100	343 T	1850 T	MIT004	804	715 T	1590 V	343 T	1850 T	MIT004	804	715 T	1590 V
Heptachlorobiphenylhomologs	pg/g-Wet	7	7	100	4580 T	155000 T	MIT004	28700	5380 T	114000 V	4580 T	155000 T	MIT004	28700	5380 T	114000 V
Hexachlorobiphenyl homologs	pg/g-Wet	7	7	100	10700 T	192000 T	MIT004	40500	13200 T	143000 V	10700 T	192000 T	MIT004	40500	13200 T	143000 V
Monochlorobiphenyl homologs	pg/g-Wet	7	7	100	13.4 T	49.6 T	MIT004	37.9	42.6 T	49.1 V	13.4 T	49.6 T	MIT004	37.9	42.6 T	49.1 V
Nonachlorobiphenyl homologs	pg/g-Wet	7	7	100	49.2 T	725 T	MIT004	183	95.4 T	555 V	49.2 T	725 T	MIT004	183	95.4 T	555 V
Octachlorobiphenyl homologs	pg/g-Wet	7	7	100	678 T	21400 T	MIT004	4060	873 T	15900 V	678 T	21400 T	MIT004	4060	873 T	15900 V
Pentachlorobiphenylhomologs	pg/g-Wet	7	7	100	8210 JT	64000 T	MIT004	19200	13200 T	48900 V	8210 JT	64000 T	MIT004	19200	13200 T	48900 V
Tetrachlorobiphenyl homologs	pg/g-Wet	7	7	100	4190 T	53400 T	MIT004	14700	8890 T	40800 V	4190 T	53400 T	MIT004	14700	8890 T	40800 V
Trichlorobiphenyl homologs	pg/g-Wet	7	7	100	935 JT	9710 T	MIT004	3500	2500 T	8080 V	935 JT	9710 T	MIT004	3500	2500 T	8080 V
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	7	7	100	1.86	8.51	MIT009	4.2	4	7.29 V	1.86	8.51	MIT009	4.2	4	7.29 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	7	100	6.34	44.4	MIT007	19.6	13.9	41.8 V	6.34	44.4	MIT007	19.6	13.9	41.8 V
Hexachlorodibenzofuran homologs	pg/g-Wet	7	7	100	2.02	11.9	MIT356	4.69	3.22	10.2 V	2.02	11.9	MIT356	4.69	3.22	10.2 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	7	100	1.99	7.56	MIT009	3.95	3.16	7.03 V	1.99	7.56	MIT009	3.95	3.16	7.03 V
Octachlorodibenzofuran	pg/g-Wet	7	7	100	1.75	8.66	MIT009	3.74	3.29 J	7.25 V	1.75	8.66	MIT009	3.74	3.29 J	7.25 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	7	7	100	18.9	130	MIT009	63.8	53.2	128 V	18.9	130	MIT009	63.8	53.2	128 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	7	7	100	0.446	21.2	MIT356	5.9	3.95	16.3 V	0.446	21.2	MIT356	5.9	3.95	16.3 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	5	71.4	0.238	1.4	MIT810	1.01	1.11	1.4 V	0.175 U	1.4	MIT810	0.782	0.91	1.4 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	7	7	100	1.18	31.7	MIT356	8.6	5.15	24.4 V	1.18	31.7	MIT356	8.6	5.15	24.4 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	7	100	0.974	6.8	MIT356	3.66	4.03	6.48 V	0.974	6.8	MIT356	3.66	4.03	6.48 V
Total PCDD/F	pg/g-Wet	7	7	100	49.1 T	213 T	MIT009	119	108 T	205 JV	49.1 T	213 T	MIT009	119	108 T	205 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	7	7	100	0.545 J	2.75	MIT009	1.45	1.36	2.44 V	0.545 J	2.75	MIT009	1.45	1.36	2.44 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	7	7	100	2.92	23.1	MIT007	9.38	6.59	21 V	2.92	23.1	MIT007	9.38	6.59	21 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	7	4	57.1	0.078 J	0.535 J	MIT356	0.219	0.132 JV	0.476 JV	0.072 U	0.757 U	MIT007	0.201	0.122 J	0.488 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	7	5	71.4	0.192 J	5.2	MIT356	1.27	0.282 J	4.25 JV	0.192 J	5.2	MIT356	0.974	0.282 J	3.77 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	7	5	71.4	0.09 J	0.346 J	MIT009	0.177	0.167 J	0.313 JV	0.09 J	0.95 U	MIT007	0.203	0.167 J	0.436 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	7	5	71.4	0.092 J	1.24	MIT356	0.345	0.11 J	1.03 JV	0.092 J	1.24	MIT356	0.293	0.11 J	0.949 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	7	7	100	0.372 J	1.63 J	MIT007	0.757	0.586 J	1.46 JV	0.372 J	1.63 J	MIT007	0.757	0.586 J	1.46 JV
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.0489 U	0.761 U	MIT007	0.101	0.054 U	0.296 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	7	4	57.1	0.153 J	0.235 J	MIT356	0.193	0.193 JV	0.229 JV	0.153 J	0.555 U	MIT009	0.199	0.197 J	0.265 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	7	5	71.4	0.11 J	6.71	MIT356	1.48	0.182 J	5.43 JV	0.11 J	6.71	MIT356	1.13	0.182 J	4.81 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	7	4	57.1	0.079 J	0.218 J	MIT356	0.158	0.167 JV	0.213 JV	0.079 J	0.672 U	MIT007	0.171	0.15 J	0.301 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.063 U	0.331 U	MIT007	0.0791	0.063 U	0.148 UV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	7	4	57.1	0.177 J	2.69	MIT356	0.891	0.348 JV	2.35 JV	0.177 J	2.69	MIT356	0.557	0.177 J	2.02 JV
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	7	4	57.1	0.296	11	MIT356	3.08	0.513 V	9.44 V	0.263 U	11	MIT356	1.83	0.296	7.89 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	7	3	42.9	0.112 J	0.29	MIT810	0.197	0.189	0.28 V	0.061 U	0.329 U	MIT007	0.135	0.112 J	0.26 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	7	7	100	0.275 JT	3.34 JT	MIT356	0.88	0.449 JT	2.56 JV	0.275 JT	3.34 JT	MIT356	0.88	0.449 JT	2.56 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	7	7	100	0.476 JT	3.4 JT	MIT356	1.21	0.953 JT	2.71 JV	0.476 JT	3.4 JT	MIT356	1.21	0.953 JT	2.71 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	7	7	100	0.0652 T	0.52 T	MIT009	0.328	0.341 T	0.516 V	0.0652 T	0.52 T	MIT009	0.328	0.341 T	0.516 V
Pesticides																
2,4'-DDD	µg/kg-Wet	7	7	100	0.136	14.1	MIT356	2.45	0.393	10.3 V	0.136	14.1	MIT356	2.45	0.393	10.3 V
2,4'-DDE	µg/kg-Wet	7	7	100	0.0382 J	1.28	MIT356	0.258	0.0775	0.947 V	0.0382 J	1.28	MIT356	0.258	0.0775	0.947 V
2,4'-DDT	µg/kg-Wet	7	5	71.4	0.0532	7.54	MIT356	1.62	0.12 J	6.09 V	0.0172 U	7.54	MIT356	1.16	0.0962	5.37 V
4,4'-DDD	µg/kg-Wet	7	7	100	0.646	30.3	MIT356	5.44	0.841 J	22.1 V	0.646	30.3	MIT356	5.44	0.841 J	22.1 V
4,4'-DDE	µg/kg-Wet	7	7	100	1.21	29.4	MIT356	7.19	3.13	22.5 V	1.21	29.4	MIT356	7.19	3.13	22.5 V
4,4'-DDT	µg/kg-Wet	7	7	100	0.0502	12.2	MIT356	1.9	0.192	8.68 V	0.0502	12.2	MIT356	1.9	0.192	8.68 V
Aldrin	µg/kg-Wet	7	6	85.7	0.00926 J	0.0872	MIT810	0.0464	0.0382 JV	0.0861 V	0.00926 J	0.0872	MIT810	0.0407	0.025 J	0.0859 V
alpha-Endosulfan	µg/kg-Wet	7	5	71.4	0.045	0.097 J	MIT356	0.0706	0.064	0.096 JV	0.02 U	0.137 U	MIT007	0.0616	0.064	0.0955 JV
alpha-Hexachlorocyclohexane	µg/kg-Wet	7	4	57.1	0.00446 J	0.0195 J	MIT356	0.0129	0.0139 JV	0.0191 JV	0.00446 J	0.0195 J	MIT356	0.0101	0.0089 U	0.0187 JV
beta-Endosulfan	µg/kg-Wet	7	3	42.9	0.021	0.098 J	MIT356	0.0553	0.047	0.0929 JV	0.021	0.156 U	MIT007	0.0451	0.029 U	0.092 JV
beta-Hexachlorocyclohexane	µg/kg-Wet	7	3	42.9	0.00457 J	0.00794 J	MIT810	0.00598	0.00542 J	0.00769 JV	0.00295 U	0.0268 U	MIT007	0.00625	0.00542 J	0.0118 JV
cis-Chlordane	µg/kg-Wet	7	7	100	0.0977	0.6	MIT356	0.298	0.216	0.555 V	0.0977	0.6	MIT356	0.298	0.216	0.555 V
cis-Nonachlor	µg/kg-Wet	7	7	100	0.0405 J	0.24	MIT356	0.126	0.0954 J	0.222 V	0.0405 J	0.24	MIT356	0.126	0.0954 J	0.222 V
delta-Hexachlorocyclohexane	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.00185 U	0.0174 U	MIT009	0.00458	0.00585 U	0.00804 UV
Dieldrin	µg/kg-Wet	7	7	100	0.098	0.396	MIT356	0.238	0.228	0.386 V	0.098	0.396	MIT356	0.238	0.228	0.386 V
Endosulfan sulfate	µg/kg-Wet	7	5	71.4	0.097	0.296	MIT356	0.178	0.14	0.282 V	0.061 U	0.296	MIT356	0.136	0.128	0.275 V
Endrin	µg/kg-Wet	7	1	14.3	0.008 J	0.008 J	MIT810	0.008	0.008 J	0.008 J	0.004 U	0.146 U	MIT007	0.018	0.0084 U	0.0568 UV
Endrin aldehyde	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.00551 U	0.109 U	MIT007	0.014	0.00635 U	0.0424 UV
Endrin ketone	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.00324 U	0.228 U	MIT007	0.0274	0.0132 U	0.0887 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	7	4	57.1	0.0111 J	0.0214 J	MIT356	0.0145	0.0127 JV	0.0201 JV	0.00458 U	0.0214 J	MIT356	0.0111	0.0111 J	0.0189 JV
Heptachlor	µg/kg-Wet	7	3	42.9	0.00497 J	0.012 J	MIT007	0.00784	0.00655 J	0.0115 JV	0.00228 U	0.012 J	MIT007	0.0047	0.00303 U	0.0104 JV
Heptachlor epoxide	µg/kg-Wet	7	6	85.7	0.006	0.025 J	MIT810	0.0177	0.0175 V	0.0248 JV	0.006	0.025 J	MIT810	0.0162	0.017	0.0247 JV
Methoxychlor	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.00635 U	0.109 U	MIT007	0.0138	0.0063 U	0.0424 UV
Oxychlordane	µg/kg-Wet	7	4	57.1	0.0375 J	0.183	MIT009	0.103	0.0967 JV	0.175 V	0.0204 U	0.183	MIT009	0.0696	0.0375 J	0.168 V
Total Chlordanes	µg/kg-Wet	7	7	100	0.313 JT	2.06 JT	MIT356	1.1	0.852 JT	1.96 JV	0.313 JT	2.06 JT	MIT356	1.1	0.852 JT	1.96 JV
Total Endosulfan	µg/kg-Wet	7	6	85.7	0.021 T	0.491 JT	MIT356	0.235	0.217 V	0.448 JV	0.021 T	0.491 JT	MIT356	0.212	0.183 T	0.439 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	7	7	100	0.782 T	44.4 T	MIT356	7.88	1.22 T	32.4 V	0.782 T	44.4 T	MIT356	7.88	1.22 T	32.4 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	7	7	100	2.67 T	94.8 T	MIT356	18.4	4.73 JT	69.9 V	2.67 T	94.8 T	MIT356	18.4	4.73 JT	69.9 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	7	7	100	1.28 T	30.7 T	MIT356	7.45	3.21 T	23.5 V	1.28 T	30.7 T	MIT356	7.45	3.21 T	23.5 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	7	7	100	0.0502 T	19.7 T	MIT356	3.06	0.288 T	14 V	0.0502 T	19.7 T	MIT356	3.06	0.288 T	14 V
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	7	7	100	2.15 T	71.9 T	MIT356	14.5	4.21 JT	53.3 V	2.15 T	71.9 T	MIT356	14.5	4.21 JT	53.3 V
trans-Chlordane	µg/kg-Wet	7	7	100	0.0686	0.466	MIT356	0.231	0.139	0.443 V	0.0686	0.466	MIT356	0.231	0.139	0.443 V
trans-Nonachlor	µg/kg-Wet	7	7	100	0.106	0.697	MIT356	0.384	0.302	0.664 V	0.106	0.697	MIT356	0.384	0.302	0.664 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	7	7	100	0.12	0.544	MIT356	0.297	0.264	0.484 V	0.12	0.544	MIT356	0.297	0.264	0.484 V
Hexachlorobutadiene	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.006 UJ	0.063 UJ	MIT007	0.00899	0.0059 UJ	0.0243 UJV
Lab-exposed clam (Corbicula fluminea – body without shell)																
Conventionals																
Lipids	percent-Wet	45	45	100	0.527	2.29	BT024	1.02	0.92	1.91 V	0.527	2.29	BT024	1.02	0.92	1.91 V
Total solids	percent-Wet	45	45	100	5.11 T	10	WR-VC-108; WR-VC-28	7.36	7.23	9.72 V	5.11 T	10	WR-VC-108; WR-VC-28	7.36	7.23	9.72 V
Metals																
Aluminum	mg/kg-Wet	35	35	100	7.6 T	76.5 T	BT011	28.9	24.6	61.9 V	7.6 T	76.5 T	BT011	28.9	24.6	61.9 V
Antimony	mg/kg-Wet	45	19	42.2	0.0006	0.0012	BT028	0.000788	0.0007	0.00111 V	0.0005 U	0.0035 U	BT002	0.000612	0.0005 U	0.00118 V
Arsenic	mg/kg-Wet	45	45	100	0.303 JT	0.548	BT023	0.427	0.419 J	0.54 V	0.303 JT	0.548	BT023	0.427	0.419 J	0.54 V
Cadmium	mg/kg-Wet	45	45	100	0.0383 T	0.0666	BT023	0.0515	0.0499	0.0598 JV	0.0383 T	0.0666	BT023	0.0515	0.0499	0.0598 JV
Chromium	mg/kg-Wet	45	45	100	0.084	0.49	BT033	0.195	0.19	0.324 V	0.084	0.49	BT033	0.195	0.19	0.324 V
Copper	mg/kg-Wet	45	45	100	2.64 T	5.94 J	BT023	3.86	3.78	4.65 JV	2.64 T	5.94 J	BT023	3.86	3.78	4.65 JV
Lead	mg/kg-Wet	45	45	100	0.033	0.221	BT002	0.055	0.047	0.0804 V	0.033	0.221	BT002	0.055	0.047	0.0804 V
Mercury	mg/kg-Wet	45	45	100	0.00705 T	0.0162	BT022	0.00984	0.0095	0.0124 V	0.00705 T	0.0162	BT022	0.00984	0.0095	0.0124 V
Nickel	mg/kg-Wet	45	45	100	0.0753	0.313 J	BT033	0.138	0.137	0.185 JV	0.0753	0.313 J	BT033	0.138	0.137	0.185 JV
Selenium	mg/kg-Wet	35	35	100	0.072	0.247	BT033	0.143	0.15	0.233 V	0.072	0.247	BT033	0.143	0.15	0.233 V
Silver	mg/kg-Wet	45	45	100	0.00677	0.0181	BT030	0.0117	0.0118	0.0155 V	0.00677	0.0181	BT030	0.0117	0.0118	0.0155 V
Zinc	mg/kg-Wet	45	45	100	10.2	16.8	BT030	13	12.5	15.7 V	10.2	16.8	BT030	13	12.5	15.7 V
Butyltins																
Butyltin ion	µg/kg-Wet	45	19	42.2	0.19 J	15	BT023	1.35	0.45 J	3.84 V	0.061 U	15	BT023	0.639	0.19 J	1.2 V
Dibutyltin ion	µg/kg-Wet	45	20	44	0.47 J	120 J	BT023	7.2	1.1 JV	10 JV	0.37 U	120 J	BT023	3.4	0.41 U	2.4 V
Tetrabutyltin	µg/kg-Wet	45	0	0	--	--	--	--	--	--	0.067 U	0.67 U	BT023	0.0402	0.0335 U	0.0335 UV
Tributyltin ion	µg/kg-Wet	45	19	42	0.45 J	680	BT023	42	3.7	99 V	0.45 J	680	BT023	18	0.9 U	15 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	10	0	0	--	--	--	--	--	--	4.3 U	4.3 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	2.2	2.2 UV	2.2 UV
Aroclor 1221	µg/kg-Wet	10	0	0	--	--	--	--	--	--	2.4 U	2.4 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	1.2	1.2 UV	1.2 UV
Aroclor 1232	µg/kg-Wet	10	0	0	--	--	--	--	--	--	3 U	3 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	1.5	1.5 UV	1.5 UV
Aroclor 1242	µg/kg-Wet	10	10	100	11 J	22	WR-VC-108	15	16 V	20 JV	11 J	22	WR-VC-108	15	16 V	20 JV
Aroclor 1248	µg/kg-Wet	10	0	0	--	--	--	--	--	--	2.6 U	2.6 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	1.3	1.3 UV	1.3 UV
Aroclor 1254	µg/kg-Wet	10	0	0	--	--	--	--	--	--	9.7 U	22 U	WR-VC-108	7.4	7 UV	11 UV
Aroclor 1260	µg/kg-Wet	10	0	0	--	--	--	--	--	--	3.1 U	3.1 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	1.6	1.6 UV	1.6 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Aroclor 1262	µg/kg-Wet	10	0	0	--	--	--	--	--	--	1.6 U	1.6 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.8	0.8 UV	0.8 UV
Aroclor 1268	µg/kg-Wet	10	0	0	--	--	--	--	--	--	1.3 U	1.3 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.65	0.65 UV	0.65 UV
Aroclors	µg/kg-Wet	10	10	100	11 JT	22 T	WR-VC-108	15	16 V	20 JV	11 JT	22 T	WR-VC-108	15	16 V	20 V
PCB Congeners																
PCB001	pg/g-Wet	43	33	76.7	66.3	485 J	BT017	167	144	309 V	66.3	1000 U	WR-VC-108; WR-VC-	188	163	468 JV
PCB002	pg/g-Wet	34	34	100	4.59	26	BT017	12.4	11 V	24.2 V	4.59	26	BT017	12.4	11 V	24.2 V
PCB003	pg/g-Wet	34	34	100	22.3	156	BT017	54.5	46.5 V	107 V	22.3	156	BT017	54.5	46.5 V	107 V
PCB004	pg/g-Wet	35	35	100	577	3050	BT016	1040	848	2260 JV	577	3050	BT016	1040	848	2260 JV
PCB005	pg/g-Wet	45	35	77.8	23.6	81.5	BT028	39.2	35.8	68.2 V	23.6	2200 U	WR-VC-29	136	36.8	640 UV
PCB006	pg/g-Wet	35	35	100	217	965	BT028	349	309	545 V	217	965	BT028	349	309	545 V
PCB007	pg/g-Wet	35	35	100	35.9	186 J	BT017	73.4	65.3	141 JV	35.9	186 J	BT017	73.4	65.3	141 JV
PCB008	pg/g-Wet	45	40	88.9	1010	5540 J	BT017	2080	1670 V	3990 V	1010	5540 J	BT017	1940	1530	3910 V
PCB009	pg/g-Wet	35	35	100	48 J	215 J	BT017	94.3	82.6	195 V	48 J	215 J	BT017	94.3	82.6	195 V
PCB010	pg/g-Wet	35	35	100	15.5 J	169	BT016	33.6	27.8 J	55.7 V	15.5 J	169	BT016	33.6	27.8 J	55.7 V
PCB011	pg/g-Wet	35	35	100	202	658	BT017	332	284	618 V	202	658	BT017	332	284	618 V
PCB012 & 013	pg/g-Wet	35	35	100	43.1	220	BT017	86.5	66.7 J	172 V	43.1	220	BT017	86.5	66.7 J	172 V
PCB014	pg/g-Wet	35	2	5.71	0.345 J	0.589	BT028	0.467	0.467 JV	0.577 JV	0.345 J	5.93 U	BT030	0.472	0.374 U	0.688 V
PCB015	pg/g-Wet	35	35	100	291	2150	BT017	566	411	1190 V	291	2150	BT017	566	411	1190 V
PCB016	pg/g-Wet	35	35	100	208	4280	BT028	440	290	732 JV	208	4280	BT028	440	290	732 JV
PCB017	pg/g-Wet	35	35	100	243	4880	BT028	607	359	1540 JV	243	4880	BT028	607	359	1540 JV
PCB018	pg/g-Wet	10	10	100	820 NJ	2800 NJ	WR-VC-29	1300	1300 JV	2300 JV	820 NJ	2800 NJ	WR-VC-29	1300	1300 JV	2300 JV
PCB018 & 030	pg/g-Wet	35	35	100	381	9830	BT028	995	623	1870 JV	381	9830	BT028	995	623	1870 JV
PCB019	pg/g-Wet	35	35	100	76.3	5630	BT016	333	110 J	989 V	76.3	5630	BT016	333	110 J	989 V
PCB020 & 028	pg/g-Wet	35	35	100	459	12500	BT028	1390	702	4110 V	459	12500	BT028	1390	702	4110 V
PCB021 & 033	pg/g-Wet	35	35	100	234	6240	BT028	639	325	1650 V	234	6240	BT028	639	325	1650 V
PCB022	pg/g-Wet	35	35	100	184	4000	BT028	469	253	1200 V	184	4000	BT028	469	253	1200 V
PCB023	pg/g-Wet	35	32	91.4	0.618	10.7	BT028	1.61	0.978 V	4.18 JV	0.618	10.7	BT028	1.51	0.887	3.59 JV
PCB024	pg/g-Wet	35	35	100	5.29	106	BT028	12.8	9.19	23.1 JV	5.29	106	BT028	12.8	9.19	23.1 JV
PCB025	pg/g-Wet	35	35	100	34.1	811	BT028	97	54.2	214 V	34.1	811	BT028	97	54.2	214 V
PCB026 & 029	pg/g-Wet	35	35	100	71.9	1670	BT028	183	101	394 JV	71.9	1670	BT028	183	101	394 JV
PCB027	pg/g-Wet	35	35	100	39.2	835	BT016	106	55.3	330 V	39.2	835	BT016	106	55.3	330 V
PCB028	pg/g-Wet	10	10	100	570 J	1600	WR-VC-108	920	910 V	1500 JV	570 J	1600	WR-VC-108	920	910 V	1500 JV
PCB031	pg/g-Wet	45	44	97.8	346	10800	BT028	1090	555 V	1390 V	346	10800	BT028	1070	540	1390 V
PCB032	pg/g-Wet	35	35	100	114	2840	BT028	327	178	866 JV	114	2840	BT028	327	178	866 JV
PCB033	pg/g-Wet	10	4	40	660 NJ	1500 NJ	WR-VC-108	1200	1300 JV	1500 JV	500 U	1500 NJ	WR-VC-108	630	270 UV	1500 JV
PCB034	pg/g-Wet	35	34	97.1	1.31	58.5	BT028	5.09	2.22 V	12.5 JV	1.31	58.5	BT028	4.97	2.18	11.9 JV
PCB035	pg/g-Wet	35	34	97.1	6.44	94.3	BT028	13	9.21 V	21 V	6.44	94.3	BT028	13.3	9.29	21.7 V
PCB036	pg/g-Wet	35	30	85.7	1.03	3.9	BT020	2.1	1.83 V	3.38 V	1.01 U	3.9	BT020	1.91	1.77	3.33 V
PCB037	pg/g-Wet	45	37	82.2	41.8	2210	BT028	201	66.6	766 JV	41.8	2210	BT028	178	70 U	632 JV
PCB038	pg/g-Wet	35	5	14.3	0.287 J	4.74	BT017	2.49	2.67	4.65 V	0.201 U	4.74	BT017	0.672	0.288 U	3.16 V
PCB039	pg/g-Wet	35	26	74.3	1.78	78.8	BT017	8.59	3.02 V	47.4 V	0.549 U	78.8	BT017	6.51	2.5	23.2 V
PCB040 & 041 & 071	pg/g-Wet	35	35	100	74.8	5120	BT017	526	155	2970 V	74.8	5120	BT017	526	155	2970 V
PCB042	pg/g-Wet	35	35	100	128	2330	BT028	337	194	1290 V	128	2330	BT028	337	194	1290 V
PCB043	pg/g-Wet	35	35	100	6.21	404	BT028	41.4	10.9	217 V	6.21	404	BT028	41.4	10.9	217 V
PCB044	pg/g-Wet	10	10	100	620	1300	WR-VC-108	790	720 V	1100 V	620	1300	WR-VC-108	790	720 V	1100 V
PCB044 & 047 & 065	pg/g-Wet	35	35	100	313	8070	BT028	1240	498	6090 V	313	8070	BT028	1240	498	6090 V
PCB045 & 051	pg/g-Wet	35	35	100	36.2	2710	BT016	287	69.3	1650 V	36.2	2710	BT016	287	69.3	1650 V
PCB046	pg/g-Wet	35	35	100	8.26	695	BT028	65.5	17.1	333 V	8.26	695	BT028	65.5	17.1	333 V
PCB048	pg/g-Wet	35	35	100	53.7	2210	BT017	227	84	1020 V	53.7	2210	BT017	227	84	1020 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB049	pg/g-Wet	10	10	100	290 J	940	WR-VC-108	440	380 JV	760 V	290 J	940	WR-VC-108	440	380 JV	760 V
PCB049 & 069	pg/g-Wet	35	35	100	103	5220	BT017	657	200	3280 V	103	5220	BT017	657	200	3280 V
PCB050 & 053	pg/g-Wet	35	35	100	42.3	2350	BT016	232	71.1	1030 V	42.3	2350	BT016	232	71.1	1030 V
PCB052	pg/g-Wet	45	45	100	205	8390	BT028	972	518	3500 V	205	8390	BT028	972	518	3500 V
PCB054	pg/g-Wet	35	34	97.1	1.45	1170	BT016	45.3	4.98 V	58.1 V	1.45	1170	BT016	44.1	4.9	54.3 V
PCB055	pg/g-Wet	35	11	31.4	2.34	111	BT028	23.3	6.28	105 V	1.82 U	111	BT028	8.06	0.97 U	36.1 V
PCB056	pg/g-Wet	45	35	77.8	69.4	3700	BT017	354	108	1890 V	69.4	3700	BT017	297	101	1120 V
PCB057	pg/g-Wet	35	26	74.3	0.575 J	33.5	BT028	4.82	1.2 JV	28.9 V	0.575 J	33.5	BT028	3.82	1.08 U	25.7 V
PCB058	pg/g-Wet	35	21	60	0.478 J	17.3	BT028	3.78	1.58 J	17	0.351 U	17.3	BT028	2.53	0.825 U	11.4 V
PCB059 & 062 & 075	pg/g-Wet	35	35	100	22.1	782	BT028	91.3	36.3	390 V	22.1	782	BT028	91.3	36.3	390 V
PCB060	pg/g-Wet	45	35	77.8	28.6	2800	BT017	198	46.7	973 V	28.6	2800	BT017	210	61.5	660 V
PCB061 & 070 & 074 & 076	pg/g-Wet	35	35	100	221	14700	BT017	1400	400	7150 V	221	14700	BT017	1400	400	7150 V
PCB063	pg/g-Wet	35	35	100	6.27	396	BT017	36.1	12.4	164 V	6.27	396	BT017	36.1	12.4	164 V
PCB064	pg/g-Wet	35	35	100	59.8	4420	BT017	424	110	2550 V	59.8	4420	BT017	424	110	2550 V
PCB066	pg/g-Wet	45	44	97.8	169	7160	BT017	734	321 V	2950 V	169	7160	BT017	722	307	2830 V
PCB067	pg/g-Wet	35	35	100	6.47	206	BT028	25.2	9.91	103 V	6.47	206	BT028	25.2	9.91	103 V
PCB068	pg/g-Wet	35	33	94.3	1.78	49.5	BT016	8.3	3.99	26.6 V	1.78	49.5	BT016	7.91	3.96	26.5 V
PCB070	pg/g-Wet	10	9	90	430 J	1100	WR-VC-108	580	510	920 V	320 U	1100	WR-VC-108	540	510 JV	900 V
PCB072	pg/g-Wet	35	34	97.1	1.74	44.6	BT028	9.25	5.09 V	35.9 V	1.74	44.6	BT028	9.01	4.97	35.3 V
PCB073	pg/g-Wet	35	9	25.7	1.66	191	BT016	27	3.99	123 V	1.55 U	191	BT016	7.75	0.83 U	14.8 V
PCB074	pg/g-Wet	10	4	40	180 J	360 J	WR-VC-108	250	220 JV	340 JV	160 U	360 J	WR-VC-108	150	80 UV	310 JV
PCB077	pg/g-Wet	45	35	77.8	19.6	497	BT028	67.4	29.9	295 V	19.6	820 U	WR-VC-46	112	37.7	378 UV
PCB078	pg/g-Wet	35	0	0	--	--	--	--	--	--	1.14 U	9.65 U	BT030	0.846	0.605 U	1.83 UV
PCB079	pg/g-Wet	35	35	100	14.3	76.1	BT017	24.7	20.6	43.5 V	14.3	76.1	BT017	24.7	20.6	43.5 V
PCB080	pg/g-Wet	35	0	0	--	--	--	--	--	--	0.752 U	16.7 U	BT030	1.32	1.06 U	1.96 UV
PCB081	pg/g-Wet	45	18	40	0.745	23	BT017	3.77	1.17 V	17.3 V	0.691 U	1700 U	WR-VC-108	117	1.23	640 UV
PCB082	pg/g-Wet	35	35	100	14.9	697	BT017	84.7	29.9	416 V	14.9	697	BT017	84.7	29.9	416 V
PCB083 & 099	pg/g-Wet	35	35	100	312	2890	BT017	811	516	2280 V	312	2890	BT017	811	516	2280 V
PCB084	pg/g-Wet	35	35	100	33.7	1430	BT017	215	86.3	944 V	33.7	1430	BT017	215	86.3	944 V
PCB085 & 116 & 117	pg/g-Wet	35	35	100	76.1	1130	BT017	218	116	684 V	76.1	1130	BT017	218	116	684 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	35	35	100	374	3200	BT017	855	560	2430 V	374	3200	BT017	855	560	2430 V
PCB087	pg/g-Wet	10	1	10	1000	1000	WR-VC-29	1000	1000	1000	930 U	1600 U	WR-VC-66	620	550 UV	910 V
PCB088 & 091	pg/g-Wet	35	35	100	33.3	841	BT017	168	69.7	541 V	33.3	841	BT017	168	69.7	541 V
PCB089	pg/g-Wet	35	35	100	1.44	150	BT017	13.2	3.69	75.8 V	1.44	150	BT017	13.2	3.69	75.8 V
PCB090	pg/g-Wet	10	0	0	--	--	--	--	--	--	120 U	1400 U	WR-VC-66	380	460 UV	660 UV
PCB090 & 101 & 113	pg/g-Wet	35	35	100	493	4090	BT028	1270	829	3610 V	493	4090	BT028	1270	829	3610 V
PCB092	pg/g-Wet	35	35	100	63.9	696	BT016	213	134	687 V	63.9	696	BT016	213	134	687 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	35	35	100	300	3320	BT028	893	539	2800 V	300	3320	BT028	893	539	2800 V
PCB094	pg/g-Wet	35	34	97.1	1.29	303	BT016	17.4	3.62 V	37.3 V	1.29	303	BT016	16.9	3.53	36.7 V
PCB095	pg/g-Wet	10	10	100	510	1600	WR-VC-108	710	570 V	1200 V	510	1600	WR-VC-108	710	570 V	1200 V
PCB096	pg/g-Wet	35	34	97.1	1.24	131	BT016	14	3.26 V	64.1 V	1.24	131	BT016	13.6	3.19	62.8 V
PCB097	pg/g-Wet	10	0	0	--	--	--	--	--	--	500 U	620 U	WR-VC-108	260	250 UV	290 UV
PCB099	pg/g-Wet	10	9	90	420 J	700	WR-VC-108	520	490 J	670 V	340 U	700	WR-VC-108	480	480 JV	660 V
PCB101	pg/g-Wet	10	5	50	940 J	2100	WR-VC-108	1500	1300 J	2000 V	910 U	2100	WR-VC-108	1000	800 JV	2000 V
PCB103	pg/g-Wet	35	35	100	2.57	244	BT016	22.6	7.98	82 V	2.57	244	BT016	22.6	7.98	82 V
PCB104	pg/g-Wet	35	29	82.9	0.177 J	97.8	BT016	4.55	0.612	6.63 V	0.177 J	97.8	BT016	3.81	0.545 J	5.92 V
PCB105	pg/g-Wet	45	38	84.4	227	1960	BT017	478	321 V	1200 V	227	1960	BT017	438	307	1120 V
PCB106	pg/g-Wet	35	0	0	--	--	--	--	--	--	0.701 U	5.76 U	BT030	0.897	0.805 U	1.8 UV
PCB107 & 124	pg/g-Wet	35	35	100	21.9	154	BT017	44.9	30	112 V	21.9	154	BT017	44.9	30	112 V
PCB109	pg/g-Wet	35	35	100	40	327	BT017	100	70.8	265 V	40	327	BT017	100	70.8	265 V
PCB110	pg/g-Wet	10	2	20	950	1000	WR-VC-28	980	980 V	1000 V	850 U	1800 U	WR-VC-108	650	600 UV	980 V
PCB110 & 115	pg/g-Wet	35	35	100	440	4650	BT028	1180	718	3480 V	440	4650	BT028	1180	718	3480 V
PCB111	pg/g-Wet	35	25	71.4	0.445 J	5.99	BT022	1.68	1.34	5.32 V	0.363 U	5.99	BT022	1.29	0.771	3.73 V
PCB112	pg/g-Wet	35	1	2.86	110	110	BT016	110	110	110	0.598 U	110	BT016	3.53	0.318 U	1.31 UV
PCB114	pg/g-Wet	45	35	77.8	13.1	145	BT017	28.6	18.1	73.9 V	13.1	145	BT017	32.2	20.2	62.6 V
PCB118	pg/g-Wet	45	44	97.8	1100	5250	BT017	2160	1810 V	4690 V	1100	5250	BT017	2120	1810	4670 V
PCB119	pg/g-Wet	10	0	0	--	--	--	--	--	--	120 U	1500 U	WR-VC-29	480	490 UV	710 UV
PCB120	pg/g-Wet	35	35	100	3.87	29.4	BT022	8.5	6.2	16.6 V	3.87	29.4	BT022	8.5	6.2	16.6 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB121	pg/g-Wet	35	22	62.9	0.255 J	18.4	BT016	1.94	0.819 V	4.75 V	0.209 U	18.4	BT016	1.34	0.605	3.9 V
PCB122	pg/g-Wet	35	30	85.7	5.17	63.5	BT017	13.3	8.06 V	44.3 V	4.9 U	63.5	BT017	11.8	7.79	42.3 V
PCB123	pg/g-Wet	45	35	77.8	29.6	116	BT017	47.9	39.7	91.2 V	29.6	620 U	WR-VC-11; WR-VC-43	87.7	42.4	296 UV
PCB126	pg/g-Wet	45	29	64.4	1.95	12.6	BT017	4.25	3.15	9.19 V	1.95	120 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	16.3	3.17	60 UV
PCB127	pg/g-Wet	35	15	42.9	1.51	4.25	BT024	2.24	1.88	3.96 V	1.33 U	7.19 U	BT030	1.65	1.51	3.67 V
PCB128	pg/g-Wet	10	0	0	--	--	--	--	--	--	170 U	200 U	WR-VC-57	87	85 UV	93 UV
PCB128 & 166	pg/g-Wet	35	35	100	104	600	BT022	236	177	513 V	104	600	BT022	236	177	513 V
PCB129 & 138 & 160 & 163	pg/g-Wet	35	35	100	1430	5760	BT022	2580	2040	4940 V	1430	5760	BT022	2580	2040	4940 V
PCB130	pg/g-Wet	35	35	100	48.7	303	BT022	111	84.4	228 V	48.7	303	BT022	111	84.4	228 V
PCB131	pg/g-Wet	35	35	100	4.53	40.3	BT022	14.6	9.9	38 V	4.53	40.3	BT022	14.6	9.9	38 V
PCB132	pg/g-Wet	45	35	77.8	73.8	998	BT022	305	197	850 V	73.8	998	BT022	291	250 U	843 V
PCB133	pg/g-Wet	35	35	100	11.6	119	BT016	36.3	23.6	87.3 V	11.6	119	BT016	36.3	23.6	87.3 V
PCB134 & 143	pg/g-Wet	35	35	100	16.2	258	BT016	62.2	40	154 V	16.2	258	BT016	62.2	40	154 V
PCB135 & 151 & 154	pg/g-Wet	35	35	100	123	2340	BT016	487	343	1540 V	123	2340	BT016	487	343	1540 V
PCB136	pg/g-Wet	35	35	100	21.9	634	BT016	121	80.3	441 V	21.9	634	BT016	121	80.3	441 V
PCB137	pg/g-Wet	35	34	97.1	37.9	119	BT017	62.9	54.9 V	112 V	37.9	119	BT017	61.8	54.5	111 V
PCB138	pg/g-Wet	10	9	90	1200 J	1700 J	WR-VC-108; WR-VC-57; WR-VC-66	1500	1600 J	1700 JV	690 U	1700 J	WR-VC-108; WR-VC-57; WR-VC-66	1400	1600 JV	1700 JV
PCB139 & 140	pg/g-Wet	35	35	100	7.71	83.4	BT022	25.7	17.8	58.9 V	7.71	83.4	BT022	25.7	17.8	58.9 V
PCB141	pg/g-Wet	45	35	77.8	26.8	466	BT016	80.5	49.3	202 V	26.8	466	BT016	72.6	45 U	161 V
PCB142	pg/g-Wet	35	1	2.86	1.28	1.28	BT017	1.28	1.28	1.28	0.571 U	4.73 U	BT030	0.617	0.433 U	1.6 UV
PCB144	pg/g-Wet	35	35	100	11.5	219	BT016	49.7	30.6	145 V	11.5	219	BT016	49.7	30.6	145 V
PCB145	pg/g-Wet	35	16	45.7	0.093 J	1.71	BT016	0.495	0.366 JV	1.27 V	0.085 U	1.71	BT016	0.315	0.173 U	1.03 V
PCB146	pg/g-Wet	35	35	100	183	988	BT022	387	300	759 V	183	988	BT022	387	300	759 V
PCB147 & 149	pg/g-Wet	35	35	100	418	3650	BT016	1200	853	3320 V	418	3650	BT016	1200	853	3320 V
PCB148	pg/g-Wet	35	33	94.3	0.9	30.6	BT016	5.3	2.51	20 V	0.853 U	30.6	BT016	5.04	2.31	19.3 V
PCB149	pg/g-Wet	10	10	100	580	1200	WR-VC-108	800	690 V	1200 JV	580	1200	WR-VC-108	800	690 V	1200 JV
PCB150	pg/g-Wet	35	34	97.1	0.501 J	28	BT016	4.34	1.89 V	21.4 V	0.501 J	28	BT016	4.23	1.79	21.1 V
PCB151	pg/g-Wet	10	9	90	210 J	380 J	WR-VC-108	260	240 J	350 JV	99 U	380 J	WR-VC-108	240	240 JV	340 JV
PCB152	pg/g-Wet	35	32	91.4	0.295 J	38	BT016	2.69	0.823 JV	7.35 V	0.295 J	38	BT016	2.48	0.779	6.97 V
PCB153	pg/g-Wet	10	9	90	2300	2900	WR-VC-108	2600	2500	2900 V	2300	2900	WR-VC-108	2500	2500 V	2900 V
PCB153 & 168	pg/g-Wet	35	35	100	2950	7590	BT022	4430	4060	6670 V	2950	7590	BT022	4430	4060	6670 V
PCB155	pg/g-Wet	35	31	88.6	0.596	6.47	BT016	1.39	1.03	2.72 V	0.596	6.47	BT016	1.32	0.957	2.62 V
PCB156	pg/g-Wet	10	0	0	--	--	--	--	--	--	310 U	310 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	160	160 UV	160 UV
PCB156 & 157	pg/g-Wet	35	35	100	111	328	BT024	172	144	310 V	111	328	BT024	172	144	310 V
PCB157	pg/g-Wet	10	0	0	--	--	--	--	--	--	120 U	120 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	60	60 UV	60 UV
PCB158	pg/g-Wet	45	35	77.8	86.4	426	BT022	185	145	392 V	86.4	426	BT022	165	128	379 V
PCB159	pg/g-Wet	35	24	68.6	0.602	31.7	BT016	5.97	2.5 V	25.4 V	0.602	31.7	BT016	4.58	2.22	17.5 V
PCB161	pg/g-Wet	35	0	0	--	--	--	--	--	--	0.645 U	5.34 U	BT030	0.511	0.339 U	1.14 UV
PCB162	pg/g-Wet	35	34	97.1	2.52	12	BT022	5.11	4.01 V	10.6 V	2.52	12	BT022	5.02	3.97	10.6 V
PCB164	pg/g-Wet	35	35	100	29.4	299	BT016	82.3	54.5	209 V	29.4	299	BT016	82.3	54.5	209 V
PCB165	pg/g-Wet	35	13	37.1	0.515 J	9.7	BT016	2.74	1.79	6.9 V	0.416 U	9.7	BT016	1.33	0.498 U	4.9 V
PCB166	pg/g-Wet	10	0	0	--	--	--	--	--	--	260 U	380 U	WR-VC-108	160	160 UV	190 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB167	pg/g-Wet	45	41	91.1	140 NJ	333	BT022	218	207	306	100 U	333	BT022	203	207	303 JV
PCB168	pg/g-Wet	10	0	0	--	--	--	--	--	--	260 U	260 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	130	130 UV	130 UV
PCB169	pg/g-Wet	45	1	2.22	1.55	1.55	BT026	1.55	1.55	1.55	0.514 U	360 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	40.6	0.82 U	180 UV
PCB170	pg/g-Wet	45	35	77.8	23.7	485	BT032	88.6	46.9	297 V	23.7	485	BT032	91.2	75.7	209 V
PCB171 & 173	pg/g-Wet	35	35	100	32.3	425	BT016	102	63.2	301 V	32.3	425	BT016	102	63.2	301 V
PCB172	pg/g-Wet	35	35	100	2.87	75.6	BT016	13.1	7.09	44.6 V	2.87	75.6	BT016	13.1	7.09	44.6 V
PCB174	pg/g-Wet	45	35	77.8	21.4	706	BT016	112	63.4	391 V	21.4	706	BT016	104	75 U	271 V
PCB175	pg/g-Wet	35	35	100	4.8	58.3	BT016	13.9	8.54	39.7 V	4.8	58.3	BT016	13.9	8.54	39.7 V
PCB176	pg/g-Wet	35	35	100	10.7	172	BT016	38	21.2	127 V	10.7	172	BT016	38	21.2	127 V
PCB177	pg/g-Wet	45	35	77.8	77.4	892	BT016	232	147	682 V	77.4	892	BT016	200	131	558 V
PCB178	pg/g-Wet	35	35	100	45.4	385	BT016	113	78.8	297 V	45.4	385	BT016	113	78.8	297 V
PCB179	pg/g-Wet	35	35	100	38.7	646	BT016	143	80.9	464 V	38.7	646	BT016	143	80.9	464 V
PCB180	pg/g-Wet	10	8	80	390 J	490 J	WR-VC-108	440	440 JV	480 JV	390 J	490 J	WR-VC-108	390	430 JV	480 JV
PCB180 & 193	pg/g-Wet	35	35	100	409	1660	BT016	624	528	1120 V	409	1660	BT016	624	528	1120 V
PCB181	pg/g-Wet	35	34	97.1	2.01	12.3	BT017	4.11	3.18 V	8.16 V	2.01	12.3	BT017	4.04	3.17	8.09 V
PCB182	pg/g-Wet	35	25	71.4	0.759 J	5.87	BT016	2.3	1.94	5.44 V	0.759 J	20.2 U	BT030	2.15	1.35	5.57 V
PCB183	pg/g-Wet	10	0	0	--	--	--	--	--	--	140 U	140 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	70	70 UV	70 UV
PCB183 & 185	pg/g-Wet	35	35	100	99.3	932	BT016	247	167	660 V	99.3	932	BT016	247	167	660 V
PCB184	pg/g-Wet	45	28	62.2	0.595	3.26	BT017	1.34	1.05 V	2.81 V	0.543 U	83 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	10.1	1.15	41.5 UV
PCB186	pg/g-Wet	35	1	2.86	0.134 J	0.134 J	BT018	0.134	0.134 J	0.134 J	0.052 U	5.1 U	BT030	0.385	0.32 U	0.513 UV
PCB187	pg/g-Wet	45	35	77.8	274	2040	BT016	654	477	1730 V	270 U	2040	BT016	546	422	1540 V
PCB188	pg/g-Wet	35	24	68.6	0.602	4.74	BT022	1.81	1.23 V	4.64 V	0.594 U	4.74	BT022	1.37	1.04	4.43 V
PCB189	pg/g-Wet	45	27	60	0.918	14.9	BT016	3.51	1.89	11.8 V	0.916 U	100 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	13.4	2.66	50 UV
PCB190	pg/g-Wet	35	35	100	47	255	BT016	85.8	60.2	200 V	47	255	BT016	85.8	60.2	200 V
PCB191	pg/g-Wet	35	35	100	4.35	50.3	BT016	10.9	7.07	28.2 V	4.35	50.3	BT016	10.9	7.07	28.2 V
PCB192	pg/g-Wet	35	0	0	--	--	--	--	--	--	1.4 U	11.9 U	BT030	0.927	0.745 U	1.2 UV
PCB194	pg/g-Wet	45	35	77.8	4.04	77.7	BT032	13.9	7.66	40.1 V	4.04	610 U	WR-VC-66	43.9	12.4	289 UV
PCB195	pg/g-Wet	45	35	77.8	15.7	168	BT016	42.8	28	114 V	15.7	210 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	56.6	38.3	105 UV
PCB196	pg/g-Wet	35	35	100	12.5	138	BT016	32.3	19.2	87.2 V	12.5	138	BT016	32.3	19.2	87.2 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB197 & 200	pg/g-Wet	35	34	97.1	5.85	55.4	BT032	15.9	10.9 V	41.6 V	5.85	55.4	BT032	15.5	10.8	40.6 V
PCB198 & 199	pg/g-Wet	35	35	100	35	282	BT032	83.3	56.2	209 V	35	282	BT032	83.3	56.2	209 V
PCB201	pg/g-Wet	45	35	77.8	13.5	71.6	BT016	30.5	23.8	66.3 V	13.5	250 U	WR-VC-57	34.2	29.9	68.8 V
PCB202	pg/g-Wet	35	35	100	58.3	221	BT022	108	90.6	197 V	58.3	221	BT022	108	90.6	197 V
PCB203	pg/g-Wet	45	35	77.8	108	320	BT032	163	138	292 V	108	320	BT032	159	145 U	280 V
PCB204	pg/g-Wet	35	16	45.7	0.104 J	0.494 J	BT017	0.228	0.199 JV	0.419 JV	0.097 U	14.3 U	BT030	0.416	0.139 U	1.01 JV
PCB205	pg/g-Wet	35	35	100	3.2	23.6	BT016	7.12	4.93	17 V	3.2	23.6	BT016	7.12	4.93	17 V
PCB206	pg/g-Wet	45	35	77.8	50.3	166	BT017	83.3	72.6	152 V	50.3	166	BT017	80.4	70 U	149 V
PCB207	pg/g-Wet	35	35	100	8.08	25	BT017	13	11.6	23.9 V	8.08	25	BT017	13	11.6	23.9 V
PCB208	pg/g-Wet	35	35	100	35.8	115	BT017	56.5	48.6	104 V	35.8	115	BT017	56.5	48.6	104 V
PCB209	pg/g-Wet	45	35	77.8	56.1	185	BT017	91.8	77.8	167 V	56.1	185	BT017	83.6	71.9	163 V
Total PCB Congeners	pg/g-Wet	35	35	100	19100 JT	189000 T	BT028	43100	28000 JT	107000 JV	19100 JT	189000 T	BT028	43100	28000 JT	107000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	35	35	100	19.1 JT	189 T	BT028	43.1	28 JT	107 JV	19.1 JT	189 T	BT028	43.1	28 JT	107 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	35	35	100	2550 T	11800 T	BT017	4570	3730 T	8650 V	2550 T	11800 T	BT017	4570	3730 T	8650 V
Heptachlorobiphenylhomologs	pg/g-Wet	35	35	100	1150 T	8820 T	BT016	2490	1750 T	6410 V	1150 T	8820 T	BT016	2490	1750 T	6410 V
Hexachlorobiphenyl homologs	pg/g-Wet	35	35	100	5880 T	23700 T	BT022	10900	8890 T	20700 V	5880 T	23700 T	BT022	10900	8890 T	20700 V
Monochlorobiphenyl homologs	pg/g-Wet	34	34	100	35.8 T	667 T	BT017	229	204 V	440 V	35.8 T	667 T	BT017	229	204 V	440 V
Nonachlorobiphenyl homologs	pg/g-Wet	35	35	100	94.1 T	305 T	BT017	153	135 T	280 V	94.1 T	305 T	BT017	153	135 T	280 V
Octachlorobiphenyl homologs	pg/g-Wet	35	35	100	272 T	1290 T	BT032	497	388 T	1070 V	272 T	1290 T	BT032	497	388 T	1070 V
Pentachlorobiphenylhomologs	pg/g-Wet	35	35	100	4090 T	30300 T	BT017	9060	5980 T	23500 V	4090 T	30300 T	BT017	9060	5980 T	23500 V
Tetrachlorobiphenyl homologs	pg/g-Wet	35	35	100	1600 T	67500 T	BT017	8130	2740 T	39700 V	1600 T	67500 T	BT017	8130	2740 T	39700 V
Trichlorobiphenyl homologs	pg/g-Wet	35	35	100	2610 T	62500 T	BT028	7010	3750 T	18600 JV	2610 T	62500 T	BT028	7010	3750 T	18600 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	35	30	85.7	0.16	8.5	BT008	1.23	0.507 V	6.1 V	0.127 U	8.5	BT008	1.07	0.432	4.86 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	35	100	0.278	25.9	BT017	3.4	1.46	13.7 V	0.278	25.9	BT017	3.4	1.46	13.7 V
Hexachlorodibenzofuran homologs	pg/g-Wet	35	35	100	0.12	23.3	BT007	2.35	0.711	10.4 V	0.12	23.3	BT007	2.35	0.711	10.4 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	33	94.3	0.063	15.6	BT017	1.28	0.365	3.71 V	0.063	15.6	BT017	1.21	0.355	3.66 V
Octachlorodibenzofuran	pg/g-Wet	35	22	62.9	0.09 J	4.84	BT008	0.883	0.456 JV	3.24 JV	0.09 J	4.84	BT008	0.607	0.238 J	2.47 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	35	35	100	2.12 J	53.5	BT008	11	5.66	42.3 V	2.12 J	53.5	BT008	11	5.66	42.3 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	35	34	97.1	0.154	128	BT017	5.72	0.856 V	12.7 V	0.132 U	128	BT017	5.56	0.839	11.8 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	24	68.6	0.051	30.9	BT017	1.49	0.152 V	0.779 V	0.051	30.9	BT017	1.04	0.065	0.668 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	35	35	100	0.888	397	BT017	13.7	1.87	6.91 V	0.888	397	BT017	13.7	1.87	6.91 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	32	91.4	0.342	48.2	BT017	2.33	0.735 V	2.14 V	0.0495 U	48.2	BT017	2.13	0.652	2.13 V
Total PCDD/F	pg/g-Wet	35	35	100	4.48 JT	696 JT	BT017	42	12.3 JT	109 JV	4.48 JT	696 JT	BT017	42	12.3 JT	109 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	35	13	37.1	0.12 J	1.74	BT007	0.531	0.227 J	1.55 V	0.075 U	1.74	BT007	0.27	0.12 J	1.22 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	35	25	71.4	0.417 J	5.56	BT017	1.58	0.705 J	5.22 V	0.26 U	5.56	BT017	1.2	0.587 J	5.11 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	35	5	14.3	0.057 J	0.184 J	BT007	0.108	0.073 J	0.181 JV	0.057 J	0.184 J	BT007	0.0663	0.065 U	0.108 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	35	15	42.9	0.05 J	3.28	BT007	0.64	0.103 J	3.03 V	0.048 U	3.28	BT007	0.302	0.0595 U	2.33 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	35	6	17.1	0.08 J	0.14 J	BT022	0.102	0.102 JV	0.132 JV	0.052 U	0.465 U	BT017	0.0841	0.082 U	0.117 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	35	4	11.4	0.05 J	0.407 J	BT017	0.147	0.065 JV	0.356 JV	0.05 J	0.407 J	BT017	0.0625	0.0466 U	0.144 UV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	35	22	62.9	0.077 J	2.54	BT017	0.395	0.147 JV	1.1 JV	0.077 J	2.54	BT017	0.276	0.117 J	1.07 JV
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	35	5	14.3	0.061 J	0.081 J	BT0272	0.07	0.069 J	0.0788 JV	0.052 U	0.164 U	BT020	0.0626	0.066 U	0.0751 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	35	11	31.4	0.054 J	0.178 J	BT007	0.11	0.095 J	0.175 JV	0.054 J	0.546 U	BT017	0.0712	0.0471 U	0.174 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	35	11	31.4	0.051 J	2.96	BT017	0.55	0.117 J	2.48 V	0.05 U	2.96	BT017	0.203	0.051 J	0.837 JV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	35	10	28.6	0.051 J	17	BT017	1.79	0.066 JV	9.46 JV	0.049 U	17	BT017	0.545	0.054 J	0.218 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	35	21	60	0.058 J	0.816 J	BT017	0.141	0.085 J	0.329 J	0.052 U	0.816 J	BT017	0.1	0.066 J	0.267 JV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	35	17	48.6	0.079 J	9.31	BT017	0.935	0.13 J	4.41 V	0.075 U	9.31	BT017	0.488	0.093 U	1.97 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	35	22	62.9	0.162 J	45.2	BT017	2.62	0.341 V	3.8 V	0.122 U	45.2	BT017	1.7	0.242	1.82 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	35	12	34.3	0.051 J	15.4	BT017	1.44	0.11 JV	7.38 V	0.051 J	15.4	BT017	0.523	0.051 J	0.367 JV
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	35	35	100	0.000714 T	40.5 JT	BT017	1.4	0.12 JT	1.42 JV	0.000714 T	40.5 JT	BT017	1.4	0.12 JT	1.42 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	42	41	97.6	0.036 A	42.1 JT	BT017	1.59	0.454 JT	2.26 JT	0.036 A	42.1 JT	BT017	1.7	0.457 JV	2.81 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	45	44	97.8	0.036 T	1.56 T	BT017	0.376	0.348 V	1.04 V	0.036 T	12 UT	WR-VC-28	0.501	0.361 T	1.19 V
Pesticides																
2,4'-DDD	µg/kg-Wet	45	36	80	0.094 J	239	BT018	7.56	0.226 JV	6.45 V	0.094 J	239	BT018	6.16	0.305 U	2.3 JV
2,4'-DDE	µg/kg-Wet	45	30	66.7	0.0125 J	2.93	BT018	0.175	0.023 JV	0.793 V	0.0125 J	2.93	BT018	0.228	0.025 J	0.55 UV
2,4'-DDT	µg/kg-Wet	45	26	57.8	0.0225 J	1.8 J	WR-VC-57	0.133	0.029 JV	0.577 JV	0.0211 U	1.8 J	WR-VC-57	0.237	0.0339 J	0.84 UV
4,4'-DDD	µg/kg-Wet	45	45	100	0.375	702	BT018	18.8	0.85 NJ	7.49 V	0.375	702	BT018	18.8	0.85 NJ	7.49 V
4,4'-DDE	µg/kg-Wet	45	45	100	0.513	8.55	BT017	1.55	0.912	5.91 V	0.513	8.55	BT017	1.55	0.912	5.91 V
4,4'-DDT	µg/kg-Wet	45	42	93.3	0.0665 J	87.1	BT018	2.58	0.12 JV	1.7 V	0.0665 J	87.1	BT018	2.41	0.117 J	1.7 V
Aldrin	µg/kg-Wet	45	28	62.2	0.0118 J	2.14	BT028	0.102	0.0219 JV	0.0562 JV	0.0118 J	2.14	BT028	0.0911	0.0246 J	0.075 UV
alpha-Endosulfan	µg/kg-Wet	45	3	6.67	0.015 J	0.049 J	BT020	0.0297	0.025 J	0.0466 JV	0.003 U	1 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.12	0.0119 U	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	45	20	44.4	0.00607 J	0.0136 J	BT0061	0.00921	0.00886 JV	0.0128 JV	0.0054 U	0.32 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.0421	0.00882 J	0.16 UV
beta-Endosulfan	µg/kg-Wet	45	3	6.67	0.025 J	0.0308 J	BT022	0.0281	0.0284 J	0.0306 JV	0.012 U	1 U	WR-VC-43; WR-VC-57	0.0633	0.0307 U	0.12 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	45	6	13.3	0.00131 J	0.00873 J	BT011	0.00413	0.00306 JV	0.00812 JV	0.00118 U	0.46 U	WR-VC-72	0.0454	0.0207 U	0.155 UV
cis-Chlordane	µg/kg-Wet	45	45	100	0.414 J	2.29	BT028	0.925	0.741	1.78 V	0.414 J	2.29	BT028	0.925	0.741	1.78 V
cis-Nonachlor	µg/kg-Wet	45	42	93.3	0.234 J	2 NJ	WR-VC-108; WR-VC-11; WR-VC-66	0.655	0.37 JV	2 JV	0.234 J	2.2 U	WR-VC-28	0.668	0.388 J	1.98 JV
delta-Hexachlorocyclohexane	µg/kg-Wet	45	4	8.89	0.001 J	0.23 J	WR-VC-46	0.0598	0.004 JV	0.197 JV	0.001 J	0.24 U	WR-VC-43	0.0294	0.002 U	0.105 UV
Dieldrin	µg/kg-Wet	45	36	80	0.139 J	4.14	BT028	0.359	0.193 V	0.65 V	0.139 J	4.14	BT028	0.343	0.202	0.607 V
Endosulfan sulfate	µg/kg-Wet	45	18	40	0.0203 J	0.42 J	WR-VC-29	0.0622	0.039 JV	0.127 JV	0.018 U	0.42 J	WR-VC-29	0.055	0.03 J	0.14 UV
Endrin	µg/kg-Wet	45	5	11.1	0.00563 J	0.0616 J	BT028	0.0192	0.008 J	0.0519 JV	0.002 U	0.12 U	WR-VC-108	0.0172	0.0126 U	0.0435 UV
Endrin aldehyde	µg/kg-Wet	45	0	0	--	--	--	--	--	--	0.001 U	0.8 U	WR-VC-57	0.0736	0.00955 U	0.325 UV
Endrin ketone	µg/kg-Wet	45	3	6.67	0.002 J	0.0108 J	BT028	0.0056	0.004 J	0.0101 JV	0.00105 U	0.48 U	WR-VC-57	0.0604	0.0199 U	0.2 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	45	27	60	0.0314 J	0.21 J	WR-VC-72	0.0637	0.0519 J	0.106 JV	0.0307 U	0.67 U	WR-VC-28	0.0661	0.0519 J	0.107 JV
Heptachlor	µg/kg-Wet	45	26	57.8	0.0158 J	0.0534 J	BT020	0.026	0.0217 JV	0.0473 JV	0.012 U	0.31 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.0523	0.0227 J	0.155 UV
Heptachlor epoxide	µg/kg-Wet	45	33	73.3	0.0173 J	0.094 J	BT017	0.0333	0.026 J	0.0749 JV	0.017 U	1 U	WR-VC-108; WR-VC-57; WR-VC-66	0.0847	0.029 J	0.434 UV
Methoxychlor	µg/kg-Wet	45	0	0	--	--	--	--	--	--	0.004 U	0.32 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.0418	0.0095 U	0.16 UV
Mirex	µg/kg-Wet	10	0	0	--	--	--	--	--	--	0.24 U	0.24 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.12	0.12 UV	0.12 UV
Oxychlordane	µg/kg-Wet	45	30	66.7	0.0387 J	0.5 J	WR-VC-108	0.0798	0.0588 JV	0.147 JV	0.0326 U	0.64 U	WR-VC-28	0.101	0.0593 J	0.278 UV
Total Chlordanes	µg/kg-Wet	45	45	100	1.61 JT	8.2 JT	WR-VC-108	3.73	2.71 JT	7.28 JV	1.61 JT	8.2 JT	WR-VC-108	3.73	2.71 JT	7.28 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total Endosulfan	µg/kg-Wet	45	19	42.2	0.0203 JT	0.42 JT	WR-VC-29	0.068	0.041 JT	0.176 JV	0.018 UT	1 UT	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	0.14	0.0319 UT	0.5 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	45	45	100	0.511 JT	941 T	BT018	24.9	0.995 JT	9.73 V	0.511 JT	941 T	BT018	24.9	0.995 JT	9.73 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	45	45	100	1.13 JT	1040 T	BT018	29.1	2.67 JT	16 JV	1.13 JT	1040 T	BT018	29.1	2.67 JT	16 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	45	45	100	0.526 JT	11.2 T	BT018	1.66	0.936 JT	6.26 JV	0.526 JT	11.2 T	BT018	1.66	0.936 JT	6.26 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	45	42	93.3	0.075 JT	87.1 T	BT018	2.66	0.161 JV	3.26 V	0.075 JT	87.1 T	BT018	2.49	0.146 JT	3.01 V
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	45	45	100	0.959 JT	797 T	BT018	22.8	2.28 JT	13.6 JV	0.959 JT	797 T	BT018	22.8	2.28 JT	13.6 JV
Toxaphene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	14 U	22 U	WR-VC-28	8.8	9 UV	11 UV
trans-Chlordane	µg/kg-Wet	45	45	100	0.26 J	2.81	BT028	0.804	0.437 J	1.88 JV	0.26 J	2.81	BT028	0.804	0.437 J	1.88 JV
trans-Nonachlor	µg/kg-Wet	45	45	100	0.657	3	BT017	1.34	1.13	2.26 V	0.657	3	BT017	1.34	1.13	2.26 V
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	45	19	42	0.59 J	3.5	WR-VC-108	1.3	1.1	2.2 V	0.15 U	3.5	WR-VC-108	0.76	0.44 U	1.9 V
Acenaphthene	µg/kg-Wet	45	44	97.8	0.16 J	13	BT012; BT014	1.52	0.46 JV	10.6 V	0.091 U	13	BT012; BT014	1.49	0.42 J	10.4 V
Acenaphthylene	µg/kg-Wet	45	31	68.9	0.15 J	1.1	BT014	0.367	0.3 J	0.84 V	0.092 U	1.1	BT014	0.267	0.23 J	0.786 V
Anthracene	µg/kg-Wet	45	45	100	0.52	29	BT014	2.9	1.2	6.4 V	0.52	29	BT014	2.9	1.2	6.4 V
Benzo(a)anthracene	µg/kg-Wet	45	45	100	0.39 J	67	BT012	5.3	1.5	29 V	0.39 J	67	BT012	5.3	1.5	29 V
Benzo(a)pyrene	µg/kg-Wet	45	43	96	0.42 J	33	BT012	2.1	0.63	8.5 V	0.12 U	33	BT012	2.1	0.63	8.3 V
Benzo(b)fluoranthene	µg/kg-Wet	45	39	87	0.21 J	33	BT012	2.9	0.81	13 V	0.15 U	33	BT012	2.5	0.77	13 V
Benzo(g,h,i)perylene	µg/kg-Wet	45	28	62	0.18 J	18	BT012	1.8	0.56 V	6.8 V	0.17 U	18	BT012	1.2	0.32 J	5.7 V
Benzo(k)fluoranthene	µg/kg-Wet	45	32	71	0.17 J	23	BT012	1.9	0.43 JV	6.5 V	0.13 U	23	BT012	1.3	0.35 J	5.5 V
Chrysene	µg/kg-Wet	45	45	100	1.6	100	BT012	9.9	3.6	46 V	1.6	100	BT012	9.9	3.6	46 V
Dibenzo(a,h)anthracene	µg/kg-Wet	45	10	22	0.15 J	1.4	BT012; BT026	0.58	0.38 JV	1.4 V	0.11 U	1.4	BT012; BT026	0.17	0.055 U	0.79 V
Fluoranthene	µg/kg-Wet	45	45	100	4.8	390	BT012	43	14	270 V	4.8	390	BT012	43	14	270 V
Fluorene	µg/kg-Wet	45	45	100	0.5	11	BT015; WR-VC-46	2	0.96	8.8 V	0.5	11	BT015; WR-VC-46	2	0.96	8.8 V
High Molecular Weight PAH	µg/kg-Wet	45	45	100	13.1 JT	1170 T	BT012	113	35.5 JT	645 JV	13.1 JT	1170 T	BT012	113	35.5 JT	645 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	45	17	38	0.17 J	12	BT012	1.8	0.41 J	7.2 V	0.16 U	12	BT012	0.73	0.08 U	3.7 V
Low Molecular Weight PAH	µg/kg-Wet	45	45	100	5.07 JT	168 T	WR-VC-46	24.7	10.6 JT	144 V	5.07 JT	168 T	WR-VC-46	24.7	10.6 JT	144 V
Naphthalene	µg/kg-Wet	45	1	2.2	5.1	5.1	BT014	5.1	5.1	5.1	0.33 U	5.1	BT014	0.63	0.5 U	1.1 UV
Phenanthrene	µg/kg-Wet	45	45	100	3.5	140	WR-VC-46	17	7.1	100 V	3.5	140	WR-VC-46	17	7.1	100 V
Pyrene	µg/kg-Wet	45	45	100	3.7	490	BT012	47	14	280 V	3.7	490	BT012	47	14	280 V
Total BaPEq	µg/kg-Wet	45	45	100	0.0407 JT	45.9 T	BT012	3.06	0.859 JT	12.7 JV	0.0407 JT	45.9 T	BT012	3.06	0.859 JT	12.7 JV
Total cPAHs	µg/kg-Wet	45	45	100	2.1 JT	270 T	BT012	22	6.8 JT	98 JV	2.1 JT	270 T	BT012	22	6.8 JT	98 JV
Total PAHs	µg/kg-Wet	45	45	100	18.2 JT	1320 T	BT012	138	45.9 JT	811 JV	18.2 JT	1320 T	BT012	138	45.9 JT	811 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	45	37	82	53 J	8600	BT028	360	100 J	340 JV	53 J	8600	BT028	300	88 J	330 JV
Butylbenzyl phthalate	µg/kg-Wet	45	0	0	--	--	--	--	--	--	14 UJ	14 UJ	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	7	7 U	7 UV
Dibutyl phthalate	µg/kg-Wet	45	10	22	25 J	49	WR-VC-108	31	29 JV	43 JV	16 U	210 U	BT002; BT014; BT015	46	30 J	100 UV
Diethyl phthalate	µg/kg-Wet	45	20	44	9.6 J	19 J	BT023	14	14 JV	18 JV	9.4 U	19 J	BT023	8.9	4.7 U	17 JV
Dimethyl phthalate	µg/kg-Wet	45	2	4.4	5.3 J	5.6 J	BT026	5.5	5.5 JV	5.6 JV	5.1 U	5.6 J	BT026	2.7	2.6 U	2.6 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Di-n-octyl phthalate	µg/kg-Wet	45	0	0	--	--	--	--	--	--	13 U	13 U	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	6.5	6.5 U	6.5 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	9.9 U	9.9 U	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	5	5 U	5 UV
1,2-Dichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	12 UJ	12 UJ	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014;	6	6 UJ	6 UJV
1,2-Diphenylhydrazine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	40 U	40 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	20	20 UV	20 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,3-Dichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	11 UJ	11 UJ	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	5.5	5.5 UJ	5.5 UJV
1,4-Dichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	11 UJ	11 UJ	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	5.5	5.5 UJ	5.5 UJV
2,4-Dinitrotoluene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.5 U	8.5 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	4.3	4.3 UV	4.3 UV
2,6-Dinitrotoluene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	7 U	7 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	3.5	3.5 UV	3.5 UV
2-Chloronaphthalene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5.9 U	5.9 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	3	3 UV	3 UV
2-Nitroaniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	26 U	26 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	13	13 UV	13 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
3,3'-Dichlorobenzidine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	780 UJ	780 UJ	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	390	390 UJV	390 UJV
3-Nitroaniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.9 U	8.9 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	4.5	4.5 UV	4.5 UV
4-Bromophenylphenyl ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5.5 U	5.5 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	2.8	2.8 UV	2.8 UV
4-Chloroaniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5.9 U	5.9 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	3	3 UV	3 UV
4-Chlorophenylphenyl ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	4.5 U	4.5 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	2.3	2.3 UV	2.3 UV
4-Nitroaniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	26 U	26 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	13	13 UV	13 UV
Aniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	230 UJ	230 UJ	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	120	120 UJV	120 UJV
Benzoic acid	µg/kg-Wet	10	4	40	2000 J	3800 J	WR-VC-28	2700	2500 JV	3600 JV	980 UJ	3800 J	WR-VC-28	1400	630 UJV	3300 JV
Benzyl alcohol	µg/kg-Wet	45	37	82	6.7 J	51	WR-VC-72	15	12 J	29 JV	6.7 J	51	WR-VC-72	13	9.5 J	28 JV
Bis(2-chloroethoxy)methane	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5 U	5 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	2.5	2.5 UV	2.5 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.7 U	8.7 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	4.4	4.4 UV	4.4 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	11 U	11 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	5.5	5.5 UV	5.5 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Carbazole	µg/kg-Wet	10	0	0	--	--	--	--	--	--	33 U	33 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	17	17 UV	17 UV
Dibenzofuran	µg/kg-Wet	45	45	100	0.24 J	1.2	BT014; WR-VC-108	0.49	0.4 J	1 V	0.24 J	1.2	BT014; WR-VC-108	0.49	0.4 J	1 V
Hexachlorobenzene	µg/kg-Wet	45	34	75.6	0.0292 J	0.275	BT017	0.0625	0.0468 JV	0.108 JV	0.0292 J	0.275	BT017	0.0745	0.0529 J	0.12 UV
Hexachlorobutadiene	µg/kg-Wet	45	5	11.1	0.00419 J	4.25 J	BT017	0.854	0.00548 J	3.4 JV	0.00417 UJ	8.5 U	BT002; BT004; BT005; BT0061; BT0062; BT007; BT008; BT010; BT011; BT012; BT014; BT015; BT016; BT018; BT019; BT022; BT025; BT026; BT029; BT031; BT033	2.16	0.5 U	4.25 UV
Hexachlorocyclopentadiene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5000 U	5000 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	2500	2500 UV	2500 UV
Hexachloroethane	µg/kg-Wet	45	4	8.9	0.66 J	0.81 J	WR-VC-108	0.73	0.73 JV	0.81 JV	0.31 U	8.5 UJ	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033	3.4	4.3 U	4.3 UV
Isophorone	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5.8 U	5.8 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	2.9	2.9 UV	2.9 UV
Nitrobenzene	µg/kg-Wet	10	1	10	31 J	31 J	WR-VC-11	31	31 J	31 J	10 U	31 J	WR-VC-11	7.6	5 UV	19 JV
N-Nitrosodimethylamine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	10 U	10 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	5	5 UV	5 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
N-Nitrosodiphenylamine	µg/kg-Wet	45	0	0	--	--	--	--	--	--	9.5 U	9.5 U	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	4.8	4.8 U	4.8 UV
N-Nitrosodipropylamine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.2 U	8.2 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	4.1	4.1 UV	4.1 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	55 U	55 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	28	28 UV	28 UV
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	55 U	55 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	28	28 UV	28 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	42 U	42 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	21	21 UV	21 UV
2,4,5-Trichlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	11 U	11 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	5.5	5.5 UV	5.5 UV
2,4,6-Trichlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.8 U	8.8 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	4.4	4.4 UV	4.4 UV
2,4-Dichlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	12 U	12 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	6	6 UV	6 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2,4-Dimethylphenol	µg/kg-Wet	45	0	0	--	--	--	--	--	--	13 U	13 U	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	6.5	6.5 U	6.5 UV
2,4-Dinitrophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	23 U	23 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	12	12 UV	12 UV
2-Chlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	11 U	11 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	5.5	5.5 UV	5.5 UV
2-Methylphenol	µg/kg-Wet	45	3	6.7	68 J	99	BT008	84	84	98 V	53 U	99	BT008	30	27 U	60 JV
2-Nitrophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	15 U	15 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	7.5	7.5 UV	7.5 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	15 U	15 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	7.5	7.5 UV	7.5 UV
4-Chloro-3-methylphenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	72 U	72 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	36	36 UV	36 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
4-Methylphenol	µg/kg-Wet	45	0	0	--	--	--	--	--	--	15 U	15 U	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT007; BT008; BT009; BT010; BT011; BT012; BT013; BT014; BT015; BT016; BT017; BT018; BT019; BT020; BT021; BT022; BT023; BT024; BT025; BT026; BT0271; BT0272; BT028; BT029; BT030; BT031; BT032; BT033; WR-VC-	7.5	7.5 U	7.5 UV
4-Nitrophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	7.5 U	7.5 U	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	3.8	3.8 UV	3.8 UV
Pentachlorophenol	µg/kg-Wet	28	0	0	--	--	--	--	--	--	31 U	31 U	BT001; BT002; BT003; BT004; BT005; BT0061; BT0062; BT009; BT010; BT011; BT012; BT014; BT015; BT016; BT018; BT019; BT023; BT033; WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	16	16 UV	16 UV
Phenol	µg/kg-Wet	45	4	8.9	17 J	180	BT005	62	25 JV	160 JV	17 J	180	BT005	13	8.5 U	21 JV
Lab-exposed worm (Lumbriculus variegatus – whole body)																
Conventionals																
Lipids	percent-Wet	45	45	100	1.35	3.46	BT023	2.32	2.32	2.9 V	1.35	3.46	BT023	2.32	2.32	2.9 V
Total solids	percent-Wet	45	45	100	12.8	17.9	BT023	15.1	15	17 V	12.8	17.9	BT023	15.1	15	17 V
Metals																
Aluminum	mg/kg-Wet	35	35	100	106	539	BT010	289	291	478 V	106	539	BT010	289	291	478 V
Antimony	mg/kg-Wet	45	23	51.1	0.002 J	0.014 J	BT028	0.00409	0.003 J	0.007 JV	0.001 UJ	0.014 J	BT028	0.00269	0.002 J	0.00692 JV
Arsenic	mg/kg-Wet	45	45	100	0.246 J	3.04	BT019	1.03	0.895	1.92 V	0.246 J	3.04	BT019	1.03	0.895	1.92 V
Cadmium	mg/kg-Wet	45	45	100	0.0364	0.254	BT007	0.0698	0.0561 J	0.114 JV	0.0364	0.254	BT007	0.0698	0.0561 J	0.114 JV
Chromium	mg/kg-Wet	45	43	95.6	0.0952	0.89	BT025	0.44	0.42	0.778 V	0.0384 U	0.89	BT025	0.421	0.41	0.776 V
Copper	mg/kg-Wet	45	45	100	1.83 T	20.2	BT023	2.82	2.35	3.29 V	1.83 T	20.2	BT023	2.82	2.35	3.29 V
Lead	mg/kg-Wet	45	45	100	0.122	0.847 T	BT008	0.334	0.287 T	0.663 V	0.122	0.847 T	BT008	0.334	0.287 T	0.663 V
Mercury	mg/kg-Wet	44	43	97.7	0.00206 J	0.0105	BT016	0.00492	0.0041	0.00901 V	0.0009 U	0.0105	BT016	0.00482	0.00405 V	0.00897 V
Nickel	mg/kg-Wet	45	45	100	0.132 J	0.535	BT025	0.34	0.328	0.523 V	0.132 J	0.535	BT025	0.34	0.328	0.523 V
Selenium	mg/kg-Wet	35	35	100	0.08	0.37	BT002	0.21	0.25	0.353 V	0.08	0.37	BT002	0.21	0.25	0.353 V
Silver	mg/kg-Wet	45	45	100	0.0041	0.0142	WR-VC-108	0.00735	0.0069	0.0106 V	0.0041	0.0142	WR-VC-108	0.00735	0.0069	0.0106 V
Zinc	mg/kg-Wet	45	45	100	18.2 T	31.5	BT007	26.4	26.3	30.7 V	18.2 T	31.5	BT007	26.4	26.3	30.7 V
Butyltins																
Butyltin ion	µg/kg-Wet	45	44	98	2.2	3600	BT023	160	21 V	450 JV	2.2	3600	BT023	160	20	440 JV
Dibutyltin ion	µg/kg-Wet	45	40	89	0.62 J	820	BT023	32	4 JV	56 V	0.47 U	820	BT023	29	3.7	52 V
Tetrabutyltin	µg/kg-Wet	45	11	24.4	0.31 J	4.2	BT031	2.07	2.4 NJ	3.65 JV	0.067 U	4.2	BT031	0.777	0.4 NJ	2.84 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Tributyltin ion	µg/kg-Wet	45	25	56	0.89 J	1700	BT023	77	5.7	45 V	0.44 U	1700	BT023	43	2.1	29 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	10	0	0	--	--	--	--	--	--	4.3 U	14 U	WR-VC-108	3	2.2 UV	5.5 UV
Aroclor 1221	µg/kg-Wet	10	0	0	--	--	--	--	--	--	2.4 U	7.3 U	WR-VC-108	1.6	1.2 UV	2.9 UV
Aroclor 1232	µg/kg-Wet	10	0	0	--	--	--	--	--	--	3 U	9.1 U	WR-VC-108	2	1.5 UV	3.6 UV
Aroclor 1242	µg/kg-Wet	10	0	0	--	--	--	--	--	--	1.4 U	4.3 U	WR-VC-108	0.96	0.7 UV	1.7 UV
Aroclor 1248	µg/kg-Wet	10	0	0	--	--	--	--	--	--	2.6 U	7.9 U	WR-VC-108	1.8	1.3 UV	3.2 UV
Aroclor 1254	µg/kg-Wet	10	10	100	55	470 J	WR-VC-108	180	150 V	380 JV	55	470 J	WR-VC-108	180	150 V	380 JV
Aroclor 1260	µg/kg-Wet	10	0	0	--	--	--	--	--	--	3.1 U	9.4 U	WR-VC-108	2.1	1.6 UV	3.8 UV
Aroclor 1262	µg/kg-Wet	10	0	0	--	--	--	--	--	--	1.6 U	4.9 U	WR-VC-108	1.1	0.8 UV	2 UV
Aroclor 1268	µg/kg-Wet	10	0	0	--	--	--	--	--	--	1.3 U	4 U	WR-VC-108	0.89	0.65 UV	1.6 UV
Aroclors	µg/kg-Wet	10	10	100	55 T	470 JT	WR-VC-108	180	150 V	380 JV	55 T	470 JT	WR-VC-108	180	150 V	380 JV
PCB Congeners																
PCB001	pg/g-Wet	42	32	76.2	2.6	1520	BT028	132	10.3 V	808 V	2.6	3100 U	WR-VC-108	199	17.9 V	1190 V
PCB002	pg/g-Wet	32	32	100	1.39	156	BT028	16.6	10.2 V	39.5 V	1.39	156	BT028	16.6	10.2 V	39.5 V
PCB003	pg/g-Wet	32	21	65.6	3.03	360	BT017	43.9	8.13	222	2.82 U	639 U	BT028	39.8	5.9 V	266 V
PCB004	pg/g-Wet	34	34	100	75.9	29600	BT016	2350	164 JV	13000 V	75.9	29600	BT016	2350	164 JV	13000 V
PCB005	pg/g-Wet	45	34	75.6	0.981	863	BT028	34.5	3.14 V	75.3 V	0.981	863	BT028	48.9	5.19	122 UV
PCB006	pg/g-Wet	35	35	100	15.7	9870	BT028	505	55.1	1680 V	15.7	9870	BT028	505	55.1	1680 V
PCB007	pg/g-Wet	35	35	100	3.42	1950	BT028	92.4	10.4	260 V	3.42	1950	BT028	92.4	10.4	260 V
PCB008	pg/g-Wet	45	42	93.3	63.9	55600	BT028	2240	265 JV	7210 V	63.9	55600	BT028	2110	265 U	6520 V
PCB009	pg/g-Wet	35	35	100	4.42	3410	BT028	143	13.1	400 V	4.42	3410	BT028	143	13.1	400 V
PCB010	pg/g-Wet	35	35	100	2.42 J	1780	BT016	94.4	7.83 J	367 V	2.42 J	1780	BT016	94.4	7.83 J	367 V
PCB011	pg/g-Wet	35	35	100	113	522	BT032	205	185 J	337 V	113	522	BT032	205	185 J	337 V
PCB012 & 013	pg/g-Wet	35	35	100	8.62	2220	BT028	135	22.8	454 V	8.62	2220	BT028	135	22.8	454 V
PCB014	pg/g-Wet	35	20	57.1	0.306 J	11.6	BT017	1.9	0.561 JV	10.6 JV	0.306 J	11.6	BT017	1.6	0.545 UJ	6.75 JV
PCB015	pg/g-Wet	35	35	100	41 J	20100	BT028	1140	136	4920 V	41 J	20100	BT028	1140	136	4920 V
PCB016	pg/g-Wet	35	35	100	43	51800	BT028	2220	199 J	5990 V	43	51800	BT028	2220	199 J	5990 V
PCB017	pg/g-Wet	35	35	100	69	65800	BT028	4090	494	18500 V	69	65800	BT028	4090	494	18500 V
PCB018	pg/g-Wet	10	10	100	360 J	6100 J	WR-VC-108	1900	1300 JV	5200 JV	360 J	6100 J	WR-VC-108	1900	1300 JV	5200 JV
PCB018 & 030	pg/g-Wet	35	35	100	107	164000	BT028	7220	529	20900 V	107	164000	BT028	7220	529	20900 V
PCB019	pg/g-Wet	34	34	100	96.4	108000	BT016	4330	332 V	10700 V	96.4	108000	BT016	4330	332 V	10700 V
PCB020 & 028	pg/g-Wet	35	35	100	344	211000	BT028	11600	1790	53100 V	344	211000	BT028	11600	1790	53100 V
PCB021 & 033	pg/g-Wet	35	35	100	101	113000	BT028	5080	651	12900 V	101	113000	BT028	5080	651	12900 V
PCB022	pg/g-Wet	35	35	100	80.9	74500	BT028	3530	423	11800 V	80.9	74500	BT028	3530	423	11800 V
PCB023	pg/g-Wet	35	31	88.6	0.167 J	223	BT028	11.8	2.01	37.8 V	0.167 J	223	BT028	10.7	2.01	35.4 V
PCB024	pg/g-Wet	35	33	94.3	1.34	1660	BT028	71.3	7.72	128 V	0.723 U	1660	BT028	67.3	7.48	127 V
PCB025	pg/g-Wet	35	35	100	25	12900	BT028	855	188	2950 V	25	12900	BT028	855	188	2950 V
PCB026 & 029	pg/g-Wet	35	35	100	42.4	33700	BT028	1790	258	5620 V	42.4	33700	BT028	1790	258	5620 V
PCB027	pg/g-Wet	35	35	100	20.4	19000	BT016	1030	101	3810 V	20.4	19000	BT016	1030	101	3810 V
PCB028	pg/g-Wet	10	10	100	840	8000	WR-VC-108	2600	2400 JV	6400 V	840	8000	WR-VC-108	2600	2400 JV	6400 V
PCB031	pg/g-Wet	45	45	100	227	196000	BT028	8320	1330	23700 V	227	196000	BT028	8320	1330	23700 V
PCB032	pg/g-Wet	35	35	100	54.8	41400	BT028	2590	320	9870 V	54.8	41400	BT028	2590	320	9870 V
PCB033	pg/g-Wet	10	0	0	--	--	--	--	--	--	71 U	1600 U	WR-VC-108	250	250 UV	630 UV
PCB034	pg/g-Wet	35	34	97.1	1.61	1380	BT028	73.6	15.9 V	199 V	1.61	1380	BT028	71.6	13.1	199 V
PCB035	pg/g-Wet	35	35	100	6.63	1620	BT028	81.3	18.7	158 V	6.63	1620	BT028	81.3	18.7	158 V
PCB036	pg/g-Wet	35	26	74.3	1.76 J	10.1	BT012	3.74	3.31 JV	7.49 V	0.887 U	13.6 U	BT028	3.48	3.02	7.09 V
PCB037	pg/g-Wet	45	39	86.7	77.1	42000	BT028	2050	342	7450 V	77.1	42000	BT028	1830	325 U	6680 JV
PCB038	pg/g-Wet	35	22	62.9	0.555 J	161	BT028	20	3.57 V	117 V	0.555 J	161	BT028	12.9	1.58	95.1 V
PCB039	pg/g-Wet	35	31	88.6	3.03	1600	BT028	119	18.4	690 V	0.568 U	1600	BT028	105	10.9 J	639 V
PCB040 & 041 & 071	pg/g-Wet	35	35	100	293	112000	BT028	10400	1550	73400 V	293	112000	BT028	10400	1550	73400 V
PCB042	pg/g-Wet	35	35	100	155	55600	BT028	4960	831	36900 V	155	55600	BT028	4960	831	36900 V
PCB043	pg/g-Wet	35	35	100	23.3	9150	BT028	811	109	5230 V	23.3	9150	BT028	811	109	5230 V
PCB044	pg/g-Wet	10	10	100	1200 J	12000	WR-VC-108	3900	3000 JV	9600 JV	1200 J	12000	WR-VC-108	3900	3000 JV	9600 JV
PCB044 & 047 & 065	pg/g-Wet	35	35	100	920	262000	BT016	28900	3620	190000 V	920	262000	BT016	28900	3620	190000 V
PCB045 & 051	pg/g-Wet	35	35	100	167	100000	BT016	6500	774	26900 V	167	100000	BT016	6500	774	26900 V
PCB046	pg/g-Wet	35	35	100	25.5	11500	BT028	979	135	6020 V	25.5	11500	BT028	979	135	6020 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB048	pg/g-Wet	35	35	100	87.4	51100	BT028	3590	416	23600 V	87.4	51100	BT028	3590	416	23600 V
PCB049	pg/g-Wet	10	10	100	1500	14000	WR-VC-108	4800	4000 V	11000 V	1500	14000	WR-VC-108	4800	4000 V	11000 V
PCB049 & 069	pg/g-Wet	35	35	100	552	157000	BT028	16100	2370	86400 V	552	157000	BT028	16100	2370	86400 V
PCB050 & 053	pg/g-Wet	35	35	100	167	86900	BT016	5540	680 J	22400 V	167	86900	BT016	5540	680 J	22400 V
PCB052	pg/g-Wet	45	45	100	936	266000	BT028	20800	3820	127000 V	936	266000	BT028	20800	3820	127000 V
PCB054	pg/g-Wet	35	35	100	22.6	35600	BT016	1180	80	1020 V	22.6	35600	BT016	1180	80	1020 V
PCB055	pg/g-Wet	35	22	62.9	7.74	2550	BT028	273	34.8 V	1480 V	1.91 U	2550	BT028	173	16.6	1120 V
PCB056	pg/g-Wet	45	43	95.6	292	97900	BT002	7240	841 J	49900 V	292	97900	BT002	6960	841 J	45400 V
PCB057	pg/g-Wet	35	35	100	3.76	1080	BT016	101	15.1	594 V	3.76	1080	BT016	101	15.1	594 V
PCB058	pg/g-Wet	35	34	97.1	3.23	463	BT028	56.3	15.6 JV	249 V	3.23	463	BT028	54.9	14.6 J	241 V
PCB059 & 062 & 075	pg/g-Wet	35	35	100	74.3	19200	BT028	1920	290	12000 V	74.3	19200	BT028	1920	290	12000 V
PCB060	pg/g-Wet	45	35	77.8	121	46000	BT002	3980	285 J	35400 V	121	46000	BT002	3250	362	27100 V
PCB061 & 070 & 074 & 076	pg/g-Wet	35	35	100	1260	369000	BT028	32200	5010	236000 V	1260	369000	BT028	32200	5010	236000 V
PCB063	pg/g-Wet	35	35	100	35.1	8570	BT028	749	148	5300 V	35.1	8570	BT028	749	148	5300 V
PCB064	pg/g-Wet	35	35	100	320	119000	BT028	9340	1150	67800 V	320	119000	BT028	9340	1150	67800 V
PCB066	pg/g-Wet	45	44	97.8	786	217000	BT002	15500	2860 V	88400 V	94 U	217000	BT002	15100	2590	84500 V
PCB067	pg/g-Wet	35	35	100	20	5630	BT028	468	84.5	2490 V	20	5630	BT028	468	84.5	2490 V
PCB068	pg/g-Wet	35	35	100	15.5	2330	BT016	200	66.5	485 V	15.5	2330	BT016	200	66.5	485 V
PCB070	pg/g-Wet	10	10	100	1300	16000	WR-VC-108	5000	4300 V	13000 V	1300	16000	WR-VC-108	5000	4300 V	13000 V
PCB072	pg/g-Wet	35	35	100	18.4	1190	BT028	222	86.6	837 V	18.4	1190	BT028	222	86.6	837 V
PCB073	pg/g-Wet	35	23	65.7	10.2	8310	BT016	443	32.6	690 V	1.63 U	8310	BT016	292	22.9	555 V
PCB074	pg/g-Wet	10	10	100	560 J	5400	WR-VC-108	1900	1800 V	4500 V	560 J	5400	WR-VC-108	1900	1800 V	4500 V
PCB077	pg/g-Wet	45	35	77.8	59.6	13200	BT028	1020	169	6480 V	59.6	13200	BT028	869	250 U	4880 V
PCB078	pg/g-Wet	35	0	0	--	--	--	--	--	--	1.18 U	65 U	BT002	4.17	1.07 U	23 UV
PCB079	pg/g-Wet	35	35	100	20	1430	BT028	223	74.6	972 V	20	1430	BT028	223	74.6	972 V
PCB080	pg/g-Wet	35	13	37.1	0.939	9.2 J	BT026; BT032	4.76	3.81	9.2 JV	0.939	58.5 U	BT002	5.07	2.09 U	19.9 UV
PCB081	pg/g-Wet	45	29	64.4	2.32	516	BT028	50.4	6.96	344 V	2.14 U	32000 U	WR-VC-108	911	11.9	4610 UV
PCB082	pg/g-Wet	35	35	100	147	19600	BT002	2090	503	12500 V	147	19600	BT002	2090	503	12500 V
PCB083 & 099	pg/g-Wet	35	35	100	1340	104000	BT002	16200	4810	78700 V	1340	104000	BT002	16200	4810	78700 V
PCB084	pg/g-Wet	35	35	100	280	36900	BT002	4560	1040	23200 V	280	36900	BT002	4560	1040	23200 V
PCB085 & 116 & 117	pg/g-Wet	35	35	100	331	41900	BT002	4030	1000	20000 V	331	41900	BT002	4030	1000	20000 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	35	35	100	996	114000	BT002	13600	3650	59300 V	996	114000	BT002	13600	3650	59300 V
PCB087	pg/g-Wet	10	10	100	16000	49000	WR-VC-66	29000	24000 V	48000 V	16000	49000	WR-VC-66	29000	24000 V	48000 V
PCB088 & 091	pg/g-Wet	35	35	100	322	29300	BT016	4740	1220	23500 V	322	29300	BT016	4740	1220	23500 V
PCB089	pg/g-Wet	35	35	100	12.8	2890	BT002	303	54.5	2390 V	12.8	2890	BT002	303	54.5	2390 V
PCB090	pg/g-Wet	10	2	20	7400 J	12000	WR-VC-72	9700	9700 JV	12000 JV	120 U	12000	WR-VC-72	3100	1900 UV	9900 JV
PCB090 & 101 & 113	pg/g-Wet	35	35	100	2010	144000	BT002	26000	7890	132000 V	2010	144000	BT002	26000	7890	132000 V
PCB092	pg/g-Wet	35	35	100	435	48700	BT016	5550	1750	21000 V	435	48700	BT016	5550	1750	21000 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	35	35	100	1650	190000	BT016	25000	6530	127000 V	1650	190000	BT016	25000	6530	127000 V
PCB094	pg/g-Wet	35	35	100	21.8	17900	BT016	735	100	1200 V	21.8	17900	BT016	735	100	1200 V
PCB095	pg/g-Wet	10	10	100	2700	30000	WR-VC-108	8900	6200 V	22000 V	2700	30000	WR-VC-108	8900	6200 V	22000 V
PCB096	pg/g-Wet	35	35	100	15.7	5530	BT016	363	62.9	1240 V	15.7	5530	BT016	363	62.9	1240 V
PCB097	pg/g-Wet	10	5	50	2200 NJ	16000 J	WR-VC-108	5600	2900 NJ	14000 JV	750 U	16000 J	WR-VC-108	3100	1800 JV	11000 JV
PCB099	pg/g-Wet	10	10	100	1800	14000	WR-VC-108	5100	4200 V	11000 V	1800	14000	WR-VC-108	5100	4200 V	11000 V
PCB101	pg/g-Wet	10	8	80	3900	39000	WR-VC-108	12000	7600 V	31000 V	3900	39000	WR-VC-108	11000	6600 V	28000 V
PCB103	pg/g-Wet	35	35	100	42.7	15100	BT016	885	266	2630 V	42.7	15100	BT016	885	266	2630 V
PCB104	pg/g-Wet	35	35	100	4.82	4780	BT016	167	16.9	236 V	4.82	4780	BT016	167	16.9	236 V
PCB105	pg/g-Wet	45	35	77.8	543	61600	BT002	5630	1430	28700 V	100 U	61600	BT002	4570	1200	21700 V
PCB106	pg/g-Wet	35	2	5.71	69.3	242	BT016	156	156 V	233 V	0.719 U	242	BT016	11.9	1.94 U	34 V
PCB107 & 124	pg/g-Wet	35	35	100	59	4300	BT002	582	193	2660 V	59	4300	BT002	582	193	2660 V
PCB109	pg/g-Wet	35	35	100	146	7520	BT002	1220	470	4790 V	146	7520	BT002	1220	470	4790 V
PCB110	pg/g-Wet	10	8	80	3700	36000	WR-VC-108	12000	8900 JV	29000 JV	3700	36000	WR-VC-108	11000	6900 V	27000 JV
PCB110 & 115	pg/g-Wet	35	35	100	2170	174000	BT002	23900	7560	96200 V	2170	174000	BT002	23900	7560	96200 V
PCB111	pg/g-Wet	35	32	91.4	3.54	387	BT016	35.4	15.3 V	95.7 V	3.54	387	BT016	33.1	13.7	90.9 V
PCB112	pg/g-Wet	35	1	2.86	11800	11800	BT016	11800	11800	11800	0.63 U	11800	BT016	339	0.78 U	7.45 UV
PCB114	pg/g-Wet	45	39	86.7	30.6	2940	BT028	358	120	2410 V	30.6	2940	BT028	318	77.1	2000 V
PCB118	pg/g-Wet	45	45	100	1500	118000	BT002	12900	5010	40900 V	1500	118000	BT002	12900	5010	40900 V
PCB119	pg/g-Wet	10	2	20	1400 NJ	3100 NJ	WR-VC-57	2300	2300 JV	3000 JV	500 U	3100 NJ	WR-VC-57	840	390 UV	2300 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB120	pg/g-Wet	35	35	100	14.4	848	BT016	130	70.3	402 V	14.4	848	BT016	130	70.3	402 V
PCB121	pg/g-Wet	35	32	91.4	2.98	1110	BT016	58	12.6 V	159 V	1.65 U	1110	BT016	53.6	12.5	152 V
PCB122	pg/g-Wet	35	35	100	19.5	1980	BT002	220	60.3	1190 V	19.5	1980	BT002	220	60.3	1190 V
PCB123	pg/g-Wet	45	34	75.6	25.6	2500	BT002	289	77.3 V	1570 V	25.6	2500	BT002	264	136	1280 V
PCB126	pg/g-Wet	45	33	73.3	5.15	249	BT002	35.1	17.7	128 V	5.15	480 U	WR-VC-108	47.3	26.4	143 V
PCB127	pg/g-Wet	35	21	60	1.87	44.4	BT016	11.7	8.27	30.6	1.54 U	44.4	BT016	9.61	6.05 U	28.9 V
PCB128	pg/g-Wet	10	10	100	560 J	4000	WR-VC-108	1500	1300 JV	3100 V	560 J	4000	WR-VC-108	1500	1300 JV	3100 V
PCB128 & 166	pg/g-Wet	35	35	100	343	8850	BT016	2170	964	8140 V	343	8850	BT016	2170	964	8140 V
PCB129 & 138 & 160 & 163	pg/g-Wet	35	35	100	3070	314000	BT016	30400	12400	85300 V	3070	314000	BT016	30400	12400	85300 V
PCB130	pg/g-Wet	35	35	100	174	6630	BT016	1210	608	3580 V	174	6630	BT016	1210	608	3580 V
PCB131	pg/g-Wet	35	35	100	19.2	848	BT016	167	73.1	640 V	19.2	848	BT016	167	73.1	640 V
PCB132	pg/g-Wet	45	45	100	719	55000	BT016	6140	2700	20200 V	719	55000	BT016	6140	2700	20200 V
PCB133	pg/g-Wet	35	35	100	69.5	7060	BT016	642	317	1730 V	69.5	7060	BT016	642	317	1730 V
PCB134 & 143	pg/g-Wet	35	35	100	103	11800	BT016	1130	443	3240 V	103	11800	BT016	1130	443	3240 V
PCB135 & 151 & 154	pg/g-Wet	35	35	100	210	277000	BT016	19400	5930	57500 V	210	277000	BT016	19400	5930	57500 V
PCB136	pg/g-Wet	35	35	100	332	49100	BT016	4160	1510	12200 V	332	49100	BT016	4160	1510	12200 V
PCB137	pg/g-Wet	35	35	100	13.9	2030	BT028	348	169	1190 V	13.9	2030	BT028	348	169	1190 V
PCB138	pg/g-Wet	10	10	100	4300 J	28000 J	WR-VC-108	11000	9200 JV	23000 JV	4300 J	28000 J	WR-VC-108	11000	9200 JV	23000 JV
PCB139 & 140	pg/g-Wet	35	35	100	42.9	1720	BT016	359	181	986 V	42.9	1720	BT016	359	181	986 V
PCB141	pg/g-Wet	45	45	100	54.3	29700	BT016	2330	880	8100 V	54.3	29700	BT016	2330	880	8100 V
PCB142	pg/g-Wet	35	1	2.86	15.7	15.7	BT018	15.7	15.7	15.7	2.45 U	279 U	BT016	14	6.95 U	38.4 UV
PCB144	pg/g-Wet	35	35	100	84	11800	BT016	1210	488	4340 V	84	11800	BT016	1210	488	4340 V
PCB145	pg/g-Wet	35	33	94.3	0.578	101	BT016	9.09	2.56	32.5 V	0.578	101	BT016	8.6	2.54	32.5 V
PCB146	pg/g-Wet	35	35	100	579	58300	BT016	5780	2640	15400 V	579	58300	BT016	5780	2640	15400 V
PCB147 & 149	pg/g-Wet	35	35	100	2460	381000	BT016	34200	13700	101000 V	2460	381000	BT016	34200	13700	101000 V
PCB148	pg/g-Wet	35	35	100	12.8	2040	BT016	160	61.8	578 V	12.8	2040	BT016	160	61.8	578 V
PCB149	pg/g-Wet	10	10	100	4100	27000	WR-VC-108	12000	9900 V	24000 V	4100	27000	WR-VC-108	12000	9900 V	24000 V
PCB150	pg/g-Wet	35	35	100	11.8	1920	BT016	165	61.2	844 V	11.8	1920	BT016	165	61.2	844 V
PCB151	pg/g-Wet	10	10	100	1900	11000	WR-VC-108; WR-VC-57	5500	4400 V	11000 V	1900	11000	WR-VC-108; WR-VC-57	5500	4400 V	11000 V
PCB152	pg/g-Wet	35	35	100	4.75	2280	BT016	102	18.3	273 V	4.75	2280	BT016	102	18.3	273 V
PCB153	pg/g-Wet	10	10	100	4700	25000	WR-VC-108	12000	10000 JV	23000 V	4700	25000	WR-VC-108	12000	10000 JV	23000 V
PCB153 & 168	pg/g-Wet	35	35	100	2830	357000	BT016	30100	10800	80600 V	2830	357000	BT016	30100	10800	80600 V
PCB155	pg/g-Wet	35	34	97.1	2.78	564	BT016	25.9	5.92 V	47.4 V	2.37 U	564	BT016	25.2	5.9	46.7 V
PCB156	pg/g-Wet	10	2	20	1100 J	3400 NJ	WR-VC-108	2300	2300 JV	3300 JV	310 U	3400 NJ	WR-VC-108	1100	950 UV	2400 JV
PCB156 & 157	pg/g-Wet	35	35	100	225	10700	BT016	1760	767	6630 V	225	10700	BT016	1760	767	6630 V
PCB157	pg/g-Wet	10	7	70	210 NJ	650 J	WR-VC-57	390	330 NJ	630 JV	210 NJ	1600 U	WR-VC-108	400	340 JV	730 JV
PCB158	pg/g-Wet	45	37	82.2	148	17500	BT016	1810	802	6080 V	148	17500	BT016	1570	580 J	5720 V
PCB159	pg/g-Wet	35	34	97.1	14.9	2970	BT016	252	83.7 V	883 V	14.9	2970	BT016	247	82.8	830 V
PCB161	pg/g-Wet	35	0	0	--	--	--	--	--	--	1.75 U	195 U	BT016	9.45	3.9 U	26.8 UV
PCB162	pg/g-Wet	35	35	100	8.46	223	BT016	50.5	24.5	153 V	8.46	223	BT016	50.5	24.5	153 V
PCB164	pg/g-Wet	35	35	100	208	22700	BT016	2100	843	5860 V	208	22700	BT016	2100	843	5860 V
PCB165	pg/g-Wet	35	27	77.1	5.07	826	BT016	63	17.8	175 V	5.07	826	BT016	52.8	17.6	171 V
PCB166	pg/g-Wet	10	10	100	3200	17000	WR-VC-57	8800	7800 V	17000 V	3200	17000	WR-VC-57	8800	7800 V	17000 V
PCB167	pg/g-Wet	45	41	91.1	81	5010	BT016	710	420	2010	81	5010	BT016	668	370 J	2000 V
PCB168	pg/g-Wet	10	0	0	--	--	--	--	--	--	260 U	790 U	WR-VC-108	180	130 UV	320 UV
PCB169	pg/g-Wet	45	0	0	--	--	--	--	--	--	1.58 U	1100 U	WR-VC-108	63.5	6.8 U	260 UV
PCB170	pg/g-Wet	45	45	100	442	59600	BT016	4240	1720	9380 V	442	59600	BT016	4240	1720	9380 V
PCB171 & 173	pg/g-Wet	35	35	100	172	16200	BT016	1550	558	4780 V	172	16200	BT016	1550	558	4780 V
PCB172	pg/g-Wet	35	35	100	68.7	10500	BT016	884	317	2480 V	68.7	10500	BT016	884	317	2480 V
PCB174	pg/g-Wet	45	43	95.6	367	54600	BT016	4840	2000	10600 V	367	54600	BT016	4640	1770	10500 V
PCB175	pg/g-Wet	35	35	100	19.5	2750	BT016	240	92.8	702 V	19.5	2750	BT016	240	92.8	702 V
PCB176	pg/g-Wet	35	35	100	89.7	9950	BT016	946	363	2890 V	89.7	9950	BT016	946	363	2890 V
PCB177	pg/g-Wet	45	45	100	486	39000	BT016	3510	1980	8270 V	486	39000	BT016	3510	1980	8270 V
PCB178	pg/g-Wet	35	35	100	185	17300	BT016	1670	702	5160 V	185	17300	BT016	1670	702	5160 V
PCB179	pg/g-Wet	35	35	100	328	37300	BT016	3450	1380	10900 V	328	37300	BT016	3450	1380	10900 V
PCB180	pg/g-Wet	10	10	100	350 J	2300	WR-VC-108	990	720 JV	2000 V	350 J	2300	WR-VC-108	990	720 JV	2000 V
PCB180 & 193	pg/g-Wet	35	35	100	204	54000	BT032	5460	1990	22300 V	204	54000	BT032	5460	1990	22300 V
PCB181	pg/g-Wet	35	35	100	6.01	430	BT016	49.5	17.6	163 V	6.01	430	BT016	49.5	17.6	163 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB182	pg/g-Wet	35	21	60	6.81	188	BT032	31.9	19.3	86.5	2.5 U	188	BT032	20.7	12	58.6 V
PCB183	pg/g-Wet	10	10	100	510 NJ	2600 J	WR-VC-57	1400	1400 JV	2500 JV	510 NJ	2600 J	WR-VC-57	1400	1400 JV	2500 JV
PCB183 & 185	pg/g-Wet	35	35	100	346	47000	BT016	4530	1830	14700 V	346	47000	BT016	4530	1830	14700 V
PCB184	pg/g-Wet	45	33	73.3	1.31	53.2	BT016	6.28	3.33	20.5 V	1.31	260 U	WR-VC-108	17.4	4.95	60 UV
PCB186	pg/g-Wet	35	16	45.7	0.309 J	24.3	BT016	3.15	0.689 JV	12.3 JV	0.309 J	24.3	BT016	2.01	0.432 J	6.66 JV
PCB187	pg/g-Wet	45	35	77.8	1540	225000	BT016	21500	8250	71000 V	1540	225000	BT016	17800	7830	48600 V
PCB188	pg/g-Wet	35	35	100	4.48	366	BT016	30.2	12.6	109 V	4.48	366	BT016	30.2	12.6	109 V
PCB189	pg/g-Wet	45	35	77.8	23.4	2440	BT016	191	74	466 V	23.4	2440	BT016	168	74	342 V
PCB190	pg/g-Wet	35	35	100	151	15500	BT016	1300	475	3690 V	151	15500	BT016	1300	475	3690 V
PCB191	pg/g-Wet	35	35	100	8.61	1950	BT016	174	65.2	579 V	8.61	1950	BT016	174	65.2	579 V
PCB192	pg/g-Wet	35	0	0	--	--	--	--	--	--	1.39 U	27.6 U	BT028	2	0.75 U	10.3 UV
PCB194	pg/g-Wet	45	38	84.4	114	14200	BT016	1140	500 V	2530 V	114	14200	BT016	998	388	1820 V
PCB195	pg/g-Wet	45	40	88.9	116	9920	BT016	732	323 JV	1360 V	116	9920	BT016	670	309	1230 V
PCB196	pg/g-Wet	35	35	100	63.6	6850	BT016	618	254	1790 V	63.6	6850	BT016	618	254	1790 V
PCB197 & 200	pg/g-Wet	35	35	100	55.2	4680	BT016	405	164	1080 V	55.2	4680	BT016	405	164	1080 V
PCB198 & 199	pg/g-Wet	35	35	100	399	32300	BT016	3010	1250	7840 V	399	32300	BT016	3010	1250	7840 V
PCB201	pg/g-Wet	45	35	77.8	49.8	3770	BT016	341	158	886 V	49.8	3770	BT016	344	202	771 V
PCB202	pg/g-Wet	35	35	100	107	4540	BT016	545	308	1370 V	107	4540	BT016	545	308	1370 V
PCB203	pg/g-Wet	45	43	95.6	251	17800	BT016	1500	746	3190 V	251	17800	BT016	1450	744	3080 V
PCB204	pg/g-Wet	35	23	65.7	0.283 J	8.62 J	BT017	1.61	0.648	6.67 V	0.262 U	8.62 J	BT017	1.16	0.559 J	4.89 V
PCB205	pg/g-Wet	35	35	100	17.9	1500	BT016	117	47.5	280 V	17.9	1500	BT016	117	47.5	280 V
PCB206	pg/g-Wet	45	43	95.6	98.9 J	2650 J	BT016	458	290 J	1180 JV	98.9 J	2650 J	BT016	442	287 J	1170 JV
PCB207	pg/g-Wet	35	35	100	17.5	419 J	BT016	75.7	47.3 J	192 JV	17.5	419 J	BT016	75.7	47.3 J	192 JV
PCB208	pg/g-Wet	35	35	100	50.9	737	BT028	193	120	619 V	50.9	737	BT028	193	120	619 V
PCB209	pg/g-Wet	45	38	84.4	59.2	1390	BT028	183	124 V	404 V	59.2	1390	BT028	168	118	329 V
Total PCB Congeners	pg/g-Wet	35	35	100	44800 JT	4310000 JT	BT028	612000	168000 JT	3250000 V	44800 JT	4310000 JT	BT028	612000	168000 JT	3250000 V
Total PCBs[c]																
Total PCBs	µg/kg-Wet	35	35	100	44.8 JT	4310 JT	BT028	612	168 JT	3250 V	44.8 JT	4310 JT	BT028	612	168 JT	3250 V
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	35	35	100	385 T	115000 T	BT028	7160	972 T	28700 V	385 T	115000 T	BT028	7160	972 T	28700 V
Heptachlorobiphenylhomologs	pg/g-Wet	35	35	100	4440 T	591000 T	BT016	56300	23100 T	185000 V	4440 T	591000 T	BT016	56300	23100 T	185000 V
Hexachlorobiphenyl homologs	pg/g-Wet	35	35	100	12900 T	1640000 T	BT016	148000	60800 T	416000 V	12900 T	1640000 T	BT016	148000	60800 T	416000 V
Monochlorobiphenyl homologs	pg/g-Wet	32	32	100	5.47 T	1680 T	BT028	177	25.1 V	1060 V	5.47 T	1680 T	BT028	177	25.1 V	1060 V
Nonachlorobiphenyl homologs	pg/g-Wet	35	35	100	170 T	3680 T	BT016	751	467 T	2010 V	170 T	3680 T	BT016	751	467 T	2010 V
Octachlorobiphenyl homologs	pg/g-Wet	35	35	100	1170 T	95500 T	BT016	8620	3590 T	22500 V	1170 T	95500 T	BT016	8620	3590 T	22500 V
Pentachlorobiphenylhomologs	pg/g-Wet	35	35	100	12600 T	1000000 T	BT002	152000	43500 T	725000 V	12600 T	1000000 T	BT002	152000	43500 T	725000 V
Tetrachlorobiphenyl homologs	pg/g-Wet	35	35	100	6440 T	1840000 T	BT028	182000	26400 T	1140000 V	6440 T	1840000 T	BT028	182000	26400 T	1140000 V
Trichlorobiphenyl homologs	pg/g-Wet	35	35	100	1300 T	1040000 T	BT028	57000	7080 T	214000 V	1300 T	1040000 T	BT028	57000	7080 T	214000 V
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	35	35	100	2.34	58.5	BT008	11	5.79	36.6 V	2.34	58.5	BT008	11	5.79	36.6 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	35	100	6.25	79.3	BT008	22.3	15.7	53 V	6.25	79.3	BT008	22.3	15.7	53 V
Hexachlorodibenzofuran homologs	pg/g-Wet	35	35	100	3.11	160	BT017	19.8	7.96	69 V	3.11	160	BT017	19.8	7.96	69 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	35	100	3.67	71.1	BT017	11.7	7.52	25.3 V	3.67	71.1	BT017	11.7	7.52	25.3 V
Octachlorodibenzofuran	pg/g-Wet	35	35	100	0.97 J	30.6	BT007	4.7	2.3	19.3 V	0.97 J	30.6	BT007	4.7	2.3	19.3 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	35	35	100	10.7	405	BT005	57.9	28.6	205 V	10.7	405	BT005	57.9	28.6	205 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	35	35	100	3.68	1380	BT017	62.3	12.9	132 V	3.68	1380	BT017	62.3	12.9	132 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	35	100	1.37	291	BT017	12.1	3.35	11.2 V	1.37	291	BT017	12.1	3.35	11.2 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	35	35	100	4.82	4000	BT017	137	16.2	111 V	4.82	4000	BT017	137	16.2	111 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	35	35	100	5.46	446	BT017	21.3	8.69	13.9 V	5.46	446	BT017	21.3	8.69	13.9 V
Total PCDD/F	pg/g-Wet	35	35	100	51 JT	6440 T	BT017	360	114 T	582 V	51 JT	6440 T	BT017	360	114 T	582 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	35	34	97.1	0.801 J	13.7	BT008	3.27	1.83 V	11.1 V	0.801 J	13.7	BT008	3.19	1.71	11 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	35	35	100	3.37	37.7	BT008	10.7	7.42	27 V	3.37	37.7	BT008	10.7	7.42	27 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	35	17	48.6	0.055 J	2.75	BT017	0.472	0.147 J	2.05 V	0.055 J	2.75	BT017	0.269	0.085 J	1.47 V
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	35	35	100	0.257 J	39	BT017	3.76	0.777 J	24.6 V	0.257 J	39	BT017	3.76	0.777 J	24.6 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	35	30	85.7	0.198 J	3.48	BT017	0.517	0.38 JV	0.805 JV	0.198 J	3.48	BT017	0.463	0.31 J	0.761 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	35	31	88.6	0.166 J	13.4	BT017	1.34	0.437 J	5.73 V	0.131 U	13.4	BT017	1.2	0.399 J	5.24 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	35	35	100	1.07 J	19.6	BT017	3.31	1.91	7.62 V	1.07 J	19.6	BT017	3.31	1.91	7.62 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	35	5	14.3	0.076 J	0.727 J	BT017	0.331	0.287 J	0.674 JV	0.052 U	0.727 J	BT017	0.0997	0.0665 U	0.339 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	35	29	82.9	0.311 J	5.24	BT017	0.937	0.538 J	2.22 V	0.311 J	5.24	BT017	0.829	0.514 J	1.85 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	35	34	97.1	0.213 J	76	BT017	5.18	0.83 JV	25.6 V	0.213 J	76	BT017	5.05	0.763 J	23.7 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	35	33	94.3	0.439 J	196	BT017	6.79	0.767 J	1.87 V	0.439 J	196	BT017	6.42	0.726 J	1.86 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	35	20	57.1	0.141 J	6.08	BT017	0.78	0.333 JV	1.91 V	0.133 U	6.08	BT017	0.507	0.213 U	1.59 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	35	34	97.1	0.374 J	111	BT017	6.38	1.1 JV	27.1 V	0.361 U	111	BT017	6.2	1.09 J	26.9 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	35	35	100	0.421	447	BT017	18	2.14	35.7 V	0.421	447	BT017	18	2.14	35.7 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	35	26	74.3	0.219 J	163	BT017	6.98	0.468 JV	5.21 V	0.213 U	163	BT017	5.24	0.366	2.66 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	35	35	100	0.743 JT	448 JT	BT017	16.5	2.29 JT	18.3 JV	0.743 JT	448 JT	BT017	16.5	2.29 JT	18.3 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	37	37	100	0.093 A	463 JT	BT017	19.6	5.33 JT	31 JV	0.093 A	463 JT	BT017	19.6	5.33 JT	31 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	45	45	100	0.0723 NJT	31.6 T	BT002	3.27	1.17 T	13.3 V	0.0723 NJT	31.6 T	BT002	3.27	1.17 T	13.3 V
Pesticides																
2,4'-DDD	µg/kg-Wet	45	44	97.8	0.611	204	BT017	16	3.1 V	87.6 JV	0.611	204	BT017	15.7	3.2	83.8 JV
2,4'-DDE	µg/kg-Wet	45	36	80	0.127 J	52.7	BT018	2.92	0.56 V	10.3 V	0.127 J	52.7	BT018	2.62	0.595	7.44 JV
2,4'-DDT	µg/kg-Wet	45	33	73.3	0.0232 J	14	WR-VC-108	1.73	0.201 J	6.26 JV	0.0191 U	14	WR-VC-108	1.32	0.086 J	5.26 JV
4,4'-DDD	µg/kg-Wet	45	45	100	2.6 J	1060	BT017	64	13.4	191 V	2.6 J	1060	BT017	64	13.4	191 V
4,4'-DDE	µg/kg-Wet	45	45	100	9.52	171	BT017	27.7	19	66.1 JV	9.52	171	BT017	27.7	19	66.1 JV
4,4'-DDT	µg/kg-Wet	45	43	95.6	0.0456 J	37.9	BT018	3.44	0.472	15.4 JV	0.0456 J	37.9	BT018	3.29	0.435	14.8 JV
Aldrin	µg/kg-Wet	45	35	77.8	0.043 J	37	BT028	1.49	0.429 J	0.928 V	0.043 J	37	BT028	1.22	0.424 J	0.883 JV
alpha-Endosulfan	µg/kg-Wet	45	13	28.9	0.0219 J	0.181 J	BT032	0.0549	0.0373 J	0.137 JV	0.0219 J	1 U	WR-VC-11; WR-VC-43	0.0852	0.0236 U	0.432 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	45	19	42.2	0.006 J	0.0151 J	BT024	0.0109	0.011 J	0.015 JV	0.00569 U	0.97 U	WR-VC-108	0.0588	0.0133 J	0.23 UV
beta-Endosulfan	µg/kg-Wet	45	21	46.7	0.0479 J	1.5 NJ	WR-VC-72	0.275	0.0989 J	1.1 NJ	0.0411 U	3.1 U	WR-VC-108	0.2	0.0665 U	1.1 JV
beta-Hexachlorocyclohexane	µg/kg-Wet	43	9	20.9	0.003 J	0.0493 J	BT018	0.0125	0.00732 J	0.0372 JV	0.003 J	1.5 U	WR-VC-29	0.082	0.0218 U	0.257 UV
cis-Chlordane	µg/kg-Wet	45	39	86.7	0.749	28.6	BT028	2.4	1.33	4.32 V	0.0749 U	28.6	BT028	2.15	1.29	3.88 V
cis-Nonachlor	µg/kg-Wet	45	35	77.8	0.218 J	2.98	BT028	0.602	0.378 J	1.9 V	0.218 J	9.3 U	WR-VC-108	0.972	0.467	2.65 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	45	4	8.89	0.000971 J	0.0161 J	BT018	0.00707	0.00561 JV	0.0148 JV	0.000971 J	1.5 U	WR-VC-28	0.0762	0.00905 U	0.475 UV
Dieldrin	µg/kg-Wet	45	35	77.8	0.127 J	26.7	BT028	1.18	0.374	1.05 V	0.075 U	26.7	BT028	1.05	0.402	1.15 V
Endosulfan sulfate	µg/kg-Wet	45	35	77.8	0.246	0.78 J	WR-VC-29	0.389	0.366	0.661 V	0.246	1 U	WR-VC-11; WR-VC-72	0.379	0.366	0.601 V
Endrin	µg/kg-Wet	45	17	37.8	0.00262 J	1.3 J	WR-VC-108	0.265	0.157 J	0.828 JV	0.00262 J	1.3 J	WR-VC-108	0.111	0.0128 U	0.666 JV
Endrin aldehyde	µg/kg-Wet	45	0	0	--	--	--	--	--	--	0.000692 U	1.7 U	WR-VC-46	0.0921	0.00955 U	0.75 UV
Endrin ketone	µg/kg-Wet	45	5	11.1	0.00107 J	2 J	WR-VC-108	0.406	0.00888 J	1.6 JV	0.00107 J	3.5 U	WR-VC-46	0.168	0.0199 U	0.83 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	45	17	37.8	0.00666 J	0.021 J	BT004	0.0136	0.0127 J	0.0194 JV	0.00666 J	1.2 U	WR-VC-108	0.0663	0.016 J	0.274 UV
Heptachlor	µg/kg-Wet	45	14	31.1	0.00353 J	0.0186 J	BT007	0.0113	0.0121 JV	0.0185 JV	0.00331 U	1 U	WR-VC-118	0.0837	0.0111 U	0.455 UV
Heptachlor epoxide	µg/kg-Wet	45	42	93.3	0.00732 J	9.8 NJ	WR-VC-108	0.707	0.0228 JV	3.1 JV	0.00652 U	9.8 NJ	WR-VC-108	0.676	0.0227 J	3.08 JV
Methoxychlor	µg/kg-Wet	45	0	0	--	--	--	--	--	--	0.0104 U	1.7 U	WR-VC-72	0.138	0.0186 U	0.69 UV
Mirex	µg/kg-Wet	10	0	0	--	--	--	--	--	--	0.24 U	1 U	WR-VC-43	0.23	0.15 UV	0.48 UV
Oxychlordane	µg/kg-Wet	45	25	55.6	0.0145 J	0.98 J	WR-VC-72	0.116	0.0333 J	0.691 JV	0.00788 U	1.2 U	WR-VC-108	0.12	0.0334 U	0.547 JV
Total Chlordanes	µg/kg-Wet	45	45	100	1.89 JT	71.9 T	BT028	6.51	4.31 JT	10.2 JV	1.89 JT	71.9 T	BT028	6.51	4.31 JT	10.2 JV
Total Endosulfan	µg/kg-Wet	45	38	84.4	0.246 T	1.5 NJT	WR-VC-72	0.529	0.427 JV	1.15 JV	0.246 T	3.1 UT	WR-VC-108	0.53	0.43 JT	1.36 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	45	45	100	4.78 T	1260 T	BT017	79.6	15.5 T	273 V	4.78 T	1260 T	BT017	79.6	15.5 T	273 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	45	45	100	14.5 JT	1490 T	BT017	114	40.7 JT	372 JV	14.5 JT	1490 T	BT017	114	40.7 JT	372 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	45	45	100	9.66 JT	188 T	BT017	30	19 T	81.3 JV	9.66 JT	188 T	BT017	30	19 T	81.3 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	45	44	97.8	0.0456 JT	37.9 T	BT018	4.66	0.557 JV	27.8 JV	0.0456 JT	37.9 T	BT018	4.56	0.541 JT	27.1 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	45	45	100	13.6 JT	1260 T	BT017	94.9	36.7 T	281 JV	13.6 JT	1260 T	BT017	94.9	36.7 T	281 JV
Toxaphene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	37 U	170 U	WR-VC-108	37	30 UV	72 UV
trans-Chlordane	µg/kg-Wet	45	44	97.8	0.438 J	30.5	BT028	2.92	1.26 V	6.81 V	0.0304 U	30.5	BT028	2.86	1.22	6.74 V
trans-Nonachlor	µg/kg-Wet	45	35	77.8	0.435 J	9.8	BT028	1.34	0.739	4.17 V	0.32 U	9.8	BT028	1.14	0.667	3.32 V
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	45	31	69	0.29 J	57	WR-VC-108	5.6	1.6	31 V	0.15 U	57	WR-VC-108	3.9	1.2	17 V
Acenaphthene	µg/kg-Wet	45	43	95.6	1.7	520	BT014	58.6	8.3	460 V	0.091 U	520	BT014	56	7.8	460 V
Acenaphthylene	µg/kg-Wet	45	44	97.8	0.33 J	29	BT014	5.61	3.6 V	21.7 V	0.092 U	29	BT014	5.49	3.5	21.6 V
Anthracene	µg/kg-Wet	45	45	100	1.3	650	BT014	40	8.3	94 V	1.3	650	BT014	40	8.3	94 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Benzo(a)anthracene	µg/kg-Wet	45	45	100	5.9	2600	BT014	180	38	920 V	5.9	2600	BT014	180	38	920 V
Benzo(a)pyrene	µg/kg-Wet	45	45	100	2.2	1500	BT014	100	17	680 V	2.2	1500	BT014	100	17	680 V
Benzo(b)fluoranthene	µg/kg-Wet	45	45	100	7.7	1600	BT014	140	35	670 V	7.7	1600	BT014	140	35	670 V
Benzo(g,h,i)perylene	µg/kg-Wet	45	45	100	4	720	BT014	54	11	330 V	4	720	BT014	54	11	330 V
Benzo(k)fluoranthene	µg/kg-Wet	45	45	100	3.9	1500	BT014	100	22	490 V	3.9	1500	BT014	100	22	490 V
Chrysene	µg/kg-Wet	45	45	100	14	3900	BT014	310	86	1500 V	14	3900	BT014	310	86	1500 V
Dibenzo(a,h)anthracene	µg/kg-Wet	45	36	80	0.46 J	95	BT012	9.6	2.1 V	62 V	0.11 U	95	BT012	7.7	1.8	46 V
Fluoranthene	µg/kg-Wet	45	45	100	15	10000	BT014	730	120	4400 V	15	10000	BT014	730	120	4400 V
Fluorene	µg/kg-Wet	45	45	100	1.3	300	BT012; BT014	37	6.6	250 V	1.3	300	BT012; BT014	37	6.6	250 V
High Molecular Weight PAH	µg/kg-Wet	45	45	100	70.7 T	33600 T	BT014	2470	486 T	13600 V	70.7 T	33600 T	BT014	2470	486 T	13600 V
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	45	45	100	2	670	BT014	47	7.9	280 V	2	670	BT014	47	7.9	280 V
Low Molecular Weight PAH	µg/kg-Wet	45	45	100	12.3 T	3760 T	BT015	418	55.2 T	3460 V	12.3 T	3760 T	BT015	418	55.2 T	3460 V
Naphthalene	µg/kg-Wet	45	6	13	2.9	31	BT015	11	7.6 V	26 V	0.46 U	31	BT015	2.1	0.75 U	7.6 V
Phenanthrene	µg/kg-Wet	45	45	100	4.1	2800	WR-VC-46	270	31	2200 V	4.1	2800	WR-VC-46	270	31	2200 V
Pyrene	µg/kg-Wet	45	45	100	16	11000	BT014	790	130	5100 V	16	11000	BT014	790	130	5100 V
Total BaPEq	µg/kg-Wet	45	45	100	3.81 T	2090 T	BT014	148	28.6 T	912 V	3.81 T	2090 T	BT014	148	28.6 T	912 V
Total cPAHs	µg/kg-Wet	45	45	100	36 T	12000 T	BT014	900	210 T	4400 V	36 T	12000 T	BT014	900	210 T	4400 V
Total PAHs	µg/kg-Wet	45	45	100	83 T	37300 T	BT014	2890	550 T	17400 V	83 T	37300 T	BT014	2890	550 T	17400 V
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	45	27	60	69 J	220 J	BT010; BT023	130	120 J	210 JV	53 U	530 U	WR-VC-108	95	100 J	220 JV
Butylbenzyl phthalate	µg/kg-Wet	45	0	0	--	--	--	--	--	--	14 U	140 U	WR-VC-108	8.9	7 U	14 UV
Dibutyl phthalate	µg/kg-Wet	45	11	24	23 J	470 J	BT020	88	46	290 JV	16 U	470 J	BT020	63	24 J	160 UV
Diethyl phthalate	µg/kg-Wet	45	0	0	--	--	--	--	--	--	9.4 U	94 U	WR-VC-108	6.9	4.7 U	13 UV
Dimethyl phthalate	µg/kg-Wet	45	0	0	--	--	--	--	--	--	5.1 U	51 U	WR-VC-108	3.3	2.6 U	5.5 UV
Di-n-octyl phthalate	µg/kg-Wet	45	0	0	--	--	--	--	--	--	13 U	130 U	WR-VC-108	8.2	6.5 U	13 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	9.9 U	99 U	WR-VC-108	6.3	5 U	10 UV
1,2-Dichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	12 U	120 U	WR-VC-108	7.6	6 U	12 UJV
1,2-Diphenylhydrazine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	40 U	400 U	WR-VC-108	38	20 UV	120 UV
1,3-Dichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	11 U	110 U	WR-VC-108	7	5.5 U	11 UJV
1,4-Dichlorobenzene	µg/kg-Wet	45	0	0	--	--	--	--	--	--	11 U	110 U	WR-VC-108	7	5.5 U	11 UJV
2,4-Dinitrotoluene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.5 U	85 U	WR-VC-108	8.1	4.3 UV	25 UV
2,6-Dinitrotoluene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	7 U	70 U	WR-VC-108	6.7	3.5 UV	21 UV
2-Chloronaphthalene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5.9 U	59 U	WR-VC-108	5.6	3 UV	18 UV
2-Nitroaniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	26 U	260 U	WR-VC-108	25	13 UV	77 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	780 UJ	7800 UJ	WR-VC-108	740	390 UJV	2300 UJV
3-Nitroaniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.9 U	89 U	WR-VC-108	8.5	4.5 UV	26 UV
4-Bromophenylphenyl ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5.5 U	55 U	WR-VC-108	5.2	2.8 UV	16 UV
4-Chloroaniline	µg/kg-Wet	10	1	10	24 J	24 J	WR-VC-28	24	24 J	24 J	5.9 U	59 U	WR-VC-108	7.7	3 UV	27 JV
4-Chlorophenylphenyl ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	4.5 U	45 U	WR-VC-108	4.3	2.3 UV	13 UV
4-Nitroaniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	26 U	260 U	WR-VC-108	25	13 UV	77 UV
Aniline	µg/kg-Wet	10	0	0	--	--	--	--	--	--	230 UJ	2300 UJ	WR-VC-108	220	120 UJV	680 UJV
Benzoic acid	µg/kg-Wet	10	0	0	--	--	--	--	--	--	190 UJ	190 UJ	WR-VC-108; WR-VC-11; WR-VC-118; WR-VC-28; WR-VC-29; WR-VC-43; WR-VC-46; WR-VC-57; WR-VC-66; WR-VC-72	95	95 UJV	95 UJV
Benzyl alcohol	µg/kg-Wet	45	45	100	280	4900 J	BT020	1500	990	4000 JV	280	4900 J	BT020	1500	990	4000 JV
Bis(2-chloroethoxy)methane	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5 U	50 U	WR-VC-108	4.8	2.5 UV	15 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.7 U	87 U	WR-VC-108	8.3	4.4 UV	26 UV
Bis(2-chloroisopropyl) ether	µg/kg-Wet	10	0	0	--	--	--	--	--	--	11 U	110 U	WR-VC-108	10	5.5 UV	33 UV
Carbazole	µg/kg-Wet	10	0	0	--	--	--	--	--	--	33 U	330 U	WR-VC-108	31	17 UV	98 UV
Dibenzofuran	µg/kg-Wet	45	43	95.6	0.37 J	27	BT014	4.29	1.6	16 V	0.071 U	27	BT014	4.1	1.6	16 V
Hexachlorobenzene	µg/kg-Wet	45	37	82.2	0.242 J	2.69	BT017	0.629	0.488	1.16 V	0.24 U	2.69	BT017	0.548	0.46 J	1.14 V
Hexachlorobutadiene	µg/kg-Wet	45	6	13.3	0.00117 J	11.7 J	BT017	1.96	0.00427 JV	8.78 JV	0.00117 J	17 U	BT020; BT0272; BT030	1.44	0.0115 UJ	8.5 UV
Hexachlorocyclopentadiene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5000 U	50000 U	WR-VC-108	4800	2500 UV	15000 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Hexachloroethane	µg/kg-Wet	45	0	0	--	--	--	--	--	--	0.31 U	17 U	BT020; BT0272; BT030	3.7	4.3 U	7.6 UV
Isophorone	µg/kg-Wet	10	0	0	--	--	--	--	--	--	5.8 U	58 U	WR-VC-108	5.5	2.9 UV	17 UV
Nitrobenzene	µg/kg-Wet	10	0	0	--	--	--	--	--	--	10 U	100 U	WR-VC-108	9.5	5 UV	30 UV
N-Nitrosodimethylamine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	10 U	100 U	WR-VC-108	9.5	5 UV	30 UV
N-Nitrosodiphenylamine	µg/kg-Wet	45	4	8.9	21 J	190	BT012	72	39 JV	170 V	9.5 U	190	BT012	12	4.8 U	44 JV
N-Nitrosodipropylamine	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.2 U	82 U	WR-VC-108	7.8	4.1 UV	24 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	55 U	550 U	WR-VC-108	52	28 UV	160 UV
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	55 U	550 U	WR-VC-108	52	28 UV	160 UV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	42 U	420 U	WR-VC-108	40	21 UV	120 UV
2,4,5-Trichlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	11 U	110 U	WR-VC-108	10	5.5 UV	33 UV
2,4,6-Trichlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	8.8 U	88 U	WR-VC-108	8.4	4.4 UV	26 UV
2,4-Dichlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	12 U	120 U	WR-VC-108	11	6 UV	36 UV
2,4-Dimethylphenol	µg/kg-Wet	45	0	0	--	--	--	--	--	--	13 U	130 U	WR-VC-108	8.2	6.5 U	13 UV
2,4-Dinitrophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	23 U	230 U	WR-VC-108	22	12 UV	68 UV
2-Chlorophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	11 U	110 U	WR-VC-108	10	5.5 UV	33 UV
2-Methylphenol	µg/kg-Wet	45	33	73	53 J	350	BT004	140	130	270 V	53 J	530 U	WR-VC-108	120	98	260 V
2-Nitrophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	15 U	150 U	WR-VC-108	14	7.5 UV	45 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	15 U	150 U	WR-VC-108	14	7.5 UV	45 UV
4-Chloro-3-methylphenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	72 U	720 U	WR-VC-108	68	36 UV	210 UV
4-Methylphenol	µg/kg-Wet	45	38	84	26 J	290	BT0271; BT032	100	72 JV	210 V	15 U	290	BT0271; BT032	87	66 J	200 V
4-Nitrophenol	µg/kg-Wet	10	0	0	--	--	--	--	--	--	7.5 U	75 U	WR-VC-108	7.1	3.8 UV	22 UV
Pentachlorophenol	µg/kg-Wet	28	0	0	--	--	--	--	--	--	31 U	310 U	WR-VC-108	20	16 UV	16 UV
Phenol	µg/kg-Wet	45	34	76	17 J	110	WR-VC-28	27	21 JV	45 JV	17 J	170 U	WR-VC-108	24	19 J	48 JV
Mussel (body without shell)																
Conventionals																
Lipids	percent-Wet	7	7	100	0.18	0.64	FM025	0.4	0.4	0.6 V	0.18	0.64	FM025	0.4	0.4	0.6 V
Total solids	percent-Wet	7	7	100	3.65	9.11	FM021	6.8	6.91	9.03 V	3.65	9.11	FM021	6.8	6.91	9.03 V
Metals																
Aluminum	mg/kg-Wet	7	7	100	5.9	211	FM006	134	144 T	211 V	5.9	211	FM006	134	144 T	211 V
Antimony	mg/kg-Wet	7	7	100	0.0008 J	0.0035 J	FM006	0.00215	0.0024 J	0.00326 JV	0.0008 J	0.0035 J	FM006	0.00215	0.0024 J	0.00326 JV
Arsenic	mg/kg-Wet	7	7	100	0.224	0.616	FM021	0.385	0.35	0.563 V	0.224	0.616	FM021	0.385	0.35	0.563 V
Cadmium	mg/kg-Wet	7	7	100	0.0905	0.188	FM006	0.123	0.108	0.174 V	0.0905	0.188	FM006	0.123	0.108	0.174 V
Chromium	mg/kg-Wet	7	3	42.9	0.21	0.28	FM006	0.248	0.255 JT	0.278 JV	0.13 U	0.34 U	FM025	0.183	0.17 U	0.273 JV
Copper	mg/kg-Wet	7	7	100	1.01	1.82	FM006	1.39	1.37 T	1.78 V	1.01	1.82	FM006	1.39	1.37 T	1.78 V
Lead	mg/kg-Wet	7	7	100	0.0386	0.22	FM006	0.139	0.118	0.217 V	0.0386	0.22	FM006	0.139	0.118	0.217 V
Mercury	mg/kg-Wet	7	7	100	0.0022 J	0.0061 J	FM021	0.00424	0.0048 J	0.00589 JV	0.0022 J	0.0061 J	FM021	0.00424	0.0048 J	0.00589 JV
Nickel	mg/kg-Wet	7	7	100	0.308	0.712	FM021	0.456	0.41	0.652 V	0.308	0.712	FM021	0.456	0.41	0.652 V
Selenium	mg/kg-Wet	7	7	100	0.056	0.128	FM021	0.0878	0.091	0.123 V	0.056	0.128	FM021	0.0878	0.091	0.123 V
Silver	mg/kg-Wet	7	7	100	0.0237	0.0759	FM021	0.0421	0.0398	0.0674 V	0.0237	0.0759	FM021	0.0421	0.0398	0.0674 V
Zinc	mg/kg-Wet	7	7	100	15.7	41.5	FM021	27	27.4	39.1 V	15.7	41.5	FM021	27	27.4	39.1 V
Butyltins																
Butyltin ion	µg/kg-Wet	7	7	100	0.44 J	2.2 J	FM025	1.2	1.4 J	2 JV	0.44 J	2.2 J	FM025	1.2	1.4 J	2 JV
Dibutyltin ion	µg/kg-Wet	7	7	100	0.85 J	3.8 J	FM006	2	1.8 J	3.4 JV	0.85 J	3.8 J	FM006	2	1.8 J	3.4 JV
Tetrabutyltin	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.84 UJ	0.86 UJ	FM009; FM033	0.43	0.43 UJ	0.43 UJV
Tributyltin ion	µg/kg-Wet	7	7	100	2.2 J	16 J	FM006	5.8	4.1 J	13 JV	2.2 J	16 J	FM006	5.8	4.1 J	13 JV
PCB Congeners																
PCB001	pg/g-Wet	3	3	100	0.926	3.1	FM006	1.75	1.21 J	2.91 JV	0.926	3.1	FM006	1.75	1.21 J	2.91 JV
PCB002	pg/g-Wet	3	3	100	0.614	1.09	FM006	0.773	0.616 J	1.04 JV	0.614	1.09	FM006	0.773	0.616 J	1.04 JV
PCB003	pg/g-Wet	7	4	57.1	0.476 J	2.54	FM006	1.17	0.825 V	2.3 V	0.476 J	2.54	FM006	0.842	0.53 U	2.06 V
PCB004	pg/g-Wet	7	5	71.4	2.71 J	49.2 J	FM006	18.6	16.3	42.9 JV	2.27 U	49.2 J	FM006	13.7	6.84 J	39.8 JV
PCB005	pg/g-Wet	7	1	14.3	3.09	3.09	FM006	3.09	3.09	3.09	0.191 U	3.09	FM006	0.85	0.41 U	2.52 V
PCB006	pg/g-Wet	7	3	42.9	1.14	41.6	FM006	15.9	5.09	37.9 V	0.707 U	41.6	FM006	7.6	1.43 U	30.6 V
PCB007	pg/g-Wet	7	2	28.6	1.25	9.1	FM006	5.18	5.18 V	8.71 V	0.345 U	9.1	FM006	1.85	0.5 U	6.74 V
PCB008	pg/g-Wet	7	7	100	2.24	230	FM006	45.4	17.3	170 V	2.24	230	FM006	45.4	17.3	170 V

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					Detected Concentrations						Detected and Nondetected Concentrations					
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PCB009	pg/g-Wet	7	4	57.1	0.284	14.3	FM006	4.56	1.83 V	12.5 V	0.284	14.3	FM006	2.87	1.05 U	10.7 V
PCB010	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.167 U	2.74 U	FM006	0.562	0.41 U	1.28 UV
PCB011	pg/g-Wet	7	7	100	16.9	50.4	FM025	29.4	26	46.1 V	16.9	50.4	FM025	29.4	26	46.1 V
PCB012 & 013	pg/g-Wet	7	2	28.6	3.39	28.2	FM006	15.8	15.8 V	27 V	0.755 U	28.2	FM006	5.11	1.2 U	20.8 V
PCB014	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.182 U	2.3 U	FM033	0.439	0.371 U	0.961 UV
PCB015	pg/g-Wet	7	7	100	2.78	272	FM006	48	10.5	196 V	2.78	272	FM006	48	10.5	196 V
PCB016	pg/g-Wet	7	7	100	2.29	258	FM006	48.9	12.3	189 V	2.29	258	FM006	48.9	12.3	189 V
PCB017	pg/g-Wet	7	7	100	4.43	350	FM006	69.4	20.8	257 V	4.43	350	FM006	69.4	20.8	257 V
PCB018 & 030	pg/g-Wet	7	7	100	5.19	604	FM006	114	27	441 V	5.19	604	FM006	114	27	441 V
PCB019	pg/g-Wet	7	7	100	5.26 J	73.7	FM006	19.4	10.5	56.3 V	5.26 J	73.7	FM006	19.4	10.5	56.3 V
PCB020 & 028	pg/g-Wet	7	7	100	24.9	2190	FM006	420	137	1600 V	24.9	2190	FM006	420	137	1600 V
PCB021 & 033	pg/g-Wet	7	7	100	11	1240	FM006	230	55.1	907 V	11	1240	FM006	230	55.1	907 V
PCB022	pg/g-Wet	7	7	100	8.42	792	FM006	149	41.1	578 V	8.42	792	FM006	149	41.1	578 V
PCB023	pg/g-Wet	7	4	57.1	0.096 J	2.69	FM006	0.82	0.247 JV	2.33 JV	0.096 J	2.69	FM006	0.586	0.203 U	2.01 V
PCB024	pg/g-Wet	7	5	71.4	0.101 J	11.8	FM006	2.91	1.06	9.68 V	0.101 J	11.8	FM006	2.13	0.372	8.62 V
PCB025	pg/g-Wet	7	7	100	2.02	163	FM006	31.3	10.4	119 V	2.02	163	FM006	31.3	10.4	119 V
PCB026 & 029	pg/g-Wet	7	7	100	3.98	383	FM006	71.9	19.5	279 V	3.98	383	FM006	71.9	19.5	279 V
PCB027	pg/g-Wet	7	7	100	1.18	62	FM006	12.3	3.61	45.5 V	1.18	62	FM006	12.3	3.61	45.5 V
PCB031	pg/g-Wet	7	7	100	17.7	1810	FM006	339	98.2	1320 V	17.7	1810	FM006	339	98.2	1320 V
PCB032	pg/g-Wet	7	7	100	4.27	387	FM006	74.7	18.9	284 V	4.27	387	FM006	74.7	18.9	284 V
PCB034	pg/g-Wet	7	3	42.9	0.693	7.4	FM006	2.99	0.872	6.75 V	0.532 U	7.4	FM006	1.51	0.565 U	5.44 V
PCB035	pg/g-Wet	7	6	85.7	0.518 J	31.5	FM006	6.97	2.73 V	24.3 V	0.518 J	31.5	FM006	6.04	2.68	22.9 V
PCB036	pg/g-Wet	7	1	14.3	0.14 J	0.14 J	FM004	0.14	0.14 J	0.14 J	0.14 J	1.19 U	FM033	0.273	0.281 U	0.513 UV
PCB037	pg/g-Wet	7	7	100	6.87	508	FM006	96.2	31.9	370 V	6.87	508	FM006	96.2	31.9	370 V
PCB038	pg/g-Wet	7	2	28.6	0.335 J	0.519	FM001	0.427	0.427 JV	0.51 JV	0.208 U	2.27 U	FM006	0.413	0.335 J	0.95 V
PCB039	pg/g-Wet	7	5	71.4	0.41 J	24.5	FM006	6.44	2.42	20.3 V	0.41 J	24.5	FM006	4.84	1.63	18.1 V
PCB040 & 041 & 071	pg/g-Wet	7	7	100	24.1	1390	FM006	287	120	1040 V	24.1	1390	FM006	287	120	1040 V
PCB042	pg/g-Wet	7	7	100	10.9	663	FM006	136	56	494 V	10.9	663	FM006	136	56	494 V
PCB043	pg/g-Wet	7	6	85.7	2.89	125	FM006	28.9	10.7 V	98.2 V	1.97 U	125	FM006	24.9	10.6	92.8 V
PCB044 & 047 & 065	pg/g-Wet	7	7	100	70	2550	FM006	545	209	1910 V	70	2550	FM006	545	209	1910 V
PCB045 & 051	pg/g-Wet	7	7	100	12.3	380	FM006	82.4	36.9	286 V	12.3	380	FM006	82.4	36.9	286 V
PCB046	pg/g-Wet	7	7	100	1.77	116	FM006	23.1	9.26	86.1 V	1.77	116	FM006	23.1	9.26	86.1 V
PCB048	pg/g-Wet	7	7	100	8.38	598	FM006	119	49.2	442 V	8.38	598	FM006	119	49.2	442 V
PCB049 & 069	pg/g-Wet	7	7	100	33.5	1700	FM006	354	131	1270 V	33.5	1700	FM006	354	131	1270 V
PCB050 & 053	pg/g-Wet	7	7	100	8.44	264	FM006	58.1	24.1	199 V	8.44	264	FM006	58.1	24.1	199 V
PCB052	pg/g-Wet	7	7	100	51.1	3300	FM006	644	200	2430 V	51.1	3300	FM006	644	200	2430 V
PCB054	pg/g-Wet	7	7	100	1.75	8.27	FM006	3.36	2.68	6.86 V	1.75	8.27	FM006	3.36	2.68	6.86 V
PCB055	pg/g-Wet	7	2	28.6	4.91	38.9	FM006	21.9	21.9 V	37.2 V	0.289 U	38.9	FM006	6.49	0.364 U	28.7 V
PCB056	pg/g-Wet	7	7	100	21.9	708	FM006	177	83.7	549 V	21.9	708	FM006	177	83.7	549 V
PCB057	pg/g-Wet	7	5	71.4	0.501 J	15.4	FM006	4.15	1.5	12.8 V	0.501 J	15.4	FM006	3.13	1.11	11.5 V
PCB058	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.262 U	2.64 U	FM006	0.439	0.275 U	1.08 UV
PCB059 & 062 & 075	pg/g-Wet	7	7	100	4.4	244	FM006	49.9	20.9	182 V	4.4	244	FM006	49.9	20.9	182 V
PCB060	pg/g-Wet	7	7	100	12.2	387	FM006	93.7	41.9	298 V	12.2	387	FM006	93.7	41.9	298 V
PCB061 & 070 & 074 & 076	pg/g-Wet	7	7	100	97.4	3960	FM006	868	372	2970 V	97.4	3960	FM006	868	372	2970 V
PCB063	pg/g-Wet	7	7	100	2.4	88.5	FM006	20.1	9.11	66.8 V	2.4	88.5	FM006	20.1	9.11	66.8 V
PCB064	pg/g-Wet	7	7	100	19.6	1210	FM006	248	99.7	906 V	19.6	1210	FM006	248	99.7	906 V
PCB066	pg/g-Wet	7	7	100	54.4	1710	FM006	417	205	1310 V	54.4	1710	FM006	417	205	1310 V
PCB067	pg/g-Wet	7	3	42.9	9.65	89	FM006	37	12.4	81.3 V	2 U	89	FM006	17.1	3.39 U	66 V
PCB068	pg/g-Wet	7	1	14.3	15.5	15.5	FM006	15.5	15.5	15.5	0.926 U	15.5	FM006	3.14	1.25 U	11.5 V
PCB072	pg/g-Wet	7	4	57.1	4.01	30.6	FM006	11.3	5.26 V	26.9 V	0.908 U	30.6	FM006	6.71	4.01	23.2 V
PCB073	pg/g-Wet	7	1	14.3	1.09	1.09	FM009	1.09	1.09	1.09	0.153 U	1.09	FM009	0.345	0.229 U	0.904 V
PCB077	pg/g-Wet	7	7	100	5.18	146	FM006	34.7	15.3	112 V	5.18	146	FM006	34.7	15.3	112 V
PCB078	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.28 U	2.47 U	FM006	0.429	0.259 U	1.02 UV
PCB079	pg/g-Wet	7	6	85.7	2.06	61	FM006	15	7.01 V	48.2 V	1.69 U	61	FM006	13	5.46	45.7 V
PCB080	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.25 U	2.14 U	FM006	0.362	0.223 U	0.871 UV
PCB081	pg/g-Wet	7	4	57.1	0.465	5.11	FM006	1.96	1.14 V	4.57 V	0.355 U	5.11	FM006	1.27	0.495 U	4.03 V
PCB082	pg/g-Wet	7	7	100	13.1	434	FM006	96.5	38.1	327 V	13.1	434	FM006	96.5	38.1	327 V
PCB083 & 099	pg/g-Wet	7	7	100	95.2	2300	FM006	548	306	1770 V	95.2	2300	FM006	548	306	1770 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB084	pg/g-Wet	7	7	100	21.9	883	FM006	188	70.3	664 V	21.9	883	FM006	188	70.3	664 V
PCB085 & 116 & 117	pg/g-Wet	7	7	100	27	747	FM006	169	73.5	565 V	27	747	FM006	169	73.5	565 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	7	7	100	84.1	2640	FM006	581	259	1990 V	84.1	2640	FM006	581	259	1990 V
PCB088 & 091	pg/g-Wet	7	7	100	20.7	577	FM006	140	70.1	446 V	20.7	577	FM006	140	70.1	446 V
PCB089	pg/g-Wet	7	6	85.7	1.21	37	FM006	10.4	5.84 V	30.3 V	1.21	37	FM006	9.05	4.48	28.9 V
PCB090 & 101 & 113	pg/g-Wet	7	7	100	143	4650	FM006	1030	503	3520 V	143	4650	FM006	1030	503	3520 V
PCB092	pg/g-Wet	7	7	100	29.7	831	FM006	197	110	637 V	29.7	831	FM006	197	110	637 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	7	7	100	96.4	3460	FM006	756	320	2600 V	96.4	3460	FM006	756	320	2600 V
PCB094	pg/g-Wet	7	7	100	1.73	25.8	FM006	8.34	4.7	20.8 V	1.73	25.8	FM006	8.34	4.7	20.8 V
PCB096	pg/g-Wet	7	7	100	1.24 J	28	FM006	7.2	3.39	21.7 V	1.24 J	28	FM006	7.2	3.39	21.7 V
PCB103	pg/g-Wet	7	7	100	4.09	38.2	FM006	14.9	13.4	33.6 V	4.09	38.2	FM006	14.9	13.4	33.6 V
PCB104	pg/g-Wet	7	6	85.7	0.527 J	2.34	FM006	1.35	1.2 V	2.22 V	0.527 J	2.34	FM006	1.25	1.04	2.19 V
PCB105	pg/g-Wet	7	7	100	62.2	1570	FM006	346	129	1180 V	62.2	1570	FM006	346	129	1180 V
PCB106	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.178 U	1 U	FM006	0.231	0.202 U	0.436 UV
PCB107 & 124	pg/g-Wet	7	7	100	6.37	204	FM006	42.4	14.4	151 V	6.37	204	FM006	42.4	14.4	151 V
PCB109	pg/g-Wet	7	7	100	11.6	297	FM006	65.7	30.8	222 V	11.6	297	FM006	65.7	30.8	222 V
PCB110 & 115	pg/g-Wet	7	7	100	140	5040	FM006	1060	422	3770 V	140	5040	FM006	1060	422	3770 V
PCB111	pg/g-Wet	7	3	42.9	0.656	3.27	FM006	1.61	0.904	3.03 V	0.416 U	3.27	FM006	0.963	0.656	2.57 V
PCB112	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.184 U	0.47 U	FM033	0.13	0.115 U	0.204 UV
PCB114	pg/g-Wet	7	7	100	3.91	93.9	FM006	20.8	8.55	70.6 V	3.91	93.9	FM006	20.8	8.55	70.6 V
PCB118	pg/g-Wet	7	7	100	160	4820	FM006	1020	396	3580 V	160	4820	FM006	1020	396	3580 V
PCB120	pg/g-Wet	7	6	85.7	1.4	14.6	FM006	5.36	3.79 V	12.7 V	1.4	14.6	FM006	4.73	3.24	12.3 V
PCB121	pg/g-Wet	7	5	71.4	0.512 J	1.67	FM025	0.981	1	1.55 V	0.512 J	1.67	FM025	0.839	0.65 U	1.5 V
PCB122	pg/g-Wet	7	6	85.7	2.07	54.1	FM006	14	7.14 V	43.2 V	2.07	54.1	FM006	12.2	4.84	41 V
PCB123	pg/g-Wet	7	7	100	3.15	85.5	FM006	18.5	6.41	64.1 V	3.15	85.5	FM006	18.5	6.41	64.1 V
PCB126	pg/g-Wet	7	6	85.7	0.69 J	8.46	FM006	2.41	1.39 V	6.79 V	0.594 U	8.46	FM006	2.11	1.11	6.45 V
PCB127	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.195 U	0.996 U	FM006	0.243	0.201 U	0.442 UV
PCB128 & 166	pg/g-Wet	7	7	100	57.9	1110	FM006	243	105	832 V	57.9	1110	FM006	243	105	832 V
PCB129 & 138 & 160 & 163	pg/g-Wet	7	7	100	406	7710	FM006	1800	859	5850 V	406	7710	FM006	1800	859	5850 V
PCB130	pg/g-Wet	7	7	100	18.1	354	FM006	85.1	45	272 V	18.1	354	FM006	85.1	45	272 V
PCB131	pg/g-Wet	7	7	100	2.32	85.4	FM006	17.8	6.48	63.3 V	2.32	85.4	FM006	17.8	6.48	63.3 V
PCB132	pg/g-Wet	7	7	100	79.1	2210	FM006	513	255	1680 V	79.1	2210	FM006	513	255	1680 V
PCB133	pg/g-Wet	7	6	85.7	8.06	91.7	FM006	33.1	22.9 V	78.4 V	8.06	91.7	FM006	29.2	22.6	75.7 V
PCB134 & 143	pg/g-Wet	7	7	100	11.8	283	FM006	69.7	34.7	218 V	11.8	283	FM006	69.7	34.7	218 V
PCB135 & 151 & 154	pg/g-Wet	7	7	100	129	2060	FM006	602	411	1640 V	129	2060	FM006	602	411	1640 V
PCB136	pg/g-Wet	7	7	100	28.9	552	FM006	160	113	448 V	28.9	552	FM006	160	113	448 V
PCB137	pg/g-Wet	7	7	100	13.8	372	FM006	77.3	26.5	276 V	13.8	372	FM006	77.3	26.5	276 V
PCB139 & 140	pg/g-Wet	7	7	100	5.11	138	FM006	30.6	13.9	104 V	5.11	138	FM006	30.6	13.9	104 V
PCB141	pg/g-Wet	7	7	100	66.1	1220	FM006	317	176	956 V	66.1	1220	FM006	317	176	956 V
PCB142	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.191 U	2.74 U	FM006	0.416	0.307 U	1.06 UV
PCB144	pg/g-Wet	7	7	100	13.4	302	FM006	77.6	45.1	233 V	13.4	302	FM006	77.6	45.1	233 V
PCB145	pg/g-Wet	7	5	71.4	0.143 J	2.36	FM006	0.669	0.255	1.97 V	0.143 J	2.36	FM006	0.553	0.255	1.78 V
PCB146	pg/g-Wet	7	7	100	68.3	1010	FM006	278	173	801 V	68.3	1010	FM006	278	173	801 V
PCB147 & 149	pg/g-Wet	7	7	100	267	5490	FM006	1400	824	4250 V	267	5490	FM006	1400	824	4250 V
PCB148	pg/g-Wet	7	7	100	2.04	11.4	FM006	5.59	4.94	10.6 V	2.04	11.4	FM006	5.59	4.94	10.6 V
PCB150	pg/g-Wet	7	7	100	1.47	8.31	FM006	4.23	3.72	8.06 V	1.47	8.31	FM006	4.23	3.72	8.06 V
PCB152	pg/g-Wet	7	6	85.7	1.23	6.34	FM006	2.66	2.01 V	5.47 V	0.519 U	6.34	FM006	2.32	1.68	5.29 V
PCB153 & 168	pg/g-Wet	7	7	100	393	7160	FM006	1810	980	5560 V	393	7160	FM006	1810	980	5560 V
PCB155	pg/g-Wet	7	3	42.9	0.525 J	1.13	FM006	0.772	0.661	1.08 V	0.524 U	1.13	FM006	0.56	0.47 U	0.989 V
PCB156 & 157	pg/g-Wet	7	7	100	35.1	735	FM006	159	63.5	547 V	35.1	735	FM006	159	63.5	547 V
PCB158	pg/g-Wet	7	7	100	32.8	678	FM006	154	67.2	512 V	32.8	678	FM006	154	67.2	512 V
PCB159	pg/g-Wet	7	7	100	7.79	66.9	FM006	21.6	14.9	55.1 V	7.79	66.9	FM006	21.6	14.9	55.1 V
PCB161	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.137 U	1.74 U	FM006	0.298	0.195 U	0.722 UV
PCB162	pg/g-Wet	7	5	71.4	1.62	26.7	FM006	7.72	3.24	22.3 V	1.25 U	26.7	FM006	5.7	2.46	20.1 V
PCB164	pg/g-Wet	7	7	100	22.3	466	FM006	117	60.1	363 V	22.3	466	FM006	117	60.1	363 V
PCB165	pg/g-Wet	7	3	42.9	1.41	2.61	FM025	1.82	1.43	2.49 V	0.794 U	2.61	FM025	1.11	0.96 U	2.26 V
PCB167	pg/g-Wet	7	7	100	14.8	297	FM006	67.4	28.7	225 V	14.8	297	FM006	67.4	28.7	225 V
PCB169	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.517 U	3.57 U	FM006	0.639	0.406 U	1.51 UV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB170	pg/g-Wet	7	7	100	147	1350	FM006	390	204	1080 V	147	1350	FM006	390	204	1080 V
PCB171 & 173	pg/g-Wet	7	7	100	46.6	479	FM006	139	79.9	384 V	46.6	479	FM006	139	79.9	384 V
PCB172	pg/g-Wet	7	7	100	25.9	233	FM006	71.3	40.7	190 V	25.9	233	FM006	71.3	40.7	190 V
PCB174	pg/g-Wet	7	7	100	146	1510	FM006	471	311	1240 V	146	1510	FM006	471	311	1240 V
PCB175	pg/g-Wet	7	7	100	5.79	49.5	FM006	16.2	9.83	41.4 V	5.79	49.5	FM006	16.2	9.83	41.4 V
PCB176	pg/g-Wet	7	7	100	19.4	190	FM006	63.7	42.8	161 V	19.4	190	FM006	63.7	42.8	161 V
PCB177	pg/g-Wet	7	7	100	81.3	684	FM006	222	146	557 V	81.3	684	FM006	222	146	557 V
PCB178	pg/g-Wet	7	7	100	30.2	264	FM006	93.5	65.9	225 V	30.2	264	FM006	93.5	65.9	225 V
PCB179	pg/g-Wet	7	7	100	61.2	554	FM006	197	148	468 V	61.2	554	FM006	197	148	468 V
PCB180 & 193	pg/g-Wet	7	7	100	406	3920	FM006	1140	638	3140 V	406	3920	FM006	1140	638	3140 V
PCB181	pg/g-Wet	7	7	100	1.43	16.2	FM006	4.17	2.36	12.4 V	1.43	16.2	FM006	4.17	2.36	12.4 V
PCB182	pg/g-Wet	7	7	100	1.65	12.3	FM006	4.22	2.39	10.5 V	1.65	12.3	FM006	4.22	2.39	10.5 V
PCB183 & 185	pg/g-Wet	7	7	100	122	1290	FM006	378	230	1040 V	122	1290	FM006	378	230	1040 V
PCB184	pg/g-Wet	7	5	71.4	0.543	1.93	FM006	0.969	0.625	1.78 V	0.328 U	1.93	FM006	0.748	0.579 J	1.7 V
PCB186	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.0509 U	0.313 U	FM033	0.0736	0.075 U	0.133 UV
PCB187	pg/g-Wet	7	7	100	279	2110	FM006	669	372	1730 V	279	2110	FM006	669	372	1730 V
PCB188	pg/g-Wet	7	6	85.7	0.861	3.49	FM006	1.72	1.28 V	3.2 V	0.861	3.49	FM006	1.56	1.25	3.14 V
PCB189	pg/g-Wet	7	7	100	4.59	49.6	FM006	14	8.07	38.8 V	4.59	49.6	FM006	14	8.07	38.8 V
PCB190	pg/g-Wet	7	7	100	29.9	259	FM006	77.2	42.1	209 V	29.9	259	FM006	77.2	42.1	209 V
PCB191	pg/g-Wet	7	6	85.7	6.89	54.5	FM006	18.8	10.3 V	46.3 V	6.17 U	54.5	FM006	16.5	10.2	44.7 V
PCB192	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.102 U	0.626 U	FM033	0.147	0.151 U	0.266 UV
PCB194	pg/g-Wet	7	7	100	73.7	688	FM006	199	105	545 V	73.7	688	FM006	199	105	545 V
PCB195	pg/g-Wet	7	7	100	33.4	340	FM006	98.1	53.5	268 V	33.4	340	FM006	98.1	53.5	268 V
PCB196	pg/g-Wet	7	7	100	32.4	372	FM006	112	67.1	301 V	32.4	372	FM006	112	67.1	301 V
PCB197 & 200	pg/g-Wet	7	7	100	14.8	154	FM006	45.1	26	123 V	14.8	154	FM006	45.1	26	123 V
PCB198 & 199	pg/g-Wet	7	7	100	77.2	804	FM006	245	142	661 V	77.2	804	FM006	245	142	661 V
PCB201	pg/g-Wet	7	7	100	11.9	105	FM006	32.6	19.5	85 V	11.9	105	FM006	32.6	19.5	85 V
PCB202	pg/g-Wet	7	7	100	21.4	183	FM006	58.4	39.1	149 V	21.4	183	FM006	58.4	39.1	149 V
PCB203	pg/g-Wet	7	7	100	68.4	813	FM006	229	115	649 V	68.4	813	FM006	229	115	649 V
PCB204	pg/g-Wet	7	3	42.9	0.151 J	0.166 J	FM021; FM025	0.161	0.166 J	0.166 JV	0.086 U	0.425 U	FM006	0.122	0.151 J	0.199 JV
PCB205	pg/g-Wet	7	7	100	4.18	36.1	FM006	10.7	6.12	28.8 V	4.18	36.1	FM006	10.7	6.12	28.8 V
PCB206	pg/g-Wet	7	7	100	43	565	FM006	143	66.6	436 V	43	565	FM006	143	66.6	436 V
PCB207	pg/g-Wet	7	7	100	3.38	42.9	FM006	13	7.89	34.2 V	3.38	42.9	FM006	13	7.89	34.2 V
PCB208	pg/g-Wet	7	7	100	12.3	131	FM006	38.6	22.7	106 V	12.3	131	FM006	38.6	22.7	106 V
PCB209	pg/g-Wet	7	7	100	26.8	160	FM006	77.1	48.8	153 V	26.8	160	FM006	77.1	48.8	153 V
Total PCB Congeners	pg/g-Wet	7	7	100	5750 JT	108000 JT	FM006	25700	12500 JT	82200 JV	5750 JT	108000 JT	FM006	25700	12500 JT	82200 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	7	7	100	5.75 JT	108 JT	FM006	25.7	12.5 JT	82.2 JV	5.75 JT	108 JT	FM006	25.7	12.5 JT	82.2 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	7	7	100	21.9 T	673 JT	FM006	152	79.9 JT	498 JV	21.9 T	673 JT	FM006	152	79.9 JT	498 JV
Heptachlorobiphenylhomologs	pg/g-Wet	7	7	100	1470 JT	13000 T	FM006	3960	2360 T	10600 V	1470 JT	13000 T	FM006	3960	2360 T	10600 V
Hexachlorobiphenyl homologs	pg/g-Wet	7	7	100	1700 T	32400 T	FM006	8030	4350 T	25000 V	1700 T	32400 T	FM006	8030	4350 T	25000 V
Monochlorobiphenyl homologs	pg/g-Wet	7	4	57.1	0.476 JA	6.73 T	FM006	3.05	2.51 JV	6.14 JV	0.476 JA	6.73 T	FM006	1.92	0.53 UA	5.55 JV
Nonachlorobiphenyl homologs	pg/g-Wet	7	7	100	58.7 T	739 T	FM006	194	97.2 T	576 V	58.7 T	739 T	FM006	194	97.2 T	576 V
Octachlorobiphenyl homologs	pg/g-Wet	7	7	100	339 T	3500 T	FM006	1030	576 T	2810 JV	339 T	3500 T	FM006	1030	576 T	2810 JV
Pentachlorobiphenylhomologs	pg/g-Wet	7	7	100	931 JT	28800 T	FM006	6340	2800 T	21700 V	931 JT	28800 T	FM006	6340	2800 T	21700 V
Tetrachlorobiphenyl homologs	pg/g-Wet	7	7	100	442 JT	19800 T	FM006	4230	1540 T	14800 V	442 JT	19800 T	FM006	4230	1540 T	14800 V
Trichlorobiphenyl homologs	pg/g-Wet	7	7	100	99.3 JT	8900 T	FM006	1690	487 JT	6490 JV	99.3 JT	8900 T	FM006	1690	487 JT	6490 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	7	7	100	0.357	2.98	FM033	1.61	1.53	2.91 V	0.357	2.98	FM033	1.61	1.53	2.91 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	7	100	2.25	10.7	FM006	6.16	5.93	10.6 V	2.25	10.7	FM006	6.16	5.93	10.6 V
Hexachlorodibenzofuran homologs	pg/g-Wet	7	7	100	0.241	2.37	FM006	1.25	1.25	2.22 V	0.241	2.37	FM006	1.25	1.25	2.22 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	7	100	0.291	2.89	FM006	1.43	1.05	2.76 V	0.291	2.89	FM006	1.43	1.05	2.76 V
Octachlorodibenzofuran	pg/g-Wet	7	7	100	0.446 J	2.86 J	FM033	1.42	1.45	2.7 JV	0.446 J	2.86 J	FM033	1.42	1.45	2.7 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	7	7	100	7.71	35.8	FM033	21.5	22.6	35.2 V	7.71	35.8	FM033	21.5	22.6	35.2 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	7	7	100	0.513	3.35	FM006	1.59	1.34	3.01 V	0.513	3.35	FM006	1.59	1.34	3.01 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	6	85.7	0.212	0.648	FM006	0.424	0.43 V	0.635 V	0.0197 U	0.648	FM006	0.365	0.311	0.632 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	7	7	100	0.587	5.81	FM006	2.36	2.11	5.15 V	0.587	5.81	FM006	2.36	2.11	5.15 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	7	7	100	0.556	2.3	FM025	1.05	0.773	2.04 V	0.556	2.3	FM025	1.05	0.773	2.04 V
Total PCDD/F	pg/g-Wet	7	7	100	14.4 JT	66.2 JT	FM006	38.7	40.1 T	63.1 JV	14.4 JT	66.2 JT	FM006	38.7	40.1 T	63.1 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	7	6	85.7	0.255 J	1.07 J	FM033	0.629	0.564 V	1.03 JV	0.204 U	1.07 J	FM033	0.553	0.52	1.03 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	7	7	100	1.08 J	5.14	FM033	2.97	2.8	5.13 V	1.08 J	5.14	FM033	2.97	2.8	5.13 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	7	4	57.1	0.024 J	0.057 J	FM021	0.039	0.0375 JV	0.0557 JV	0.024 J	0.099 U	FM033	0.0387	0.0395 U	0.0548 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	7	7	100	0.049 J	0.179 J	FM006	0.111	0.121 J	0.168 JV	0.049 J	0.179 J	FM006	0.111	0.121 J	0.168 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	7	4	57.1	0.042 J	0.121 J	FM006	0.089	0.0965 JV	0.12 JV	0.038 U	0.121 J	FM006	0.0662	0.0565 U	0.119 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	7	4	57.1	0.03 J	0.09	FM025	0.0635	0.067 JV	0.0878 JV	0.03 J	0.127 U	FM033	0.0546	0.059 J	0.0855 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	7	6	85.7	0.152 J	0.527 J	FM006	0.324	0.29 JV	0.52 JV	0.152 J	0.527 J	FM006	0.313	0.247 U	0.519 JV
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	7	0	0	--	--	--	--	--	--	0.0311 U	0.191 U	FM033	0.0451	0.0459 U	0.0812 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	7	5	71.4	0.083 J	0.239 J	FM006	0.154	0.154 J	0.23 JV	0.057 U	0.262 U	FM033	0.133	0.131 U	0.225 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	7	3	42.9	0.064 J	0.165 J	FM021	0.124	0.144 J	0.163 JV	0.055 U	0.238 U	FM033	0.0849	0.064 J	0.159 JV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	7	3	42.9	0.068 J	0.178 J	FM006	0.123	0.122 J	0.172 JV	0.041 U	0.178 J	FM006	0.0837	0.077 U	0.161 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	7	5	71.4	0.045 J	0.16 J	FM033	0.0916	0.082 J	0.148 JV	0.045 J	0.16 J	FM033	0.0784	0.069 J	0.143 JV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	7	6	85.7	0.112 J	0.286 J	FM006	0.181	0.167 JV	0.264 JV	0.1 U	0.286 J	FM006	0.162	0.156 J	0.26 JV
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	7	2	28.6	0.277	0.305	FM021	0.291	0.291 V	0.304 V	0.052 U	0.454 U	FM006	0.152	0.107 U	0.297 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	7	2	28.6	0.048 J	0.057 J	FM021	0.0525	0.0525 JV	0.0566 JV	0.048 J	0.127 U	FM025	0.0456	0.048 J	0.0616 JV
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	7	7	100	0.0704 JT	0.446 JT	FM006	0.231	0.176 JT	0.428 JV	0.0704 JT	0.446 JT	FM006	0.231	0.176 JT	0.428 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	7	7	100	0.161 JT	1.54 JT	FM006	0.491	0.388 JT	1.23 JV	0.161 JT	1.54 JT	FM006	0.491	0.388 JT	1.23 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	7	7	100	0.0101 T	1.09 T	FM006	0.259	0.132 T	0.827 V	0.0101 T	1.09 T	FM006	0.259	0.132 T	0.827 V
Pesticides																
2,4'-DDD	µg/kg-Wet	7	7	100	0.03 J	0.143 J	FM025	0.0801	0.073 J	0.136 JV	0.03 J	0.143 J	FM025	0.0801	0.073 J	0.136 JV
2,4'-DDE	µg/kg-Wet	7	6	85.7	0.014 J	0.102 J	FM025	0.0387	0.0315 JV	0.085 JV	0.014 J	0.102 J	FM025	0.0347	0.03 J	0.0816 JV
2,4'-DDT	µg/kg-Wet	7	7	100	0.035 J	0.082 J	FM006	0.0583	0.062 J	0.0769 JV	0.035 J	0.082 J	FM006	0.0583	0.062 J	0.0769 JV
4,4'-DDD	µg/kg-Wet	7	7	100	0.277 J	1.22 J	FM006	0.634	0.571 J	1.15 JV	0.277 J	1.22 J	FM006	0.634	0.571 J	1.15 JV
4,4'-DDE	µg/kg-Wet	7	7	100	0.544 J	3.15 J	FM025	1.48	1.45 J	2.72 JV	0.544 J	3.15 J	FM025	1.48	1.45 J	2.72 JV
4,4'-DDT	µg/kg-Wet	7	7	100	0.091 J	0.239 J	FM006	0.182	0.182 J	0.232 JV	0.091 J	0.239 J	FM006	0.182	0.182 J	0.232 JV
Aldrin	µg/kg-Wet	7	4	57.1	0.007 J	0.067 J	FM025	0.023	0.009 JV	0.0585 JV	0.005 UJ	0.067 J	FM025	0.0143	0.007 J	0.0499 JV
alpha-Endosulfan	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.00827 UJ	0.034 UJ	FM033	0.00935	0.0075 UJ	0.0163 UJV
alpha-Hexachlorocyclohexane	µg/kg-Wet	7	2	28.6	0.003 J	0.005 J	FM033	0.004	0.004 JV	0.0049 JV	0.003 J	0.426 UJ	FM004	0.0907	0.005 J	0.211 UJV
beta-Endosulfan	µg/kg-Wet	7	1	14.3	0.0172 J	0.0172 J	FM021	0.0172	0.0172 J	0.0172 J	0.0172 J	0.117 UJ	FM009	0.0238	0.0172 J	0.0498 UJV
beta-Hexachlorocyclohexane	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.0222 UJ	0.136 UJ	FM033	0.032	0.0328 UJ	0.0577 UJV
cis-Chlordane	µg/kg-Wet	7	7	100	0.053 J	0.261 J	FM025	0.13	0.123 J	0.228 JV	0.053 J	0.261 J	FM025	0.13	0.123 J	0.228 JV
cis-Nonachlor	µg/kg-Wet	7	7	100	0.03 J	0.092 J	FM025	0.0576	0.057 J	0.0842 JV	0.03 J	0.092 J	FM025	0.0576	0.057 J	0.0842 JV
delta-Hexachlorocyclohexane	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.000865 UJ	0.0596 UJ	FM033	0.00702	0.00141 UJ	0.0252 UJV
Dieldrin	µg/kg-Wet	7	7	100	0.0742 J	0.186 J	FM025	0.136	0.143 J	0.177 JV	0.0742 J	0.186 J	FM025	0.136	0.143 J	0.177 JV
Endosulfan sulfate	µg/kg-Wet	7	7	100	0.11 J	0.267 J	FM033	0.199	0.192 J	0.259 JV	0.11 J	0.267 J	FM033	0.199	0.192 J	0.259 JV
Endrin	µg/kg-Wet	7	2	28.6	0.00224 J	0.00418 J	FM033	0.00321	0.00321 JV	0.00408 JV	0.00134 UJ	0.0222 UJ	FM004	0.00721	0.0106 UJ	0.0111 UJV
Endrin aldehyde	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.0137 UJ	0.0844 UJ	FM033	0.0199	0.0203 UJ	0.0358 UJV
Endrin ketone	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.0137 UJ	0.0844 UJ	FM033	0.0199	0.0203 UJ	0.0358 UJV
gamma-Hexachlorocyclohexane	µg/kg-Wet	7	1	14.3	0.007 J	0.007 J	FM006	0.007	0.007 J	0.007 J	0.003 UJ	0.062 UJ	FM033	0.0123	0.0147 UJ	0.0263 UJV
Heptachlor	µg/kg-Wet	7	1	14.3	0.006 J	0.006 J	FM025	0.006	0.006 J	0.006 J	0.001 UJ	0.0806 UJ	FM033	0.0127	0.006 J	0.0342 UJV
Heptachlor epoxide	µg/kg-Wet	7	6	85.7	0.0075 J	0.0135 J	FM025	0.0106	0.0102 JV	0.0134 JV	0.0075 J	0.0135 J	FM025	0.00981	0.00994 J	0.0134 JV
Methoxychlor	µg/kg-Wet	7	1	14.3	0.0136 J	0.0136 J	FM033	0.0136	0.0136 J	0.0136 J	0.00237 UJ	0.0136 J	FM033	0.00377	0.00213 UJ	0.0105 JV
Oxychlordane	µg/kg-Wet	7	3	42.9	0.012 J	0.02 J	FM025	0.015	0.013 J	0.0193 JV	0.011 UJ	0.186 UJ	FM033	0.0334	0.02 J	0.0789 UJV
Total Chlordanes	µg/kg-Wet	7	7	100	0.191 JT	0.866 JT	FM025	0.451	0.434 JT	0.763 JV	0.191 JT	0.866 JT	FM025	0.451	0.434 JT	0.763 JV
Total Endosulfan	µg/kg-Wet	7	7	100	0.11 JT	0.267 JT	FM033	0.201	0.192 JT	0.259 JV	0.11 JT	0.267 JT	FM033	0.201	0.192 JT	0.259 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	7	7	100	0.309 JT	1.34 JT	FM006	0.715	0.644 JT	1.27 JV	0.309 JT	1.34 JT	FM006	0.715	0.644 JT	1.27 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	7	7	100	0.979 JT	4.44 JT	FM025	2.47	2.62 JT	4.05 JV	0.979 JT	4.44 JT	FM025	2.47	2.62 JT	4.05 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	7	7	100	0.544 JT	3.25 JT	FM025	1.51	1.48 JT	2.8 JV	0.544 JT	3.25 JT	FM025	1.51	1.48 JT	2.8 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	7	7	100	0.126 JT	0.321 JT	FM006	0.241	0.244 JT	0.309 JV	0.126 JT	0.321 JT	FM006	0.241	0.244 JT	0.309 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
trans-Chlordane	µg/kg-Wet	7	7	100	0.04 J	0.232 J	FM025	0.1	0.098 J	0.194 JV	0.04 J	0.232 J	FM025	0.1	0.098 J	0.194 JV
trans-Nonachlor	µg/kg-Wet	7	7	100	0.068 J	0.261 J	FM025	0.157	0.156 J	0.242 JV	0.068 J	0.261 J	FM025	0.157	0.156 J	0.242 JV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	7	1	14	1.2 J	1.2 J	FM033	1.2	1.2 J	1.2 J	0.51 UJ	1.2 J	FM033	0.52	0.44 UJ	0.99 JV
Acenaphthene	µg/kg-Wet	7	7	100	0.14 J	2 J	FM033	0.68	0.48 J	1.7 JV	0.14 J	2 J	FM033	0.68	0.48 J	1.7 JV
Acenaphthylene	µg/kg-Wet	7	3	43	0.39 J	1.8 J	FM033	1.3	1.7 J	1.8 JV	0.3 UJ	1.8 J	FM033	0.64	0.15 UJ	1.8 JV
Anthracene	µg/kg-Wet	7	6	86	0.61 J	2.3 J	FM006	1.1	0.91 JV	2 JV	0.33 UJ	2.3 J	FM006	0.95	0.82 J	1.9 JV
Benzo(a)anthracene	µg/kg-Wet	7	7	100	0.73 J	11 J	FM006	2.6	1.2 J	8.2 JV	0.73 J	11 J	FM006	2.6	1.2 J	8.2 JV
Benzo(a)pyrene	µg/kg-Wet	7	7	100	0.51 J	5.2 J	FM006	1.4	0.79 J	4 JV	0.51 J	5.2 J	FM006	1.4	0.79 J	4 JV
Benzo(b)fluoranthene	µg/kg-Wet	7	7	100	0.59 J	12 J	FM006	2.5	0.87 J	8.8 JV	0.59 J	12 J	FM006	2.5	0.87 J	8.8 JV
Benzo(g,h,i)perylene	µg/kg-Wet	7	6	86	0.43 J	7.1 J	FM006	1.7	0.75 JV	5.6 JV	0.2 UJ	7.1 J	FM006	1.5	0.68 J	5.2 JV
Benzo(k)fluoranthene	µg/kg-Wet	7	7	100	0.23 J	4.2 J	FM006	0.95	0.43 J	3.2 JV	0.23 J	4.2 J	FM006	0.95	0.43 J	3.2 JV
Chrysene	µg/kg-Wet	7	7	100	2.1 J	27 J	FM006	6.4	3 J	20 JV	2.1 J	27 J	FM006	6.4	3 J	20 JV
Dibenzo(a,h)anthracene	µg/kg-Wet	7	1	14	0.67 J	0.67 J	FM006	0.67	0.67 J	0.67 J	0.14 UJ	0.67 J	FM006	0.17	0.07 UJ	0.51 JV
Fluoranthene	µg/kg-Wet	7	7	100	3.5 J	27 J	FM006	9.1	5.9 J	22 JV	3.5 J	27 J	FM006	9.1	5.9 J	22 JV
Fluorene	µg/kg-Wet	7	7	100	0.35 J	1.3 J	FM025	0.81	0.75 J	1.2 JV	0.35 J	1.3 J	FM025	0.81	0.75 J	1.2 JV
High Molecular Weight PAH	µg/kg-Wet	7	7	100	13 JT	130 JT	FM006	35	19 JT	99 JV	13 JT	130 JT	FM006	35	19 JT	99 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	7	3	42.9	0.1 J	3.1 J	FM006	1.18	0.33 J	2.82 JV	0.096 UJ	6.4 UJ	FM021	0.989	0.1 J	3.17 JV
Low Molecular Weight PAH	µg/kg-Wet	7	7	100	3 JT	14 JT	FM006	8.2	8.4 JT	13 JV	3 JT	14 JT	FM006	8.2	8.4 JT	13 JV
Naphthalene	µg/kg-Wet	7	7	100	1.1 J	2.1 J	FM033	1.5	1.5 J	2 JV	1.1 J	2.1 J	FM033	1.5	1.5 J	2 JV
Phenanthrene	µg/kg-Wet	7	7	100	1.4 J	8.4 J	FM006	3.7	2.9 J	7.2 JV	1.4 J	8.4 J	FM006	3.7	2.9 J	7.2 JV
Pyrene	µg/kg-Wet	7	7	100	4.2 J	36 J	FM006	11	6.6 J	28 JV	4.2 J	36 J	FM006	11	6.6 J	28 JV
Total BaPEq	µg/kg-Wet	7	7	100	0.693 JT	8.55 JT	FM006	2.12	1.07 JT	6.44 JV	0.693 JT	8.55 JT	FM006	2.12	1.07 JT	6.44 JV
Total cPAHs	µg/kg-Wet	7	7	100	4.6 JT	63 JT	FM006	14	6.7 JT	47 JV	4.6 JT	63 JT	FM006	14	6.7 JT	47 JV
Total PAHs	µg/kg-Wet	7	7	100	16 JT	150 JT	FM006	44	24 JT	120 JV	16 JT	150 JT	FM006	44	24 JT	120 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	7	4	57	54 J	120 J	FM006	91	94 JV	120 JV	49 UJ	120 J	FM006	66	54 J	110 JV
Butylbenzylphthalate	µg/kg-Wet	7	0	0	--	--	--	--	--	--	130 UJ	260 UJ	FM004; FM006; FM033	93	65 UJ	130 UJV
Dibutyl phthalate	µg/kg-Wet	7	5	71	12 J	32 J	FM004; FM033	23	21 J	32 JV	8.9 UJ	32 J	FM004; FM033	18	17 J	32 JV
Diethyl phthalate	µg/kg-Wet	7	0	0	--	--	--	--	--	--	13 UJ	26 UJ	FM004; FM006; FM033	9.3	6.5 UJ	13 UJV
Dimethyl phthalate	µg/kg-Wet	7	0	0	--	--	--	--	--	--	11 UJ	22 UJ	FM004; FM006; FM033	7.9	5.5 UJ	11 UJV
Di-n-octyl phthalate	µg/kg-Wet	7	0	0	--	--	--	--	--	--	39 UJ	78 UJ	FM004; FM006	28	20 UJ	39 UJV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	7	0	0	--	--	--	--	--	--	4.7 UJ	9.4 UJ	FM004; FM006	3.3	2.4 UJ	4.7 UJV
1,2-Dichlorobenzene	µg/kg-Wet	7	0	0	--	--	--	--	--	--	7.7 UJ	16 UJ	FM004; FM006	5.6	3.9 UJ	8 UJV
1,3-Dichlorobenzene	µg/kg-Wet	7	0	0	--	--	--	--	--	--	9.8 UJ	20 UJ	FM004; FM006	7	4.9 UJ	10 UJV
1,4-Dichlorobenzene	µg/kg-Wet	7	0	0	--	--	--	--	--	--	8.9 UJ	18 UJ	FM004; FM006; FM033	6.4	4.5 UJ	9 UJV
Benzyl alcohol	µg/kg-Wet	7	3	43	22 J	170 J	FM033	80	48 J	160 JV	22 J	170 J	FM033	42	22 J	130 JV
Hexachlorobenzene	µg/kg-Wet	7	7	100	0.063 J	0.181 J	FM025	0.122	0.125 J	0.17 JV	0.063 J	0.181 J	FM025	0.122	0.125 J	0.17 JV
Hexachlorobutadiene	µg/kg-Wet	7	0	0	--	--	--	--	--	--	0.00809 UJ	11 UJ	FM033	1.56	0.0129 UJ	4.66 UJV
Hexachloroethane	µg/kg-Wet	7	0	0	--	--	--	--	--	--	9.3 UJ	19 UJ	FM004; FM006	6.7	4.7 UJ	9.5 UJV
N-Nitrosodiphenylamine	µg/kg-Wet	7	0	0	--	--	--	--	--	--	12 UJ	24 UJ	FM004; FM006; FM033	8.6	6 UJ	12 UJV
Phenols																
2,4-Dimethylphenol	µg/kg-Wet	7	0	0	--	--	--	--	--	--	20 UJ	40 UJ	FM004; FM006	14	10 UJ	20 UJV
2-Methylphenol	µg/kg-Wet	7	0	0	--	--	--	--	--	--	20 UJ	40 UJ	FM004; FM006	14	10 UJ	20 UJV
4-Methylphenol	µg/kg-Wet	7	0	0	--	--	--	--	--	--	20 UJ	40 UJ	FM004; FM006	14	10 UJ	20 UJV
Pentachlorophenol	µg/kg-Wet	7	0	0	--	--	--	--	--	--	20 UJ	40 UJ	FM004; FM006	14	10 UJ	20 UJV
Phenol	µg/kg-Wet	7	0	0	--	--	--	--	--	--	20 UJ	40 UJ	FM004; FM006	14	10 UJ	20 UJV
Sturgeon (stomach contents)																
Conventionals																
Lipids	percent-Wet	3	3	100	0.37 T	1.7	STWB03	0.95	0.79	1.6 V	0.37 T	1.7	STWB03	0.95	0.79	1.6 V
Total solids	percent-Wet	3	3	100	12.9	20.7 T	STWB04	17.8	19.9	20.6 V	12.9	20.7 T	STWB04	17.8	19.9	20.6 V

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Metals																
Aluminum	mg/kg-Wet	3	3	100	75.9 JT	3740 J	STWB03	1380	319 J	3400 JV	75.9 JT	3740 J	STWB03	1380	319 J	3400 JV
Antimony	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.003 U	0.004 U	STWB03; STWB04	0.00183	0.002 UT	0.002 UV
Arsenic	mg/kg-Wet	3	3	100	0.17 T	0.82	STWB03	0.45	0.35	0.77 V	0.17 T	0.82	STWB03	0.45	0.35	0.77 V
Cadmium	mg/kg-Wet	3	3	100	0.008 T	0.054	STWB03	0.033	0.037	0.0523 V	0.008 T	0.054	STWB03	0.033	0.037	0.0523 V
Chromium	mg/kg-Wet	3	3	100	0.15 JT	4.1	STWB03	1.6	0.5	3.7 V	0.15 JT	4.1	STWB03	1.6	0.5	3.7 V
Copper	mg/kg-Wet	3	3	100	6.73 J	11 J	STWB01	8.51	7.8 JT	10.7 JV	6.73 J	11 J	STWB01	8.51	7.8 JT	10.7 JV
Lead	mg/kg-Wet	3	3	100	0.103 T	1.5	STWB03	0.581	0.139	1.36 V	0.103 T	1.5	STWB03	0.581	0.139	1.36 V
Mercury	mg/kg-Wet	3	3	100	0.0073 J	0.0119 J	STWB03	0.0102	0.0115 J	0.0119 JV	0.0073 J	0.0119 J	STWB03	0.0102	0.0115 J	0.0119 JV
Nickel	mg/kg-Wet	3	3	100	0.267	2.33	STWB03	1.08	0.631 T	2.16 V	0.267	2.33	STWB03	1.08	0.631 T	2.16 V
Selenium	mg/kg-Wet	3	2	67	0.2 J	0.3	STWB01	0.25	0.25 JV	0.3 JV	0.1 UT	0.3	STWB01	0.18	0.2 J	0.29 JV
Silver	mg/kg-Wet	3	3	100	0.027 JT	0.068 J	STWB01	0.049	0.052 J	0.0664 JV	0.027 JT	0.068 J	STWB01	0.049	0.052 J	0.0664 JV
Zinc	mg/kg-Wet	3	3	100	9.56 T	19.1	STWB01	15.8	18.8	19.1 V	9.56 T	19.1	STWB01	15.8	18.8	19.1 V
PCB Congeners																
PCB001	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.322 U	0.322 U	STWB04	0.161	0.161 U	0.161 U
PCB002	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.151 U	0.151 U	STWB04	0.0755	0.0755 U	0.0755 U
PCB003	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.262 U	0.262 U	STWB04	0.131	0.131 U	0.131 U
PCB004	pg/g-Wet	1	1	100	0.725 J	0.725 J	STWB04	0.725	0.725 J	0.725 J	0.725 J	0.725 J	STWB04	0.725	0.725 J	0.725 J
PCB005	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.233 UJ	0.233 UJ	STWB04	0.117	0.117 UJ	0.117 UJ
PCB006	pg/g-Wet	1	1	100	0.25 J	0.25 J	STWB04	0.25	0.25 J	0.25 J	0.25 J	0.25 J	STWB04	0.25	0.25 J	0.25 J
PCB007	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.291 UJ	0.291 UJ	STWB04	0.146	0.146 UJ	0.146 UJ
PCB008	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.23 UJ	1.23 UJ	STWB04	0.615	0.615 UJ	0.615 UJ
PCB009	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.291 UJ	0.291 UJ	STWB04	0.146	0.146 UJ	0.146 UJ
PCB010	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.233 UJ	0.233 UJ	STWB04	0.117	0.117 UJ	0.117 UJ
PCB011	pg/g-Wet	1	1	100	3.59 J	3.59 J	STWB04	3.59	3.59 J	3.59 J	3.59 J	3.59 J	STWB04	3.59	3.59 J	3.59 J
PCB012 & 013	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.326 UJ	0.326 UJ	STWB04	0.163	0.163 UJ	0.163 UJ
PCB014	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.396 UJ	0.396 UJ	STWB04	0.198	0.198 UJ	0.198 UJ
PCB015	pg/g-Wet	1	1	100	3.08	3.08	STWB04	3.08	3.08	3.08	3.08	3.08	STWB04	3.08	3.08	3.08
PCB016	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.516 U	0.516 U	STWB04	0.258	0.258 U	0.258 U
PCB017	pg/g-Wet	1	1	100	1.29	1.29	STWB04	1.29	1.29	1.29	1.29	1.29	STWB04	1.29	1.29	1.29
PCB018 & 030	pg/g-Wet	1	0	0	--	--	--	--	--	--	2.65 U	2.65 U	STWB04	1.33	1.33 U	1.33 U
PCB019	pg/g-Wet	1	1	100	1.13	1.13	STWB04	1.13	1.13	1.13	1.13	1.13	STWB04	1.13	1.13	1.13
PCB020 & 028	pg/g-Wet	1	1	100	44.3	44.3	STWB04	44.3	44.3	44.3	44.3	44.3	STWB04	44.3	44.3	44.3
PCB021 & 033	pg/g-Wet	1	0	0	--	--	--	--	--	--	2.35 U	2.35 U	STWB04	1.18	1.18 U	1.18 U
PCB022	pg/g-Wet	1	1	100	1.92	1.92	STWB04	1.92	1.92	1.92	1.92	1.92	STWB04	1.92	1.92	1.92
PCB023	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.314 U	0.314 U	STWB04	0.157	0.157 U	0.157 U
PCB024	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.198 U	0.198 U	STWB04	0.099	0.099 U	0.099 U
PCB025	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.546 U	0.546 U	STWB04	0.273	0.273 U	0.273 U
PCB026 & 029	pg/g-Wet	1	1	100	1.62	1.62	STWB04	1.62	1.62	1.62	1.62	1.62	STWB04	1.62	1.62	1.62
PCB027	pg/g-Wet	1	1	100	0.54	0.54	STWB04	0.54	0.54	0.54	0.54	0.54	STWB04	0.54	0.54	0.54
PCB031	pg/g-Wet	1	1	100	10.7	10.7	STWB04	10.7	10.7	10.7	10.7	10.7	STWB04	10.7	10.7	10.7
PCB032	pg/g-Wet	1	1	100	4.4	4.4	STWB04	4.4	4.4	4.4	4.4	4.4	STWB04	4.4	4.4	4.4
PCB034	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.121 U	0.121 U	STWB04	0.0605	0.0605 U	0.0605 U
PCB035	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.101 U	0.101 U	STWB04	0.0505	0.0505 U	0.0505 U
PCB036	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.442 U	0.442 U	STWB04	0.221	0.221 U	0.221 U
PCB037	pg/g-Wet	1	1	100	5.91	5.91	STWB04	5.91	5.91	5.91	5.91	5.91	STWB04	5.91	5.91	5.91
PCB038	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.349 U	0.349 U	STWB04	0.175	0.175 U	0.175 U
PCB039	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.115 U	0.115 U	STWB04	0.0575	0.0575 U	0.0575 U
PCB040 & 041 & 071	pg/g-Wet	1	1	100	12.6	12.6	STWB04	12.6	12.6	12.6	12.6	12.6	STWB04	12.6	12.6	12.6
PCB042	pg/g-Wet	1	1	100	1.47	1.47	STWB04	1.47	1.47	1.47	1.47	1.47	STWB04	1.47	1.47	1.47
PCB043	pg/g-Wet	1	1	100	0.95	0.95	STWB04	0.95	0.95	0.95	0.95	0.95	STWB04	0.95	0.95	0.95
PCB044 & 047 & 065	pg/g-Wet	1	1	100	144	144	STWB04	144	144	144	144	144	STWB04	144	144	144
PCB045 & 051	pg/g-Wet	1	1	100	4.16	4.16	STWB04	4.16	4.16	4.16	4.16	4.16	STWB04	4.16	4.16	4.16
PCB046	pg/g-Wet	1	1	100	0.251 J	0.251 J	STWB04	0.251	0.251 J	0.251 J	0.251 J	0.251 J	STWB04	0.251	0.251 J	0.251 J
PCB048	pg/g-Wet	1	1	100	1.71	1.71	STWB04	1.71	1.71	1.71	1.71	1.71	STWB04	1.71	1.71	1.71
PCB049 & 069	pg/g-Wet	1	1	100	33.5	33.5	STWB04	33.5	33.5	33.5	33.5	33.5	STWB04	33.5	33.5	33.5
PCB050 & 053	pg/g-Wet	1	1	100	6.81	6.81	STWB04	6.81	6.81	6.81	6.81	6.81	STWB04	6.81	6.81	6.81

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB052	pg/g-Wet	1	1	100	64.2	64.2	STWB04	64.2	64.2	64.2	64.2	64.2	STWB04	64.2	64.2	64.2
PCB054	pg/g-Wet	1	1	100	0.716	0.716	STWB04	0.716	0.716	0.716	0.716	0.716	STWB04	0.716	0.716	0.716
PCB055	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.431 U	0.431 U	STWB04	0.216	0.216 U	0.216 U
PCB056	pg/g-Wet	1	1	100	2.73	2.73	STWB04	2.73	2.73	2.73	2.73	2.73	STWB04	2.73	2.73	2.73
PCB057	pg/g-Wet	1	1	100	0.173 J	0.173 J	STWB04	0.173	0.173 J	0.173 J	0.173 J	0.173 J	STWB04	0.173	0.173 J	0.173 J
PCB058	pg/g-Wet	1	1	100	0.194 J	0.194 J	STWB04	0.194	0.194 J	0.194 J	0.194 J	0.194 J	STWB04	0.194	0.194 J	0.194 J
PCB059 & 062 & 075	pg/g-Wet	1	1	100	5.55	5.55	STWB04	5.55	5.55	5.55	5.55	5.55	STWB04	5.55	5.55	5.55
PCB060	pg/g-Wet	1	1	100	26.9	26.9	STWB04	26.9	26.9	26.9	26.9	26.9	STWB04	26.9	26.9	26.9
PCB061 & 070 & 074 & 076	pg/g-Wet	1	1	100	114	114	STWB04	114	114	114	114	114	STWB04	114	114	114
PCB063	pg/g-Wet	1	1	100	8.08	8.08	STWB04	8.08	8.08	8.08	8.08	8.08	STWB04	8.08	8.08	8.08
PCB064	pg/g-Wet	1	1	100	19.8	19.8	STWB04	19.8	19.8	19.8	19.8	19.8	STWB04	19.8	19.8	19.8
PCB066	pg/g-Wet	1	1	100	131	131	STWB04	131	131	131	131	131	STWB04	131	131	131
PCB067	pg/g-Wet	1	1	100	0.792	0.792	STWB04	0.792	0.792	0.792	0.792	0.792	STWB04	0.792	0.792	0.792
PCB068	pg/g-Wet	1	1	100	2.85	2.85	STWB04	2.85	2.85	2.85	2.85	2.85	STWB04	2.85	2.85	2.85
PCB072	pg/g-Wet	1	1	100	1.41	1.41	STWB04	1.41	1.41	1.41	1.41	1.41	STWB04	1.41	1.41	1.41
PCB073	pg/g-Wet	1	1	100	1.25	1.25	STWB04	1.25	1.25	1.25	1.25	1.25	STWB04	1.25	1.25	1.25
PCB077	pg/g-Wet	1	1	100	6.35	6.35	STWB04	6.35	6.35	6.35	6.35	6.35	STWB04	6.35	6.35	6.35
PCB078	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.384 U	0.384 U	STWB04	0.192	0.192 U	0.192 U
PCB079	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.713 U	0.713 U	STWB04	0.357	0.357 U	0.357 U
PCB080	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.303 U	0.303 U	STWB04	0.152	0.152 U	0.152 U
PCB081	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.387 U	0.387 U	STWB04	0.194	0.194 U	0.194 U
PCB082	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.39 U	1.39 U	STWB04	0.695	0.695 U	0.695 U
PCB083 & 099	pg/g-Wet	1	1	100	358	358	STWB04	358	358	358	358	358	STWB04	358	358	358
PCB084	pg/g-Wet	1	1	100	8.98	8.98	STWB04	8.98	8.98	8.98	8.98	8.98	STWB04	8.98	8.98	8.98
PCB085 & 116 & 117	pg/g-Wet	1	1	100	85.4	85.4	STWB04	85.4	85.4	85.4	85.4	85.4	STWB04	85.4	85.4	85.4
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	1	1	100	71.2	71.2	STWB04	71.2	71.2	71.2	71.2	71.2	STWB04	71.2	71.2	71.2
PCB088 & 091	pg/g-Wet	1	1	100	19.8	19.8	STWB04	19.8	19.8	19.8	19.8	19.8	STWB04	19.8	19.8	19.8
PCB089	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.279 U	0.279 U	STWB04	0.14	0.14 U	0.14 U
PCB090 & 101 & 113	pg/g-Wet	1	1	100	185	185	STWB04	185	185	185	185	185	STWB04	185	185	185
PCB092	pg/g-Wet	1	1	100	48.3	48.3	STWB04	48.3	48.3	48.3	48.3	48.3	STWB04	48.3	48.3	48.3
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	1	1	100	120	120	STWB04	120	120	120	120	120	STWB04	120	120	120
PCB094	pg/g-Wet	1	1	100	1.17	1.17	STWB04	1.17	1.17	1.17	1.17	1.17	STWB04	1.17	1.17	1.17
PCB096	pg/g-Wet	1	1	100	0.486	0.486	STWB04	0.486	0.486	0.486	0.486	0.486	STWB04	0.486	0.486	0.486
PCB103	pg/g-Wet	1	1	100	3.17	3.17	STWB04	3.17	3.17	3.17	3.17	3.17	STWB04	3.17	3.17	3.17
PCB104	pg/g-Wet	1	1	100	0.364 J	0.364 J	STWB04	0.364	0.364 J	0.364 J	0.364 J	0.364 J	STWB04	0.364	0.364 J	0.364 J
PCB105	pg/g-Wet	1	1	100	154	154	STWB04	154	154	154	154	154	STWB04	154	154	154
PCB106	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.212 U	0.212 U	STWB04	0.106	0.106 U	0.106 U
PCB107 & 124	pg/g-Wet	1	1	100	3.14	3.14	STWB04	3.14	3.14	3.14	3.14	3.14	STWB04	3.14	3.14	3.14
PCB109	pg/g-Wet	1	1	100	43.9	43.9	STWB04	43.9	43.9	43.9	43.9	43.9	STWB04	43.9	43.9	43.9
PCB110 & 115	pg/g-Wet	1	1	100	154	154	STWB04	154	154	154	154	154	STWB04	154	154	154
PCB111	pg/g-Wet	1	1	100	1.43	1.43	STWB04	1.43	1.43	1.43	1.43	1.43	STWB04	1.43	1.43	1.43
PCB112	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.175 U	0.175 U	STWB04	0.0875	0.0875 U	0.0875 U
PCB114	pg/g-Wet	1	1	100	13.7	13.7	STWB04	13.7	13.7	13.7	13.7	13.7	STWB04	13.7	13.7	13.7
PCB118	pg/g-Wet	1	1	100	416	416	STWB04	416	416	416	416	416	STWB04	416	416	416
PCB120	pg/g-Wet	1	1	100	3.97	3.97	STWB04	3.97	3.97	3.97	3.97	3.97	STWB04	3.97	3.97	3.97
PCB121	pg/g-Wet	1	1	100	1.28	1.28	STWB04	1.28	1.28	1.28	1.28	1.28	STWB04	1.28	1.28	1.28
PCB122	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.256 U	0.256 U	STWB04	0.128	0.128 U	0.128 U
PCB123	pg/g-Wet	1	0	0	--	--	--	--	--	--	5.09 U	5.09 U	STWB04	2.55	2.55 U	2.55 U
PCB126	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.935 U	0.935 U	STWB04	0.468	0.468 U	0.468 U
PCB127	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.224 U	0.224 U	STWB04	0.112	0.112 U	0.112 U
PCB128 & 166	pg/g-Wet	1	1	100	97.9	97.9	STWB04	97.9	97.9	97.9	97.9	97.9	STWB04	97.9	97.9	97.9
PCB129 & 138 & 160 & 163	pg/g-Wet	1	1	100	1190	1190	STWB04	1190	1190	1190	1190	1190	STWB04	1190	1190	1190
PCB130	pg/g-Wet	1	1	100	37.6	37.6	STWB04	37.6	37.6	37.6	37.6	37.6	STWB04	37.6	37.6	37.6
PCB131	pg/g-Wet	1	1	100	0.886	0.886	STWB04	0.886	0.886	0.886	0.886	0.886	STWB04	0.886	0.886	0.886
PCB132	pg/g-Wet	1	1	100	47.4	47.4	STWB04	47.4	47.4	47.4	47.4	47.4	STWB04	47.4	47.4	47.4
PCB133	pg/g-Wet	1	1	100	32.3	32.3	STWB04	32.3	32.3	32.3	32.3	32.3	STWB04	32.3	32.3	32.3
PCB134 & 143	pg/g-Wet	1	1	100	6.7	6.7	STWB04	6.7	6.7	6.7	6.7	6.7	STWB04	6.7	6.7	6.7
PCB135 & 151 & 154	pg/g-Wet	1	1	100	161	161	STWB04	161	161	161	161	161	STWB04	161	161	161

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB136	pg/g-Wet	1	1	100	18.2	18.2	STWB04	18.2	18.2	18.2	18.2	18.2	STWB04	18.2	18.2	18.2
PCB137	pg/g-Wet	1	1	100	52.7	52.7	STWB04	52.7	52.7	52.7	52.7	52.7	STWB04	52.7	52.7	52.7
PCB139 & 140	pg/g-Wet	1	1	100	11.5	11.5	STWB04	11.5	11.5	11.5	11.5	11.5	STWB04	11.5	11.5	11.5
PCB141	pg/g-Wet	1	1	100	75.3	75.3	STWB04	75.3	75.3	75.3	75.3	75.3	STWB04	75.3	75.3	75.3
PCB142	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.299 U	0.299 U	STWB04	0.15	0.15 U	0.15 U
PCB144	pg/g-Wet	1	1	100	11	11	STWB04	11	11	11	11	11	STWB04	11	11	11
PCB145	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.186 U	0.186 U	STWB04	0.093	0.093 U	0.093 U
PCB146	pg/g-Wet	1	1	100	287	287	STWB04	287	287	287	287	287	STWB04	287	287	287
PCB147 & 149	pg/g-Wet	1	1	100	288	288	STWB04	288	288	288	288	288	STWB04	288	288	288
PCB148	pg/g-Wet	1	1	100	4.27	4.27	STWB04	4.27	4.27	4.27	4.27	4.27	STWB04	4.27	4.27	4.27
PCB150	pg/g-Wet	1	1	100	0.712	0.712	STWB04	0.712	0.712	0.712	0.712	0.712	STWB04	0.712	0.712	0.712
PCB152	pg/g-Wet	1	1	100	0.489	0.489	STWB04	0.489	0.489	0.489	0.489	0.489	STWB04	0.489	0.489	0.489
PCB153 & 168	pg/g-Wet	1	1	100	1450	1450	STWB04	1450	1450	1450	1450	1450	STWB04	1450	1450	1450
PCB155	pg/g-Wet	1	1	100	0.768	0.768	STWB04	0.768	0.768	0.768	0.768	0.768	STWB04	0.768	0.768	0.768
PCB156 & 157	pg/g-Wet	1	1	100	138	138	STWB04	138	138	138	138	138	STWB04	138	138	138
PCB158	pg/g-Wet	1	1	100	88.6	88.6	STWB04	88.6	88.6	88.6	88.6	88.6	STWB04	88.6	88.6	88.6
PCB159	pg/g-Wet	1	1	100	5.85	5.85	STWB04	5.85	5.85	5.85	5.85	5.85	STWB04	5.85	5.85	5.85
PCB161	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.279 U	0.279 U	STWB04	0.14	0.14 U	0.14 U
PCB162	pg/g-Wet	1	1	100	4.07	4.07	STWB04	4.07	4.07	4.07	4.07	4.07	STWB04	4.07	4.07	4.07
PCB164	pg/g-Wet	1	1	100	40.6	40.6	STWB04	40.6	40.6	40.6	40.6	40.6	STWB04	40.6	40.6	40.6
PCB165	pg/g-Wet	1	1	100	1.87	1.87	STWB04	1.87	1.87	1.87	1.87	1.87	STWB04	1.87	1.87	1.87
PCB167	pg/g-Wet	1	1	100	47.1	47.1	STWB04	47.1	47.1	47.1	47.1	47.1	STWB04	47.1	47.1	47.1
PCB169	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.71 U	0.71 U	STWB04	0.36	0.36 U	0.36 U
PCB170	pg/g-Wet	1	1	100	360	360	STWB04	360	360	360	360	360	STWB04	360	360	360
PCB171 & 173	pg/g-Wet	1	1	100	95.4	95.4	STWB04	95.4	95.4	95.4	95.4	95.4	STWB04	95.4	95.4	95.4
PCB172	pg/g-Wet	1	1	100	67.9	67.9	STWB04	67.9	67.9	67.9	67.9	67.9	STWB04	67.9	67.9	67.9
PCB174	pg/g-Wet	1	1	100	100	100	STWB04	100	100	100	100	100	STWB04	100	100	100
PCB175	pg/g-Wet	1	1	100	14.9	14.9	STWB04	14.9	14.9	14.9	14.9	14.9	STWB04	14.9	14.9	14.9
PCB176	pg/g-Wet	1	1	100	7.33	7.33	STWB04	7.33	7.33	7.33	7.33	7.33	STWB04	7.33	7.33	7.33
PCB177	pg/g-Wet	1	1	100	206	206	STWB04	206	206	206	206	206	STWB04	206	206	206
PCB178	pg/g-Wet	1	1	100	91.3	91.3	STWB04	91.3	91.3	91.3	91.3	91.3	STWB04	91.3	91.3	91.3
PCB179	pg/g-Wet	1	1	100	33.1	33.1	STWB04	33.1	33.1	33.1	33.1	33.1	STWB04	33.1	33.1	33.1
PCB180 & 193	pg/g-Wet	1	1	100	1240	1240	STWB04	1240	1240	1240	1240	1240	STWB04	1240	1240	1240
PCB181	pg/g-Wet	1	1	100	3.81	3.81	STWB04	3.81	3.81	3.81	3.81	3.81	STWB04	3.81	3.81	3.81
PCB182	pg/g-Wet	1	1	100	2.8	2.8	STWB04	2.8	2.8	2.8	2.8	2.8	STWB04	2.8	2.8	2.8
PCB183 & 185	pg/g-Wet	1	1	100	255	255	STWB04	255	255	255	255	255	STWB04	255	255	255
PCB184	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.5 U	0.5 U	STWB04	0.25	0.25 U	0.25 U
PCB186	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.116 U	0.116 U	STWB04	0.058	0.058 U	0.058 U
PCB187	pg/g-Wet	1	1	100	782	782	STWB04	782	782	782	782	782	STWB04	782	782	782
PCB188	pg/g-Wet	1	1	100	2.15	2.15	STWB04	2.15	2.15	2.15	2.15	2.15	STWB04	2.15	2.15	2.15
PCB189	pg/g-Wet	1	1	100	16.2	16.2	STWB04	16.2	16.2	16.2	16.2	16.2	STWB04	16.2	16.2	16.2
PCB190	pg/g-Wet	1	1	100	62.4	62.4	STWB04	62.4	62.4	62.4	62.4	62.4	STWB04	62.4	62.4	62.4
PCB191	pg/g-Wet	1	1	100	18.1	18.1	STWB04	18.1	18.1	18.1	18.1	18.1	STWB04	18.1	18.1	18.1
PCB192	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.233 U	0.233 U	STWB04	0.117	0.117 U	0.117 U
PCB194	pg/g-Wet	1	1	100	160	160	STWB04	160	160	160	160	160	STWB04	160	160	160
PCB195	pg/g-Wet	1	1	100	72.5	72.5	STWB04	72.5	72.5	72.5	72.5	72.5	STWB04	72.5	72.5	72.5
PCB196	pg/g-Wet	1	1	100	99.9	99.9	STWB04	99.9	99.9	99.9	99.9	99.9	STWB04	99.9	99.9	99.9
PCB197 & 200	pg/g-Wet	1	1	100	13	13	STWB04	13	13	13	13	13	STWB04	13	13	13
PCB198 & 199	pg/g-Wet	1	1	100	195	195	STWB04	195	195	195	195	195	STWB04	195	195	195
PCB201	pg/g-Wet	1	1	100	27.3	27.3	STWB04	27.3	27.3	27.3	27.3	27.3	STWB04	27.3	27.3	27.3
PCB202	pg/g-Wet	1	1	100	48.2	48.2	STWB04	48.2	48.2	48.2	48.2	48.2	STWB04	48.2	48.2	48.2
PCB203	pg/g-Wet	1	1	100	99.4	99.4	STWB04	99.4	99.4	99.4	99.4	99.4	STWB04	99.4	99.4	99.4
PCB204	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.132 U	0.132 U	STWB04	0.066	0.066 U	0.066 U
PCB205	pg/g-Wet	1	1	100	4.9	4.9	STWB04	4.9	4.9	4.9	4.9	4.9	STWB04	4.9	4.9	4.9
PCB206	pg/g-Wet	1	1	100	32.9	32.9	STWB04	32.9	32.9	32.9	32.9	32.9	STWB04	32.9	32.9	32.9
PCB207	pg/g-Wet	1	1	100	8.43	8.43	STWB04	8.43	8.43	8.43	8.43	8.43	STWB04	8.43	8.43	8.43
PCB208	pg/g-Wet	1	1	100	15.5	15.5	STWB04	15.5	15.5	15.5	15.5	15.5	STWB04	15.5	15.5	15.5
PCB209	pg/g-Wet	1	1	100	21.9	21.9	STWB04	21.9	21.9	21.9	21.9	21.9	STWB04	21.9	21.9	21.9

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total PCB Congeners	pg/g-Wet	1	1	100	10600 JT	10600 JT	STWB04	10600	10600 JT	10600 JT	10600 JT	10600 JT	STWB04	10600	10600 JT	10600 JT
Total PCBs[c]																
Total PCBs	µg/kg-Wet	1	1	100	10.6 JT	10.6 JT	STWB04	10.6	10.6 JT	10.6 JT	10.6 JT	10.6 JT	STWB04	10.6	10.6 JT	10.6 JT
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	1	1	100	7.65 JT	7.65 JT	STWB04	7.65	7.65 JT	7.65 JT	7.65 JT	7.65 JT	STWB04	7.65	7.65 JT	7.65 JT
Heptachlorobiphenylhomologs	pg/g-Wet	1	1	100	3360 T	3360 T	STWB04	3360	3360 T	3360 T	3360 T	3360 T	STWB04	3360	3360 T	3360 T
Hexachlorobiphenyl homologs	pg/g-Wet	1	1	100	4100 T	4100 T	STWB04	4100	4100 T	4100 T	4100 T	4100 T	STWB04	4100	4100 T	4100 T
Monochlorobiphenyl homologs	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.322 UT	0.322 UT	STWB04	0.161	0.161 UT	0.161 UT
Nonachlorobiphenyl homologs	pg/g-Wet	1	1	100	56.8 T	56.8 T	STWB04	56.8	56.8 T	56.8 T	56.8 T	56.8 T	STWB04	56.8	56.8 T	56.8 T
Octachlorobiphenyl homologs	pg/g-Wet	1	1	100	720 T	720 T	STWB04	720	720 T	720 T	720 T	720 T	STWB04	720	720 T	720 T
Pentachlorobiphenylhomologs	pg/g-Wet	1	1	100	1690 JT	1690 JT	STWB04	1690	1690 JT	1690 JT	1690 JT	1690 JT	STWB04	1690	1690 JT	1690 JT
Tetrachlorobiphenyl homologs	pg/g-Wet	1	1	100	591 JT	591 JT	STWB04	591	591 JT	591 JT	591 JT	591 JT	STWB04	591	591 JT	591 JT
Trichlorobiphenyl homologs	pg/g-Wet	1	1	100	71.8 T	71.8 T	STWB04	71.8	71.8 T	71.8 T	71.8 T	71.8 T	STWB04	71.8	71.8 T	71.8 T
PCDD/Fs																
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.0242 A	0.0242 A	STWB04	0.0242	0.0242 A	0.0242 A	0.0242 A	0.0242 A	STWB04	0.0242	0.0242 A	0.0242 A
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.0242 T	0.0242 T	STWB04	0.0242	0.0242 T	0.0242 T	0.0242 T	0.0242 T	STWB04	0.0242	0.0242 T	0.0242 T
Pesticides																
2,4'-DDD	µg/kg-Wet	1	1	100	0.052 J	0.052 J	STWB04	0.052	0.052 J	0.052 J	0.052 J	0.052 J	STWB04	0.052	0.052 J	0.052 J
2,4'-DDE	µg/kg-Wet	1	1	100	0.00776 J	0.00776 J	STWB04	0.00776	0.00776 J	0.00776 J	0.00776 J	0.00776 J	STWB04	0.00776	0.00776 J	0.00776 J
2,4'-DDT	µg/kg-Wet	1	1	100	0.0348 J	0.0348 J	STWB04	0.0348	0.0348 J	0.0348 J	0.0348 J	0.0348 J	STWB04	0.0348	0.0348 J	0.0348 J
4,4'-DDD	µg/kg-Wet	1	1	100	0.168 J	0.168 J	STWB04	0.168	0.168 J	0.168 J	0.168 J	0.168 J	STWB04	0.168	0.168 J	0.168 J
4,4'-DDE	µg/kg-Wet	1	1	100	3.18	3.18	STWB04	3.18	3.18	3.18	3.18	3.18	STWB04	3.18	3.18	3.18
4,4'-DDT	µg/kg-Wet	1	1	100	0.163 J	0.163 J	STWB04	0.163	0.163 J	0.163 J	0.163 J	0.163 J	STWB04	0.163	0.163 J	0.163 J
Aldrin	µg/kg-Wet	1	1	100	0.00442 J	0.00442 J	STWB04	0.00442	0.00442 J	0.00442 J	0.00442 J	0.00442 J	STWB04	0.00442	0.00442 J	0.00442 J
alpha-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0183 U	0.0183 U	STWB04	0.00915	0.00915 U	0.00915 U
alpha-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.262 U	0.262 U	STWB04	0.131	0.131 U	0.131 U
beta-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0323 U	0.0323 U	STWB04	0.0162	0.0162 U	0.0162 U
beta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0415 U	0.0415 U	STWB04	0.0208	0.0208 U	0.0208 U
cis-Chlordane	µg/kg-Wet	1	1	100	0.214 J	0.214 J	STWB04	0.214	0.214 J	0.214 J	0.214 J	0.214 J	STWB04	0.214	0.214 J	0.214 J
cis-Nonachlor	µg/kg-Wet	1	1	100	0.126 J	0.126 J	STWB04	0.126	0.126 J	0.126 J	0.126 J	0.126 J	STWB04	0.126	0.126 J	0.126 J
delta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0403 U	0.0403 U	STWB04	0.0202	0.0202 U	0.0202 U
Dieldrin	µg/kg-Wet	1	1	100	0.359	0.359	STWB04	0.359	0.359	0.359	0.359	0.359	STWB04	0.359	0.359	0.359
Endosulfan sulfate	µg/kg-Wet	1	1	100	0.109 J	0.109 J	STWB04	0.109	0.109 J	0.109 J	0.109 J	0.109 J	STWB04	0.109	0.109 J	0.109 J
Endrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0302 U	0.0302 U	STWB04	0.0151	0.0151 U	0.0151 U
Endrin aldehyde	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0571 U	0.0571 U	STWB04	0.0286	0.0286 U	0.0286 U
Endrin ketone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0571 U	0.0571 U	STWB04	0.0286	0.0286 U	0.0286 U
gamma-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0188 U	0.0188 U	STWB04	0.0094	0.0094 U	0.0094 U
Heptachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0245 U	0.0245 U	STWB04	0.0123	0.0123 U	0.0123 U
Heptachlor epoxide	µg/kg-Wet	1	1	100	0.0265 J	0.0265 J	STWB04	0.0265	0.0265 J	0.0265 J	0.0265 J	0.0265 J	STWB04	0.0265	0.0265 J	0.0265 J
Methoxychlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0336 U	0.0336 U	STWB04	0.0168	0.0168 U	0.0168 U
Oxychlordane	µg/kg-Wet	1	1	100	0.171 J	0.171 J	STWB04	0.171	0.171 J	0.171 J	0.171 J	0.171 J	STWB04	0.171	0.171 J	0.171 J
Total Chlordanes	µg/kg-Wet	1	1	100	0.914 JT	0.914 JT	STWB04	0.914	0.914 JT	0.914 JT	0.914 JT	0.914 JT	STWB04	0.914	0.914 JT	0.914 JT
Total Endosulfan	µg/kg-Wet	1	1	100	0.109 JT	0.109 JT	STWB04	0.109	0.109 JT	0.109 JT	0.109 JT	0.109 JT	STWB04	0.109	0.109 JT	0.109 JT
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	1	1	100	0.22 JT	0.22 JT	STWB04	0.22	0.22 JT	0.22 JT	0.22 JT	0.22 JT	STWB04	0.22	0.22 JT	0.22 JT
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	3.61 JT	3.61 JT	STWB04	3.61	3.61 JT	3.61 JT	3.61 JT	3.61 JT	STWB04	3.61	3.61 JT	3.61 JT
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	1	1	100	3.19 JT	3.19 JT	STWB04	3.19	3.19 JT	3.19 JT	3.19 JT	3.19 JT	STWB04	3.19	3.19 JT	3.19 JT
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	1	1	100	0.198 JT	0.198 JT	STWB04	0.198	0.198 JT	0.198 JT	0.198 JT	0.198 JT	STWB04	0.198	0.198 JT	0.198 JT
trans-Chlordane	µg/kg-Wet	1	1	100	0.0466 J	0.0466 J	STWB04	0.0466	0.0466 J	0.0466 J	0.0466 J	0.0466 J	STWB04	0.0466	0.0466 J	0.0466 J
trans-Nonachlor	µg/kg-Wet	1	1	100	0.356 J	0.356 J	STWB04	0.356	0.356 J	0.356 J	0.356 J	0.356 J	STWB04	0.356	0.356 J	0.356 J
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	3	3	100	0.46 J	200	STWB03	67	0.51 J	180 JV	0.46 J	200	STWB03	67	0.51 J	180 JV
Acenaphthene	µg/kg-Wet	3	3	100	0.26 J	480	STWB03	160	0.66	430 V	0.26 J	480	STWB03	160	0.66	430 V
Acenaphthylene	µg/kg-Wet	3	2	66.7	0.14 J	38	STWB03	19.1	19.1 JV	36.1 JV	0.069 U	38	STWB03	12.7	0.14 J	34.2 JV

Table D5.1-2. Summary Statistics for All Analytes in Study Area Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Anthracene	µg/kg-Wet	3	3	100	0.27 J	230	STWB03	77	0.36 J	210 JV	0.27 J	230	STWB03	77	0.36 J	210 JV
Benzo(a)anthracene	µg/kg-Wet	3	2	66.7	3.4	420	STWB03	212	212 V	399 V	0.066 U	420	STWB03	141	3.4	378 V
Benzo(a)pyrene	µg/kg-Wet	3	2	66.7	2.2	210	STWB03	106	106 V	200 V	0.081 U	210	STWB03	70.7	2.2	189 V
Benzo(b)fluoranthene	µg/kg-Wet	3	2	67	4.5	210	STWB03	110	110 V	200 V	0.07 U	210	STWB03	72	4.5	190 V
Benzo(g,h,i)perylene	µg/kg-Wet	3	2	66.7	0.74	240	STWB03	120	120 V	228 V	0.073 U	240	STWB03	80.3	0.74	216 V
Benzo(k)fluoranthene	µg/kg-Wet	3	2	66.7	2.4	270	STWB03	136	136 V	257 V	0.056 U	270	STWB03	90.8	2.4	243 V
Chrysene	µg/kg-Wet	3	2	66.7	5.6	580	STWB03	293	293 V	551 V	0.076 U	580	STWB03	195	5.6	523 V
Dibenzo(a,h)anthracene	µg/kg-Wet	3	1	33.3	40	40	STWB03	40	40	40	0.059 U	40	STWB03	13.4	0.0295 U	36 V
Fluoranthene	µg/kg-Wet	3	3	100	0.47 J	1300	STWB03	440	9.4	1200 V	0.47 J	1300	STWB03	440	9.4	1200 V
Fluorene	µg/kg-Wet	3	3	100	0.29 J	330	STWB03	110	0.42 J	300 JV	0.29 J	330	STWB03	110	0.42 J	300 JV
High Molecular Weight PAH	µg/kg-Wet	3	3	100	0.98 JT	5100 T	STWB03	1700	35 T	4600 V	0.98 JT	5100 T	STWB03	1700	35 T	4600 V
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	3	2	66.7	1	250	STWB03	126	126 V	238 V	0.064 U	250	STWB03	83.7	1	225 V
Low Molecular Weight PAH	µg/kg-Wet	3	3	100	2.6 JT	3800 T	STWB03	1300	2.6 JT	3400 JV	2.6 JT	3800 T	STWB03	1300	2.6 JT	3400 JV
Naphthalene	µg/kg-Wet	3	1	33	260	260	STWB03	260	260	260	1.4 U	260	STWB03	87	0.75 U	230 V
Phenanthrene	µg/kg-Wet	3	3	100	0.76	2300	STWB03	770	1.1	2100 V	0.76	2300	STWB03	770	1.1	2100 V
Pyrene	µg/kg-Wet	3	3	100	0.51	1600	STWB03	540	5.7	1400 V	0.51	1600	STWB03	540	5.7	1400 V
Total BaPEq	µg/kg-Wet	3	2	66.7	3.12 T	341 T	STWB03	172	172 V	324 V	0.081 UT	341 T	STWB03	115	3.12 T	307 V
Total cPAHs	µg/kg-Wet	3	2	66.7	19 T	2000 T	STWB03	1010	1010 V	1900 V	0.081 UT	2000 T	STWB03	673	19 T	1800 V
Total PAHs	µg/kg-Wet	3	3	100	3.6 JT	9000 T	STWB03	3000	38 JT	8100 JV	3.6 JT	9000 T	STWB03	3000	38 JT	8100 JV
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	1	1	100	0.161 J	0.161 J	STWB04	0.161	0.161 J	0.161 J	0.161 J	0.161 J	STWB04	0.161	0.161 J	0.161 J
Hexachlorobutadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0151 UJ	0.0151 UJ	STWB04	0.00755	0.00755 UJ	0.00755 UJ

Notes:

[a] Whenever several result values match maximum or minimum value, qualifier preference has been given in the following order: U over J over A over N over T over no qualification.

[b] Median is the exact result value ranking as the 0.50 percentile in an ascending list of all results, and 95th percentile is the exact result value of the 0.95 ranking result. When the ascending list of all results doesn't produce an exact match to the corresponding percentile rank, average of two adjacent results ranking closest to 0.50 percentile is the median, and an interpolated value is the 95th percentile. Such median or 95th percentile value is always qualified with "V". It is qualified with "U" if both results ranking immediately above and below the corresponding percentile are "U" qualified, and with "J" if at least one of the results is "J" qualified.

[c] Total PCBs are total PCB congeners.

[d] Total PCBs are total PCB congeners whenever available and total Aroclors if not.

Reason codes for qualifiers:

A - Total value based on limited number of analytes.
J - The associated numerical value is an estimated quantity.
N - Presumptive evidence of presence of material; identification of the compound is not definitive.
T - The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte). Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for the Round 2 data.
U - The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
V - Median or 95th percentile obtained through interpolation.

-- data not available.

BaPEq - benzo(a)pyrene equivalent
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DL - detection limit
ND - non-detect
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PCDD/Fs - dioxins/furans
TEQ - toxicity equivalent

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Brown bullhead (whole body)																
Conventionals																
Lipids	percent-Wet	2	2	100	2.1	2.6	20R001	2.4	2.4 V	2.6 V	2.1	2.6	20R001	2.4	2.4 V	2.6 V
Total solids	percent-Wet	2	2	100	22.4	23 T	20R001	22.7	22.7 V	23 V	22.4	23 T	20R001	22.7	22.7 V	23 V
Metals																
Aluminum	mg/kg-Wet	2	2	100	18.6 JT	38.6 J	20R001	28.6	28.6 JV	37.6 JV	18.6 JT	38.6 J	20R001	28.6	28.6 JV	37.6 JV
Antimony	mg/kg-Wet	2	0	0	--	--	--	--	--	--	0.001 UT	0.006 U	20R001	0.00175	0.00175 UV	0.00288 UV
Arsenic	mg/kg-Wet	2	2	100	0.07 J	0.09 JT	20R001	0.08	0.08 JV	0.089 JV	0.07 J	0.09 JT	20R001	0.08	0.08 JV	0.089 JV
Cadmium	mg/kg-Wet	2	2	100	0.0045 JT	0.006	20R001	0.00525	0.00525 JV	0.00593 JV	0.0045 JT	0.006	20R001	0.00525	0.00525 JV	0.00593 JV
Chromium	mg/kg-Wet	2	2	100	0.485 T	0.7	20R001	0.593	0.593 V	0.689 V	0.485 T	0.7	20R001	0.593	0.593 V	0.689 V
Copper	mg/kg-Wet	2	2	100	0.625 T	0.65	20R001	0.638	0.638 V	0.649 V	0.625 T	0.65	20R001	0.638	0.638 V	0.649 V
Lead	mg/kg-Wet	2	2	100	0.015 T	0.021	20R001	0.018	0.018 V	0.0207 V	0.015 T	0.021	20R001	0.018	0.018 V	0.0207 V
Manganese	mg/kg-Wet	2	2	100	2.65 T	3.52	20R001	3.09	3.09 V	3.48 V	2.65 T	3.52	20R001	3.09	3.09 V	3.48 V
Mercury	mg/kg-Wet	2	2	100	0.054 T	0.094	20R001	0.074	0.074 V	0.092 V	0.054 T	0.094	20R001	0.074	0.074 V	0.092 V
Nickel	mg/kg-Wet	2	2	100	0.19 T	0.27	20R001	0.23	0.23 V	0.27 V	0.19 T	0.27	20R001	0.23	0.23 V	0.27 V
Selenium	mg/kg-Wet	2	0	0	--	--	--	--	--	--	0.2 U	0.2 U	20R001	0.1	0.1 UV	0.1 UV
Silver	mg/kg-Wet	2	0	0	--	--	--	--	--	--	0.007 U	0.007 U	20R001	0.0035	0.0035 UV	0.0035 UV
Thallium	mg/kg-Wet	2	2	100	0.0015 JT	0.0018 J	20R001	0.00165	0.00165 JV	0.00179 JV	0.0015 JT	0.0018 J	20R001	0.00165	0.00165 JV	0.00179 JV
Zinc	mg/kg-Wet	2	2	100	13.9 T	14.4	20R001	14.2	14.2 V	14.4 V	13.9 T	14.4	20R001	14.2	14.2 V	14.4 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	2	0	0	--	--	--	--	--	--	0.95 U	1.6 U	20R001	0.64	0.64 UV	0.78 UV
Aroclor 1221	µg/kg-Wet	2	0	0	--	--	--	--	--	--	0.95 U	4.3 U	20R001	1.3	1.3 UV	2.1 UV
Aroclor 1232	µg/kg-Wet	2	0	0	--	--	--	--	--	--	0.95 U	3.1 U	20R001	1	1 UV	1.5 UV
Aroclor 1242	µg/kg-Wet	2	0	0	--	--	--	--	--	--	0.95 U	3.1 U	20R001	1	1 UV	1.5 UV
Aroclor 1248	µg/kg-Wet	2	1	50	7.6	7.6	20R001	7.6	7.6	7.6	7.6	9.7 U	20R001	6.2	6.2 V	7.5 V
Aroclor 1254	µg/kg-Wet	2	0	0	--	--	--	--	--	--	15 U	22 U	20R001	9.3	9.3 UV	11 UV
Aroclor 1260	µg/kg-Wet	2	2	100	20 J	44 J	20R001	32	32 JV	43 JV	20 J	44 J	20R001	32	32 JV	43 JV
Aroclor 1262	µg/kg-Wet	2	0	0	--	--	--	--	--	--	0.95 U	0.95 U	20R001	0.48	0.48 UV	0.48 UV
Aroclor 1268	µg/kg-Wet	2	0	0	--	--	--	--	--	--	0.95 U	0.95 U	20R001	0.48	0.48 UV	0.48 UV
Aroclors	µg/kg-Wet	2	2	100	27.6 JT	44 JT	20R001	35.8	35.8 JV	43.2 JV	27.6 JT	44 JT	20R001	35.8	35.8 JV	43.2 JV
PCB Congeners																
PCB004	pg/g-Wet	2	0	0	--	--	--	--	--	--	12.1 U	12.9 U	20R001	6.25	6.25 UV	6.43 UV
PCB005	pg/g-Wet	2	0	0	--	--	--	--	--	--	4.19 U	4.45 U	20R001	2.16	2.16 UV	2.22 UV
PCB006	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.25 U	6.63 U	20R001	3.22	3.22 UV	3.31 UV
PCB007	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.64 U	7.05 U	20R001	3.42	3.42 UV	3.51 UV
PCB008	pg/g-Wet	2	0	0	--	--	--	--	--	--	9.09 U	9.64 U	20R001	4.68	4.68 UV	4.81 UV
PCB009	pg/g-Wet	2	0	0	--	--	--	--	--	--	4.39 U	4.66 U	20R001	2.26	2.26 UV	2.32 UV
PCB010	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.45 U	8.97 U	20R001	4.36	4.36 UV	4.47 UV
PCB011	pg/g-Wet	2	1	50	97.1 J	97.1 J	20R001	97.1	97.1 J	97.1 J	43 U	97.1 J	20R001	59.3	59.3 JV	93.3 JV
PCB012 & 013	pg/g-Wet	2	0	0	--	--	--	--	--	--	9.37 U	9.94 U	20R001	4.83	4.83 UV	4.96 UV
PCB014	pg/g-Wet	2	0	0	--	--	--	--	--	--	5.5 U	5.84 U	20R001	2.84	2.84 UV	2.91 UV
PCB015	pg/g-Wet	2	0	0	--	--	--	--	--	--	4.25 U	4.86 U	20R001	2.28	2.28 UV	2.41 UV
PCB016	pg/g-Wet	2	2	100	9.14	11	20R001	10.1	10.1 V	10.9 V	9.14	11	20R001	10.1	10.1 V	10.9 V
PCB017	pg/g-Wet	2	1	50	8.68	8.68	20R001	8.68	8.68	8.68	6.9 U	8.68	20R001	6.07	6.07 V	8.42 V
PCB018 & 030	pg/g-Wet	2	2	100	26.4 J	43.3 J	20R001	34.9	34.9 JV	42.5 JV	26.4 J	43.3 J	20R001	34.9	34.9 JV	42.5 JV
PCB019	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.78 U	7.19 U	20R001	3.49	3.49 UV	3.58 UV
PCB020 & 028	pg/g-Wet	2	2	100	158 J	197 J	20R001	178	178 JV	195 JV	158 J	197 J	20R001	178	178 JV	195 JV
PCB021 & 033	pg/g-Wet	2	1	50	13.9 J	13.9 J	20R001	13.9	13.9 J	13.9 J	11.9 U	13.9 J	20R001	9.93	9.93 JV	13.5 JV
PCB022	pg/g-Wet	2	2	100	32.3	42.5	20R001	37.4	37.4 V	42 V	32.3	42.5	20R001	37.4	37.4 V	42 V
PCB023	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.81 U	7.22 U	20R001	3.51	3.51 UV	3.6 UV
PCB024	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.8 U	9.33 U	20R001	4.53	4.53 UV	4.65 UV
PCB025	pg/g-Wet	2	0	0	--	--	--	--	--	--	5.4 U	5.73 U	20R001	2.78	2.78 UV	2.86 UV
PCB026 & 029	pg/g-Wet	2	2	100	18.3 J	19.7 J	20R001	19	19 JV	19.6 JV	18.3 J	19.7 J	20R001	19	19 JV	19.6 JV
PCB027	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.64 U	7.05 U	20R001	3.42	3.42 UV	3.51 UV
PCB031	pg/g-Wet	2	2	100	65.6	68.8	20R001	67.2	67.2 V	68.6 V	65.6	68.8	20R001	67.2	67.2 V	68.6 V
PCB032	pg/g-Wet	2	2	100	10.8	15.4	20R001	13.1	13.1 V	15.2 V	10.8	15.4	20R001	13.1	13.1 V	15.2 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB034	pg/g-Wet	2	0	0	--	--	--	--	--	--	5.57 U	5.91 U	20R001	2.87	2.87 UV	2.95 UV
PCB035	pg/g-Wet	2	0	0	--	--	--	--	--	--	4.11 U	4.36 U	20R001	2.12	2.12 UV	2.17 UV
PCB036	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.89 U	7.31 U	20R001	3.55	3.55 UV	3.64 UV
PCB037	pg/g-Wet	2	0	0	--	--	--	--	--	--	7.83 U	8.3 U	20R001	4.03	4.03 UV	4.14 UV
PCB038	pg/g-Wet	2	0	0	--	--	--	--	--	--	5.12 U	5.44 U	20R001	2.64	2.64 UV	2.71 UV
PCB039	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.76 U	7.17 U	20R001	3.48	3.48 UV	3.57 UV
PCB040 & 041 & 071	pg/g-Wet	2	2	100	72.7 J	83.8 J	20R001	78.3	78.3 JV	83.2 JV	72.7 J	83.8 J	20R001	78.3	78.3 JV	83.2 JV
PCB042	pg/g-Wet	2	2	100	33.4	48.5	20R001	41	41 V	47.7 V	33.4	48.5	20R001	41	41 V	47.7 V
PCB043	pg/g-Wet	2	0	0	--	--	--	--	--	--	13.1 U	13.9 U	20R001	6.75	6.75 UV	6.93 UV
PCB044 & 047 & 065	pg/g-Wet	2	2	100	260 J	466 J	20R001	363	363 JV	456 JV	260 J	466 J	20R001	363	363 JV	456 JV
PCB045 & 051	pg/g-Wet	2	0	0	--	--	--	--	--	--	20.7 U	21.9 U	20R001	10.7	10.7 UV	10.9 UV
PCB046	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.95 U	9.5 U	20R001	4.61	4.61 UV	4.74 UV
PCB048	pg/g-Wet	2	2	100	16.9	31.5	20R001	24.2	24.2 V	30.8 V	16.9	31.5	20R001	24.2	24.2 V	30.8 V
PCB049 & 069	pg/g-Wet	2	2	100	133 J	164 J	20R001	149	149 JV	162 JV	133 J	164 J	20R001	149	149 JV	162 JV
PCB050 & 053	pg/g-Wet	2	0	0	--	--	--	--	--	--	20.8 U	22 U	20R001	10.7	10.7 UV	11 UV
PCB052	pg/g-Wet	2	2	100	157	229	20R001	193	193 V	225 V	157	229	20R001	193	193 V	225 V
PCB054	pg/g-Wet	2	0	0	--	--	--	--	--	--	7.58 U	8.04 U	20R001	3.91	3.91 UV	4.01 UV
PCB055	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.44 U	8.96 U	20R001	4.35	4.35 UV	4.47 UV
PCB056	pg/g-Wet	2	2	100	60.9	65	20R001	63	63 V	64.8 V	60.9	65	20R001	63	63 V	64.8 V
PCB057	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.53 U	9.05 U	20R001	4.4	4.4 UV	4.51 UV
PCB058	pg/g-Wet	2	0	0	--	--	--	--	--	--	10.5 U	11.1 U	20R001	5.4	5.4 UV	5.54 UV
PCB059 & 062 & 075	pg/g-Wet	2	2	100	20.5 J	33.8 J	20R001	27.2	27.2 JV	33.1 JV	20.5 J	33.8 J	20R001	27.2	27.2 JV	33.1 JV
PCB060	pg/g-Wet	2	2	100	93.9	207	20R001	150	150 V	201 V	93.9	207	20R001	150	150 V	201 V
PCB061 & 070 & 074 & 076	pg/g-Wet	2	2	100	450 J	716 J	20R001	583	583 JV	703 JV	450 J	716 J	20R001	583	583 JV	703 JV
PCB063	pg/g-Wet	2	2	100	27.5	52.5	20R001	40	40 V	51.3 V	27.5	52.5	20R001	40	40 V	51.3 V
PCB064	pg/g-Wet	2	2	100	113	145	20R001	129	129 V	143 V	113	145	20R001	129	129 V	143 V
PCB066	pg/g-Wet	2	2	100	446	980	20R001	713	713 V	953 V	446	980	20R001	713	713 V	953 V
PCB067	pg/g-Wet	2	0	0	--	--	--	--	--	--	12.2 U	13 U	20R001	6.3	6.3 UV	6.48 UV
PCB068	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.95 U	9.49 U	20R001	4.61	4.61 UV	4.73 UV
PCB072	pg/g-Wet	2	1	50	10.3	10.3	20R001	10.3	10.3	10.3	9.81 U	10.3	20R001	7.6	7.6 V	10 V
PCB073	pg/g-Wet	2	0	0	--	--	--	--	--	--	11 U	11.7 U	20R001	5.68	5.68 UV	5.83 UV
PCB077	pg/g-Wet	2	0	0	--	--	--	--	--	--	13.6 U	14.4 U	20R001	7	7 UV	7.18 UV
PCB078	pg/g-Wet	2	0	0	--	--	--	--	--	--	7.23 U	7.67 U	20R001	3.73	3.73 UV	3.82 UV
PCB079	pg/g-Wet	2	2	100	11.1	11.2	20R001	11.2	11.2 V	11.2 V	11.1	11.2	20R001	11.2	11.2 V	11.2 V
PCB080	pg/g-Wet	2	0	0	--	--	--	--	--	--	10.6 U	11.3 U	20R001	5.48	5.48 UV	5.63 UV
PCB081	pg/g-Wet	2	2	100	1.99	3	20R001	2.5	2.5 V	2.95 V	1.99	3	20R001	2.5	2.5 V	2.95 V
PCB082	pg/g-Wet	2	2	100	78.7	80.4	20R001	79.6	79.6 V	80.3 V	78.7	80.4	20R001	79.6	79.6 V	80.3 V
PCB083 & 099	pg/g-Wet	2	2	100	623 J	878 J	20R001	751	751 JV	865 JV	623 J	878 J	20R001	751	751 JV	865 JV
PCB084	pg/g-Wet	2	2	100	117	141	20R001	129	129 V	140 V	117	141	20R001	129	129 V	140 V
PCB085 & 116 & 117	pg/g-Wet	2	2	100	235 J	446 J	20R001	341	341 JV	435 JV	235 J	446 J	20R001	341	341 JV	435 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	2	2	100	544 J	664 J	20R001	604	604 JV	658 JV	544 J	664 J	20R001	604	604 JV	658 JV
PCB088 & 091	pg/g-Wet	2	2	100	55.7 J	79.3 J	20R001	67.5	67.5 JV	78.1 JV	55.7 J	79.3 J	20R001	67.5	67.5 JV	78.1 JV
PCB089	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.41 U	8.93 U	20R001	4.34	4.34 UV	4.45 UV
PCB090 & 101 & 113	pg/g-Wet	2	2	100	439 J	703 J	20R001	571	571 JV	690 JV	439 J	703 J	20R001	571	571 JV	690 JV
PCB092	pg/g-Wet	2	2	100	227	416	20R001	322	322 V	407 V	227	416	20R001	322	322 V	407 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	2	2	100	332 J	534 J	20R001	433	433 JV	524 JV	332 J	534 J	20R001	433	433 JV	524 JV
PCB094	pg/g-Wet	2	0	0	--	--	--	--	--	--	8.55 U	9.07 U	20R001	4.41	4.41 UV	4.52 UV
PCB096	pg/g-Wet	2	0	0	--	--	--	--	--	--	11.2 U	11.9 U	20R001	5.78	5.78 UV	5.93 UV
PCB103	pg/g-Wet	2	0	0	--	--	--	--	--	--	7.88 U	8.36 U	20R001	4.06	4.06 UV	4.17 UV
PCB104	pg/g-Wet	2	0	0	--	--	--	--	--	--	12.9 U	13.7 U	20R001	6.65	6.65 UV	6.83 UV
PCB105	pg/g-Wet	2	2	100	630	1340	20R001	985	985 V	1300 V	630	1340	20R001	985	985 V	1300 V
PCB106	pg/g-Wet	2	0	0	--	--	--	--	--	--	17 U	18.1 U	20R001	8.78	8.78 UV	9.02 UV
PCB107 & 124	pg/g-Wet	2	1	50	47.1 J	47.1 J	20R001	47.1	47.1 J	47.1 J	33.4 U	47.1 J	20R001	31.9	31.9 JV	45.6 JV
PCB109	pg/g-Wet	2	2	100	140	302	20R001	221	221 V	294 V	140	302	20R001	221	221 V	294 V
PCB110 & 115	pg/g-Wet	2	2	100	998 J	1150 J	20R001	1070	1070 JV	1140 JV	998 J	1150 J	20R001	1070	1070 JV	1140 JV
PCB111	pg/g-Wet	2	0	0	--	--	--	--	--	--	9.83 U	10.4 U	20R001	5.06	5.06 UV	5.19 UV
PCB112	pg/g-Wet	2	0	0	--	--	--	--	--	--	12.1 U	12.8 U	20R001	6.23	6.23 UV	6.38 UV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB114	pg/g-Wet	2	2	100	46.2	111	20R001	78.6	78.6 V	108 V	46.2	111	20R001	78.6	78.6 V	108 V
PCB118	pg/g-Wet	2	2	100	1880	3970	20R001	2930	2930 V	3870 V	1880	3970	20R001	2930	2930 V	3870 V
PCB120	pg/g-Wet	2	2	100	11.6	28.2	20R001	19.9	19.9 V	27.4 V	11.6	28.2	20R001	19.9	19.9 V	27.4 V
PCB121	pg/g-Wet	2	0	0	--	--	--	--	--	--	7.11 U	7.55 U	20R001	3.67	3.67 UV	3.76 UV
PCB122	pg/g-Wet	2	1	50	25.3 J	25.3 J	20R001	25.3	25.3 J	25.3 J	21.6 U	25.3 J	20R001	18.1	18.1 JV	24.6 JV
PCB123	pg/g-Wet	2	2	100	36.8	73.4	20R001	55.1	55.1 V	71.6 V	36.8	73.4	20R001	55.1	55.1 V	71.6 V
PCB126	pg/g-Wet	2	2	100	5.96	10	20R001	7.98	7.98 V	9.8 V	5.96	10	20R001	7.98	7.98 V	9.8 V
PCB127	pg/g-Wet	2	0	0	--	--	--	--	--	--	16.7 U	17.7 U	20R001	8.6	8.6 UV	8.83 UV
PCB128 & 166	pg/g-Wet	2	2	100	325 J	753 J	20R001	539	539 JV	732 JV	325 J	753 J	20R001	539	539 JV	732 JV
PCB129 & 138 & 160 & 163	pg/g-Wet	2	2	100	2640 J	6400 J	20R001	4520	4520 JV	6210 JV	2640 J	6400 J	20R001	4520	4520 JV	6210 JV
PCB130	pg/g-Wet	2	2	100	166	350	20R001	258	258 V	341 V	166	350	20R001	258	258 V	341 V
PCB131	pg/g-Wet	2	1	50	11.9	11.9	20R001	11.9	11.9	11.9	10.7 U	11.9	20R001	8.63	8.63 V	11.6 V
PCB132	pg/g-Wet	2	2	100	385	484	20R001	435	435 V	479 V	385	484	20R001	435	435 V	479 V
PCB133	pg/g-Wet	2	2	100	55.3	145	20R001	100	100 V	141 V	55.3	145	20R001	100	100 V	141 V
PCB134 & 143	pg/g-Wet	2	2	100	65.8 J	84.7 J	20R001	75.3	75.3 JV	83.8 JV	65.8 J	84.7 J	20R001	75.3	75.3 JV	83.8 JV
PCB135 & 151 & 154	pg/g-Wet	2	1	50	521 J	521 J	20R001	521	521 J	521 J	28.8 U	521 J	20R001	268	268 JV	496 JV
PCB136	pg/g-Wet	2	2	100	98	130	20R001	110	110 V	130 V	98	130	20R001	110	110 V	130 V
PCB137	pg/g-Wet	2	2	100	140	323	20R001	232	232 V	314 V	140	323	20R001	232	232 V	314 V
PCB139 & 140	pg/g-Wet	2	2	100	29.2 J	51.5 J	20R001	40.4	40.4 JV	50.4 JV	29.2 J	51.5 J	20R001	40.4	40.4 JV	50.4 JV
PCB141	pg/g-Wet	2	2	100	326	954	20R001	640	640 V	923 V	326	954	20R001	640	640 V	923 V
PCB142	pg/g-Wet	2	0	0	--	--	--	--	--	--	10.5 U	11.1 U	20R001	5.4	5.4 UV	5.54 UV
PCB144	pg/g-Wet	2	2	100	37.8	103	20R001	70.4	70.4 V	99.7 V	37.8	103	20R001	70.4	70.4 V	99.7 V
PCB145	pg/g-Wet	2	0	0	--	--	--	--	--	--	4.12 U	4.37 U	20R001	2.12	2.12 UV	2.18 UV
PCB146	pg/g-Wet	2	2	100	615	1550	20R001	1080	1080 V	1500 V	615	1550	20R001	1080	1080 V	1500 V
PCB147 & 149	pg/g-Wet	2	2	100	804 J	1780 J	20R001	1290	1290 JV	1730 JV	804 J	1780 J	20R001	1290	1290 JV	1730 JV
PCB148	pg/g-Wet	2	1	50	11.3 J	11.3 J	20R001	11.3	11.3 J	11.3 J	8.96 U	11.3 J	20R001	7.89	7.89 JV	11 JV
PCB150	pg/g-Wet	2	0	0	--	--	--	--	--	--	3.77 U	4 U	20R001	1.94	1.94 UV	1.99 UV
PCB152	pg/g-Wet	2	0	0	--	--	--	--	--	--	9.96 U	10.6 U	20R001	5.14	5.14 UV	5.28 UV
PCB153 & 168	pg/g-Wet	2	2	100	1520 J	2560 J	20R001	2040	2040 JV	2510 JV	1520 J	2560 J	20R001	2040	2040 JV	2510 JV
PCB155	pg/g-Wet	2	0	0	--	--	--	--	--	--	7.55 U	8.01 U	20R001	3.89	3.89 UV	3.99 UV
PCB156	pg/g-Wet	2	2	100	257	571	20R001	414	414 V	555 V	257	571	20R001	414	414 V	555 V
PCB157	pg/g-Wet	2	2	100	49.5	101	20R001	75.3	75.3 V	98.4 V	49.5	101	20R001	75.3	75.3 V	98.4 V
PCB158	pg/g-Wet	2	2	100	231	562	20R001	397	397 V	545 V	231	562	20R001	397	397 V	545 V
PCB159	pg/g-Wet	2	2	100	19.2 J	64	20R001	41.6	41.6 JV	61.8 JV	19.2 J	64	20R001	41.6	41.6 JV	61.8 JV
PCB161	pg/g-Wet	2	0	0	--	--	--	--	--	--	11.6 U	12.3 U	20R001	5.98	5.98 UV	6.13 UV
PCB162	pg/g-Wet	2	1	50	25.6 J	25.6 J	20R001	25.6	25.6 J	25.6 J	14.8 U	25.6 J	20R001	16.5	16.5 JV	24.7 JV
PCB164	pg/g-Wet	2	2	100	114	292	20R001	203	203 V	283 V	114	292	20R001	203	203 V	283 V
PCB165	pg/g-Wet	2	0	0	--	--	--	--	--	--	9.6 U	10.2 U	20R001	4.95	4.95 UV	5.09 UV
PCB167	pg/g-Wet	2	2	100	134	290	20R001	212	212 V	282 V	134	290	20R001	212	212 V	282 V
PCB169	pg/g-Wet	2	2	100	0.885	1.18	20R001	1.03	1.03 V	1.17 V	0.885	1.18	20R001	1.03	1.03 V	1.17 V
PCB170	pg/g-Wet	2	2	100	568	2180	20R001	1370	1370 V	2100 V	568	2180	20R001	1370	1370 V	2100 V
PCB171 & 173	pg/g-Wet	2	2	100	147 J	608 J	20R001	378	378 JV	585 JV	147 J	608 J	20R001	378	378 JV	585 JV
PCB172	pg/g-Wet	2	2	100	119	471	20R001	295	295 V	453 V	119	471	20R001	295	295 V	453 V
PCB174	pg/g-Wet	2	2	100	317	1110	20R001	714	714 V	1070 V	317	1110	20R001	714	714 V	1070 V
PCB175	pg/g-Wet	2	2	100	25.2	80.4	20R001	52.8	52.8 V	77.6 V	25.2	80.4	20R001	52.8	52.8 V	77.6 V
PCB176	pg/g-Wet	2	2	100	28.1	58.8	20R001	43.5	43.5 V	57.3 V	28.1	58.8	20R001	43.5	43.5 V	57.3 V
PCB177	pg/g-Wet	2	2	100	334	1090	20R001	712	712 V	1050 V	334	1090	20R001	712	712 V	1050 V
PCB178	pg/g-Wet	2	2	100	145	511	20R001	328	328 V	493 V	145	511	20R001	328	328 V	493 V
PCB179	pg/g-Wet	2	2	100	146	420	20R001	283	283 V	406 V	146	420	20R001	283	283 V	406 V
PCB180 & 193	pg/g-Wet	2	2	100	1770 J	6320 J	20R001	4050	4050 JV	6090 JV	1770 J	6320 J	20R001	4050	4050 JV	6090 JV
PCB181	pg/g-Wet	2	1	50	19.7 J	19.7 J	20R001	19.7	19.7 J	19.7 J	13.6 U	19.7 J	20R001	13.3	13.3 JV	19.1 JV
PCB182	pg/g-Wet	2	1	50	19.1	19.1	20R001	19.1	19.1	19.1	14.8 U	19.1	20R001	13.3	13.3 V	18.5 V
PCB183 & 185	pg/g-Wet	2	2	100	333 J	1200 J	20R001	767	767 JV	1160 JV	333 J	1200 J	20R001	767	767 JV	1160 JV
PCB184	pg/g-Wet	2	0	0	--	--	--	--	--	--	12.3 U	13 U	20R001	6.33	6.33 UV	6.48 UV
PCB186	pg/g-Wet	2	0	0	--	--	--	--	--	--	7.08 U	7.51 U	20R001	3.65	3.65 UV	3.74 UV
PCB187	pg/g-Wet	2	2	100	1350	4170	20R001	2760	2760 V	4030 V	1350	4170	20R001	2760	2760 V	4030 V
PCB188	pg/g-Wet	2	0	0	--	--	--	--	--	--	13.4 U	14.2 U	20R001	6.9	6.9 UV	7.08 UV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB189	pg/g-Wet	2	2	100	28.1	87.6	20R001	57.9	57.9 V	84.6 V	28.1	87.6	20R001	57.9	57.9 V	84.6 V
PCB190	pg/g-Wet	2	2	100	142	568	20R001	355	355 V	547 V	142	568	20R001	355	355 V	547 V
PCB191	pg/g-Wet	2	2	100	28.3	104	20R001	66.2	66.2 V	100 V	28.3	104	20R001	66.2	66.2 V	100 V
PCB192	pg/g-Wet	2	0	0	--	--	--	--	--	--	6.39 U	6.78 U	20R001	3.29	3.29 UV	3.38 UV
PCB194	pg/g-Wet	2	2	100	258	952	20R001	605	605 V	917 V	258	952	20R001	605	605 V	917 V
PCB195	pg/g-Wet	2	2	100	115	434	20R001	275	275 V	418 V	115	434	20R001	275	275 V	418 V
PCB196	pg/g-Wet	2	2	100	145	504	20R001	325	325 V	486 V	145	504	20R001	325	325 V	486 V
PCB197 & 200	pg/g-Wet	2	2	100	31.8 J	101 J	20R001	66.4	66.4 JV	97.5 JV	31.8 J	101 J	20R001	66.4	66.4 JV	97.5 JV
PCB198 & 199	pg/g-Wet	2	2	100	362 J	1220 J	20R001	791	791 JV	1180 JV	362 J	1220 J	20R001	791	791 JV	1180 JV
PCB201	pg/g-Wet	2	2	100	36.9	118	20R001	77.5	77.5 V	114 V	36.9	118	20R001	77.5	77.5 V	114 V
PCB202	pg/g-Wet	2	2	100	74.9	204	20R001	139	139 V	198 V	74.9	204	20R001	139	139 V	198 V
PCB203	pg/g-Wet	2	2	100	232	817	20R001	525	525 V	788 V	232	817	20R001	525	525 V	788 V
PCB204	pg/g-Wet	2	0	0	--	--	--	--	--	--	16.9 U	17.9 U	20R001	8.7	8.7 UV	8.93 UV
PCB205	pg/g-Wet	2	1	50	52.6	52.6	20R001	52.6	52.6	52.6	19.5 U	52.6	20R001	31.2	31.2 V	50.5 V
PCB206	pg/g-Wet	2	2	100	96.4	308	20R001	202	202 V	297 V	96.4	308	20R001	202	202 V	297 V
PCB207	pg/g-Wet	2	2	100	20.4	50.6	20R001	35.5	35.5 V	49.1 V	20.4	50.6	20R001	35.5	35.5 V	49.1 V
PCB208	pg/g-Wet	2	2	100	39.6	101	20R001	70.3	70.3 V	97.9 V	39.6	101	20R001	70.3	70.3 V	97.9 V
PCB209	pg/g-Wet	2	2	100	47.4	122	20R001	84.7	84.7 V	118 V	47.4	122	20R001	84.7	84.7 V	118 V
Total PCB Congeners	pg/g-Wet	2	2	100	24200 JT	56300 JT	20R001	40300	40300 JV	54700 JV	24200 JT	56300 JT	20R001	40300	40300 JV	54700 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	2	2	100	24.2 JT	56.3 JT	20R001	40.3	40.3 JV	54.7 JV	24.2 JT	56.3 JT	20R001	40.3	40.3 JV	54.7 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	2	1	50	97.1 JT	97.1 JT	20R001	97.1	97.1 JT	97.1 JT	43 UT	97.1 JT	20R001	59.3	59.3 JV	93.3 JV
Heptachlorobiphenylhomologs	pg/g-Wet	2	2	100	5480 JT	19000 JT	20R001	12200	12200 JV	18300 JV	5480 JT	19000 JT	20R001	12200	12200 JV	18300 JV
Hexachlorobiphenyl homologs	pg/g-Wet	2	2	100	8550 JT	17600 JT	20R001	13100	13100 JV	17100 JV	8550 JT	17600 JT	20R001	13100	13100 JV	17100 JV
Nonachlorobiphenyl homologs	pg/g-Wet	2	2	100	156 T	460 T	20R001	308	308 V	445 V	156 T	460 T	20R001	308	308 V	445 V
Octachlorobiphenyl homologs	pg/g-Wet	2	2	100	1260 JT	4400 JT	20R001	2830	2830 JV	4240 JV	1260 JT	4400 JT	20R001	2830	2830 JV	4240 JV
Pentachlorobiphenylhomologs	pg/g-Wet	2	2	100	6470 JT	10900 JT	20R001	8690	8690 JV	10700 JV	6470 JT	10900 JT	20R001	8690	8690 JV	10700 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	2	2	100	1900 JT	3250 JT	20R001	2580	2580 JV	3180 JV	1900 JT	3250 JT	20R001	2580	2580 JV	3180 JV
Trichlorobiphenyl homologs	pg/g-Wet	2	2	100	321 JT	420 JT	20R001	371	371 JV	415 JV	321 JT	420 JT	20R001	371	371 JV	415 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	2	2	100	0.128	0.299	20R001	0.214	0.214 V	0.29 V	0.128	0.299	20R001	0.214	0.214 V	0.29 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	2	2	100	0.795	0.931	20R001	0.863	0.863 V	0.924 V	0.795	0.931	20R001	0.863	0.863 V	0.924 V
Hexachlorodibenzofuran homologs	pg/g-Wet	2	2	100	0.384	0.428	20R001	0.406	0.406 V	0.426 V	0.384	0.428	20R001	0.406	0.406 V	0.426 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	2	2	100	1.26	1.5	20R001	1.38	1.38 V	1.49 V	1.26	1.5	20R001	1.38	1.38 V	1.49 V
Octachlorodibenzofuran	pg/g-Wet	2	0	0	--	--	--	--	--	--	0.046 U	0.046 U	20R001	0.023	0.023 UV	0.023 UV
Octachlorodibenzo-p-dioxin	pg/g-Wet	2	1	50	0.632	0.632	20R001	0.632	0.632	0.632	0.474 U	0.632	20R001	0.435	0.435 V	0.612 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	2	2	100	0.807	0.871	20R001	0.839	0.839 V	0.868 V	0.807	0.871	20R001	0.839	0.839 V	0.868 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	2	2	100	0.427	0.6	20R001	0.514	0.514 V	0.591 V	0.427	0.6	20R001	0.514	0.514 V	0.591 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	2	2	100	0.375	0.658	20R001	0.517	0.517 V	0.644 V	0.375	0.658	20R001	0.517	0.517 V	0.644 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	2	2	100	0.211	2.21	20R001	1.21	1.21 V	2.11 V	0.211	2.21	20R001	1.21	1.21 V	2.11 V
Total PCDD/F	pg/g-Wet	2	2	100	5.06 T	7.45 T	20R001	6.26	6.26 V	7.33 V	5.06 T	7.45 T	20R001	6.26	6.26 V	7.33 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	2	2	100	0.107 J	0.172	20R001	0.14	0.14 JV	0.169 JV	0.107 J	0.172	20R001	0.14	0.14 JV	0.169 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	2	2	100	0.524	0.572	20R001	0.548	0.548 V	0.57 V	0.524	0.572	20R001	0.548	0.548 V	0.57 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	2	1	50	0.016 J	0.016 J	20R001	0.016	0.016 J	0.016 J	0.016 J	0.016 J	20R001	0.012	0.012 JV	0.0156 JV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	2	2	100	0.048	0.071	20R001	0.0595	0.0595 V	0.0699 V	0.048	0.071	20R001	0.0595	0.0595 V	0.0699 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	2	2	100	0.138	0.206	20R001	0.172	0.172 V	0.203 V	0.138	0.206	20R001	0.172	0.172 V	0.203 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	2	2	100	0.044	0.05 J	20R001	0.047	0.047 JV	0.0497 JV	0.044	0.05 J	20R001	0.047	0.047 JV	0.0497 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	2	2	100	0.844	0.893	20R001	0.869	0.869 V	0.891 V	0.844	0.893	20R001	0.869	0.869 V	0.891 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	2	0	0	--	--	--	--	--	--	0.011 U	0.011 U	20R001	0.0055	0.0055 UV	0.0055 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	2	2	100	0.105	0.174	20R001	0.14	0.14 V	0.171 V	0.105	0.174	20R001	0.14	0.14 V	0.171 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	2	2	100	0.063	0.088	20R001	0.0755	0.0755 V	0.0868 V	0.063	0.088	20R001	0.0755	0.0755 V	0.0868 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	2	2	100	0.413	0.551	20R001	0.482	0.482 V	0.544 V	0.413	0.551	20R001	0.482	0.482 V	0.544 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	2	2	100	0.043	0.047	20R001	0.045	0.045 V	0.0468 V	0.043	0.047	20R001	0.045	0.045 V	0.0468 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	2	2	100	0.218	0.235	20R001	0.227	0.227 V	0.234 V	0.218	0.235	20R001	0.227	0.227 V	0.234 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	2	2	100	0.186	0.266	20R001	0.226	0.226 V	0.262 V	0.186	0.266	20R001	0.226	0.226 V	0.262 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	2	2	100	0.169	2.11	20R001	1.14	1.14 V	2.01 V	0.169	2.11	20R001	1.14	1.14 V	2.01 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	2	2	100	0.807 JT	2.9 JT	20R001	1.85	1.85 JV	2.8 JV	0.807 JT	2.9 JT	20R001	1.85	1.85 JV	2.8 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	2	2	100	2.04 JT	3.62 JT	20R001	2.83	2.83 JV	3.54 JV	2.04 JT	3.62 JT	20R001	2.83	2.83 JV	3.54 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	2	2	100	0.715 T	1.23 T	20R001	0.973	0.973 V	1.2 V	0.715 T	1.23 T	20R001	0.973	0.973 V	1.2 V
Pesticides																
2,4'-DDD	µg/kg-Wet	2	2	100	1.7 NJ	2 N	20R001	1.9	1.9 JV	2 JV	1.7 NJ	2 N	20R001	1.9	1.9 JV	2 JV
2,4'-DDE	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
2,4'-DDT	µg/kg-Wet	2	2	100	2 N	4.5 N	20R001	3.3	3.3 V	4.4 V	2 N	4.5 N	20R001	3.3	3.3 V	4.4 V
4,4'-DDD	µg/kg-Wet	2	2	100	2.2 NJ	2.8 NJ	20R001	2.5	2.5 JV	2.8 JV	2.2 NJ	2.8 NJ	20R001	2.5	2.5 JV	2.8 JV
4,4'-DDE	µg/kg-Wet	2	2	100	12 J	37 J	20R001	25	25 JV	36 JV	12 J	37 J	20R001	25	25 JV	36 JV
4,4'-DDT	µg/kg-Wet	2	2	100	2.2 NJ	6 NJ	20R001	4.1	4.1 JV	5.8 JV	2.2 NJ	6 NJ	20R001	4.1	4.1 JV	5.8 JV
Aldrin	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
alpha-Endosulfan	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJ	1 UJ	20R001	0.5	0.5 UJV	0.5 UJV
alpha-Hexachlorocyclohexane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
beta-Endosulfan	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJ	1 UJ	20R001	0.5	0.5 UJV	0.5 UJV
beta-Hexachlorocyclohexane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1.3 UJ	1.8 UJ	20R001	0.78	0.78 UJV	0.89 UJV
cis-Chlordane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJ	1 UJ	20R001	0.5	0.5 UJV	0.5 UJV
cis-Nonachlor	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1.3 U	2.1 U	20R001	0.85	0.85 UV	1 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1.1 U	20R001	0.53	0.53 UV	0.55 UV
Dieldrin	µg/kg-Wet	2	1	50	1.2 NJ	1.2 NJ	20R001	1.2	1.2 NJ	1.2 NJ	1 UJ	1.2 NJ	20R001	0.85	0.85 JV	1.2 JV
Endosulfan sulfate	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJ	1 UJ	20R001	0.5	0.5 UJV	0.5 UJV
Endrin	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJ	1 UJ	20R001	0.5	0.5 UJV	0.5 UJV
Endrin aldehyde	µg/kg-Wet	2	1	50	1.5 N	1.5 N	20R001	1.5	1.5 N	1.5 N	1 U	1.5 N	20R001	1	1 V	1.5 V
Endrin ketone	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJ	1.2 UJ	20R001	0.55	0.55 UJV	0.6 UJV
gamma-Hexachlorocyclohexane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
Heptachlor	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1.1 U	20R001	0.53	0.53 UV	0.55 UV
Heptachlor epoxide	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
Methoxychlor	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
Mirex	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
Oxychlordane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 UV	0.5 UV
Total Chlordanes	µg/kg-Wet	2	2	100	2.1 NT	3.7 NJT	20R001	2.9	2.9 JV	3.6 JV	2.1 NT	3.7 NJT	20R001	2.9	2.9 JV	3.6 JV
Total Endosulfan	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJT	1 UJT	20R001	0.5	0.5 UJV	0.5 UJV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	2	2	100	4.2 NJT	4.5 NJT	20R001	4.4	4.4 JV	4.5 JV	4.2 NJT	4.5 NJT	20R001	4.4	4.4 JV	4.5 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	2	2	100	20.4 NJT	52 NJT	20R001	36.2	36.2 JV	50.4 JV	20.4 NJT	52 NJT	20R001	36.2	36.2 JV	50.4 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	2	2	100	12 JT	37 JT	20R001	25	25 JV	36 JV	12 JT	37 JT	20R001	25	25 JV	36 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	2	2	100	4.2 NJT	10.5 NJT	20R001	7.35	7.35 JV	10.2 JV	4.2 NJT	10.5 NJT	20R001	7.35	7.35 JV	10.2 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	2	2	100	16.4 JT	45.8 JT	20R001	31.1	31.1 JV	44.3 JV	16.4 JT	45.8 JT	20R001	31.1	31.1 JV	44.3 JV
Toxaphene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	50 U	73 U	20R001	31	31 UV	36 UV
trans-Chlordane	µg/kg-Wet	2	1	50	1.2 NJ	1.2 NJ	20R001	1.2	1.2 NJ	1.2 NJ	1 UJ	1.2 NJ	20R001	0.85	0.85 JV	1.2 JV
trans-Nonachlor	µg/kg-Wet	2	2	100	2.1 N	2.5 N	20R001	2.3	2.3 V	2.5 V	2.1 N	2.5 N	20R001	2.3	2.3 V	2.5 V
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Acenaphthene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Acenaphthylene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Anthracene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Benzo(a)anthracene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Benzo(a)pyrene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Benzo(b)fluoranthene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Benzo(g,h,i)perylene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Benzo(k)fluoranthene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Chrysene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Fluoranthene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Fluorene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
High Molecular Weight PAH	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Low Molecular Weight PAH	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Naphthalene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Phenanthrene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Pyrene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Total BaPEq	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	16.5	16.5 UV	16.5 UV
Total cPAHs	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Total PAHs	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	2	1	50	3000 JT	3000 JT	20R001	3000	3000 JT	3000 JT	99 UJT	3000 JT	20R001	1500	1500 JV	2900 JV
Butylbenzyl phthalate	µg/kg-Wet	2	0	0	--	--	--	--	--	--	330 UJ	330 UJ	20R001	170	170 UJV	170 UJV
Dibutyl phthalate	µg/kg-Wet	2	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 UV	170 UV
Diethyl phthalate	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 UV	85 UV
Dimethyl phthalate	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 UV	85 UV
Di-n-octyl phthalate	µg/kg-Wet	2	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 UV	170 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
1,2-Diphenylhydrazine	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 U	33 U	20R001	17	17 UV	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
1,4-Dichlorobenzene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
2,4-Dinitrotoluene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
2,6-Dinitrotoluene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
2-Chloronaphthalene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
2-Nitroaniline	µg/kg-Wet	2	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 UV	420 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 UV	850 UV
3-Nitroaniline	µg/kg-Wet	2	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 UV	420 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
4-Chloroaniline	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 UT	170 UT	20R001	85	85 UV	85 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	2	0	0	--	--	--	--	--	--	83 UT	83 UT	20R001	42	42 UV	42 UV
4-Nitroaniline	µg/kg-Wet	2	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 UV	420 UV
Azobenzene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 UV	85 UV
Benzoic acid	µg/kg-Wet	2	0	0	--	--	--	--	--	--	8300 U	8300 U	20R001	4200	4200 UV	4200 UV
Benzyl alcohol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 UV	170 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 UV	85 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 UV	85 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Carbazole	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Dibenzofuran	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
Hexachlorobenzene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UT	33 UT	20R001	8.5	8.5 UV	16 UV
Hexachlorobutadiene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UT	1 UT	20R001	0.5	0.5 UV	0.5 UV
Hexachlorocyclopentadiene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 UV	420 UV
Hexachloroethane	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1 UJT	33 UT	20R001	8.5	8.5 UJV	16 UJV
Isophorone	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 UV	850 UV
Nitrobenzene	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 UT	170 UT	20R001	85	85 UV	85 UV
N-Nitrosodiphenylamine	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 UJ	170 UJ	20R001	85	85 UJV	85 UJV
N-Nitrosodipropylamine	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1700 UJ	1700 UJ	20R001	850	850 UJV	850 UJV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 UV	850 UV
2,4,5-Trichlorophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 UV	420 UV
2,4,6-Trichlorophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
2,4-Dichlorophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
2,4-Dimethylphenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	500 U	500 U	20R001	250	250 UV	250 UV
2-Chlorophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
2-Methylphenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 UV	85 UV
2-Nitrophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 UV	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	3300 UJ	3300 UJ	20R001	1700	1700 UJV	1700 UJV
4-Chloro-3-methylphenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 UV	170 UV
4-Methylphenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UV	17 UV
4-Nitrophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 UV	850 UV
Pentachlorophenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	170 UT	170 UT	20R001	85	85 UV	85 UV
Phenol	µg/kg-Wet	2	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 UV	170 UV
Chinook (whole body)																
Conventionals																
Lipids	percent-Wet	3	3	100	1.8	1.9	T04	1.8	1.8	1.9 V	1.8	1.9	T04	1.8	1.8	1.9 V
Total solids	percent-Wet	3	3	100	19.3	19.9	T04	19.6	19.5	19.9 V	19.3	19.9	T04	19.6	19.5	19.9 V
Metals																
Aluminum	mg/kg-Wet	3	3	100	9 T	13.5	T04	11.5	12.1	13.3 V	9 T	13.5	T04	11.5	12.1	13.3 V
Antimony	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.00154 U	0.00159 UT	T04	0.000783	0.00078 U	0.000794 UV
Arsenic	mg/kg-Wet	3	3	100	0.0468	0.056	T04	0.0502	0.0478 T	0.0551 V	0.0468	0.056	T04	0.0502	0.0478 T	0.0551 V
Cadmium	mg/kg-Wet	3	3	100	0.00776 T	0.0164	T04	0.0118	0.0111	0.0159 V	0.00776 T	0.0164	T04	0.0118	0.0111	0.0159 V
Chromium	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.0579 U	0.0597 UT	T04	0.0294	0.0293 U	0.0298 UV
Copper	mg/kg-Wet	3	3	100	0.879 T	0.957	T04	0.919	0.921	0.954 V	0.879 T	0.957	T04	0.919	0.921	0.954 V
Lead	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.00975 U	0.0251 U	T04	0.00747	0.00498 UT	0.0118 UV
Mercury	mg/kg-Wet	3	3	100	0.00935 J	0.0129	T04	0.0117	0.0127	0.0129 V	0.00935 J	0.0129	T04	0.0117	0.0127	0.0129 V
Nickel	mg/kg-Wet	3	3	100	0.246	0.409 JT	T04	0.319	0.301	0.398 JV	0.246	0.409 JT	T04	0.319	0.301	0.398 JV
Selenium	mg/kg-Wet	3	3	100	0.116	0.219 JT	T04	0.157	0.137	0.211 JV	0.116	0.219 JT	T04	0.157	0.137	0.211 JV
Silver	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.00234 U	0.0027 U	T04	0.00127	0.00129 UT	0.00135 UV
Zinc	mg/kg-Wet	3	3	100	26.9 T	29.1	T04	28.2	28.8	29 V	26.9 T	29.1	T04	28.2	28.8	29 V
Butyltins																
Butyltin ion	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.18 U	1.1 U	T04	0.4	0.55 U	0.55 UV
Dibutyltin ion	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.58 U	1 U	T04	0.4	0.4 U	0.49 UV
Tetrabutyltin	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.15 U	0.16 U	T04	0.078	0.08 U	0.08 UV
Tributyltin ion	µg/kg-Wet	3	3	100	0.37 J	0.45 J	T04	0.41	0.42 J	0.45 JV	0.37 J	0.45 J	T04	0.41	0.42 J	0.45 JV
PCB Congeners																
PCB001	pg/g-Wet	3	3	100	7.43	7.81	T04	7.64	7.68	7.8 V	7.43	7.81	T04	7.64	7.68	7.8 V
PCB002	pg/g-Wet	3	3	100	0.586	0.649	T04	0.611	0.598	0.644 V	0.586	0.649	T04	0.611	0.598	0.644 V
PCB003	pg/g-Wet	3	3	100	1.69	1.92	T04	1.8	1.8	1.91 V	1.69	1.92	T04	1.8	1.8	1.91 V
PCB004	pg/g-Wet	3	3	100	31.4	34.1	T04	32.9	33.3	34 V	31.4	34.1	T04	32.9	33.3	34 V
PCB005	pg/g-Wet	3	1	33.3	0.726	0.726	T04	0.726	0.726	0.726	0.726	0.823 U	T04	0.513	0.412 U	0.695 V
PCB006	pg/g-Wet	3	3	100	6.86	7.57	T04	7.13	6.97	7.51 V	6.86	7.57	T04	7.13	6.97	7.51 V
PCB007	pg/g-Wet	3	3	100	1.51	1.61	T04	1.56	1.56	1.61 V	1.51	1.61	T04	1.56	1.56	1.61 V
PCB008	pg/g-Wet	3	3	100	29.8	32.9	T04	31.1	30.6	32.7 V	29.8	32.9	T04	31.1	30.6	32.7 V
PCB009	pg/g-Wet	3	3	100	2.48	2.66	T04	2.54	2.49	2.64 V	2.48	2.66	T04	2.54	2.49	2.64 V
PCB010	pg/g-Wet	3	3	100	1.19	1.21	T04	1.2	1.2	1.21 V	1.19	1.21	T04	1.2	1.2	1.21 V
PCB011	pg/g-Wet	3	3	100	24.7	46.8	T04	33.7	29.7	45.1 V	24.7	46.8	T04	33.7	29.7	45.1 V
PCB012 & 013	pg/g-Wet	3	2	66.7	0.853 J	1.05	T04	0.952	0.952 JV	1.04 JV	0.853 J	1.28 U	T04	0.848	0.853 J	1.03 JV
PCB014	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.555 U	0.58 U	T04	0.282	0.279 U	0.289 UV
PCB015	pg/g-Wet	3	3	100	4.31	4.85	T04	4.52	4.41	4.81 V	4.31	4.85	T04	4.52	4.41	4.81 V
PCB016	pg/g-Wet	3	3	100	8.98	10.6	T04	9.79	9.8	10.5 V	8.98	10.6	T04	9.79	9.8	10.5 V
PCB017	pg/g-Wet	3	3	100	16.2	21.9	T04	18.9	18.7	21.6 V	16.2	21.9	T04	18.9	18.7	21.6 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB018 & 030	pg/g-Wet	3	3	100	28.6	34.5	T04	31.7	32	34.3 V	28.6	34.5	T04	31.7	32	34.3 V
PCB019	pg/g-Wet	3	3	100	5.53	7.48	T04	6.3	5.89	7.32 V	5.53	7.48	T04	6.3	5.89	7.32 V
PCB020 & 028	pg/g-Wet	3	3	100	99.6	158	T04	127	122	154 V	99.6	158	T04	127	122	154 V
PCB021 & 033	pg/g-Wet	3	3	100	15.7	23.3	T04	19.2	18.7	22.8 V	15.7	23.3	T04	19.2	18.7	22.8 V
PCB022	pg/g-Wet	3	3	100	11.9	15.6	T04	13.5	12.9	15.3 V	11.9	15.6	T04	13.5	12.9	15.3 V
PCB023	pg/g-Wet	3	2	66.7	0.08 J	0.103 J	T04	0.0915	0.0915 JV	0.102 JV	0.08 J	0.103 J	T04	0.0771	0.08 J	0.101 JV
PCB024	pg/g-Wet	3	3	100	0.503	0.579	T04	0.55	0.567	0.578 V	0.503	0.579	T04	0.55	0.567	0.578 V
PCB025	pg/g-Wet	3	3	100	4.62	6.4	T04	5.47	5.39	6.3 V	4.62	6.4	T04	5.47	5.39	6.3 V
PCB026 & 029	pg/g-Wet	3	3	100	12.3	19.9	T04	15.7	14.8	19.4 V	12.3	19.9	T04	15.7	14.8	19.4 V
PCB027	pg/g-Wet	3	3	100	2.32	3.14	T04	2.71	2.66	3.09 V	2.32	3.14	T04	2.71	2.66	3.09 V
PCB031	pg/g-Wet	3	3	100	56.6	77.7	T04	67.7	68.7	76.8 V	56.6	77.7	T04	67.7	68.7	76.8 V
PCB032	pg/g-Wet	3	3	100	10.9	15.6	T04	12.8	11.9	15.2 V	10.9	15.6	T04	12.8	11.9	15.2 V
PCB034	pg/g-Wet	3	3	100	0.333 J	0.527	T04	0.45	0.489	0.523 V	0.333 J	0.527	T04	0.45	0.489	0.523 V
PCB035	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.0673 U	0.699 U	T04	0.146	0.0535 U	0.32 UV
PCB036	pg/g-Wet	3	1	33.3	0.061 J	0.061 J	T04	0.061	0.061 J	0.061 J	0.061 J	0.0948 U	T04	0.0473	0.0474 U	0.0596 JV
PCB037	pg/g-Wet	3	3	100	5.34	6.98	T04	6.29	6.56	6.94 V	5.34	6.98	T04	6.29	6.56	6.94 V
PCB038	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.206 U	0.225 U	T04	0.108	0.109 U	0.112 UV
PCB039	pg/g-Wet	3	3	100	0.784	1.18	T04	0.929	0.822	1.14 V	0.784	1.18	T04	0.929	0.822	1.14 V
PCB040 & 041 & 071	pg/g-Wet	3	3	100	45.6	90.8	T04	67.5	66.2	88.3 V	45.6	90.8	T04	67.5	66.2	88.3 V
PCB042	pg/g-Wet	3	3	100	20.4	40.9	T04	31.5	33.3	40.1 V	20.4	40.9	T04	31.5	33.3	40.1 V
PCB043	pg/g-Wet	3	3	100	3.84	6.87	T04	5.35	5.33	6.72 V	3.84	6.87	T04	5.35	5.33	6.72 V
PCB044 & 047 & 065	pg/g-Wet	3	3	100	156	296	T04	222	215	288 V	156	296	T04	222	215	288 V
PCB045 & 051	pg/g-Wet	3	3	100	11.2	20.4	T04	15.5	14.9	19.9 V	11.2	20.4	T04	15.5	14.9	19.9 V
PCB046	pg/g-Wet	3	3	100	1.78	3.45	T04	2.62	2.64	3.37 V	1.78	3.45	T04	2.62	2.64	3.37 V
PCB048	pg/g-Wet	3	3	100	17.4	34.8	T04	26.2	26.3	34 V	17.4	34.8	T04	26.2	26.3	34 V
PCB049 & 069	pg/g-Wet	3	3	100	103	206	T04	153	150	200 V	103	206	T04	153	150	200 V
PCB050 & 053	pg/g-Wet	3	3	100	9.98	19.3	T04	14.3	13.5	18.7 V	9.98	19.3	T04	14.3	13.5	18.7 V
PCB052	pg/g-Wet	3	3	100	209	403	T04	296	275	390 V	209	403	T04	296	275	390 V
PCB054	pg/g-Wet	3	3	100	0.622	1.64	T04	1	0.744	1.55 V	0.622	1.64	T04	1	0.744	1.55 V
PCB055	pg/g-Wet	3	3	100	3.74	6.83	T04	5.61	6.25	6.77 V	3.74	6.83	T04	5.61	6.25	6.77 V
PCB056	pg/g-Wet	3	3	100	14.5	26.8	T04	19.8	18.2	25.9 V	14.5	26.8	T04	19.8	18.2	25.9 V
PCB057	pg/g-Wet	3	3	100	0.77	1.28	T04	1.05	1.09	1.26 V	0.77	1.28	T04	1.05	1.09	1.26 V
PCB058	pg/g-Wet	3	2	66.7	0.671	0.91	T04	0.791	0.791 V	0.898 V	0.671	1.34 U	T04	0.75	0.671	0.886 V
PCB059 & 062 & 075	pg/g-Wet	3	3	100	11.8	21	T04	16.5	16.8	20.6 V	11.8	21	T04	16.5	16.8	20.6 V
PCB060	pg/g-Wet	3	3	100	43.5	86	T04	64.4	63.7	83.8 V	43.5	86	T04	64.4	63.7	83.8 V
PCB061 & 070 & 074 & 076	pg/g-Wet	3	3	100	342	610	T04	472	463	595 V	342	610	T04	472	463	595 V
PCB063	pg/g-Wet	3	3	100	10.6	21.6	T04	15.7	15	20.9 V	10.6	21.6	T04	15.7	15	20.9 V
PCB064	pg/g-Wet	3	3	100	65.9	125	T04	95.8	96.4	122 V	65.9	125	T04	95.8	96.4	122 V
PCB066	pg/g-Wet	3	3	100	243	444	T04	343	341	434 V	243	444	T04	343	341	434 V
PCB067	pg/g-Wet	3	3	100	2.97	5.36	T04	4.25	4.42	5.27 V	2.97	5.36	T04	4.25	4.42	5.27 V
PCB068	pg/g-Wet	3	3	100	3.01	4.81	T04	3.93	3.97	4.73 V	3.01	4.81	T04	3.93	3.97	4.73 V
PCB072	pg/g-Wet	3	3	100	3.28	6.11	T04	4.67	4.62	5.96 V	3.28	6.11	T04	4.67	4.62	5.96 V
PCB073	pg/g-Wet	3	3	100	1.29	2.17	T04	1.85	2.08	2.16 V	1.29	2.17	T04	1.85	2.08	2.16 V
PCB077	pg/g-Wet	3	3	100	13.2	20.4	T04	17.2	18.1	20.2 V	13.2	20.4	T04	17.2	18.1	20.2 V
PCB078	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.903 U	0.942 U	T04	0.459	0.454 U	0.469 UV
PCB079	pg/g-Wet	3	3	100	5.86	10.6	T04	7.7	6.65	10.2 V	5.86	10.6	T04	7.7	6.65	10.2 V
PCB080	pg/g-Wet	3	0	0	--	--	--	--	--	--	1.57 U	1.63 U	T04	0.795	0.785 U	0.812 UV
PCB081	pg/g-Wet	3	0	0	--	--	--	--	--	--	1.43 U	2.24 U	T04	0.94	0.985 U	1.11 UV
PCB082	pg/g-Wet	3	3	100	34.4	70.4	T04	50.7	47.3	68.1 V	34.4	70.4	T04	50.7	47.3	68.1 V
PCB083 & 099	pg/g-Wet	3	3	100	438	731	T04	583	581	716 V	438	731	T04	583	581	716 V
PCB084	pg/g-Wet	3	3	100	42.2	90.1	T04	63.1	57	86.8 V	42.2	90.1	T04	63.1	57	86.8 V
PCB085 & 116 & 117	pg/g-Wet	3	3	100	135	230	T04	182	180	225 V	135	230	T04	182	180	225 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	3	3	100	309	559	T04	424	403	543 V	309	559	T04	424	403	543 V
PCB088 & 091	pg/g-Wet	3	3	100	46.5	95.1	T04	67.8	61.8	91.8 V	46.5	95.1	T04	67.8	61.8	91.8 V
PCB089	pg/g-Wet	3	2	66.7	2.89	4.52	T04	3.71	3.71 V	4.44 V	1.97 U	4.52	T04	2.8	2.89	4.36 V
PCB090 & 101 & 113	pg/g-Wet	3	3	100	567	1020	T04	773	733	991 V	567	1020	T04	773	733	991 V
PCB092	pg/g-Wet	3	3	100	101	173	T04	133	126	168 V	101	173	T04	133	126	168 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	3	3	100	227	438	T04	317	285	423 V	227	438	T04	317	285	423 V
PCB094	pg/g-Wet	3	1	33.3	1.99	1.99	T04	1.99	1.99	1.99	1.22 U	2.1 U	T04	1.22	1.05 U	1.9 V
PCB096	pg/g-Wet	3	3	100	0.837	1.81	T04	1.27	1.15	1.74 V	0.837	1.81	T04	1.27	1.15	1.74 V
PCB103	pg/g-Wet	3	3	100	3.02	6.02	T04	4.31	3.9	5.81 V	3.02	6.02	T04	4.31	3.9	5.81 V
PCB104	pg/g-Wet	3	2	66.7	0.135 J	0.254 J	T04	0.195	0.195 JV	0.248 JV	0.135 J	0.254 J	T04	0.159	0.135 J	0.242 JV
PCB105	pg/g-Wet	3	3	100	297	503	T04	395	384	491 V	297	503	T04	395	384	491 V
PCB106	pg/g-Wet	3	0	0	--	--	--	--	--	--	1.14 U	1.69 U	T04	0.735	0.79 U	0.84 UV
PCB107 & 124	pg/g-Wet	3	3	100	20.4	31.4	T04	26.5	27.6	31 V	20.4	31.4	T04	26.5	27.6	31 V
PCB109	pg/g-Wet	3	3	100	60.3	102	T04	80.2	78.4	99.6 V	60.3	102	T04	80.2	78.4	99.6 V
PCB110 & 115	pg/g-Wet	3	3	100	542	914	T04	706	662	889 V	542	914	T04	706	662	889 V
PCB111	pg/g-Wet	3	1	33.3	1.23	1.23	T04	1.23	1.23	1.23	0.895 U	1.54 U	T04	0.816	0.77 U	1.18 V
PCB112	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.881 U	1.52 U	T04	0.575	0.525 U	0.737 UV
PCB114	pg/g-Wet	3	3	100	18.6	33.8	T04	26	25.6	33 V	18.6	33.8	T04	26	25.6	33 V
PCB118	pg/g-Wet	3	3	100	833	1430	T04	1110	1080	1400 V	833	1430	T04	1110	1080	1400 V
PCB120	pg/g-Wet	3	3	100	4.14	5.69	T04	4.87	4.79	5.6 V	4.14	5.69	T04	4.87	4.79	5.6 V
PCB121	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.895 U	1.54 U	T04	0.583	0.53 U	0.746 UV
PCB122	pg/g-Wet	3	3	100	2.62	4	T04	3.12	2.75	3.88 V	2.62	4	T04	3.12	2.75	3.88 V
PCB123	pg/g-Wet	3	3	100	17.2	27.8	T04	21.8	20.3	27.1 V	17.2	27.8	T04	21.8	20.3	27.1 V
PCB126	pg/g-Wet	3	3	100	3.12	4.54	T04	3.89	4.02	4.49 V	3.12	4.54	T04	3.89	4.02	4.49 V
PCB127	pg/g-Wet	3	2	66.7	2.6	2.76	T04	2.68	2.68 V	2.75 V	2.02 U	2.76	T04	2.12	2.6	2.74 V
PCB128 & 166	pg/g-Wet	3	3	100	157	260	T04	202	188	253 V	157	260	T04	202	188	253 V
PCB129 & 138 & 160 & 163	pg/g-Wet	3	3	100	1230	2000	T04	1570	1490	1950 V	1230	2000	T04	1570	1490	1950 V
PCB130	pg/g-Wet	3	3	100	65	112	T04	86.2	81.5	109 V	65	112	T04	86.2	81.5	109 V
PCB131	pg/g-Wet	3	3	100	4.31	9.25	T04	6.44	5.75	8.9 V	4.31	9.25	T04	6.44	5.75	8.9 V
PCB132	pg/g-Wet	3	3	100	144	276	T04	200	179	266 V	144	276	T04	200	179	266 V
PCB133	pg/g-Wet	3	3	100	20.5	34.4	T04	26.7	25.2	33.5 V	20.5	34.4	T04	26.7	25.2	33.5 V
PCB134 & 143	pg/g-Wet	3	3	100	23.7	42.6	T04	32	29.8	41.3 V	23.7	42.6	T04	32	29.8	41.3 V
PCB135 & 151 & 154	pg/g-Wet	3	3	100	203	334	T04	257	234	324 V	203	334	T04	257	234	324 V
PCB136	pg/g-Wet	3	3	100	34.4	65.6	T04	46.7	40.1	63.1 V	34.4	65.6	T04	46.7	40.1	63.1 V
PCB137	pg/g-Wet	3	3	100	43	80.9	T04	62	62	79 V	43	80.9	T04	62	62	79 V
PCB139 & 140	pg/g-Wet	3	3	100	13.2	24.3	T04	18.7	18.7	23.7 V	13.2	24.3	T04	18.7	18.7	23.7 V
PCB141	pg/g-Wet	3	3	100	138	251	T04	185	167	243 V	138	251	T04	185	167	243 V
PCB142	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.566 U	1.05 U	T04	0.384	0.343 U	0.507 UV
PCB144	pg/g-Wet	3	3	100	24.1	47.9	T04	34.4	31.1	46.2 V	24.1	47.9	T04	34.4	31.1	46.2 V
PCB145	pg/g-Wet	3	3	100	0.109 J	0.251 J	T04	0.179	0.177 J	0.244 JV	0.109 J	0.251 J	T04	0.179	0.177 J	0.244 JV
PCB146	pg/g-Wet	3	3	100	209	350	T04	270	252	340 V	209	350	T04	270	252	340 V
PCB147 & 149	pg/g-Wet	3	3	100	588	985	T04	743	656	952 V	588	985	T04	743	656	952 V
PCB148	pg/g-Wet	3	3	100	1.53	2.88	T04	2.14	2.01	2.79 V	1.53	2.88	T04	2.14	2.01	2.79 V
PCB150	pg/g-Wet	3	3	100	0.875	1.7	T04	1.21	1.04	1.63 V	0.875	1.7	T04	1.21	1.04	1.63 V
PCB152	pg/g-Wet	3	3	100	0.214 J	0.379 J	T04	0.276	0.234 J	0.365 JV	0.214 J	0.379 J	T04	0.276	0.234 J	0.365 JV
PCB153 & 168	pg/g-Wet	3	3	100	1270	2120	T04	1660	1590	2070 V	1270	2120	T04	1660	1590	2070 V
PCB155	pg/g-Wet	3	3	100	0.913	1.12	T04	1.03	1.05	1.11 V	0.913	1.12	T04	1.03	1.05	1.11 V
PCB156 & 157	pg/g-Wet	3	3	100	111	196	T04	151	147	191 V	111	196	T04	151	147	191 V
PCB158	pg/g-Wet	3	3	100	96.1	173	T04	130	122	168 V	96.1	173	T04	130	122	168 V
PCB159	pg/g-Wet	3	3	100	8.46	12.9	T04	10.1	8.81	12.5 V	8.46	12.9	T04	10.1	8.81	12.5 V
PCB161	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.5 U	0.752 U	T04	0.293	0.252 U	0.364 UV
PCB162	pg/g-Wet	3	3	100	4.93	7.67	T04	6.22	6.05	7.51 V	4.93	7.67	T04	6.22	6.05	7.51 V
PCB164	pg/g-Wet	3	3	100	60.6	93.1	T04	72.7	64.5	90.2 V	60.6	93.1	T04	72.7	64.5	90.2 V
PCB165	pg/g-Wet	3	3	100	0.856	1.35	T04	1.03	0.874	1.3 V	0.856	1.35	T04	1.03	0.874	1.3 V
PCB167	pg/g-Wet	3	3	100	46.1	77.2	T04	60.4	57.9	75.3 V	46.1	77.2	T04	60.4	57.9	75.3 V
PCB169	pg/g-Wet	3	0	0	--	--	--	--	--	--	1.49 U	2.33 U	T04	0.935	0.895 U	1.14 UV
PCB170	pg/g-Wet	3	3	100	237	399	T04	305	279	387 V	237	399	T04	305	279	387 V
PCB171 & 173	pg/g-Wet	3	3	100	56.5	101	T04	74.1	64.8	97.4 V	56.5	101	T04	74.1	64.8	97.4 V
PCB172	pg/g-Wet	3	3	100	50.1	82.5	T04	63.9	59	80.2 V	50.1	82.5	T04	63.9	59	80.2 V
PCB174	pg/g-Wet	3	3	100	170	266	T04	203	172	257 V	170	266	T04	203	172	257 V
PCB175	pg/g-Wet	3	3	100	8.98	16.2	T04	12	10.9	15.7 V	8.98	16.2	T04	12	10.9	15.7 V
PCB176	pg/g-Wet	3	3	100	14.1	28	T04	19.4	16	26.8 V	14.1	28	T04	19.4	16	26.8 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB177	pg/g-Wet	3	3	100	148	249	T04	186	160	240 V	148	249	T04	186	160	240 V
PCB178	pg/g-Wet	3	3	100	65.3	100	T04	79.6	73.6	97.4 V	65.3	100	T04	79.6	73.6	97.4 V
PCB179	pg/g-Wet	3	3	100	51.8	84	T04	63.1	53.5	81 V	51.8	84	T04	63.1	53.5	81 V
PCB180 & 193	pg/g-Wet	3	3	100	673	1120	T04	873	825	1090 V	673	1120	T04	873	825	1090 V
PCB181	pg/g-Wet	3	2	66.7	2.57	3.47	T04	3.02	3.02 V	3.43 V	2.12 U	3.47	T04	2.37	2.57	3.38 V
PCB182	pg/g-Wet	3	3	100	2.33	3.2	T04	2.65	2.43	3.12 V	2.33	3.2	T04	2.65	2.43	3.12 V
PCB183 & 185	pg/g-Wet	3	3	100	180	305	T04	230	205	295 V	180	305	T04	230	205	295 V
PCB184	pg/g-Wet	3	3	100	0.926	1.35	T04	1.17	1.22	1.34 V	0.926	1.35	T04	1.17	1.22	1.34 V
PCB186	pg/g-Wet	3	1	33.3	0.061 J	0.061 J	T04	0.061	0.061 J	0.061 J	0.0537 U	0.0647 U	T04	0.0401	0.0324 U	0.0581 JV
PCB187	pg/g-Wet	3	3	100	527	724	T04	596	538	705 V	527	724	T04	596	538	705 V
PCB188	pg/g-Wet	3	3	100	0.687	1.09	T04	0.847	0.763	1.06 V	0.687	1.09	T04	0.847	0.763	1.06 V
PCB189	pg/g-Wet	3	3	100	8.98	15.2	T04	11.8	11.2	14.8 V	8.98	15.2	T04	11.8	11.2	14.8 V
PCB190	pg/g-Wet	3	3	100	55.6	90.2	T04	69.7	63.4	87.5 V	55.6	90.2	T04	69.7	63.4	87.5 V
PCB191	pg/g-Wet	3	3	100	9.9	17.5	T04	13	11.6	16.9 V	9.9	17.5	T04	13	11.6	16.9 V
PCB192	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.0537 U	1.16 U	T04	0.216	0.0404 U	0.526 UV
PCB194	pg/g-Wet	3	3	100	100	166	T04	130	123	162 V	100	166	T04	130	123	162 V
PCB195	pg/g-Wet	3	3	100	36.4	61.7	T04	47.1	43.2	59.9 V	36.4	61.7	T04	47.1	43.2	59.9 V
PCB196	pg/g-Wet	3	3	100	47.1	87.9	T04	64.8	59.4	85.1 V	47.1	87.9	T04	64.8	59.4	85.1 V
PCB197 & 200	pg/g-Wet	3	3	100	11	19.4	T04	14.1	12	18.7 V	11	19.4	T04	14.1	12	18.7 V
PCB198 & 199	pg/g-Wet	3	3	100	139	219	T04	174	165	214 V	139	219	T04	174	165	214 V
PCB201	pg/g-Wet	3	3	100	11.6	21.7	T04	16	14.6	21 V	11.6	21.7	T04	16	14.6	21 V
PCB202	pg/g-Wet	3	3	100	32.1	45	T04	37.2	34.4	43.9 V	32.1	45	T04	37.2	34.4	43.9 V
PCB203	pg/g-Wet	3	3	100	92.3	149	T04	119	116	146 V	92.3	149	T04	119	116	146 V
PCB204	pg/g-Wet	3	1	33.3	0.133 J	0.133 J	T04	0.133	0.133 J	0.133 J	0.133 J	0.223 U	T04	0.109	0.112 U	0.131 JV
PCB205	pg/g-Wet	3	3	100	5.91	9.24	T04	7.34	6.87	9 V	5.91	9.24	T04	7.34	6.87	9 V
PCB206	pg/g-Wet	3	3	100	43.2	62.6	T04	52.5	51.6	61.5 V	43.2	62.6	T04	52.5	51.6	61.5 V
PCB207	pg/g-Wet	3	3	100	5.03	8.15	T04	6.46	6.19	7.95 V	5.03	8.15	T04	6.46	6.19	7.95 V
PCB208	pg/g-Wet	3	3	100	16.2	21.4	T04	18.4	17.6	21 V	16.2	21.4	T04	18.4	17.6	21 V
PCB209	pg/g-Wet	3	3	100	19.6	22	T04	21	21.5	22 V	19.6	22	T04	21	21.5	22 V
Total PCB Congeners	pg/g-Wet	3	3	100	12800 JT	21600 JT	T04	16700	15800 JT	21000 JV	12800 JT	21600 JT	T04	16700	15800 JT	21000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	3	3	100	12.8 JT	21.6 JT	T04	16.7	15.8 JT	21 JV	12.8 JT	21.6 JT	T04	16.7	15.8 JT	21 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	3	3	100	110 JT	126 T	T04	116	111 T	125 V	110 JT	126 T	T04	116	111 T	125 V
Heptachlorobiphenylhomologs	pg/g-Wet	3	3	100	2270 T	3610 T	T04	2810	2540 T	3500 V	2270 T	3610 T	T04	2810	2540 T	3500 V
Hexachlorobiphenyl homologs	pg/g-Wet	3	3	100	4500 T	7560 T	T04	5840	5460 T	7350 V	4500 T	7560 T	T04	5840	5460 T	7350 V
Monochlorobiphenyl homologs	pg/g-Wet	3	3	100	9.72 T	10.4 T	T04	10.1	10.1 T	10.4 V	9.72 T	10.4 T	T04	10.1	10.1 T	10.4 V
Nonachlorobiphenyl homologs	pg/g-Wet	3	3	100	64.5 T	92.2 T	T04	77.4	75.4 T	90.5 V	64.5 T	92.2 T	T04	77.4	75.4 T	90.5 V
Octachlorobiphenyl homologs	pg/g-Wet	3	3	100	476 T	779 T	T04	610	574 T	759 V	476 T	779 T	T04	610	574 T	759 V
Pentachlorobiphenylhomologs	pg/g-Wet	3	3	100	3700 T	6480 T	T04	4980	4770 T	6310 V	3700 T	6480 T	T04	4980	4770 T	6310 V
Tetrachlorobiphenyl homologs	pg/g-Wet	3	3	100	1350 T	2520 T	T04	1910	1870 T	2460 V	1350 T	2520 T	T04	1910	1870 T	2460 V
Trichlorobiphenyl homologs	pg/g-Wet	3	3	100	280 JT	403 JT	T04	338	332 JT	396 JV	280 JT	403 JT	T04	338	332 JT	396 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	3	2	66.7	0.097	0.263	T04	0.18	0.18 V	0.255 V	0.0561 U	0.263	T04	0.129	0.097	0.246 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	1.02	1.18	T04	1.09	1.08	1.17 V	1.02	1.18	T04	1.09	1.08	1.17 V
Hexachlorodibenzofuran homologs	pg/g-Wet	3	3	100	0.071	0.216	T04	0.166	0.212	0.216 V	0.071	0.216	T04	0.166	0.212	0.216 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.25	1.08	T04	0.627	0.551	1.03 V	0.25	1.08	T04	0.627	0.551	1.03 V
Octachlorodibenzofuran	pg/g-Wet	3	3	100	0.203 J	0.245 J	T04	0.23	0.243 J	0.245 JV	0.203 J	0.245 J	T04	0.23	0.243 J	0.245 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	2.08 J	2.45	T04	2.3	2.36	2.44 V	2.08 J	2.45	T04	2.3	2.36	2.44 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	3	2	66.7	0.206	0.371	T04	0.289	0.289 V	0.363 V	0.206	0.597 U	T04	0.292	0.299 U	0.364 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.301	0.701	T04	0.456	0.365	0.667 V	0.301	0.701	T04	0.456	0.365	0.667 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	3	3	100	0.212	0.307	T04	0.257	0.251	0.301 V	0.212	0.307	T04	0.257	0.251	0.301 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	1	33.3	0.243	0.243	T04	0.243	0.243	0.243	0.054 U	0.243	T04	0.0994	0.0281 U	0.222 V
Total PCDD/F	pg/g-Wet	3	3	100	5.07 JT	6.18 JT	T04	5.52	5.31 JT	6.09 JV	5.07 JT	6.18 JT	T04	5.52	5.31 JT	6.09 JV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	3	1	33.3	0.14 J	0.14 J	T04	0.14	0.14 J	0.14 J	0.138 U	0.147 U	T04	0.0942	0.0735 U	0.133 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.726 J	0.866 J	T04	0.794	0.789 J	0.858 JV	0.726 J	0.866 J	T04	0.794	0.789 J	0.858 JV
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.0537 U	0.0561 U	T04	0.0273	0.027 U	0.0279 UV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.0537 U	0.0561 U	T04	0.0273	0.027 U	0.0279 UV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	2	66.7	0.096 J	0.131 J	T04	0.114	0.114 JV	0.129 JV	0.082 U	0.131 J	T04	0.0893	0.096 J	0.128 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.0537 U	0.0561 U	T04	0.0273	0.027 U	0.0279 UV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	2	66.7	0.344 J	0.563 J	T04	0.454	0.454 JV	0.552 JV	0.317 U	0.563 J	T04	0.355	0.344 J	0.541 JV
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.0537 U	0.0561 U	T04	0.0273	0.027 U	0.0279 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	2	66.7	0.084 J	0.166 J	T04	0.125	0.125 JV	0.162 JV	0.084 J	0.166 J	T04	0.108	0.084 J	0.158 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	3	2	66.7	0.071 J	0.079 J	T04	0.075	0.075 JV	0.0786 JV	0.054 U	0.079 J	T04	0.059	0.071 J	0.0782 JV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.301 J	0.701 J	T04	0.456	0.365 J	0.667 JV	0.301 J	0.701 J	T04	0.456	0.365 J	0.667 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	3	100	0.071 J	0.08 J	T04	0.074	0.071 J	0.0791 JV	0.071 J	0.08 J	T04	0.074	0.071 J	0.0791 JV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	3	3	100	0.137 J	0.155 J	T04	0.144	0.139 J	0.153 JV	0.137 J	0.155 J	T04	0.144	0.139 J	0.153 JV
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	3	3	100	0.21 J	0.297	T04	0.256	0.26	0.293 V	0.21 J	0.297	T04	0.256	0.26	0.293 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	3	1	33.3	0.243	0.243	T04	0.243	0.243	0.243	0.153 U	0.243	T04	0.137	0.0925 U	0.228 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	0.388 JT	1.12 JT	T04	0.671	0.505 JT	1.06 JV	0.388 JT	1.12 JT	T04	0.671	0.505 JT	1.06 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	0.741 JT	1.62 JT	T04	1.11	0.978 JT	1.56 JV	0.741 JT	1.62 JT	T04	1.11	0.978 JT	1.56 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	0.353 T	0.508 T	T04	0.445	0.473 T	0.505 V	0.353 T	0.508 T	T04	0.445	0.473 T	0.505 V
Pesticides																
2,4'-DDD	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.34 U	0.34 U	T04	0.17	0.17 U	0.17 UV
2,4'-DDE	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.16 U	0.93 U	T04	0.32	0.42 U	0.46 UV
2,4'-DDT	µg/kg-Wet	3	3	100	0.81 NJ	1.2 NJ	T04	1	1 NJ	1.2 JV	0.81 NJ	1.2 NJ	T04	1	1 NJ	1.2 JV
4,4'-DDD	µg/kg-Wet	3	1	33	1 J	1 J	T04	1	1 J	1 J	0.69 U	1 J	T04	0.6	0.44 U	0.94 JV
4,4'-DDE	µg/kg-Wet	3	3	100	6.3	7.9	T04	6.9	6.6	7.8 V	6.3	7.9	T04	6.9	6.6	7.8 V
4,4'-DDT	µg/kg-Wet	3	3	100	1.5	2.1	T04	1.7	1.6	2.1 V	1.5	2.1	T04	1.7	1.6	2.1 V
Aldrin	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.16 U	0.17 U	T04	0.082	0.08 U	0.085 UV
alpha-Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.18 U	1.1 U	T04	0.26	0.15 U	0.51 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.34 U	0.34 U	T04	0.17	0.17 U	0.17 UV
beta-Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.26 U	1.1 U	T04	0.41	0.55 U	0.55 UV
beta-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.33 U	0.36 U	T04	0.17	0.17 U	0.18 UV
cis-Chlordane	µg/kg-Wet	3	3	100	0.34 J	0.56 J	T04	0.42	0.37 J	0.54 JV	0.34 J	0.56 J	T04	0.42	0.37 J	0.54 JV
cis-Nonachlor	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.26 U	1.1 U	T04	0.27	0.14 U	0.51 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.22 U	0.23 U	T04	0.11	0.12 U	0.12 UV
Dieldrin	µg/kg-Wet	3	3	100	0.65 J	0.84 J	T04	0.74	0.72 J	0.83 JV	0.65 J	0.84 J	T04	0.74	0.72 J	0.83 JV
Endosulfan sulfate	µg/kg-Wet	3	1	33	0.34 J	0.34 J	T04	0.34	0.34 J	0.34 J	0.24 UJ	0.34 J	T04	0.21	0.16 UJ	0.32 JV
Endrin	µg/kg-Wet	3	2	67	0.14 J	0.24 J	T04	0.19	0.19 JV	0.24 JV	0.14 J	0.4 U	T04	0.19	0.2 U	0.24 JV
Endrin aldehyde	µg/kg-Wet	3	2	67	0.25 NJ	0.61 NJ	T04	0.43	0.43 JV	0.59 JV	0.19 U	0.61 NJ	T04	0.32	0.25 NJ	0.57 JV
Endrin ketone	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.1 U	1.3 U	T04	0.58	0.55 U	0.64 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.18 U	0.49 U	T04	0.14	0.09 U	0.23 UV
Heptachlor	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.33 U	0.33 U	T04	0.17	0.17 U	0.17 UV
Heptachlor epoxide	µg/kg-Wet	3	2	67	0.73 J	1.2 NJ	T04	0.97	0.97 JV	1.2 JV	0.36 U	1.2 NJ	T04	0.7	0.73 J	1.2 JV
Methoxychlor	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.34 U	0.34 U	T04	0.17	0.17 U	0.17 UV
Oxychlordane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.41 U	0.45 U	T04	0.21	0.21 U	0.22 UV
Total Chlordanes	µg/kg-Wet	3	3	100	2.07 NJT	3.02 NJT	T04	2.42	2.18 NJT	2.94 JV	2.07 NJT	3.02 NJT	T04	2.42	2.18 NJT	2.94 JV
Total Endosulfan	µg/kg-Wet	3	1	33	0.34 JT	0.34 JT	T04	0.34	0.34 JT	0.34 JT	0.34 JT	1.1 UT	T04	0.48	0.55 UT	0.55 UV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	3	1	33	1 JT	1 JT	T04	1	1 JT	1 JT	0.69 UT	1 JT	T04	0.6	0.44 UT	0.94 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	3	3	100	8.61 NJT	12.2 NJT	T04	10	9.2 NJT	11.9 JV	8.61 NJT	12.2 NJT	T04	10	9.2 NJT	11.9 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	3	3	100	6.3 T	7.9 T	T04	6.9	6.6 T	7.8 V	6.3 T	7.9 T	T04	6.9	6.6 T	7.8 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	3	3	100	2.31 NJT	3.3 NJT	T04	2.74	2.6 NJT	3.23 JV	2.31 NJT	3.3 NJT	T04	2.74	2.6 NJT	3.23 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	3	3	100	7.8 T	11 JT	T04	9	8.2 T	11 JV	7.8 T	11 JT	T04	9	8.2 T	11 JV
Toxaphene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	24 U	38 U	T04	16	18 U	19 UV
trans-Chlordane	µg/kg-Wet	3	3	100	0.51 NJ	0.73 NJ	T04	0.6	0.56 NJ	0.71 JV	0.51 NJ	0.73 NJ	T04	0.6	0.56 NJ	0.71 JV
trans-Nonachlor	µg/kg-Wet	3	3	100	1 J	1.9	T04	1.4	1.3	1.8 V	1 J	1.9	T04	1.4	1.3	1.8 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	3	3	100	3.3	4	T04	3.6	3.4	3.9 V	3.3	4	T04	3.6	3.4	3.9 V
Acenaphthene	µg/kg-Wet	3	3	100	0.38 J	0.41 J	T04	0.4	0.4 J	0.41 JV	0.38 J	0.41 J	T04	0.4	0.4 J	0.41 JV
Acenaphthylene	µg/kg-Wet	3	3	100	0.15 J	0.27 J	T04	0.2	0.19 J	0.26 JV	0.15 J	0.27 J	T04	0.2	0.19 J	0.26 JV
Anthracene	µg/kg-Wet	3	3	100	0.15 J	0.2 J	T04	0.17	0.17 J	0.2 JV	0.15 J	0.2 J	T04	0.17	0.17 J	0.2 JV
Benzo(a)anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.13 U	0.13 U	T04	0.065	0.065 U	0.065 UV
Benzo(a)pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.13 U	0.13 U	T04	0.065	0.065 U	0.065 UV
Benzo(b)fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.16 U	0.16 U	T04	0.08	0.08 U	0.08 UV
Benzo(g,h,i)perylene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.18 U	0.18 U	T04	0.09	0.09 U	0.09 UV
Benzo(k)fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.14 U	0.14 U	T04	0.07	0.07 U	0.07 UV
Chrysene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.2 U	0.2 U	T04	0.1	0.1 U	0.1 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	3	3	100	0.21 J	0.32 J	T04	0.27	0.27 J	0.32 JV	0.21 J	0.32 J	T04	0.27	0.27 J	0.32 JV
Fluoranthene	µg/kg-Wet	3	1	33	0.61	0.61	T04	0.61	0.61	0.61	0.37 U	0.61	T04	0.33	0.19 U	0.57 V
Fluorene	µg/kg-Wet	3	3	100	0.36 J	0.41 J	T04	0.39	0.39 J	0.41 JV	0.36 J	0.41 J	T04	0.39	0.39 J	0.41 JV
High Molecular Weight PAH	µg/kg-Wet	3	3	100	0.21 JT	1.37 JT	T04	0.633	0.32 JT	1.27 JV	0.21 JT	1.37 JT	T04	0.633	0.32 JT	1.27 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	0.17 U	0.17 U	T04	0.085	0.085 U	0.085 UV
Low Molecular Weight PAH	µg/kg-Wet	3	3	100	5.04 JT	9.77 JT	T04	6.71	5.32 JT	9.33 JV	5.04 JT	9.77 JT	T04	6.71	5.32 JT	9.33 JV
Naphthalene	µg/kg-Wet	3	1	33	3.8	3.8	T04	3.8	3.8	3.8	2.8 U	3.8	T04	2.2	1.5 U	3.6 V
Phenanthrene	µg/kg-Wet	3	3	100	0.62	0.84	T04	0.72	0.69	0.83 V	0.62	0.84	T04	0.72	0.69	0.83 V
Pyrene	µg/kg-Wet	3	1	33	0.49 J	0.49 J	T04	0.49	0.49 J	0.49 J	0.29 U	0.49 J	T04	0.26	0.15 U	0.46 JV
Total BaPEq	µg/kg-Wet	3	3	100	0.21 JT	0.32 JT	T04	0.267	0.27 JT	0.315 JV	0.21 JT	0.32 JT	T04	0.267	0.27 JT	0.315 JV
Total cPAHs	µg/kg-Wet	3	3	100	0.21 JT	0.32 JT	T04	0.27	0.27 JT	0.32 JV	0.21 JT	0.32 JT	T04	0.27	0.27 JT	0.32 JV
Total PAHs	µg/kg-Wet	3	3	100	5.25 JT	10.1 JT	T04	7.35	6.69 JT	9.76 JV	5.25 JT	10.1 JT	T04	7.35	6.69 JT	9.76 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	3	2	67	140 J	140 J	T04	140	140 JV	140 JV	120 U	140 J	T04	110	140 J	140 JV
Butylbenzyl phthalate	µg/kg-Wet	3	3	100	200	240	T04	220	210	240 V	200	240	T04	220	210	240 V
Dibutyl phthalate	µg/kg-Wet	3	2	67	50 J	52 J	T04	51	51 JV	52 JV	34 U	52 J	T04	40	50 J	52 JV
Diethyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	20 U	21 U	T04	10	10 U	10 UV
Dimethyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	11 U	12 U	T04	5.7	5.5 U	6 UV
Di-n-octyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	27 U	30 U	T04	14	14 U	15 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	21 U	23 U	T04	11	11 U	11 UV
1,2-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	25 U	27 U	T04	13	13 U	13 UV
1,3-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	23 UJ	25 UJ	T04	12	12 UJ	12 UJV
1,4-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	23 UJ	25 UJ	T04	12	12 UJ	12 UJV
Benzyl alcohol	µg/kg-Wet	3	3	100	31 J	57 J	T04	42	39 J	55 JV	31 J	57 J	T04	42	39 J	55 JV
Dibenzofuran	µg/kg-Wet	3	3	100	0.37 J	0.48 J	T04	0.42	0.4 J	0.47 JV	0.37 J	0.48 J	T04	0.42	0.4 J	0.47 JV
Hexachlorobenzene	µg/kg-Wet	3	3	100	0.57 J	1.2 J	T04	0.96	1.1 J	1.2 JV	0.57 J	1.2 J	T04	0.96	1.1 J	1.2 JV
Hexachlorobutadiene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.1 U	1.8 U	T04	0.67	0.55 U	0.87 UV
Hexachloroethane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	18 U	19 U	T04	9.2	9 U	9.5 UV
N-Nitrosodiphenylamine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	20 U	22 U	T04	10	10 U	11 UV
Phenols																
2,4-Dimethylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	27 U	30 U	T04	14	14 U	15 UV
2-Methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	110 U	120 U	T04	58	60 U	60 UV
4-Methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	31 U	34 U	T04	16	16 U	17 UV
Pentachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	64 U	70 U	T04	33	33 U	35 UV
Phenol	µg/kg-Wet	3	1	33	40 J	40 J	T04	40	40 J	40 J	35 U	40 J	T04	26	19 U	38 JV
Lamprey Ammocoetes and Macropthalmia																
Conventionals																
Lipids	percent-Wet	4	4	100	3.14	10	LT023c	5.2	3.83 V	9.09 V	3.14	10	LT023c	5.2	3.83 V	9.09 V
Total solids	percent-Wet	4	4	100	20.9	26	LT023c	22.8	22.2 V	25.6 V	20.9	26	LT023c	22.8	22.2 V	25.6 V
Metals																
Aluminum	mg/kg-Wet	4	4	100	3.4	297	LT023c	188	227 V	287 V	3.4	297	LT023c	188	227 V	287 V
Antimony	mg/kg-Wet	4	3	75	0.003 J	0.003 J	LT023b; LT023c	0.003	0.003 J	0.003 JV	0.002 U	0.003 J	LT023b; LT023c	0.0025	0.003 JV	0.003 JV
Arsenic	mg/kg-Wet	4	4	100	0.08 J	0.19	LT023c	0.14	0.15 V	0.19 V	0.08 J	0.19	LT023c	0.14	0.15 V	0.19 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Cadmium	mg/kg-Wet	4	3	75	0.003 J	0.014	LT023b	0.007	0.004 J	0.013 JV	0.002 U	0.014	LT023b	0.0055	0.0035 JV	0.0125 JV
Chromium	mg/kg-Wet	4	3	75	0.26	0.3	LT023c	0.28	0.29	0.3 V	0.1 U	0.3	LT023c	0.23	0.28 V	0.3 V
Copper	mg/kg-Wet	4	4	100	3.92	4.8	LT023c	4.43	4.5 V	4.78 V	3.92	4.8	LT023c	4.43	4.5 V	4.78 V
Lead	mg/kg-Wet	4	4	100	0.0303	0.0954	LT023c	0.0733	0.0837 V	0.0938 V	0.0303	0.0954	LT023c	0.0733	0.0837 V	0.0938 V
Mercury	mg/kg-Wet	4	4	100	0.259	0.902	LT023c	0.55	0.519 JV	0.87 JV	0.259	0.902	LT023c	0.55	0.519 JV	0.87 JV
Nickel	mg/kg-Wet	4	4	100	0.096	0.268	LT023c	0.225	0.268 V	0.268 V	0.096	0.268	LT023c	0.225	0.268 V	0.268 V
Selenium	mg/kg-Wet	4	4	100	0.28	0.31	LT023c	0.3	0.31 V	0.31 V	0.28	0.31	LT023c	0.3	0.31 V	0.31 V
Silver	mg/kg-Wet	4	4	100	0.03	0.0408	LT023b	0.0355	0.0356 V	0.0401 V	0.03	0.0408	LT023b	0.0355	0.0356 V	0.0401 V
Zinc	mg/kg-Wet	4	4	100	25.8	29.1	LT023c	27.5	27.6 V	29.1 V	25.8	29.1	LT023c	27.5	27.6 V	29.1 V
PCB Congeners																
PCB001	pg/g-Wet	2	2	100	2.49 J	2.5 J	LT023c	2.5	2.5 JV	2.5 JV	2.49 J	2.5 J	LT023c	2.5	2.5 JV	2.5 JV
PCB002	pg/g-Wet	3	3	100	10.4 J	35.4 J	LT023c	25.1	29.4 J	34.8 JV	10.4 J	35.4 J	LT023c	25.1	29.4 J	34.8 JV
PCB003	pg/g-Wet	3	2	66.7	1.89 J	4.37 J	LT023c	3.13	3.13 JV	4.25 JV	1.89 J	4.37 J	LT023c	2.44	1.89 J	4.12 JV
PCB004	pg/g-Wet	3	3	100	15.1 J	64.4 J	LT023c	33.7	21.6 J	60.1 JV	15.1 J	64.4 J	LT023c	33.7	21.6 J	60.1 JV
PCB005	pg/g-Wet	4	1	25	1.04	1.04	LT023c	1.04	1.04	1.04	0.501 U	1.04	LT023c	0.52	0.396 UJV	0.954 JV
PCB006	pg/g-Wet	4	3	75	5.6	20.8	LT023c	11.4	7.83 J	19.5 JV	4.4 UJ	20.8	LT023c	9.11	6.72 JV	18.9 JV
PCB007	pg/g-Wet	4	2	50	1.62	3.45	LT023c	2.54	2.54 V	3.36 V	0.877 UJ	3.45	LT023c	1.52	1.1 V	3.18 V
PCB008	pg/g-Wet	4	4	100	20.3 J	85.5	LT023c	40.6	28.3 JV	77.4 JV	20.3 J	85.5	LT023c	40.6	28.3 JV	77.4 JV
PCB009	pg/g-Wet	4	3	75	1.09 J	4.89	LT023c	2.63	1.91	4.59 V	1.07 U	4.89	LT023c	2.11	1.5 JV	4.44 V
PCB010	pg/g-Wet	4	1	25	1.6	1.6	LT023c	1.6	1.6	1.6	0.472 U	1.6	LT023c	0.647	0.375 UJV	1.43 JV
PCB011	pg/g-Wet	4	4	100	576 J	3280	LT023c	1410	888 JV	2920 JV	576 J	3280	LT023c	1410	888 JV	2920 JV
PCB012 & 013	pg/g-Wet	4	3	75	17	56.6	LT023c	32	22.5 J	53.2 JV	0.882 UJ	56.6	LT023c	24.1	19.8 JV	51.5 JV
PCB014	pg/g-Wet	4	1	25	1.76	1.76	LT023c	1.76	1.76	1.76	0.586 U	1.76	LT023c	0.7	0.374 UJV	1.56 JV
PCB015	pg/g-Wet	4	3	75	27.2	78.8	LT023c	45.2	29.7	73.9 V	27.2	78.8	LT023c	37.4	28.5 V	71.4 V
PCB016	pg/g-Wet	4	4	100	40.1 J	121	LT023c	61.9	43.2 V	109 V	40.1 J	121	LT023c	61.9	43.2 V	109 V
PCB017	pg/g-Wet	4	4	100	57.8 J	179	LT023c	90.3	62.3 V	162 V	57.8 J	179	LT023c	90.3	62.3 V	162 V
PCB018 & 030	pg/g-Wet	4	4	100	105	312	LT023c	160	111 JV	283 V	105	312	LT023c	160	111 JV	283 V
PCB019	pg/g-Wet	4	4	100	14.3	54	LT023c	26.3	18.4 JV	48.7 JV	14.3	54	LT023c	26.3	18.4 JV	48.7 JV
PCB020 & 028	pg/g-Wet	4	4	100	367	909	LT023c	513	387 JV	832 V	367	909	LT023c	513	387 JV	832 V
PCB021 & 033	pg/g-Wet	4	4	100	111 J	263	LT023c	153	120 V	242 V	111 J	263	LT023c	153	120 V	242 V
PCB022	pg/g-Wet	4	4	100	107	271	LT023c	150	112 JV	247 V	107	271	LT023c	150	112 JV	247 V
PCB023	pg/g-Wet	4	1	25	0.407 J	0.407 J	LT023b	0.407	0.407 J	0.407 J	0.407 J	0.947 U	LT023c	0.336	0.329 JV	0.464 JV
PCB024	pg/g-Wet	4	4	100	1.63	5.77	LT023c	2.81	1.93 JV	5.2 JV	1.63	5.77	LT023c	2.81	1.93 JV	5.2 JV
PCB025	pg/g-Wet	4	4	100	28.8	72.7	LT023c	41.4	32 JV	66.7 V	28.8	72.7	LT023c	41.4	32 JV	66.7 V
PCB026 & 029	pg/g-Wet	4	4	100	60.2	154	LT023c	85	62.9 JV	141 V	60.2	154	LT023c	85	62.9 JV	141 V
PCB027	pg/g-Wet	4	4	100	9.83	31.4	LT023c	16.1	11.5 JV	28.4 V	9.83	31.4	LT023c	16.1	11.5 JV	28.4 V
PCB031	pg/g-Wet	4	4	100	288 J	720	LT023c	402	300 V	657 V	288 J	720	LT023c	402	300 V	657 V
PCB032	pg/g-Wet	4	4	100	43.3	125	LT023c	66.1	48 JV	114 V	43.3	125	LT023c	66.1	48 JV	114 V
PCB034	pg/g-Wet	4	4	100	2.1	6.31	LT023c	3.5	2.8 JV	5.83 V	2.1	6.31	LT023c	3.5	2.8 JV	5.83 V
PCB035	pg/g-Wet	4	3	75	11	21.7	LT023c	14.7	11.3	20.7 V	10.9 UJ	21.7	LT023c	12.4	11.2 V	20.1 V
PCB036	pg/g-Wet	4	4	100	7.82 J	18.3	LT023c	11.2	9.35 V	17 V	7.82 J	18.3	LT023c	11.2	9.35 V	17 V
PCB037	pg/g-Wet	4	4	100	70.3	158	LT023c	93.8	73.5 V	146 V	70.3	158	LT023c	93.8	73.5 V	146 V
PCB038	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.75 U	1.68 U	LT023c	0.555	0.503 UJV	0.807 UJV
PCB039	pg/g-Wet	4	4	100	5.24	10.4	LT023c	6.86	5.9 JV	9.74 V	5.24	10.4	LT023c	6.86	5.9 JV	9.74 V
PCB040 & 041 & 071	pg/g-Wet	4	4	100	311	701	LT023c	433	361 V	651 V	311	701	LT023c	433	361 V	651 V
PCB042	pg/g-Wet	4	4	100	164	366	LT023c	230	194 V	341 V	164	366	LT023c	230	194 V	341 V
PCB043	pg/g-Wet	4	4	100	27.9	54.1	LT023c	36.4	31.9 V	50.8 V	27.9	54.1	LT023c	36.4	31.9 V	50.8 V
PCB044 & 047 & 065	pg/g-Wet	4	4	100	689	1560	LT023c	975	825 V	1450 V	689	1560	LT023c	975	825 V	1450 V
PCB045 & 051	pg/g-Wet	4	4	100	75.1	205	LT023c	116	91 V	189 V	75.1	205	LT023c	116	91 V	189 V
PCB046	pg/g-Wet	4	4	100	22.1	62.2	LT023c	34.7	27.2 V	57.2 V	22.1	62.2	LT023c	34.7	27.2 V	57.2 V
PCB048	pg/g-Wet	4	4	100	121	246	LT023c	158	133 V	230 V	121	246	LT023c	158	133 V	230 V
PCB049 & 069	pg/g-Wet	4	4	100	516	1090	LT023c	704	605 V	1020 V	516	1090	LT023c	704	605 V	1020 V
PCB050 & 053	pg/g-Wet	4	4	100	61.3	172	LT023c	97.6	78.5 V	159 V	61.3	172	LT023c	97.6	78.5 V	159 V
PCB052	pg/g-Wet	4	4	100	935	2120	LT023c	1330	1130 V	1980 V	935	2120	LT023c	1330	1130 V	1980 V
PCB054	pg/g-Wet	4	3	75	1.51	5.84	LT023c	3	1.64	5.42 V	1.51	5.84	LT023c	2.49	1.58 V	5.21 V
PCB055	pg/g-Wet	4	1	25	20.8	20.8	LT023c	20.8	20.8	20.8	0.675 U	20.8	LT023c	5.54	0.508 UV	17.8 V
PCB056	pg/g-Wet	4	4	100	280	496	LT023c	343	297 V	467 V	280	496	LT023c	343	297 V	467 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB057	pg/g-Wet	4	3	75	3.73	5.5	LT023c	4.47	4.17	5.37 V	3.73	5.5	LT023c	3.89	3.95 V	5.3 V
PCB058	pg/g-Wet	4	4	100	3.87	5.45	LT023c	4.61	4.56 V	5.34 V	3.87	5.45	LT023c	4.61	4.56 V	5.34 V
PCB059 & 062 & 075	pg/g-Wet	4	4	100	61.2	126	LT023c	81.9	70.1 V	118 V	61.2	126	LT023c	81.9	70.1 V	118 V
PCB060	pg/g-Wet	4	4	100	152	242	LT023c	179	160 V	230 V	152	242	LT023c	179	160 V	230 V
PCB061 & 070 & 074 & 076	pg/g-Wet	4	4	100	1530	2520	LT023c	1830	1630 V	2390 V	1530	2520	LT023c	1830	1630 V	2390 V
PCB063	pg/g-Wet	4	4	100	38.6	61.3	LT023c	45.4	40.9 V	58.5 V	38.6	61.3	LT023c	45.4	40.9 V	58.5 V
PCB064	pg/g-Wet	4	4	100	320	696	LT023c	445	381 V	651 V	320	696	LT023c	445	381 V	651 V
PCB066	pg/g-Wet	4	4	100	763 J	1230	LT023c	919	842 V	1170 V	763 J	1230	LT023c	919	842 V	1170 V
PCB067	pg/g-Wet	4	4	100	21.9	34.5	LT023c	25.8	23.3 V	33 V	21.9	34.5	LT023c	25.8	23.3 V	33 V
PCB068	pg/g-Wet	4	4	100	10.4	15.8	LT023c	12.5	12 V	15.4 V	10.4	15.8	LT023c	12.5	12 V	15.4 V
PCB072	pg/g-Wet	4	4	100	16.6	25.3	LT023c	19.2	17.5 V	24.2 V	16.6	25.3	LT023c	19.2	17.5 V	24.2 V
PCB073	pg/g-Wet	4	1	25	6.6	6.6	LT023c	6.6	6.6	6.6	0.47 U	6.6	LT023c	1.83	0.25 UV	5.65 V
PCB077	pg/g-Wet	4	4	100	55.3	99.7	LT023c	69.2	61 V	94 V	55.3	99.7	LT023c	69.2	61 V	94 V
PCB078	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.621 U	1.03 U	LT023c	0.4	0.387 UV	0.507 UV
PCB079	pg/g-Wet	4	4	100	20.1	25	LT023c	22.2	21.8 V	24.7 V	20.1	25	LT023c	22.2	21.8 V	24.7 V
PCB080	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.556 U	0.949 U	LT023c	0.366	0.356 UV	0.467 UV
PCB081	pg/g-Wet	4	3	75	2.12	3.03	LT023c	2.46	2.22	2.95 V	2.12	3.03	LT023c	2.14	2.17 V	2.91 V
PCB082	pg/g-Wet	4	4	100	139	230	LT023c	163	141 V	217 V	139	230	LT023c	163	141 V	217 V
PCB083 & 099	pg/g-Wet	4	4	100	1170	1770	LT023c	1390	1300 V	1700 V	1170	1770	LT023c	1390	1300 V	1700 V
PCB084	pg/g-Wet	4	4	100	323	587	LT023c	404	353 V	554 V	323	587	LT023c	404	353 V	554 V
PCB085 & 116 & 117	pg/g-Wet	4	4	100	355	538	LT023c	412	377 V	516 V	355	538	LT023c	412	377 V	516 V
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	4	4	100	1040 J	1660	LT023c	1230	1110 JV	1580 JV	1040 J	1660	LT023c	1230	1110 JV	1580 JV
PCB088 & 091	pg/g-Wet	4	4	100	241	392	LT023c	286	256 V	373 V	241	392	LT023c	286	256 V	373 V
PCB089	pg/g-Wet	4	4	100	15.7	27	LT023c	18.9	16.5 V	25.5 V	15.7	27	LT023c	18.9	16.5 V	25.5 V
PCB090 & 101 & 113	pg/g-Wet	4	4	100	1970	2980	LT023c	2320	2160 V	2860 V	1970	2980	LT023c	2320	2160 V	2860 V
PCB092	pg/g-Wet	4	4	100	376	555	LT023c	433	400 V	533 V	376	555	LT023c	433	400 V	533 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	4	4	100	1220	2050	LT023c	1470	1300 V	1950 V	1220	2050	LT023c	1470	1300 V	1950 V
PCB094	pg/g-Wet	4	4	100	8.09	14.4	LT023c	9.92	8.6 V	13.6 V	8.09	14.4	LT023c	9.92	8.6 V	13.6 V
PCB096	pg/g-Wet	4	4	100	8.11	15.3	LT023c	10.4	9.19 V	14.5 V	8.11	15.3	LT023c	10.4	9.19 V	14.5 V
PCB103	pg/g-Wet	4	4	100	19.6	29	LT023c	22.7	21 V	27.9 V	19.6	29	LT023c	22.7	21 V	27.9 V
PCB104	pg/g-Wet	4	2	50	0.719	0.787	LT023c	0.753	0.753 V	0.784 V	0.357 U	0.787	LT023c	0.497	0.51 V	0.777 V
PCB105	pg/g-Wet	4	4	100	465	711	LT023c	550	513 V	683 V	465	711	LT023c	550	513 V	683 V
PCB106	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.501 U	2.11 U	LT023c	0.519	0.384 UV	0.964 UV
PCB107 & 124	pg/g-Wet	4	4	100	67.3	103	LT023c	79.8	74.5 V	98.9 V	67.3	103	LT023c	79.8	74.5 V	98.9 V
PCB109	pg/g-Wet	4	4	100	142	206	LT023c	164	154 V	199 V	142	206	LT023c	164	154 V	199 V
PCB110 & 115	pg/g-Wet	4	4	100	1540	2660	LT023c	1880	1650 V	2510 V	1540	2660	LT023c	1880	1650 V	2510 V
PCB111	pg/g-Wet	4	4	100	1.92	2.73	LT023c	2.32	2.31 V	2.68 V	1.92	2.73	LT023c	2.32	2.31 V	2.68 V
PCB112	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.259 U	0.602 U	LT023c	0.234	0.254 UV	0.295 UV
PCB114	pg/g-Wet	4	4	100	36	52.3	LT023c	42.7	41.2 V	50.9 V	36	52.3	LT023c	42.7	41.2 V	50.9 V
PCB118	pg/g-Wet	4	4	100	1520	2200	LT023c	1780	1710 V	2130 V	1520	2200	LT023c	1780	1710 V	2130 V
PCB120	pg/g-Wet	4	4	100	9.64	13.6	LT023c	11.4	11.2 V	13.3 V	9.64	13.6	LT023c	11.4	11.2 V	13.3 V
PCB121	pg/g-Wet	4	4	100	0.98	1.48	LT023c	1.19	1.15 V	1.44 V	0.98	1.48	LT023c	1.19	1.15 V	1.44 V
PCB122	pg/g-Wet	4	4	100	15.5	24	LT023c	18	16.2 V	22.9 V	15.5	24	LT023c	18	16.2 V	22.9 V
PCB123	pg/g-Wet	4	4	100	34.5	53.8	LT023c	40.9	37.6 V	51.6 V	34.5	53.8	LT023c	40.9	37.6 V	51.6 V
PCB126	pg/g-Wet	4	4	100	5.68	8.51	LT023c	6.83	6.56 V	8.28 V	5.68	8.51	LT023c	6.83	6.56 V	8.28 V
PCB127	pg/g-Wet	4	3	75	3.3	3.87	LT023c	3.62	3.69	3.85 V	3.3	4.05 U	LT023c	3.22	3.5 V	3.84 V
PCB128 & 166	pg/g-Wet	4	4	100	206	306	LT023c	239	223 V	295 V	206	306	LT023c	239	223 V	295 V
PCB129 & 138 & 160 & 163	pg/g-Wet	4	4	100	1820	2700	LT023c	2120	1980 V	2600 V	1820	2700	LT023c	2120	1980 V	2600 V
PCB130	pg/g-Wet	4	4	100	124	185	LT023c	147	140 V	179 V	124	185	LT023c	147	140 V	179 V
PCB131	pg/g-Wet	4	4	100	16.6	26.8	LT023c	20.4	19.2 V	25.8 V	16.6	26.8	LT023c	20.4	19.2 V	25.8 V
PCB132	pg/g-Wet	4	4	100	323	519	LT023c	378	335 V	491 V	323	519	LT023c	378	335 V	491 V
PCB133	pg/g-Wet	4	4	100	50.1	67.6	LT023c	56.6	54.4 V	65.8 V	50.1	67.6	LT023c	56.6	54.4 V	65.8 V
PCB134 & 143	pg/g-Wet	4	4	100	81.6	127	LT023c	96.2	88.1 V	121 V	81.6	127	LT023c	96.2	88.1 V	121 V
PCB135 & 151 & 154	pg/g-Wet	4	4	100	645	902	LT023c	718	663 V	869 V	645	902	LT023c	718	663 V	869 V
PCB136	pg/g-Wet	4	4	100	167	248	LT023c	191	175 V	238 V	167	248	LT023c	191	175 V	238 V
PCB137	pg/g-Wet	4	4	100	89.1	121	LT023c	103	101 V	119 V	89.1	121	LT023c	103	101 V	119 V
PCB139 & 140	pg/g-Wet	4	4	100	32.1	47.5	LT023c	38.7	37.5 V	46.3 V	32.1	47.5	LT023c	38.7	37.5 V	46.3 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB141	pg/g-Wet	4	4	100	290	418	LT023c	327	300 V	401 V	290	418	LT023c	327	300 V	401 V
PCB142	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.341 U	0.61 U	LT023c	0.226	0.215 UV	0.295 UV
PCB144	pg/g-Wet	4	4	100	87.4	121	LT023c	100	96.7 V	117 V	87.4	121	LT023c	100	96.7 V	117 V
PCB145	pg/g-Wet	4	3	75	0.616 J	0.966	LT023c	0.745	0.654	0.935 V	0.616 J	0.966	LT023c	0.653	0.635 JV	0.919 V
PCB146	pg/g-Wet	4	4	100	404	537	LT023c	451	432 V	523 V	404	537	LT023c	451	432 V	523 V
PCB147 & 149	pg/g-Wet	4	4	100	1220	1910	LT023c	1440	1310 V	1820 V	1220	1910	LT023c	1440	1310 V	1820 V
PCB148	pg/g-Wet	4	4	100	5.22	5.73	LT023c	5.51	5.54 V	5.7 V	5.22	5.73	LT023c	5.51	5.54 V	5.7 V
PCB150	pg/g-Wet	4	4	100	2.9	4.34	LT023c	3.54	3.47 V	4.22 V	2.9	4.34	LT023c	3.54	3.47 V	4.22 V
PCB152	pg/g-Wet	4	4	100	1.41	2.15	LT023c	1.66	1.54 V	2.07 V	1.41	2.15	LT023c	1.66	1.54 V	2.07 V
PCB153 & 168	pg/g-Wet	4	4	100	2400	3330	LT023c	2730	2600 V	3230 V	2400	3330	LT023c	2730	2600 V	3230 V
PCB155	pg/g-Wet	4	4	100	2.23	3.16	LT023c	2.69	2.69 V	3.11 V	2.23	3.16	LT023c	2.69	2.69 V	3.11 V
PCB156 & 157	pg/g-Wet	4	4	100	164	233	LT023c	194	189 V	228 V	164	233	LT023c	194	189 V	228 V
PCB158	pg/g-Wet	4	4	100	170	244	LT023c	197	188 V	237 V	170	244	LT023c	197	188 V	237 V
PCB159	pg/g-Wet	4	4	100	5.73	9.48	LT023c	6.87	6.13 V	8.99 V	5.73	9.48	LT023c	6.87	6.13 V	8.99 V
PCB161	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.379 U	0.426 U	LT023c	0.201	0.201 UV	0.212 UV
PCB162	pg/g-Wet	4	4	100	9.51	13.5	LT023c	11.3	11.1 V	13.2 V	9.51	13.5	LT023c	11.3	11.1 V	13.2 V
PCB164	pg/g-Wet	4	4	100	60.4	108	LT023c	73.2	62.2 V	101 V	60.4	108	LT023c	73.2	62.2 V	101 V
PCB165	pg/g-Wet	4	4	100	1.13	1.52	LT023c	1.35	1.38 V	1.51 V	1.13	1.52	LT023c	1.35	1.38 V	1.51 V
PCB167	pg/g-Wet	4	4	100	80	113	LT023c	94.4	92.2 V	111 V	80	113	LT023c	94.4	92.2 V	111 V
PCB169	pg/g-Wet	4	0	0	--	--	--	--	--	--	1.37 U	1.86 U	LT023c	0.781	0.755 UV	0.905 UV
PCB170	pg/g-Wet	4	4	100	192	257	LT023c	212	199 V	248 V	192	257	LT023c	212	199 V	248 V
PCB171 & 173	pg/g-Wet	4	4	100	63.6	89.8	LT023c	72	67.3 V	86.5 V	63.6	89.8	LT023c	72	67.3 V	86.5 V
PCB172	pg/g-Wet	4	4	100	69	94.9	LT023c	78.1	74.3 V	92.1 V	69	94.9	LT023c	78.1	74.3 V	92.1 V
PCB174	pg/g-Wet	4	4	100	133	226	LT023c	166	153 V	215 V	133	226	LT023c	166	153 V	215 V
PCB175	pg/g-Wet	4	4	100	15.6	20.8	LT023c	17.3	16.5 V	20.2 V	15.6	20.8	LT023c	17.3	16.5 V	20.2 V
PCB176	pg/g-Wet	4	4	100	32.4	47	LT023c	36.7	33.7 V	45.1 V	32.4	47	LT023c	36.7	33.7 V	45.1 V
PCB177	pg/g-Wet	4	4	100	141	210	LT023c	162	149 V	201 V	141	210	LT023c	162	149 V	201 V
PCB178	pg/g-Wet	4	4	100	112	155	LT023c	126	118 V	150 V	112	155	LT023c	126	118 V	150 V
PCB179	pg/g-Wet	4	4	100	117	187	LT023c	141	130 V	179 V	117	187	LT023c	141	130 V	179 V
PCB180 & 193	pg/g-Wet	4	4	100	727	943	LT023c	795	754 V	916 V	727	943	LT023c	795	754 V	916 V
PCB181	pg/g-Wet	4	4	100	3.79	5.04	LT023c	4.14	3.87 V	4.87 V	3.79	5.04	LT023c	4.14	3.87 V	4.87 V
PCB182	pg/g-Wet	4	4	100	3.23	4.13	LT023c	3.69	3.7 V	4.09 V	3.23	4.13	LT023c	3.69	3.7 V	4.09 V
PCB183 & 185	pg/g-Wet	4	4	100	274	361	LT023c	302	287 V	351 V	274	361	LT023c	302	287 V	351 V
PCB184	pg/g-Wet	4	4	100	3.05	4.4	LT023c	3.47	3.22 V	4.23 V	3.05	4.4	LT023c	3.47	3.22 V	4.23 V
PCB186	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.157 U	0.172 U	LT023b	0.081	0.0798 UV	0.0852 UV
PCB187	pg/g-Wet	4	4	100	549	783	LT023c	624	583 V	755 V	549	783	LT023c	624	583 V	755 V
PCB188	pg/g-Wet	4	3	75	1.72	2.25	LT023c	2.01	2.07	2.23 V	1.72	2.25	LT023c	1.75	1.9 V	2.22 V
PCB189	pg/g-Wet	4	4	100	10.7	13.8	LT023c	12.2	12.2 V	13.6 V	10.7	13.8	LT023c	12.2	12.2 V	13.6 V
PCB190	pg/g-Wet	4	4	100	59	79.8	LT023c	66.8	64.3 V	77.5 V	59	79.8	LT023c	66.8	64.3 V	77.5 V
PCB191	pg/g-Wet	4	4	100	8.1	10.9	LT023c	9.01	8.51 V	10.5 V	8.1	10.9	LT023c	9.01	8.51 V	10.5 V
PCB192	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.313 U	0.345 U	LT023b	0.162	0.16 UV	0.171 UV
PCB194	pg/g-Wet	4	4	100	100	119	LT023c	107	105 V	117 V	100	119	LT023c	107	105 V	117 V
PCB195	pg/g-Wet	4	4	100	30.2	36.8	LT023c	31.9	30.4 V	35.9 V	30.2	36.8	LT023c	31.9	30.4 V	35.9 V
PCB196	pg/g-Wet	4	4	100	36.1	44.9	LT023c	39.1	37.7 V	43.8 V	36.1	44.9	LT023c	39.1	37.7 V	43.8 V
PCB197 & 200	pg/g-Wet	4	4	100	13.3	18.2	LT023c	14.7	13.6 V	17.5 V	13.3	18.2	LT023c	14.7	13.6 V	17.5 V
PCB198 & 199	pg/g-Wet	4	4	100	111	149	LT023c	122	113 V	144 V	111	149	LT023c	122	113 V	144 V
PCB201	pg/g-Wet	4	4	100	17.5	23.1	LT023c	19.3	18.3 V	22.4 V	17.5	23.1	LT023c	19.3	18.3 V	22.4 V
PCB202	pg/g-Wet	4	4	100	55.7	76.4	LT023c	66.9	67.7 V	75.6 V	55.7	76.4	LT023c	66.9	67.7 V	75.6 V
PCB203	pg/g-Wet	4	4	100	103	133	LT023c	113	108 V	129 V	103	133	LT023c	113	108 V	129 V
PCB204	pg/g-Wet	4	3	75	0.241 J	0.308 J	LT023c	0.272	0.266 J	0.304 JV	0.241 J	0.308 J	LT023c	0.236	0.254 JV	0.302 JV
PCB205	pg/g-Wet	4	4	100	3.49	4.3	LT023c	3.83	3.77 V	4.23 V	3.49	4.3	LT023c	3.83	3.77 V	4.23 V
PCB206	pg/g-Wet	4	4	100	45	54.3	LT023c	48.9	48.1 V	53.5 V	45	54.3	LT023c	48.9	48.1 V	53.5 V
PCB207	pg/g-Wet	4	4	100	7.89	9.81	LT023c	8.72	8.6 V	9.67 V	7.89	9.81	LT023c	8.72	8.6 V	9.67 V
PCB208	pg/g-Wet	4	4	100	26.7	34.3	LT023c	30.7	30.9 V	33.9 V	26.7	34.3	LT023c	30.7	30.9 V	33.9 V
PCB209	pg/g-Wet	4	4	100	73.7	99.8	LT023c	86.6	86.5 V	98.4 V	73.7	99.8	LT023c	86.6	86.5 V	98.4 V
Total PCB Congeners	pg/g-Wet	4	4	100	31300 JT	52800 JT	LT023c	37600	33200 JV	50000 JV	31300 JT	52800 JT	LT023c	37600	33200 JV	50000 JV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total PCBs[c]																
Total PCBs	µg/kg-Wet	4	4	100	31.3 JT	52.8 JT	LT023c	37.6	33.2 JV	50 JV	31.3 JT	52.8 JT	LT023c	37.6	33.2 JV	50 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	4	4	100	597 JT	3600 JT	LT023c	1550	994 JV	3210 JV	597 JT	3600 JT	LT023c	1550	994 JV	3210 JV
Heptachlorobiphenylhomologs	pg/g-Wet	4	4	100	2550 T	3490 T	LT023c	2830	2650 V	3370 V	2550 T	3490 T	LT023c	2830	2650 V	3370 V
Hexachlorobiphenyl homologs	pg/g-Wet	4	4	100	8460 T	12300 T	LT023c	9750	9110 JV	11800 JV	8460 T	12300 T	LT023c	9750	9110 JV	11800 JV
Monochlorobiphenyl homologs	pg/g-Wet	3	3	100	14.8 JT	39.8 JT	LT023c	28.8	31.9 JT	39 JV	14.8 JT	39.8 JT	LT023c	28.8	31.9 JT	39 JV
Nonachlorobiphenyl homologs	pg/g-Wet	4	4	100	79.6 T	98.4 T	LT023c	88.3	87.6 V	97 V	79.6 T	98.4 T	LT023c	88.3	87.6 V	97 V
Octachlorobiphenyl homologs	pg/g-Wet	4	4	100	480 JT	605 JT	LT023c	517	492 JV	589 JV	480 JT	605 JT	LT023c	517	492 JV	589 JV
Pentachlorobiphenylhomologs	pg/g-Wet	4	4	100	10800 JT	16900 T	LT023c	12700	11600 JV	16100 JV	10800 JT	16900 T	LT023c	12700	11600 JV	16100 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	4	4	100	6220 JT	12200 T	LT023c	8120	7030 V	11500 V	6220 JT	12200 T	LT023c	8120	7030 V	11500 V
Trichlorobiphenyl homologs	pg/g-Wet	4	4	100	1350 JT	3430 T	LT023c	1890	1400 JV	3130 V	1350 JT	3430 T	LT023c	1890	1400 JV	3130 V
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	4	4	100	1.97	5.02	LT023c	3.16	2.82 V	4.77 V	1.97	5.02	LT023c	3.16	2.82 V	4.77 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	6.56	9.5	LT023c	8.71	9.39 V	9.49 V	6.56	9.5	LT023c	8.71	9.39 V	9.49 V
Hexachlorodibenzofuran homologs	pg/g-Wet	4	4	100	4.35	12.1	LT023c	7.95	7.68 V	11.5 V	4.35	12.1	LT023c	7.95	7.68 V	11.5 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	3.18	6	LT023c	4.88	5.16 V	5.9 V	3.18	6	LT023c	4.88	5.16 V	5.9 V
Octachlorodibenzofuran	pg/g-Wet	4	2	50	1.05 J	1.26 J	LT023c	1.16	1.16 JV	1.25 JV	0.629 U	1.26 J	LT023c	0.764	0.74 JV	1.23 JV
Octachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	8.77	14.2	LT023c	11.4	11.3 V	14 V	8.77	14.2	LT023c	11.4	11.3 V	14 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	4	4	100	4.47	10.6	LT023c	7.3	7.07 V	10.1 V	4.47	10.6	LT023c	7.3	7.07 V	10.1 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	0.498	1.42	LT023c	1.12	1.28 V	1.41 V	0.498	1.42	LT023c	1.12	1.28 V	1.41 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	4	4	100	5.77	8.3	LT023c	6.49	5.95 V	7.96 V	5.77	8.3	LT023c	6.49	5.95 V	7.96 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	4	4	100	1.02	1.65	LT023c	1.41	1.49 V	1.64 V	1.02	1.65	LT023c	1.41	1.49 V	1.64 V
Total PCDD/F	pg/g-Wet	4	4	100	37.7 T	63 T	LT023c	53	55.7 JV	62.2 JV	37.7 T	63 T	LT023c	53	55.7 JV	62.2 JV
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	4	3	75	0.693 J	1.4	LT023c	1.04	1.02 J	1.36 JV	0.693 J	1.4	LT023c	0.915	0.857 JV	1.34 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	5.02	9.16	LT023c	7.01	6.93 V	8.86 V	5.02	9.16	LT023c	7.01	6.93 V	8.86 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.1 U	0.18 U	LT023c	0.0688	0.0675 UV	0.0874 UV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	4	3	75	0.463 J	0.796 J	LT023c	0.577	0.471 J	0.764 JV	0.331 U	0.796 J	LT023c	0.474	0.467 JV	0.747 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.471 J	0.951 J	LT023c	0.639	0.568 JV	0.903 JV	0.471 J	0.951 J	LT023c	0.639	0.568 JV	0.903 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	4	4	100	0.169 J	0.392 J	LT023c	0.269	0.258 JV	0.372 JV	0.169 J	0.392 J	LT023c	0.269	0.258 JV	0.372 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	1.42 J	3.23	LT023c	2.19	2.05 V	3.07 V	1.42 J	3.23	LT023c	2.19	2.05 V	3.07 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.0956 U	0.105 U	LT023b	0.0495	0.0488 UV	0.052 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	4	3	75	0.606 J	0.98 J	LT023c	0.747	0.654 J	0.947 JV	0.402 U	0.98 J	LT023c	0.61	0.63 JV	0.931 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	4	3	75	0.252 J	0.515 J	LT023c	0.345	0.269 J	0.49 JV	0.201 U	0.515 J	LT023c	0.284	0.261 JV	0.478 JV
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.498 J	1.33 J	LT023c	0.855	0.796 JV	1.26 JV	0.498 J	1.33 J	LT023c	0.855	0.796 JV	1.26 JV
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	4	0	0	--	--	--	--	--	--	0.177 U	0.306 U	LT023c	0.128	0.134 UV	0.151 UV
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	4	2	50	0.547 J	0.85 J	LT023c	0.699	0.699 JV	0.835 JV	0.358 U	0.85 J	LT023c	0.452	0.389 JV	0.805 JV
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	4	4	100	0.731	1.18	LT023c	0.945	0.934 V	1.16 V	0.731	1.18	LT023c	0.945	0.934 V	1.16 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	4	4	100	0.28 J	0.64	LT023c	0.443	0.425 V	0.613 V	0.28 J	0.64	LT023c	0.443	0.425 V	0.613 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	4	4	100	1.15 JT	3.1 JT	LT023c	2	1.87 JV	2.95 JV	1.15 JT	3.1 JT	LT023c	2	1.87 JV	2.95 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	4	4	100	1.8 JT	4.06 JT	LT023c	2.76	2.6 JV	3.88 JV	1.8 JT	4.06 JT	LT023c	2.76	2.6 JV	3.88 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	4	4	100	0.655 T	0.963 T	LT023c	0.772	0.734 V	0.936 V	0.655 T	0.963 T	LT023c	0.772	0.734 V	0.936 V
Pesticides																
2,4'-DDD	µg/kg-Wet	4	4	100	1.41	4.14	LT023c	2.53	2.28 V	3.86 V	1.41	4.14	LT023c	2.53	2.28 V	3.86 V
2,4'-DDE	µg/kg-Wet	4	4	100	0.381	0.748	LT023c	0.533	0.501 V	0.714 V	0.381	0.748	LT023c	0.533	0.501 V	0.714 V
2,4'-DDT	µg/kg-Wet	4	4	100	0.558	1.22	LT023c	0.73	0.57 V	1.12 V	0.558	1.22	LT023c	0.73	0.57 V	1.12 V
4,4'-DDD	µg/kg-Wet	4	4	100	9.11	25	LT023c	16	15 V	23.6 V	9.11	25	LT023c	16	15 V	23.6 V
4,4'-DDE	µg/kg-Wet	4	4	100	23	39.9	LT023c	30.9	30.3 V	38.7 V	23	39.9	LT023c	30.9	30.3 V	38.7 V
4,4'-DDT	µg/kg-Wet	4	4	100	2.34	6.12	LT023c	3.39	2.55 V	5.59 V	2.34	6.12	LT023c	3.39	2.55 V	5.59 V
Aldrin	µg/kg-Wet	4	4	100	0.65	2.72	LT023c	1.86	2.03 V	2.62 V	0.65	2.72	LT023c	1.86	2.03 V	2.62 V
alpha-Endosulfan	µg/kg-Wet	4	4	100	0.167 J	1.09	LT023c	0.42	0.212 JV	0.962 V	0.167 J	1.09	LT023c	0.42	0.212 JV	0.962 V
alpha-Hexachlorocyclohexane	µg/kg-Wet	4	4	100	0.0285 J	13.5	LT023b	3.41	0.0514 JV	11.5 JV	0.0285 J	13.5	LT023b	3.41	0.0514 JV	11.5 JV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
beta-Endosulfan	µg/kg-Wet	4	2	50	0.179 J	0.483	LT023c	0.331	0.331 JV	0.468 JV	0.116 U	0.483	LT023c	0.203	0.136 JV	0.437 JV
beta-Hexachlorocyclohexane	µg/kg-Wet	4	4	100	0.0227 J	1.13	LT023b	0.305	0.0327 JV	0.966 JV	0.0227 J	1.13	LT023b	0.305	0.0327 JV	0.966 JV
cis-Chlordane	µg/kg-Wet	4	4	100	2.33	8.43	LT023c	4.67	3.97 V	7.76 V	2.33	8.43	LT023c	4.67	3.97 V	7.76 V
cis-Nonachlor	µg/kg-Wet	4	4	100	1.2	2.61	LT023c	1.81	1.72 V	2.49 V	1.2	2.61	LT023c	1.81	1.72 V	2.49 V
delta-Hexachlorocyclohexane	µg/kg-Wet	4	4	100	0.00249 J	0.0808 J	LT023b	0.0233	0.00499 JV	0.0696 JV	0.00249 J	0.0808 J	LT023b	0.0233	0.00499 JV	0.0696 JV
Dieldrin	µg/kg-Wet	4	4	100	0.698	5.36	LT023c	2.01	0.986 V	4.71 V	0.698	5.36	LT023c	2.01	0.986 V	4.71 V
Endosulfan sulfate	µg/kg-Wet	4	4	100	0.338	1.22	LT023c	0.717	0.656 V	1.14 V	0.338	1.22	LT023c	0.717	0.656 V	1.14 V
Endrin	µg/kg-Wet	4	2	50	0.00784 J	0.019 J	LT023c	0.0134	0.0134 JV	0.0184 JV	0.00463 U	0.019 J	LT023c	0.0082	0.00573 JV	0.0173 JV
Endrin aldehyde	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.0422 UJ	0.0462 UJ	LT023b	0.0218	0.0215 UJV	0.0229 UJV
Endrin ketone	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.0422 U	0.0462 U	LT023b	0.0218	0.0215 UV	0.0229 UV
gamma-Hexachlorocyclohexane	µg/kg-Wet	4	3	75	0.0175 J	0.181 J	LT023b	0.0851	0.0569 J	0.169 JV	0.0106 U	0.181 J	LT023b	0.0652	0.0372 JV	0.162 JV
Heptachlor	µg/kg-Wet	4	3	75	0.00757 J	0.0379 J	LT023c	0.0205	0.0159 J	0.0357 JV	0.00757 J	0.0379 J	LT023c	0.0168	0.0117 JV	0.0346 JV
Heptachlor epoxide	µg/kg-Wet	4	4	100	0.0334 J	0.242	LT023c	0.089	0.0404 JV	0.212 JV	0.0334 J	0.242	LT023c	0.089	0.0404 JV	0.212 JV
Methoxychlor	µg/kg-Wet	4	1	25	0.111 J	0.111 J	LT023c	0.111	0.111 J	0.111 J	0.0174 U	0.111 J	LT023c	0.0374	0.015 UV	0.0967 JV
Oxychlordane	µg/kg-Wet	4	4	100	0.13 J	0.776	LT023c	0.355	0.258 JV	0.698 JV	0.13 J	0.776	LT023c	0.355	0.258 JV	0.698 JV
Total Chlordanes	µg/kg-Wet	4	4	100	8.71 JT	25.2 T	LT023c	15.4	13.8 JV	23.5 JV	8.71 JT	25.2 T	LT023c	15.4	13.8 JV	23.5 JV
Total Endosulfan	µg/kg-Wet	4	4	100	0.577 T	2.79 T	LT023c	1.3	0.921 JV	2.52 JV	0.577 T	2.79 T	LT023c	1.3	0.921 JV	2.52 JV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	4	4	100	10.5 T	29.1 T	LT023c	18.6	17.3 V	27.4 V	10.5 T	29.1 T	LT023c	18.6	17.3 V	27.4 V
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	36.8 T	77.1 T	LT023c	54.1	51.2 V	73.5 V	36.8 T	77.1 T	LT023c	54.1	51.2 V	73.5 V
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	4	4	100	23.4 T	40.6 T	LT023c	31.4	30.8 V	39.3 V	23.4 T	40.6 T	LT023c	31.4	30.8 V	39.3 V
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	4	4	100	2.9 T	7.34 T	LT023c	4.12	3.12 V	6.72 V	2.9 T	7.34 T	LT023c	4.12	3.12 V	6.72 V
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	4	4	100	34.5 T	71 T	LT023c	50.3	47.8 V	67.8 V	34.5 T	71 T	LT023c	50.3	47.8 V	67.8 V
trans-Chlordane	µg/kg-Wet	4	4	100	1.74	5.49	LT023c	3.22	2.83 V	5.1 V	1.74	5.49	LT023c	3.22	2.83 V	5.1 V
trans-Nonachlor	µg/kg-Wet	4	4	100	3.31	7.88	LT023c	5.3	5.01 V	7.48 V	3.31	7.88	LT023c	5.3	5.01 V	7.48 V
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	4	4	100	1.8 J	6.1	LT023c	4	4.1 V	5.9 V	1.8 J	6.1	LT023c	4	4.1 V	5.9 V
Acenaphthene	µg/kg-Wet	4	4	100	0.25 J	0.83 J	LT023c	0.57	0.6 JV	0.81 JV	0.25 J	0.83 J	LT023c	0.57	0.6 JV	0.81 JV
Acenaphthylene	µg/kg-Wet	4	1	25	1.8	1.8	LT023c	1.8	1.8	1.8	0.59 U	1.8	LT023c	0.67	0.3 UV	1.6 V
Anthracene	µg/kg-Wet	4	4	100	1.7	6	LT023c	3.1	2.4 V	5.5 V	1.7	6	LT023c	3.1	2.4 V	5.5 V
Benzo(a)anthracene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.19 U	0.92 U	LT023c	0.32	0.35 UV	0.45 UV
Benzo(a)pyrene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.22 U	0.22 U	LT023b; LT023c	0.11	0.11 UV	0.11 UV
Benzo(b)fluoranthene	µg/kg-Wet	4	1	25	1.7	1.7	LT023c	1.7	1.7	1.7	0.2 U	1.7	LT023c	0.5	0.1 UV	1.5 V
Benzo(g,h,i)perylene	µg/kg-Wet	4	1	25	0.29 J	0.29 J	LT023c	0.29	0.29 J	0.29 J	0.2 U	0.29 J	LT023c	0.15	0.1 UV	0.26 JV
Benzo(k)fluoranthene	µg/kg-Wet	4	1	25	0.46 J	0.46 J	LT023c	0.46	0.46 J	0.46 J	0.19 U	0.46 J	LT023c	0.19	0.095 UV	0.41 JV
Chrysene	µg/kg-Wet	4	2	50	0.25 J	0.75 J	LT023b	0.5	0.5 JV	0.73 JV	0.17 U	0.75 J	LT023b	0.29	0.17 JV	0.68 JV
Dibenzo(a,h)anthracene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.28 U	0.28 U	LT023b; LT023c	0.14	0.14 UV	0.14 UV
Fluoranthene	µg/kg-Wet	4	4	100	3.6	10	LT023c	6.7	6.6 V	9.8 V	3.6	10	LT023c	6.7	6.6 V	9.8 V
Fluorene	µg/kg-Wet	4	4	100	0.98 J	3.1	LT023c	2.2	2.5 V	3.1 V	0.98 J	3.1	LT023c	2.2	2.5 V	3.1 V
High Molecular Weight PAH	µg/kg-Wet	4	4	100	5.9 JT	21 JT	LT023c	13	12 JV	20 JV	5.9 JT	21 JT	LT023c	13	12 JV	20 JV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	4	1	25	0.32 J	0.32 J	LT023c	0.32	0.32 J	0.32 J	0.2 U	0.32 J	LT023c	0.16	0.1 UV	0.29 JV
Low Molecular Weight PAH	µg/kg-Wet	4	4	100	8.8 JT	28 JT	LT023c	18	18 JV	27 JV	8.8 JT	28 JT	LT023c	18	18 JV	27 JV
Naphthalene	µg/kg-Wet	4	4	100	1.7 J	3.6	LT023c	2.9	3.1 V	3.6 V	1.7 J	3.6	LT023c	2.9	3.1 V	3.6 V
Phenanthrene	µg/kg-Wet	4	4	100	2.4	6.6	LT023c	5	5.5 V	6.6 V	2.4	6.6	LT023c	5	5.5 V	6.6 V
Pyrene	µg/kg-Wet	4	4	100	2	7.8	LT023c	5	5.1 V	7.6 V	2	7.8	LT023c	5	5.1 V	7.6 V
Total BaPEq	µg/kg-Wet	4	3	75	0.00025 JT	0.207 JT	LT023c	0.0693	0.00075 JT	0.186 JV	0.00025 JT	0.28 UT	LT023c	0.087	0.0704 JV	0.197 JV
Total cPAHs	µg/kg-Wet	4	3	75	0.25 JT	2.5 JT	LT023c	1.2	0.75 JT	2.3 JV	0.25 JT	2.5 JT	LT023c	0.91	0.5 JV	2.2 JV
Total PAHs	µg/kg-Wet	4	4	100	18 JT	41 JT	LT023c	31	33 JV	40 JV	18 JT	41 JT	LT023c	31	33 JV	40 JV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	4	4	100	120 J	160 J	LT023c	140	140 JV	160 JV	120 J	160 J	LT023c	140	140 JV	160 JV
Butylbenzyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	7.3 U	7.3 U	LT023b; LT023c	3.7	3.7 UV	3.7 UV
Dibutyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	16 U	16 U	LT023b; LT023c	8	8 UV	8 UV
Diethyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	62 U	990 U	LT023c	220	180 UV	460 UV
Dimethyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	7.7 U	7.7 U	LT023b; LT023c	3.9	3.9 UV	3.9 UV
Di-n-octyl phthalate	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	11 U	LT023b; LT023c	5.5	5.5 UV	5.5 UV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	9.8 U	9.8 U	LT023b; LT023c	4.9	4.9 UV	4.9 UV
1,2-Dichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	11 U	LT023b; LT023c	5.5	5.5 UV	5.5 UV
1,3-Dichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	11 U	LT023b; LT023c	5.5	5.5 UV	5.5 UV
1,4-Dichlorobenzene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	11 U	11 U	LT023b; LT023c	5.5	5.5 UV	5.5 UV
Benzyl alcohol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	22 U	22 U	LT023b; LT023c	11	11 UV	11 UV
Hexachlorobenzene	µg/kg-Wet	4	4	100	1.92	6.02	LT023c	3.34	2.71 V	5.62 V	1.92	6.02	LT023c	3.34	2.71 V	5.62 V
Hexachlorobutadiene	µg/kg-Wet	4	0	0	--	--	--	--	--	--	0.0198 UJ	10 U	LT023b; LT023c	3.75	5 UV	5 UV
Hexachloroethane	µg/kg-Wet	4	0	0	--	--	--	--	--	--	20 U	20 U	LT023b; LT023c	10	10 UV	10 UV
N-Nitrosodiphenylamine	µg/kg-Wet	4	0	0	--	--	--	--	--	--	6.6 U	6.6 U	LT023b; LT023c	3.3	3.3 UV	3.3 UV
Phenols																
2,4-Dimethylphenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	19 U	19 U	LT023b; LT023c	9.5	9.5 UV	9.5 UV
2-Methylphenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	8.2 U	8.2 U	LT023b; LT023c	4.1	4.1 UV	4.1 UV
4-Methylphenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	7.7 U	7.7 U	LT023b; LT023c	3.9	3.9 UV	3.9 UV
Pentachlorophenol	µg/kg-Wet	4	1	25	38 J	38 J	LT023c	38	38 J	38 J	30 U	38 J	LT023c	21	15 UV	35 JV
Phenol	µg/kg-Wet	4	0	0	--	--	--	--	--	--	45 U	45 U	LT023b; LT023c	23	23 UV	23 UV
Smallmouth bass (whole body)																
Conventionals																
Lipids	percent-Wet	3	3	100	5.7	6.9	20R001	6.2	6.1	6.8 V	5.7	6.9	20R001	6.2	6.1	6.8 V
Total solids	percent-Wet	3	3	100	30.8	31.2	20R001	31	30.9	31.2 V	30.8	31.2	20R001	31	30.9	31.2 V
Metals																
Aluminum	mg/kg-Wet	3	3	100	2.76 J	5 J	20R001	3.57	2.95 J	4.8 JV	2.76 J	5 J	20R001	3.57	2.95 J	4.8 JV
Antimony	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.004 U	0.007 U	20R001	0.00267	0.0025 U	0.0034 UV
Arsenic	mg/kg-Wet	3	3	100	0.28	0.36	20R001	0.32	0.33	0.36 V	0.28	0.36	20R001	0.32	0.33	0.36 V
Cadmium	mg/kg-Wet	3	1	33.3	0.004 J	0.004 J	20R001	0.004	0.004 J	0.004 J	0.003 U	0.004 J	20R001	0.00233	0.0015 U	0.00375 JV
Chromium	mg/kg-Wet	3	3	100	0.16	2.79	20R001	1.05	0.19	2.53 V	0.16	2.79	20R001	1.05	0.19	2.53 V
Copper	mg/kg-Wet	3	3	100	0.37	0.54	20R001	0.44	0.4	0.53 V	0.37	0.54	20R001	0.44	0.4	0.53 V
Lead	mg/kg-Wet	3	3	100	0.003 J	0.019	20R001	0.009	0.005 J	0.0176 JV	0.003 J	0.019	20R001	0.009	0.005 J	0.0176 JV
Manganese	mg/kg-Wet	3	3	100	0.544	1.66	20R001	0.937	0.607	1.55 V	0.544	1.66	20R001	0.937	0.607	1.55 V
Mercury	mg/kg-Wet	3	3	100	0.167	0.549	20R001	0.41	0.513	0.545 V	0.167	0.549	20R001	0.41	0.513	0.545 V
Nickel	mg/kg-Wet	3	3	100	0.13	1.57	20R001	0.61	0.13	1.43 V	0.13	1.57	20R001	0.61	0.13	1.43 V
Selenium	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.3 U	0.3 U	20R001	0.15	0.15 U	0.15 UV
Silver	mg/kg-Wet	3	0	0	--	--	--	--	--	--	0.003 U	0.007 U	20R001	0.0025	0.0025 U	0.0034 UV
Thallium	mg/kg-Wet	3	3	100	0.0025 J	0.0499	20R001	0.0184	0.0028 J	0.0452 JV	0.0025 J	0.0499	20R001	0.0184	0.0028 J	0.0452 JV
Zinc	mg/kg-Wet	3	3	100	12.8	14.4	20R001	13.8	14.1	14.4 V	12.8	14.4	20R001	13.8	14.1	14.4 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	3	0	0	--	--	--	--	--	--	9.5 U	11 U	20R001	5	4.8 U	5.4 UV
Aroclor 1221	µg/kg-Wet	3	0	0	--	--	--	--	--	--	19 U	25 U	20R001	11	12 U	12 UV
Aroclor 1232	µg/kg-Wet	3	0	0	--	--	--	--	--	--	11 U	26 U	20R001	9	8.5 U	13 UV
Aroclor 1242	µg/kg-Wet	3	0	0	--	--	--	--	--	--	9.5 U	14 U	20R001	5.5	4.8 U	6.8 UV
Aroclor 1248	µg/kg-Wet	3	0	0	--	--	--	--	--	--	23 U	59 U	20R001	22	24 U	29 UV
Aroclor 1254	µg/kg-Wet	3	0	0	--	--	--	--	--	--	66 U	150 U	20R001	59	70 U	75 UV
Aroclor 1260	µg/kg-Wet	3	3	100	120	290 J	20R001	220	260 J	290 JV	120	290 J	20R001	220	260 J	290 JV
Aroclor 1262	µg/kg-Wet	3	0	0	--	--	--	--	--	--	9.5 U	9.5 U	20R001	4.8	4.8 U	4.8 UV
Aroclor 1268	µg/kg-Wet	3	0	0	--	--	--	--	--	--	9.5 U	9.5 U	20R001	4.8	4.8 U	4.8 UV
Aroclors	µg/kg-Wet	3	3	100	120 T	290 JT	20R001	220	260 JT	290 JV	120 T	290 JT	20R001	220	260 JT	290 JV
PCB Congeners																
PCB004	pg/g-Wet	3	3	100	33.3	69.4	20R001	48.3	42.1	66.7 V	33.3	69.4	20R001	48.3	42.1	66.7 V
PCB005	pg/g-Wet	3	0	0	--	--	--	--	--	--	4.32 U	8.2 U	20R001	2.82	2.21 U	3.91 UV
PCB006	pg/g-Wet	3	3	100	18.3	24.1	20R001	21.1	20.9 J	23.8 JV	18.3	24.1	20R001	21.1	20.9 J	23.8 JV
PCB007	pg/g-Wet	3	0	0	--	--	--	--	--	--	6.85 U	7.39 U	20R001	3.54	3.5 U	3.68 UV
PCB008	pg/g-Wet	3	3	100	70.2	88.4	20R001	78.6	77.2	87.3 V	70.2	88.4	20R001	78.6	77.2	87.3 V
PCB009	pg/g-Wet	3	1	33.3	4.56 J	4.56 J	20R001	4.56	4.56 J	4.56 J	4.56 J	7.25 U	20R001	3.5	3.63 U	4.47 JV
PCB010	pg/g-Wet	3	0	0	--	--	--	--	--	--	8.7 U	8.89 U	20R001	4.39	4.36 U	4.44 UV
PCB011	pg/g-Wet	3	3	100	68.9 J	252 J	20R001	156	146	241 JV	68.9 J	252 J	20R001	156	146	241 JV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB012 & 013	pg/g-Wet	3	0	0	--	--	--	--	--	--	9.64 U	9.85 U	20R001	4.86	4.83 U	4.92 UV
PCB014	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.67 U	7.98 U	20R001	3.24	2.89 U	3.88 UV
PCB015	pg/g-Wet	3	0	0	--	--	--	--	--	--	4.59 U	11.4 U	20R001	3.51	2.55 U	5.38 UV
PCB016	pg/g-Wet	3	3	100	57.5 J	90.5	20R001	76	80	89.5 V	57.5 J	90.5	20R001	76	80	89.5 V
PCB017	pg/g-Wet	3	3	100	127	260	20R001	187	173	251 V	127	260	20R001	187	173	251 V
PCB018 & 030	pg/g-Wet	3	3	100	185 J	329 J	20R001	246	225 J	319 JV	185 J	329 J	20R001	246	225 J	319 JV
PCB019	pg/g-Wet	3	3	100	24.3	124	20R001	67.1	53	117 V	24.3	124	20R001	67.1	53	117 V
PCB020 & 028	pg/g-Wet	3	3	100	564 J	1460 J	20R001	1010	998 J	1410 JV	564 J	1460 J	20R001	1010	998 J	1410 JV
PCB021 & 033	pg/g-Wet	3	3	100	126 J	316 J	20R001	210	188 J	303 JV	126 J	316 J	20R001	210	188 J	303 JV
PCB022	pg/g-Wet	3	3	100	117	258	20R001	185	180	250 V	117	258	20R001	185	180	250 V
PCB023	pg/g-Wet	3	0	0	--	--	--	--	--	--	7.01 U	7.16 U	20R001	3.53	3.51 U	3.57 UV
PCB024	pg/g-Wet	3	0	0	--	--	--	--	--	--	9.05 U	9.25 U	20R001	4.56	4.54 U	4.62 UV
PCB025	pg/g-Wet	3	3	100	35.6	72.3	20R001	51.6	46.8 J	69.8 JV	35.6	72.3	20R001	51.6	46.8 J	69.8 JV
PCB026 & 029	pg/g-Wet	3	3	100	90.2 J	207 J	20R001	143	132 J	200 JV	90.2 J	207 J	20R001	143	132 J	200 JV
PCB027	pg/g-Wet	3	3	100	30.2	46.4	20R001	37.6	36.2	45.4 V	30.2	46.4	20R001	37.6	36.2	45.4 V
PCB031	pg/g-Wet	3	3	100	335	716	20R001	518	504	695 V	335	716	20R001	518	504	695 V
PCB032	pg/g-Wet	3	3	100	81.4	158	20R001	118	116	154 V	81.4	158	20R001	118	116	154 V
PCB034	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.73 U	5.86 U	20R001	2.89	2.87 U	2.92 UV
PCB035	pg/g-Wet	3	0	0	--	--	--	--	--	--	4.22 U	4.32 U	20R001	2.13	2.12 U	2.16 UV
PCB036	pg/g-Wet	3	0	0	--	--	--	--	--	--	7.09 U	7.24 U	20R001	3.57	3.55 U	3.61 UV
PCB037	pg/g-Wet	3	3	100	66.1	121	20R001	94.3	95.9	118 V	66.1	121	20R001	94.3	95.9	118 V
PCB038	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.27 U	5.39 U	20R001	2.66	2.64 U	2.69 UV
PCB039	pg/g-Wet	3	1	33.3	10.9	10.9	20R001	10.9	10.9	10.9	6.95 U	10.9	20R001	5.98	3.55 U	10.2 V
PCB040 & 041 & 071	pg/g-Wet	3	3	100	297 J	897 J	20R001	576	534 J	861 JV	297 J	897 J	20R001	576	534 J	861 JV
PCB042	pg/g-Wet	3	3	100	178	530	20R001	356	361	513 V	178	530	20R001	356	361	513 V
PCB043	pg/g-Wet	3	3	100	53.2	110 J	20R001	90.7	109	110 JV	53.2	110 J	20R001	90.7	109	110 JV
PCB044 & 047 & 065	pg/g-Wet	3	3	100	1090 J	3810 J	20R001	2410	2320 J	3660 JV	1090 J	3810 J	20R001	2410	2320 J	3660 JV
PCB045 & 051	pg/g-Wet	3	3	100	79.6 J	339 J	20R001	189	147 J	320 JV	79.6 J	339 J	20R001	189	147 J	320 JV
PCB046	pg/g-Wet	3	3	100	17.8	45.3	20R001	30.7	28.9	43.7 V	17.8	45.3	20R001	30.7	28.9	43.7 V
PCB048	pg/g-Wet	3	3	100	145	401	20R001	271	268	388 V	145	401	20R001	271	268	388 V
PCB049 & 069	pg/g-Wet	3	3	100	739 J	2640 J	20R001	1690	1680 J	2540 JV	739 J	2640 J	20R001	1690	1680 J	2540 JV
PCB050 & 053	pg/g-Wet	3	3	100	66.6 J	267 J	20R001	152	121 J	252 JV	66.6 J	267 J	20R001	152	121 J	252 JV
PCB052	pg/g-Wet	3	3	100	1260	4000	20R001	2680	2780	3880 V	1260	4000	20R001	2680	2780	3880 V
PCB054	pg/g-Wet	3	1	33.3	34.5	34.5	20R001	34.5	34.5	34.5	7.8 U	34.5	20R001	14.1	3.99 U	31.4 V
PCB055	pg/g-Wet	3	0	0	--	--	--	--	--	--	8.69 U	8.88 U	20R001	4.38	4.35 U	4.43 UV
PCB056	pg/g-Wet	3	3	100	169	542	20R001	361	371	525 V	169	542	20R001	361	371	525 V
PCB057	pg/g-Wet	3	2	66.7	15 J	15.9 J	20R001	15.5	15.5 JV	15.9 JV	8.97 U	15.9 J	20R001	11.8	15 J	15.8 JV
PCB058	pg/g-Wet	3	1	33.3	11.1	11.1	20R001	11.1	11.1	11.1	10.8 U	11.1	20R001	7.33	5.5 U	10.5 V
PCB059 & 062 & 075	pg/g-Wet	3	3	100	85.1 J	270 J	20R001	181	187 J	262 JV	85.1 J	270 J	20R001	181	187 J	262 JV
PCB060	pg/g-Wet	3	3	100	384	1000	20R001	786	975	998 V	384	1000	20R001	786	975	998 V
PCB061 & 070 & 074 & 076	pg/g-Wet	3	3	100	2190 J	5090 J	20R001	3980	4650 J	5050 JV	2190 J	5090 J	20R001	3980	4650 J	5050 JV
PCB063	pg/g-Wet	3	3	100	117	250	20R001	198	227	248 V	117	250	20R001	198	227	248 V
PCB064	pg/g-Wet	3	3	100	419	1230	20R001	843	879	1190 V	419	1230	20R001	843	879	1190 V
PCB066	pg/g-Wet	3	3	100	2110	4520	20R001	3650	4330	4500 V	2110	4520	20R001	3650	4330	4500 V
PCB067	pg/g-Wet	3	3	100	24.6	55.2	20R001	40.2	40.8 J	53.8 JV	24.6	55.2	20R001	40.2	40.8 J	53.8 JV
PCB068	pg/g-Wet	3	3	100	21.3	50.5	20R001	34.3	31.2 J	48.6 JV	21.3	50.5	20R001	34.3	31.2 J	48.6 JV
PCB072	pg/g-Wet	3	3	100	30.6 J	64.4	20R001	49.2	52.6	63.2 V	30.6 J	64.4	20R001	49.2	52.6	63.2 V
PCB073	pg/g-Wet	3	0	0	--	--	--	--	--	--	11.3 U	11.6 U	20R001	5.72	5.7 U	5.79 UV
PCB077	pg/g-Wet	3	3	100	89	211	20R001	152	156	206 V	89	211	20R001	152	156	206 V
PCB078	pg/g-Wet	3	0	0	--	--	--	--	--	--	7.44 U	7.6 U	20R001	3.75	3.73 U	3.79 UV
PCB079	pg/g-Wet	3	3	100	24.1	72.3	20R001	50.9	56.3	70.7 V	24.1	72.3	20R001	50.9	56.3	70.7 V
PCB080	pg/g-Wet	3	0	0	--	--	--	--	--	--	10.9 U	11.2 U	20R001	5.52	5.5 U	5.59 UV
PCB081	pg/g-Wet	3	3	100	4.31	11.6	20R001	7.62	6.95	11.1 V	4.31	11.6	20R001	7.62	6.95	11.1 V
PCB082	pg/g-Wet	3	3	100	125	397	20R001	284	330	390 V	125	397	20R001	284	330	390 V
PCB083 & 099	pg/g-Wet	3	3	100	4590 J	9130 J	20R001	7340	8310 J	9050 JV	4590 J	9130 J	20R001	7340	8310 J	9050 JV
PCB084	pg/g-Wet	3	3	100	204	707	20R001	467	490	685 V	204	707	20R001	467	490	685 V
PCB085 & 116 & 117	pg/g-Wet	3	3	100	1220 J	2610 J	20R001	2010	2190 J	2570 JV	1220 J	2610 J	20R001	2010	2190 J	2570 JV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	3	3	100	1440 J	4090 J	20R001	3050	3610 J	4040 JV	1440 J	4090 J	20R001	3050	3610 J	4040 JV
PCB088 & 091	pg/g-Wet	3	2	66.7	218 J	516 J	20R001	367	367 JV	501 JV	15.8 U	516 J	20R001	247	218 J	486 JV
PCB089	pg/g-Wet	3	2	66.7	20.6	21.3	20R001	21	21 V	21.3 V	8.85 U	21.3	20R001	15.4	20.6	21.2 V
PCB090 & 101 & 113	pg/g-Wet	3	3	100	3300 J	10200 J	20R001	7330	8490 J	10000 JV	3300 J	10200 J	20R001	7330	8490 J	10000 JV
PCB092	pg/g-Wet	3	3	100	731	2100	20R001	1510	1700	2060 V	731	2100	20R001	1510	1700	2060 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	3	3	100	1240 J	4620 J	20R001	3110	3470 J	4510 JV	1240 J	4620 J	20R001	3110	3470 J	4510 JV
PCB094	pg/g-Wet	3	2	66.7	12.8	29	20R001	20.9	20.9 V	28.2 V	8.99 U	29	20R001	15.4	12.8	27.4 V
PCB096	pg/g-Wet	3	2	66.7	20	38.9	20R001	29.5	29.5 V	38 V	11.8 U	38.9	20R001	21.6	20	37 V
PCB103	pg/g-Wet	3	3	100	33.9	168	20R001	90.9	70.8	158 V	33.9	168	20R001	90.9	70.8	158 V
PCB104	pg/g-Wet	3	0	0	--	--	--	--	--	--	13.3 U	13.6 U	20R001	6.7	6.65 U	6.79 UV
PCB105	pg/g-Wet	3	3	100	3030	5810	20R001	4510	4700	5700 V	3030	5810	20R001	4510	4700	5700 V
PCB106	pg/g-Wet	3	0	0	--	--	--	--	--	--	17.5 U	17.9 U	20R001	8.82	8.75 U	8.93 UV
PCB107 & 124	pg/g-Wet	3	3	100	91.1 J	242 J	20R001	184	220 J	240 JV	91.1 J	242 J	20R001	184	220 J	240 JV
PCB109	pg/g-Wet	3	3	100	604	1240	20R001	951	1010	1220 V	604	1240	20R001	951	1010	1220 V
PCB110 & 115	pg/g-Wet	3	3	100	2280 J	7180 J	20R001	5250	6300 J	7090 JV	2280 J	7180 J	20R001	5250	6300 J	7090 JV
PCB111	pg/g-Wet	3	2	66.7	17.5	20.8 J	20R001	19.2	19.2 JV	20.6 JV	10.3 U	20.8 J	20R001	14.5	17.5	20.5 JV
PCB112	pg/g-Wet	3	0	0	--	--	--	--	--	--	12.5 U	12.7 U	20R001	6.28	6.25 U	6.34 UV
PCB114	pg/g-Wet	3	3	100	280	619	20R001	420	361	593 V	280	619	20R001	420	361	593 V
PCB118	pg/g-Wet	3	3	100	9830	18700	20R001	14200	14100	18200 V	9830	18700	20R001	14200	14100	18200 V
PCB120	pg/g-Wet	3	3	100	35.8	95.6	20R001	67	69.6	93 V	35.8	95.6	20R001	67	69.6	93 V
PCB121	pg/g-Wet	3	2	66.7	10.2	17.1	20R001	13.7	13.7 V	16.8 V	7.48 U	17.1	20R001	10.3	10.2	16.4 V
PCB122	pg/g-Wet	3	1	33.3	49	49	20R001	49	49	49	21 U	49	20R001	23.4	10.7 U	45.2 V
PCB123	pg/g-Wet	3	3	100	140	278	20R001	208	207	271 V	140	278	20R001	208	207	271 V
PCB126	pg/g-Wet	3	3	100	19.3	46.2	20R001	33.6	35.2	45.1 V	19.3	46.2	20R001	33.6	35.2	45.1 V
PCB127	pg/g-Wet	3	3	100	20.7 J	42.9 J	20R001	29.2	23.9 J	41 JV	20.7 J	42.9 J	20R001	29.2	23.9 J	41 JV
PCB128 & 166	pg/g-Wet	3	3	100	1580 J	3310 J	20R001	2560	2780 J	3260 JV	1580 J	3310 J	20R001	2560	2780 J	3260 JV
PCB129 & 138 & 160 & 163	pg/g-Wet	3	3	100	13300 J	31500 J	20R001	24700	29200 J	31300 JV	13300 J	31500 J	20R001	24700	29200 J	31300 JV
PCB130	pg/g-Wet	3	3	100	420	1010	20R001	778	905	1000 V	420	1010	20R001	778	905	1000 V
PCB131	pg/g-Wet	3	3	100	20.4 J	82.6	20R001	57.6	69.8	81.3 V	20.4 J	82.6	20R001	57.6	69.8	81.3 V
PCB132	pg/g-Wet	3	3	100	616	2600	20R001	1840	2300	2570 V	616	2600	20R001	1840	2300	2570 V
PCB133	pg/g-Wet	3	3	100	238	605	20R001	454	518	596 V	238	605	20R001	454	518	596 V
PCB134 & 143	pg/g-Wet	3	3	100	154 J	468 J	20R001	343	408 J	462 JV	154 J	468 J	20R001	343	408 J	462 JV
PCB135 & 151 & 154	pg/g-Wet	3	2	66.7	2060 J	7100 J	20R001	4580	4580 JV	6850 JV	29.7 U	7100 J	20R001	3060	2060 J	6600 JV
PCB136	pg/g-Wet	3	3	100	329	1330	20R001	930	1130	1310 V	329	1330	20R001	930	1130	1310 V
PCB137	pg/g-Wet	3	3	100	808	1560	20R001	1100	929	1500 V	808	1560	20R001	1100	929	1500 V
PCB139 & 140	pg/g-Wet	3	3	100	179 J	351 J	20R001	284	323 J	348 JV	179 J	351 J	20R001	284	323 J	348 JV
PCB141	pg/g-Wet	3	3	100	1630	4520	20R001	3350	3890	4460 V	1630	4520	20R001	3350	3890	4460 V
PCB142	pg/g-Wet	3	0	0	--	--	--	--	--	--	10.8 U	11 U	20R001	5.43	5.4 U	5.49 UV
PCB144	pg/g-Wet	3	3	100	228	678	20R001	502	600	670 V	228	678	20R001	502	600	670 V
PCB145	pg/g-Wet	3	0	0	--	--	--	--	--	--	4.24 U	4.34 U	20R001	2.14	2.13 U	2.17 UV
PCB146	pg/g-Wet	3	3	100	2280	6070	20R001	4400	4840	5950 V	2280	6070	20R001	4400	4840	5950 V
PCB147 & 149	pg/g-Wet	3	3	100	2040 J	8610 J	20R001	6000	7340 J	8480 JV	2040 J	8610 J	20R001	6000	7340 J	8480 JV
PCB148	pg/g-Wet	3	3	100	14.5	67.1	20R001	38	32.5	63.6 V	14.5	67.1	20R001	38	32.5	63.6 V
PCB150	pg/g-Wet	3	3	100	5.54	26.2	20R001	14.5	11.8	24.8 V	5.54	26.2	20R001	14.5	11.8	24.8 V
PCB152	pg/g-Wet	3	2	66.7	10.6 J	22.9	20R001	16.8	16.8 JV	22.3 JV	10.5 U	22.9	20R001	12.9	10.6 J	21.7 JV
PCB153 & 168	pg/g-Wet	3	3	100	16100 J	38700 J	20R001	30000	35300 J	38400 JV	16100 J	38700 J	20R001	30000	35300 J	38400 JV
PCB155	pg/g-Wet	3	2	66.7	9.69	12.2	20R001	10.9	10.9 V	12.1 V	7.94 U	12.2	20R001	8.62	9.69	11.9 V
PCB156	pg/g-Wet	3	3	100	1420	3090	20R001	2280	2330	3010 V	1420	3090	20R001	2280	2330	3010 V
PCB157	pg/g-Wet	3	3	100	260	509	20R001	376	359	494 V	260	509	20R001	376	359	494 V
PCB158	pg/g-Wet	3	3	100	1310	2830	20R001	2280	2700	2820 V	1310	2830	20R001	2280	2700	2820 V
PCB159	pg/g-Wet	3	3	100	53.3	184	20R001	136	172	183 V	53.3	184	20R001	136	172	183 V
PCB161	pg/g-Wet	3	0	0	--	--	--	--	--	--	12 U	12.2 U	20R001	6.03	6 U	6.09 UV
PCB162	pg/g-Wet	3	3	100	57.2	114	20R001	87.6	91.7	112 V	57.2	114	20R001	87.6	91.7	112 V
PCB164	pg/g-Wet	3	3	100	360	1140	20R001	820	959	1120 V	360	1140	20R001	820	959	1120 V
PCB165	pg/g-Wet	3	2	66.7	21.4	33	20R001	27.2	27.2 V	32.4 V	10.1 U	33	20R001	19.8	21.4	31.8 V
PCB167	pg/g-Wet	3	3	100	539	1130	20R001	885	987	1120 V	539	1130	20R001	885	987	1120 V
PCB169	pg/g-Wet	3	3	100	1.7	3.33	20R001	2.68	3.02	3.3 V	1.7	3.33	20R001	2.68	3.02	3.3 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB170	pg/g-Wet	3	3	100	3830	10100	20R001	7610	8900	9980 V	3830	10100	20R001	7610	8900	9980 V
PCB171 & 173	pg/g-Wet	3	3	100	1020 J	2920 J	20R001	2160	2530 J	2880 JV	1020 J	2920 J	20R001	2160	2530 J	2880 JV
PCB172	pg/g-Wet	3	3	100	653	1940	20R001	1370	1520	1900 V	653	1940	20R001	1370	1520	1900 V
PCB174	pg/g-Wet	3	3	100	885	3250	20R001	2410	3100	3240 V	885	3250	20R001	2410	3100	3240 V
PCB175	pg/g-Wet	3	3	100	115	346	20R001	246	276	339 V	115	346	20R001	246	276	339 V
PCB176	pg/g-Wet	3	3	100	90.8	424	20R001	293	364	418 V	90.8	424	20R001	293	364	418 V
PCB177	pg/g-Wet	3	3	100	1020	3400	20R001	2400	2770	3340 V	1020	3400	20R001	2400	2770	3340 V
PCB178	pg/g-Wet	3	3	100	744	2370	20R001	1640	1820	2320 V	744	2370	20R001	1640	1820	2320 V
PCB179	pg/g-Wet	3	3	100	558	1880	20R001	1410	1800	1870 V	558	1880	20R001	1410	1800	1870 V
PCB180 & 193	pg/g-Wet	3	3	100	10900 J	33200 J	20R001	23200	25600 J	32400 JV	10900 J	33200 J	20R001	23200	25600 J	32400 JV
PCB181	pg/g-Wet	3	3	100	35.7	73.2	20R001	57.6	63.9	72.3 V	35.7	73.2	20R001	57.6	63.9	72.3 V
PCB182	pg/g-Wet	3	3	100	26.1	82.2	20R001	55	56.8 J	79.7 JV	26.1	82.2	20R001	55	56.8 J	79.7 JV
PCB183 & 185	pg/g-Wet	3	3	100	2670 J	7770 J	20R001	5620	6430 J	7640 JV	2670 J	7770 J	20R001	5620	6430 J	7640 JV
PCB184	pg/g-Wet	3	0	0	--	--	--	--	--	--	12.7 U	12.9 U	20R001	6.38	6.35 U	6.44 UV
PCB186	pg/g-Wet	3	0	0	--	--	--	--	--	--	7.28 U	7.44 U	20R001	3.67	3.65 U	3.71 UV
PCB187	pg/g-Wet	3	3	100	4850	17600	20R001	11100	10900	16900 V	4850	17600	20R001	11100	10900	16900 V
PCB188	pg/g-Wet	3	2	66.7	14.7 J	26.1	20R001	20.4	20.4 JV	25.5 JV	14.1 U	26.1	20R001	16	14.7 J	25 JV
PCB189	pg/g-Wet	3	3	100	156	403	20R001	310	370	400 V	156	403	20R001	310	370	400 V
PCB190	pg/g-Wet	3	3	100	851	2350	20R001	1760	2090	2320 V	851	2350	20R001	1760	2090	2320 V
PCB191	pg/g-Wet	3	3	100	188	520	20R001	390	463	514 V	188	520	20R001	390	463	514 V
PCB192	pg/g-Wet	3	0	0	--	--	--	--	--	--	6.57 U	6.72 U	20R001	3.31	3.3 U	3.35 UV
PCB194	pg/g-Wet	3	3	100	1530	4730	20R001	3340	3760	4630 V	1530	4730	20R001	3340	3760	4630 V
PCB195	pg/g-Wet	3	3	100	690	2060	20R001	1450	1590	2010 V	690	2060	20R001	1450	1590	2010 V
PCB196	pg/g-Wet	3	3	100	841	2740	20R001	1890	2100	2680 V	841	2740	20R001	1890	2100	2680 V
PCB197 & 200	pg/g-Wet	3	3	100	105 J	356 J	20R001	270	348 J	355 JV	105 J	356 J	20R001	270	348 J	355 JV
PCB198 & 199	pg/g-Wet	3	3	100	1510 J	5090 J	20R001	3450	3750 J	4960 JV	1510 J	5090 J	20R001	3450	3750 J	4960 JV
PCB201	pg/g-Wet	3	3	100	174	559	20R001	383	416	545 V	174	559	20R001	383	416	545 V
PCB202	pg/g-Wet	3	3	100	318	953	20R001	709	856	943 V	318	953	20R001	709	856	943 V
PCB203	pg/g-Wet	3	3	100	1070	3180	20R001	2330	2750	3140 V	1070	3180	20R001	2330	2750	3140 V
PCB204	pg/g-Wet	3	0	0	--	--	--	--	--	--	17.4 U	17.8 U	20R001	8.77	8.7 U	8.88 UV
PCB205	pg/g-Wet	3	3	100	76.8	233	20R001	162	177	227 V	76.8	233	20R001	162	177	227 V
PCB206	pg/g-Wet	3	3	100	356	1050	20R001	772	909	1040 V	356	1050	20R001	772	909	1040 V
PCB207	pg/g-Wet	3	3	100	70	191	20R001	142	165	188 V	70	191	20R001	142	165	188 V
PCB208	pg/g-Wet	3	3	100	105	296	20R001	217	249	291 V	105	296	20R001	217	249	291 V
PCB209	pg/g-Wet	3	3	100	119	260	20R001	202	226	257 V	119	260	20R001	202	226	257 V
Total PCB Congeners	pg/g-Wet	3	3	100	123000 JT	317000 JT	20R001	238000	275000 JT	313000 JV	123000 JT	317000 JT	20R001	238000	275000 JT	313000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	3	3	100	123 JT	317 JT	20R001	238	275 JT	313 JV	123 JT	317 JT	20R001	238	275 JT	313 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	3	3	100	238 JT	380 JT	20R001	305	297 JT	372 JV	238 JT	380 JT	20R001	305	297 JT	372 JV
Heptachlorobiphenylhomologs	pg/g-Wet	3	3	100	28600 JT	88400 JT	20R001	62100	69300 JT	86500 JV	28600 JT	88400 JT	20R001	62100	69300 JT	86500 JV
Hexachlorobiphenyl homologs	pg/g-Wet	3	3	100	46000 JT	115000 JT	20R001	87300	101000 JT	114000 JV	46000 JT	115000 JT	20R001	87300	101000 JT	114000 JV
Nonachlorobiphenyl homologs	pg/g-Wet	3	3	100	531 T	1540 T	20R001	1130	1320 T	1520 V	531 T	1540 T	20R001	1130	1320 T	1520 V
Octachlorobiphenyl homologs	pg/g-Wet	3	3	100	6310 JT	19900 JT	20R001	14000	15700 JT	19500 JV	6310 JT	19900 JT	20R001	14000	15700 JT	19500 JV
Pentachlorobiphenylhomologs	pg/g-Wet	3	3	100	29400 JT	63800 JT	20R001	51400	60900 JT	63500 JV	29400 JT	63800 JT	20R001	51400	60900 JT	63500 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	3	3	100	9590 JT	26400 JT	20R001	18800	20400 JT	25800 JV	9590 JT	26400 JT	20R001	18800	20400 JT	25800 JV
Trichlorobiphenyl homologs	pg/g-Wet	3	3	100	1840 JT	4170 JT	20R001	2950	2830 JT	4040 JV	1840 JT	4170 JT	20R001	2950	2830 JT	4040 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	3	3	100	0.115	0.32	20R001	0.228	0.25	0.313 V	0.115	0.32	20R001	0.228	0.25	0.313 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.38	0.55	20R001	0.492	0.547	0.55 V	0.38	0.55	20R001	0.492	0.547	0.55 V
Hexachlorodibenzofuran homologs	pg/g-Wet	3	3	100	0.432	1.13	20R001	0.761	0.721	1.09 V	0.432	1.13	20R001	0.761	0.721	1.09 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.631	2.33	20R001	1.39	1.22	2.22 V	0.631	2.33	20R001	1.39	1.22	2.22 V
Octachlorodibenzofuran	pg/g-Wet	3	2	66.7	0.053	0.063	20R001	0.058	0.058 V	0.0625 V	0.046 U	0.063	20R001	0.0463	0.053	0.062 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.17	2.43	20R001	1	0.409	2.23 V	0.17	2.43	20R001	1	0.409	2.23 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	3	3	100	1.12	2.89	20R001	1.86	1.57	2.76 V	1.12	2.89	20R001	1.86	1.57	2.76 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.704	1.09	20R001	0.853	0.764	1.06 V	0.704	1.09	20R001	0.853	0.764	1.06 V

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Tetrachlorodibenzofuran homologs	pg/g-Wet	3	3	100	1.24	1.77	20R001	1.44	1.3	1.72 V	1.24	1.77	20R001	1.44	1.3	1.72 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.443	0.514	20R001	0.476	0.47	0.51 V	0.443	0.514	20R001	0.476	0.47	0.51 V
Total PCDD/F	pg/g-Wet	3	3	100	5.37 T	10.5 T	20R001	8.55	9.77 T	10.4 V	5.37 T	10.5 T	20R001	8.55	9.77 T	10.4 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	3	3	100	0.046	0.137	20R001	0.0897	0.086	0.132 V	0.046	0.137	20R001	0.0897	0.086	0.132 V
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.164	0.473	20R001	0.325	0.339	0.46 V	0.164	0.473	20R001	0.325	0.339	0.46 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.016 U	0.016 U	20R001	0.008	0.008 U	0.008 UV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	3	100	0.077	0.16	20R001	0.124	0.135	0.158 V	0.077	0.16	20R001	0.124	0.135	0.158 V
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.1	0.15	20R001	0.127	0.132	0.148 V	0.1	0.15	20R001	0.127	0.132	0.148 V
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	3	100	0.042	0.092	20R001	0.0697	0.075	0.0903 V	0.042	0.092	20R001	0.0697	0.075	0.0903 V
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.488	2.18	20R001	1.2	0.944	2.06 V	0.488	2.18	20R001	1.2	0.944	2.06 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	3	1	33.3	0.011 J	0.011 J	20R001	0.011	0.011 J	0.011 J	0.011 J	0.011 J	20R001	0.00733	0.0055 U	0.0105 JV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.044 J	0.094 J	20R001	0.0757	0.089	0.0935 JV	0.044 J	0.094 J	20R001	0.0757	0.089	0.0935 JV
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	3	3	100	0.2	0.361	20R001	0.28	0.278	0.353 V	0.2	0.361	20R001	0.28	0.278	0.353 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.704	1.08	20R001	0.849	0.764	1.05 V	0.704	1.08	20R001	0.849	0.764	1.05 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	3	100	0.031	0.102	20R001	0.064	0.059	0.0977 V	0.031	0.102	20R001	0.064	0.059	0.0977 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	3	3	100	0.453	1.78	20R001	0.917	0.518	1.65 V	0.453	1.78	20R001	0.917	0.518	1.65 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	3	3	100	0.9	1.63	20R001	1.26	1.25	1.59 V	0.9	1.63	20R001	1.26	1.25	1.59 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.443	0.506	20R001	0.466	0.449	0.5 V	0.443	0.506	20R001	0.466	0.449	0.5 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	1.56 JT	2.45 JT	20R001	1.9	1.68 T	2.37 JV	1.56 JT	2.45 JT	20R001	1.9	1.68 T	2.37 JV
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	4.91 JT	7 JT	20R001	6.05	6.24 T	6.92 JV	4.91 JT	7 JT	20R001	6.05	6.24 T	6.92 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	2.46 T	5.44 T	20R001	4.15	4.55 T	5.35 V	2.46 T	5.44 T	20R001	4.15	4.55 T	5.35 V
Pesticides																
2,4'-DDD	µg/kg-Wet	3	2	67	4.7 NJ	7.4 NJ	20R001	6.1	6.1 JV	7.3 JV	1.6 U	7.4 NJ	20R001	4.3	4.7 NJ	7.1 JV
2,4'-DDE	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.5 U	2 U	20R001	0.87	0.85 U	0.99 UV
2,4'-DDT	µg/kg-Wet	3	3	100	7.2 NJ	16 NJ	20R001	11	11 NJ	16 JV	7.2 NJ	16 NJ	20R001	11	11 NJ	16 JV
4,4'-DDD	µg/kg-Wet	3	3	100	4.7 NJ	10 NJ	20R001	8.2	9.8 NJ	10 JV	4.7 NJ	10 NJ	20R001	8.2	9.8 NJ	10 JV
4,4'-DDE	µg/kg-Wet	3	3	100	32 J	60 J	20R001	49	55 J	60 JV	32 J	60 J	20R001	49	55 J	60 JV
4,4'-DDT	µg/kg-Wet	3	3	100	13 J	27 J	20R001	21	24 J	27 JV	13 J	27 J	20R001	21	24 J	27 JV
Aldrin	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	3 U	20R001	0.87	0.6 U	1.4 UV
alpha-Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 U	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 U	0.5 UV
beta-Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1.2 UJ	20R001	0.53	0.5 UJ	0.59 UJV
beta-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	2.2 UJ	4 UJ	20R001	1.7	1.9 UJ	2 UJV
cis-Chlordane	µg/kg-Wet	3	1	33	2.1 NJ	2.1 NJ	20R001	2.1	2.1 NJ	2.1 NJ	1 UJ	2.1 NJ	20R001	1	0.5 UJ	1.9 JV
cis-Nonachlor	µg/kg-Wet	3	0	0	--	--	--	--	--	--	2.6 U	8 U	20R001	3	3.8 U	4 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	3	2	67	1.6 NJ	2.5 NJ	20R001	2.1	2.1 JV	2.5 JV	1 U	2.5 NJ	20R001	1.5	1.6 NJ	2.4 JV
Dieldrin	µg/kg-Wet	3	3	100	2.5 NJ	4.5 NJ	20R001	3.5	3.6 NJ	4.4 JV	2.5 NJ	4.5 NJ	20R001	3.5	3.6 NJ	4.4 JV
Endosulfan sulfate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	20R001	0.5	0.5 UJ	0.5 UJV
Endrin	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	20R001	0.5	0.5 UJ	0.5 UJV
Endrin aldehyde	µg/kg-Wet	3	1	33	2.3 NJ	2.3 NJ	20R001	2.3	2.3 NJ	2.3 NJ	1.3 U	2.3 NJ	20R001	1.2	0.75 U	2.1 JV
Endrin ketone	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.3 UJ	3.3 UJ	20R001	1.3	1.5 UJ	1.6 UJV
gamma-Hexachlorocyclohexane	µg/kg-Wet	3	2	67	3.3 NJ	4.3 NJ	20R001	3.8	3.8 JV	4.3 JV	2.3 U	4.3 NJ	20R001	2.9	3.3 NJ	4.2 JV
Heptachlor	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 U	0.5 UV
Heptachlor epoxide	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 U	0.5 UV
Methoxychlor	µg/kg-Wet	3	1	33	5.3 NJ	5.3 NJ	20R001	5.3	5.3 NJ	5.3 NJ	1.1 U	5.3 NJ	20R001	2.6	1.8 U	5 JV
Mirex	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	20R001	0.5	0.5 U	0.5 UV
Oxychlordane	µg/kg-Wet	3	3	100	1.9 NJ	3.7 NJ	20R001	2.9	3.1 N	3.6 JV	1.9 NJ	3.7 NJ	20R001	2.9	3.1 N	3.6 JV
Total Chlordanes	µg/kg-Wet	3	3	100	5.9 NJT	15 NJT	20R001	10.6	10.9 NJT	14.6 JV	5.9 NJT	15 NJT	20R001	10.6	10.9 NJT	14.6 JV
Total Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJT	1.2 UJT	20R001	0.53	0.5 UJT	0.59 UJV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	3	3	100	4.7 NJT	17.4 NJT	20R001	12.2	14.5 NJT	17.1 JV	4.7 NJT	17.4 NJT	20R001	12.2	14.5 NJT	17.1 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	3	3	100	56.9 NJT	120 NJT	20R001	94	105 NJT	119 JV	56.9 NJT	120 NJT	20R001	94	105 NJT	119 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	3	3	100	32 JT	60 JT	20R001	49	55 JT	60 JV	32 JT	60 JT	20R001	49	55 JT	60 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	3	3	100	20.2 NJT	43 NJT	20R001	32.7	35 NJT	42.2 JV	20.2 NJT	43 NJT	20R001	32.7	35 NJT	42.2 JV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	3	3	100	49.7 JT	97 JT	20R001	78.5	88.8 JT	96.2 JV	49.7 JT	97 JT	20R001	78.5	88.8 JT	96.2 JV
Toxaphene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	160 U	240 U	20R001	100	110 U	120 UV
trans-Chlordane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	2 UJ	8.4 UJ	20R001	2.5	2.3 UJ	4 UJV
trans-Nonachlor	µg/kg-Wet	3	3	100	4 N	9.2 NJ	20R001	7	7.8 NJ	9.1 JV	4 N	9.2 NJ	20R001	7	7.8 NJ	9.1 JV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Acenaphthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Acenaphthylene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Benzo(a)anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Benzo(a)pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Benzo(b)fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Benzo(g,h,i)perylene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Benzo(k)fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Chrysene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Fluorene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
High Molecular Weight PAH	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Low Molecular Weight PAH	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Naphthalene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Phenanthrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Total BaPEq	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	16.5	16.5 UT	16.5 UV
Total cPAHs	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Total PAHs	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	3	1	33	4800 T	4800 T	20R001	4800	4800 T	4800 T	330 UJT	4800 T	20R001	1700	280 UJT	4300 JV
Butylbenzyl phthalate	µg/kg-Wet	3	1	33	790 J	790 J	20R001	790	790 J	790 J	330 UJ	790 J	20R001	370	170 UJ	730 JV
Dibutyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 U	170 UV
Diethyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 U	85 UV
Dimethyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 U	85 UV
Di-n-octyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 U	170 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
1,2-Diphenylhydrazine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 U	33 U	20R001	17	17 U	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
1,4-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
2,4-Dinitrotoluene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
2,6-Dinitrotoluene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
2-Chloronaphthalene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
2-Nitroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 U	420 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 U	850 UV
3-Nitroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 U	420 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
4-Chloroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UT	170 UT	20R001	85	85 UT	85 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	83 UT	83 UT	20R001	42	42 UT	42 UV
4-Nitroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 U	420 UV
Azobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 U	85 UV
Benzoic acid	µg/kg-Wet	3	0	0	--	--	--	--	--	--	8300 U	8300 U	20R001	4200	4200 U	4200 UV
Benzyl alcohol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 U	170 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 U	85 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 U	85 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV

Table D5.1-3. Summary Statistics for All Analytes for Upriver Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Carbazole	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Dibenzofuran	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Hexachlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.7 UT	2.3 UT	20R001	1	1 UT	1.1 UV
Hexachlorobutadiene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UT	1 UT	20R001	0.5	0.5 UT	0.5 UV
Hexachlorocyclopentadiene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 U	420 UV
Hexachloroethane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJT	1 UJT	20R001	0.5	0.5 UJT	0.5 UJV
Isophorone	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 U	850 UV
Nitrobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UT	170 UT	20R001	85	85 UT	85 UV
N-Nitrosodiphenylamine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UJ	170 UJ	20R001	85	85 UJ	85 UJV
N-Nitrosodipropylamine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 UJ	1700 UJ	20R001	850	850 UJ	850 UJV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 U	850 UV
2,4,5-Trichlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	20R001	420	420 U	420 UV
2,4,6-Trichlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
2,4-Dichlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
2,4-Dimethylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	500 U	500 U	20R001	250	250 U	250 UV
2-Chlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
2-Methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	20R001	85	85 U	85 UV
2-Nitrophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 U	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	3300 U	3300 U	20R001	1700	1700 U	1700 UV
4-Chloro-3-methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 U	170 UV
4-Methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	20R001	17	17 UT	17 UV
4-Nitrophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	20R001	850	850 U	850 UV
Pentachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UT	170 UT	20R001	85	85 UT	85 UV
Phenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	20R001	170	170 U	170 UV

Notes:

[a] Whenever several result values match maximum or minimum value, qualifier preference has been given in the following order: U over J over A over N over T over no qualification.

[b] Median is the exact result value ranking as the 0.50 percentile in an ascending list of all results, and 95th percentile is the exact result value of the 0.95 ranking result. When the ascending list of all results doesn't produce an exact match to the corresponding percentile rank, average of two adjacent results ranking closest to 0.50 percentile is the median, and an interpolated value is the 95th percentile. Such median or 95th percentile value is always qualified with "V". It is qualified with "U" if both results ranking immediately above and below the corresponding percentile are "U" qualified, and with "J" if at least one of the results is "J" qualified.

[c] Total PCBs are total PCB congeners.

Reason codes for qualifiers:

A - Total value based on limited number of analytes.
J - The associated numerical value is an estimated quantity.
N - Presumptive evidence of presence of material; identification of the compound is not definitive.
T - The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte). Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for the Round 2 data.
U - The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
V - Median or 95th percentile obtained through interpolation.

-- data not available.
BaPEq - benzo(a)pyrene equivalent
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DL - detection limit
ND - non-detect
PAH - polycyclic aromatic hydrocarbon
PBDE - polybrominated diphenyl ether
PCB - polychlorinated biphenyl
PCDD/Fs - dioxins/furans
TEQ - toxicity equivalent

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Chinook (stomach contents)																
PCB Congeners																
PCB001	pg/g-Wet	1	1	100	8.67	8.67	T04	8.67	8.67	8.67	8.67	8.67	T04	8.67	8.67	8.67
PCB002	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.47 U	1.47 U	T04	0.735	0.735 U	0.735 U
PCB003	pg/g-Wet	1	1	100	3.65	3.65	T04	3.65	3.65	3.65	3.65	3.65	T04	3.65	3.65	3.65
PCB004	pg/g-Wet	1	1	100	30.6	30.6	T04	30.6	30.6	30.6	30.6	30.6	T04	30.6	30.6	30.6
PCB005	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.2 U	1.2 U	T04	0.6	0.6 U	0.6 U
PCB006	pg/g-Wet	1	1	100	9.13	9.13	T04	9.13	9.13	9.13	9.13	9.13	T04	9.13	9.13	9.13
PCB007	pg/g-Wet	1	1	100	2.57	2.57	T04	2.57	2.57	2.57	2.57	2.57	T04	2.57	2.57	2.57
PCB008	pg/g-Wet	1	1	100	40.4	40.4	T04	40.4	40.4	40.4	40.4	40.4	T04	40.4	40.4	40.4
PCB009	pg/g-Wet	1	1	100	3.54	3.54	T04	3.54	3.54	3.54	3.54	3.54	T04	3.54	3.54	3.54
PCB010	pg/g-Wet	1	1	100	1.25	1.25	T04	1.25	1.25	1.25	1.25	1.25	T04	1.25	1.25	1.25
PCB011	pg/g-Wet	1	1	100	334	334	T04	334	334	334	334	334	T04	334	334	334
PCB012 & 013	pg/g-Wet	1	1	100	2.6	2.6	T04	2.6	2.6	2.6	2.6	2.6	T04	2.6	2.6	2.6
PCB014	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.15 U	1.15 U	T04	0.575	0.575 U	0.575 U
PCB015	pg/g-Wet	1	1	100	17.3	17.3	T04	17.3	17.3	17.3	17.3	17.3	T04	17.3	17.3	17.3
PCB016	pg/g-Wet	1	1	100	14.6	14.6	T04	14.6	14.6	14.6	14.6	14.6	T04	14.6	14.6	14.6
PCB017	pg/g-Wet	1	1	100	24.6	24.6	T04	24.6	24.6	24.6	24.6	24.6	T04	24.6	24.6	24.6
PCB018 & 030	pg/g-Wet	1	1	100	39.5	39.5	T04	39.5	39.5	39.5	39.5	39.5	T04	39.5	39.5	39.5
PCB019	pg/g-Wet	1	1	100	5.23	5.23	T04	5.23	5.23	5.23	5.23	5.23	T04	5.23	5.23	5.23
PCB020 & 028	pg/g-Wet	1	1	100	129	129	T04	129	129	129	129	129	T04	129	129	129
PCB021 & 033	pg/g-Wet	1	1	100	21.8	21.8	T04	21.8	21.8	21.8	21.8	21.8	T04	21.8	21.8	21.8
PCB022	pg/g-Wet	1	1	100	20.6	20.6	T04	20.6	20.6	20.6	20.6	20.6	T04	20.6	20.6	20.6
PCB023	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.21 U	1.21 U	T04	0.605	0.605 U	0.605 U
PCB024	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.462 U	0.462 U	T04	0.231	0.231 U	0.231 U
PCB025	pg/g-Wet	1	1	100	6.95	6.95	T04	6.95	6.95	6.95	6.95	6.95	T04	6.95	6.95	6.95
PCB026 & 029	pg/g-Wet	1	1	100	15.5	15.5	T04	15.5	15.5	15.5	15.5	15.5	T04	15.5	15.5	15.5
PCB027	pg/g-Wet	1	1	100	2.93	2.93	T04	2.93	2.93	2.93	2.93	2.93	T04	2.93	2.93	2.93
PCB031	pg/g-Wet	1	1	100	81	81	T04	81	81	81	81	81	T04	81	81	81
PCB032	pg/g-Wet	1	1	100	14.9	14.9	T04	14.9	14.9	14.9	14.9	14.9	T04	14.9	14.9	14.9
PCB034	pg/g-Wet	1	1	100	0.421 J	0.421 J	T04	0.421	0.421 J	0.421 J	0.421 J	0.421 J	T04	0.421	0.421 J	0.421 J
PCB035	pg/g-Wet	1	1	100	2.51	2.51	T04	2.51	2.51	2.51	2.51	2.51	T04	2.51	2.51	2.51
PCB036	pg/g-Wet	1	1	100	1.63	1.63	T04	1.63	1.63	1.63	1.63	1.63	T04	1.63	1.63	1.63
PCB037	pg/g-Wet	1	1	100	26.1	26.1	T04	26.1	26.1	26.1	26.1	26.1	T04	26.1	26.1	26.1
PCB038	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.223 U	0.223 U	T04	0.112	0.112 U	0.112 U
PCB039	pg/g-Wet	1	1	100	0.796 J	0.796 J	T04	0.796	0.796 J	0.796 J	0.796 J	0.796 J	T04	0.796	0.796 J	0.796 J
PCB040 & 041 & 071	pg/g-Wet	1	1	100	44.4	44.4	T04	44.4	44.4	44.4	44.4	44.4	T04	44.4	44.4	44.4
PCB042	pg/g-Wet	1	1	100	36.2	36.2	T04	36.2	36.2	36.2	36.2	36.2	T04	36.2	36.2	36.2
PCB043	pg/g-Wet	1	1	100	2.52	2.52	T04	2.52	2.52	2.52	2.52	2.52	T04	2.52	2.52	2.52
PCB044 & 047 & 065	pg/g-Wet	1	1	100	166	166	T04	166	166	166	166	166	T04	166	166	166
PCB045 & 051	pg/g-Wet	1	1	100	12.6	12.6	T04	12.6	12.6	12.6	12.6	12.6	T04	12.6	12.6	12.6
PCB046	pg/g-Wet	1	1	100	3.01	3.01	T04	3.01	3.01	3.01	3.01	3.01	T04	3.01	3.01	3.01
PCB048	pg/g-Wet	1	1	100	19.6	19.6	T04	19.6	19.6	19.6	19.6	19.6	T04	19.6	19.6	19.6
PCB049 & 069	pg/g-Wet	1	1	100	126	126	T04	126	126	126	126	126	T04	126	126	126
PCB050 & 053	pg/g-Wet	1	1	100	12.2	12.2	T04	12.2	12.2	12.2	12.2	12.2	T04	12.2	12.2	12.2
PCB052	pg/g-Wet	1	1	100	241	241	T04	241	241	241	241	241	T04	241	241	241
PCB054	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.54 U	0.54 U	T04	0.27	0.27 U	0.27 U
PCB055	pg/g-Wet	1	1	100	2.77	2.77	T04	2.77	2.77	2.77	2.77	2.77	T04	2.77	2.77	2.77
PCB056	pg/g-Wet	1	1	100	46.7	46.7	T04	46.7	46.7	46.7	46.7	46.7	T04	46.7	46.7	46.7
PCB057	pg/g-Wet	1	1	100	0.587 J	0.587 J	T04	0.587	0.587 J	0.587 J	0.587 J	0.587 J	T04	0.587	0.587 J	0.587 J
PCB058	pg/g-Wet	1	1	100	0.514 J	0.514 J	T04	0.514	0.514 J	0.514 J	0.514 J	0.514 J	T04	0.514	0.514 J	0.514 J
PCB059 & 062 & 075	pg/g-Wet	1	1	100	11.6	11.6	T04	11.6	11.6	11.6	11.6	11.6	T04	11.6	11.6	11.6
PCB060	pg/g-Wet	1	1	100	45	45	T04	45	45	45	45	45	T04	45	45	45
PCB061 & 070 & 074 & 076	pg/g-Wet	1	1	100	370	370	T04	370	370	370	370	370	T04	370	370	370
PCB063	pg/g-Wet	1	1	100	11.2	11.2	T04	11.2	11.2	11.2	11.2	11.2	T04	11.2	11.2	11.2
PCB064	pg/g-Wet	1	1	100	73.9	73.9	T04	73.9	73.9	73.9	73.9	73.9	T04	73.9	73.9	73.9

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB066	pg/g-Wet	1	1	100	251	251	T04	251	251	251	251	251	T04	251	251	251
PCB067	pg/g-Wet	1	1	100	4	4	T04	4	4	4	4	4	T04	4	4	4
PCB068	pg/g-Wet	1	1	100	3.28	3.28	T04	3.28	3.28	3.28	3.28	3.28	T04	3.28	3.28	3.28
PCB072	pg/g-Wet	1	1	100	3.1	3.1	T04	3.1	3.1	3.1	3.1	3.1	T04	3.1	3.1	3.1
PCB073	pg/g-Wet	1	0	0	--	--		--	--	--	0.679 U	0.679 U	T04	0.34	0.34 U	0.34 U
PCB077	pg/g-Wet	1	1	100	17.4	17.4	T04	17.4	17.4	17.4	17.4	17.4	T04	17.4	17.4	17.4
PCB078	pg/g-Wet	1	0	0	--	--		--	--	--	1.87 U	1.87 U	T04	0.935	0.935 U	0.935 U
PCB079	pg/g-Wet	1	1	100	4.32	4.32	T04	4.32	4.32	4.32	4.32	4.32	T04	4.32	4.32	4.32
PCB080	pg/g-Wet	1	0	0	--	--		--	--	--	3.24 U	3.24 U	T04	1.62	1.62 U	1.62 U
PCB081	pg/g-Wet	1	0	0	--	--		--	--	--	0.712 U	0.712 U	T04	0.356	0.356 U	0.356 U
PCB082	pg/g-Wet	1	1	100	33.5	33.5	T04	33.5	33.5	33.5	33.5	33.5	T04	33.5	33.5	33.5
PCB083 & 099	pg/g-Wet	1	1	100	358	358	T04	358	358	358	358	358	T04	358	358	358
PCB084	pg/g-Wet	1	1	100	45.8	45.8	T04	45.8	45.8	45.8	45.8	45.8	T04	45.8	45.8	45.8
PCB085 & 116 & 117	pg/g-Wet	1	1	100	113	113	T04	113	113	113	113	113	T04	113	113	113
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	1	1	100	251	251	T04	251	251	251	251	251	T04	251	251	251
PCB088 & 091	pg/g-Wet	1	1	100	46.4	46.4	T04	46.4	46.4	46.4	46.4	46.4	T04	46.4	46.4	46.4
PCB089	pg/g-Wet	1	1	100	1.66	1.66	T04	1.66	1.66	1.66	1.66	1.66	T04	1.66	1.66	1.66
PCB090 & 101 & 113	pg/g-Wet	1	1	100	483	483	T04	483	483	483	483	483	T04	483	483	483
PCB092	pg/g-Wet	1	1	100	77.2	77.2	T04	77.2	77.2	77.2	77.2	77.2	T04	77.2	77.2	77.2
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	1	1	100	202	202	T04	202	202	202	202	202	T04	202	202	202
PCB094	pg/g-Wet	1	1	100	0.989	0.989	T04	0.989	0.989	0.989	0.989	0.989	T04	0.989	0.989	0.989
PCB096	pg/g-Wet	1	1	100	0.853 J	0.853 J	T04	0.853	0.853 J	0.853 J	0.853 J	0.853 J	T04	0.853	0.853 J	0.853 J
PCB103	pg/g-Wet	1	1	100	2.72	2.72	T04	2.72	2.72	2.72	2.72	2.72	T04	2.72	2.72	2.72
PCB104	pg/g-Wet	1	1	100	0.119 J	0.119 J	T04	0.119	0.119 J	0.119 J	0.119 J	0.119 J	T04	0.119	0.119 J	0.119 J
PCB105	pg/g-Wet	1	1	100	224	224	T04	224	224	224	224	224	T04	224	224	224
PCB106	pg/g-Wet	1	0	0	--	--		--	--	--	1.11 U	1.11 U	T04	0.555	0.555 U	0.555 U
PCB107 & 124	pg/g-Wet	1	1	100	19.6	19.6	T04	19.6	19.6	19.6	19.6	19.6	T04	19.6	19.6	19.6
PCB109	pg/g-Wet	1	1	100	48.9	48.9	T04	48.9	48.9	48.9	48.9	48.9	T04	48.9	48.9	48.9
PCB110 & 115	pg/g-Wet	1	1	100	440	440	T04	440	440	440	440	440	T04	440	440	440
PCB111	pg/g-Wet	1	0	0	--	--		--	--	--	0.409 U	0.409 U	T04	0.205	0.205 U	0.205 U
PCB112	pg/g-Wet	1	0	0	--	--		--	--	--	0.976 U	0.976 U	T04	0.488	0.488 U	0.488 U
PCB114	pg/g-Wet	1	1	100	14.7	14.7	T04	14.7	14.7	14.7	14.7	14.7	T04	14.7	14.7	14.7
PCB118	pg/g-Wet	1	1	100	631	631	T04	631	631	631	631	631	T04	631	631	631
PCB120	pg/g-Wet	1	1	100	2.73	2.73	T04	2.73	2.73	2.73	2.73	2.73	T04	2.73	2.73	2.73
PCB121	pg/g-Wet	1	0	0	--	--		--	--	--	0.414 U	0.414 U	T04	0.207	0.207 U	0.207 U
PCB122	pg/g-Wet	1	1	100	5.2	5.2	T04	5.2	5.2	5.2	5.2	5.2	T04	5.2	5.2	5.2
PCB123	pg/g-Wet	1	1	100	12.9	12.9	T04	12.9	12.9	12.9	12.9	12.9	T04	12.9	12.9	12.9
PCB126	pg/g-Wet	1	1	100	2.84	2.84	T04	2.84	2.84	2.84	2.84	2.84	T04	2.84	2.84	2.84
PCB127	pg/g-Wet	1	0	0	--	--		--	--	--	1.02 U	1.02 U	T04	0.51	0.51 U	0.51 U
PCB128 & 166	pg/g-Wet	1	1	100	105	105	T04	105	105	105	105	105	T04	105	105	105
PCB129 & 138 & 160 & 163	pg/g-Wet	1	1	100	856	856	T04	856	856	856	856	856	T04	856	856	856
PCB130	pg/g-Wet	1	1	100	49.3	49.3	T04	49.3	49.3	49.3	49.3	49.3	T04	49.3	49.3	49.3
PCB131	pg/g-Wet	1	1	100	4.14	4.14	T04	4.14	4.14	4.14	4.14	4.14	T04	4.14	4.14	4.14
PCB132	pg/g-Wet	1	1	100	110	110	T04	110	110	110	110	110	T04	110	110	110
PCB133	pg/g-Wet	1	1	100	15.8	15.8	T04	15.8	15.8	15.8	15.8	15.8	T04	15.8	15.8	15.8
PCB134 & 143	pg/g-Wet	1	1	100	16.3	16.3	T04	16.3	16.3	16.3	16.3	16.3	T04	16.3	16.3	16.3
PCB135 & 151 & 154	pg/g-Wet	1	1	100	151	151	T04	151	151	151	151	151	T04	151	151	151
PCB136	pg/g-Wet	1	1	100	33.3	33.3	T04	33.3	33.3	33.3	33.3	33.3	T04	33.3	33.3	33.3
PCB137	pg/g-Wet	1	1	100	35.3	35.3	T04	35.3	35.3	35.3	35.3	35.3	T04	35.3	35.3	35.3
PCB139 & 140	pg/g-Wet	1	1	100	10.6	10.6	T04	10.6	10.6	10.6	10.6	10.6	T04	10.6	10.6	10.6
PCB141	pg/g-Wet	1	1	100	99.8	99.8	T04	99.8	99.8	99.8	99.8	99.8	T04	99.8	99.8	99.8
PCB142	pg/g-Wet	1	0	0	--	--		--	--	--	0.915 U	0.915 U	T04	0.458	0.458 U	0.458 U
PCB144	pg/g-Wet	1	1	100	17.4	17.4	T04	17.4	17.4	17.4	17.4	17.4	T04	17.4	17.4	17.4
PCB145	pg/g-Wet	1	0	0	--	--		--	--	--	0.122 U	0.122 U	T04	0.061	0.061 U	0.061 U
PCB146	pg/g-Wet	1	1	100	171	171	T04	171	171	171	171	171	T04	171	171	171
PCB147 & 149	pg/g-Wet	1	1	100	466	466	T04	466	466	466	466	466	T04	466	466	466
PCB148	pg/g-Wet	1	0	0	--	--		--	--	--	1.14 U	1.14 U	T04	0.57	0.57 U	0.57 U

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB150	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.497 U	0.497 U	T04	0.249	0.249 U	0.249 U
PCB152	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.105 U	0.105 U	T04	0.0525	0.0525 U	0.0525 U
PCB153 & 168	pg/g-Wet	1	1	100	842	842	T04	842	842	842	842	842	T04	842	842	842
PCB155	pg/g-Wet	1	1	100	0.488 J	0.488 J	T04	0.488	0.488 J	0.488 J	0.488 J	0.488 J	T04	0.488	0.488 J	0.488 J
PCB156 & 157	pg/g-Wet	1	1	100	83.8	83.8	T04	83.8	83.8	83.8	83.8	83.8	T04	83.8	83.8	83.8
PCB158	pg/g-Wet	1	1	100	73.4	73.4	T04	73.4	73.4	73.4	73.4	73.4	T04	73.4	73.4	73.4
PCB159	pg/g-Wet	1	0	0	--	--	--	--	--	--	4.34 U	4.34 U	T04	2.17	2.17 U	2.17 U
PCB161	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.03 U	1.03 U	T04	0.515	0.515 U	0.515 U
PCB162	pg/g-Wet	1	1	100	4.3	4.3	T04	4.3	4.3	4.3	4.3	4.3	T04	4.3	4.3	4.3
PCB164	pg/g-Wet	1	1	100	42.1	42.1	T04	42.1	42.1	42.1	42.1	42.1	T04	42.1	42.1	42.1
PCB165	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.36 U	0.36 U	T04	0.18	0.18 U	0.18 U
PCB167	pg/g-Wet	1	1	100	36.2	36.2	T04	36.2	36.2	36.2	36.2	36.2	T04	36.2	36.2	36.2
PCB169	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.316 U	0.316 U	T04	0.158	0.158 U	0.158 U
PCB170	pg/g-Wet	1	1	100	149	149	T04	149	149	149	149	149	T04	149	149	149
PCB171 & 173	pg/g-Wet	1	1	100	37.9	37.9	T04	37.9	37.9	37.9	37.9	37.9	T04	37.9	37.9	37.9
PCB172	pg/g-Wet	1	1	100	35.9	35.9	T04	35.9	35.9	35.9	35.9	35.9	T04	35.9	35.9	35.9
PCB174	pg/g-Wet	1	1	100	103	103	T04	103	103	103	103	103	T04	103	103	103
PCB175	pg/g-Wet	1	1	100	6.84	6.84	T04	6.84	6.84	6.84	6.84	6.84	T04	6.84	6.84	6.84
PCB176	pg/g-Wet	1	1	100	9.6	9.6	T04	9.6	9.6	9.6	9.6	9.6	T04	9.6	9.6	9.6
PCB177	pg/g-Wet	1	1	100	85.7	85.7	T04	85.7	85.7	85.7	85.7	85.7	T04	85.7	85.7	85.7
PCB178	pg/g-Wet	1	1	100	44.7	44.7	T04	44.7	44.7	44.7	44.7	44.7	T04	44.7	44.7	44.7
PCB179	pg/g-Wet	1	1	100	43	43	T04	43	43	43	43	43	T04	43	43	43
PCB180 & 193	pg/g-Wet	1	1	100	424	424	T04	424	424	424	424	424	T04	424	424	424
PCB181	pg/g-Wet	1	0	0	--	--	--	--	--	--	1.43 U	1.43 U	T04	0.715	0.715 U	0.715 U
PCB182	pg/g-Wet	1	1	100	1.37	1.37	T04	1.37	1.37	1.37	1.37	1.37	T04	1.37	1.37	1.37
PCB183 & 185	pg/g-Wet	1	1	100	114	114	T04	114	114	114	114	114	T04	114	114	114
PCB184	pg/g-Wet	1	1	100	0.707 J	0.707 J	T04	0.707	0.707 J	0.707 J	0.707 J	0.707 J	T04	0.707	0.707 J	0.707 J
PCB186	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.986 U	0.986 U	T04	0.493	0.493 U	0.493 U
PCB187	pg/g-Wet	1	1	100	394	394	T04	394	394	394	394	394	T04	394	394	394
PCB188	pg/g-Wet	1	1	100	0.542 J	0.542 J	T04	0.542	0.542 J	0.542 J	0.542 J	0.542 J	T04	0.542	0.542 J	0.542 J
PCB189	pg/g-Wet	1	1	100	6.74	6.74	T04	6.74	6.74	6.74	6.74	6.74	T04	6.74	6.74	6.74
PCB190	pg/g-Wet	1	1	100	35.4	35.4	T04	35.4	35.4	35.4	35.4	35.4	T04	35.4	35.4	35.4
PCB191	pg/g-Wet	1	1	100	6.6	6.6	T04	6.6	6.6	6.6	6.6	6.6	T04	6.6	6.6	6.6
PCB192	pg/g-Wet	1	0	0	--	--	--	--	--	--	2.29 U	2.29 U	T04	1.15	1.15 U	1.15 U
PCB194	pg/g-Wet	1	1	100	78.4	78.4	T04	78.4	78.4	78.4	78.4	78.4	T04	78.4	78.4	78.4
PCB195	pg/g-Wet	1	1	100	25.6	25.6	T04	25.6	25.6	25.6	25.6	25.6	T04	25.6	25.6	25.6
PCB196	pg/g-Wet	1	1	100	37.4	37.4	T04	37.4	37.4	37.4	37.4	37.4	T04	37.4	37.4	37.4
PCB197 & 200	pg/g-Wet	1	1	100	9.66	9.66	T04	9.66	9.66	9.66	9.66	9.66	T04	9.66	9.66	9.66
PCB198 & 199	pg/g-Wet	1	1	100	132	132	T04	132	132	132	132	132	T04	132	132	132
PCB201	pg/g-Wet	1	1	100	10.4	10.4	T04	10.4	10.4	10.4	10.4	10.4	T04	10.4	10.4	10.4
PCB202	pg/g-Wet	1	1	100	30.5	30.5	T04	30.5	30.5	30.5	30.5	30.5	T04	30.5	30.5	30.5
PCB203	pg/g-Wet	1	1	100	82	82	T04	82	82	82	82	82	T04	82	82	82
PCB204	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.156 U	0.156 U	T04	0.078	0.078 U	0.078 U
PCB205	pg/g-Wet	1	1	100	4.07	4.07	T04	4.07	4.07	4.07	4.07	4.07	T04	4.07	4.07	4.07
PCB206	pg/g-Wet	1	1	100	44.8	44.8	T04	44.8	44.8	44.8	44.8	44.8	T04	44.8	44.8	44.8
PCB207	pg/g-Wet	1	1	100	5.12	5.12	T04	5.12	5.12	5.12	5.12	5.12	T04	5.12	5.12	5.12
PCB208	pg/g-Wet	1	1	100	15.7	15.7	T04	15.7	15.7	15.7	15.7	15.7	T04	15.7	15.7	15.7
PCB209	pg/g-Wet	1	1	100	22.6	22.6	T04	22.6	22.6	22.6	22.6	22.6	T04	22.6	22.6	22.6
Total PCB Congeners	pg/g-Wet	1	1	100	10600 JT	10600 JT	T04	10600	10600 JT	10600 JT	10600 JT	10600 JT	T04	10600	10600 JT	10600 JT
Total PCBs[c]																
Total PCBs	µg/kg-Wet	1	1	100	10.6 JT	10.6 JT	T04	10.6	10.6 JT	10.6 JT	10.6 JT	10.6 JT	T04	10.6	10.6 JT	10.6 JT
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	1	1	100	441 T	441 T	T04	441	441 T	441 T	441 T	441 T	T04	441	441 T	441 T
Heptachlorobiphenyl homologs	pg/g-Wet	1	1	100	1500 JT	1500 JT	T04	1500	1500 JT	1500 JT	1500 JT	1500 JT	T04	1500	1500 JT	1500 JT
Hexachlorobiphenyl homologs	pg/g-Wet	1	1	100	3220 JT	3220 JT	T04	3220	3220 JT	3220 JT	3220 JT	3220 JT	T04	3220	3220 JT	3220 JT

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Monochlorobiphenyl homologs	pg/g-Wet	1	1	100	12.3 T	12.3 T	T04	12.3	12.3 T	12.3 T	12.3 T	12.3 T	T04	12.3	12.3 T	12.3 T
Nonachlorobiphenyl homologs	pg/g-Wet	1	1	100	65.6 T	65.6 T	T04	65.6	65.6 T	65.6 T	65.6 T	65.6 T	T04	65.6	65.6 T	65.6 T
Octachlorobiphenyl homologs	pg/g-Wet	1	1	100	410 T	410 T	T04	410	410 T	410 T	410 T	410 T	T04	410	410 T	410 T
Pentachlorobiphenyl homologs	pg/g-Wet	1	1	100	3020 JT	3020 JT	T04	3020	3020 JT	3020 JT	3020 JT	3020 JT	T04	3020	3020 JT	3020 JT
Tetrachlorobiphenyl homologs	pg/g-Wet	1	1	100	1510 JT	1510 JT	T04	1510	1510 JT	1510 JT	1510 JT	1510 JT	T04	1510	1510 JT	1510 JT
Trichlorobiphenyl homologs	pg/g-Wet	1	1	100	408 JT	408 JT	T04	408	408 JT	408 JT	408 JT	408 JT	T04	408	408 JT	408 JT
PCDD/Fs																
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.316 A	0.316 A	T04	0.316	0.316 A	0.316 A	0.316 A	0.316 A	T04	0.316	0.316 A	0.316 A
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.316 T	0.316 T	T04	0.316	0.316 T	0.316 T	0.316 T	0.316 T	T04	0.316	0.316 T	0.316 T
Pesticides																
2,4'-DDD	µg/kg-Wet	1	1	100	0.0822 J	0.0822 J	T04	0.0822	0.0822 J	0.0822 J	0.0822 J	0.0822 J	T04	0.0822	0.0822 J	0.0822 J
2,4'-DDE	µg/kg-Wet	1	1	100	0.0317 J	0.0317 J	T04	0.0317	0.0317 J	0.0317 J	0.0317 J	0.0317 J	T04	0.0317	0.0317 J	0.0317 J
2,4'-DDT	µg/kg-Wet	1	1	100	0.108	0.108	T04	0.108	0.108	0.108	0.108	0.108	T04	0.108	0.108	0.108
4,4'-DDD	µg/kg-Wet	1	1	100	0.478	0.478	T04	0.478	0.478	0.478	0.478	0.478	T04	0.478	0.478	0.478
4,4'-DDE	µg/kg-Wet	1	1	100	5.33	5.33	T04	5.33	5.33	5.33	5.33	5.33	T04	5.33	5.33	5.33
4,4'-DDT	µg/kg-Wet	1	1	100	0.578	0.578	T04	0.578	0.578	0.578	0.578	0.578	T04	0.578	0.578	0.578
Aldrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.000169 U	0.000169 U	T04	8.45E-05	8.45E-05 U	8.45E-05 U
alpha-Endosulfan	µg/kg-Wet	1	1	100	0.449	0.449	T04	0.449	0.449	0.449	0.449	0.449	T04	0.449	0.449	0.449
alpha-Hexachlorocyclohexane	µg/kg-Wet	1	1	100	0.0165 J	0.0165 J	T04	0.0165	0.0165 J	0.0165 J	0.0165 J	0.0165 J	T04	0.0165	0.0165 J	0.0165 J
beta-Endosulfan	µg/kg-Wet	1	1	100	0.25 J	0.25 J	T04	0.25	0.25 J	0.25 J	0.25 J	0.25 J	T04	0.25	0.25 J	0.25 J
beta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.00892 U	0.00892 U	T04	0.00446	0.00446 U	0.00446 U
cis-Chlordane	µg/kg-Wet	1	1	100	0.267	0.267	T04	0.267	0.267	0.267	0.267	0.267	T04	0.267	0.267	0.267
cis-Nonachlor	µg/kg-Wet	1	1	100	0.244	0.244	T04	0.244	0.244	0.244	0.244	0.244	T04	0.244	0.244	0.244
delta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0014 U	0.0014 U	T04	0.0007	0.0007 U	0.0007 U
Dieldrin	µg/kg-Wet	1	1	100	0.905	0.905	T04	0.905	0.905	0.905	0.905	0.905	T04	0.905	0.905	0.905
Endosulfan sulfate	µg/kg-Wet	1	1	100	0.891	0.891	T04	0.891	0.891	0.891	0.891	0.891	T04	0.891	0.891	0.891
Endrin	µg/kg-Wet	1	1	100	0.00503 J	0.00503 J	T04	0.00503	0.00503 J	0.00503 J	0.00503 J	0.00503 J	T04	0.00503	0.00503 J	0.00503 J
Endrin aldehyde	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0224 U	0.0224 U	T04	0.0112	0.0112 U	0.0112 U
Endrin ketone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0015 U	0.0015 U	T04	0.00075	0.00075 U	0.00075 U
gamma-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0221 U	0.0221 U	T04	0.0111	0.0111 U	0.0111 U
Heptachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0025 U	0.0025 U	T04	0.00125	0.00125 U	0.00125 U
Heptachlor epoxide	µg/kg-Wet	1	1	100	0.11 J	0.11 J	T04	0.11	0.11 J	0.11 J	0.11 J	0.11 J	T04	0.11	0.11 J	0.11 J
Methoxychlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.0545 U	0.0545 U	T04	0.0273	0.0273 U	0.0273 U
Oxychlordane	µg/kg-Wet	1	1	100	0.58	0.58	T04	0.58	0.58	0.58	0.58	0.58	T04	0.58	0.58	0.58
Total Chlordanes	µg/kg-Wet	1	1	100	2.26 JT	2.26 JT	T04	2.26	2.26 JT	2.26 JT	2.26 JT	2.26 JT	T04	2.26	2.26 JT	2.26 JT
Total Endosulfan	µg/kg-Wet	1	1	100	1.59 JT	1.59 JT	T04	1.59	1.59 JT	1.59 JT	1.59 JT	1.59 JT	T04	1.59	1.59 JT	1.59 JT
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	1	1	100	0.56 JT	0.56 JT	T04	0.56	0.56 JT	0.56 JT	0.56 JT	0.56 JT	T04	0.56	0.56 JT	0.56 JT
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	6.61 JT	6.61 JT	T04	6.61	6.61 JT	6.61 JT	6.61 JT	6.61 JT	T04	6.61	6.61 JT	6.61 JT
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	1	1	100	5.36 JT	5.36 JT	T04	5.36	5.36 JT	5.36 JT	5.36 JT	5.36 JT	T04	5.36	5.36 JT	5.36 JT
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	1	1	100	0.686 T	0.686 T	T04	0.686	0.686 T	0.686 T	0.686 T	0.686 T	T04	0.686	0.686 T	0.686 T
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	6.39 T	6.39 T	T04	6.39	6.39 T	6.39 T	6.39 T	6.39 T	T04	6.39	6.39 T	6.39 T
trans-Chlordane	µg/kg-Wet	1	1	100	0.151 J	0.151 J	T04	0.151	0.151 J	0.151 J	0.151 J	0.151 J	T04	0.151	0.151 J	0.151 J
trans-Nonachlor	µg/kg-Wet	1	1	100	1.02	1.02	T04	1.02	1.02	1.02	1.02	1.02	T04	1.02	1.02	1.02
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	6.15 U	6.15 U	T04	3.08	3.08 U	3.08 U
Acenaphthene	µg/kg-Wet	1	1	100	1.96 J	1.96 J	T04	1.96	1.96 J	1.96 J	1.96 J	1.96 J	T04	1.96	1.96 J	1.96 J
Acenaphthylene	µg/kg-Wet	1	1	100	0.764 J	0.764 J	T04	0.764	0.764 J	0.764 J	0.764 J	0.764 J	T04	0.764	0.764 J	0.764 J
Anthracene	µg/kg-Wet	1	1	100	1.78 J	1.78 J	T04	1.78	1.78 J	1.78 J	1.78 J	1.78 J	T04	1.78	1.78 J	1.78 J
Benzo(a)anthracene	µg/kg-Wet	1	1	100	2.66	2.66	T04	2.66	2.66	2.66	2.66	2.66	T04	2.66	2.66	2.66
Benzo(a)pyrene	µg/kg-Wet	1	1	100	1.07 J	1.07 J	T04	1.07	1.07 J	1.07 J	1.07 J	1.07 J	T04	1.07	1.07 J	1.07 J
Benzo(b)fluoranthene	µg/kg-Wet	1	1	100	2.43	2.43	T04	2.43	2.43	2.43	2.43	2.43	T04	2.43	2.43	2.43
Benzo(g,h,i)perylene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2.3 U	2.3 U	T04	1.2	1.2 U	1.2 U
Benzo(j+k)fluoranthene	µg/kg-Wet	1	1	100	1.86 J	1.86 J	T04	1.86	1.86 J	1.86 J	1.86 J	1.86 J	T04	1.86	1.86 J	1.86 J

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Chrysene	µg/kg-Wet	1	1	100	8.01	8.01	T04	8.01	8.01	8.01	8.01	8.01	T04	8.01	8.01	8.01
Dibenzo(a,h)anthracene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.207 U	0.207 U	T04	0.104	0.104 U	0.104 U
Fluoranthene	µg/kg-Wet	1	1	100	24.3 J	24.3 J	T04	24.3	24.3 J	24.3 J	24.3 J	24.3 J	T04	24.3	24.3 J	24.3 J
Fluorene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2.07 U	2.07 U	T04	1.04	1.04 U	1.04 U
High Molecular Weight PAH	µg/kg-Wet	1	1	100	59.4 JT	59.4 JT	T04	59.4	59.4 JT	59.4 JT	59.4 JT	59.4 JT	T04	59.4	59.4 JT	59.4 JT
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.27 U	1.27 U	T04	0.635	0.635 U	0.635 U
Low Molecular Weight PAH	µg/kg-Wet	1	1	100	28 JT	28 JT	T04	28	28 JT	28 JT	28 JT	28 JT	T04	28	28 JT	28 JT
Naphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	T04	5.5	5.5 U	5.5 U
Phenanthrene	µg/kg-Wet	1	1	100	23.5	23.5	T04	23.5	23.5	23.5	23.5	23.5	T04	23.5	23.5	23.5
Pyrene	µg/kg-Wet	1	1	100	19.1 J	19.1 J	T04	19.1	19.1 J	19.1 J	19.1 J	19.1 J	T04	19.1	19.1 J	19.1 J
Total BaPEq	µg/kg-Wet	1	1	100	1.61 JT	1.61 JT	T04	1.61	1.61 JT	1.61 JT	1.61 JT	1.61 JT	T04	1.61	1.61 JT	1.61 JT
Total cPAHs	µg/kg-Wet	1	1	100	16 JT	16 JT	T04	16	16 JT	16 JT	16 JT	16 JT	T04	16	16 JT	16 JT
Total PAHs	µg/kg-Wet	1	1	100	87.4 JT	87.4 JT	T04	87.4	87.4 JT	87.4 JT	87.4 JT	87.4 JT	T04	87.4	87.4 JT	87.4 JT
Semivolatile Organic Compounds																
Hexachlorobenzene	µg/kg-Wet	1	1	100	0.767	0.767	T04	0.767	0.767	0.767	0.767	0.767	T04	0.767	0.767	0.767
Hexachlorobutadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.00589 U	0.00589 U	T04	0.00295	0.00295 U	0.00295 U
Lab-exposed clam (Corbicula fluminea – body without shell)																
Conventionals																
Lipids	percent-Wet	1	1	100	1.1	1.1	WR-PG-Ref03	1.1	1.1	1.1	1.1	1.1	WR-PG-Ref03	1.1	1.1	1.1
Total solids	percent-Wet	1	1	100	7.8	7.8	WR-PG-Ref03	7.8	7.8	7.8	7.8	7.8	WR-PG-Ref03	7.8	7.8	7.8
Metals																
Antimony	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.000624 U	0.000624 U	WR-PG-Ref03	0.000312	0.000312 U	0.000312 U
Arsenic	mg/kg-Wet	1	1	100	0.392	0.392	WR-PG-Ref03	0.392	0.392	0.392	0.392	0.392	WR-PG-Ref03	0.392	0.392	0.392
Cadmium	mg/kg-Wet	1	1	100	0.04	0.04	WR-PG-Ref03	0.04	0.04	0.04	0.04	0.04	WR-PG-Ref03	0.04	0.04	0.04
Chromium	mg/kg-Wet	1	1	100	0.0936	0.0936	WR-PG-Ref03	0.0936	0.0936	0.0936	0.0936	0.0936	WR-PG-Ref03	0.0936	0.0936	0.0936
Copper	mg/kg-Wet	1	1	100	3.19	3.19	WR-PG-Ref03	3.19	3.19	3.19	3.19	3.19	WR-PG-Ref03	3.19	3.19	3.19
Lead	mg/kg-Wet	1	1	100	0.0359	0.0359	WR-PG-Ref03	0.0359	0.0359	0.0359	0.0359	0.0359	WR-PG-Ref03	0.0359	0.0359	0.0359
Mercury	mg/kg-Wet	1	1	100	0.0113	0.0113	WR-PG-Ref03	0.0113	0.0113	0.0113	0.0113	0.0113	WR-PG-Ref03	0.0113	0.0113	0.0113
Nickel	mg/kg-Wet	1	1	100	0.0694	0.0694	WR-PG-Ref03	0.0694	0.0694	0.0694	0.0694	0.0694	WR-PG-Ref03	0.0694	0.0694	0.0694
Silver	mg/kg-Wet	1	1	100	0.00632	0.00632	WR-PG-Ref03	0.00632	0.00632	0.00632	0.00632	0.00632	WR-PG-Ref03	0.00632	0.00632	0.00632
Zinc	mg/kg-Wet	1	1	100	10.6	10.6	WR-PG-Ref03	10.6	10.6	10.6	10.6	10.6	WR-PG-Ref03	10.6	10.6	10.6
Butyltins																
Butyltin ion	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.19 U	0.19 U	WR-PG-Ref03	0.095	0.095 U	0.095 U
Dibutyltin ion	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.54 U	0.54 U	WR-PG-Ref03	0.27	0.27 U	0.27 U
Tetrabutyltin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.067 U	0.067 U	WR-PG-Ref03	0.0335	0.0335 U	0.0335 U
Tributyltin ion	µg/kg-Wet	1	1	100	0.091 NJ	0.091 NJ	WR-PG-Ref03	0.091	0.091 NJ	0.091 NJ	0.091 NJ	0.091 NJ	WR-PG-Ref03	0.091	0.091 NJ	0.091 NJ
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	1	0	0	--	--	--	--	--	--	6.6 U	6.6 U	WR-PG-Ref03	3.3	3.3 U	3.3 U
Aroclor 1221	µg/kg-Wet	1	0	0	--	--	--	--	--	--	20 U	20 U	WR-PG-Ref03	10	10 U	10 U
Aroclor 1232	µg/kg-Wet	1	0	0	--	--	--	--	--	--	9.8 U	9.8 U	WR-PG-Ref03	4.9	4.9 U	4.9 U
Aroclor 1242	µg/kg-Wet	1	0	0	--	--	--	--	--	--	6.8 U	6.8 U	WR-PG-Ref03	3.4	3.4 U	3.4 U
Aroclor 1248	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.8 U	5.8 U	WR-PG-Ref03	2.9	2.9 U	2.9 U
Aroclor 1254	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
Aroclor 1260	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.1 U	8.1 U	WR-PG-Ref03	4.1	4.1 U	4.1 U
Aroclor 1262	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2.5 U	2.5 U	WR-PG-Ref03	1.3	1.3 U	1.3 U
Aroclor 1268	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.5 U	1.5 U	WR-PG-Ref03	0.75	0.75 U	0.75 U
Aroclors	µg/kg-Wet	1	0	0	--	--	--	--	--	--	20 UT	20 UT	WR-PG-Ref03	10	10 UT	10 UT
PCB Congeners																
PCB001	pg/g-Wet	1	0	0	--	--	--	--	--	--	1200 U	1200 U	WR-PG-Ref03	600	600 U	600 U
PCB005	pg/g-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	WR-PG-Ref03	250	250 U	250 U
PCB008	pg/g-Wet	1	1	100	2000	2000	WR-PG-Ref03	2000	2000	2000	2000	2000	WR-PG-Ref03	2000	2000	2000
PCB018	pg/g-Wet	1	1	100	1000 NJ	1000 NJ	WR-PG-Ref03	1000	1000 NJ	1000 NJ	1000 NJ	1000 NJ	WR-PG-Ref03	1000	1000 NJ	1000 NJ
PCB028	pg/g-Wet	1	1	100	730	730	WR-PG-Ref03	730	730	730	730	730	WR-PG-Ref03	730	730	730
PCB031	pg/g-Wet	1	1	100	730	730	WR-PG-Ref03	730	730	730	730	730	WR-PG-Ref03	730	730	730

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB033	pg/g-Wet	1	0	0	--	--	--	--	--	--	770 U	770 U	WR-PG-Ref03	390	390 U	390 U
PCB037	pg/g-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	WR-PG-Ref03	70	70 U	70 U
PCB044	pg/g-Wet	1	1	100	690 NJ	690 NJ	WR-PG-Ref03	690	690 NJ	690 NJ	690 NJ	690 NJ	WR-PG-Ref03	690	690 NJ	690 NJ
PCB049	pg/g-Wet	1	1	100	310 J	310 J	WR-PG-Ref03	310	310 J	310 J	310 J	310 J	WR-PG-Ref03	310	310 J	310 J
PCB052	pg/g-Wet	1	0	0	--	--	--	--	--	--	220 U	220 U	WR-PG-Ref03	110	110 U	110 U
PCB056	pg/g-Wet	1	0	0	--	--	--	--	--	--	190 U	190 U	WR-PG-Ref03	95	95 U	95 U
PCB060	pg/g-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	WR-PG-Ref03	250	250 U	250 U
PCB066	pg/g-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	WR-PG-Ref03	250	250 U	250 U
PCB070	pg/g-Wet	1	1	100	470 J	470 J	WR-PG-Ref03	470	470 J	470 J	470 J	470 J	WR-PG-Ref03	470	470 J	470 J
PCB074	pg/g-Wet	1	0	0	--	--	--	--	--	--	160 U	160 U	WR-PG-Ref03	80	80 U	80 U
PCB077	pg/g-Wet	1	0	0	--	--	--	--	--	--	110 U	110 U	WR-PG-Ref03	55	55 U	55 U
PCB081	pg/g-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	WR-PG-Ref03	85	85 U	85 U
PCB087	pg/g-Wet	1	0	0	--	--	--	--	--	--	970 U	970 U	WR-PG-Ref03	490	490 U	490 U
PCB090	pg/g-Wet	1	0	0	--	--	--	--	--	--	660 U	660 U	WR-PG-Ref03	330	330 U	330 U
PCB095	pg/g-Wet	1	1	100	440 J	440 J	WR-PG-Ref03	440	440 J	440 J	440 J	440 J	WR-PG-Ref03	440	440 J	440 J
PCB097	pg/g-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	WR-PG-Ref03	250	250 U	250 U
PCB099	pg/g-Wet	1	0	0	--	--	--	--	--	--	360 U	360 U	WR-PG-Ref03	180	180 U	180 U
PCB101	pg/g-Wet	1	1	100	1900 J	1900 J	WR-PG-Ref03	1900	1900 J	1900 J	1900 J	1900 J	WR-PG-Ref03	1900	1900 J	1900 J
PCB105	pg/g-Wet	1	0	0	--	--	--	--	--	--	100 U	100 U	WR-PG-Ref03	50	50 U	50 U
PCB110	pg/g-Wet	1	1	100	1200	1200	WR-PG-Ref03	1200	1200	1200	1200	1200	WR-PG-Ref03	1200	1200	1200
PCB114	pg/g-Wet	1	0	0	--	--	--	--	--	--	90 U	90 U	WR-PG-Ref03	45	45 U	45 U
PCB118	pg/g-Wet	1	1	100	1600	1600	WR-PG-Ref03	1600	1600	1600	1600	1600	WR-PG-Ref03	1600	1600	1600
PCB119	pg/g-Wet	1	0	0	--	--	--	--	--	--	970 U	970 U	WR-PG-Ref03	490	490 U	490 U
PCB123	pg/g-Wet	1	0	0	--	--	--	--	--	--	300 U	300 U	WR-PG-Ref03	150	150 U	150 U
PCB126	pg/g-Wet	1	0	0	--	--	--	--	--	--	120 U	120 U	WR-PG-Ref03	60	60 U	60 U
PCB128	pg/g-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	WR-PG-Ref03	85	85 U	85 U
PCB132	pg/g-Wet	1	0	0	--	--	--	--	--	--	690 U	690 U	WR-PG-Ref03	350	350 U	350 U
PCB138	pg/g-Wet	1	1	100	1800 J	1800 J	WR-PG-Ref03	1800	1800 J	1800 J	1800 J	1800 J	WR-PG-Ref03	1800	1800 J	1800 J
PCB141	pg/g-Wet	1	0	0	--	--	--	--	--	--	90 U	90 U	WR-PG-Ref03	45	45 U	45 U
PCB149	pg/g-Wet	1	0	0	--	--	--	--	--	--	690 U	690 U	WR-PG-Ref03	350	350 U	350 U
PCB151	pg/g-Wet	1	0	0	--	--	--	--	--	--	99 U	99 U	WR-PG-Ref03	50	50 U	50 U
PCB153	pg/g-Wet	1	1	100	2600	2600	WR-PG-Ref03	2600	2600	2600	2600	2600	WR-PG-Ref03	2600	2600	2600
PCB156	pg/g-Wet	1	0	0	--	--	--	--	--	--	310 U	310 U	WR-PG-Ref03	160	160 U	160 U
PCB157	pg/g-Wet	1	0	0	--	--	--	--	--	--	130 U	130 U	WR-PG-Ref03	65	65 U	65 U
PCB158	pg/g-Wet	1	0	0	--	--	--	--	--	--	190 U	190 U	WR-PG-Ref03	95	95 U	95 U
PCB166	pg/g-Wet	1	0	0	--	--	--	--	--	--	360 U	360 U	WR-PG-Ref03	180	180 U	180 U
PCB167	pg/g-Wet	1	0	0	--	--	--	--	--	--	100 U	100 U	WR-PG-Ref03	50	50 U	50 U
PCB168	pg/g-Wet	1	0	0	--	--	--	--	--	--	260 U	260 U	WR-PG-Ref03	130	130 U	130 U
PCB169	pg/g-Wet	1	0	0	--	--	--	--	--	--	360 U	360 U	WR-PG-Ref03	180	180 U	180 U
PCB170	pg/g-Wet	1	0	0	--	--	--	--	--	--	200 U	200 U	WR-PG-Ref03	100	100 U	100 U
PCB174	pg/g-Wet	1	0	0	--	--	--	--	--	--	150 U	150 U	WR-PG-Ref03	75	75 U	75 U
PCB177	pg/g-Wet	1	1	100	210 J	210 J	WR-PG-Ref03	210	210 J	210 J	210 J	210 J	WR-PG-Ref03	210	210 J	210 J
PCB180	pg/g-Wet	1	1	100	440 J	440 J	WR-PG-Ref03	440	440 J	440 J	440 J	440 J	WR-PG-Ref03	440	440 J	440 J
PCB183	pg/g-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	WR-PG-Ref03	70	70 U	70 U
PCB184	pg/g-Wet	1	0	0	--	--	--	--	--	--	83 U	83 U	WR-PG-Ref03	42	42 U	42 U
PCB187	pg/g-Wet	1	1	100	520 J	520 J	WR-PG-Ref03	520	520 J	520 J	520 J	520 J	WR-PG-Ref03	520	520 J	520 J
PCB189	pg/g-Wet	1	0	0	--	--	--	--	--	--	100 U	100 U	WR-PG-Ref03	50	50 U	50 U
PCB194	pg/g-Wet	1	0	0	--	--	--	--	--	--	680 U	680 U	WR-PG-Ref03	340	340 U	340 U
PCB195	pg/g-Wet	1	0	0	--	--	--	--	--	--	210 U	210 U	WR-PG-Ref03	110	110 U	110 U
PCB201	pg/g-Wet	1	0	0	--	--	--	--	--	--	83 U	83 U	WR-PG-Ref03	42	42 U	42 U
PCB203	pg/g-Wet	1	0	0	--	--	--	--	--	--	290 U	290 U	WR-PG-Ref03	150	150 U	150 U
PCB206	pg/g-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	WR-PG-Ref03	70	70 U	70 U
PCB209	pg/g-Wet	1	0	0	--	--	--	--	--	--	110 U	110 U	WR-PG-Ref03	55	55 U	55 U
Total PCBs[d]																
Total PCBs	µg/kg-Wet	1	0	0	--	--	--	--	--	--	20 UT	20 UT	WR-PG-Ref03	10	10 UT	10 UT

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCDD/Fs																
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.048 A	0.048 A	WR-PG-Ref03	0.048	0.048 A	0.048 A	0.048 A	0.048 A	WR-PG-Ref03	0.048	0.048 A	0.048 A
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.048 T	0.048 T	WR-PG-Ref03	0.048	0.048 T	0.048 T	0.048 T	0.048 T	WR-PG-Ref03	0.048	0.048 T	0.048 T
Pesticides																
2,4'-DDD	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.32 U	0.32 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
2,4'-DDE	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.2 U	1.2 U	WR-PG-Ref03	0.6	0.6 U	0.6 U
2,4'-DDT	µg/kg-Wet	1	1	100	2.1 J	2.1 J	WR-PG-Ref03	2.1	2.1 J	2.1 J	2.1 J	2.1 J	WR-PG-Ref03	2.1	2.1 J	2.1 J
4,4'-DDD	µg/kg-Wet	1	1	100	0.69 J	0.69 J	WR-PG-Ref03	0.69	0.69 J	0.69 J	0.69 J	0.69 J	WR-PG-Ref03	0.69	0.69 J	0.69 J
4,4'-DDE	µg/kg-Wet	1	1	100	1.2 J	1.2 J	WR-PG-Ref03	1.2	1.2 J	1.2 J	1.2 J	1.2 J	WR-PG-Ref03	1.2	1.2 J	1.2 J
4,4'-DDT	µg/kg-Wet	1	1	100	1.9	1.9	WR-PG-Ref03	1.9	1.9	1.9	1.9	1.9	WR-PG-Ref03	1.9	1.9	1.9
Aldrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.15 U	0.15 U	WR-PG-Ref03	0.075	0.075 U	0.075 U
alpha-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	WR-PG-Ref03	0.5	0.5 U	0.5 U
alpha-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.32 U	0.32 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
beta-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.48 U	0.48 U	WR-PG-Ref03	0.24	0.24 U	0.24 U
beta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.62 U	0.62 U	WR-PG-Ref03	0.31	0.31 U	0.31 U
cis-Chlordane	µg/kg-Wet	1	1	100	1.2	1.2	WR-PG-Ref03	1.2	1.2	1.2	1.2	1.2	WR-PG-Ref03	1.2	1.2	1.2
cis-Nonachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.96 U	0.96 U	WR-PG-Ref03	0.48	0.48 U	0.48 U
delta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.21 U	0.21 U	WR-PG-Ref03	0.11	0.11 U	0.11 U
Dieldrin	µg/kg-Wet	1	1	100	0.55 J	0.55 J	WR-PG-Ref03	0.55	0.55 J	0.55 J	0.55 J	0.55 J	WR-PG-Ref03	0.55	0.55 J	0.55 J
Endosulfan sulfate	µg/kg-Wet	1	1	100	0.73 NJ	0.73 NJ	WR-PG-Ref03	0.73	0.73 NJ	0.73 NJ	0.73 NJ	0.73 NJ	WR-PG-Ref03	0.73	0.73 NJ	0.73 NJ
Endrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.075 U	0.075 U	WR-PG-Ref03	0.0375	0.0375 U	0.0375 U
Endrin aldehyde	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	WR-PG-Ref03	0.5	0.5 U	0.5 U
Endrin ketone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.4 U	0.4 U	WR-PG-Ref03	0.2	0.2 U	0.2 U
gamma-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.17 U	0.17 U	WR-PG-Ref03	0.085	0.085 U	0.085 U
Heptachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.31 U	0.31 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
Heptachlor epoxide	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.34 U	0.34 U	WR-PG-Ref03	0.17	0.17 U	0.17 U
Methoxychlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.32 U	0.32 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
Mirex	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.24 U	0.24 U	WR-PG-Ref03	0.12	0.12 U	0.12 U
Oxychlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.89 U	0.89 U	WR-PG-Ref03	0.45	0.45 U	0.45 U
Total Chlordanes	µg/kg-Wet	1	1	100	4.6 JT	4.6 JT	WR-PG-Ref03	4.6	4.6 JT	4.6 JT	4.6 JT	4.6 JT	WR-PG-Ref03	4.6	4.6 JT	4.6 JT
Total Endosulfan	µg/kg-Wet	1	1	100	0.73 NJT	0.73 NJT	WR-PG-Ref03	0.73	0.73 NJT	0.73 NJT	0.73 NJT	0.73 NJT	WR-PG-Ref03	0.73	0.73 NJT	0.73 NJT
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	1	1	100	0.69 JT	0.69 JT	WR-PG-Ref03	0.69	0.69 JT	0.69 JT	0.69 JT	0.69 JT	WR-PG-Ref03	0.69	0.69 JT	0.69 JT
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	5.89 JT	5.89 JT	WR-PG-Ref03	5.89	5.89 JT	5.89 JT	5.89 JT	5.89 JT	WR-PG-Ref03	5.89	5.89 JT	5.89 JT
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	1	1	100	1.2 JT	1.2 JT	WR-PG-Ref03	1.2	1.2 JT	1.2 JT	1.2 JT	1.2 JT	WR-PG-Ref03	1.2	1.2 JT	1.2 JT
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	1	1	100	4 JT	4 JT	WR-PG-Ref03	4	4 JT	4 JT	4 JT	4 JT	WR-PG-Ref03	4	4 JT	4 JT
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	3.79 T	3.79 T	WR-PG-Ref03	3.79	3.79 T	3.79 T	3.79 T	3.79 T	WR-PG-Ref03	3.79	3.79 T	3.79 T
Toxaphene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	42 U	42 U	WR-PG-Ref03	21	21 U	21 U
trans-Chlordane	µg/kg-Wet	1	1	100	1.7 J	1.7 J	WR-PG-Ref03	1.7	1.7 J	1.7 J	1.7 J	1.7 J	WR-PG-Ref03	1.7	1.7 J	1.7 J
trans-Nonachlor	µg/kg-Wet	1	1	100	1.7	1.7	WR-PG-Ref03	1.7	1.7	1.7	1.7	1.7	WR-PG-Ref03	1.7	1.7	1.7
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	1	1	100	1.1	1.1	WR-PG-Ref03	1.1	1.1	1.1	1.1	1.1	WR-PG-Ref03	1.1	1.1	1.1
Acenaphthene	µg/kg-Wet	1	1	100	0.33 J	0.33 J	WR-PG-Ref03	0.33	0.33 J	0.33 J	0.33 J	0.33 J	WR-PG-Ref03	0.33	0.33 J	0.33 J
Acenaphthylene	µg/kg-Wet	1	1	100	0.34 J	0.34 J	WR-PG-Ref03	0.34	0.34 J	0.34 J	0.34 J	0.34 J	WR-PG-Ref03	0.34	0.34 J	0.34 J
Anthracene	µg/kg-Wet	1	1	100	0.74	0.74	WR-PG-Ref03	0.74	0.74	0.74	0.74	0.74	WR-PG-Ref03	0.74	0.74	0.74
Benzo(a)anthracene	µg/kg-Wet	1	1	100	0.51	0.51	WR-PG-Ref03	0.51	0.51	0.51	0.51	0.51	WR-PG-Ref03	0.51	0.51	0.51
Benzo(a)pyrene	µg/kg-Wet	1	1	100	0.26 J	0.26 J	WR-PG-Ref03	0.26	0.26 J	0.26 J	0.26 J	0.26 J	WR-PG-Ref03	0.26	0.26 J	0.26 J
Benzo(b)fluoranthene	µg/kg-Wet	1	1	100	0.36 J	0.36 J	WR-PG-Ref03	0.36	0.36 J	0.36 J	0.36 J	0.36 J	WR-PG-Ref03	0.36	0.36 J	0.36 J
Benzo(g,h,i)perylene	µg/kg-Wet	1	1	100	0.22 J	0.22 J	WR-PG-Ref03	0.22	0.22 J	0.22 J	0.22 J	0.22 J	WR-PG-Ref03	0.22	0.22 J	0.22 J
Benzo(k)fluoranthene	µg/kg-Wet	1	1	100	0.16 J	0.16 J	WR-PG-Ref03	0.16	0.16 J	0.16 J	0.16 J	0.16 J	WR-PG-Ref03	0.16	0.16 J	0.16 J
Chrysene	µg/kg-Wet	1	1	100	2.6	2.6	WR-PG-Ref03	2.6	2.6	2.6	2.6	2.6	WR-PG-Ref03	2.6	2.6	2.6
Dibenzo(a,h)anthracene	µg/kg-Wet	1	1	100	0.13 J	0.13 J	WR-PG-Ref03	0.13	0.13 J	0.13 J	0.13 J	0.13 J	WR-PG-Ref03	0.13	0.13 J	0.13 J
Fluoranthene	µg/kg-Wet	1	1	100	9.4	9.4	WR-PG-Ref03	9.4	9.4	9.4	9.4	9.4	WR-PG-Ref03	9.4	9.4	9.4
Fluorene	µg/kg-Wet	1	1	100	0.92	0.92	WR-PG-Ref03	0.92	0.92	0.92	0.92	0.92	WR-PG-Ref03	0.92	0.92	0.92

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
High Molecular Weight PAH	µg/kg-Wet	1	1	100	18.3 JT	18.3 JT	WR-PG-Ref03	18.3	18.3 JT	18.3 JT	18.3 JT	18.3 JT	WR-PG-Ref03	18.3	18.3 JT	18.3 JT
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	1	1	100	0.18 J	0.18 J	WR-PG-Ref03	0.18	0.18 J	0.18 J	0.18 J	0.18 J	WR-PG-Ref03	0.18	0.18 J	0.18 J
Low Molecular Weight PAH	µg/kg-Wet	1	1	100	11.4 JT	11.4 JT	WR-PG-Ref03	11.4	11.4 JT	11.4 JT	11.4 JT	11.4 JT	WR-PG-Ref03	11.4	11.4 JT	11.4 JT
Naphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.96 U	0.96 U	WR-PG-Ref03	0.48	0.48 U	0.48 U
Phenanthrene	µg/kg-Wet	1	1	100	8	8	WR-PG-Ref03	8	8	8	8	8	WR-PG-Ref03	8	8	8
Pyrene	µg/kg-Wet	1	1	100	4.5	4.5	WR-PG-Ref03	4.5	4.5	4.5	4.5	4.5	WR-PG-Ref03	4.5	4.5	4.5
Total BaPEq	µg/kg-Wet	1	1	100	0.499 JT	0.499 JT	WR-PG-Ref03	0.499	0.499 JT	0.499 JT	0.499 JT	0.499 JT	WR-PG-Ref03	0.499	0.499 JT	0.499 JT
Total cPAHs	µg/kg-Wet	1	1	100	4.2 JT	4.2 JT	WR-PG-Ref03	4.2	4.2 JT	4.2 JT	4.2 JT	4.2 JT	WR-PG-Ref03	4.2	4.2 JT	4.2 JT
Total PAHs	µg/kg-Wet	1	1	100	29.7 JT	29.7 JT	WR-PG-Ref03	29.7	29.7 JT	29.7 JT	29.7 JT	29.7 JT	WR-PG-Ref03	29.7	29.7 JT	29.7 JT
Phthalates																
Bis(2-ethylhexyl) phthalate	µg/kg-Wet	1	1	100	85 J	85 J	WR-PG-Ref03	85	85 J	85 J	85 J	85 J	WR-PG-Ref03	85	85 J	85 J
Butylbenzyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	14 U	14 U	WR-PG-Ref03	7	7 U	7 U
Dibutyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	23 U	23 U	WR-PG-Ref03	12	12 U	12 U
Diethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	19 U	19 U	WR-PG-Ref03	9.5	9.5 U	9.5 U
Dimethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.1 U	5.1 U	WR-PG-Ref03	2.6	2.6 U	2.6 U
Di-n-octyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	23 UJ	23 UJ	WR-PG-Ref03	12	12 UJ	12 UJ
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	9.9 U	9.9 U	WR-PG-Ref03	5	5 U	5 U
1,2-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	12 U	12 U	WR-PG-Ref03	6	6 U	6 U
1,3-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
1,4-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
2,4-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.5 U	8.5 U	WR-PG-Ref03	4.3	4.3 U	4.3 U
2,6-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	7 U	7 U	WR-PG-Ref03	3.5	3.5 U	3.5 U
2-Chloronaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.9 U	5.9 U	WR-PG-Ref03	3	3 U	3 U
2-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	26 U	26 U	WR-PG-Ref03	13	13 U	13 U
3,3'-Dichlorobenzidine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	780 UJ	780 UJ	WR-PG-Ref03	390	390 UJ	390 UJ
3-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.9 U	8.9 U	WR-PG-Ref03	4.5	4.5 U	4.5 U
4-Bromophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.5 U	5.5 U	WR-PG-Ref03	2.8	2.8 U	2.8 U
4-Chloroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.9 U	5.9 U	WR-PG-Ref03	3	3 U	3 U
4-Chlorophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	4.5 U	4.5 U	WR-PG-Ref03	2.3	2.3 U	2.3 U
4-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	26 U	26 U	WR-PG-Ref03	13	13 U	13 U
Aniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	230 UJ	230 UJ	WR-PG-Ref03	120	120 UJ	120 UJ
Azobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	40 U	40 U	WR-PG-Ref03	20	20 U	20 U
Benzoic acid	µg/kg-Wet	1	1	100	1400 J	1400 J	WR-PG-Ref03	1400	1400 J	1400 J	1400 J	1400 J	WR-PG-Ref03	1400	1400 J	1400 J
Benzyl alcohol	µg/kg-Wet	1	1	100	13 J	13 J	WR-PG-Ref03	13	13 J	13 J	13 J	13 J	WR-PG-Ref03	13	13 J	13 J
Bis(2-chloroethoxy) methane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5 U	5 U	WR-PG-Ref03	2.5	2.5 U	2.5 U
Bis(2-chloroethyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.7 U	8.7 U	WR-PG-Ref03	4.4	4.4 U	4.4 U
Bis(2-chloroisopropyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
Carbazole	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 U	33 U	WR-PG-Ref03	17	17 U	17 U
Dibenzofuran	µg/kg-Wet	1	1	100	0.55	0.55	WR-PG-Ref03	0.55	0.55	0.55	0.55	0.55	WR-PG-Ref03	0.55	0.55	0.55
Hexachlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	WR-PG-Ref03	0.5	0.5 U	0.5 U
Hexachlorobutadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.31 U	0.31 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
Hexachlorocyclopentadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5000 U	5000 U	WR-PG-Ref03	2500	2500 U	2500 U
Hexachloroethane	µg/kg-Wet	1	1	100	1.3 J	1.3 J	WR-PG-Ref03	1.3	1.3 J	1.3 J	1.3 J	1.3 J	WR-PG-Ref03	1.3	1.3 J	1.3 J
Isophorone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.8 U	5.8 U	WR-PG-Ref03	2.9	2.9 U	2.9 U
Nitrobenzene	µg/kg-Wet	1	1	100	19 J	19 J	WR-PG-Ref03	19	19 J	19 J	19 J	19 J	WR-PG-Ref03	19	19 J	19 J
N-Nitrosodimethylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	10 U	10 U	WR-PG-Ref03	5	5 U	5 U
N-Nitrosodiphenylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	9.5 U	9.5 U	WR-PG-Ref03	4.8	4.8 U	4.8 U
N-Nitrosodipropylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.2 U	8.2 U	WR-PG-Ref03	4.1	4.1 U	4.1 U
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	55 U	55 U	WR-PG-Ref03	28	28 U	28 U
2,3,4,6-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	55 U	55 U	WR-PG-Ref03	28	28 U	28 U
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	42 U	42 U	WR-PG-Ref03	21	21 U	21 U
2,4,5-Trichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
2,4,6-Trichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.8 U	8.8 U	WR-PG-Ref03	4.4	4.4 U	4.4 U

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2,4-Dichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	12 U	12 U	WR-PG-Ref03	6	6 U	6 U
2,4-Dimethylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	13 U	13 U	WR-PG-Ref03	6.5	6.5 U	6.5 U
2,4-Dinitrophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	23 U	23 U	WR-PG-Ref03	12	12 U	12 U
2-Chlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
2-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	53 U	53 U	WR-PG-Ref03	27	27 U	27 U
2-Nitrophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	15 U	15 U	WR-PG-Ref03	7.5	7.5 U	7.5 U
4,6-Dinitro-2-methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	15 U	15 U	WR-PG-Ref03	7.5	7.5 U	7.5 U
4-Chloro-3-methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	72 U	72 U	WR-PG-Ref03	36	36 U	36 U
4-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	15 U	15 U	WR-PG-Ref03	7.5	7.5 U	7.5 U
4-Nitrophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	7.5 U	7.5 U	WR-PG-Ref03	3.8	3.8 U	3.8 U
Pentachlorophenol	µg/kg-Wet	1	1	100	46 J	46 J	WR-PG-Ref03	46	46 J	46 J	46 J	46 J	WR-PG-Ref03	46	46 J	46 J
Phenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 U	33 U	WR-PG-Ref03	17	17 U	17 U
Lab-exposed worm (Lumbriculus variegatus – whole body)																
Conventionals																
Lipids	percent-Wet	1	1	100	1.6	1.6	WR-PG-Ref03	1.6	1.6	1.6	1.6	1.6	WR-PG-Ref03	1.6	1.6	1.6
Total solids	percent-Wet	1	1	100	13.1	13.1	WR-PG-Ref03	13.1	13.1	13.1	13.1	13.1	WR-PG-Ref03	13.1	13.1	13.1
Metals																
Antimony	mg/kg-Wet	1	1	100	0.0021 J	0.0021 J	WR-PG-Ref03	0.0021	0.0021 J	0.0021 J	0.0021 J	0.0021 J	WR-PG-Ref03	0.0021	0.0021 J	0.0021 J
Arsenic	mg/kg-Wet	1	1	100	1.52	1.52	WR-PG-Ref03	1.52	1.52	1.52	1.52	1.52	WR-PG-Ref03	1.52	1.52	1.52
Cadmium	mg/kg-Wet	1	1	100	0.0341	0.0341	WR-PG-Ref03	0.0341	0.0341	0.0341	0.0341	0.0341	WR-PG-Ref03	0.0341	0.0341	0.0341
Chromium	mg/kg-Wet	1	1	100	0.197	0.197	WR-PG-Ref03	0.197	0.197	0.197	0.197	0.197	WR-PG-Ref03	0.197	0.197	0.197
Copper	mg/kg-Wet	1	1	100	1.86	1.86	WR-PG-Ref03	1.86	1.86	1.86	1.86	1.86	WR-PG-Ref03	1.86	1.86	1.86
Lead	mg/kg-Wet	1	1	100	0.107	0.107	WR-PG-Ref03	0.107	0.107	0.107	0.107	0.107	WR-PG-Ref03	0.107	0.107	0.107
Mercury	mg/kg-Wet	1	1	100	0.00891	0.00891	WR-PG-Ref03	0.00891	0.00891	0.00891	0.00891	0.00891	WR-PG-Ref03	0.00891	0.00891	0.00891
Nickel	mg/kg-Wet	1	1	100	0.258	0.258	WR-PG-Ref03	0.258	0.258	0.258	0.258	0.258	WR-PG-Ref03	0.258	0.258	0.258
Silver	mg/kg-Wet	1	1	100	0.0038	0.0038	WR-PG-Ref03	0.0038	0.0038	0.0038	0.0038	0.0038	WR-PG-Ref03	0.0038	0.0038	0.0038
Zinc	mg/kg-Wet	1	1	100	22	22	WR-PG-Ref03	22	22	22	22	22	WR-PG-Ref03	22	22	22
Butyltins																
Butyltin ion	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.9 U	0.9 U	WR-PG-Ref03	0.45	0.45 U	0.45 U
Dibutyltin ion	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.3 U	0.3 U	WR-PG-Ref03	0.15	0.15 U	0.15 U
Tetrabutyltin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.067 U	0.067 U	WR-PG-Ref03	0.0335	0.0335 U	0.0335 U
Tributyltin ion	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.072 U	0.072 U	WR-PG-Ref03	0.036	0.036 U	0.036 U
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	1	0	0	--	--	--	--	--	--	4.3 U	4.3 U	WR-PG-Ref03	2.2	2.2 U	2.2 U
Aroclor 1221	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2.4 U	2.4 U	WR-PG-Ref03	1.2	1.2 U	1.2 U
Aroclor 1232	µg/kg-Wet	1	0	0	--	--	--	--	--	--	3 U	3 U	WR-PG-Ref03	1.5	1.5 U	1.5 U
Aroclor 1242	µg/kg-Wet	1	0	0	--	--	--	--	--	--	3.3 U	3.3 U	WR-PG-Ref03	1.7	1.7 U	1.7 U
Aroclor 1248	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2.9 U	2.9 U	WR-PG-Ref03	1.5	1.5 U	1.5 U
Aroclor 1254	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.5 U	5.5 U	WR-PG-Ref03	2.8	2.8 U	2.8 U
Aroclor 1260	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.3 U	5.3 U	WR-PG-Ref03	2.7	2.7 U	2.7 U
Aroclor 1262	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2.1 U	2.1 U	WR-PG-Ref03	1.1	1.1 U	1.1 U
Aroclor 1268	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.9 U	1.9 U	WR-PG-Ref03	0.95	0.95 U	0.95 U
Aroclors	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.5 UT	5.5 UT	WR-PG-Ref03	2.8	2.8 UT	2.8 UT
PCB Congeners																
PCB001	pg/g-Wet	1	0	0	--	--	--	--	--	--	810 U	810 U	WR-PG-Ref03	410	410 U	410 U
PCB005	pg/g-Wet	1	0	0	--	--	--	--	--	--	150 U	150 U	WR-PG-Ref03	75	75 U	75 U
PCB008	pg/g-Wet	1	0	0	--	--	--	--	--	--	130 U	130 U	WR-PG-Ref03	65	65 U	65 U
PCB018	pg/g-Wet	1	0	0	--	--	--	--	--	--	110 U	110 U	WR-PG-Ref03	55	55 U	55 U
PCB028	pg/g-Wet	1	0	0	--	--	--	--	--	--	120 U	120 U	WR-PG-Ref03	60	60 U	60 U
PCB031	pg/g-Wet	1	0	0	--	--	--	--	--	--	120 U	120 U	WR-PG-Ref03	60	60 U	60 U
PCB033	pg/g-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	WR-PG-Ref03	250	250 U	250 U
PCB037	pg/g-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	WR-PG-Ref03	70	70 U	70 U
PCB044	pg/g-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	WR-PG-Ref03	70	70 U	70 U
PCB049	pg/g-Wet	1	1	100	210 J	210 J	WR-PG-Ref03	210	210 J	210 J	210 J	210 J	WR-PG-Ref03	210	210 J	210 J

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB052	pg/g-Wet	1	0	0	--	--	--	--	--	--	230 U	230 U	WR-PG-Ref03	120	120 U	120 U
PCB056	pg/g-Wet	1	0	0	--	--	--	--	--	--	190 U	190 U	WR-PG-Ref03	95	95 U	95 U
PCB060	pg/g-Wet	1	0	0	--	--	--	--	--	--	400 U	400 U	WR-PG-Ref03	200	200 U	200 U
PCB066	pg/g-Wet	1	0	0	--	--	--	--	--	--	310 U	310 U	WR-PG-Ref03	160	160 U	160 U
PCB070	pg/g-Wet	1	1	100	240 J	240 J	WR-PG-Ref03	240	240 J	240 J	240 J	240 J	WR-PG-Ref03	240	240 J	240 J
PCB074	pg/g-Wet	1	0	0	--	--	--	--	--	--	160 U	160 U	WR-PG-Ref03	80	80 U	80 U
PCB077	pg/g-Wet	1	0	0	--	--	--	--	--	--	110 U	110 U	WR-PG-Ref03	55	55 U	55 U
PCB081	pg/g-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	WR-PG-Ref03	85	85 U	85 U
PCB087	pg/g-Wet	1	0	0	--	--	--	--	--	--	4400 U	4400 U	WR-PG-Ref03	2200	2200 U	2200 U
PCB090	pg/g-Wet	1	0	0	--	--	--	--	--	--	250 U	250 U	WR-PG-Ref03	130	130 U	130 U
PCB095	pg/g-Wet	1	1	100	480 J	480 J	WR-PG-Ref03	480	480 J	480 J	480 J	480 J	WR-PG-Ref03	480	480 J	480 J
PCB097	pg/g-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	WR-PG-Ref03	250	250 U	250 U
PCB099	pg/g-Wet	1	1	100	570	570	WR-PG-Ref03	570	570	570	570	570	WR-PG-Ref03	570	570	570
PCB101	pg/g-Wet	1	1	100	680	680	WR-PG-Ref03	680	680	680	680	680	WR-PG-Ref03	680	680	680
PCB105	pg/g-Wet	1	0	0	--	--	--	--	--	--	100 U	100 U	WR-PG-Ref03	50	50 U	50 U
PCB110	pg/g-Wet	1	1	100	740	740	WR-PG-Ref03	740	740	740	740	740	WR-PG-Ref03	740	740	740
PCB114	pg/g-Wet	1	0	0	--	--	--	--	--	--	90 U	90 U	WR-PG-Ref03	45	45 U	45 U
PCB118	pg/g-Wet	1	1	100	570 J	570 J	WR-PG-Ref03	570	570 J	570 J	570 J	570 J	WR-PG-Ref03	570	570 J	570 J
PCB119	pg/g-Wet	1	0	0	--	--	--	--	--	--	350 U	350 U	WR-PG-Ref03	180	180 U	180 U
PCB123	pg/g-Wet	1	0	0	--	--	--	--	--	--	300 U	300 U	WR-PG-Ref03	150	150 U	150 U
PCB126	pg/g-Wet	1	0	0	--	--	--	--	--	--	120 U	120 U	WR-PG-Ref03	60	60 U	60 U
PCB128	pg/g-Wet	1	1	100	190 J	190 J	WR-PG-Ref03	190	190 J	190 J	190 J	190 J	WR-PG-Ref03	190	190 J	190 J
PCB132	pg/g-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	WR-PG-Ref03	250	250 U	250 U
PCB138	pg/g-Wet	1	1	100	900 NJ	900 NJ	WR-PG-Ref03	900	900 NJ	900 NJ	900 NJ	900 NJ	WR-PG-Ref03	900	900 NJ	900 NJ
PCB141	pg/g-Wet	1	0	0	--	--	--	--	--	--	90 U	90 U	WR-PG-Ref03	45	45 U	45 U
PCB149	pg/g-Wet	1	1	100	630	630	WR-PG-Ref03	630	630	630	630	630	WR-PG-Ref03	630	630	630
PCB151	pg/g-Wet	1	0	0	--	--	--	--	--	--	230 U	230 U	WR-PG-Ref03	120	120 U	120 U
PCB153	pg/g-Wet	1	1	100	840	840	WR-PG-Ref03	840	840	840	840	840	WR-PG-Ref03	840	840	840
PCB156	pg/g-Wet	1	0	0	--	--	--	--	--	--	310 U	310 U	WR-PG-Ref03	160	160 U	160 U
PCB157	pg/g-Wet	1	0	0	--	--	--	--	--	--	120 U	120 U	WR-PG-Ref03	60	60 U	60 U
PCB158	pg/g-Wet	1	0	0	--	--	--	--	--	--	230 U	230 U	WR-PG-Ref03	120	120 U	120 U
PCB166	pg/g-Wet	1	0	0	--	--	--	--	--	--	610 U	610 U	WR-PG-Ref03	310	310 U	310 U
PCB167	pg/g-Wet	1	0	0	--	--	--	--	--	--	190 U	190 U	WR-PG-Ref03	95	95 U	95 U
PCB168	pg/g-Wet	1	0	0	--	--	--	--	--	--	260 U	260 U	WR-PG-Ref03	130	130 U	130 U
PCB169	pg/g-Wet	1	0	0	--	--	--	--	--	--	360 U	360 U	WR-PG-Ref03	180	180 U	180 U
PCB170	pg/g-Wet	1	0	0	--	--	--	--	--	--	200 U	200 U	WR-PG-Ref03	100	100 U	100 U
PCB174	pg/g-Wet	1	0	0	--	--	--	--	--	--	150 U	150 U	WR-PG-Ref03	75	75 U	75 U
PCB177	pg/g-Wet	1	0	0	--	--	--	--	--	--	180 U	180 U	WR-PG-Ref03	90	90 U	90 U
PCB180	pg/g-Wet	1	1	100	190 J	190 J	WR-PG-Ref03	190	190 J	190 J	190 J	190 J	WR-PG-Ref03	190	190 J	190 J
PCB183	pg/g-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	WR-PG-Ref03	70	70 U	70 U
PCB184	pg/g-Wet	1	0	0	--	--	--	--	--	--	83 U	83 U	WR-PG-Ref03	42	42 U	42 U
PCB187	pg/g-Wet	1	1	100	620	620	WR-PG-Ref03	620	620	620	620	620	WR-PG-Ref03	620	620	620
PCB189	pg/g-Wet	1	0	0	--	--	--	--	--	--	100 U	100 U	WR-PG-Ref03	50	50 U	50 U
PCB194	pg/g-Wet	1	0	0	--	--	--	--	--	--	110 U	110 U	WR-PG-Ref03	55	55 U	55 U
PCB195	pg/g-Wet	1	0	0	--	--	--	--	--	--	210 U	210 U	WR-PG-Ref03	110	110 U	110 U
PCB201	pg/g-Wet	1	0	0	--	--	--	--	--	--	77 U	77 U	WR-PG-Ref03	39	39 U	39 U
PCB203	pg/g-Wet	1	0	0	--	--	--	--	--	--	290 U	290 U	WR-PG-Ref03	150	150 U	150 U
PCB206	pg/g-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	WR-PG-Ref03	70	70 U	70 U
PCB209	pg/g-Wet	1	0	0	--	--	--	--	--	--	110 U	110 U	WR-PG-Ref03	55	55 U	55 U
Total PCBs[a]																
Total PCBs	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.5 UT	5.5 UT	WR-PG-Ref03	2.8	2.8 UT	2.8 UT
PCDD/Fs																
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.0171 JA	0.0171 JA	WR-PG-Ref03	0.0171	0.0171 JA	0.0171 JA	0.0171 JA	0.0171 JA	WR-PG-Ref03	0.0171	0.0171 JA	0.0171 JA

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.0171 JT	0.0171 JT	WR-PG-Ref03	0.0171	0.0171 JT	0.0171 JT	0.0171 JT	0.0171 JT	WR-PG-Ref03	0.0171	0.0171 JT	0.0171 JT
Pesticides																
2,4'-DDD	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.32 U	0.32 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
2,4'-DDE	µg/kg-Wet	1	1	100	0.56 J	0.56 J	WR-PG-Ref03	0.56	0.56 J	0.56 J	0.56 J	0.56 J	WR-PG-Ref03	0.56	0.56 J	0.56 J
2,4'-DDT	µg/kg-Wet	1	1	100	3.7	3.7	WR-PG-Ref03	3.7	3.7	3.7	3.7	3.7	WR-PG-Ref03	3.7	3.7	3.7
4,4'-DDD	µg/kg-Wet	1	1	100	0.96 J	0.96 J	WR-PG-Ref03	0.96	0.96 J	0.96 J	0.96 J	0.96 J	WR-PG-Ref03	0.96	0.96 J	0.96 J
4,4'-DDE	µg/kg-Wet	1	1	100	6.1	6.1	WR-PG-Ref03	6.1	6.1	6.1	6.1	6.1	WR-PG-Ref03	6.1	6.1	6.1
4,4'-DDT	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.2 U	0.2 U	WR-PG-Ref03	0.1	0.1 U	0.1 U
Aldrin	µg/kg-Wet	1	1	100	0.36 J	0.36 J	WR-PG-Ref03	0.36	0.36 J	0.36 J	0.36 J	0.36 J	WR-PG-Ref03	0.36	0.36 J	0.36 J
alpha-Endosulfan	µg/kg-Wet	1	1	100	0.36 J	0.36 J	WR-PG-Ref03	0.36	0.36 J	0.36 J	0.36 J	0.36 J	WR-PG-Ref03	0.36	0.36 J	0.36 J
alpha-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.32 U	0.32 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
beta-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.24 U	0.24 U	WR-PG-Ref03	0.12	0.12 U	0.12 U
beta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.31 U	0.31 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
cis-Chlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.11 U	0.11 U	WR-PG-Ref03	0.055	0.055 U	0.055 U
cis-Nonachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	WR-PG-Ref03	0.5	0.5 U	0.5 U
delta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.21 U	0.21 U	WR-PG-Ref03	0.11	0.11 U	0.11 U
Dieldrin	µg/kg-Wet	1	1	100	0.22 J	0.22 J	WR-PG-Ref03	0.22	0.22 J	0.22 J	0.22 J	0.22 J	WR-PG-Ref03	0.22	0.22 J	0.22 J
Endosulfan sulfate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.19 U	0.19 U	WR-PG-Ref03	0.095	0.095 U	0.095 U
Endrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	WR-PG-Ref03	0.5	0.5 U	0.5 U
Endrin aldehyde	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.25 U	0.25 U	WR-PG-Ref03	0.13	0.13 U	0.13 U
Endrin ketone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.4 U	0.4 U	WR-PG-Ref03	0.2	0.2 U	0.2 U
gamma-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.74 U	0.74 U	WR-PG-Ref03	0.37	0.37 U	0.37 U
Heptachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.58 U	0.58 U	WR-PG-Ref03	0.29	0.29 U	0.29 U
Heptachlor epoxide	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.34 U	0.34 U	WR-PG-Ref03	0.17	0.17 U	0.17 U
Methoxychlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.58 U	0.58 U	WR-PG-Ref03	0.29	0.29 U	0.29 U
Mirex	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.24 U	0.24 U	WR-PG-Ref03	0.12	0.12 U	0.12 U
Oxychlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.39 U	0.39 U	WR-PG-Ref03	0.2	0.2 U	0.2 U
Total Chlordanes	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UT	1 UT	WR-PG-Ref03	0.5	0.5 UT	0.5 UT
Total Endosulfan	µg/kg-Wet	1	1	100	0.36 JT	0.36 JT	WR-PG-Ref03	0.36	0.36 JT	0.36 JT	0.36 JT	0.36 JT	WR-PG-Ref03	0.36	0.36 JT	0.36 JT
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	1	1	100	0.96 JT	0.96 JT	WR-PG-Ref03	0.96	0.96 JT	0.96 JT	0.96 JT	0.96 JT	WR-PG-Ref03	0.96	0.96 JT	0.96 JT
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	11.3 JT	11.3 JT	WR-PG-Ref03	11.3	11.3 JT	11.3 JT	11.3 JT	11.3 JT	WR-PG-Ref03	11.3	11.3 JT	11.3 JT
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	1	1	100	6.66 JT	6.66 JT	WR-PG-Ref03	6.66	6.66 JT	6.66 JT	6.66 JT	6.66 JT	WR-PG-Ref03	6.66	6.66 JT	6.66 JT
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	1	1	100	3.7 T	3.7 T	WR-PG-Ref03	3.7	3.7 T	3.7 T	3.7 T	3.7 T	WR-PG-Ref03	3.7	3.7 T	3.7 T
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	7.06 T	7.06 T	WR-PG-Ref03	7.06	7.06 T	7.06 T	7.06 T	7.06 T	WR-PG-Ref03	7.06	7.06 T	7.06 T
Toxaphene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	25 U	25 U	WR-PG-Ref03	13	13 U	13 U
trans-Chlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	WR-PG-Ref03	0.5	0.5 U	0.5 U
trans-Nonachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.29 U	0.29 U	WR-PG-Ref03	0.15	0.15 U	0.15 U
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.15 U	0.15 U	WR-PG-Ref03	0.075	0.075 U	0.075 U
Acenaphthene	µg/kg-Wet	1	1	100	0.53	0.53	WR-PG-Ref03	0.53	0.53	0.53	0.53	0.53	WR-PG-Ref03	0.53	0.53	0.53
Acenaphthylene	µg/kg-Wet	1	1	100	0.24 J	0.24 J	WR-PG-Ref03	0.24	0.24 J	0.24 J	0.24 J	0.24 J	WR-PG-Ref03	0.24	0.24 J	0.24 J
Anthracene	µg/kg-Wet	1	1	100	0.65	0.65	WR-PG-Ref03	0.65	0.65	0.65	0.65	0.65	WR-PG-Ref03	0.65	0.65	0.65
Benzo(a)anthracene	µg/kg-Wet	1	1	100	1.1	1.1	WR-PG-Ref03	1.1	1.1	1.1	1.1	1.1	WR-PG-Ref03	1.1	1.1	1.1
Benzo(a)pyrene	µg/kg-Wet	1	1	100	0.82	0.82	WR-PG-Ref03	0.82	0.82	0.82	0.82	0.82	WR-PG-Ref03	0.82	0.82	0.82
Benzo(b)fluoranthene	µg/kg-Wet	1	1	100	2.7	2.7	WR-PG-Ref03	2.7	2.7	2.7	2.7	2.7	WR-PG-Ref03	2.7	2.7	2.7
Benzo(g,h,i)perylene	µg/kg-Wet	1	1	100	1.6	1.6	WR-PG-Ref03	1.6	1.6	1.6	1.6	1.6	WR-PG-Ref03	1.6	1.6	1.6
Benzo(k)fluoranthene	µg/kg-Wet	1	1	100	1.5	1.5	WR-PG-Ref03	1.5	1.5	1.5	1.5	1.5	WR-PG-Ref03	1.5	1.5	1.5
Chrysene	µg/kg-Wet	1	1	100	4.4	4.4	WR-PG-Ref03	4.4	4.4	4.4	4.4	4.4	WR-PG-Ref03	4.4	4.4	4.4
Dibenzo(a,h)anthracene	µg/kg-Wet	1	1	100	0.14 J	0.14 J	WR-PG-Ref03	0.14	0.14 J	0.14 J	0.14 J	0.14 J	WR-PG-Ref03	0.14	0.14 J	0.14 J
Fluoranthene	µg/kg-Wet	1	1	100	4.8	4.8	WR-PG-Ref03	4.8	4.8	4.8	4.8	4.8	WR-PG-Ref03	4.8	4.8	4.8
Fluorene	µg/kg-Wet	1	1	100	0.72	0.72	WR-PG-Ref03	0.72	0.72	0.72	0.72	0.72	WR-PG-Ref03	0.72	0.72	0.72
High Molecular Weight PAH	µg/kg-Wet	1	1	100	22.3 JT	22.3 JT	WR-PG-Ref03	22.3	22.3 JT	22.3 JT	22.3 JT	22.3 JT	WR-PG-Ref03	22.3	22.3 JT	22.3 JT
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	1	1	100	0.71	0.71	WR-PG-Ref03	0.71	0.71	0.71	0.71	0.71	WR-PG-Ref03	0.71	0.71	0.71
Low Molecular Weight PAH	µg/kg-Wet	1	1	100	4.74 JT	4.74 JT	WR-PG-Ref03	4.74	4.74 JT	4.74 JT	4.74 JT	4.74 JT	WR-PG-Ref03	4.74	4.74 JT	4.74 JT

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Naphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.72 U	0.72 U	WR-PG-Ref03	0.36	0.36 U	0.36 U
Phenanthrene	µg/kg-Wet	1	1	100	2.6	2.6	WR-PG-Ref03	2.6	2.6	2.6	2.6	2.6	WR-PG-Ref03	2.6	2.6	2.6
Pyrene	µg/kg-Wet	1	1	100	4.5	4.5	WR-PG-Ref03	4.5	4.5	4.5	4.5	4.5	WR-PG-Ref03	4.5	4.5	4.5
Total BaPEq	µg/kg-Wet	1	1	100	1.43 JT	1.43 JT	WR-PG-Ref03	1.43	1.43 JT	1.43 JT	1.43 JT	1.43 JT	WR-PG-Ref03	1.43	1.43 JT	1.43 JT
Total cPAHs	µg/kg-Wet	1	1	100	11 JT	11 JT	WR-PG-Ref03	11	11 JT	11 JT	11 JT	11 JT	WR-PG-Ref03	11	11 JT	11 JT
Total PAHs	µg/kg-Wet	1	1	100	27 JT	27 JT	WR-PG-Ref03	27	27 JT	27 JT	27 JT	27 JT	WR-PG-Ref03	27	27 JT	27 JT
Phthalates																
Bis(2-ethylhexyl) phthalate	µg/kg-Wet	1	1	100	66 J	66 J	WR-PG-Ref03	66	66 J	66 J	66 J	66 J	WR-PG-Ref03	66	66 J	66 J
Butylbenzyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	14 U	14 U	WR-PG-Ref03	7	7 U	7 U
Dibutyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 U	33 U	WR-PG-Ref03	17	17 U	17 U
Diethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
Dimethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.1 U	5.1 U	WR-PG-Ref03	2.6	2.6 U	2.6 U
Di-n-octyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	30 U	30 U	WR-PG-Ref03	15	15 U	15 U
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	9.9 U	9.9 U	WR-PG-Ref03	5	5 U	5 U
1,2-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	12 U	12 U	WR-PG-Ref03	6	6 U	6 U
1,3-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
1,4-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
2,4-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.5 U	8.5 U	WR-PG-Ref03	4.3	4.3 U	4.3 U
2,6-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	7 U	7 U	WR-PG-Ref03	3.5	3.5 U	3.5 U
2-Chloronaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.9 U	5.9 U	WR-PG-Ref03	3	3 U	3 U
2-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	26 U	26 U	WR-PG-Ref03	13	13 U	13 U
3,3'-Dichlorobenzidine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	780 UJ	780 UJ	WR-PG-Ref03	390	390 UJ	390 UJ
3-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.9 U	8.9 U	WR-PG-Ref03	4.5	4.5 U	4.5 U
4-Bromophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.5 U	5.5 U	WR-PG-Ref03	2.8	2.8 U	2.8 U
4-Chloroaniline	µg/kg-Wet	1	1	100	18 J	18 J	WR-PG-Ref03	18	18 J	18 J	18 J	18 J	WR-PG-Ref03	18	18 J	18 J
4-Chlorophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	4.5 U	4.5 U	WR-PG-Ref03	2.3	2.3 U	2.3 U
4-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	26 U	26 U	WR-PG-Ref03	13	13 U	13 U
Aniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	230 UJ	230 UJ	WR-PG-Ref03	120	120 UJ	120 UJ
Azobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	40 U	40 U	WR-PG-Ref03	20	20 U	20 U
Benzyl alcohol	µg/kg-Wet	1	1	100	2800	2800	WR-PG-Ref03	2800	2800	2800	2800	2800	WR-PG-Ref03	2800	2800	2800
Bis(2-chloroethoxy) methane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5 U	5 U	WR-PG-Ref03	2.5	2.5 U	2.5 U
Bis(2-chloroethyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.7 U	8.7 U	WR-PG-Ref03	4.4	4.4 U	4.4 U
Bis(2-chloroisopropyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	11 U	11 U	WR-PG-Ref03	5.5	5.5 U	5.5 U
Carbazole	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 U	33 U	WR-PG-Ref03	17	17 U	17 U
Dibenzofuran	µg/kg-Wet	1	1	100	0.34 J	0.34 J	WR-PG-Ref03	0.34	0.34 J	0.34 J	0.34 J	0.34 J	WR-PG-Ref03	0.34	0.34 J	0.34 J
Hexachlorobenzene	µg/kg-Wet	1	1	100	0.78 J	0.78 J	WR-PG-Ref03	0.78	0.78 J	0.78 J	0.78 J	0.78 J	WR-PG-Ref03	0.78	0.78 J	0.78 J
Hexachlorobutadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.31 U	0.31 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
Hexachlorocyclopentadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5000 U	5000 U	WR-PG-Ref03	2500	2500 U	2500 U
Hexachloroethane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.31 U	0.31 U	WR-PG-Ref03	0.16	0.16 U	0.16 U
Isophorone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	5.8 U	5.8 U	WR-PG-Ref03	2.9	2.9 U	2.9 U
Nitrobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	10 U	10 U	WR-PG-Ref03	5	5 U	5 U
N-Nitrosodimethylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	10 U	10 U	WR-PG-Ref03	5	5 U	5 U
N-Nitrosodiphenylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	9.5 U	9.5 U	WR-PG-Ref03	4.8	4.8 U	4.8 U
N-Nitrosodipropylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8.2 U	8.2 U	WR-PG-Ref03	4.1	4.1 U	4.1 U
Phenols																
2-Methylphenol	µg/kg-Wet	1	1	100	75 J	75 J	WR-PG-Ref03	75	75 J	75 J	75 J	75 J	WR-PG-Ref03	75	75 J	75 J
4-Methylphenol	µg/kg-Wet	1	1	100	89 J	89 J	WR-PG-Ref03	89	89 J	89 J	89 J	89 J	WR-PG-Ref03	89	89 J	89 J
Pentachlorophenol	µg/kg-Wet	1	1	100	78 J	78 J	WR-PG-Ref03	78	78 J	78 J	78 J	78 J	WR-PG-Ref03	78	78 J	78 J

Table D5.1-4. Summary Statistics for All Analytes in Upriver Invertebrate Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	**Units**	**# Analyzed**	**# Detected**	**% Detected**	**Minimum[a]**	**Maximum[a]**	**Maximum Location**	**Mean**	**Median[b]**	**95th[b]**	**Minimum (full DL)[a]**	**Maximum (full DL)[a]**	**Maximum Location**	**Mean (half DL)**	**Median (half DL)[b]**	**95th (half DL)[b]**

Notes:

[a] Whenever several result values match maximum or minimum value, qualifier preference has been given in the following order: U over J over A over N over T over no qualification.

[b] Median is the exact result value ranking as the 0.50 percentile in an ascending list of all results, and 95th percentile is the exact result value of the 0.95 ranking result. When the ascending list of all results doesn't produce an exact match to the corresponding percentile rank, average of two adjacent results ranking closest to 0.50 percentile is the median, and an interpolated value is the 95th percentile. Such median or 95th percentile value is always qualified with "V". It is qualified with "U" if both results ranking immediately above and below the corresponding percentile are "U" qualified, and with "J" if at least one of the results is "J" qualified.

[c] Total PCBs are total PCB congeners.

[d] Total PCBs are total Aroclors.

Reason codes for qualifiers:
A - Total value based on limited number of analytes.
J - The associated numerical value is an estimated quantity.
N - Presumptive evidence of presence of material; identification of the compound is not definitive.
T - The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte). Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for the Round 2 data.
U - The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
V - Median or 95th percentile obtained through interpolation.

-- data not available.

BaPEq - benzo(a)pyrene equivalent
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DL - detection limit
ND - non-detect
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PCDD/Fs - dioxins/furans
TEQ - toxicity equivalent

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Brown bullhead (whole body)																
Conventionals																
Lipids	percent-Wet	1	1	100	2.1	2.1	28R001	2.1	2.1	2.1	2.1	2.1	28R001	2.1	2.1	2.1
Total solids	percent-Wet	1	1	100	24.1	24.1	28R001	24.1	24.1	24.1	24.1	24.1	28R001	24.1	24.1	24.1
Metals																
Aluminum	mg/kg-Wet	1	1	100	115 J	115 J	28R001	115	115 J	115 J	115 J	115 J	28R001	115	115 J	115 J
Antimony	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.003 U	0.003 U	28R001	0.0015	0.0015 U	0.0015 U
Arsenic	mg/kg-Wet	1	1	100	0.08 J	0.08 J	28R001	0.08	0.08 J	0.08 J	0.08 J	0.08 J	28R001	0.08	0.08 J	0.08 J
Cadmium	mg/kg-Wet	1	1	100	0.006	0.006	28R001	0.006	0.006	0.006	0.006	0.006	28R001	0.006	0.006	0.006
Chromium	mg/kg-Wet	1	1	100	2.04	2.04	28R001	2.04	2.04	2.04	2.04	2.04	28R001	2.04	2.04	2.04
Copper	mg/kg-Wet	1	1	100	0.89	0.89	28R001	0.89	0.89	0.89	0.89	0.89	28R001	0.89	0.89	0.89
Lead	mg/kg-Wet	1	1	100	0.019	0.019	28R001	0.019	0.019	0.019	0.019	0.019	28R001	0.019	0.019	0.019
Manganese	mg/kg-Wet	1	1	100	7.22	7.22	28R001	7.22	7.22	7.22	7.22	7.22	28R001	7.22	7.22	7.22
Mercury	mg/kg-Wet	1	1	100	0.067	0.067	28R001	0.067	0.067	0.067	0.067	0.067	28R001	0.067	0.067	0.067
Nickel	mg/kg-Wet	1	1	100	0.82	0.82	28R001	0.82	0.82	0.82	0.82	0.82	28R001	0.82	0.82	0.82
Selenium	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.2 U	0.2 U	28R001	0.1	0.1 U	0.1 U
Silver	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.009 U	0.009 U	28R001	0.0045	0.0045 U	0.0045 U
Thallium	mg/kg-Wet	1	1	100	0.0017 J	0.0017 J	28R001	0.0017	0.0017 J	0.0017 J	0.0017 J	0.0017 J	28R001	0.0017	0.0017 J	0.0017 J
Zinc	mg/kg-Wet	1	1	100	14.5	14.5	28R001	14.5	14.5	14.5	14.5	14.5	28R001	14.5	14.5	14.5
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2 U	2 U	28R001	1	1 U	1 U
Aroclor 1221	µg/kg-Wet	1	0	0	--	--	--	--	--	--	3 U	3 U	28R001	1.5	1.5 U	1.5 U
Aroclor 1232	µg/kg-Wet	1	0	0	--	--	--	--	--	--	3.4 U	3.4 U	28R001	1.7	1.7 U	1.7 U
Aroclor 1242	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2.8 U	2.8 U	28R001	1.4	1.4 U	1.4 U
Aroclor 1248	µg/kg-Wet	1	0	0	--	--	--	--	--	--	4.9 U	4.9 U	28R001	2.5	2.5 U	2.5 U
Aroclor 1254	µg/kg-Wet	1	0	0	--	--	--	--	--	--	10 U	10 U	28R001	5	5 U	5 U
Aroclor 1260	µg/kg-Wet	1	1	100	15 J	15 J	28R001	15	15 J	15 J	15 J	15 J	28R001	15	15 J	15 J
Aroclor 1262	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.95 U	0.95 U	28R001	0.48	0.48 U	0.48 U
Aroclor 1268	µg/kg-Wet	1	0	0	--	--	--	--	--	--	0.95 U	0.95 U	28R001	0.48	0.48 U	0.48 U
Aroclors	µg/kg-Wet	1	1	100	15 JT	15 JT	28R001	15	15 JT	15 JT	15 JT	15 JT	28R001	15	15 JT	15 JT
PCB Congeners																
PCB004	pg/g-Wet	1	0	0	--	--	--	--	--	--	12.3 UT	12.3 UT	28R001	6.15	6.15 UT	6.15 UT
PCB005	pg/g-Wet	1	0	0	--	--	--	--	--	--	4.45 UT	4.45 UT	28R001	2.23	2.23 UT	2.23 UT
PCB006	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.33 UT	6.33 UT	28R001	3.17	3.17 UT	3.17 UT
PCB007	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.73 UT	6.73 UT	28R001	3.37	3.37 UT	3.37 UT
PCB008	pg/g-Wet	1	0	0	--	--	--	--	--	--	9.2 UT	9.2 UT	28R001	4.6	4.6 UT	4.6 UT
PCB009	pg/g-Wet	1	0	0	--	--	--	--	--	--	4.66 UT	4.66 UT	28R001	2.33	2.33 UT	2.33 UT
PCB010	pg/g-Wet	1	0	0	--	--	--	--	--	--	8.56 UT	8.56 UT	28R001	4.28	4.28 UT	4.28 UT
PCB011	pg/g-Wet	1	0	0	--	--	--	--	--	--	41 UT	41 UT	28R001	21	21 UT	21 UT
PCB012 & 013	pg/g-Wet	1	0	0	--	--	--	--	--	--	9.49 UT	9.49 UT	28R001	4.75	4.75 UT	4.75 UT
PCB014	pg/g-Wet	1	0	0	--	--	--	--	--	--	5.57 UT	5.57 UT	28R001	2.79	2.79 UT	2.79 UT
PCB015	pg/g-Wet	1	0	0	--	--	--	--	--	--	5.06 UT	5.06 UT	28R001	2.53	2.53 UT	2.53 UT
PCB016	pg/g-Wet	1	1	100	9.61 JT	9.61 JT	28R001	9.61	9.61 JT	9.61 JT	9.61 JT	9.61 JT	28R001	9.61	9.61 JT	9.61 JT
PCB017	pg/g-Wet	1	1	100	7.43 JT	7.43 JT	28R001	7.43	7.43 JT	7.43 JT	7.43 JT	7.43 JT	28R001	7.43	7.43 JT	7.43 JT
PCB018 & 030	pg/g-Wet	1	1	100	24.2 JT	24.2 JT	28R001	24.2	24.2 JT	24.2 JT	24.2 JT	24.2 JT	28R001	24.2	24.2 JT	24.2 JT
PCB019	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.86 UT	6.86 UT	28R001	3.43	3.43 UT	3.43 UT
PCB020 & 028	pg/g-Wet	1	1	100	159 JT	159 JT	28R001	159	159 JT	159 JT	159 JT	159 JT	28R001	159	159 JT	159 JT
PCB021 & 033	pg/g-Wet	1	0	0	--	--	--	--	--	--	11.4 UT	11.4 UT	28R001	5.7	5.7 UT	5.7 UT
PCB022	pg/g-Wet	1	1	100	39 T	39 T	28R001	39	39 T	39 T	39 T	39 T	28R001	39	39 T	39 T
PCB023	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.89 UT	6.89 UT	28R001	3.45	3.45 UT	3.45 UT
PCB024	pg/g-Wet	1	0	0	--	--	--	--	--	--	8.91 UT	8.91 UT	28R001	4.46	4.46 UT	4.46 UT
PCB025	pg/g-Wet	1	0	0	--	--	--	--	--	--	5.46 UT	5.46 UT	28R001	2.73	2.73 UT	2.73 UT
PCB026 & 029	pg/g-Wet	1	1	100	17.5 JT	17.5 JT	28R001	17.5	17.5 JT	17.5 JT	17.5 JT	17.5 JT	28R001	17.5	17.5 JT	17.5 JT
PCB027	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.73 UT	6.73 UT	28R001	3.37	3.37 UT	3.37 UT
PCB031	pg/g-Wet	1	1	100	73.3 T	73.3 T	28R001	73.3	73.3 T	73.3 T	73.3 T	73.3 T	28R001	73.3	73.3 T	73.3 T
PCB032	pg/g-Wet	1	1	100	11 T	11 T	28R001	11	11 T	11 T	11 T	11 T	28R001	11	11 T	11 T

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB034	pg/g-Wet	1	0	0	--	--	--	--	--	--	5.64 UT	5.64 UT	28R001	2.82	2.82 UT	2.82 UT
PCB035	pg/g-Wet	1	0	0	--	--	--	--	--	--	4.16 UT	4.16 UT	28R001	2.08	2.08 UT	2.08 UT
PCB036	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.97 UT	6.97 UT	28R001	3.49	3.49 UT	3.49 UT
PCB037	pg/g-Wet	1	0	0	--	--	--	--	--	--	7.92 UT	7.92 UT	28R001	3.96	3.96 UT	3.96 UT
PCB038	pg/g-Wet	1	0	0	--	--	--	--	--	--	5.19 UT	5.19 UT	28R001	2.6	2.6 UT	2.6 UT
PCB039	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.84 UT	6.84 UT	28R001	3.42	3.42 UT	3.42 UT
PCB040 & 041 & 071	pg/g-Wet	1	1	100	76.2 JT	76.2 JT	28R001	76.2	76.2 JT	76.2 JT	76.2 JT	76.2 JT	28R001	76.2	76.2 JT	76.2 JT
PCB042	pg/g-Wet	1	1	100	53.7 T	53.7 T	28R001	53.7	53.7 T	53.7 T	53.7 T	53.7 T	28R001	53.7	53.7 T	53.7 T
PCB043	pg/g-Wet	1	0	0	--	--	--	--	--	--	13.3 UT	13.3 UT	28R001	6.65	6.65 UT	6.65 UT
PCB044 & 047 & 065	pg/g-Wet	1	1	100	274 JT	274 JT	28R001	274	274 JT	274 JT	274 JT	274 JT	28R001	274	274 JT	274 JT
PCB045 & 051	pg/g-Wet	1	0	0	--	--	--	--	--	--	20.9 UT	20.9 UT	28R001	10.5	10.5 UT	10.5 UT
PCB046	pg/g-Wet	1	0	0	--	--	--	--	--	--	9.06 UT	9.06 UT	28R001	4.53	4.53 UT	4.53 UT
PCB048	pg/g-Wet	1	1	100	25 T	25 T	28R001	25	25 T	25 T	25 T	25 T	28R001	25	25 T	25 T
PCB049 & 069	pg/g-Wet	1	1	100	148 JT	148 JT	28R001	148	148 JT	148 JT	148 JT	148 JT	28R001	148	148 JT	148 JT
PCB050 & 053	pg/g-Wet	1	0	0	--	--	--	--	--	--	21 UT	21 UT	28R001	11	11 UT	11 UT
PCB052	pg/g-Wet	1	1	100	156 T	156 T	28R001	156	156 T	156 T	156 T	156 T	28R001	156	156 T	156 T
PCB054	pg/g-Wet	1	0	0	--	--	--	--	--	--	7.67 UT	7.67 UT	28R001	3.84	3.84 UT	3.84 UT
PCB055	pg/g-Wet	1	0	0	--	--	--	--	--	--	8.55 UT	8.55 UT	28R001	4.28	4.28 UT	4.28 UT
PCB056	pg/g-Wet	1	1	100	64.1 T	64.1 T	28R001	64.1	64.1 T	64.1 T	64.1 T	64.1 T	28R001	64.1	64.1 T	64.1 T
PCB057	pg/g-Wet	1	0	0	--	--	--	--	--	--	8.64 UT	8.64 UT	28R001	4.32	4.32 UT	4.32 UT
PCB058	pg/g-Wet	1	0	0	--	--	--	--	--	--	10.6 UT	10.6 UT	28R001	5.3	5.3 UT	5.3 UT
PCB059 & 062 & 075	pg/g-Wet	1	1	100	21.1 JT	21.1 JT	28R001	21.1	21.1 JT	21.1 JT	21.1 JT	21.1 JT	28R001	21.1	21.1 JT	21.1 JT
PCB060	pg/g-Wet	1	1	100	80.2 T	80.2 T	28R001	80.2	80.2 T	80.2 T	80.2 T	80.2 T	28R001	80.2	80.2 T	80.2 T
PCB061 & 070 & 074 & 076	pg/g-Wet	1	1	100	397 JT	397 JT	28R001	397	397 JT	397 JT	397 JT	397 JT	28R001	397	397 JT	397 JT
PCB063	pg/g-Wet	1	1	100	21.4 T	21.4 T	28R001	21.4	21.4 T	21.4 T	21.4 T	21.4 T	28R001	21.4	21.4 T	21.4 T
PCB064	pg/g-Wet	1	1	100	118 T	118 T	28R001	118	118 T	118 T	118 T	118 T	28R001	118	118 T	118 T
PCB066	pg/g-Wet	1	1	100	392 T	392 T	28R001	392	392 T	392 T	392 T	392 T	28R001	392	392 T	392 T
PCB067	pg/g-Wet	1	0	0	--	--	--	--	--	--	12.4 UT	12.4 UT	28R001	6.2	6.2 UT	6.2 UT
PCB068	pg/g-Wet	1	0	0	--	--	--	--	--	--	9.06 UT	9.06 UT	28R001	4.53	4.53 UT	4.53 UT
PCB072	pg/g-Wet	1	0	0	--	--	--	--	--	--	9.36 UT	9.36 UT	28R001	4.68	4.68 UT	4.68 UT
PCB073	pg/g-Wet	1	0	0	--	--	--	--	--	--	11.2 UT	11.2 UT	28R001	5.6	5.6 UT	5.6 UT
PCB077	pg/g-Wet	1	0	0	--	--	--	--	--	--	13.7 UT	13.7 UT	28R001	6.85	6.85 UT	6.85 UT
PCB078	pg/g-Wet	1	0	0	--	--	--	--	--	--	7.32 UT	7.32 UT	28R001	3.66	3.66 UT	3.66 UT
PCB079	pg/g-Wet	1	1	100	10.3 JT	10.3 JT	28R001	10.3	10.3 JT	10.3 JT	10.3 JT	10.3 JT	28R001	10.3	10.3 JT	10.3 JT
PCB080	pg/g-Wet	1	0	0	--	--	--	--	--	--	10.8 UT	10.8 UT	28R001	5.4	5.4 UT	5.4 UT
PCB081	pg/g-Wet	1	1	100	1.66 T	1.66 T	28R001	1.66	1.66 T	1.66 T	1.66 T	1.66 T	28R001	1.66	1.66 T	1.66 T
PCB082	pg/g-Wet	1	1	100	59 T	59 T	28R001	59	59 T	59 T	59 T	59 T	28R001	59	59 T	59 T
PCB083 & 099	pg/g-Wet	1	1	100	512 JT	512 JT	28R001	512	512 JT	512 JT	512 JT	512 JT	28R001	512	512 JT	512 JT
PCB084	pg/g-Wet	1	1	100	104 T	104 T	28R001	104	104 T	104 T	104 T	104 T	28R001	104	104 T	104 T
PCB085 & 116 & 117	pg/g-Wet	1	1	100	195 JT	195 JT	28R001	195	195 JT	195 JT	195 JT	195 JT	28R001	195	195 JT	195 JT
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	1	1	100	413 JT	413 JT	28R001	413	413 JT	413 JT	413 JT	413 JT	28R001	413	413 JT	413 JT
PCB088 & 091	pg/g-Wet	1	1	100	51.5 JT	51.5 JT	28R001	51.5	51.5 JT	51.5 JT	51.5 JT	51.5 JT	28R001	51.5	51.5 JT	51.5 JT
PCB089	pg/g-Wet	1	0	0	--	--	--	--	--	--	8.52 UT	8.52 UT	28R001	4.26	4.26 UT	4.26 UT
PCB090 & 101 & 113	pg/g-Wet	1	1	100	413 JT	413 JT	28R001	413	413 JT	413 JT	413 JT	413 JT	28R001	413	413 JT	413 JT
PCB092	pg/g-Wet	1	1	100	157 T	157 T	28R001	157	157 T	157 T	157 T	157 T	28R001	157	157 T	157 T
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	1	1	100	258 JT	258 JT	28R001	258	258 JT	258 JT	258 JT	258 JT	28R001	258	258 JT	258 JT
PCB094	pg/g-Wet	1	0	0	--	--	--	--	--	--	8.66 UT	8.66 UT	28R001	4.33	4.33 UT	4.33 UT
PCB096	pg/g-Wet	1	0	0	--	--	--	--	--	--	11.4 UT	11.4 UT	28R001	5.7	5.7 UT	5.7 UT
PCB103	pg/g-Wet	1	0	0	--	--	--	--	--	--	7.98 UT	7.98 UT	28R001	3.99	3.99 UT	3.99 UT
PCB104	pg/g-Wet	1	0	0	--	--	--	--	--	--	13.1 UT	13.1 UT	28R001	6.55	6.55 UT	6.55 UT
PCB105	pg/g-Wet	1	1	100	454 T	454 T	28R001	454	454 T	454 T	454 T	454 T	28R001	454	454 T	454 T
PCB106	pg/g-Wet	1	0	0	--	--	--	--	--	--	17.2 UT	17.2 UT	28R001	8.6	8.6 UT	8.6 UT
PCB107 & 124	pg/g-Wet	1	0	0	--	--	--	--	--	--	33.8 UT	33.8 UT	28R001	16.9	16.9 UT	16.9 UT
PCB109	pg/g-Wet	1	1	100	121 T	121 T	28R001	121	121 T	121 T	121 T	121 T	28R001	121	121 T	121 T
PCB110 & 115	pg/g-Wet	1	1	100	744 JT	744 JT	28R001	744	744 JT	744 JT	744 JT	744 JT	28R001	744	744 JT	744 JT
PCB111	pg/g-Wet	1	0	0	--	--	--	--	--	--	9.95 UT	9.95 UT	28R001	4.98	4.98 UT	4.98 UT
PCB112	pg/g-Wet	1	0	0	--	--	--	--	--	--	12.3 UT	12.3 UT	28R001	6.15	6.15 UT	6.15 UT

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB114	pg/g-Wet	1	1	100	33.8 T	33.8 T	28R001	33.8	33.8 T	33.8 T	33.8 T	33.8 T	28R001	33.8	33.8 T	33.8 T
PCB118	pg/g-Wet	1	1	100	1480 T	1480 T	28R001	1480	1480 T	1480 T	1480 T	1480 T	28R001	1480	1480 T	1480 T
PCB120	pg/g-Wet	1	1	100	8.18 JT	8.18 JT	28R001	8.18	8.18 JT	8.18 JT	8.18 JT	8.18 JT	28R001	8.18	8.18 JT	8.18 JT
PCB121	pg/g-Wet	1	0	0	--	--	--	--	--	--	7.2 UT	7.2 UT	28R001	3.6	3.6 UT	3.6 UT
PCB122	pg/g-Wet	1	0	0	--	--	--	--	--	--	20.6 UT	20.6 UT	28R001	10.3	10.3 UT	10.3 UT
PCB123	pg/g-Wet	1	1	100	30.1 T	30.1 T	28R001	30.1	30.1 T	30.1 T	30.1 T	30.1 T	28R001	30.1	30.1 T	30.1 T
PCB126	pg/g-Wet	1	1	100	4.18 T	4.18 T	28R001	4.18	4.18 T	4.18 T	4.18 T	4.18 T	28R001	4.18	4.18 T	4.18 T
PCB127	pg/g-Wet	1	0	0	--	--	--	--	--	--	16.9 UT	16.9 UT	28R001	8.45	8.45 UT	8.45 UT
PCB128 & 166	pg/g-Wet	1	1	100	280 JT	280 JT	28R001	280	280 JT	280 JT	280 JT	280 JT	28R001	280	280 JT	280 JT
PCB129 & 138 & 160 & 163	pg/g-Wet	1	1	100	2100 JT	2100 JT	28R001	2100	2100 JT	2100 JT	2100 JT	2100 JT	28R001	2100	2100 JT	2100 JT
PCB130	pg/g-Wet	1	1	100	130 T	130 T	28R001	130	130 T	130 T	130 T	130 T	28R001	130	130 T	130 T
PCB131	pg/g-Wet	1	0	0	--	--	--	--	--	--	10.8 UT	10.8 UT	28R001	5.4	5.4 UT	5.4 UT
PCB132	pg/g-Wet	1	1	100	239 T	239 T	28R001	239	239 T	239 T	239 T	239 T	28R001	239	239 T	239 T
PCB133	pg/g-Wet	1	1	100	40.1 T	40.1 T	28R001	40.1	40.1 T	40.1 T	40.1 T	40.1 T	28R001	40.1	40.1 T	40.1 T
PCB134 & 143	pg/g-Wet	1	1	100	43.6 JT	43.6 JT	28R001	43.6	43.6 JT	43.6 JT	43.6 JT	43.6 JT	28R001	43.6	43.6 JT	43.6 JT
PCB135 & 151 & 154	pg/g-Wet	1	1	100	377 JT	377 JT	28R001	377	377 JT	377 JT	377 JT	377 JT	28R001	377	377 JT	377 JT
PCB136	pg/g-Wet	1	1	100	59.3 T	59.3 T	28R001	59.3	59.3 T	59.3 T	59.3 T	59.3 T	28R001	59.3	59.3 T	59.3 T
PCB137	pg/g-Wet	1	1	100	90.9 T	90.9 T	28R001	90.9	90.9 T	90.9 T	90.9 T	90.9 T	28R001	90.9	90.9 T	90.9 T
PCB139 & 140	pg/g-Wet	1	1	100	17.5 JT	17.5 JT	28R001	17.5	17.5 JT	17.5 JT	17.5 JT	17.5 JT	28R001	17.5	17.5 JT	17.5 JT
PCB141	pg/g-Wet	1	1	100	161 T	161 T	28R001	161	161 T	161 T	161 T	161 T	28R001	161	161 T	161 T
PCB142	pg/g-Wet	1	0	0	--	--	--	--	--	--	10.6 UT	10.6 UT	28R001	5.3	5.3 UT	5.3 UT
PCB144	pg/g-Wet	1	1	100	36.6 JT	36.6 JT	28R001	36.6	36.6 JT	36.6 JT	36.6 JT	36.6 JT	28R001	36.6	36.6 JT	36.6 JT
PCB145	pg/g-Wet	1	0	0	--	--	--	--	--	--	4.17 UT	4.17 UT	28R001	2.09	2.09 UT	2.09 UT
PCB146	pg/g-Wet	1	1	100	445 T	445 T	28R001	445	445 T	445 T	445 T	445 T	28R001	445	445 T	445 T
PCB147 & 149	pg/g-Wet	1	1	100	743 JT	743 JT	28R001	743	743 JT	743 JT	743 JT	743 JT	28R001	743	743 JT	743 JT
PCB148	pg/g-Wet	1	0	0	--	--	--	--	--	--	8.55 UT	8.55 UT	28R001	4.28	4.28 UT	4.28 UT
PCB150	pg/g-Wet	1	0	0	--	--	--	--	--	--	3.82 UT	3.82 UT	28R001	1.91	1.91 UT	1.91 UT
PCB152	pg/g-Wet	1	0	0	--	--	--	--	--	--	10.1 UT	10.1 UT	28R001	5.05	5.05 UT	5.05 UT
PCB153 & 168	pg/g-Wet	1	1	100	1230 JT	1230 JT	28R001	1230	1230 JT	1230 JT	1230 JT	1230 JT	28R001	1230	1230 JT	1230 JT
PCB155	pg/g-Wet	1	0	0	--	--	--	--	--	--	7.64 UT	7.64 UT	28R001	3.82	3.82 UT	3.82 UT
PCB156	pg/g-Wet	1	1	100	145 T	145 T	28R001	145	145 T	145 T	145 T	145 T	28R001	145	145 T	145 T
PCB157	pg/g-Wet	1	1	100	32.7 T	32.7 T	28R001	32.7	32.7 T	32.7 T	32.7 T	32.7 T	28R001	32.7	32.7 T	32.7 T
PCB158	pg/g-Wet	1	1	100	183 T	183 T	28R001	183	183 T	183 T	183 T	183 T	28R001	183	183 T	183 T
PCB159	pg/g-Wet	1	1	100	10.5 T	10.5 T	28R001	10.5	10.5 T	10.5 T	10.5 T	10.5 T	28R001	10.5	10.5 T	10.5 T
PCB161	pg/g-Wet	1	0	0	--	--	--	--	--	--	11.8 UT	11.8 UT	28R001	5.9	5.9 UT	5.9 UT
PCB162	pg/g-Wet	1	0	0	--	--	--	--	--	--	14.1 UT	14.1 UT	28R001	7.05	7.05 UT	7.05 UT
PCB164	pg/g-Wet	1	1	100	69.8 T	69.8 T	28R001	69.8	69.8 T	69.8 T	69.8 T	69.8 T	28R001	69.8	69.8 T	69.8 T
PCB165	pg/g-Wet	1	0	0	--	--	--	--	--	--	9.72 UT	9.72 UT	28R001	4.86	4.86 UT	4.86 UT
PCB167	pg/g-Wet	1	1	100	106 T	106 T	28R001	106	106 T	106 T	106 T	106 T	28R001	106	106 T	106 T
PCB169	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.772 UT	0.772 UT	28R001	0.386	0.386 UT	0.386 UT
PCB170	pg/g-Wet	1	1	100	344 T	344 T	28R001	344	344 T	344 T	344 T	344 T	28R001	344	344 T	344 T
PCB171 & 173	pg/g-Wet	1	1	100	130 JT	130 JT	28R001	130	130 JT	130 JT	130 JT	130 JT	28R001	130	130 JT	130 JT
PCB172	pg/g-Wet	1	1	100	78.9 T	78.9 T	28R001	78.9	78.9 T	78.9 T	78.9 T	78.9 T	28R001	78.9	78.9 T	78.9 T
PCB174	pg/g-Wet	1	1	100	204 T	204 T	28R001	204	204 T	204 T	204 T	204 T	28R001	204	204 T	204 T
PCB175	pg/g-Wet	1	1	100	21.2 JT	21.2 JT	28R001	21.2	21.2 JT	21.2 JT	21.2 JT	21.2 JT	28R001	21.2	21.2 JT	21.2 JT
PCB176	pg/g-Wet	1	1	100	24.1 JT	24.1 JT	28R001	24.1	24.1 JT	24.1 JT	24.1 JT	24.1 JT	28R001	24.1	24.1 JT	24.1 JT
PCB177	pg/g-Wet	1	1	100	276 T	276 T	28R001	276	276 T	276 T	276 T	276 T	28R001	276	276 T	276 T
PCB178	pg/g-Wet	1	1	100	125 T	125 T	28R001	125	125 T	125 T	125 T	125 T	28R001	125	125 T	125 T
PCB179	pg/g-Wet	1	1	100	121 T	121 T	28R001	121	121 T	121 T	121 T	121 T	28R001	121	121 T	121 T
PCB180 & 193	pg/g-Wet	1	1	100	1130 JT	1130 JT	28R001	1130	1130 JT	1130 JT	1130 JT	1130 JT	28R001	1130	1130 JT	1130 JT
PCB181	pg/g-Wet	1	0	0	--	--	--	--	--	--	13 UT	13 UT	28R001	6.5	6.5 UT	6.5 UT
PCB182	pg/g-Wet	1	0	0	--	--	--	--	--	--	14.1 UT	14.1 UT	28R001	7.05	7.05 UT	7.05 UT
PCB183 & 185	pg/g-Wet	1	1	100	292 JT	292 JT	28R001	292	292 JT	292 JT	292 JT	292 JT	28R001	292	292 JT	292 JT
PCB184	pg/g-Wet	1	0	0	--	--	--	--	--	--	12.4 UT	12.4 UT	28R001	6.2	6.2 UT	6.2 UT
PCB186	pg/g-Wet	1	0	0	--	--	--	--	--	--	7.16 UT	7.16 UT	28R001	3.58	3.58 UT	3.58 UT
PCB187	pg/g-Wet	1	1	100	1120 T	1120 T	28R001	1120	1120 T	1120 T	1120 T	1120 T	28R001	1120	1120 T	1120 T
PCB188	pg/g-Wet	1	0	0	--	--	--	--	--	--	13.6 UT	13.6 UT	28R001	6.8	6.8 UT	6.8 UT

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB189	pg/g-Wet	1	1	100	17 T	17 T	28R001	17	17 T	17 T	17 T	17 T	28R001	17	17 T	17 T
PCB190	pg/g-Wet	1	1	100	109 T	109 T	28R001	109	109 T	109 T	109 T	109 T	28R001	109	109 T	109 T
PCB191	pg/g-Wet	1	1	100	20.4 T	20.4 T	28R001	20.4	20.4 T	20.4 T	20.4 T	20.4 T	28R001	20.4	20.4 T	20.4 T
PCB192	pg/g-Wet	1	0	0	--	--	--	--	--	--	6.47 UT	6.47 UT	28R001	3.24	3.24 UT	3.24 UT
PCB194	pg/g-Wet	1	1	100	169 T	169 T	28R001	169	169 T	169 T	169 T	169 T	28R001	169	169 T	169 T
PCB195	pg/g-Wet	1	1	100	83.6 T	83.6 T	28R001	83.6	83.6 T	83.6 T	83.6 T	83.6 T	28R001	83.6	83.6 T	83.6 T
PCB196	pg/g-Wet	1	1	100	103 T	103 T	28R001	103	103 T	103 T	103 T	103 T	28R001	103	103 T	103 T
PCB197 & 200	pg/g-Wet	1	1	100	28.4 JT	28.4 JT	28R001	28.4	28.4 JT	28.4 JT	28.4 JT	28.4 JT	28R001	28.4	28.4 JT	28.4 JT
PCB198 & 199	pg/g-Wet	1	1	100	295 JT	295 JT	28R001	295	295 JT	295 JT	295 JT	295 JT	28R001	295	295 JT	295 JT
PCB201	pg/g-Wet	1	1	100	39.7 T	39.7 T	28R001	39.7	39.7 T	39.7 T	39.7 T	39.7 T	28R001	39.7	39.7 T	39.7 T
PCB202	pg/g-Wet	1	1	100	75.4 T	75.4 T	28R001	75.4	75.4 T	75.4 T	75.4 T	75.4 T	28R001	75.4	75.4 T	75.4 T
PCB203	pg/g-Wet	1	1	100	227 T	227 T	28R001	227	227 T	227 T	227 T	227 T	28R001	227	227 T	227 T
PCB204	pg/g-Wet	1	0	0	--	--	--	--	--	--	17.1 UT	17.1 UT	28R001	8.55	8.55 UT	8.55 UT
PCB205	pg/g-Wet	1	0	0	--	--	--	--	--	--	18.6 UT	18.6 UT	28R001	9.3	9.3 UT	9.3 UT
PCB206	pg/g-Wet	1	1	100	111 T	111 T	28R001	111	111 T	111 T	111 T	111 T	28R001	111	111 T	111 T
PCB207	pg/g-Wet	1	1	100	21.2 JT	21.2 JT	28R001	21.2	21.2 JT	21.2 JT	21.2 JT	21.2 JT	28R001	21.2	21.2 JT	21.2 JT
PCB208	pg/g-Wet	1	1	100	44.6 T	44.6 T	28R001	44.6	44.6 T	44.6 T	44.6 T	44.6 T	28R001	44.6	44.6 T	44.6 T
PCB209	pg/g-Wet	1	1	100	104 T	104 T	28R001	104	104 T	104 T	104 T	104 T	28R001	104	104 T	104 T
Total PCB Congeners	pg/g-Wet	1	1	100	19100 JT	19100 JT	28R001	19100	19100 JT	19100 JT	19100 JT	19100 JT	28R001	19100	19100 JT	19100 JT
Total PCBs[c]																
Total PCBs	µg/kg-Wet	1	1	100	19.1 JT	19.1 JT	28R001	19.1	19.1 JT	19.1 JT	19.1 JT	19.1 JT	28R001	19.1	19.1 JT	19.1 JT
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	1	0	0	--	--	--	--	--	--	41 UT	41 UT	28R001	21	21 UT	21 UT
Heptachlorobiphenylhomologs	pg/g-Wet	1	1	100	4010 JT	4010 JT	28R001	4010	4010 JT	4010 JT	4010 JT	4010 JT	28R001	4010	4010 JT	4010 JT
Hexachlorobiphenyl homologs	pg/g-Wet	1	1	100	6540 JT	6540 JT	28R001	6540	6540 JT	6540 JT	6540 JT	6540 JT	28R001	6540	6540 JT	6540 JT
Nonachlorobiphenyl homologs	pg/g-Wet	1	1	100	177 JT	177 JT	28R001	177	177 JT	177 JT	177 JT	177 JT	28R001	177	177 JT	177 JT
Octachlorobiphenyl homologs	pg/g-Wet	1	1	100	1020 JT	1020 JT	28R001	1020	1020 JT	1020 JT	1020 JT	1020 JT	28R001	1020	1020 JT	1020 JT
Pentachlorobiphenylhomologs	pg/g-Wet	1	1	100	5040 JT	5040 JT	28R001	5040	5040 JT	5040 JT	5040 JT	5040 JT	28R001	5040	5040 JT	5040 JT
Tetrachlorobiphenyl homologs	pg/g-Wet	1	1	100	1840 JT	1840 JT	28R001	1840	1840 JT	1840 JT	1840 JT	1840 JT	28R001	1840	1840 JT	1840 JT
Trichlorobiphenyl homologs	pg/g-Wet	1	1	100	341 JT	341 JT	28R001	341	341 JT	341 JT	341 JT	341 JT	28R001	341	341 JT	341 JT
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	1	1	100	0.136	0.136	28R001	0.136	0.136	0.136	0.136	0.136	28R001	0.136	0.136	0.136
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	1	1	100	0.369	0.369	28R001	0.369	0.369	0.369	0.369	0.369	28R001	0.369	0.369	0.369
Hexachlorodibenzofuran homologs	pg/g-Wet	1	1	100	0.309	0.309	28R001	0.309	0.309	0.309	0.309	0.309	28R001	0.309	0.309	0.309
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	1	1	100	0.482	0.482	28R001	0.482	0.482	0.482	0.482	0.482	28R001	0.482	0.482	0.482
Octachlorodibenzofuran	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.045 U	0.045 U	28R001	0.0225	0.0225 U	0.0225 U
Octachlorodibenzo-p-dioxin	pg/g-Wet	1	1	100	0.273	0.273	28R001	0.273	0.273	0.273	0.273	0.273	28R001	0.273	0.273	0.273
Pentachlorodibenzofuranhomologs	pg/g-Wet	1	1	100	0.579	0.579	28R001	0.579	0.579	0.579	0.579	0.579	28R001	0.579	0.579	0.579
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	1	1	100	0.188	0.188	28R001	0.188	0.188	0.188	0.188	0.188	28R001	0.188	0.188	0.188
Tetrachlorodibenzofuran homologs	pg/g-Wet	1	1	100	0.503	0.503	28R001	0.503	0.503	0.503	0.503	0.503	28R001	0.503	0.503	0.503
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	1	1	100	0.194	0.194	28R001	0.194	0.194	0.194	0.194	0.194	28R001	0.194	0.194	0.194
Total PCDD/F	pg/g-Wet	1	1	100	3.03 T	3.03 T	28R001	3.03	3.03 T	3.03 T	3.03 T	3.03 T	28R001	3.03	3.03 T	3.03 T
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	1	1	100	0.067	0.067	28R001	0.067	0.067	0.067	0.067	0.067	28R001	0.067	0.067	0.067
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	1	1	100	0.259	0.259	28R001	0.259	0.259	0.259	0.259	0.259	28R001	0.259	0.259	0.259
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.016 U	0.016 U	28R001	0.008	0.008 U	0.008 U
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	1	1	100	0.032	0.032	28R001	0.032	0.032	0.032	0.032	0.032	28R001	0.032	0.032	0.032
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	1	1	100	0.069	0.069	28R001	0.069	0.069	0.069	0.069	0.069	28R001	0.069	0.069	0.069
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	1	1	100	0.021	0.021	28R001	0.021	0.021	0.021	0.021	0.021	28R001	0.021	0.021	0.021
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	1	1	100	0.343	0.343	28R001	0.343	0.343	0.343	0.343	0.343	28R001	0.343	0.343	0.343
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	1	0	0	--	--	--	--	--	--	0.011 U	0.011 U	28R001	0.0055	0.0055 U	0.0055 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	1	1	100	0.048 J	0.048 J	28R001	0.048	0.048 J	0.048 J	0.048 J	0.048 J	28R001	0.048	0.048 J	0.048 J
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	1	1	100	0.035	0.035	28R001	0.035	0.035	0.035	0.035	0.035	28R001	0.035	0.035	0.035
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	1	1	100	0.188	0.188	28R001	0.188	0.188	0.188	0.188	0.188	28R001	0.188	0.188	0.188
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	1	1	100	0.028	0.028	28R001	0.028	0.028	0.028	0.028	0.028	28R001	0.028	0.028	0.028

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	1	1	100	0.118	0.118	28R001	0.118	0.118	0.118	0.118	0.118	28R001	0.118	0.118	0.118
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	1	1	100	0.259	0.259	28R001	0.259	0.259	0.259	0.259	0.259	28R001	0.259	0.259	0.259
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	1	1	100	0.143	0.143	28R001	0.143	0.143	0.143	0.143	0.143	28R001	0.143	0.143	0.143
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.451 JT	0.451 JT	28R001	0.451	0.451 JT	0.451 JT	0.451 JT	0.451 JT	28R001	0.451	0.451 JT	0.451 JT
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.938 JT	0.938 JT	28R001	0.938	0.938 JT	0.938 JT	0.938 JT	0.938 JT	28R001	0.938	0.938 JT	0.938 JT
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	1	1	100	0.487 T	0.487 T	28R001	0.487	0.487 T	0.487 T	0.487 T	0.487 T	28R001	0.487	0.487 T	0.487 T
Pesticides																
2,4'-DDD	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
2,4'-DDE	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
2,4'-DDT	µg/kg-Wet	1	1	100	1.6 N	1.6 N	28R001	1.6	1.6 N	1.6 N	1.6 N	1.6 N	28R001	1.6	1.6 N	1.6 N
4,4'-DDD	µg/kg-Wet	1	1	100	2.3 NJ	2.3 NJ	28R001	2.3	2.3 NJ	2.3 NJ	2.3 NJ	2.3 NJ	28R001	2.3	2.3 NJ	2.3 NJ
4,4'-DDE	µg/kg-Wet	1	1	100	12 J	12 J	28R001	12	12 J	12 J	12 J	12 J	28R001	12	12 J	12 J
4,4'-DDT	µg/kg-Wet	1	1	100	2.1 NJ	2.1 NJ	28R001	2.1	2.1 NJ	2.1 NJ	2.1 NJ	2.1 NJ	28R001	2.1	2.1 NJ	2.1 NJ
Aldrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
alpha-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
alpha-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
beta-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJ
beta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.1 UJ	1.1 UJ	28R001	0.55	0.55 UJ	0.55 UJ
cis-Chlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJ
cis-Nonachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.3 U	1.3 U	28R001	0.65	0.65 U	0.65 U
delta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
Dieldrin	µg/kg-Wet	1	1	100	1.2 NJ	1.2 NJ	28R001	1.2	1.2 NJ	1.2 NJ	1.2 NJ	1.2 NJ	28R001	1.2	1.2 NJ	1.2 NJ
Endosulfan sulfate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJ
Endrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJ
Endrin aldehyde	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
Endrin ketone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJ
gamma-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
Heptachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
Heptachlor epoxide	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
Methoxychlor	µg/kg-Wet	1	1	100	1.1 N	1.1 N	28R001	1.1	1.1 N	1.1 N	1.1 N	1.1 N	28R001	1.1	1.1 N	1.1 N
Mirex	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
Oxychlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 U
Total Chlordanes	µg/kg-Wet	1	1	100	1.1 NT	1.1 NT	28R001	1.1	1.1 NT	1.1 NT	1.1 NT	1.1 NT	28R001	1.1	1.1 NT	1.1 NT
Total Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJT	1 UJT	28R001	0.5	0.5 UJT	0.5 UJT
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	1	1	100	2.3 NJT	2.3 NJT	28R001	2.3	2.3 NJT	2.3 NJT	2.3 NJT	2.3 NJT	28R001	2.3	2.3 NJT	2.3 NJT
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	18 NJT	18 NJT	28R001	18	18 NJT	18 NJT	18 NJT	18 NJT	28R001	18	18 NJT	18 NJT
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	1	1	100	12 JT	12 JT	28R001	12	12 JT	12 JT	12 JT	12 JT	28R001	12	12 JT	12 JT
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	1	1	100	3.7 NJT	3.7 NJT	28R001	3.7	3.7 NJT	3.7 NJT	3.7 NJT	3.7 NJT	28R001	3.7	3.7 NJT	3.7 NJT
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	16.4 JT	16.4 JT	28R001	16.4	16.4 JT	16.4 JT	16.4 JT	16.4 JT	28R001	16.4	16.4 JT	16.4 JT
Toxaphene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	50 U	50 U	28R001	25	25 U	25 U
trans-Chlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJ
trans-Nonachlor	µg/kg-Wet	1	1	100	1.1 N	1.1 N	28R001	1.1	1.1 N	1.1 N	1.1 N	1.1 N	28R001	1.1	1.1 N	1.1 N
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	73 UT	73 UT	28R001	37	37 UT	37 UT
Acenaphthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Acenaphthylene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Anthracene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	86 UT	86 UT	28R001	43	43 UT	43 UT
Benzo(a)anthracene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Benzo(a)pyrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Benzo(b)fluoranthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Benzo(g,h,i)perylene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Benzo(k)fluoranthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Chrysene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Dibenzo(a,h)anthracene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Fluoranthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	93 UT	93 UT	28R001	47	47 UT	47 UT
Fluorene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	66 UT	66 UT	28R001	33	33 UT	33 UT
High Molecular Weight PAH	µg/kg-Wet	1	0	0	--	--	--	--	--	--	93 UT	93 UT	28R001	47	47 UT	47 UT
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Low Molecular Weight PAH	µg/kg-Wet	1	0	0	--	--	--	--	--	--	86 UT	86 UT	28R001	43	43 UT	43 UT
Naphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	70 UT	70 UT	28R001	35	35 UT	35 UT
Phenanthrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	83 UT	83 UT	28R001	42	42 UT	42 UT
Pyrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	50 UT	50 UT	28R001	25	25 UT	25 UT
Total BaPEq	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	16.5	16.5 UT	16.5 UT
Total cPAHs	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Total PAHs	µg/kg-Wet	1	0	0	--	--	--	--	--	--	93 UT	93 UT	28R001	47	47 UT	47 UT
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	99 UJT	99 UJT	28R001	50	50 UJT	50 UJT
Butylbenzyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	330 UJ	330 UJ	28R001	170	170 UJ	170 UJ
Dibutyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 U
Diethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 U
Dimethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 U
Di-n-octyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 U
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
1,2-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
1,2-Diphenylhydrazine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 U	33 U	28R001	17	17 U	17 U
1,3-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
1,4-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
2,4-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
2,6-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
2-Chloronaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
2-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 U
3,3'-Dichlorobenzidine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 U
3-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 U
4-Bromophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
4-Chloroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 UT	170 UT	28R001	85	85 UT	85 UT
4-Chlorophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	83 UT	83 UT	28R001	42	42 UT	42 UT
4-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 U
Azobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 U
Benzoic acid	µg/kg-Wet	1	0	0	--	--	--	--	--	--	8300 U	8300 U	28R001	4200	4200 U	4200 U
Benzyl alcohol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 U
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 U
Bis(2-chloroethoxy)methane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 U
Bis(2-chloroethyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Carbazole	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Dibenzofuran	µg/kg-Wet	1	0	0	--	--	--	--	--	--	66 UT	66 UT	28R001	33	33 UT	33 UT
Hexachlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
Hexachlorobutadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UT	1 UT	28R001	0.5	0.5 UT	0.5 UT
Hexachlorocyclopentadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 U
Hexachloroethane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJT	1 UJT	28R001	0.5	0.5 UJT	0.5 UJT
Isophorone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 U
Nitrobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
N-Nitrosodimethylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 UT	170 UT	28R001	85	85 UT	85 UT
N-Nitrosodiphenylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 UJ	170 UJ	28R001	85	85 UJ	85 UJ
N-Nitrosodipropylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1700 UJ	1700 UJ	28R001	850	850 UJ	850 UJ
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 U
2,4,5-Trichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 U
2,4,6-Trichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
2,4-Dichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
2,4-Dimethylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	500 U	500 U	28R001	250	250 U	250 U
2-Chlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	66 UT	66 UT	28R001	33	33 UT	33 UT
2-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 U
2-Nitrophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 U
4,6-Dinitro-2-methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	3300 U	3300 U	28R001	1700	1700 U	1700 U
4-Chloro-3-methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 U
4-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UT
4-Nitrophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 U
Pentachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	170 UT	170 UT	28R001	85	85 UT	85 UT
Phenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 U
Chinook (whole body)																
Conventionals																
Lipids	percent-Wet	1	1	100	2.7	2.7	26R111	2.7	2.7	2.7	2.7	2.7	26R111	2.7	2.7	2.7
Total solids	percent-Wet	1	1	100	22.1	22.1	26R111	22.1	22.1	22.1	22.1	22.1	26R111	22.1	22.1	22.1
Metals																
Aluminum	mg/kg-Wet	1	1	100	4.74 J	4.74 J	26R111	4.74	4.74 J	4.74 J	4.74 J	4.74 J	26R111	4.74	4.74 J	4.74 J
Antimony	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.001 U	0.001 U	26R111	0.0005	0.0005 U	0.0005 U
Arsenic	mg/kg-Wet	1	1	100	0.03 J	0.03 J	26R111	0.03	0.03 J	0.03 J	0.03 J	0.03 J	26R111	0.03	0.03 J	0.03 J
Cadmium	mg/kg-Wet	1	1	100	0.005 J	0.005 J	26R111	0.005	0.005 J	0.005 J	0.005 J	0.005 J	26R111	0.005	0.005 J	0.005 J
Chromium	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.07 U	0.07 U	26R111	0.035	0.035 U	0.035 U
Copper	mg/kg-Wet	1	1	100	1.35	1.35	26R111	1.35	1.35	1.35	1.35	1.35	26R111	1.35	1.35	1.35
Lead	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.003 UJ	0.003 UJ	26R111	0.0015	0.0015 UJ	0.0015 UJ
Manganese	mg/kg-Wet	1	1	100	3.29	3.29	26R111	3.29	3.29	3.29	3.29	3.29	26R111	3.29	3.29	3.29
Mercury	mg/kg-Wet	1	1	100	0.012	0.012	26R111	0.012	0.012	0.012	0.012	0.012	26R111	0.012	0.012	0.012
Nickel	mg/kg-Wet	1	1	100	0.295 J	0.295 J	26R111	0.295	0.295 J	0.295 J	0.295 J	0.295 J	26R111	0.295	0.295 J	0.295 J
Selenium	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.2 U	0.2 U	26R111	0.1	0.1 U	0.1 U
Silver	mg/kg-Wet	1	0	0	--	--	--	--	--	--	0.002 U	0.002 U	26R111	0.001	0.001 U	0.001 U
Thallium	mg/kg-Wet	1	1	100	0.0025 J	0.0025 J	26R111	0.0025	0.0025 J	0.0025 J	0.0025 J	0.0025 J	26R111	0.0025	0.0025 J	0.0025 J
Zinc	mg/kg-Wet	1	1	100	34	34	26R111	34	34	34	34	34	26R111	34	34	34
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.9 U	1.9 U	26R111	0.95	0.95 U	0.95 U
Aroclor 1221	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.9 U	1.9 U	26R111	0.95	0.95 U	0.95 U
Aroclor 1232	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.9 U	1.9 U	26R111	0.95	0.95 U	0.95 U
Aroclor 1242	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.9 U	1.9 U	26R111	0.95	0.95 U	0.95 U
Aroclor 1248	µg/kg-Wet	1	1	100	7.1	7.1	26R111	7.1	7.1	7.1	7.1	7.1	26R111	7.1	7.1	7.1
Aroclor 1254	µg/kg-Wet	1	0	0	--	--	--	--	--	--	9.2 U	9.2 U	26R111	4.6	4.6 U	4.6 U
Aroclor 1260	µg/kg-Wet	1	1	100	7.4	7.4	26R111	7.4	7.4	7.4	7.4	7.4	26R111	7.4	7.4	7.4
Aroclor 1262	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.9 U	1.9 U	26R111	0.95	0.95 U	0.95 U
Aroclor 1268	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.9 U	1.9 U	26R111	0.95	0.95 U	0.95 U
Aroclors	µg/kg-Wet	1	1	100	14.5 T	14.5 T	26R111	14.5	14.5 T	14.5 T	14.5 T	14.5 T	26R111	14.5	14.5 T	14.5 T
Total PCBs[d]																
Total PCBs	µg/kg-Wet	1	1	100	14.5 T	14.5 T	26R111	14.5	14.5 T	14.5 T	14.5 T	14.5 T	26R111	14.5	14.5 T	14.5 T
Pesticides																
2,4'-DDD	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
2,4'-DDE	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
2,4'-DDT	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	26R111	0.5	0.5 UJ	0.5 UJ
4,4'-DDD	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	26R111	0.5	0.5 UJ	0.5 UJ
4,4'-DDE	µg/kg-Wet	1	1	100	7.2	7.2	26R111	7.2	7.2	7.2	7.2	7.2	26R111	7.2	7.2	7.2
4,4'-DDT	µg/kg-Wet	1	1	100	1.3 J	1.3 J	26R111	1.3	1.3 J	1.3 J	1.3 J	1.3 J	26R111	1.3	1.3 J	1.3 J

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Aldrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
alpha-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
alpha-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
beta-Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
beta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1.6 U	1.6 U	26R111	0.8	0.8 U	0.8 U
cis-Chlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
cis-Nonachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
delta-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Dieldrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	26R111	0.5	0.5 UJ	0.5 UJ
Endosulfan sulfate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Endrin	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Endrin aldehyde	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJ	1 UJ	26R111	0.5	0.5 UJ	0.5 UJ
Endrin ketone	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
gamma-Hexachlorocyclohexane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Heptachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Heptachlor epoxide	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Methoxychlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Mirex	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Oxychlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Total Chlordanes	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UT	1 UT	26R111	0.5	0.5 UT	0.5 UT
Total Endosulfan	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UT	1 UT	26R111	0.5	0.5 UT	0.5 UT
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJT	1 UJT	26R111	0.5	0.5 UJT	0.5 UJT
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	8.5 JT	8.5 JT	26R111	8.5	8.5 JT	8.5 JT	8.5 JT	8.5 JT	26R111	8.5	8.5 JT	8.5 JT
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	1	1	100	7.2 T	7.2 T	26R111	7.2	7.2 T	7.2 T	7.2 T	7.2 T	26R111	7.2	7.2 T	7.2 T
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	1	1	100	1.3 JT	1.3 JT	26R111	1.3	1.3 JT	1.3 JT	1.3 JT	1.3 JT	26R111	1.3	1.3 JT	1.3 JT
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	1	1	100	8.5 JT	8.5 JT	26R111	8.5	8.5 JT	8.5 JT	8.5 JT	8.5 JT	26R111	8.5	8.5 JT	8.5 JT
Toxaphene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	50 U	50 U	26R111	25	25 U	25 U
trans-Chlordane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
trans-Nonachlor	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 U	1 U	26R111	0.5	0.5 U	0.5 U
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Acenaphthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Acenaphthylene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Anthracene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Benzo(a)anthracene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Benzo(a)pyrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Benzo(b)fluoranthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Benzo(g,h,i)perylene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Benzo(k)fluoranthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Chrysene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Dibenzo(a,h)anthracene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Fluoranthene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Fluorene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
High Molecular Weight PAH	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Low Molecular Weight PAH	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Naphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Phenanthrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Pyrene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Total BaPEq	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	13.5	13.5 UT	13.5 UT
Total cPAHs	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Total PAHs	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	81 UT	81 UT	26R111	41	41 UT	41 UT
Butylbenzyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2000 U	2000 U	26R111	1000	1000 U	1000 U
Dibutyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	430 U	430 U	26R111	220	220 U	220 U

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Diethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	26R111	70	70 U	70 U
Dimethyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	26R111	70	70 U	70 U
Di-n-octyl phthalate	µg/kg-Wet	1	0	0	--	--	--	--	--	--	4800 U	4800 U	26R111	2400	2400 U	2400 U
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
1,2-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
1,2-Diphenylhydrazine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 U	27 U	26R111	14	14 U	14 U
1,3-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
1,4-Dichlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
2,4-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
2,6-Dinitrotoluene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
2-Chloronaphthalene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
2-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	680 U	680 U	26R111	340	340 U	340 U
3,3'-Dichlorobenzidine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1400 U	1400 U	26R111	700	700 U	700 U
3-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	680 U	680 U	26R111	340	340 U	340 U
4-Bromophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
4-Chloroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 UT	140 UT	26R111	70	70 UT	70 UT
4-Chlorophenyl phenyl ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	68 UT	68 UT	26R111	34	34 UT	34 UT
4-Nitroaniline	µg/kg-Wet	1	0	0	--	--	--	--	--	--	680 U	680 U	26R111	340	340 U	340 U
Azobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	26R111	70	70 U	70 U
Benzyl alcohol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	270 U	270 U	26R111	140	140 U	140 U
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	26R111	70	70 U	70 U
Bis(2-chloroethoxy)methane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	26R111	70	70 U	70 U
Bis(2-chloroethyl) ether	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Carbazole	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Dibenzofuran	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Hexachlorobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UT	1 UT	26R111	0.5	0.5 UT	0.5 UT
Hexachlorobutadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJT	1 UJT	26R111	0.5	0.5 UJT	0.5 UJT
Hexachlorocyclopentadiene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	680 U	680 U	26R111	340	340 U	340 U
Hexachloroethane	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1 UJT	1 UJT	26R111	0.5	0.5 UJT	0.5 UJT
Nitrobenzene	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
N-Nitrosodimethylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 UJT	140 UJT	26R111	70	70 UJT	70 UJT
N-Nitrosodiphenylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	26R111	70	70 U	70 U
N-Nitrosodipropylamine	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1400 U	1400 U	26R111	700	700 U	700 U
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1400 U	1400 U	26R111	700	700 U	700 U
2,4,5-Trichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	680 U	680 U	26R111	340	340 U	340 U
2,4,6-Trichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
2,4-Dichlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
2,4-Dimethylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	410 U	410 U	26R111	210	210 U	210 U
2,4-Dinitrophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2700 U	2700 U	26R111	1400	1400 U	1400 U
2-Chlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
2-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 U	140 U	26R111	70	70 U	70 U
4,6-Dinitro-2-methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	2700 U	2700 U	26R111	1400	1400 U	1400 U
4-Chloro-3-methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	270 U	270 U	26R111	140	140 U	140 U
4-Methylphenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	27 UT	27 UT	26R111	14	14 UT	14 UT
4-Nitrophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	1400 U	1400 U	26R111	700	700 U	700 U
Pentachlorophenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	140 UT	140 UT	26R111	70	70 UT	70 UT
Phenol	µg/kg-Wet	1	0	0	--	--	--	--	--	--	270 U	270 U	26R111	140	140 U	140 U
Smallmouth bass (whole body)																
Conventionals																
Lipids	percent-Wet	3	3	100	4.1	4.9	28R001	4.51	4.53 T	4.86 V	4.1	4.9	28R001	4.51	4.53 T	4.86 V
Total solids	percent-Wet	3	3	100	28.7	30.5	28R001	29.7	29.9	30.4 V	28.7	30.5	28R001	29.7	29.9	30.4 V

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Metals																
Aluminum	mg/kg-Wet	3	3	100	3.22 J	13.9 J	28R001	7.51	5.4 J	13.1 JV	3.22 J	13.9 J	28R001	7.51	5.4 J	13.1 JV
Antimony	mg/kg-Wet	3	0	0	--	--		--	--	--	0.003 U	0.004 U	28R001	0.00183	0.002 U	0.002 UV
Arsenic	mg/kg-Wet	3	3	100	0.1 J	0.19	28R001	0.14	0.14 J	0.19 JV	0.1 J	0.19	28R001	0.14	0.14 J	0.19 JV
Cadmium	mg/kg-Wet	3	1	33.3	0.011	0.011	28R001	0.011	0.011	0.011	0.003 U	0.011	28R001	0.00467	0.0015 U	0.0101 V
Chromium	mg/kg-Wet	3	3	100	0.9	2.22	28R001	1.56	1.55	2.15 V	0.9	2.22	28R001	1.56	1.55	2.15 V
Copper	mg/kg-Wet	3	3	100	0.41	0.51	28R001	0.47	0.48	0.51 V	0.41	0.51	28R001	0.47	0.48	0.51 V
Lead	mg/kg-Wet	3	3	100	0.004 J	0.014	28R001	0.008	0.006 J	0.0132 JV	0.004 J	0.014	28R001	0.008	0.006 J	0.0132 JV
Manganese	mg/kg-Wet	3	3	100	1.2	1.29	28R001	1.25	1.27	1.29 V	1.2	1.29	28R001	1.25	1.27	1.29 V
Mercury	mg/kg-Wet	3	3	100	0.183	0.286	28R001	0.234	0.233	0.281 V	0.183	0.286	28R001	0.234	0.233	0.281 V
Nickel	mg/kg-Wet	3	3	100	0.55	1.32	28R001	0.84	0.65	1.25 V	0.55	1.32	28R001	0.84	0.65	1.25 V
Selenium	mg/kg-Wet	3	0	0	--	--		--	--	--	0.3 U	0.3 U	28R001	0.15	0.15 U	0.15 UV
Silver	mg/kg-Wet	3	0	0	--	--		--	--	--	0.005 U	0.016 U	28R001	0.006	0.0075 U	0.00795 UV
Thallium	mg/kg-Wet	3	3	100	0.002 J	0.0024 J	28R001	0.00223	0.0023 J	0.00239 JV	0.002 J	0.0024 J	28R001	0.00223	0.0023 J	0.00239 JV
Zinc	mg/kg-Wet	3	3	100	15	16.8	28R001	15.6	15	16.6 V	15	16.8	28R001	15.6	15	16.6 V
PCB Aroclors																
Aroclor 1016	µg/kg-Wet	3	0	0	--	--		--	--	--	0.95 U	9.5 U	28R001	3.3	4.8 U	4.8 UV
Aroclor 1221	µg/kg-Wet	3	0	0	--	--		--	--	--	0.95 U	19 U	28R001	6.3	9 U	9.5 UV
Aroclor 1232	µg/kg-Wet	3	0	0	--	--		--	--	--	0.95 U	11 U	28R001	3.6	4.8 U	5.4 UV
Aroclor 1242	µg/kg-Wet	3	0	0	--	--		--	--	--	0.95 U	16 U	28R001	4.4	4.8 U	7.7 UV
Aroclor 1248	µg/kg-Wet	3	1	33	17	17	28R001	17	17	17	17	26 U	28R001	14	13 U	17 V
Aroclor 1254	µg/kg-Wet	3	0	0	--	--		--	--	--	40 U	77 U	28R001	31	36 U	38 UV
Aroclor 1260	µg/kg-Wet	3	1	33	46	46	28R001	46	46	46	46	72 U	28R001	38	36 U	45 V
Aroclor 1262	µg/kg-Wet	3	0	0	--	--		--	--	--	0.95 U	9.5 U	28R001	3.3	4.8 U	4.8 UV
Aroclor 1268	µg/kg-Wet	3	0	0	--	--		--	--	--	0.95 U	9.5 U	28R001	3.3	4.8 U	4.8 UV
Aroclors	µg/kg-Wet	3	1	33	63 T	63 T	28R001	63	63 T	63 T	63 T	77 UT	28R001	46	39 UT	61 V
PCB Congeners																
PCB004	pg/g-Wet	3	3	100	16.1	18 T	28R001	17	16.9	17.9 V	16.1	18 T	28R001	17	16.9	17.9 V
PCB005	pg/g-Wet	3	0	0	--	--		--	--	--	2.14 UT	2.68 U	28R001	1.19	1.17 U	1.32 UV
PCB006	pg/g-Wet	3	3	100	5.61	6.43	28R001	6	5.97 JT	6.38 JV	5.61	6.43	28R001	6	5.97 JT	6.38 JV
PCB007	pg/g-Wet	3	0	0	--	--		--	--	--	3.39 UT	3.7 U	28R001	1.8	1.85 U	1.85 UV
PCB008	pg/g-Wet	3	3	100	22.8 T	26.8	28R001	24.4	23.6	26.5 V	22.8 T	26.8	28R001	24.4	23.6	26.5 V
PCB009	pg/g-Wet	3	1	33.3	2.39 JT	2.39 JT	28R001	2.39	2.39 JT	2.39 JT	2.39 JT	2.51 U	28R001	1.62	1.26 U	2.28 JV
PCB010	pg/g-Wet	3	0	0	--	--		--	--	--	4.32 UT	4.71 U	28R001	2.29	2.35 U	2.35 UV
PCB011	pg/g-Wet	3	3	100	40.6	48	28R001	44.7	45.6 T	47.8 V	40.6	48	28R001	44.7	45.6 T	47.8 V
PCB012 & 013	pg/g-Wet	3	0	0	--	--		--	--	--	4.79 UT	5.22 U	28R001	2.54	2.61 U	2.61 UV
PCB014	pg/g-Wet	3	0	0	--	--		--	--	--	2.81 UT	3.07 U	28R001	1.49	1.53 U	1.53 UV
PCB015	pg/g-Wet	3	3	100	6.48 JT	9.31	28R001	7.53	6.8	9.06 V	6.48 JT	9.31	28R001	7.53	6.8	9.06 V
PCB016	pg/g-Wet	3	3	100	42.7	48 T	28R001	44.7	43.5	47.6 V	42.7	48 T	28R001	44.7	43.5	47.6 V
PCB017	pg/g-Wet	3	3	100	71.2	81.2 T	28R001	75.3	73.6	80.4 V	71.2	81.2 T	28R001	75.3	73.6	80.4 V
PCB018 & 030	pg/g-Wet	3	3	100	131 J	137 J	28R001	134	135 JT	137 JV	131 J	137 J	28R001	134	135 JT	137 JV
PCB019	pg/g-Wet	3	3	100	12.3	14	28R001	13.3	13.7 T	14 V	12.3	14	28R001	13.3	13.7 T	14 V
PCB020 & 028	pg/g-Wet	3	3	100	439 J	535 JT	28R001	474	448 J	526 JV	439 J	535 JT	28R001	474	448 J	526 JV
PCB021 & 033	pg/g-Wet	3	3	100	69.6 J	77.6 JT	28R001	72.6	70.6 J	76.9 JV	69.6 J	77.6 JT	28R001	72.6	70.6 J	76.9 JV
PCB022	pg/g-Wet	3	3	100	88.5	98.5 T	28R001	92.5	90.4	97.7 V	88.5	98.5 T	28R001	92.5	90.4	97.7 V
PCB023	pg/g-Wet	3	0	0	--	--		--	--	--	3.48 UT	3.79 U	28R001	1.84	1.89 U	1.89 UV
PCB024	pg/g-Wet	3	0	0	--	--		--	--	--	4.5 UT	4.9 U	28R001	2.38	2.45 U	2.45 UV
PCB025	pg/g-Wet	3	3	100	21.9	27.5 T	28R001	25	25.7	27.3 V	21.9	27.5 T	28R001	25	25.7	27.3 V
PCB026 & 029	pg/g-Wet	3	3	100	58.4 J	69.4 JT	28R001	63	61.2 J	68.6 JV	58.4 J	69.4 JT	28R001	63	61.2 J	68.6 JV
PCB027	pg/g-Wet	3	3	100	9.55	12.5	28R001	11.3	11.8 T	12.4 V	9.55	12.5	28R001	11.3	11.8 T	12.4 V
PCB031	pg/g-Wet	3	3	100	270	303	28R001	284	280 T	301 V	270	303	28R001	284	280 T	301 V
PCB032	pg/g-Wet	3	3	100	44.3	50.5 T	28R001	46.7	45.4	50 V	44.3	50.5 T	28R001	46.7	45.4	50 V
PCB034	pg/g-Wet	3	0	0	--	--		--	--	--	2.85 UT	3.1 U	28R001	1.51	1.55 U	1.55 UV
PCB035	pg/g-Wet	3	0	0	--	--		--	--	--	2.1 UT	2.29 U	28R001	1.11	1.14 U	1.14 UV
PCB036	pg/g-Wet	3	0	0	--	--		--	--	--	3.84 U	11.2 U	28R001	4.02	4.55 UT	5.49 UV
PCB037	pg/g-Wet	3	3	100	23.4	27.2 T	28R001	24.9	24	26.9 V	23.4	27.2 T	28R001	24.9	24	26.9 V

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB038	pg/g-Wet	3	0	0	--	--	--	--	--	--	2.62 UT	2.86 U	28R001	1.39	1.43 U	1.43 UV
PCB039	pg/g-Wet	3	2	66.7	4	4.38 JT	28R001	4.19	4.19 JV	4.36 JV	3.77 U	4.38 JT	28R001	3.42	4	4.34 JV
PCB040 & 041 & 071	pg/g-Wet	3	3	100	331 J	453 JT	28R001	380	355 J	443 JV	331 J	453 JT	28R001	380	355 J	443 JV
PCB042	pg/g-Wet	3	3	100	232	300 T	28R001	263	258	296 V	232	300 T	28R001	263	258	296 V
PCB043	pg/g-Wet	3	3	100	26.5	32.4 T	28R001	29	28	32 V	26.5	32.4 T	28R001	29	28	32 V
PCB044 & 047 & 065	pg/g-Wet	3	3	100	1010 J	1290 JT	28R001	1130	1080 J	1270 JV	1010 J	1290 JT	28R001	1130	1080 J	1270 JV
PCB045 & 051	pg/g-Wet	3	3	100	74.3 J	90.2 JT	28R001	79.8	74.8 J	88.7 JV	74.3 J	90.2 JT	28R001	79.8	74.8 J	88.7 JV
PCB046	pg/g-Wet	3	3	100	18.7	24.2 T	28R001	20.6	19	23.7 V	18.7	24.2 T	28R001	20.6	19	23.7 V
PCB048	pg/g-Wet	3	3	100	156	188 T	28R001	168	160	185 V	156	188 T	28R001	168	160	185 V
PCB049 & 069	pg/g-Wet	3	3	100	790 J	997 JT	28R001	881	857 J	983 JV	790 J	997 JT	28R001	881	857 J	983 JV
PCB050 & 053	pg/g-Wet	3	3	100	65 J	80.1 JT	28R001	72	70.9 J	79.2 JV	65 J	80.1 JT	28R001	72	70.9 J	79.2 JV
PCB052	pg/g-Wet	3	3	100	1160	1420 T	28R001	1280	1260	1400 V	1160	1420 T	28R001	1280	1260	1400 V
PCB054	pg/g-Wet	3	0	0	--	--	--	--	--	--	3.87 UT	4.22 U	28R001	2.05	2.11 U	2.11 UV
PCB055	pg/g-Wet	3	1	33.3	7.87	7.87	28R001	7.87	7.87	7.87	4.31 UT	7.87	28R001	4.12	2.35 U	7.32 V
PCB056	pg/g-Wet	3	3	100	256	341 T	28R001	300	302	337 V	256	341 T	28R001	300	302	337 V
PCB057	pg/g-Wet	3	3	100	5.62	7.1	28R001	6.29	6.14 JT	7 JV	5.62	7.1	28R001	6.29	6.14 JT	7 JV
PCB058	pg/g-Wet	3	2	66.7	6.58 T	7.85	28R001	7.22	7.22 V	7.79 V	5.83 U	7.85	28R001	5.78	6.58 T	7.72 V
PCB059 & 062 & 075	pg/g-Wet	3	3	100	80.4 J	98.3 JT	28R001	88.1	85.6 J	97 JV	80.4 J	98.3 JT	28R001	88.1	85.6 J	97 JV
PCB060	pg/g-Wet	3	3	100	249	361 T	28R001	307	312	356 V	249	361 T	28R001	307	312	356 V
PCB061 & 070 & 074 & 076	pg/g-Wet	3	3	100	2080 J	2490 JT	28R001	2310	2350 J	2480 JV	2080 J	2490 JT	28R001	2310	2350 J	2480 JV
PCB063	pg/g-Wet	3	3	100	78.8	97.6 T	28R001	89.2	91.3	97 V	78.8	97.6 T	28R001	89.2	91.3	97 V
PCB064	pg/g-Wet	3	3	100	453	581 T	28R001	516	513	574 V	453	581 T	28R001	516	513	574 V
PCB066	pg/g-Wet	3	3	100	1510	2090 T	28R001	1820	1860	2070 V	1510	2090 T	28R001	1820	1860	2070 V
PCB067	pg/g-Wet	3	3	100	22.2	25.9	28R001	24.4	25 T	25.8 V	22.2	25.9	28R001	24.4	25 T	25.8 V
PCB068	pg/g-Wet	3	3	100	18.7	22.5	28R001	21.1	22.2 T	22.5 V	18.7	22.5	28R001	21.1	22.2 T	22.5 V
PCB072	pg/g-Wet	3	3	100	22.7	29.1	28R001	26.9	29 T	29.1 V	22.7	29.1	28R001	26.9	29 T	29.1 V
PCB073	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.63 UT	6.14 U	28R001	2.98	3.07 U	3.07 UV
PCB077	pg/g-Wet	3	3	100	60.7	79.8 T	28R001	68.6	65.2	78.3 V	60.7	79.8 T	28R001	68.6	65.2	78.3 V
PCB078	pg/g-Wet	3	0	0	--	--	--	--	--	--	3.69 UT	4.03 U	28R001	1.96	2.01 U	2.01 UV
PCB079	pg/g-Wet	3	3	100	31	44.8 T	28R001	38.6	40	44.3 V	31	44.8 T	28R001	38.6	40	44.3 V
PCB080	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.92 U	62.8 U	28R001	19.4	23.9 UT	30.6 UV
PCB081	pg/g-Wet	3	3	100	4.18	5.4 T	28R001	4.66	4.4	5.3 V	4.18	5.4 T	28R001	4.66	4.4	5.3 V
PCB082	pg/g-Wet	3	3	100	236	373 T	28R001	315	337	369 V	236	373 T	28R001	315	337	369 V
PCB083 & 099	pg/g-Wet	3	3	100	2950 J	4170 JT	28R001	3730	4070 J	4160 JV	2950 J	4170 JT	28R001	3730	4070 J	4160 JV
PCB084	pg/g-Wet	3	3	100	355	556 T	28R001	468	494	550 V	355	556 T	28R001	468	494	550 V
PCB085 & 116 & 117	pg/g-Wet	3	3	100	836 J	1270 JT	28R001	1100	1200 J	1260 JV	836 J	1270 JT	28R001	1100	1200 J	1260 JV
PCB086 & 087 & 097 & 108 & 119 & 125	pg/g-Wet	3	3	100	2180 J	3110 JT	28R001	2760	2990 J	3100 JV	2180 J	3110 JT	28R001	2760	2990 J	3100 JV
PCB088 & 091	pg/g-Wet	3	3	100	332 J	497 JT	28R001	434	473 J	495 JV	332 J	497 JT	28R001	434	473 J	495 JV
PCB089	pg/g-Wet	3	3	100	14.2	24.2 T	28R001	20	21.5	23.9 V	14.2	24.2 T	28R001	20	21.5	23.9 V
PCB090 & 101 & 113	pg/g-Wet	3	3	100	3710 J	5270 J	28R001	4700	5130 JT	5260 JV	3710 J	5270 J	28R001	4700	5130 JT	5260 JV
PCB092	pg/g-Wet	3	3	100	613	908 T	28R001	805	894	907 V	613	908 T	28R001	805	894	907 V
PCB093 & 095 & 098 & 100 & 102	pg/g-Wet	3	3	100	1410 J	2050 JT	28R001	1790	1900 J	2040 JV	1410 J	2050 JT	28R001	1790	1900 J	2040 JV
PCB094	pg/g-Wet	3	3	100	6.32	8.51 T	28R001	7.57	7.89	8.45 V	6.32	8.51 T	28R001	7.57	7.89	8.45 V
PCB096	pg/g-Wet	3	3	100	6.36	9.67 T	28R001	7.95	7.83	9.49 V	6.36	9.67 T	28R001	7.95	7.83	9.49 V
PCB103	pg/g-Wet	3	3	100	23.7	33 T	28R001	29.6	32	32.9 V	23.7	33 T	28R001	29.6	32	32.9 V
PCB104	pg/g-Wet	3	0	0	--	--	--	--	--	--	6.61 UT	7.21 U	28R001	3.5	3.6 U	3.6 UV
PCB105	pg/g-Wet	3	3	100	1520	2280 T	28R001	2020	2250	2280 V	1520	2280 T	28R001	2020	2250	2280 V
PCB106	pg/g-Wet	3	0	0	--	--	--	--	--	--	8.7 UT	9.49 U	28R001	4.61	4.73 U	4.74 UV
PCB107 & 124	pg/g-Wet	3	3	100	125 J	182 JT	28R001	161	176 J	181 JV	125 J	182 JT	28R001	161	176 J	181 JV
PCB109	pg/g-Wet	3	3	100	454	618	28R001	548	572 T	613 V	454	618	28R001	548	572 T	613 V
PCB110 & 115	pg/g-Wet	3	3	100	3310 J	4610 JT	28R001	4130	4460 J	4600 JV	3310 J	4610 JT	28R001	4130	4460 J	4600 JV
PCB111	pg/g-Wet	3	2	66.7	6.86 T	8.09	28R001	7.48	7.48 V	8.03 V	5.48 U	8.09	28R001	5.9	6.86 T	7.97 V
PCB112	pg/g-Wet	3	0	0	--	--	--	--	--	--	6.19 UT	6.75 U	28R001	3.28	3.37 U	3.37 UV
PCB114	pg/g-Wet	3	3	100	115	169 T	28R001	150	166	169 V	115	169 T	28R001	150	166	169 V
PCB118	pg/g-Wet	3	3	100	5200	7520	28R001	6640	7210 T	7490 V	5200	7520	28R001	6640	7210 T	7490 V
PCB120	pg/g-Wet	3	3	100	28	42.2	28R001	35.5	36.4 T	41.6 V	28	42.2	28R001	35.5	36.4 T	41.6 V
PCB121	pg/g-Wet	3	0	0	--	--	--	--	--	--	3.64 UT	3.97 U	28R001	1.93	1.98 U	1.98 UV

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB122	pg/g-Wet	3	3	100	24.5	38 T	28R001	33	36.5	37.9 V	24.5	38 T	28R001	33	36.5	37.9 V
PCB123	pg/g-Wet	3	3	100	91.6	142 T	28R001	121	130	141 V	91.6	142 T	28R001	121	130	141 V
PCB126	pg/g-Wet	3	3	100	14.8	19.7	28R001	17.8	19 T	19.6 V	14.8	19.7	28R001	17.8	19 T	19.6 V
PCB127	pg/g-Wet	3	3	100	10.6	16.2	28R001	13.7	14.2 JT	16 JV	10.6	16.2	28R001	13.7	14.2 JT	16 JV
PCB128 & 166	pg/g-Wet	3	3	100	889 J	1480 JT	28R001	1280	1470 J	1480 JV	889 J	1480 JT	28R001	1280	1470 J	1480 JV
PCB129 & 138 & 160 & 163	pg/g-Wet	3	3	100	7900 J	12000 J	28R001	10500	11500 JT	12000 JV	7900 J	12000 J	28R001	10500	11500 JT	12000 JV
PCB130	pg/g-Wet	3	3	100	446	670	28R001	587	645 T	668 V	446	670	28R001	587	645 T	668 V
PCB131	pg/g-Wet	3	3	100	50.5	77.5 T	28R001	66.7	72.2	77 V	50.5	77.5 T	28R001	66.7	72.2	77 V
PCB132	pg/g-Wet	3	3	100	915	1510	28R001	1310	1490 T	1510 V	915	1510	28R001	1310	1490 T	1510 V
PCB133	pg/g-Wet	3	3	100	134	217	28R001	185	204 T	216 V	134	217	28R001	185	204 T	216 V
PCB134 & 143	pg/g-Wet	3	3	100	202 J	296 JT	28R001	262	287 J	295 JV	202 J	296 JT	28R001	262	287 J	295 JV
PCB135 & 151 & 154	pg/g-Wet	3	3	100	1440 J	2170 JT	28R001	1920	2150 J	2170 JV	1440 J	2170 JT	28R001	1920	2150 J	2170 JV
PCB136	pg/g-Wet	3	3	100	238	390 T	28R001	330	363	387 V	238	390 T	28R001	330	363	387 V
PCB137	pg/g-Wet	3	3	100	300	461	28R001	395	423 T	457 V	300	461	28R001	395	423 T	457 V
PCB139 & 140	pg/g-Wet	3	3	100	100 J	157 J	28R001	136	150 JT	156 JV	100 J	157 J	28R001	136	150 JT	156 JV
PCB141	pg/g-Wet	3	3	100	517	918	28R001	753	823 T	909 V	517	918	28R001	753	823 T	909 V
PCB142	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.37 UT	5.85 U	28R001	2.84	2.92 U	2.92 UV
PCB144	pg/g-Wet	3	3	100	185	288	28R001	252	283 T	288 V	185	288	28R001	252	283 T	288 V
PCB145	pg/g-Wet	3	0	0	--	--	--	--	--	--	2.11 UT	2.3 U	28R001	1.12	1.15 U	1.15 UV
PCB146	pg/g-Wet	3	3	100	1480	2250	28R001	1930	2050 T	2230 V	1480	2250	28R001	1930	2050 T	2230 V
PCB147 & 149	pg/g-Wet	3	3	100	3640 J	5190 J	28R001	4660	5160 JT	5190 JV	3640 J	5190 J	28R001	4660	5160 JT	5190 JV
PCB148	pg/g-Wet	3	3	100	9.58	13.4	28R001	11.8	12.4 T	13.3 V	9.58	13.4	28R001	11.8	12.4 T	13.3 V
PCB150	pg/g-Wet	3	3	100	5.34	8.27	28R001	7.11	7.71 T	8.21 V	5.34	8.27	28R001	7.11	7.71 T	8.21 V
PCB152	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.09 UT	5.55 U	28R001	2.7	2.77 U	2.77 UV
PCB153 & 168	pg/g-Wet	3	3	100	8160 J	12500 J	28R001	10600	11000 JT	12400 JV	8160 J	12500 J	28R001	10600	11000 JT	12400 JV
PCB155	pg/g-Wet	3	2	66.7	5.48 T	5.83 J	28R001	5.66	5.66 JV	5.81 JV	4.21 U	5.83 J	28R001	4.47	5.48 T	5.8 JV
PCB156	pg/g-Wet	3	3	100	537	835	28R001	709	754 T	827 V	537	835	28R001	709	754 T	827 V
PCB157	pg/g-Wet	3	3	100	124	187	28R001	163	179 T	186 V	124	187	28R001	163	179 T	186 V
PCB158	pg/g-Wet	3	3	100	683	1050	28R001	918	1020 T	1050 V	683	1050	28R001	918	1020 T	1050 V
PCB159	pg/g-Wet	3	3	100	31.8	47.9 JT	28R001	41.6	45.1	47.6 JV	31.8	47.9 JT	28R001	41.6	45.1	47.6 JV
PCB161	pg/g-Wet	3	0	0	--	--	--	--	--	--	5.94 UT	6.48 U	28R001	3.15	3.23 U	3.24 UV
PCB162	pg/g-Wet	3	3	100	37.9	50.2	28R001	45	46.9 T	49.9 V	37.9	50.2	28R001	45	46.9 T	49.9 V
PCB164	pg/g-Wet	3	3	100	285	442 T	28R001	384	425	440 V	285	442 T	28R001	384	425	440 V
PCB165	pg/g-Wet	3	2	66.7	5.83 T	6.17	28R001	6	6 V	6.15 V	5.35 U	6.17	28R001	4.89	5.83 T	6.14 V
PCB167	pg/g-Wet	3	3	100	310	466	28R001	400	423 T	462 V	310	466	28R001	400	423 T	462 V
PCB169	pg/g-Wet	3	3	100	1.24	1.74 T	28R001	1.55	1.66	1.73 V	1.24	1.74 T	28R001	1.55	1.66	1.73 V
PCB170	pg/g-Wet	3	3	100	1060	1640	28R001	1390	1460 T	1620 V	1060	1640	28R001	1390	1460 T	1620 V
PCB171 & 173	pg/g-Wet	3	3	100	411 J	602 J	28R001	535	592 JT	601 JV	411 J	602 J	28R001	535	592 JT	601 JV
PCB172	pg/g-Wet	3	3	100	224	348	28R001	289	296 T	343 V	224	348	28R001	289	296 T	343 V
PCB174	pg/g-Wet	3	3	100	693	962	28R001	855	909 T	957 V	693	962	28R001	855	909 T	957 V
PCB175	pg/g-Wet	3	3	100	60.6	90.6	28R001	78.6	84.6 T	90 V	60.6	90.6	28R001	78.6	84.6 T	90 V
PCB176	pg/g-Wet	3	3	100	120	186	28R001	164	185 T	186 V	120	186	28R001	164	185 T	186 V
PCB177	pg/g-Wet	3	3	100	938	1380	28R001	1210	1310 T	1370 V	938	1380	28R001	1210	1310 T	1370 V
PCB178	pg/g-Wet	3	3	100	428	609	28R001	543	591 T	607 V	428	609	28R001	543	591 T	607 V
PCB179	pg/g-Wet	3	3	100	406	612 T	28R001	531	576	608 V	406	612 T	28R001	531	576	608 V
PCB180 & 193	pg/g-Wet	3	3	100	3350 J	4950 J	28R001	4200	4310 JT	4890 JV	3350 J	4950 J	28R001	4200	4310 JT	4890 JV
PCB181	pg/g-Wet	3	3	100	16.9	23.3 T	28R001	21	22.7	23.2 V	16.9	23.3 T	28R001	21	22.7	23.2 V
PCB182	pg/g-Wet	3	3	100	9.62	12.5 JT	28R001	11.3	11.9 J	12.4 JV	9.62	12.5 JT	28R001	11.3	11.9 J	12.4 JV
PCB183 & 185	pg/g-Wet	3	3	100	1130 J	1690 J	28R001	1450	1520 JT	1670 JV	1130 J	1690 J	28R001	1450	1520 JT	1670 JV
PCB184	pg/g-Wet	3	2	66.7	8.44 T	9.65	28R001	9.05	9.05 V	9.59 V	6.85 U	9.65	28R001	7.17	8.44 T	9.53 V
PCB186	pg/g-Wet	3	0	0	--	--	--	--	--	--	3.62 UT	3.94 U	28R001	1.92	1.97 U	1.97 UV
PCB187	pg/g-Wet	3	3	100	3140	4420	28R001	3880	4080 T	4390 V	3140	4420	28R001	3880	4080 T	4390 V
PCB188	pg/g-Wet	3	1	33.3	6.97 T	6.97 T	28R001	6.97	6.97 T	6.97 T	6.97 T	7.46 U	28R001	4.81	3.73 U	6.65 V
PCB189	pg/g-Wet	3	3	100	46.5	63.5	28R001	55.7	57.1 T	62.9 V	46.5	63.5	28R001	55.7	57.1 T	62.9 V
PCB190	pg/g-Wet	3	3	100	341	487	28R001	424	443 T	483 V	341	487	28R001	424	443 T	483 V
PCB191	pg/g-Wet	3	3	100	55.5	85.2	28R001	72.2	75.8 T	84.3 V	55.5	85.2	28R001	72.2	75.8 T	84.3 V
PCB192	pg/g-Wet	3	0	0	--	--	--	--	--	--	3.26 UT	3.56 U	28R001	1.73	1.78 U	1.78 UV

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
PCB194	pg/g-Wet	3	3	100	467	684	28R001	578	582 T	674 V	467	684	28R001	578	582 T	674 V
PCB195	pg/g-Wet	3	3	100	202	314	28R001	262	271 T	310 V	202	314	28R001	262	271 T	310 V
PCB196	pg/g-Wet	3	3	100	267	381	28R001	322	318 T	375 V	267	381	28R001	322	318 T	375 V
PCB197 & 200	pg/g-Wet	3	3	100	71 J	96 J	28R001	86.2	91.7 JT	95.6 JV	71 J	96 J	28R001	86.2	91.7 JT	95.6 JV
PCB198 & 199	pg/g-Wet	3	3	100	691 J	1010 J	28R001	855	863 JT	995 JV	691 J	1010 J	28R001	855	863 JT	995 JV
PCB201	pg/g-Wet	3	3	100	92.6	134	28R001	115	118 T	132 V	92.6	134	28R001	115	118 T	132 V
PCB202	pg/g-Wet	3	3	100	225	330	28R001	289	311 T	328 V	225	330	28R001	289	311 T	328 V
PCB203	pg/g-Wet	3	3	100	508	696	28R001	605	610 T	687 V	508	696	28R001	605	610 T	687 V
PCB204	pg/g-Wet	3	0	0	--	--	--	--	--	--	8.63 UT	9.41 U	28R001	4.57	4.7 U	4.7 UV
PCB205	pg/g-Wet	3	3	100	32.3	42.7	28R001	37.4	37.2 T	42.2 V	32.3	42.7	28R001	37.4	37.2 T	42.2 V
PCB206	pg/g-Wet	3	3	100	257	313	28R001	288	295 T	311 V	257	313	28R001	288	295 T	311 V
PCB207	pg/g-Wet	3	3	100	51.8	61.6	28R001	58.2	61.1 T	61.6 V	51.8	61.6	28R001	58.2	61.1 T	61.6 V
PCB208	pg/g-Wet	3	3	100	114	139 T	28R001	130	137	139 V	114	139 T	28R001	130	137	139 V
PCB209	pg/g-Wet	3	3	100	262	325 T	28R001	297	304	323 V	262	325 T	28R001	297	304	323 V
Total PCB Congeners	pg/g-Wet	3	3	100	78100 JT	111000 JT	28R001	99000	108000 JT	111000 JV	78100 JT	111000 JT	28R001	99000	108000 JT	111000 JV
Total PCBs[c]																
Total PCBs	µg/kg-Wet	3	3	100	78.1 JT	111 JT	28R001	99	108 JT	111 JV	78.1 JT	111 JT	28R001	99	108 JT	111 JV
PCB Homologs																
Dichlorobiphenyl homologs	pg/g-Wet	3	3	100	100 T	101 JT	28R001	100	100 T	101 JV	100 T	101 JT	28R001	100	100 T	101 JV
Heptachlorobiphenylhomologs	pg/g-Wet	3	3	100	12400 JT	18100 JT	28R001	15700	16600 JT	18000 JV	12400 JT	18100 JT	28R001	15700	16600 JT	18000 JV
Hexachlorobiphenyl homologs	pg/g-Wet	3	3	100	28600 JT	43600 JT	28R001	37800	41100 JT	43400 JV	28600 JT	43600 JT	28R001	37800	41100 JT	43400 JV
Nonachlorobiphenyl homologs	pg/g-Wet	3	3	100	423 T	512 T	28R001	477	495 T	510 V	423 T	512 T	28R001	477	495 T	510 V
Octachlorobiphenyl homologs	pg/g-Wet	3	3	100	2560 JT	3690 JT	28R001	3150	3200 JT	3640 JV	2560 JT	3690 JT	28R001	3150	3200 JT	3640 JV
Pentachlorobiphenylhomologs	pg/g-Wet	3	3	100	23600 JT	33400 JT	28R001	30000	33100 JT	33400 JV	23600 JT	33400 JT	28R001	30000	33100 JT	33400 JV
Tetrachlorobiphenyl homologs	pg/g-Wet	3	3	100	8750 JT	11200 JT	28R001	9940	9870 JT	11100 JV	8750 JT	11200 JT	28R001	9940	9870 JT	11100 JV
Trichlorobiphenyl homologs	pg/g-Wet	3	3	100	1290 JT	1460 JT	28R001	1370	1350 JT	1450 JV	1290 JT	1460 JT	28R001	1370	1350 JT	1450 JV
PCDD/F Homologs																
Heptachlorodibenzofuranhomologs	pg/g-Wet	3	3	100	0.239	0.32	28R001	0.279	0.277	0.316 V	0.239	0.32	28R001	0.279	0.277	0.316 V
Heptachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.198	0.664	28R001	0.477	0.569	0.655 V	0.198	0.664	28R001	0.477	0.569	0.655 V
Hexachlorodibenzofuran homologs	pg/g-Wet	3	3	100	0.39	0.591	28R001	0.499	0.515	0.583 V	0.39	0.591	28R001	0.499	0.515	0.583 V
Hexachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.335	0.807	28R001	0.539	0.476	0.774 V	0.335	0.807	28R001	0.539	0.476	0.774 V
Octachlorodibenzofuran	pg/g-Wet	3	3	100	0.058	0.077	28R001	0.0687	0.071	0.0764 V	0.058	0.077	28R001	0.0687	0.071	0.0764 V
Octachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.199	0.233	28R001	0.215	0.212	0.231 V	0.199	0.233	28R001	0.215	0.212	0.231 V
Pentachlorodibenzofuranhomologs	pg/g-Wet	3	3	100	0.97	1.13	28R001	1.03	0.987	1.12 V	0.97	1.13	28R001	1.03	0.987	1.12 V
Pentachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.377	0.53	28R001	0.443	0.423	0.519 V	0.377	0.53	28R001	0.443	0.423	0.519 V
Tetrachlorodibenzofuran homologs	pg/g-Wet	3	3	100	0.736	0.984	28R001	0.853	0.838	0.969 V	0.736	0.984	28R001	0.853	0.838	0.969 V
Tetrachlorodibenzo-p-dioxin homologs	pg/g-Wet	3	3	100	0.316	0.404	28R001	0.365	0.376	0.401 V	0.316	0.404	28R001	0.365	0.376	0.401 V
Total PCDD/F	pg/g-Wet	3	3	100	3.99 T	5.73 T	28R001	4.77	4.58 T	5.62 V	3.99 T	5.73 T	28R001	4.77	4.58 T	5.62 V
PCDD/Fs																
1,2,3,4,6,7,8-Heptachlorodibenzofuran	pg/g-Wet	3	3	100	0.134	0.149 J	28R001	0.143	0.146	0.149 JV	0.134	0.149 J	28R001	0.143	0.146	0.149 JV
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.198	0.259	28R001	0.228	0.227	0.256 V	0.198	0.259	28R001	0.228	0.227	0.256 V
1,2,3,4,7,8,9-Heptachlorodibenzofuran	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.016 U	0.016 U	28R001	0.008	0.008 U	0.008 UV
1,2,3,4,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	3	100	0.043	0.056 J	28R001	0.051	0.054	0.0558 JV	0.043	0.056 J	28R001	0.051	0.054	0.0558 JV
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.057 J	0.11	28R001	0.0777	0.066 J	0.106 JV	0.057 J	0.11	28R001	0.0777	0.066 J	0.106 JV
1,2,3,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	3	100	0.029	0.045	28R001	0.0367	0.036 J	0.0441 JV	0.029	0.045	28R001	0.0367	0.036 J	0.0441 JV
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.253	0.522	28R001	0.386	0.382	0.508 V	0.253	0.522	28R001	0.386	0.382	0.508 V
1,2,3,7,8,9-Hexachlorodibenzofuran	pg/g-Wet	3	0	0	--	--	--	--	--	--	0.011 U	0.011 U	28R001	0.0055	0.0055 U	0.0055 UV
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.036	0.065	28R001	0.048	0.043	0.0628 V	0.036	0.065	28R001	0.048	0.043	0.0628 V
1,2,3,7,8-Pentachlorodibenzofuran	pg/g-Wet	3	3	100	0.087	0.13	28R001	0.106	0.1	0.127 V	0.087	0.13	28R001	0.106	0.1	0.127 V
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.377	0.53	28R001	0.443	0.423	0.519 V	0.377	0.53	28R001	0.443	0.423	0.519 V
2,3,4,6,7,8-Hexachlorodibenzofuran	pg/g-Wet	3	3	100	0.031	0.05	28R001	0.042	0.045	0.0495 V	0.031	0.05	28R001	0.042	0.045	0.0495 V
2,3,4,7,8-Pentachlorodibenzofuran	pg/g-Wet	3	3	100	0.296	0.306	28R001	0.3	0.298	0.305 V	0.296	0.306	28R001	0.3	0.298	0.305 V
2,3,7,8-Tetrachlorodibenzofuran	pg/g-Wet	3	3	100	0.61	0.822	28R001	0.711	0.702	0.81 V	0.61	0.822	28R001	0.711	0.702	0.81 V
2,3,7,8-Tetrachlorodibenzo-p-dioxin	pg/g-Wet	3	3	100	0.316	0.396	28R001	0.355	0.353	0.392 V	0.316	0.396	28R001	0.355	0.353	0.392 V
Dioxin/furan TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	0.905 JT	1.19 JT	28R001	1.03	0.995 JT	1.17 JV	0.905 JT	1.19 JT	28R001	1.03	0.995 JT	1.17 JV

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Total TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	2.67 JT	3.49 JT	28R001	3.18	3.37 JT	3.48 JV	2.67 JT	3.49 JT	28R001	3.18	3.37 JT	3.48 JV
Total PCB TEQ																
Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	pg/g-Wet	3	3	100	1.76 T	2.38 T	28R001	2.15	2.3 T	2.37 V	1.76 T	2.38 T	28R001	2.15	2.3 T	2.37 V
Pesticides																
2,4'-DDD	µg/kg-Wet	3	1	33	2.8 NJ	2.8 NJ	28R001	2.8	2.8 NJ	2.8 NJ	1.9 U	2.8 NJ	28R001	1.6	1.1 U	2.6 JV
2,4'-DDE	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	2.4 U	28R001	0.82	0.75 U	1.2 UV
2,4'-DDT	µg/kg-Wet	3	3	100	4.3 NJ	6.6 NJ	28R001	5.5	5.7 NJ	6.5 JV	4.3 NJ	6.6 NJ	28R001	5.5	5.7 NJ	6.5 JV
4,4'-DDD	µg/kg-Wet	3	3	100	8 NJ	10 NJ	28R001	9.2	9.6 NJ	10 JV	8 NJ	10 NJ	28R001	9.2	9.6 NJ	10 JV
4,4'-DDE	µg/kg-Wet	3	3	100	39 J	59 J	28R001	48	47 J	58 JV	39 J	59 J	28R001	48	47 J	58 JV
4,4'-DDT	µg/kg-Wet	3	3	100	8.8 J	14 J	28R001	12	12 J	14 JV	8.8 J	14 J	28R001	12	12 J	14 JV
Aldrin	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 UV
alpha-Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 UV
alpha-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 UV
beta-Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJV
beta-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	3.1 UJ	3.6 UJ	28R001	1.6	1.6 UJ	1.8 UJV
cis-Chlordane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJV
cis-Nonachlor	µg/kg-Wet	3	0	0	--	--	--	--	--	--	3.4 U	3.7 U	28R001	1.8	1.8 U	1.8 UV
delta-Hexachlorocyclohexane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJV
Dieldrin	µg/kg-Wet	3	3	100	1.9 NJ	2.5 NJ	28R001	2.1	2 NJ	2.5 JV	1.9 NJ	2.5 NJ	28R001	2.1	2 NJ	2.5 JV
Endosulfan sulfate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJV
Endrin	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJV
Endrin aldehyde	µg/kg-Wet	3	3	100	1.3 N	2 NJ	28R001	1.6	1.5 N	2 JV	1.3 N	2 NJ	28R001	1.6	1.5 N	2 JV
Endrin ketone	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJ	1 UJ	28R001	0.5	0.5 UJ	0.5 UJV
gamma-Hexachlorocyclohexane	µg/kg-Wet	3	3	100	2.7 NJ	4.1 NJ	28R001	3.3	3.1 NJ	4 JV	2.7 NJ	4.1 NJ	28R001	3.3	3.1 NJ	4 JV
Heptachlor	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 UV
Heptachlor epoxide	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 UV
Methoxychlor	µg/kg-Wet	3	1	33	4.3 N	4.3 N	28R001	4.3	4.3 N	4.3 N	1 U	4.3 N	28R001	1.8	0.6 U	3.9 V
Mirex	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 U	1 U	28R001	0.5	0.5 U	0.5 UV
Oxychlordane	µg/kg-Wet	3	3	100	1.3 NJ	2 NJ	28R001	1.6	1.6 NJ	2 JV	1.3 NJ	2 NJ	28R001	1.6	1.6 NJ	2 JV
Total Chlordanes	µg/kg-Wet	3	3	100	4.5 NJT	6.6 NJT	28R001	5.7	5.9 NJT	6.5 JV	4.5 NJT	6.6 NJT	28R001	5.7	5.9 NJT	6.5 JV
Total Endosulfan	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJT	1 UJT	28R001	0.5	0.5 UJT	0.5 UJV
Total of 2,4' and 4,4'-DDD	µg/kg-Wet	3	3	100	8 NJT	12.8 NJT	28R001	10.1	9.6 NJT	12.5 JV	8 NJT	12.8 NJT	28R001	10.1	9.6 NJT	12.5 JV
Total of 2,4' and 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	3	3	100	60.1 NJT	89.2 NJT	28R001	75.6	77.5 NJT	88 JV	60.1 NJT	89.2 NJT	28R001	75.6	77.5 NJT	88 JV
Total of 2,4' and 4,4'-DDE	µg/kg-Wet	3	3	100	39 JT	59 JT	28R001	48	47 JT	58 JV	39 JT	59 JT	28R001	48	47 JT	58 JV
Total of 2,4' and 4,4'-DDT	µg/kg-Wet	3	3	100	13.1 NJT	20.6 NJT	28R001	17.1	17.7 NJT	20.3 JV	13.1 NJT	20.6 NJT	28R001	17.1	17.7 NJT	20.3 JV
Total of 4,4'-DDD, -DDE, -DDT	µg/kg-Wet	3	3	100	55.8 JT	82.6 JT	28R001	69.1	69 JT	81.2 JV	55.8 JT	82.6 JT	28R001	69.1	69 JT	81.2 JV
Toxaphene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	67 U	120 U	28R001	47	48 U	59 UV
trans-Chlordane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.8 UJ	2.2 UJ	28R001	1	1.1 UJ	1.1 UJV
trans-Nonachlor	µg/kg-Wet	3	3	100	3.2 N	4.6 N	28R001	4	4.3 NJ	4.6 JV	3.2 N	4.6 N	28R001	4	4.3 NJ	4.6 JV
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	73 UT	28R001	30	37 UT	37 UV
Acenaphthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Acenaphthylene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Benzo(a)anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Benzo(a)pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Benzo(b)fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	60 UT	28R001	21	17 UT	29 UV
Benzo(g,h,i)perylene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Benzo(k)fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	70 UT	28R001	23	17 UT	33 UV
Chrysene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Dibenzo(a,h)anthracene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Fluoranthene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	93 UT	28R001	27	17 UT	44 UV
Fluorene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	66 UT	28R001	28	33 UT	33 UV
High Molecular Weight PAH	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	93 UT	28R001	27	17 UT	44 UV
Indeno(1,2,3-cd)pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
Low Molecular Weight PAH	µg/kg-Wet	3	0	0	--	--	--	--	--	--	70 UT	73 UT	28R001	36	37 UT	37 UV
Naphthalene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	70 UT	70 UT	28R001	35	35 UT	35 UV
Phenanthrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Pyrene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Total BaPEq	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	16.5	16.5 UT	16.5 UV
Total cPAHs	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	70 UT	28R001	23	17 UT	33 UV
Total PAHs	µg/kg-Wet	3	0	0	--	--	--	--	--	--	70 UT	93 UT	28R001	39	37 UT	46 UV
Phthalates																
Bis(2-ethylhexyl)phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	99 UJT	100 UJT	28R001	50	50 UJT	50 UJV
Butylbenzyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 UJ	330 UJ	28R001	170	170 UJ	170 UJV
Dibutyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 UV
Diethyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 UV
Dimethyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 UV
Di-n-octyl phthalate	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 UV
Semivolatile Organic Compounds																
1,2,4-Trichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
1,2-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
1,2-Diphenylhydrazine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 U	33 U	28R001	17	17 U	17 UV
1,3-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
1,4-Dichlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
2,4-Dinitrotoluene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
2,6-Dinitrotoluene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
2-Chloronaphthalene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
2-Nitroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 UV
3,3'-Dichlorobenzidine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 UV
3-Nitroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 UV
4-Bromophenyl phenyl ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
4-Chloroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UT	170 UT	28R001	85	85 UT	85 UV
4-Chlorophenyl phenyl ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	83 UT	83 UT	28R001	42	42 UT	42 UV
4-Nitroaniline	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 UV
Azobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 UV
Benzoic acid	µg/kg-Wet	3	0	0	--	--	--	--	--	--	8300 U	8300 U	28R001	4200	4200 U	4200 UV
Benzyl alcohol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 UV
Bis(2-chloro-1-methylethyl) ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 UV
Bis(2-chloroethoxy)methane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 UV
Bis(2-chloroethyl) ether	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Carbazole	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Dibenzofuran	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Hexachlorobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1.4 UT	1.8 UT	28R001	0.77	0.7 UT	0.88 UV
Hexachlorobutadiene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UT	1 UT	28R001	0.5	0.5 UT	0.5 UV
Hexachlorocyclopentadiene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 UV
Hexachloroethane	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1 UJT	1 UJT	28R001	0.5	0.5 UJT	0.5 UJV
Isophorone	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 UV
Nitrobenzene	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
N-Nitrosodimethylamine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UT	170 UT	28R001	85	85 UT	85 UV
N-Nitrosodiphenylamine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UJ	170 UJ	28R001	85	85 UJ	85 UJV
N-Nitrosodipropylamine	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
Phenols																
2,3,4,5-Tetrachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 UJ	1700 UJ	28R001	850	850 UJ	850 UJV
2,3,5,6-Tetrachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 UV
2,4,5-Trichlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	830 U	830 U	28R001	420	420 U	420 UV
2,4,6-Trichlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
2,4-Dichlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	33 UT	28R001	17	17 UT	17 UV
2,4-Dimethylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	500 U	500 U	28R001	250	250 U	250 UV
2-Chlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	63 UT	70 UT	28R001	33	33 UT	35 UV
2-Methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 U	170 U	28R001	85	85 U	85 UV

Table D5.1-5. Summary Statistics for All Analytes for Above Falls Fish Tissues.

					Detected Concentrations						Detected and Nondetected Concentrations					
Analyte	Units	# Analyzed	# Detected	% Detected	Minimum[a]	Maximum[a]	Maximum Location	Mean	Median[b]	95th[b]	Minimum (full DL)[a]	Maximum (full DL)[a]	Maximum Location	Mean (half DL)	Median (half DL)[b]	95th (half DL)[b]
2-Nitrophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 UV
4,6-Dinitro-2-methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	3300 U	3300 U	28R001	1700	1700 U	1700 UV
4-Chloro-3-methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 UV
4-Methylphenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	33 UT	120 UT	28R001	31	17 UT	56 UV
4-Nitrophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	1700 U	1700 U	28R001	850	850 U	850 UV
Pentachlorophenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	170 UJT	170 UJT	28R001	85	85 UT	85 UV
Phenol	µg/kg-Wet	3	0	0	--	--	--	--	--	--	330 U	330 U	28R001	170	170 U	170 UV

Notes:

[a] Whenever several result values match maximum or minimum value, qualifier preference has been given in the following order: U over J over A over N over T over no qualification.

[b] Median is the exact result value ranking as the 0.50 percentile in an ascending list of all results, and 95th percentile is the exact result value of the 0.95 ranking result. When the ascending list of all results doesn't produce an exact match to the corresponding percentile rank, average of two adjacent results ranking closest to 0.50 percentile is the median, and an interpolated value is the 95th percentile. Such median or 95th percentile value is always qualified with "V". It is qualified with "U" if both results ranking immediately above and below the corresponding percentile are "U" qualified, and with "J" if at least one of the results is "J" qualified.

[c] Total PCBs are total PCB congeners whenever available and total Aroclors if not.

[d] Total PCBs are total Aroclors.

Reason codes for qualifiers:

A - Total value based on limited number of analytes.
J - The associated numerical value is an estimated quantity.
N - Presumptive evidence of presence of material; identification of the compound is not definitive.
T - The associated numerical value was mathematically derived (e.g., from summing multiple analyte results such as Aroclors, or calculating the average of multiple results for a single analyte). Also indicates all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods) for the Round 2 data.
U - The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
V - Median or 95th percentile obtained through interpolation.

-- data not available.
BaPEq - benzo(a)pyrene equivalent
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DL - detection limit
ND - non-detect
PAH - polycyclic aromatic hydrocarbon
PBDE - polybrominated diphenyl ether
PCB - polychlorinated biphenyl
PCDD/Fs - dioxins/furans
TEQ - toxicity equivalent

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REMEDIAL INVESTIGATION REPORT

APPENDIX D5.2
BIOTA BOX-WHISKER PLOTS AND SCATTER PLOTS (FOR ICS NOT PRESENTED IN MAIN REPORT)

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August 29, 2011

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Figure D5.2-3. Box-Whisker Plot of Detected Total cPAH BaPEq Values and Low Molecular Weight PAHs in Biota by Sample Type, RM 0.8–12

Figure D5.2-4. Box-Whisker Plot of Detected High Molecular Weight PAHs and Hexachlorobenzene in Biota by Sample Type, RM 0.8–12

Figure D5.2-5. Box-Whisker Plot of Detected Cadmium and gamma-Hexachlorocyclohexane in Biota by Sample Type, RM 0.8–12

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Figure D5.2-9a-j. Scatter Plot of Total of 2,4' and 4,4'-DDE in Tissue Samples by River Mile, RM 0.8–12.2

Figure D5.2-10a-j. Scatter Plot of Total of 2,4' and 4,4'-DDD in Tissue Samples by River Mile, RM 0.8–12.2

Figure D5-2-11. Scatter Plot of Total cPAH BaPEq Values in Tissue Samples by River Mile, RM 0.8–12.2

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Figure D5.2-14a-j. Scatter Plot of Hexachlorobenzene in Tissue Samples by River Mile, RM 0.8–12.2

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Figure D5.2-17a-j. Scatter Plot of Lead in Tissue Samples by River Mile, RM 0.8–12.2

Figure D5.2-18a-j. Scatter Plot of Mercury in Tissue Samples by River Mile, RM 0.8–12.2

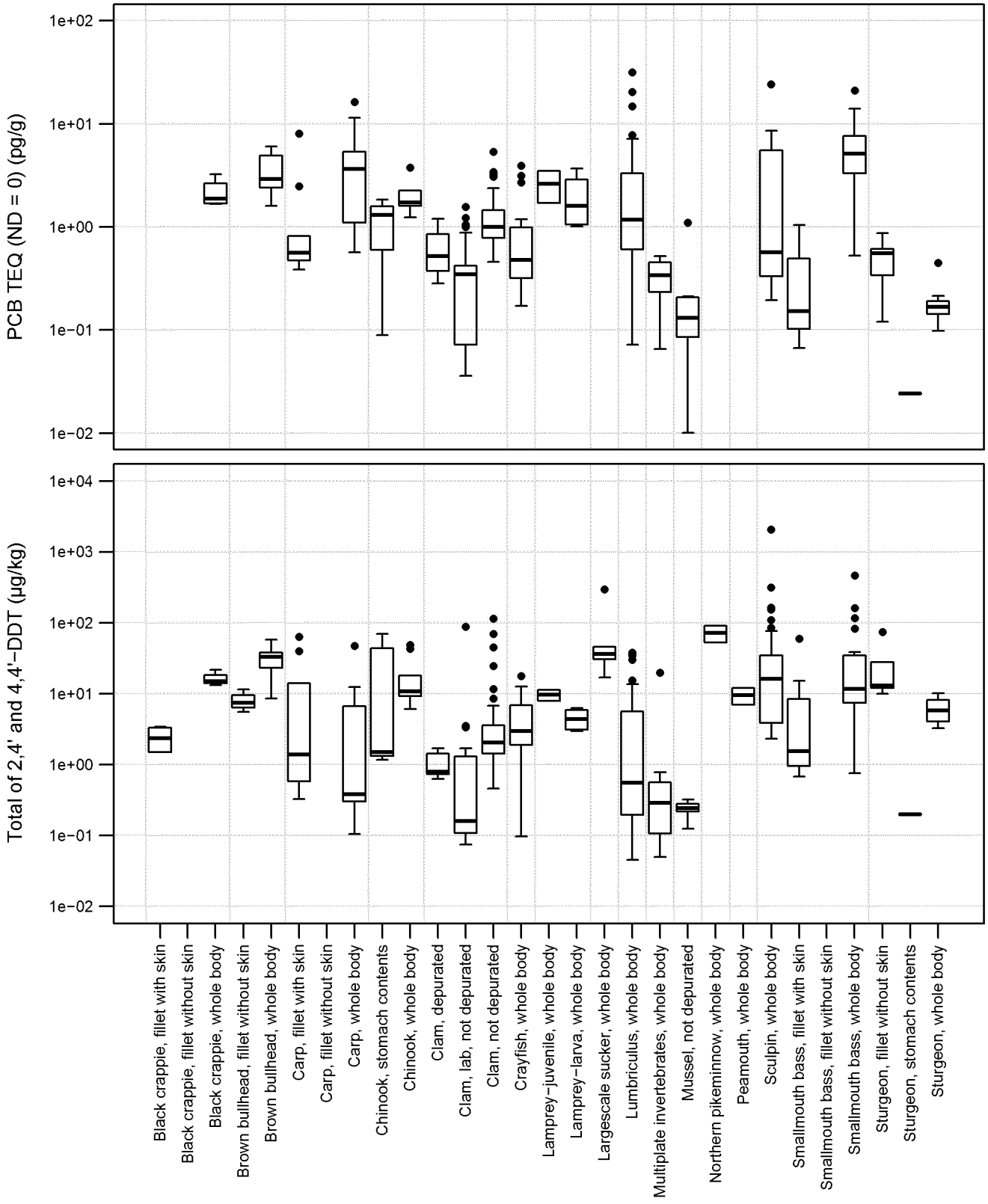

Figure D5.2-1
Portland Harbor RI/FS
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Box−Whisker Plot of Detected PCB TEQ (ND = 0)
and Total DDT Isomers in Biota
by Sample Type, RM 0.8−12.2

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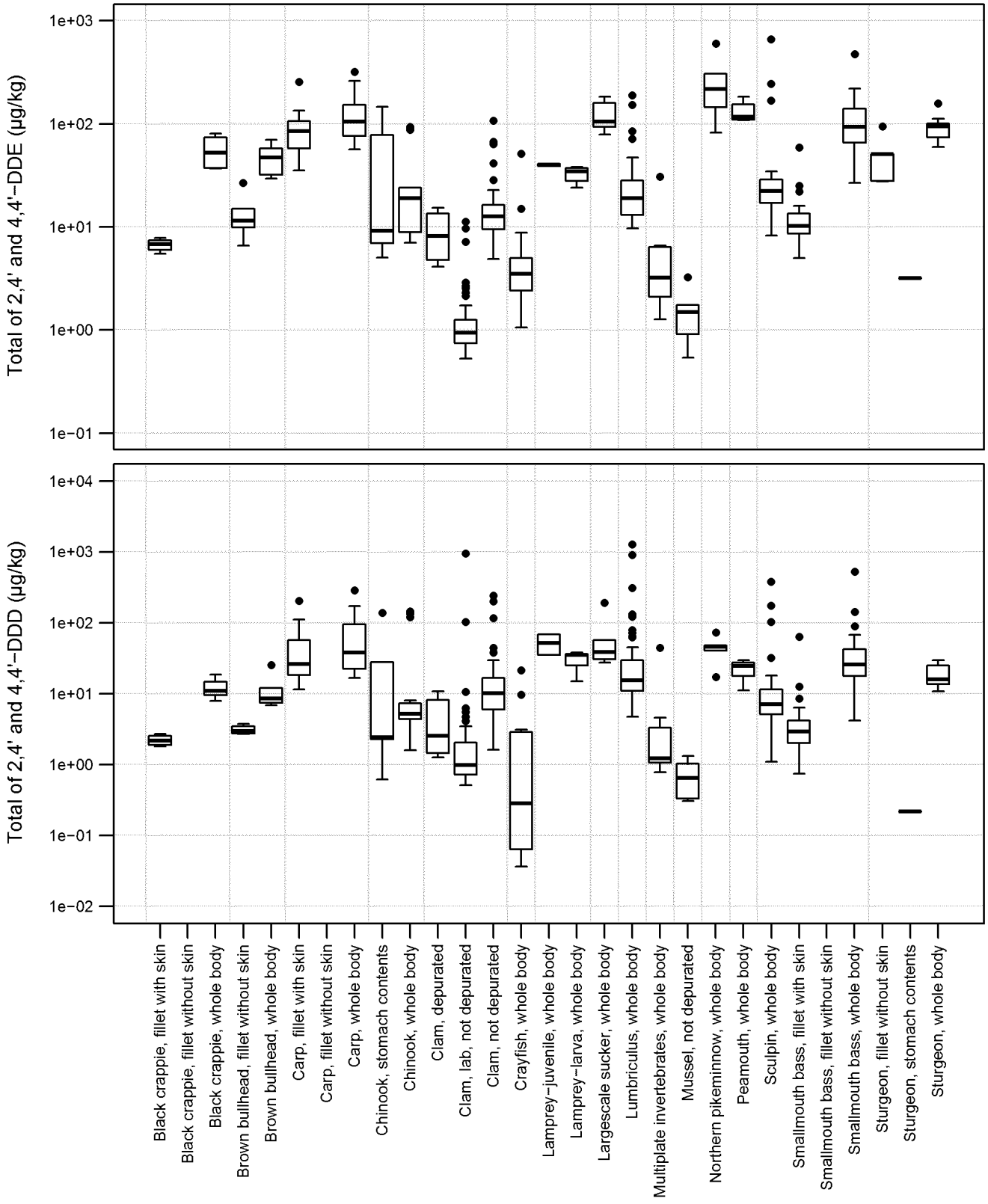

Figure D5.2-2
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Box−Whisker Plot of Detected Total DDE Isomers
and Total DDD Isomers in Biota
by Sample Type, RM 0.8−12.2

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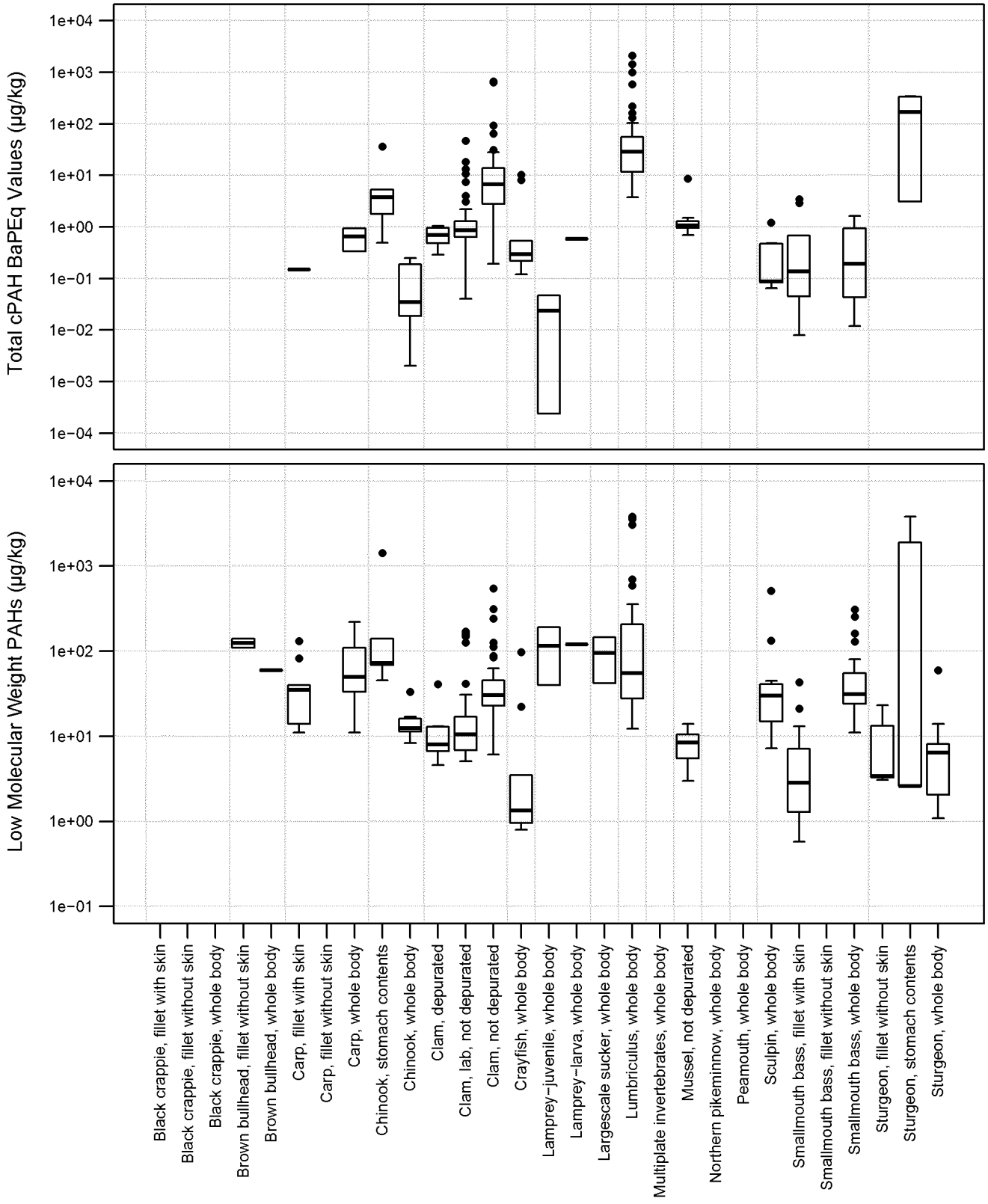

Figure D5.2-3
Portland Harbor RI/FS
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Box−Whisker Plot of Detected Total cPAH BaPEq Values
and Low Molecular Weight PAHs in Biota
by Sample Type, RM 0.8−12.2

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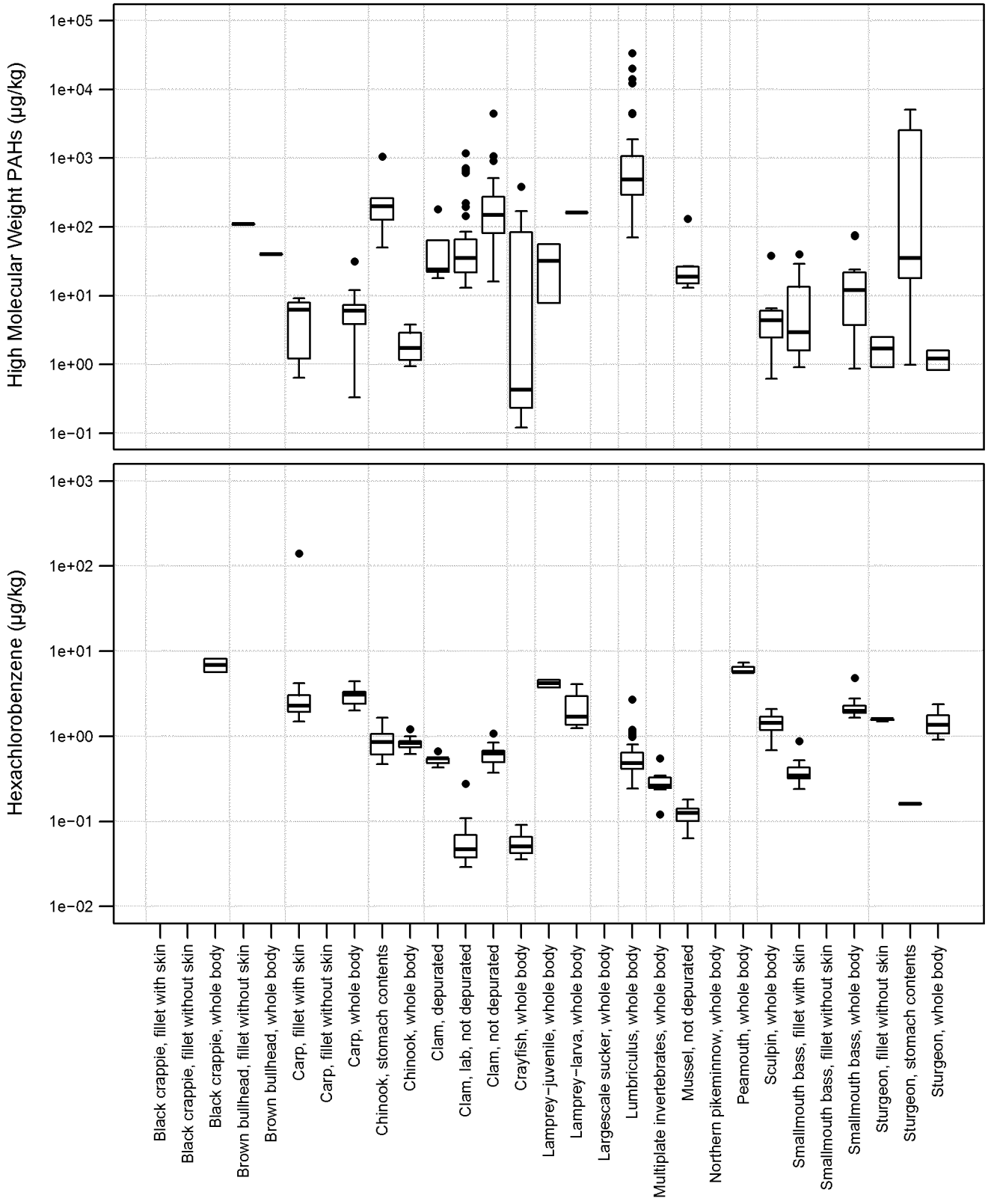

Figure D5.2-4
Portland Harbor RI/FS
Remedial Investigation Report
Box−Whisker Plot of Detected High Molecular Weight PAHs
and Hexachlorobenzene in Biota
by Sample Type, RM 0.8−12.2

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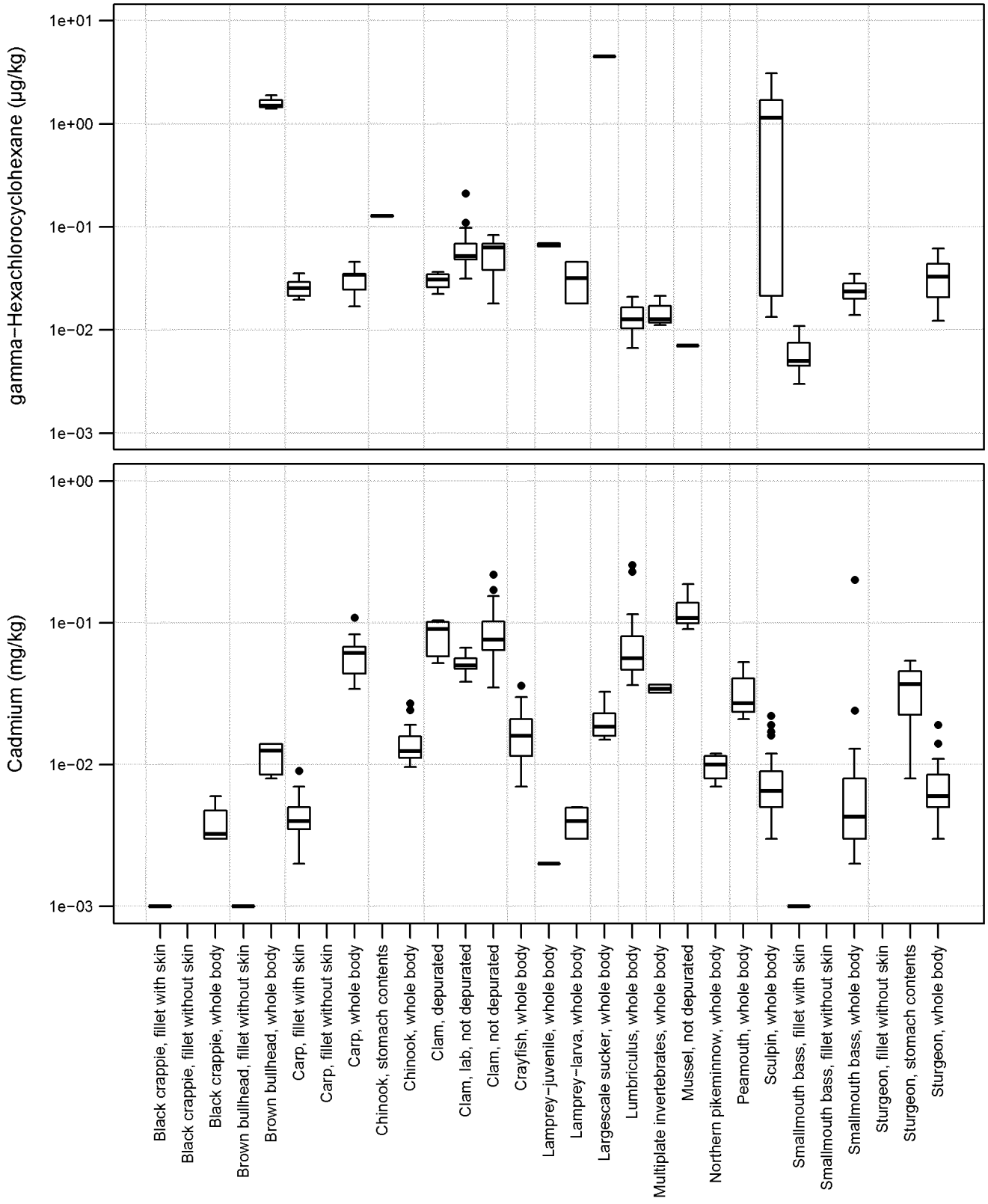

Figure D5.2-5
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Remedial Investigation Report
Box−Whisker Plot of Detected Cadmium
and gamma−Hexachlorocyclohexane in Biota
by Sample Type, RM 0.8−12.2

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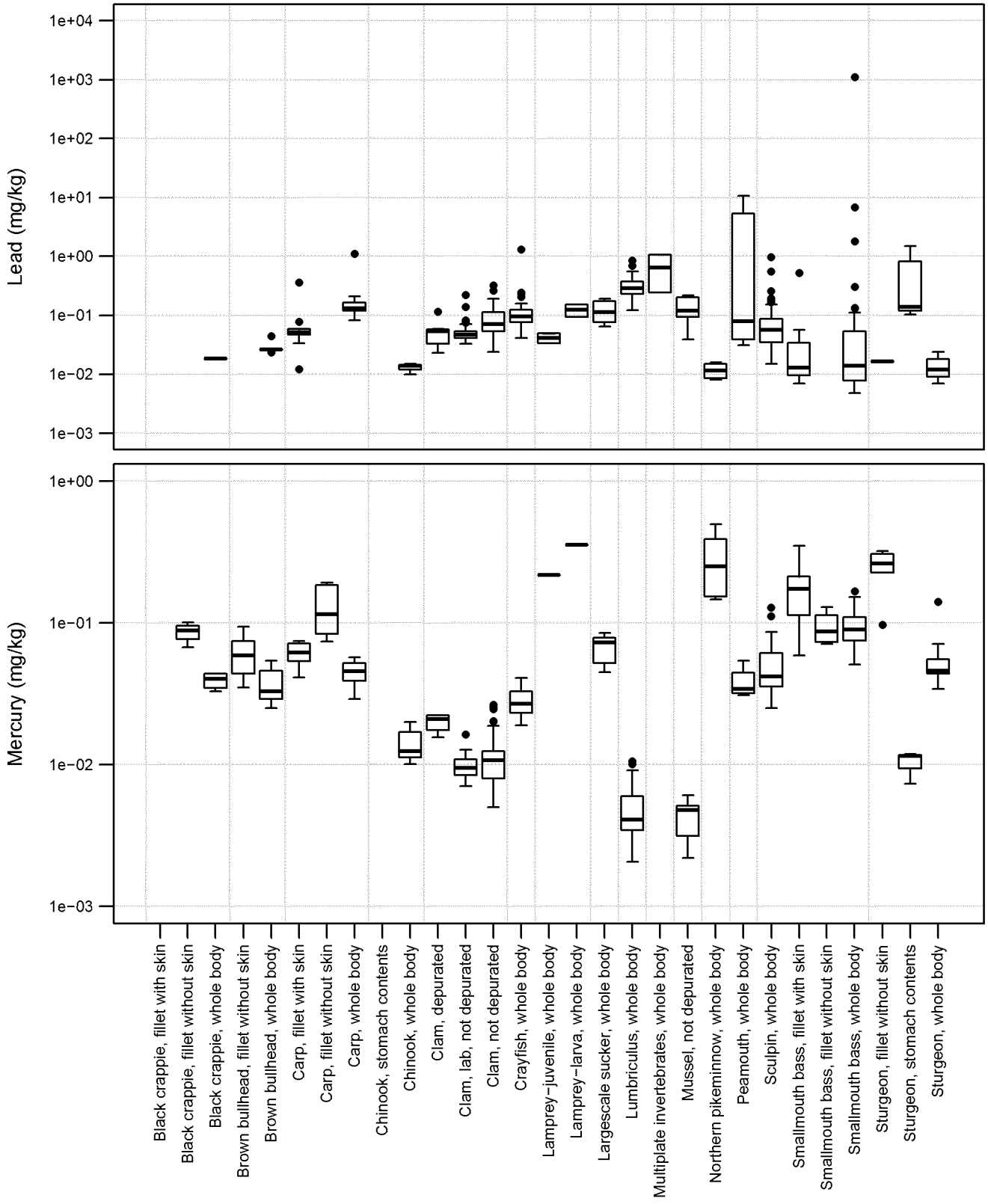

Figure D5.2-6
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Box−Whisker Plot of Detected Lead
and Mercury in Biota
by Sample Type, RM 0.8−12.2

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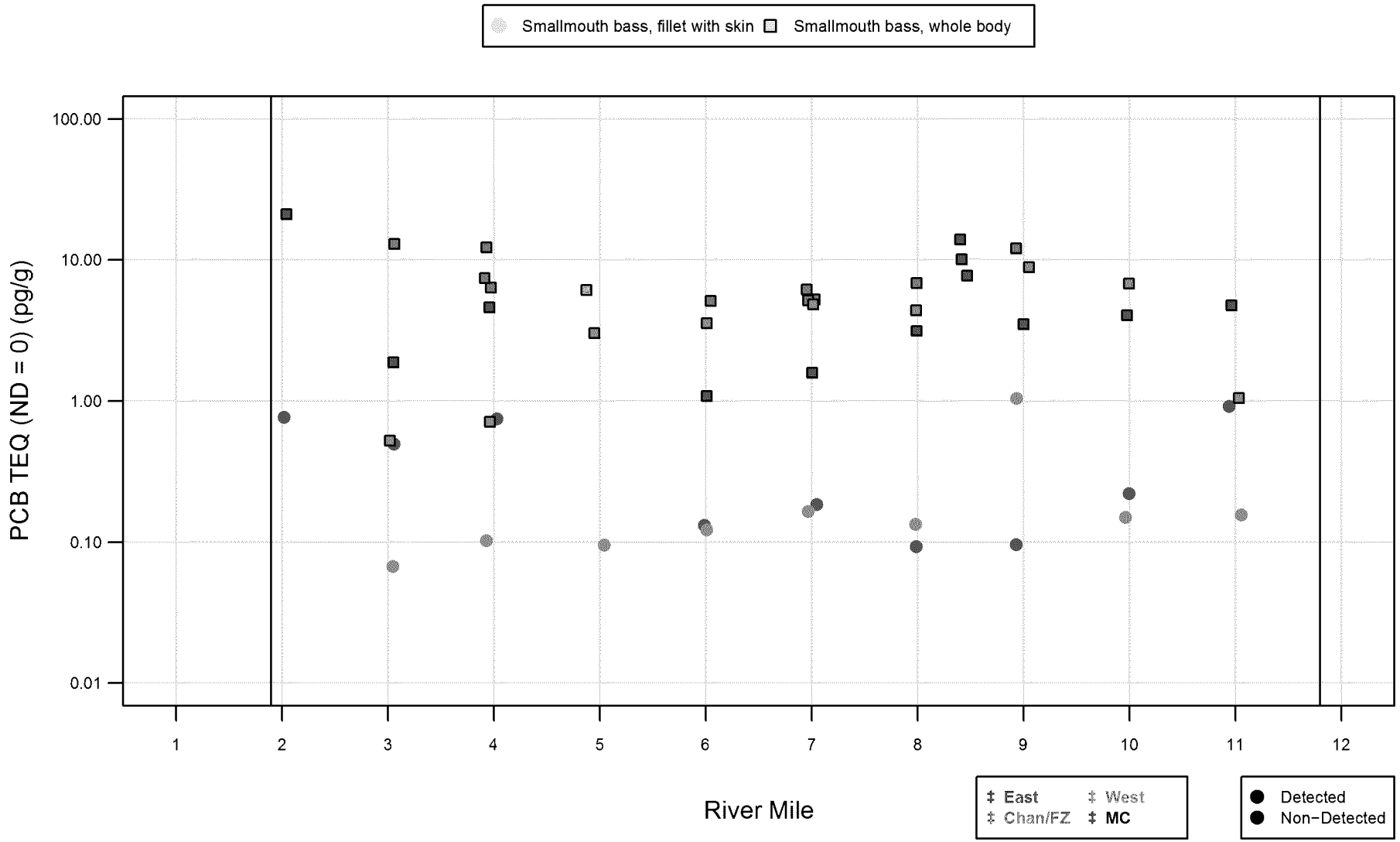

Figure D5.2-7a

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Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
Tissue Samples by River Mile, RM 0.8−12.2

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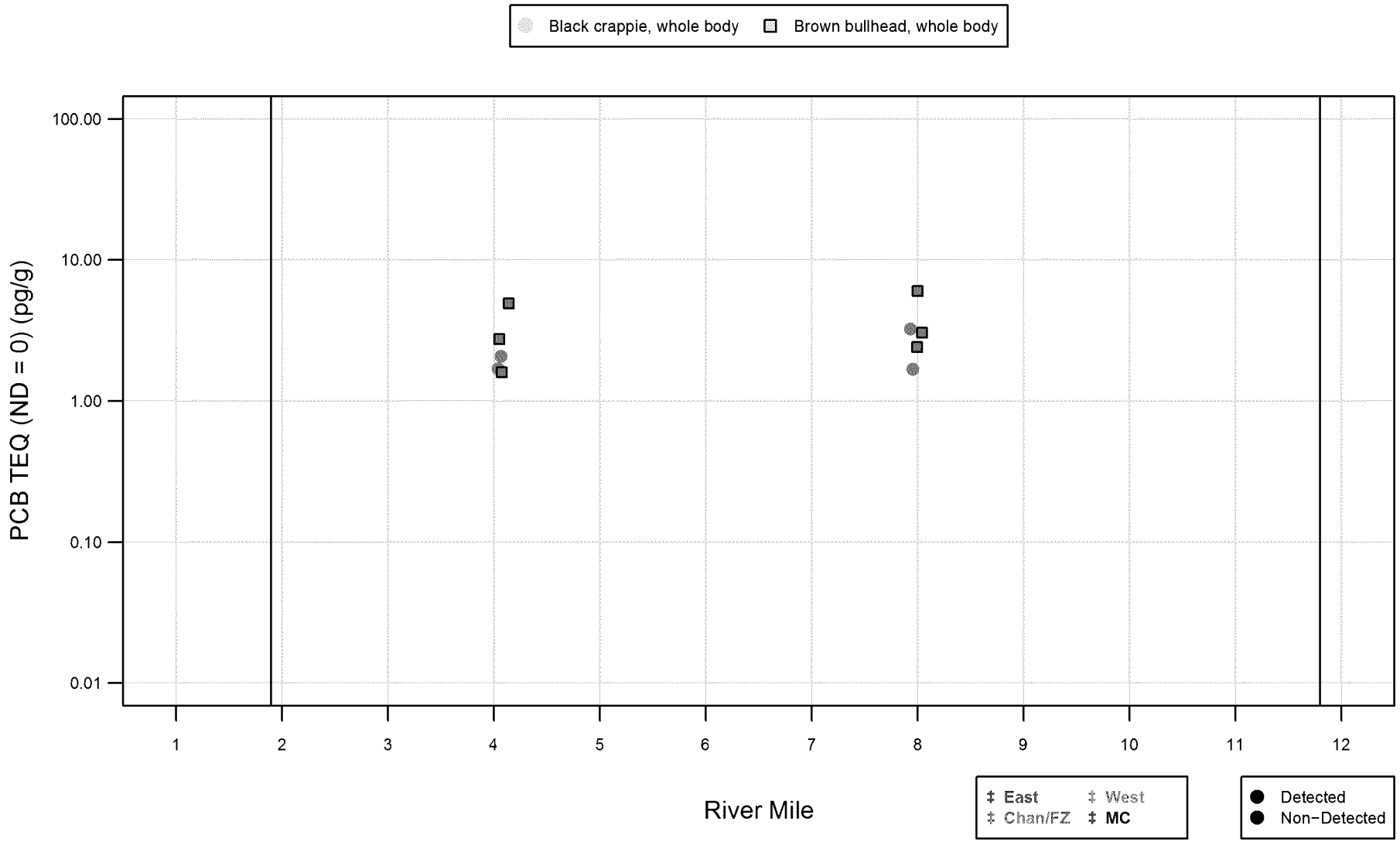

Figure D5.2-7b

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Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
Tissue Samples by River Mile, RM 0.8−12.2

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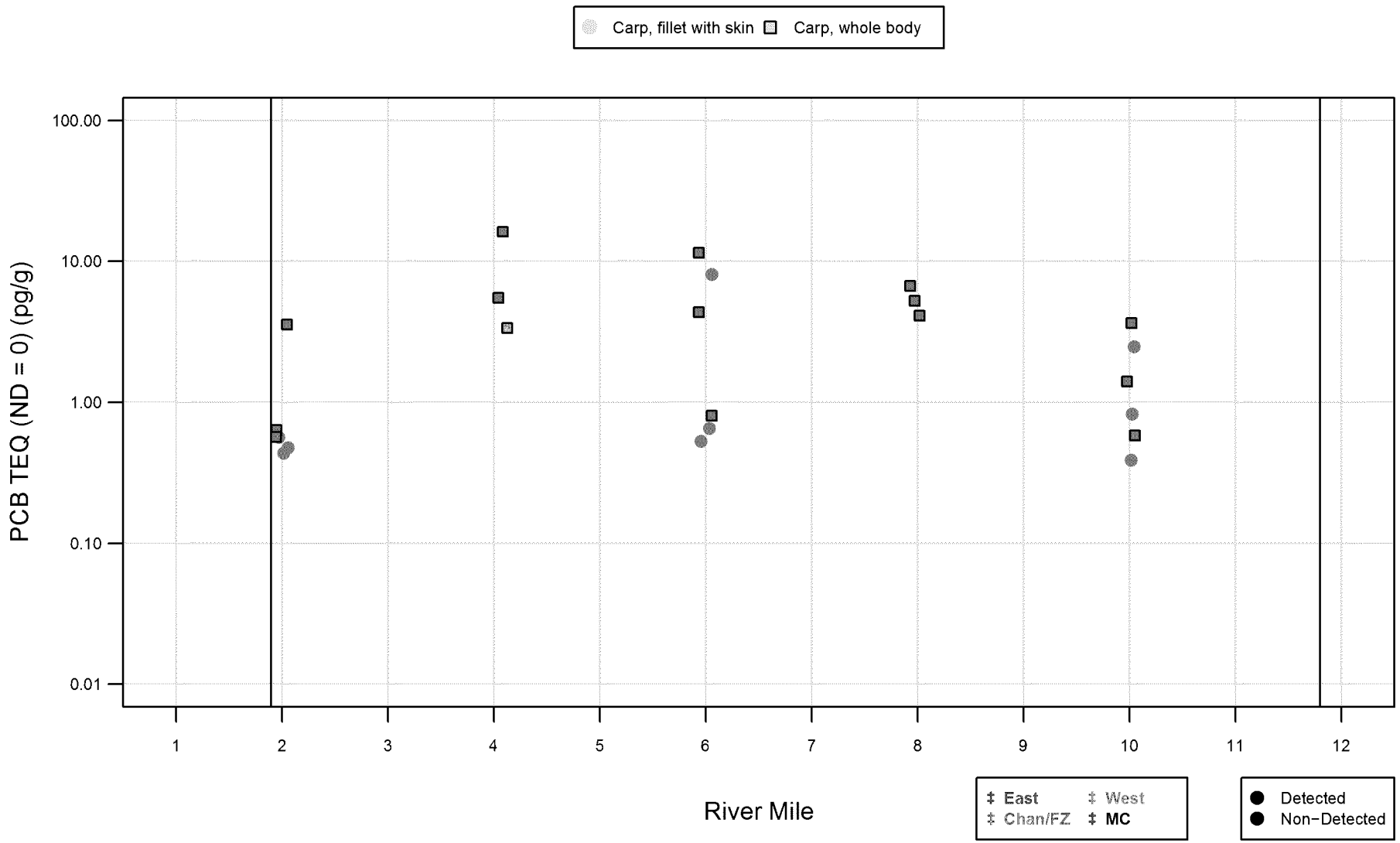

Figure D5.2-7c

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
Tissue Samples by River Mile, RM 0.8−12.2

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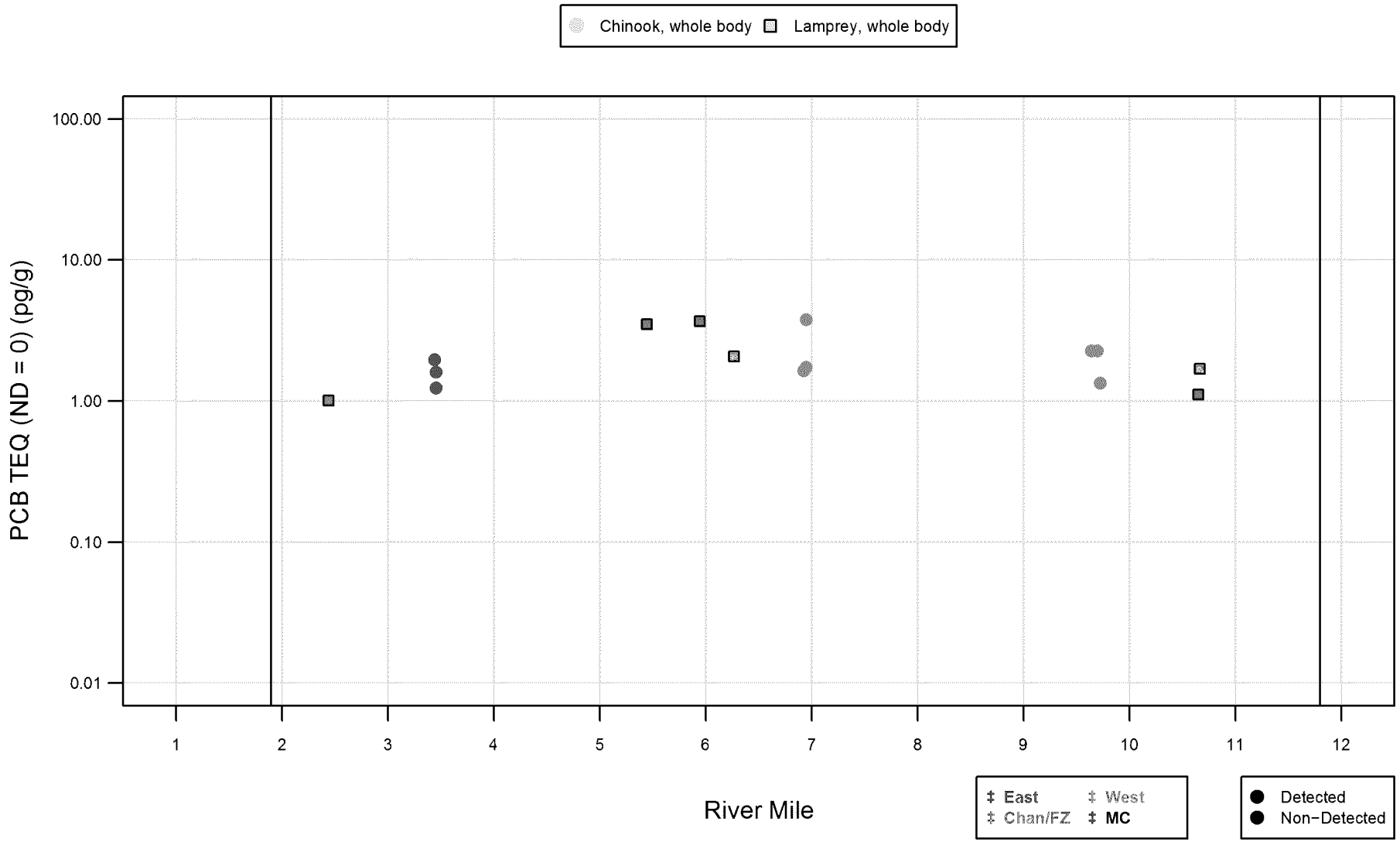

Figure D5.2-7d

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
Tissue Samples by River Mile, RM 0.8−12.2

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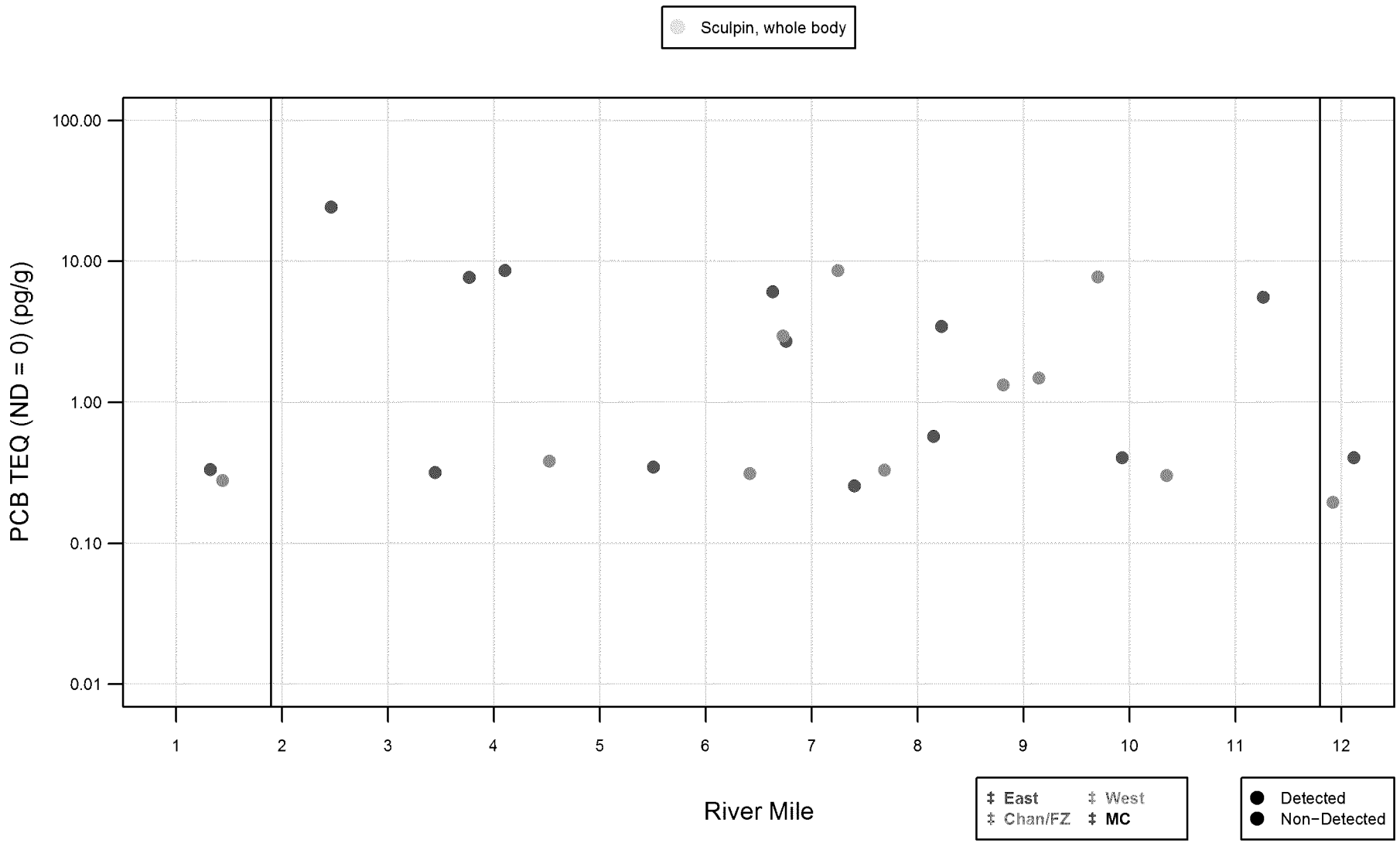

Figure D5.2-7e

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
Tissue Samples by River Mile, RM 0.8−12.2

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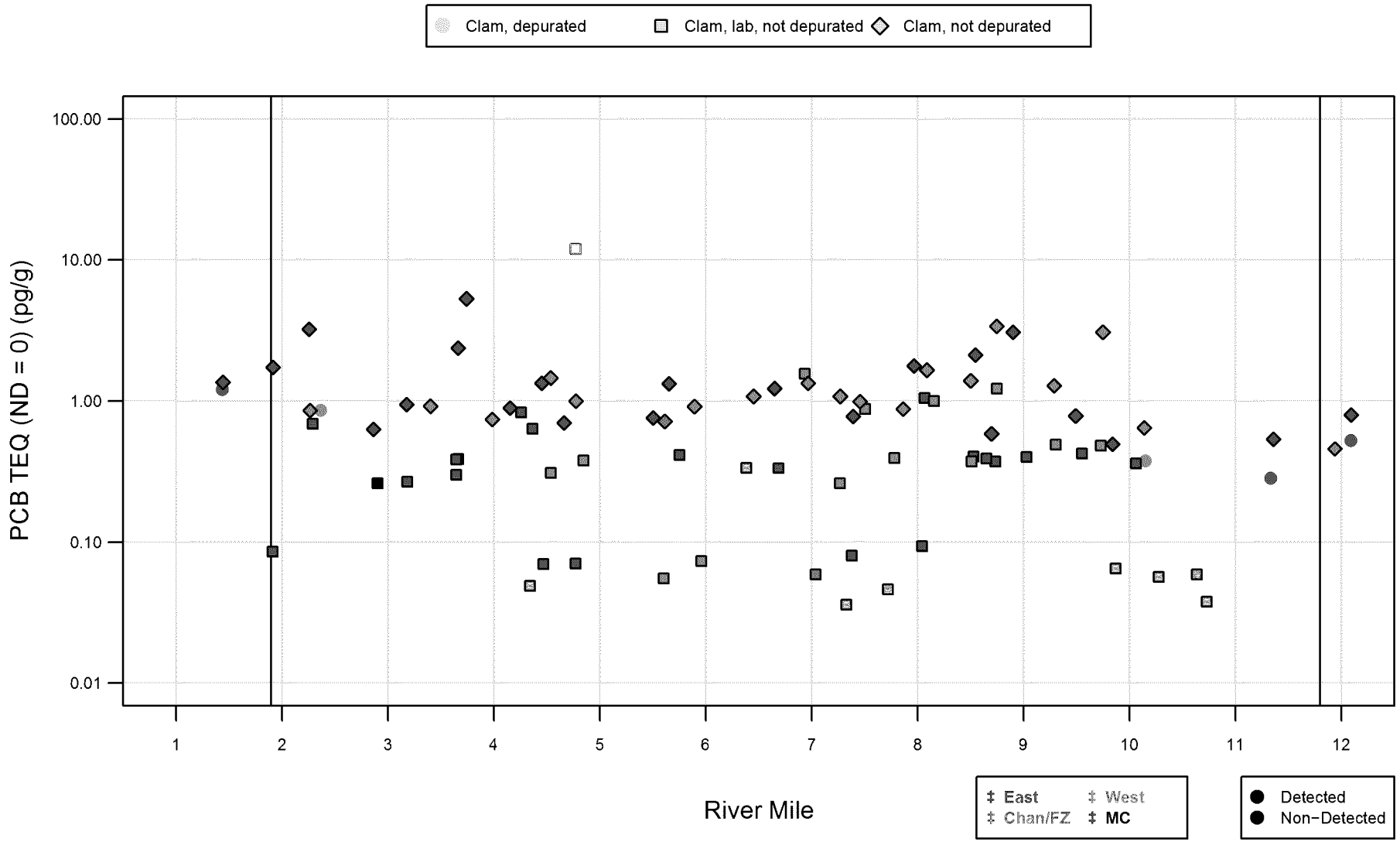

Figure D5.2-7f

Portland Harbor RI/FS
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Scatter Plot of PCB TEQ (ND = 0) in
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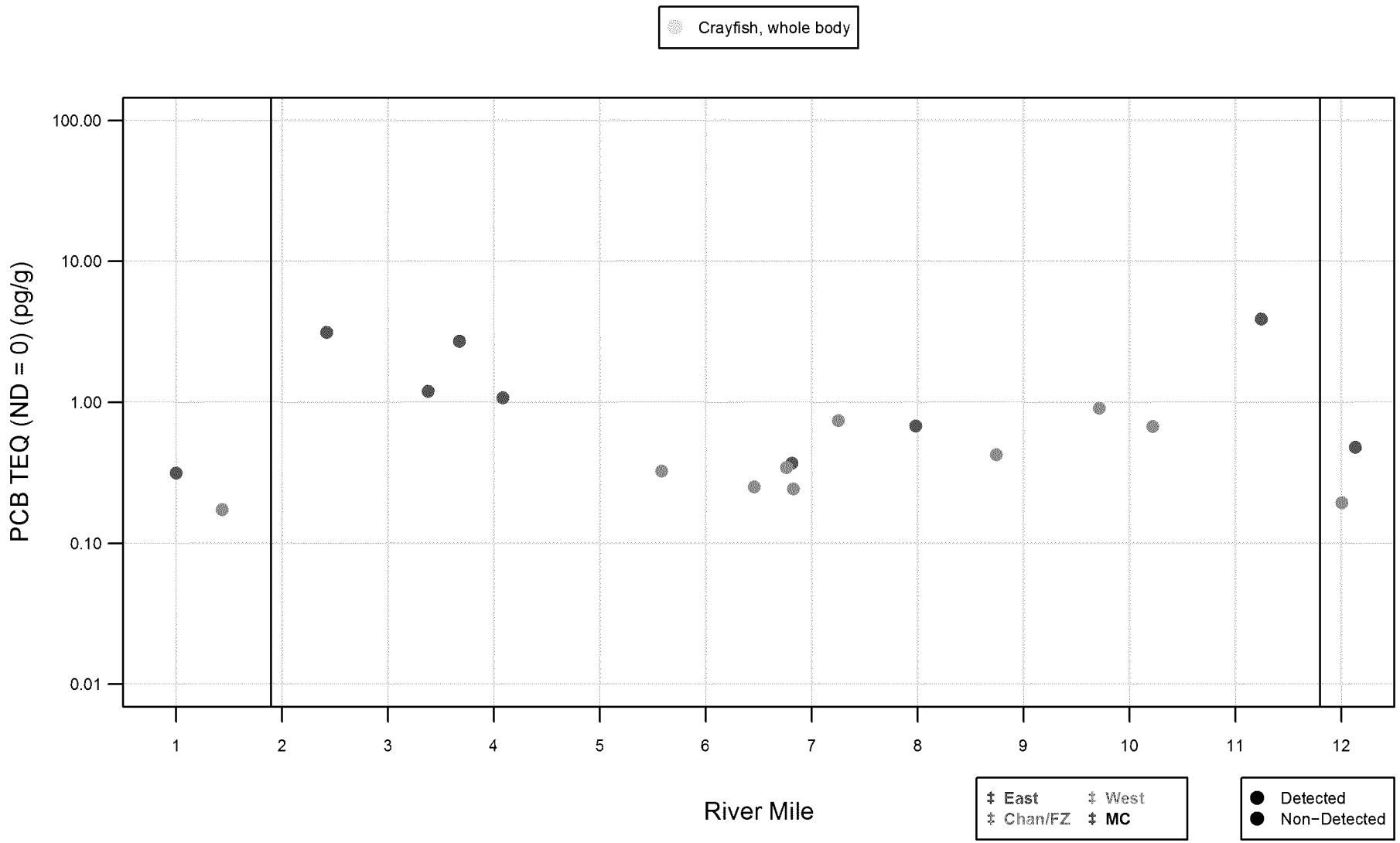

Figure D5.2-7g

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
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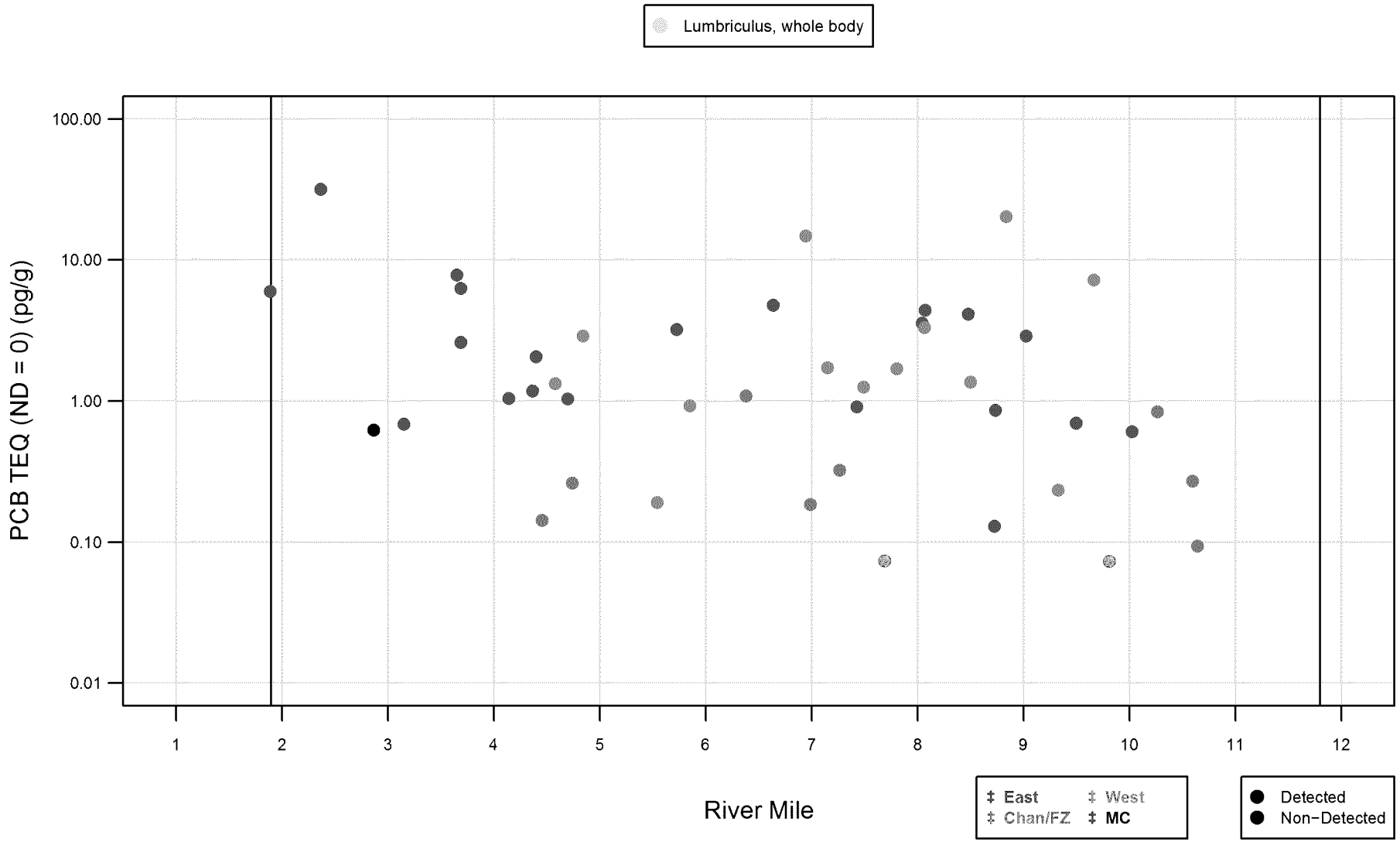

Figure D5.2-7h

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
Tissue Samples by River Mile, RM 0.8−12.2

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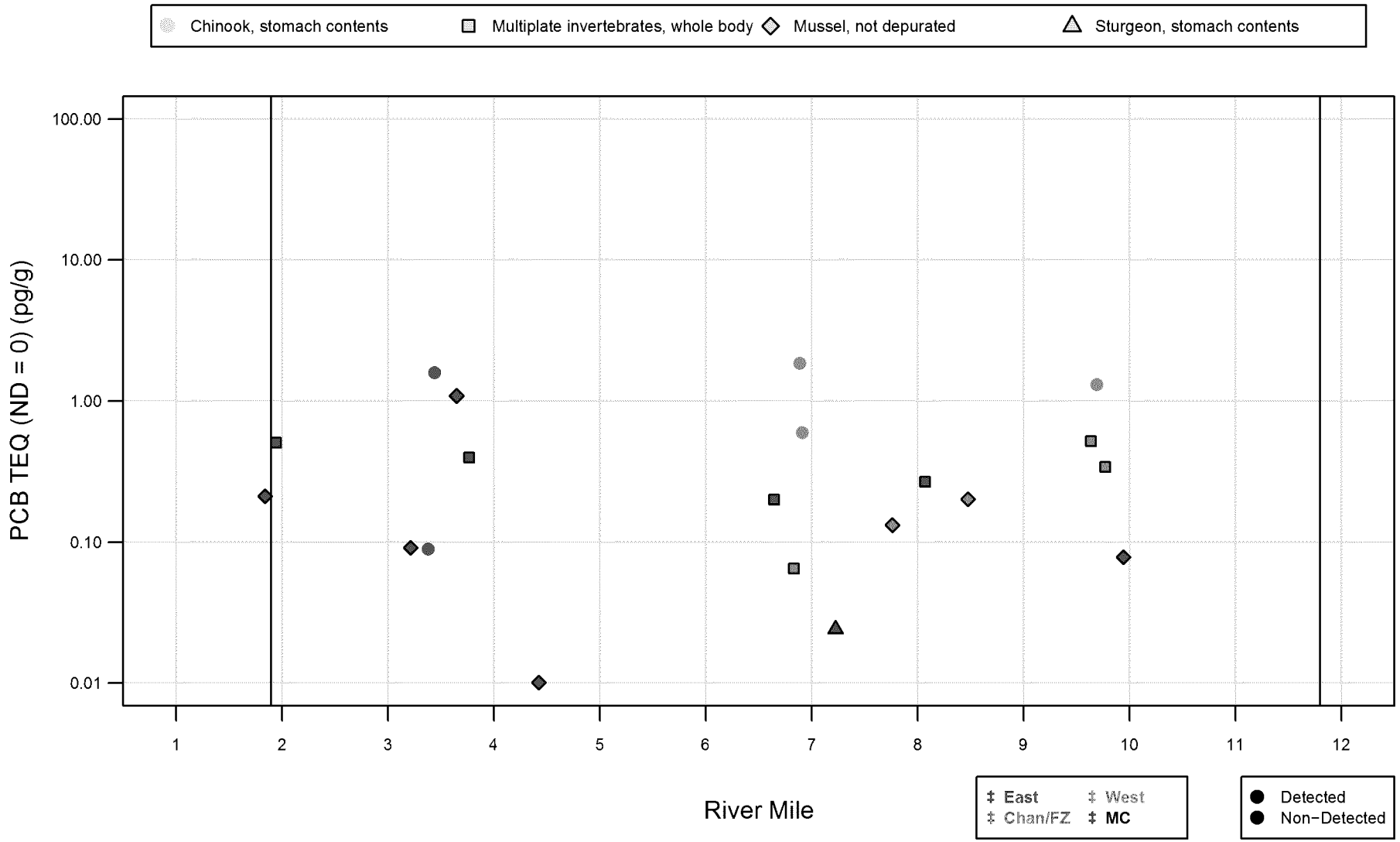

Figure D5.2-7i

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
Tissue Samples by River Mile, RM 0.8−12.2

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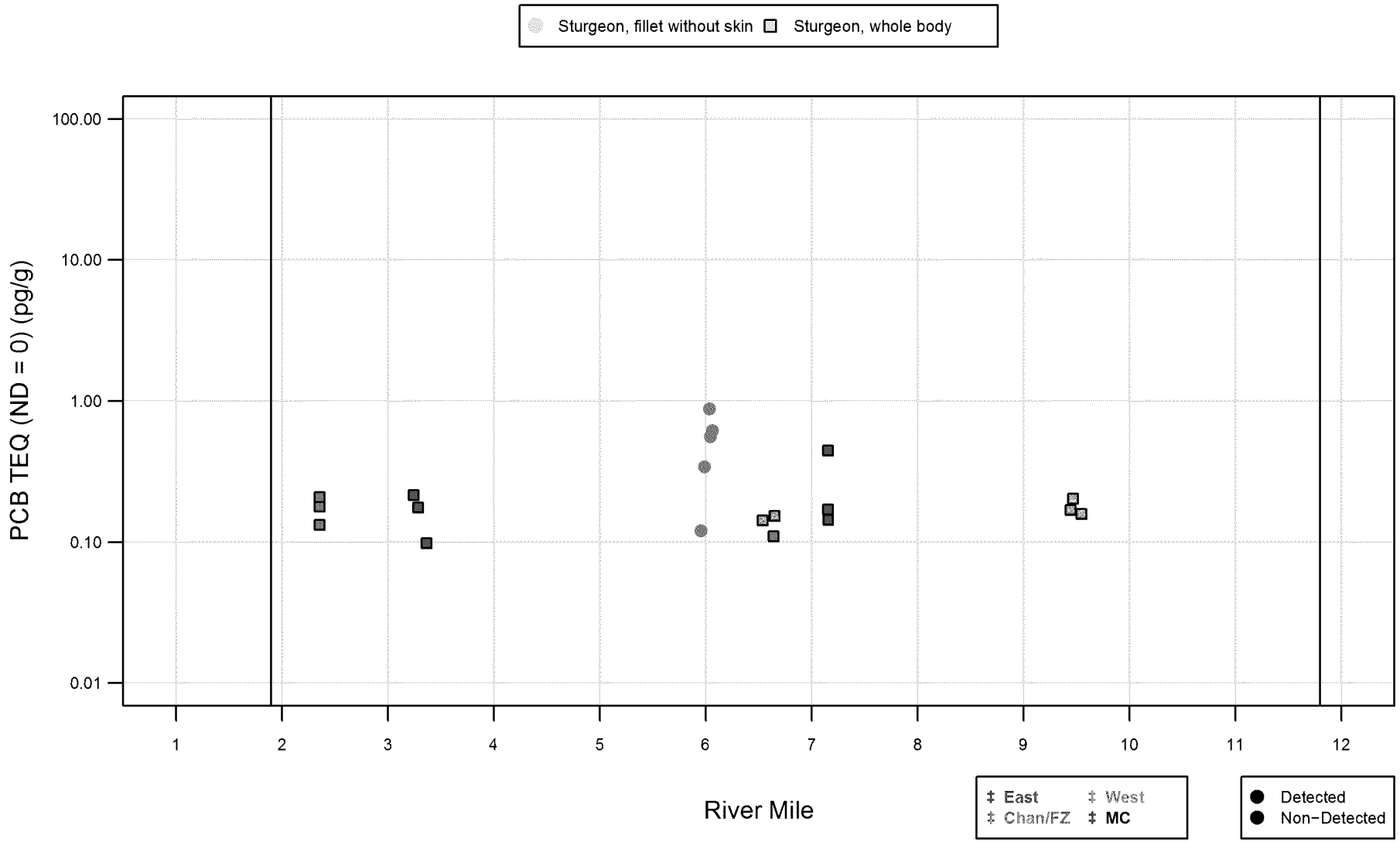

Figure D5.2-7j

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of PCB TEQ (ND = 0) in
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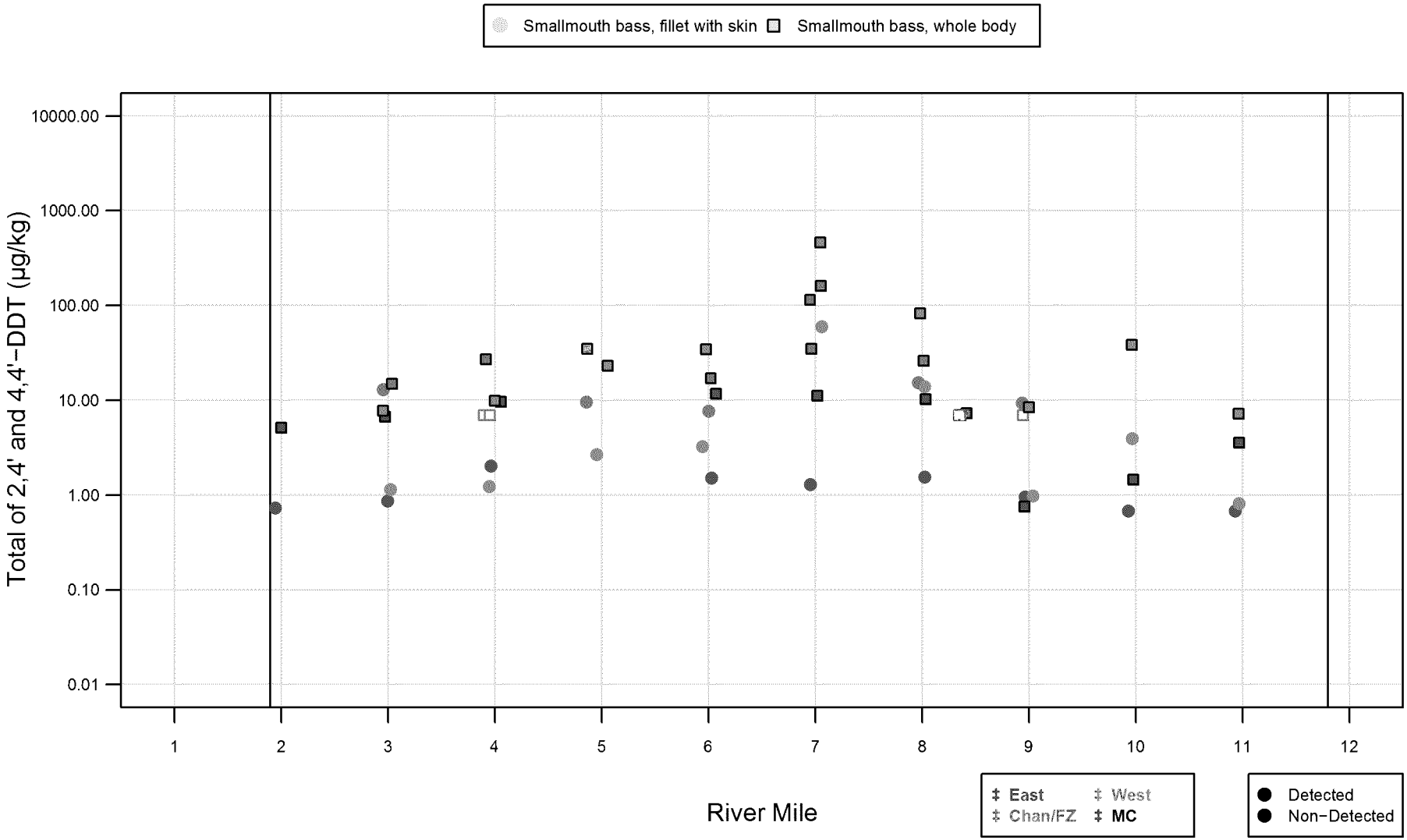

Figure D5.2-8a

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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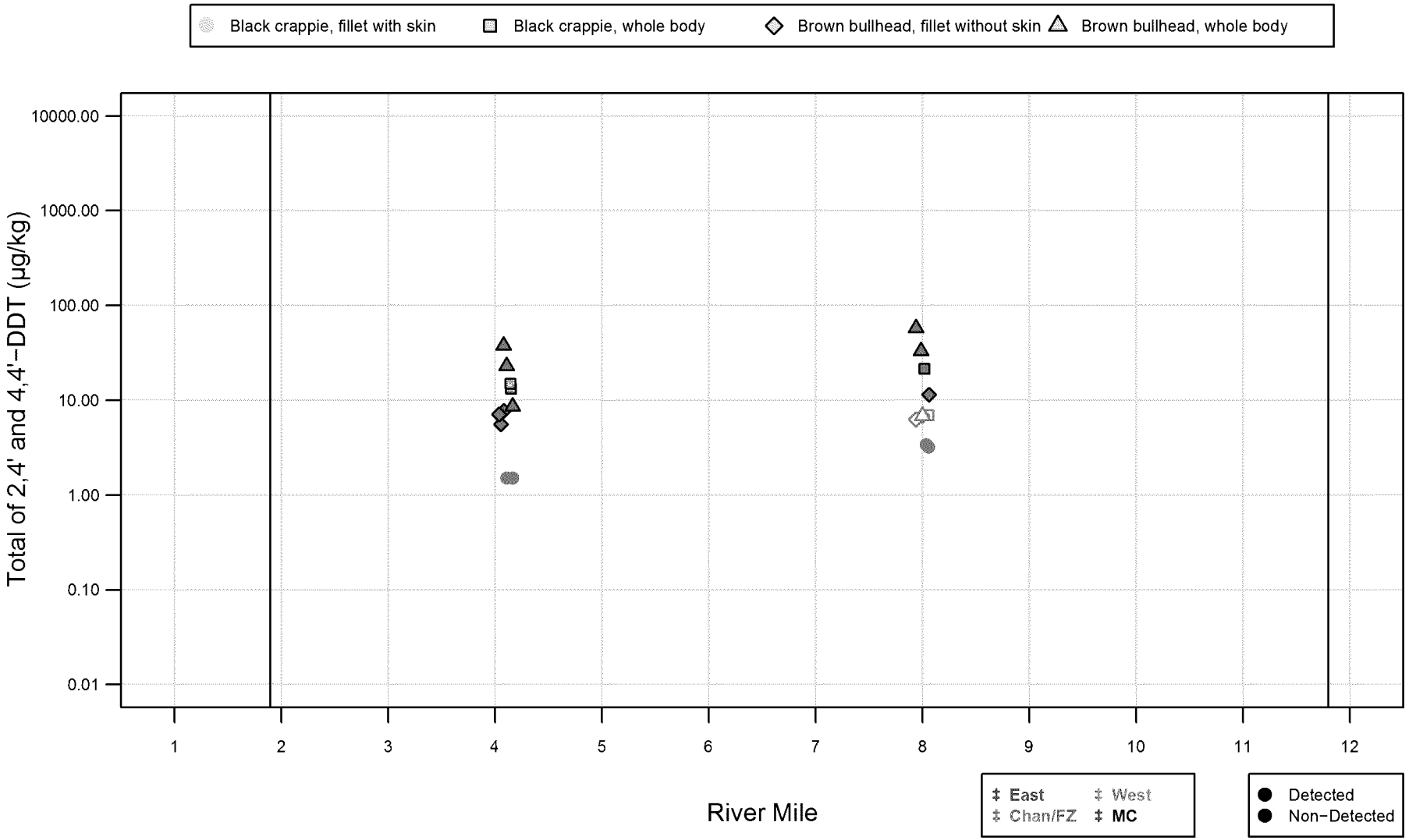

Figure D5.2-8b

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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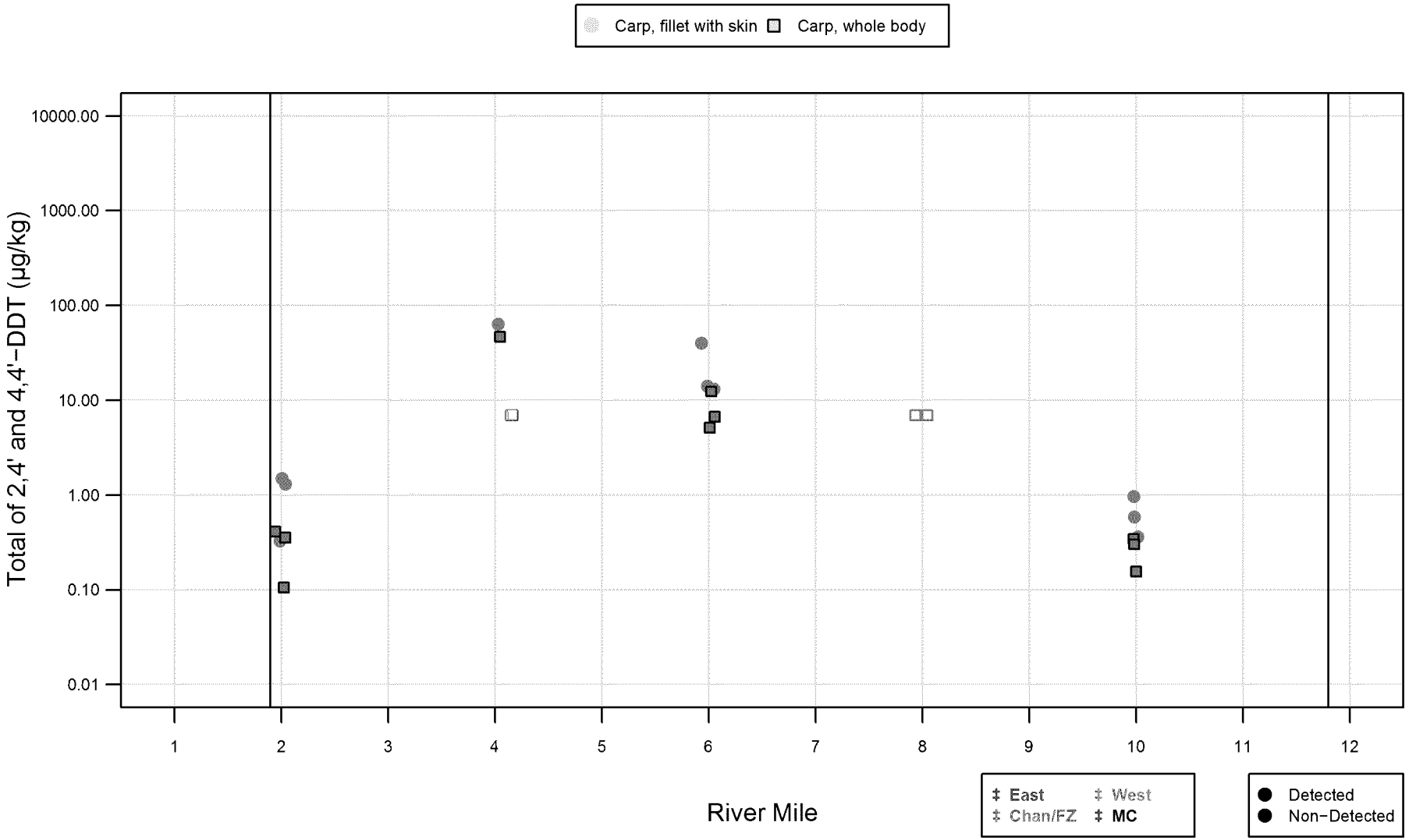

Figure D5.2-8c

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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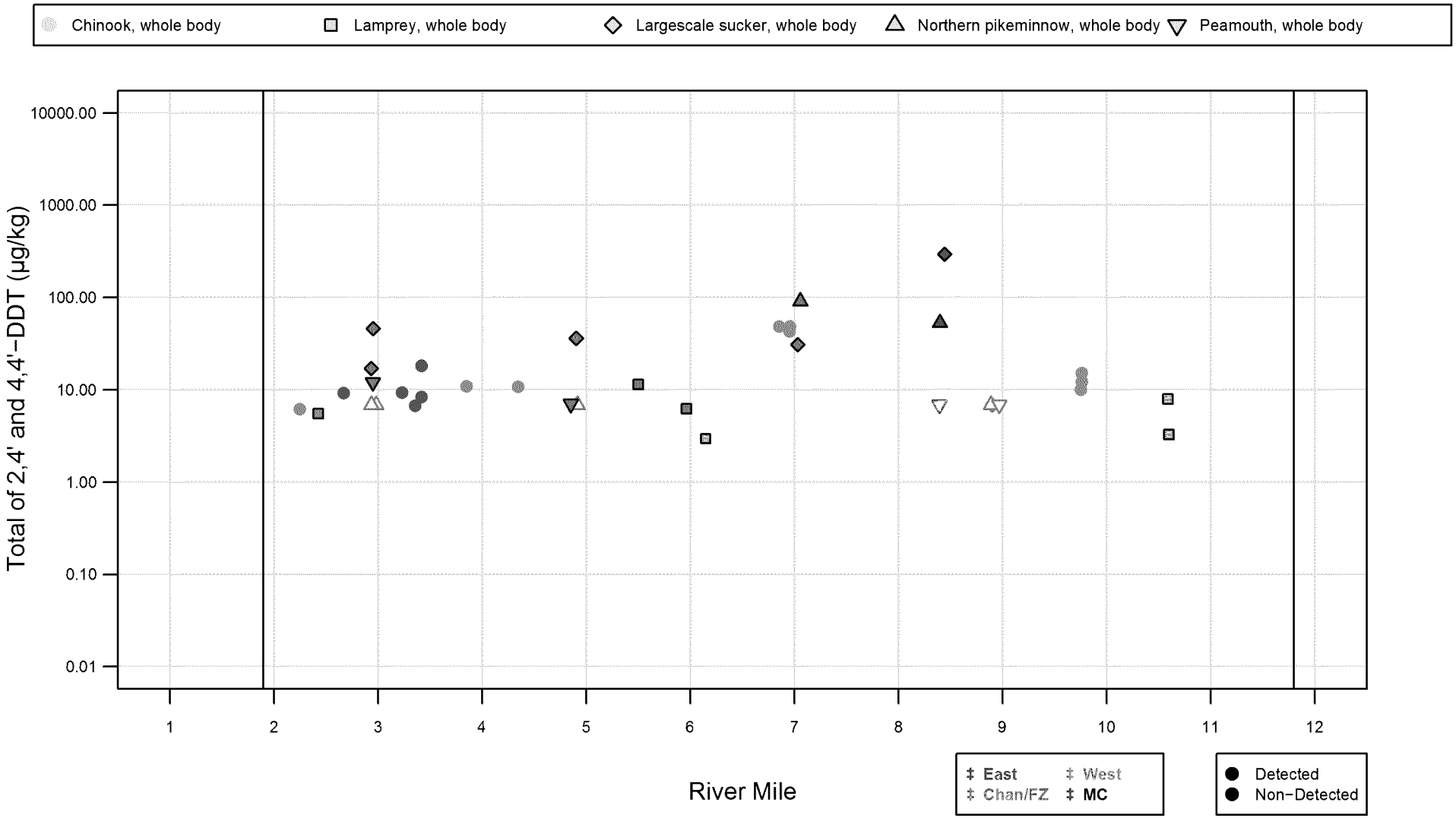

Figure D5.2-8d

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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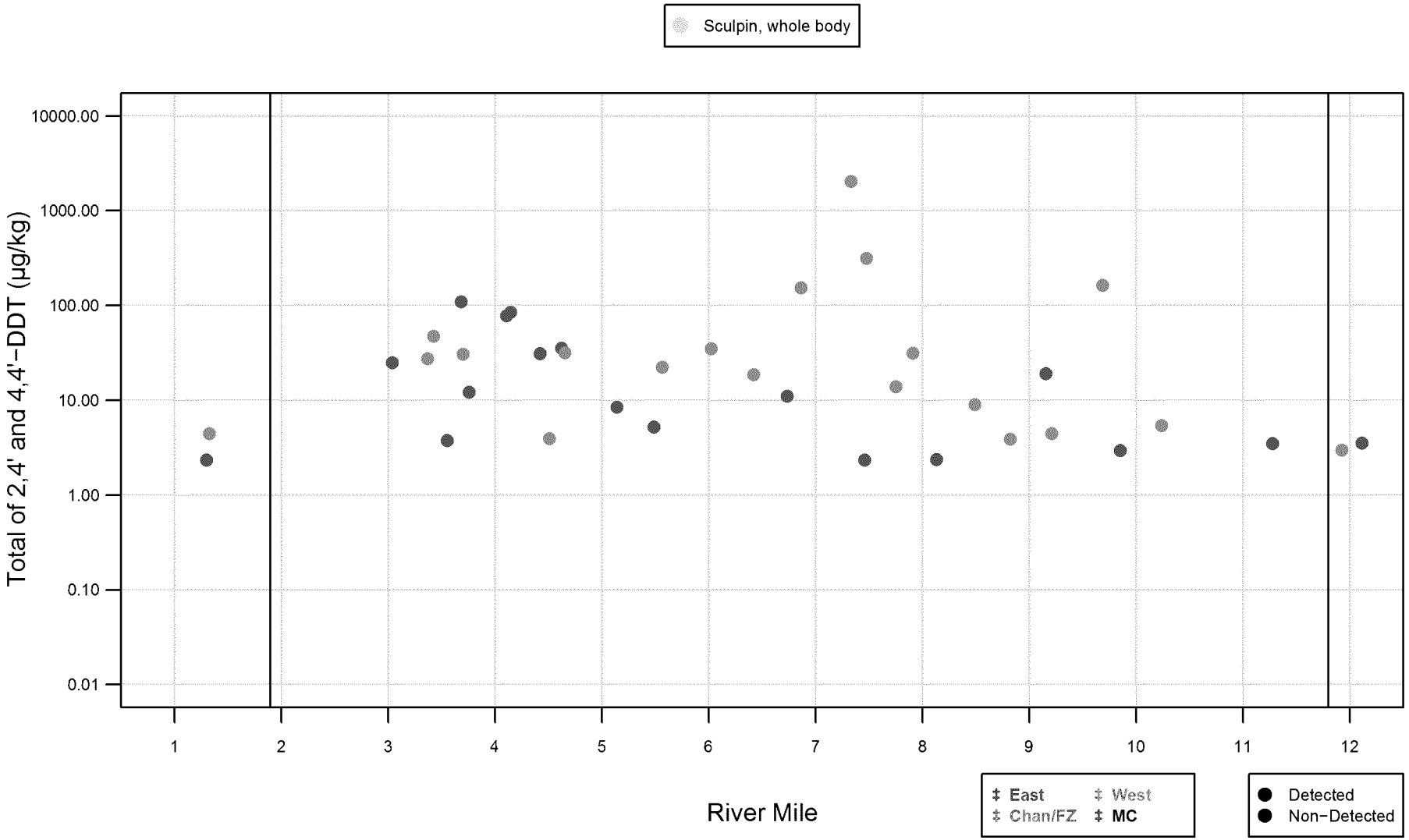

Figure D5.2-8e

Portland Harbor RI/FS
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Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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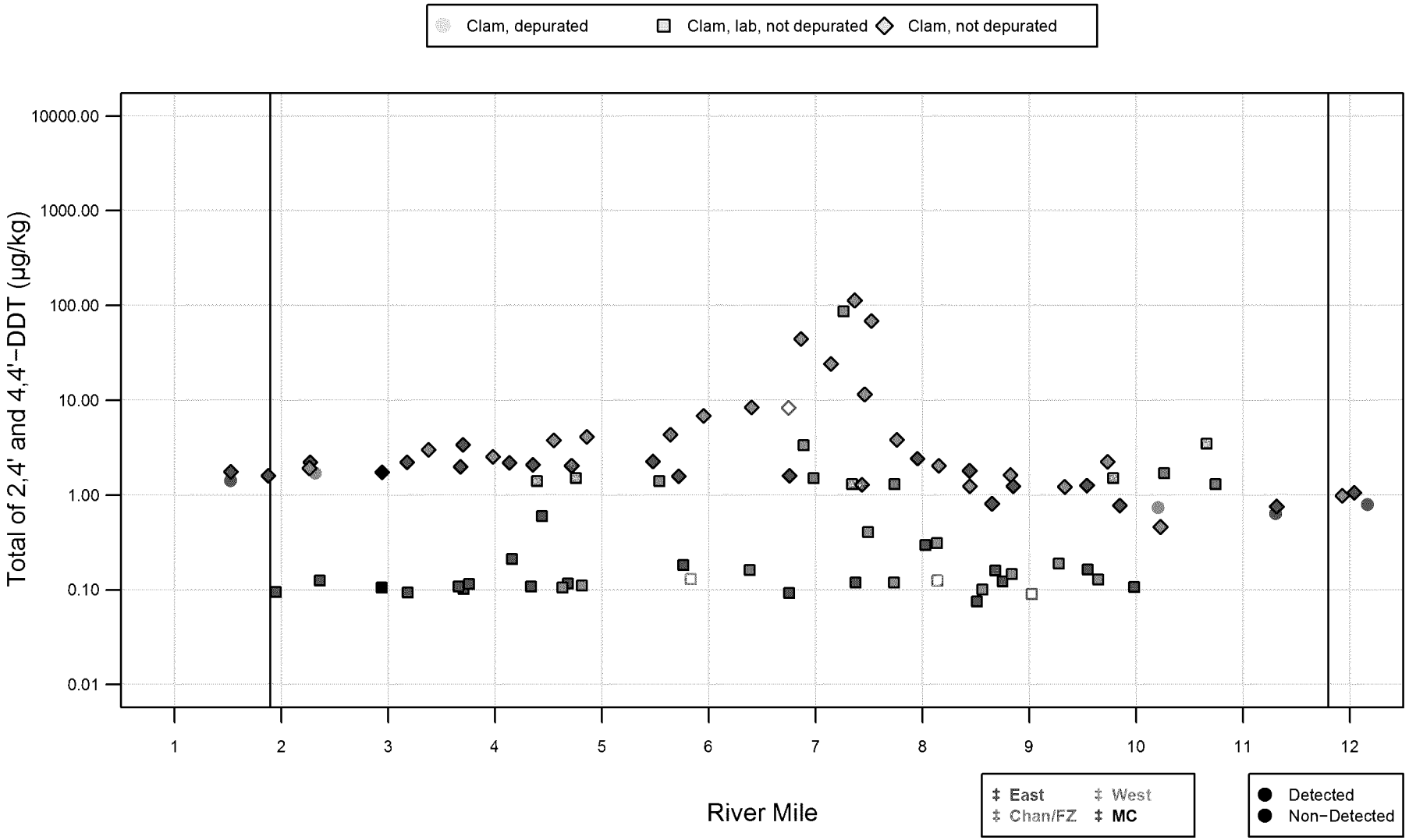

Figure D5.2-8f

Portland Harbor RI/FS
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Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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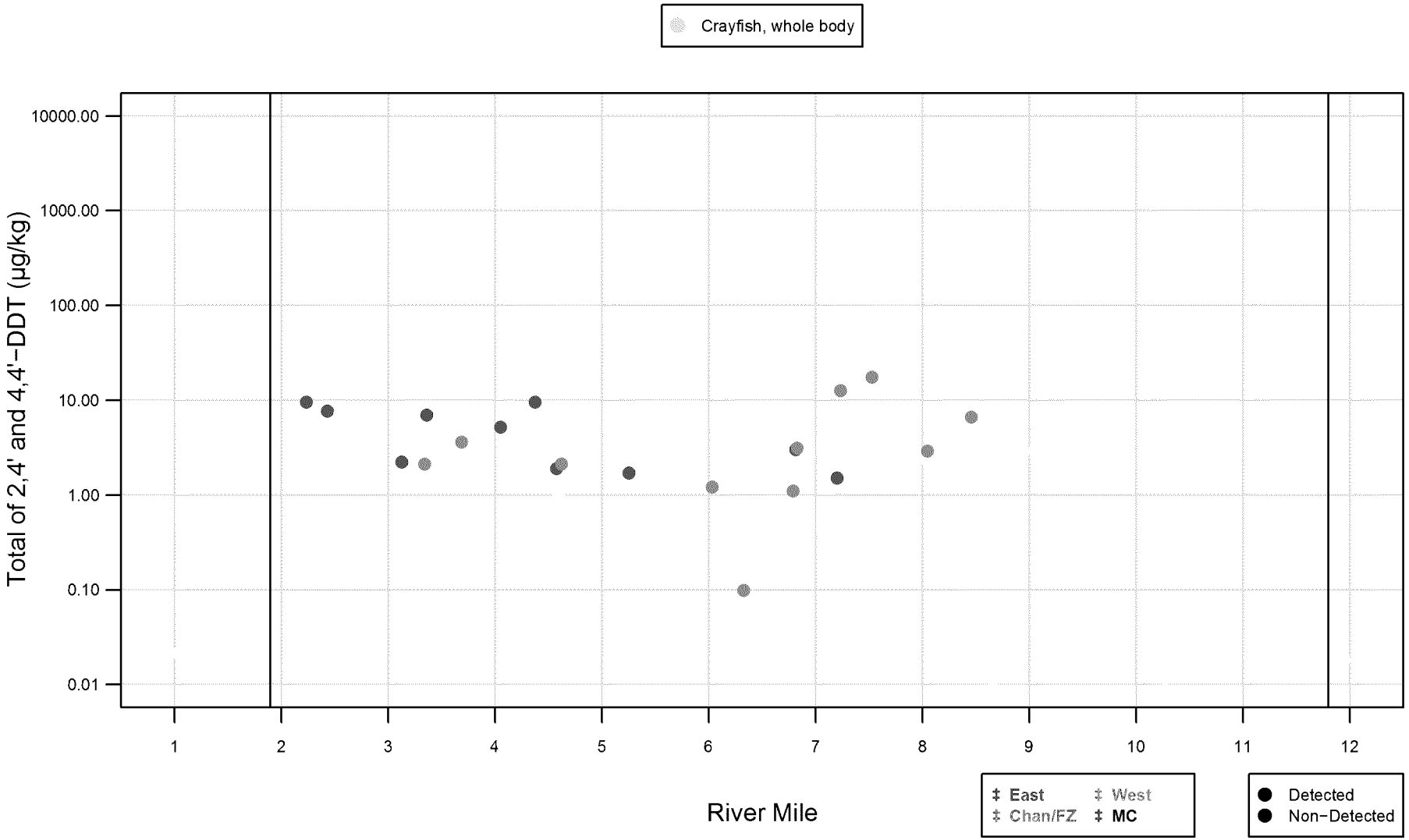

Figure D5.2-8g

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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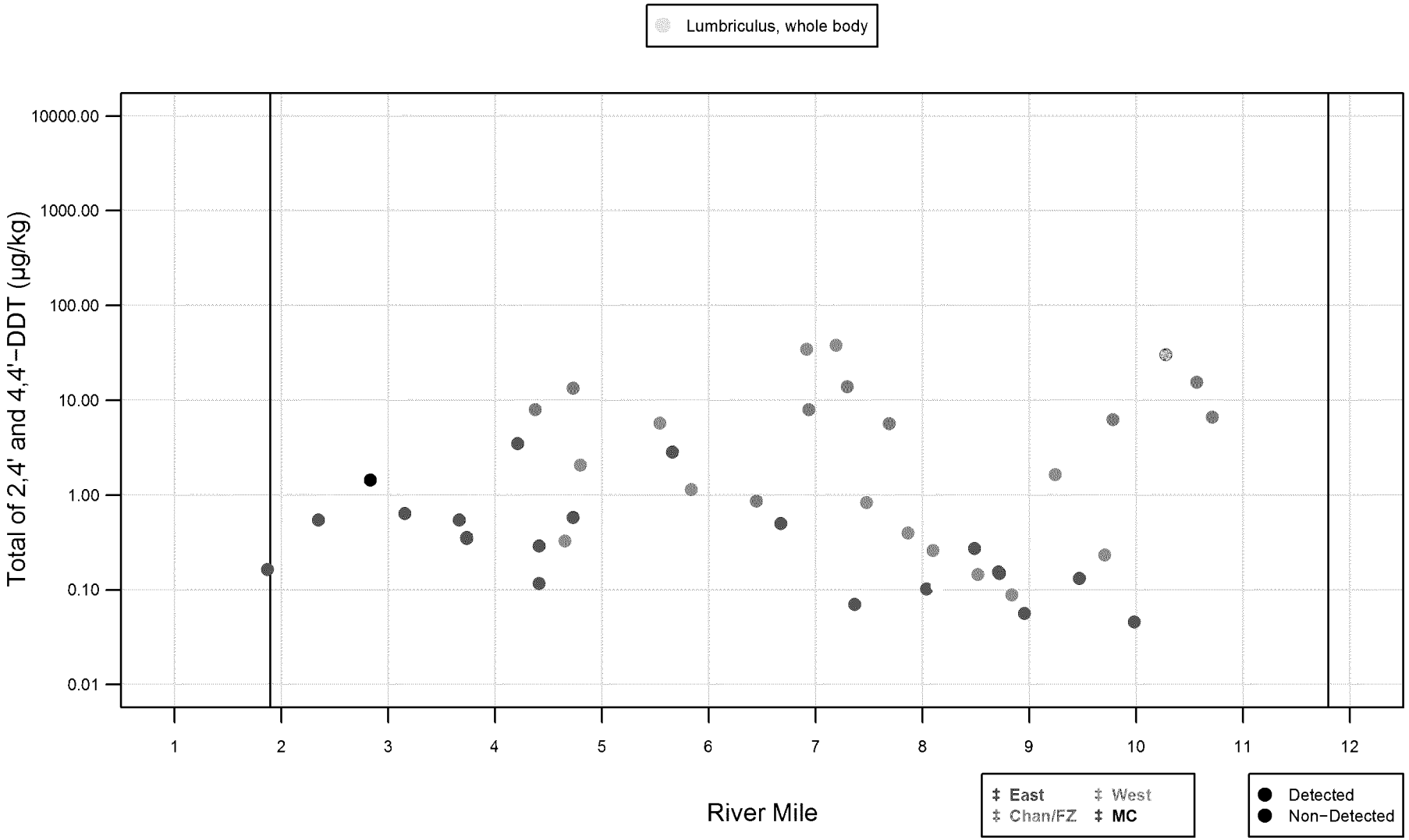

Figure D5.2-8h

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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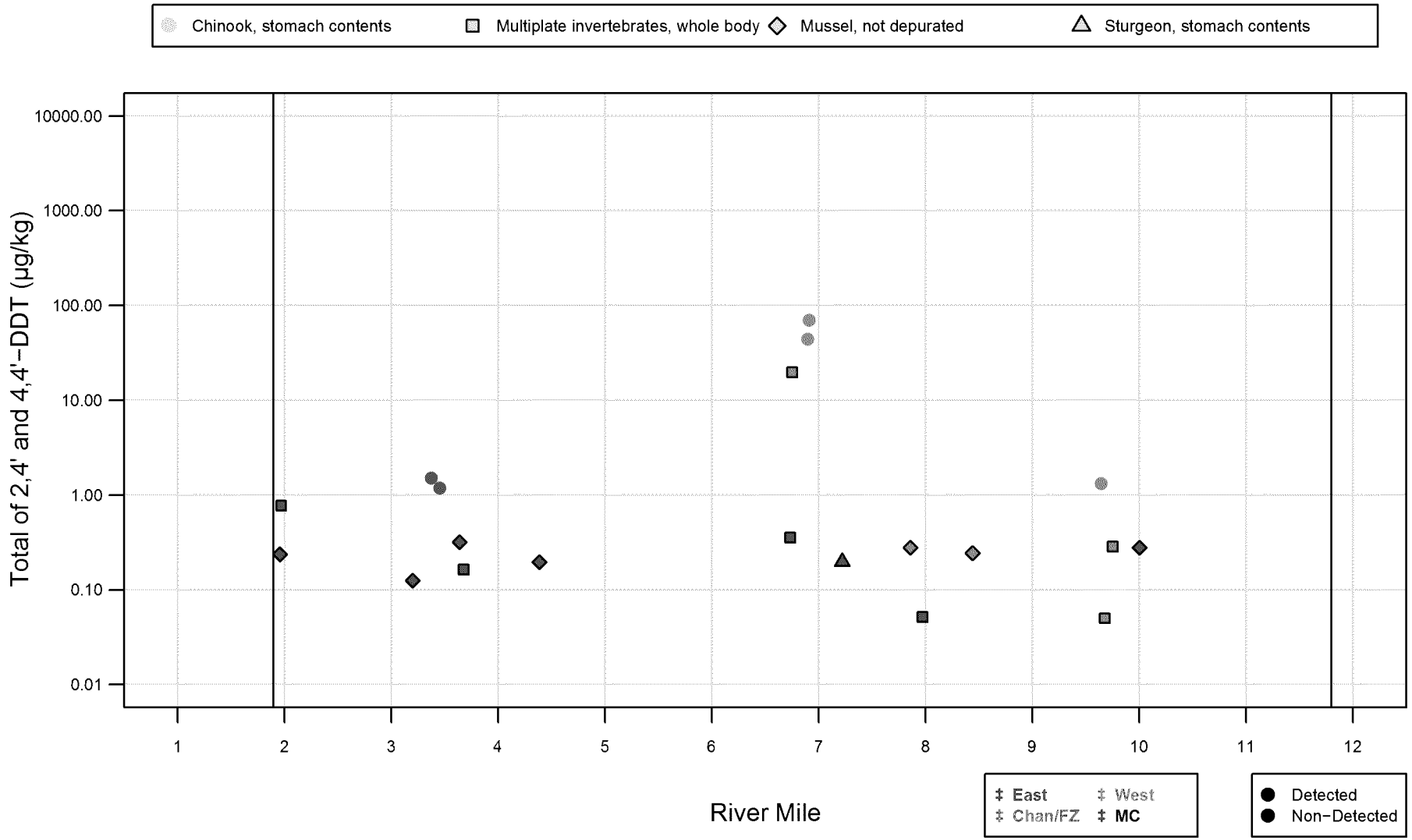

Figure D5.2-8i

Portland Harbor RI/FS
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Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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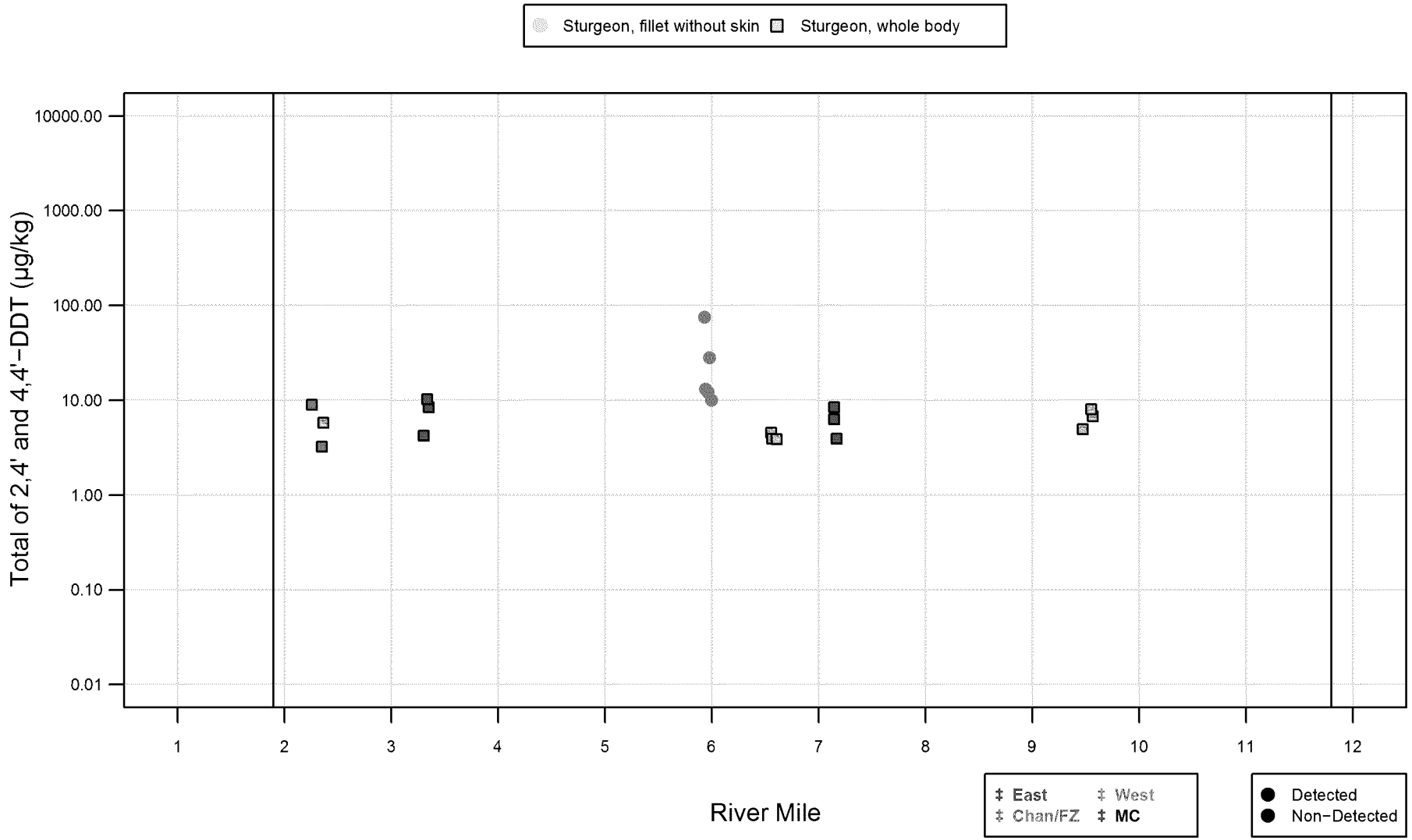

Figure D5.2-8j

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDT in Tissue Samples by River Mile, RM 0.8−12.2

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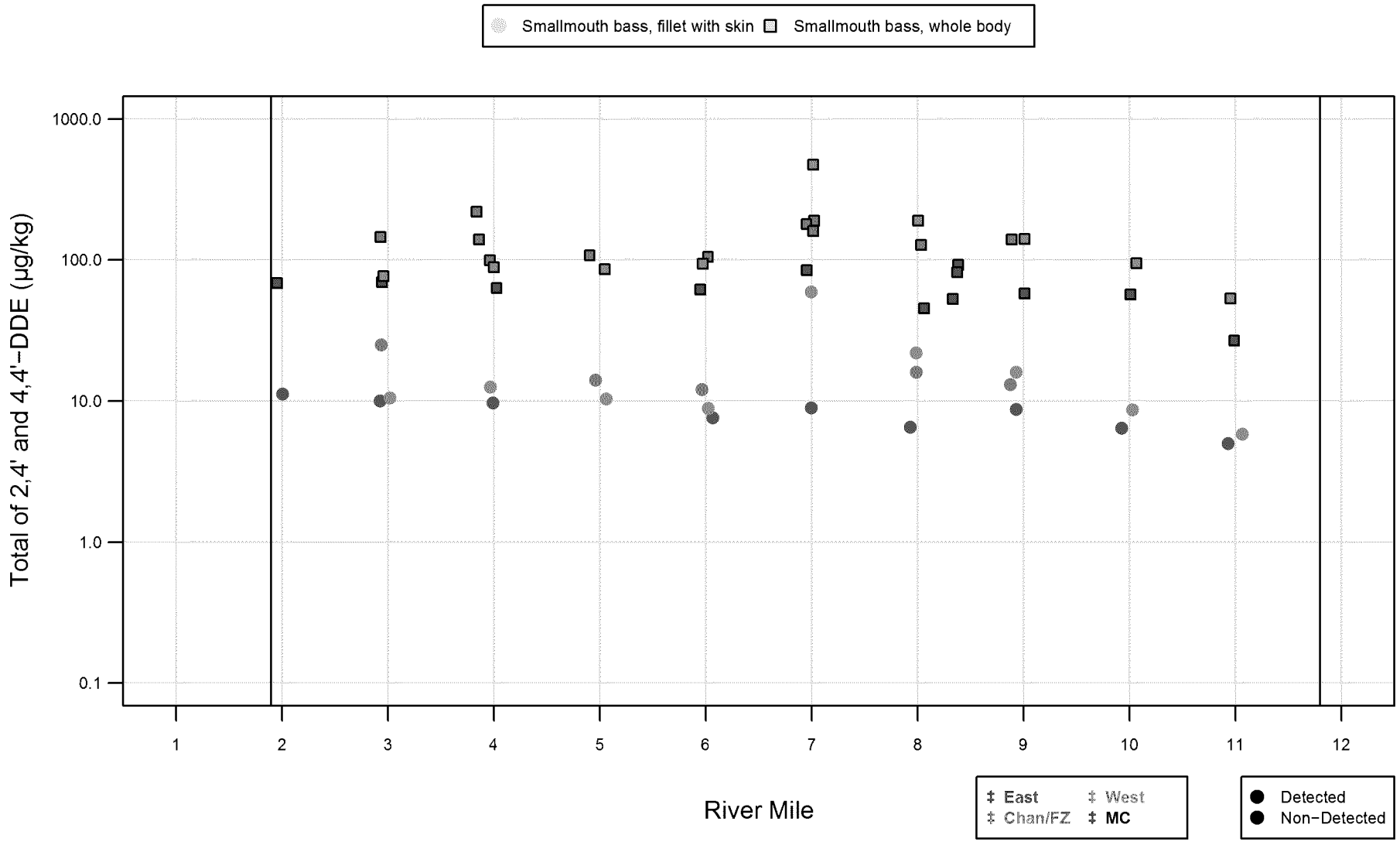

Figure D5.2-9a

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in Tissue Samples by River Mile, RM 0.8−12.2

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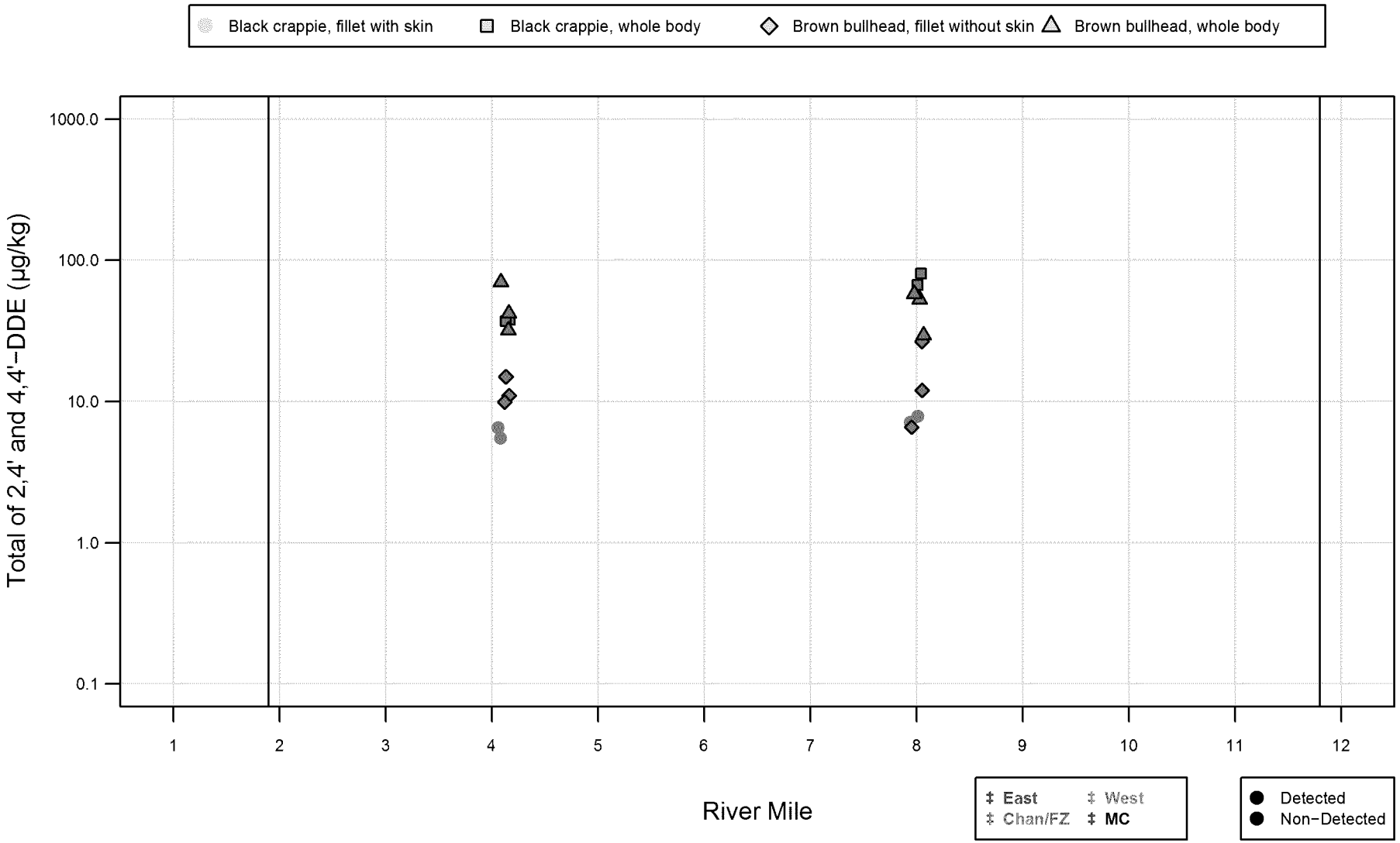

Figure D5.2-9b

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in
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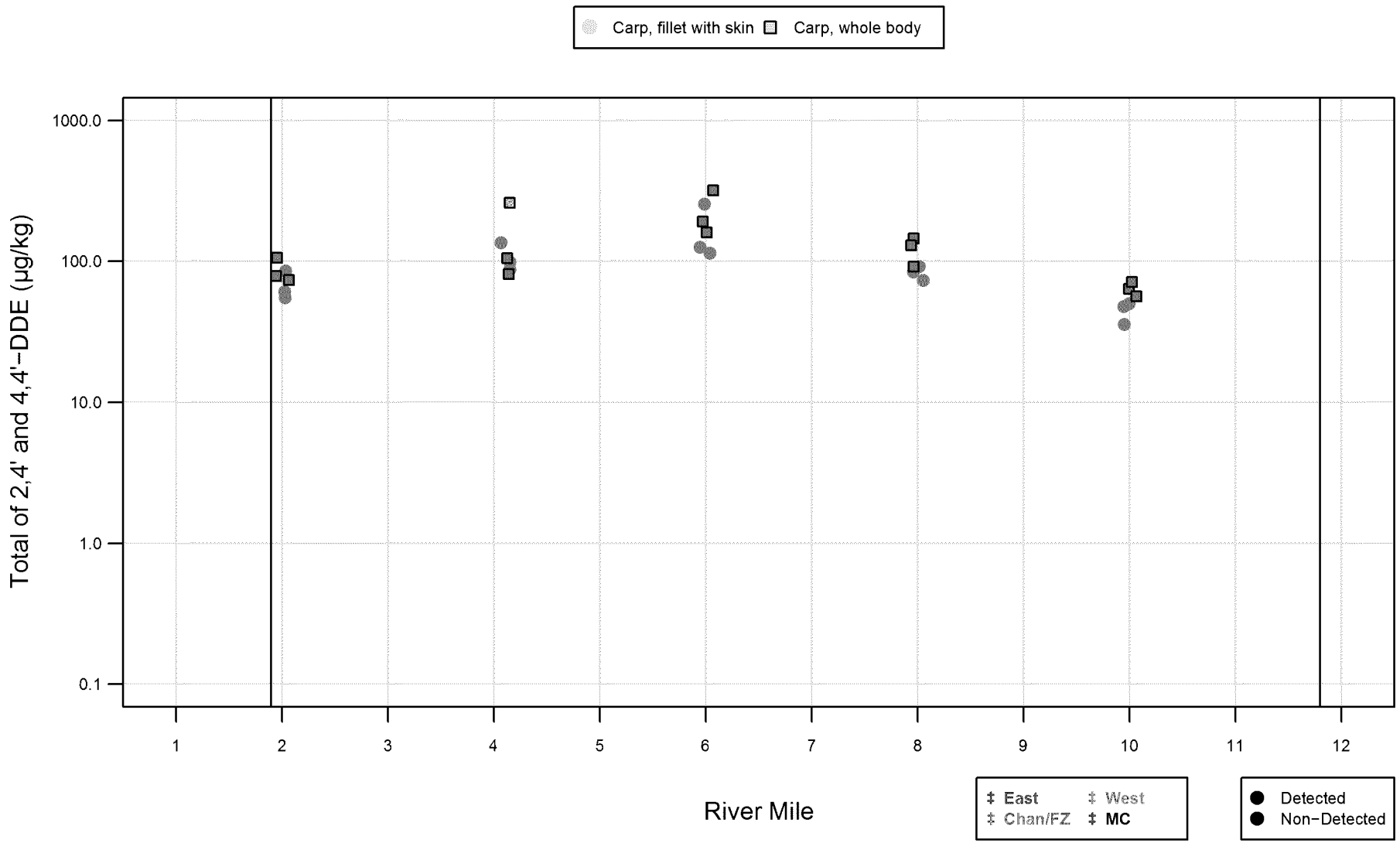

Figure D5.2-9c

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in Tissue Samples by River Mile, RM 0.8−12.2

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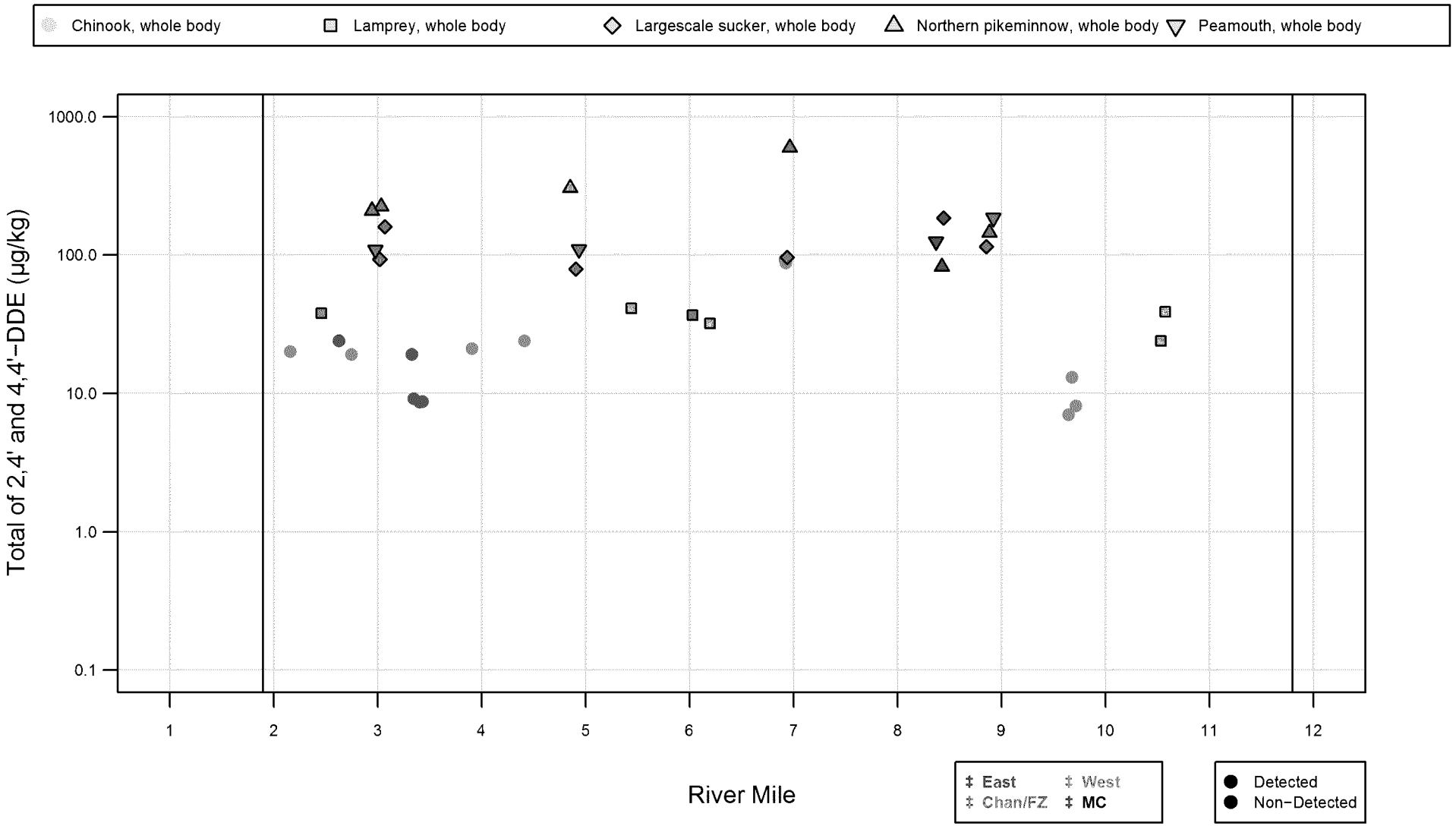

Figure D5.2-9d

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in Tissue Samples by River Mile, RM 0.8−12.2

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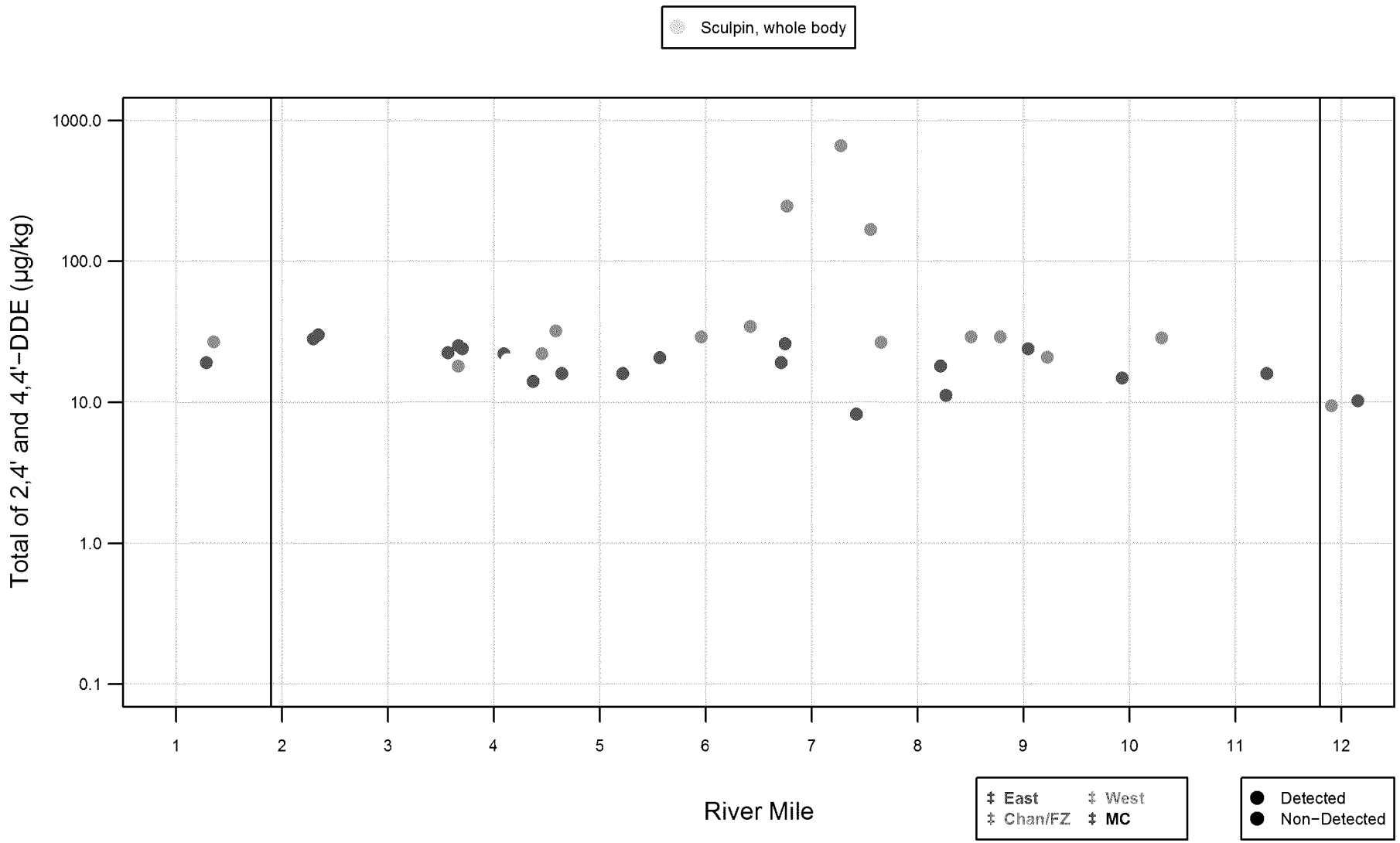

Figure D5.2-9e

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in Tissue Samples by River Mile, RM 0.8−12.2

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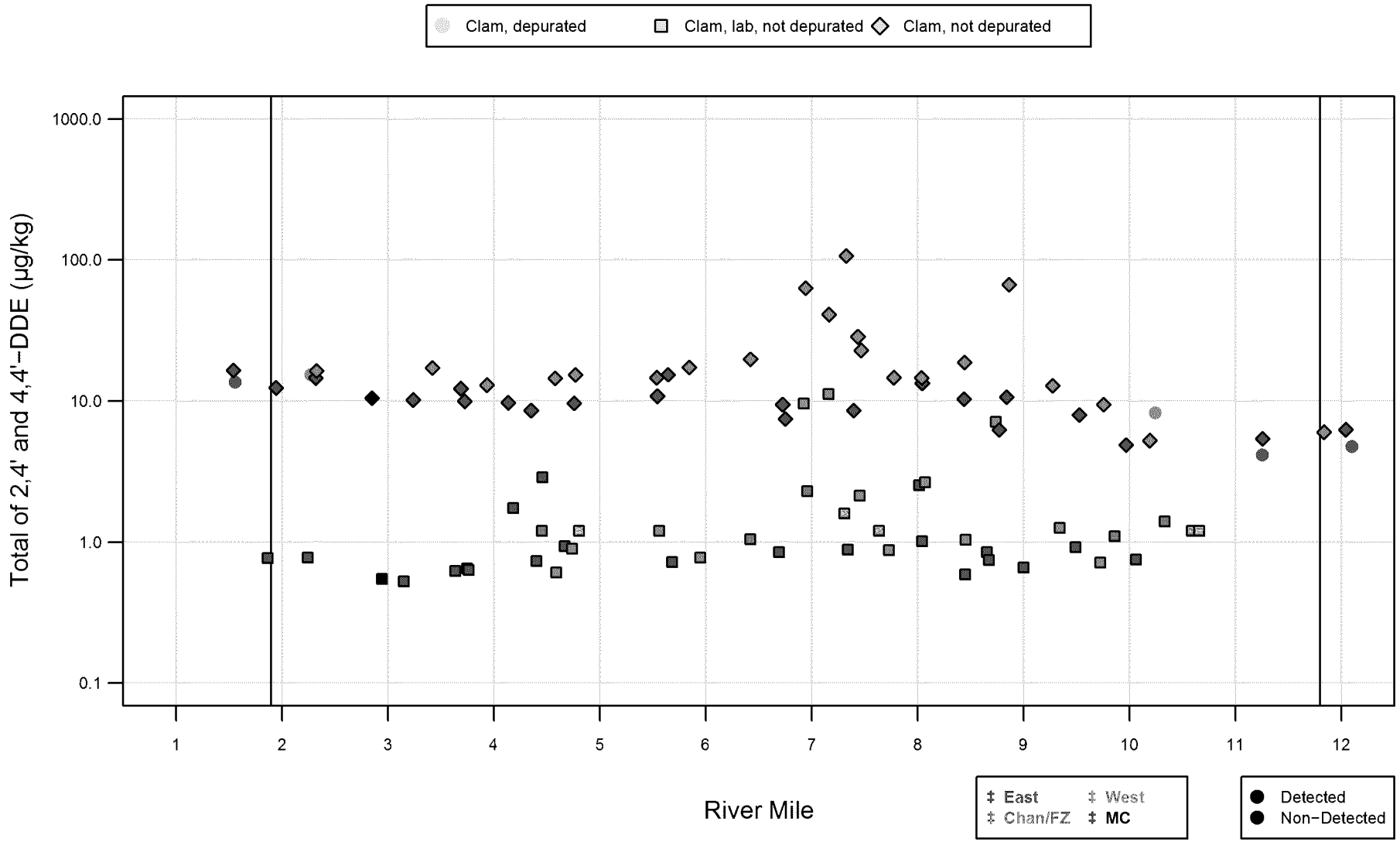

Figure D5.2-9f

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in Tissue Samples by River Mile, RM 0.8−12.2

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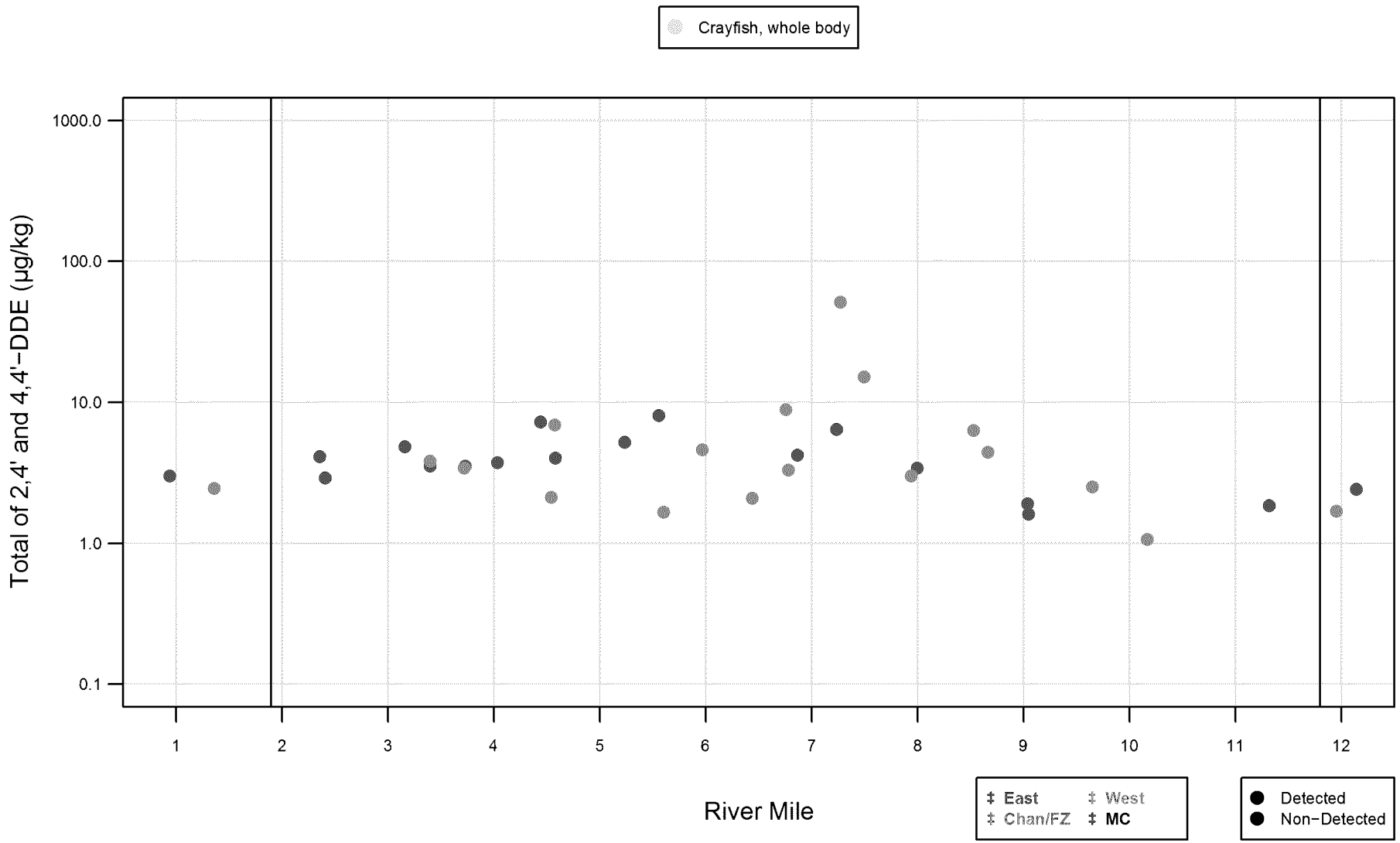

Figure D5.2-9g

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in Tissue Samples by River Mile, RM 0.8−12.2

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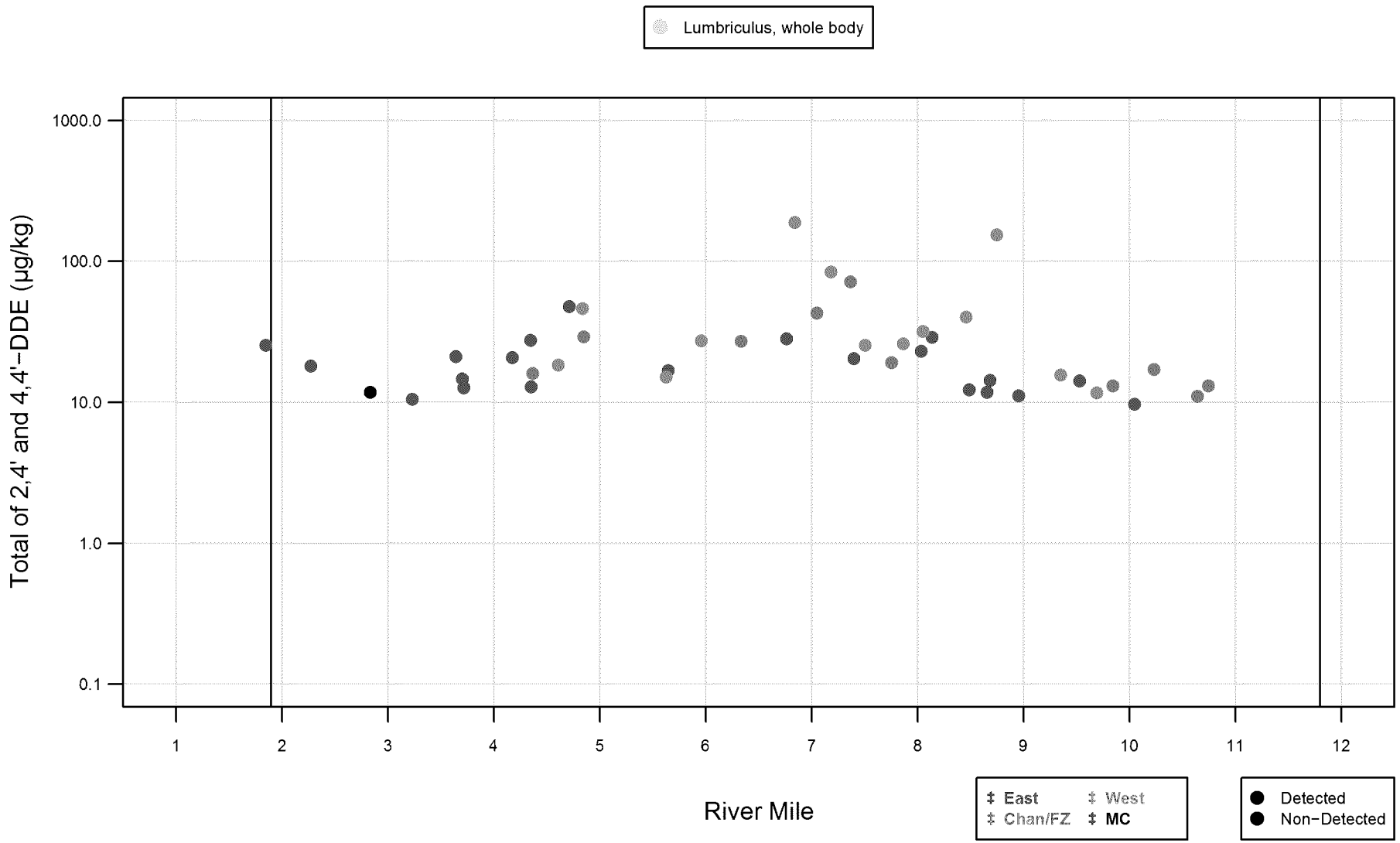

Figure D5.2-9h

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in
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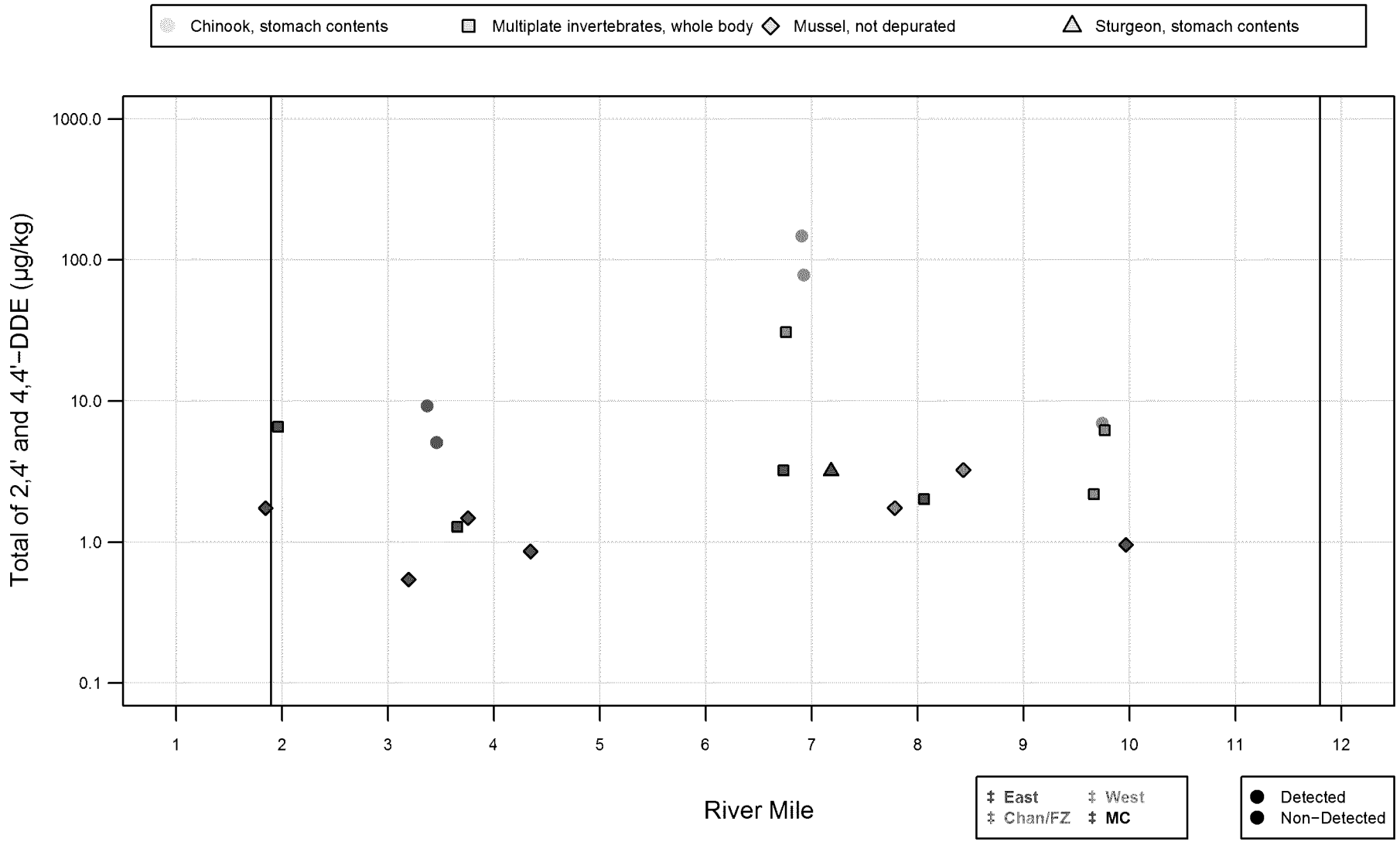

Figure D5.2-9i

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDE in Tissue Samples by River Mile, RM 0.8−12.2

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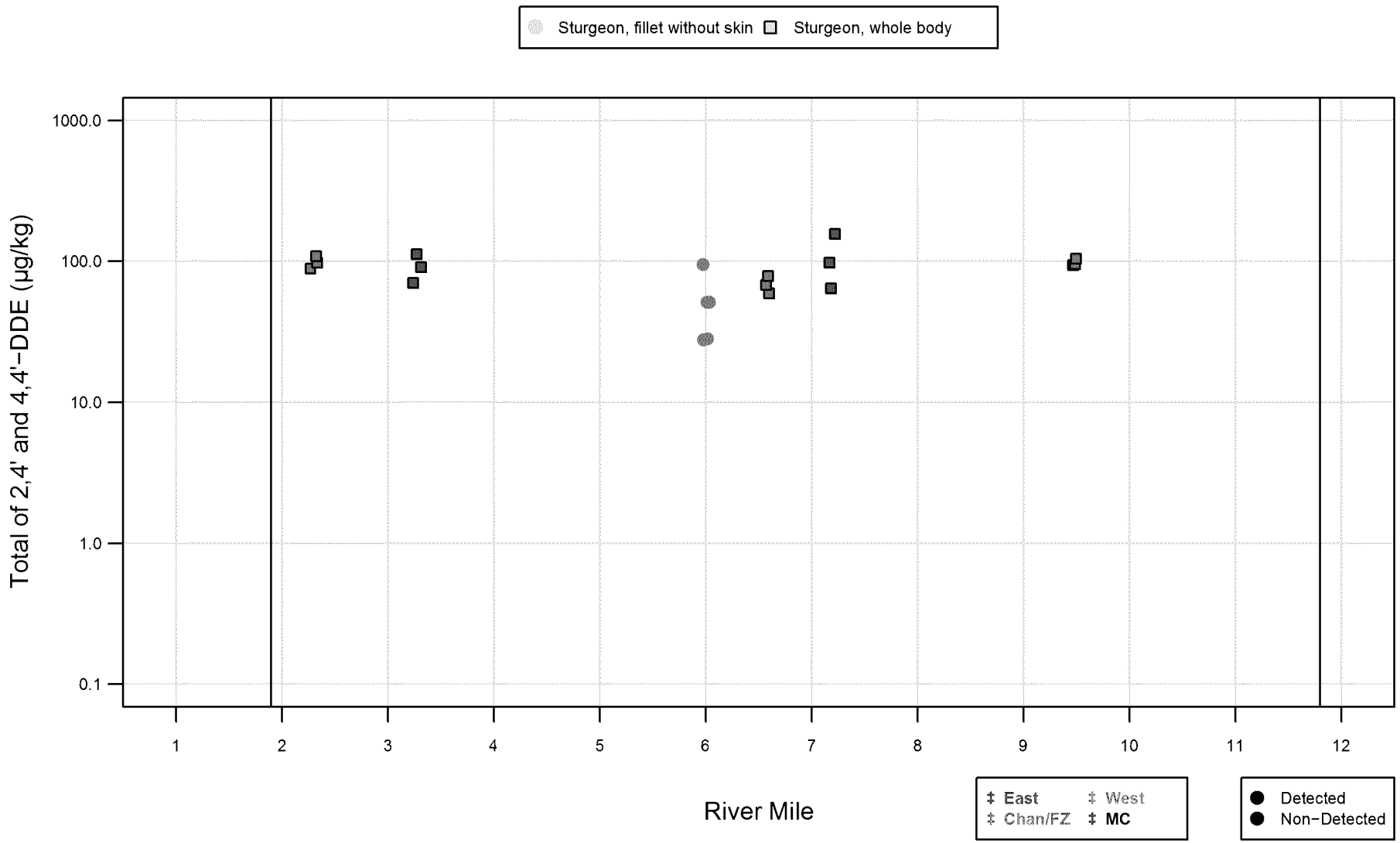

Figure D5.2-9j

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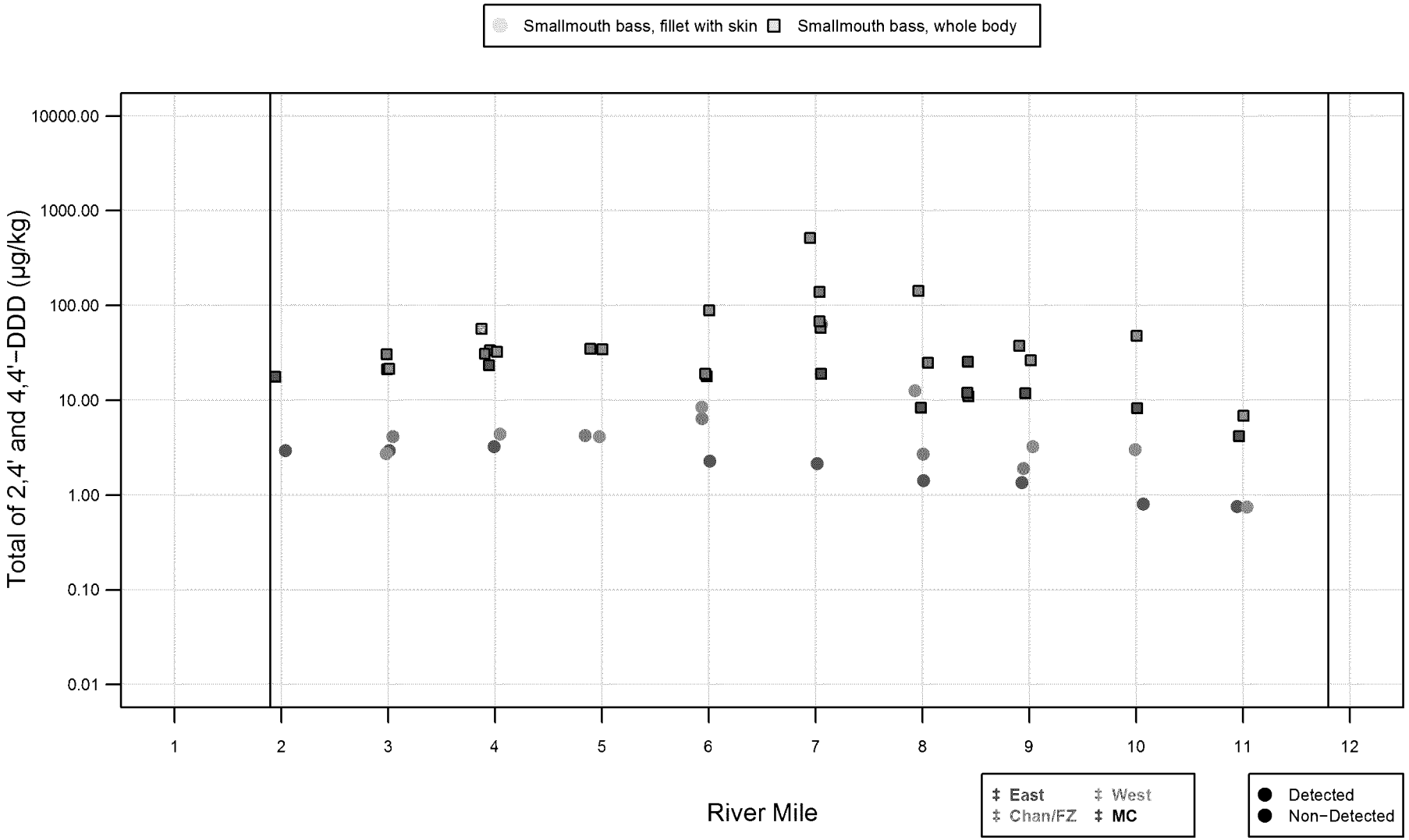

Figure D5.2-10a

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDD in Tissue Samples by River Mile, RM 0.8−12.2

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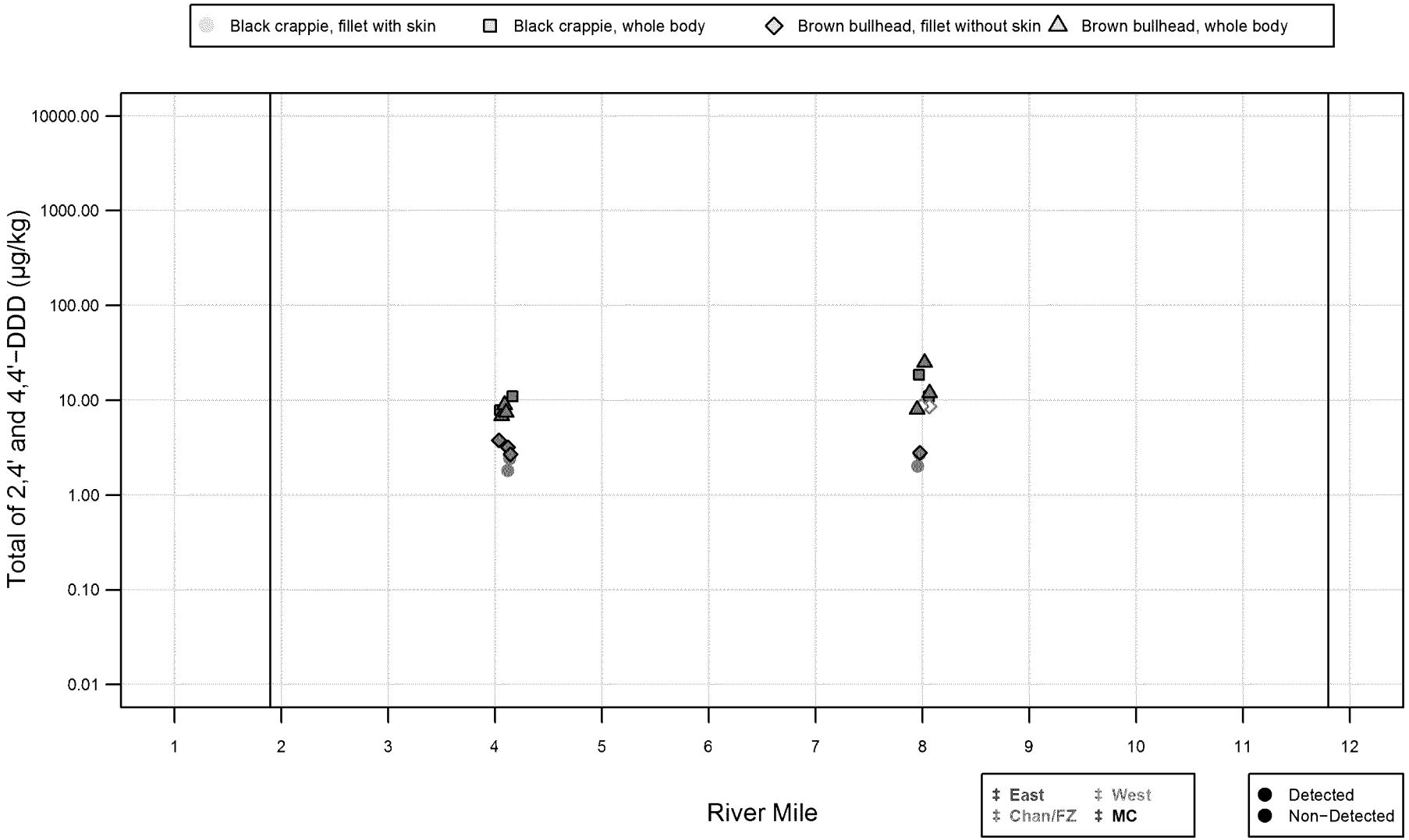

Figure D5.2-10b

Portland Harbor RI/FS
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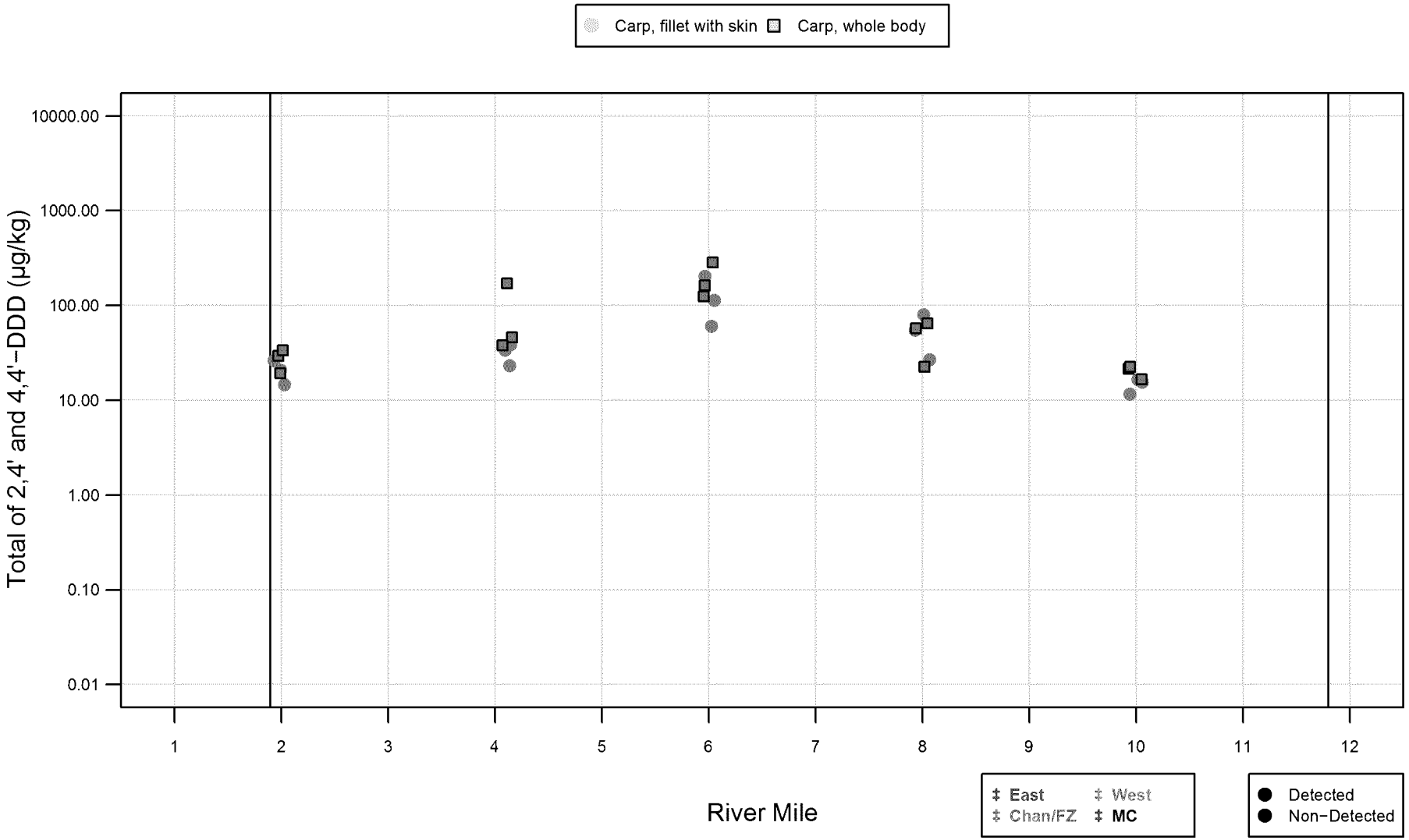

Figure D5.2-10c

Portland Harbor RI/FS
Remedial Investigation Report
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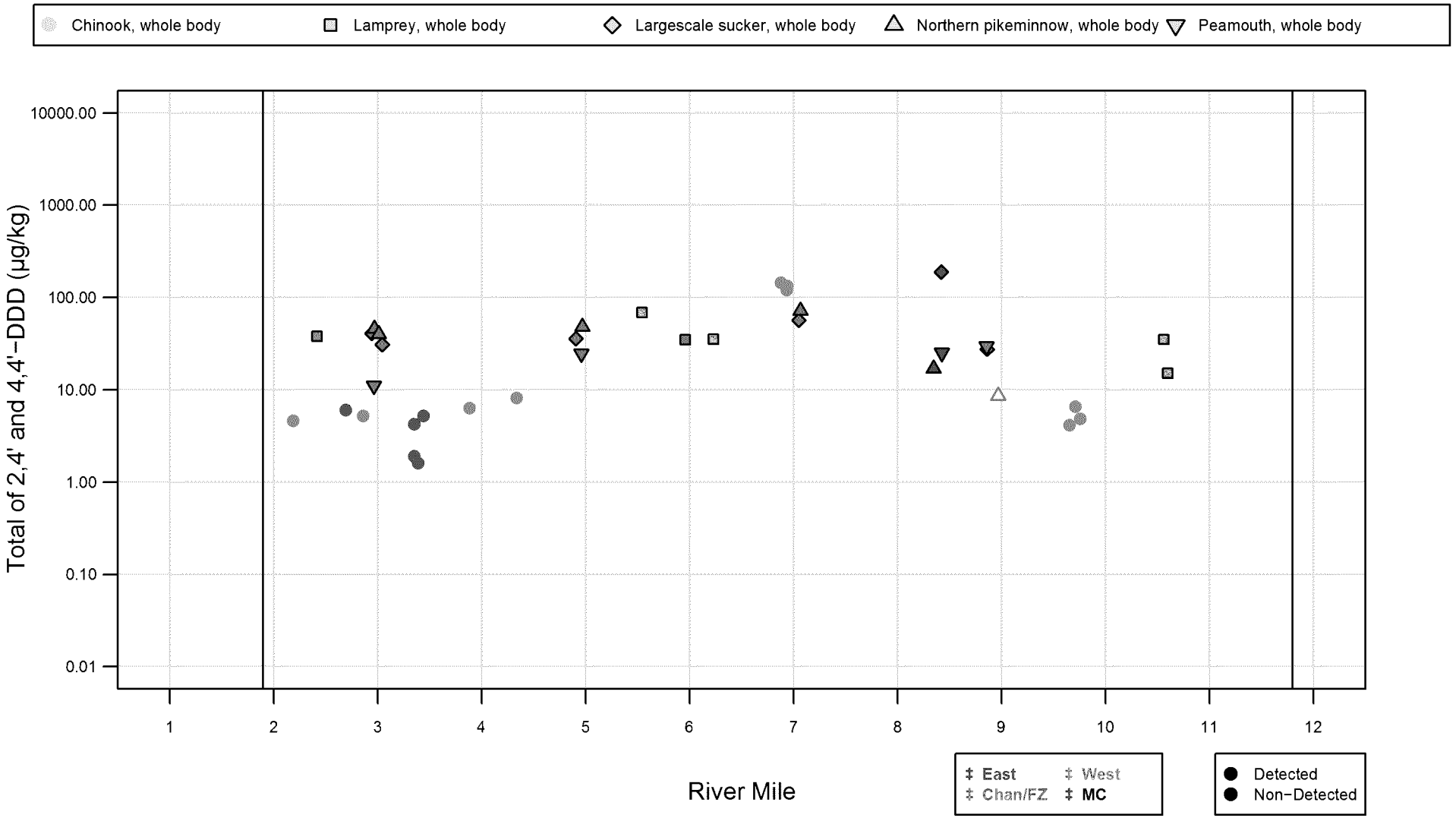

Figure D5.2-10d

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Remedial Investigation Report
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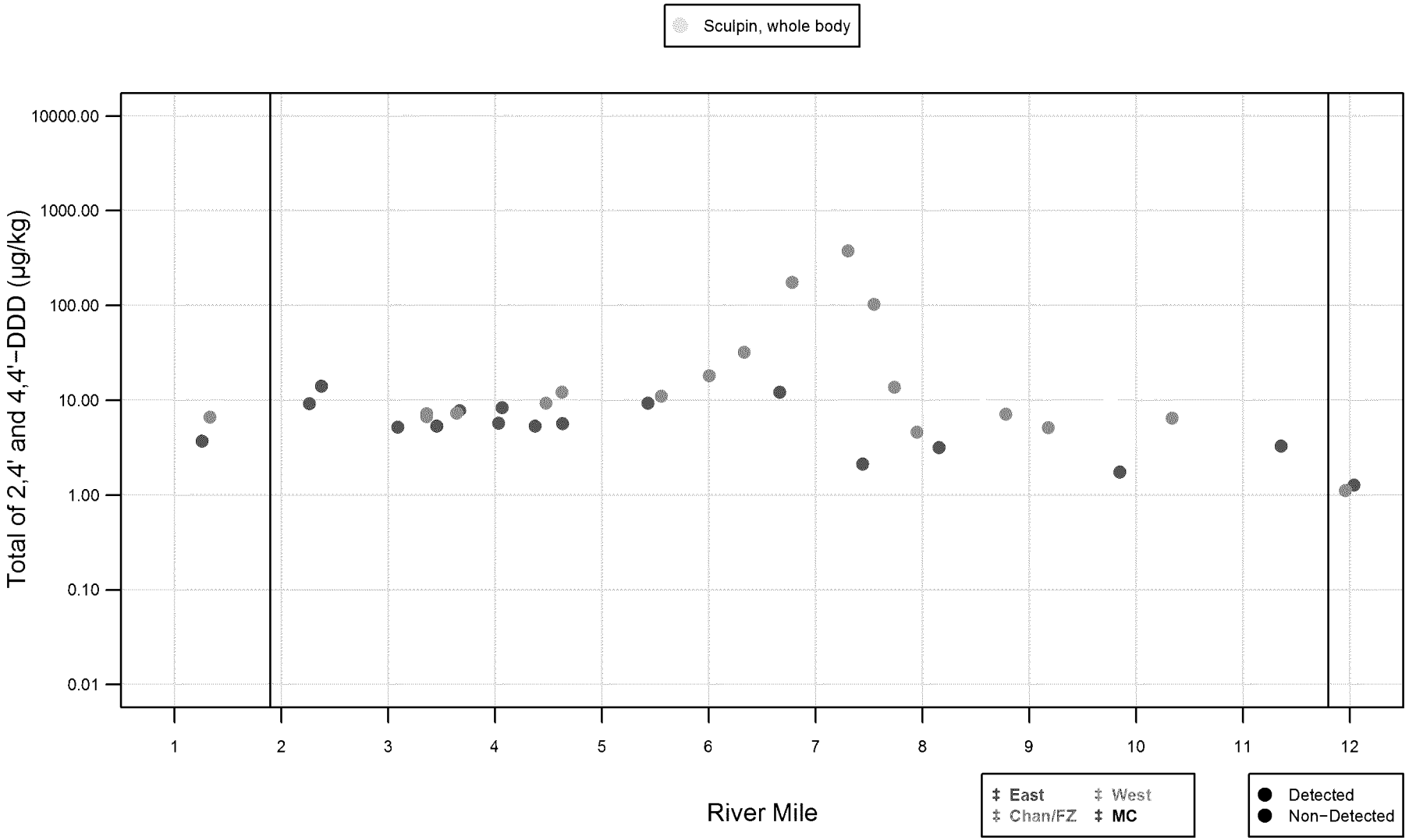

Figure D5.2-10e

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDD in Tissue Samples by River Mile, RM 0.8−12.2

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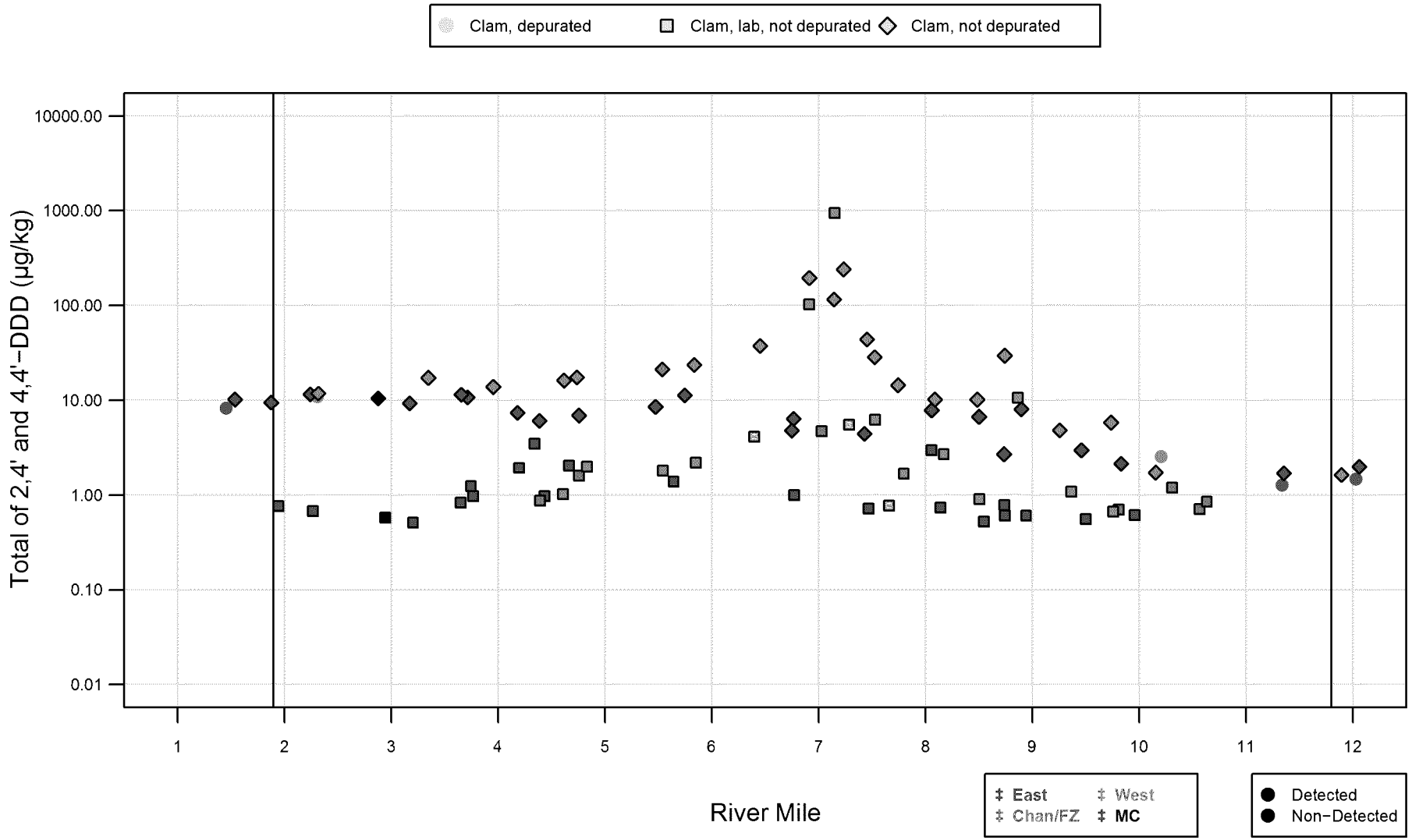

Figure D5.2-10f

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDD in Tissue Samples by River Mile, RM 0.8−12.2

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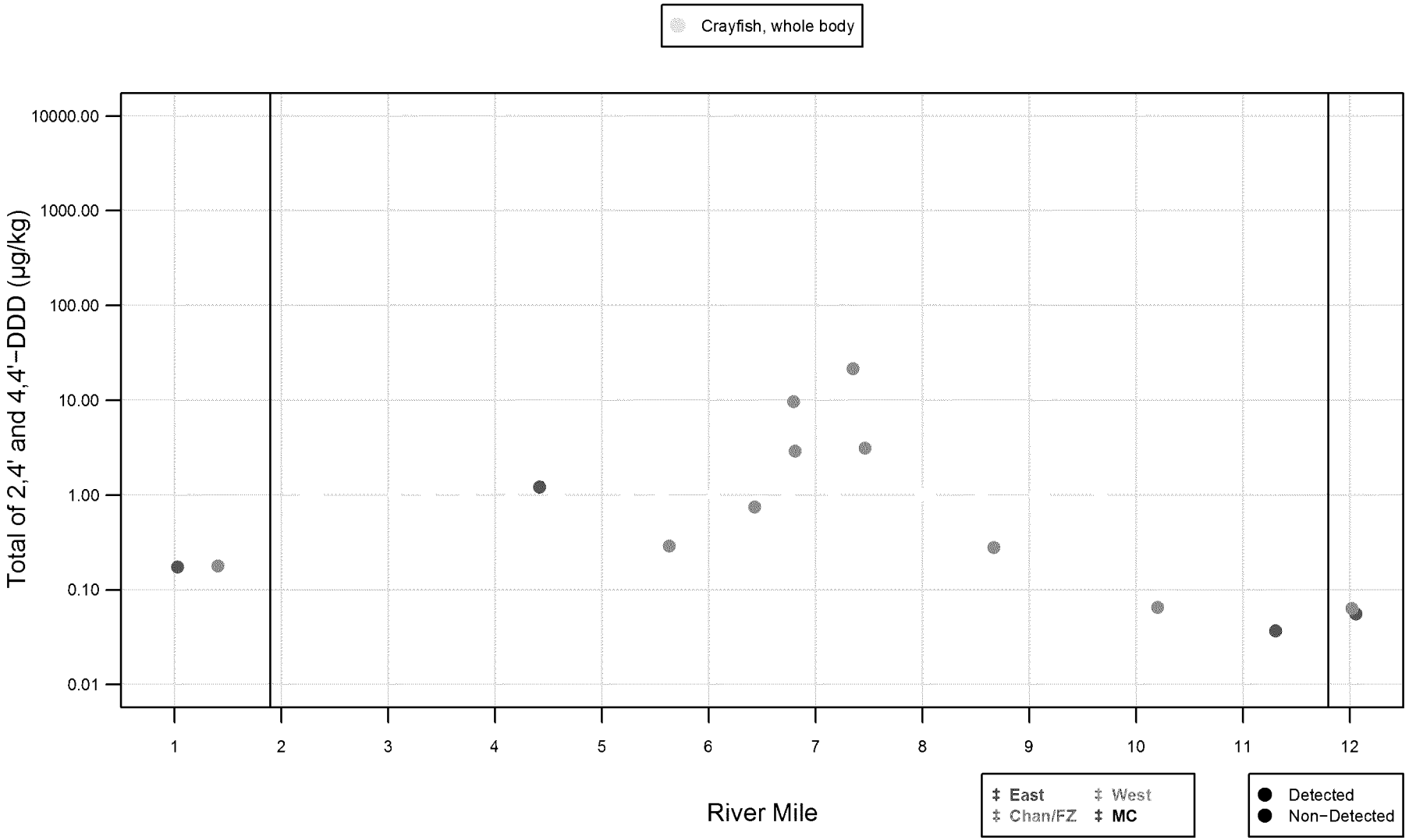

Figure D5.2-10g

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDD in Tissue Samples by River Mile, RM 0.8−12.2

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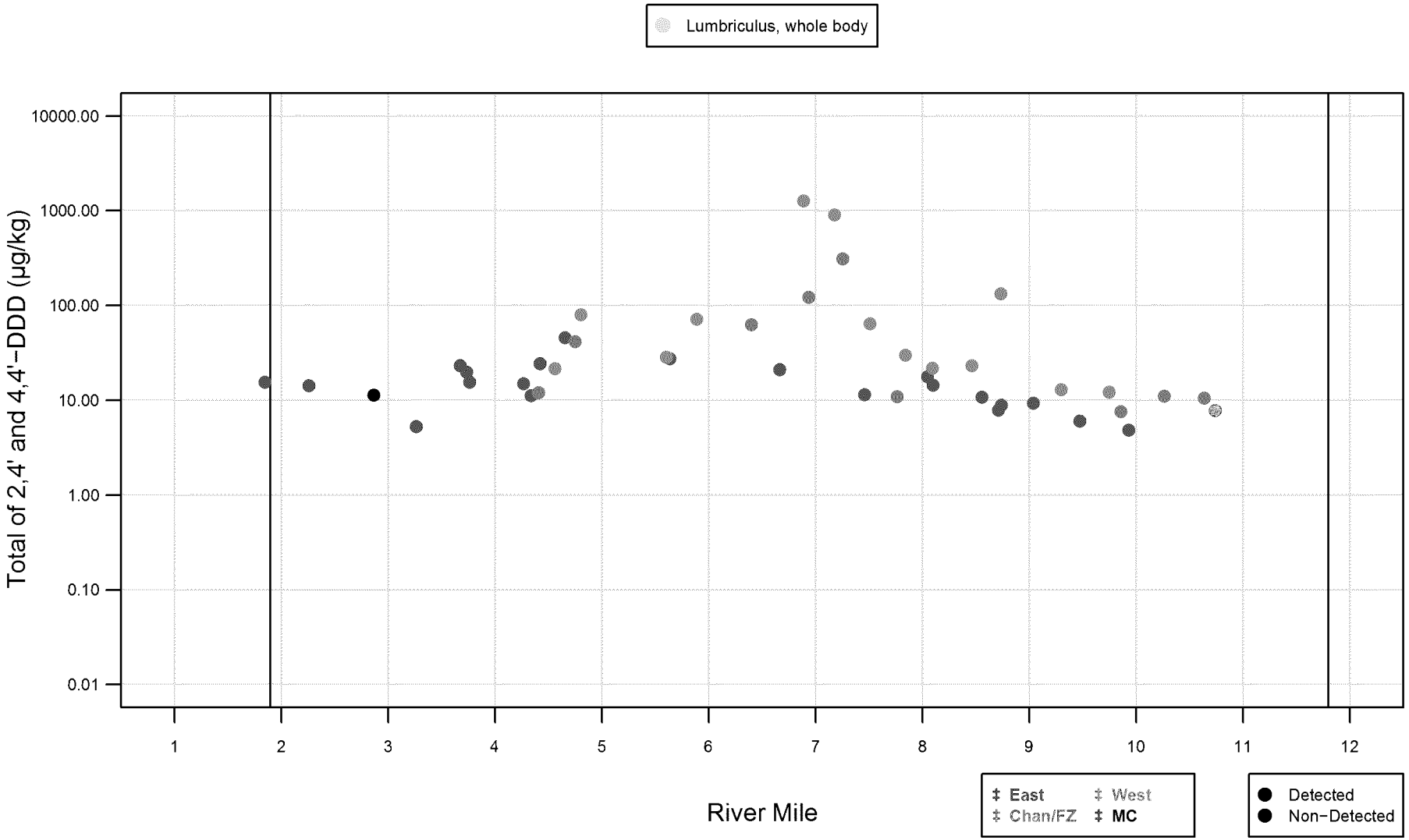

Figure D5.2-10h

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDD in Tissue Samples by River Mile, RM 0.8−12.2

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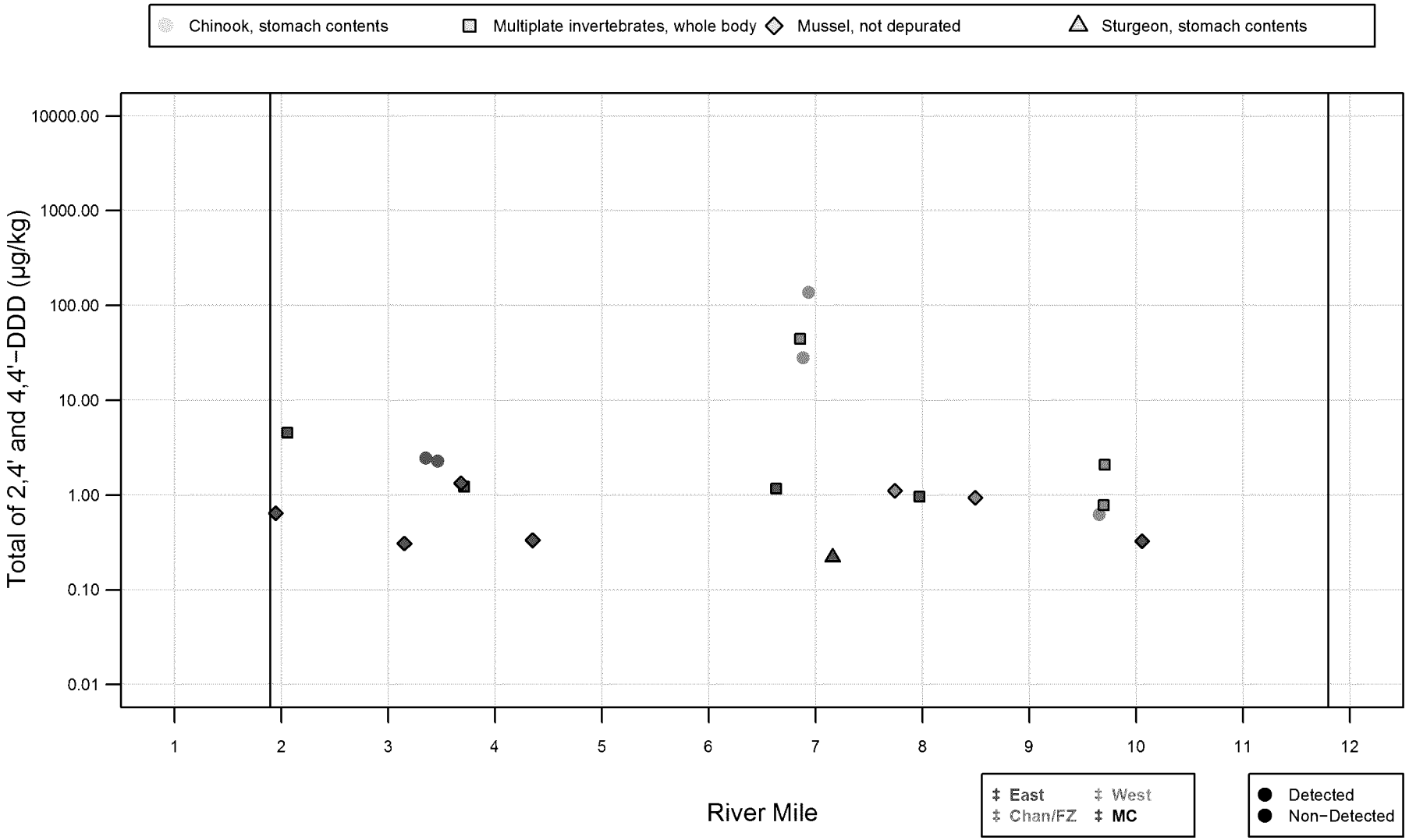

Figure D5.2-10i

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDD in Tissue Samples by River Mile, RM 0.8−12.2

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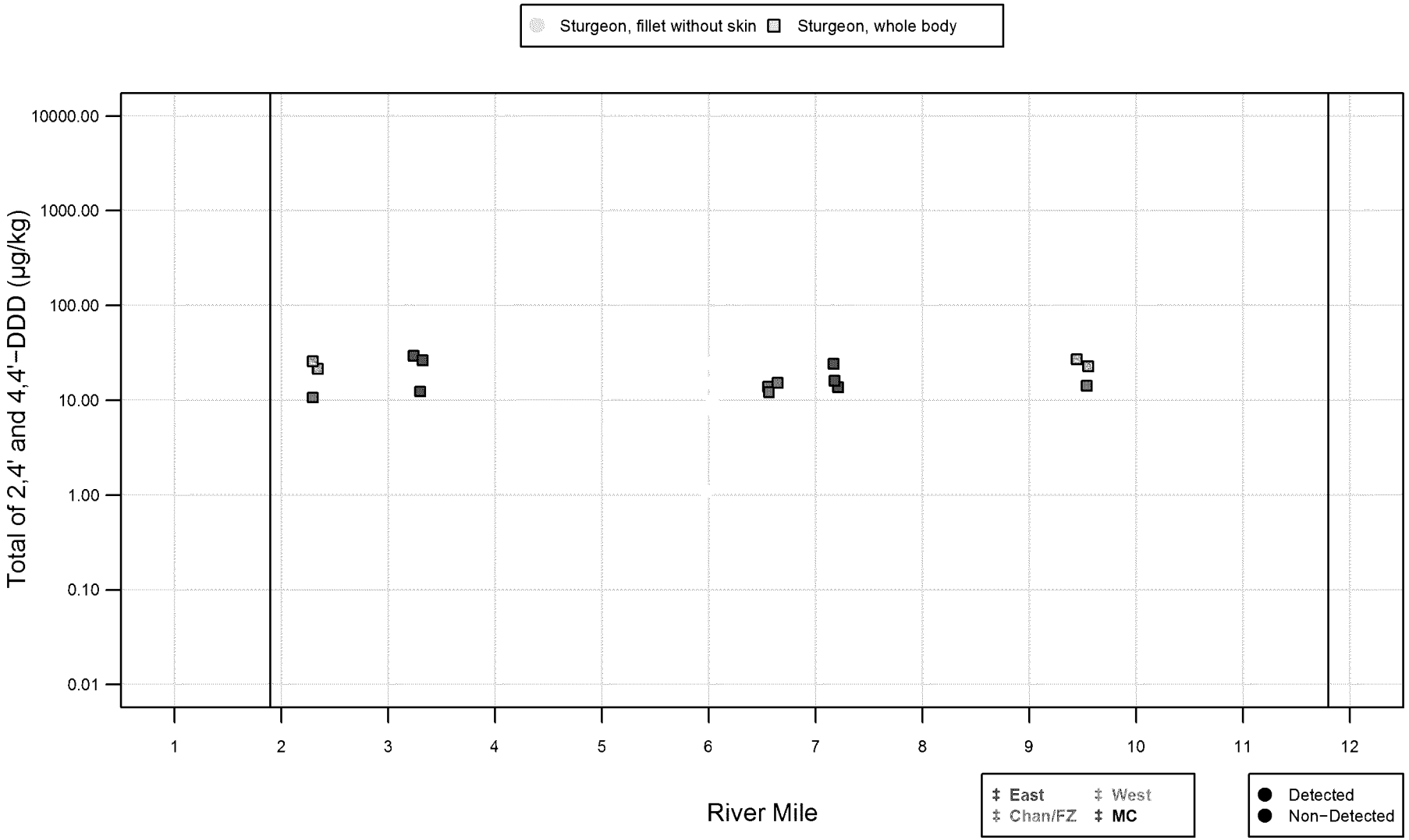

Figure D5.2-10j

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total of 2,4' and 4,4'−DDD in Tissue Samples by River Mile, RM 0.8−12.2

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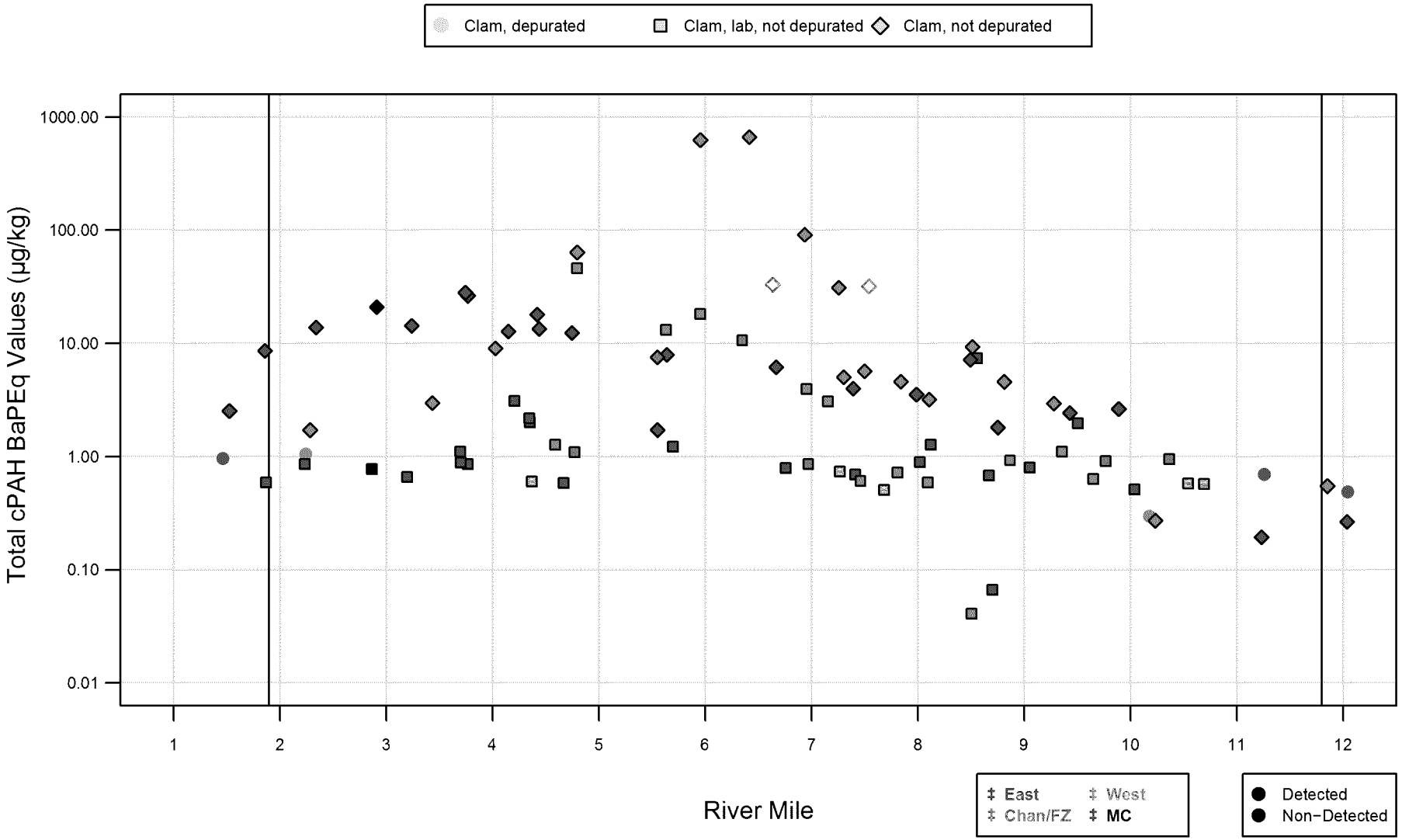

Figure D5.2-11

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Total cPAH BaPEq Values in Tissue Samples by River Mile, RM 0.8−12.2

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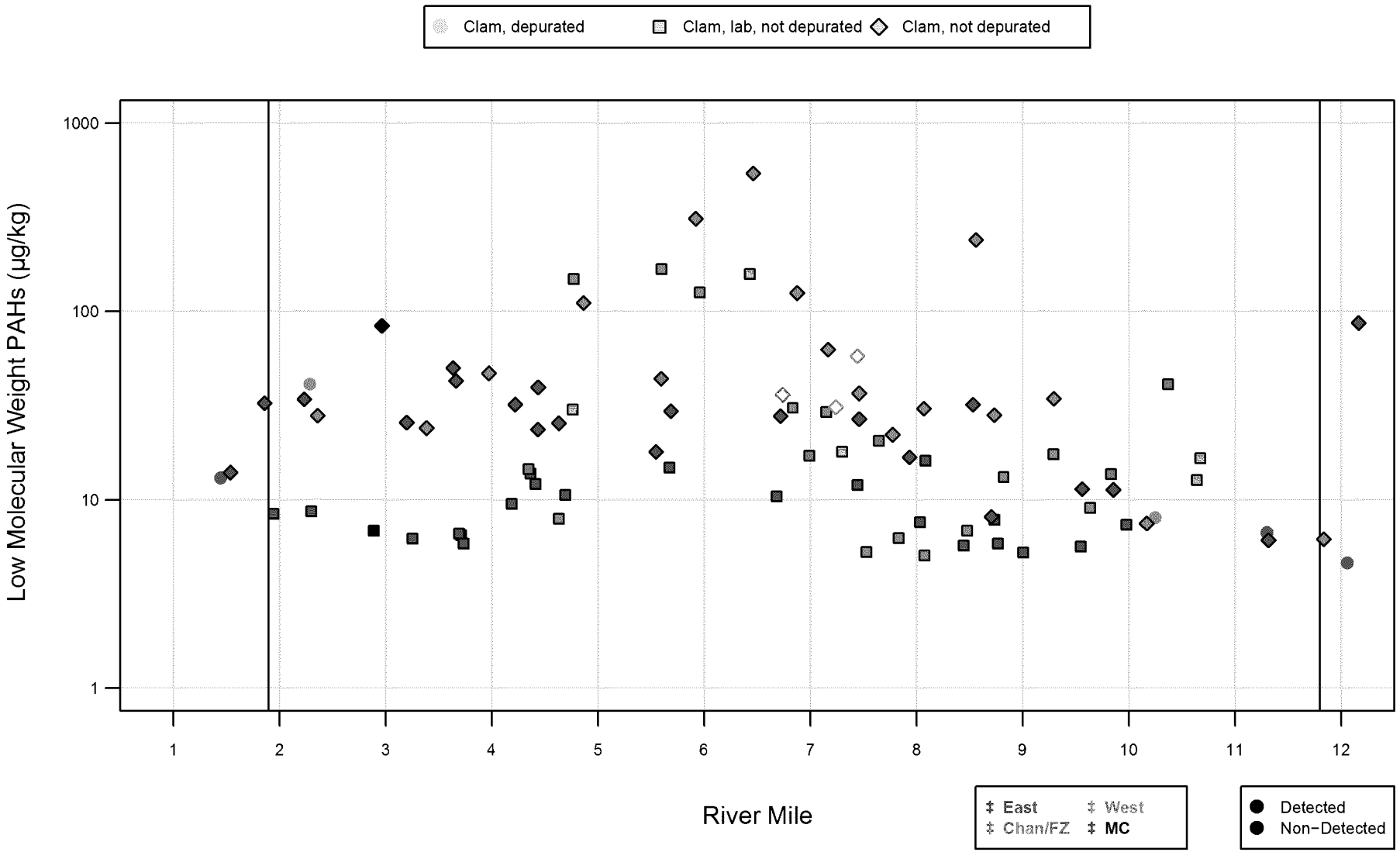

Figure D5.2-12

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Low Molecular Weight PAHs in Tissue Samples by River Mile, RM 0.8−12.2

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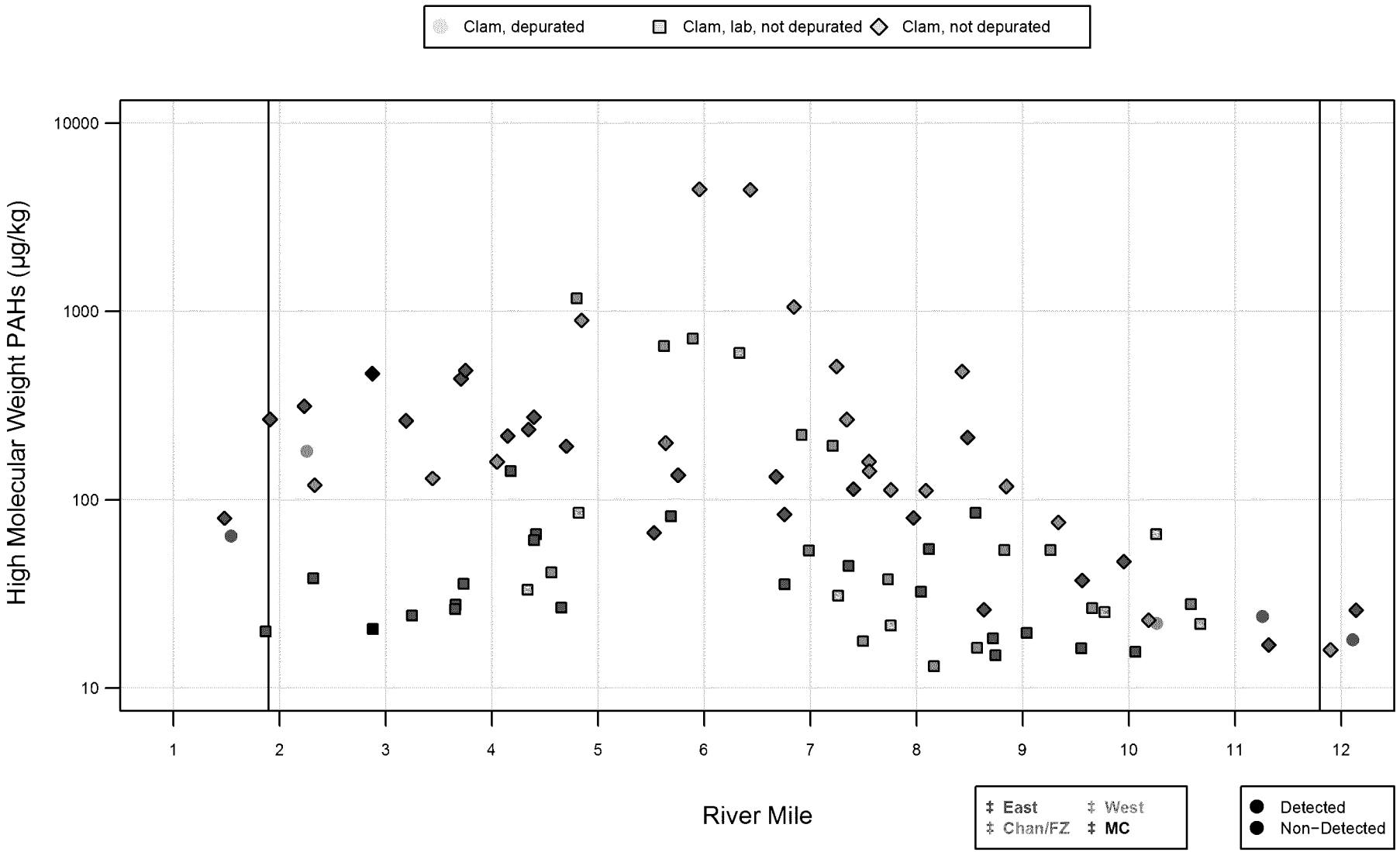

Figure D5.2-13

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of High Molecular Weight PAHs in Tissue Samples by River Mile, RM 0.8−12.2

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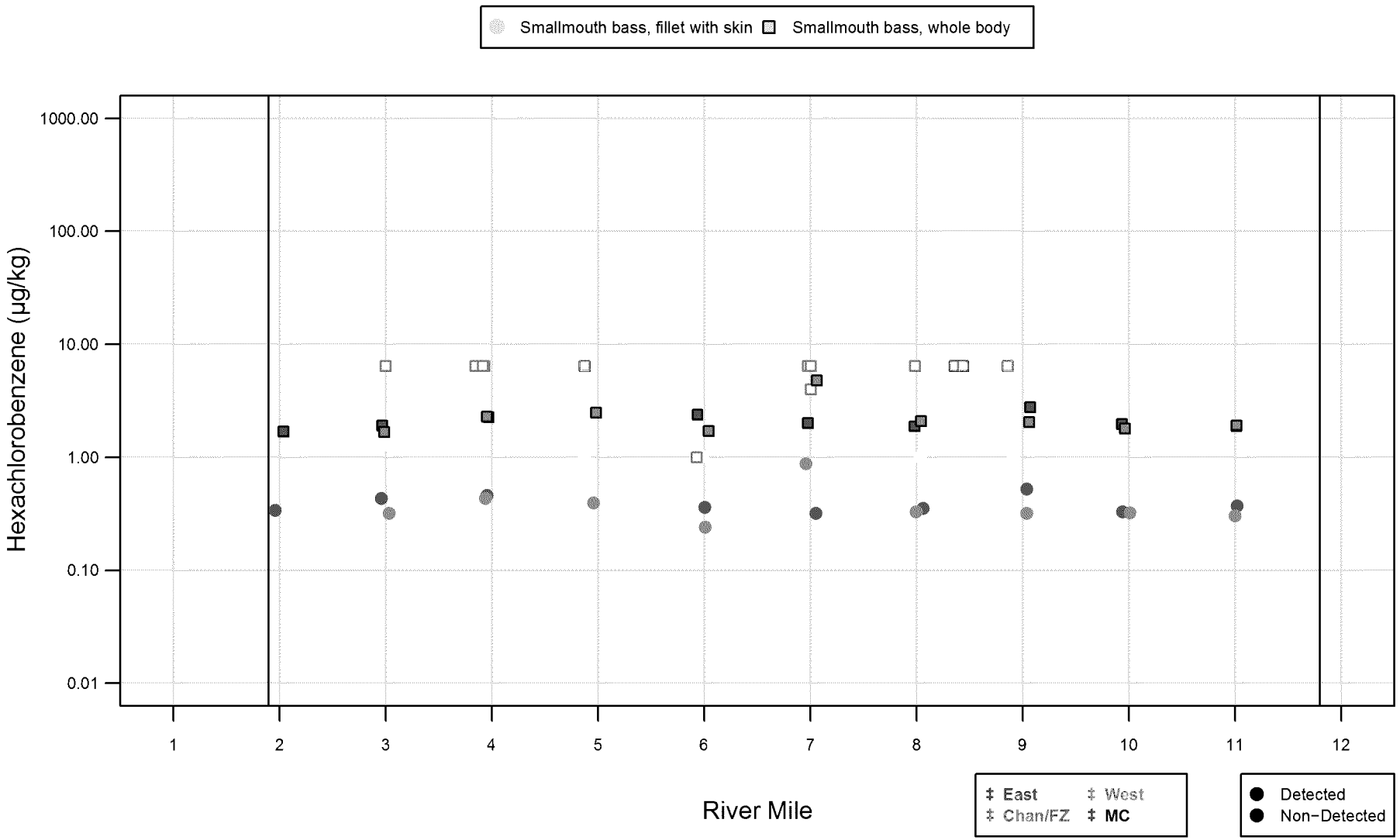

Figure D5.2-14a

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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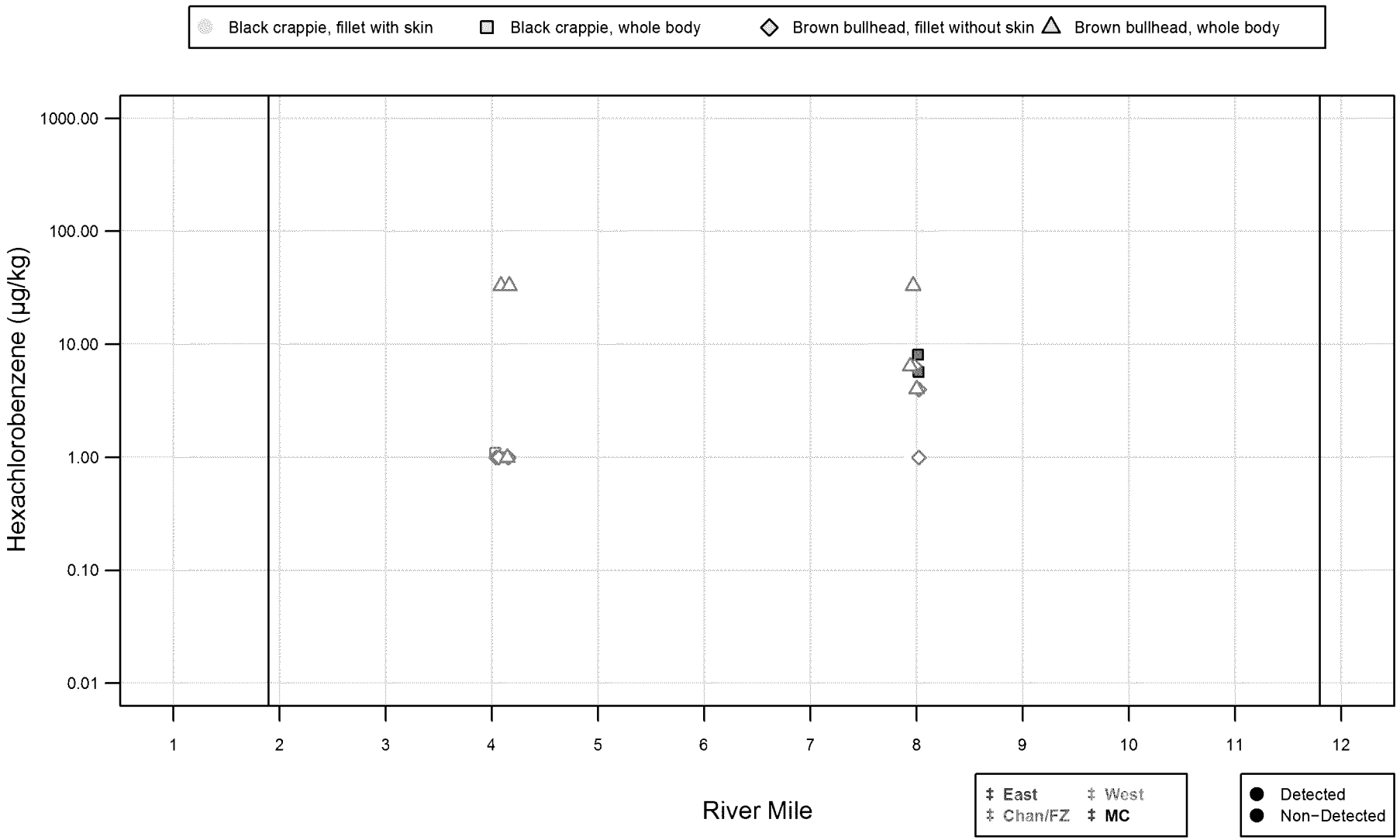

Figure D5.2-14b

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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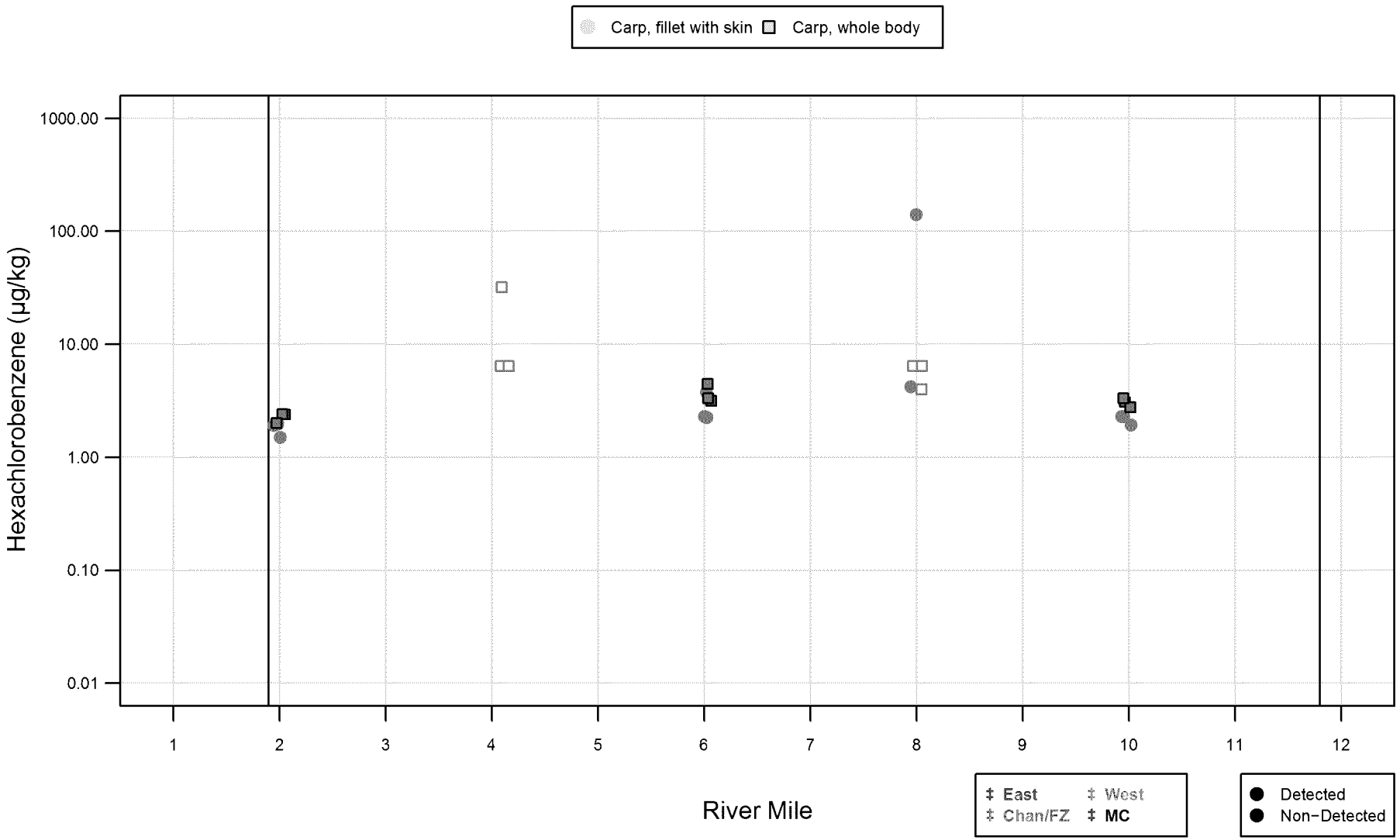

Figure D5.2-14c

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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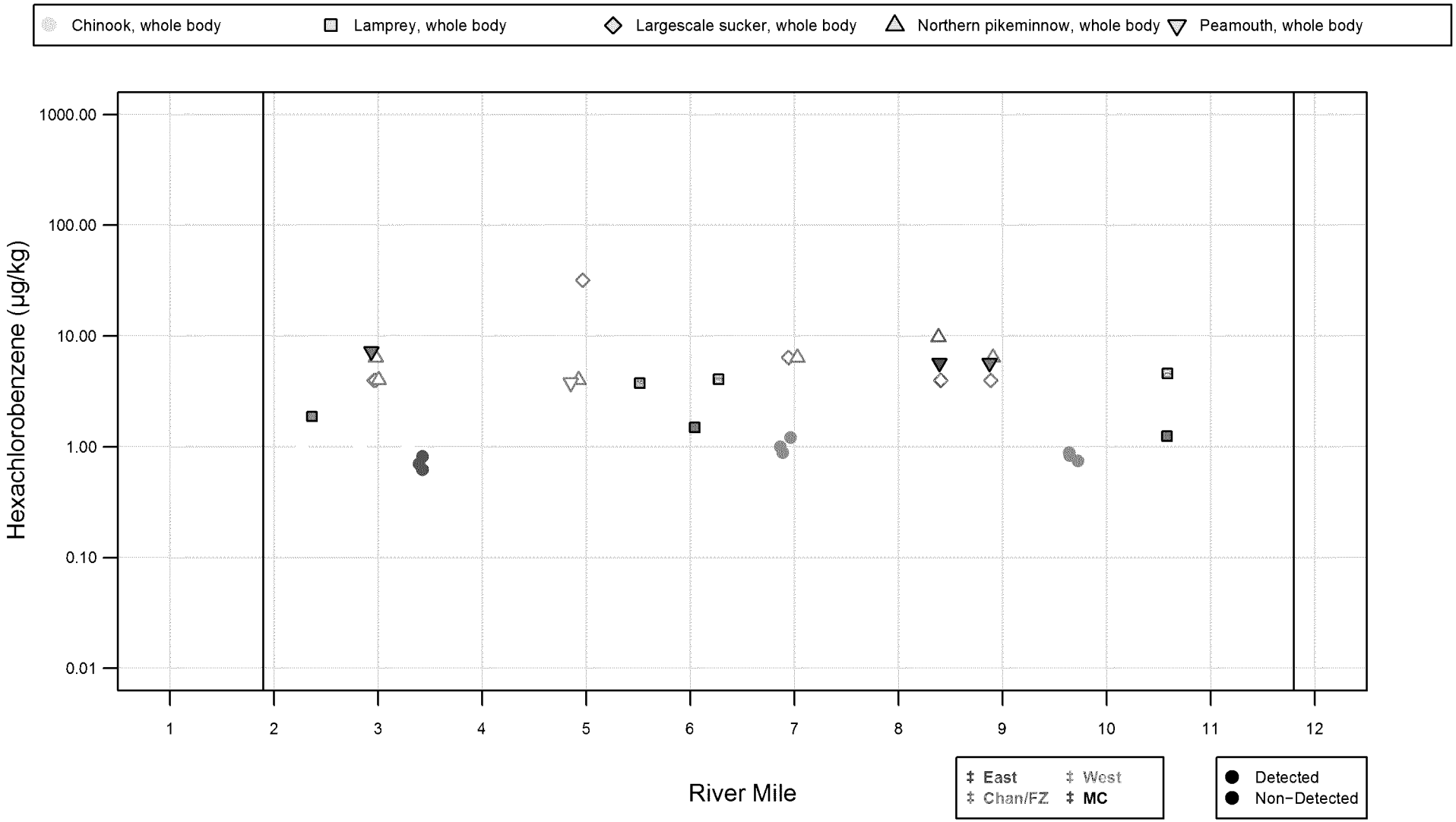

Figure D5.2-14d

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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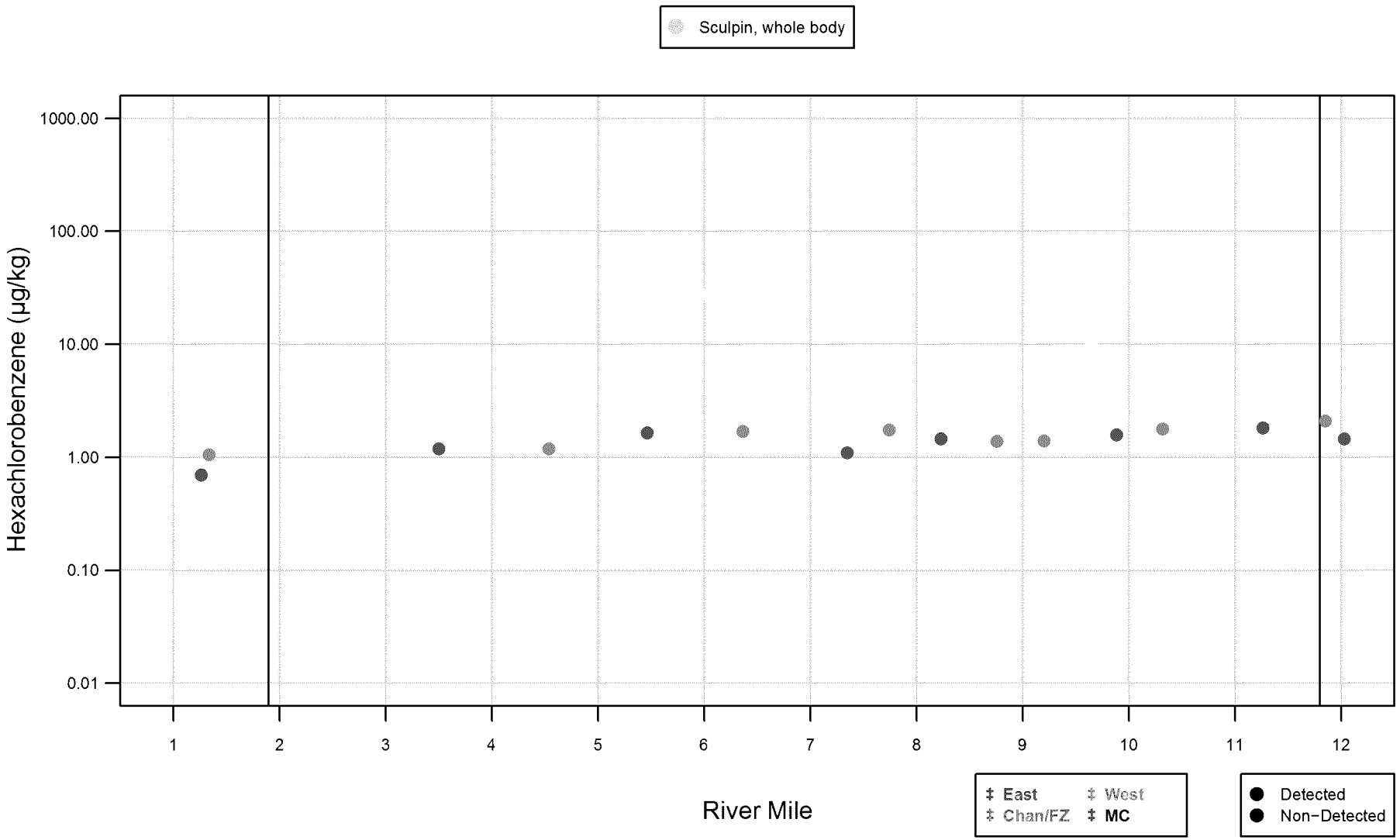

Figure D5.2-14e

Portland Harbor RI/FS
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Tissue Samples by River Mile, RM 0.8−12.2

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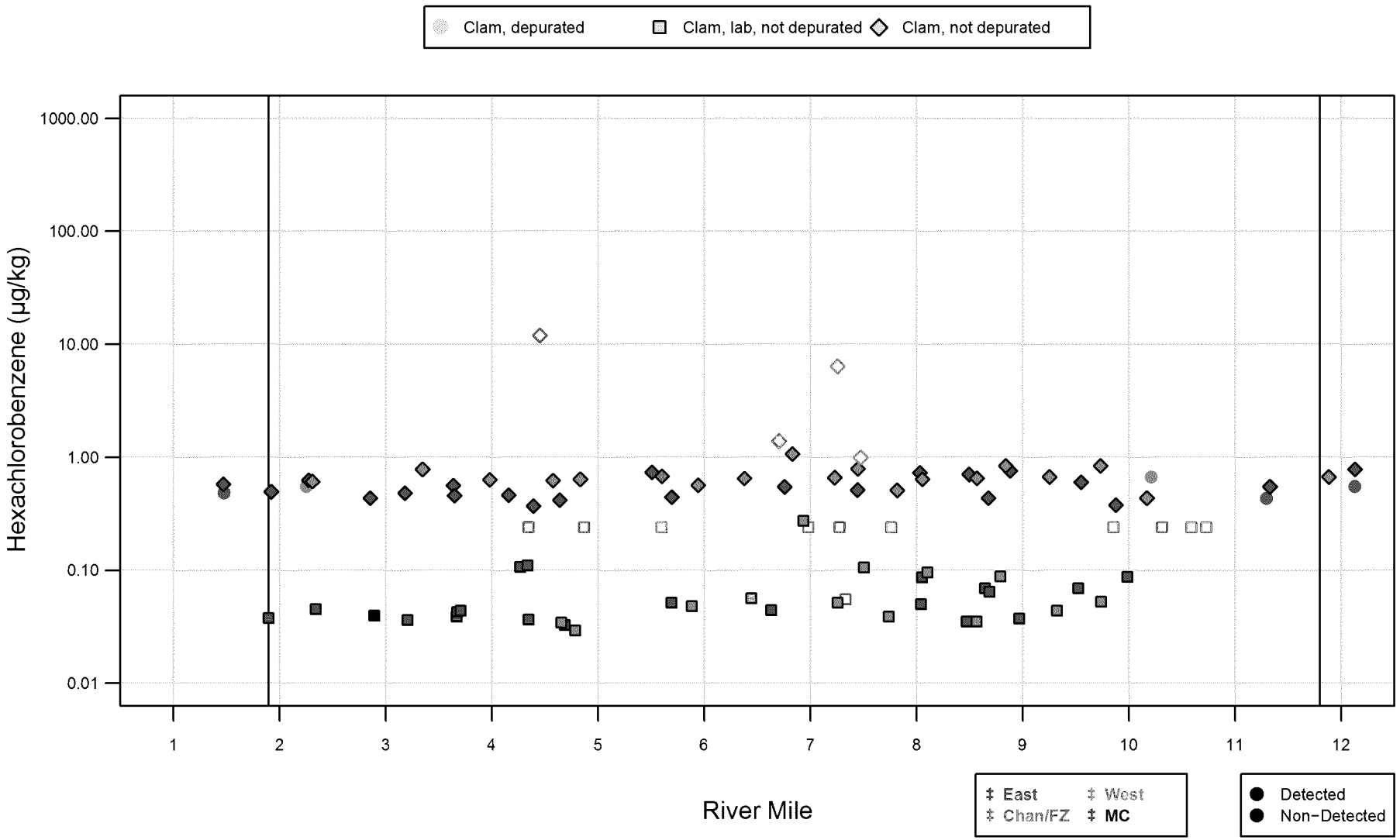

Figure D5.2-14f

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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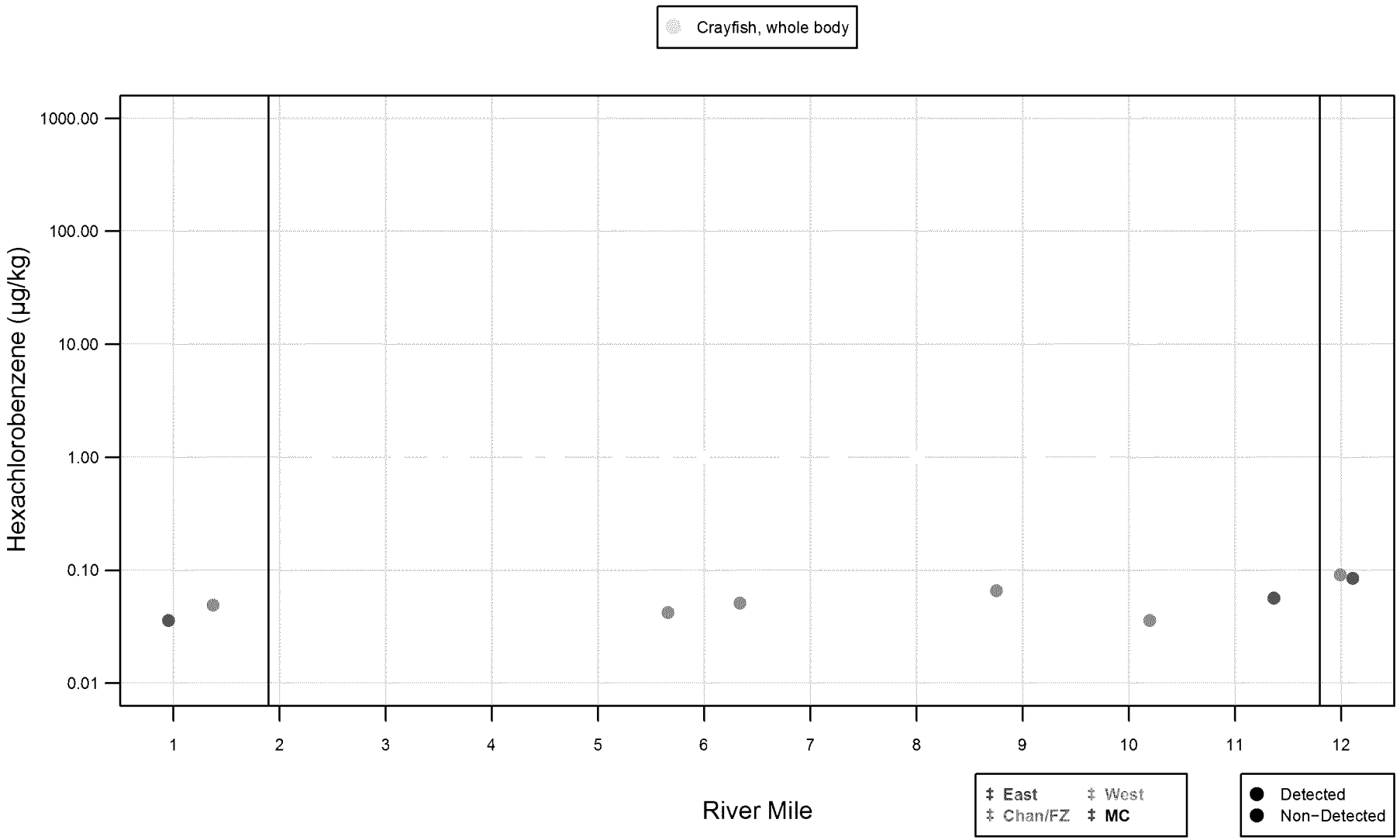

Figure D5.2-14g

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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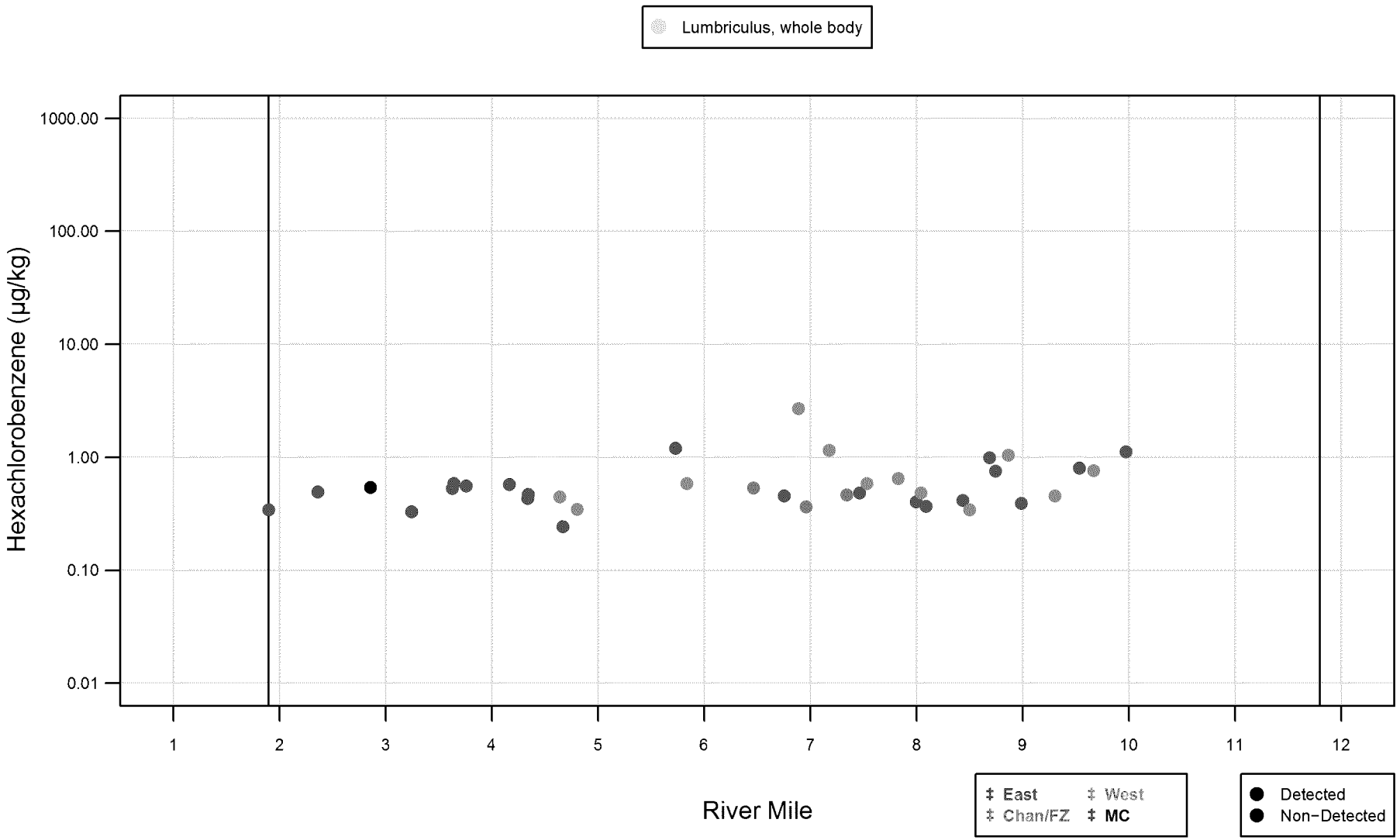

Figure D5.2-14h

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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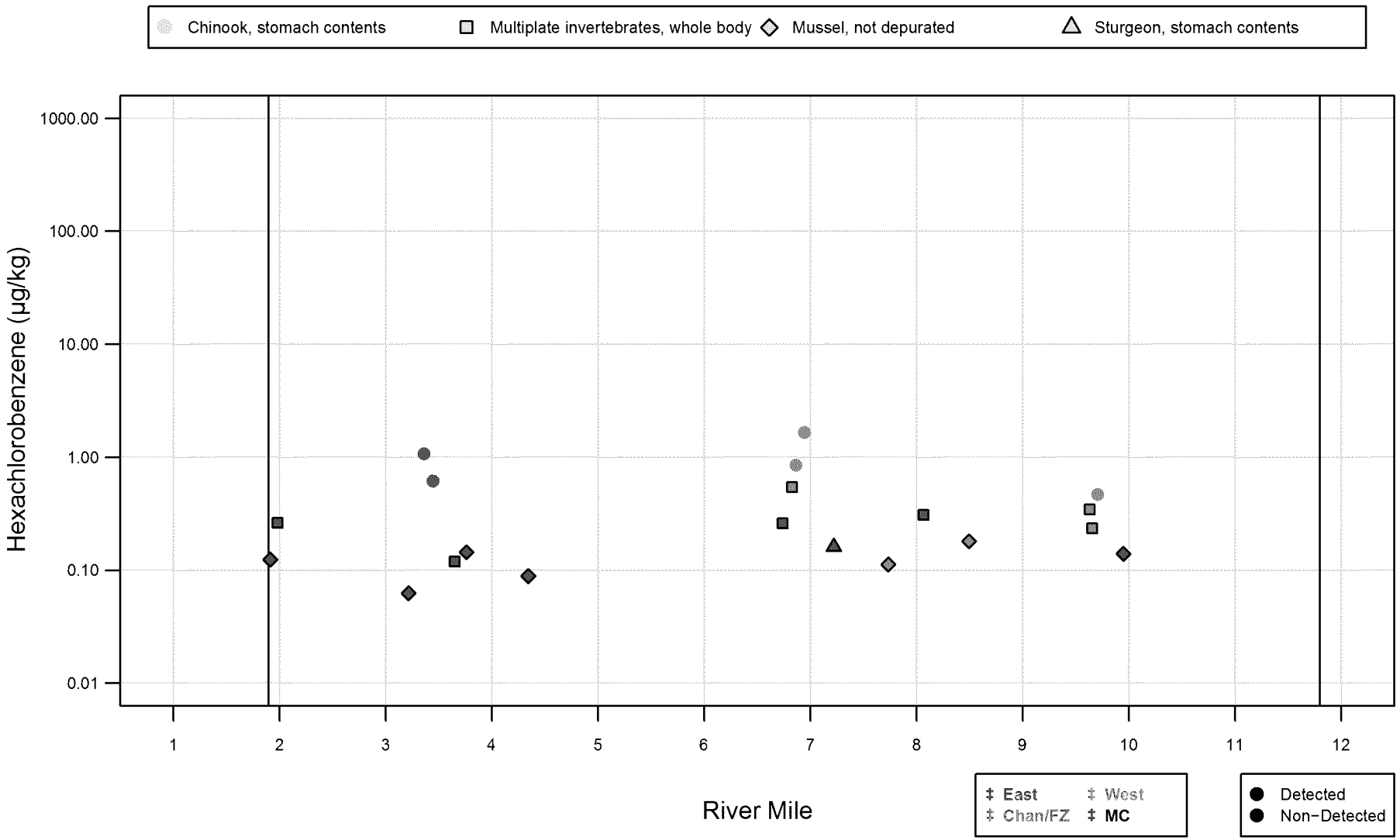

Figure D5.2-14i

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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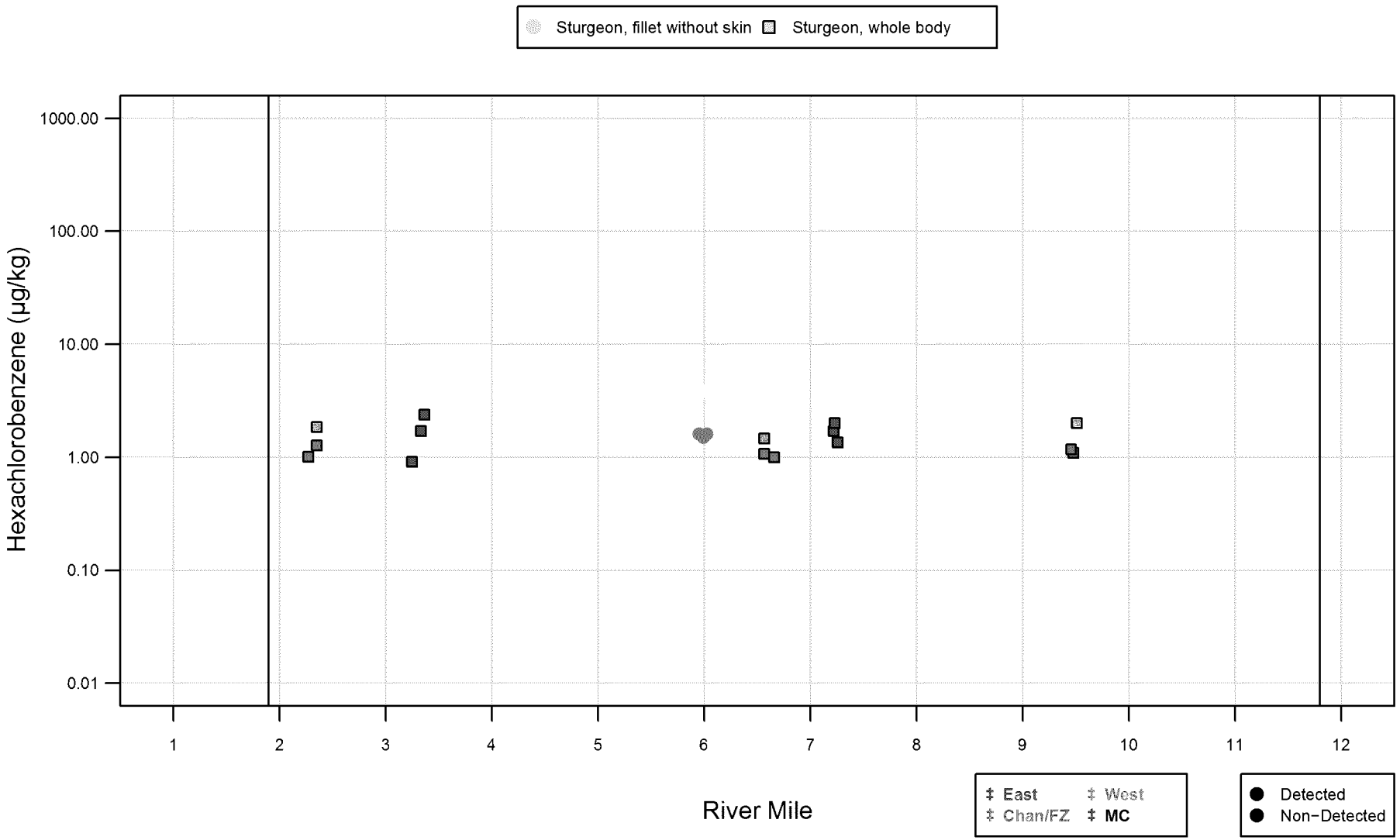

Figure D5.2-14j

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Hexachlorobenzene in
Tissue Samples by River Mile, RM 0.8−12.2

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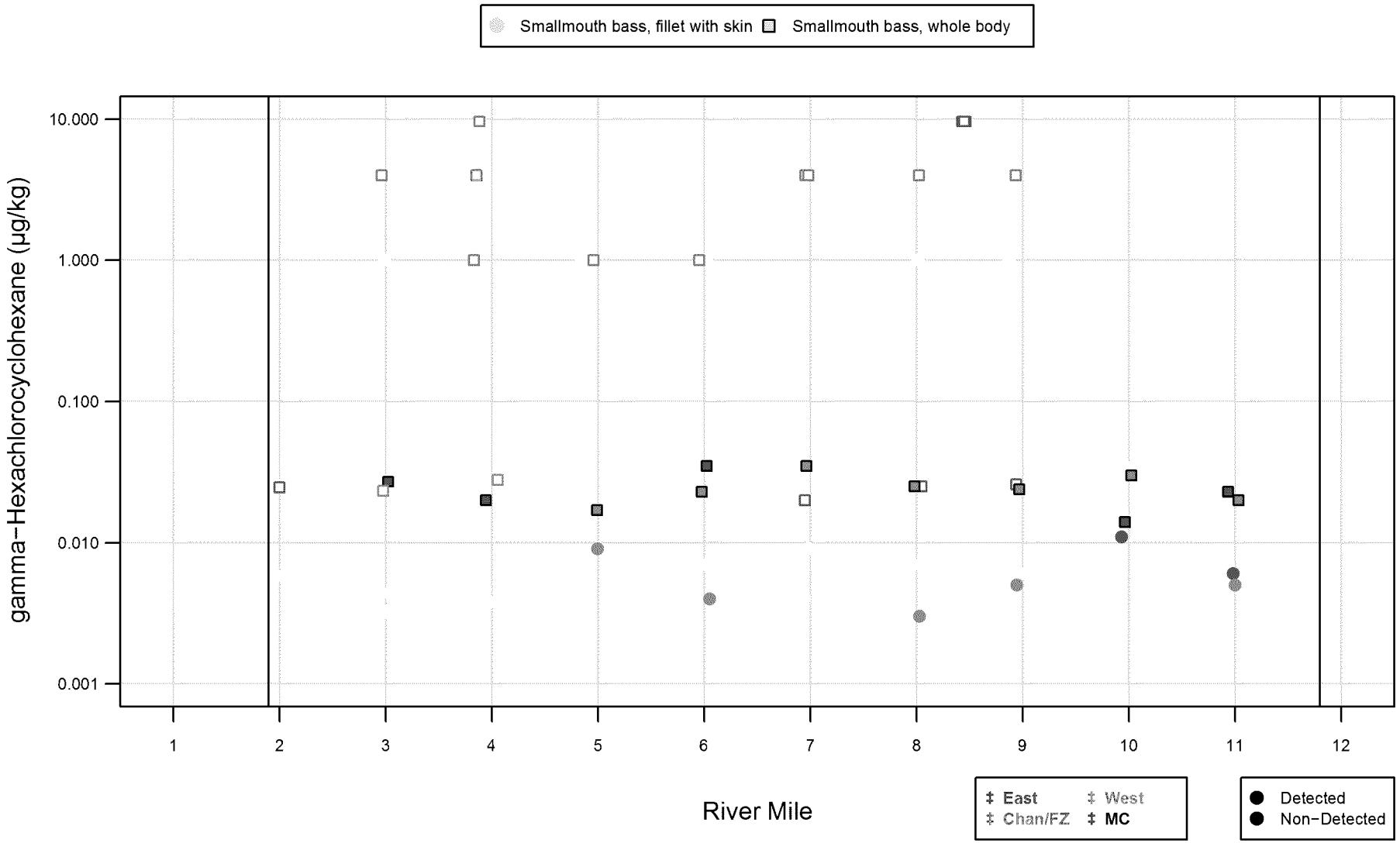

Figure D5.2-15a

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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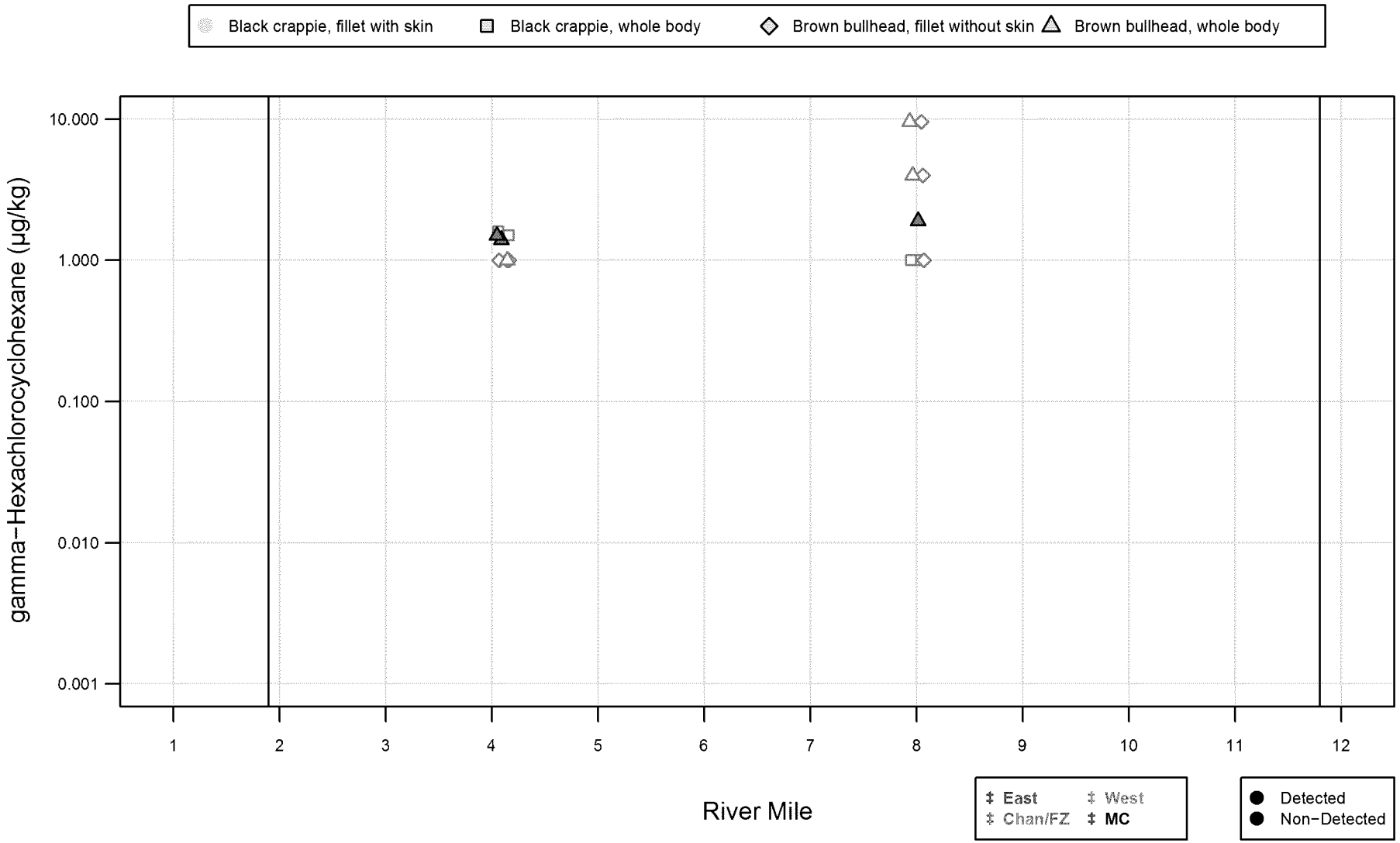

Figure D5.2-15b

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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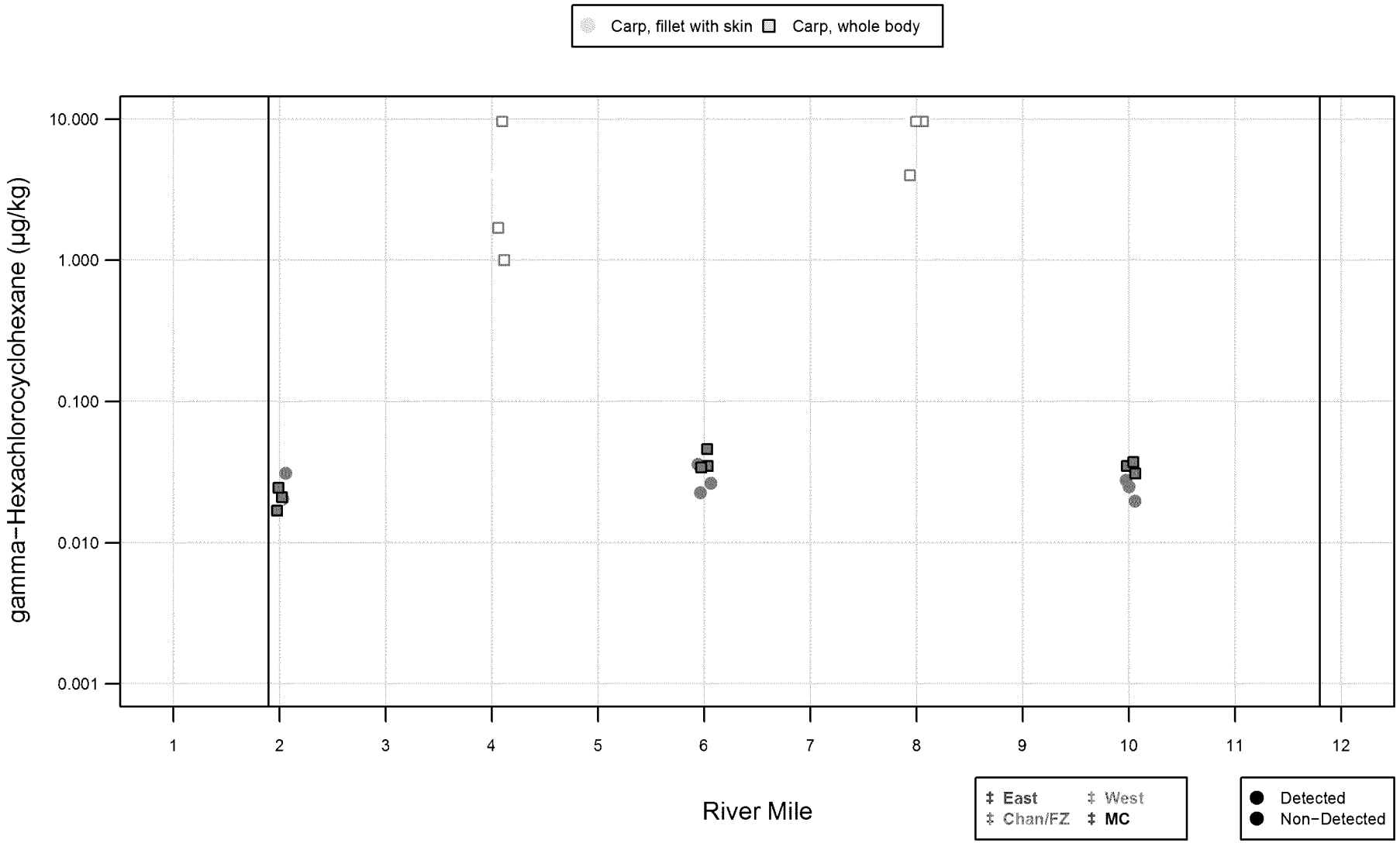

Figure D5.2-15c

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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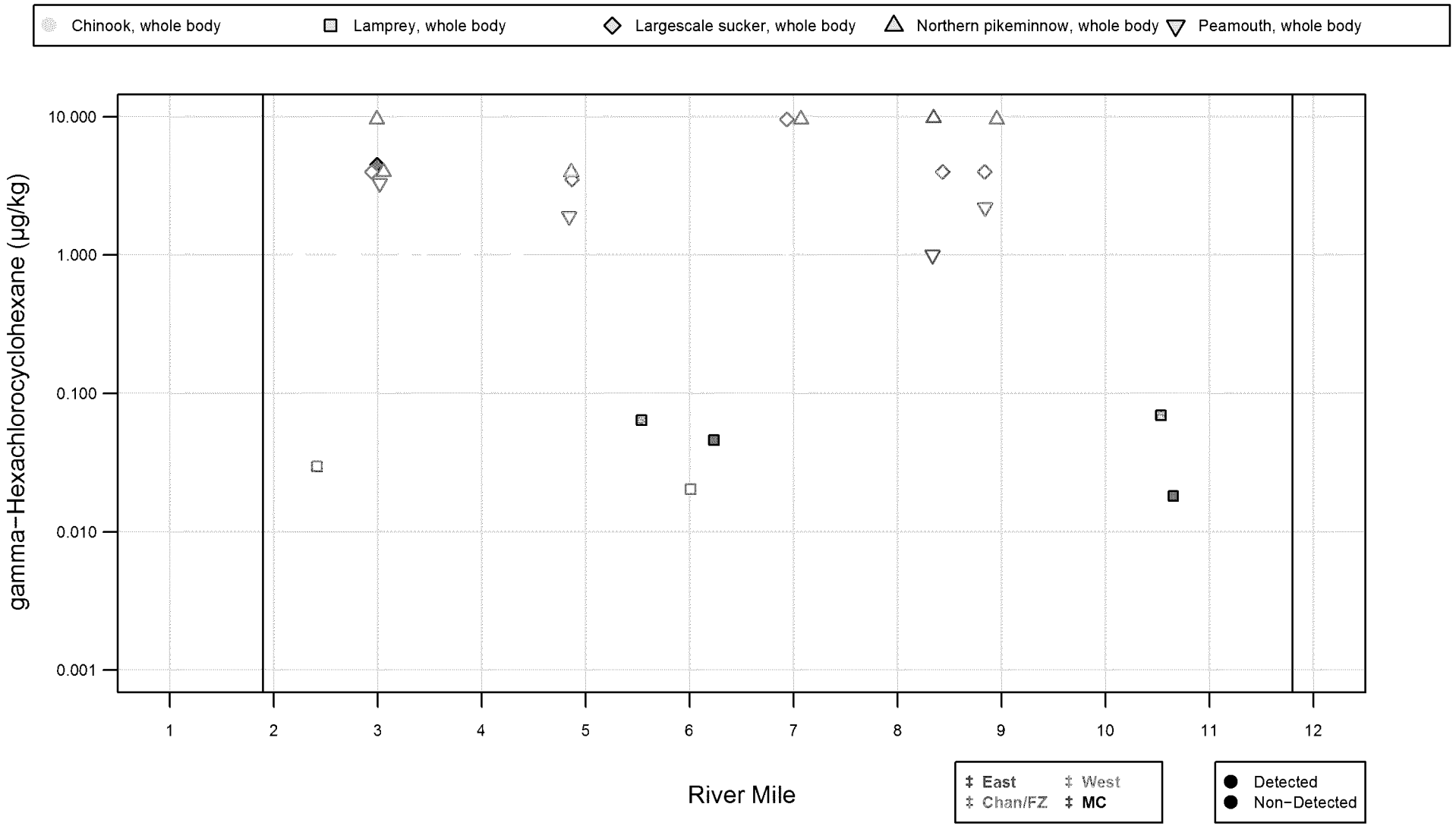

Figure D5.2-15d

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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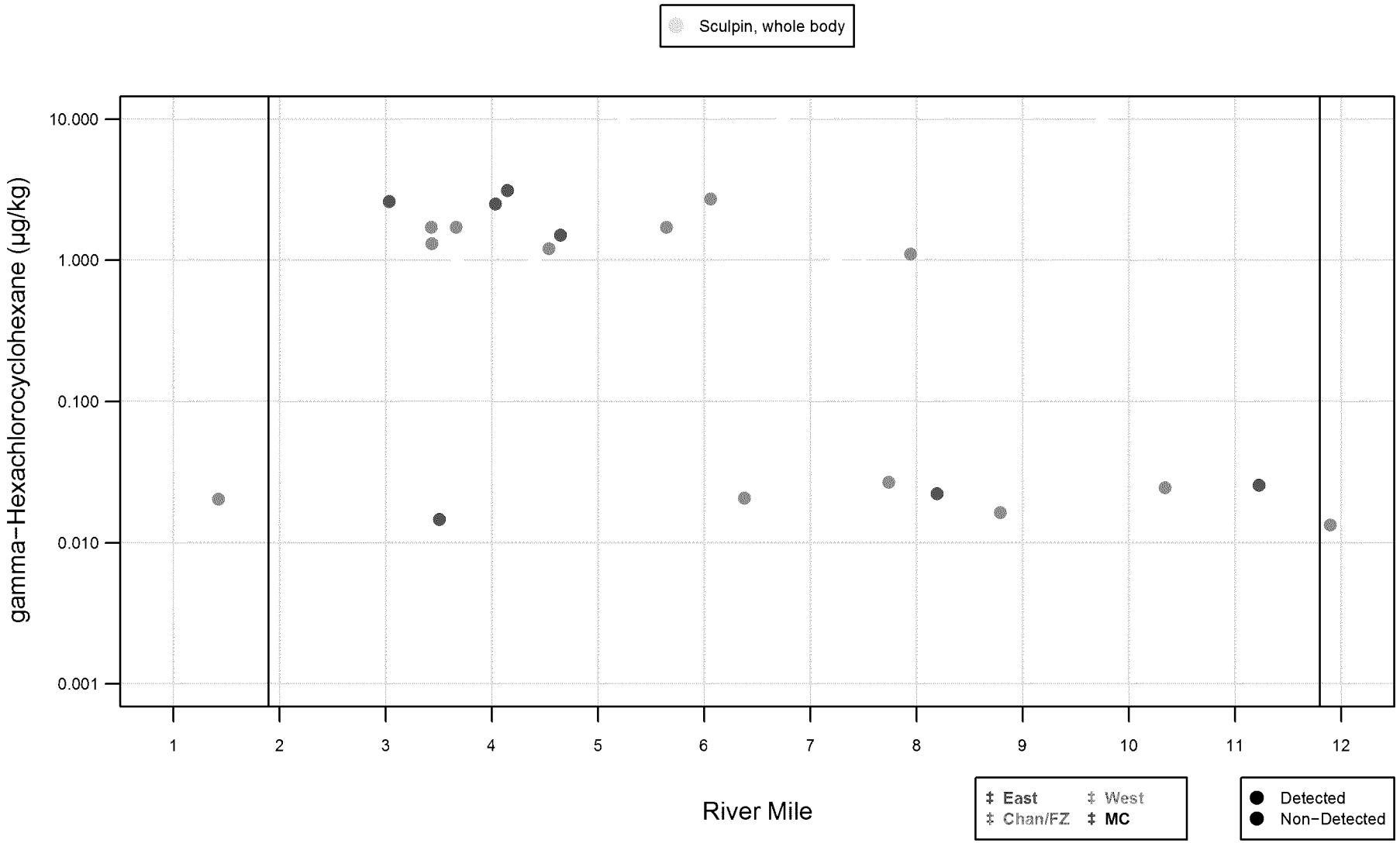

Figure D5.2-15e

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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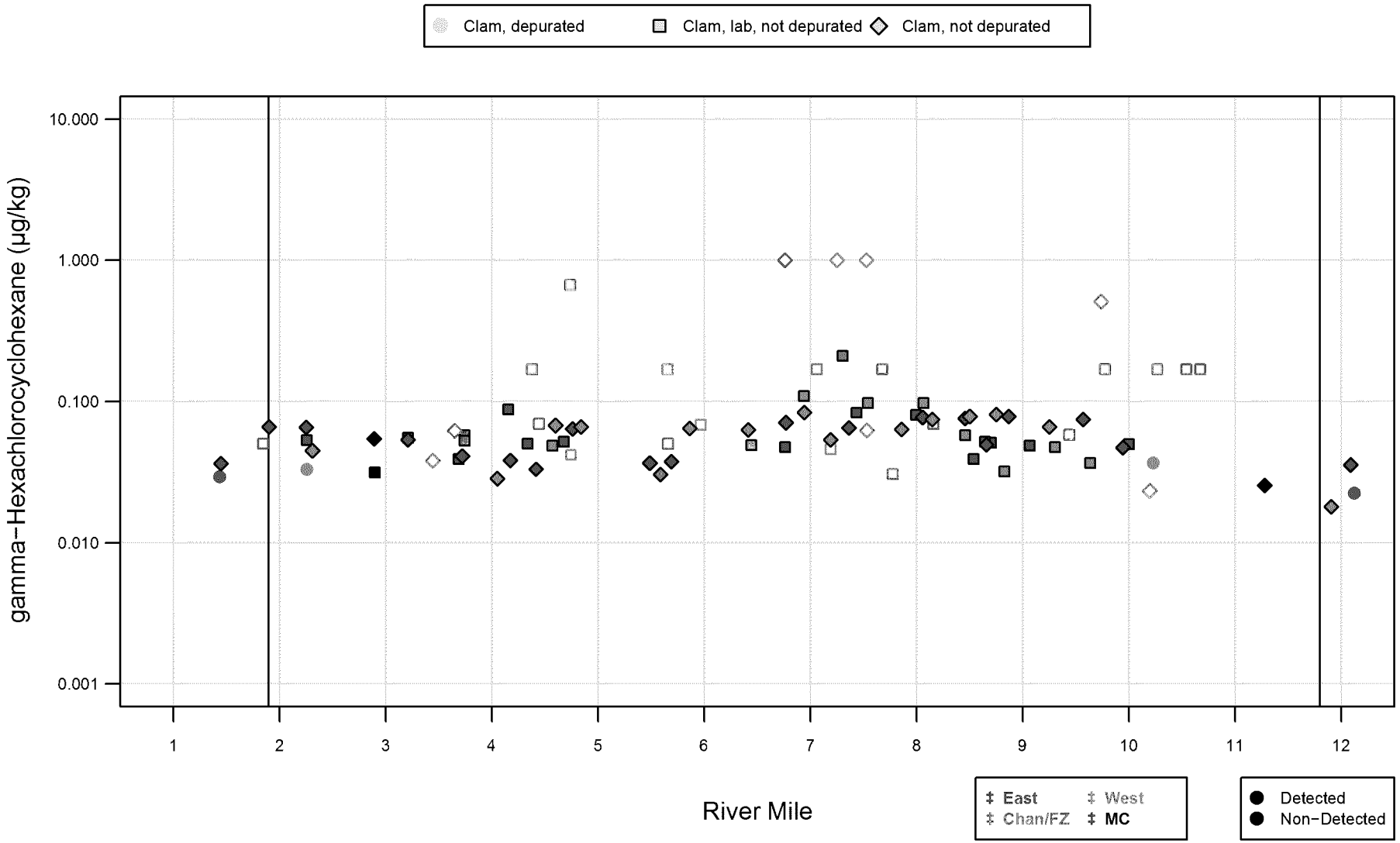

Figure D5.2-15f

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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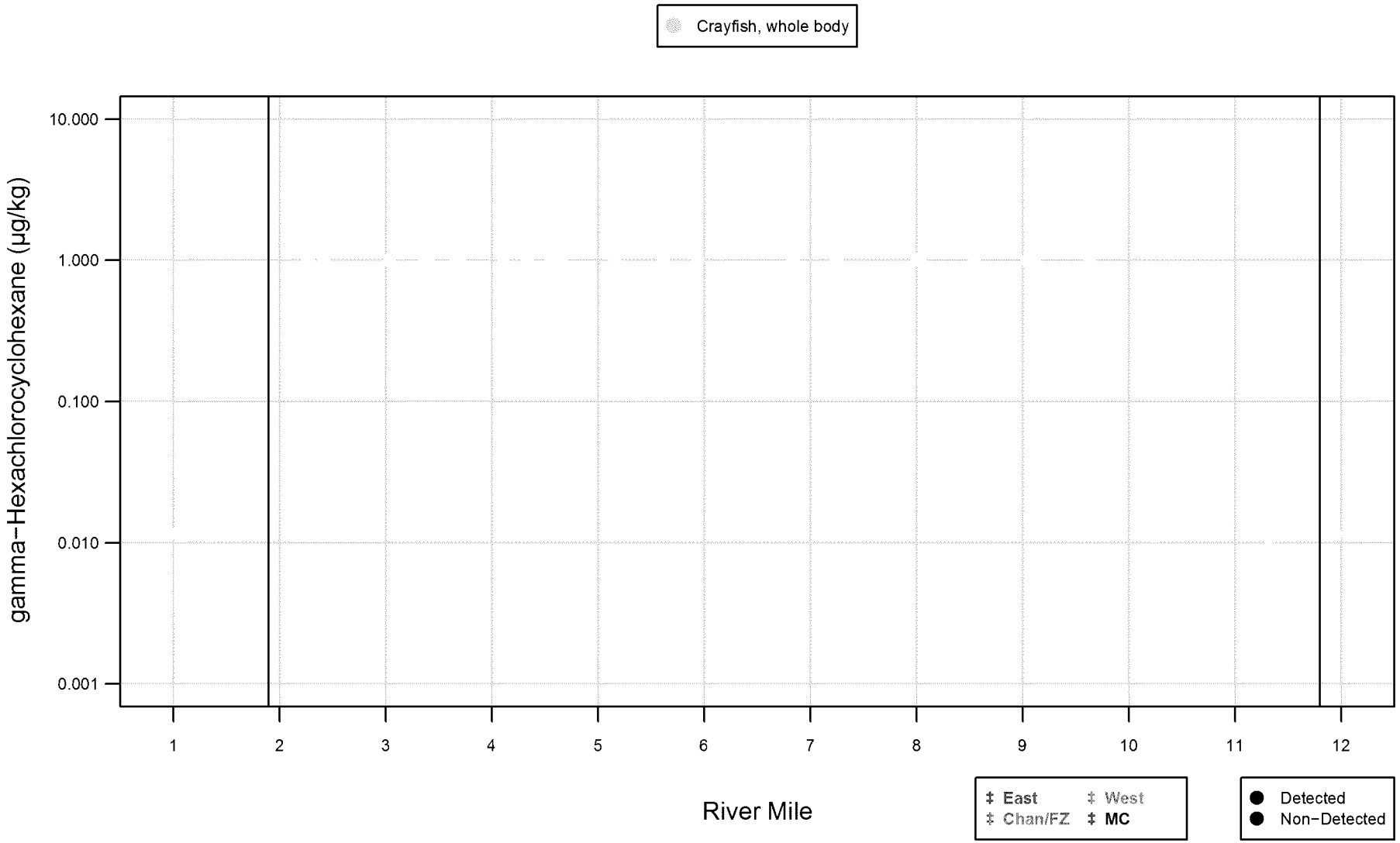

Figure D5.2-15g

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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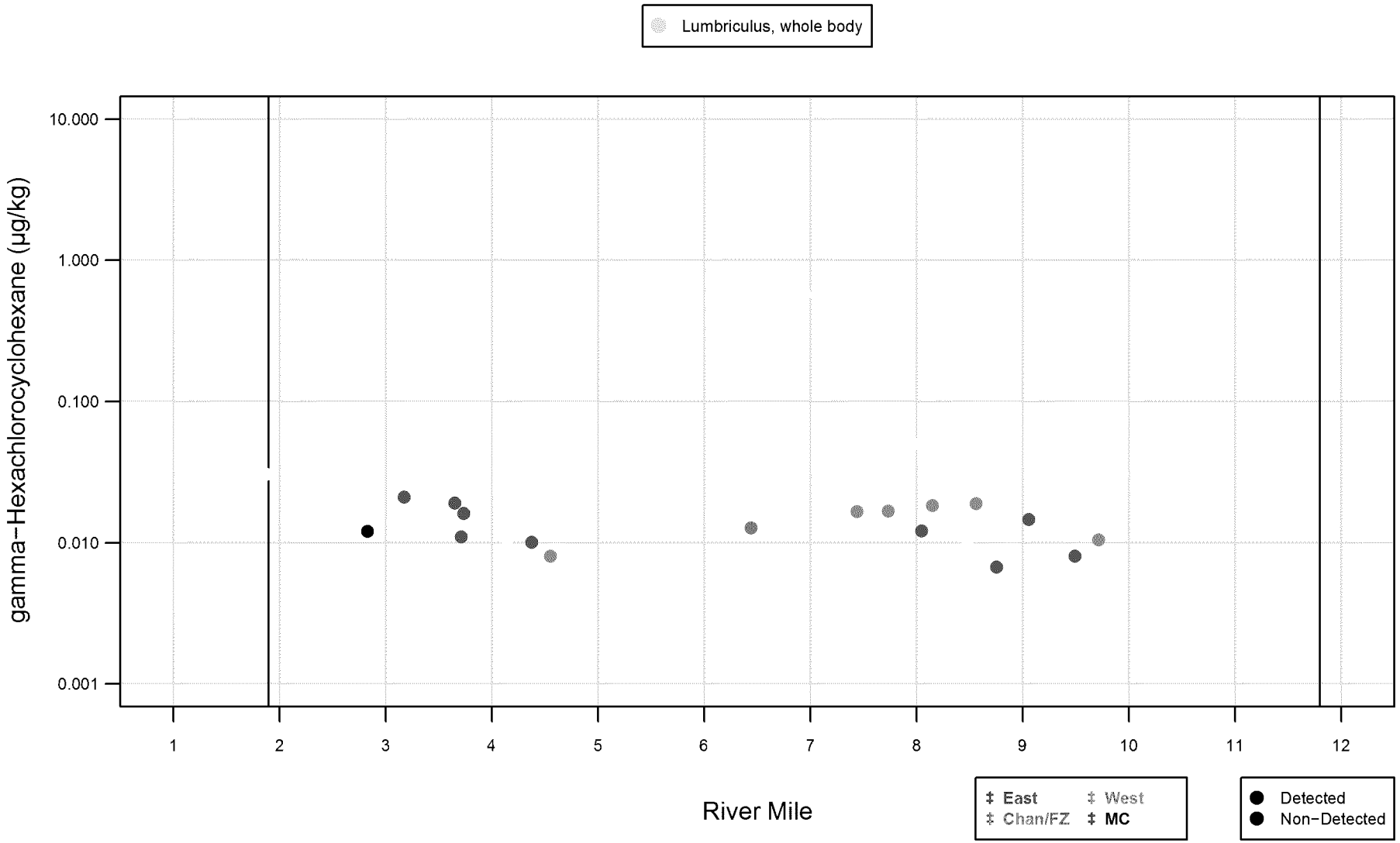

Figure D5.2-15h

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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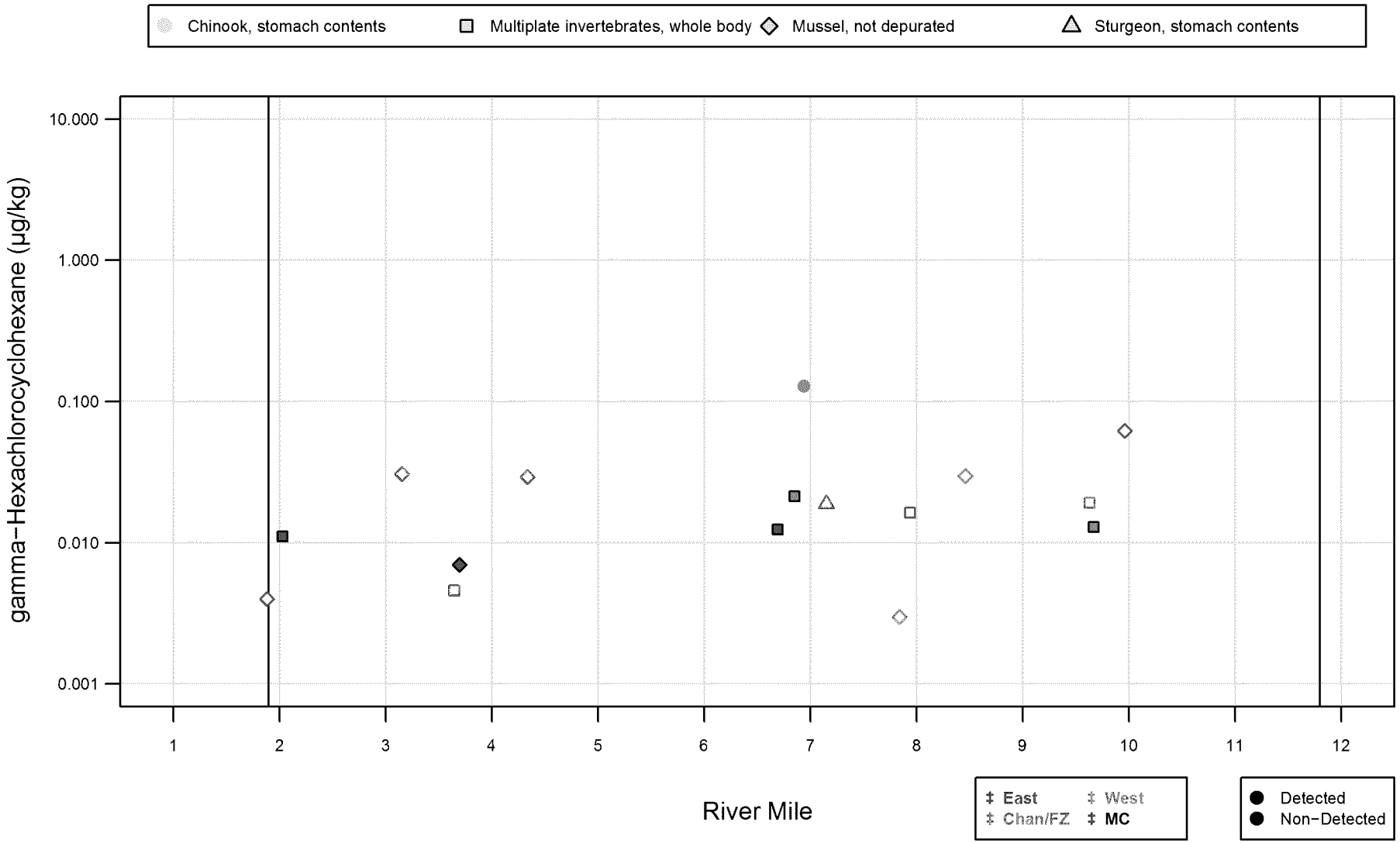

Figure D5.2-15i

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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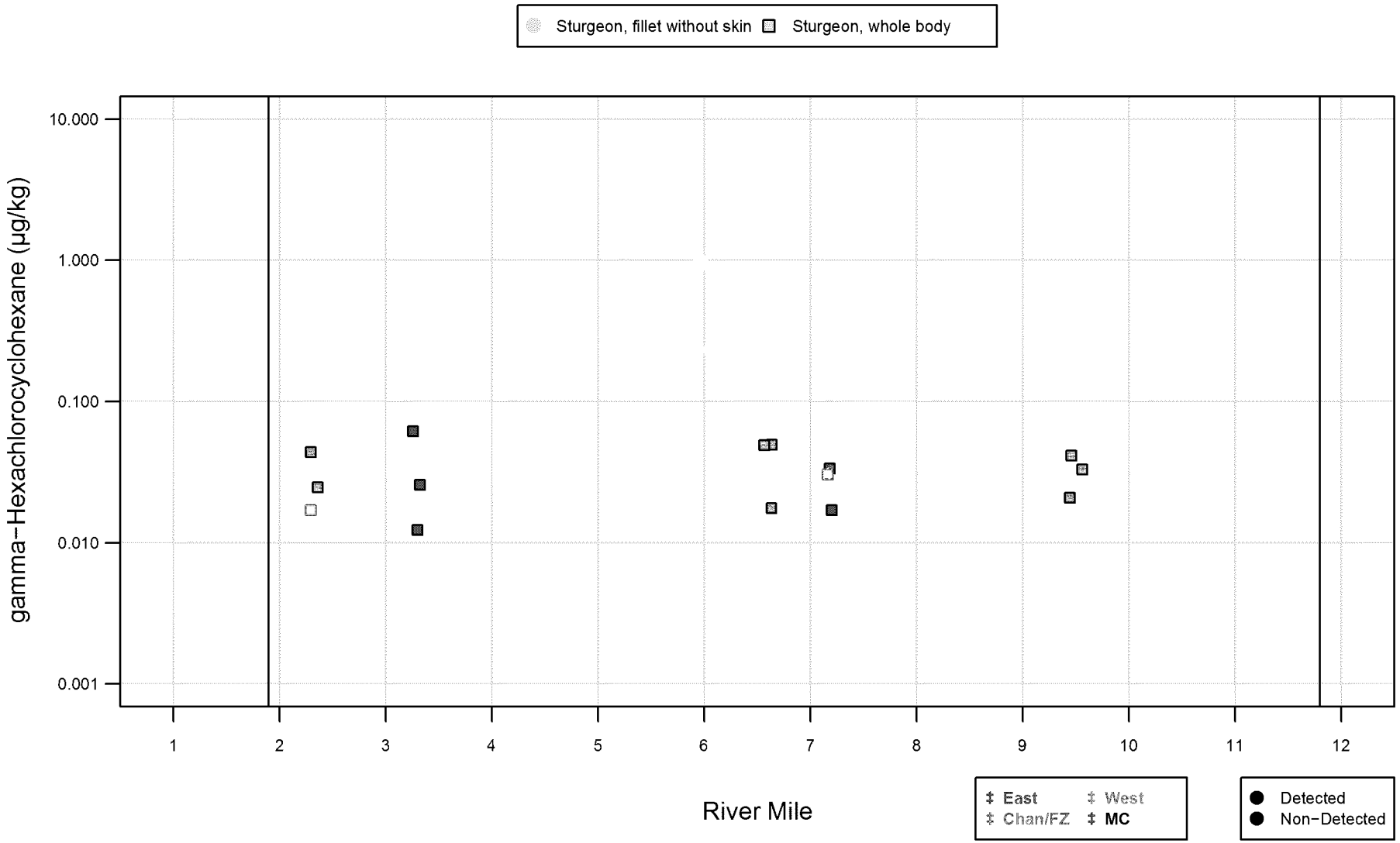

Figure D5.2-15j

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of gamma−Hexachlorocyclohexane in Tissue Samples by River Mile, RM 0.8−12.2

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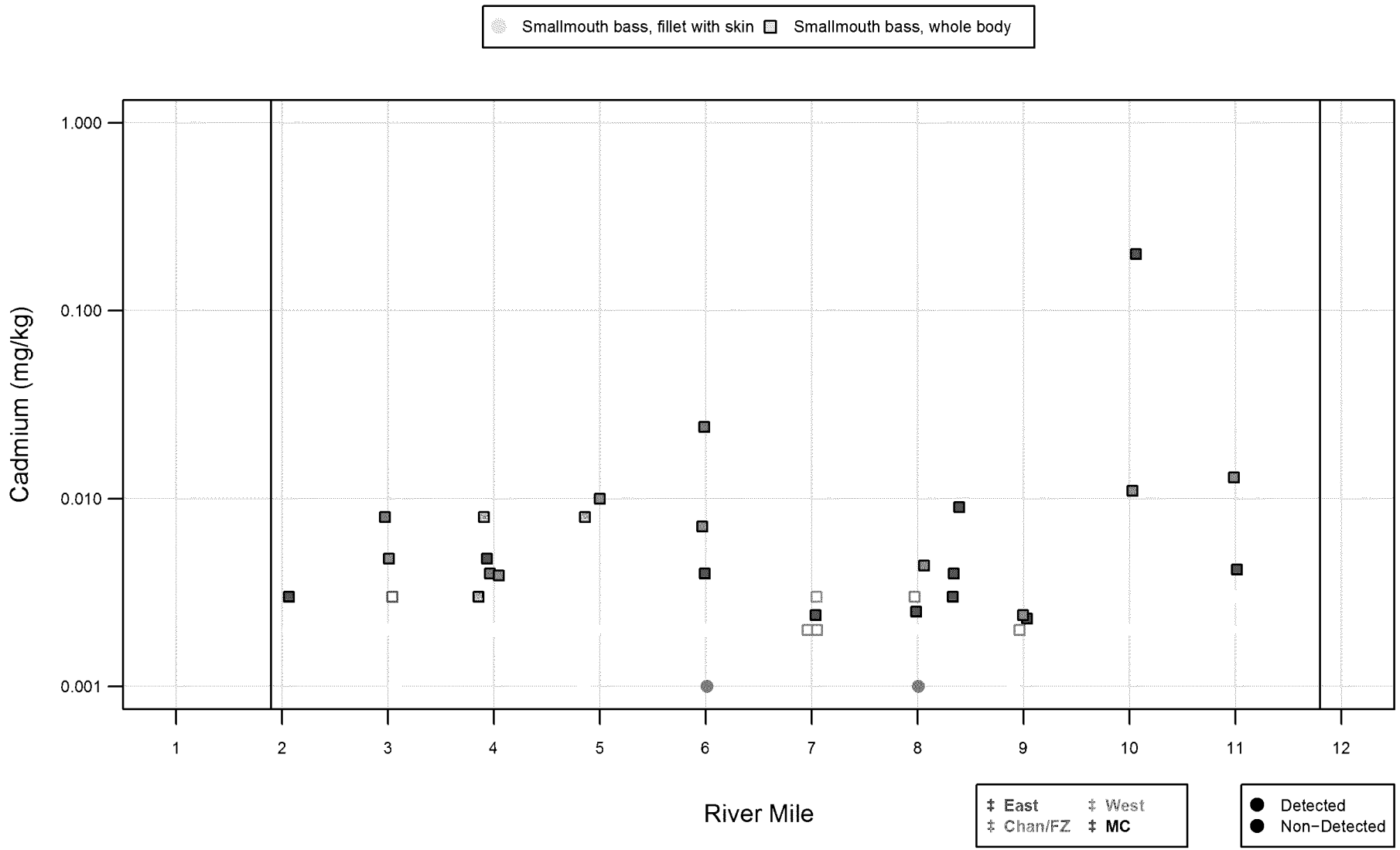

Figure D5.2-16a

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Cadmium in
Tissue Samples by River Mile, RM 0.8−12.2

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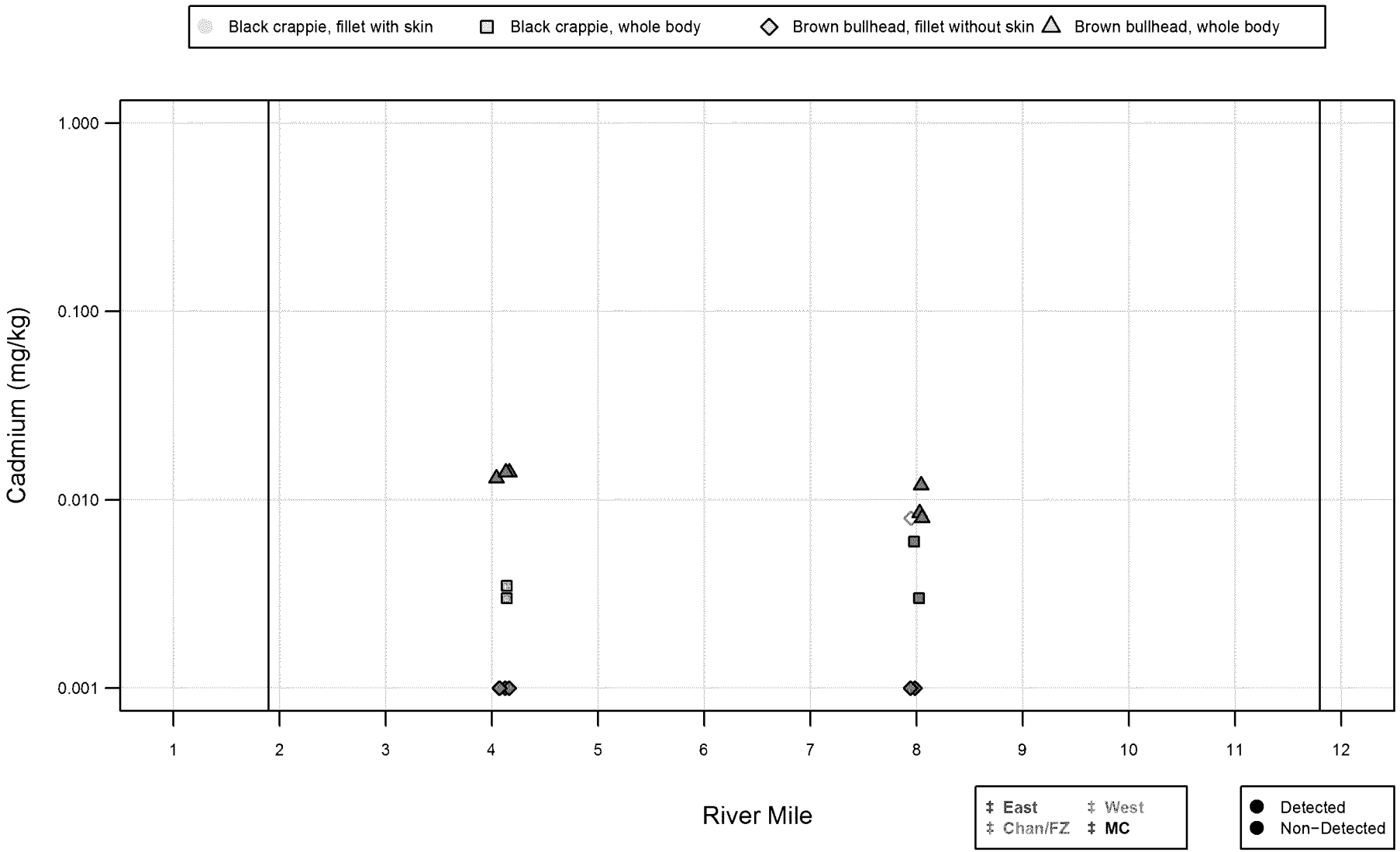

Figure D5.2-16b

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Cadmium in
Tissue Samples by River Mile, RM 0.8−12.2

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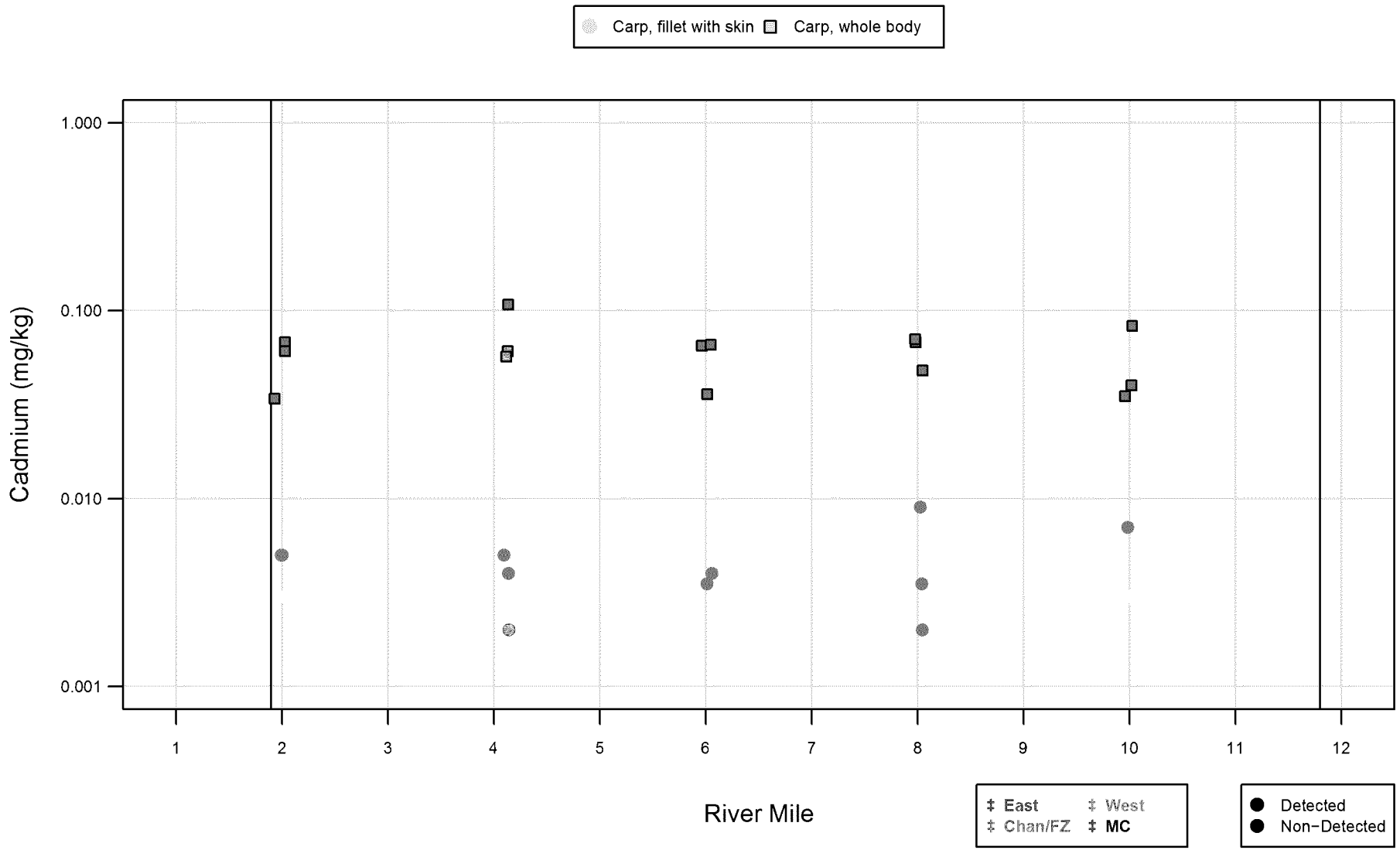

Figure D5.2-16c

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Cadmium in
Tissue Samples by River Mile, RM 0.8−12.2

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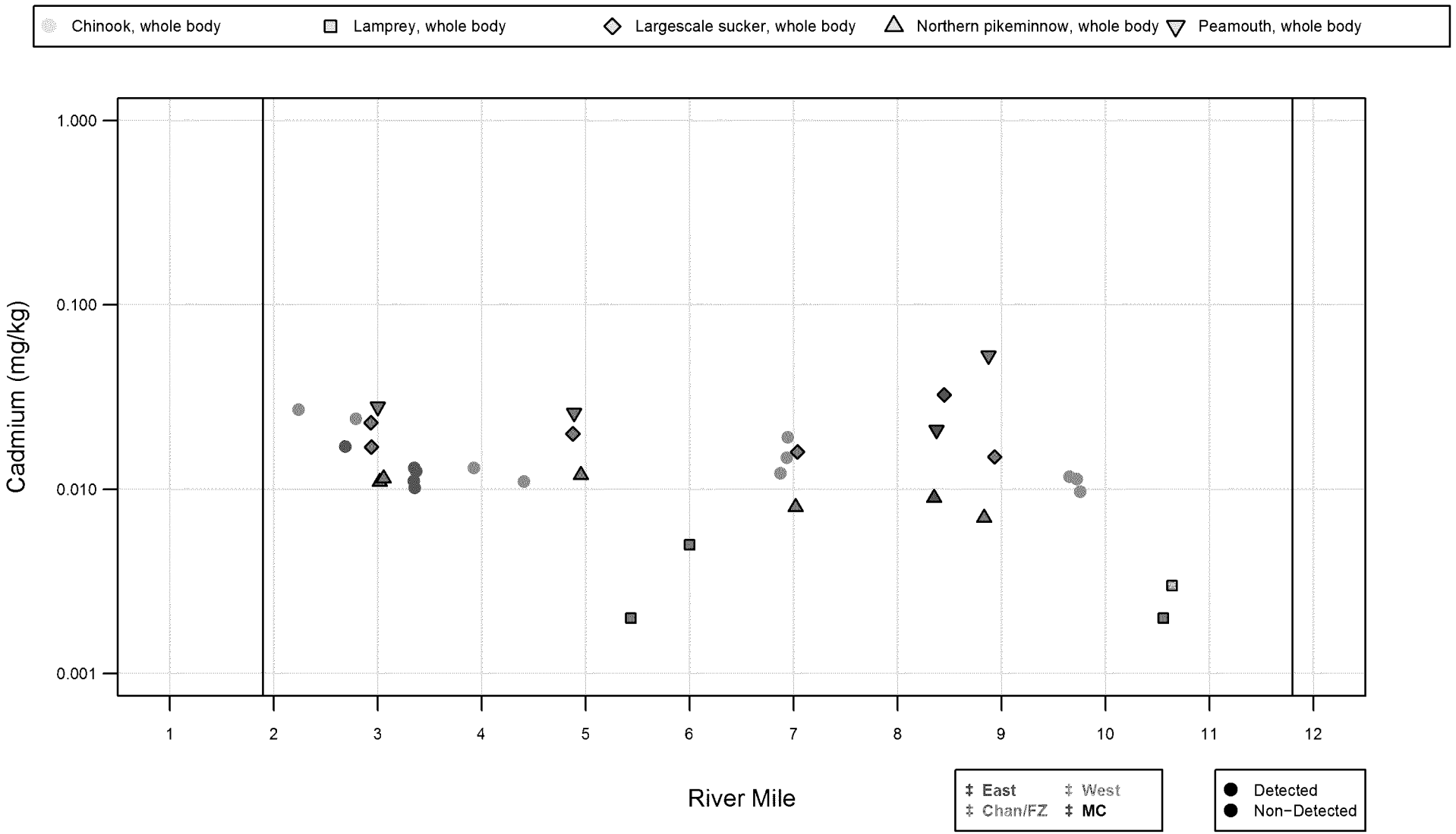

Figure D5.2-16d

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Cadmium in
Tissue Samples by River Mile, RM 0.8−12.2

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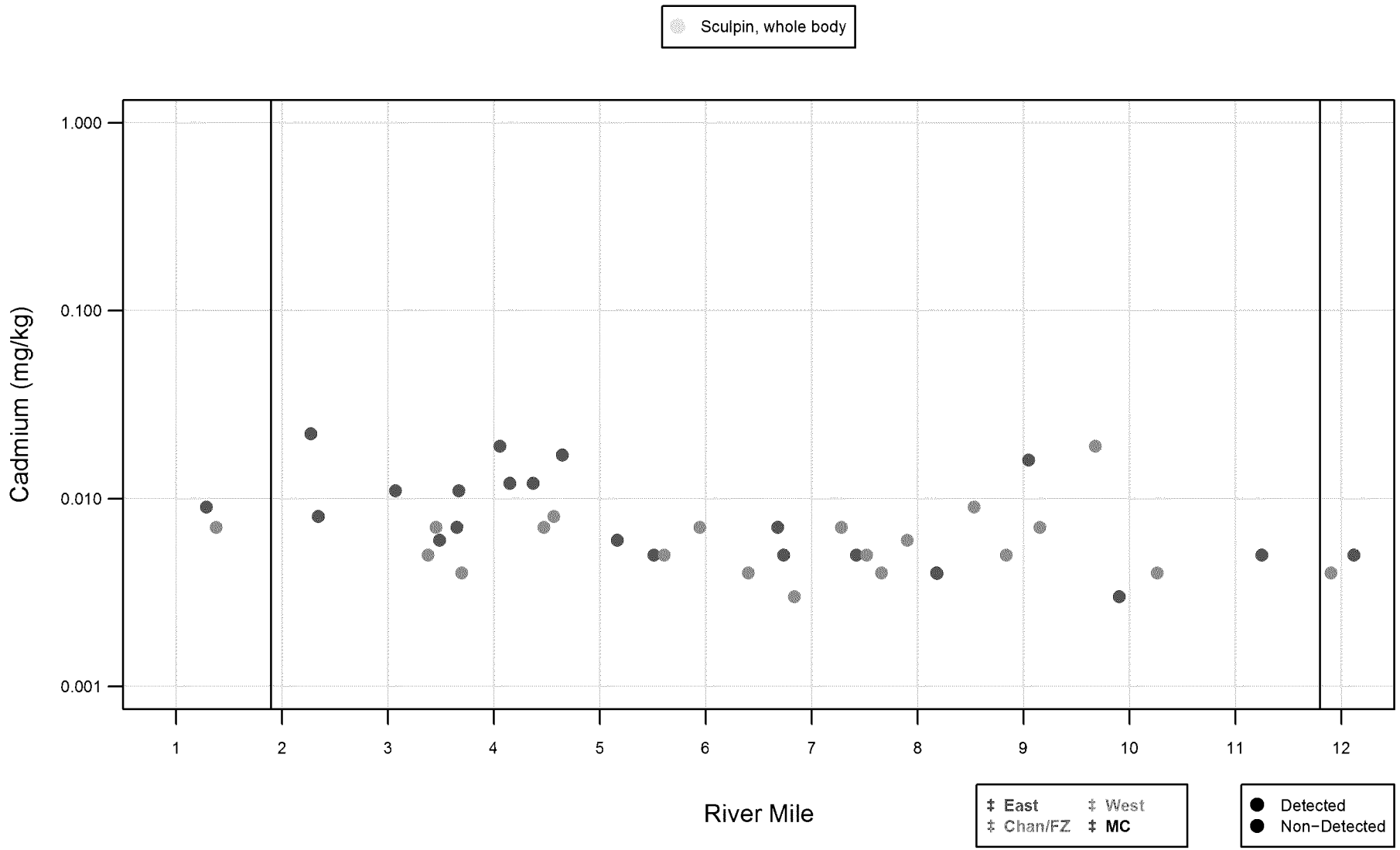

Figure D5.2-16e

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Remedial Investigation Report
Scatter Plot of Cadmium in
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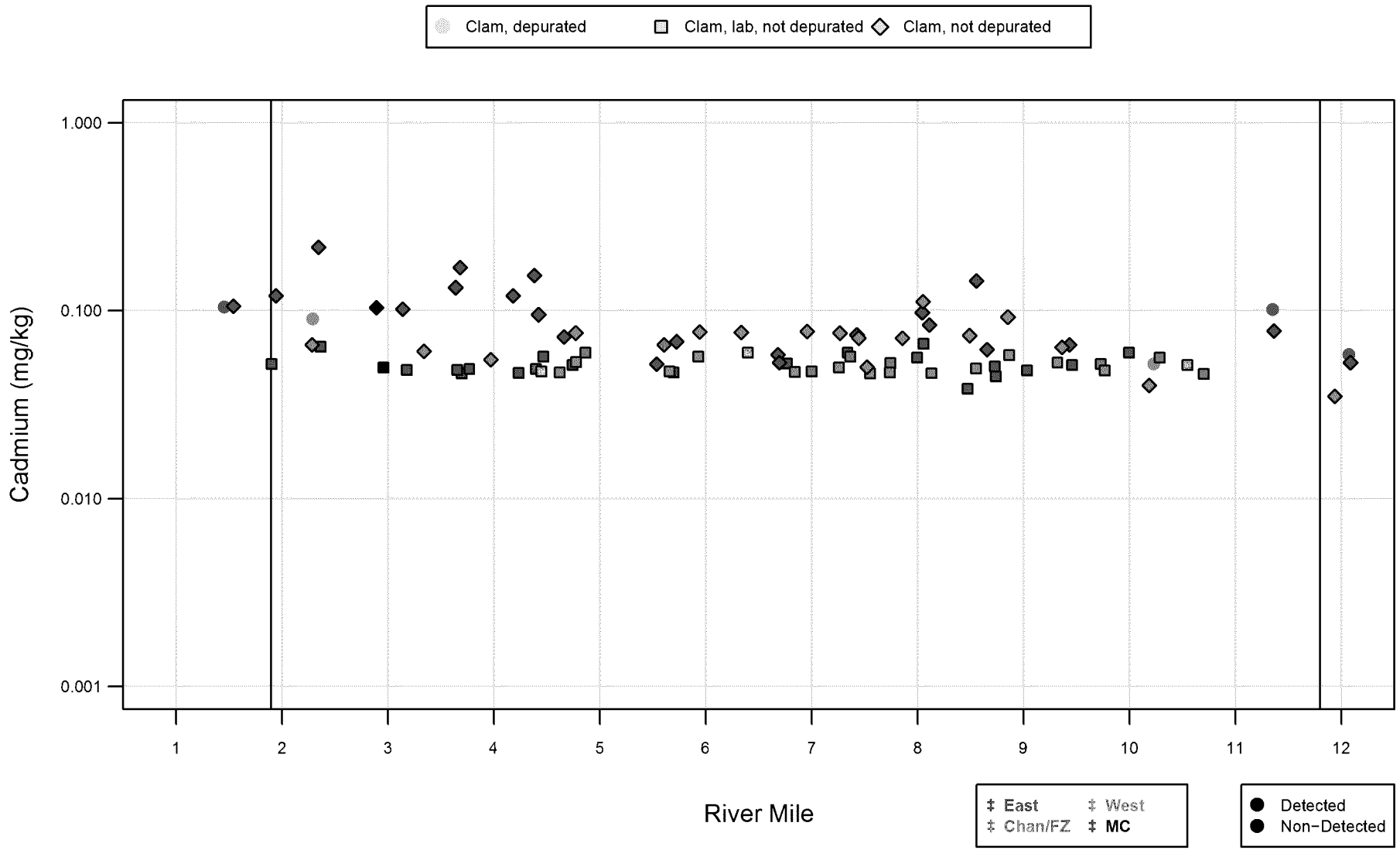

Figure D5.2-16f

Portland Harbor RI/FS
Remedial Investigation Report
Scatter Plot of Cadmium in
Tissue Samples by River Mile, RM 0.8−12.2

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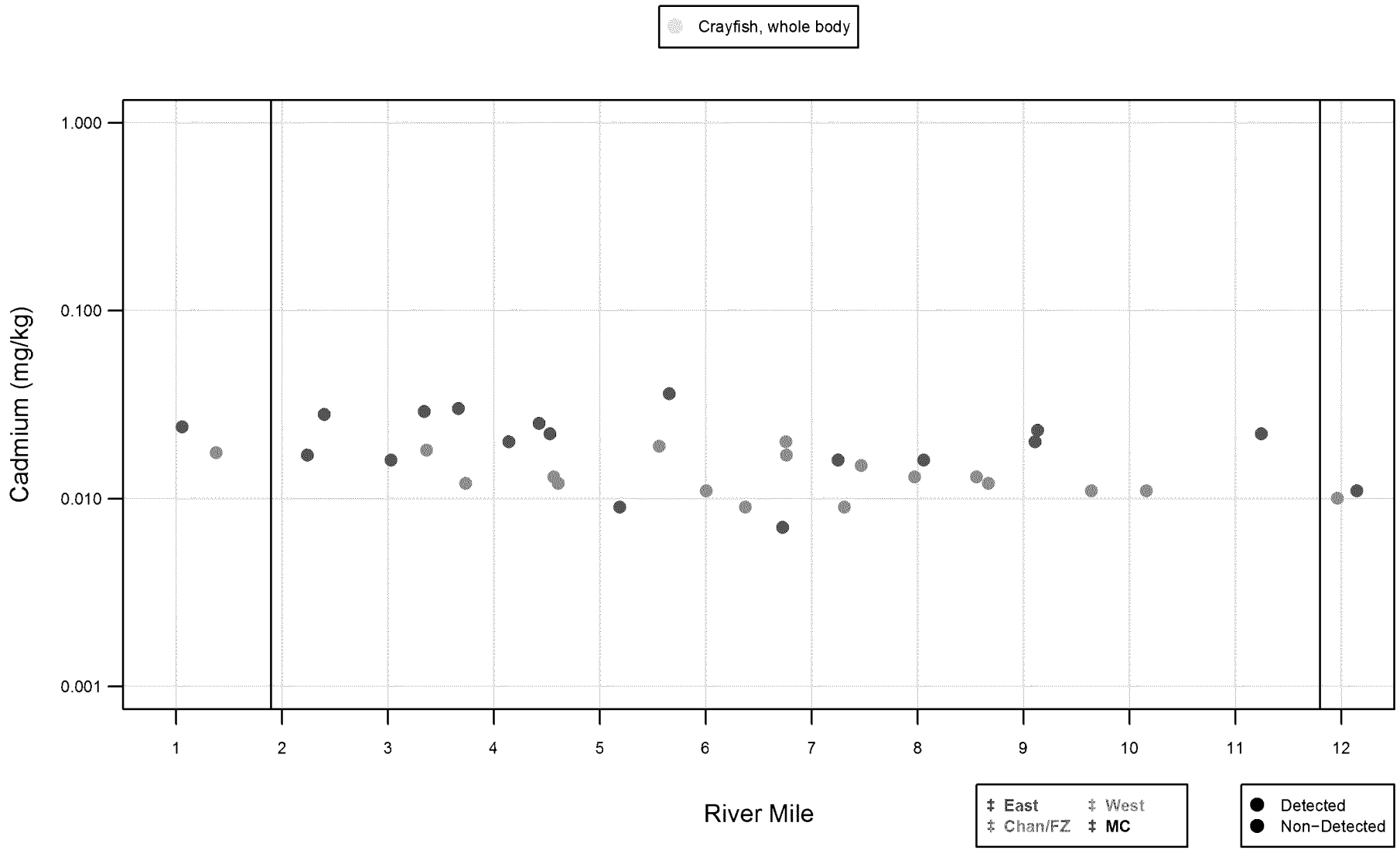

Figure D5.2-16g

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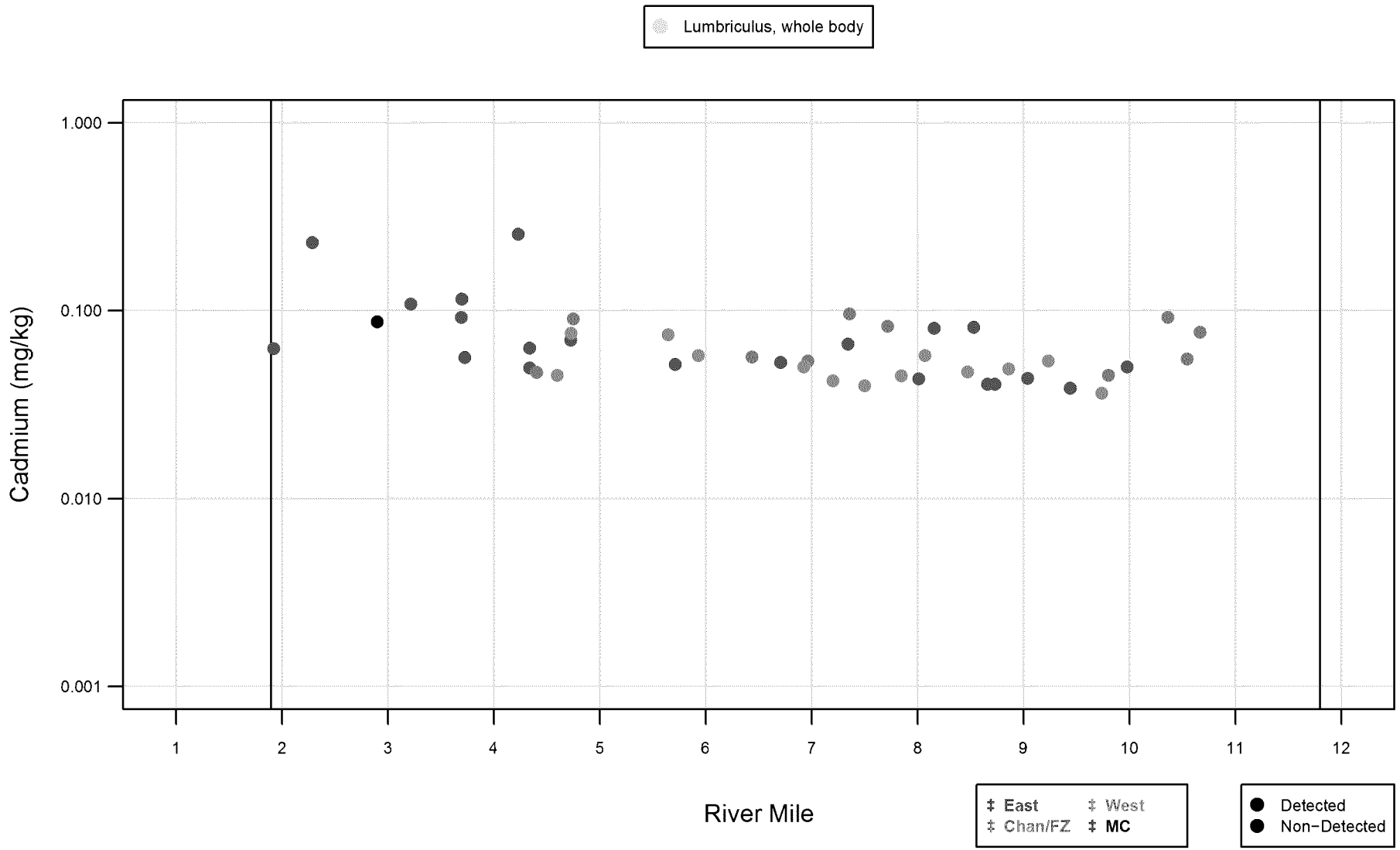

Figure D5.2-16h

Portland Harbor RI/FS
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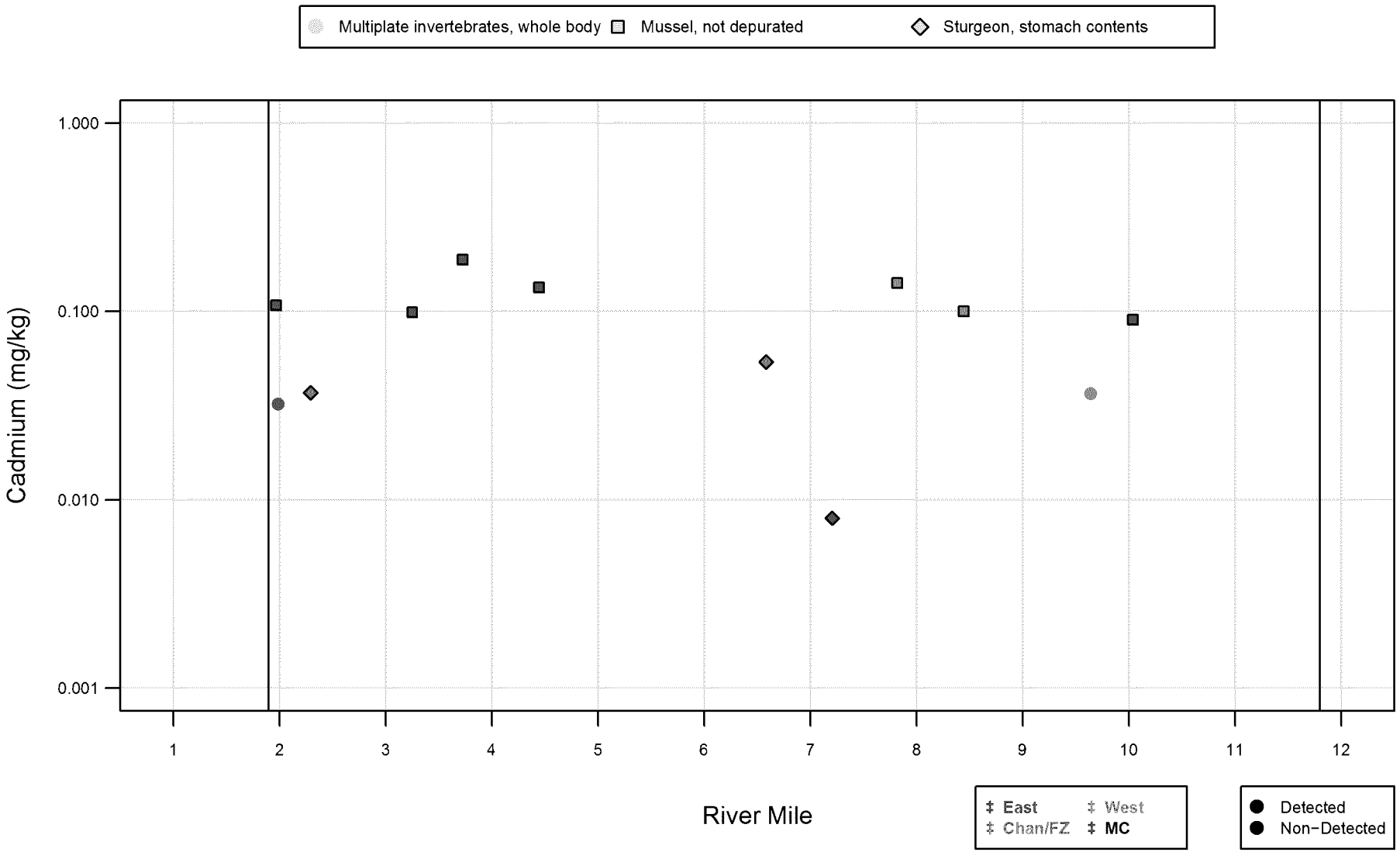

Figure D5.2-16i

Portland Harbor RI/FS
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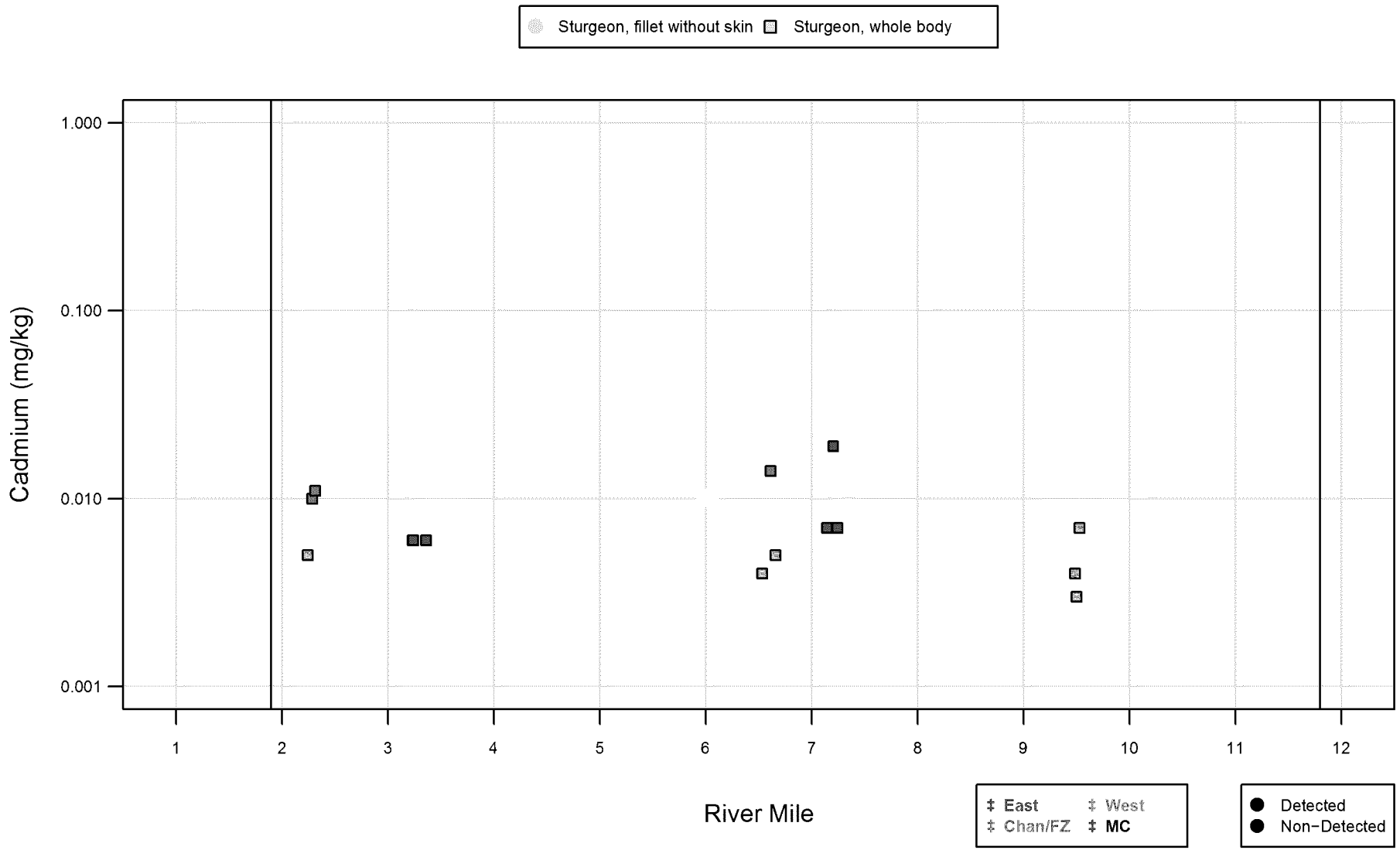

Figure D5.2-16j

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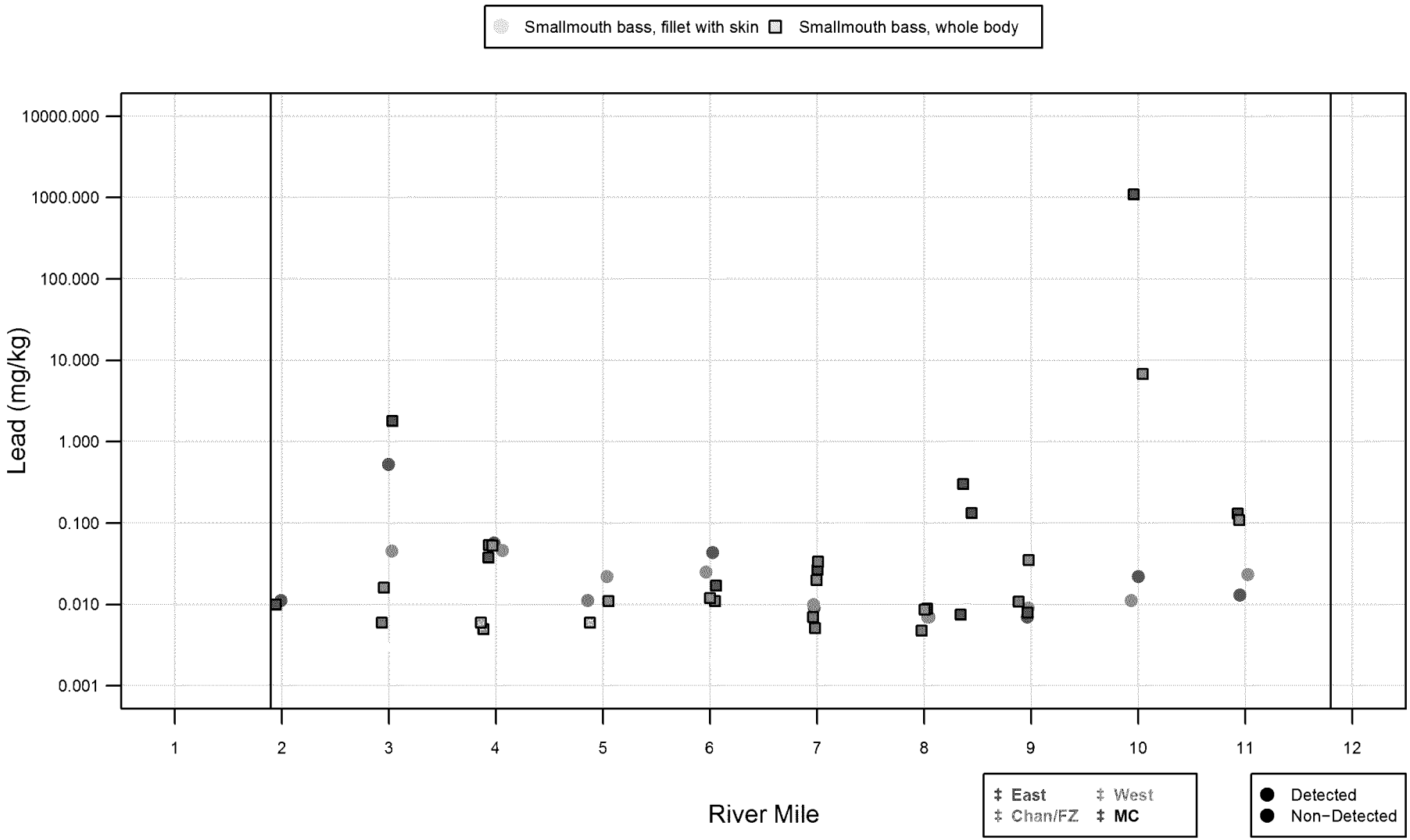

Figure D5.2-17a

Portland Harbor RI/FS
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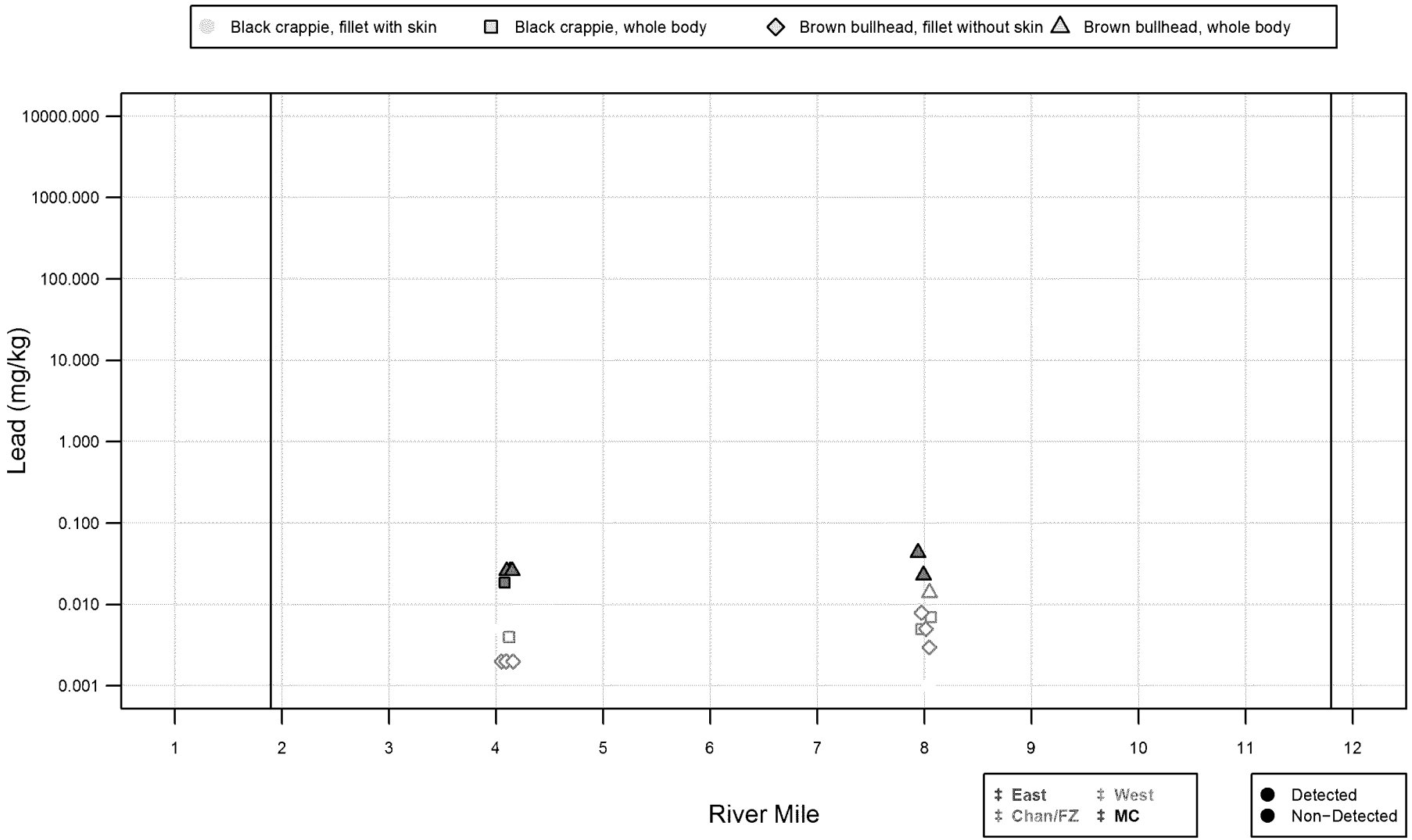

Figure D5.2-17b

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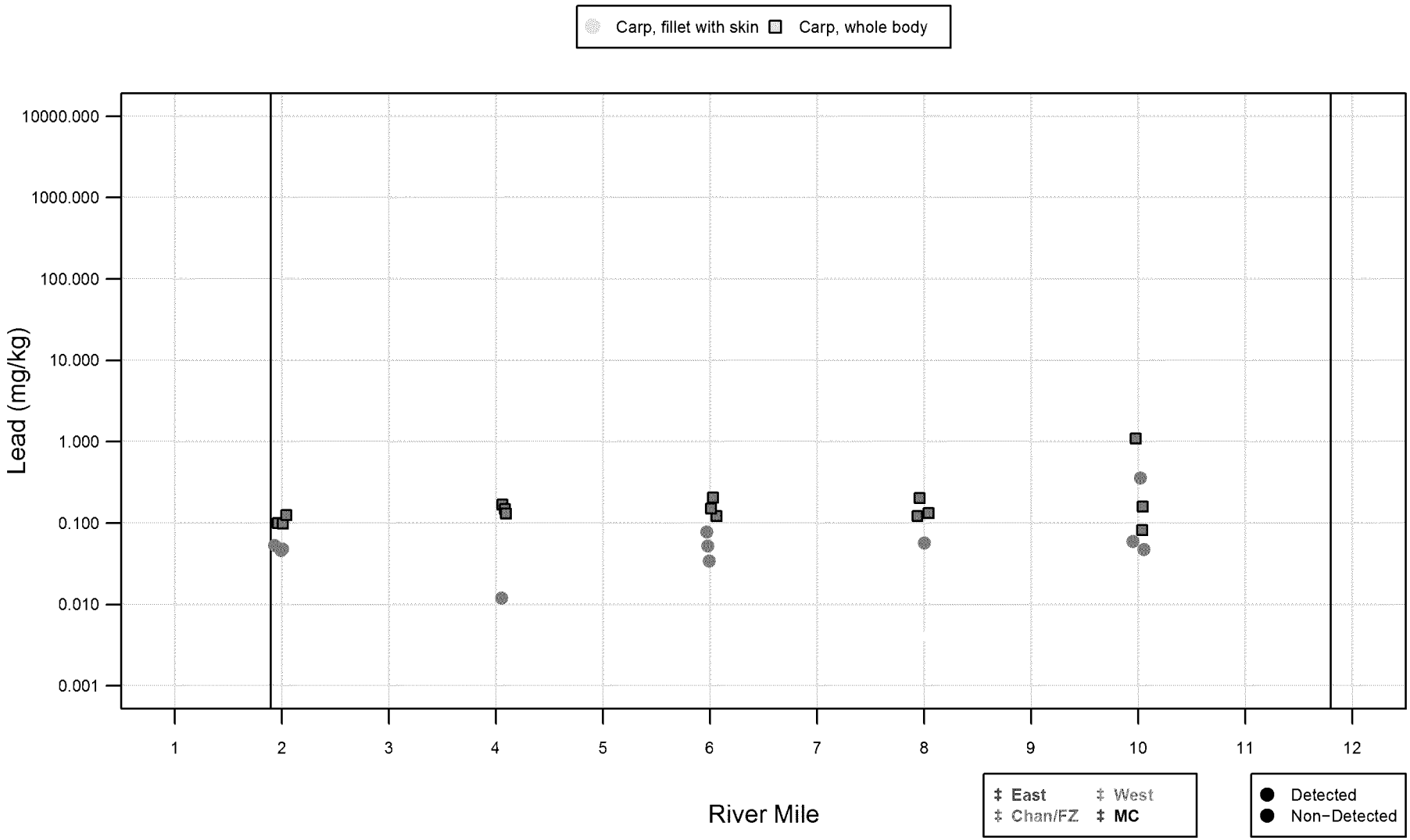

Figure D5.2-17c

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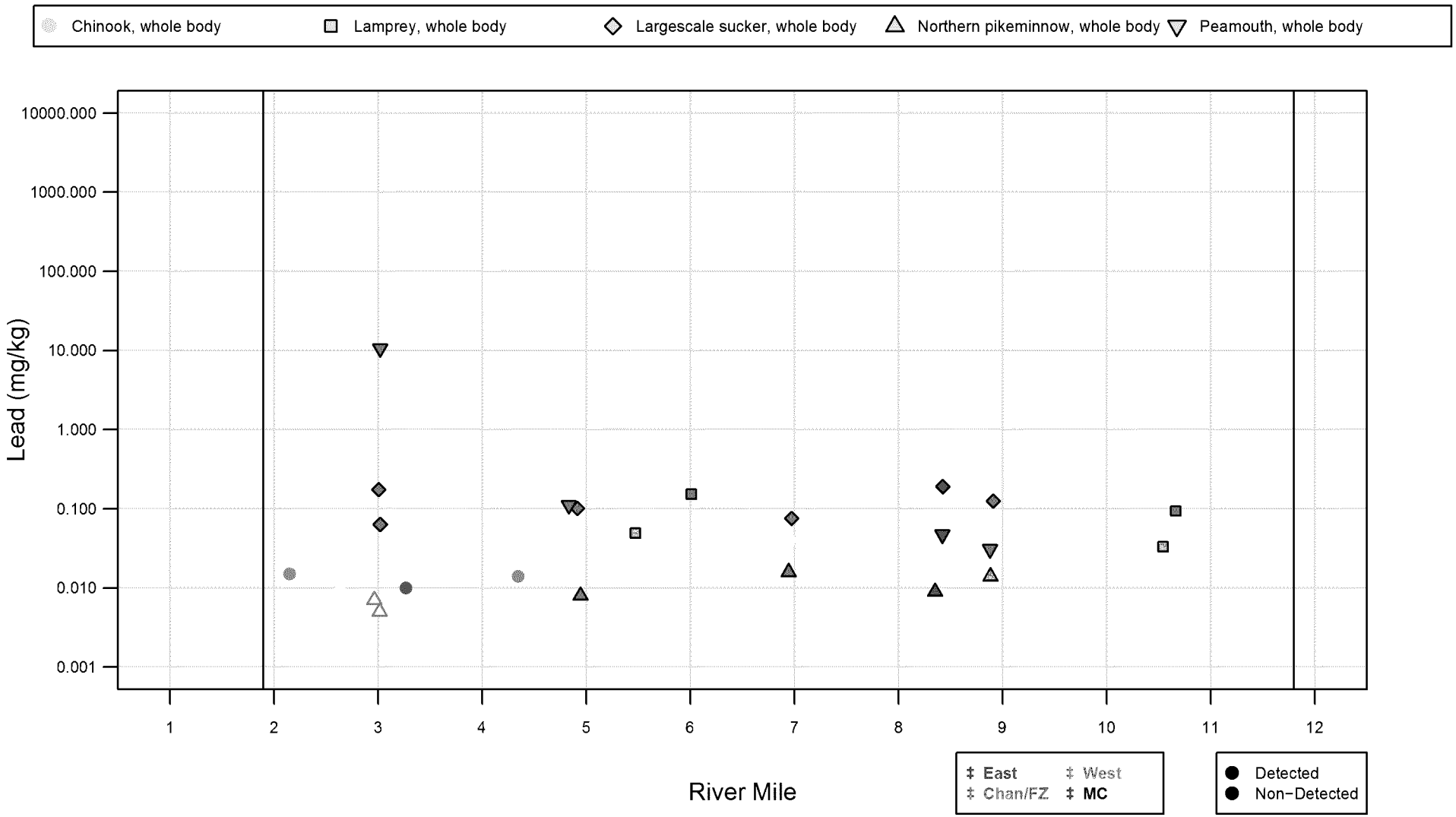

Figure D5.2-17d

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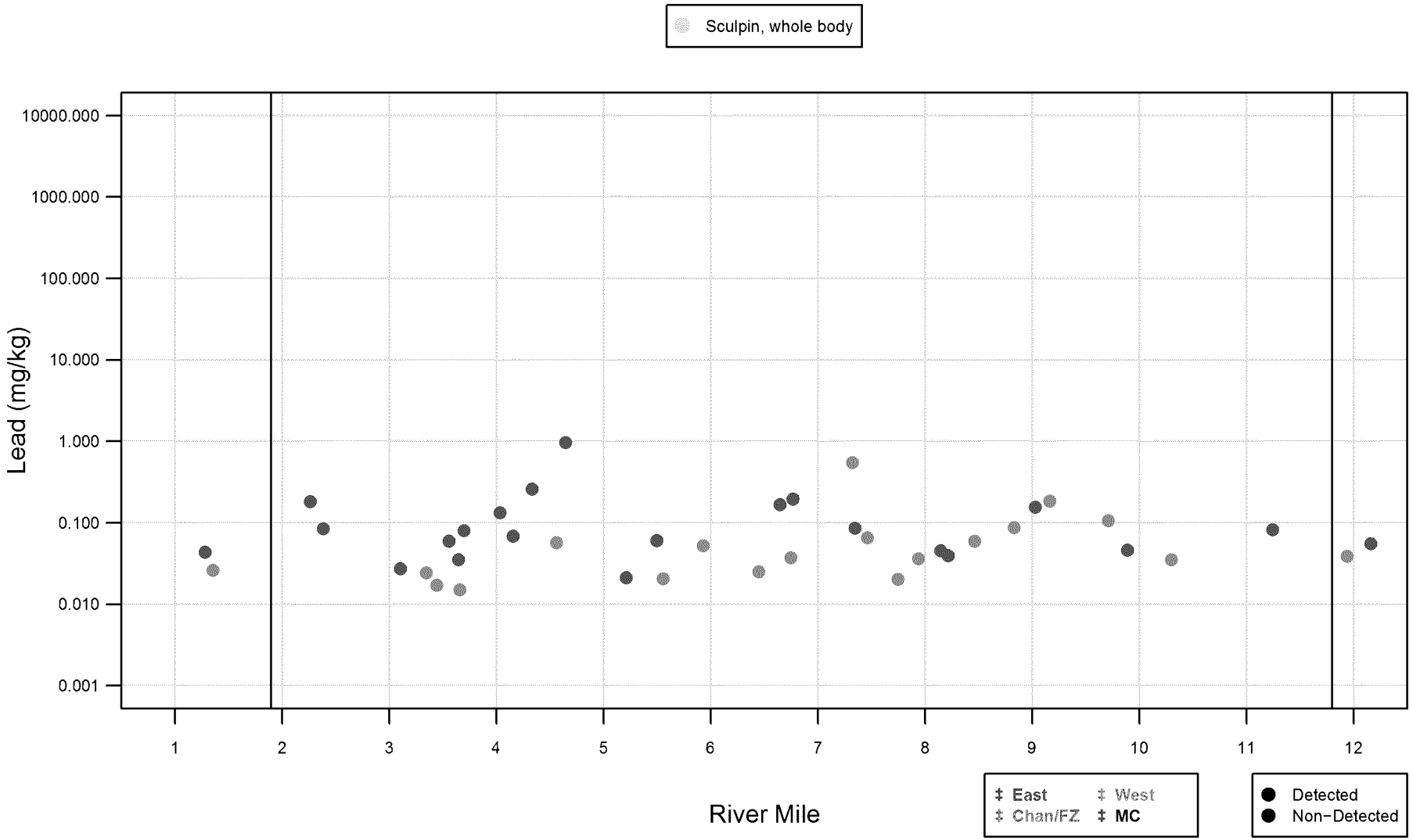

Figure D5.2-17e

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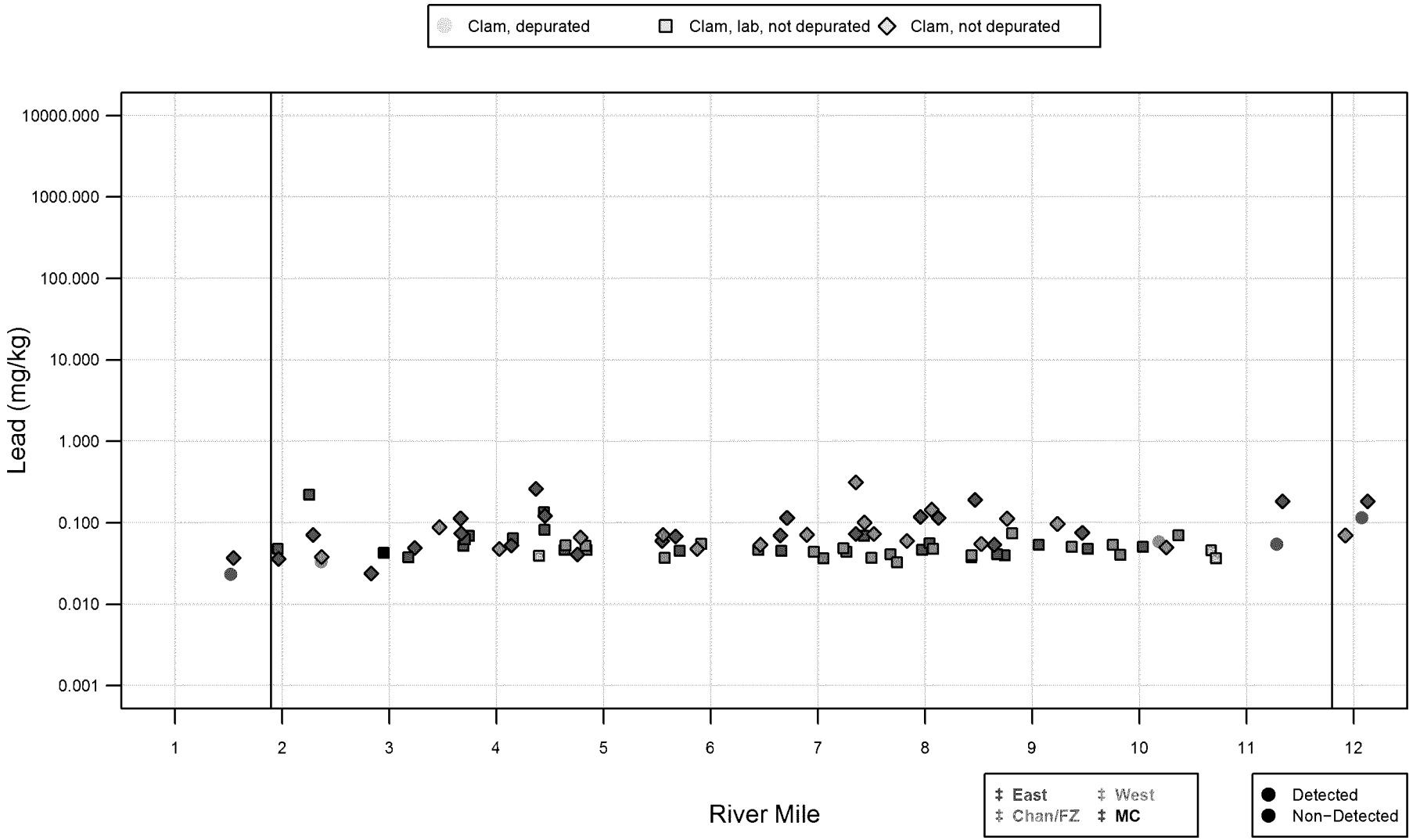

Figure D5.2-17f

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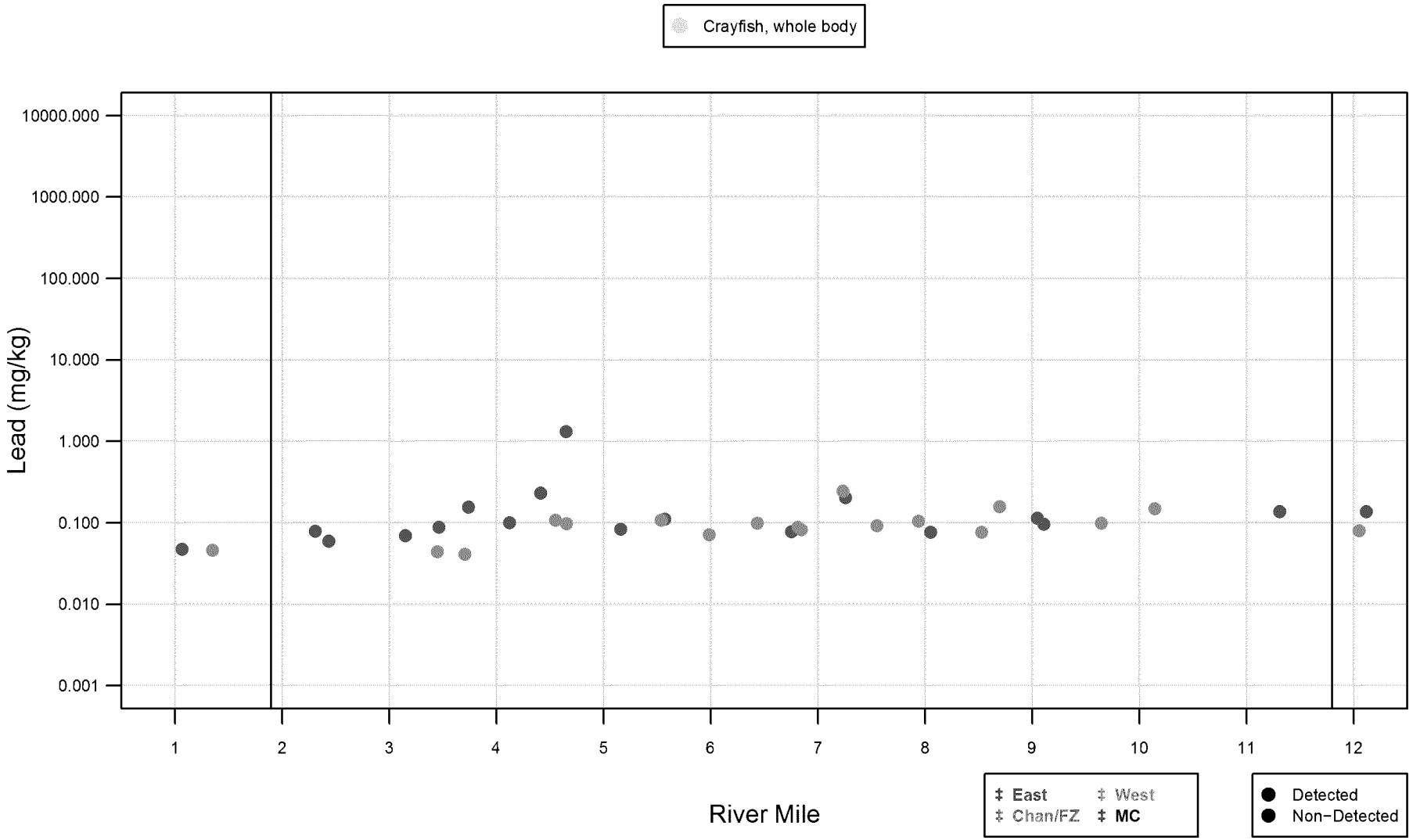

Figure D5.2-17g

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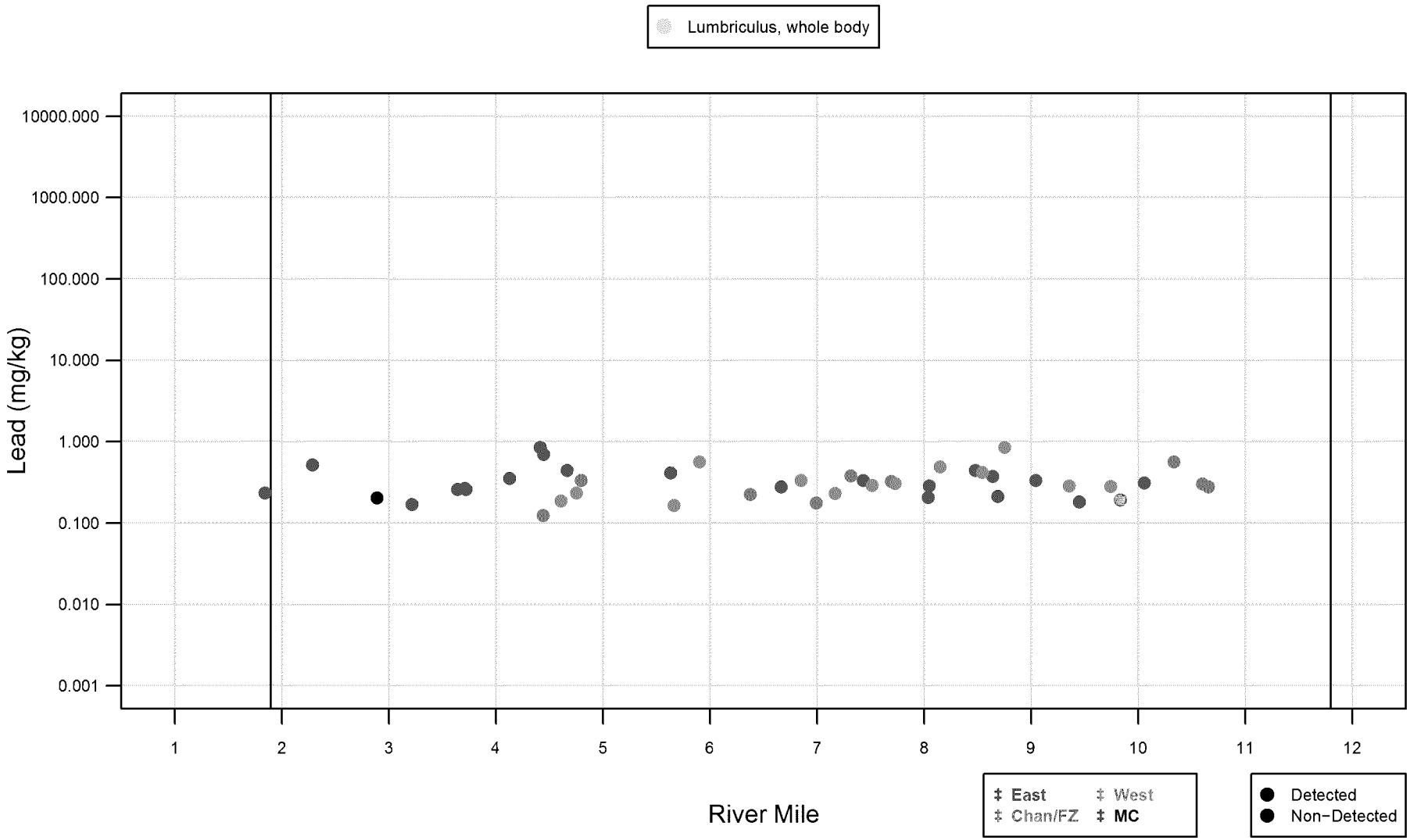

Figure D5.2-17h

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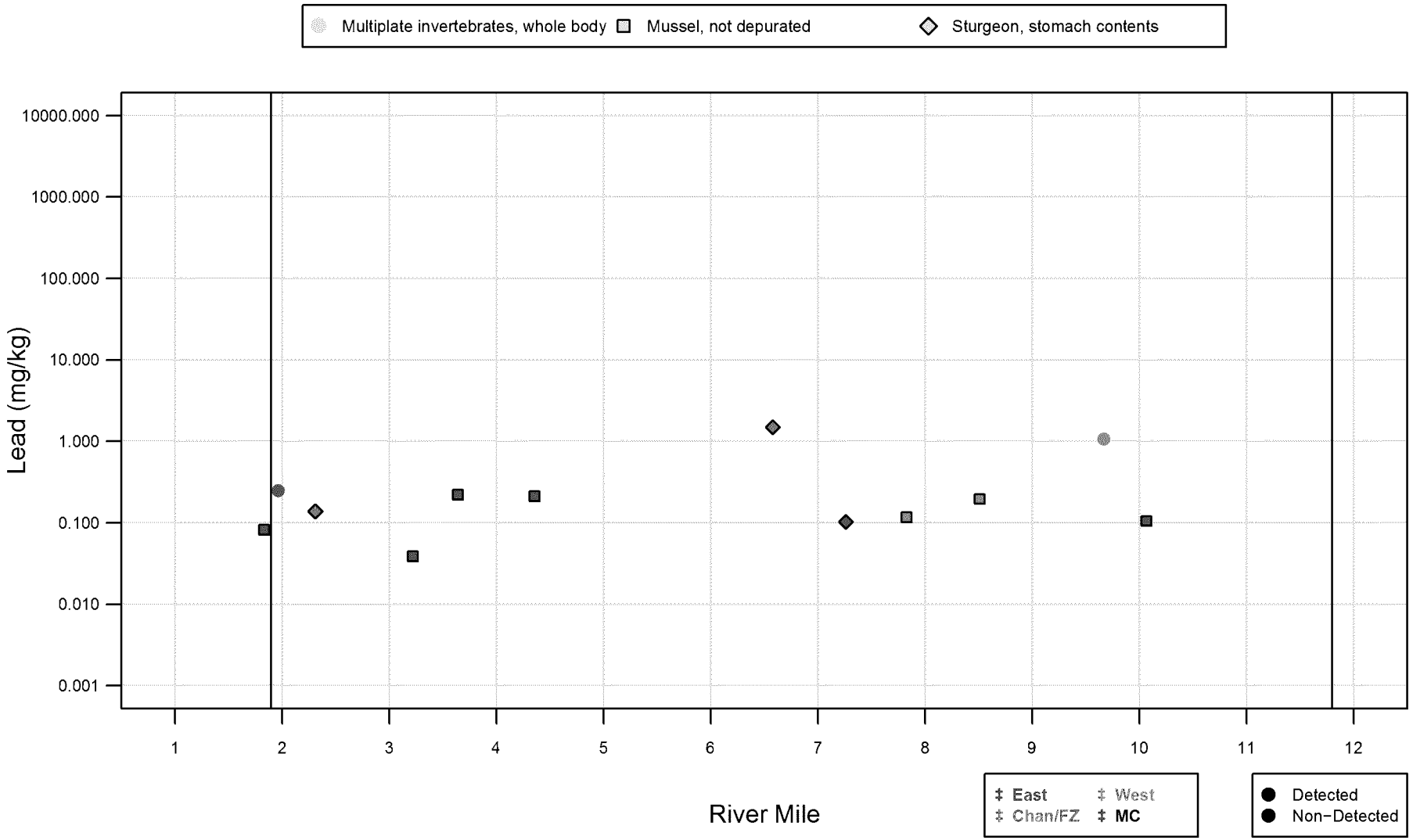

Figure D5.2-17i

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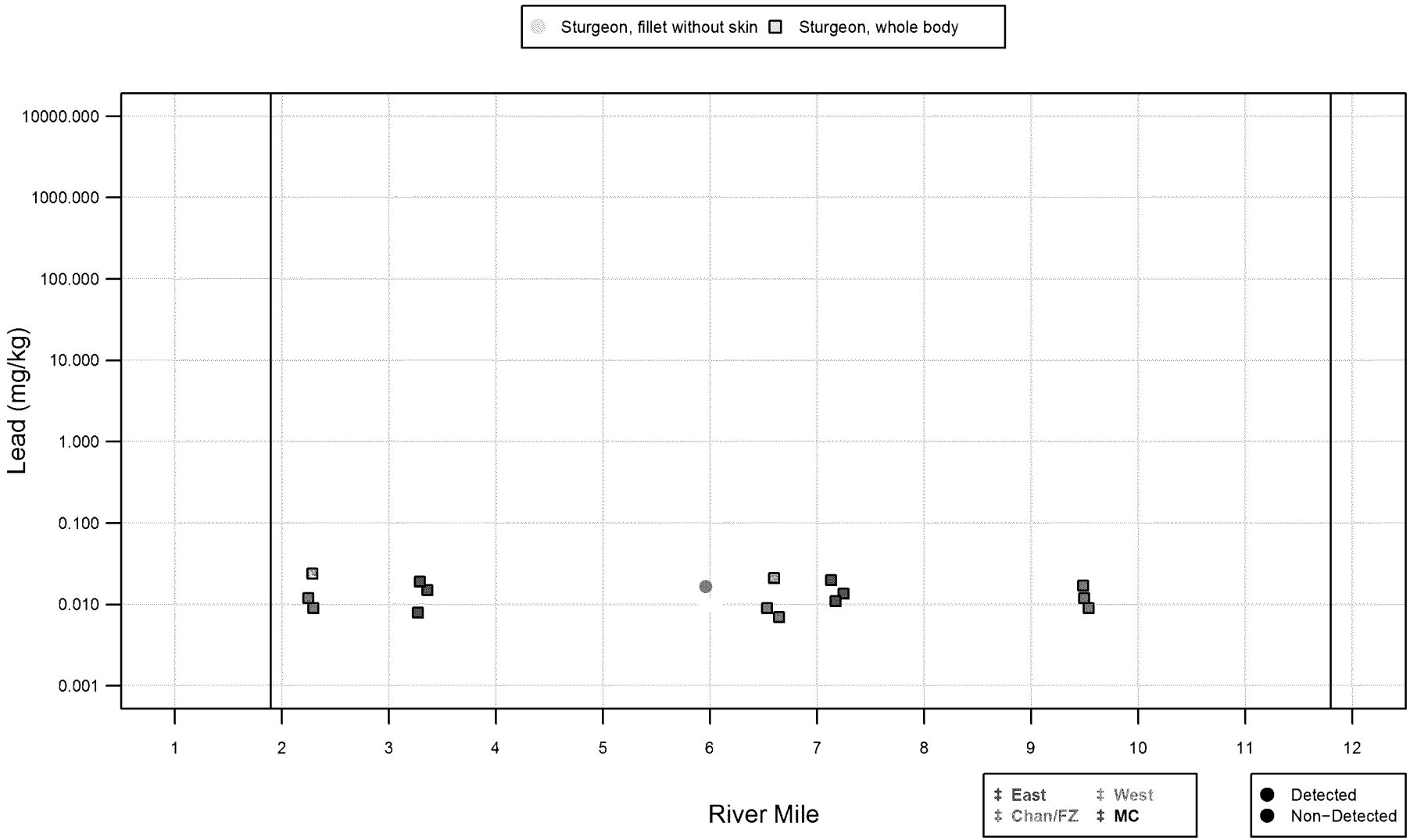

Figure D5.2-17j

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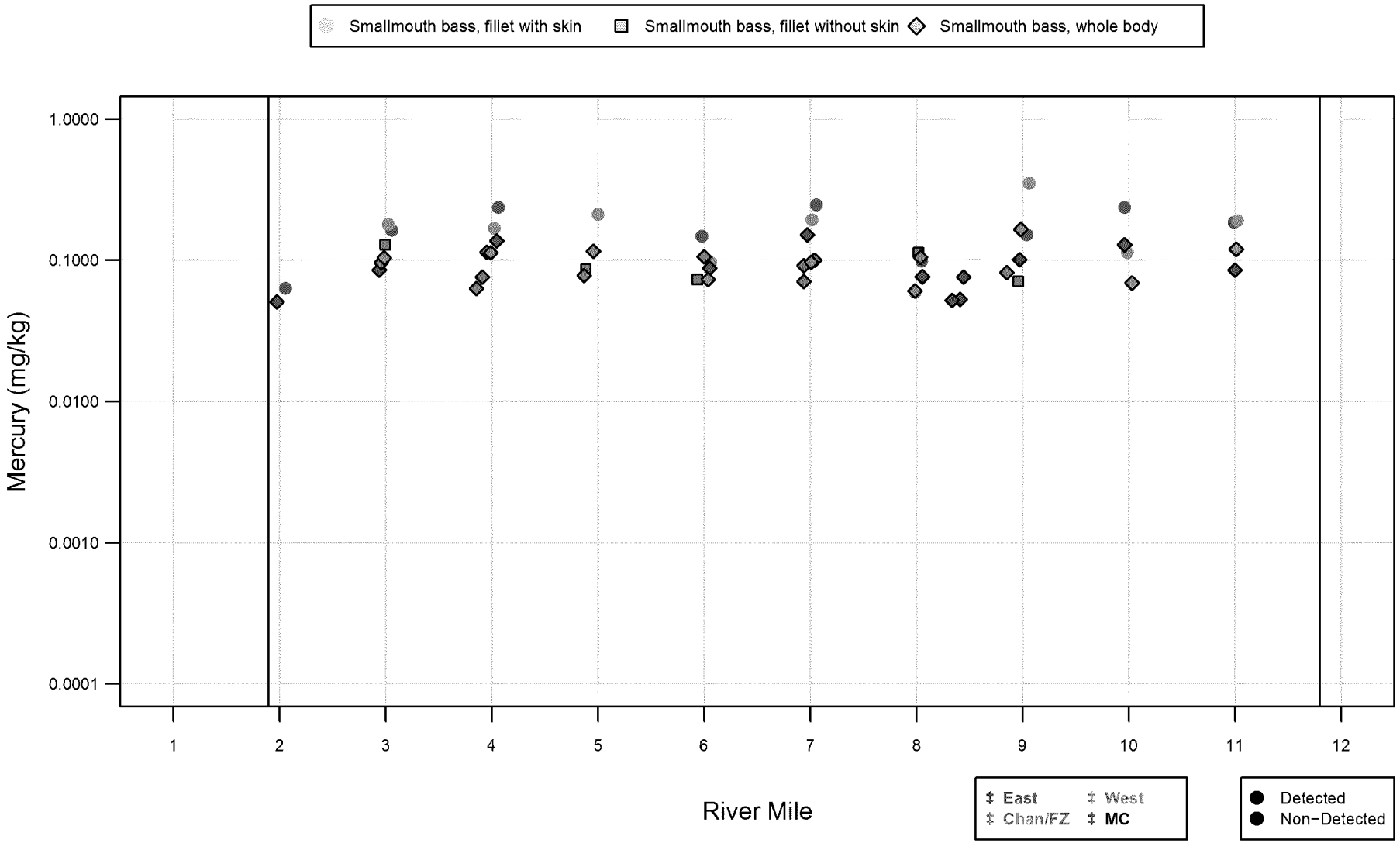

Figure D5.2-18a

Portland Harbor RI/FS
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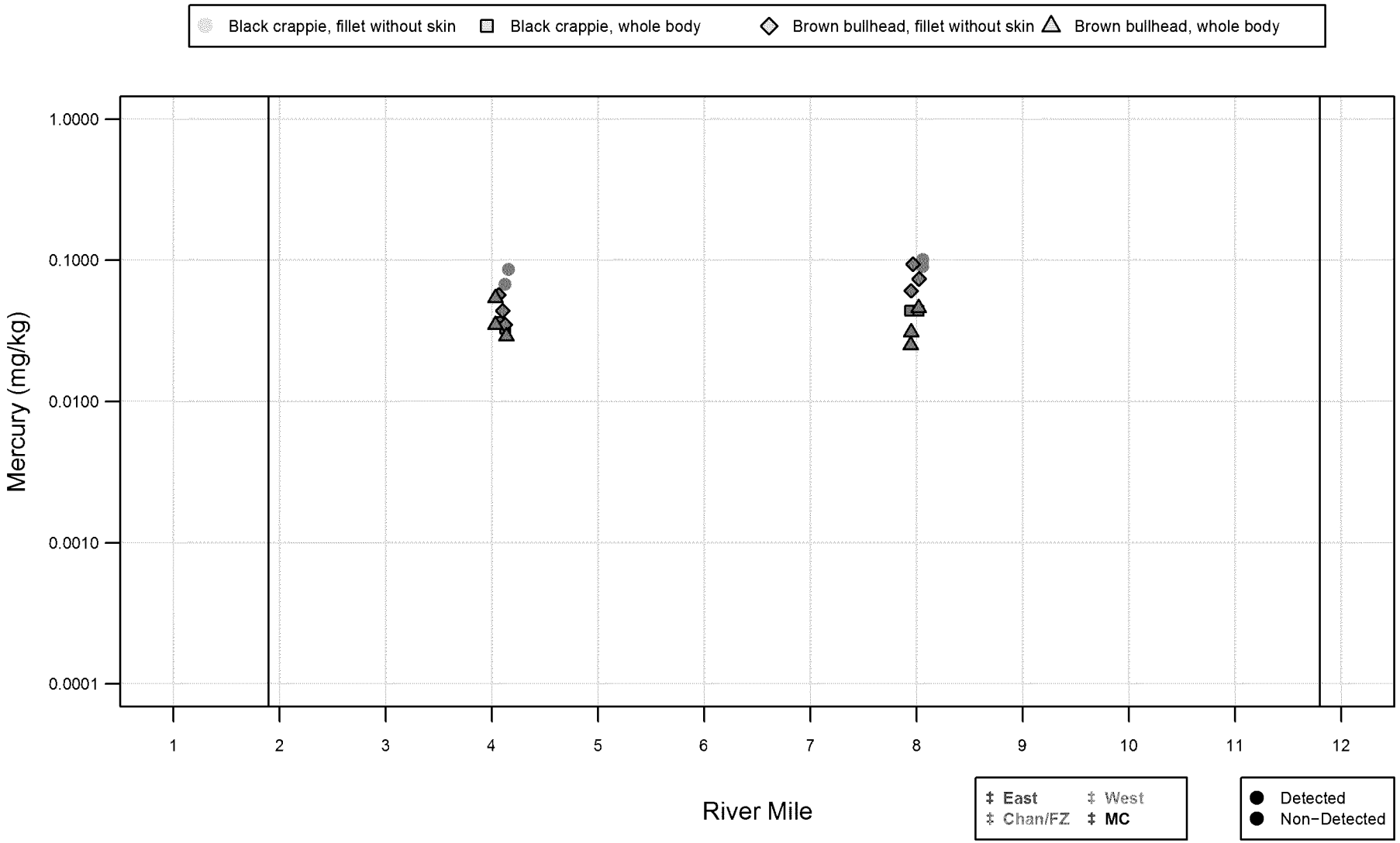

Figure D5.2-18b

Portland Harbor RI/FS
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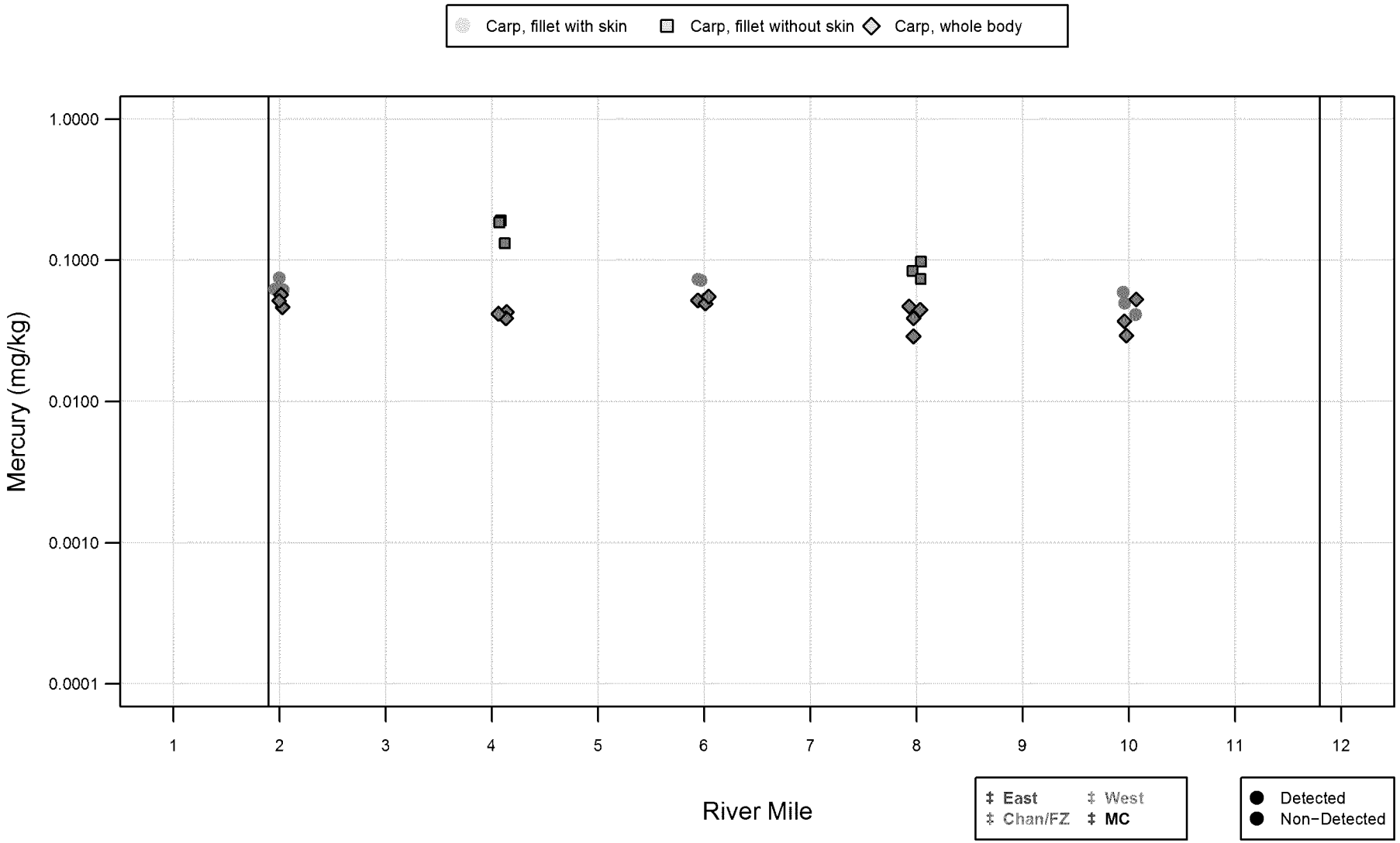

Figure D5.2-18c

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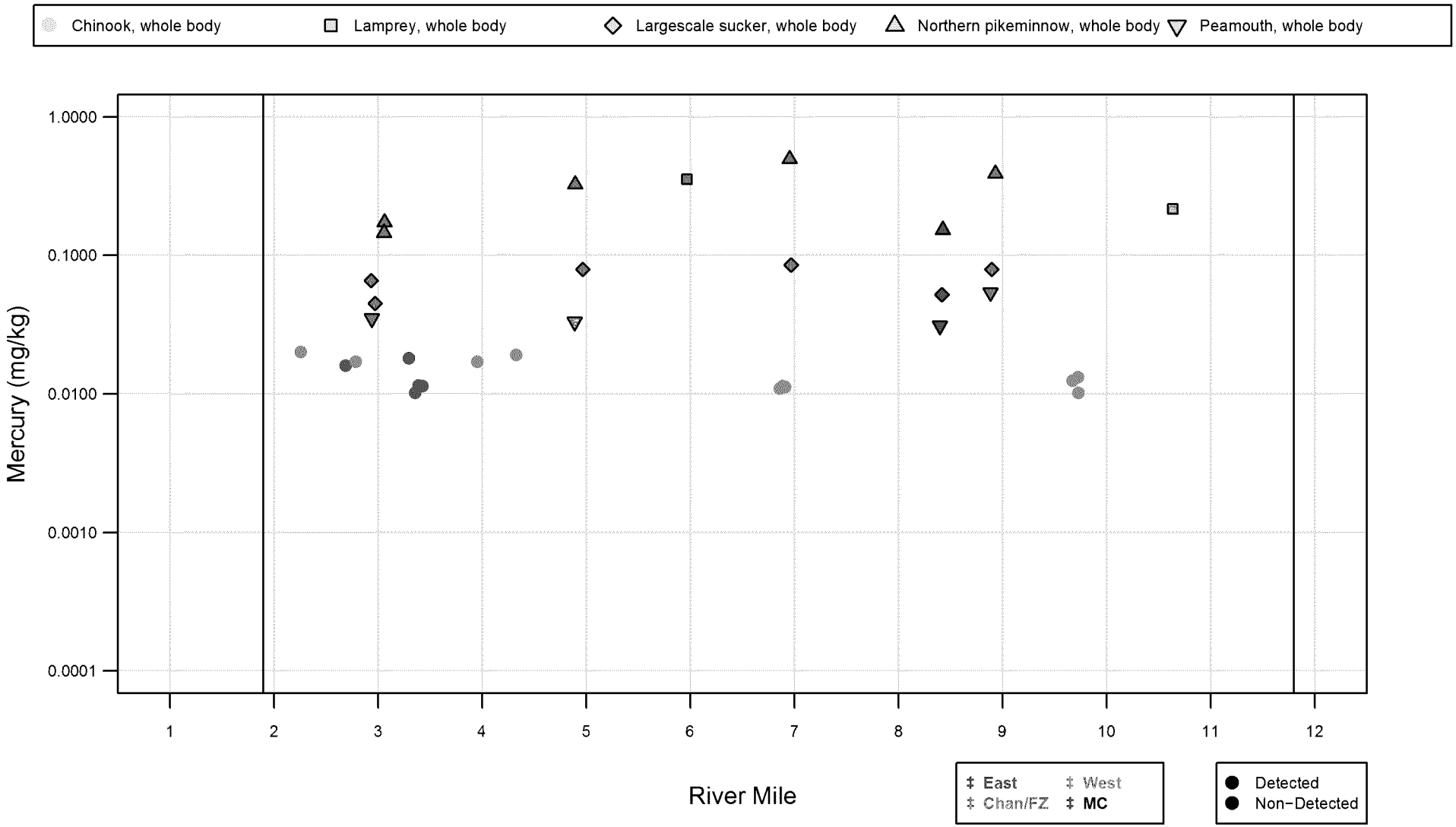

Figure D5.2-18d

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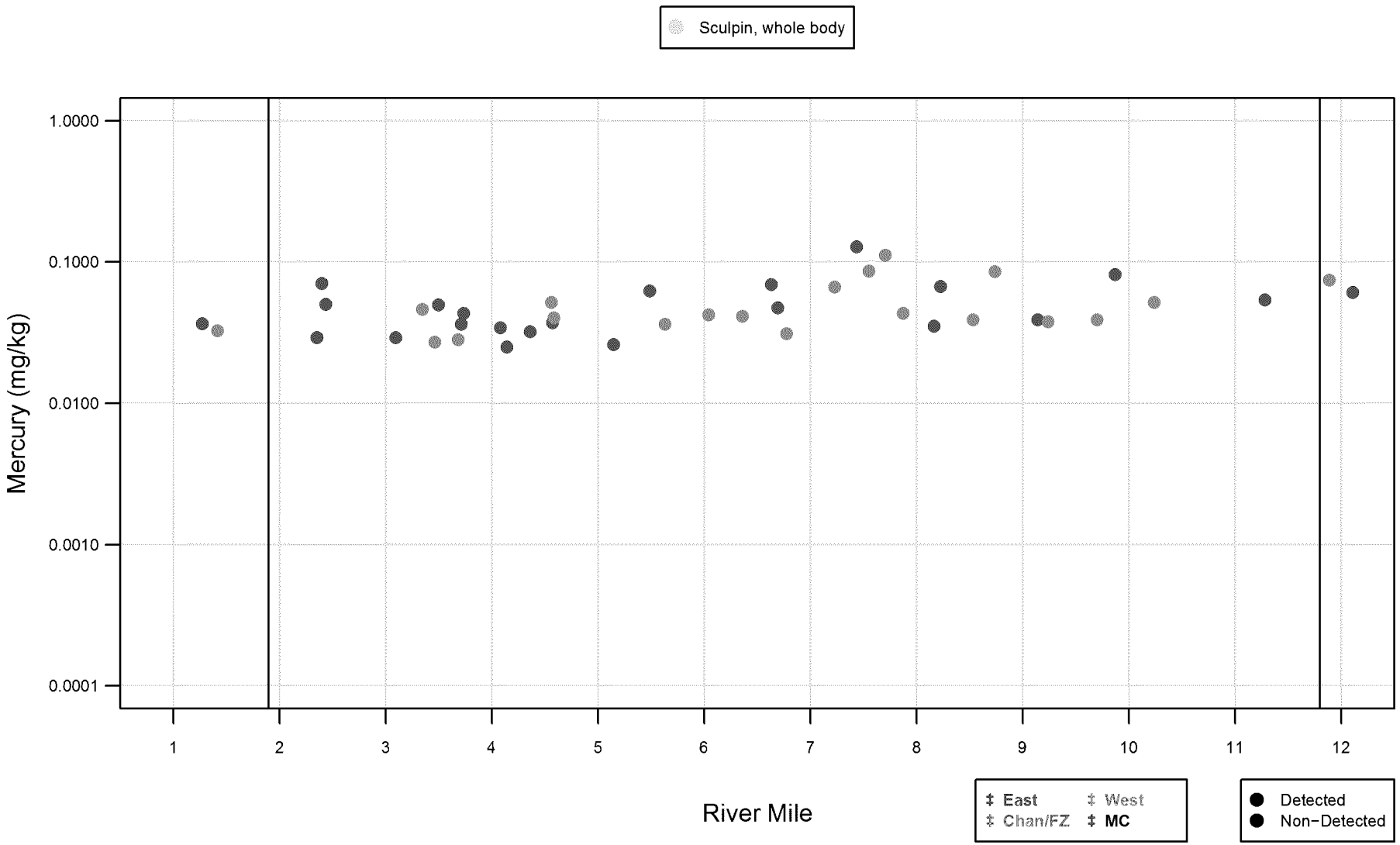

Figure D5.2-18e

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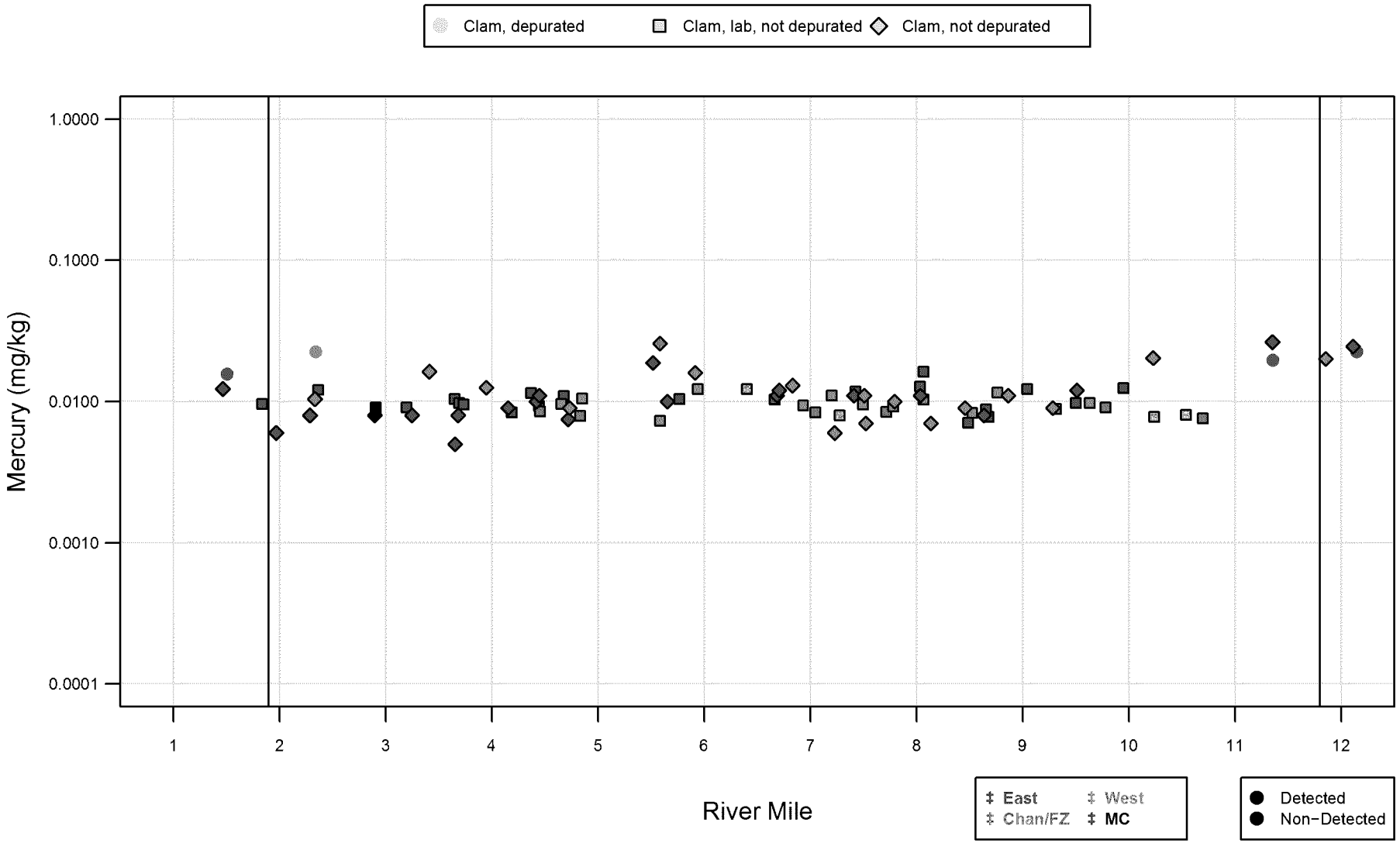

Figure D5.2-18f

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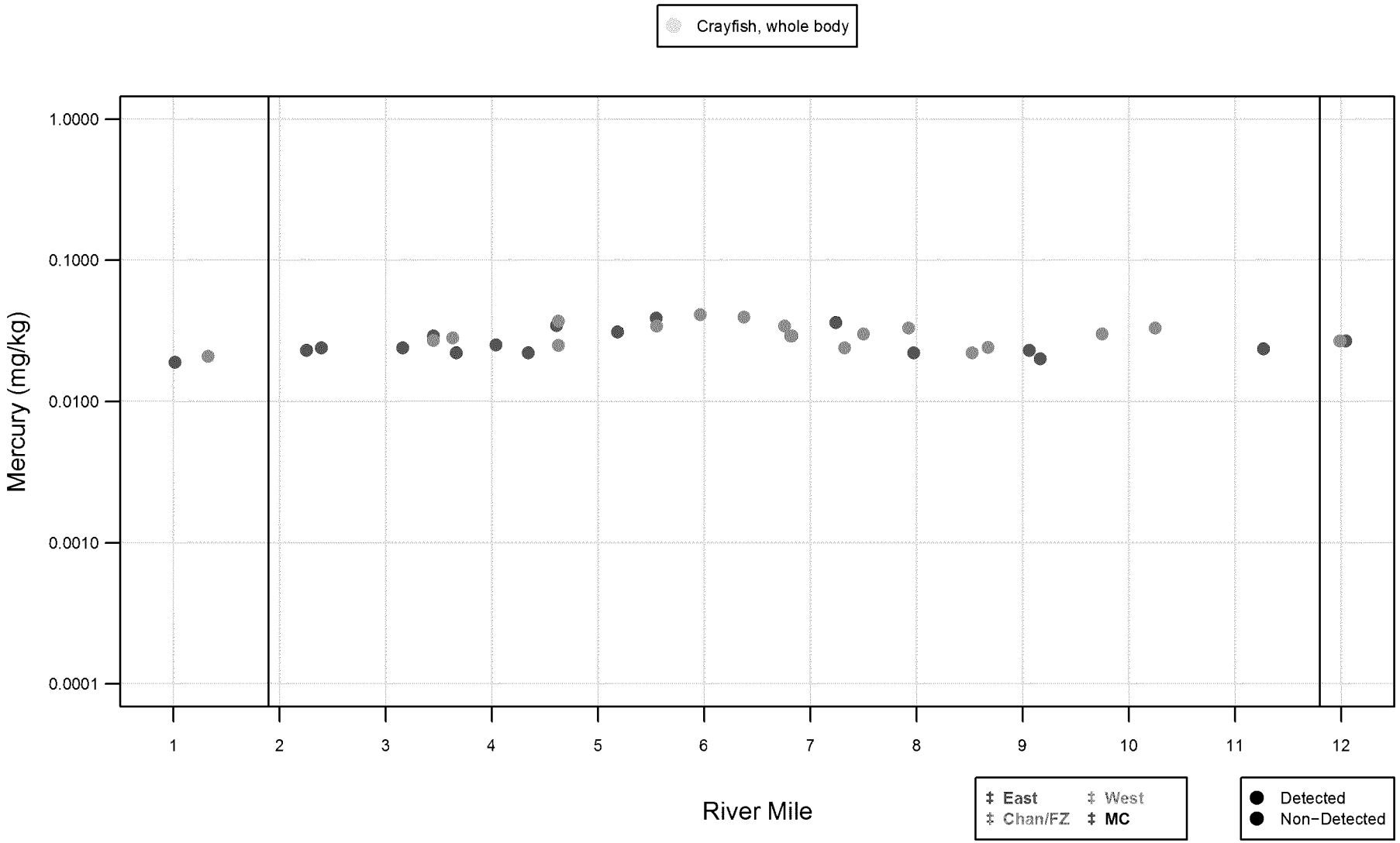

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Figure D5.2-18g

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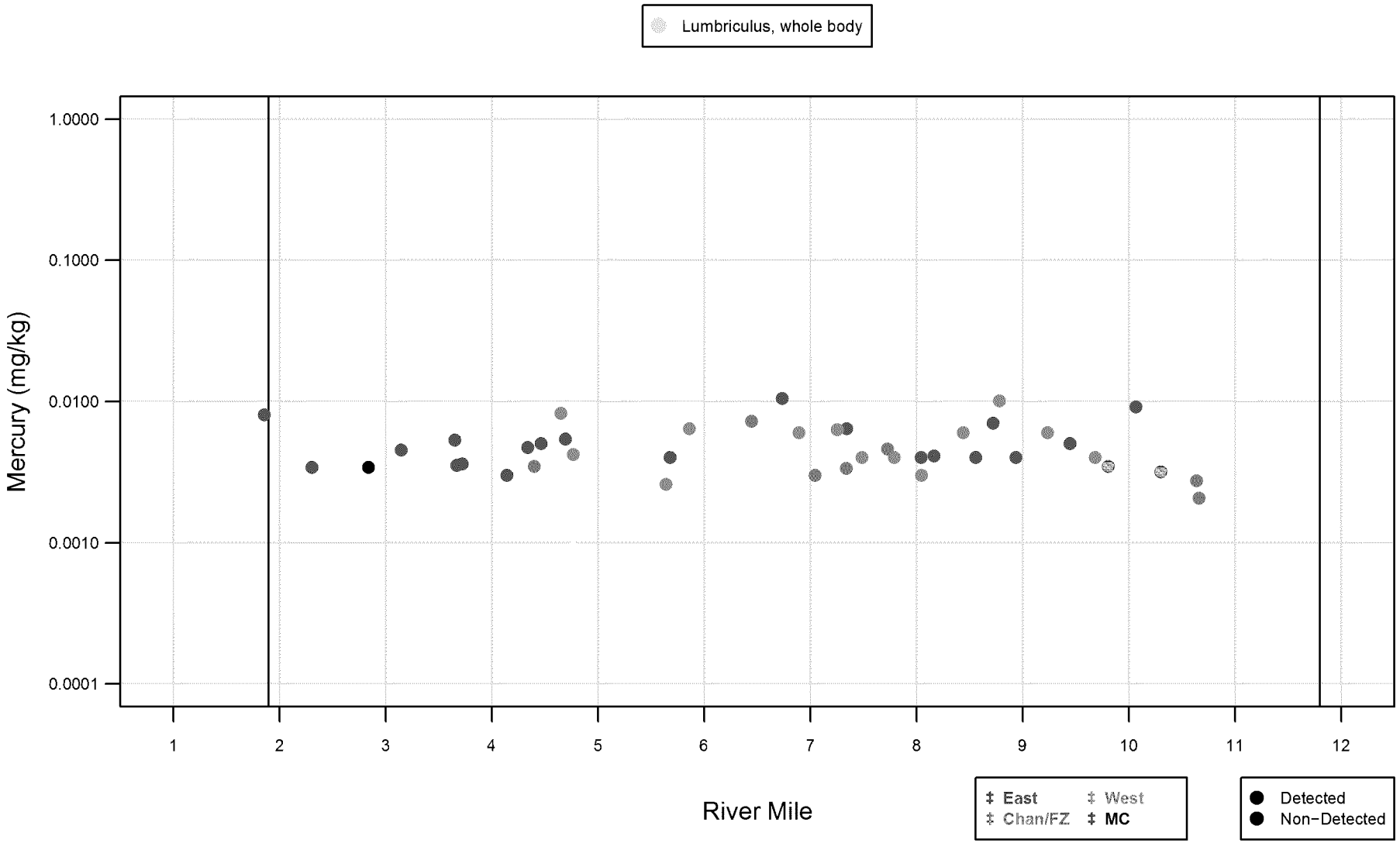

Figure D5.2-18h

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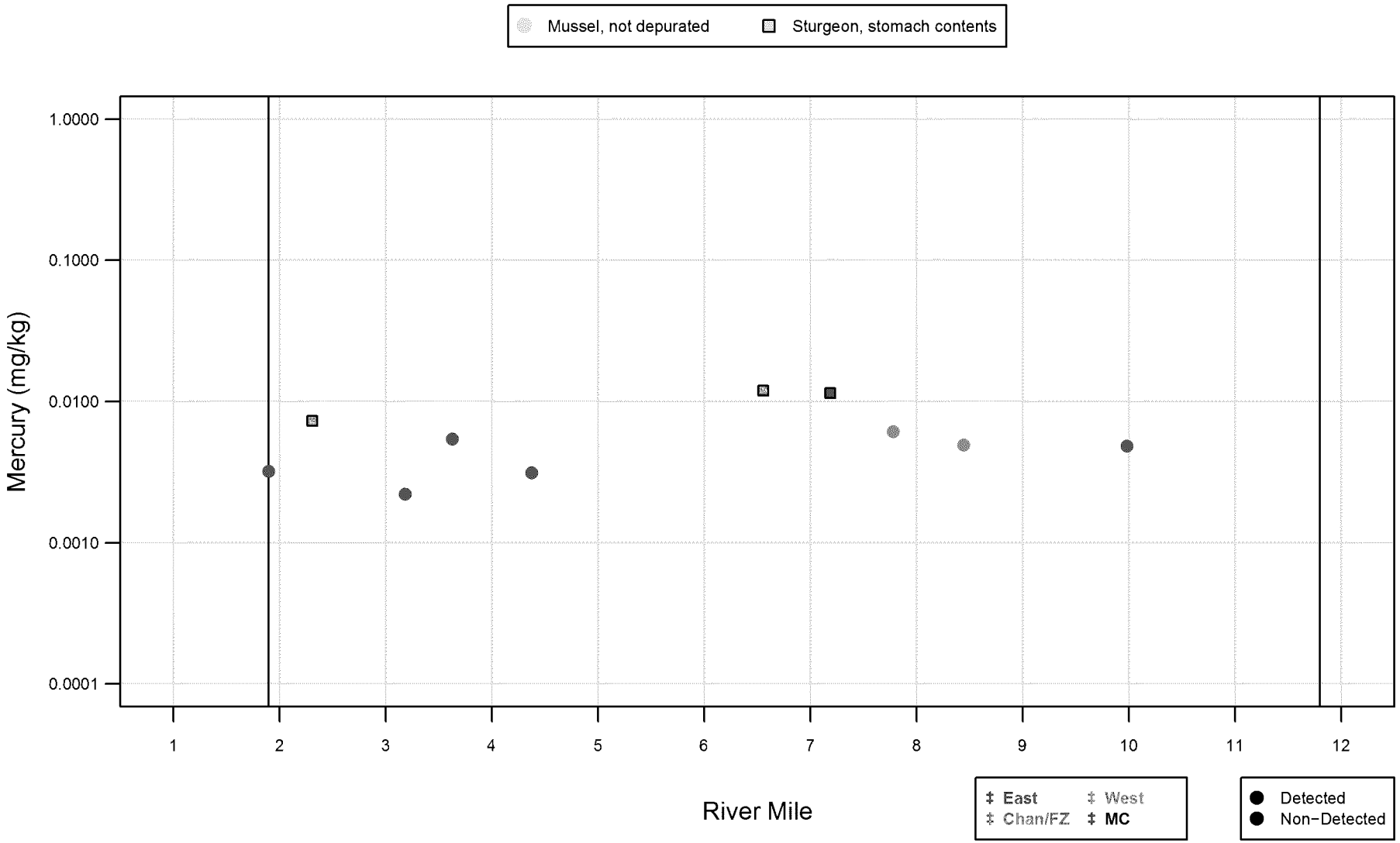

Figure D5.2-18i

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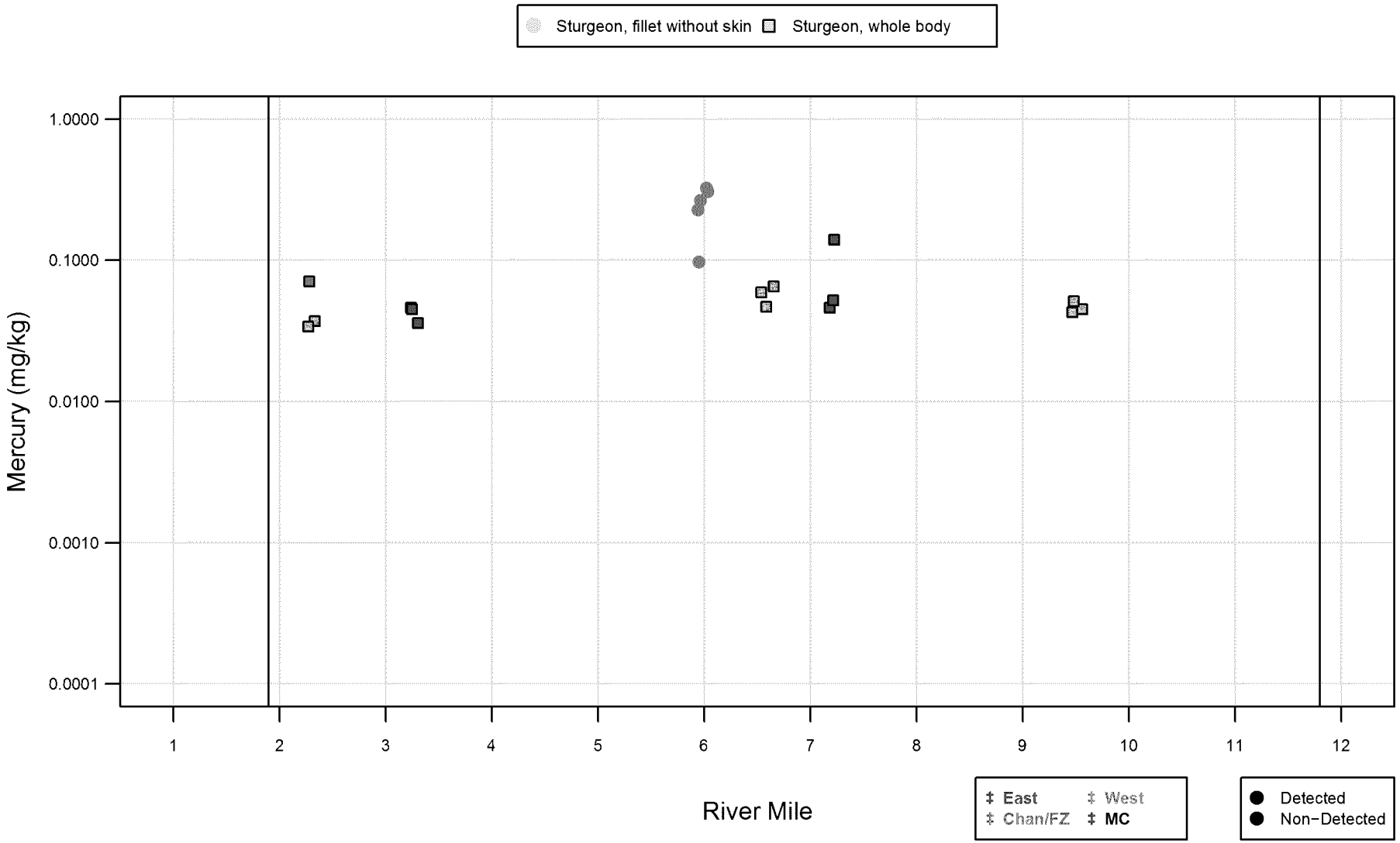

Figure D5.2-18j

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 8/29/2013 5:34:39 PM
Subject: RAOs
PortlandHarborFinalRAOs080709.pdf
EPARAODirection080709.pdf

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

Portland Harbor Site Remedial Action Objectives[i]

RAO 1:

Reduce to acceptable levels human health risks from exposure to contaminated sediments[ii] and groundwater resulting from incidental ingestion of and dermal contact with sediments and groundwater, and comply with identified ARARs.

This RAO applies to direct human health sediment exposure scenarios found to have an unacceptable risk in the risk assessment and human health risks from ingesting groundwater beneath the Willamette River that exceeds ARARs with the understanding that groundwater plumes exceeding ARARs will be controlled through upland source control actions. The goal for this RAO is to reduce risks to human health from COC concentrations in contaminated sediments and groundwater through sediment remedies at the site, comply with chemical-specific ARARs identified for the site, and protect beneficial uses of the Willamette River at the site.

RAO 2:

Reduce to acceptable levels human health risks from indirect exposures to COCs through ingestion of fish and shellfish that occur via bioaccumulation pathways from sediment, groundwater and/or surface water and comply with identified ARARs.

This RAO applies to fish and shellfish consumption scenarios found to have an unacceptable risk in the risk assessment with the understanding that groundwater plumes will be controlled to achieve ARARs and risk-based remediation goals through upland source control actions. The goal is to reduce risks to human health through sediment remedies that protect humans from indirect exposures to COCs through eating fish and shellfish exposed to COCs via bioaccumulation and bioconcentration, comply with chemical-specific ARARs identified for the site, and protect the beneficial uses of the Willamette River at the site. This RAO is expected to contribute to the reduction and elimination of Portland Harbor PCB fish consumption advisories. It is recognized that reduction and elimination of the Portland Harbor fish advisory can only be achieved when conducted in conjunction with other Portland Harbor source controls and other PCB reduction efforts conducted under other regulations and programs within the Willamette River watershed, as described in the Source Control Management Goal below.

RAO 3:

Reduce risks from COCs in surface water at the site to acceptable exposure levels that are protective of human health risks from ingestion of, inhalation of, and dermal contact with surface water; protect the drinking water beneficial use of the Willamette River at the site; and comply with identified ARARs.

This RAO applies to direct human health surface water exposure scenarios found to have an unacceptable risk in the risk assessment and the protection of the drinking water beneficial use of the Willamette River. The goal is to reduce risks from COC concentrations in surface water, to the extent practicable, through sediment remedies that protect humans from the ingestion of and dermal contact with surface water; comply with chemical specific ARARs identified for the site; and protect the beneficial uses (domestic/private water supply) of the Willamette River at the site.

RAO 4:

Reduce to acceptable levels the risks to ecological receptors resulting from the ingestion of and direct contact with contaminated sediments and groundwater, and comply with identified ARARs.

This RAO applies to all ecological receptors found to have an unacceptable risk in the risk assessment via direct sediment exposure with the understanding that groundwater plumes will be controlled to achieve ARARs and risk-based remediation goals through upland source control actions. The goal is to reduce risks to ecological receptors from COC concentrations in contaminated sediments and groundwater through sediment remedies at the site, prevent unacceptable effects on the survival, growth, and reproduction of ecological receptors at the site, and comply with chemical-specific ARARs identified for the site. .

RAO 5:

Reduce to acceptable levels risks to ecological receptors from indirect exposures through ingestion of prey to COCs in sediments via bioaccumulation pathways from sediment, groundwater and/or surface water and comply with identified ARARs.

This RAO applies to all ecological receptors found to have an unacceptable risk in the risk assessment through ingestion of prey with the understanding that groundwater plumes will be controlled to achieve ARARs and risk-based remediation goals through upland source control actions. The goal is to reduce risks from COCs through sediment remedies that protect ecological receptors from exposures to COCs through consumption of fish and shellfish, benthic organisms and other prey items exposed to COCs via bioaccumulation and bioconcentration; comply with chemical-specific ARARs identified for the site; and protect the beneficial uses of the Willamette River. This RAO is expected to contribute to reduction of prey ingestion related ecological risks through reduction in sediment chemical contributions to fish tissue. It is recognized that reduction of and elimination of these risks can only be achieved when conducted in conjunction with other Portland Harbor source controls efforts conducted under other regulations and programs within the Willamette River watershed, as described in the Source Control Management Goal below.

RAO 6:

Reduce risks from COCs in surface water at the site to acceptable exposure levels that are protective of ecological receptors based on the ingestion of and direct contact with surface water and comply with identified ARARs.

This RAO applies to all ecological receptors found to have an unacceptable risk in the risk assessment through exposure to surface water. The goal is to reduce the risk from COC concentrations in surface, water to the extent practicable, through sediment remedies that prevent unacceptable effects on survival, growth, and reproduction of ecological receptors; comply with identified chemical-specific ARARs; and protect the beneficial uses of the Willamette River.

Portland Harbor Site-Wide Management Goals[iii]

Management Goal 1:

Ensure sediment cleanup activities consider, complement, and are compatible with, upland and upstream source control efforts designed to prevent recontamination by COCs in groundwater, stormwater, soil erosion, upstream sources and overwater activities at the site and are consistent with the RAOs for the site; and allow in water remedies at the site to proceed in a timely manner.

This management goal recognizes that a successful site remedy includes the implementation of effective in-water remedies and upland source control measures. The goal is to have a sediment cleanup that is compatible with upland and upstream source controls that prevent sediment recontamination after cleanup. The goal must also consider sequencing and other approaches in conducting sediment remedies that will minimize downstream migration of contaminants and prevent recontamination of downstream response actions. Further, sediment remediation activities should not hinder upland source control actions and water quality programs being implemented by Oregon DEQ. Upland and upstream source identification and control is being regulated and directed by Oregon DEQ working with individual parties within and outside Portland Harbor. The goal of these source controls is to reduce risk and prevent the unacceptable recontamination of cleaned up sediments. Upland source control activities need to be implemented in a timeframe and manner that reduces risk and minimizes the potential for recontamination by COCs in groundwater, stormwater, soil erosion, and over water activities at, and upstream from the site and are consistent with and facilitate the achievement of site cleanup goals and compliance with ARARs. The FS will include an evaluation of the potential for in-river risks and recontamination from ongoing upland and upstream sources as allowed by existing data and information. The FS will estimate, as existing information allows, the source reduction levels on a site-wide basis that would be expected to meet various sediment and water PRGs including the uncertainty of such estimates. The FS will not attempt to estimate the source reduction actually provided by various individual potential, planned, or implemented source controls at properties along the river or the watershed as a whole. With regards to riparian soils, there may be cost savings by integrating sediment remedies along the shoreline with upland source control efforts. Upland source control efforts will address riparian soils that are likely to have a direct effect through the erosion of bank material upon sediments and surface water below the mean high water mark. Factors that will be considered to determine whether riparian soils

are likely to have a direct effect on sediments include the characteristics of the river bank, the presence of contamination and the status of upland source control efforts.

Management Goal 2:

To the maximum extent practicable, minimize the long-term transport of COCs in the Willamette River from the site to the Columbia River and the Multnomah Channel.

The goal is to prevent the migration of sediment COCs at levels that would potentially pose unacceptable risks to human health and ecological receptors downstream of the site. Sediment cleanup alternatives will be evaluated in the FS under the long term effectiveness criterion to clearly estimate, as existing information allows, whether unacceptable downstream transport would be minimized (or not) by each alternative. Minimization of downstream COC transport will be a clear sub-criterion presented in the FS under the more general long term effectiveness criterion.

Management Goal 3:

Clean up contaminated sediments in a manner that promotes habitat that will support a healthy aquatic ecosystem and the conservation and recovery of threatened and endangered species.

The goal is to ensure that sediment cleanup alternatives selected for the site consider the benefits of re-establishing ecological habitats in those areas remediated to support a diverse ecosystem. Sediment remedial actions must comply with ARARs, including the Clean Water Act compensatory mitigation and Section 404(b)(1) analysis and the Endangered Species Act. Other potential ARARs may include the Marine Mammal Protection Act and/or Migratory Bird Treaty Act. The need for habitat mitigation in conjunction with the remedial action alternatives will be evaluated for each detailed sediment cleanup alternative in the FS under the long term effectiveness and compliance with ARARs criteria and cost estimate analysis. For each detailed alternative, the FS will evaluate reasonably anticipated future land use with respect to habitat, including potential restoration activities under the Natural Resource Damages Assessment (NRDA) process. The FS will also clearly describe the degree to which habitat mitigation needs to be included to meet substantive requirements of potential ARARs. For each detailed alternative, the FS will clearly describe whether habitat mitigation needs to be included to meet the substantive requirements of potential ARARs. This aspect of the FS will not include evaluation of any potential or needed habitat restoration activities under the NRDA provisions of CERCLA, the Clean Water Act, and the Oil Protection Act (OPA).

---

[i] RAOs will be refined after the draft human health and ecological risk assessments are made available to EPA and DEQ. These RAOs will be used to evaluate remedial action alternatives in the Portland Harbor Feasibility Study and as the basis for the evaluation, design and implementation of upland source control actions being performed under Oregon Department of Environmental Quality oversight.

[ii] Sediments are defined as soils, sand, organic matter, or minerals that accumulate on the river bottom. For purposes of describing the RAOs, sediment also includes the interstitial water and transition zone water (TZW) that is influenced by groundwater and surface water and thus can also be contaminated by groundwater, surface water, or

chemicals dissolving off of the sediments. Sediments extend up to the ordinary high water mark (13.3 feet NAVD88) along the banks (including beach sediments) within the Portland Harbor Superfund Site. Riparian soils are found along the river banks from the ordinary high water mark to the mean high water mark (20 feet NAVD88). High water mark datum is from Proposed Round 3 Scope of Work, Portland Harbor Superfund Site, February 17, 2006.

[iii] Site-Wide Management Goals are those goals that must be evaluated in the Portland Harbor Feasibility Study to ensure a successful remedy and will require integration with other regulatory mechanisms to implement. These regulatory mechanisms include, but are not limited to, State of Oregon Water Quality and Environmental Cleanup programs. Specific numeric PRGs and remediation goals are not expected to be developed for these management goals by the LWG for their part in developing the Portland Harbor FS for the in-water portion of the Site. They will be considered in the development of in-water remedial alternatives, assessing compliance with ARARs including section 404 of the Clean Water Act and the Endangered Species Act and as part of the evaluation of long term effectiveness and permanence, implementability, and compatibility with anticipated future uses. EPA expects that upland source control measures will be the primary actions for protecting beneficial uses of groundwater, including potential water supply use, and that such controls will be conducted to achieve RAOs established for the in river portion of the Portland Harbor Site.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
805 SW Broadway, Suite 500
Portland, Oregon 97205

August 7, 2009

Mr. Robert Wyatt
Northwest Natural & Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Portland Harbor Superfund Site; Administrative Order on Consent for Remedial Investigation and Feasibility Study; Docket No. CERCLA-10-2001-0240 – EPA Direction on Portland Harbor Remedial Action Objectives

Dear Mr. Wyatt:

EPA and the Lower Willamette Group (LWG) have been discussing the Remedial Action Objectives (RAOs) for Portland Harbor since we met on February 9, 2009. On June 11, 2009, EPA sent a proposed set of RAOs to the LWG that attempted to address many of the concerns raised by the LWG and their representatives. These RAOs were discussed at our management team meeting on June 19, 2009 and again with Carl Stivers of Anchor QEA on June 25, 2009. On July 2, 2009, EPA developed and sent via email a redline-strikeout version relative to the June 12, 2009 RAO language that further considered LWG concerns. These RAOs were discussed at our meeting on July 8, 2009, and the LWG responded in writing to EPA's comments on July 24, 2009,

At this time, EPA believes that we have provided adequate opportunities for input and discussion on the RAOs. As a result, EPA is directing the LWG to incorporate the attached RAOs into the draft feasibility study (FS) for the Portland Harbor site. Some of the key changes in the latest version of the RAOs are highlighted below.

- EPA has retained the current language about chemical specific ARARs. The RAOs do not address location and/or action specific ARARs which also must be complied with.
- EPA has retained the term "groundwater" in sediment RAOs 1 and 4 because the terms "pore water", "interstitial water", and "transition zone water" have no regulatory meaning.
- EPA has added the term "groundwater to the RAOs 2 and 5 to be consistent with RAOs 1 and 4 and because of the potential for groundwater to transport contaminants to surface water and surface sediments.
- EPA has added language about sequencing of remedies in Management Goal 1.

- EPA has deleted the language regarding the programmatic consultation from Management Goal 3 at the request of the Natural Resource Trustees. EPA expects further discussion regarding programmatic consultation.

A clean version and redlined version of the RAOs are attached. As stated previously, EPA believes that the attached RAOs addresses concerns raised by the LWG and at the same time, is consistent with the National Contingency Plan (NCP) and EPA's Contaminated Sediment Guidance. Further, the supporting text clarifies that the RAOs are expected to be achieved through sediment remedies while acknowledging the role of source control in achieving the RAOs. Although management goals are not contemplated in the NCP and are only briefly discussed in the Contaminated Sediment Guidance, EPA believes that these management goals are appropriate for the Portland Harbor site and has described how these management goals should be addressed in the Portland Harbor FS.

EPA would like to note that the above RAOs may be refined based on the results of the baseline human health and ecological risk assessments. Finally, although EPA is hereby directing the LWG to use these RAOs in the draft FS, EPA expects further discussion about how to incorporate the RAOs in the draft FS.

If you have any questions, please contact Chip Humphrey at (503) 326-2678 or Eric Blischke (503) 326-4006. All legal inquiries should be directed to Lori Cora at (206) 553-1115.

Sincerely,

Chip Humphrey
Eric Blischke
Remedial Project Managers

cc: Greg Ulirsch, ATSDR
Rob Neely, NOAA
Ted Buerger, US Fish and Wildlife Service
Preston Sleeger, Department of Interior
Jim Anderson, DEQ
Kurt Burkholder, Oregon DOJ
David Farrer, Oregon Environmental Health Assessment Program
Rick Keppler, Oregon Department of Fish and Wildlife
Michael Karnosh, Confederated Tribes of Grand Ronde
Tom Downey, Confederated Tribes of Siletz
Audie Huber, Confederated Tribes of Umatilla
Brian Cunninghame, Confederated Tribes of Warm Springs
Erin Madden, Nez Perce Tribe
Rose Longoria, Confederated Tribes of Yakama Nation

To: Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Mon 8/12/2013 7:56:31 PM
Subject: FW: Arkema EE/CA comments
Arkema EE-CA_specific comments responses_8_Aug_13.docx
Arkema EE-CA _EPA Comments Review Transmittal_8_Aug_13.docx
Arkema NAPL Evaluation Memo_6-25-13_REV 1.pdf
Portland_Harbor_Recontamination_Evaluation_Framework_Draft_4_JAN_2013.pdf

Lori, Let me know when you have an idea of your review time on this and I'll plan accordingly—likely I'll not spend much time on this until after I'm done diving, so I'd target getting it out early next week unless you need more time.

Feel free also to ask for targeted review items if you like and I can see what CDM can highlight for legal issues.

Thanks

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Thursday, August 08, 2013 8:01 AM
To: Sheldrake, Sean
Subject: Arkema EE/CA comments

Sean, attached is the final draft of the responses to LSS's response to comments dated March 28, 2013. Per your request, where appropriate, we redrafted with specific comments requests made as directions. The comments can be placed in pdf format once they are final and ready to go to LSS. Lori Cora had an issue with comment #20 stating that the response needs to be clearer as to the Oregon law basis for application of the Pesticide residue rule. I checked with Matt McClincy at DEQ and he stated the proposed language looks OK and he could talk to Lori if she had questions.

I also attached a draft cover letter. Chip and/or Kristine may want to review it to make sure our interpretation of the how the FS process is progressing in relation to Arkema is correct. The letter is missing a closing statement as I am unsure how EPA wants to proceed (offer to meet with LSS, etc.?).

I also provided the two attachments referenced in the comment responses which should be provided to LSS.

Lance

==========

Lance E. Peterson, RG, LHG

Senior Project Manager

CDM Smith

14432 SE Eastgate Way, Suite 100, Bellevue, WA 98007

425-519-8300 (office) | 425-519-8382 (direct) | 425-417-5946 (mobile) | 425-746-0197 (fax)

mailto:petersonle@cdmsmith.com | cdmsmith.com

To: Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
Cc: Peterson, Lance[PetersonLE@cdmsmith.com]
From: Sheldrake, Sean
Sent: Mon 8/12/2013 5:36:28 PM
Subject: FW: draft body of letter re: cost estimates
cost estimate letter.docx

Thanks Lori, I'll ask CDM for a clean version with your direction included once we hear from Chip and Kristine and then send on to Silvina I suppose.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Monday, August 12, 2013 10:18 AM
To: Sheldrake, Sean; Koch, Kristine; Humphrey, Chip
Subject: draft body of letter re: cost estimates

I've taken a shot at redrafting this as a letter that will Sean would send. It needs filled in and it could benefit from input from HQs.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 7/8/2013 6:20:57 PM
Subject: RE: RI and surface water sampling
2011-08-29_DF RI_AppD3.3_Maps.pdf
2011-08-29_DF RI_AppD3.3_Tables.pdf
2011-08-29_DF RI_AppD3.3_Text.pdf

Appendix D3.3 of the RI. I've attached it for you.

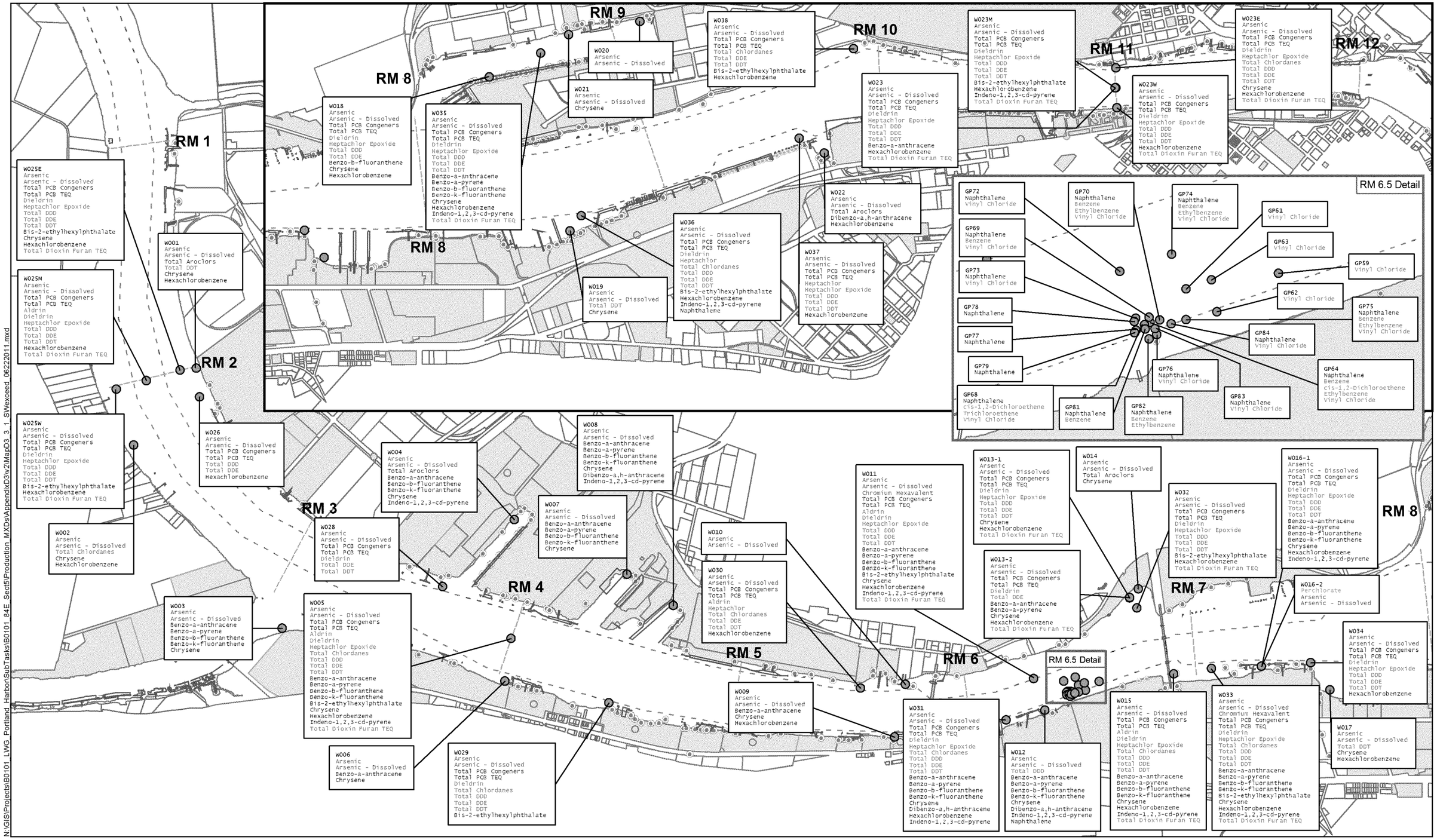
Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Monday, July 08, 2013 11:01 AM
To: Koch, Kristine
Subject: RI and surface water sampling

Hi, Kristine. Is there a figure, table or section of the RI you can point me to that shows the sampling results compared to water quality criteria and/or MCLs?



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FEATURE SOURCES:
Transportation,Property,or Boundaries:Metro RLIS.
Channel & River Miles:US Army Corps of Engineers.
Bathymetric Information:David Evans and Associates,Inc.

0 1,000 2,000 3,000 4,000 5,000 Feet

Map Features

- Surface Water Sample Locations
- River Miles
- Navigation Channel
- River Edge +13 ft NAVD

Outfalls

- Outfall
- Dock Drain
- Roof Drain

- Bridges
- Docks and Structures
- Waterfront Taxlots
- Upland ECSI Sites (2008)

Textcolor indicates analyte group

Sample Location
Conventionals
Metals
PCBs
Pesticides
SVOCs
PCDD/F
VOCs

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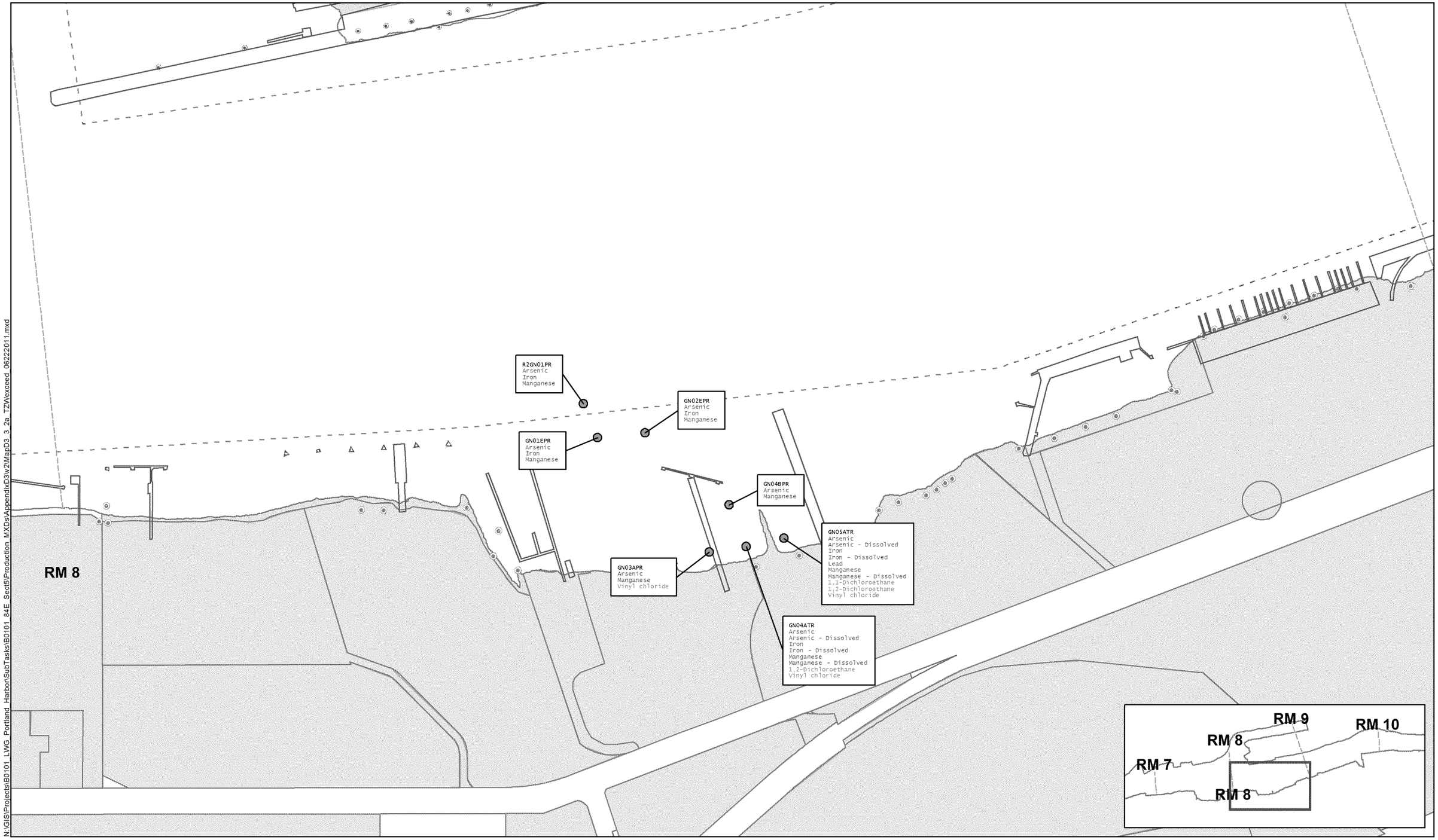
Map D3.3-1
Portland Harbor RI/FS
Remedial Investigation Report
Surface Water Exceedances of Human Health Water Quality Criteria



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Transportation,Property,or Boundaries:Metro RLIS.
Channel & River Miles:US Army Corps of Engineers.
Bathymetric Information:David Evans and Associates,Inc.

0 200 400 600 800 1,000 Feet

Map Features

- TZW Sample Locations
- River Miles
- Navigation Channel
- River Edge +13 ft NAVD

Outfalls

- Outfall
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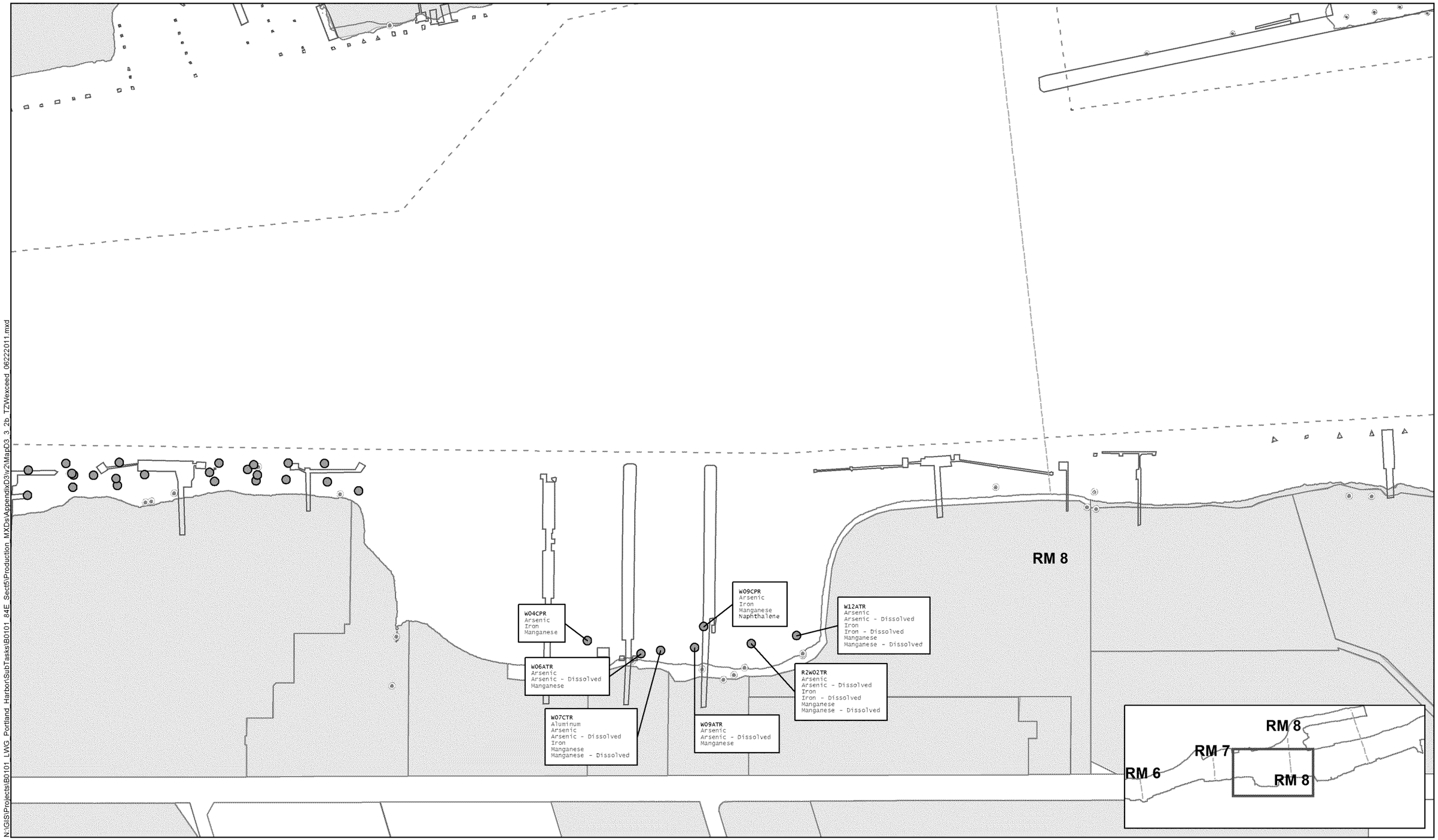
Map D3.3-2a
Portland Harbor RI/FS
Remedial Investigation Report
Transition Zone Water Exceedances of
Human Health Water Quality Criteria



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Channel & River Miles: US Army Corps of Engineers.
Bathymetric Information:David Evans and Associates,Inc.

0 200 400 600 800 1,000 Feet

Map Features

- TZW Sample Locations
- River Miles
- Navigation Channel
- River Edge +13 ft NAVD

Outfalls

- Outfall
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Map D3.3-2b
Portland Harbor RI/FS
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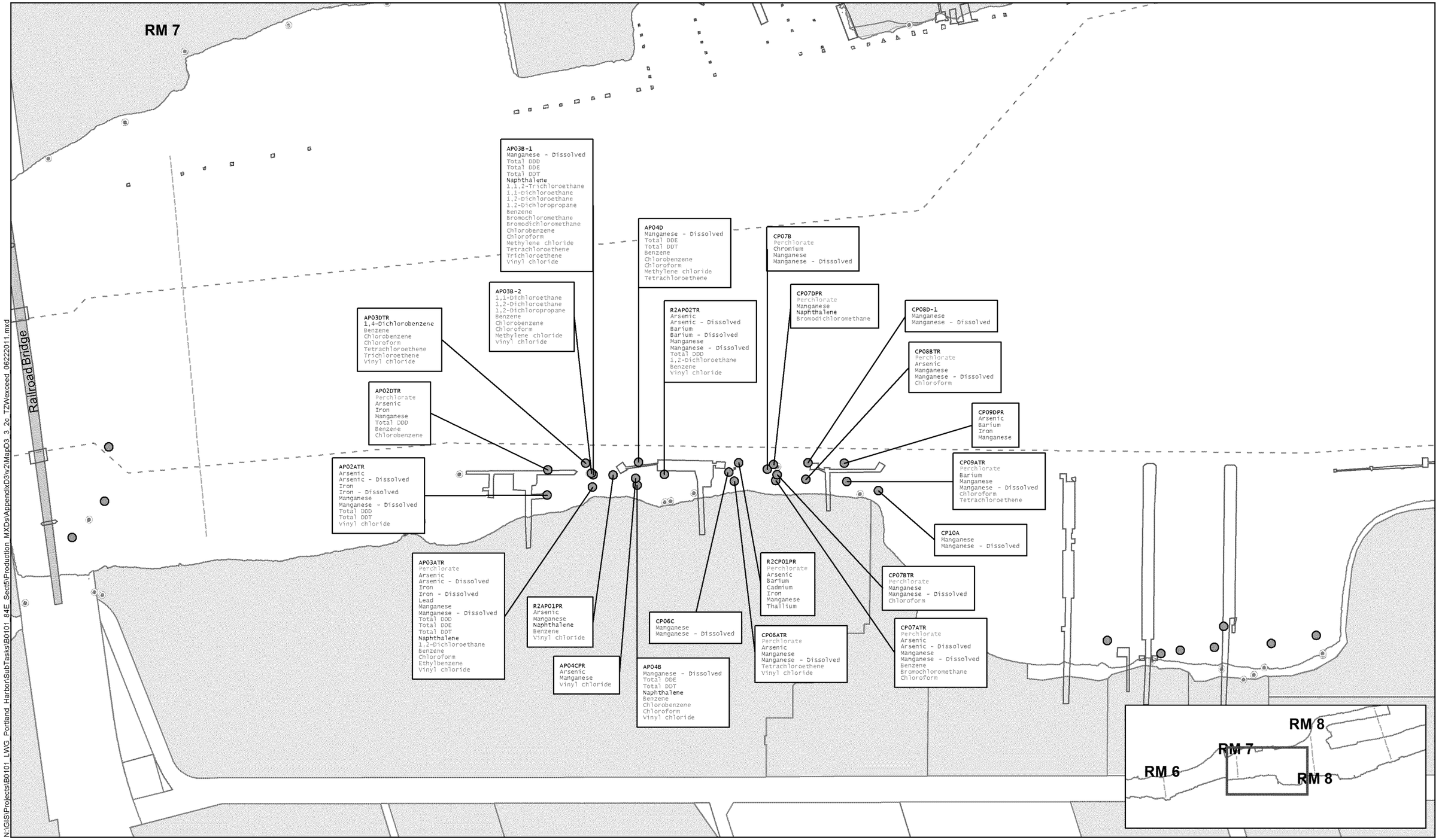
Transition Zone Water Exceedances of
Human Health Water Quality Criteria



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LWG Lower Willamette Group

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Transportation Property, or Boundaries: Metro RLIS.
Channel & River Miles: US Army Corps of Engineers.
Bathymetric Information: David Evans and Associates, Inc.

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Map Features

- TZW Sample Locations
- River Miles
- Navigation Channel
- River Edge +13 ft NAVD

Outfalls

- Outfall
- Dock Drain
- Roof Drain

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- Waterfront Taxlots
- Upland ECSI Sites (2008)

Textcolor indicates analyte group

Sample Location
Conventionals
Metals
PCBs
Pesticides
SVOCs
PCDD/F
VOCs

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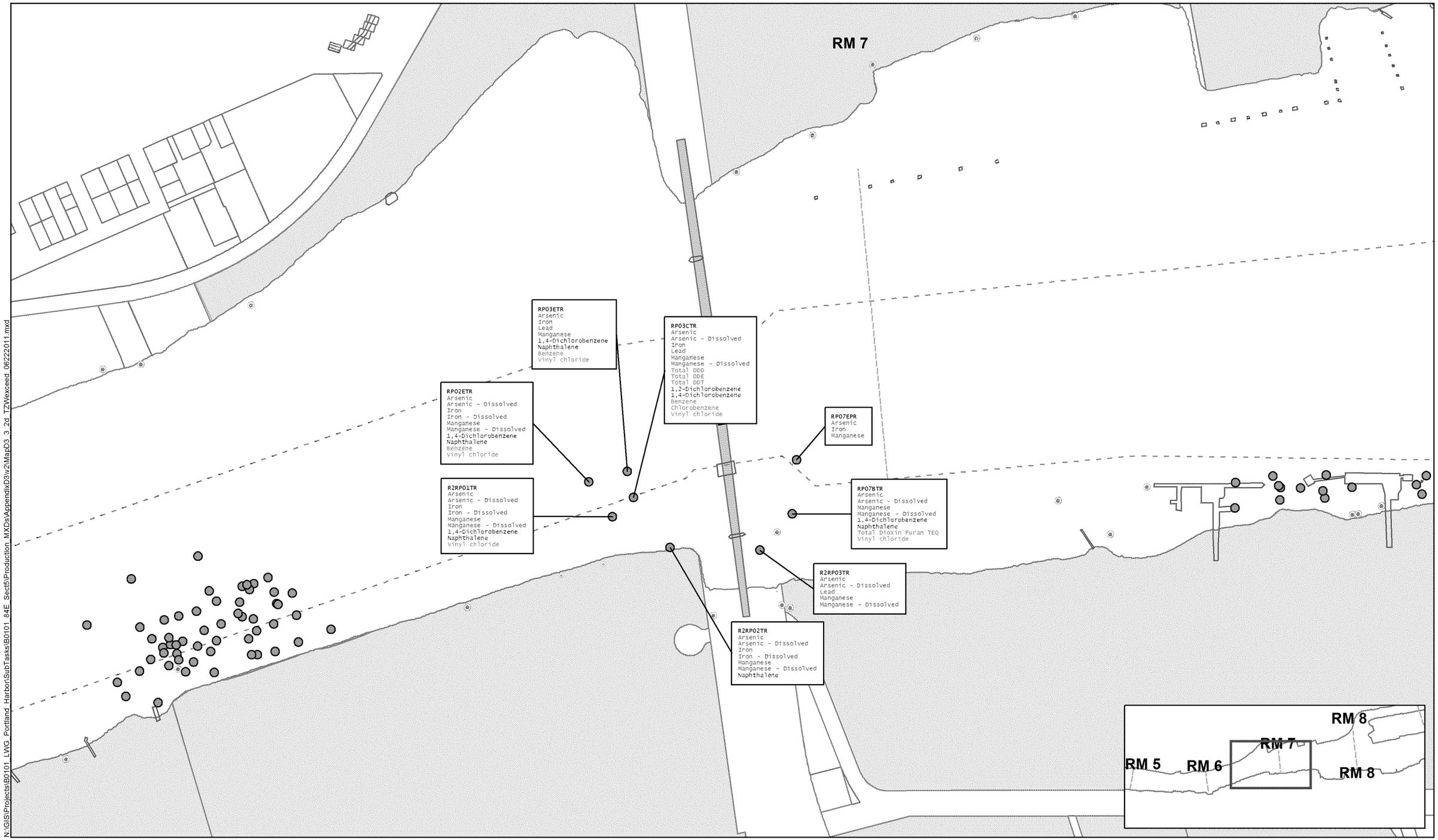
Map D3.3-2c
Portland Harbor RI/FS
Remedial Investigation Report
Transition Zone Water Exceedances of Human Health Water Quality Criteria



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Transportation,Property,or Boundaries:Metro RLIS.
Channel & River Miles: US Army Corps of Engineers.
Bathymetric Information:David Evans and Associates,Inc.

0 200 400 600 800 1,000 Feet

Map Features

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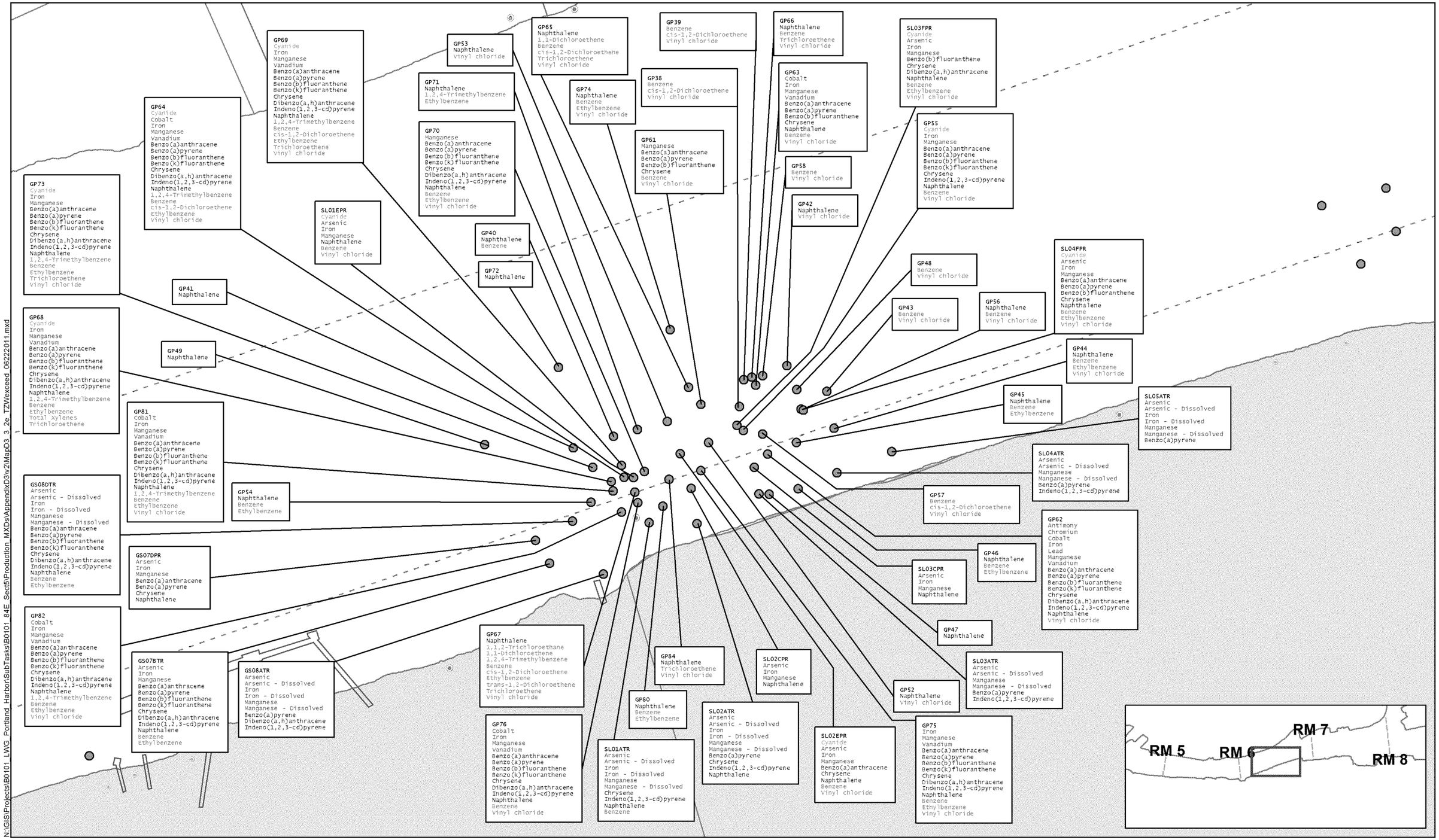
Map D3.3-2d
Portland Harbor RI/FS
Remedial Investigation Report
Transition Zone Water Exceedances of Human Health Water Quality Criteria



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Channel & River Miles: US Army Corps of Engineers.
BathymetricInformation:David Evans and Associates,Inc.

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Map Features

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Map D3.3-2e
Portland Harbor RI/FS
Remedial Investigation Report
Transition Zone Water Exceedances of
Human Health Water Quality Criteria

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Channel & River Miles: US Army Corps of Engineers.
Bathymetric Information: David Evans and Associates, Inc.

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Map Features

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Map D3.3-2f
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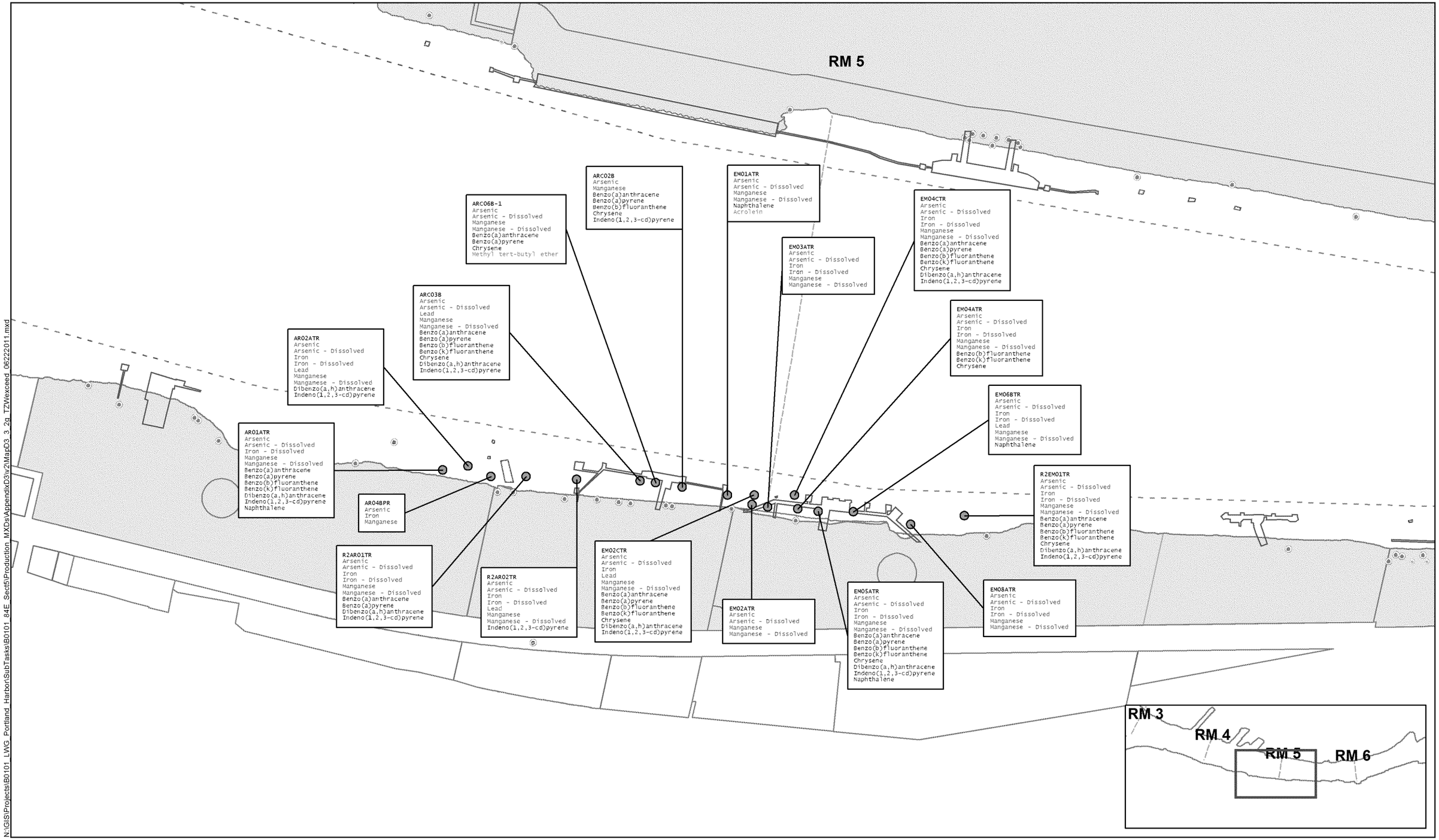
Remedial Investigation Report
Transition Zone Water Exceedances of
Human Health Water Quality Criteria



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BathymetricInformation:David Evans and Associates,Inc.

Map Features

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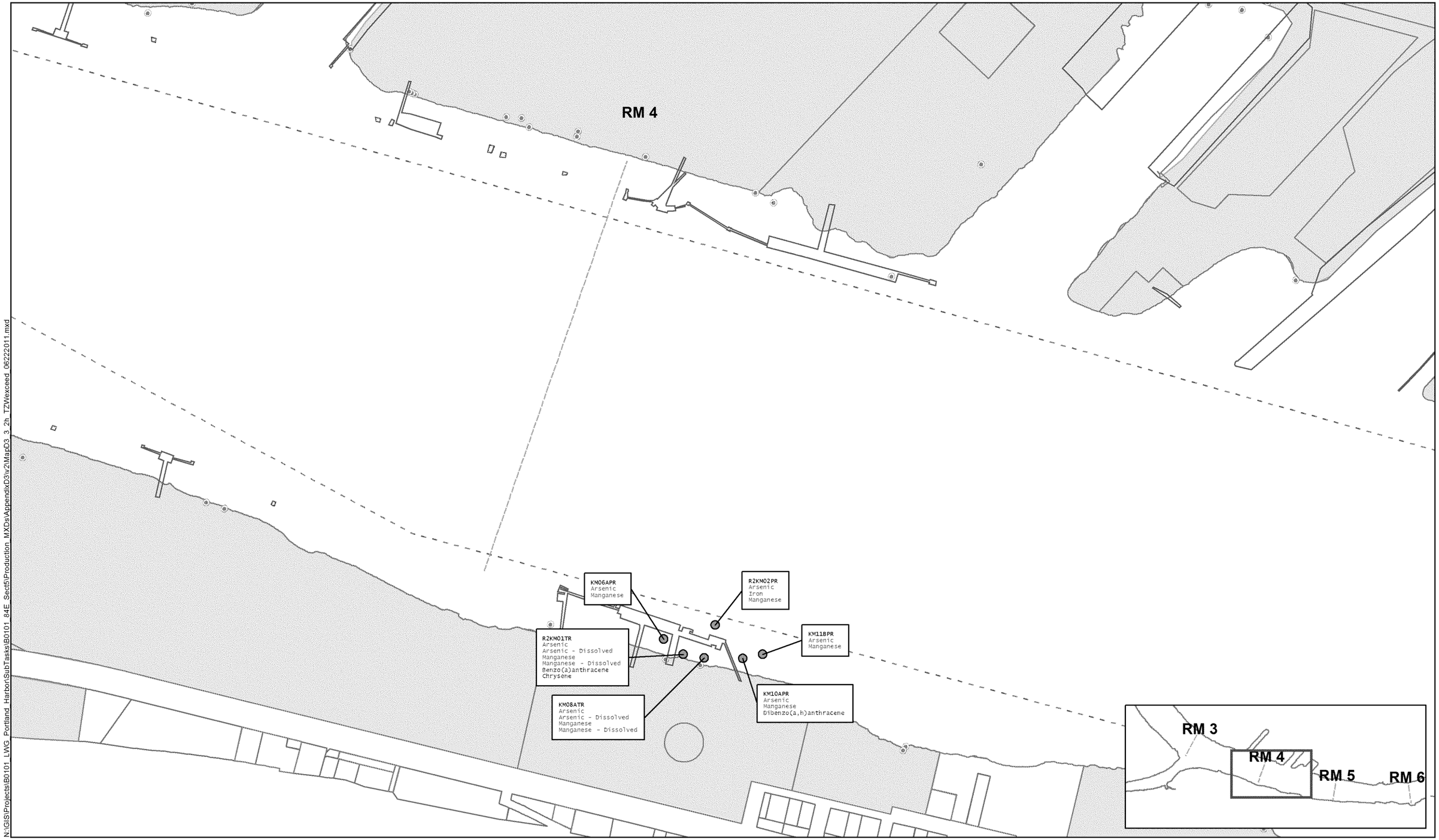
Map D3.3-2g
Portland Harbor RI/FS
Remedial Investigation Report
Transition Zone Water Exceedances of
Human Health Water Quality Criteria



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FEATURE SOURCES:
Transportation Property, or Boundaries: Metro RLIS.
Channel & River Miles: US Army Corps of Engineers.
Bathymetric Information: David Evans and Associates, Inc.

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Map Features

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Map D3.3-2h
Portland Harbor RI/FS
Remedial Investigation Report
Transition Zone Water Exceedances of
Human Health Water Quality Criteria

Table D3.3-1. Screening Evaluation of Surface Water Against Human Health Screening Criteria.

Chemical[a]	Notes	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Location of Maximum	Frequency of Detection	NRWQC[b] (µg/L)	NRWQC[b] divided by 10 (µg/L)	MCL[c] (µg/L)	MCLG[d] (µg/L)	RSL[e] (µg/L)	Max > NRWQC?	Max > NRWQC divided by 10?	Max > MCL?	Max > MCLG?	Max > RSL?
Metals															
Aluminum		2.1E+00	1.9E+03	LW2-W023	232 / 272	NA	NA	NA	NA	3.7E+04	--	--	--	--	N
Antimony		2.0E-02	1.3E-01	LW2-W001	149 / 322	6.4E+02	6.4E+01	6.0E+00	6.0E+00	1.5E+01	N	N	N	N	N
Arsenic		1.8E-01	7.5E-01	LW2-W001	273 / 322	1.4E-01	1.4E-02	1.0E+01	--	4.5E-02	Y	Y	N	--	Y
Cadmium		8.0E-03	5.0E-02	LW2-W004, LW2-W015, LW2-W022, LW3-W032	55 / 322	NA	NA	5.0E+00	5.0E+00	1.8E+01	--	--	N	N	N
Chromium	g	1.0E-01	1.9E+00	LW3-W031	157 / 322	NA	NA	1.0E+02	1.0E+02	5.5E+04	--	--	N	N	N
Chromium hexavalent		7.0E-01	1.1E+00	LW2-W011	5 / 20	NA	NA	NA	NA	4.3E-02	--	--	--	--	Y
Copper		3.7E-01	3.7E+00	LW2-W023	320 / 322	NA	NA	1.3E+03	1.3E+03	1.5E+03	--	--	N	N	N
Lead		8.0E-03	1.8E+00	LW2-W008	265 / 322	NA	NA	1.5E+01	--	NA	--	--	N	--	--
Mercury		2.0E-02	4.0E-02	LW3-W023M, LW3-W025M, LW3-W031	9 / 322	NA	NA	2.0E+00	2.0E+00	5.7E-01	--	--	N	N	N
Nickel		2.0E-01	2.2E+00	LW3-W031	279 / 322	4.6E+03	4.6E+02	NA	NA	7.3E+02	N	N	--	--	N
Selenium		1.0E-01	1.0E+00	LW2-W002	150 / 322	4.2E+03	4.2E+02	5.0E+01	5.0E+01	1.8E+02	N	N	N	N	N
Silver		1.0E-02	6.1E-02	LW2-W002	4 / 322	NA	NA	NA	NA	1.8E+02	--	--	--	--	N
Thallium		4.0E-03	3.2E-02	LW2-W015	8 / 50	4.7E-01	4.7E-02	2.0E+00	5.0E-01	NA	N	N	N	N	--
Zinc		9.0E-01	5.8E+01	LW2-W022	197 / 322	2.6E+04	2.6E+03	NA	NA	1.1E+04	N	N	--	--	N
Butyltins															
Butyltin ion	h	2.0E-03	8.5E-02	LW3-W023W	13 / 161	NA	NA	NA	NA	1.1E+01	--	--	--	--	N
Dibutyltin ion	h	6.1E-04	7.3E-03	LW2-W009	19 / 161	NA	NA	NA	NA	1.1E+01	--	--	--	--	N
Tributyltin ion	h	9.5E-04	3.5E-03	LW3-W035	11 / 161	NA	NA	NA	NA	1.1E+01	--	--	--	--	N
PAHs															
2-Methylnaphthalene		1.4E-03	6.2E-01	LW3-W031	64 / 232	NA	NA	NA	NA	1.5E+02	--	--	--	--	N
Acenaphthene		2.1E-04	2.1E-01	LW2-W012, LW3-W031	79 / 232	9.9E+02	9.9E+01	NA	NA	2.2E+03	N	N	--	--	N
Acenaphthylene	i	2.8E-04	4.3E-02	LW2-W012	57 / 232	NA	NA	NA	NA	2.2E+03	--	--	--	--	N
Anthracene		2.9E-04	4.8E-01	LW3-W031	39 / 232	4.0E+04	4.0E+03	NA	NA	1.1E+04	N	N	--	--	N
Benzo(a)anthracene	j	5.2E-05	2.7E-01	LW3-W031	80 / 232	1.8E-02	1.8E-03	2.0E-01	--	2.9E-02	Y	Y	Y	--	Y
Benzo(a)pyrene	j	1.8E-05	1.9E-01	LW3-W031	71 / 232	1.8E-02	1.8E-03	2.0E-01	NA	2.9E-03	Y	Y	N	--	Y
Benzo(b)fluoranthene	j	2.4E-05	1.3E-01	LW3-W031	77 / 232	1.8E-02	1.8E-03	2.0E-01	--	2.9E-02	Y	Y	N	--	Y
Benzo(g,h,i)perylene	k	6.6E-05	1.4E-01	LW2-W012, LW3-W031	71 / 232	NA	NA	NA	NA	1.1E+03	--	--	--	--	N
Benzo(k)fluoranthene	j	1.6E-05	1.3E-01	LW3-W031	76 / 232	1.8E-02	1.8E-03	2.0E-01	--	2.9E-01	Y	Y	N	--	N
Chrysene	j	9.3E-05	3.7E-01	LW3-W031	100 / 232	1.8E-02	1.8E-03	2.0E-01	--	2.9E+00	Y	Y	Y	--	N
Dibenzo(a,h)anthracene	j	2.6E-05	2.4E-02	LW3-W031	30 / 232	1.8E-02	1.8E-03	2.0E-01	--	2.9E-03	Y	Y	N	--	Y
Fluoranthene		5.0E-04	8.1E-01	LW3-W031	132 / 232	1.4E+02	1.4E+01	NA	NA	1.5E+03	N	N	--	--	N
Fluorene		6.3E-05	3.1E-01	LW3-W031	79 / 232	5.3E+03	5.3E+02	NA	NA	1.5E+03	N	N	--	--	N
Indeno(1,2,3-cd)pyrene	j	1.5E-04	1.2E-01	LW3-W031	58 / 232	1.8E-02	1.8E-03	2.0E-01	--	2.9E-02	Y	Y	N	--	Y
Naphthalene		7.4E-04	6.1E+02	WLCSLH01GP82	39 / 255	NA	NA	NA	NA	1.4E-01	--	--	--	--	Y
Phenanthrene	k	3.8E-04	2.2E+00	LW3-W031	72 / 232	NA	NA	NA	NA	1.1E+03	--	--	--	--	N
Pyrene		4.3E-04	1.3E+00	LW3-W031	124 / 232	4.0E+03	4.0E+02	NA	NA	1.1E+03	N	N	--	--	N

Table D3.3-1. Screening Evaluation of Surface Water Against Human Health Screening Criteria.

Chemical[a]	Notes	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Location of Maximum	Frequency of Detection	NRWQC[b] (µg/L)	NRWQC[b] divided by 10 (µg/L)	MCL[c] (µg/L)	MCLG[d] (µg/L)	RSL[e] (µg/L)	Max > NRWQC?	Max > NRWQC divided by 10?	Max > MCL?	Max > MCLG?	Max > RSL?
Phthalates															
Bis(2-ethylhexyl) phthalate		7.8E-03	6.8E+00	LW2-W005	22 / 183	2.2E+00	2.2E-01	6.0E+00	NA	4.8E+00	Y	Y	Y	--	Y
Butylbenzyl phthalate		8.9E-04	3.2E-01	LW3-W025W	40 / 183	1.9E+03	1.9E+02	NA	NA	3.5E+01	N	N	--	--	N
Dibutyl phthalate		1.5E-03	2.6E-01	LW3-W029	9 / 183	4.5E+03	4.5E+02	NA	NA	3.7E+03	N	N	--	--	N
Diethyl phthalate		1.2E-03	2.6E-01	LW2-W005	25 / 183	4.4E+04	4.4E+03	NA	NA	2.9E+04	N	N	--	--	N
Dimethyl phthalate	l	4.8E-03	4.8E-03	LW2-W015	1 / 183	1.1E+06	1.1E+05	NA	NA	2.9E+04	N	N	--	--	N
Di-n-octyl phthalate	l	1.4E-04	3.1E-02	LW3-W034	3 / 183	NA	NA	NA	NA	2.9E+04	--	--	--	--	N
SVOCs															
1,4-Dichlorobenzene		1.9E-02	1.9E-02	LW2-W022	1 / 183	1.9E+02	1.9E+01	7.5E+01	7.5E+01	4.3E-01	N	N	N	N	N
4-Chloroaniline		2.0E-02	2.0E-02	LW3-W023M	1 / 159	NA	NA	NA	NA	3.4E-01	--	--	--	--	N
Aniline		2.3E+00	2.3E+00	LW3-W035	1 / 152	NA	NA	NA	NA	1.2E+01	--	--	--	--	N
Benzoic acid		1.8E+00	3.1E+00	LW3-W026	10 / 158	NA	NA	NA	NA	1.5E+05	--	--	--	--	N
Carbazole	m	2.4E-02	1.6E-01	LW3-W031	4 / 160	NA	NA	NA	NA	1.5E+03	--	--	--	--	N
Dibenzofuran		4.6E-02	4.6E-02	LW3-W031	1 / 161	NA	NA	NA	NA	3.7E+01	--	--	--	--	N
Hexachlorobenzene		4.2E-06	7.0E-03	LW2-W022	92 / 242	2.9E-04	2.9E-05	1.0E+00	NA	4.2E-02	Y	Y	N	--	N
Hexachlorobutadiene		1.1E-07	2.6E-03	LW2-W017	46 / 253	1.8E+01	1.8E+00	NA	NA	8.6E-01	N	N	--	--	N
Isophorone		1.0E-02	1.8E-02	LW2-W017	4 / 160	9.6E+02	9.6E+01	NA	NA	7.1E+01	N	N	--	--	N
VOCs															
Ethylbenzene		5.5E-01	1.1E+01	WLCSLH01GP64	8 / 23	2.1E+03	2.1E+02	7.0E+02	7.0E+02	1.5E+00	N	N	N	N	Y
1,3,5-Trimethylbenzene		3.1E-01	4.4E-01	WLCSLH01GP64	3 / 23	NA	NA	NA	NA	3.7E+02	--	--	--	--	N
Toluene		2.1E-01	4.1E+00	WLCSLH01GP64	8 / 23	1.5E+04	1.5E+03	1.0E+03	1.0E+03	2.3E+03	N	N	N	N	N
Sec-butylbenzene	n	5.5E-01	5.5E-01	WLCSLH01GP82	1 / 23	NA	NA	NA	NA	NA	--	--	--	--	--
cis-1,2-Dichloroethene		1.2E+00	2.8E+02	WLCSLH01GP64	5 / 23	NA	NA	7.0E+01	7.0E+01	7.3E+01	--	--	Y	Y	Y
trans-1,2-Dichloroethene		1.5E+00	1.5E+00	WLCSLH01GP64	1 / 23	1.0E+04	1.0E+03	1.0E+02	1.0E+02	1.1E+02	N	N	N	N	N
m,p-Xylene	o	4.3E-01	3.9E+00	WLCSLH01GP64	4 / 23	NA	NA	1.0E+04	1.0E+04	2.0E+02	--	--	N	N	N
Benzene		2.7E-01	3.1E+01	WLCSLH01GP64	8 / 23	5.1E+01	5.1E+00	5.0E+00	NA	4.1E-01	N	Y	Y	--	Y
Vinyl chloride		3.2E-01	7.3E+01	WLCSLH01GP64	15 / 23	2.4E+00	2.4E-01	2.0E+00	NA	1.6E-02	Y	Y	Y	--	Y
1,1-Dichloroethene		5.1E-01	5.1E-01	WLCSLH01GP64	1 / 23	7.1E+03	7.1E+02	7.0E+00	7.0E+00	3.4E+02	N	N	N	N	N
Trichloroethene		6.1E-01	1.9E+02	WLCSLH01GP68	2 / 23	3.0E+01	3.0E+00	5.0E+00	NA	2.0E+00	Y	Y	Y	--	Y
o-Xylene	o	4.3E-01	2.0E+00	WLCSLH01GP64	2 / 23	NA	NA	1.0E+04	1.0E+04	1.2E+03	--	--	N	N	N
1,2,4-Trimethylbenzene		1.0E+00	2.9E+00	WLCSLH01GP82	3 / 23	NA	NA	NA	NA	1.5E+01	--	--	--	--	N
Phenols															
4-Chloro-3-methylphenol		3.3E-02	6.5E-01	LW2-W003	9 / 160	NA	NA	NA	NA	3.7E+03	--	--	--	--	N
Phenol		2.2E-02	3.8E-01	LW3-W033	10 / 160	8.6E+05	8.6E+04	NA	NA	1.1E+04	N	N	--	--	N
Polychlorinated Biphenyls															
Total Aroclors	p	5.9E-03	1.7E-02	LW2-W014	6 / 53	6.4E-05	6.4E-06	5.0E-01	NA	3.4E-02	Y	Y	N	--	N
Total PCB Congeners	p	4.6E-05	1.2E-02	LW2-W013	107 / 107	6.4E-05	6.4E-06	5.0E-01	NA	3.4E-02	Y	Y	N	--	N

Table D3.3-1. Screening Evaluation of Surface Water Against Human Health Screening Criteria.

Chemical[a]	Notes	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Location of Maximum	Frequency of Detection	NRWQC[b] (µg/L)	NRWQC[b] divided by 10 (µg/L)	MCL[c] (µg/L)	MCLG[d] (µg/L)	RSL[e] (µg/L)	Max > NRWQC?	Max > NRWQC divided by 10?	Max > MCL?	Max > MCLG?	Max > RSL?
Dioxin/Furan															
Total Dioxin/Furan TEQ	q	2.2E-08	5.0E-07	LW2-W015	65 / 65	5.1E-09	5.1E-10	3.0E-05	NA	5.2E-07	Y	Y	N	--	N
Total PCB TEQ	q	7.1E-10	1.6E-07	LW2-W005	107 / 107	5.1E-09	5.1E-10	3.0E-05	NA	5.2E-07	Y	Y	N	--	N
Pesticides															
Total DDD	r	1.5E-05	5.2E-03	LW2-W015	88 / 162	3.1E-04	3.1E-05	NA	NA	2.8E-01	Y	Y	--	--	N
Total DDE	s	1.5E-05	7.5E-04	LW2-W016	89 / 162	2.2E-04	2.2E-05	NA	NA	2.0E-01	Y	Y	--	--	N
Total DDT	t	1.6E-06	1.9E-02	LW2-W001	95 / 162	2.2E-04	2.2E-05	NA	NA	2.0E-01	Y	Y	--	--	N
Total Chlordanes		1.4E-05	2.9E-03	LW2-W002	85 / 162	8.1E-04	8.1E-05	2.0E+00	NA	1.9E-01	Y	Y	N	--	N
Total Endosulfan		1.5E-05	1.2E-03	LW2-W013	88 / 162	8.9E+01	8.9E+00	NA	NA	2.2E+02	N	N	--	--	N
Heptachlor epoxide		2.1E-06	1.1E-04	LW3-W037	75 / 162	3.9E-05	3.9E-06	2.0E-01	NA	7.4E-03	Y	Y	N	--	N
Aldrin		3.0E-07	5.2E-03	LW3-W030	69 / 162	5.0E-05	5.0E-06	NA	NA	4.0E-03	Y	Y	--	--	Y
alpha-Hexachlorocyclohexane		4.5E-07	2.0E-04	LW3-W026	84 / 162	4.9E-03	4.9E-04	NA	NA	1.1E-02	N	N	--	--	N
beta-Hexachlorocyclohexane		1.6E-06	5.3E-04	LW3-W026	58 / 162	1.7E-02	1.7E-03	NA	NA	3.7E-02	N	N	--	--	N
delta-Hexachlorocyclohexane	n	7.6E-07	1.7E-03	LW2-W013	36 / 162	NA	NA	NA	NA	NA	--	--	--	--	--
Endrin ketone	u	3.4E-07	2.2E-04	LW3-W036	43 / 162	NA	NA	2.0E+00	2.0E+00	1.1E+01	--	--	N	N	N
gamma-Hexachlorocyclohexane		7.2E-06	1.9E-03	LW3-W026	88 / 162	1.8E+00	1.8E-01	2.0E-01	2.0E-01	6.1E-02	N	N	N	N	N
Dieldrin		1.7E-05	1.2E-03	LW3-W028, LW3-W036	82 / 162	5.4E-05	5.4E-06	NA	NA	4.2E-03	Y	Y	--	--	N
Endrin		1.7E-07	2.9E-04	LW3-W038	15 / 149	6.0E-02	6.0E-03	2.0E+00	2.0E+00	1.1E+01	N	N	N	N	N
Methoxychlor		9.2E-07	1.1E-02	LW2-W013-2	43 / 162	NA	NA	4.0E+01	4.0E+01	1.8E+02	--	--	N	N	N
Endrin aldehyde	u	3.5E-04	9.8E-04	LW3-W036	7 / 160	3.0E-01	3.0E-02	2.0E+00	2.0E+00	1.1E+01	N	N	N	N	N
Heptachlor		1.3E-07	2.1E-03	LW3-W030	21 / 162	7.9E-05	7.9E-06	4.0E-01	NA	1.5E-02	Y	Y	N	--	N
Herbicides															
2,4-D		7.6E-02	3.1E-01	LW3-W035	5 / 161	NA	NA	7.0E+01	7.0E+01	3.7E+02	--	--	N	N	N
2,4-DB		2.0E-01	2.5E-01	LW3-W025E	2 / 158	NA	NA	NA	NA	2.9E+02	--	--	--	--	N
Dalapon		2.3E-01	3.3E-01	LW3-W036	2 / 158	NA	NA	2.0E+02	2.0E+02	1.1E+03	--	--	N	N	N
MCPP		7.3E+00	3.4E+01	LW3-W035	5 / 158	NA	NA	NA	NA	3.7E+01	--	--	--	--	N
Conventionals															
Perchlorate	v	3.0E-01	1.6E+01	LW2-W016-2	7 / 20	NA	NA	1.5E+01	NA	2.6E+01	--	--	Y	--	N

Table D3.3-1. Screening Evaluation of Surface Water Against Human Health Screening Criteria.

Chemical[a]	Notes	95 UCL[f] Distribution	95 UCL Method	Value	95 UCL > NRWQC?	95 UCL > NRWQC divided by 10?	95 UCL > MCL?	95 UCL > MCLG?	95 UCL > RSL?
Metals									
Aluminum		--	--	--	--	--	--	--	--
Antimony		--	--	--	--	--	--	--	--
Arsenic		normal	95% KM (t) UCL	3.9E-01	Y	Y	N	N	Y
Cadmium		--	--	--	--	--	--	--	--
Chromium	g	--	--	--	--	--	--	--	--
Chromium hexavalent		normal	95% KM (t) UCL	8.3E-01	N	N	N	N	Y
Copper		--	--	--	--	--	--	--	--
Lead		--	--	--	--	--	--	--	--
Mercury		--	--	--	--	--	--	--	--
Nickel		--	--	--	--	--	--	--	--
Selenium		--	--	--	--	--	--	--	--
Silver		--	--	--	--	--	--	--	--
Thallium		--	--	--	--	--	--	--	--
Zinc		--	--	--	--	--	--	--	--
Butyltins									
Butyltin ion	h	--	--	--	--	--	--	--	--
Dibutyltin ion	h	--	--	--	--	--	--	--	--
Tributyltin ion	h	--	--	--	--	--	--	--	--
PAHs									
2-Methylnaphthalene		--	--	--	--	--	--	--	--
Acenaphthene		--	--	--	--	--	--	--	--
Acenaphthylene	i	--	--	--	--	--	--	--	--
Anthracene		--	--	--	--	--	--	--	--
Benzo(a)anthracene	j	non-parametric	95% KM (Chebyshev) UCL	8.5E-03	N	Y	N	N	N
Benzo(a)pyrene	j	non-parametric	95% KM (Chebyshev) UCL	7.1E-03	N	Y	N	N	Y
Benzo(b)fluoranthene	j	non-parametric	95% KM (BCA) UCL	3.7E-03	N	Y	N	N	N
Benzo(g,h,i)perylene	k	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	j	non-parametric	95% KM (BCA) UCL	3.4E-03	N	Y	N	N	N
Chrysene	j	non-parametric	95% KM (BCA) UCL	8.1E-03	N	Y	N	N	N
Dibenzo(a,h)anthracene	j	non-parametric	95% KM (Chebyshev) UCL	9.2E-04	N	N	N	N	N
Fluoranthene		--	--	--	--	--	--	--	--
Fluorene		--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	j	non-parametric	95% KM (Chebyshev) UCL	5.0E-03	N	Y	N	N	N
Naphthalene		non-parametric	97.5% KM (Chebyshev) UCL	3.3E+01	N	N	N	N	Y
Phenanthrene	k	--	--	--	--	--	--	--	--
Pyrene		--	--	--	--	--	--	--	--

Table D3.3-1. Screening Evaluation of Surface Water Against Human Health Screening Criteria.

Chemical[a]	Notes	95 UCL[f] Distribution	95 UCL Method	Value	95 UCL > NRWQC?	95 UCL > NRWQC divided by 10?	95 UCL > MCL?	95 UCL > MCLG?	95 UCL > RSL?
Phthalates									
Bis(2-ethylhexyl) phthalate		non-parametric	95% KM (Chebyshev) UCL	3.9E-01	N	Y	N	N	N
Butylbenzyl phthalate		--	--	--	--	--	--	--	--
Dibutyl phthalate		--	--	--	--	--	--	--	--
Diethyl phthalate		--	--	--	--	--	--	--	--
Dimethyl phthalate	l	--	--	--	--	--	--	--	--
Di-n-octyl phthalate	l	--	--	--	--	--	--	--	--
SVOCs									
1,4-Dichlorobenzene		--	--	--	--	--	--	--	--
4-Chloroaniline		--	--	--	--	--	--	--	--
Aniline		--	--	--	--	--	--	--	--
Benzoic acid		--	--	--	--	--	--	--	--
Carbazole	m	--	--	--	--	--	--	--	--
Dibenzofuran		--	--	--	--	--	--	--	--
Hexachlorobenzene		non-parametric	95% KM (Chebyshev) UCL	4.7E-04	Y	Y	N	N	N
Hexachlorobutadiene		--	--	--	--	--	--	--	--
Isophorone		--	--	--	--	--	--	--	--
VOCs									
Ethylbenzene		gamma	95% KM (t) UCL	2.3E+00	N	N	N	N	Y
1,3,5-Trimethylbenzene		--	--	--	--	--	--	--	--
Toluene		--	--	--	--	--	--	--	--
Sec-butylbenzene	n	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene		normal	95% KM (t) UCL	4.4E+01	N	N	N	N	N
trans-1,2-Dichloroethene		--	--	--	--	--	--	--	--
m,p-Xylene	o	--	--	--	--	--	--	--	--
Benzene		approx. gamma	95% KM (t) UCL	4.3E+00	N	N	N	N	Y
Vinyl chloride		non-parametric	97.5% KM (Chebyshev) UCL	2.4E+01	Y	Y	Y	N	Y
1,1-Dichloroethene		--	--	--	--	--	--	--	--
Trichloroethene		NA	*UCL not calculated for less than 5 detects*	NA	--	--	--	--	--
o-Xylene	o	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene		--	--	--	--	--	--	--	--
Phenols									
4-Chloro-3-methylphenol		--	--	--	--	--	--	--	--
Phenol		--	--	--	--	--	--	--	--
Polychlorinated Biphenyls									
Total Aroclors	p	normal	95% KM (t) UCL	7.0E-03	Y	Y	N	N	N
Total PCB Congeners	p	non-parametric	95% KM (BCA) UCL	9.4E-04	Y	Y	N	N	N

Table D3.3-1. Screening Evaluation of Surface Water Against Human Health Screening Criteria.

Chemical[a]	Notes	95 UCL[f] Distribution	95 UCL Method	Value	95 UCL > NRWQC?	95 UCL > NRWQC divided by 10?	95 UCL > MCL?	95 UCL > MCLG?	95 UCL > RSL?
Dioxin/Furan									
Total Dioxin/Furan TEQ	q	lognormal	95% KM (Chebyshev) UCL	1.7E-07	Y	Y	N	N	N
Total PCB TEQ	q	non-parametric	95% KM (BCA) UCL	1.3E-08	Y	Y	N	N	N
Pesticides									
Total DDD	r	non-parametric	95% KM (Chebyshev) UCL	4.9E-04	Y	Y	N	N	N
Total DDE	s	non-parametric	95% KM (t) UCL	1.4E-04	N	Y	N	N	N
Total DDT	t	lognormal	95% KM (Chebyshev) UCL	1.1E-03	Y	Y	N	N	N
Total Chlordanes		non-parametric	95% KM (Chebyshev) UCL	2.4E-04	N	Y	N	N	N
Total Endosulfan		--	--	--	--	--	--	--	--
Heptachlor epoxide		non-parametric	95% KM (BCA) UCL	1.1E-05	N	Y	N	N	N
Aldrin		non-parametric	95% KM (BCA) UCL	9.9E-05	Y	Y	N	N	N
alpha-Hexachlorocyclohexane		--	--	--	--	--	--	--	--
beta-Hexachlorocyclohexane		--	--	--	--	--	--	--	--
delta-Hexachlorocyclohexane	n	--	--	--	--	--	--	--	--
Endrin ketone	u	--	--	--	--	--	--	--	--
gamma-Hexachlorocyclohexane		--	--	--	--	--	--	--	--
Dieldrin		non-parametric	95% KM (t) UCL	1.1E-04	Y	Y	N	N	N
Endrin		--	--	--	--	--	--	--	--
Methoxychlor		--	--	--	--	--	--	--	--
Endrin aldehyde	u	--	--	--	--	--	--	--	--
Heptachlor		non-parametric	95% KM (Chebyshev) UCL	7.7E-05	N	Y	N	N	N
Herbicides									
2,4-D		--	--	--	--	--	--	--	--
2,4-DB		--	--	--	--	--	--	--	--
Dalapon		--	--	--	--	--	--	--	--
MCPP		--	--	--	--	--	--	--	--
Conventionals									
Perchlorate	v	gamma	95% KM (t) UCL	2.8E+00	N	N	N	N	N

Table D3.3-1. Screening Evaluation of Surface Water Against Human Health Screening Criteria.

Notes:
Contaminants in bold italics exceed one or more human health screening criteria.

a Chemicals listed are analytes detected in the human health bioaccumulation data set for surface water. Data set includes individual samples from sampling locations within the Study Area.
b NRWQC listed for human health consumption of organism. National Recommended Water Quality Criteria, EPA 2009b.
c MCL from EPA National Primary Drinking Water Regulations, EPA 816-F-09-0004, May 2009. Accessed online April 2011.
d MCLG from EPA National Primary Drinking Water Regulations, EPA 816-F-09-0004, May 2009. Accessed online April 2011. Only non-zero MCLGs are listed.
e EPA Regional Screening Levels for tapwater, November 2010. Accessed online April 2011.
f 95 UCLs calculated for analytes whose maximum detected concentration exceeded at least one screening level, and for which at least 5 samples resulted in a detected concentration.
g EPA RSL listed is for trivalent chromium; MCL listed is for total chromium.
h EPA RSL for tributyltin oxide (TBTO) used as surrogate.
i EPA RSL for acenaphthene used as surrogate.
j Benzo(a)pyrene MCL and RSL used for screening of all carcinogenic PAHs.
k EPA RSL for pyrene used as surrogate.
l EPA RSL for diethyl phthalate used as surrogate.
m EPA RSL for fluorene used as surrogate.
n Screening value does not exist and surrogate was not identified.
o Xylene mixture RSL used for m,p-Xylene; Total xylenes MCL and MCLG used for m,p-Xylene and for o-Xylene.
p EPA RSL for PCBs as Aroclor 1254 used for screening concentration.
q EPA RSL for 2,3,7,8-TCDD (dioxin) used for screening concentration.
r EPA RSL for DDD used for total DDD.
s EPA RSL for p,p'-DDE used for total DDE.
t EPA RSL for DDT used for total DDT.
u RSL, MCL, and MCLG for endrin used as surrogate.
v The Interim Drinking Water Health Advisory was used as the MCL for perchlorate.

-- = not applicable.
95 UCL = 95th percentile upper confidence limit on the mean
CAS = Chemical Abstract Service number
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
EPA = U.S. Environmental Protection Agency
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MCPP = 2-(2-methyl-4-chlorophenoxy)propionic acid
N = no
NA = not available
NRWQC = National Recommended Water Quality Criteria
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
RSL = Regional Screening Level for tapwater
SVOC = semivolatile organic compound
TCDD = tetrachlorodibenzo-p-dioxin
TEQ = toxic equivalents
VOC = volatile organic compound
Y = yes

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This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Table D3.3-2. Screening Evaluation of Transition Zone Water Data Against Human Health-Based Criteria.

Chemical[a]	Notes	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Location of Maximum	Frequency of Detection	NRWQC[b] (µg/L)	MCL[c] (µg/L)	MCLG[d] (µg/L)	Tapwater RSL[e] (µg/L)	Max > NRWQC ?	Max > MCL?	Max > MCLG?	Max > RSL?
Metals													
Aluminum		2.4E+00	4.1E+04	W-07-C-TR	93 / 148	NA	NA	NA	3.7E+04	--	--	--	Y
Antimony		2.0E-02	2.5E+01	WLCSLH01GP62	63 / 161	6.4E+02	6.0E+00	6.0E+00	1.5E+01	N	Y	Y	Y
Arsenic		3.0E-01	7.7E+01	EM-03-A-TR	148 / 171	1.4E-01	1.0E+01	--	4.5E-02	Y	Y	--	Y
Barium		4.1E+00	4.4E+03	CP-09-A-TR	148 / 148	NA	2.0E+03	2.0E+03	7.3E+03	--	Y	Y	N
Beryllium		5.0E-03	1.3E+00	W-07-C-TR	60 / 148	NA	4.0E+00	4.0E+00	7.3E+01	--	N	N	N
Cadmium		5.0E-03	3.6E+01	R2-CP-01-PR	92 / 148	NA	5.0E+00	5.0E+00	1.8E+01	--	Y	Y	Y
Chromium	f	2.0E-01	1.5E+02	WLCSLH01GP62	109 / 175	NA	1.0E+02	1.0E+02	5.5E+04	--	Y	Y	N
Cobalt		6.1E+00	8.2E+01	WLCSLH01GP62	8 / 13	NA	NA	NA	1.1E+01	--	--	--	Y
Copper		3.6E-01	1.7E+02	WLCSLH01GP62	54 / 150	NA	1.3E+03	1.3E+03	1.5E+03	--	N	N	N
Iron		2.9E+01	2.5E+05	CP-09-D-PR	161 / 161	NA	NA	NA	2.6E+04	--	--	--	Y
Lead		1.0E-02	1.3E+02	WLCSLH01GP62	72 / 171	NA	1.5E+01	--	NA	--	Y	--	--
Manganese		4.4E+01	6.6E+04	R2-CP-01-PR	189 / 189	1.0E+02	NA	NA	8.8E+02	Y	--	--	Y
Mercury		8.0E-02	5.0E-01	CP-06-A-TR	16 / 148	NA	2.0E+00	2.0E+00	5.7E-01	--	N	N	N
Nickel		2.0E-01	1.4E+02	R2-CP-01-PR	140 / 161	4.6E+03	NA	NA	7.3E+02	N	--	--	N
Selenium		1.0E-01	4.6E+00	CP-07-A-TR	88 / 161	4.2E+03	5.0E+01	5.0E+01	1.8E+02	N	N	N	N
Silver		5.0E-03	2.6E+00	CP-07-D-PR	41 / 157	NA	NA	NA	1.8E+02	--	--	--	N
Thallium		3.0E-03	6.6E-01	R2-CP-01-PR	57 / 148	4.7E-01	2.0E+00	5.0E-01	NA	Y	N	Y	--
Titanium	g	4.5E+01	7.0E+03	WLCSLH01GP62	13 / 13	NA	NA	NA	NA	--	--	--	--
Vanadium		1.2E+01	3.8E+02	WLCSLH01GP62	9 / 13	NA	NA	NA	2.6E+00	--	--	--	Y
Zinc		9.5E-01	9.8E+02	WLCSLH01GP62	97 / 171	2.6E+04	NA	NA	1.1E+04	N	--	--	N
PAHs													
2-Methylnaphthalene		8.2E-02	8.4E+01	GS-07-B-TR	27 / 100	NA	NA	NA	1.5E+02	--	--	--	N
Acenaphthene		3.1E-03	4.0E+02	WLCSLH01GP73	106 / 113	9.9E+02	NA	NA	2.2E+03	N	--	--	N
Acenaphthylene	h	6.5E-03	6.7E+00	WLCSLH01GP68	70 / 113	NA	NA	NA	2.2E+03	--	--	--	N
Anthracene		2.7E-03	6.4E+01	WLCSLH01GP73	86 / 113	4.0E+04	NA	NA	1.1E+04	N	--	--	N
Benzo(a)anthracene	i	4.6E-03	3.2E+01	WLCSLH01GP73	51 / 113	1.8E-02	2.0E-01	--	2.9E-02	Y	Y	--	Y
Benzo(a)pyrene	i	2.5E-03	3.8E+01	WLCSLH01GP73	42 / 113	1.8E-02	2.0E-01	NA	2.9E-03	Y	Y	--	Y
Benzo(b)fluoranthene	i	4.2E-03	3.3E+01	WLCSLH01GP73	35 / 113	1.8E-02	2.0E-01	--	2.9E-02	Y	Y	--	Y
Benzo(g,h,i)perylene	J	6.9E-03	2.9E+01	WLCSLH01GP73	44 / 113	NA	NA	NA	1.1E+03	--	--	--	N
Benzo(k)fluoranthene	i	4.0E-03	9.0E+00	WLCSLH01GP73	29 / 113	1.8E-02	2.0E-01	--	2.9E-01	Y	Y	--	Y
Chrysene	i	3.3E-03	3.5E+01	WLCSLH01GP73	52 / 113	1.8E-02	2.0E-01	--	2.9E+00	Y	Y	--	Y
Dibenzo(a,h)anthracene	i	2.4E-03	3.7E+00	WLCSLH01GP73	30 / 113	1.8E-02	2.0E-01	--	2.9E-03	Y	Y	--	Y
Fluoranthene		1.3E-02	1.1E+02	WLCSLH01GP73	74 / 113	1.4E+02	NA	NA	1.5E+03	N	--	--	N
Fluorene		7.5E-03	1.1E+02	WLCSLH01GP73	87 / 113	5.3E+03	NA	NA	1.5E+03	N	--	--	N
Indeno(1,2,3-cd)pyrene	i	4.6E-03	1.7E+01	WLCSLH01GP73	43 / 113	1.8E-02	2.0E-01	--	2.9E-02	Y	Y	--	Y
Naphthalene		4.8E-02	1.4E+04	WLCSLH01GP73	80 / 188	NA	NA	NA	1.4E-01	--	--	--	Y
Phenanthrene	j	1.2E-02	3.6E+02	WLCSLH01GP73	77 / 113	NA	NA	NA	1.1E+03	--	--	--	N
Pyrene		1.7E-02	1.5E+02	WLCSLH01GP73	79 / 113	4.0E+03	NA	NA	1.1E+03	N	--	--	N
SVOCs													
1,2-Dichlorobenzene		1.4E-01	6.4E+02	RP-03-C-TR	15 / 140	1.3E+03	6.0E+02	6.0E+02	3.7E+02	N	Y	Y	Y
1,3-Dichlorobenzene	k	1.2E-01	2.3E+01	RP-03-C-TR	8 / 140	9.6E+02	NA	NA	3.7E+02	N	--	--	N
1,4-Dichlorobenzene		1.4E-01	2.4E+02	RP-03-C-TR	13 / 140	1.9E+02	7.5E+01	7.5E+01	4.3E-01	Y	Y	Y	Y
Dibenzofuran		1.3E-02	8.0E+00	GS-07-B-TR	54 / 100	NA	NA	NA	3.7E+01	--	--	--	N

Table D3.3-2. Screening Evaluation of Transition Zone Water Data Against Human Health-Based Criteria.

Chemical[a]	Notes	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Location of Maximum	Frequency of Detection	NRWQC[b] (µg/L)	MCL[c] (µg/L)	MCLG[d] (µg/L)	Tapwater RSL[e] (µg/L)	Max > NRWQC ?	Max > MCL?	Max > MCLG?	Max > RSL?
Dioxins Furans													
Total Dioxin/Furan TEQ	l	1.5E-06	1.8E-06	RP07BTR	2 / 6	5.1E-09	3.0E-05	NA	5.2E-07	Y	N	--	Y
Pesticides													
Total DDD	m	3.2E-02	2.4E+00	AP-02-D-TR	13 / 26	3.1E-04	NA	NA	2.8E-01	Y	--	--	Y
Total DDE	n	3.9E-03	2.4E-01	LWP1-AP03B-1	8 / 26	2.2E-04	NA	NA	2.0E-01	Y	--	--	Y
Total DDT	o	7.5E-03	1.9E+00	AP-03-A-TR	10 / 26	2.2E-04	NA	NA	2.0E-01	Y	--	--	Y
Herbicides													
2,4-D		1.2E-01	9.7E-01	RP-03-E-TR	9 / 15	NA	7.0E+01	7.0E+01	3.7E+02	--	N	N	N
Dalapon		2.2E+00	2.4E+00	RP-07-E-PR	2 / 2	NA	2.0E+02	2.0E+02	1.1E+03	--	N	N	N
Dichloroprop	p	7.0E-01	7.0E-01	R2-RP-01-TR	1 / 15	NA	NA	NA	3.7E+02	--	--	--	N
Silvex		2.2E+01	2.2E+01	RP-03-E-TR	1 / 15	NA	5.0E+01	5.0E+01	2.9E+02	--	N	N	N
VOCs													
1,1,1-Trichloroethane		1.2E-01	3.3E-01	CP-07-A-TR	5 / 148	NA	2.0E+02	2.0E+02	9.1E+03	--	N	N	N
1,1,2-Trichloroethane		1.3E+00	3.6E+02	LWP1-AP03B-1	4 / 148	1.6E+01	5.0E+00	3.0E+00	2.4E-01	Y	Y	Y	Y
1,1-Dichloroethane		1.1E-01	3.2E+02	LWP1-AP03B-1	26 / 148	NA	NA	NA	2.4E+00	--	--	--	Y
1,1-Dichloroethene		1.8E-01	4.1E+01	WLCSLH01GP65	13 / 148	7.1E+03	7.0E+00	7.0E+00	3.4E+02	N	Y	Y	N
1,2-Dichloroethane		1.3E-01	7.7E+02	LWP1-AP03B-1	11 / 148	3.7E+01	5.0E+00	--	1.5E-01	Y	Y	--	Y
1,2-Dichloropropane		1.4E-01	6.1E+01	LWP1-AP03B-1	7 / 148	1.5E+01	5.0E+00	--	3.9E-01	Y	Y	--	Y
1,2,4-Trimethylbenzene		1.1E+00	7.0E+01	WLCSLH01GP68	17 / 41	NA	NA	NA	1.5E+01	--	--	--	Y
1,3,5-Trimethylbenzene		3.3E-01	2.2E+01	WLCSLH01GP68	16 / 41	NA	NA	NA	3.7E+02	--	--	--	N
1-Methyl-4-isopropylbenzene	q	4.8E-01	4.0E+00	WLCSLH01GP68	9 / 41	NA	NA	NA	6.8E+02	--	--	--	N
Acetone		5.2E+00	5.4E+01	LWP1-AP03B-1	6 / 54	NA	NA	NA	2.2E+04	--	--	--	N
Acrolein		1.8E+00	1.8E+00	EM-01-A-TR	1 / 5	9.0E+00	NA	NA	4.2E-02	N	--	--	Y
Benzene		1.7E-01	3.8E+03	WLCSLH01GP68	66 / 151	5.1E+01	5.0E+00	NA	4.1E-01	Y	Y	--	Y
Bromochloromethane	r	2.2E-01	1.8E+03	LWP1-AP03B-1	3 / 148	NA	NA	NA	1.2E-01	--	--	--	Y
Bromodichloromethane	s	3.1E-01	2.9E+02	LWP1-AP03B-1	3 / 148	1.7E+01	8.0E+01	NA	1.2E-01	Y	Y	--	Y
Carbon disulfide		1.5E-01	8.0E+02	GS-01-B-PR	11 / 148	NA	NA	NA	1.0E+03	--	--	--	N
Chlorobenzene		1.5E-01	1.2E+04	AP-03-D-TR, LWP1-AP04D	43 / 148	1.6E+03	1.0E+02	1.0E+02	9.1E+01	Y	Y	Y	Y
Chloroethane		2.3E-01	1.6E+02	GN-05-A-TR	11 / 148	NA	NA	NA	2.1E+04	--	--	--	N
Chloroform	s	1.4E-01	7.7E+05	LWP1-AP03B-1	15 / 148	4.7E+02	8.0E+01	NA	1.9E-01	Y	Y	--	Y
Chloromethane		1.1E+01	3.2E+01	LWP1-AP03B-1	3 / 148	NA	NA	NA	1.9E+02	--	--	--	N
cis-1,2-Dichloroethene		1.2E-01	6.7E+04	WLCSLH01GP67	44 / 136	NA	7.0E+01	7.0E+01	7.3E+01	--	Y	Y	Y
Ethylbenzene		9.0E-02	4.2E+02	WLCSLH01GP68	46 / 151	2.1E+03	7.0E+02	7.0E+02	1.5E+00	N	N	N	Y
Isopropylbenzene		1.1E-01	1.5E+01	WLCSLH01GP68	33 / 148	NA	NA	NA	6.8E+02	--	--	--	N
Methyl isobutyl ketone		8.8E-01	5.5E+00	CP-07-D-PR	3 / 85	NA	NA	NA	2.0E+03	--	--	--	N
Methyl tert-butyl ether		2.0E-01	1.5E+01	LWP1-ARC06B-1	30 / 148	NA	NA	NA	1.2E+01	--	--	--	Y
Methylene bromide		1.4E-01	2.1E-01	CP-07-A-TR	3 / 148	NA	NA	NA	8.2E+00	--	--	--	N
Methylene chloride		2.3E-01	5.2E+05	LWP1-AP03B-1	12 / 148	5.9E+02	5.0E+00	NA	4.8E+00	Y	Y	--	Y
Methylethyl ketone		2.3E+00	1.2E+01	GS-01-B-PR	10 / 54	NA	NA	NA	7.1E+03	--	--	--	N
n-Butylbenzene	q	3.4E-01	4.8E-01	WLCSLH01GP69	3 / 41	NA	NA	NA	6.8E+02	--	--	--	N
n-Propylbenzene	q	3.0E-01	4.0E+00	WLCSLH01GP71	13 / 41	NA	NA	NA	6.8E+02	--	--	--	N
Sec-butylbenzene	q	1.8E+00	7.1E+00	WLCSLH01GP68	5 / 41	NA	NA	NA	6.8E+02	--	--	--	N
Styrene		2.2E-01	1.7E+00	WLCSLH01GP68	27 / 148	NA	1.0E+02	1.0E+02	1.6E+03	--	N	N	N
tert-Butylbenzene	q	3.0E-01	4.0E-01	WLCSLH01GP82	2 / 41	NA	NA	NA	6.8E+02	--	--	--	N
Tetrachloroethene		3.6E-01	1.4E+03	LWP1-AP03B-1	7 / 148	3.3E+00	5.0E+00	NA	1.1E-01	Y	Y	--	Y
Toluene		2.3E-01	1.8E+02	WLCSLH01GP54	75 / 151	1.5E+04	1.0E+03	1.0E+03	2.3E+03	N	N	N	N

Table D3.3-2. Screening Evaluation of Transition Zone Water Data Against Human Health-Based Criteria.

Chemical[a]	Notes	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Location of Maximum	Frequency of Detection	NRWQC[b] (µg/L)	MCL[c] (µg/L)	MCLG[d] (µg/L)	Tapwater RSL[e] (µg/L)	Max > NRWQC ?	Max > MCL?	Max > MCLG?	Max > RSL?
trans-1,2-Dichloroethene		2.3E-01	1.2E+02	WLCSLH01GP67	16 / 148	1.0E+04	1.0E+02	1.0E+02	1.1E+02	N	Y	Y	Y
Trichloroethene		1.4E-01	8.9E+04	WLCSLH01GP67	24 / 148	3.0E+01	5.0E+00	NA	2.0E+00	Y	Y	--	Y
Vinyl chloride		7.0E-02	4.3E+03	WLCSLH01GP67	57 / 148	2.4E+00	2.0E+00	NA	1.6E-02	Y	Y	--	Y
Total Xylenes	t	2.2E-01	4.4E+02	WLCSLH01GP68	66 / 151	NA	1.0E+04	1.0E+04	2.0E+02	--	N	N	Y
Petroleum													
Diesel Range Hydrocarbons		2.6E+01	6.1E+03	GS-07-B-TR	60 / 91	NA	NA	NA	NA	--	--	--	--
Gasoline Range Hydrocarbons		1.3E+01	4.0E+03	GS-07-B-TR	29 / 60	NA	NA	NA	NA	--	--	--	--
Residual Range Hydrocarbons		6.1E+01	1.2E+03	GS-07-B-TR	38 / 91	NA	NA	NA	NA	--	--	--	--
Conventionals													
Cyanide		6.0E+00	2.3E+04	GS-02-A-TR	32 / 34	1.4E+02	2.0E+02	2.0E+02	7.3E+02	Y	Y	Y	Y
Perchlorate	v	1.1E+02	1.8E+05	CP-07-B-TR	16 / 34	NA	1.5E+01	NA	2.6E+01	--	Y	--	Y

Notes:

Contaminants in bold italics exceed one or more human health screening criteria.

a Chemicals listed are analytes detected in TZW samples taken from less than or equal to 38cm depth within the Study Area for the sampling events identified in the text. Data set includes both filtered and unfiltered results.
b NRWQC listed for human health consumption of organism. National Recommended Water Quality Criteria, EPA 2009b.
c MCL from EPA National Primary Drinking Water Regulations, EPA 816-F-09-0004, May 2009. Accessed online April 2011.
d MCLG from EPA National Primary Drinking Water Regulations, EPA 816-F-09-0004, May 2009. Accessed online April 2011. Only non-zero MCLGs are listed.
e EPA Regional Screening Levels for tapwater, November 2010. Accessed online April 2011.
f EPA RSL listed is for trivalent chromium; MCL listed is for total chromium.
g Screening value does not exist and surrogate was not identified.
h EPA RSL for acenapthene used as surrogate.
i Benzo(a)pyrene MCL and RSL used for screening of all carcinogenic PAHs.
j EPA RSL for pyrene used as surrogate.
k EPA RSL for 1,2-dichlorobenzene used as surrogate.
l EPA RSL for 2,3,7,8-TCDD used for dioxin TEQ.
m EPA RSL for DDD used for total DDD.
n EPA RSL for p,p'-DDE used for total DDE.
o EPA RSL for DDT used for total DDT.
p EPA RSL for 2,4-dichlorophenoxyacetic acid used as surrogate.
q EPA RSL for Isopropylbenzeneused as surrogate.
r EPA RSL for bromodichloromethaneused as surrogate.
s MCL is for total trihalomethanes.
t Xylene mixture used for total xylenes.
u The Interim Drinking Water Health Advisory was used as the MCL for perchlorate.

-- = not applicable
CAS = Chemical Abstract Services number
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
EPA = U.S. Environmental Protection Agency
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
N = no
NA = not available (value not listed for the given chemical)
NRWQC = National Recommended Water Quality Criteria
PAH = polycyclic aromatic hydrocarbon
RSL = Regional Screening Level
SVOC = semivolatile organic compound
TCDD = tetrachlorodibenzo-p-dioxin
TEQ = toxicity equivalent
TZW = transition zone water
VOCs = volatile organic compounds
Y = yes

Table D3.3-3. Screening Evaluation of Estimated Surface Water Concentrations Against Human Health-Based Criteria.

Chemical[a]	Notes	Load, Central Flow Estimate[b]		Concentration Estimate, Average Annual Mean Willamette River Flow[c] (µg/L)	Screening Values			Exceeds RSL, MCL, or MCLG?
		Peepers and Unfiltered Push Probe (kg/yr)	Peepers and Filtered Push Probe (kg/yr)		MCL[d] (µg/L)	MCLG[e] (µg/L)	RSL[f] (µg/L)	
Metals								
Aluminum		3.9E+04	5.9E+01	6.3E+00	NA	NA	3.7E+04	N
Antimony		4.8E-01	1.6E-01	7.7E-05	6.0E+00	6.0E+00	1.5E+01	N
Arsenic		3.0E+01	2.7E+01	4.9E-03	1.0E+01	--	4.5E-02	N
Barium		4.9E+02	2.4E+02	8.0E-02	2.0E+03	2.0E+03	7.3E+03	N
Cadmium		6.2E-01	2.3E-01	1.0E-04	5.0E+00	5.0E+00	1.8E+01	N
Chromium	g	5.5E+01	3.2E+00	8.9E-03	1.0E+02	1.0E+02	5.5E+04	N
Cobalt		4.5E+00	NA	7.3E-04	NA	NA	1.1E+01	N
Iron		1.2E+05	6.9E+04	1.9E+01	NA	NA	2.6E+04	N
Lead		3.1E+01	2.6E-01	5.1E-03	1.5E+01	--	NA	N
Manganese		8.5E+03	8.0E+03	1.4E+00	NA	NA	8.8E+02	N
Thallium		1.5E-01	2.0E-02	2.5E-05	2.0E+00	5.0E-01	NA	N
Vanadium		1.8E+01	NA	2.9E-03	NA	NA	2.6E+00	N
PAHs								
Benzo(a)anthracene	h	3.1E+00	2.3E-02	5.0E-04	2.0E-01	--	2.9E-02	N
Benzo(a)pyrene	h	3.6E+00	9.4E-03	5.8E-04	2.0E-01	NA	2.9E-03	N
Benzo(b)fluoranthene	h	2.9E+00	8.3E-03	4.7E-04	2.0E-01	--	2.9E-02	N
Benzo(k)fluoranthene	h	1.0E+00	8.6E-03	1.6E-04	2.0E-01	--	2.9E-01	N
Chrysene	h	4.2E+00	3.2E-02	6.8E-04	2.0E-01	--	2.9E+00	N
Dibenzo(a,h)anthracene	h	3.4E-01	2.8E-04	5.6E-05	2.0E-01	--	2.9E-03	N
Indeno(1,2,3-cd)pyrene	h	2.7E+00	2.3E-03	4.4E-04	2.0E-01	--	2.9E-02	N
Naphthalene		7.7E+02	1.2E+02	1.3E-01	NA	NA	1.4E-01	N
SVOCs								
1,2-Dichlorobenzene		3.6E+01	NA	5.8E-03	6.0E+02	6.0E+02	3.7E+02	N
1,4-Dichlorobenzene		1.3E+01	NA	2.1E-03	7.5E+01	7.5E+01	4.3E-01	N
Dioxins_Furans								
Total Dioxin/Furan TEQ	i	7.9E-08	NA	1.3E-11	3.0E-05	NA	5.2E-07	N
Pesticides								
Total DDD	j	5.2E-02	2.0E-02	8.4E-06	NA	NA	2.8E-01	N
Total DDE	k	3.6E-03	6.9E-06	5.9E-07	NA	NA	2.0E-01	N
Total DDT	l	2.9E-02	1.0E-03	4.7E-06	NA	NA	2.0E-01	N
VOCs								
1,1,2-Trichloroethane		5.9E-01	NA	9.6E-05	5.0E+00	3.0E+00	2.4E-01	N
1,1-Dichloroethane		8.3E-01	NA	1.3E-04	NA	NA	2.4E+00	N
1,1-Dichloroethene		6.2E-01	NA	1.0E-04	7.0E+00	7.0E+00	3.4E+02	N
1,2-Dichloroethane		1.2E+00	NA	2.0E-04	5.0E+00	--	1.5E-01	N
1,2-Dichloropropane		4.1E-01	NA	6.7E-05	5.0E+00	--	3.9E-01	N

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Table D3.3-3. Screening Evaluation of Estimated Surface Water Concentrations Against Human Health-Based Criteria.

Chemical[a]	Notes	Load, Central Flow Estimate[b]		Concentration Estimate, Average Annual Mean Willamette River Flow[c] (µg/L)	Screening Values			Exceeds RSL, MCL, or MCLG?
		Peepers and Unfiltered Push Probe (kg/yr)	Peepers and Filtered Push Probe (kg/yr)		MCL[d] (µg/L)	MCLG[e] (µg/L)	RSL[f] (µg/L)	
1,2,4-Trimethylbenzene		4.5E+00	NA	7.3E-04	NA	NA	1.5E+01	N
Acrolein		1.2E-02	NA	1.9E-06	NA	NA	4.2E-02	N
Benzene		5.2E+01	NA	8.4E-03	5.0E+00	NA	4.1E-01	N
Bromochloromethane	m	1.2E+01	NA	2.0E-03	NA	NA	1.2E-01	N
Bromodichloromethane		9.8E-02	NA	1.6E-05	8.0E+01	NA	1.2E-01	N
Chlorobenzene		6.7E+01	NA	1.1E-02	1.0E+02	1.0E+02	9.1E+01	N
Chloroform		3.3E+00	NA	5.3E-04	8.0E+01	NA	1.9E-01	N
cis-1,2-Dichloroethene		3.5E+02	NA	5.6E-02	7.0E+01	7.0E+01	7.3E+01	N
Ethylbenzene		9.0E+00	NA	1.5E-03	7.0E+02	7.0E+02	1.5E+00	N
Methyl tert-butyl ether		NA	NA	NA	NA	NA	1.2E+01	--
Methylene chloride		8.2E+02	NA	1.3E-01	5.0E+00	NA	4.8E+00	N
Tetrachloroethene		2.3E+00	NA	3.8E-04	5.0E+00	NA	1.1E-01	N
trans-1,2-Dichloroethene		8.2E-01	NA	1.3E-04	1.0E+02	1.0E+02	1.1E+02	N
Trichloroethene		4.4E+00	NA	7.2E-04	5.0E+00	NA	2.0E+00	N
Vinyl chloride		5.0E+01	NA	8.1E-03	2.0E+00	NA	1.6E-02	N
Total Xylenes	n	9.6E+00	NA	1.6E-03	1.0E+04	1.0E+04	2.0E+02	N
Conventionals								
Cyanide		8.1E-02	3.1E-02	1.3E-05	2.0E+02	2.0E+02	7.3E+02	N
Perchlorate		1.4E+03	1.4E+03	2.3E-01	1.5E+01	NA	2.6E+01	N

Notes:

a Chemicals listed are analytes detected in TZW data set which exceeded at least one screening value.
b Estimated upland groundwater plume loading to the water column is based on central flow rate, according to the methods described in the RI Report. Push probe refers to samples collected by either Trident or GeoProbe samplers. Where filtered trident or push probe data was not available, the unfiltered concentration was used.
c The concentration estimate is based on the average annual mean flow in the Willamette River from 1973 through 2007, which is 33,033 cubic feet per second. Annual mean flow is used to represent average exposures over an exposure duration of 30 years.
d MCL from EPA National Primary Drinking Water Regulations, EPA 816-F-09-0004, May 2009. Accessed online April 2011.
e MCLG from EPA National Primary Drinking Water Regulations, EPA 816-F-09-0004, May 2009. Accessed online April 2011. Only non-zero MCLGs are listed.
f EPA Regional Screening Levels for tapwater, November 2010. Accessed online April 2011.
g EPA RSL listed is for trivalent chromium; MCL listed is for total chromium.
h Benzo(a)pyrene MCL and RSL used for screening of all carcinogenic PAHs.
i EPA RSL for 2,3,7,8-TCDD used for dioxin TEQ.
j EPA RSL for DDD used for total DDD.
k EPA RSL for p,p'-DDE used for total DDE.
l EPA RSL for DDT used for total DDT.
m EPA RSL for bromodichloromethane used as surrogate.
n EPA RSL for xylene mixture used as surrogate.

Table D3.3-3. Screening Evaluation of Estimated Surface Water Concentrations Against Human Health-Based Criteria.

Chemical[a]	Notes	Load, Central Flow Estimate[b]		Concentration Estimate, Average Annual Mean Willamette River Flow[c] (µg/L)	Screening Values			Exceeds RSL, MCL, or MCLG?
		Peepers and Unfiltered Push Probe (kg/yr)	Peepers and Filtered Push Probe (kg/yr)		MCL[d] (µg/L)	MCLG[e] (µg/L)	RSL[f] (µg/L)	

-- = not applicable (MCLG is zero or loading estimates not available)
CAS = Chemical Abstract Service
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
EPA = U.S. Environmental Protection Agency
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
N = no
NA = not available
PAH = polycyclic aromatic hydrocarbon
RSL = Regional Screening Level
SVOC = semivolatile organic compound
TEQ = toxicity equivalent
TZW = transition zone water
VOC = volatile organic compound
Y = yes

LWG
LOWER WILLAMETTE GROUP

PORTLAND HARBOR RI/FS

REMEDIAL INVESTIGATION REPORT

APPENDIX D3.3
SCREENING OF SURFACE AND TRANSITION ZONE WATER DATA AGAINST HUMAN HEALTH SCREENING CRITERIA

DRAFT FINAL

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August 29, 2011

APPENDIX D3.3 SCREENING OF SURFACE AND TRANSITION ZONE WATER DATA AGAINST HUMAN HEALTH SCREENING CRITERIA

D3.3.1 Introduction

Surface water and shallow (less than or equal to 38 cm in depth) transition zone water (TZW) data were screened against human-health-based criteria to identify those chemicals detected at concentrations above the screening criteria. The criteria that were used in the screening evaluations of surface water and TZW were specified by EPA and documented in the general responses to EPA's directive comments on the Baseline Human Health Risk Assessment (BHHRA), dated September 15, 2010.

D3.3.2 Screening of Surface Water Data

This section presents the results of screening the complete surface water data set against human-health-based screening levels. The criteria used in the screening evaluation of surface water are the National Recommended Water Quality Criteria (NRWQC) for the consumption of organisms (EPA 2009), the NRWQC divided by 10 (to represent an ingestion rate of 175 g/day), the Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) (EPA 2009), the SDWA non-zero Maximum Contaminant Level Goals (MCLGs) (EPA 2009), and EPA Regional Screening Levels (RSLs) for tap water (EPA 2010).

The screening was performed by comparing the maximum concentration detected in surface water for each chemical to the respective human health screening levels. Surface water data were managed according to the rules used in the BHHRA, as described in Attachment F2. If the human health screening level was exceeded by the maximum detected concentration, the 95th percentile upper confidence limit (95 UCL) for surface water for each chemical was compared to the respective human health screening level. The surface water data set used for the screening consisted of the surface water data collected within the Study Area from the following sampling events:

- Round 2a surface water event 1
- Round 2a surface water event 2
- Round 2a surface water event 3
- Round 3 surface water January 2006
- Round 3 surface water September 2006
- Round 3 surface water November 2006
- Round 3 surface water 2007 high-flow event
- Siltronic supplemental in-river TZW

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There were 91 analytes detected in the surface water data set. The results of the surface water screening against human-health-based criteria are presented in Table D3.3-1 and Map D3.3-1 and are summarized here:

- There were 24 chemicals for which the maximum detected concentration exceeded the NRWQC, and 11 chemicals for which the 95 UCL exceeded the NRWQC.
- When compared to the NRWQC divided by 10 to represent an ingestion rate of 175 g/day, the maximum detected concentration in surface water exceeded the screening level for 25 chemicals, and the 95 UCL exceeded the screening level for 22 chemicals.
- There were 8 chemicals for which the maximum detected concentration exceeded the MCL, and 1 chemical for which the 95 UCL exceeded the MCL.
- There was 1 chemical for which the maximum detected concentration exceeded the non-zero MCLG; the 95 UCL did not exceed the MCLG. There were 15 chemicals for which the maximum detected concentration exceeded the RSL, and 7 chemicals for which the 95 UCL exceeded the RSL.

D3.3.3 Screening of Transition Zone Water Data

This section presents the results of the screening of shallow TZW data directly against human health screening values and for potential contributions to surface water. To evaluate the potential for contributions to surface water, TZW data were initially screened directly against human health screening values. For those chemicals with TZW concentrations exceeding screening values, surface water concentrations were estimated through calculating theoretical loading from TZW to surface water, and those surface water concentrations were compared against human-health-based screening values.

Shallow TZW data (less than or equal to 38 cm in depth) collected within the Study Area were used for the screening, including both filtered and unfiltered sample results. Data collected from the following sampling events were included in the screening: the Siltronic supplemental in-river TZW sampling event; the Round 2a groundwater pathway assessment TZW sampling event; and the groundwater pathway assessment pilot study (only samples collected by small-volume peeper or trident).

Deep TZW (greater than 38 cm in depth) does not pose a potentially complete pathway for human exposure, and thus was not evaluated in this screening. A discussion of the relationship between deep TZW and surrounding media is provided in Appendix C2 of the RI Report.

For direct screening of TZW, the BHHRA data rules for handling of replicates and summing of analytes (described in Attachment F2) were applied to the data set. The TZW samples were collected offshore of nine upland sites with known or likely pathways for discharge of upland groundwater to the Study Area. For this reason, the

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TZW data set likely represents a conservative screening for potential contributions from TZW to surface water. The RI Appendix C2 presents the process used to select these sites per agreement with EPA, DEQ, and LWG. The TZW sampling locations selected for each site focus on the zones of possible groundwater plume discharge, as determined from the groundwater pathway assessment (GWPA) discharge mapping effort. Additional sampling locations were specified to provide comparative data for TZW quality outside of the potential discharge zones (Appendix C2). The data set is limited and not all chemicals of interest in sediments were analyzed. In addition, there may be other groundwater plumes in the Study Area that may be discharging into river sediments where samples have not been collected.

The maximum detected concentration in TZW was screened against the NRWQC for the consumption of organisms (EPA 2009), the SDWA MCLs (EPA 2009), the SDWA non-zero MCLGs (EPA 2009), and EPA RSLs for tap water (EPA 2010). There were 93 analytes detected in the TZW data set. The results of the TZW screening against human-health-based criteria are presented in Table D3.3-2 and Map D3.3-2a-h and are summarized here:

- There were 27 chemicals for which the maximum detected concentration in shallow TZW exceeded the NRWQC
- There were 31 chemicals for which the maximum detected concentration in shallow TZW exceeded the MCL
- There were 13 chemicals for which the maximum detected concentration in shallow TZW exceeded the respective non-zero MCLG
- There were 44 chemicals for which the maximum detected concentration exceeded the RSL.

In total, 49 chemicals exceeded at least one screening value and were retained for estimating TZW loading to surface water. Loading estimates and models were used to estimate surface water concentrations resulting from TZW based on the central tendency flow estimates of groundwater to the Willamette River. Loading estimates were calculated based on assumptions, data rules, and the TZW data set used for the RI. To provide a reasonable estimate of surface water concentrations based on loading from groundwater discharge, central flow loading estimates were used with the average annual mean flow rate (measured from 1973 through 2007) to calculate surface water concentrations. The average annual mean flow was used to calculate loading in order to represent the exposure that would hypothetically occur with daily exposure over a 30-year exposure duration. Further detail regarding the derivation of the surface water estimates is provided in Section 6 and Appendix E of the RI Report. These estimates are considered mean approximations of upland groundwater plume loading to surface water for several reasons that are discussed in detail in Appendix E.

The estimated concentrations in surface water based on calculated loading from TZW were screened against the SDWA MCLs (EPA 2009), the SDWA non-zero MCLGs

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(EPA 2009), and EPA RSLs for tap water (EPA 2010). Table D3.3-3 provides the comparison of the estimated surface water concentrations against the human-health-based screening values. Of the 49 chemicals retained for the screening, none of the concentration estimates based on loading calculations exceeded the respective screening values used for this screening.

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REFERENCES

EPA. 2009. National Recommended Water Quality Criteria. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, DC.

EPA. 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Dated November 2010. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. U.S. Environmental Protection Agency Region 3, Washington, DC.

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Peterson, Lance
Sent: Mon 5/20/2013 10:39:04 PM
Subject: FW: NW Natural Response to EPA Letter on US Moorings Sediments Area, Gasco Sediments Site
NW Nat Letter USM Response to EPA_051513.pdf

Here is the 5/15 NWN letter.

Lance

From: Ryan Barth [mailto:rbarth@anchorqea.com]
Sent: Wednesday, May 15, 2013 4:47 PM
To: Sean Sheldrake
Cc: Peterson, Lance; Carl Stivers; Bob Wyatt; Patty Dost; Ben Hung; James Peale; WEARLE@davisrothwell.com; 'agladstone@davisrothwell.com'; myron.burr@siltronic.com
Subject: NW Natural Response to EPA Letter on US Moorings Sediments Area, Gasco Sediments Site

On behalf of NW Natural, attached please find a technical analysis of the US Moorings sediments area issue per your request in item 1 below. Thanks.

Ryan Barth, P.E.

Anchor QEA, LLC

rbarth@anchorqea.com

720 Olive Way, Suite 1900

Seattle, Washington 98101

Office: 206.287.9130

Direct: 206.903.3334

Fax: 206.287.9131

Cell: 206.719.3605

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Friday, May 10, 2013 4:33 PM
To: Bob Wyatt
Cc: Ryan Barth; Carl Stivers; Peterson, Lance; Dana Bayuk
Subject: RE: Gasco Sediments Site

Bob,

This email serves as a schedule extension to the 30 day workplan requirement, as noted below. However, I do need to point out that the dispute timeframe has past for the EPA requirement of modification of the draft ee/ca removal action area for further ee/ca consideration (next revision) or alternatively, obtaining additional samples (see attached). EPA is amenable to looking at alternate schedule proposals from NWN as well as new information of course as you've suggested below. Accordingly, I've noted that dispute of a workplan timeframe can be held until after the meeting to ensure adequate time is given for development of a plan, but not the substance of what is set out in the November 29, 2012 letter for which the dispute timeframe has already passed.

Revised schedule:

1. NW Natural submits a technical analysis of the issue by next Friday (May 17th, 2013).

2. Within 30 days of that date NW Natural will meet with EPA to discuss the evaluation and to determine if EPA still believes additional samples may be necessary. EPA will extend the deadline for initiating dispute resolution concerning the work plan ***deadline*** until 7 days after the meeting.

3. A workplan to fulfill requirements of the November 29, 2012 letter is due 90 days from today's date, unless otherwise approved by EPA.

Please let me know if you have any questions.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Wyatt, Robert [mailto:rjw@nwnatural.com]
Sent: Friday, May 10, 2013 4:05 PM
To: Sheldrake, Sean
Cc: Ryan Barth; Carl Stivers
Subject: Gasco Sediments Site

Hi Sean,

It was great talking with you this afternoon. As we discussed, NW Natural would like to revise the schedule for responding to your May 1st, 2013 request for a work plan. My proposal for revising the schedule is as follows:

1. NW Natural submits a technical analysis of the issue by next Friday (May 17th, 2013).

2. Within 45 days of that date NW Natural will meet with EPA to discuss the evaluation and to determine if EPA still believes additional samples may be necessary. EPA will extend the deadline for initiating dispute

resolution concerning the work plan request until 7 days after the meeting.

3. If sampling is not required we would not develop a sampling plan.

4. If EPA still believes that sampling is necessary we would evaluate data needs, data use and data quality objectives to be used in the development of a work plan. The schedule for work plan development would be produced at that time.

I agree with your goal of having a clear project timeline, and I appreciate your willingness to consider this revised schedule approach.

I hope you have a great weekend,

Bob

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 5/24/2016 8:19:23 PM
Subject: FW: PTW White Paper 10-01-15.docx
PTW White Paper 10-01-15.docx

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Fonseca, Silvina
Sent: Thursday, October 01, 2015 10:56 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>
Subject: PTW White Paper 10-01-15.docx

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Scott Coffey[coffeyse@cdmsmith.com]
Cc: Cora, Lori[Cora.Lori@epa.gov]; Peterson, Lance[PetersonLE@cdmsmith.com]
From: Blischke, Eric
Sent: Fri 5/20/2016 1:53:42 PM
Subject: RE: Ptw white paper transmitted to LWG
PTW_Presentation. 4-15-14.pptx
PTW_Tech Memo_04-10-14_Draft_REV1.pdf
PTW_Evaluation_Framework_06-06-14_REV 2.pdf

I am attaching two versions of the memo. I believe the April 2014 version went to the LWG. The memo was revised in June 2014 but I am not sure that version went to the LWG. I am also attaching a presentation from April 2014 where we walked through the memo.

Let me know if you have any questions.

Thanks, Eric

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Thursday, May 19, 2016 1:58 PM
To: Coffey, Scott <CoffeySE@cdmsmith.com>
Cc: Cora, Lori <Cora.Lori@epa.gov>; Blischke, Eric <blischkee@cdmsmith.com>; Peterson, Lance <PetersonLE@cdmsmith.com>
Subject: RE: Ptw white paper transmitted to LWG

Scott, It was for Harborwide ptw framework development, discussed in an LWG meeting. Eric was primary cdm author. S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Thursday, May 19, 2016 12:42 PM
To: Sheldrake, Sean <sheldrake.sean@epa.gov>
Cc: Cora, Lori <Cora.Lori@epa.gov>; Blischke, Eric <blischkee@cdmsmith.com>; Peterson, Lance <PetersonLE@cdmsmith.com>
Subject: RE: Ptw white paper transmitted to LWG

Hi Sean.

Eric is wondering if the White paper was prepared for/related to Arkema, or Gasco?

I'm Ccing Lance in case he knows of the white paper.

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Thursday, May 19, 2016 11:58 AM
To: Coffey, Scott <CoffeySE@cdmsmith.com>
Cc: Cora, Lori <Cora.Lori@epa.gov>
Subject: Ptw white paper transmitted to LWG

Hi Scott, could you ask Eric to pull the version we sent to lwg for discussion? Lori would like to

review it.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

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Identification of Principle Threat Waste at the Portland Harbor Site

April 15, 2014

Overview

- Regulatory Basis for Identification of PTW
- PTW Identification Criteria
  - Direct observation of NAPL
  - Indirect evidence of NAPL
  - High Concentration Threshold
- Identification of PTW at the Portland Harbor Site
- Evaluation of PTW in the Portland Harbor FS

Regulatory Basis

- NCP establishes expectation that treatment should be used to address the principal threats whenever practicable
- Regulatory Definition (EPA 1991):
  - “Those source materials considered to be highly toxic or highly mobile that cannot generally be reliably contained or would provide a significant risk to human health or the environment should exposure occur.”

Definitions

- Source Material
  - Contaminated sediments represent source material
  - This is particularly true for sediments contaminated with bioaccumulative chemicals are a source of contamination to fish tissue
- NAPL
  - The PTW guidance specifically identifies NAPL as PTW
- High Concentration
  - The PTW guidance states “where toxicity and mobility of source material combine to pose a human health risk of 10^{-3} or greater, generally treatment alternatives should be evaluated.”

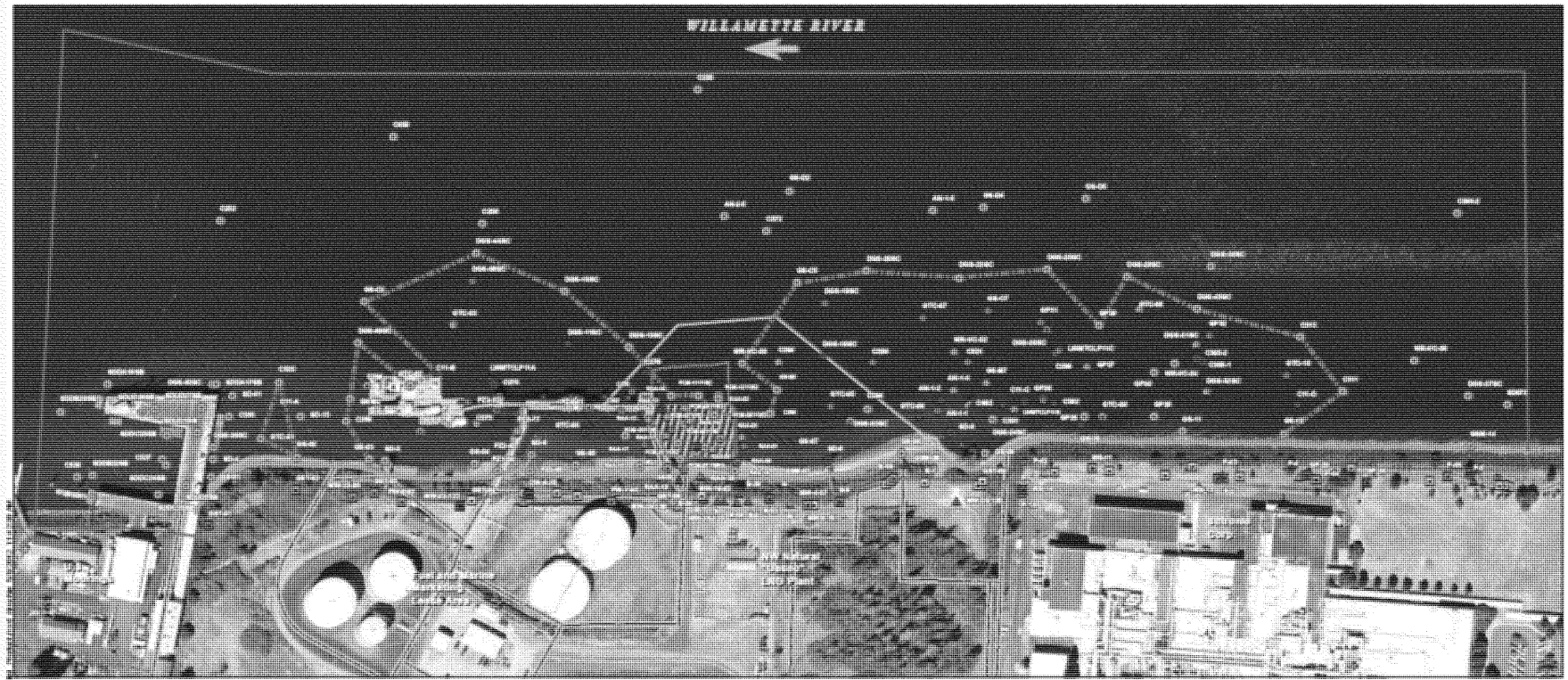
Approach for Portland Harbor

High Concentration Threshold

Chemical	PRG Basis	Risk Based Sediment PRG	High Concentration PTW Threshold
Total PCBs	Risk-Based (below background value)	0.2 µg/kg	200 µg/kg
Dioxin/Furan TEQ	Fish Consumption (mixed diet fillet only)	0.03 ng/kg	30 ng/kg
Total DDx	Fish Consumption (mixed diet fillet only)	7 µg/kg	7,000 µg/kg
BaPEq	Direct Contact (high frequency fisher)	106 µg/kg	106,000 µg/kg

C(sat) Estimate Threshold

Chemical	C(sat)	Notes
Benzo(a)pyrene	41 mg/kg	Widespread exceedances offshore of Gasco and Siltronic. Three exceedances in navigation channel downstream of the St. Johns Bridge. Numerous exceedances at Terminal 4, Slip 1 due to the presence of pencil pitch.
Naphthalene	1,200 mg/kg	Widespread exceedances offshore of Gasco and Siltronic.
Chlorobenzene	3,500 mg/kg	One exceedance offshore of Arkema between docks.
Total DDT (sum of 2,4 and 4,4'-DDT)	1,800 mg/kg	Numerous detections offshore of Arkema between docks.



- Sediment Coring Location
- Core with Liquid Substantial Product
- Shoreline Soil Boring Location
- Boring with Potential Mobile Product
- Inconclusive Substantial Product
- No Substantial Product
- Substantial Product from 0-4 feet Below Mudline
- Substantial Product from 4-8 feet Below Mudline
- Substantial Product from 8-12 feet Below Mudline
- Substantial Product from 12-16 feet Below Mudline
- Substantial Product from 16-20 feet Below Mudline
- Substantial Product from 20-24 feet Below Mudline
- Substantial Product from 24-28 feet Below Mudline
- Substantial Product from 28-32 feet Below Mudline
- Substantial Product from 32-36 feet Below Mudline
- Substantial Product >36 feet Below Mudline
- Gasco Sediment Site Area of Interest (Final Work Plan [Anchor QEA 2009])
- Substantial Product Area
- Tar Body Removal Action 6-inch Fringe Cover Placement
- Tar Body Removal Action Area (RAPP [Anchor 2005])
- Tar Body Removal Action Pilot Cap
- Boundary of EPA Managed Sediments and DEQ Managed Uplands – 13 feet NAVD88

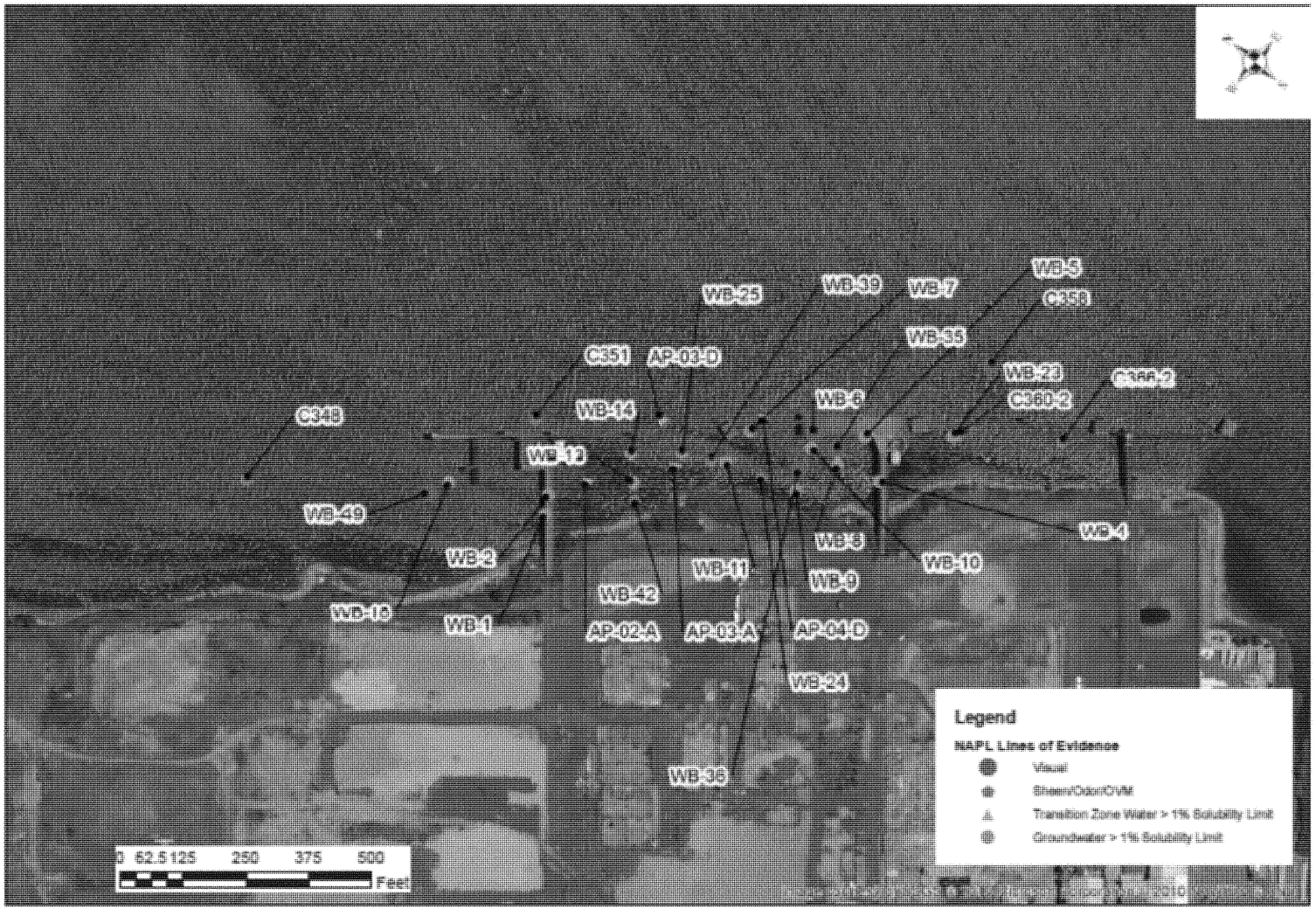
NOTES:
1. Arrow indicates direction of flow of river.
2. Horizontal datum is NAD83 HARN Oregon State Plane North, Int. Feet.
3. Vertical datum is NAVD88.
4. Aerial imagery from July 2007.
5. Review of the core logs at the locations designated as Inconclusive Substantial Product provided insufficient information to confirm the presence of substantial product using the definition in the Statement of Work (e.g., stained sediments noted in an interval but no Sublayers provided).
6. The designated depths of substantial product are the deepest depth of substantial product observed in the overlaying log. Shallower depths may not contain substantial product.
7. Locations designated as containing liquid substantial product contain liquid substantial product in at least one depth interval. These locations may also contain non-liquid substantial product and the shown deepest depth interval designation may be driven by either liquid substantial or non-liquid substantial product.
8. Per the SOW, the definition of substantial product does not apply laterally at the top of the riverbank. The shown top of riverbank listings were screened against the SOW substantial product definition solely to support evaluation of substantial product in the riverbank.

Figure 1
Summary of Presence of Substantial Product
Draft Engineering Evaluation/Cost Analysis
Gasco Sediments Cleanup Action

ANCHOR QEA

Feet
0 100 200 300 400

Figure 2: Non-Aqueous Phase Liquid (NAPL) Evaluation
Arkema Inc.
Portland, Oregon



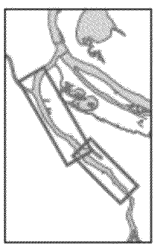
Legend

SDU

> High Concentration Threshold (106,000 ug/kg)

Feet

0 1,000 2,000 3,000 4,000



BaPEq

High Concentration PTW Threshold Exceedance

Threshold = 106,000 ug/kg

Figure 3

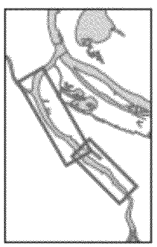
Legend

SDU

> High Concentration PTW Threshold (7,000 ug/kg)

Feet

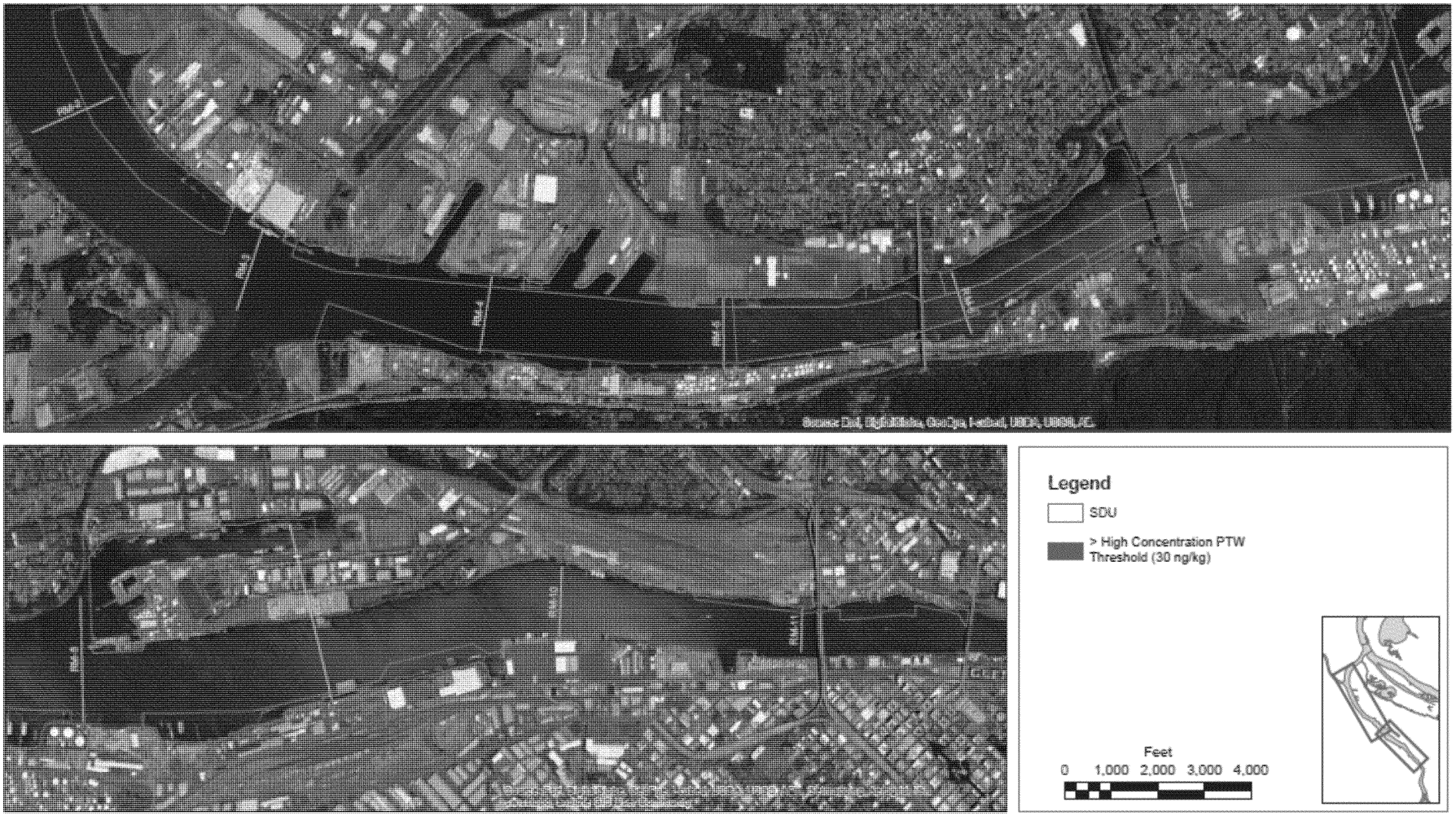
0 1,000 2,000 3,000 4,000



Total DDx
High Concentration PTW Threshold Exceedance
Threshold = 7,000 ug/kg

Figure 4

Date: 3/19/2014

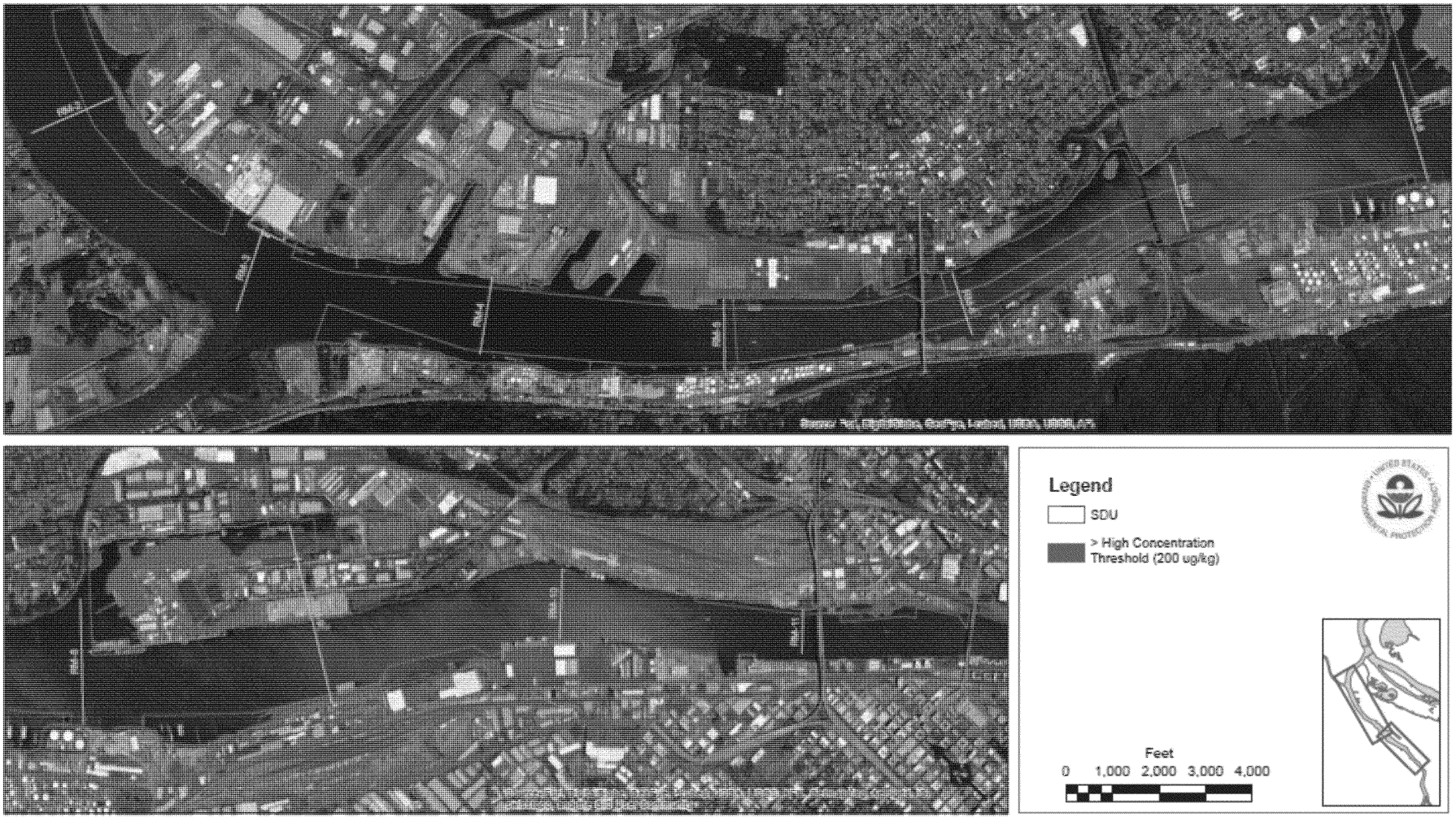


Dioxan Furan TEQ
High Concentration PTW Threshold Exceedance
Threshold = 30 ng/kg

Figure 5

Path: C:\MapDoc\62014\MXD\Erie_PTW_memo.mxd

Date: 3/20/2014



Total PCBs
High Concentration PTW Threshold Exceedance
Threshold = 200 ug/kg

Figure 6

Path: C:\MapDocs\2014\MXDs\Eric_PTW_memo_rv.mxd
Date: 4/10/2014

Summary

- PTW is present offshore of the Gasco and Arkema sites based on direct observation of NAPL in Willamette River sediments
- PTW is present within the navigation channel downstream of the Gasco site and at Terminal 4 as evidenced by high concentrations of PAHs
- Areas of PTW based on elevated levels of dioxin/furan TEQ are present offshore of the Arkema and McCormick and Baxter sites and within Willamette Cove and Swan Island Lagoon
- Widespread occurrences of PTW based on elevated levels of PCBs in sediments above the high concentration threshold are present throughout the Portland Harbor site

Evaluation Process

- The FS should consider the presence, distribution and extent of PTW
- A key consideration is an assessment of contaminant mobility as it relates to removal and containment based alternatives
- The practicability of treatment should be evaluated against the NCP's nine remedy selection criteria
- In-situ containment can also be effective for principal threat wastes, where that approach represents the best balance of the NCP nine remedy selection criteria.

To: Conley, Alanna[conley.alanna@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Christopher, Anne[Christopher.Anne@epa.gov]; MacIntyre, Mark[Macintyre.Mark@epa.gov]; Philip, Jeff[Philip.Jeff@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Cora, Lori
Sent: Wed 6/1/2016 5:45:12 PM
Subject: RE: NOT FOR RELEASE: Public Notice and Web form (Final Review) ATTORNEY CLIENT COMMUNICATION
CoraOregonian_Portland Harbor Proposed Plan Public Notice 6_1 (002).docx

Hello, I tweaked the first paragraph (I tried to delete about as much as I added given length constraints). I think we should include the preferred disposal option in the description which I added, and be clear we are taking comments on the preferred alternative as well as all other alternatives (EPA guidance includes this).

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Conley, Alanna
Sent: Wednesday, June 01, 2016 10:06 AM
To: Zhen, Davis <Zhen.Davis@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; MacIntyre, Mark <Macintyre.Mark@epa.gov>; Philip, Jeff <Philip.Jeff@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>
Subject: NOT FOR RELEASE: Public Notice and Web form (Final Review)

This information is not to be released or shared. There have been outside requests for additional information on the meeting schedule. It will be publically available when the Public Notice is issued next week.

•□□□□□□□ This is the last chance to review of the Public Notice before sending to the Oregonian tomorrow for publication in the Wednesday, June 8th paper. If we have any last minute schedule changes, I can make edits Monday morning.

•□□□□□□□ Last chance to review the attached comment box which will post on EPA's website Wednesday also.

Thanks,

Alanna

To: Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Robinson, Deborah
Sent: Thur 5/21/2015 6:48:01 PM
Subject: RE: tribal consultations letter

Hi Sean,

I think the letter looks good, and I suggest you run it by at least Kristine and Lori, and then send it to Jim Woods as a draft. Cami and Jim did meet briefly Monday 5/11 after the Dennis/Michelle meeting, but by then Jim had all the info he needed. He expressed interest in helping us communicate effectively on this, which is great.

I learned yesterday that Jim was to meet specifically with some PH tribes today, so we may learn something from him that might inform the letter. He works remotely on Friday according to Matt, but would likely be available by phone tomorrow to talk about his meetings.

Also, have you been in touch at all with the Tribal Coordinator for the PH tribes? I am pretty sure it is Kris Carre. I believe they don't really engage with SF projects, but it might be good to give her a heads up that we are getting in touch and getting ready to send this letter out.

Thank you Sean,

Debbie

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Sheldrake, Sean
Sent: Thursday, May 21, 2015 11:01 AM
To: Robinson, Deborah
Subject: RE: tribal consultations letter

Thanks Debbie—Cami asked me to draft the attached last week and your notes were very helpful in adding a few tweaks.

Want to take a look at this draft template, or shall I just send to the recipients of your last message and solicit feedback?

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Robinson, Deborah
Sent: Wednesday, May 20, 2015 2:13 PM
To: Sheldrake, Sean; Koch, Kristine; Cora, Lori; Christopher, Anne; Woods, Jim
Subject: tribal consultations letter

Hi,

Sean, you had asked for my notes from the meeting with Dennis and Michelle about writing to the tribes to set up consultations. Anyone else who was there, please feel free to correct or add.

I had scheduled a follow-up meeting for Cami and Jim Woods, but I did not hear whether it actually happened. Neither Kristine nor I were available for that meeting. The reason for that meeting was to prepare Jim – he is at a Tribal leaders conference this week and we wanted to prepare him to talk to the leaders of the PH tribes about initiating the consultations. Jim did also attend the meeting with Dennis and Michelle, and we put together a background paper on PH for him.

My Notes for Letters:

- See the Tribal Consultation Policy for how we solicit consultations,
- Explain we want to consult as we develop the proposed plan for PH.
- We will send more details later.
- We have been consulting regularly with staff representatives as we developed the RI and FS.
- This is the most meaningful time for consultations - between NRRB and Proposed Plan. Preferred timeframe is late November through mid-February.

Other notes about consultations:

- Sean or Kristine would go along.
- Did not say whether Dennis would do all of them or Michelle would do some.
- Try to get Jim Woolford to come along.
- If a Tribe wants to meet with Gina, they would likely need to go to DC.
- We need to be sure to build in time to prepare RA/DRA for the consultations

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Fonseca, Silvina[Fonseca.Silvina@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 5/21/2015 8:35:50 PM
Subject: FW: DEQ Review Comments on Draft FS Section 2
Portland Harbor FS Section 2-DEQ Comments.doc
Appendix A2 ecological PRGs BKS revision 071514).docx
PdxHarborFS-Section2.pdf

Here are DEQ's comments on the FS Section 2.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: MCCLINCY Matt [mailto:MCCLINCY.Matt@deq.state.or.us]
Sent: Thursday, September 04, 2014 4:48 PM
To: Koch, Kristine
Cc: GAINER Tom; PARRETT Kevin; JOHNSON Keith; poulsen.mike@deq.state.or.us; PETERSON Jenn L; LIVERMAN Alex
Subject: DEQ Review Comments on Draft FS Section 2

Hi Kristine,

Attached are DEQ review comments on the draft FS Section 2. Feel free to contact myself or Tom Gainer with any questions.

Matt McClincy

Oregon Department of Environmental Quality

Northwest Region

2020 SW Fourth Ave., Suite 400

Portland, Oregon 97201-4987

Phone 503-229-5538

Fax 503-229-6945

To: Cora, Lori[Cora.Lori@epa.gov]
From: Lori Cora
Sent: Thur 5/21/2015 8:27:40 PM
CoraCopy of 2012-03_Section 3_Tables.xlsx

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 5/18/2015 5:14:15 PM
Subject: FW: FS Section 3 Subsections for Review: Appendix E-Tech Assignment Support
Appendix E_Tech Assignment Support_2015-05-12.docx
Attachment E-1_2012-03-30_Draft FS_Appendix Hc_Attach 1_Wake Analysis.pdf
Figure E-1_2012-03-30_Draft FS_Appendix Hc_Figure 4-1_Wind Rose.pdf
Figure E-2_2012-03-30_Draft FS_Appendix La_Figure 2-1_Numerical Grid Ext....pdf
Figure E-3a_2012-03-30_Draft FS_Appendix La_Figure 2-30_Sediment Bed Dat....pdf
Figure E-3b_2012-03-30_Draft FS_Appendix La_Figure2-31_Sediment Bed Data....pdf
Figure E-4_2012-03-30_Draft FS_Appendix La_Figure 2-32_Sediment Bedmap.pdf
Figure E-5_2012-03-30_Draft FS_Appendix La_Figure 2-33_Spatial Distribut....pdf
Figure E-6a_2012-03-30_Draft FS_Appendix La_Figure 2-34_Bed Composition.pdf
Figure E-6b_2012-03-30_Draft FS_Appendix La_Figure 2-35_Bed Composition.pdf
Figure E-7_2012-03-30_Draft FS_Appendix La_Figure 2-36_Sedflume Location....pdf
Figure E-8 thru E-22_2012-03-30_Draft FS_Appendix La_Figures_Log-Linear ....pdf
Figure E-23_2012-03-30_Draft FS_Appendix La_Figure 2-52_Vertical Variati....pdf

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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 3:30 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: FS Section 3 Subsections for Review: Appendix E-Tech Assignment Support

Attached is Appendix E: Technology Assignment Supporting Documentation that accompanies the FS Section 3 subsections being submitted to EPA for review.

This is the 7th and final email transmittal.

Scott

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations
1218 Third Avenue, Suite 1100 | Seattle, WA 98101
phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 5/18/2015 5:14:18 PM
Subject: FW: Section 3.7 and 3.8
WORKING DRAFT_Portland Harbor FS Screening Section 3.8_2015-05-15.docx

Kristine Koch
Remedial Project Manager
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1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Saturday, May 16, 2015 8:04 AM
To: Koch, Kristine; Allen, Elizabeth
Cc: Mullin, Jeanette
Subject: Section 3.7 and 3.8

Kristine and Elizabeth

I received the alternative development and screening sections (3.7 and 3.8) from our designated section author at the end of the day Friday, but I feel the alt development section 3.7 needs some significant reorganization before we send it to you, even in a working draft format. I will be talking to the writer involved and we'll get this straightened out. Some items we're fixing:

•□□□□□□□□ Adding text at the beginning explaining how and why the alternatives are similar so that it is less repetitious in the text describing each alternative

•□□□□□□□□ The compilation of one large table showing how the alternatives vary by each

category – this will convey the size of the various remedial actions assigned for each alternative.

•□□□□□□□□ We then need unique text under each alternative that explain the discriminators between the alternatives.

I realize it is a working draft and is to provide you a sneak peak of our progress, but I'm reluctant to send this section to you before these issues are resolved.

I do feel the screening section is decent enough to show our progress and to get your input, so I've attached a **working draft of our screening section 3.8.**

Scott

Scott Coffey, L.Hg.
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phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 5/18/2015 5:11:26 PM
Subject: FW: FS Section 3 Subsections for Review: Appendix D-CDF Water Quality - Part 6 of 6 (but there will be 7 actually)
Appendix D_CDF Water Quality.docx
Appendix D_Figure D-1_T4 Plan View.pdf
Appendix D_Figure D-2_T4 CDF Model Structure.pdf
Appendix D_Figure D-3_T4 CDF GW Flow.pdf
Appendix D_Figure D-4a-d_T4 COC Concentrations.pdf
Appendix D_Figure D-5_T4 CDF Contaminant Distribution.pdf
Appendix D_Table D-1_Elutriate Tests_REV1.pdf
Appendix D_Table D-2_Bulk Sediment-Leachate_REV1.pdf
Appendix D_Table D-3_Physical Properties of CDF Material.pdf
Appendix D_Table D-4_Geochemical Properties of COCs.pdf

Kristine Koch
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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 3:28 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: FS Section 3 Subsections for Review: Appendix D-CDF Water Quality - Part 6 of 6 (but there will be 7 actually)

Attached is Appendix D: CDF Water Quality that accompanies the FS Section 3 subsections being submitted to EPA for review.

I thought this would be the last email transmittal for the sections, figures, tables and appendices, but I have to send the other appendix separately, so you will have 7 email transmittals in all.

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations
1218 Third Avenue, Suite 1100 | Seattle, WA 98101
phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 5/18/2015 5:10:54 PM
Subject: FW: Draft FS Section 3 Subsections for Review - Figures Part 4 of 6
Figure 3.6-06_Benthic-Risk-Areas.pdf
Figure 3.6-07_RCRA-Wastes_REV1.pdf
Figure 3.6-08_Sediment Disposal Decision Tree_2015-05-14.pdf
Figure 3.6-09_2012-03-30_Draft FS_Appendix Ja_T4 CDF.PDF
Figure 3.6-10_Nav-Channel-and-Potential-Dredge_REV1.pdf
Figure 3.6-11_NAPL_50ftDepth_REV1.pdf
Figure 3.6-12_Grapple_Bucket.pdf
Figure 3.6-13_Debris-Pilings_REV1.pdf
Figure 3.6-14_Docks-Structures_REV1.pdf
Figure 3.6-15_Sand Cap Cross-Section.pdf
Figure 3.6-16_Vegetated Slope-Geocell.pdf
Figure 3.6-17_Geocell Photo.pdf

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 3:23 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: Draft FS Section 3 Subsections for Review - Figures Part 4 of 6

Third set of figures.

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations

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phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 5/18/2015 5:09:42 PM
Subject: FW: Draft FS Section 3 Subsections for Review - Figures Part 3 of 6
Figure 3.4-2a_Total-PCB-RALs_REV1.pdf
Figure 3.4-2b_Total-PAH-RALs_REV1.pdf
Figure 3.4-2c_TCDD-RALs_REV1.pdf
Figure 3.4-2d_PeCDD-RALs_REV1.pdf
Figure 3.4-2e_PeCDF-RALs_REV1.pdf
Figure 3.4-2f_Total-DDX-RALs_REV1.pdf
Figure 3.5-1_SMAs w banks_REV2.pdf
Figure 3.6-01_Arkema_NAPL.PDF
Figure 3.6-02_Gasco_NAPL.PDF
Figure 3.6-03_PTW Site-Wide Concentrations_REV1.pdf
Figure 3.6-04_Arkema-NAPL_PTW_REV1.pdf
Figure 3.6-05_Gasco_NAPL_PTW.PDF

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 3:22 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Subject: Draft FS Section 3 Subsections for Review - Figures Part 3 of 6

Second set of figures

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations

1218 Third Avenue, Suite 1100 | Seattle, WA 98101
phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 5/18/2015 5:07:25 PM
Subject: FW: Revised FS Section 3 Subsections for Review - Part 1 of 6
Portland Harbor FS Section 3_REV1_2015-05-15.docx
Portland Harbor FS Section 3_REV1_2015-05-15_markup.docx
FS Section 3 - List of Figures_2015-05-12.xlsx
FS Section 3 - List of Tables_2015-05-12.xlsx
Table 3.3-1_SDU Primary Contaminants_2015-03-16.xlsx
Table 3.6-1_PTW Concentration Threshold Table_2015-02-23.xlsx
Table 3.6-2_CDF Performance Standards.docx
Table 3.6-3_T4 60 Percent CDF DAR_Table 2-1 Monitoring.pdf
Table 3.5-1_SMA Summary Information_REV1.xlsx
Table 3.6-4_Predominant Technology Acres Summary_REV 1.xlsx

Please send me your comments by Friday.

Kristine Koch
Remedial Project Manager
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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Friday, May 15, 2015 3:15 PM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina
Cc: Mullin, Jeanette; King, Todd W.; Foster, Malena L.; Hazen, Gary; Jones, Jennifer M.
Subject: Revised FS Section 3 Subsections for Review - Part 1 of 6

Attached is a clean version and marked up version of the FS Section 3 subsections identified below for EPA review. These subsections were revised based on EPA HQ comments and Region 10 direction.

3.1 Remedial Alternative Development Strategy

3.2 Focused COCs

3.3 Sediment Decision Units

3.4 Remedial Action Levels

3.5 Sediment Management Areas

3.6 Remedial Technology Assignment

- 3.6.1 Principal Threat Waste
- 3.6.2 Benthic Risk Areas
- 3.6.3 Sediment Disposal and Management
- 3.6.4 MNR Considerations
- 3.6.5 EMNR Considerations
- 3.6.6 In-Situ Treatment
- 3.6.7 Dredging and Excavation Considerations
- 3.6.8 Representative Caps and Capping Considerations
- 3.6.9 IC Consideration
- 3.6.10 Assignment of Technologies to SMAs

Also attached is a list of figures and a list of tables for the FS Section 3 subsections being submitted. Figures and appendices will be sent in six separate emails due to the large number of figures and large file sizes.

Please note: We are still working on volume determinations as a result of the revision made to the processing rules for technology assignment on April 30th. As a result, we have placeholders for this information and will provide a final draft of Section 3.6 **later next week** and a submittal of the alternatives screening section (Section 3.7) by **May 27th**.

Regards,

Scott

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations
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phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]; Tom Zeilman[tzeilman@qwestoffice.net]; David F. Askman[dave@askmanlaw.com]
From: Koch, Kristine
Sent: Fri 5/15/2015 5:46:03 PM
Subject: RE: Yakama Review Memo

OK, thanks Rose.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Rose Longoria [mailto:rose@yakamafish-nsn.gov]
Sent: Friday, May 15, 2015 10:14 AM
To: Koch, Kristine
Cc: Cora, Lori; Tom Zeilman; David F. Askman
Subject: Re: Yakama Review Memo

Hello Kristine -

Thank you for forwarding the email. I know that your time is limited and that you have lots of work to complete with a crazy schedule. If the EPA folks (you, Lori, Cami) are still available, I would like to keep our conference call date/time to quickly relay YN's cost accounting process and how that aligns with our understanding of the law. Having this common understanding will be beneficial not only for the PH project but for future projects.

I really appreciate your time.

Respectfully,

rose

--

Rose Longoria

Yakama Nation Fisheries

COLUMBIA RIVER | Honor. Protect. Restore.

From: "Koch, Kristine" <Koch.Kristine@epa.gov>
Date: Friday, May 15, 2015 at 9:26 AM
To: Rose Longoria <lonr@yakamafish-nsn.gov>
Cc: Lori Cora <cora.lori@epa.gov>
Subject: FW: Yakama Review Memo

Rose – Please see the email I sent to the LWG today regarding the EPA review of the Yakama cost recovery memo. Let me know if you still need to have a call.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Koch, Kristine
Sent: Friday, May 15, 2015 8:52 AM
To: 'Hans Feige'
Subject: RE: Yakama Review Memo

Hans,

This email is to clarify the discussions you and I have had regarding the LWG's request for information about how EPA treats vacation and other fringe benefits in grants.

On March 5, 2015, the LWG sent a request to me that in accordance with the RI/FS AOC, the LWG wanted EPA to review the most recent tribal documentation and provide its view of whether the costs were consistent with the NCP. Additionally, the LWG also asked how EPA grant regulations addressed overtime, vacation, and holiday hours. The LWG represented that the Yakama representatives explained to LWG that they bill holiday and vacation time to the project as direct costs because, as part of their budgeting process, they allocate all personnel time, including holiday and vacation hours, to specific projects. The LWG asked me whether it is typical for an agency or entities receiving grant funding from EPA to bill holiday or vacation time as direct costs to a project? They indicated that Yakama also invoice the LWG for Fringe Benefits, and they include an indirect charge on top of all direct and consultant charges and concluded that the fringe benefits are a percentage of the direct costs, and the indirect charges are a percentage of all project costs.

I reviewed OMB Circular A-87, Cost Principles for State and Local and Indian Tribal Governments Codified in 2CFR Section 225, that EPA uses for Grants and found that Fringe Benefits include holiday and vacation time. The guidelines say Fringe Benefits can be covered under Overhead or Direct Charge. It is critical that the grant specify how the funding is established between the two parties. I told you Hans, that if there is uncertainty in how the Yakama is billing, the LWG should request clarification as to what is specifically covered under Overhead and Fringe Benefits to ensure that direct charges are not duplicated in the funding. Contrary to your representations in your April 30, 2015 memo, I did not request that "revised versions of the cost documentation (with any vacation, holiday, or overtime charges removed) be presented to the EPA to make her review for NCP compliance easier" as indicated by the LWG. In fact, this issue is a matter of contract between the LWG and Yakama and is not related to my review for consistency with the NCP. I also want to clarify another statement in your April 30 memo. Specifically, you state that "…the practice of billing vacation, holiday, and overtime pay as Direct charges is not consistent with the NCP." You said that this came out of your conversation with me. I did not make this statement, rather I suggested that you needed to clarify how the Yakama billed for those kinds of costs and whether that was consistent with your funding agreement.

EPA has completed its review of the documentation and is prepared to send a letter of concurrence with the billing from the Yakama as being consistent with CERCLA and the NCP unless the LWG wishes to retract the request sent on March 5.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Hans Feige [mailto:hfeige@feige.us]
Sent: Friday, May 01, 2015 3:06 PM
To: rose@yakamafish-nsn.gov; Tom Zeilman; Koch, Kristine
Cc: 'Pearman, Beverly'; 'Jen Woronets'
Subject: FW: Yakama Review Memo

Rose and Tom:

Attached, at the request of the Lower Willamette Group, is the memo I prepared for the LWG regarding the past cost documentation provided by the Yakama. The LWG wanted me to pass this along to you.

The memo details my efforts to review the documentation and the conclusions that I reached. Also included are several detailed tables along with timesheets from the cost documentation packages with color coded highlighted entries.

I have included Kristine Koch in the distribution since I consulted with her in this process.

I would like to try and schedule a meeting as soon as possible to discuss this. We can meet in person or via teleconference, whichever is easier. I will ask Jen Woronets to begin early next week to start scheduling a meeting.

If you have any questions, please call.

Thank you.

-Hans

From: John Wyatt
Sent: Friday, May 01, 2015 2:09 PM
To: Hans Feige
Subject: Yakama Review Memo

Hans,

At your request, attached is a copy of the memo regarding review of Yakama billed hours for FY 2012 through FY 2014.

John Wyatt, RG

Associate

Feige & Associates, Inc.

27001 NW Saint Helens Rd.

Scappoose, OR 97056

Office: (503) 543-9700

Cell: (503) 539-7548

Fax: (503) 543-8757

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To: Koch, Kristine[Koch.Kristine@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Robinson, Deborah
Sent: Fri 5/8/2015 10:39:29 PM
Subject: Fatal Flaws? -- FW: Updated - DELIBERATIVE-CONFIDENTIAL- Monday 5/11/15 Briefing outline for RA/DRA

DELIBERATIVE/CONFIDENTIAL

Status and Schedule Update on Portland Harbor Superfund Site

Monday 5-11-15

Possible Agenda Topics

- Overall Schedule of Activities and Interactions
  - Briefing Gina
  - Roles – Michelle and Dennis
- EPA/DEQ Strategy and Relationship
- Congress – Interest, strategy for reaching out to Congress
- Tribal Consultations
- What info are you seeking in briefings every two weeks? Are there any topics you want to know more about? Where would like us to focus on getting you info about?

Proposed PH Schedule

Throughout this schedule we have intensive coordination with DEQ

5/27/15	Final RI from PRPs Due
Mid-July?	Brief Gina
7/29/15	Provide Draft Final FS Sections 3 and 4

R10/HQ/DEQ Meet with Congress, PRPs, MOU partners and CAG

(Members will be in DC – how do you want to approach this?)

9/18/15 Conceptual Remedy

R10/HQ/DEQ Meet with Congress, PRPs, MOU partners and CAG

(Members will be in DC – how do you want to approach this?)

10/18/15 Package for NRRB

11/18/15 2-day NRRB and CSTAG Meeting

?? Direct LWG to finalize the FS

Nov – Feb Tribal Consultations

Feb 2016? Proposed Plan

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Robinson, Deborah[Robinson.Deborah@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Robinson, Deborah
Sent: Fri 5/8/2015 9:48:37 PM
Subject: Updated - Hand this out - FW: DELIBERATIVE-CONFIDENTIAL -Seeking your Input - Briefing outline for RA/DRA

HI Lori – I don't kn

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Robinson, Deborah
Sent: Thursday, May 07, 2015 2:34 PM
To: Koch, Kristine; Grandinetti, Cami
Subject: DELIBERATIVE-CONFIDENTIAL -Seeking your Input - Briefing outline for RA/DRA

I took a crack at an outline for the Monday 11:15 briefing for RA/DRA – Please improve upon it.

•□□□□□□□ Did I pick the right topics? Should we delete any or add any?

•□□□□□□□ Kristine – are there Technical issues or strategy you would like to raise to them? I wrote that as a place holder.

•□□□□□□□ Is there something we want to say about the LWG, our coordination with them?

•□□□□□□□ Who else from the team should be there? HQ? Should we invite the whole team if available? Could listen in on phone?

I summarized an overall schedule blow the topics – please check it for completeness and accuracy

Kristine - Michelle and Jim need more comprehensive info –Do we already have something that gives a high level but good summary that would bring them up to date? I listed some possible topics at the bottom of this email and will look through the talking points that have been

developed since I joined the project, but any guidance you have would be very helpful.

Status and Schedule Update on Portland Harbor Superfund Site

Dennis, Michelle, Matt Magorrian, Jim Woods, Bill Dunbar, Marianne Holsman

Kristine, Cami, Debbie

Possible Agenda Topics

•□□□□□□□ Overall Schedule of Activities and Interactions

o Briefing Gina

o Roles – Michelle and Dennis

•□□□□□□□ Technical Issues/Strategy

•□□□□□□□ EPA/DEQ Strategy and Relationship (Detailed meetings – monthly with DEQ at staff/manager and executive levels, several significant meetings in late July and August with executives – understanding alternatives in FS and how we are evaluating them, and understanding the conceptual remedy – want senior managers of both agencies to really understand what to expect. Goal – we understand any issues DEQ is raising and hopefully resolve them. Reaching out to Congressionals regularly – important for Dick and Dennis to also reach out on FS and Conceptual

•□□□□□□□ Congress – Interest, strategy for reaching out to congress

•□□□□□□□ Tribal Consultations

•□□□□□□□ What info are you seeking in briefings every two weeks? Are there any topics you want to know more about? Where would like us to focus on getting you info about? (see list below for some ideas)

Proposed PH Schedule

Throughout this schedule we have intensive coordination with DEQ. (see above)

5/27/15 Final RI from PRPs Due

Mid-July? Brief Gina

7/29/15 Provide Draft Final FS Sections 3 and 4

R10/HQ/DEQ Meet with Congress, PRPs, MOU partners and CAG

Are you thinking of going to DC – how do you want to approach this?

9/18/15 Conceptual Remedy

R10/HQ/DEQ Meet with Congress, PRPs, MOU partners and CAG

Are you thinking of going to DC – how do you want to approach this?

10/18/15 Package for NRRB

11/18/15 2-day NRRB and CSTAG Meeting

?? Direct LWG to finalize the FS

Nov – Feb Tribal Consultations

Feb 2016? Proposed Plan

More Comprehensive Briefing Topics – background info for Michelle and Jim?

- Background – location, how long, contaminants, risk, when listed, many PRPs, bigger and more contam than Duwamish
- Why the administrator is signing the ROD
- Project Schedule
- HQ engagement
- Political Interest

•□□□□□□□ Unprecedented coordination with DEQ

•□□□□□□□ Public Interest

•□□□□□□□ Tribes

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Koch, Kristine[Koch.Kristine@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Conley, Alanna
Sent: Tue 5/5/2015 10:09:28 PM
Subject: RE: Monitoring Presentation for CAG May 13
May 13 CAG Monitoring.pptx

Below are questions important to CAG related to monitoring. Most are covered in slides, one is not but should be discussed during presentation. I don't think we need to add slides for those not covered, but be sure we discuss.

•□□□□□□□ Monitoring during cleanup (Covered)

•□□□□□□□ Monitoring site after cleanup / effectiveness of remedies selected (covered but could add more)

•□□□□□□□ Assurances and assurance bonds – if remedy does not meet cleanup standards what recourse does EPA use to rectify the problem.

•□□□□□□□ Assurance bonds – discussion on bonds EPA holds to pay for anything that goes wrong (not in slides – be sure to discuss)

•□□□□□□□ Long term monitoring for contamination left in place / not taken off site. How do we monitor in perpetuity contamination that is left on site?

From: Conley, Alanna
Sent: Tuesday, May 05, 2015 2:02 PM
To: Koch, Kristine; Sheldrake, Sean
Subject: Monitoring Presentation for CAG May 13

Kristine,

Monitoring presentation attached. Revise as needed. As discussed, it is a general overview of monitoring at SF sites, but hope not too general.

You can always ad-lib where needed.

I will be back next week and we can make final changes.

Alanna

To: Conley, Alanna[conley.alanna@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]
Cc: Christopher, Anne[Christopher.Anne@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]
From: Sheldrake, Sean
Sent: Thur 5/7/2015 4:55:17 PM
Subject: RE: Monitoring Presentation for CAG May 13
EPA R10 Diver taking surface grab 2010.jpg
IMG_1404.JPG
00272_s_w14agcn74k70272.jpg

Kristine,

A couple thoughts in case they are helpful:

1.Shouldn't we add quantitative chemical monitoring "in some cases" to slide #5. I think for this it's good to note we've had projects where we've started chemical monitoring (e.g. T4) and then stopped as we weren't getting any hits, but turbidity remained an issue of concern, so it's not "one size fits all" in terms of upcoming dredging projects in PH.

2.Here's a couple better diver pictures if you want to swap out slide #9 with one (psr, Wyckoff, respectively)

3.Would also suggest adding sediment traps into the discussion for pre/during/post monitoring for a variety of purposes, e.g. upstream input? Source control working? How well is the offsite migration of particulate contaminants controlled during dredging to evaluate whether controls need to be improved for a multi season project, Etc. (3rd pic)

Let me know if I can help with anything else on this one.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Conley, Alanna
Sent: Tuesday, May 05, 2015 3:09 PM
To: Koch, Kristine; Sheldrake, Sean
Subject: RE: Monitoring Presentation for CAG May 13

Below are questions important to CAG related to monitoring. Most are covered in slides, one is not but should be discussed during presentation. I don't think we need to add slides for those not covered, but be sure we discuss.

•□□□□□□□ Monitoring during cleanup (Covered)

•□□□□□□□ Monitoring site after cleanup / effectiveness of remedies selected (covered but could add more)

•□□□□□□□ Assurances and assurance bonds – if remedy does not meet cleanup standards what recourse does EPA use to rectify the problem.

•□□□□□□□ Assurance bonds – discussion on bonds EPA holds to pay for anything that goes wrong (not in slides – be sure to discuss)

•□□□□□□□ Long term monitoring for contamination left in place / not taken off site. How do we monitor in perpetuity contamination that is left on site?

From: Conley, Alanna
Sent: Tuesday, May 05, 2015 2:02 PM
To: Koch, Kristine; Sheldrake, Sean
Subject: Monitoring Presentation for CAG May 13

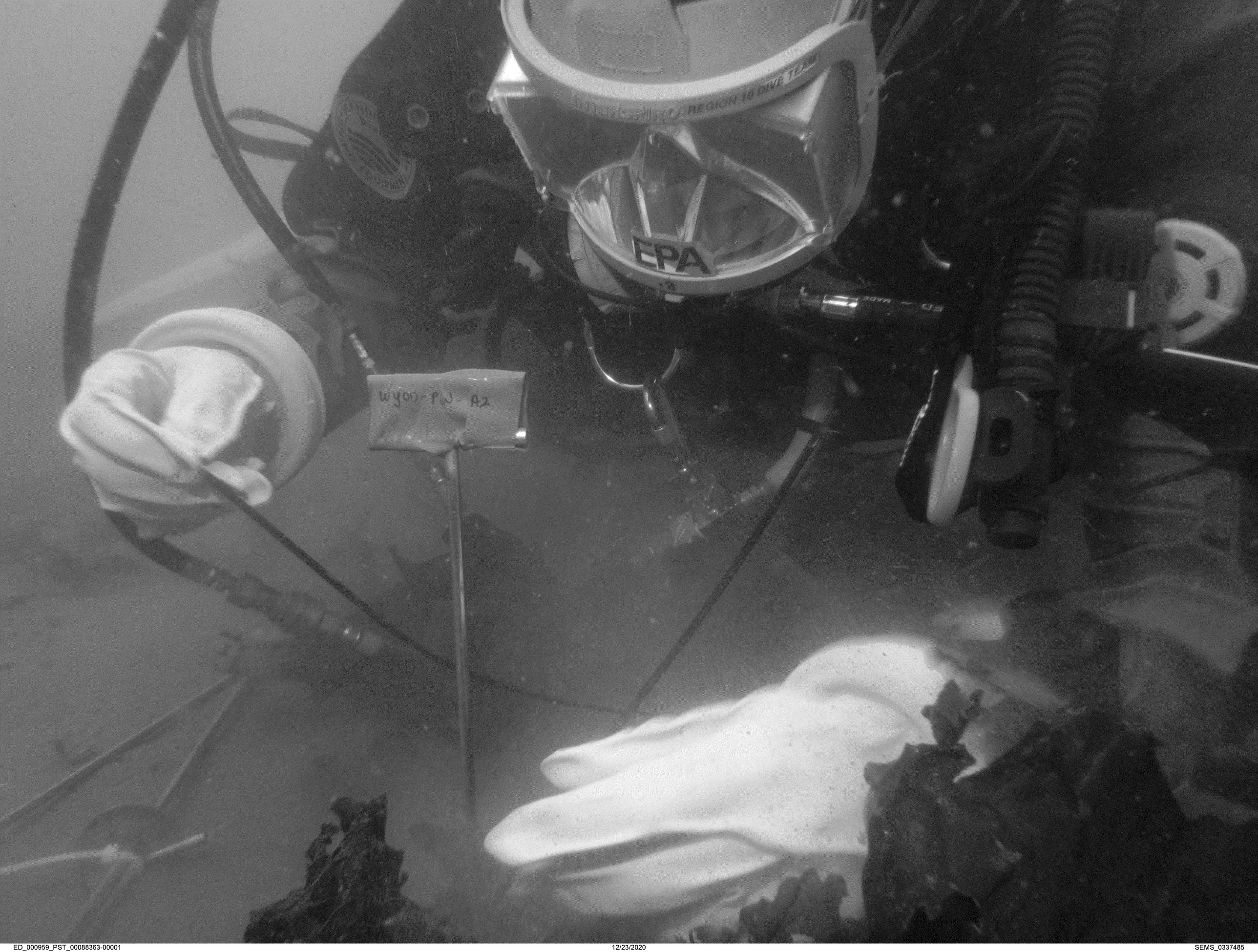
Kristine,

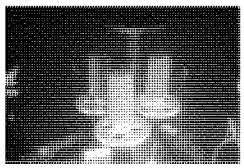
Monitoring presentation attached. Revise as needed. As discussed, it is a general overview of monitoring at SF sites, but hope not too general.

You can always ad-lib where needed.

I will be back next week and we can make final changes.

Alanna


REGION 10 DIVE TEAM
EPA
WY01-PW-A2



To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 4/20/2015 10:29:38 PM
Subject: Latest version of FS Section 2
2015_02_23 Portland Harbor FS Section 2.docx

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 4/6/2015 4:12:55 PM
Subject: FW: Portland Harbor - LWG FS Section 2 comments
2015-03-25 LWG Comments on 2015-02-23_Table 2_1-1_ARARs.xlsx

Here is the document from the LWG if you want to use it.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: James McKenna [mailto:jim.mckenna@verdantllc.com]
Sent: Monday, April 06, 2015 9:09 AM
To: Koch, Kristine
Cc: Jennifer Woronets; Cora, Lori; Bob Wyatt (rjw@nwnatural.com); Carl Stivers; Patty Dost; Amanda Shellenberger
Subject: RE: Portland Harbor - LWG FS Section 2 comments

Kristine,

Per your request the LWG is providing the native file of the ARAR's table (you requested a Word version but it is actually an Excel file).

Please contact me if you have any questions.

Thanks,

Jim McKenna

Verdant Solutions, LLC

5111 SE 41st Avenue

Portland, Oregon 97202

Office: (503) 477-5593

Cell: (503) 309-1621

jim.mckenna@verdantllc.com

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Thursday, April 2, 2015 1:06 PM
To: Bob Wyatt (rjw@nwnatural.com); James McKenna
Cc: Jennifer Woronets; Cora, Lori
Subject: Portland Harbor - LWG FS Section 2 comments

Bob and Jim,

Can you provide the LWG's ARARs chart comments in word so we can respond to the comments in the document?

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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LWG Comments on Table 2.1-1. Chemical-Specific ARARs for Remedial Action at the Portland Harbor Superfund Site

Medium	Regulation/Citation	Criterion/Standard	Comments	LWG Comments
Protection of surface water	Clean Water Act, 33 USC 1313 and 1314. Most recent 304(a) list, as updated up to issuance of the ROD	Under Section 304(a), minimum criteria are developed for water quality programs established by states. Two kinds of water quality criteria are developed: one for protection of human health, and one for protection of aquatic life.	Relevant and appropriate for cleanup standards for surface water and contaminated groundwater discharging to surface water if more stringent than promulgated state criteria. Relevant and Appropriate to short-term impacts from dredging and capping if more stringent than promulgated state criteria. Relevant and Appropriate as criterion to apply to point source discharges used in implementing the remedy, if applicable.	With respect to the first sentence, this should be qualified as noted in the 2/10/10 letter from Lori Cora to Patricia Dost: "If the State's water quality criteria is promulgated after the most recent NRWQC for that contaminant is published, but adopted a criteria less stringent than the NRWQC due to water body-specific reasons, per Subsection 2(B)(i), EPA may determine that the NRWQC is not relevant and appropriate as long as the remedy will be protective using the State promulgated standard." With respect to the last sentence, the LWG disagrees that all federal water quality standards are "relevant and appropriate as criterion to apply to point source discharges used in implementing the remedy, if applicable." The federal ARAR applicable in this circumstance is Clean Water Act section 402, 33 USC 1342 per section 3.2.3 of *CERCLA Compliance with Other Laws Manual*.
Protection of potential drinking water sources	Safe Drinking Water Act, 42 USC 300f, 40 CFR Part 141, Subpart O, App. A. 40 CFR Part 143	Establishes Maximum Contaminant Level Goals (MCLGs) and Maximum Contaminant Levels (MCLs) to protect human health from contaminants in drinking water.	Relevant and Appropriate as cleanup standards for groundwater and surface water at Portland Harbor, which are potential drinking water sources.	The LWG recommends reverting to the original sentence: "Relevant and Appropriate as a performance standard for groundwater and surface water that are potential drinking water sources." We disagree that these are "cleanup standards." Instead they are performance standards to be applied at point of use to drinking water taken from groundwater or surface water, which is how the SDWA is applied. (Also, the placement of the comma changed the meaning of the original text.)
Measure of protectiveness of human health and the environment in all media	Oregon Environmental Cleanup Law ORS 465.315. Oregon Hazardous Substance Remedial Action Rules OAR 340- 122-0040(2)(a) and (c), 0115(2-6).	Sets standards for degree of cleanup required for hazardous substances. Establishes acceptable risk levels for human health at $1x10^{-6}$ for individual carcinogens, $1x10^{-5}$ for multiple carcinogens, and Hazard Index of 1 for noncarcinogens; and protection of ecological receptors at the individual level for threatened or endangered species and the population level for all others.	A risk-based numerical value that, when applied to site-specific conditions, will establish concentrations of hazardous substances that may remain or be managed on-site in a manner avoiding unacceptable risk.	
Protection of surface water	Water Pollution Control Act ORS 468B.048. Water Quality Standards OAR Part 340, Division 41	DEQ is authorized to administer and enforce CWA program in Oregon. DEQ rules designate beneficial uses for water bodies and narrative and numeric water quality criteria necessary to protect those uses. OAR 340-041-0340 designates and defines the beneficial uses that shall be protected in the Willamette Basin.	Oregon's numeric toxics water quality standards (Tables 30 and 40) are applicable requirements as cleanup standards for surface water to the extent they are more stringent than Clean Water Act 304(a) recommended criterion. All state water quality standards, including numeric, narrative, and designated uses, are applicable requirements for any discharges to surface water from point sources and activities that may result in discharges to waters of the state, such as dredge and fill, de-watering sediments, and other remedial activities. All state water quality standards are applicable to measuring controls on contaminated groundwater discharging to the Willamette River.	The LWG disagrees that Oregon's numeric toxics water quality standards are applicable requirements as cleanup standards. The first sentence should read "Oregon's numeric toxics water quality standards (Tables 30 and 40) are relevant and appropriate as cleanup standards for surface water to the extent they are more stringent than Clean Water Act 304(a) recommended criterion," subject to qualifier stated in 2/10/10 letter from Lori Cora to Patricia Dost. The LWG also disagrees with the accuracy of the last sentence and asks that it be deleted. State WQS are written to be applied to surface water, not groundwater.

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LWG Comments on Table 2.1.2. Action-Specific ARARs for Remedial Action at the Portland Harbor Superfund Site

Action	Regulation/Citation	Criterion/Standard	Comments	LWG Comments
Actions that discharge dredged or fill material into navigable waters	Clean Water Act, Section 404 and Section 404(b)(1) Guidelines, 33 USC 1344, 40 CFR Part 230	Regulates discharge of dredged and fill material into navigable waters of the United States.	Applicable to dredging, covering, capping, and designation and construction of in-water disposal sites and in-water filling activities in the Willamette River.	
Actions that discharge pollutants to waters of U.S.	Clean Water Act, Section 402, 33 USC 1342	Regulates discharges of pollutants from point sources to waters of the U.S., and requires compliance with the standards, limitations and regulations promulgated per Sections 301, 304, 306, 307, 308 of the CWA.	Relevant and Appropriate to remedial activities that result in a discharge of pollutants from point sources to the river if more stringent than state promulgated point source requirements.	
Actions that discharge pollutants to waters of U.S.	Clean Water Act, Section 401, 33 USC 1341, 40 CFR Section, 121.2(a)(3), (4) and (5)	Any federally authorized activity which may result in any discharge into navigable waters requires reasonable assurance that the action will comply with applicable provisions of sections 1311, 1312, 1313, 1316, and 1317 of the Clean Water Act.	Relevant and Appropriate to implementation of the remedial action that results in a discharge to the river if more stringent than state implementation regulations.	
Actions resulting in discharges to waters of the State of Oregon, including removal and fill activities	Water Pollution Control Act ORS 468B.048 Regulations Pertaining to NPDES Discharges OAR 340-041, 340-042	Effluent limitations and management practices for point-source discharges into waters of the state (otherwise subject to NPDES permit but for on-site permit exemption).	Applies state water quality standards and effluent limitations to point-source discharges to the Willamette River.	
Actions resulting in discharges to waters of the State of Oregon, including removal and fill activities	Certification of Compliance with Water Quality Requirements and Standards ORS 468b.035, OAR 340-041, 340-042, 340-048	Provides that federally-approved activities that may result in a discharge to waters of the State requires evaluation whether an activity may proceed and meet water quality standards with conditions, which if met, will ensure that water quality standards are met.	Applicable to implementation of the remedial action (e.g., dredging, capping, and construction of confined disposal facility) that may result in a discharge to waters of the State.	
Actions resulting in discharges to waters of the State of Oregon, including removal and fill activities	ORS 196.825(5) - Statutory requirement to require mitigation. Implementing rules: OAR 141-085-510, 141-085-680, 141-085 0685, 141-085-0690, 141-085-0710, 141-085-715.	Substantive requirements for mitigation for the reasonably expected adverse effects of removal or fill in a project development in waters of the state, including in designated Essential Indigenous Anadromous Salmonid Habitat.	Applicable to remedial action dredge and fill activities, capping, and riverbank remediation.	OAR 141-085-0765 should be included in column B.

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Actions in federal navigation channels	Actions in federal navigation channels	River and Harbors Act, 33 USC 401 et seq. 33 CFR parts 320 to 323	Section 10 prohibits the unauthorized obstruction or alteration of any navigable water. Structures or work in, above, or under navigable waters are regulated under Section 10.	Applicable requirements for how remedial actions are taken or constructed in the navigation channel.
Transportation of hazardous waste off-site	Transportation of hazardous waste off-site	Resource Conservation and Recovery Act. 40 CFR 260, 261	Establishes identification standards and definitions for material exempt from the definition of a hazardous waste.	Applicable to characterizing contaminated media or hazardous wastes generated from the action and designated for off-site or upland disposal; potentially relevant and appropriate for use in identifying acceptance criteria for confined in-water disposal.
Transportation of hazardous waste off-site	Transportation of hazardous waste off-site	Resource Conservation and Recovery Act. 40 CFR 260, 262	Includes manifest, record-keeping, and other requirements applicable to generators of hazardous waste.	Applicable to remedial actions that involve the transport of hazardous materials (i.e., dredged material)
Transportation of hazardous waste off-site	Transportation of hazardous waste off-site	Resource Conservation and Recovery Act. 40 CFR 263	Sets forth standards for transporters of hazardous wastes, including receipt of an EPA identification number and manifesting requirements.	Relevant and appropriate for remedial actions that involve the transport of hazardous materials (i.e., dredged material).
Transportation of and storage and disposal of hazardous waste off-site	Transportation of and storage and disposal of hazardous waste off-site	Resource Conservation and Recovery Act. 40 CFR 264 and 265	Management standards including record keeping, requirements for particular units such as tanks or containers, and other requirements applicable to owners and operators of hazardous waste treatment, storage and disposal facilities.	Relevant and appropriate to remedial actions that involve the off-site transport of hazardous materials for storage and/or disposal (i.e., dredged material).
Disposal of samples and remedial waste	Disposal of samples and remedial waste	Resource Conservation and Recovery Act. 40 CFR 268	Places land disposal restrictions, including treatment standards and related testing, tracking and record keeping requirements on hazardous waste.	Applicable for waste generated from remedial process and analyzed samples transported off site for disposal.
Upland and in-water disposal of dredge material	Upland and in-water disposal of dredge material	RCRA – Solid Waste. 40 CFR 257 Subpart A	Establishes criteria for determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment.	RCRA Solid Waste requirements may be relevant and appropriate to remedial actions that result in upland or in-water disposal of dredged material. Requirements for the management of solid waste landfills may be relevant and appropriate to upland disposal.
Transportation of hazardous waste off-site	Transportation of hazardous waste off-site	Hazardous Materials Transportation Act. 49 USC §5101 et seq. 40 CFR Parts 171-177	Establishes requirements for acceptance and transportation of hazardous materials by private, common, or contract carriers by motor vehicle.	Hazardous Materials Transportation Act requirements are applicable to remedial actions that involve the transport of hazardous materials (i.e., dredged material).
Onsite treatment, disposal, storage of hazardous waste	Onsite treatment, disposal, storage of hazardous waste	Hazardous Waste and Hazardous Materials II. ORS 466.005(7) OAR 340-102-0011 - Hazardous Waste Determination	Defines "Hazardous Waste" and the rule contains the criteria by which anyone generating residue must determine if that residue is a hazardous waste.	Specifies substantive requirements if remedial action will involve on-site treatment, disposal, or storage of RCRA-listed or characteristic hazardous waste. (Note: off-site treatment, storage, or disposal subject to all administrative and substantive state requirements.)
Onsite treatment, disposal, storage of hazardous waste	Onsite treatment, disposal, storage of hazardous waste	Hazardous Waste and Hazardous Materials II. Identification and Listing of Hazardous Waste OAR 340-101-0033	Identifies additional residuals that are subject to regulation as hazardous waste under state law.	Specifies requirements if remedial action will involve on-site treatment, disposal, or storage of additional listed wastes.
Onsite treatment, disposal, storage of non-hazardous waste	Onsite treatment, disposal, storage of non-hazardous waste	Solid Waste: General Provisions. ORS 459.005, OAR 340-093, 340-094	Substantive Requirements for the location, design, construction, operation, and closure of solid waste management facilities.	Applicable if upland disposal facility contemplated on-site for solid, nonhazardous, waste disposal, handling, treatment, or transfer. (Note: off-site transfer, treatment, handling, or disposal subject to all administrative and substantive state requirements.)

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Onsite treatment, disposal, storage of non-hazardous waste	Onsite treatment, disposal, storage of non-hazardous waste	Solid Waste: Land Disposal Sites Other than Municipal Solid Waste Landfills ORS 459.015, OAR 340-095	Requirements for the management of solid wastes at land disposal sites other than municipal solid waste landfills.	Applicable to the on-site management and disposal of contaminated sediment, soil, and/or groundwater.
Actions handling PCB remediation wastes and PCB containing material	Actions handling PCB remediation wastes and PCB containing material	Toxic Substances Control Act, 15 USC §2601 et seq., 40 CFR Part 761.60-761.79	Establishes requirements for handling, storage, and disposal of PCB-containing materials, including PCB remediation wastes, and sets performance standards for disposal technologies for materials/wastes with concentrations in excess of 50 mg/kg. Establishes decontamination standards for PCB contaminated debris.	TSCA requirements are applicable to the handling of contaminated material, debris, or surface water with PCB contamination.
Risk-based limits protective of human health for air emissions associated with soil or sediment removal	Risk-based limits protective of human health for air emissions associated with soil or sediment removal	Clean Air Act, 40 CFR Parts 50 and 52	Air emissions from stationary and mobile sources that may be generated that creates threats to human health as defined in the regulations.	Relevant and Appropriate to remedial activities that generate air emissions.
Actions generating air emissions	Actions generating air emissions	Oregon Air Pollution Control ORS 468A et. seq., General Emissions Standards OAR 340-226	DEQ is authorized to administer and enforce Clean Air program in Oregon. Rules provide general emission standards for fugitive emissions of air contaminants and require highest and best practicable treatment or control of such emissions.	Applicable to remedial actions taking place in on-site uplands. Could apply to earth-moving equipment, dust from vehicle traffic, and mobile-source exhaust, among other things.
Actions generating air emissions	Actions generating air emissions	Fugitive Emission Requirements OAR 340-208	Prohibits any handling, transporting, or storage of materials, or use of a road, or any equipment to be operated, without taking reasonable precautions to prevent particulate matter from becoming airborne. These rules for “special control areas” or other areas where fugitive emissions may cause nuisance and control measures are practicable.	Applicable to remedial actions taking place in on-site uplands. Could apply to earth-moving equipment, dust from vehicle traffic, and mobile-source exhaust, among other things.
Actions that may affect fish and wildlife	Actions that may affect fish and wildlife	Fish and Wildlife Coordination Act. 16 USC 662, 663 50 CFR 6.302(g)	Requires federal agencies to consider effects on fish and wildlife from projects that may alter a body of water and mitigate or compensate for project-related losses, which includes discharges of pollutants to water bodies.	Potentially applicable to determining impacts and appropriate mitigation, if necessary, for effects on fish and wildlife from filling activities or discharges from point sources.
Presence of protected species	Presence of protected species	ODFW Fish Management Plans for the Willamette River. OAR 635, div 500	Provides basis for in-water work windows in the Willamette River.	Potentially applicable to timing of implementation of the remedial action due to presence of protected species at the site.
Actions that may affect marine mammals	Actions that may affect marine mammals	Marine Mammal Protection Act. 16 USC §1361 et seq. 50 CFR 216	Imposes restrictions on the taking, possession, transportation, selling, offering for sale, and importing of marine mammals.	Applicable to remedial actions that have the potential to affect marine mammals.
Actions that may affect migratory birds	Actions that may affect migratory birds	Migratory Bird Treaty Act. 16 USC §703 50 CFR §10.12	Makes it unlawful to take any migratory bird. “Take” is defined as pursuing, hunting, wounding, killing, capturing, trapping and collecting.	Applicable to remedial actions that have the potential to effect a taking of migratory birds.

LWG Comments on Table 2.1.2. Action-Specific ARARs for Remedial Action at the Portland Harbor Superfund Site

Action	LWG Comments
Actions that discharge dredged or fill material into navigable waters	
Actions that discharge pollutants to waters of U.S.	
Actions that discharge pollutants to waters of U.S.	
Actions resulting in discharges to waters of the State of Oregon, including removal and fill activities	
Actions resulting in discharges to waters of the State of Oregon, including removal and fill activities	
Actions resulting in discharges to waters of the State of Oregon, including removal and fill activities	OAR 141-085-0765 should be included in column B.

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Actions in federal navigation channels	
Transportation of hazardous waste off-site	
Transportation of hazardous waste off-site	The comment should be revised as follows: "Applicable to remedial actions that involve the transport of hazardous waste (i.e., dredged material)."
Transportation of hazardous waste off-site	The LWG is not sure why this one is "relevant and approprate" instead of "applicable." It should be revised to: "Applicable to remedial actions that involve the transport of hazardous waste (i.e., dredged material)."
Transportation of and storage and disposal of hazardous waste off-site	The LWG is not sure why this one is "relevant and approprate" instead of "applicable." It should be revised to: "Applicable to remedial actions that involve the transport of hazardous waste (i.e., dredged material)."
Disposal of samples and remedial waste	This regulation is applicable to hazardous wastes, not remediation waste. It should read "Applicable to hazardous waste transported offsite for disposal."
Upland and in-water disposal of dredge material	
Transportation of hazardous waste off-site	
Onsite treatment, disposal, storage of hazardous waste	
Onsite treatment, disposal, storage of hazardous waste	
Onsite treatment, disposal, storage of non-hazardous waste	

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Onsite treatment, disposal, storage of non-hazardous waste	
Actions handling PCB remediation wastes and PCB containing material	
Risk-based limits protective of human health for air emissions associated with soil or sediment removal	
Actions generating air emissions	
Actions generating air emissions	
Actions that may affect fish and wildlife	
Presence of protected species	
Actions that may affect marine mammals	
Actions that may affect migratory birds	

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 4/3/2015 4:30:40 PM
Subject: RE: Section 2 FS Review Comments

I didn't either. Just wanted you to be aware of it.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Cora, Lori
Sent: Thursday, April 02, 2015 3:56 PM
To: Koch, Kristine
Subject: RE: Section 2 FS Review Comments

I have no particular or special information to disagree with DEQ's comment. We don't refer to Table 31 in the ARAR tables. I think the State's promulgated numeric toxics standards are set out in Tables 30 and 40 and that is what we refer to in our ARARs chart. Other "guidance" criteria are not ARAR if they are not enforceable or approved by EPA as WQS.

Rochelle Labiosa in the Office of Water is responsible for Oregon water quality standard approvals. She may be a good resource the status of Oregon's WQS.

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From: Koch, Kristine
Sent: Thursday, April 02, 2015 1:59 PM
To: Cora, Lori
Subject: RE: Section 2 FS Review Comments

See comment on Table 2.1-4

Kristine Koch
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From: Cora, Lori
Sent: Wednesday, April 01, 2015 4:33 PM
To: Koch, Kristine
Subject: RE: Section 2 FS Review Comments

Hi, Kristine. I don't see any DEQ comments on ARARs. Am I missing something?

Lori Houck Cora | Assistant Regional Counsel
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From: Koch, Kristine
Sent: Tuesday, March 31, 2015 2:44 PM
To: Cora, Lori
Subject: FW: Section 2 FS Review Comments

Here are DEQ's comments. I thought I had already sent them to you.

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From: GAINER Tom [mailto:GAINER.Tom@deq.state.or.us]
Sent: Wednesday, March 25, 2015 10:48 AM
To: Koch, Kristine
Cc: MCCLINCY Matt; GAINER Tom; poulsen.mike@deq.state.or.us; PETERSON Jenn L; PARRETT Kevin; JOHNSON Keith
Subject: Section 2 FS Review Comments

Kristine-

Below are DEQ's comments on Section 2 of the 2/23/2015 Portland Harbor draft FS. DEQ sent EPA comments on the previous version of Section 2 on 9/4/2014 and responses were provided; DEQ is not repeating previously submitted comments. Please contact myself or Matt McClincy if you have questions.

Thanks-

Tom Gainer, P.E.

Project Manager/Environmental Engineer

Oregon Department of Environmental Quality, NW Region

503-229-5326

This spring, DEQ's Northwest Region Office will be moving to a new location - the 700 Lloyd Building at 700 NE Multnomah St., Suite #600, Portland, OR 97232. The target date for operating at the new location is May 26th, 2015.

Section 2.2, RAO 8 Suggest striking MCLs from this RAO as they are not relevant to ecological receptors.

Section 2.2.1

1. Identification of Contaminants of Concern, Weak Lines of Evidence: It is unclear how COCs were eliminated based on representing a weak line of evidence, and how they are tied to COCs in the BERA . It is unclear if the designation of a weak line was for one or all media in which it was identified. For example, diesel range hydrocarbons were identified in both sediment predictive models (LRM) and transition zone water. Additionally, it is unclear if spatial scale of exceedance harbor wide was a consideration in defining those as weak lines of evidence. While some COCs are found primarily in one area (e.g. trimethylbenzenes, off GASCO) it is unclear if this results in their designation as weak lines. A better way to state it would be that they are strong and appropriate lines for a given river mile (source) within the larger Site. This is also a more comprehensive way to connect upland source exceedances in groundwater with pore water exceedances in sediment. A table that lists those lines of evidence designated as weak, along with the reasoning, would be a better way to review this section.

2. Co-location with other contaminants: DEQ suggests that EPA name all contaminants as COCs, including those co-located with other contaminants, and then indicate that focusing on co-located COCs may achieve protectiveness. Dropping contaminants as COCs may hinder the ability to ensure that contaminants are adequately evaluated.

3. Related Contaminants Addressed by Other Contaminants (and Appendix B2, Section 1.3): The text states that Total DDD, DDE and DDT were grouped for PRG development and the individual sums were eliminated. For ecological risk PRG tables, both DDX and DDE are listed. Please note that DDE is the COC that came through the risk assessment for piscivorous birds, and that the DDX TRV may not be protective of DDE effects. Unlike the DDE TRV in the BERA, the ATLs calculated based on the individual and population-based TRVs for DDX of 0.227 and 2.27 mg/kg-day generally exceed concentrations considered protective of fish-eating birds. Due to the significant differences in the TRVs for the DDE and DDX, DEQ does not believe that DDE effects will be sufficiently represented by DDX and recommends that DDE be the primary PRG. Alternatively, a DDX TRV that better considers DDE effects could be used as a surrogate for transformation.

Table 2.1-4 This table identifies a number of values from DEQ Water Table 31 Aquatic Life Water Quality Guidance Values for Toxic Pollutants as DEQ Ambient Water Quality Criteria (acute and chronic). Values from Table 31 are not DEQ AWQC. Table 2.1-4 should be edited accordingly.

Table 2.2-1

1. We suggest adding headers (*e.g.*, Drinking Water/Direct Contact) under RAO 3 and RAO 4. In general, the PRGs for RAO 3 and RAO 4 are identical. Table 2.2-3 provides the basis for selection of the COCs for each RAO. In some cases, the basis for a COC is provided but there is no PRG (*e.g.*, PBDE for RAO 3), and in other cases there is a PRG, but no basis provided in Table 2.2-3 (*e.g.*, zinc PRG for RAO 3, aldrin and dieldrin for RAO 4).

2. A beach PRG for RAO 1 is not provided, although a basis is presented in Table 2.2-12.

3. Footnotes 16 and 17 are not included.

4. RAO 8, Manganese PRG: The chronic criteria of 120 ug/L to screen risks to aquatic organisms from exposure to dissolved manganese (Mn) is a tier II water quality

benchmark, published in 1996 by Suter and Tsao (Suter GW, Tsao CL, 1996, Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 revision, Prepared for U.S. Department of Energy Office of Environmental Management, Risk Assessment Program, Health Sciences Research Division). In a November 25, 2014 technical memo addressed to EPA, Windward Environmental, on behalf of the LWG, proposed revising the Mn PRG based on a more robust set of toxicity tests than those used by Suter and Tsao and additional studies that demonstrate Mn toxicity is influenced by water hardness. Windward compiled bioassay results from published and unpublished studies and employed EPA protocols to derive acute and chronic SLVs for Mn based on hardness.

DEQ Cleanup has been working on internal guidance for project managers on issues associated with Mn. This effort included a review of the Windward Environmental memo, as DEQ supports the development of a hardness-based SLV and would like to match the Portland Harbor Mn PRG with the Mn risk values identified by our work group. This DEQ review of the Windward memo concluded:

A. Much of the data used by Windward to derive acute and chronic criteria does not appear to meet the guidelines for minimum data quality set out by Stephan (Stephan CE, Mount DI, Hansen DJ, Gentile JH, Chapman GA, Brungs WA, 1985, Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses, PB85-227049, Office of Research and Development, US Environmental Protection Agency, Washington, DC.) and followed by Suter and Tsao (1996). DEQ has questions regarding the following data quality issues:

- Absence of information on test conditions
- Use of non-native species
- Accuracy of data transcription from the literature

B. Re-calculation of the CMC based only on those tests that meet EPA guidelines may result in a different value than those presented by Windward.

Recommendations:

a. Explicitly state the criteria used for including bioassay tests in the data compilation and confirm the studies included meet these criteria.

b. When testing protocols deviate from EPA guidelines, explain the mitigating factors or circumstances that warrant or justify inclusion of the data.

c. Eliminate exotic species from the calculations unless supporting justification is provided.

d. Identify all deviations from EPA protocols in calculating CMCs and justify the excursion.

e. Review hardness and contaminant concentration data for accuracy, and recalculate hardness-toxicity relationship.

f. Re-calculate FAVs and CMCs following the above corrections.

The following detail is provided to support the above conclusions and recommendations.

Windward compiled bioassay data drawn from studies of Mn toxicity conducted between 1960 and 2012. However, it appears much of the data presented in the tech memo does not meet the test guidelines or data quality objectives described in Stephen and utilized by other investigators such as Suter and Tsao (1996) in developing Tier II benchmarks. Deviations from Stephen (1985) and Suter and Tsao (1996) include:

•□□□□□□□□ Guidelines regarding variation in acute values indicate " *If the acute values within a species or among species in a genus differ by a factor of 10 or more, the higher values were excluded, and those that are within the factor of 10 range were used to attain a more conservative estimate.*"

In Table 1 of the Windward memo, this guideline was not followed for the following species: *Chironomus tentans, Daphnia magna, Oncorhynchus mykiss,* and *Pimephales promelas.*

•□□□□□□□□ Stephan (1985) also indicates that only tests with essential information on basic test conditions and protocols be included in the calculations. Data included from several investigators, representing 33 of 82 individual tests presented in Table 1, did not report: 1) the type of exposure (static, renewal, or flow-through), 2) whether the contaminant of interest was sampled during the test, or 3) the duration of the test. The majority of these bioassays are attributed to ENSR (1990, 1992, 1994 and 1996).

•□□□□□□□□ For several genera and species only one test result is reported. A partial list of these includes: *Aeolosoma sp.* (oligochete worm), *Agosia chrysogaster (longfin dace), Anodanta imbecillis (freshwater mussel), Aselius aquaticus (isopod), Bufo boreus (western toad), Colise fasciata (giant gourami), Crangonyx pseugracillis (amphipod), Dutephrynus melanostictus (Asian common toad), Lampsillius siliquoidea (fatmucket clam).*

Inclusion of these species, most of which represent the adult stage of their lifecycle rather than the more sensitive embryonic or juvenile stages has an effect on the FCV. Although only the lowest 4 GMAVs are included in the calculations, the number of species with GMAVs is a factor. These species represent the most tolerant of the organisms used in the calculations. The LC50s for several of these organisms are listed below along with their rank in tolerance. (1) *Crangonyx pseugracillis,* 694,000 ug/L; (2) *Colise fasciata*, 542,969 ug/L; (3) *Aselius aquaticus,* 330,000 ug/L; (4) *Bufo boreus,* 211,027 ug/L; (6) *Dutephrynus melanostictus,* 81,261 ug/L.

The use of these test results is questionable in the derivation of acute criteria due to the limited amount, quality, applicability, and/or age of the data. Studies included in the report date as early as 1960, and although available to previous researchers like Suter and Tsao (1996) were not used or referred to by them in deriving acute and chronic criteria. The authors of the Windward memo do not discuss the sources and quality of the data and what guidelines they used when deciding to include/exclude the results of a study.

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For completeness and for consistency with DEQ's approach for calculating TPH risk-based concentrations, we added individual chemical constituents to Table 1. Calculations were performed the same as for chemical fractions. We note that calculated screening levels for individual constituents are typically much higher than screening values based on benthic toxicity.

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Conclusion

To create a more consistent and defensible approach, we are suggesting modifications to EPA's approach for calculating screening levels for petroleum hydrocarbon fractions. The one modification that results in a substantive change to screening values is a correction to maximum solubility values for aromatic fractions. After making this revision, it is clear to us that it is important to have screening levels for higher molecular weight aromatic fractions to evaluate potential narcosis effects on aquatic organisms.

Tables 2.2-6 and 2.2-7 The RSLs for RAOs 3 and 4 do not appear to be from the current EPA table (January 2015). There are minor differences for most of the chemicals.

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Section 1.2, Sediment PRGs based on Ingestion of Biota (Prey) Please include calculations related to the use of a weighted mean based on prey consumption portions.

Section 1.3, Sediment PRG for Piscivorous Bird Egg Unlike the DDE TRV in the BERA, the ATLs calculated based on the individual and population-based TRVs for DDX of 0.227 and 2.27 mg/kg-day generally exceed concentrations considered protective of fish-eating birds. Due to the significant differences in the TRVs for the DDE and DDX, DEQ does not believe that DDE effects will be sufficiently represented by DDX and recommends that DDE be the primary PRG. See also Comment #3 on Section 2.2.1.

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 3/31/2015 9:44:28 PM
Subject: FW: Section 2 FS Review Comments
Eco Screening Values for TPH Fractions.xls

Here are DEQ's comments. I thought I had already sent them to you.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: GAINER Tom [mailto:GAINER.Tom@deq.state.or.us]
Sent: Wednesday, March 25, 2015 10:48 AM
To: Koch, Kristine
Cc: MCCLINCY Matt; GAINER Tom; poulsen.mike@deq.state.or.us; PETERSON Jenn L; PARRETT Kevin; JOHNSON Keith
Subject: Section 2 FS Review Comments

Kristine-

Below are DEQ's comments on Section 2 of the 2/23/2015 Portland Harbor draft FS. DEQ sent EPA comments on the previous version of Section 2 on 9/4/2014 and responses were provided; DEQ is not repeating previously submitted comments. Please contact myself or Matt McClincy if you have questions.

Thanks-

Tom Gainer, P.E.

Project Manager/Environmental Engineer

Oregon Department of Environmental Quality, NW Region

503-229-5326

This spring, DEQ's Northwest Region Office will be moving to a new location - the 700 Lloyd Building at 700 NE Multnomah St., Suite #600, Portland, OR 97232. The target date for operating at the new location is May 26th, 2015.

Section 2.2, RAO 8 Suggest striking MCLs from this RAO as they are not relevant to ecological receptors.

Section 2.2.1

1. Identification of Contaminants of Concern, Weak Lines of Evidence: It is unclear how COCs were eliminated based on representing a weak line of evidence, and how they are tied to COCs in the BERA . It is unclear if the designation of a weak line was for one or all media in which it was identified. For example, diesel range hydrocarbons were identified in both sediment predictive models (LRM) and transition zone water. Additionally, it is unclear if spatial scale of exceedance harbor wide was a consideration in defining those as weak lines of evidence. While some COCs are found primarily in one area (e.g. trimethylbenzenes, off GASCO) it is unclear if this results in their designation as weak lines. A better way to state it would be that they are strong and appropriate lines for a given river mile (source) within the larger Site. This is also a more comprehensive way to connect upland source exceedances in groundwater with pore water exceedances in sediment. A table that lists those lines of evidence designated as weak, along with the reasoning, would be a better way to review this section.

2. Co-location with other contaminants: DEQ suggests that EPA name all contaminants as COCs, including those co-located with other contaminants, and then indicate that focusing on co-located COCs may achieve protectiveness. Dropping contaminants as COCs may hinder the ability to ensure that contaminants are adequately evaluated.

3. Related Contaminants Addressed by Other Contaminants (and Appendix B2, Section 1.3): The text states that Total DDD, DDE and DDT were grouped for PRG development and the individual sums were eliminated. For ecological risk PRG tables, both DDX and DDE are listed. Please note that DDE is the COC that came through the risk assessment for piscivorous birds, and that the DDX TRV may not be protective of DDE effects. Unlike the DDE TRV in the BERA, the ATLs calculated based on the individual and population-based TRVs for DDX of 0.227 and 2.27 mg/kg-day generally exceed concentrations considered protective of fish-eating birds. Due to the significant differences in the TRVs for the DDE and DDX, DEQ does not believe that DDE effects will be sufficiently represented by DDX and recommends that DDE be the primary PRG. Alternatively, a DDX TRV that better considers DDE effects could be used as a surrogate for transformation.

Table 2.1-4 This table identifies a number of values from DEQ Water Table 31 Aquatic Life Water Quality Guidance Values for Toxic Pollutants as DEQ Ambient Water Quality Criteria (acute and chronic). Values from Table 31 are not DEQ AWQC. Table 2.1-4 should be edited accordingly.

Table 2.2-1

1. We suggest adding headers (*e.g.*, Drinking Water/Direct Contact) under RAO 3 and RAO 4. In general, the PRGs for RAO 3 and RAO 4 are identical. Table 2.2-3 provides the basis for selection of the COCs for each RAO. In some cases, the basis for a COC is provided but there is no PRG (*e.g.*, PBDE for RAO 3), and in other cases there is a PRG, but no basis provided in Table 2.2-3 (*e.g.*, zinc PRG for RAO 3, aldrin and dieldrin for RAO 4).

2. A beach PRG for RAO 1 is not provided, although a basis is presented in Table 2.2-12.

3. Footnotes 16 and 17 are not included.

4. RAO 8, Manganese PRG: The chronic criteria of 120 ug/L to screen risks to aquatic organisms from exposure to dissolved manganese (Mn) is a tier II water quality benchmark, published in 1996 by Suter and Tsao (Suter GW, Tsao CL, 1996,

Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 revision, Prepared for U.S. Department of Energy Office of Environmental Management, Risk Assessment Program, Health Sciences Research Division). In a November 25, 2014 technical memo addressed to EPA, Windward Environmental, on behalf of the LWG, proposed revising the Mn PRG based on a more robust set of toxicity tests than those used by Suter and Tsao and additional studies that demonstrate Mn toxicity is influenced by water hardness. Windward compiled bioassay results from published and unpublished studies and employed EPA protocols to derive acute and chronic SLVs for Mn based on hardness.

DEQ Cleanup has been working on internal guidance for project managers on issues associated with Mn. This effort included a review of the Windward Environmental memo, as DEQ supports the development of a hardness-based SLV and would like to match the Portland Harbor Mn PRG with the Mn risk values identified by our work group. This DEQ review of the Windward memo concluded:

A. Much of the data used by Windward to derive acute and chronic criteria does not appear to meet the guidelines for minimum data quality set out by Stephan (Stephan CE, Mount DI, Hansen DJ, Gentile JH, Chapman GA, Brungs WA, 1985, Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses, PB85-227049, Office of Research and Development, US Environmental Protection Agency, Washington, DC.) and followed by Suter and Tsao (1996). DEQ has questions regarding the following data quality issues:

- Absence of information on test conditions
- Use of non-native species
- Accuracy of data transcription from the literature

B. Re-calculation of the CMC based only on those tests that meet EPA guidelines may result in a different value than those presented by Windward.

Recommendations:

a. Explicitly state the criteria used for including bioassay tests in the data compilation and confirm the studies included meet these criteria.

b. When testing protocols deviate from EPA guidelines, explain the mitigating factors or circumstances that warrant or justify inclusion of the data.

c. Eliminate exotic species from the calculations unless supporting justification is provided.

d. Identify all deviations from EPA protocols in calculating CMCs and justify the excursion.

e. Review hardness and contaminant concentration data for accuracy, and recalculate hardness-toxicity relationship.

f. Re-calculate FAVs and CMCs following the above corrections.

The following detail is provided to support the above conclusions and recommendations.

Windward compiled bioassay data drawn from studies of Mn toxicity conducted between 1960 and 2012. However, it appears much of the data presented in the tech memo does not meet the test guidelines or data quality objectives described in Stephen and utilized by other investigators such as Suter and Tsao (1996) in developing Tier II benchmarks. Deviations from Stephen (1985) and Suter and Tsao (1996) include:

•□□□□□□□□ Guidelines regarding variation in acute values indicate " *If the acute values within a species or among species in a genus differ by a factor of 10 or more, the higher values were excluded, and those that are within the factor of 10 range were used to attain a more conservative estimate.*"

In Table 1 of the Windward memo, this guideline was not followed for the following species: *Chironomus tentans, Daphnia magna, Oncorhynchus mykiss,* and *Pimephales promelas.*

•□□□□□□□□ Stephan (1985) also indicates that only tests with essential information on basic test conditions and protocols be included in the calculations. Data included from several investigators, representing 33 of 82 individual tests presented in Table 1, did not report: 1) the type of exposure (static, renewal, or flow-through), 2) whether the contaminant of interest was sampled during the test, or 3) the duration of the test. The majority of these bioassays are attributed to ENSR (1990, 1992, 1994 and 1996).

•□□□□□□□□ For several genera and species only one test result is reported. A partial list of these includes: *Aeolosoma sp.* (oligochete worm), *Agosia chrysogaster (longfin dace), Anodanta imbecillis (freshwater mussel), Aselius aquaticus (isopod), Bufo boreus (western toad), Colise fasciata (giant gourami), Crangonyx pseugracillis (amphipod), Dutephrynus melanostictus (Asian common toad), Lampsillius siliquoidea (fatmucket clam).*

Inclusion of these species, most of which represent the adult stage of their lifecycle rather than the more sensitive embryonic or juvenile stages has an effect on the FCV. Although only the lowest 4 GMAVs are included in the calculations, the number of species with GMAVs is a factor. These species represent the most tolerant of the organisms used in the calculations. The LC50s for several of these organisms are listed below along with their rank in tolerance. (1) *Crangonyx pseugracillis,* 694,000 ug/L; (2) *Colise fasciata*, 542,969 ug/L; (3) *Aselius aquaticus,* 330,000 ug/L; (4) *Bufo boreus,* 211,027 ug/L; (6) *Dutephrynus melanostictus,* 81,261 ug/L.

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To: Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]; Conley, Alanna[conley.alanna@epa.gov]
From: MacIntyre, Mark
Sent: Mon 3/23/2015 10:04:25 PM
Subject: A slightly More Pedestrian Version of Deb's PDX Dispute Talking Points
PDX Background Dispute Talking Points 03-23-15.docx

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Talking Points
Portland Harbor Background Dispute

Background

- LWG submitted a draft Remedial Investigation (RI) to EPA in June 2011.

- Among other aspects of that draft, LWG shared how they planned to calculate background contaminant concentrations for the Portland Harbor Superfund Site.

- EPA did not approve that section of LWG's RI.

- Failing to reach agreement regarding background calculation methods or approach, EPA instead provided LWG (via email) a revised section of the RI that met EPA's requirements. (Aug. 12, 2014)

- EPA's revision confirmed:

    - Their final decision to exclude certain data in terms of calculating background for indicator contaminants,
    - Identified the methodology for completing background calculations for 23 other contaminants, and
    - Directed LWG to complete background calculations for these contaminants by EPA's methodology.

- LWG disputed EPA's decision under the existing Dispute Resolution. Specifically, the issues in dispute were:
    - Did EPA follow its guidance?, and
    - Did EPA perform an analysis in a scientifically acceptable manner?

Decision

- Mr. Albright upheld EPA staff's decisions regarding the method for determining background sediment concentrations for the contaminants of concern.

- Mr. Albright found that EPA's staff decisions were rationally supported and the approach used to identify and address outliers is consistent with its guidance.

- Accordingly, Mr. Albright directed the LWG to:

    1. Incorporate the changes EPA made to Section 7 of the draft RI into the final draft RI report;
    2. Complete background threshold values for the other 23 contaminants by use of the methodology employed by EPA.
    3. Submit background calculations for the other 23 contaminants to EPA within thirty days of the date of this decision.

Questions on the decision should be directed to Rick Albright at 206-553-1847.

To: Cora, Lori[Cora.Lori@epa.gov]
From: Yamamoto, Deb
Sent: Tue 3/17/2015 11:51:10 PM
Subject: CONFIDENTIAL: PH Dispute Decision
draft LWG determination 3 16 15.docx

From: Albright, Rick
Sent: Monday, March 16, 2015 4:53 PM
To: Yamamoto, Deb; Koch, Kristine; Allen, Elizabeth
Subject: PH Dispute Decision

The latest draft is attached. Ted and I didn't get a chance to talk today so still a few things to resolve …….

To: Cora, Lori[Cora.Lori@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]
Cc: Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Koch, Kristine
Sent: Wed 3/4/2015 6:09:12 PM
Subject: RE: PH -review draft congressional briefing paper
kk_CoraCong del PH update 3- 2-15 draft.docx

Here are my comments.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Cora, Lori
Sent: Monday, March 02, 2015 12:12 PM
To: Robinson, Deborah
Cc: Koch, Kristine; Sheldrake, Sean
Subject: RE: PH -review draft congressional briefing paper

Here are my comments on the congressional briefing paper.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Cohen, Lori
Sent: Monday, March 02, 2015 11:52 AM

To: Koch, Kristine; Sheldrake, Sean; Muza, Richard; Conley, Alanna; Dunbar, Bill; Cora, Lori
Cc: Yamamoto, Deb; Grandinetti, Cami; Robinson, Deborah; Christopher, Anne; Schuster, Cindy
Subject: PH -review draft congressional briefing paper

All –

Here is a draft briefing paper for the Congressionals on Portland Harbor.

The briefings will be held the week of March 16 and we expect these to be joint briefings by Dennis McLerran, Dick Pedersen, and Jim Woolford.

Please send any comments on these key messages to Debbie Robinson no later than COB Tuesday, March 3 – she will incorporate your comments in the next draft. I will then sent it to Jim Woolford and to DEQ for review and comment.

Thanks all

Lori

To: Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 2/13/2015 4:39:26 PM
Subject: FW: LWG Response to EPA Draft RI Executive Summary
2015_RI_Executive Summary.doc
2015-02-12 Letter to EPA with RI Executive Summary.pdf

All – the attached letter is a flat out lie. We gave them the executive summary on January 13. They had 30 days to review and provide us comments. They contacted me last week and wanted to meet with me this week. I told them I was unavailable this week until Friday due to the vast amount of meetings already on my calendar. They also told me that they would not have redline of our executive summary until this Thursday for our review anyway. There was no need for us to meet until we had something to meet about. Now they are raising a lot of issues outside the process and I fear that there is going to be a big dispute on a huge number of issues in the RI report. We need to talk and discuss how to proceed ASAP!!!!!

Kristine Koch
Remedial Project Manager
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From: James McKenna [mailto:jim.mckenna@verdantllc.com]
Sent: Thursday, February 12, 2015 4:12 PM
To: Koch, Kristine
Cc: Gene Revelas (grevelas@integral-corp.com); Bob Wyatt; Jennifer Woronets
Subject: LWG Response to EPA Draft RI Executive Summary

Good afternoon Kristine. Per our communications last week I am sending you the LWG's comments on EPA's draft RI Executive Summary, as well as our recommended alternative draft Executive Summary.

Thanks,

Jim McKenna

Verdant Solutions, LLC

5111 SE 41st Avenue

Portland, Oregon 97202

Office: (503) 477-5593

Cell: (503) 309-1621

jim.mckenna@verdantllc.com

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Thursday, February 5, 2015 10:10 AM
To: James McKenna
Cc: Gene Revelas (grevelas@integral-corp.com); Bob Wyatt; Jennifer Woronets
Subject: RE: Status of the revised Draft RI Section 10 and the Draft Executive Summary

Jim – That all works for me. I'll let you know next week if we need to have further discussions on Section 10 or if we accept you suggested edits.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: James McKenna [mailto:jim.mckenna@verdantllc.com]
Sent: Wednesday, February 04, 2015 5:02 PM
To: Koch, Kristine
Cc: Gene Revelas (grevelas@integral-corp.com); Bob Wyatt; Jennifer Woronets
Subject: RE: Status of the revised Draft RI Section 10 and the Draft Executive Summary

Kristine:

Thank you for your response. We'll take the time you have available on Friday, February 13, to attempt to wrap up our discussion of Section 10. During that meeting we will walk through the LWG's suggested edits on EPA's most recent draft (provided to you via email on February 2), with the goal of resolving them during that call.

We understand that you are unavailable to meet with us to discuss the Executive Summary prior to February 12, which is the end of the 30 day review and discussion period under the RI process agreement. Therefore, the LWG will provide written comments on the Executive Summary and a recommended revised Executive Summary by February 12. If you would like to discuss these comments on February 13 (or another day), please let us know.

Thanks, Jim.

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Tuesday, February 3, 2015 8:01 AM
To: James McKenna
Cc: Gene Revelas (grevelas@integral-corp.com); Bob Wyatt; Jennifer Woronets
Subject: RE: Status of the revised Draft RI Section 10 and the Draft Executive Summary

Jim – I'm fully booked this week. I have a 2 hour time slot for a conf call next Monday between 11 and 1, or I'm free the following Friday, Feb 13 to meet in Olympia.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: James McKenna [mailto:jim.mckenna@verdantllc.com]
Sent: Monday, February 02, 2015 3:16 PM
To: Koch, Kristine
Cc: Sheldrake, Sean; Gene Revelas (grevelas@integral-corp.com); Bob Wyatt; Jennifer Woronets
Subject: Status of the revised Draft RI Section 10 and the Draft Executive Summary

Good afternoon Kristine. As I reported to you last week, the LWG has not identified any show-stoppers with the revised draft Section 10, but we do have a few suggested edits that we feel should not be controversial to EPA. Gene and I are putting the final touches on a RLSO version of Sections 10.1 and 10.2 and should have it to you shortly. Do you have time tomorrow for a 30 to 60 minute phone call so we can walk through these and see if we can come to closure? My Tuesday is wide open.

In regards to the Executive Summary, again we have received initial feedback from the LWG members and Gene and I would like to set up some time later this week to discuss this with you. It will likely take several hours (3 to 4), so if you want to meet in Olympia that would be great. I am wide open Thursday and Friday. Let me know a date and time slot that work for you.

Thanks,

Jim McKenna

Verdant Solutions, LLC

5111 SE 41st Avenue

Portland, Oregon 97202

Office: (503) 477-5593

Cell: (503) 309-1621

jim.mckenna@verdantllc.com

To: Cora, Lori[Cora.Lori@epa.gov]
From: Grandinetti, Cami
Sent: Tue 2/10/2015 11:36:28 PM
Subject: FW: Revised Agenda
Revised draft Final - DEQ-EPA PH Monthly Team Mtg Agenda - 2-11-15.docx
DEQ-EPA Strategic Relationship - Version 2-6-15.docx
DEQ PH Key Issues Table - Version 1-9-15.docx

I forgot to include you when I forwarded—sorry.

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Bill Ross [mailto:bross@rossstrategic.com]
Sent: Tuesday, February 10, 2015 12:09 PM
To: Kevin Parrett (parrett.kevin@deq.state.or.us); Grandinetti, Cami
Subject: FW: Revised Agenda

Kevin and Cami, please find attached the agenda for tomorrow's meeting of the EPA and DEQ teams on the Portland Harbor Cleanup. Also are attached the two handouts referenced in the agenda.

Please forward this to the appropriate people attending from your agencies.

Cami, can you forward to Deb the call-in number for her to use if she calls in?

I look forward to supporting you all tomorrow.

Cheers, Bill

From: Bill Ross
Sent: Tuesday, February 10, 2015 10:00 AM
To: Parrett.Kevin@deq.state.or.us; Cami Grandinetti (grandinetti.cami@epa.gov); Keith Johnson (JOHNSON.Keith@deq.state.or.us)
Subject: FW: Revised Agenda

I have edited Kevin's to tighten up what the key sections are about. Review and respond. Thanks!

From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
Sent: Tuesday, February 10, 2015 9:41 AM
To: Bill Ross
Cc: JOHNSON Keith; Grandinetti, Cami
Subject: Revised Agenda

Bill. Here's the revised agenda based on our discussion this morning. I also rotated the "presenter" between Bill, Cami, Keith and me.

-Kevin

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Sheldrake, Sean[sheldrake.sean@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Coffey, Scott[CoffeySE@cdmsmith.com]
From: Peterson, Lance
Sent: Wed 1/28/2015 7:18:29 PM
Subject: FW: Current COC, PRG and background values for PH
Table 2.2-13 and 14_PRG Summary and Basis.xlsx
Table 2.2-05_Background Concentrations.xlsx

Lori, per your request attached are the current lists of COCs, PRGs by RAO, and background concentrations provided to LWG.

Lance

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Wednesday, January 28, 2015 10:17 AM
To: Cora, Lori; Koch, Kristine
Cc: Peterson, Lance
Subject: RE: Current COC, PRG and background values for PH

Lance, could you send the latest to Lori (billable to 11E) in consultation with Scott?

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Wednesday, January 28, 2015 10:12 AM
To: Sheldrake, Sean; Koch, Kristine
Subject: Current COC, PRG and background values for PH

I was reading the letter to the RM11E folks. Can one of you send me

the list of the current COCs, PRGs by RAO, and background values sent to the LWG? Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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Table 2.2-5
Background Concentrations
Portland Harbor Superfund Site
Portland, Oregon

COCs		Background		Background - OC Corrected	
Persistent	**Units**	95% UCL	95% UPL	95% UCL	95% UPL
Total PCBs	µg/kg	4	7	6	10.5
Total PCDD/Fs	µg/kg	0.08	0.2	0.12	0.3
Hydrocarbons					
cPAH	µg/kg	8	28	12	42
Total PAH	mg/kg	0.07	0.2	0.11	0.3
Total LPAH	mg/kg	0.01	0.02	0.02	0.03
Total HPAH	mg/kg - %fines	NA	NA	NA	NA
TPH (C-10 to C-12 aliphatic/aromatic)	mg/kg	NA	NA	NA	NA
Pesticides					
Aldrin	µg/kg	ND	ND	ND	ND
Dieldrin	µg/kg	ND	ND	ND	ND
Total DDx	µg/kg	2	3	3	5
gamma-BHC (Lindane)	µg/kg	ND	ND	ND	ND
Total Chlordanes	µg/kg	0.4	0.7	0.6	1
Metals					
Arsenic	mg/kg	3	4	3	4
Cadmium	mg/kg	0.1	0.2	0.1	0.2
Chromium	mg/kg	24	32	24	32
Copper	mg/kg	26	40	26	40
Lead	mg/kg	8	10	8	10
Mercury	mg/kg	0.03	0.05	0.03	0.05
Zinc	mg/kg	77	104	77	104
Phthalates					
BEHP	µg/kg	40	114	60	171
Butyltins					
TBT	mg/kg	ND	ND	ND	ND
Other					
PBDE	µg/kg	ND	ND	ND	ND
Toxicity					
Benthic Toxicity		NA	NA	NA	NA

Notes:
µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
ND - not detected
OC - organic carbon
UCL - Upper Confidence Limit
UPL - Upper Prediction Limit

To: Cora, Lori[Cora.Lori@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]
Cc: Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]
From: Sheldrake, Sean
Sent: Wed 1/28/2015 6:16:51 PM
Subject: RE: Current COC, PRG and background values for PH

Lance, could you send the latest to Lori (billable to 11E) in consultation with Scott?

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

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206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Wednesday, January 28, 2015 10:12 AM
To: Sheldrake, Sean; Koch, Kristine
Subject: Current COC, PRG and background values for PH

I was reading the letter to the RM11E folks. Can one of you send me

the list of the current COCs, PRGs by RAO, and background values sent to the LWG? Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Cohen, Lori[Cohen.Lori@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 1/9/2015 2:35:45 PM
Subject: FW: Portland Harbor - Draft Final FS Section 1 and Appendix A - LWG Comments
2015_01_09 EPA responses_Combined LWG Edits Portland Harbor FS Section 1 8-28-2014.doc
2015-01-09 Proposed Final Portland Harbor FS Section 1.docx

Kristine Koch
Remedial Project Manager
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From: Koch, Kristine
Sent: Friday, January 09, 2015 6:35 AM
To: 'Jennifer Woronets'
Cc: Jim McKenna (jim.mckenna@verdantllc.com); Carl Stivers; Patty Dost; Bob Wyatt; Sheldrake, Sean; Allen, Elizabeth (allen.elizabeth@epa.gov)
Subject: RE: Portland Harbor - Draft Final FS Section 1 and Appendix A - LWG Comments

Bob and Jim – This email is to clarify that the EPA response to LWG comments on Section 1 was handled consistent with our revised FS process. On July 8, 2014, EPA provided a draft of the modifications made to the draft FS: Sections 1 and 2 of the draft FS were combined into one section (Section 1). On August 14, the LWG provided redline/strikeout comments to EPA. EPA considered those comments and provided written responses on August 25, 2014. On August 29, 2014, EPA received additional comments with redline/strikeout modifications to the text from the LWG. EPA considered the comments and modifications LWG made to the text and considered those in finalizing the text. However, EPA has further reviewed the redline/strikeout edits provided by the LWG on August 29 and has made some additional modifications to the text. EPA is providing an updated version of the text of FS Section 1 with our response to the redline/strikeout modifications and comments by Amanda Shellenberger in the August 29 version of the document (attached). The comments provided by the LWG on August 29, 2014,

had already been discussed previously, thus EPA is not providing additional responses to those comments.

One of the LWG's comments provided on August 14 was that a description of the FS database be included in the text of Section 1. EPA agreed and requested that the LWG provide the language describing the database by August 29, 2014. On September 17, 2014, the LWG provided the text for the description of the FS database. EPA considered this language in making the final edits. The other discrete issue came out of the meeting on August 25, 2014. The LWG claimed that the information in the text of FS Section 1 lacked accuracy regarding the fate and transport of contaminants. EPA requested that the LWG provide corrections to the language by August 29, 2014. On September 17, 2014, the LWG completely deleted EPA's discussion of fate and transport and replaced it with the LWG's complete CSM language from the draft FS that EPA had removed. Since this was not what was agreed to in the August 25, 2014 meeting, EPA did not consider these edits.

I would also like to clarify that EPA considered edits to the FS in regard to the August 22, 2014 letter from Black Helterline LLP on behalf of Northwest Pipe and the August 29, 2014 letter from Golder Associates Inc. and AMEC on behalf of Bayer CropScience (BCS). EPA disagrees that August 22, 2014 letter implied legal action or that we deleted the information solely based on the information provided in the letter. Black Helterline LLP demanded that EPA remove what they believed to be incorrect information regarding their client. EPA consulted with Oregon DEQ project managers and EPA's lead RPM for source control to determine if the requested changes in both letters were factually correct. DEQ and EPA project managers determined that the information was correct; thus, EPA made the requested modifications to the text of FS Section 1.

Let me know if you have any concerns with these clarifications.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Friday, January 02, 2015 4:34 PM
To: Koch, Kristine
Cc: Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Carl Stivers; Patty Dost; Bob Wyatt; Sheldrake, Sean
Subject: RE: Portland Harbor - Draft Final FS Section 1 and Appendix A - LWG Comments

Kristine,

The following email is provided on behalf of Jim.

Kristine:

Attached please find LWG comments on your December 18, 2014 proposed final draft of Section 1 of the revised FS. EPA provided a draft of Section 1 of its revised FS on July 8, 2014 and engaged in technical discussions with the LWG that concluded on August 29, 2014. On August 29, the LWG submitted to EPA a letter and attachments that included a list of concerns related to EPA's Section 1, along with a redline-strikeout set of suggested edits to Section 1 (the LWG provided text on two discrete issues at EPA's request on September 17 based on new proposed edits from EPA on August 25).

You indicated by telephone on December 19 that you would not be providing a written response to the August 29 comments and that further technical discussion was unnecessary, because the LWG's concerns were fully vetted during the original review period. Because it does not appear that EPA incorporated the LWG's August 29 comments into the December 18 draft, we are reiterating those comments to provide a clear record of our ongoing significant concerns with EPA's "streamlined" Section 1. We hope EPA will consider these comments before providing its final directed changes on all sections of the FS pursuant to the December 17 revisions to the FS Revision Process Agreement.

Please note that, although we are not requesting an extension to the 15 day technical resolution period, we are providing a copy of the comments to the EPA and LWG senior managers because

these comments identify key LWG concerns about the revised FS.

If you need further information or would like to discuss these comments, please let us know.

Thanks, Jim.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

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Portland, OR 97204

503-972-5014

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From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Thursday, December 18, 2014 2:19 PM
To: Bob Wyatt; Jim McKenna (jim.mckenna@verdantllc.com)
Cc: Jennifer Woronets; Sean Sheldrake
Subject: Portland Harbor - Draft Final FS Section 1 and Appendix A

Bob and Jim – Thank you for the input the LWG provided on EPA's modification to the Portland Harbor FS Section 1, which replaces Sections 1 and 2 of the draft FS, and Appendix A, which

replaces Appendix R of the draft FS. EPA has carefully considered all comments in preparing the draft final document. Per the FS revision process modified on December 17, 2014, EPA is providing the draft final versions of FS Section 1 and Appendix A. EPA's contractor sent you the revised FS database in a separate email. We look forward to completing the remaining sections of the FS with you.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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1.0 INTRODUCTION

This report presents the Feasibility Study (FS) for the Portland Harbor Superfund Site in Portland, Oregon (Figure 1-1). Portland Harbor was evaluated and proposed for inclusion on the National Priorities List (NPL) pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund), 42 U.S.C. §9605, by the U.S. Environmental Protection Agency (EPA) and formally listed as a Superfund Site in December 2000. The lead agency for this site is EPA.

The basis of this FS is environmental data collected and compiled by the Lower Willamette Group (LWG) and other parties since the inception of the Portland Harbor Remedial Investigation and Feasibility Study (RI/FS) in 2001[1]. The LWG is performing the remedial investigation (RI) and FS for the Portland Harbor Superfund Site (Site) pursuant to an EPA Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (AOC; EPA 2001, 2003, 2006). Oversight of LWG's Portland Harbor RI and FS is being provided by EPA with support from Oregon Department of Environmental Quality (DEQ).

The RI (insert citation) has been completed and has characterized the Site sufficiently to define the nature and extent of the source material and the Site-related contaminants based on data collected through July of 2010.. Baseline ecological and human health risk assessments (Windward 2013; Kennedy Jenks 2013) have also been completed. The site characterization and baseline risk assessments are sufficient to complete the FS for the Site.[2]

This FS focuses on approximately ten miles of the lower Willamette River from RM 1.9 (at the upriver end of the Port of Portland's Terminal 5) to RM 11.8 (near the Broadway Bridge), sometimes referred to as the "site" in this FS for convenience. The terms site, harbor-wide, and site-wide used in this FS generally refer to the sediments, pore water, and surface water within this reach of the lower Willamette River, not to the upland portions (above elevation 13.3 feet North American Vertical Datum of 1988 [NAVD88]) of the Portland Harbor Superfund Site.

This FS is consistent with CERCLA, as amended (42 United States Code [U.S.C.] 9601 et seq.), and its regulations, the National Oil and Hazardous Substances Pollution

[1] Upland source control efforts, including site-specific upland source control studies and implementation of source control measures, are performed under the oversight of the Oregon Department of Environmental Quality and are not within the scope of the Agreement and Order on Consent and Statement of Work for the in-water portion of the Site.

[2] Although this section identifies many specific sources of contamination, neither this section nor this report generally is intended as an exhaustive list of current or historical sources of contamination.

For discussion purposes only – do not cite or quote. This draft document has been provided to EPA to facilitate EPA's comment process on the Draft FS in order for LWG to finalize the FS. The comments or changes (including redlines) on this document may not reflect LWG positions or the final resolution of the EPA comments.
Draft

Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), commonly referred to as the National Contingency Plan (NCP) and was prepared in accordance with EPA guidance. Guidance documents used in preparing this FS include:

- *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988)
- *Clarification of the Role of Applicable or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals under CERCLA* (EPA 1997a)
- *Rules of Thumb for Superfund Remedy Selection* (EPA 1997b)
- *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (EPA 2002)
- *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (EPA 2005)
- *Technical Resource Document on Monitored Natural Recovery* (EPA 2014)

1.1 PURPOSE AND ORGANIZATION OF REPORT

The purpose of the FS is to identify, develop, screen, and evaluate a range of remedial alternatives to reduce risks from contaminated media to acceptable levels and to provide the regulatory agencies with sufficient information to select a remedy that meets the requirements established in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This FS report is comprised of four sections as described below.

- Section 1 – Introduction: Provides a summary of the Site RI, including Site description, Site history, nature and extent of contamination, contaminant fate and transport, and baseline human health and ecological risks.
- Section 2 - Identification and Screening of Technologies: Develops remedial action objectives (RAOs), develops preliminary remediation goals (PRGs) for addressing human health and ecological risks posed by contaminants in sediment and tissue, develops general response actions (GRAs) for each medium of interest, identifies areas of media to which general response actions might be applied, identifies and screens remedial technologies and process options, and

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identifies and evaluates technology process options to select a representative process for each technology type retained for consideration.

- Section 3 - Development and Screening of Alternatives: Presents a range of remedial alternatives developed by combining the feasible technologies and process options. The alternatives are then refined and screened to reduce the number of alternatives that will be analyzed in detail. This screening aids in streamlining the feasibility study process while ensuring that the most promising alternatives are being considered.

- Section 4 - Detailed Analysis of Alternatives: Provides the detailed analysis of each alternative with respect to the following seven criteria: 1) overall protection of human health and the environment, 2) compliance with ARARs, 3) long-term effectiveness and permanence, 4) reduction of toxicity, mobility, or volume through treatment, 5) short-term effectiveness, 6) implementability, and 7) cost. In addition to the detailed analysis, a comparative analysis of remedial action alternatives is also presented in this section. EPA also recognizes that this site affects many stakeholdersalong the riverand the evaluation of remedial alternatives considers impacts to these communities.

1.2 BACKGROUND INFORMATION

1.2.1 Site Description

The Willamette River originates within Oregon in the Cascade Mountain Range and flows approximately 187 miles north to its confluence with the Columbia River, and is one of 14 American Heritage Rivers in the country. It is the 19th largest river in the United States, and drains 11.7 percent of the State of Oregon. As Oregon's major port and population center, the lower Willamette River sees a great variety of uses including shipping, industrial, fishing, recreational, natural resource, and other uses. The lower reach of the Willamette River from River Mile (RM) 0 to approximately RM 26.5 is a wide, shallow, slow moving segment that is tidally influenced with tidal reversals occurring during low flow periods as far upstream as RM 15. The river segment between RM 3 and RM 10 is the primary depositional area of the lower Willamette River system. The lower reach has been extensively dredged to maintain a 40-foot deep navigation channel from RM 0 to RM 11.7.

The Portland Harbor RI/FS Study Area is located along the lower reach of the lower Willamette River in Portland, Oregon known as Portland Harbor (**Figure 1-1**). The RI/FS Study Area extends from river mile (RM) 1.9 to 11.8 and up to a vertical elevation of 13.3 feet NAVD88. . While the harbor area is extensively industrialized, it occurs within a region characterized by commercial, residential, recreational, and

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agricultural uses. Land use along the lower Willamette River in the harbor includes marine terminals, manufacturing, and other commercial operations, as well as public facilities, parks, and open spaces. **Figures 1.2-1a** through **1.2-1d** illustrate land use zoning within the lower Willamette River as well as waterfront land ownership. The State of Oregon owns certain submerged and submersible lands underlying navigable and tidally influenced waters. The ownership of submerged and submersible lands is complicated and has changed over time (**Figure 1.2-2**).

Today, the Willamette River is noticeably different from the river prior to industrial development that commenced in the mid to late 18th century. Historically, the Willamette was wider, had more sand bars and shoals, and fluctuated greatly in volume. In contrast, the main river now has been redirected and channelized, several lakes and wetlands in the lower floodplain have been filled and agricultural lands converted to urban or industrial areas. The end result is a river that is deeper and narrower than it was historically with higher banks that prevent the river from expanding during high-flow events. The Willamette River channel, from the Broadway Bridge (RM 11.6) to the mouth (RM 0), currently varies in width from 600 to 1,900 feet. Further, the installation of a series of dams moderate fluctuations of flow in the lower Willamette River.

Little, if any, original shoreline or river bottom exists that has not been modified by the above actions, or as a result of them. Much of the shoreline has been raised, filled, stabilized, and/or engineered and contains overwater piers and berths, port terminals and slips, stormwater and industrial wastewater outfalls and combined sewer overflows (CSOs), and other engineered features. Constructed structures, such as wharfs, piers, floating docks, and pilings, are especially common in Portland Harbor where urbanization and industrialization are most prevalent. These structures are built largely to accommodate or support shipping traffic within the river and to stabilize the riverbanks for urban development. Constructed structures are clearly visible in the aerial photos provided in **Figures 1.2-3a** through **1.2-3n**

Armoring to stabilize banks covers approximately half of the harbor shoreline, which is integral to the operation of activities that characterize Portland Harbor. Riprap is the most common bank-stabilization measure. However, upland bulkheads and rubble piles are also used to stabilize the banks. Some riverbank areas and adjacent parcels have been abandoned and allowed to revegetate, and beaches have formed along some modified shorelines due to relatively natural processes.

A federal navigation channel, maintained to a depth of -40 feet with an authorized depth of -43 feet, extends from the confluence of the lower Willamette River with the Columbia River to RM 11.7 (**Figure 1.2-4**). The lower Willamette River federal

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navigation project was first authorized in 1878 to deepen and maintain parts of the Columbia River and lower Willamette River with a 20-foot minimum depth. The depth of the navigation channel has been deepened at various intervals since that time (i.e., increased to 25 feet in 1899, 30 feet in 1912, 35 feet in 1930, and 40 feet in 1962). Container and other commercial vessels regularly transit the river. Certain parts of the river require periodic maintenance dredging to keep the navigation channel at its maintained depth. In addition, the Port of Portland and other private entities periodically perform maintenance dredging to support access to dock and wharf facilities. Dredging activity has greatly altered the physical and ecological environment of the river in Portland Harbor.

Development of the river has resulted in major modifications to the ecological function of the lower Willamette River. However, a number of species of invertebrates, fishes, birds, amphibians, and mammals, including some protected by the Endangered Species Act (ESA), use habitats that occur within and along the river. The river is also an important rearing site and pathway for migration of anadromous fishes, such as salmon and lamprey. Various recreational fisheries, including salmon, bass, sturgeon, crayfish, and others, are active within the lower Willamette River. A detailed description of ecological communities in Portland Harbor is presented in the Baseline Ecological Risk Assessment (BERA) provided as Appendix G of the RI Report.

1.2.2 Site History

Since the late 1800s, the Portland Harbor section of the Lower Willamette River has been extensively modified to accommodate a vigorous shipping industry. Modifications include redirection and channelization of the main river, draining seasonal and permanent wetlands in the lower floodplain, and relatively frequent dredging to maintain the navigation channel. .Historically, the Willamette was wider, had more sand bars and shoals, and fluctuated greatly in volume.

The lower Willamette River and its adjacent upland areas have been used for industrial, commercial, and shipping operations for over a century. Commercial and industrial development in Portland Harbor accelerated in the 1920s and again during World War II, which reinvigorated industry following the Great Depression. Before World War II, industrial development primarily included sawmills, manufactured gas production (MGP), bulk fuel terminals, and smaller industrial facilities. During World War II, a considerable number of ships were built at military shipyards located in Portland Harbor. Additional industrial operations located along the river in the post-World War II years included wood-treatment, agricultural chemical production, battery processing, ship loading and unloading, ship maintenance, repair and dismantling, chemical manufacturing and distribution, metal recycling, steel mills, smelters, foundries, electrical production, marine shipping and associated operations, rail yards, and rail car manufacturing. Many of these operations continue today.

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Contaminants associated with these operations were released from various sources and migrated to the lower Willamette River. The long history of industrial and shipping activities in the Portland Harbor, as well as agricultural, industrial, and municipal activities upstream of Portland Harbor, has contributed to chemical contamination of surface water and sediments in the lower Willamette River.

1.2.2.1 Investigation History

Many environmental investigations by private, state, and federal agencies have been conducted, both in the lower Willamette River and on adjacent upland properties, to characterize the nature and extent of contamination in the river, as well as to identify potential sources of contaminants that could continue to enter the river. Investigations have been conducted in Portland Harbor from the 1920s to the present, with most studies being performed from the late 1970s through the present. Nearly 700 documents and data sets were obtained that address conditions in the lower Willamette River. Specific historical and recent studies and data sets were selected for inclusion in the data set used to characterize and evaluate the Study Area in the RI and FS reports.

Site data were collected by the LWG during four major rounds of field investigations between 2001 and 2010 to complete the RI. The investigations were often timed around varying river stages, river flows, and storm events. The field investigations first began in 2001 in the Initial Study Area (ISA) as defined by the AOC, SOW, and Programmatic Work Plan as RM 3 to RM 9. As the studies commenced, the Study Area was expanded from RM 1.9 to RM 11.8, as well as a portion of Multnomah Channel. Studies conducted by the LWG also included areas downriver of the Study Area to the confluence with the Columbia River at RM 0 and upriver to RM 28.4. Surface and subsurface sediment samples, sediment trap samples, riverbank sediment and soil samples, surface water samples, stormwater and stormwater solids samples, groundwater samples, transition zone water (TZW) samples, and biota/tissue samples were collected and analyzed during the various investigations conducted. Additional studies were conducted by specific parties at several sites within the Study Area with EPA oversight including offshore areas of: Arkema, Gasco , Siltronic, Terminal 4, and River Mile 11 East. Some of the data generated from these investigations were included in the RI data set and additional later data from these same sites was included in the FS data set (see Section 1.3.

1.2.2.2 Upland Source Control Measures

Identifying current sources of contamination to the Study Area and eliminating or minimizing these pathways where possible is critical for remedy effectiveness as well as

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evaluating the recontamination potential of a cleanup. In February 2001, DEQ, EPA, and other governmental parties signed a Memorandum of Understanding (MOU) agreeing that DEQ, using state cleanup authority, has lead technical and legal responsibility for identifying and controlling upland sources of contamination that may impact the river (e.g., sediment, groundwater, transition zone water, and/or surface water). Currently, DEQ is investigating or directing source control work at over 90 upland sites in Portland Harbor and evaluating investigation and remediation information at more than 80 other upland sites in the vicinity (ODEQ 2103a). Additionally, DEQ is working with the City of Portland under an Intergovernmental Agreement to identify and control upland sources draining to the Study Area through 39 city outfalls, and with the Oregon Department of Transportation on controlling sources in highway and bridge runoff drained to the Study Area (City of Portland 2012).

The City prepared a CSO Management Plan (City of Portland, 2005) with recommendations to address wet weather overflow discharges, including implementation of storage and treatment facilities along the Willamette River ("Big Pipe project") to control the CSO discharges. The primary means for increasing the storage capacity was through construction of the West Side Tunnel (completed in 2006) and the East Side Tunnel (completed in 2011).

The cleanup of known or potentially contaminated upland sites is tracked in DEQ's Environmental Cleanup Site Information (ECSI) database, which is available online at http://www.deq.state.or.us/lq/ECSI/ecsi.htm, and source control efforts are summarized in DEQ's Portland Harbor Upland Source Control Milestone and Summary Report (http://www.deq.state.or.us/lq/cu/nwr/PortlandHarbor/jointsource.htm).

Figures 1.2-6a through **1.2-6e** graphically display the status of DEQ source control evaluations as of 2014 for various sites along the Study Area by potential release/migration pathways to the river.

Sources are discussed in more detail in subsections 1.2.3.3 and 1.2.3.4An important overall assumption of the FS is that upland sources in Portland Harbor will be controlled sufficient to achieve project goals through the DEQ process. Although sources are discussed in the FS, the sediment remedy is not intended to address or control upland sources. Groundwater is summarized in the subsections below because groundwater may impact decisions about sediment caps within the Site. Bank conditions are summarized because EPA may include some bank areas within the Portland Harbor Site based on future site-specific determinations.

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1.2.2.3 Early Action Sites

Within Portland Harbor, separate orders have been executed by EPA with various parties for five specific sites. These sites are:

1. Terminal 4 – conducted by the Port of Portland
2. Gasco – conducted by NW Natural
3. Gasco and Siltronic – conducted by NW Natural and Siltronic
4. Arkema – conducted by Arkema
5. RM 11 E – conducted by Glacier Northwest, Inc., Cargill, Inc., PacifiCorp, CBS Corporation, DIL Trust, and City of Portland.

These projects are currently in various stages of completion as described below. Some Iinformation from some of these early action sites has been included in the Portland Harbor FS database (as detailed in Section 1.3) for use in the development and detailed evaluation of alternatives.

- **Terminal 4** – The Port of Portland has been implementing a removal action at Terminal 4. A Phase I Abatement Measure was completed in 2008 that consisted of remediation and maintenance dredging of approximately 13,000 cubic yards of sediment. Remediation consisted of dredging 6,315 cubic yards of contaminated sediment and placing it in an off-site disposal facility, isolating contaminated sediment in the back of Slip 3 with a cap made of organoclay-sand mix, and stabilizing the bank along Wheeler Bay.

- **Gasco** – A removal action was conducted at the Gasco site between August and October 2005. Approximately 15,300 cubic yards of a tar-like material and tar-like contaminated sediment were removed by dredging from the riverbank and nearshore area adjacent to the Gasco facility and disposed of off-site. After the removal action, an organoclay mat was placed along an upper-elevation band of the shoreline dredge cut. This mat was secured with placement of an overlying sand cap and quarry spalls. A 1 foot thick sand cap and 0.5 foot of erosion protection gravel was placed over the remainder of the removal area (0.4 acres). Approximately 0.5 foot of a "fringe cap" of sand material was placed over 2.3 acres of the area surrounding the removal area.

- **Gasco and Siltronic** – NW Natural and Siltronic are conducting site characterization and design evaluations for the area adjacent to their two

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facilities. Under the order, NW Natural and Siltronic have agreed to perform further characterization, studies, analysis and preliminary design that will lead ultimately to a final remedy at the GASCO Sediments Site. Conducting this work will facilitate construction of the final remedy to begin expeditiously following issuance of a Record of Decision (ROD) for the Portland Harbor Superfund Site. The remedial action for the NW Natural and Siltronic sediments will be implemented in coordination with and following completion of any necessary upland NW Natural and Siltronic source control work being managed by DEQ.

- **Arkema** – Under an AOC with EPA, Arkema conducted additional site characterization and preliminary design evaluations for a planned Removal Action. .

- **River Mile 11 East -** A group of Respondents, collectively known as the RM11E Group (includes Glacier Northwest, Inc., Cargill, Inc., PacifiCorp, CBS Corporation, DIL Trust, and City of Portland), entered into an AOC to perform supplemental RI/FSwork in support of preliminary design activities.

In addition, a near-shore sediment removal adjacent to the BP Arco Bulk Terminal in 2007-08 under DEQ oversight resulted in 12,300 cubic yards of petroleum-contaminated soil and sediment being removed and disposed of off-site, and replaced with clean fill in conjunction with the installation of a new steel sheet-pile seawall along the riverbank of the BP Arco Bulk Terminal property.

1.2.3 Nature and Extent of Contamination

Due to the large number of contaminants detected at the Study Area in various media, the nature and extent of contamination focuses on specific contaminants or groups of contaminants selected by evaluating several criteria discussed in Section 5.1 of the RI.

Fourteen indicator contaminants were discussed in detail in Section 5 of the RI report based on frequency of detection, ease of cross media comparisons, co-location with other contaminants, widespread sources, and similar chemical structures and properties. Information regarding the remaining contaminants is provided in Appendix D of the RI. The nature and extent of indicator contaminants in sediment and surface water are summarized in the following sections. As discussed in Section 5.1 of the RI, additional contaminants beyond the indicator contaminants presented in the RI (and summarized in this section) are present at the site at concentrations that may pose unacceptable risk to human health and the environment. Section 2.2.1 of the FS identifies the contaminants of concern (COCs) selected for the Portland Harbor Superfund Site and discusses the process for selecting the COCs. Groundwater is summarized in the

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subsections below because groundwater may impact decisions about sediment caps within the Site. Bank conditions are summarized because EPA may include some bank areas above elevation 13.3 feet North American Vertical Datum of 1988 [NAVD88] within the Portland Harbor Site based on future site-specific determinations.

1.2.3.1 Sources

Historical and current locations of various industrial facilities identified along the lower Willamette River are provided by industrial sector in **Figures 1.2-5a** through **1.2-5j**. The approximate location of facilities is shown on the maps; however, the actual extent of historical and current facilities/operations is not shown. Detailed information regarding historic and current sources of contamination in the lower Willamette River is provided in Section 4 of the RI Report.

Each of these industrial sectors has been typically associated with the use of various chemicals. The contaminants are dependent upon the activities conducted, but the contaminants most commonly associated with each industry sector include the following:

Industrial Sector	Common Industry Contaminants
Ship Building, Dismantling, and Repair	Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), metals (e.g., Cu, Cr, Pb, Hg, Zn), phthalates, butyltins
Wood Products and Wood Treating	VOCs, SVOCs, TPH, benzene, PAHs, metals (e.g., As, Cr, Cu, Zn), pesticides, fungicides, biocides, borates, pentachlorophenol, creosote, acid/alkaline wastes, dioxins
Chemical Manufacturing and Distribution	Vary depending on the operations, but chemical manufacturing known to have occurred within Portland Harbor includes pesticides, herbicides, VOCs, SVOCs, dioxins/furans, metals, PCBs, solvents, acid/alkaline wastes, benzene, TPH, and PAHs
Metal Recycling, Production, and Fabrication	PCBs, PAHs, heavy metals, asbestos, cyanide, phthalates, fuel additives(ethylene glycoland products of incomplete combustion, battery acid, oil and grease, lubricants, paint pigments or additives, ionizing radioactive isotopes, transmission and brake fluids, antifreeze, benzene, chemical residue, heating oil, petroleum products, solvents, hydraulic fluids, oils, fuels, grease, other lubricants, chemical additives

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Manufactured Gas Production	VOCs including benzene, toluene, ethylbenzene, and xylenes (BTEX), SVOCs, PAHs, TPH, metals, and cyanide
Electrical Production and Distribution	PCBs, TPH, and PAHs
Bulk Fuel Distribution and Storage, and Asphalt Manufacturing	VOCs (benzene), SVOCs, PAHs, TPH, metals, gasoline additives (methyl tert-butyl ether [MTBE], ethylene dibromide [EDB], ethylene dichloride [EDC])
Steel Mills, Smelters, and Foundries	Metals, TPH, PAHs, PCBs, fuel additives, chlorinated solvents
Commodities Maritime Shipping and Associated Marine Operations	Spillage of raw materials during transport to and from vessels, butyltins, metals, TPH, fuel additives, chlorinated solvents
Rail Yards	VOCs, SVOCs, TPH, PCBs, and heavy metals

Contaminants released during industry operations and/or other activities to the air, soil, groundwater, surface water, and/or impervious surfaces can potentially migrate to the lower Willamette River via the following pathways: direct discharge, overland transport, groundwater, riverbank erosion, atmospheric deposition, overwater activities, and upstream watershed.

One key migration pathway for contaminants from these various industries to migrate to the river was through direct discharge via numerous public and private outfalls, including storm drains and combined sewer overflows, which were and some still are located along both shores of the lower Willamette River in the metropolitan area. In the early 1900s, rivers in the United States were generally used as open sewers, which was also true for the Willamette (Carter 2006). The process water from a variety of industries, including slaughterhouses, chemical plants, electroplaters, paper mills, and food processors, was discharged directly into the river. In the 1950s, municipal conveyance systems included interceptors and associated facilities were installed to reduce the volume of untreated sewage discharging to the Willamette from the City of Portland and regulatory actions in the 1960s and 1970s, such as the Clean Water Act, gradually reduced the direct discharge of waste to the Willamette River.

Historical releases from upland or overwater activities within the Study Area likely contributed to the majority of the observed contaminant distribution in sediments within the Study Area. The majority of current contaminant pathways to the river (soil erosion, groundwater, and stormwater) from upland sources are a result of historical operational practices, spills, and other releases.

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In addition, point and nonpoint discharges within the Willamette River Basin are potential sources of contamination in sediment, surface water, and biota in the Study Area. Contaminants in discharges and runoff from diverse land uses in the basin eventually enter the river upstream of the Study Area. Contaminant loading from sediment transport and water from upstream areas throughout the last century also contributed to the conditions currently observed in the Study Area.

1.2.3.2 Sediment

Sediment samples were collected from the Study Area for consideration in the FS. Much of the sampling was conducted by the LWG under the terms of AOC and consistent with EPA approved work plans., Sample locations were biased toward areas of known or suspected contamination based on existing information. Additional sampling was conducted both upstream and downstream of the Study Area. Summary statistics of surface and subsurface sediment results for the contaminants presented above are provided in **Table 1.2-1**. Generally, concentrations of the indicator contaminantswere greater in subsurface sediment samples relative to surface samples, confirming that historical inputs were greater than current inputs. However, as discussed below, there are noted areas within the Study Area where surface concentrations are greater than subsurface concentrations likely reflecting more recent releases and/or disturbances of bedded sediments.

PCBs

With few exceptions, the highest PCB concentrations in surface sediment are present in nearshore areas outside the navigation channel and proximal to currently known or suspected sources (**Figure 1.2-5a**). Similar spatial and concentration trends are observed for subsurface sediments (**Figure 1.2-5b**). Total PCB concentrations are typically greater in the subsurface than in surface sediments, indicating PCB sources are primarily historical. Overall, surface sediment PCB concentrations in the Study Area are greater than those in the upriver (upstream of Ross Island) and downstream (mainstem of the lower Willamette River downstream of RM 1.9 and Multnomah Channel) reaches.

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Dioxins/Furans
Total PCDD/Fs were detected at several locations along the eastern and western nearshore zones and in Swan Island Lagoon (**Figure 1.2-6a**). Limited surface PCDD/F data are available; thus, spatial resolution is somewhat limited, especially in the navigation channel Total PCDD/F concentrations in the subsurface are generally greater than that observed in surface sediments (**Figure 1.2-6b**). The higher concentrations typically observed in subsurface sediment relative to concentrations in surface sediment are indicative of a primarily historical input of these contaminants to the Study Area.

DDx
The highest reported DDx concentrations in surface sediments are present in localized areas in the western nearshore zones between RMs 6.3 and 7.5 (**Figure 1.2-7a**). DDx concentrations are typically greater in the subsurface than in the surface layer, indicating DDx sources are primarily historical (**Figure 1.2-7b**). The concentrations of DDx in surface sediments are greater in the Study Area than those in the upriver, downtown, Multnomah Channel, and downstream reaches.

Total PAHs
The highest reported concentrations of total PAH in surface sediments generally occur in the western nearshore zone downstream of RM 6.8, and on the east side at approximately RM 4.5 (**Figure 1.2-8a**). Total PAH concentrations are generally higher in subsurface sediments within the Study Area as a whole, pointing to higher historical inputs to the Study Area (**Figure 1.2-8b**). Within the Study Area, total PAHs in sediment are generally dominated by HPAHs. Surface sediments from the western nearshore zone appeared to exhibit higher proportions of LPAHs than sediments from the eastern nearshore zone and the navigation channel, but follow the general trend of HPAH dominance. Subsurface generally exhibit similar PAH profiles to the surface sediments.

Bis(2-ethylhexyl) phthalate
The highest reported concentrations of bis(2-ethylhexyl) phthalate were observed in samples collected in surface and subsurface sediment from the eastern nearshore in Swan Island Lagoon, between RM 3.8 and 4.1, and in the International Terminals Slip (**Figures 1.2-9a and 1.2-9b**).

Total Chlordanes
The highest reported concentrations of total chlordanes were observed along the western nearshore zone between approximately RM 7 and 9 (**Figure 1.2-10a**). Total chlordane concentrations are generally higher in subsurface sediments within the Site, pointing to higher historical inputs to the Site (**Figure 1.2-10b**).

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Aldrin and Dieldrin
Aldrin and dieldrin, have similar chemical structures and are discussed together here because aldrin readily undergoes biotic and abiotic transformation to dieldrin. The highest reported concentrations of aldrin were observed in the western nearshore zone from RM 6.8 to RM 7.4 and and from RM 8.6 to 8.8 (**Figures 1.2-11a**). The highest reported surface concentrations of dieldrin were observed in Swan Island Lagoon and in the western nearshore zone from RM 8 to 9 (**Figure 1.2-12a**). Aldrin and dieldrin concentrations are higher in subsurface sediments than surface sediments within the Site (**Figures 1.2-11b and 1.2-12b**), pointing to higher historical inputs to the Study Area.

Metals
The highest reported arsenic concentrations were reported in several locations in the eastern nearshore at RM 2.3, RM 5.6, RM 7.2, near the mouth of Swan Island Lagoon, and in the western nearshore area at RM 6.8, RM 8.6, and RM 10.2 (**Figure 2.1-13a**). Arsenic concentrations are generally greater in the surface sediments than in subsurface sediments within the Study Area (**Figure 1.2-13b**).

The highest reported chromium concentrations were observed in the eastern nearshore zone at RM 2.1-2.4, RM 3.7-4.4, RM 5.6-5.9, and in Swan Island Lagoon, and in the western nearshore zone at RM 6-6.1, RM 6.8-6.9, and RM 8.8-9.2 (**Figure 2.1-14a**). Chromium concentrations are generally greater in the surface sediments than in subsurface sediments within the Study Area (**Figure 1.2-14b**).

The highest surface and subsurface copper concentrations were observed in the eastern nearshore zone at RM 2.1-2.4, RM 3.7-4, RM 5.5-6.1, RM 11.1-11.3, and Swan Island Lagoon, and in the western nearshore zone from RM 4.3 through 10.4 (**Figure 1.2-15a**). Copper concentrations are generally similar in surface and subsurface sediments in the Study Area (**Figure 1.2-15b**).

The highest surface sediment zinc concentrations were found in the eastern nearshore zone at RM 4-4.6, RM 5.6, and RM 6.7, and the western nearshore zone between RM 8 and 9.2 (**Figure 1.2-16a**). The highest subsurface concentrations of zinc were found in the western nearshore zone at RM 9-9.2 and in Swan Island Lagoon (**Figure 1.2-16b**). Zinc concentrations are generally similar in the surface sediments and subsurface sediments within the Study Area.

Tributyltin Ion
The highest concentrations of tributyltin were reported in surface sediment near the eastern nearshore zone at RM 3.7, RM 7.5, and in Swan Island Lagoon (**Figure 1.2-17a**). The highest subsurface concentrations of tributyltin are found in the eastern nearshore zone between RM 7 and RM 8, and in Swan Island Lagoon (**Figure 1.2-17b**).

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Concentrations are generally higher in subsurface sediments than surface sediments within the Site, pointing to primarily historical inputs to the Study Area.

1.2.3.3 Surface Water

Concentrations of contaminants in surface water samples varied both spatially and with river flow. Surface water sample locations with the highest reported contaminant concentrations are as follows:

River Mile	River Location	Sample ID	Contaminants
MC	Transect	W027	PCDD/Fs, aldrin, copper
2	East	W001	PCBs, DDx
	West	W002	chlordanes
	Transect	W025	PCBs, BEHP, aldrin
3	International Slip	W004	PCBs
	East	W028	PCBs
4	West	W029	BEHP, chlordanes
5	East	W030	PCBs, DDx, chlordanes
6	East	W013, W014, W032	PCBs, PCDD/Fs
	West	W015, W031	PCBS, PCDD/Fs, DDx, PAHs, chlordanes, aldrin, dieldrin, copper
	Transect	W011	PCDD/Fs, BEHP, aldrin
7	West	W016, W033	PCBs, PCDD/Fs, DDx
8	West	W019, W036	PCBs, PAHs, BEHP
9	West	W022, W037	DDx, zinc
11	Transect	W023	PCDD/Fs, chlordanes, copper
16	Transect	W024	BEHP, copper

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RM 7E, RM 8E, RM 9E, and RM 10 was not sampled.

1.2.3.4 Concentrations of contaminants in surface water within the Study Area are generally higher than those entering the upstream limit of the Study Area (W024 at RM 16) under all flow conditions. The highest contaminant concentrations in surface water within the Site were found near known sources**Groundwater**

Figure 1.2-18a through Figure 1.2-18h and **Figure 1.2-19** (inset of the Doane Lake area) show the nature and extent of known contaminated plumes currently or potentially discharging to the river. Cleanup of contaminated groundwater is being managed by DEQ under an MOU with EPA. The following provides a discussion of the groundwater plumes presented in **Figures 1.2-18a through 1.2-18h** and **1.2-19**:

East Side of Willamette River

RM 2

Evraz Oregon Steel Mill – Contaminants detected in groundwater above screening levels are manganese and arsenic. Arsenic concentrations in beach monitoring wells exceed MCLs. Manganese was detected in beach wells at concentrations exceeding aquatic life screening criteria. Further evaluation of groundwater discharge at the Evraz Oregon Steel Mill site is ongoing.

RM 3.5

Time Oil – Contaminants are pentachlorophenol, arsenic, gasoline- and diesel-range hydrocarbons. A pump and treat system is operating to prevent migration of the pentachlorophenol plume from reaching the river via a stormwater outfall and prevent offsite migration to the Premier Edible Oils property. There are three TPH plumes identified at this site; the northern plume is not discharging to the river, the middle plume is discharging to the river, but arsenic is the only contaminant with concentrations exceeding SLVs. The southern upland plume migrates a short distance onto the Premier Edible Oils property and is not discharging to the river.

Premier Edible Oil – Contaminants are TPH (diesel-range hydrocarbons), manganese, and arsenic.

Schnitzer Steel Industries – A halogenated VOC plume is known to be discharging to the river. Contaminants include cis-1,2-dichloroethene (cis-1,2-DCE), tetrachloroethene (PCE), and trichloroethene (TCE).

RM 4.5

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Terminal 4 Slip 3 – Contaminants include TPH (diesel-range hydrocarbons). Source control measures to address contaminated groundwater discharges have been completed and monitoring is ongoing.**RM 6**
McCormick & Baxter Creosote Co. – Contaminants include pentachlorophenol , PAHs, arsenic, chromium, copper, and zinc. An upland groundwater barrier wall system and in-river sediment cap has been installed that isolates contaminated groundwater from the river. A 5-Year Review completed in 2011 by EPA and DEQ determined constructed remedies are protective to human health and the environment.

RM 11
Tarr Oil – A halogenated VOC plume is not known to be releasing to the river. Contaminants include cis-1,2-DCE, PCE, TCE, and vinyl chloride

West Side of Willamette River

RM 4
Kinder Morgan Linnton Bulk Terminal – A TPH plume is located onsite and has released to the river. Contaminants include LNAPL, diesel-range hydrocarbons, residual-range hydrocarbons, and gasoline-range hydrocarbons. A sheet-pile wall has been constructed to prevent LNAPL migration to the river.

RM 5
BP Arco Bulk Terminal – A TPH plume has discharged to the river. Contaminants include TPH (gasoline-range and diesel-range hydrocarbons) and LNAPL, and the plume extends under the adjacent downstream property. A sheet-pile wall with groundwater hydraulic control system is in place. A groundwater pump and treat system and LNAPL recovery system is in use.

Exxon Mobil Bulk Terminal – A TPH plume has discharged to the river. Contaminants include gasoline- and diesel-range hydrocarbons. A bentonite wall has been constructed along the riverbank for the majority of the site. A groundwater pump and treat system is in place and operating at the downstream end of the site where the cutoff wall is absent. Treatment of the source areas via air sparging is ongoing.

RM 5.5
Foss Maritime/Brix Marine – TPH releases from underground storage tanks (USTs) have been identified onsite. Contaminants include gasoline- and diesel-range hydrocarbons.

RM 6

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NW Natural/Gasco – Groundwater plumes associated with historical MGP waste are known to be discharging to the river. Contaminants detected in groundwater include PAHs, SVOCs, VOCs (e.g., benzene, ethylbenzene, toluene and xylene – BTEX), cyanide, sulfide, sulfate and carbon disulfide, ammonia, and metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc). Gasoline- range hydrocarbons, diesel- range hydrocarbons, residual-range hydrocarbons and total petroleum hydrocarbon fractions are being added to the groundwater monitoring program. A hydraulic control pump and treatment system has been constructed at the riverbank and is currently being tested.

RM 6 and RM 7

Siltronic – A chloinated VOC plume as well as goundwater plumes associated with historical MGP waste and pesticide plumes from Rhone Poulenc are known to discharge to the river. Contaminants include petroleum-related and chlorinated VOCs (benzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,1-dichloroethene, cis-1,2-DCE, trans-1,2-DCE, TCE, and vinyl chloride), PAHs, gasoline- range, diesel-range, and residual-range hydrocarbons, cyanide, metals (arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, thallium, vanadium, and zinc), Silvex, and dichlorprop. In-situ bioremediation and treatment with zero-valent iron has been implemented to reduce halogenated VOC concentrations discharging to the river. The NW Natural hydraulic control pump and treatment system extends to the northern portion of the Siltronic site is expected to control the TCE plume in addition to the Gasco MGP plume.

RM 7

Rhone Poulenc – Known releases of organochlorine insecticides and herbicides, including PCP, 2,4-DP, Bromoxynil, 4(2,4-dichloropenoxy)butyric acid (2,4-DB), 2-methyl-4-chlorophenoxyacetic (MCPA), methylchlorophenoxypropionic acid (MCPP), 4-(4-chloro-2-methylphenoxy)butanoic acid (MCPB), 2,4,5-trichlorophenoxyacetic acid [2,4,5-T], 2,4-dichlorophenoxyacetic acid (2,4-D), DDT, Endrin, Heptachlor, sodium chlorate, sodium arsenate, 2,4,5-TP (Silvex), aldrin, dieldrin, chlordanes, and dichlorprop have occurred at the site

Spatial and temporal uncertainty present in the groundwater dataset for the site results in uncertainty in defining the full extent of the groundwater plume. DEQ determined that there is clear evidence that source control is needed to address direct discharge to the River of the following contaminants in groundwater: VOCs (e.g., dichlorobenzene isomers, and chlorobenzene), and herbicides (e.g., Silvex and dichlorprop). The plume is uncontrolled (ODEQ 2013).

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The City Outfall 22B groundwater infiltration pathway is currently being addressed through implementation of the Outfall 22B Expanded IRAM. The Outfall 22B Expanded IRAM is being implemented to address exceedances of Joint Source Control Screening Level Values for the following in dry weather flow: SVOCs (2,4,6-trichlorophenol, 2,4-dichlorophenol, 2-methylphenol, pentachlorophenol, and naphthalene), insecticides (aldrin, alpha-chlordane, deldrin, gamma-chlorodane, heptachlor epoxide, hexachlorobenzene, DDD, DDE, and DDT), Dioxin/furans (2,3,7,8-TCDD) and metals (aluminum, boron, molybdenum, thallium, arsenic, barium, iron, manganese) (ODEQ 2013b).

Kinder Morgan Pump Station – A TPH plume has been identified at the pump station. The extent of the plume is currently unknown.

Arkema – Contaminants detected in groundwater at the site include, but are not limited to, DDT and its metabolites DDD and DDE (DDX) and VOCs (MCB, chloroform, PCE, TCE and benzene), perchlorate and hexavalent chromium). The DDX and MCB are primarily associated with pesticide manufacturing process residue (MPR). Perchlorate and hexavalent chromium are associated with the Chlorate Plant area. A barrier wall and groundwater pump and treat system is being constructed to manage the groundwater plumes on the southern end of the property and is currently being tested. Additional source control measures to address groundwater impacts north of the groundwater containment system will be evaluated in the Arkema upland FS.

RM 8 Kinder Morgan Willbridge Bulk Terminal – A TPH plume is not known to be currently discharging to the river. Contaminants include gasoline- range hydrocarbons, diesel- range hydrocarbons, residual-range hydrocarbons, and arsenic. Evaluation of the plume is ongoing.

Chevron and Unocal Willbridge Bulk Terminal – A TPH plume located onsite has discharged to the river. Contaminants include LNAPL, gasoline- range hydrocarbons, diesel- range hydrocarbons, residual-range hydrocarbons, and metals (arsenic and manganese). Nineteen control measures have been implemented at the site between the early 1970s and 2010 to address the potential migration of impacted groundwater to the Willamette River. Saturated petroleum hydrocarbon (SPH) contamination has been detected at various locations across the site. Observations of sheen associated with recent high groundwater conditions has raised concerns regarding the long-term adequacy of the LNAPL containment system; additional characterization is in progress, and it is expected that modifications to the LNAPL containment system will be proposed.

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Chevron Asphalt Plant – Free product consisting of relatively immobile asphalt-related petroleum has been noted on site. Contaminants include TPH (diesel-range and gasoline-range hydrocarbons), arsenic, BTEX and napthalene. DEQ has concluded that the plume is not discharging to the river.

RM 9

Gunderson –There is a chlorinated VOC plume (1,1-DCE, 1,1,1-trichloroethane [1,1,1-TCA], PCE, TCE and vinyl chloride) near the downstream end of the Gunderson property. An air sparge/soil vapor extraction and a pump and treat system were operating for the VOC plume. DEQ approved the shut-down of the pump ant treat system and a rebound assessment is in progress.

In addition, there is a PAH groundwater plume located between the Equilon (Shell Terminal) pipeline gasoline release and the Equilon dock at Gunderson. The PAH plume was determined by DEQ to not be discharging to the river. Shell treated a gasoline release from their pipeline on the Gunderson site using an air sparge and vapor recovery system. This system has been shut down and dismantled. DEQ approved the cleanup and issued a NFA.

Christensen Oil – A TPH (Stoddard solvent) plume is located onsite. The plume extent is not known to currently discharge to the river since a dual phase extraction and treatment system is currently operating to control migration of the plume. Evaluation of the control is ongoing.

Univar – A VOC plume is located onsite. Contaminants include 1,1-DCA, 1,1-DCE, cis-1,2-DCE, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE, vinyl chloride, and xylenes. The plume does not extend to the river. Soil vapor extraction and pump and treat systems have been implemented as interim corrective measures.

Galvanizers Inc. – A zinc plume located at this site is not known to currently discharge to the river. The plume may have infiltrated the storm water system that discharged to the river, however, that system has been diverted to the City Big Pipe project.

RM 10
Sulzer Pump – TPH, PAH, and VOC plumes from UST and waste oil UST releases exists at this site.

RM 11.5
Centennial Mills – A TPH (diesel-range hydrocarbons) plume is located at this site. The plume is not known to discharge to the river, but may be infiltrating the Tanner Creek sewer line near the river.

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1.2.3.5 River Banks

Identification of contaminated banks is being managed by DEQ under an MOU with EPA. The following provides a discussion of the known contaminated banks.

East Side of Willamette River

RM 2
Evraz Oregon Steel Mill – Contaminants present in the riverbank includes PCBs and metals (arsenic, cadmium, chromium, copper, lead, manganese, and zinc). A source control measure to remove, cap and stabilize contaminated riverbank material is currently in the design phase.

RM 3.5
Schnitzer Steel Industries – Results of soils samples collected under the docks along the south shore of the International Slip indicate that contaminants are PCBs and dioxins.

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RM 5.5
MarCom South – Further investigation of the nature and extent of contamination in the bank was conducted in 2012. Contaminants are PAHs and metals (arsenic, cadmium, chromium, copper, zinc).

RM 7
Willamette Cove - Riverbank contaminants are PCBs, dioxins/furans, metals (lead, mercury, nickel, and copper), and PAHs. Source control evaluation is currently ongoing.

RM 8.5
Swan Island Shipyard – Recent sampling results for OU1 indicate that contaminants include metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc), PAHs, PCBs, and tributyltin. Contaminants in river bank soils in OU5 include metals (arsenic, copper, lead, and zinc), PAHs, and PCBs. Source control evaluation is currently ongoing.

West Side of Willamette River

RM 4
Kinder Morgan Linnton Bulk Terminal – Contaminants are petroleum constituents (BTEXs and PAHs) and metals (arsenic and lead).

RM 6
NW Natural/Gasco – Contamination associated with historical MGP waste are known to be located in the river bank. Contaminants include PAHs, gasoline- range hydrocarbons, diesel- range hydrocarbons, residual-range hydrocarbons, cyanide, and metals (zinc).

RM 6 and RM 7
Siltronic – Contamination associated with historical MGP waste is known to be present in the northern portion of the Siltronic riverbank. Riverbank contaminants include PAHs, gasoline- range hydrocarbons, diesel- range hydrocarbons, residual-range hydrocarbon and cyanide and metals (zinc).

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Burlington Northern and Santa Fe Railroad Bridge – Contamination associated with and pesticide and herbicide releases from Rhone Poulenc and Arkema are known to be present in the river bank below and adjacent to the Burlington Northern and Santa Fe railroad bridge. Riverbank contaminants include, dioxin/furans, metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, sodium, thallium, vanadium, zinc, Insecticides (DDD, DDE, DDT, aldrin, alpha-BHC, alpha-chlordane, beta-BHC, cis-nonachlor, delta-BHC, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, gamma0BHC, gammachlordane heptachlor, heptachlor epoxide, hexachlorobutadiene, methoxychlor, mirex, oxychlordane, and trans-nonachlor), PCBs, SVOCs (acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, benzoic acid, benzyl alcohol, bis (2-ethylhexyl)phthalate, butylbenzylphthalate, chrysene, bibenzo(a,h)anthracene, dimethylphthalate, bi0n-butylphthalate, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene and pyrene). (AMEC 2011).

RM 7
Arkema –Riverbank contaminants include DDT, dioxin/furans, PCBs, and metals (chromium and lead).

RM 9
Gunderson –Contaminants include metals (lead, nickel, and zinc), and PCBs.

1.2.4 Contaminant Fate and Transport

Most of the sediment contamination at the Site is associated with known or suspected historical sources and practices. Ongoing sources of contamination include contaminated groundwater plumes, river bank soils, stormwater and upstream surface water. The distribution contaminants in sediments in several nearshore areas appears to reflect more significant historical lateral inputs. As concluded in Section 10 of the RI, empirical tissue contaminant data and food web modeling indicate that persistent contaminants (particularly PCBs and dioxin/furans) in sediments and surface water bioaccumulate in aquatic species tissue.

Internal contaminant fate and transport processes are those processes that affect the fate, transport and redistribution of contaminants within the study area. The major internal fate and transport processes are:

- Erosion from the sediment bed
- Deposition to the sediment bed

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- Dissolved flux from the sediment bed (porewater exchange)
- Groundwater advection
- Degradation (for some contaminants)
- Volatilization
- Downstream transport of either particulate-bound or dissolved phase contaminants

These processes interact to create complex patterns of contaminant redistribution that vary over space, time, and by contaminant. Empirical estimates of contaminant loading associated with internal and external contaminant sources were developed during the RI. External sources include upstream loading (via surface water and sediment bedload), "lateral" external loading such as stormwater runoff permitted discharges (point-source, non-stormwater), upland groundwater (contaminant plume transport to river), atmospheric deposition (to the river surface), direct upland soil and riverbank erosion, otherwise uncontaminated groundwater advection through contaminated subsurface sediments (chemical partitioning from subsurface sediment to pore water and advection to the surface sediment interval), and overwater releases. Internal sources include surface sediment loading to the surface water via sediment erosion (resuspension) and sediment porewater exchange (chemical partitioning from surface sediment to porewater and advection to surface water), as well as sinks.

Figures 1.2-20a through **1.2-20c** provides a visual summary of currently known or suspected contaminant source loads within and exiting from the Site for three representative contaminants: total PCBs, benzo(a)pyrene, and DDE.

Elevated concentrations of contaminants in the Study Area are typically associated with areas near currently known or likely historical and/or existing sources. Although the highest sediment concentration levels for the indicator contaminants are found in nearshore areas, somewhat elevated levels of the bounding indicator contaminants are found in the higher energy portion of the channel in the middle of the Study Area (RM 5 to 7). This may reflect past or current dispersal of material away from nearshore source areas. Throughout the Study Area, contaminant concentrations are generally higher in subsurface sediments than in surface sediments, indicating both higher historical contaminant inputs and improving sediment quality over time (see final RI and draft FS Section XX for more detail on sediment trends over time). Localized exceptions to the pattern of higher subsurface sediment concentrations exist in a few areas for some contaminants, likely reflecting more recent releases and/or disturbances

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of bedded sediments. Also, the depth of subsurface contamination is generally greater in nearshore areas as compared to the navigation channel (see Section XX).

Areas with elevated contaminant concentrations in surface sediments generally correspond to areas of elevated subsurface sediment contaminant concentrations, particularly in nearshore areas. Areas where only surface or subsurface sediments exhibited elevated concentrations of contaminants point to spatially and temporally variable inputs and sources, or to different influences from sediment transport mechanisms. Per the RI, the PCB distributions in areas of elevated PCB concentrations are generally distinct from those in surrounding areas of lower PCB concentrations. Within areas of elevated PCB concentrations, the PCB patterns in surface and subsurface sediment, sediment traps, and in the particulate portion of the surface water samples are often similar. A similar pattern and similar composition across media was observed to a lesser degree for PAHs, but was less apparent for dioxins/furans or DDx compounds.

Most areas of elevated contaminant concentration in bedded sediment are located in relatively stable nearshore areas, and large-scale downstream migration/dispersal of concentrated contaminants from these areas is not indicated by the bedded sediment data. Much larger historical direct discharges from upland and overwater sources, rather than reworking of bedded sediments, are believed to have produced some of the observed patterns (e.g., elevated levels in subsurface sediments downstream of the source areas). Limited ongoing downstream dispersal of contaminants in sediments is suggested based on bedded sediment concentration gradients downstream of areas with elevated sediment concentrations.

Based on results of surface water data collected during the RI, resuspension and/or dissolved phase flux from the sediment bed are contributing to contaminant concentrations in surface water, particularly in quiescent areas where surface water mixing and dilution is minimal. Loading estimates presented in **Figures 1.2-20a** through **1.2-20c** are consistent with this concept, indicating the mass flux of contaminants exiting the downstream end of the Study Area in surface water (either directly to the Columbia River or via Multnomah Channel) is greater than the flux entering the Study Area.

Contaminant concentrations in stormwater entering the Study Area are generally greater than concentrations associated with upstream surface water. However, from a loading perspective, lateral contaminated loads associated with upland sources are comparable to upstream loads for certain contaminants including PCBs and DDx.

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Groundwater plume discharge to surface water has been observed in several areas Dissolved phase flux from surface sediments to the water column has been inferred from RI data.

Finally, empirical tissue contaminant data and food web modeling indicate that persistent contaminants (particularly PCBs and dioxin/furans) in sediments and surface water can bioaccumulate in aquatic species tissue.

The CSM integrates the information gathered to date to provide a coherent hypothesis of the Site fate and transport. **Figure 1.2-21** provides a simplified visual summary of this hypothesis, including contaminant interactions with human and ecological receptors.

1.2.5 Baseline Risk Assessment

This section presents a summary of the results of the baseline human health and ecological risk assessments (BHHRA and BERA). These assessments are presented in Appendices F and Appendix G of the RI report.

1.2.5.1 Baseline Human Health Risk Assessment

The BHHRA presents an analysis of the potential for effects associated with both current and potential future human exposures at Portland Harbor. Potential exposure to contaminants found in environmental media and biota was evaluated for various occupational and recreational uses of the river, as well as recreational, subsistence, and traditional and ceremonial tribal consumption of fish caught within the Portland Harbor site. Additionally, because of the persistent and bioaccumulative nature of many of the contaminants found in sediment, infant consumption of human breast milk was also quantitatively evaluated.
The specific populations and exposure pathways evaluated were:

- Dockside workers — direct exposure via incidental ingestion and dermal contact with beach sediments.
- In-water workers — direct exposures to in-water sediment.
- Transients — direct exposure to beach sediment, surface water for bathing and drinking water scenarios, and groundwater seeps.
- Recreational beach users — direct exposure to beach sediment and surface water while for swimming.
- Tribal fishers — direct exposure to beach or in-water sediments, and consumption of migratory and resident fish.
- Recreational and subsistence fishers — direct exposure to beach or in-water sediments, consumption of resident fish, and consumption of shellfish.
- Divers — direct exposure to in-water sediment and surface water.

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- Domestic water user — direct exposure to untreated surface water potentially used as a drinking water source in the future.
- Infant consumption of human breast milk — exposure to certain persistent and bioaccumulative contaminants (polychlorinated biphenyls [PCBs], dichlorodiphenyldichloroethane, dichlorodiphenyldichloroethylene, and dichlorodiphenyltrichloroethane [DDx] compounds, dioxins and furans, and polybrominated diphenyl ethers [PBDEs]) via nursing infants of dockside and in-water workers, divers, and recreational, subsistence, and tribal fishers.

Consistent with EPA policy, the BHHRA evaluated a reasonable maximum exposure (RME), which is defined as the maximum exposure that is reasonably expected to occur. In addition, estimates of central tendency (CT), which are intended to represent average exposures, were also evaluated. **Figure 1.2**-22 presents the conceptual site model for the BHHRA.

Cancer risk and noncancer hazard from site-related contamination was characterized based on current and potential future uses at Portland Harbor, and a large number of different exposures scenarios were evaluated. Based on 2002 and 2007 fish tissue data, exposure to bioaccumulative contaminants (PCBs, dioxins/furans, and organochlorine pesticides, primarily DDx compounds) via consumption of resident fish consistently poses the greatest potential for human exposure to in-water contamination. Scenarios for which the cumulative estimated cancer risk is greater than 1×10^{-4} or the HI is greater than 1 are consumption of fish and shellfish, and direct contact with in-water sediment by tribal and high frequency fishers. The major findings of the BHHRA are:

- Estimated cancer risks resulting from the consumption of fish or shellfish are generally orders of magnitude higher than risk resulting from direct contact with sediment and surface water. Risks and noncancer hazards from fish and shellfish consumption exceed the EPA point of departure for cancer risk of $1 \times 10_{-4}$ and target hazard index (HI) of 1 when evaluated on a harbor-wide basis, and when evaluated on the smaller spatial scale by river mile.

- Consumption of resident fish species consistently results in the greatest risk estimates. Evaluated harbor-wide wide, the estimated RME cancer risks are 4×10^{-3} and 1×10^{-2} for recreational and subsistence fishers, respectively.

- Noncancer hazard estimates for consumption of resident fish species are greater than 1 at all river miles. Based on a harbor-wide evaluation of noncancer risk, the estimated RME HI is 300 and 1,000 for recreational and subsistence fisher, respectively. The highest hazard estimates for recreational fishers are at RM 4, RM 7, RM 11, and in Swan Island Lagoon.

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The highest noncancer hazards are associated with nursing infants of mothers, who consume resident fish from Portland Harbor. When fish consumption is evaluated on a harbor-wide basis, the estimated RME HI is 4,000 and 10,000 for breastfed infants of recreational and subsistence fishers, respectively. Evaluated on a harbor-wide scale, the estimated RME HI for tribal consumers of migratory and resident fish is 600 assuming fillet-only consumption, and 800 assuming whole-body consumption. The corresponding HI estimates for nursing infants of tribal mothers, who consume fish, are 8,000 and 9,000 respectively, assuming maternal consumption of fillet or whole-body fish.

These risk estimates are based on specific assumptions regarding fish consumption practices within Portland Harbor. Recreational fishers are assumed to consume 49 grams per day (approximately 6.5 eight ounce meals per month) of a multi-species diet consisting of resident fish fillet with skin tissue for 30 years; subsistence fishers are assumed to consume 142 grams per day (approximately 19 eight ounce meals per month) of a multi-species diet consisting of resident fish fillet with skin tissue for 30 years; and tribal fishers are assumed to consume 175 grams per day (approximately 23 eight ounce meals per month) of a multi-species diet consisting of migratory and resident fish whole body or fillet with skin tissue for 70 years. The risk estimates do not account for effects from preparation or cooking the fish. For a breastfeeding infant, it is assumed that the maternal consumption of fish prior to birth of the infant is the same as described for the fishers.

- PCBs are the primary contributor to risk from fish consumption harbor-wide. When evaluated on a river mile scale, dioxins/furans are a secondary contributor to the overall risk and hazard estimates, and pose the highest risk at RM 7. PCBs are the primary contributors to the noncancer hazard to nursing infants, primarily because of the bioaccumulative properties of PCBs and the susceptibility of infants to the developmental effects associated with exposure to PCBs.

- The greatest source of uncertainty in the risk and hazard estimates includes the lack of site-specific information about consumption of resident fish from Portland Harbor. Because tribal fish consumption practices were evaluated assuming a combined diet consisting of both resident and migratory fish, it is not clear to what degree contamination in Portland Harbor contributes to those estimated risks. In addition, it is important to remember that the noncancer hazard estimates presented in the BHHRA are not predictions of specific disease, and the cancer estimates represent upper-bound values, and the EPA is

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reasonably confident that the actual cancer risks will not exceed the estimated risks presented in the BHHRA.

1.2.5.2 Baseline Ecological Risk Assessment

The BERA presents an evaluation of risks to aquatic and aquatic-dependent species within the Study Area in the absence of any actions to control or mitigate contaminant releases. The overall process used for the BERA was based on the guidance provided in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments – Interim Final* (EPA 1997c) and followed the approach documented in numerous interim deliverables as well as discussions, directives, and agreements with the LWG, EPA and its federal, state, and tribal partners. **Figure 1.2-23** presents the conceptual site model for the BERA.

Sediment toxicity tests were performed to evaluate adverse effects of Portland Harbor sediment on survival and biomass of larvae of the aquatic insect *Chironomus dilutus* and juveniles of the amphipod *Hyalella azteca*. These toxicity tests demonstrated that the exposure of these animals to sediment from some locations within Portland Harbor resulted in increased mortality and/or reduced biomass of these two species within 10 to 28 days – a direct measure of sediment toxicity to benthic invertebrates within the Portland Harbor Study Area. The moderate and severe levels of toxicity were not randomly scattered throughout the Study Area. Instead, most samples and locations eliciting multiple instances of moderate and severe toxicity tended to be clustered in several areas, especially areas between RM 5.9 and RM 7.8. Other areas with "clusters" of benthic toxicity included International Slip; between RMs 3.7 and 4.2 on the west side of river; between RMs 4.8 and 5.2 on the west side of river; Willamette Cove; near the mouth of Swan Island Lagoon; and between RMs 8.7 and 8.8 on the west side of river. A weight-of-evidence analysis identified 17 benthic areas of concern (AOCs) within the Study Area. Combined, the above areas can be estimated to cover between 4 and 8% of the total surface area of sediment within the Study Area.

Aside from the toxicity testing used to characterize risks to the benthic community, most risk characterizations in the BERA were made using the hazard quotient (HQ). An HQ is calculated by dividing the exposure estimate by a effects threshold. COPCs for which the HQ was ≥ 1.0 were identified as contaminants posing potentially unacceptable risk at the conclusion of the BERA. The potential for unacceptable risk becomes increasingly large as the HQ value increases, although the increase is not necessarily linear (e.g., a sample with an HQ = 2.0 does not necessarily have twice the risk of a sample with an HQ = 1.0).

In ERAs, the ecological significance of the identified risks is determined by evaluating if the risks will make an observable difference in light of other factors that are influencing the environment, such as habitat alteration.

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With the exception of species protected by law or regulation (e.g., threatened and endangered species) for which individual organisms are protected, EPA guidance and policy state that ERAs should generally focus on the protection of local populations and communities of biota (e.g., the Study Area population of smallmouth bass, not the global population of smallmouth bass, which exists on four continents). Oregon's ERA guidance (ODEQ 1998) defines a local population for a stream or river as follows, "For aquatic species in moving water such as streams and rivers (lotic habitats), the local population comprises all individuals of the endpoint species within the stream segment within the contaminated area."

Ecological significance can be defined as the importance of an adverse effect on population, community, or ecosystem responses. Factors contributing to ecological significance considered in the BERA included the nature and magnitude of effects, the spatial and temporal extent of effects, uncertainties in the exposure assessment, uncertainties in the effects characterization, and concordance of the various LOEs used to assess risk to communities or populations.

The LWG and EPA separately evaluated the ecological significance of the identified risks and drew independent conclusions. Both parties found that PCBs, PAHs, dioxins and furans, and total DDx are ecologically significant contaminants at Portland Harbor. EPA identified several additional contaminants that it considers most likely to be ecologically significant contaminants

The following presents the primary conclusions of the BERA.

- In total, 93 contaminants (as individual contaminants, sums, or totals)[3] with HQ $\geq$ 1.0 pose potentially unacceptable ecological risk. Differences in the specific toxicity reference values (TRVs) used in different lines of evidence (LOEs) for total PCBs (e.g., total PCBs versus specific Aroclor mixtures), total DDx, and total PAHs, all of which describe individual contaminants or a group of multiple but related individual chemical compounds, can result in different counts of the number of contaminants posing potentially unacceptable risk. The list of contaminants posing potentially unacceptable risks can be condensed if individual PCB, DDx and PAH compounds or groups are condensed into three comprehensive groups: total PCBs, total DDx, and total PAHs. Doing so reduces the number of contaminants with HQ $\geq$ 1.0 posing potentially unacceptable risks to 66.

[3] The five chemicals or chemical groups with concentrations that exceeded only the sediment probable effects concentration (PEC) and/or probable effects level (PEL) (i.e., chemicals that were not identified as COPCs for other benthic invertebrate LOEs: Aroclor 1254, chlordane [cis and trans], gamma- hexachlorocyclohexane [HCH] [Lindane], heptachlor epoxide, and total chlordane), ammonia and sulfide (which are conventional parameters), and residual-range hydrocarbons that had concentrations that exceeded only the total petroleum hydrocarbons [TPH] SQGs) are not included in this count.

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- Risks to benthic invertebrates are clustered in 17 benthic AOCs.
- Sediment and TZW samples with the highest HQs for many contaminants also tend to be clustered in areas with the greatest benthic invertebrate toxicity.
- The COPCs in sediment that are most commonly spatially associated with locations of potentially unacceptable risk to the benthic community or populations are PAHs and DDx compounds.
- Not all COPCs posing potentially unacceptable risk have equal ecological significance. The most ecologically significant COPCs (i.e., contaminants of primary ecological significance) are PCBs, PAHs, dioxins and furans (as TEQ), and DDT and its metabolites.
- The list of ecologically significant COPCs is not intended to suggest that other contaminants in the Study Area do not also present potentially unacceptable risk.
- The contaminants identified as posing potentially unacceptable risk in the largest numbers of LOEs are (in decreasing frequency of occurrence) total PCBs, copper, total DDx, lead, tributyltin (TBT), zinc, total toxic equivalent (TEQ), PCB TEQ, benzo(a)pyrene, cadmium, 4,4′-DDT, dioxin/furan TEQ, bis(2-ethylhexyl) phthalate, naphthalene, and benzo(a)anthracene. The remaining 78 contaminants posing potentially unacceptable risk were identified as posing potentially unacceptable risk by three or fewer LOEs.
- Of the three groups of contaminants (i.e., total PAHs, total PCBs, total DDx) with the greatest areal extent of HQs $\geq$ 1.0 in the Study Area, PAH and DDx risks are largely limited to benthic invertebrates and other sediment-associated receptors. PCBs tend to pose their largest ecological risks to mammals and birds.
- The combined toxicity of dioxins/furans and dioxin-like PCBs, expressed as total TEQ, poses the potential risk of reduced reproductive success in mink, river otter, spotted sandpiper, bald eagle, and osprey. The PCB TEQ fraction of the total TEQ is responsible for the majority of total TEQ exposure, but the total dioxin/furan TEQ fraction also exceeds its TRV in some locations of the Study Area.

1.3 FS DATABASE DESCRIPTION

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1.0 INTRODUCTION

This report presents the Feasibility Study (FS) for the Portland Harbor Superfund Site in Portland, Oregon (**Figure 1-1**). Portland Harbor was evaluated and proposed for inclusion on the National Priorities List (NPL) pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund), 42 U.S.C. §9605, by the U.S. Environmental Protection Agency (EPA) and formally listed as a Superfund Site in December 2000. The lead agency for this site is EPA.

The basis of this FS is environmental data collected and compiled by the Lower Willamette Group (LWG) and other parties since the inception of the Portland Harbor Remedial Investigation and Feasibility Study (RI/FS) in 2001[1]. The LWG is performing the remedial investigation (RI) and FS for the Portland Harbor Superfund Site (Site) pursuant to an EPA Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (AOC; EPA 2001, 2003, 2006). Oversight of LWG's Portland Harbor RI and FS is being provided by EPA with support from Oregon Department of Environmental Quality (DEQ). EPA has entered into a Memorandum of Understanding (MOU) with DEQ, six federally recognized tribes, two other federal agencies, and one other state agency[2], who have all participated in providing support in the development of this document.

The RI (insert citation) has been completed and has characterized the Site sufficiently to define the nature and extent of the source material and the Site-related contaminants. Baseline ecological and human health risk assessments (Windward 2013; Kennedy Jenks 2013) have also been completed. The site characterization and baseline risk assessments are sufficient to complete the FS for the Site.[3]

This FS focuses on approximately ten miles of the lower Willamette River from River Mile (RM) 1.9 (at the upriver end of the Port of Portland's Terminal 5) to RM 11.8 (near the Broadway Bridge), sometimes referred to as the "site" in this FS for convenience. The terms site, harbor-wide, and site-wide used in this FS generally refer to the sediments, pore water, and surface water within this reach of the lower Willamette River, not to the upland portions of the Portland Harbor Superfund Site.

[1] Upland source control efforts, including site-specific upland source control studies and implementation of source control measures, are performed under the oversight of the Oregon Department of Environmental Quality and are not within the scope of the Agreement and Order on Consent and Statement of Work for the in-water portion of the Site.

[2] Government parties that signed the MOU include: the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Nez Perce Tribe, the National Oceanic and Atmospheric Administration, the U.S. Department of the Interior, and the Oregon Department of Fish and Wildlife.

[3] Although this section identifies many specific sources of contamination, neither this section nor this report generally is intended as an exhaustive list of current or historical sources of contamination.

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This FS is consistent with CERCLA, as amended (42 United States Code [U.S.C.] 9601 et seq.), and its regulations, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), commonly referred to as the National Contingency Plan (NCP) and was prepared in accordance with EPA guidance. Guidance documents used in preparing this FS include:

- *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988)
- *Clarification of the Role of Applicable or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals under CERCLA* (EPA 1997a)
- *Rules of Thumb for Superfund Remedy Selection* (EPA 1997b)
- *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (EPA 2002)
- *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (EPA 2005)
- *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000)
- *Technical Resource Document on Monitored Natural Recovery* (EPA 2014)

1.1 PURPOSE AND ORGANIZATION OF REPORT

The purpose of the FS is to identify, develop, screen, and evaluate a range of remedial alternatives to reduce risks from contaminated media to acceptable levels and to provide the regulatory agencies with sufficient information to select a remedy that meets the requirements established in the NCP. This FS report is comprised of four sections as described below.

- Section 1 – Introduction: Provides a summary of the Site RI, including Site description, Site history, nature and extent of contamination, contaminant fate and transport, and baseline human health and ecological risks.
- Section 2 - Identification and Screening of Technologies: Develops remedial action objectives (RAOs), develops preliminary remediation goals (PRGs) for addressing human health and ecological risks posed by contaminants in sediment and tissue, develops general response actions (GRAs) for each medium of interest, identifies areas of media to which general response actions might be applied, identifies and screens remedial technologies and process options, and identifies and evaluates technology process options to select a representative

process for each technology type retained for consideration.

- Section 3 - Development and Screening of Alternatives: Presents a range of remedial alternatives developed by combining the feasible technologies and process options. The alternatives are then refined and screened to reduce the number of alternatives that will be analyzed in detail. This screening aids in streamlining the feasibility study process while ensuring that the most promising alternatives are being considered.

- Section 4 - Detailed Analysis of Alternatives: Provides the detailed analysis of each alternative with respect to the following seven criteria: 1) overall protection of human health and the environment, 2) compliance with ARARs, 3) long-term effectiveness and permanence, 4) reduction of toxicity, mobility, or volume through treatment, 5) short-term effectiveness, 6) implementability, and 7) cost. In addition to the detailed analysis, a comparative analysis of remedial action alternatives is also presented in this section. EPA also recognizes that this site affects many stakeholders, including communities with environmental justice concerns who live along the river or who live elsewhere but use the river. The evaluation of remedial alternatives considers impacts to these communities.

1.2 BACKGROUND INFORMATION

1.2.1 Site Description

The Willamette River originates within Oregon in the Cascade Mountain Range and flows approximately 187 miles north to its confluence with the Columbia River, and is one of 14 American Heritage Rivers in the country. It is the 19th largest river in the United States, and drains 11.7 percent of the State of Oregon. As Oregon's major port and population center, the lower Willamette River sees a great variety of uses including shipping, industrial, fishing, recreational, natural resource, and other uses. The lower reach of the Willamette River from RM 0 to approximately RM 26.5 is a wide, shallow, slow moving segment that is tidally influenced with tidal reversals occurring during low flow periods as far upstream as RM 15. The river segment between RM 3 and RM 10 is the primary depositional area of the lower Willamette River system. The lower reach has been extensively dredged to maintain a 40-foot deep navigation channel from RM 0 to RM 11.7.

The Portland Harbor RI/FS Study Area is located along the lower reach of the lower Willamette River in Portland, Oregon known as Portland Harbor (**Figure 1-1**). The RI/FS Study Area extends from RM 1.9 to 11.8 and up to a vertical elevation of 13.3 feet North American Vertical Datum of 1988 (NAVD88). While the harbor area is extensively industrialized, it occurs within a region characterized by commercial, residential, recreational, and agricultural uses. Land use along the lower Willamette River in the harbor includes marine terminals, manufacturing, and other commercial operations, as well as public facilities, parks, and open spaces. **Figures 1.2-1a** through **1.2-1d** illustrate land use zoning within the lower Willamette River as well as

waterfront land ownership. The State of Oregon owns certain submerged and submersible lands underlying navigable and tidally influenced waters. The ownership of submerged and submersible lands is complicated and has changed over time (**Figure 1.2-2**).

Today, the Willamette River is noticeably different from the river prior to industrial development that commenced in the mid to late 18th century. Historically, the Willamette River was wider with more sand bars and shoals and flow volumes were subject to greater fluctuation. The main river now has been redirected and channelized, several lakes and wetlands in the lower floodplain have been filled and agricultural lands converted to urban or industrial areas. The end result is a river that is deeper and narrower than it was historically with higher banks that prevent the river from expanding during high-flow events. The Willamette River channel, from the Broadway Bridge (RM 11.6) to the mouth (RM 0), currently varies in width from 600 to 1,900 feet. Further, the installation of a series of dams moderate fluctuations of flow in the lower Willamette River.

Little, if any, original shoreline or river bottom exists that has not been modified by the above actions, or as a result of them. Much of the shoreline has been raised, filled, stabilized, and/or engineered and contains overwater piers and berths, port terminals and slips, stormwater and industrial wastewater outfalls and combined sewer overflows (CSOs), and other engineered features. Constructed structures, such as wharfs, piers, floating docks, and pilings, are especially common in Portland Harbor where urbanization and industrialization are most prevalent. These structures are built largely to accommodate or support shipping traffic within the river and to stabilize the riverbanks for urban development. Constructed structures are clearly visible in the aerial photos provided in **Figures 1.2-3a** through **1.2-3n.**

Armoring to stabilize banks covers approximately half of the harbor shoreline, which is integral to the operation of activities that characterize Portland Harbor. Riprap is the most common bank-stabilization measure. However, upland bulkheads and rubble piles are also used to stabilize the banks. Seawalls are used to control periodic flooding as most of the original wetlands bordering the Willamette in the Portland Harbor area have been filled. Some riverbank areas and adjacent parcels have been abandoned and allowed to revegetate, and beaches have formed along some modified shorelines due to relatively natural processes.

A federal navigation channel, maintained to a depth of -40 feet with an authorized depth of -43 feet, extends from the confluence of the lower Willamette River with the Columbia River to RM 11.7 (**Figure 1.2-4**). The lower Willamette River federal navigation project was first authorized in 1878 to deepen and maintain parts of the Columbia River and lower Willamette River with a 20-foot minimum depth. The depth of the navigation channel has been deepened at various intervals since that time (i.e., increased to 25 feet in 1899, 30 feet in 1912, 35 feet in 1930, and 40 feet in 1962). Container and other commercial vessels regularly transit the river. Certain parts of the

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river require periodic maintenance dredging to keep the navigation channel at its maintained depth. In addition, the Port of Portland and other private entities periodically perform maintenance dredging to support access to dock and wharf facilities. Dredging activity has greatly altered the physical and ecological environment of the river in Portland Harbor.

Development of the river has resulted in major modifications to the ecological function of the lower Willamette River. However, a number of species of invertebrates, fishes, birds, amphibians, and mammals, including some protected by the Endangered Species Act (ESA), use habitats that occur within and along the river. The river is also an important rearing site and pathway for migration of anadromous fishes, such as salmon and lamprey. Various recreational fisheries, including salmon, bass, sturgeon, crayfish, and others, are active within the lower Willamette River. A detailed description of ecological communities in Portland Harbor is presented in the Baseline Ecological Risk Assessment (BERA) provided as Appendix G of the RI Report.

1.2.2 Site History

Since the late 1800s, the Portland Harbor section of the lower Willamette River has been extensively modified to accommodate a vigorous shipping industry. Modifications include redirection and channelization of the main river, draining seasonal and permanent wetlands in the lower floodplain, and relatively frequent dredging to maintain the navigation channel. Historically, the Willamette was wider, had more sand bars and shoals, and fluctuated greatly in volume.

The lower Willamette River and its adjacent upland areas have been used for industrial, commercial, and shipping operations for over a century. Commercial and industrial development in Portland Harbor accelerated in the 1920s and again during World War II, which reinvigorated industry following the Great Depression. Before World War II, industrial development primarily included sawmills, manufactured gas production (MGP), bulk fuel terminals, and smaller industrial facilities. During World War II, a considerable number of ships were built at military shipyards located in Portland Harbor. Additional industrial operations located along the river in the post-World War II years included wood-treatment, agricultural chemical production, battery processing, ship loading and unloading, ship maintenance, repair and dismantling, chemical manufacturing and distribution, metal recycling, steel mills, smelters, foundries, electrical production, marine shipping and associated operations, rail yards, and rail car manufacturing. Many of these operations continue today. Contaminants associated with these operations were released from various sources and migrated to the lower Willamette River. The long history of industrial and shipping activities in the Portland Harbor, as well as agricultural, industrial, and municipal activities upstream of Portland Harbor, has contributed to chemical contamination of surface water and sediments in the lower Willamette River.

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1.2.2.1 Investigation History

Many environmental investigations by private, state, and federal agencies have been conducted, both in the lower Willamette River and on adjacent upland properties, to characterize the nature and extent of contamination in the river, as well as to identify potential sources of contaminants that could continue to enter the river. Investigations have been conducted in Portland Harbor from the 1920s to the present, with most studies being performed from the late 1970s through the present. Nearly 700 documents and data sets were obtained that address conditions in the lower Willamette River. Specific historical and recent studies and data sets were selected for inclusion in the data set used to characterize and evaluate the Study Area in the RI and FS reports.

Site data were collected by the LWG during four major rounds of field investigations between 2001 and 2010 to complete the RI. The investigations were often timed around varying river stages, river flows, and storm events. The field investigations first began in 2001 in the Initial Study Area (ISA) as defined by the AOC, Statement of Work (SOW), and Programmatic Work Plan as RM 3 to RM 9. As the studies commenced, the Study Area was expanded from RM 1.9 to RM 11.8, as well as a portion of the Multnomah Channel. Studies conducted by the LWG also included areas downriver of the Study Area to the confluence with the Columbia River at RM 0 and upriver to RM 28.4. Surface and subsurface sediment samples, sediment trap samples, riverbank sediment and soil samples, surface water samples, stormwater and stormwater solids samples, groundwater samples, transition zone water (TZW) samples, and biota/tissue samples were collected and analyzed during the various investigations conducted.

1.2.2.2 Upland Source Control Measures

Identifying current sources of contamination to the Study Area and eliminating or minimizing these pathways where possible is critical for remedy effectiveness as well as evaluating the recontamination potential of a cleanup. In February 2001, DEQ, EPA, and other governmental parties signed an MOU agreeing that DEQ, using state cleanup authority, has lead technical and legal responsibility for identifying and controlling upland sources of contamination that may impact the river (e.g., sediment, groundwater, TZW, and/or surface water). Currently, DEQ is investigating or directing source control work at over 90 upland sites in Portland Harbor and evaluating investigation and remediation information at more than 80 other upland sites in the vicinity (ODEQ 2014). Additionally, DEQ is working with the City of Portland under an Intergovernmental Agreement to identify and control upland sources draining to the Study Area through 39 city outfalls, and with the Oregon Department of Transportation on controlling sources in highway and bridge runoff drained to the Study Area (City of Portland 2012).

The City prepared a CSO Management Plan (City of Portland 2005) with recommendations to address wet weather overflow discharges, including implementation of storage and treatment facilities along the Willamette River ("Big Pipe project") to control the CSO discharges. The primary means for increasing the

storage capacity was through construction of the West Side Tunnel (completed in 2006) and the East Side Tunnel (completed in 2011).

The cleanup of known or potentially contaminated upland sites is tracked in DEQ's Environmental Cleanup Site Information (ECSI) database, which is available online at http://www.deq.state.or.us/lq/ECSI/ecsi.htm, and source control efforts are summarized in DEQ's Portland Harbor Upland Source Control Milestone and Summary Report (http://www.deq.state.or.us/lq/cu/nwr/PortlandHarbor/jointsource.htm).

Figures 1.2-5a through **1.2-5e** graphically display the status of DEQ source control evaluations as of 2014 for various sites along the Study Area by potential release/migration pathways to the river. An important overall assumption of the FS is that upland sources in Portland Harbor will be controlled sufficient to achieve project goals through the DEQ process.

1.2.2.3 Early Action Sites

Within Portland Harbor, separate orders have been executed by EPA with various parties for five specific sites. These sites are:

1. Terminal 4 – conducted by the Port of Portland
2. Gasco – conducted by NW Natural
3. Gasco and Siltronic – conducted by NW Natural and Siltronic
4. Arkema – conducted by Arkema
5. RM 11 E – conducted by Glacier Northwest, Inc., Cargill, Inc., PacifiCorp, CBS Corporation, DIL Trust, and City of Portland

These projects are currently in various stages of completion as described below.

- **Terminal 4** – The Port of Portland has been implementing a removal action at Terminal 4. A Phase I Abatement Measure was completed in 2008 that consisted of remediation and maintenance dredging of approximately 13,000 cubic yards of sediment. Remediation consisted of dredging 6,315 cubic yards of contaminated sediment and placing it in an off-site disposal facility, isolating contaminated sediment in the back of Slip 3 with a cap made of organoclay-sand mix, and stabilizing the bank along Wheeler Bay.

- **Gasco** – A removal action was conducted at the Gasco site between August and October 2005. Approximately 15,300 cubic yards of a tar-like material and tar-like contaminated sediment were removed by dredging from the riverbank and nearshore area adjacent to the Gasco facility and disposed of off-site. After the removal action, an organoclay mat was placed along an upper-elevation band of the shoreline dredge cut. This mat was secured with placement of an overlying

sand cap and quarry spalls. A one foot thick sand cap and 0.5 foot of erosion protection gravel was placed over the remainder of the removal area (0.4 acres). Approximately 0.5 foot of a "fringe cap" of sand material was placed over 2.3 acres of the area surrounding the removal area.

- **Gasco and Siltronic** – NW Natural and Siltronic are conducting site characterization and design evaluations for the area adjacent to their two facilities. Under the order, NW Natural and Siltronic have agreed to perform further characterization, studies, analysis and preliminary design that will lead ultimately to a final remedy at the Gasco Sediments Site. Conducting this work will facilitate construction of the final remedy to begin expeditiously following issuance of a Record of Decision (ROD) for the Portland Harbor Superfund Site. The remedial action for the NW Natural and Siltronic sediments will be implemented in coordination with and following completion of any necessary upland NW Natural and Siltronic source control work being managed by DEQ.

- **Arkema** – Under an AOC with EPA, Arkema conducted additional site characterization and preliminary design evaluations for a planned Removal Action.

- **River Mile 11 East -** A group of Respondents, collectively known as the RM 11E Group (includes Glacier Northwest, Inc., Cargill, Inc., PacifiCorp, CBS Corporation, DIL Trust, and City of Portland), entered into an AOC to perform supplemental RI/FS work in support of preliminary design activities.

In addition, a near-shore sediment removal adjacent to the BP Arco Bulk Terminal in 2007-08 under DEQ oversight resulted in 12,300 cubic yards of petroleum-contaminated soil and sediment being removed and disposed of off-site, and replaced with clean fill in conjunction with the installation of a new steel sheet-pile seawall along the entire riverbank of the BP Arco Bulk Terminal property.

1.2.3 Nature and Extent of Contamination

Due to the large number of contaminants detected at the Study Area in various media, the nature and extent of contamination focuses on specific contaminants or groups of contaminants selected by evaluating several criteria discussed in Section 5.1 of the RI.

Fourteen indicator contaminants were discussed in detail in Section 5 of the RI report based on frequency of detection, ease of cross media comparisons, co-location with other contaminants, widespread sources, and similar chemical structures and properties. Information regarding the remaining contaminants is provided in Appendix D of the RI. The nature and extent of indicator contaminants in sediment and surface water are summarized in the following sections. As discussed in Section 5.1 of the RI, additional contaminants beyond the indicator contaminants presented in the RI (and summarized in this section) are present at the site at concentrations that may pose unacceptable risk to human health and the environment. Section 2.2.1 of the FS identifies the

contaminants of concern (COCs) selected for the Portland Harbor Superfund Site and discusses the process for selecting the COCs.

Groundwater COCs are summarized in the subsections below because this information may affect decisions about sediment caps within the Site. The COCs in river banks are also summarized because EPA may include some bank areas above elevation 13.3 feet NAVD88 within the Portland Harbor Site based on future site-specific determinations.

1.2.3.1 Sources

Historical and current locations of various industrial facilities identified along the lower Willamette River are provided by industrial sector in **Figures 1.2-6a** through **1.2-6j**. The approximate location of facilities is shown on the maps; however, the actual extent of historical and current facilities/operations is not shown. Detailed information regarding historic and current sources of contamination in the lower Willamette River is provided in Section 4 of the RI Report.

Each of these industrial sectors is typically associated with the use of various chemicals. The contaminants are dependent upon the activities conducted, but the contaminants most commonly associated with each industry sector include the following:

Industrial Sector	Common Industry Contaminants
Ship Building, Dismantling, and Repair	Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), metals (e.g., Cu, Cr, Pb, Hg, Zn), phthalates, butyltins
Wood Products and Wood Treating	VOCs, SVOCs, TPH, benzene, PAHs, metals (e.g., As, Cr, Cu, Zn), pesticides, fungicides, biocides, borates, pentachlorophenol, creosote, acid/alkaline wastes, dioxins
Chemical Manufacturing and Distribution	Vary depending on the operations, but chemical manufacturing known to have occurred within Portland Harbor includes pesticides, herbicides, VOCs, SVOCs, dioxins/furans, metals, PCBs, solvents, acid/alkaline wastes, benzene, TPH, and PAHs
Metal Recycling, Production, and Fabrication	VOCs, SVOCs, TPH, PCBs, PAHs, heavy metals, asbestos, cyanide, phthalates, fuel and fuel additives, battery acid, oil and grease, lubricants, paint pigments or additives, ionizing radioactive isotopes, transmission and brake fluids, lead acid, antifreeze, benzene, chemical residue, heating oil, solvents
Manufactured Gas Production	VOCs including benzene, toluene, ethylbenzene, and xylenes (BTEX), SVOCs, PAHs, TPH, metals, and cyanide

Electrical Production and Distribution	PCBs, TPH, and PAHs
Bulk Fuel Distribution and Storage, and Asphalt Manufacturing	VOCs (benzene), SVOCs, PAHs, TPH, metals, gasoline additives (methyl tert-butyl ether [MTBE], ethylene dibromide [EDB], ethylene dichloride [EDC])
Steel Mills, Smelters, and Foundries	Metals, TPH, PAHs, PCBs, fuel additives, chlorinated VOCs
Commodities Maritime Shipping and Associated Marine Operations	Spillage of raw materials during transport to and from vessels, butyltins, metals, TPH, fuel additives, chlorinated VOCs
Rail Yards	VOCs, SVOCs, TPH, PCBs, and heavy metals

Contaminants released during industry operations and/or other activities to the air, soil, groundwater, surface water, and/or impervious surfaces can potentially migrate to the lower Willamette River via the following pathways: direct discharge, overland transport, groundwater, riverbank erosion, atmospheric deposition, overwater activities, and upstream watershed.

One key migration pathway for contaminants from these various industries to migrate to the river was through direct discharge via numerous public and private outfalls, including storm drains and CSOs, which are located along both shores of the lower Willamette River in the metropolitan area. In the early 1900s, rivers in the United States were generally used as open sewers, which was also true for the Willamette (Carter 2006). The process water from a variety of industries, including slaughterhouses, chemical plants, electroplaters, paper mills, and food processors, was discharged directly into the river. In the 1950s, municipal conveyance systems included interceptors and associated facilities were installed to reduce the volume of untreated sewage discharging to the Willamette from the City of Portland and regulatory actions in the 1960s and 1970s, such as the Clean Water Act, gradually reduced the direct discharge of waste to the Willamette River.

Historical releases from upland or overwater activities within the Study Area likely contributed to the majority of the observed contaminant distribution in sediments within the Study Area. The majority of current contaminant pathways to the river (soil erosion, groundwater, and stormwater) from upland sources are a result of historical operational practices, spills, and other releases.

In addition, point and nonpoint discharges within the Willamette River Basin are potential sources of contamination in sediment, surface water, and biota in the Study Area. Contaminants in discharges and runoff from diverse land uses in the basin eventually enter the river upstream of the Study Area. Contaminant loading from sediment transport and water from upstream areas throughout the last century also contributed to the conditions currently observed in the Study Area.

1.2.3.2 Sediment

Sediment samples were collected from the Study Area for consideration in the FS. Much of the sampling was conducted by the LWG under the terms of the AOC and consistent with EPA approved work plans. Sample locations were biased toward areas of known or suspected contamination based on existing information. Additional sampling was conducted both upstream and downstream of the Study Area. Summary statistics of surface and subsurface sediment results for the contaminants presented above are provided in **Table 1.2-1**. Generally, concentrations of the contaminants were greater in subsurface sediment samples relative to surface samples, confirming that historical inputs were greater than current inputs. However, there are noted areas within the Study Area where surface concentrations are greater than subsurface concentrations likely reflecting more recent releases and/or disturbance of bedded sediments.

PCBs

With few exceptions, the highest PCB concentrations in surface sediment are present in nearshore areas outside the navigation channel and proximal to currently known or suspected sources (**Figure 1.2-7a**). Similar spatial and concentration trends are observed for subsurface sediments (**Figure 1.2-7b**). Total PCB concentrations are typically greater in the subsurface than in surface sediments, indicating PCB sources are primarily historical. Overall, surface sediment PCB concentrations in the Study Area are greater than those in the upriver (upstream of Ross Island) and downstream (main stem of the lower Willamette River downstream of RM 1.9 and Multnomah Channel) reaches.

Dioxins/Furans

Total polychlorinated dibenzo-p-dioxins/furans (PCDD/Fs) were detected at several locations along the eastern and western nearshore zones and in Swan Island Lagoon (**Figure 1.2-8a**). Limited surface PCDD/F data are available; thus, spatial resolution is somewhat limited, especially in the navigation channel. Total PCDD/F concentrations in the subsurface are generally greater than that observed in surface sediments (**Figure 1.2-8b**). The higher concentrations generally observed in subsurface sediment relative to concentrations in surface sediment are indicative of a primarily historical input of these contaminants to the Study Area.

DDx

The highest reported DDx[4] concentrations in surface sediments are present in localized areas in the western nearshore zones between RMs 6.3 and 7.5 (**Figure 1.2-9a**). DDx concentrations are typically greater in the subsurface than in the surface layer, indicating DDx sources are primarily historical (**Figure 1.2-9b**). The concentrations of DDx in surface sediments are greater in the Study Area than those in the upriver, downtown, Multnomah Channel, and downstream reaches.

Total PAHs

[4] DDx is the sum of 2,4'- and 4,4'-dichloro-diphenyl-dichloroethane (DDD), 2,4'- and 4,4'-dichloro-diphenyl-dichloroethene (DDE), and 2,4'- and 4,4'-dichloro-diphenyl-trichloroethane (DDT).

The highest reported concentrations of total PAHs in surface sediments generally occur in the western nearshore zone downstream of RM 6.8, and on the east side at approximately RM 4.5 (**Figure 1.2-10a**). Total PAH concentrations are generally higher in subsurface sediments within the Study Area as a whole, pointing to higher historical inputs to the Study Area (**Figure 1.2-10b**). Within the Study Area, total PAHs in sediment are generally dominated by high molecular weight PAHs (HPAHs). Surface sediments from the western nearshore zone appeared to exhibit higher proportions of low molecular weight PAHs (LPAHs) than sediments from the eastern nearshore zone and the navigation channel, but follow the general trend of HPAH dominance. Subsurface sediments generally exhibit similar PAH profiles to the surface sediments.

Bis(2-ethylhexyl) phthalate
The highest reported concentrations of bis(2-ethylhexyl) phthalate were observed in samples collected in surface and subsurface sediment from the eastern nearshore in Swan Island Lagoon, between RM 3.8 and 4.1, and in the International Terminals Slip (**Figures 1.2-11a and 1.2-11b**).

Total Chlordanes
The highest reported concentrations of total chlordanes were observed along the western nearshore zone between approximately RM 7 and 9 (**Figure 1.2-12a**). Total chlordane concentrations are generally higher in subsurface sediments within the Site, pointing to higher historical inputs to the Site (**Figure 1.2-12b**).

Aldrin and Dieldrin
Aldrin and dieldrin, have similar chemical structures and are discussed together here because aldrin readily undergoes biotic and abiotic transformation to dieldrin. The highest reported concentrations of aldrin were observed in the western nearshore zone from RM 6.8 to RM 7 and from RM 8.6 to RM 8.8 (**Figures 1.2-13a**). The highest reported surface concentrations of dieldrin were observed in Swan Island Lagoon and in the western nearshore zone from RM 8 to 9 (**Figure 1.2-14a**). Aldrin and dieldrin concentrations are higher in subsurface sediments than surface sediments within the Site (**Figures 1.2-13b and 1.2-14b**), pointing to higher historical inputs to the Study Area.

Metals
The highest reported arsenic concentrations were reported in several locations in the eastern nearshore at RM 2.3, RM 5.6, RM 7.2, near the mouth of Swan Island Lagoon, and in the western nearshore area at RM 6.8, RM 8.6, and RM 10.2 (**Figure 2.1-15a**). Arsenic concentrations are generally greater in the surface sediments than in subsurface sediments within the Study Area (**Figure 1.2-15b**).

The highest reported chromium concentrations were observed in the eastern nearshore zone at RM 2.1-2.4, RM 3.7-4.4, RM 5.6-5.9, and in Swan Island Lagoon, and in the western nearshore zone at RM 6-6.1, RM 6.8-6.9, and RM 8.8-9.2 (**Figure 2.1-16a**). Chromium concentrations are generally greater in the surface sediments than in subsurface sediments within the Study Area (**Figure 1.2-16b**).

The highest surface and subsurface copper concentrations were observed in the eastern nearshore zone at RM 2.1-2.4, RM 3.7-4, RM 5.5-6.1, RM 11.1-11.3, and Swan Island Lagoon, and in the western nearshore zone from RM 4.3 through 10.4 (**Figure 1.2-17a**). Copper concentrations are generally similar in surface and subsurface sediments in the Study Area (**Figure 2.1-17b**).

The highest surface sediment zinc concentrations were found in the eastern nearshore zone at RM 4-4.6, RM 5.6, and RM 6.7, and the western nearshore zone between RM 8 and 9.2 (**Figure 2.1-18a**). The highest subsurface concentrations of zinc were found in the western nearshore zone at RM 9-9.2 and in Swan Island Lagoon (**Figure 1.2-18b**). Zinc concentrations are generally similar in the surface sediments and subsurface sediments within the Study Area.

Tributyltin Ion
The highest concentrations of tributyltin were reported in surface sediment near the eastern nearshore zone at RM 3.7, RM 7.5, and in Swan Island Lagoon (**Figure 2.1-19a**). The highest subsurface concentrations of tributyltin are found in the eastern nearshore zone between RM 7 and RM 8, and in Swan Island Lagoon (**Figure 2.1-19b**). Concentrations are generally higher in subsurface than surface sediments within the Site, pointing to primarily historical inputs to the Study Area.

1.2.3.3 Surface Water

Concentrations of contaminants in surface water samples varied both spatially and with river flow. Surface water sample locations with the highest reported contaminant concentrations are as follows:

River Mile	River Location	Sample ID	Contaminants
MC	Transect	W027	PCDD/Fs, aldrin, copper
2	East	W001	PCBs, DDx
	West	W002	chlordanes
	Transect	W025	PCBs, BEHP, aldrin
3	International Slip	W004	PCBs
	East	W028	PCBs
4	West	W029	BEHP, chlordanes
5	East	W030	PCBs, DDx, chlordanes

6	East	W013, W014, W032	PCBs, PCDD/Fs
	West	W015, W031	PCBS, PCDD/Fs, DDx, PAHs, chlordanes, aldrin, dieldrin, copper
	Transect	W011	PCDD/Fs, BEHP, aldrin
7	West	W016, W033	PCBs, PCDD/Fs, DDx
8	West	W019, W036	PCBs, PAHs, BEHP
9	West	W022, W037	DDx, zinc
11	Transect	W023	PCDD/Fs, chlordanes, copper
16	Transect	W024	BEHP, copper

RM 7E, RM 8E, RM 9E, and RM 10 were not sampled.
BEHP - bis(2-ethylhexyl) phthalate

Concentrations of contaminants in surface water within the Study Area are generally higher than those entering the upstream limit of the Study Area (W024 at RM 16) under all flow conditions. The highest contaminant concentrations in surface water within the Site were found near known sources. At the downstream end of the Study Area, RM 2 (W001, W002, W025) and Multnomah Channel (W027), concentrations of total PCBs, dioxin/furans, DDx, BEHP, chlordanes, and aldrin in surface water are greater than concentrations entering the Study Area that indicate contamination from Portland Harbor is being transported downstream to the Columbia River.

1.2.3.4 Groundwater

Figure 1.2-20a through Figure 1.2-20h and **Figure 1.2-21** (inset of the Doane Lake area) show the nature and extent of known contaminated groundwater plumes currently or potentially discharging to the river. Cleanup of contaminated groundwater is being managed by DEQ under an MOU with EPA (see 1.2.2.2, above). The following provides a discussion of the groundwater plumes presented in **Figures 1.2-20a through 1.2-20h** and **1.2-21.** Additional information on these sites is available in DEQ's ECSI database.

East Side of Willamette River

RM 2
Evraz Oregon Steel Mill (ESCI Site ID 141) –Contaminants are manganese and arsenic.

RM 3.5
Time Oil (ECSI Site ID 170) – Contaminants are pentachlorophenol, arsenic, gasoline- and diesel-range hydrocarbons.

Premier Edible Oil (ECSI Site ID 2013) – Contaminants are TPH (diesel-range hydrocarbons), manganese, and arsenic.

Schnitzer Steel Industries (ECSI Site ID 2355) – A halogenated VOC plume is known to be discharging to the river. Contaminants include cis-1,2-dichloroethene (cis-1,2-DCE), tetrachloroethene (PCE), and trichloroethene (TCE).

RM 4.5
Terminal 4 Slip 3 (ECSI Site ID 272) – Contaminants include TPH (diesel-range hydrocarbons).

RM 6
McCormick & Baxter Creosote Co. (ECSI Site ID 74) – Contaminants include pentachlorophenol, PAHs, arsenic, chromium, copper, and zinc.

RM 11
Tarr Oil (ECSI Site ID 1139) – A halogenated VOC plume is not known to be releasing to the river. Contaminants include cis-1,2-DCE, PCE, TCE, and vinyl chloride.

West Side of Willamette River

RM 4
Kinder Morgan Linnton Bulk Terminal (ECSI Site ID 1096) – A TPH plume is located onsite and has released to the river. Contaminants include light non-aqueous phase liquids (LNAPL), diesel-range hydrocarbons, residual-range hydrocarbons, and gasoline-range hydrocarbons.

RM 5
BP Arco Bulk Terminal (ECSI Site ID 1528) – A TPH plume has discharged to the river. Contaminants include TPH (gasoline-range and diesel-range hydrocarbons) and LNAPL, and the plume extends under the adjacent downstream property.

Exxon Mobil Bulk Terminal (ECSI Site ID 137) – A TPH plume has discharged to the river. Contaminants include gasoline- and diesel-range hydrocarbons.

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RM 5.5
Foss Maritime/Brix Marine (ECSI Site ID 2364) – TPH releases from underground storage tanks (USTs) have been identified onsite. Contaminants include gasoline- and diesel-range hydrocarbons.

RM 6
NW Natural/Gasco (ECSI Site ID 84) – Goundwater contamination associated with historical MGP waste is known to be discharging to the river. Contaminants detected in groundwater include PAHs, SVOCs, VOCs (e.g., BTEX), cyanide, sulfide, sulfate and carbon disulfide, ammonia, and metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc). Gasoline-range hydrocarbons, diesel-range hydrocarbons, residual-range hydrocarbons and total petroleum hydrocarbon fractions are being added to the groundwater monitoring program.

RM 6 and RM 7
Siltronic (ECSI Site ID 183) – A chlorinated VOC plume as well as groundwater plumes associated with historical MGP waste and pesticide plumes from Rhone Poulenc are known to discharge to the river. Contaminants include petroleum-related and chlorinated VOCs (benzene, chlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,1-dichloroethene, cis-1,2-DCE, trans-1,2-DCE, TCE, and vinyl chloride), PAHs, gasoline-range, diesel-range, and residual-range hydrocarbons, cyanide, metals (arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, thallium, vanadium, and zinc), 2,4,5-trichlorophenoxyacetic acid (2,4,5-TP), and 2-(2,4-Dichlorophenoxy)propionic acid (2,4-DP-p).

RM 7
Rhone Poulenc (ECSI Site ID 155) – Known releases of organochlorine insecticides and herbicides, including pentachlorophenol (PCP), 2,4-DP, Bromoxynil, 4(2,4-dichloropenoxy)butyric acid (2,4-DB), 2-methyl-4-chlorophenoxyacetic (MCPA), methylchlorophenoxypropionic acid (MCPP), 4-(4-chloro-2-methylphenoxy)butanoic acid (MCPB), 2,4,5-trichlorophenoxyacetic acid [2,4,5-T], 2,4-dichlorophenoxyacetic acid (2,4-D), DDT, Endrin, Heptachlor, sodium chlorate, sodium arsenate, 2,4,5-TP, aldrin, dieldrin, chlordanes, and 2,4-DP-p have occurred at the site.

Contaminants migrating in groundwater include VOCs, and herbicides. Contaminants infiltrating City Outfall 22B include: SVOCs (2,4,6-trichlorophenol, 2,4-dichlorophenol, 2-methylphenol, pentachlorophenol, and naphthalene), insecticides (aldrin, alpha-chlordane, dieldrin, gamma-chlordane, heptachlor epoxide, hexachlorobenzene, DDD, DDE, and DDT), dioxin/furans (2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD]) and metals (aluminum, boron, molybdenum, thallium, arsenic, barium, iron, manganese) (ODEQ 2013).

Kinder Morgan Pump Station (ECSI Site ID 2104) – A TPH plume has been identified at the pump station.

Arkema (ECSI Site ID 398) – Contaminants detected in groundwater at the site include, but are not limited to, DDT and its metabolites DDD and DDE (DDx) and VOCs (chlorobenzene, chloroform, PCE, TCE and benzene), perchlorate and hexavalent chromium.

RM 8

Kinder Morgan Willbridge Bulk Terminal (ECSI Site ID 160) – A TPH plume is not known to be currently discharging to the river. Contaminants include gasoline-range hydrocarbons, diesel-range hydrocarbons, residual-range hydrocarbons, and arsenic.

Chevron and Unocal Willbridge Bulk Terminal (ECSI Site IDs 25 & 177) – A TPH plume located onsite has discharged to the river. Contaminants include LNAPL, gasoline-range hydrocarbons, diesel-range hydrocarbons, residual-range hydrocarbons, and metals (arsenic and manganese).

Chevron Asphalt Plant (ECSI Site ID 1281) – Free product consisting of relatively immobile asphalt-related petroleum has been noted on site. Contaminants include TPH (diesel-range and gasoline-range hydrocarbons), arsenic, BTEX and naphthalene.

RM 9

Gunderson (ECSI Site ID 1155) –There is a chlorinated VOC plume (1,1-DCE, 1,1,1-trichloroethane [1,1,1-TCA], PCE, TCE and vinyl chloride) near the downstream end of the Gunderson property. In addition, there is a PAH groundwater plume located between the Equilon (Shell Terminal) pipeline gasoline release and the Equilon dock at Gunderson.

Christensen Oil (ECSI Site ID 2426) – A TPH (Stoddard solvent) plume is located onsite.

Univar (ECSI Site ID 330) – A VOC plume is located onsite. Contaminants include 1,1-dichloroethane (DCA), 1,1-DCE, cis-1,2-DCE, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE, vinyl chloride, and xylenes.

Galvanizers Inc. (ECSI Site ID 1196) – A zinc plume is located at this site.

RM 10

Sulzer Pump (ECSI Site ID 1235) – TPH, PAH, and VOC plumes from UST and waste oil UST releases exist at this site.

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RM 11.5
Centennial Mills (ECSI Site ID 5136) – A TPH (diesel-range hydrocarbons) plume is located at this site. The plume is not known to discharge to the river, but may be infiltrating the Tanner Creek sewer line near the river.

1.2.3.5 Riverbanks

Identification of contaminated banks is being managed by DEQ under an MOU with EPA. The following provides a discussion of the known contaminated banks. Additional information on these sites is available in DEQ's ECSI database.

East Side of Willamette River

RM 2
Evraz Oregon Steel Mill (ECSI Site ID 141) – Contaminants present in the riverbank includes PCBs and metals (arsenic, cadmium, chromium, copper, lead, manganese, and zinc).

RM 3.5
Schnitzer Steel Industries (ECSI Site ID 2355) – Results of soils samples collected under the docks along the south shore of the International Slip indicate that contaminants are PCBs and dioxins.

RM 5.5
MarCom South (ECSI Site ID 2350) – Further investigation of the nature and extent of contamination in the bank was conducted in 2012. Contaminants are PAHs and metals (arsenic, cadmium, chromium, copper, zinc).

RM 7
Willamette Cove (ECSI Site ID 2363) - Riverbank contaminants are PCBs, dioxins/furans, metals (lead, mercury, nickel, and copper), and PAHs.

RM 8.5
Swan Island Shipyard (ECSI Site ID 271) – Recent sampling results for OU1 indicate that contaminants include metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc), PAHs, PCBs, and tributyltin. Contaminants in riverbank soils in OU5 include metals (arsenic, copper, lead, and zinc), PAHs, and PCBs.

West Side of Willamette River

RM 4
Kinder Morgan Linnton Bulk Terminal (ECSI Site ID 1096) – Contaminants are petroleum constituents (BTEXs and PAHs) and metals (arsenic and lead).

RM 6

NW Natural/Gasco (ECSI Site ID 84) – Contamination associated with historical MGP waste are known to be located in the riverbank. Contaminants include PAHs, gasoline-range hydrocarbons, diesel-range hydrocarbons, residual-range hydrocarbons, cyanide, and metals (zinc).

RM 6 and RM 7
Siltronic (ECSI Site ID 183) – Contamination associated with historical MGP waste is known to be present in the northern portion of the Siltronic riverbank. Riverbank contaminants include PAHs, gasoline-range hydrocarbons, diesel-range hydrocarbons, residual-range hydrocarbon and cyanide and metals (zinc).

BNSF Railroad Bridge – Contamination associated with pesticide and herbicide releases from Rhone Poulenc and Arkema are known to be present in the riverbank below and adjacent to the BNSF railroad bridge. Riverbank contaminants include dioxin/furans, metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, sodium, thallium, vanadium, zinc, insecticides (DDD, DDE, DDT, aldrin, alpha-hexachlorocyclohexane [alpha-BHC], alpha-chlordane, beta-BHC, cis-nonachlor, delta-BHC, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, gamma-BHC, gamma-chlordane heptachlor, heptachlor epoxide, hexachlorobutadiene, methoxychlor, mirex, oxychlordane, and trans-nonachlor), PCBs, SVOCs (acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, benzoic acid, benzyl alcohol, bis (2-ethylhexyl)phthalate, butylbenzylphthalate, chrysene, bibenzo(a,h)anthracene, dimethylphthalate, di-n-butylphthalate, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene and pyrene). (AMEC 2011).

RM 7
Arkema (ECSI Site ID 398) –Riverbank contaminants include DDT, dioxin/furans, PCBs, and metals (chromium and lead).

RM 9
Gunderson (ECSI Site ID 1155) –Contaminants include metals (lead, nickel, and zinc), and PCBs.

1.2.4 Contaminant Fate and Transport

Most of the sediment contamination at the Site is associated with known or suspected historical sources and practices. Ongoing sources of contamination include contaminated groundwater plumes, riverbank soils, stormwater and upstream surface water. The distribution of contaminants in sediments in several nearshore areas appears to reflect more significant historical lateral inputs. Persistent contaminants (particularly PCBs and dioxin/furans) from sediments and surface water bioaccumulate in progressively higher trophic levels within the food chain.

Internal contaminant fate and transport processes are those processes that affect the fate, transport and redistribution of contaminants within the Study Area. The major internal fate and transport processes are:

- Erosion from the sediment bed
- Deposition to the sediment bed
- Dissolved flux from the sediment bed (porewater exchange)
- Groundwater advection
- Degradation (for some contaminants)
- Volatilization
- Downstream transport of either particulate-bound or dissolved phase contaminants

These processes interact to create complex patterns of contaminant redistribution that vary over space, time, and by contaminant. Empirical estimates of contaminant loading associated with internal and external contaminant sources were developed during the RI. External sources include upstream loading (via surface water and sediment bedload), "lateral" external loading such as stormwater runoff permitted discharges (point-source, non-stormwater), upland groundwater (contaminant plume transport to river), atmospheric deposition (to the river surface), direct upland soil and riverbank erosion, otherwise uncontaminated groundwater advection through contaminated subsurface sediments (chemical partitioning from subsurface sediment to porewater and advection to the surface sediment interval), and overwater releases. Internal sources include surface sediment loading to the surface water via sediment erosion (resuspension) and sediment porewater exchange (chemical partitioning from surface sediment to porewater and advection to surface water), as well as sinks. **Figures 1.2-22a** through **1.2-22c** provides a visual summary of currently known or suspected contaminant source loads within and exiting from the Site for three representative contaminants: total PCBs, benzo(a)pyrene, and DDE.

Elevated contaminant concentrations in the Study Area are typically associated with areas near currently known or likely historical and/or existing sources. Although the highest sediment contaminant concentrations are generally found in nearshore areas, higher concentrations are also found in the higher-energy portion of the channel in the middle of the Study Area (RM 5 to 7). This may reflect past or current dispersal of material away from nearshore source areas. Throughout the Study Area, contaminant concentrations are generally higher in subsurface sediments than in surface sediments, indicating both higher historical contaminant inputs and improving sediment quality over time. Localized exceptions to the pattern of higher subsurface sediment

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concentrations exist in a few areas for some contaminants, likely reflecting more recent releases and/or disturbances of bedded sediments. Also, the depth of subsurface contamination is generally greater in nearshore areas as compared to the navigation channel.

Areas with elevated contaminant concentrations in surface sediments generally correspond to areas of elevated subsurface sediment contaminant concentrations, particularly in nearshore areas. Areas where only surface or subsurface sediments exhibited elevated concentrations of contaminants point to spatially and temporally variable inputs and sources, or to different influences from sediment transport mechanisms. The PCB distributions in areas of elevated PCB concentrations are generally distinct from those in surrounding areas of lower PCB concentrations. Within areas of elevated PCB concentrations, the PCB patterns in surface and subsurface sediment, sediment traps, and in the particulate portion of the surface water samples are often similar. A similar pattern and similar composition across media was observed to a lesser degree for PAHs, but was less apparent for dioxins/furans or DDx compounds.

Most areas of elevated contaminant concentration in bedded sediment are located in relatively stable nearshore areas, and large-scale downstream migration/dispersal of concentrated contaminants from these areas is not indicated by the bedded sediment data. Much larger historical direct discharges from upland and overwater sources, rather than reworking of bedded sediments, are believed to have produced some of the observed patterns (e.g., elevated levels in subsurface sediments downstream of the source areas). Limited ongoing downstream dispersal of contaminants in sediments is suggested based on bedded sediment concentration gradients downstream of areas with elevated sediment concentrations.

Patterns of contamination in bedded surface sediment indicate some redistribution of contaminants over time from past source areas, but this is limited by burial of much of the source area contamination as indicated by higher subsurface sediment concentrations in these areas. Periodic erosion may temporarily expose buried contamination.

Based on results of surface water data collected during the RI, resuspension and/or dissolved phase flux from the sediment bed are contributing to contaminant concentrations in surface water, particularly in quiescent areas where surface water mixing and dilution is minimal. Loading estimates presented in **Figures 1.2-22a** through **1.2-22c** are consistent with this concept, indicating the mass flux of contaminants exiting the downstream end of the Study Area in surface water, either directly to the Columbia River or via Multnomah Channel, is greater than the flux entering the Study Area.

Contaminant concentrations in stormwater entering the Study Area are generally greater than concentrations associated with upstream surface water. However, from a loading

perspective, lateral contaminated loads associated with upland sources are comparable to upstream loads for certain contaminants.

Groundwater plume discharge to surface water has been observed in several areas. Dissolved phase flux from surface sediments to the water column has been inferred from RI data.

Finally, empirical tissue contaminant data and food web modeling indicate that persistent contaminants (particularly PCBs and dioxin/furans) in sediments and surface water can bioaccumulate in aquatic species tissue.

The CSM integrates the information gathered to date to provide a coherent hypothesis of the Site fate and transport. **Figure 1.2-23** provides a simplified visual summary of this hypothesis, including contaminant interactions with human and ecological receptors.

1.2.5 Baseline Risk Assessment

This section presents a summary of the results of the baseline human health and ecological risk assessments (BHHRA and BERA). These assessments are presented in Appendix F and Appendix G of the RI report.

1.2.5.1 Baseline Human Health Risk Assessment

The BHHRA presents an analysis of the potential for effects associated with both current and potential future human exposures at Portland Harbor. Potential exposure to contaminants found in environmental media and biota was evaluated for various occupational and recreational uses of the river, as well as recreational, subsistence, and traditional and ceremonial tribal consumption of fish caught within the Portland Harbor site. Additionally, because of the persistent and bioaccumulative nature of many of the contaminants found in sediment, infant consumption of human breast milk was also quantitatively evaluated.

Consistent with EPA policy, the BHHRA evaluated a reasonable maximum exposure (RME), which is defined as the maximum exposure that is reasonably expected to occur. In addition, estimates of central tendency (CT), which are intended to represent average exposures, were also evaluated. **Figure 1.2-24** presents the CSM for the BHHRA and **Table 1.2-2** provides a list of chemicals potentially posing unacceptable risks for human health.

The major findings of the BHHRA are:

- Estimated cancer risks resulting from the consumption of fish or shellfish are generally orders of magnitude higher than risk resulting from direct contact with sediment and surface water. Risks and noncancer hazards from fish and shellfish consumption exceed the EPA point of departure for cancer risk of 1×10^{-4} and

target hazard index (HI) of 1 when evaluated on a harbor-wide basis, and when evaluated on the smaller spatial scale by river mile.

- Consumption of resident fish species consistently results in the greatest risk estimates. Evaluated harbor-wide, the estimated RME cancer risks are 4×10^{-3} and 1×10^{-2} for recreational and subsistence fishers, respectively.

- Evaluated on a river mile scale, it is only at RM 5 that RME risk estimates from consumption of resident fish is less than 1×10^{-4}.

- Noncancer hazard estimates for consumption of resident fish species are greater than 1 at all river miles. Based on a harbor-wide evaluation of noncancer risk, the estimated RME HI is 300 and 1,000 for recreational and subsistence fisher, respectively. The highest hazard estimates for recreational fishers are at RM 4, RM 7, RM 11, and in Swan Island Lagoon.

  The highest noncancer hazards are associated with nursing infants of mothers, who consume resident fish from Portland Harbor. When fish consumption is evaluated on a harbor-wide basis, the estimated RME HI is 4,000 and 10,000 for breastfed infants of recreational and subsistence fishers, respectively. Evaluated on a harbor-wide scale, the estimated RME HI for tribal consumers of migratory and resident fish is 600 assuming fillet-only consumption, and 800 assuming whole-body consumption. The corresponding HI estimates for nursing infants of mothers, who consume fish, are 8,000 and 9,000 respectively, assuming maternal consumption of fillet or whole-body fish.

- PCBs are the primary contributor to risk from fish consumption harbor-wide. When evaluated on a river mile scale, dioxins/furans are a secondary contributor to the overall risk and hazard estimates. PCBs are the primary contributors to the noncancer hazard to nursing infants, primarily because of the bioaccumulative properties of PCBs and the susceptibility of infants to the developmental effects associated with exposure to PCBs.

- The greatest source of uncertainty in the risk and hazard estimates includes the lack of good site-specific information about consumption of resident fish from Portland Harbor. Because tribal fish consumption practices were evaluated assuming a combined diet consisting of both resident and migratory fish, it is not clear to what degree contamination in Portland Harbor contributes to those estimated risks. In addition, it is important to remember that the noncancer hazard estimates presented in the BHHRA are not predictions of specific disease, and the cancer estimates represent upper-bound values, and the EPA is reasonably confident that the actual cancer risks will not exceed the estimated risks presented in the BHHRA.

1.2.5.2 Baseline Ecological Risk Assessment

The BERA presents an evaluation of risks to aquatic and aquatic-dependent species within the Study Area in the absence of any actions to control or mitigate contaminant releases. The overall process used for the BERA was based on the guidance provided in the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments – Interim Final* (EPA 1997c) and followed the approach documented in numerous interim deliverables as well as discussions, directives, and agreements with the LWG, EPA and its federal, state, and tribal partners. **Figure 1.2-25** presents the CSM for the BERA and **Table 1.2-3** provides a list of contaminants of potential concern (COPCs) posing potentially unacceptable ecological risks within the Portland Harbor Study Area. A list of chemicals identified as most likely to be contaminants of ecological significance is provided in **Table 1.2-4**.

The following presents the primary conclusions of the BERA.

- In total, 93 contaminants (as individual contaminants, sums, or totals)[5] with HQ ≥ 1.0 pose potentially unacceptable ecological risk. Differences in the specific toxicity reference values (TRVs) used in different lines of evidence (LOEs) for total PCBs (e.g., total PCBs versus specific Aroclor mixtures), total DDx, and total PAHs, all of which describe individual contaminants or a group of multiple but related individual chemical compounds, can result in different counts of the number of contaminants posing potentially unacceptable risk. The list of contaminants posing potentially unacceptable risks can be condensed if individual PCB, DDx and PAH compounds or groups are condensed into three comprehensive groups: total PCBs, total DDx, and total PAHs. Doing so reduces the number of contaminants with HQ ≥ 1.0 posing potentially unacceptable risks to 66.

- Risks to benthic invertebrates are clustered in 17 benthic areas of concern (AOCs).

- Sediment and TZW samples with the highest HQs for many contaminants also tend to be clustered in areas with the greatest benthic invertebrate toxicity.

- The COPCs in sediment that are most commonly spatially associated with locations of potentially unacceptable risk to the benthic community or populations are PAHs and DDx compounds.

- Not all COPCs posing potentially unacceptable risk have equal ecological significance. The most ecologically significant COPCs (i.e., contaminants of

[5] The five chemicals or chemical groups with concentrations that exceeded only the sediment probable effects concentration (PEC) and/or probable effects level (PEL) (i.e., chemicals that were not identified as COPCs for other benthic invertebrate LOEs: Aroclor 1254, chlordane [cis and trans], gamma- hexachlorocyclohexane [HCH] [Lindane], heptachlor epoxide, and total chlordane), ammonia and sulfide (which are conventional parameters), and residual-range hydrocarbons that had concentrations that exceeded only the total petroleum hydrocarbons [TPH] SQGs) are not included in this count.

primary ecological significance) are PCBs, PAHs, dioxins and furans (as toxic equivalent [TEQ]), and DDT and its metabolites.

- The list of ecologically significant COPCs is not intended to suggest that other contaminants in the Study Area do not also present potentially unacceptable risk.

- The contaminants identified as posing potentially unacceptable risk in the largest numbers of LOEs are (in decreasing frequency of occurrence) total PCBs, copper, total DDx, lead, tributyltin (TBT), zinc, total TEQ, PCB TEQ, benzo(a)pyrene, cadmium, 4,4′-DDT, dioxin/furan TEQ, bis(2-ethylhexyl) phthalate, naphthalene, and benzo(a)anthracene. The remaining 78 contaminants posing potentially unacceptable risk were identified as posing potentially unacceptable risk by three or fewer LOEs.

- Of the three groups of contaminants (i.e., total PAHs, total PCBs, total DDx) with the greatest areal extent of HQs ≥ 1.0 in the Study Area, PAH and DDx risks are largely limited to benthic invertebrates and other sediment-associated receptors. PCBs tend to pose their largest ecological risks to mammals and birds.

- The combined toxicity of dioxins/furans and dioxin-like PCBs, expressed as total TEQ, poses the potential risk of reduced reproductive success in mink, river otter, spotted sandpiper, bald eagle, and osprey. The PCB TEQ fraction of the total TEQ is responsible for the majority of total TEQ exposure, but the total dioxin/furan TEQ fraction also exceeds its TRV in some locations of the Study Area.

1.3 FS DATABASE DESCRIPTION

This section describes the FS database that contains the sediment data used in the alternatives development and evaluations in this FS. The source of the sediment data within the FS database is the Site Characterization and Risk Assessment (SCRA) database used for evaluations in the RI Report (RI citation). However, the SCRA database did not use consistent summing rules as were used in the baseline risk assessment (BRA). To allow for evaluations of risk reduction based on various alternatives presented in this report, it was necessary to ensure that the data were treated in a manner consistent with the BRA. Data selection, evaluation, summation rules, and other rules and procedures for the FS database are described in Appendix A. The FS database only includes sediment data and does not contain porewater, surface water, TZW, or biota/tissue data; those data are retained in the SCRA database although they may be used for analysis in this FS.

For the RI and FS, a date of May 1, 1997, was used to define the initiation of the sediment dataset to follow the last major flood of the lower Willamette River in the winter of 1996. The SCRA database includes data collected through July 19, 2010. However, the following additional sediment data was added to the FS database:

- Additional updates to the SCRA database posted to the LWG's portal through February 4, 2011
- Gasco Engineering Evaluation/Cost Analysis (EE/CA) data as provided by Anchor QEA in 2013 and meeting the FS sediment database protocols described in Appendix A
- Arkema EE/CA data as provided by Integral in May 2014 and meeting the FS sediment database protocols described in Appendix A

As noted in Section 1.2.2.3, the RM11E Group entered into an AOC to collect additional data (to include sediment, riverbank soil, porewater, and groundwater data) in support of preliminary remedial design activities. While the sediment data was not included within the FS database due to timing, all the data will be available in the Administrative Record for use during remedial design.

The SCRA database or the FS database may be used for some depictions or evaluations in this FS. Unless otherwise noted, the FS database was used for evaluations of sediment in this report.

ED_000959_PST_00089175-00026 12/23/2020 SEMS_0337503

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ED_000959_PST_00089175-00028 12/23/2020 SEMS_0337503

To: Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Humphrey, Chip
Sent: Fri 5/17/2013 12:00:53 AM
Subject: RE: PH revised RI process

Same for me but I'll defer to Kristine on this.

From: Yamamoto, Deb
Sent: Thursday, May 16, 2013 4:40 PM
To: Cohen, Lori
Cc: Koch, Kristine; Humphrey, Chip; Cora, Lori
Subject: RE: PH revised RI process

This letter looks fine to me.

From: Cohen, Lori
Sent: Thursday, May 16, 2013 4:28 PM
To: Koch, Kristine; Humphrey, Chip; Yamamoto, Deb; Cora, Lori
Subject: PH revised RI process

All –

Deb, Kristine and I talked about the changes the LWG has requested to the RI review process I sent out on April 1. The attached letter is a draft that incorporates the acceptable changes – its not a complete redline/strikeout from the April 1 version, but I highlighted in red the changes. The enclosure would be the attached spreadsheet with the latest schedule from Kristine

I would like to get this to the LWG asap – so please look at this as soon as you can. If by any slight miracle you all agree to this by COB Friday, I will send it out. If not, I am out all next week, so perhaps Deb can work with you all to finalize.

Deb – Jen can format for you and you can sign for me (unless there are major changes that we need to discuss).

I want to be done with this process piece… as I know you do!

Thanks everyone.

Lori

From: Koch, Kristine
Sent: Wednesday, May 15, 2013 1:54 PM
To: Bob Wyatt (rjw@nwnatural.com); James McKenna
Cc: Jennifer Worenets (jworonets@anchorqea.com); Humphrey, Chip; Yamamoto, Deb; Cohen, Lori; Cora, Lori
Subject: Revised RI Schedule

Bob and Jim -

Here is the revised RI schedule, which do not affect the overall schedule. Please note that if there are any more slippages in the schedule, it will affect the overall schedule. Please note that a slippage in EPA providing comments on a particular section also results in slippage of the review period for the LWG since the LWG gets 30 days per section from the date the comments are provided to the LWG – currently, there are no overlapping review periods, with the exception of the BERA (which uses a different contractor and should not be controversial since it would reflect the final BERA). Since I have been keeping versions of the sections as negotiated, I would require the incorporation of the latest version, not the original version. While we encourage the LWG to incorporate all EPA's comments into each section, EPA will not commit to reviewing those sections since our focus is on providing comments on the sections. I do plan to review these prior to sending the final letter directing incorporation of our comments because if these are adequate, then I'll direct incorporation of the LWG's modified version or may edit it and provide those versions. I've also included that LWG will have 30 days to dispute rather than 14 due to the size of the document and the numerous changes being made to the document.

Please let me know if you have any concerns or need clarification on this process.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Cohen, Lori[Cohen.Lori@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Yamamoto, Deb
Sent: Thur 5/16/2013 11:39:50 PM
Subject: RE: PH revised RI process

This letter looks fine to me.

From: Cohen, Lori
Sent: Thursday, May 16, 2013 4:28 PM
To: Koch, Kristine; Humphrey, Chip; Yamamoto, Deb; Cora, Lori
Subject: PH revised RI process

All –

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I would like to get this to the LWG asap – so please look at this as soon as you can. If by any slight miracle you all agree to this by COB Friday, I will send it out. If not, I am out all next week, so perhaps Deb can work with you all to finalize.

Deb – Jen can format for you and you can sign for me (unless there are major changes that we need to discuss).

I want to be done with this process piece… as I know you do!

Thanks everyone.

Lori

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Sent: Wednesday, May 15, 2013 1:54 PM
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Please let me know if you have any concerns or need clarification on this process.

Regards,

Kristine Koch
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May 08, 2013

PROPOSED "TIERED APPROVAL PROCESS"

Issue: The enhanced informal dispute process should include a means to remove all ambiguity in any agreed-upon resolution, with respect to all changes to text, tables, figures and appendices, and we suggest doing this through a tiered approval process.

The LWG needs a mechanism to clarify that all changes, once made, have been approved by EPA. Although the proposed process lays out a 30-day period for airing and resolving all major issues with proposed revisions to each RI Report section, the process does not produce any binding agreement on the agreed-upon modifications made during those time periods. The LWG, however, will then be required to make all changes to the RI Report 30 days after receipt of a letter from EPA stating that it has completed its modifications and comments on all sections of the RI. Thus, in the event that LWG misinterprets EPA's direction, or applies it in a manner that does not comport with what EPA had anticipated, it would bear the enforcement risk and be subject to AOC penalties. To avoid this, we suggest using a tiered approval process that we believe should be acceptable to EPA and yet provide the finality that the LWG needs.

Understanding how the revision process is currently working may help in evaluating this proposed tiered-approval process. Using EPA's comments on Section 2 of the RI Report as an example, EPA provided those comments on November 30, 2012. Those comments included a nearly full rewrite of RI Section 2 which proposed very specific language to be inserted into the document. Other comments, particularly those included in the Table EPA provided of approximately 77 changes to be made to Sections 1 and 2 text, maps, tables and figures, gave direction but did not, in many cases, specify exactly how that direction was to be carried out. For example, EPA directed the LWG to add a new subsection (Attachment A, cell B76):

> "This section is to be titled "Removal Actions Conducted". The RI would typically refer to early action areas, which have LOTS of data, even though the RI/FS and PP will not develop cleanup alternatives for the removal areas, in the ROD EPA will have to 'accept' the removal action cleanups as 'final' so it would be good to put them in the RI – just a paragraph or two to give names of EAAs…."

It also commented without specificity on the maps provided in support of Section 2:

> "This is only for surface & subsurface sediment – were there any other types of data that are or should be presented in the maps?"

EPA and the LWG met on December 18, 2012 and January 10, 2013 to discuss the comments and develop an agreed-upon approach for making final revisions to RI Sections 1 and 2. These discussions and resolutions were documented in meeting notes provided by the LWG to EPA on December 20, 2012 and January 15, 2013. There were no issues from Section 2 that were elevated to Senior Managers.

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This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part

However, at the end of the 30 day collaborative period, those meeting notes currently serve as the only documentation of the modifications agreed to by EPA and LWG project managers. And some of those notes reflect general agreements, which still leave ambiguity as to implementation. At this point, the LWG has nearly completed all the revisions to RI Section 2 in accordance with the documented agreements. The current plan is to submit these revised Sections 1 and 2 and all associated data products to EPA in the coming weeks. However, at no point under the current process will the LWG receive any binding approval from EPA of any of the revisions made.

What this review highlights for us is that there likely is a need for tiered approvals by the EPA of the resolutions reached through the proposed enhanced informal dispute resolution process. We suggest that, at the conclusion of the enhanced informal dispute process for each section, the LWG provide to EPA documentation of the agreed-upon modifications, similar to what we have done for the first sections, in the form of a table of Modifications From Enhanced Informal Dispute Process. We assume that, at that point in time, EPA will want to reserve its rights to review final implementation of those modifications before giving any final approval. We therefore request that, at the end of the 30-day period, an individual within EPA with authority to bind the agency send a letter withdrawing the original comments on that section and replacing those comments with the Modifications From Enhanced Informal Dispute Process. We then suggest that, when the LWG has completed all steps necessary to implement those modifications and submitted them to EPA, EPA then issue a second letter formally approving those changes as complete resolution of the matters addressed in the Modifications From Enhanced Informal Dispute Process. In this way, EPA will not give up its ability to enforce its directed resolution to its original comments, the LWG will not be subject to potential enforcement based on original comments that have in fact been replaced by agreed-upon modifications, and the process will leave no ambiguity as to whether EPA's changes have been correctly implemented.

Under EPA's proposed process, after the review of the individual sections has been completed, the EPA will send a letter advising the LWG to submit a revised RI Report. At that point, the LWG will need to do two things. It will need to make a decision within 14 days whether to invoke dispute, and it will need to provide within 30 days a finalized RI Report. There will be no time then to resolve any remaining ambiguity regarding how a modification is to be implemented, thus it will be very important to have already received EPA's approval that the modifications provided on a section by section basis have been approved. Thus, although we agreed generally with your suggestion that "no new issues may be raised in formal dispute that were not raised during the enhanced informal dispute process," if EPA has not provided its final approval of the modifications by the time that the LWG is required to invoke dispute, the LWG needs to reserve the right to invoke dispute generally on all issues on which EPA has not given that final approval. Otherwise, it will be in the same position it was in with respect to the BHHRA where it was accruing penalties because it misinterpreted EPA's direction.

Do Not Quote or Cite
This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 5/14/2013 4:37:55 PM
Subject: FW: Portland Harbor RI Section 7
2013-05-08 Portland Harbor Proposed Tiered Approval Process.pdf

You should really read this.

Kristine Koch
Remedial Project Manager
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From: Wyatt, Robert [mailto:rjw@nwnatural.com]
Sent: Monday, May 13, 2013 4:23 PM
To: Koch, Kristine; James McKenna
Cc: Jennifer Worenets (jworonets@anchorqea.com); Humphrey, Chip; Allen, Elizabeth
Subject: RE: Portland Harbor RI Section 7

Kristine:

Thank you for the update on Section 7 of the RI. We look forward to working with you and your team on the issues associated with background so we can get Section 7 wrapped up. Hopefully we can get the PRG and other FS issues resolved in the next couple of weeks which will help free-up some key EPA resources for the RI.

Regarding the LWG's proposed revisions to the RI review process, Jim and I want to make it clear that it is our intent to continue the discussion of these ideas with you and Chip prior to sending anything in writing to the Senior Managers. As we've discussed over the last couple of weeks, our proposal involves two main themes: a) combining revisions to Sections 5, 6, and 7 into a single and more comprehensive effort; and b) ensuring we have full agreement on the changes to each section prior to development of the final RLSO version later this year (i.e., a tiered approach to

approval).

Jim and I are available to further discuss the pros and cons of combining the review and resolution of Sections 5, 6 and 7, but it appears you have an alternate approach in mind for revising those sections collaboratively. We look forward to working with you on a final approach and schedule for those sections. We are also very interested in implementing a tiered approval process for the RI sections. I've attached a memo that outlines our current thinking for your consideration. Again, our goal is to resolve any adjustments to the RI approach and schedule with you and Chip before finalizing them and providing them to our senior managers.

Please call me if you have any questions,

Bob

From: Koch, Kristine [Koch.Kristine@epa.gov]
Sent: Monday, May 13, 2013 1:34 PM
To: James McKenna; Wyatt, Robert
Cc: Jennifer Worenets (jworonets@anchorqea.com); Humphrey, Chip; Allen, Elizabeth
Subject: Portland Harbor RI Section 7

Bob and Jim – EPA will not be providing comments on Section 7 this week. This section has been delayed due to discussions on other sections and FS issues (PRG development). The background discussion will be relevant to both documents, so it may involve more people in the review and modification. I will get you a new date soon. Additionally, you had indicated combining sections 5, 6 and 7 together. I don't think it is a good idea based on all the work that will be required for these sections and think that it would be better to work on them together as we go through cleaning them up. You were going to get back to me on whether you wanted them all together or keeping them separate. I also understand from my Senior Management that the LWG is supposed to be providing EPA with an alternative schedule, which we have not seen yet. Any ideas on what you are thinking?

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
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To: McLerran, Dennis[mclerran.dennis@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Albright, Rick[Albright.Rick@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Magorrian, Matthew[Magorrian.Matthew@epa.gov]
From: Cohen, Lori
Sent: Tue 4/30/2013 12:16:51 AM
Subject: Material for PH briefing
2013-04-29 RA Brief for Congressional PH update - key messages lc clean.docx
2013-04-29 RA Brief for Congressional PH update - status background key issues.docx

Dennis,

We will be meeting with you on Tuesday morning in preparation for the May 1 Portland Harbor meeting with Elected Officials.

Here are the materials for the briefing.

Thank you,

Lori

To: Cohen, Lori[Cohen.Lori@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]
Cc: Humphrey, Chip[Humphrey.Chip@epa.gov]
From: Koch, Kristine
Sent: Mon 4/29/2013 8:55:55 PM
Subject: Portland Harbor Congressional Meeting - Briefing Document for RA
2013-04-29 RA Brief for Congressional PH update - key messages.docx
2013-04-29 RA Brief for Congressional PH update - status, background, key issues.docx

All – I have merged the previous 2 documents together and then made two new documents. The first is just Key Messages for Dennis. The second is the status, background, and key issues.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Portland Harbor Superfund Site
Key Messages
Congressional/EPA/Stakeholder Meeting May 1, 2013

Key Messages:

- The Portland Harbor Superfund Site is National Priority List Superfund site. It was listed on the NPL in December 2000 **and it is important to** EPA and I am sure to all of you that progress is made at this site. It is important to the City of Portland, the Port of Portland, the business community and, of course, the community at large to address the contamination at this site.
- EPA and LWG have developed a new working paradigm to move this project forward and significant progress has been made since our last meeting.
- The contamination is significant. There are high levels of PCBs, dioxins, and other contaminants that present risk to human health to those eating fish and risks to the environment.
- EPA is required to select a protective remedy that is cost effective and utilizes permanent solutions to the extent possible –this is a statutory mandate of the Superfund law.
- Throughout the investigation and cleanup, there are likely to be many opinions about the best approach and we must endeavor to work collectively to resolve our differences as quickly as possible. We prefer to work cooperatively with parties where possible, but we will use our enforcement authorities as necessary.
- Fundamental to the cleanup is to prevent, minimize and reduce ongoing sources of contamination to the river. EPA expects aggressive source control actions to ensure that sediment remedial action will be able to move forward in a timely way, and reduce the potential for recontamination.
- Major source control work is underway at the Arkema facility and the Gasco facility. We do appreciate DEQ's leadership and the parties' cooperation in conducting this work.

I'd like to highlight some of the progress and activities since we met last fall.

- EPA is pleased that several potentially responsible parties (Cargill, Inc., CBS Corporation, City of Portland, DIL Trust, Glacier Northwest, Inc., and PacifiCorp), signed an Administrative Order with EPA to conduct additional focused investigation at the area known as River Mile 11East. This area has some of the highest PCB concentrations in sediment and fish tissue within the larger Superfund Site. The work done under the agreement is intended to facilitate finalizing the remedial design soon after the Record of Decision is issued. EPA views getting started in the design and planning for cleanup of this area as a key in the sequencing of the river cleanup.

- EPA approved the final baseline human health risk assessment earlier this month. The risk assessment concludes that consumption of contaminated resident fish represents the greatest risk to people at the Site.

- (OPTION) The LWG disputed some of EPA's modifications to the previous draft of human health risk assessment, including fish consumption rates, and it's finding that the LWG's document was deficient and out of compliance with the AOC. EPA's Environmental Cleanup Office Director issued a final decision after allowing the LWG to fully brief their positions and be heard by higher management in the agency. EPA also issued stipulated penalties. Because that enforcement process is ongoing at this time, EPA won't be discussing the specifics of the compliance issues today.

- EPA is reviewing the LWG's draft Feasibility Study Report. EPA is focusing on ensuring that this document (and all documents) comply with the NCP, are technically complete, scientifically sound and are written clearly to avoid misunderstandings in the future. EPA provided initial feedback to the LWG last December communicating key concerns and deficiencies in the draft report. There are many tough decisions ahead – how much active work (like dredging and capping) will be needed, cleanup levels, whether local confined disposal facilities will be included as part of the remedy.

- EPA is diligently working to ensure that the administrative record is complete and clear prior to proposing a preferred remedy. EPA is still working towards a goal of preparing a Proposed Plan for cleanup in 2014. EPA will ensure that there are adequate opportunities for public review and comment before finalizing cleanup plans.

- The LWG, with assistance from local fishermen, including community advisory committee representatives, collected smallmouth bass tissue in the lower Willamette River in the fall of 2012. A data report was recently submitted to EPA. It provides a snapshot of current PCB levels in Portland Harbor and an area upstream of the Site. The data will help with the evaluation of alternatives in the FS and establishing baseline (pre-cleanup) conditions to evaluate remedy effectiveness.

- Fish consumption surveys need to be conducted over several seasons and over several years to account for temporal variability, which is very time consuming and expensive. It is difficult to conduct an accurate fish consumption survey that is site-specific because for over a decade, both EPA and the Oregon Health Authority have advised the public that the long-term consumption of fish is a threat to public health. Thus, any survey conducted at this point would not reflect pre-advisory consumption patterns that would affect the long-term intake of these individuals.

Portland Harbor Superfund Site
Status, Background and Key Issues
Congressional/EPA/Stakeholder Meeting May 1, 2013

Status:

- The Baseline Human Health Risk Assessment is complete. The final BHHRA was submitted March 28, 2013 and approved April 4, 2013.
- EPA and the LWG are nearing completion of the final baseline ecological risk assessment. The LWG has incorporated EPA's latest comments and provided a final document April 1, 2013 that is under EPA review. EPA is working with LWG to resolve the last remaining edits, and expects that an approvable document will be finalized in June 2013.
- EPA is providing redline changes to text and additional comments on the draft RI. The comments are being provided to the LWG section-by-section as EPA completes its review. The extent of revisions varies by section. The process provides for the LWG to provide feedback and for EPA and LWG project staff to negotiate the final language. If the staff cannot resolve the language, it can be elevated to senior managers for resolution. Five of ten sections have been provided to the LWG and two have been successfully negotiated at the staff level. Two sections have only one issue each that are being elevated to the senior manager level. The fifth one is still under review by the LWG. It is anticipated that the comments will be resolved later this year (2013) and a final document produced by the LWG in early 2014.
- The Lower Willamette Group (LWG) submitted the Draft Portland Harbor Feasibility Study (FS) to EPA March 30, 2012. Estimated costs of the cleanup alternatives range from $169 million to $1.7 billion. EPA submitted comments on the draft FS in December 2012. EPA has significant issues with the document and is working with the LWG to resolve those issues. The Oregonian printed a front page story on EPA's comments and concerns with the adequacy of the draft document. EPA and the LWG are working on how to finalize the FS and who will have the lead for what parts. EPA anticipates writing a considerable portion of the final FS, with the LWG providing technical support.

Issues/Background:

- Portland Harbor Superfund Site was listed in December 2000 for releases to the river from upland sources.
- EPA has identified approximately 148 PRPs to date, which includes several local, state and federal agencies and departments. Ten PRPs (the Lower Willamette Group or LWG) performing RI/FS under a 2001 AOC.
- State of Oregon is lead for upland source control identification and cleanup.
- RI/FS being coordinated with state and federal Natural Resource Trustee agencies, 6 Native American Tribes
- The Portland Harbor Citizens Advisory Group plays an active role in making sure the concerns of the community are considered throughout the investigation.

- **Documents Submitted Are Inadequate**
  - **Draft FS** –EPA's ability to move forward with a Proposed Plan for cleanup in late 2013 is highly dependent on the quality, transparency and completeness of the PRP's draft FS. Based on our initial review the LWG draft document, although it includes useful information and analysis, falls short of our needs. The LWG's FS and its public presentations emphasize site wide risks and cleanup evaluations that downplay the current risks and potential risk reduction associated with hot spot/source areas of contamination. The best scoring alternatives (Alternative B, C and D) rely heavily on natural recovery (no action) because their fate and transport models support natural recovery. EPA is reviewing the models and has found that the overly optimistic predictions do not reflect actual site conditions in several areas.

  - **2nd Draft RI**

    - After reviewing the second draft of the August 2011 RI, EPA determined that the document was inadequate and notified the LWG in December 2011 and requested the Word version of the document to make modifications.
    - The document was determined inadequate because it does not clearly describe the remedial investigation process, does not clearly present the information and conclusions, contains language that obfuscates the issues of contamination, and does not adequately address EPA's comments submitted in July 2010.

  - **Draft HHRA**
    - The LWG disputed EPA's modifications to the 2011 draft document and the basis for determining that they were out of compliance with the Administrative Order. There was some media coverage and Congressional interest, as well as LWG complaints to ECL management that EPA had radically changed its way of doing business on the project. EPA and the LWG have been engaged in the dispute process since late July. The initial informal dispute process narrowed the LWG's list of issues, but did not resolve all of the disputed issues. The LWG invoked formal dispute on Sept 17th, and provided their dispute position on Sept 21st. Under the AOC, the R10 ECL Director is the dispute official but by agreement of all parties Dan Opalski (prior R10 ECL Director) will retain decision making for this dispute.
    - The key issues in dispute include EPA's selection of reasonable maximum exposure scenarios for fish consumption and changes to document text that EPA found confusing, inaccurate or biased.
    - The LWG also complained about consistency in EPA direction and feels we haven't abided by other agreements made along the way. They want to define a new working relationship.

- **RI/FS and getting to Cleanup**

- Various PRP white papers were developed and publicized in the past year: (1) cost-benefit analysis purporting that jobs will be lost by a cleanup, (2) white paper criticizing EPA risk scenarios as overly conservative, (3) analysis of food-web model inaccuracies, and (4) analysis of anticipated utility rate increases due to cleanup costs.
- **Brattle Group Fish Consumption Survey** – Just prior to the last meeting EPA became aware that some PRPs conducted a survey of fish consumption in the Portland Harbor Site. There was no coordination with EPA in the survey design, and EPA has been on record discouraging surveys that do not meet rigorous technical standards, and pointing out the time and cost of doing a survey that would meet those standards. The survey was funded by 3 PRPs - Schnitzer, Vigor, and Gunderson. Gunderson is an AOC signatory/LWG member; the other two parties had the opportunity but did not sign the ACO or join the LWG. The report estimated that 7800 people were consuming resident fish from Portland Harbor, and 78 people were consuming high rates of fish (rates that were similar to EPA's estimates for reasonable maximum exposure).
- **The Portland Harbor Partnership -** A group of PRPs, including some LWG members, was previously very active conducting its own outreach activities. Although its efforts have been touted as educational, EPA is concerned that it may be laying the groundwork for advocacy. The partnership supported a survey last year by Portland State University which confirmed that people, especially ethnic community members, are fishing in the lower Willamette to supplement their diets. The Brattle Group study appears to be a follow up to the findings of the first survey. Other activities are also being planned. The Portland Harbor Partnership has not conducted major outreach activities for the past several months.

- **Work underway or completed**

  - **Early Actions at GASCO and T4; potential action at River Mile 11E -** Early Actions offshore of the Arco/BP, GASCO and the Port's T4 facilities have been completed and have reduced risk posed by these areas of highly contaminated sediment. Additional work at GASCO, T4 and at the Arkema facility will provide design level information that will help accelerate remedial work once the ROD is signed. EPA also sent a group of PRPs (to include the City) a draft AOC and scope of work for pre-design and design work at RM 11E. RM 11E is PCB hotspot at the upstream end of the site, and early sequencing of work is key to a successful cleanup. EPA staff is concerned that the City has stepped back from its early leadership role on this area, and it is unclear if this is a change in position at the City.
  - **Upstream and upland cleanups underway -** Construction is underway at contain and capture contaminated groundwater and manage stormwater from the Arkema facility under DEQ oversight. The Triangle Park upland property cleanup was also completed last fall under EPA oversight. Cleanup work was also recently completed at Zidell ship dismantling facility, which is located upstream of the PH study area. The Zidell cleanup included in-water PCB contaminated sediments and was conducted under DEQ oversight.

- **Fish tissue collection** – The LWG agreed to conduct additional smallmouth bass tissue sampling last fall at the request of EPA. The LWG recently submitted the results of PCB levels in the fish. The data will help us evaluate current trends in concentration levels, natural recovery model predictions, and establish a baseline to evaluate remedy effectiveness.

Contacts:

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Chip Humphrey, Remedial Project Manager	humphrey.chip@epa.gov	503-326-2678
Lori Houck-Cora, Asst. Regional Council	cora.lori@epa.gov	206-553-1115

To: Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]
Cc: Humphrey, Chip[Humphrey.Chip@epa.gov]
From: Koch, Kristine
Sent: Fri 4/26/2013 4:40:07 PM
Subject: Portland Harbor Briefing Documents for Tuesday RA Brief
2013-04-24 RA Brief bacground for Congressional PH update.docx
2013-04-24 RA Brief for Congressional PH update .docx

Chip and I have drafted the attached documents. If you have any questions, please give me a call or send me an email. Chip is out until Tuesday, so don't try to get in touch with him. Chip plans to participate in the briefing on Tuesday by phone. I will be traveling to Portland, so will not be participating.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Teela Labrum[tl@bhlaw.com]; sparkinson@jzplaw.com[sparkinson@jzplaw.com]
Cc: mike@reedconsulting.comcastbiz.net[mike@reedconsulting.comcastbiz.net]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 4/16/2013 3:35:51 PM
Subject: RE: Review of the Portland Harbor Draft Final RI, Section 4

EPA and LWG will consider incorporation of these comments into Section 4, as appropriate. We will not be responding to this letter.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Teela Labrum [mailto:tl@bhlaw.com]
Sent: Monday, April 15, 2013 5:41 PM
To: sparkinson@jzplaw.com
Cc: mike@reedconsulting.comcastbiz.net; Koch, Kristine
Subject: Review of the Portland Harbor Draft Final RI, Section 4

Good Evening,

Please see the attached correspondence from Attorney Steve Schell.

Best,

Teela

Teela Labrum
Paralegal & Legal Assistant
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ATTORNEYS AND COUNSELORS AT LAW

STEVEN R. SCHELL
DIRECT DIAL: (503) 417-2145
E-mail: srs@bhlaw.com
Admitted in Oregon and Washington

April 15, 2013

VIA E-MAIL AND REGULAR MAIL

Stephen T. Parkinson, Esq.
Joyce Ziker Parkinson PLLC
1601 Fifth Avenue, Suite 2040
Seattle, WA 98101
sparkinson@jzplaw.com

Reference: Northwest Pipe Company's Review of the Portland Harbor Draft Final RI, Section 4

Dear Mr. Parkinson:

We reviewed the March 19, 2013 comments from the Environmental Protection Agency ("EPA") on the Portland Harbor Draft Final RI, Section 4 ("Section 4") on behalf of Northwest Pipe Company.

Our review identified a number of omissions and errors in Section 4. We request that LWG forward these comments to EPA and work with EPA to make the necessary corrections.

- On page 12-9 there is no listing of a CH2MHill report titled Technical Evaluation of International Terminals Slip Sedimentation and Potential Contaminant Relationship to Upland and River Source Areas, dated December 2010. It was provided to the EPA in January of 2011 and again in February of 2011 as an update to Northwest Pipe's 104(e). Was this report reviewed? If it was reviewed, it should be referred to in the comments. If it was not, we think that it should be or an explanation provided for why it was not.

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- On page 4-10, footnote 7 is incorrect. The Source Control Milestone Report contains information as late as 2012, not only "through September 2010."

- In Table 4.2-2, the Potential Upland and Overwater Sources associated with the Burgard Ind. Park – NW Pipe site are described as "ASTs and 55-gallon drums, pipe lining and coating building, transformer storage area, asphalt dipper tank, industrial well, dust suppressant use, alleged solvent and petroleum dumping areas, catch basins and storm drains."

Including the site's industrial well as a source is incorrect. Additionally, it is our belief that information regarding many of the other sources comes from retaliatory false reports associated with union disputes. Based on the extensive sampling and site investigation work conducted by Northwest Pipe over the past 20 years, a more accurate summary of the Potential Upland and Overwater Sources is:

> "Residual soil and groundwater contamination from historical site operations as a shipyard assembly area and steel fabrication plant, former above-ground waste oil tank, former PCB-containing transformers, catch basins, and storm drains."

- In Table 4.4-3, the information regarding Northwest Pipe Company's study objectives is incomplete. CH2MHill collected additional stormwater data and some catch basin solids data after the 2003 data referred to in the table. The stormwater data was provided to DEQ in 2008 but to our knowledge has not appeared in any reports yet. The solids data was summarized in a memorandum titled Supplemental Environmental Data Summary and Evaluation Northwest Pipe Company Portland Plan, dated December 8, 2011. Both of these documents are attached.

- Map 4.4-3f indicates there are shallow VOC plumes with uncertain edges are on the Northwest Pipe site. For the largest and the eastern-most plumes, to our knowledge there is no sampling or data supporting the existence of such plumes. What is the basis for the inclusion of these plumes?

- Also on Map 4.4-3f, the small semi-circular plume on the southern portion of the site is a known chlorinated solvent plume. For this plume, Northwest Pipe Company and it consultant have groundwater sampling data that precisely defines that margin of the plume. The question marks indicating uncertain edges on this plume should be removed.

Please consider these omissions and errors when providing comments to the EPA. If you have any questions, please do not hesitate to contact me.

Very truly yours,

Steven R. Schell

cc: Ms. Kristine Koch (via e-mail)
Mr. Mike Reed (via e-mail)

SRS:tl
669370

To: Humphrey, Chip[Humphrey.Chip@epa.gov]; Shephard, Burt[Shephard.Burt@epa.gov]; GAINER.tom@deq.state.or.us[GAINER.tom@deq.state.or.us]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; anderson.jim@deq.state.or.us[anderson.jim@deq.state.or.us]; Goulet, Joe[Goulet.Joe@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; MCCLINCY.[Matt@deq.state.or.us]; poulsen.mike@deq.state.or.us[poulsen.mike@deq.state.or.us]; Fuentes, Rene[fuentes.rene@epa.gov]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; erin.madden@gmail.com[erin.madden@gmail.com]; Cora, Lori[Cora.Lori@epa.gov]; audiehuber@ctuir.com[audiehuber@ctuir.com]; Fleming, Sheila[fleming.sheila@epa.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; dallen@stratusconsulting.com[dallen@stratusconsulting.com]; jpeers@stratusconsulting.com[jpeers@stratusconsulting.com]; Bob Dexter[bob@ridolfi.com]; cunninghame@gorge.net[cunninghame@gorge.net]; jweis@hk-law.com[jweis@hk-law.com]; frenchrd@cdm.com[frenchrd@cdm.com]; ryan@davissudbury.com[ryan@davissudbury.com]; genevieve.angle@noaa.gov[genevieve.angle@noaa.gov]; Jessica.Winter@noaa.gov[Jessica.Winter@noaa.gov]; Allen, Elizabeth[allen.elizabeth@epa.gov]; colin@ridolfi.com[colin@ridolfi.com]; AEbbets@stratusconsulting.com[AEbbets@stratusconsulting.com]; DBeltman@stratusconsulting.com[DBeltman@stratusconsulting.com]; penoyarSJ@cdm.com[penoyarSJ@cdm.com]; Muza, Richard[Muza.Richard@epa.gov]; Conley, Alanna[conley.alanna@epa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; Gustavson, Karl[Gustavson.Karl@epa.gov]
From: Humphrey, Chip
Sent: Wed 3/6/2013 5:50:51 PM
Subject: RE: **TCT** Meeting 3/06/2013 COC list
SummaryCOCs20130305.docx
COCEvalTable20130305.xlsx

All - here are the COC summary tables from CDM based on the FS work session last week.

Chip

To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Thur 10/29/2015 5:54:23 PM
Subject: RE: can you send me your final ARARs table for Portland Harbor? Thanks.
Copy of 2015-07-21 Draft Final Tables 2 1-1 through 2 1-3 ARARs.xlsx

Here are the draft FS ARARs table. This is not the final table for the FS or the Proposed Plan for Portland Harbor. I would like to talk with you about the RC/BC discussion you are having.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Ingemansen, Dean
Sent: Thursday, October 29, 2015 10:51 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: can you send me your final ARARs table for Portland Harbor? Thanks.

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 10/23/2015 9:09:38 PM
Subject: FW: City of Portland letter regarding LWG's comment letter to the NRRB

Forgot to cc you on this one

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Koch, Kristine
Sent: Friday, October 23, 2015 2:08 PM
To: 'Von Burg, Annie'
Cc: Grandinetti, Cami; Gardner, Sara; Brown, Marjorie; Miner, Peggy; Cox, Kim (Environmental Services)
Subject: RE: City of Portland letter regarding LWG's comment letter to the NRRB

Thank you for taking the time to submit comments; however, they did not get transmitted to the NRRB and CSTAG. The only stakeholders who are allowed to comment to the board are DEQ, Tribes, the Portland Harbor CAG, and the LWG in accordance with guidelines set forth by the Board. Even though your comments will not be considered by the Board, the Region will consider them in finalizing the FS and developing its Proposed Plan.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Von Burg, Annie [mailto:Annie.VonBurg@portlandoregon.gov]
Sent: Tuesday, October 20, 2015 4:17 PM
To: Koch, Kristine
Cc: Grandinetti, Cami; Gardner, Sara; Brown, Marjorie; Miner, Peggy; Cox, Kim (Environmental Services)
Subject: City of Portland letter regarding LWG's comment letter to the NRRB

Dear Kristine,

Please see the attached letter from the City of Portland regarding LWG's comment letter to the National Remedy Review Board.

Best regards,

Annie Von Burg

Annie Von Burg

City of Portland, Bureau of Environmental Services

888 SW 5th Avenue, Suite 400

Portland, Oregon 97204

Ph: (503) 823-7859 | Fax: (503) 823-5228

Email: Annie.VonBurg@portlandoregon.gov

Comments on the Portland Harbor Superfund Site Cleanup
To the
National Remedy Review Board and
Contaminated Sediment Technical Advisory Group
from
Portland Harbor Community Advisory Group
October 19, 2015

Introduction

These comments are submitted to the National Remedy Review Board (NRRB) by the Portland Harbor Community Advisory Group (CAG) regarding the EPA remediation options for the Portland Harbor Superfund Site. The CAG appreciates the opportunity to submit these comments and provide the community perspective on cleanup of our river, our resources, our community. Our comments introduce the CAG, present technical issues concerning the remedial options and provide the community perspective on various aspects of the cleanup. We have reviewed the Feasibility Study (FS) and received briefings from EPA regional staff and from our own technical advisor.

These comments provide detail on a number of key issues of community concern regarding the cleanup of contaminated sediments in the lower Willamette River and the long term viability of the final remedy. It is unacceptable that even the most aggressive remedy, described by EPA as Alternative G in the FS is not sufficient to satisfy requirements of the Clean Water Act.

We are deeply concerned that those entities responsible have spent considerable time, energy and funds to undermine the cleanup effort and thwart attempts by the CAG and EPA to achieve a successful remedy.

The Portland Harbor Community Advisory Group (CAG)

We are members of the Portland community, both representing organizations and here as individuals. We are the people who live closest to the river and who will be living with the remedy. After some of the businesses have left Portland, our families and our grandchildren will remain to experience the work we have all done together on this site.

Organizations Represented on the CAG either now or in the past are:
Audubon Society of Portland
Cathedral Park Neighborhood
Environmental Justice Action Group
Linnton Neighborhood Association
Northwest Industrial Neighborhood
North Portland Odor Abatement Committee
Northwest Toxic Communities Coalition
Oregon Bass & Panfish Club
Oregon State Public Interest Research Group (OSPIRG)

Portland Harbor Community Coalition which includes:
American Indian Movement (AIM: Portland Chapter)
Asian Pacific American Network in Oregon (APANO)
Czech School of Portland
East European Coalition
Groundwork Portland
Iraqi Society of Oregon
Lideres Verde
Oregon AFSCME
Portland Youth and Elders Council
Right 2 Survive
Wiconi International
Wisdom of the Elders
Sierra Club
St. Johns Neighborhood Association
University Park Neighborhood
Willamette Riverkeeper

Before the lower Willamette River was listed as a superfund, one of the nation's most contaminated sites, CAG members were concerned about its health. The river is an integral part of our community, providing recreation, food through fishing, an attraction for development and visitors and builds our identity as a gateway to nature. We take seriously the goal of a long-term remedy meant to last into future centuries and recognize this process as a unique opportunity. We have persevered though this overly-long process for more than ten years despite stalling by polluters, external pressures and the challenges of bringing together a very diverse community. Now it is finally time for the community to be heard.

CAG meetings have included presentations from EPA, Lower Willamette Group, Oregon DEQ, Oregon Department of Geological and Mineral Industries, Metro, Oregon Health Authority, City of Portland, US Coast Guard, Army Corps of Engineers, Division of State Lands, site updates from PRPs, technology presentations from cleanup service providers, professors from Oregon State University and the University of Washington, and presentations from community groups. We have reached out to numerous groups and organizations, plus hundreds of individuals who have attended the CAG meetings over the last 14 years (see Attachments for details). Now the EPA regional office comes to the NRRB and CSTAG with a conceptual plan for cleaning up our river.

While there is general consensus among the CAG on these comments, we include a broad array of opinions from a diverse group of interests. Not every point in these comments is fully agreed upon by every group, but this document works to express the consensus of the CAG members. The following is a summary of key issues raised in these comments:

- Even the most aggressive clean-up option(G) is in sufficient to achieve the health and ecological goals of the community and required by law. The CAG favors a

more vigorous cleanup than Alternative G, we refer to this alternative as G+, a more protective and permanent remedy;

- The CAG does not support remedies that leave extensive amounts of contaminated materials in the river including over-reliance on Monitored Natural Recovery (MNR) and use of Confined Disposal Facilities (CDFs) ;
- We support the use of effective alternative treatment technologies for dredged contaminated sediment and for in situ treatment when available;
- EPA needs to require monitoring during dredging operations to ensure that the health of our communities and river is not compromised during operations on the river;
- Source control is a critical component, which requires assurances of effectiveness, even if under the jurisdiction of the state of Oregon;
- The remedy needs to be designed to withstand a Cascadia Subduction Zone earthquake, meaning a level 9 earthquake;
- The remedy must ensure that public trust values are preserved including opportunities to restore the ecology of the river and improve recreational access.
- It is critical that EPA allow sufficient time for public notice and comment on whatever remedy is selected following the assessment of the Remedy Review Board.

Getting it right is the most important criterion. The options that EPA has put forward in the Feasibility Study (FS) include a range of methods and approaches, some of which are simpler and less costly. The CAG and other members of the community have repeatedly expressed the desire to have this remediation completed the right way this time, and not have lingering issues, problems or threats of failure that have plagued other CERCLA sites. We greatly stress that while timely completion and controlling costs are important, we do not want pressure for cheap and fast to override the need to get it done right!

Technical Issues

1) We favor maximum removal of contamination from Portland Harbor because of the level of permanence and assurance that removal provides. Contamination left behind is subject to re-exposure by flood, geological events or navigational accidents and so poses an ongoing risk to human health and the environment. Even the most aggressive clean-up alternative (Alternative G) is not sufficient to reach "clean" goals, meet the requirement of the law, and would leave our communities and environment at a high level of risk for generations to come. All of the options rely far too heavily on approaches such as monitored natural recovery (MNR) that leave contamination in place across most of Portland Harbor (Alt G for example relies on MNR across more than 60% of the Superfund Site), unreliable institutional controls, and fail to provide credible evidence that compliance with Applicable Relevant and Appropriate Requirements (ARARs) will be achieved. The end result of any of the options would be that our river would remain severely contaminated, our communities, especially our most vulnerable underserved communities, would remain at risk for generations, fish and wildlife populations would continue to experience significant risk of exposure and

bioaccumulation, and access to the river would remain restricted. The community has already lived with decades of contamination and persevered through 15 years of the Superfund process. It is time now to move forward with effective, vigorous, long term clean-up strategies that place a significantly higher priority on removing contaminants from our river,. We call on EPA to implement a more aggressive plan that we refer to as Alternative G+, described in more detail in an ensuing section. This alternative will reduce the acreage of MNR from that in Alternative G, reduce the extent of capping and increase the amount of surface contamination removed.

2) Source control is necessary for success, throughout the Portland segment of the site, but also upriver. The final alternative needs to include a rigorous analysis strategy to ensure that Portland Harbor does not experience ongoing recontamination or result in further spreading of contamination downriver.

3) Newer methods should be used to treat the contaminated sediments either in place or *ex situ*, following removal. If a new method can detoxify the sediments, then transport and disposal are far simpler and cheaper. A detailed description of some newer methods and technologies is presented in a subsequent section, providing examples to support the EPA decision to retain these methods as options in the remedial action. The CAG refers to the information in Section 3 of the EPA version of the FS in which EPA presents alternatives for treating dredged materials, including on-site remediation through biological (biodegradation), chemical (sorption and oxidation) or physical (sedimentation or dispersion) processes. The CAG supports and encourages implementation of pilot projects to determine the potential effectiveness of these methods in the lower Willamette River.

4) It is critical to protect members of our community who have suffered the effects of exposure to contamination for many decades, whether as a matter of Environmental Justice or Cumulative Risk. These effects include direct health impacts, the psychosocial stresses and strains of living with contamination in our community and the loss/ reduction of critical cultural and community opportunities such as subsistence fishing, recreation and access. We are particularly concerned about underserved communities, communities that rely on subsistence fishing for both cultural and economic reasons, and the neighborhoods in general that are near or adjacent to the river. Minority and Native American communities, and those in the neighborhoods of industry have been exposed and EPA needs to address both Environmental Justice and Cumulative Risk issues by implementing a more aggressive remedy- G+.

Communities adjacent to the North Reach of the Willamette have been a historic dumping ground for the negative effects of industry including not only the Superfund site, but hazardous materials tank farms, industrial air pollution, truck diesel exhaust and truck movement. North Portland is also the location for a sewage treatment plant for the entire City, and a major, former city-wide dump. As St. Johns activist Ben Poe said, "North Portland is becoming weary of being the repository of everything that stinks, burns or blows up." Alternatives that leave either significant amounts of unconfined contamination in the river or which result in a CDF are inequitable and environmentally

unjust, and adds to the cumulative effects on community members of existing pollutants and industrial impacts.

5) Monitored Natural Recovery (MNR) should be a very limited option utilized only in areas of lowest and least toxic contamination and where there is a very high degree of certainty that it will be effective. MNR leaves contamination in place with a presumption that it will either be covered by additional sediment, disperse down river or gradually lose its toxicity. However, Portland Harbor is contaminated with highly toxic, pervasive contaminants and decades of data demonstrate that MNR is not in most cases an effective strategy for persistent contaminants such as heavy metals, PCBs, PAHs, dioxins and furans. If we are committed to restoring our river to health for current and future generations. In most cases, contaminants have already been in place for decades and show little or no sign of abating. It is at odds with years of research and common sense to ask the public to accept that natural recovery would suddenly represent an effective clean-up strategy for contaminants which have already remained in the river for 50 to 100 years or more.

We agree with EPA Region 10 that the site is largely not depositional, many areas are erosional, and much of the near shore areas are subject to prop scour, tidal action, ship wakes, seasonal scouring and other disturbances, and thus MNR must be employed sparingly, not widely. Natural recovery is not effective for contaminants that do not breakdown, in fact, we view natural recovery as what it is- burial and dispersal, not treatment. Natural recovery did not work on the James River, VA (Kepone) or the Hudson River, NY (PCBs). We know of no site such as Portland Harbor where MNR has proven effective over decades, much less longer.

It is important to note here that both the EPA and DEQ have stated that the modelling of MNR provided by the LWG is clearly and unequivocally inaccurate and unreliable in terms of its predictive value for deposition and accretion. It shows several sites where on the ground research demonstrates that the outcomes described by the modelling are simply wrong and show that MRN is effective in locations where we know for certain that it can not be effective. In fact, due to the complexity of the river, both EPA and DEQ have stated that a reliable predictive model may be impossible to create. In the absence of a reliable predictive model, the EPA should err on the side of caution with aggressive removal of contaminants---not leave them in place and hope without any scientific basis that a strategy that has not been effective over the course of many decades will suddenly become effective now.

6) While the community strongly prefers dredging and removal as the predominant clean-up strategy, it is important that it be done with an eye toward protecting community health and livability during cleanup operations.. The community is not opposed to 24 hour dredging as some PRP's have suggested. The fact is that the community would like to see work completed as quickly as possible and the noise caused by nighttime dredging would be limited relative to the significant amount of noise already generated during nighttime hours by working harbor industries. This issue is nothing more than a self-serving argument raised by PRPs to extend the clean-up time period and demonstrates faux concern for the community. What is important to the

community is that disruption within the neighborhoods be kept to an absolute minimum. To that end sediments should be transported to appropriate landfills to the greatest extent possible by barge, with train transport being a secondary option where necessary and truck transport kept to an absolute minimum. Any contaminant transport through neighborhoods should require the absolute highest standards for containment to ensure that fugitive dust is kept to a minimum. Materials dredged at night should be stored until daylight hours when transport through neighborhoods is required.

7) While cost is a consideration, it should not be elevated above all other factors. Too much focus has been on the raw numerical potential costs of clean-up without any reference to context for those costs. There are several important elements of the cost that should be considered. First, cost is just one factor. All the other factors need to be given due consideration as well---the CAG is deeply concerned that cost appears to be trumping community health, environmental health and public trust doctrine values. Second, the Portland Harbor is one of the largest and most complex Superfund sites in the country spanning more than eleven miles of river-it includes dozens of sites that could stand alone as individual superfund sites---comparisons to costs at other sites need to account for this fact. Third, the Portland Harbor Superfund Site includes more than 150 PRPs including the Federal Government, State of Oregon, City of Portland, Port of Portland, and some of the largest and most profitable corporations on the planet. In short, PRPs have extensive financial resources on which to draw. (see attachment). Fourth, the EPA should consider the tremendous resources that historically have already been expended and will continue to be expended on restoring the Willamette and Columbia Rivers---The public has spent billions of dollars on restoration. It is estimated that we will continue to spend upwards of $200 million/year going forward. The contamination in Portland Harbor directly undermines these long-term investments. Finally the clean-up is not only a cost generator; it is also a revenue and job generator. An EcoNorthwest Study of Portland Harbor showed that every dollar of cost to clean-up Portland Harbor will generate more than a dollar'sworth of economic activity.

8) The FS in section 4 addresses the requirement that remedies meet regulatory requirements and the Proposed Plan will have to explain how the proposed remedy meets regulatory requirements in other statutes. The CAG is especially concerned with the need to meet Clean Water Act criteria and standards for the contaminants of concern for the Portland Harbor site. Water Quality Standards for PCBs, dioxins, PAHs, DDT, metals need to be met by the remedy such that the waters of the Willamette support native animals and plants, do not further harm threatened and endangered species, and are safe for human recreation and more. Alternative G+ is needed to remove the additional contamination that prevents achieving Clean Water Act requirements.

9) In those cases where remediation requires substrate removal, the PRPs need to restore the habitat to conditions that are suitable for living resources, in terms of quality of substrate, physical characteristics and replant any vegetation that is removed. Any significant temporary or permanent loss of natural resource function as a result of clean-up actions should be fully mitigated within Portland Harbor and mitigation sites should be permanently protected via easement or other legally binding mechanism.

10) Portland Harbor is a huge site spanning more than 11 river miles. Using large spatial scales for analysis risks missing serious hotspots within larger geographic areas that overall may be less contaminated. While we support the smaller spatial scale of analysis, we are concerned that the "hotspot" approach now being advocated by EPA appears to revert back to a very large scale approach.

11) EPA has indicated that it intends to utilize a "hot spot" approach that focuses on general areas with the highest level of contaminated sediment. EPA would rely in monitored natural recovery in other locations. The CAG recognizes that the contamination is not distributed evenly across the miles of the Portland Harbor site and that the "hot spots" seem to represent the worst of the contamination problems. However, we believe that the "hotspot" approach is too limited and would leave substantial acreage on the river with unacceptably high levels of contamination. The EPA should prioritize removal of contaminated sediments from the hotspot areas but it should also apply an approach that utilizes a finer scale approach to applying removal, capping and MNR to areas outside the hotspots which still comprise more than 65% of the harbor. Surface sediments that contribute to water quality impairment need to be removed via Alternative G+. While we support EPA's use of smaller spatial scales in the river than did the LWG, the "hotspot approach" still uses a scale that is far too large to ensure that smaller areas of high contamination are adequately addressed to ensure public and environmental health.

12) One of the more controversial aspects of the FS and remedy is the use of a confined disposal facility (CDF) at T4, Slip 1, the engineering and logistical issues for long-term effectiveness are not proven in a river system as complex as the lower Willamette near the confluence with the Columbia River. "This combination of large rivers interacting, dynamic geomorphology within a transitional landscape, and tidal effects transmitted up the Columbia from the ocean create some of the most complex hydrology in the Willamette Basin. The extent of ava ilable information limits the degree to which the full complexity of these patterns can be described..." (City of Portland Bureau of Environmental Services). Additionally, the location proposed is both a hazard zone for flood and earthquake with a fault line located nearby making the fill sand at the site unstable in any kind of unusual event such as the expected Cascadia Subduction Zone earthquake. Unfortunately modeling for the CDF has not reflected anything but usual conditions. CAG members have taken a formal position against the use of a CDF, four adjacent neighborhood organizations have made a formal resolution against its use, and a community petition has circulated in opposition to it with over 1700 signatures. Community-wide rejection of a proposed CDF has been overwhelming. Detailed comments are below with the petition as an attachment.

13) Monitoring environmental and community conditions during and following the remedial work is needed to confirm the effectiveness of the operations, the equipment, and the strategy. We call on EPA to implement a rigorous monitoring program with rapid turnaround of lab analysis, to ensure the safety and welfare of the community.

14) We are deeply concerned about the over reliance on institutional controls as a surrogate for actual clean-up. Institutional controls include approaches such as fish advisories to warn anglers about the potential health effects of consuming contaminated fish. Institutional Controls are not effective and are intended to be temporary. Data indicate that these types of approaches have had limited effectiveness to date and there is no reason to believe that they will become more effective in the future. The community and particularly communities that rely on subsistence and cultural fishing have lived with the impacts of contamination long enough. The focus should be on removing contamination to achieve safe levels for fish consumption as well as other activities as quickly as possible.

15) The Plan needs to include a strong operations and maintenance section that will ensure that any remedies such as capping will be regularly evaluated to ensure that the integrity of the remedy is fully maintained in perpetuity and that any breaches are quickly repaired.

16) We understand that it is preferable to get the current remedy process completed during the current administration; the primary driver still needs to be ensuring adequate clean-up of the river and ensuring that there is time for adequate notice and review of whatever preferred alternative is selected. It will only be next spring that the public is getting its first real opportunity to see and understand what the actual clean-up will look like and the implications for the health of our river and our communities. It will be a significant challenge to disseminate and provide technical support to the diverse communities that will be directly and indirectly affected by this decision. The public does not have either the prodigious technical or legal resources available to the PRPs who have long sought and will continue to seek to limit this clean-up action. It is unacceptable after more than a decade of mostly closed door process to now severely truncate the public review part of this process. We ask that a public comment period of significantly longer than 60 days be planned for.

Feasibility Study Comments

General Comments

The Regional office project managers and team examined the Draft Feasibility Study released by the LWG in 2012, as did the CAG, other community stakeholders and the TAG advisor. The community and technical advisor were not satisfied with the Draft FS, at all. EPA announced that the FS would be redrafted under the immediate direction of EPA staff and not LWG and their contractors. The CAG agreed with this decision, and was pleased with the substance and process of the resulting re-evaluation of the RI and FS by the Region 10 project team under the leadership of Chip Humphrey and Kristine Koch.

The FS redrafting under the leadership of Kristine Koch resulted in several important developments that we bring to the attention of the NRRB, including process issues and substantive items in the FS. First, EPA has been more open and transparent to the public in the FS redrafting, meeting with the CAG and other community members and

apprising the community of the process. Second, the EPA Regional office has been receptive to input, comments and questions regarding the FS. We appreciate receiving the FS sections as the redrafting has proceeded. But this process has been affected by input and actions from LWG and elected officials, slowing the process and obfuscating the efforts to reach appropriate decision points in a timely manner. Basically, outside interests have slowed the process and now seek to derail the cleanup effort by slowing the FS and raising either false claims or erroneous information while at the same time demanding a faster, cheaper cleanup. We address some issues concerning false claims and issues raised by LWG in these comments to the NRRB.

We commend EPA for reformatting the FS, undertaking re-analysis and taking a broader view of the remedial options. The current FS is more concise, direct and easier to understand, presenting the critical information from the redrafted RI into the FS in a more manageable form.

FS Section 3

In the FS, per legal requirements, EPA must consider a "No Action" alternative for comparison purposes. Alternative A is no action and will not be selected. In Section 3, EPA presents Alternatives A through G with each Alternative using a combination of dredging, capping, and Enhanced Monitored Natural Recovery. The proportions of each change from Alternatives B to G.

Several items from Section 3 need to be noted, because Section 3 sets the stage for the analysis of Section 4, and some information in Section 3 is not repeated. The table below gives a most useful summary of what methods are used in what proportions in each Alternative. This table also gives the information that justifies what is in the paragraph following – why Alternative C is dropped from Section 4.

Summary of Total Acres Assigned to Each Technology

Alternative	Technology			
	Dredge	Dredge/Cap or Cap	In-Situ or EMNR	MNR
	(acres)			
B	70	20	110	2,250
C	86	28	106	2,231
D	131	43	91	2,185
E	203	67	59	2,121
F	374	140	24	1,912
G	544	236	15	1,655
Note: EMNR - Enhanced monitored natural recovery				

Alternative C was eliminated from further evaluation in Section 4, as explained by EPA in section 3.7 (page 3-48):

> "Based on the information provided in the screening tables of the alternatives, Alternative C was eliminated from consideration of the detailed analysis in Section 4. This decision is primarily due to the small incremental increase in quantities of dredge and borrow materials between Alternatives B and C, and the relatively small incremental decrease in focused COC concentrations when compared between Alternatives B and D or C and D. The differences between Alternatives B and C include only a 0.1 percent increase in overall acres remediated with only a corresponding average 9 percent reduction of focused COC concentrations in surface sediment. Thus, it was concluded that Alternative C was not distinctly different from Alternative B. All other alternatives are carried forward for detailed analysis in Section 4."

We agree with this decision to eliminate option C.

The alternatives presented in Section 3 and evaluated in Section 4 for compliance with the nine criteria present a range of options that grade from less area actively remediated to more acreage. The range of options is thus, a quantitative gradation from less to more area addressed with active remediation and Monitored Natural Recovery (MNR). This range of alternatives, we note, is somewhat different from many FS documents, in that the alternatives present a quantitative range of options and not a qualitative choice among quite different methods. We also note that the Alternatives B through G increase the acreage and total mass of contamination given active attention. The range is from 86 acres remediated with alternative B to 780 acres, nearly an order of magnitude increase in area remediated with the same or similar approaches. But even Alternative G will not achieve the goal of fish that can be safely consumed.

The CAG and community partners support more remediation, in the case of the alternatives, meaning more removal and active treatment for the health of the community, the fishing public and the living resources in the harbor and that depend on the harbor. In the long term, addressing more of the problem now will mean less likelihood of recontamination from the present contaminant load.

The CAG supports an enhanced Alternative G as the best option, with modifications to remove more contamination, denoted as G+, as discussed in these comments. Even this most aggressive option, G, as written, leaves too much contamination in place, as total mass, and leaves too much surface contamination exposed in a way that animals will have access to these chemicals.

FS Section 4

The remedial options and projections for MNR and future recovery in nature and time depend on continued input of contaminants from upriver source and floodplain areas adjacent to the Willamette in Portland. At present, only one COPC is anticipated to

contribute to ongoing contamination in the post remediation years, PCBs. PCBs from upriver sources is estimated to be 9 ppb now and in future years. This estimate likely overstates the concentrations of PCBs in future years, a problem that may seem familiar because the Lower Duwamish River faced a nearly identical situation. The point is this- if the concentration of PCBs in sediments flowing into the Willamette from upriver is measurably lower, then the MNR will be faster and the levels lower in the surface sediments. The estimates of PCBs in sediments from upriver coming into Portland Harbor need to be updated with new information. In the case of the Lower Duwamish, older estimates turned out to be too high by nearly twofold- the same is likely true on the Willamette River in Portland Harbor.

Section 4.1.2 explains the problems that EPA identified in the model used by LWG to estimate sediment deposition (in the original FS from 2012). In this section, the FS explains why the model cannot be used and the rationale for setting aside all of the LWG analysis and estimates on which the FS was based. EPA then goes on to discuss Monitored Natural Recovery, recognizing that MNR is basically burial.

Summarizing Section 4, this section gives the analysis of how the various clean up remedies will meet the technical demands of the site and the legal requirements set out in federal law. The requirements are listed as nine criteria for evaluating the remedies and are listed in Section 4 on the first page as the first item in this section. These criteria are explained in the subsequent sections and are, for the most part, self-evident. EPA has provided explanations that go beyond the usual simple explanations.

Several comments need to be made on this specific analysis section for Portland. Under cost, the usual practice is to estimate long term costs for 30 years, but this EPA analysis extends the time longer as explained below:

> "The alternatives retained for detailed analysis all have containment components and thus have indefinite project durations and likely require perpetual maintenance. The assumed period of analysis used to develop estimates of present value costs for each alternative is 30 year, although 100 years was also evaluated since the costs of maintaining the caps will continue in perpetuity. "

The CAG supports that longer period for economic analysis because of the inclusion of burial (MNR) in each alternative.

The last two of the nine criteria that EPA must consider are "modifying criteria" to include

- State Acceptance and Tribal Consultation and Coord ination
- Community Acceptance

The Portland Harbor site has had the involvement of six federally recognized Tribes and EPA includes consideration of Tribal input. This consideration is explained in the FS Section 4.1.11.2. The CAG has welcomed the cooperation of the Tribal representatives

and continues to value their input and updates to the CAG. We recognize the importance of their role in the process.

State acceptance can mean that the State insists on a clean-up goal or application of a state standard that the FS is not definitive about. Most state agencies remain involved and apprised of the progress of the RI/FS process. In our experience, EPA is required to obtain input from the state, which can be interpreted in different ways, depending on the state. In this case, Oregon is deeply involved and we can expect no surprises and continued involvement.

Community acceptance is a critical factor in adopting a remedy, but is too often given little consideration or is even ignored. The community in Portland has remained actively engaged in the Superfund Process despite the fact that the process has taken nearly 15 years to reach this point. In fact the community in Portland has repeatedly demonstrated an intense and active engagement with its river seeking to protect natural resources, engaging in restoration activities and participating in extensive recreation activities within Portland Harbor. Additionally the public has spent literally billions of dollars recovering listed salmonids on the Willamette and Columbia and investing in habitat protection and restoration on these systems. It is expected that salmonid recovery costs will continue to range in excess of $200 million/ year for the foreseeable future. The community is well informed and engaged with its river expects a remedy that honors the public trust doctrine, meets the requirements of the law, and most importantly restores ecological health to Portland Harbor in the absolute minimum amount of time and provides the maximum amount of certainty for future generations.

The heart of the matter for this part of any FS is the analysis of how each alternative meets the nine criteria. Alternative G comes closest, but ultimately fails to meet the expectations of the public and the requirements of federal law. In order to meet these objectives, Alternative G would require significantly more removal of contaminated sediment and more aggressive treatments outside the areas defined as "hotspots."

Expanded Comments on Selected topics

Alternative G+

EPA's predictions for the most protective remedy analyzed, Alternative G, indicates that water quality standards will not be met and that fish consumption advisories will remain in place for the foreseeable future. The difference in remedial actions from Alternatives B to G is indicated in several figures from FS section 3- Fig.s 3.3-02, 3.3-01, 3.3-06a and others indicate that Alternative G does not reduce contaminant concentrations enough to achieve Preliminary Remediation Goals (PRGs); further removal is needed to reach the target PRGs. Fig. 3.3-01 illustrates the problem that the RAL for Alternative G is still more than 5 times higher than the background level of 9 ug/Kg for PCBs. Even more removal is needed to reach the estimated background concentrations for the chemicals of concern. The data in Fig.s 3-3 -03 et seq. confirm that the amount of contaminated sediment left in place in Alternatives B-F is dramatically more than in G, even though G does not meet PRGs or background. We also note

that the FS assumes background levels of COCs are based on current conditions and not improved background conditions in the future.

We recommend an enhancement to Alternative G in terms of increasing the dredging footprint to reach PRGs for PCBs, PAHs and PCDDs. More surface contamination needs to be removed and much of it can be removed with hydraulic dredging that is logistically simpler than other dredging methods. The dredging footprints need to increase substantially to remove the sediment contamination that contributes to the impairment and failure to meet RALs and Water Quality Standards. At a minimum, the dredge footprint needs to be great enough to reach COC levels much closer to the background concentrations for PCBs. Based on the data in Fig. 3.3-01, this increase would have to be from 500 acres to at least 1000 acres, most of which is in the areas with soft sediments.

Institutional Controls

Institutional controls are a group of actions that seek to limit human activity to decrease exposure to a contaminated ecosystem. The EPA defines institutional controls as "..administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy" (USEPA 2014a). Common examples of institutional controls (ICs) include fish consumption advisories, land use designations, and zoning restrictions. The EPA Feasibility Study for the Portland Harbor Superfund Site relies on ICs in the form of fish consumption advisories and permit requirements. Currently, fish consumption advisories are already in effect for Portland Harbor and other segments of the Willamette River.

Although ICs are meant to protect human health, they are simply a means of removing an exposure pathway by restricting human activity. ICs do nothing to reduce contamination; they simply intend to keep people away from contaminated media at a site. Studies and government reports have found significant flaws in the philosophy and implementation of institutional controls, specifically with fish consumption advisories.

In 2005, the U.S. Government Accountability Office published a report titled "Improved Effectiveness of Controls at Sites Could Better Protect the Public." The study analyzed the implementation and effectiveness of institutional controls at Superfund and RCRA sites throughout the U.S. The researchers found that while the use of ICs has increased over time, there are numerous problems with both the implementation and the organization of ICs. One of the most obvious issues is one of timing and accountability. The GAO found that often documentation did not adequately address when the ICs should be implemented, how long they should last, or who would be responsible for enforcement. This led to ICs not being implemented until after cleanup processes were finished, posing significant risks to local residents. The GAO also found issues with the process for implementation of ICs. Language in the IC documentation was often vague, and the EPA sometimes failed to identify the specific mechanism for each IC. The GAO pointed out that in creating ICs, the EPA needs to identify the parties responsible for enforcing the ICs, such as state governments or site owners (2005). Because of the faulty implementation and enforcement of ICs, ICs come across as recommendations, and are thus taken much less seriously.

In a study on the effectiveness of fish consumption advisories, researchers found that fish consumption advisories are unlikely to be effective in reducing the exposure of infants and

children to persistent organic pollutants that have long elimination rates in the human metabolic system (Binnington et al. 2014). Persistent organic pollutants like PCBs, dioxins and DDT have long elimination half-lives, meaning that the human metabolic system takes longer to break down persistent pollutants than non-persistent pollutants. For this study, scientists used a mechanistic model to estimate and compare prenatal, postnatal, and childhood exposure to PCB-153 under different scenarios of maternal guideline adherence to fish consumption advisories. The scientists assumed realistic time periods for advisory compliance for mothers (from one year to five years before birth), and found that temporarily eliminating or reducing maternal fish consumption for fish contaminated with persistent organic pollutants did very little to reduce the exposure of infants and children to PCBs. This study shows that it is not just the contaminated fish that prove problematic; it is the environmental persistence of the contaminants inside the human body, which can take years to be eliminated.

In a 2008 study concerning public knowledge about fish consumption advisories, Burger and Gochfeld found that many subjects questioned in a general University population could not give any specific answers to questions regarding the existence of fish consumption advisories. Of the respondents, 62% could not give any specific information as to why fish consumption warnings exist. Over half of the respondents did not know which fish are high or low in contaminants, and 16% of the subjects could not provide an answer as to why eating fish can be healthy. The authors point out that government agencies are often concerned that the public will be confused by advisory details, and that information on the nature of risks and benefits of fish consumption can be too complicated to convey. The authors believe that operating based upon that belief is a mistake. They state that the lack of such information is a major part of ineffective communication. The study concluded that public agencies must provide more directed messages regarding the basis for making risk decisions (Burger and Gochfeld 2008).

The results of the Burger and Gochfeld study on public knowledge of fish consumption advisories were echoed by other investigations and the Columbia Slough experience, where residents continue to consume locally caught seafood even after learning of the risks posed by eating contaminated fish. The problem with relying on fish consumption advisories and other ICs for Portland Harbor is two-fold. Half of the problem is that ICs do nothing to reduce contamination; they are simply a means of controlling human behavior. The other part of the problem is that fish consumption advisories are, and will continue to be, an ineffective way to protect human and ecological health. Many residents are unaware of the fish consumption advisories, and many of those that are aware of the advisories choose to ignore the regulations and continue eating contaminated seafood. The City of Portland has experienced this problem with fish consumption advisories on Columbia Slough

Environmental Justice Issues

Environmental Justice (EJ) is defined by both the EPA and the Oregon Department of Environmental Quality (DEQ) as:

> *Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons*

across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

Both EPA and DEQ are accountable for protecting EJ populations who use and are affected by the site.

A study done by the US Federal Government found that three out of four hazardous waste disposal facilities are located in low-income, or minority communities that often lack the political power necessary to keep the facilities out of their neighborhoods. Even worse, many of these communities are never involved in the planning of the waste facilities (Bryant, 2003).

Newer technologies

Mention of companies, trade names or other specifics does not constitute endorsement on the part of any individual or organization. We present this information because these examples are available and have worked to a greater or lesser extent in cases that compare with Portland Harbor. These are illustrative only.

In situ treatments are generally cheaper and cause less community and ecosystem disturbance; however, they are less able to handle deep water sediment, woody debris, and multiple contaminants. There are more *ex situ* treatment options, and *ex situ* treatments tend to be more intensive than *in situ* treatments. Ex situ treatments allow for more control over environmental conditions, and removal and isolation from the environment reduces recontamination and or dispersal. However, *ex situ* treatments require a processing site and can be more expensive.

Several newer sediment remediation technologies should be considered for this site, examples of which are environmental dredging, sediment washing, bioremediation, mobile UV decontamination, NASA's redeployable polymer blanket, and EcoSoil®.

Environmental dredging is more precise than navigational dredging, thus ensuring more removal with less disturbance to the ecosystem and contaminants. This technology is cheaper than other removal technologies, and it has less of an impact on the surrounding community and wildlife. Mechanical and hydraulic dredging are two examples of environmental dredging. Mechanical dredges use a bucket or clamshell to move contaminated sediment to a barge for transport. They handle debris well and are better suited for shallow areas and smaller sediment volumes. Hydraulic dredges use a "cutterhead" to break up sediment and a pump and pipe to transport the sediment to a barge or processing site. They can handle high sediment volume, work well in deep water, and provide ease of transport for sediment and water. Hydraulic dredges are not well suited for large debris.

If cleanup levels are achieved, dredging and excavation can result in the least uncertainty regarding future environmental exposure to contaminants since the

contaminants are removed from the ecosystem and disposed of in a contained environment.

According to the 2015 US EPA Phase 2 Dredging, Year 5 summary, the Hudson River PCB site relied on mechanical dredges with environmental buckets for PCB remediation. Contaminated sediments were scooped up from the river bottom and loaded into hopper barges. Computer software was used to identify where to dig, and depth and location of digging was determined by satellites.

Sediment washing is a water-based, multi-step process of remediating sediment to top soil quality ex situ through mechanically mixing, washing, and rinsing soil. Solvents can be combined with the water during the washing process. They are selected based on their environmental and health effects and their ability to solubilize specific contaminants. Contaminant removal occurs in one of two ways: dissolving/suspending them in the wash water that can be sustained by chemical manipulation of pH or by concentrating them into a smaller volume of soil.

Particle size separation, gravity separation, and attrition scrubbing can be used to concentrate the contaminants into smaller volumes of soil. Hydrocarbon contaminants tend to bind to smaller soil particles, so separating the smaller soil particles can reduce the volume of contamination. This allows for the smaller volume of soil containing the clay and silt particles to be further treated by other methods or disposed of. The larger volume of soil is considered to be non-toxic and can be used as backfill.

An advantage of soil/sediment washing included the ability to recover metals and clean a wide range of both inorganic and organic contaminants from coarse grain soils. Additionally, a facility can be constructed where the sediment is unloaded. This is a cost-effective technology since it reduces the quantity of material needing further treatment by another technology.

BioGenesis^{SM} sediment washing was patented in December 2001 to decontaminate both coarse-grained and fine-grained particles. This technology is a low-temperature decontamination process, which uses a proprietary blend of chemicals, impact forces from high pressure water, and aeration to decontaminate sediments off-site. It works by isolating individual particles and removing contaminants and naturally occurring material adsorbed to the particles. According to a 2008 BioGenesis^{SM} Bench-Scale Treatability Study, processing steps include:

1) Soil/sediment preparation;
2) Attrition scrubbing/aeration;
3) Bulk organics;
4) Chemical addition and mixing;
5) Application of collision impact forces;
6) Organic contaminant oxidation
7) Solid/liquid separation
8) Wastewater treatment
9) Disposition of treated solids

The end result of the BioGenesis^{SM} process is treated soil or sediment. Depending on the results achieved and on obtaining any necessary regulatory approvals, the treated soil or sediment can also either be disposed of or potentially used as fill material or as raw material in the production of topsoil or other construction grade products.

BioGenesis^{SM} offers the advantage of being able to handle large volumes of soil. Additionally, a facility can be constructed where the sediment is unloaded.

In a 2008 Bench-Scale Treatability Study Report using BioGenesis^{SM} on the Housatonic River Rest-of-River site, validation test run results showed reproducible reductions in PCB concentrations after just one treatment cycle. Further PCB concentration reductions can be achieved through additional treatment cycles. Furthermore, this process works to reduce other metals effectively in the process, and the study concluded that the arsenic species within the sediment were recalcitrant.

A full-scale operation using BioGenesis^{SM} was conducted on dredged material from the New York/New Jersey Harbor. As stated in the 2009 BioGenesis final report on the Demonstration Testing and Full-Scale Operation of the BioGenesis^{SM} Sediment Decontamination Process, sediment was treated from three different dredged material sites, and analytical tests on the treated sediment showed significant reductions in PCBs, dioxins, all heavy metals except arsenic. Many contaminants were readily removed; however, others, such as PAHs, were difficult to remove.

Along with PCB remediation, this study sought to determine the cost per unit to treat the contaminated sediment, as well as determine whether such costs are competitive with current prices for the management of contaminated dredged material. In a commercial scale facility (500,000 cubic yards/year), the cost of BioGenesis^{SM} is very competitive.

Phytoremediation uses plants and their associated microogranisms to sequester, extract, and degrade contaminants from soil or water either in situ or ex situ. Plants have also been found to take up various organics and either process them for use in physiological processes or degrade them. Some plants have the ability to store large amounts of metals that do not seem to be utilized by the plant. Phytoremediation includes rhizofiltration, phytoextraction, phytotransformation, phytostimulation, and phytostabilization.

Phytoremediation is effective in upland and shallow areas as well as shorelines. It can be used alongside bioremediation with dredged sediment. Many investigations have found that PCBs are capable of being translocated from soil to various parts of plants and can accumulate in particular tissue in higher concentrations than others. The majority of the research centered on phytoremediation has shown that the bacteria growing in the rhizosphere does most of the remediation.

There are three mechanisms involved with PCB phytoremediation: uptake from soils and accumulation in plant tissue, enzymatic transformation/phytodegradation, and rhizoremediation. Rhizoremediation refers to plant enhancement of microbial activity, which takes place in the root zone and improves bioremediation through the release of

secondary metabolites. In order to improve the effectiveness of phytoremediation, genetically-modified bacteria or bacterial genes involved in the metabolism of PCBs have been introduced into the process.

In a 60-week study, Huesemann et al (2009) used eelgrass to remove PAH- and PCB-contaminated marine sediment *in situ*. Both PAHs and PCBs were removed to a larger extent from planted sediments compared to the unplanted control. After the 60 weeks of treatment, PAHs declined by 73% in the presence of plants but only 25% in the controls. Total PCBs decreased by 60% in the planted sediments while none were removed in the unplanted control. Overall, biodegradation was greatest in the sediment layer containing the majority of the eelgrass roots. The presence of eelgrass likely stimulated the microbial biodegradation of PAHs and PCBs in the rhizosphere by releasing plant enzymes, root exudates, or oxygen.

Liang et al conducted a study in 2014 using bioaugmentation to enhance PCB removal in a switchgrass rhizosphere. Switchgrass-treated soil with *Burkholderia xenovorans* LB400 bioaugmentation had the highest total PCB removal. Furthermore, the presence of switchgrass facilitated the LB400 survival in the soil. Overall, the study found that combining phytoremediation and bioaugmentation could be an efficient and sustainable treatment to remediate PCB contaminated soil and recalcitrant PCB congeners.

Phytoremediation is advantageous in that it is accomplished with minimal environmental disturbance. Other advantages include: it is aesthetically pleasing and passive, organic pollutants can be converted to carbon dioxide or water instead of transferring toxicity, secondary waste is minimal, the uptake of contaminated groundwater can prevent the migration of contamination, and it can be used on a large range of contaminants.

Bioremediation uses microorganisms to facilitate degradation of contaminants ex situ. BioTech Restorations, Inc (BTR) pioneered a new method of treating contaminated sediment using tilling. It works on a variety of pollutants, including PCBs and pesticides and can be employed in soil, groundwater, and dredged marine sediments. According to the BioTech Restorations, LLC business synopsis:

> *Natural attenuation and bioremediation are synonymous in that remediation occurs through a biological process where indigenous microbial populations consume the target organic pollutants. In both natural attenuation and enhanced bioremediation microorganisms express enzymes that break down pollutants into less complex non-toxic organic constituents that are consumed for bacterial growth and reproduction. Many chemical pollutants are highly persistent and are effectively immune to biological breakdown. Sites impacted by these persistent organic pollutants (POPs) represent the most costly remediation challenges as well as the greatest risks to the environment and human health.*
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> *The BTR research team, lead by Dr. Valerie Paynter has dedicated years of research to the development, testing and validation of a biological remedy for the treatment of persistent organic pollutants including PCBs, pesticides and dioxin. BTR's research found that persistent organic pollutants impair the indigenous*

bacteria's ability to secrete reductive enzymes. Absent the capacity to produce reductive enzymes, the indigenous microbial populations are incapable of degrading the target pollutants. A Factor treatment restores microbial enzyme production which results in enzymatic de-chlorination of the target POPs and rapid microbial utilization of the residual organic constituents.

BTR has developed a novel remedial biotechnology that is changing the environmental industry. A Factor remedy can reduce the cost of cleaning up a polluted site by 50% and reduce the financial barriers to the cleanup of thousands of polluted sites across the United States. Factor treatments are designed for on-site cleanup where treated soil, groundwater or sediments can be treated without the need for off-site transportation and permitted disposal. Remediation times range from 6 weeks for petroleum hydrocarbons to 6 months for PCBs and other recalcitrant organic chemical pollutants. BTR is the only remediation company so confident in its process that the company guarantees a Factor remedy will achieve the site's mandated cleanup goals.

In 1998 a first generation Factor was developed to eliminate the insecticide toxaphene from soils inside Hercules' former pesticide production facility in Georgia. Over a 24 week period, a single Factor application reduced toxaphene in soils from 3500 ppm to non-detect. Biotech has improved the process, increased efficiencies, pioneered new applications and most importantly lowered costs.

BTR was used on PCB-contaminated sediments from the Housatonic River Rest-of-River site, and the methods and results were recorded in the 2014 Housatonic River BioTech Restorations Remediation Phase I Study: Quality Assurance Project Plan prepared by Environmental Stewardship Concepts, LLC. Samples from the highest PCB contaminated soil and sediment from the site were collected. These samples were delivered overnight to BTR's soil testing lab located in Clemson, SC. There, BTR, combined and mixed the soil and sediment samples and sent a portion of the samples to an independent, certified lab for a measurement of baseline PCB concentration and soil characteristics. BTR used sediment assays to determine the most effective factor formulation to use for this site; the incubation time for the sediment assay is 8-10 weeks. The goal of the sediment assay is to select the best performing one or two factors under the precise soil/bacteria conditions of the site. Over eight formulations with proven efficacy in reducing PCBs and other chlorinated organic chemicals have been developed.

Including the Housatonic River site, BTR treatment factors have been successfully used to reduce PCB and other persistent chlorinated organic pollutant concentrations in the soils of 17 different sites.

Mobile UV decontamination uses a mobile rig that can be transported by truck to process contamination on-site. Ultraviolet light degrades PCBs and other contaminants ex situ. Mobile UV decontamination is only suited for small volumes now but could be up-scaled. This technology is currently being piloted by University of Calgary.

UV-oxidation treatment is a viable technology for treating contaminated groundwater. It uses an oxygen-based oxidant in conjunction with UV light. This technology is applicable to all types of petroleum precuts, PCBs, dioxins, PAHs, and other various forms of organic carbons. A study conducted in 2013 by Kong et al demonstrated that using UV and visible light is effective in treating PCBs in transformer oil.

NASA's redeployable polymer blanket is filled withenvironmentally safe solvent and is placed onto contaminated sediment. The solvent attracts PCBs, which migrate into the solvent-filled spikes. PCB-laden solvent is then extracted from the blanket and treated ex situ via an activated metal treatment system (AMTS). AMTS is a NASA technology that uses paste containing particles of activated zero-valent metal. The paste is applied to contaminated surfaces and extracts PCBs. Afterwards, the paste is removed and disposed of in an approved landfill.

EcoSoil® is a patented technology available for investors for in situ remediation of contaminated soil in an ecological way. Horizontal and directed drilling techniques are combined with specially designed sockets containing sorbents that are inserted into the holes. Pollutants are removed with adsorption mechanisms.

Microwave energy can be used to remove or immobilize contaminants to achieve soil remediation. Thermal desorption is a mechanism of microwave energy that can be an affordable and sustainable treatment option for persistent organic pollutants, including PCB-oils and pesticides.

Thermal desorption involves excavating, screening, and heating contaminated soils to release petroleum from the soil. Heat increases the volatility of contaminants, allowing them to be removed from the solid matrix. It entails two major components: a desorber and an off-gas treatment system. A study on the effectiveness of thermal desorption was conducted in South West England in 2009. For field application, low temperature thermal desorption was found to be the most effective. Experiments results in 48-70% decomposition of PCBs in sediments through the use of thermal desorption technology. Thermal desorption is one of the most versatile treatment technologies considering it can be implemented either on or off site.

Thermal desorption technology was utilized at the Passaic River basin in New Jersey, which is contaminated with VOCs and PCBs. It was able to remediate approximately 225 tons of soil per day, and treated soils were then used as backfill for the site. On average, PCBs were reduced to 0.16 ppm.

Natural Recovery/Monitored Natural Recovery

Natural recovery encompasses a wide range of processes, including decomposition, burial, dispersion, and volatilization. It involves either the immobilization of contaminants or the transformation of contaminants to less harmful forms, usually through covering contamination with layers of a variety of media. Inactive media includes sand, gravel, and concrete, while active media includes biochar, carbon, and

bioactive materials. Natural recovery does not remove contaminants and requires long-term monitoring.

Monitored natural recovery (MNR) refers to monitoring the progress of natural recovery. If the rate of contaminant degradation is fast enough, it can be used as the only remediation technique. MNR can also be used as a finishing option for other remedial technologies.

The Willamette River is largely not a depositional river due to flooding, fast currents, tidal action, and prop wash; sand covering will not stay in place, and spreading the pollutants further down river and to the Columbia River is not a good solution for a cleanup. MNR seems questionable on this river, especially 65% to 80% of the river as the FS proposes.

The CAG and Portland community recognize that Natural Recovery is not remediation; it is allowing the river to cover up the contaminated sediment. The CAG has examined the data available for natural recovery and is not convinced that the approach works for contaminants such as the ones in Portland Harbor. The CAG agrees with EPA's analysis of the information on siltation rates and the conclusion that sedimentation/siltation/natural recovery will not work in Portland Harbor.

Environmental and Community Monitoring

Monitoring of activities during remediation is central and necessary. Monitoring must include: air, water, noise, odor, light, traffic on the water, etc.

No matter the dredging methods, time, schedule or other logistics, EPA will need to monitor the operations whenever operations are on the water or active on shore. The environmental and quality of life monitoring has to be accompanied by on scene monitors who can oversee operations and confirm that all best management procedures are being followed. In some cases, video monitoring may be appropriate.

The Hudson River PCB site Record of Decision states the following:

> *Short- and long-term (i.e., pre-, during, and post-construction) monitoring programs will be developed to ensure compliance with performance standards and to ensure protection of human health and the environment. The types and frequency of pre-construction monitoring will be developed during remedial design. Plans for monitoring during and after construction will be developed during the remedial design and modified during and after construction as appropriate. This is consistent with the NRC Report recommendation that long-term monitoring evaluates the effectiveness of the approach as well as ensures protection of public health and the environment.*
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> *The first phase will be the first construction season of remedial dredging. The dredging during that year will be implemented initially at less than full scale operation. It will include an extensive monitoring program of all operations.*

Monitoring data will be compared to performance standards identified in this ROD or developed during the remedial design, with input from the public and in consultation with the State and federal natural resource trustees. Performance standards shall address (but may not be limited to) resuspension rates during dredging, production rates, residuals after dredging or dredging with backfill as appropriate, and community impacts (e.g., noise, air quality, odor, navigation). The information and experience gained during the first phase of dredging will be used to evaluate and determine compliance with the performance standards. Further, the data gathered will enable EPA to determine if adjustments are needed to operations in the succeeding phase of dredging, or if performance standards need to be reevaluated. EPA will make the data, as well as its final report evaluating the work with respect to the performance standards, available to the public.

The second phase will be the remainder of the dredging operation, which will be conducted at full-scale. During the full-scale remedial dredging, EPA will continue to monitor, evaluate performance data and make necessary adjustments.

The data EPA gathers, as well as the Agency's ongoing evaluation of the work with respect to the performance standards, will be made available to the public in a timely manner and will be used to evaluate the project to determine whether it is achieving its human health and environmental protection objectives.

Dredging and processing operations at the Hudson River PCB site, both in-river and at project support facilities were monitored and evaluated continually to determine if changes were needed to improve operations.

On monitoring sites, the Columbia backs the Willamette up some 20 plus miles to the falls at Oregon City. During certain times of the year, high tides will reverse the flow of the river, creating an upriver current. All sites should be monitored both up and downstream for contaminate redistribution.

During the Hudson River dredging, five quality of life performance standards were developed: air quality, noise, odor, lighting, and navigation. These standards were established to reduce the effects of dredging on people, business, and communities. The monitoring was re-evaluated and adjusted as needed as the dredging moved throughout the river.

Cleanup activities, such as sediment handling and processing, can release pollutants into the air. Based on the US EPA 2011 Quality of Life Performance Standards General Overview, the Hudson River PCB site enacted both monitoring and design requirements to minimize the effects of air emissions on people's health and the environment during the cleanup. Air emissions were routinely monitored to predict the amount of emissions from PCBs and other pollutants from the project. Performance standards set PCBs in residential areas at 0.11 micrograms per cubic meter and 0.26 micrograms per cubic meter at commercial/industrial areas.

According to the 2015 US EPA Phase 2 Dredging, Year 5 summary, compliance with the Federal Safe Drinking Water standard of 500 parts per trillion (ppt) for PCBs was monitored through an extensive river water quality monitoring program located up-stream, within 300 meters downstream of dredging, and greater than two miles downstream of dredging. Air monitoring occurred 24/7 during dredge operations. Monitoring occurred regularly and in response to complaints for quality of life issues (noise, lighting, or odor).

Several activities associated with the removal of PCB-contaminated sediment could produce noise. The Hudson River PCB site required monitoring for the sources of noise at the beginning of any change in operations that could result in increased levels of noise compared to complaint noise levels recorded in Phase 1 or in response to new complaints. According to the US EPA 2011 Quality of Life Performance Standards General Overview, standards were determined for both short-term and long-term operations. The performance standard varied from 65 decibels (running refrigerator) to 80 decibels (average street traffic) depending on the time of day and whether the noise occurred in a residential or commercial/industrial area.

Dredging at the Hudson River PCB site took place 24 hours a day, six days a week. This allowed the project to be completed ahead of schedule by increasing the efficiency of the dredging. According to the 2015 US EPA Phase 2 Dredging, Year 5 summary, a total of more than 2.75 million cubic yards of contaminated sediment were removed. Approximately 310,000 pounds of PCBs were removed, which is more than twice what was originally estimated.

Based on the US EPA 2011 Quality of Life Performance Standards General Overview, equipment and cleanup activities can also generate odors, which are difficult to measure since they vary depending on the concentration of the pollutant and the sensitivity of the person exposed. Hydrogen sulfide released from decaying plants is the most likely odor during the dredging and sediment process. Therefore, hydrogen sulfide was monitored at the Hudson River PCB site in the event of an odor complaint. The performance standard set the limit of hydrogen sulfide to 0.01 ppm.

Lighting systems are used to illuminate cleanup operations that occur after dark. As stated in the US EPA 2011 Quality of Life Performance Standards General Overview, the performance standard for light at the Hudson River PCB site required the monitoring of light levels at the beginning of any operations that could result in increased light levels compared to operations previously implemented or in response to complaints. The standard varied from 0.2 footcandle to 1 footcandle depending on the type of area-rural, suburban, urban, or commercial/industrial.

In order to avoid the slowdown or unnecessary interference of vessels unrelated to the cleanup, navigation monitoring must be implemented. The performance standard for navigation must comply with the applicable sections of federal and state navigation laws, rules, and regulations. According to the US EPA 2011 Quality of Life Performance Standards General Overview, the Hudson River PCB site called for the following requirements, as needed, to meet the goal of the standard:

1) Evaluating vessel movement;
2) Keeping mariners informed about scheduled projec t work that might affect vessel movement;
3) Restricting access to work areas and providing s age access around them
4) Scheduling project activities to consider vessel movement;
5) Establishing temporary aids to navigation such as signs and buoys to maintain efficient and safe vessel movement; and
6) Using a vessel tracking system to assist with sa fe passage of vessels through the project area.

Additionally, the EPA or PRPs need to undertake routine monitoring of vessel traffic, regular outreach to mariners, and follow up on complaints.

The value of quick turnaround of results from monitoring samples makes a mobile lab on site a worthy investment for the cleanup.

Monitoring biota during remedial operations and post-construction period is an important element to confirm the effectiveness of the remedy and confirm that conditions improve. Indeed, experience at other CERCLA sites demonstrates the importance of long term monitoring, especially monitoring animal tissues (fish, shellfish, birds, invertebrates, etc.). Several examples of fish tissue sampling efforts are important to note for the NRRB:

Hudson River, NY – GE PCB site. At this site, PCB levels in fish are the critical target for remediation in order to protect human health via fish consumption and to protect ecological receptors. The fish tissue monitoring at the Hudson River PCB site is designed to address two questions:

- How do current conditions affect PCBs level in fis h?
- What are the long term trends in fish tissue PCB c oncentrations?

To accomplish these two goals, fish sampling has two efforts: 1) young of the year that have only been exposed to current conditions on site or in the vicinity of the active remediation and 2) older and larger fish that have been on-site for some time, are the size of sport fish, and indicate long term patterns. These two efforts indicate if dredging causes substantial changes in the short term and how the remediation affects long term conditions in fish.

Fox River, WI- PCB contamination from paper mills. The remediation at this site included both removal and capping. The fish tissue monitoring indicated post-construction declines in edible fish within a short period, demonstrating the fact that remediation does have the anticipated positive outcome and that fish tissue PCB levels decreased faster than expected in the remediated areas of the river.

St. Louis, MI- Velsicol Site. The initial remediation of this closed chemical plant in St. Louis, Michigan on the Pine River addressed contamination in groundwater and sediment with DDT and PPB and a host of solvents and some metals. Fish tissue monitoring in the Pine River continued in the post-construction period, assessing PBBs

and DDTs especially. Within a few years, not only had DDT and PBB levels not declined, these chemicals began to increase in fish in the Pine River suggesting a possible failure of the remedy (a slurry wall around the site on the banks of the river). Indeed, the remedy had failed structurally.

The PHCAG has been concerned about effective river monitoring during cleanup operations especially since observing an early action dredging at the Gasco site that created a massive, visible toxic sediment plume from a tar ball, that got through a silt curtain and traveled far down the river, killing fish, crayfish and other species in its path. The release of the plume was caused by sloppy dredging as observed by PHCAG members. Aquatic life for 600 yards downriver was dead.river monitoring during cleanup operations

EPA representatives have minimized the toxic effects of the Gasco plume by simply calling it a "learning experience" whereas PHCAG members who witnessed a high number of dead animals felt it was an unacceptable fiasco.

The cleanup must be done from upstream down and monitoring should be done to at least the mouth of the Multnomah channel and perhaps as far as the Sauvies Island bridge. 80% of the Willamette's flow goes down theMultnomah channel. Points cleaned up from Schnitzer downstream should be monitored to the Columbia River slough and upstream from each cleanup site for at least half a mile because of tidal distribution.

Besides monitoring, every cleanup action must contain a contingency plan in case of excessive pollution releases to air or water. There should be an easy process for community members to report problems that result from cleanup operations to the EPA for action.

Confined Disposal Facility (CDF)

A CDF is similar to capping, but contaminants are completely isolated in a water landfill. CDFs are constructed in shallow water or nearshore and must be maintained and inspected in perpetuity.

CDF at T4: We agree with EPA that a CAD at Swan Island or a CDF at Arkema is bad placement for contaminated dredge spoils. But The PHCAG disagrees with EPA about a CDF at T4. All of the nearby neighborhood associations have passed resolutions against locating a CDF at T4. There is a citizen petition against the CDF. It is environmental injustice to locate yet another dump in our neighborhoods when we already have the huge bulk of the polluting industries located in the neighborhoods adjacent to the Superfund site.

The CDF was first proposed as an early action by the Port of Portland along with a long term plan to fill and cover the site with a new port facility and loop rail. The CAG

membership unanimously opposed this as appropriate for an early action. When EPA ruled that the originally proposed CDF would violate the Federal Clean Water Act, the Port of Portland rescheduled their proposal of a CDF so that it could be considered as part of the final cleanup, with a modified design, instead of as an early action. In addition to the potential for re-contamination of the river from leaching and from berm failure in a flood or major earthquake, the proposed site (at Terminal 4, Slip 1) is actively used by white sturgeon.

The Oregon Department of Fish & Wildlife studied the stretch of the Willamette River near Terminal 4 and determined that sturgeon use the area of the river just outside of Slip 1 for juvenile rearing. While that study did not examine sturgeon use of Slip 1, community members who regularly fish the area have reported that large numbers of sturgeon utilize the slip during the winter months. The sturgeon population in the Willamette River continues to decline, potentially leading to consideration for threatened and endangered listing, and the CAG would want to see every effort made to protect, restore, and expand habitat used by sturgeon, and not fill habitat that they currently use. The Trustee council through the Natural Resources Damage Assessment and Restoration (NRDA) process has not been able to identify any potential options to improve or restore Sturgeon habitat. The conceptual plan for the CDF includes a minimal effort to remove fish from the slip, which would only remove fish in the upper 10 feet of water, leaving deeper fish, such as sturgeon, to remain trapped in the slip during and after construction of the berm.

The CDF does not adequately address the impact of the Cascadia Subduction Zone earthquake with the proposed design using an earthen berm and liquefiable contaminated soils that it will contain. Modeling was done for a 7 in which engineers admitted it would suffer damage. It will be unlined, located on a former slough, with several sources of ground water flowing into it. The CAG was told earlier by EPA that the flow through design is an experimental design and EPA has not supplied an example of such a CDF on an active, large volume river such as the Willamette.

The CAG is concerned about the nature of contaminants that would be allowed to be placed in the CDF, and concerns were increased when an engineer on the project stated that higher level contaminants could be placed toward the back of the slip. This seems unlikely to succeed given that the process of filling the slip is described as basically adding a slurry of dredge spoils into a huge vat of water and letting the water then flow through the front of the berm into the river.

The cost of engineering, construction maintenance and monitoring in perpetuity, coupled with the risk of a second clean up if a failure happens, makes the CDF a very expensive proposition, the liability could became the taxpayers problem since T4 is a publicly owned entity, the Port of Portland and the risks of a highly concentrated body of persistent pollutants becomes the burden of the neighboring communities. It seems to be a high price to pay for extra "real estate" for the Port of Portland, since their objective is to fill in the slip.

PHCAG supports the community's view that a toxic waste dump (CDF) at T4 is not what they want.

The FS has under-modeled for earthquakes especially the expected Cascadia subduction zone earthquake. In addition, geologic fault lines have been identified which run directly through or adjacent to the proposed site.

The proposed CDF has been under-modeled for flood hazard. It's been modeled for the 100 yr flood but would be located within both the 100 and 500 year flood hazard zones as defined by federal government flood hazard maps (see attachment). Additionally, the impact of global climate change and sea rise will increase the flood potential and force at this site.

EPA region 10 does not have a reassuring record in regard to locating toxic waste dumps/CDFs in flood zones. A study conducted by the National Academy of Science cites a CDF failure in Silver Valley, Idaho, during a 1997 flood event in which lead levels spiked intensely high. The National Academy said, "The EPA did not fully consider the importance of the interacting processes of surface and groundwater flow...Because the basin has not been considered in the framework of a system and inadequate attention has been devoted to hydrologic and climatic variability, in particular, the CSMs [conceptual site models] seemingly are based primarily on average conditions (Superfund and Mining Megasites: Lessons from the Coeur d'Alene River Basin, 2005)."

EPA has claimed that there have been no CDF failures. Yet the media has reported otherwise (See attached document, "CDF failures").

One of the main reasons the citizens of the North Portland peninsula neighborhoods are so opposed to the Confined Disposal Facility is that they have had one before. It was called the "St Johns Dump" and has cost the City of Portland over $36 million dollars to correct. For fifty years, 14 million pounds of garbage was placed in a landfill that was adjacent to Smith and Bybee Lakes in North Portland. There was nothing wrong with these natural lakes except that they were located in the North Portland peninsula, away from city hall, away from wealthier neighborhoods who would not have tolerated them. Today, Metro regional government continues to oversee garbage collection and the large grants issued to those North peninsula neighborhoods that the city sees as the most affected by the St Johns Dump.

The Process

The CAG members have watched, listened, spoken up, told our fellow citizens about the issues, wrote letters and met with our elected representatives. And we have tried to be patient as we watched the Potentially Responsible Parties (PRPs) delay and obfuscate.

Over the span of fourteen years, the CAG and CAG members have engaged the community by speaking at meetings of community groups, tabling at river events, attending functions, and inviting people to attend the regular CAG meetings. The CAG has sought to inform and engage the community, to cooperate with EPA and learn the technical details of the problem and potential remedies.

At many turns, the PRPs have sought to delay or interfere. These PRPs only seek to avoid taking any responsibility for the damage. One CAG member notes: "I have collected fish for the LWG and EPA four times in the last 10 years. PRPs have threatened to have me arrested on at least 3 occasions while collecting fish samples in the Willamette adjacent or at their locations even though I identified myself and my purpose and I continued to fish. One PRP would bring out a tug and deploy an oil containment barrier to make it hard to fish their area each time we entered their slip. At one point a green dye used to detect leaks in drain systems was added to an upstream source and turned the water in the Schnitzer slip anti-freeze green and shut off fish collection for three days in the area. No responsibility was ever taken for the dye, roughly 60,000 gallons of dyed water was dumped."

"We were told to leave various other areas as well but, continued to collect fish samples. The people employed by PRPs did not know how to handle fish, demanded we catch sample fish on the exact map references even though some were up on the bank. They had been told by the EPA that structures in the area within 50 yds were appropriate but still wasted time on exact locations. They even told us that the fish stayed on the same spot and did not cross the river. Small Mouth bass range on average four to eight miles and some greater distances."

“PRPs from Schnitzer, Arkema, Exxon and the Vigor marine group came to a PHCAG meeting and tried to convince us that MNR was working in the harbor and we should not only support MNR but should introduce them to other groups. Failing to win their point the manager from Schnitzer said they were willing to hold the clean up in litigation. They said they could buy a lot of lawyers for 2 billion dollars.”

Up to now, there has been no effort by the LWG or EPA to include community recommendations in the FS litigattached "WR_PHCAG meeting 8-31-15.pdf"). In fact, they have expressed little interest in them and instead have concentrated on industrial stakeholder issues. We feel it is high time the people who will be living with the Superfund be heard.

How sites are defined by DEQ as either a brownfield or as an upland source have been unclear. Contaminated sites that are not formally listed as either may be leaking pollutants into the river, making cleanup efforts less effective. Stating a number of recent and historic problems at a site that could affect the river even though it is not listed as a brownfield (see attached DEQ letter "010814ParamountPenalty-1.pdf").

The Site:
The Willamette Superfund site is complex. It has tidal effects transmitted up the Willamette River from the Columbia River. In fact, the confluence of the 10th largest

river in the country, the Willamette, and the 2nd largest river, the Columbia, is complex. According to the City's Environmental Services site "This combination of large rivers interacting, dynamic geomorphology within a transitional landscape, and tidal effects transmitted up the Columbia from the ocean create some of the most complex hydrology in the Willamette Basin.The extent of ava ilable information limits the degree to which the full complexity of these patterns can be described..." (from Portland Bureau of Environmental Services website).

Source Control
While EPA has cooperated with DEQ in the state's eforts to control and remediate sources onshore and upriver, the CAG is concerned that DEQ is not committed and unless EPA places strict requirements on DEQ, the effort will not be sufficient.

DEQ informed the PHCAG in a June 10, 2015, general meeting that upland manufacturing sites are not considered brownfields until they change zoning for development. Only then are they "flagged" by DEQ. PHCAG wants to know how many contaminated industrially zoned sites are not considered brownfields even though they have contaminated groundwater going into the river.

As an example, the Steelhammer site is being considered for residential development. If the zone changes as expected under Portland's in-process Comprehensive Plan, DEQ says it will only then look at site contamination.

Source control must be part of the remedy and we do not want ongoing sources to contaminate the river. Another major area of risk is the hazard posed by the fuel tank farms in the Linnton/Willbridge area where 90% of the entire region's fuel supply passes through. The fuel tank farms are adjacent to the Willamette River edge in the Superfund site on liquefiable soils. During an earthquake, these tanks will cause an environmental catastrophe, contaminating the river with PAH's and other assorted toxic chemicals. EPA should require as part of the to move or stabilize these tanks to prevent an environmental disaster when the Cascadia Subduction Zone earthquake hits.

Cost
A non-LWG potentially responsible party representative from Schnitzer Steel said at a PHCAG Steering meeting on 8-26-15, that industry looks at a billion dollar price tag for the cleanup and thinks, "How many lawyers can I buy with a billion dollars." To PHCAG members present it sounded like a threat even though the rep insisted his company does not ascribe to that philosophy.

Often PRPs have cited the total cost of the cleanup for the entire Portland Harbor Superfund site, in order to convince the public, elected officials, and EPA, that the cost is overwhelming and would be economically disastrous. At the Oregon Environmental Cleanup Conference held September 18, 2016, Philip Spadaro, Managing Director/Principal Scientist for The Intelligence Group, reported on Superfund cleanup costs in which he explained that the "all-in unit cost" of cleanups has increased in general for all Superfund sites, and that the projected costs at Portland Harbor are not out of the ordinary on a per unit basis.

An attached table, while not a thorough analysis, lists estimated assets for several PRPs involved in this site. Among the 150 to 200 identified PRPs there is a total of hundreds of billions in assets and many billions of annual revenues. Considering that the cleanup costs will be spread over a period of many years, and divided among multiple PRPs, the costs are not as significant a barrier as the PRPs would lead us to believe. The full costs of remediation, monitoring and restoration need to be the responsibility of the PRPs, not the taxpayers through EPA or other general funds.

Concluding Remarks

This is our opportunity to greatly improve the condition of this river for the long-term. The community has lived with this polluted river for far too long, and the impacts to people, fish and wildlife can be profound. We need to ensure this cleanup is done right, and we need to do it once. The Willamette River is a Public Trust asset, and the local companies who have often fought the US EPA in the cleanup process to date need to meet their community obligation. They have benefited from the river for years, and now it is time to pay it back. We need to remove contaminated sediment from the Willamette, and enable people once again to consume all game fish from the river without potential impacts to their health.

We urge the NRRB and CSTAG to support the most aggressive remedy, more so than the Alternative G from the FS, what we call G+ that leaves the community with greater assurance that the remedy will be effective.

The Portland Harbor Superfund Community Advisory Group appreciates your consideration of these comments and recommendations.

Submitted by Jim Robison, Chair, Portland Harbor Community Advisory Group.

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Attachments

	Assets in	
Primary Responsible Parties	**Millions**	**Billions**
Arkema Inc	6.8	
Bayer CropScience	104	
BP-WEST COAST		315
EXXON-MOBIL		353
Greenbrier -Gunderson		1.5
NW Natural		2.93
Schnitzer Steel		3.3
Shell Oil	174	
Vigor Industrial	130	

Participating in CAG and Coalition activities, presentations and discussions:
Arbor Lodge Neighborhood
Beyond Toxics
Chinatown/Oldtown
Columbia Riverkeeper
Columbia Slough neighborhood
Cully
Dare to Dream 2
Ecotrust
Eliot
Forest Park/Northwest District Neighborhood Association
Freshwater Trust
Friends of Baltimore Woods
Friends of Cathedral Park
Friends of Columbia Gorge
Friends of Trees
George Middle School 7th Graders
Hacienda
Hmong American Community of Oregon

Impact NW
Iraqi Society
JOIN
Kenton
Latino Network
Lewis and Clark Trail Heritage Foundation
Lideras Verde
McCoy Academy
Native American Youth Association
Neighbors for Clean Air
Neighbors West-Northwest Neighborhood Coalition
Northwest District Neighborhood Association
North Portland residents via tabling St. Johns Farmer's Market
North Portland residents via tabling St. Johns Social
npGreenway
NAYA Native American Youth and Family Center
North Portland Chairs committee
North Portland Greenway Trail
Northwest Earth Institute
Occupy St. Johns
OPAL-Environmental Justice Oregon
Oregon Center for Environmental Health
Oregon Environmental Council
Oregon Physicians for Social Responsibility
Oregon Public Health Division
Overlook Neighborhood
Participants of the Big Float via tabling
Participants of the Cathedral Park Jazz Festival via tabling
Participants at the Portland State University Social Sustainability Colloquium
Portland Harbor Community Coalition
Portland Rising Tide
Portsmouth Neighborhood
Red-legged frog migration help organizers
Resolutions Northwest
ReWild Portland
SOLVE
Streetroots
The Science Project
Tualatin Riverkeeper
University Park Neighborhood Association
Willamette Speaks Story Telling: Linnton, St. Johns and NW Portland
Voice Public Involvement
350.org Portland Chapter
1700 signers of the petition against the CDF

University of Portland
Lewis & Clark University Law

Portland State University
Portland Community College
Oregon State University
University of Washington

Members of the Natural Resource Trustee Council
Nez Pierce Tribe
Confederated Tribes of the Warm Springs Reservatio n of Oregon
Confederated Tribes of the Umatilla Indian Reserva tion
Confederated Tribes of Siletz Indians
Confederated Tribes of the Grand Ronde Community o f Oregon
NOAA Fisheries
U.S. Fish and Wildlife Service
Oregon Department of Fish & Wildlife

Yakama Nation Fisheries
East Multnomah Soil & Water Conservation District
West Multnomah Soil & Water Conservation District

Business Associations
- Portland Alliance
- St Johns Booster
- St Johns – Main Street
- Portland Community Media

KBOO Radio Station

Oregon Department of Environmental Quality
News Release
Release Date: Jan. 9, 2014
Contacts:
Ron Doughten, Water Quality Program, Portland, 503-229-6991
Sarah Wheeler, Environmental Law Specialist, Portland, 503-229-6927

DEQ issues $9,636 penalty to Paramount Petroleum for stormwater permit violations at Portland asphalt plant

The Oregon Department of Environmental Quality issued a $9,636 penalty to Paramount Petroleum Corporation for stormwater permit violations at its asphalt plant at 5501 NW Front Ave. in Portland.

During the 2012-13 monitoring year, the company failed to monitor its stormwater discharge for pollutants that can impair water quality in the Willamette River. The company also discharged stormwater with levels of total suspended solids in excess of permitted limits and failed to complete and implement an exceedance report. In addition, Paramount Petroleum failed to meet the numeric limit for pH in its discharges on two occasions, and failed to conduct timely follow-up monitoring of one of those pH exceedances.

DEQ issued this penalty because a stormwater permittee is required to sample, analyze and report on its industrial stormwater discharges from asphalt emulsion activities to ensure its discharges meet water quality benchmarks and numeric limits in the permit. Failure to meet the benchmarks may indicate the presence of harmful levels of industrial pollutants in discharges to the Willamette River. Discharges outside of the permitted benchmarks for these pollutants may harm aquatic species and their habitat and reduce the safety of waters for public use.

Additionally, the reach of the Willamette River to which the asphalt plant discharges does not meet water quality standards for a number of pollutants, which is why the stormwater permit requires monitoring of those pollutants. Paramount Petroleum has until Jan. 21 to appeal the penalty.

DEQ enforces Oregon environmental laws to protect people's health and to keep our region's air, land and water clean and healthy. These compliance and enforcement efforts also help level the playing field by deterring violators who might otherwise have an unfair business advantage over their environmentally compliant competitors.

For more information about DEQ-issued penalties across Oregon and other information about DEQ's compliance and enforcement, please seethe DEQ Office of Compliance and Enforcement web page .

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Oregon Department of Environmental Quality
811 SW Sixth Avenue, Portland, OR 97204 | Tel/503-229-5696

Petition signed by over 1700 community residents

No Toxic Waste Dump in North Portland

To: Governor John Kitzhaber, Secretary of State Kate Brown, State Treasurer Ted Wheeler

cc: Chip Humphreys, EPA, DEQ, Port of Portland, Division of State Lands (DSL), Portland Harbor Trustee Council

We the undersigned ask the Oregon State Land Board and state leaders to deny any request submitted for the purchase of submerged community-owned lands in or adjacent to the Willamette River at Port of Portland's Terminal 4 intended forthe creation of a superfund confined disposal facility (CDF) or toxic waste dump in North Portland. We further reject the use of a confined disposal facility for the reasons listed below:

• North Portland is host to a garbage dump and sewag e waste site and should not be considered for a toxic waste dumpsite, also known as a CDF*, as a matter of equity (*confined disposal facility).

• The proposed dirt berm separating the toxic waste dump at T-4 from the Willamette River has not been proven to withstand major earthquakes or floods and a breech could re-contaminate the river and surrounding land.

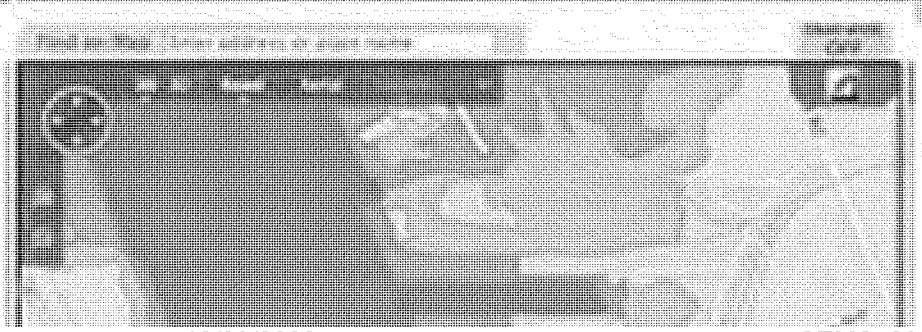
• Highly toxic pollutants will seep into the river t hrough the berm and continue to affect both animal and human health.

• Residential communities with toxic pollutants near by have been shown in studies to have negative health effects including shortened life spans.

• There is some evidence of pollutants such as PCBs may become airborne and affect areas near the river causing negative health impacts on North Portlanders.

• We ask instead that efforts at T-4 be directed to protect sturgeon habitat at the site and restore off-channel habitat for sturgeon, salmon and other native fish and wildlife. We believe there is a unique opportunity to protect and restore additional habitat for native fish populations.

100 year flood zone



List of CDF problems

Here's a list of CDF problems and I will number them so you and I can keep track.

Note: Silver Valley and others were not all called CDF's, Silver Valley was called a *repository* but it is essentially the same. There are several names.

1. Delaware River – Pennsylvania Sending whole paper and website-- http://www.waterprotectionnetwork.org/sitepages/downloads/ToolsAndResources-Reports/CRN-trRpt-DelawareRiverDeepen.pdf

Description begins on page 32.

Confined disposal facilities, the primary disposal method currently proposed by the Army Corps, can be a significant source of toxic pollution for the Delaware River during the dewatering process. Money Island and Fort Mifflin, two existing dredge spoil disposal facilities, have been found to discharge Cadmium, Lead, Copper, Zinc and total suspended solids into the Delaware River at significant levels.80 These two disposal facilities were found to be the eighth largest discharger to the estuary and in the case of lead to discharge more lead than all the other 78 point source dischargers to the estuary combined.81 According to one expert: "CDFs have the potential to impact aquatic life through acute and chronic toxicity, and human health through the bioaccumulation of organic compounds such as PCBs and DDX." 82

Historically the Army Corps has represented that according to their data; levels of toxins in River bottom sediments are not high enough to pose any adverse environmental impact. Yet numerous experts and agencies have raised questions about the accuracy of the Army Corps' sediment and water quality claims.

• The University of Delaware's Sea Grant Program states: the "Corps' heavy metal and pesticide data disagree with ADL [Arthur D Little] data by 800% to 2800% for similar parts of the river" -- ADL values being higher, and that Corps conclusions are "doubtful" because Corps data "is often lacking many of the details, or appropriate references, as provided by ADL..."83

2. Delaware River waste dumped into New Jersey CDF and then leaked. http://www.state.nj.us/dep/newsrel/2010/10_0091.htm

From New Jersey Dept of Environmental Protection

(J's note) "I love it. Pennsylvania complained about the USACE dumping

Superfund Community Recommendations meeting 8-31-15, 2:30-4:30, St. Johns Library meeting room
Present: Travis Williams, Willamette Riverkeeper; Jim Robison, PHCAG; Doug Larson, PHCAG; Darise Weller, PHCAG; Jackie Calder, PHCAG; John Shaw, PHCAG; Barbara Quinn, PHCAG.

Discussion and combination of Peter deFur's and PHCAG recommendations resulted in joint draft community recommendations below. Priority will be on the top 3. Wording, prioritizing of points and possible consolidation will be done by email discussion.

DRAFT COMMUNITY RECOMMENDATIONS:

#1 The goal is to have a healthy lower Willamette River for fish, wildlife, and humans. Until the goal is met, ensure that efforts to discourage fishing are culturally appropriate.

#2 We do not support any clean up methods that leave contaminants in or adjacent to the river. (use Jackie's more specific wording)

#3 Include control of ongoing pollution sources, both local and upriver, in the final cleanup order.

#4 Monitored natural recovery leaves contaminants in the river that will eventually recontaminate or spread downriver. It remains highly controversial and has not, to our knowledge, been demonstrated to be effective on chemicals that do not degrade and in a system like the Lower Willamette River. Don't rely heavily on this remediation method.

#5 A human Health Impact Assessment is needed to inform the clean up.

#6 To minimize air and water contamination during the clean up, require independent air and water monitoring in real time and an action plan to limit exposure in case of excess contamination.

#7 More detailed and site-specific data is needed on all aspects of the clean up based on methods such as computer modeling

#8 Because the clean up must last into perpetuity, the phrase "long-term" in the Feasibility Study and clean up order should be understood as "in perpetuity."

#9 Hire from local communities and educational institutions to work on the clean up. Follow the Davis-Bacon Act to work on technologies for the cleanup.

#10 Ensure that financial tools are in place to cover possible recontamination events. An example would be surety bonds based on inflation to address recontamination over the long-term.

#11 Establish a Pollution Prevention & Mitigation Fund (2.5%) for as long as the

LWG
LOWER WILLAMETTE GROUP

Chairperson: Bob Wyatt, NW Natural
Treasurer: Frederick Wolf, DBA, Legacy Site Services for Arkema

October 19, 2015

Via electronic mail

Amy Legare
Chair, National Remedy Review Board
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Re: LWG Recommended Approach to Portland Harbor Cleanup Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240

Dear Ms. Legare,

On September 18, 2015, EPA invited the Lower Willamette Group (LWG) to provide feedback to the National Remedy Review Board (NRRB) on the remedy selection for the Portland Harbor Superfund Site, including "any recommended approach for site cleanup."[1] The LWG appreciates the opportunity to provide these comments to the NRRB.

The LWG is composed of the ten parties who signed agreements with EPA to conduct the remedial investigation and feasibility study (RI/FS) of the Portland Harbor and four other parties who have contributed financially to the project.[2] The LWG, a small subset of potentially responsible parties identified by EPA, has been working with EPA to complete the RI/FS of the site for more than 14 years.

EPA and the LWG have made significant progress toward characterizing environmental conditions and risks at the site. The LWG's goal is to work with EPA to move forward with a cleanup proposal that is effective, achievable, and consistent with the National Contingency Plan (NCP) and agency guidance. In addition, we agree with EPA that the cleanup should be focused "on those areas that have the highest levels of toxic and persistent contaminants and whose cleanup will have the most impact on reducing risks to human health and the environment."[3]

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[1] EPA 2015a
[2] The LWG is Arkema, Inc., Bayer CropScience, Inc., BNSF Railway Company, Chevron U.S.A. Inc., City of Portland, EVRAZ, Gunderson LLC, Kinder Morgan Liquids Terminals, NW Natural, Phillips 66 Company, Port of Portland, Siltronic Corporation, TOC Holdings Co., and Union Pacific Railroad Company. This letter was prepared in cooperation with and reviewed by Ramboll Environ.
[3] EPA 2015a

Despite the progress made, the RI/FS process has not been without its challenges. Substantive disagreements arose during the risk assessments. More recently, EPA has rewritten the RI and FS. As it stands, the current draft of the Portland Harbor FS (the EPA FS) lacks some critical information needed for remedy selection. For example, the Portland Harbor FS must include sufficient information for an understanding of site conditions, as well as for making risk management decisions that prioritize the most significant and realistic risks at the site. It should also include a practical approach for identifying and managing "principal threat waste" (PTW) that does not identify vast areas of relatively low concentration, readily contained sediments as PTW. Finally, it should provide tools to evaluate and compare the effectiveness of remedial alternatives at reducing risk and achieving cleanup goals, along with the necessary backup to understand the alternatives evaluation.[4] It is critical that EPA make substantial revisions to the EPA FS so that is can be used for selection of a rational remedy.

Based upon our comprehensive study of the lower Willamette River and the Portland Harbor and our thorough knowledge of the physical, chemical, biological, and societal characteristics of the river, the LWG recommends the following approach to cleaning up Portland Harbor:

1. Focus on managing the most significant and pervasive risks.

   - Sediment cleanup levels should be tied to clearly articulated and accepted risk management goals. The FS, Proposed Plan, and Record of Decision (ROD) should document a direct correlation between active remedies (capping, dredging, in situ treatment, or enhanced monitored natural recovery [EMNR]) and important risks identified in the baseline risk assessments (BLRAs). Less significant risks, risks based upon less plausible exposure scenarios, and risks for which there is no clear correlation with sediment concentrations should not independently drive active sediment remedies. Benthic risks should be addressed consistent with the approved Baseline Ecological Risk Assessment (BERA).[5]

   - To optimize risk reduction, EPA should modify and realign the preliminary remediation goals (PRGs) and remedial action levels (RALs) to define sediment management areas (SMAs) so that remedial actions in these areas are transparently aligned with the BLRAs and more accurately reflect achievable risk-management goals.

   - EPA should work with other Portland Harbor stakeholders to identify functional opportunities for minimization of interim and short-term exposure to chemicals during the cleanup. For example, EPA could work with landowners on whether strategic locations of improvements to access to the river could encourage recreational or subsistence fishing in areas of lower sediment contamination. The community and potentially responsible parties could assist in the creation of innovative and scientifically grounded programs that provide interim measures to help mitigate risk from fish consumption and enhance site-specific data to better understand how to communicate effectively about risk.

   - EPA should acknowledge that any Portland Harbor sediment cleanup under consideration will not entirely eliminate risk. In particular, the cleanup will not remove fish advisories currently in place or achieve attainment of state water quality standards for the main stem Willamette River as a whole.

2. Reduce the uncertainty about natural recovery.

   - The LWG would like to meet with EPA and its modelling experts to better understand their concerns and to discuss potential refinements to or additional tests of the QEAFate model that might enhance EPA's confidence in the model's ability to predict natural recovery rates and the long-term effectiveness of the alternatives. EPA should work with potentially responsible parties now to conduct baseline monitoring to confirm declining contaminant concentrations in fish and sediment and reduce EPA's uncertainty about

[4] The LWG recently received the final section of the EPA FS on August 18, 2015. Consistent with EPA's instructions, the LWG submitted a list of significant comments on Section 3 and 4 of the EPA FS on September 8, 2015. LWG 2015c. The LWG's September 8, 2015 comments are enclosed with this letter for the NRRB's reference.

[5] Windward 2013

predicting long-term risk reductions through natural recovery. Surface sediment PCB data collected in 2014 in Portland Harbor[6] by non-LWG parties shows that concentrations have declined since the FS data set was closed.

- Pre-construction baseline data and other information collected during remedial design will further reduce uncertainty and help refine the model.

3. Improve the accuracy and transparency of the assumptions behind the remedial alternatives. Explain how additional risk reduction justifies higher cost actions.

- EPA should not identify materials that can be reliably contained as "principal threat wastes." Blanket identification of large areas of relatively low concentration (e.g., 200 micrograms per kilogram [µg/kg] PCBs) sediments as PTW is neither required by the NCP nor necessary to protect public health or the environment.

- EPA should consider treatment of principal threat or other remediation wastes only where the treatment cost-effectively achieves greater risk reduction than other technologies or disposal options. The need for treatment of sediment destined for upland landfills should be based on the acceptance criteria of the upland facility. In situ treatment of "principal threat" materials should be required only if contaminants cannot otherwise be reliably contained.

- Assigning and comparing technologies on a more localized and detailed spatial scale would allow EPA to demonstrate that its selected remedies will cost-effectively optimize risk reduction.

- Our experience on sediment remediation projects in the Portland Harbor and elsewhere in the Pacific Northwest leads us to conclude that some of the key construction assumptions in the EPA FS (including assumptions about construction duration, impacts, risk, and cost) are inaccurate. Realistic construction assumptions are necessary to evaluate short- and long-term effectiveness and implementability. Accurate cost estimates are necessary to evaluate cost effectiveness. EPA's assumptions must be transparent in order to support the negotiation of consent decrees to implement EPA's selected remedy through a performance settlement.

4. Maximize flexibility in remedy design and implementation.

- The FS and ROD should explicitly allow flexibility for refinement and adjustment of technologies and process options during remedial design.

- EPA should divide the site into operable units (OUs) focused on the most important SMAs. Dividing the site into OUs would allow EPA to evaluate and compare technologies on a more localized and detailed scale and would facilitate the administrative implementability of the remedy.

- EPA should consider the use of contingent remedies to address site-wide risks, as well as to address uncertainties within SMAs. Where significant uncertainty about the effectiveness of a technology at a particular SMA or the time frame to attain cleanup levels across an exposure area remains at the time of the ROD, contingent remedies, which are anchored in Oregon practice and explicitly supported by EPA guidance,[7] would allow EPA administrative and engineering flexibility to adjust to conditions at the site during remedy implementation.

Portland Harbor is a special place. It is Oregon's largest seaport, located immediately north and downstream of downtown Portland, and occupies the lower reach of the Willamette River, the 13th largest river in the contiguous

[6] This data was presented to EPA and the Oregon Department of Environmental Quality (DEQ) by webinar on September 10, 2015.
[7] EPA 1999, Section 8.3

United States. The river is wide with large water flows, averaging 33,000 cubic feet per second. Portland Harbor is an active working harbor and at the same time supports invertebrate, fish, and wildlife communities, as well as human recreational and cultural activities (e.g., boating, fishing, and beach use), and serves millions of industrial, commercial, Tribal, municipal, and recreational users.

The LWG believes that this complex system can be efficiently cleaned up by focusing active remedies on discrete areas of Portland Harbor where contaminant levels present the most potential risk to humans, fish, wildlife and invertebrates. Segregating, prioritizing and sequencing the cleanup of these higher risk areas would streamline the negotiation of consent decrees for remedy implementation and get cleanup started faster

We appreciate the opportunity to provide these comments regarding a recommended approach for site cleanup. We understand EPA may include a description of its preferred cleanup in its materials to the NRRB, and the LWG would like the opportunity to review and share its perspective on that description with the NRRB. We would be happy to do so just before or even after the NRRB meets in Portland in November.

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Recommended Approach to Cleanup

The remainder of this letter explains our technical rationale for the recommendations above. Section 1 expands upon our recommendation to focus on managing the most significant and pervasive risks at the site by proposing that EPA tie sediment cleanup levels to risk management goals. Section 2 discusses information that should be reincorporated into the conceptual site model to address and adequately reduce EPA's uncertainty about natural recovery and the long-term effectiveness of the alternatives. Section 3 describes why it is critical that EPA improve the accuracy and transparency of the assumptions behind the remedial alternatives and explain how incremental risk reduction justifies higher cost actions. Section 4 provides technical recommendations for how EPA can optimize risk reduction on an SMA or OU-specific basis by incorporating flexibility in remedy design and implementation into the ROD. Section 5 presents the LWG's recommended remedy for Portland Harbor.

1. Focus on Managing the Most Significant and Pervasive Risks

The Portland Harbor baseline risk assessments identified potential risks by evaluating conservative exposure scenarios, often using detailed food web models.[8] The resulting risk calculations are, to varying degrees, uncertain. EPA guidance states that baseline risk assessment should include conservative analyses[9]; however, EPA's remedy selection should be developed on risk management goals that look beyond the baseline risk assessments to consider "site-specific conditions, including any remaining uncertainties on the nature and extent of contamination and associated risks."[10] In the risk management process, "the results of the risk assessment are integrated with other considerations, such as economic or legal concerns, to reach decisions regarding the need for and practicability of implementing various risk reduction activities."[11]

At sediment sites, EPA should carefully evaluate the assumptions and uncertainties associated with site characterization data and site models; select site-specific, project-specific, and sediment-specific risk management approaches that will achieve risk-based goals; and ensure that sediment cleanup levels are clearly tied to risk management goals.[12] The transparent application of risk management principles helps prevent the overstatement of risks, which could "force an active management solution that [would] not reduce risk and thus [would] be inappropriate."[13] Further, EPA must consider the extent to which its remedial goals are achievable through cleaning up sediments at the site.[14]

Contrary to these principles, the EPA FS[15] lacks a coherent risk management strategy and relies largely on qualitative analyses.[16] Since consumption of fish presents over 95% of the potential risk identified in the Baseline Human Health Risk Assessment (BHHRA),[17] one useful risk management approach would be to look at how each cleanup alternative measurably improves the amount of fish people can safely eat from Portland Harbor. This can be expressed in meals-per-month, which in turn can be translated into site-specific sediment PRGs.

Table 1 shows a meals-per-month analysis and comparison of the EPA FS remedy alternatives based on EPA's estimated time-zero (i.e., immediately after construction) surface-area weighted concentrations (SWACs). Table 1 shows that there is essentially no reduction in risk from PCBs associated with fish consumption for the child and nursing infant scenarios for all alternatives. Under current conditions at the site, in order to be protective of her infant as defined under EPA's risk assessment, a nursing mother should eat less than one meal per month of resident fish. Even after Alternative G is performed, a nursing mother should still eat less than one meal per month to protect her infant. Therefore, from a risk management perspective, no sediment cleanup at the site can achieve acceptable

[8] The LWG's reservations about aspects of EPA's risk assessments are well documented and not repeated here. See, e.g., LWG 2012.
[9] CERCLA Baseline Risk Assessment Human Health Evaluation, *EH-231-012/0692 (June 1992)*
[10] *Role of the Baseline Risk Assessment in Superfund Remedy Decisions* (OSWER 9355.0-30, April 22, 1991)
[11] http://www.epa.gov/oswer/riskassessment/superfund_management.htm
[12] EPA 2005a
[13] NRC 2001, p. 171
[14] EPA 2005a, p. 2-15
[15] EPA 2015b
[16] One of the primary differences between EPA's FS and the LWG 2012 Draft FS is that EPA's FS evaluates monitored natural recovery only qualitatively. As discussed later in this letter, it is therefore not clear how EPA concludes that any of its alternatives is protective, or concludes that any one alternative is more effective in the long term than any other.
[17] Kennedy Jenks 2013

risk levels or improve rates of fish consumption related to the child and nursing infant scenarios, so these potential exposure scenarios are not useful for the comparison of the EPA FS alternatives.[18]

For the adult scenarios, there is no gain in PCB risk reduction for excess cancer at 10^{-6} (i.e., <1 meal per month now and <1 after construction of all remedies). For non-cancer endpoints, the gain is quite limited (<1 meal per month now to 2 meals per month for EPA's Alternative E and 4 meals per month for EPA's Alternative G). This marginal increase likely falls within the range of uncertainty for this analysis.

It is only the adult scenario for excess cancer risk at 10^{-4} where an increase in meals per month is expected. However, because these are time-zero values, post remedy natural recovery is expected to result in similar equilibrium sediment concentrations and similar net gains in meals per month for all of EPA's alternatives. Finally, the time-zero SWAC of 87 µg/kg is based on mostly pre-2010 data; sediment data collected in 2014 indicates the "current" SWAC may, in fact, be much lower (e.g., at or below the time-zero SWAC for EPA's Alternative B).

Table 1. Post-remedy Meals per Month Analysis[(a)]

		Adult[(c)]			Child[(d)]	Nursing Infant[(e)]
	SWAC[(b)] (µg/kg)	Non-Cancer (HQ<1)	Cancer Risk < 10^{-4}	Cancer Risk < 10^{-6}	Non-Cancer (HQ<1)	Non-Cancer (HQ<1)
Current (Pre-2010)[(f)] Conditions	87	1	3	<1	<1	<1
Alternative B	50	1	6	<1	<1	<1
Alternative E	32	2	9	<1	<1	<1
Alternative G	16	4	17	<1	1	<1
EPA estimates ALL the alternatives will eventually reach a steady state concentration between background and equilibrium.						
Equilibrium[(g)]	20	3	14	<1	1	<1
Background	9	6	25	<1	2	<1

Notes:
a) Meals per month are based on estimated PCB concentrations in a fillet tissue, multi-species diet (25% each of smallmouth bass, black crappie, carp, and brown bullhead). Fish tissue concentrations were estimated using the FS food web model spreadsheets assuming that the water concentration is equal to upstream (0.1049 nanogram per liter [ng/L]).
b) Site-wide sediment SWACs were estimated based on EPA's Draft FS.
c) Adult fish consumption assumes one meal is equal to 8 ounces. Cancer risks represent combined child/adult fish consumption.
d) Child fish consumption assumes one meal is equal to 4 ouncesChild fish consumption is only evaluated for non-cancer risks.
e) Nursing infant represents the number of meals (8 ounces) that the mother could consume and not exceed the target risk level for the infant. The nursing infant scenario is only evaluated for non-cancer risks.
f) The Site Characterization and Risk Assessment (SCRA) database includes data collected through February 4, 2011. EPA has since added a few data sets to the FS database but they do not substantially refine the site wide SWACs presented in this table (e.g., Gasco Engineering Evaluation/Cost Analysis [EE/CA] data as provided by Anchor QEA in 2013 and Arkema EE/CA data as provided by Integral in May 2014).
g) The site-wide median value shown is based on the detailed assessment submitted to EPA: "Sediment Equilibrium Estimates for the Revised Feasibility Study."[19]

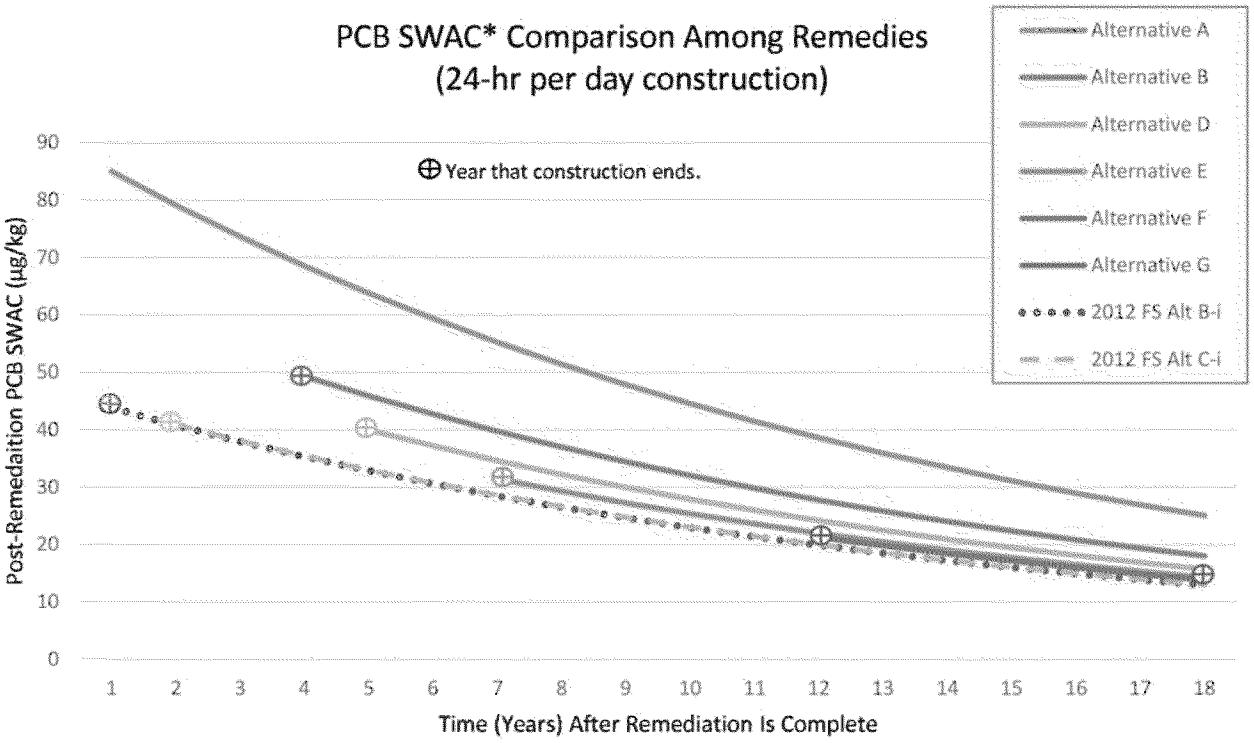
EPA's reliance on primarily qualitative evaluations in its FS precludes a practical assessment of the differences in short- and long-term risk reduction among the alternatives. EPA acknowledges that natural recovery is an important component of any remedy and is especially important for evaluating long-term changes in risk. However, EPA abandons any attempt to evaluate effects of natural recovery on SWACs (the key metric of risk in the EPA FS) and

[18] This discussion focuses on risks from PCBs, which account for more than 90% of potential risk from fish consumption at Portland Harbor on a site-wide basis. Even less measurable risk reduction can be attained for other COCs.
[19] LWG 2014b

restricts risk reduction evaluation to the direct and immediate effects of construction. The effect of this omission is especially prominent when PCB SWACs are compared beyond the very short-term risk management horizon corresponding to construction completion.

For example, Figure 1 and Table 2 present EPA's estimated SWACs over time, after construction is complete using EPA's construction durations, as well as estimated SWACs based on two alternatives from the LWG 2012 Draft FS.[20] The lines show estimated decreases in SWACs using empirical data, not modeling estimates (i.e., the observed decline in smallmouth fish tissue PCB concentrations sampled over the period from 2002 to 2012). It is apparent that as soon as 11 years post-construction for Alternative E and 6 years for Alternative G, differences in SWACs among the active alternatives (i.e., B through G) are minor; total PCB SWACs range from about 13 µg/kg for Alternative G (RAL = 75 µg/kg) to 19 µg/kg for Alternative B (RAL = 1,000 µg/kg). This small range in SWACs likely does not represent a significant difference in risk for human consumers of resident fish taken from the Harbor.[21] Further, the small range in SWACs may not even be reliably detectable, given the variability observed in sediment PCB concentrations in the site. This lack of difference is especially important in evaluating EPA's alternatives, given that the key feature that EPA varied among the alternatives (e.g., the RAL) does not appear to affect long-term effectiveness in terms of risk reduction.

Figure 1. PCB SWAC Comparison among Remedies



*SWACs are estimated based on applying RALs for all COCs (i.e., based on remediation of the entire active remediation area).

[20] Estimated SWACs for LWG 2012 Draft FS calculated using RALs of 1000 µg/kg PCB, 1000 µg/kg DDE and 20,000 µg/kg BaPEq (2012 FS Alt B-i) and 750 µg/kg PCB, 1000 µg/kg DDE and 15,000 µg/kg BaPEq (2012 FS Alt C-i). One important difference between the EPA FS and the LWG 2012 Draft FS is that the LWG 2012 Draft FS applies RALs only in exposure areas determined by the baseline risk assessment to present unacceptable risk. The starting point of each line represents the time of construction completion. As discussed below, our experience from dredge projects in the Pacific Northwest suggests that EPA's construction duration assumptions are overly optimistic.

[21] This analysis is conservative (estimates slower natural recovery) because it does not include recovery that would take place before construction is started and during construction. This figure is not intended to represent the best interpretation of the long-term outcome and time to meet RAOs for the site. However, it illustrates, using EPA's information and stated concern about evaluation uncertainties, that EPA's conclusions regarding larger alternatives meeting the RAOs more quickly are based on unsupported assumptions.

Table 2. PCB SWACs (µg/kg) Comparison Using EPA's 24 hour/day Assumption for Alternative Durations

Alternatives	Years																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A (no action)	85	79	74	69	64	59	55	51	48	45	41	39	36	33	31	29	27	25
B				49	46	43	40	37	34	32	30	28	26	24	22	21	19	18
D					40	37	35	32	30	28	26	24	22	21	19	18	17	16
E							31	29	27	25	24	22	20	19	18	16	15	14
F												21	20	18	17	16	15	14
G																		15
2012 FS B-i	44	41	38	35	33	31	28	26	25	23	21	20	19	17	16	15	14	13
2012 FS C-i		41	38	35	33	31	29	27	25	23	21	20	19	17	16	15	14	13

Notes:

= Duration of alternative construction

= Year construction is completed and EPA estimated SWAC at that time.

= Year that alternative achieves the Alternative G post construction SWAC, plus 20% (i.e., plus or minus 20% is the EPA acceptable analytical accuracy for organic compounds) using estimated natural recovery rate.

These analyses are based on site-wide SWACs. The LWG recognizes that fish consumption risks also occur on smaller scales and agrees with EPA that active sediment remediation in areas exhibiting higher concentrations of contamination can measurably reduce risk. However, as demonstrated above, there is almost no discernable difference in the overall reduction of risk for remediation of areas defined by any one set of RALs compared to another, and the time to achieve this reduction is essentially the same for all of EPA's alternatives.

1.1 Adopt Cleanup Goals that Can Be Achieved by the Sediment Remedy

The successful implementation of remedial actions at contaminated sediment sites is contingent upon selecting cleanup levels—including Remedial Action Objective (RAOs) and levels based on appropriate or refined PRGs—that are attainable and sustainable via a sediment remedy. As stated in EPA's *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*, when project managers are developing and selecting RAOs (and cleanup levels, which are the numeric expression of the RAOs), they "should evaluate whether the RAO is achievable by remediation of the site or if it requires additional actions outside the control of the project manager."[22] It is paramount that RAOs, and cleanup levels that are the numeric expression of the RAOs, "reflect objectives that are achievable from the site cleanup."[23]

Portland Harbor, the upstream watershed, and upland areas house commercial and industrial operations. In such settings, EPA guidance indicates that "it is typically very important to include…ongoing sources in the evaluation of what sediment actions may or may not be appropriate and what RAOs are achievable for the site."[24] EPA's FS considered background concentrations in the development of PRGs.[25] The LWG agrees that cleanup levels should not be below background.

[22] EPA 2005a, p. 2-15
[23] EPA 2005a, p. 2-15
[24] EPA 2005a, p. 2-21
[25] EPA 2015b, Section 2.2.2

However, the LWG continues to disagree with EPA's calculation of background Contaminant of Concern (COC) concentrations.[26] Through various statistical analyses of upstream bedded sediment and incoming suspended sediment concentrations, the LWG has identified a range of background or equilibrium concentrations.[27] The identification of a single background value by EPA for each chemical constituent oversimplifies the analysis of background and ignores the complexity of the natural environment where chemical concentrations are not represented by a single value and, instead, are represented by concentration ranges. EPA's dispute resolution document on background helps explain why EPA needs to evaluate what is considered anthropogenic background:

> [T]he purpose of the background analysis was to assess the likely sediment that comes from the larger Willamette watershed and…the analysis was not confined to assessing potential loading from the reference area only.[28]

EPA further acknowledges the wide range of potential chemical sources and concentrations, particularly in the large and complex watershed that feeds into the Willamette River:

> There are sources of contamination outside of the Site—both upriver of the Site and within the downtown reach—that may affect the ability of cleanup efforts within the Site to equilibrate to the selected cleanup levels regardless of whether the cleanup level is based on risk, regulatory standard or background.[29]

EPA's dispute resolution acknowledges that EPA's upriver background values are unattainable due to regional sources (throughout the 11,500 square miles of Willamette River watershed); therefore, those values cannot be achieved by the sediment remedy for the site. It remains to be seen if or how EPA will incorporate these factors into developing achievable cleanup levels. We continue to urge EPA to express background sediment concentrations as ranges (e.g., 6 to 19 µg/kg with outliers removed, and 14 to 60 µg/kg for the full data set for PCBs)[30] and fully consider equilibrium (e.g., calculated to be a median of 20 µg/kg PCBs and in the range of 7 to 35 µg/kg using empirical lines of evidence).[31]

1.2 Adopt PRGs that Address Realistic Risks from the Risk Assessments

The most important and pervasive risks should be a product of risk assessments conducted in accordance with EPA regulations and guidance. As described in the preamble to the NCP,[32] one of the policy goals of the Superfund program is to protect "reasonable maximum," but not "worst-case," individual exposures.

> EPA developed the concept of reasonable maximum exposure [RME], which is designed to include all exposures that can be reasonably expected to occur, but does not focus on worst-case exposure assumptions.[33]

The reasonable maximum exposure (RME) is the highest exposure that is *reasonably expected* to occur at a Superfund site. Exposure assumptions should…

> …result in an overall exposure estimate that is conservative but *within a realistic range of exposure*. Under this policy, EPA defines "reasonable maximum" such that only potential exposures that are likely to occur will be included in the assessment of exposures. The Superfund program has always designed its remedies to be protective of all individuals and environmental receptors that may be exposed at a site; consequently, EPA believes it is important to include all reasonably expected exposures in its risk assessments.[34]

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[26] EPA 2015d
[27] LWG 2014a, 2014b
[28] EPA 2015d, p. 16
[29] Id.
[30] EPA 2015b
[31] LWG 2014b
[32] NCP Preamble, 55 FR 8710
[33] Id.
[34] Id., emphasis added

In addition to evaluating the risks to the RME individual, EPA evaluates risks for the central tendency exposure (CTE) estimate, or average exposed individual. This approach is consistent with the Risk Characterization Policy and Handbook.[35] CTE estimates give the risk manager additional information to consider while making decisions concerning potential current or future site risks. The NCP is clear that the likelihood of exposure actually occurring (whether an RME or CTE estimate) should be considered when deciding an appropriate level of remediation.

> EPA does agree…that the likelihood of the exposure actually occurring should be considered when deciding the appropriate level of remediation, to the degree that this likelihood can be determined. The risk assessment guidance referenced above is designed to focus the assessment on more realistic exposures.[36]

Nonetheless, the EPA FS does not discuss the likelihood of the RME-based PRGs, nor how the potential for exposure plays into the appropriate level of remediation for this site.[37]

1.2.1 Baseline Human Health Risk Assessment

By focusing on worst-case scenarios, EPA's FS develops PRGs that represent maximum exposures estimated in the BHHRA and thus are inconsistent with EPA guidance. This section discusses four of the key technical deficiencies in the EPA FS use of the BHHRA to develop PRGs, PTW thresholds, and to support the remedy selection process. We then suggest a more technically sound approach to PRG development.

1.2.1.1 Fish and Shellfish Consumption Rates

The BHHRA evaluates fish consumption risks in RME and CTE scenarios intended to represent Tribal, subsistence, and recreational fish consumption within Portland Harbor. The EPA FS does not consider the assumptions and uncertainties associated with the RME and CTE scenarios, including whether they are *possible* or even *plausible* within Portland Harbor (e.g., the BHHRA states, "*The cancer estimates represent upper-bound values, and the EPA is reasonably confident that the actual cancer risks will not exceed the estimated risks presented in the BHHRA*"[38]). The following analysis demonstrates why the BHHRA fish consumption CTE scenario is more representative of an appropriate RME scenario and, therefore, more reasonable for PRG development.[39]

- **The Tribal Fishing Scenario** assumes adults consume 281 meals per year based on the 95th percentile of fish and shellfish from the Columbia River Inter-Tribal Fish Commission (CRITFC) survey.[40] The EPA FS does not consider the following when developing tribal fish consumption PRGs:
  - The BHHRA overestimates exposures to the site by assuming Tribal fishers harvest and consume fish *only* from Portland Harbor. In fact, contrary to this assumption, the BHHRA indicates that no CRITFC respondents reported consuming resident fish from the Willamette River, and only about 4% reported consuming anadromous fish from the river. Where consumption rates for a larger resource are used to evaluate a small part of the resource, a fractional intake term should be applied.[41]
- **The Subsistence Fishing Scenario** assumes adults consume 228 meals per year from the site. This subsistence-scenario fish consumption rate is the 99th percentile of fish and shellfish consumption rate

[35] EPA 2000a
[36] NCP Preamble, 55 FR 8710
[37] Furthermore, the EPA FS does not discuss how various risk drivers contribute to PRGs. For example, the EPA FS ARARs include maximum concentration levels (MCLs) and Secondary MCLs as water quality standards. In a river where water pre-treatment is required for municipal drinking water, the goal to achieve MCLs or Secondary MCLs in the river reflects poor risk management. Leaving aside the questionable ability of achieving MCLs or Secondary MCLs in an urban river of the scale of Portland Harbor, achieving these goals is unlikely to reduce water treatment plant operation costs because pre-treatment will continue to be required for other chemical constituents.
[38] Kennedy Jenks 2013, p. 4
[39] Notably, each of the risk assessment scenarios discussed assumes fish consumption at this rate from the Site for 30 years for the non-cancer assessment and 70 years for the cancer assessment
[40] CRITFC 1994. This survey included 513 interviews conducted at four Columbia River Basin tribal reservations (Nez Perce, Warm Springs, Yakama, and Umatilla).
[41] EPA 1989

from all sources—self-caught and purchased—throughout the United States.[42] The EPA FS does not consider the following in developing the subsistence fishing PRGs:

- The EPA[43] fish consumption estimate is based on consumption of all fish and shellfish (marine, estuarine, and freshwater) that are either self-caught or purchased at a store. The 228 meals-per-year value is a high-end value from that analysis and is not a site-specific consumption rate. It is not an appropriate basis for determining site risks or cleanup. Using the 99th percentile is not only unreasonable but also inconsistent with EPA policy and guidance.[44]

- The BHHRA asserts that the degree of consumption of shellfish from the site is uncertain, but site-specific data indicate that ingestion of self-caught shellfish is resource-limited.[45] The predominant species present is an invasive non-native clam that is illegal to possess. Crayfish are also present only to a limited degree. Thus, using the 99th percentile consumption rate for shellfish from all sources (including grocery-store purchased fish) overestimates potential site-related risks.

- **The Recreational Fishing Scenario (RME):** The RME estimate assumes 79.6 meals per year from the site based on the Adolfson[46] creel survey in which 28 of 91 anglers interviewed indicated they consume fish from the Columbia Slough; Columbia Slough is not part of the site. The specific rate applied in the BHHRA was the upper 95% upper confidence limit (UCL) for those consuming more than 50% of the weight of the fish. Details from Adolfson[47] are incomplete, but this appears to be based on a small subset (7 individuals) who reported that they consume the whole body of the fish. EPA's FS does not consider the following in developing the recreational fisher PRGs:

  - Using a dataset from a small population adds uncertainty to the estimate and does not support an RME.

  - Using the specific consumption rates based on consumption of the whole body of fish, rather than fillets, and including fish from areas outside of Portland Harbor, overestimates risks for most recreational anglers, supporting a worst-case scenario rather than an RME.

- **Recreational Fishing Scenario (CTE):** The recreational CTE scenario assumes adults consume 28 meals per year from the site and represents the 90th percentile of fish and shellfish from all sources, including the grocery store.[48] Consequently, this consumption rate does not, by definition, represent the central tendency of fish and shellfish from the site. Instead, a CTE is closer to the 50th percentile of self-caught fish from a representative resource.[49] Thus, the CTE used in the BHHRA more likely represents the RME for recreational anglers.

1.2.1.2 Nursing Infant Scenarios

EPA's FS relies on the nursing infant scenario to establish sediment PRGs.[50] This scenario is based on overly conservative exposure calculations that do not realistically estimate or represent infant exposures at Portland Harbor. Relying on this worst-case and unprecedented scenario is inconsistent with EPA and NCP guidelines and should not form the bases of PRGs and site-specific risk management approaches.

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[42] EPA 2002a
[43] EPA 2002a
[44] EPA 1989; EPA 2000a. In the NCP (1990, 55 FR 8710) preamble, EPA says: The RME scenario is "reasonable" because it is a product of factors, such as concentration and exposure frequency and duration, that are an appropriate mix of values that reflect averages and 95th percentile distributions (see the "*Risk Assessment Guidance for Superfund: Human Health Evaluation Manual*" [EPA 1989]).
[45] Integral et al. 2011
[46] Adolfson 1996
[47] Adolfson 1996
[48] EPA 2002a, Section 6, p. 39
[49] EPA 1989
[50] The nursing infant PRG for PCBs, and other conservative fish consumption scenarios discussed above, are below background, and EPA therefore defaulted to background.

The high degree of uncertainty associated with the calculations used to develop the nursing infant scenario would seem to preclude its use as a basis for a sediment cleanup decision. An example of the high degree of uncertainty is seen in the PCB concentration in breast milk that is projected by EPA's exposure assumptions. The BHHRA does not provide exposure point concentrations (EPCs) for breast milk. Instead, estimates of the mother's PCB chronic daily intake are multiplied by a factor of 25 (termed an infant risk adjustment factor [IRAF]), which is intended to represent the increase in intake for the nursing infant compared to the mother. The IRAF is based on Oregon Department of Environmental Quality (DEQ) guidance,[51] which calculates the IRAF based on estimated doses to mothers and infants and the resulting non-cancer risks to both groups. DEQ estimates doses to infants based on exposure calculations from EPA.[52] DEQ provides an example in which maternal consumption of 1 mg/kg PCB in fish at a rate of 17.5 g/day resulted in 2 mg/kg PCB in milk fat. Using those same dose calculations, a mother consuming fish with a fillet PCB concentration of 5 mg/kg at a rate of 175 g/day, as assumed in the BHHRA, would have PCB concentrations in milk fat of approximately 100 mg/kg.

For comparison, PCB concentrations in human milk compiled from the literature are shown in Table 3. The 100 mg/kg of PCBs in milk fat estimate implicitly derived in support of the EPA FS PRG and based on the exposure parameters in the BHHRA and the DEQ approach *is approximately 50 times higher than any of the mean concentrations reported worldwide*[53] and is more than 25 times higher than mean concentrations measured in studies of highly exposed populations.[54] Notably, it is also 150 times higher than the mean concentration reported in a Native American community consuming fish from the Saint Lawrence River[55], a site with much higher PCB sediment concentrations than Portland Harbor.

In addition to the apparent lack of consideration in the EPA FS of uncertainties and conservativeness of the nursing infant exposure scenario, using this exposure scenario is an unprecedented basis for a cleanup decision. A ROD search was conducted using the EPA ROD System,[56] which includes full-text RODs for Superfund sites through 2012. The database includes 260 RODs from all EPA Regions. It was queried using the search terms "human health," "nursing," "breast milk," and "infant." No RODs were identified where the nursing infant scenario was the basis for cleanup decisions. Moreover, the nursing infant scenario was not identified in any ROD summaries within Region 10.[57]

Table 3. Estimates of PCB Concentrations in Human Milk Compiled from the Literature

Site, Population	Breast Milk PCB (mg/kg lipid)	Citation	Citation Details
St. Lawrence River, Mohawk population	0.6	Fitzgerald et al. 1998	PCBs in human milk from 97 mothers from the Mohawk Tribe living along the St. Lawrence River where PCBs concentrations range up to 40,000 mg/kg in on-site soil and sludge and up to 5,700 parts per million (ppm) offshore in St. Lawrence River sediment.

[51] DEQ 2010
[52] EPA 1989
[53] ATSDR 2000, 2011
[54] Dewailly et al. 1989, Fangstrom et al. 2005
[55] Fitzgerald et al. 1998
[56] www.epa.gov/superfund/sites/rods/ (August of 2015)
[57] Outside of Region 10, two RODs from the same site (General Motors, Central Foundry Division) (EPA 1990, 1992) considered infant ingestion of breast milk as one of many pathways considered in the baseline risk assessment at a site with PCBs in groundwater, soil, sediments, and estimated in biota. However, the nursing infant pathway did not form the basis for remediation; instead, EPA identified risks associated with consumption of fish and wildlife (in the 1990 ROD) or wildlife (in the 1992 ROD) as having a much greater impact on site risks than any other pathway including the nursing scenarios. Another ROD from 1993 specifically mentions reaching out to recruit nursing mothers for biomonitoring during remediation activities to assess potential adverse health effects that may result from exposure to site metals (EPA 1993a). However, the nursing infant exposure pathway was not part of the risk assessment, nor was it in any way the basis for cleanup at this site. One ROD from 1998 considered nursing mothers one of many pathways in the toxicity assessment at a site with lead and PCBs in groundwater and soil (EPA 1998). However, the nursing infant pathway did not form the basis for remediation at the site; exposure to industrial workers was a much greater driver of remediation at the site.

Site, Population	Breast Milk PCB (mg/kg lipid)	Citation	Citation Details
Hudson Bay, Inuit population	3.6 (0.5 – 14.7)[(a)]	Dewailly et al. 1989	PCB concentrations in 24 Inuit women in northern Quebec in the late 1980s. Their dietary PCB exposure is expected to be high because their fish and marine mammal consumption rates are substantially higher than other populations.
Faroe Island, Residents	1.8 (0.69 – 4.6)	Fangstrom et al. 2005	Trends in PCB concentrations in breast milk in residents of the Faroe Islands, exposed to PCBs in their diet, which is primarily based on seafood and includes pilot whale meat and blubber and seabirds.
Worldwide compilation, ATSDR	(0.2 – 2.3)	ATSDR 2000, 2011	Mean PCB concentrations in human milk as 0.198 to 2.3 mg/kg lipid worldwide. LaKind et al.[58] overview of PCBs in human milk over time conclude that PCB concentrations in breast milk declined from ~1.8 mg/kg lipid in the late 1970s to less than 0.5 mg/kg lipid by 1991.
Portland Harbor, BHHRA (modeled)	100		

Note:
a) Numbers in parentheses indicate documented ranges.

1.2.1.3 Developing Achievable Human Health PRGs

EPA guidance states, "Any decision regarding the specific choice of a remedy for a contaminated sediment site should be based on a careful consideration of the advantages and limitations of available approaches and a balancing of trade-offs among alternatives."[59] Based on the information regarding human health and ecological risk presented above and understanding that PCBs via fish consumption represent the preponderance of risks to human receptors at the site, a more reasonable and achievable range of PRGs for PCBs can be calculated between 17 and 41 µg/kg. This range of PRGs is within the range of the RI calculated background sediment values for total PCBs (6 to 19 µg/kg with outliers removed, and 14 to 60 µg/kg for the full data set).[60] It is also consistent with the calculated equilibrium concentration range of 7 to 35 µg/kg PCBs.[61] This risk-based range of PCB PRGs is based on a non-cancer endpoint of 1 for the recreational CTE Scenario for child and adult fish consumption, respectively, with and without one anomalous carp result included as part of the multi-species diet.[62] The range of PCB PRGs for non-cancer endpoints falls within the range of PCBs calculated for a target cancer risk of 10^{-6} to 10^{-4} for the same consumption scenario (1.6 to 160 µg/kg).

Establishing a PCB PRG in the range indicated above will be protective of ecological receptors. In addition, it is important to recognize that site conditions are changing; hence, data used in the BHHRA do not reflect current risks at the site. Based on the tissue dataset used in the BHHRA, the baseline cancer risks associated with consuming smallmouth bass on a site-wide basis were calculated to be 4×10^{-4} and 1×10^{-4} for recreational RME and CTE scenarios, respectively. The non-cancer hazards were 30 and 10 for child recreational RME and CTE scenarios, respectively. Using the more recent 2012 tissue dataset, the cancer risks associated with RME and CTE scenarios for consuming smallmouth bass on a site-wide basis are 1×10^{-4} and 5×10^{-5}, respectively, and non-cancer hazards

[58] LaKind et al. 2001
[59] EPA 2005a
[60] EPA 2015b, Table 7.3-1
[61] LWG, 2014b. Sediment Equilibrium Estimates for the Revised Feasibility Study. Memorandum from the LWG to EPA Region 10. August 7, 2014.
[62] EPA's FS states "When fish consumption is evaluated on a harbor-wide basis, the estimated RME HI is 4,000 and 10,000 for breastfed infants of recreational and subsistence fishers, respectively." These elevated HI values are driven by one composite carp sample with a PCB concentration an order of magnitude higher than the remaining 63 samples.

were 10 and 5 for a child. It is expected that tissue concentrations and associated risk estimates have continued to decrease since 2012 and will continue to decrease during design and remedy implementation.

None of the alternatives results in acceptable cancer risks or non-cancer hazards for the subsistence scenario. However, as discussed above, a meals-per-month approach provides a better assessment of the gains achieved by each respective remedy. Based on EPA's projected SWACs for PCBs at time zero (immediately after active remedy completion), the numbers of meals per month that could be consumed and meet the target risk levels are as follows:

- For cancer risk of 10-4, between 3 to 17 meals per month could be consumed.
- For cancer risk of 10-6, less than 1 meal per month could be consumed for all alternatives, even at background.
- For non-cancer endpoint, an adult could consume between 1 and 4 meals per month, and a child could consume one meal per month for Alternative G
- For a nursing infant, the mother could consume less than 1 meal per month for all alternatives, even at background

Again, these are time-zero values; the net gain of meals per month for all alternatives is essentially the same when long-term monitored natural recovery (MNR) is considered (Figure 1). The meals-per-month approach can also be an important and informative tool in communicating the effectiveness of the various cleanup alternatives to the public. This approach provides a perspective on what types of risk reduction are possible for any given alternative.

EPA should also apply PRGs consistent with the exposure areas defined in the BHHRA. This is particularly relevant to carcinogenic PAH (cPAH) PRGs. EPA and the LWG agree that there is no significant relationship between fish tissue and sediment cPAH concentrations and, therefore, a reliable fish consumption PRG cannot be calculated and is not valid. EPA's proposed cPAH PRG is based on the clam consumption scenario. To be consistent with the BHHRA, the cPAH PRG based on shellfish consumption should be applied only in nearshore areas where shellfish harvesting could potentially occur. Because no human health risk relationship has been established between cPAHs and humans except in nearshore areas, SMAs for cPAHs should not be delineated in the navigation channel.[63]

The BHHRA also only shows risk for DDE (not total DDx) at a 10^{-6} level for fish consumption for large range fish. When EPA's risk level for PCBs is used for ingestion of smallmouth bass, the BHHRA shows that no risks for DDx exist at the site either on a river-mile or site-wide basis.

1.2.2 Baseline Ecological Risk Assessment

By focusing on worst-case scenarios in the BERA[64] and, in the case of benthic risk, by defaulting to screening level values outside the BERA, EPA's FS did not follow the NCP and EPA guidance in estimating potential exposures to benthic invertebrate communities and populations of fish and wildlife that feed within Portland Harbor. We reiterate the many similar concerns with EPA's reliance on conservative assumptions in the BERA as with BHHRA (e.g., reliance on an outlier carp sample point) and focus on the two technical deficiencies in the development of ecological PRGs.

[63] EPA's FS (EPA 2015b) also relies on Total PAH concentrations as a measure of toxicity and risk. TPAH concentration is not a reliable indicator of toxicity/risk requiring active remediation at Portland Harbor. Carcinogenic PAHs (cPAHs) are the dominant risk driver among PAHs in Portland Harbor sediments. An elevated TPAH concentration could be a result of non-carcinogenic PAHs that present little risk at the site. A proper RAL must be derived from the specific compounds that drive risk, not from a broad spectrum of compounds with risk factors that differ by orders of magnitude.

[64] Windward 2013

1.2.2.1 Generic vs. Site-specific Sediment Quality Values

In 2010, the LWG and EPA Region 10 developed the comprehensive benthic risk areas (CBRA) approach to identify areas of the Site that posed potentially unacceptable risks to benthic organisms. EPA directed the LWG to use the CBRA approach in the LWG's 2012 Draft FS. Consistent with that directive, the final BERA and 2012 Draft FS incorporated the derivation of site-specific sediment quality values (SQVs) for predicting potential risks to benthic invertebrates.[65]

Without explanation, EPA's FS reverted to using generic SQVs as the PRGs for the protection of benthic invertebrate communities. For example, the sediment PRGs for RAO 5 for DDx and PAHs are based on probable effect concentrations (PECs)[66] rather than site-specific SQVs. This is contrary to both guidance and precedents at other sediment cleanup sites.

The EPA FS disregards the CBRA approach and offers no technical basis for selecting less-reliable generic SQVs over more reliable, site-specific SQVs as PRGs for protection of ecological receptors from direct contact with sediment. In doing so, EPA's FS disregards EPA policy and guidance and the intent of the authors who developed the generic SQVs. EPA's ecological risk assessment guidance states that "[s]creening ecotoxicity values are derived to avoid underestimating risk. Requiring a cleanup based solely on those values would not be technically defensible."[67]

1.2.2.2 Individual vs. Population-level Risk Estimates

In its summary of the BERA, EPA's FS presents maximum hazard quotients (HQs) for wildlife receptors that were calculated using maximum concentrations as EPCs. Using maximum HQs is equivalent to using the maximum EPC to represent site-wide conditions—in either case, the level of risk present throughout the Site is greatly overestimated.

The EPA FS also relies on EPCs based on maximum prey tissue concentrations applied over the foraging range of individual organisms resulting in maximum potential risks to individual organisms rather than population-level risks. This is not only counter to the objective of the BERA (which identifies wildlife populations as ecological receptors),[68] but it is also counter to EPA's ecological risk assessment guidance, which stipulates that "assessment endpoints are any adverse effect on ecological receptors, where receptors are plant and animal populations and communities, habitats, and sensitive environments."[69]

The EPA FS does not consider site-specific data related to population-level risks to mink from PCBs when establishing the PRG for RAO 6 (prey ingestion by wildlife). The PRG does not take into account the site-specific, peer-reviewed analysis of potential population-level risks to mink that forage within Portland Harbor.[70] That analysis indicates that a protective sediment PRG for total PCBs could range from 79 to 640 µg/kg, which exceeds the EPA PRG by factors ranging from 2 to 10.

1.2.2.3 Developing Achievable Ecological PRGs

The primary use of the BERA in the EPA FS is to support the derivation of ecological PRGs, which are compared with time-zero estimated post-remediation sediment concentrations in the long- and short-term effectiveness

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[65] Attachment 6 of the BERA documents the development of SQVs using the floating percentile method (FPM) and logistic regression model (LRM).
[66] MacDonald et al. 2000
[67] EPA 1997, p. 2-5 p. 2-5 p. 2-5. The authors who developed the generic SQVs stipulate that site-specific, concentration/response relationships are preferable for deriving PRGs (Long et al. 2006). According to EPA's sediment remediation guidance (EPA 2005a), remedial goals should be based on site-specific data when available. Further, use of site-specific information is one of EPA's 11 risk management principles for contaminated sediment sites (EPA 2002b).
[68] Section 3.2
[69] EPA 1997, p. 1-6, emphasis added
[70] Luxon et al. 2014

evaluations.[71] The following modifications would result in more reasonable ecological PRGs that are more representative of potential risks in Portland Harbor:

- **Use the site-specific CBRA approach approved by EPA to establish benthic risk areas, and do not use generic SQVs to evaluate long-term effectiveness with respect to RAO 5.**[72] As described in Section 3.1.2.1 of the EPA FS, the ecological PRGs for the protection of benthic invertebrates are based on generic SQVs, ignoring the more reliable site-specific SQVs derived and included in the BERA. These are not appropriate values for assessing RAO 5. The site-specific SQVs developed based on the analysis of toxicity tests conducted with sediment from Portland Harbor should be used to evaluate RAO 5. Specifically, EPA should use the combined toxicity thresholds consistent with the BERA benthic risk evaluation. Using the CBRA approach, benthic risk areas are estimated to cover between 4 and 8% of the total surface area of sediment within the site.

- **Use exposure units that are appropriate for evaluating population-level risks rather than individual-level risks.** Risks to many wildlife receptors were assessed for 1-mile increments of the Willamette River using maximum reported concentrations of COCs due to data limitations. A more appropriate approach is one that integrates exposure over the entire site in order to better represent exposures to wildlife *populations* foraging within Portland Harbor, rather than individual organisms. This is particularly true for mink, for which a site-specific analysis was conducted to estimate a protective sediment concentration in Portland Harbor for local mink populations.[73]

- **Apply representative EPC for total PCBs for wildlife receptors.** EPCs should exclude the outlier data point that skews the whole-body fish concentration values.[74] With this adjustment, the EPC for PCBs in carp would decrease by an order of magnitude to a value that is more representative of actual tissue concentrations in Portland Harbor. This single outlier value inflates the exposure estimates for mink, river otter, osprey, and bald eagle. A more representative EPC should be selected from the whole-body carp dataset in order to derive a more reasonable PRG.

1.2.3 Residual Risk Assessment

EPA's residual risk assessment provides limited information on methodology but contains multiple inconsistencies with the BLRAs, including:[75]

- Risk estimates were based on time-zero SWACs calculated on spatial scales that are often inconsistent with the BHHRA and BERA exposure scales.

- Human health risks for the no action alternative are generally substantially higher than the baseline risks in the BHHRA (e.g., the highest non-cancer risk for a breastfeeding infant in the BHHRA was an HQ of 10,000, while the residual risk assessment indicates the highest HQ for this same scenario for the no action alternative is 210,000). These risk estimates should be consistent across the two evaluations because they reflect the same surface sediment concentrations. This indicates that EPA's residual risk evaluation is even more conservative than the PRGs themselves, which, as discussed above, are already too conservative.

- EPA's estimates of residual benthic risks use only a few of the CBRA lines of evidence and are generally inconsistent with the BERA risk assessment methods

- Residual risks are presented only for RME scenarios, and for the reasons discussed above, the CTE scenarios are likely to be more realistic.

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[71] EPA 2015b, Section 4
[72] RAO 5: Reduce risks to ecological receptors from ingestion of or direct contact with COCs in sediment to acceptable exposure levels
[73] Luxon et al. 2014
[74] See fn 62 supra
[75] LWG 2015c, 2015d

1.3 Focus on Risk Reduction, Rather than Mass Removal

To ensure that remedial alternatives are sufficiently protective of human health and the environment, remedial alternatives should be developed to achieve significant risk reductions. The NCP states, "The results of the baseline risk assessment will help establish acceptable exposure levels for use in developing remedial alternatives,"[76] indicating that the viable remedial alternatives should result in reducing risk to acceptable levels. Numerous EPA guidance documents[77] further emphasize that key objectives of the risk assessment process at Superfund sites include identifying cleanup levels that are protective of human health and ecological resources at risk and developing remedial alternatives capable of reducing unacceptable risks. With respect to contaminated sediment sites, EPA has specifically addressed the role of risk reduction in *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites*,[78] stating that "there is wide-spread agreement that risk assessment should play a critical role in evaluating options for sediment remediation,"[79] and project managers must "ensure that sediment cleanup levels are clearly tied to risk management goals."[80]

EPA regulatory or guidance materials do not emphasize the need to evaluate alternatives for levels of mass removal via dredging or excavation in developing or evaluating remedial alternatives. Furthermore, guidance documents published by the National Research Council (NRC) discourage the use of mass removal targets as proxies for risk reduction goals. In particular, the NRC asserts that "[r]emedies should be designed to meet long-term risk-reduction goals (as opposed to metrics not strictly related to risk, such as mass-removal targets)"[81] and that "the reduction of [contaminant] mass in sediments is not necessarily equivalent to reduction in exposure or risk."[82] While mass removal often plays a crucial role at contaminated sediment sites, it should not be presumed to be more effective at achieving risk reduction goals than remedial alternatives employing containment, MNR, or in situ treatment.

The EPA FS emphasizes mass removal, de facto, through the subjective and prescriptive technology assignment scoring approach, which results in extensive dredging that is identical in all alternatives. In effect, the EPA FS presents alternatives that are solely defined and differentiated by the size of the SMAs. As a result, the FS evaluation of remedy alternatives against the NCP criteria is an evaluation of *how much to dredge* or *how much to cap* to achieve remedy-specific RAL, not whether to dredge or cap within an SMA as defined by the RAL. The relative effectiveness of dredging, capping, MNR, thin-cover placement, use of activated carbon, or other remedies is never evaluated and contrasted for any specific area.

Similarly, EPA's FS defines areas for active remediation without demonstrating any clear relationship between sediment cleanup in those areas and risk reduction. For example, the unacceptable human health risks associated with the consumption of fish from Portland Harbor that were estimated in the BHHRA were primarily driven by PCBs and not cPAHs.[83] As such, the PRGs derived for cPAHs by EPA are based on direct contact exposures (e.g., beaches) and consumption of clams rather than consumption of fish. However, EPA delineated SMAs based on exceedances of PAH RALs throughout the entire waterway, including within the navigational channel where direct contact and clam consumption pathways do not apply. All of EPA's alternatives include only dredging in the navigation channel and other navigation areas. The SMA delineation should take into account the exposure pathways demonstrating unacceptable risks for the COCs rather than looking solely at exceedances of RALs.[84]

Dredging is not without its own risks. Remedies that incorporate large dredging volumes are less protective on a short- and long-term basis due to the longer period of exposure of the fish to inevitable contaminant releases and resuspension, which occur during dredging despite utilization of "Best Management Practices" (BMPs). These releases directly translate into increased fish tissue concentrations of PCBs and other COCs, which persist for many years after the dredging has been completed. This exposure is significantly magnified as the amount and duration of

[76] 40 CFR 300.430(d)(4)
[77] EPA 1997, 1999, 2005
[78] EPA 2002b
[79] EPA 2002b, p. 5
[80] EPA 2002b
[81] NRC 2007 p. 8
[82] NRC 2001, p. 11
[83] This issue is applicable to other COCs as well, including dioxin/furan.
[84] Similarly, the DDX and dioxin/furan RALs are not well aligned with the BLRAs.

dredging increases, as is the case with several of the EPA FS Alternatives. An example of the adverse long-term impact of dredging releases is the Commencement Bay (Washington) dredging history. Before two significant dredging projects (~400,000 cy in 1994-5 in the Blair and Sitcum Waterway and ~1,100,000 cy in 2003-4 in the Hylebos, Middle, and Thea Foss Waterways), the PCBs levels in 1991 fish tissue were about 48 µg/kg. These levels spiked to 140 µg/kg in 1994-5 and 205 µg/kg in 2003-4 as a result of these two large dredging projects. Twenty years later, in 2011, the fish tissue levels are still around 100 µg/kg, which is well above the 1991 pre-dredging levels. This amounts to a significant long-term impact to the fish and the people who eat them that would reduce the effectiveness and protectiveness of those remedies.

Evaluation of the comparative net risk reduction potential of the comprehensive alternatives should be conducted consistent with the BLRAs, including the risks introduced by implementing the alternatives and the risk reduction achieved by each alternative. The general emphasis in the EPA FS on removing contaminants through dredging is not consistent with this principle, and neither is the technology assignment scoring process, which gives higher scores to dredging versus containment technologies.

1.4 Consider Measures to Reduce Interim and Short-term Exposures

As discussed in the LWG's 2012 Draft FS and above, fish consumption risks are likely to increase during remedy implementation as construction activities resuspend contaminants in bedded sediments. EPA generally recognizes this in Section 4 of its FS. The emphasis on dredge remedies in the EPA FS would exacerbate short-term exposure through fish consumption. The EPA should work with other Portland Harbor stakeholders to identify functional opportunities for minimization of interim and short-term risks during the cleanup. For example, EPA could work with landowners on whether strategic locations of improvements to access to the river could encourage recreational or subsistence fishing in areas of lower sediment contamination. The community and potentially responsible parties could assist in the creation of innovative and scientifically grounded programs that provide interim measures to help mitigate risk from fish consumption and enhance site-specific data to better understand how to communicate effectively about risk.

1.5 Acknowledge that Sediment Cleanup Will Not Remove Fish Advisories

Although one of the RAOs for Portland Harbor is to reduce human health risks associated with consuming fish, remedial actions in Portland Harbor will not address all fish consumption advisories. For example, remediation will not address the river-wide mercury fish consumption advisory. The dominant source of mercury to the Willamette River is runoff of native soils, mostly from agricultural lands, throughout the watershed.[85] Therefore, although active remediation of sediment and MNR in Portland Harbor is expected to reduce concentrations of PCBs and other organic COCs in resident fish, unlimited consumption of fish from the Willamette River is not likely to be possible for the foreseeable future.

2. Reduce the Uncertainty about Natural Recovery

The RI empirical data show natural recovery of sediments is occurring at the site in many places, and natural recovery has been further documented by the LWG's 2012 fish data and the 2014 sediment PCB data. The EPA FS is missing key components required to evaluate the effectiveness of MNR as a technology in the FS, including 1) an adequate conceptual site model (CSM), and 2) appropriate evaluation of multiple lines of empirical evidence. We request that EPA consider these deficiencies and build in an approach to fill these gaps in the development of the proposed plan.

2.1 Site-specific and Robust CSM

To formulate and implement effective remedial alternatives at Superfund sites, site-specific conditions must be well characterized and incorporated into an accurate CSM. NRC guidance stresses the importance of conducting risk management decisions "on a site-specific basis…incorporat[ing] all available scientific information" because "[w]ithout a valid conceptual model of the site, it is not possible to define how a management option can successfully meet the risk-reduction goals and objectives."[86] At contaminated sediment sites in particular, "the

[85] Hope 2005
[86] NRC 2001

development of an accurate conceptual site model, which identifies contaminant sources, transport mechanisms, exposure pathways, and receptors at various levels of the food chain" is "especially important...because the interrelationship of soil, surface and groundwater, sediment, and ecological and human receptors is often complex."[87] EPA's *Technical Resource Document on Monitored Natural Recovery* explains that an evaluation of the feasibility of MNR (and presumably other proposed remedial alternatives) "is best achieved through the development of a CSM that adequately captures the physical, chemical, and biological processes that control contaminant fate, transport, and bioavailability."[88]

Neither the RI nor the EPA FS contains a coherent or complete CSM that identifies site-specific conditions in adequate detail to support development and evaluation of alternatives.[89] For example, while EPA's FS contains an overlay of bathymetry data from 2002, 2003, and 2009, it largely omits substantial integrated discussion of surface water hydrology, sediment characteristics (e.g., grain size), sediment transport, bedload movement, upstream sediment loads, and sedimentation processes. Also, other important elements of an integrated CSM are omitted, including site uses, biological habitats and potential restoration sites, biological receptors in sediment and surface water, how humans access and use the river for navigation and recreation, chemical distributions in subsurface sediments, biota tissue, transition zone water, and details of site sources. These are critical components of a robust, site-specific CSM that are entirely absent or only sporadically mentioned in EPA FS.[90] EPA's FS contains one sentence presenting the FS CSM in Section 1, which merely cites a one-page cartoon that sketches some of the site receptors and processes.

EPA's FS devotes one paragraph and one figure to the LWG's 2012 smallmouth bass data collection, which confirmed a statistically significant decreasing trend in smallmouth bass tissue concentrations based on fish collected in 2002, 2007, and 2012. Multiple lines of evidence, including time series bathymetry data, the fine-grained nature of the majority of site surface sediments, surface to subsurface sediment contaminant concentration ratios, and detailed sediment transport modelling all indicate the majority of the site is depositional. An appropriate analysis of the bathymetry empirical data indicates that 63% of the site is reliably depositional (EPA's analysis of these same data indicate the site is 47% depositional) and that an additional 25% of the site is stable (i.e., no substantial bed elevation change). Thus, approximately 88% of the site is stable or depositional.

2.2 Quantitatively Evaluate the Effectiveness of MNR

EPA and the LWG agree that MNR will be an important element of the Portland Harbor remedy. However, because EPA declined to use either the QEAFate model developed by the LWG or its own SEDCAM model to predict the rate of natural recovery in the EPA FS, and because all of EPA's alternatives rely to some extent on MNR, it is unclear how EPA concluded that FS alternatives B through G met the threshold criterion of protectiveness.[91] In fact, EPA's time-zero SWAC analysis indicates that none of the alternatives achieves all of the sediment RAOs and related sediment PRGs.

Like the threshold criterion evaluation, long-term effectiveness was evaluated qualitatively in the EPA FS. Post-remediation EPCs were based on estimates of contaminant concentrations in sediment at the completion of construction. These concentrations were determined by assuming the post remediation concentration was 2.5% of the baseline (pre-FS) concentration in remediated areas and baseline concentrations for unremediated areas.[92] So-called "residual risks" were calculated using these estimated post-remediation EPCs, and the extent of the comparison among remedies was limited to the following qualitative statements: "[t]he resulting risks and hazards following the completion of construction are greatest under Alternative B and least under Alternative G" and "[t]he

[87] EPA 2005a, p. ii
[88] EPA 2014a, Section 1.3.2, p. 6
[89] We do not understand the reference in Section 4 of the EPA FS to the "Site CSM," because Section 1 provides only a simplified visual summary of EPA's contaminant fate and transport hypothesis and two figures depicting exposure scenarios used in the baseline risk assessments.
[90] EPA's decision to include riverbanks in the FS evaluations highlights one of the major problems associated with the lack of a CSM. Riverbanks were not evaluated in the Portland Harbor RI, and the EPA FS includes no data, risk assessment or other means by which to evaluate the adequacy (or need for) remediation of any riverbank location. DEQ has worked aggressively to control sources of potential contamination to the river, including erosion of riverbank soils, and DEQ should continue this work, including integrating source control actions with planned sediment cleanup on an area-specific basis as appropriate.
[91] See Table 4.3-1
[92] EPA FS, Appendix H, p.3

time needed for MNR to achieve the RAOs is greatest for Alternative B and least for Alternative G."[93] This is inadequate for comparing alternatives, particularly when making remedy decisions for a site of the magnitude and scale of Portland Harbor. The evaluation of time to achieve RAOs is not supported by a quantitative analysis of the recovery process, and EPA's statements regarding time to achieve RAOs and PRGs cannot be analyzed by the NRRB, potentially responsible parties, or the public.

EPA's entirely qualitative evaluation of the remedial alternative's long-term effectiveness makes the FS incomplete and inconsistent with guidance expectations on the use of quantitative long-term projections, i.e., models.[94] Although models are never perfect, the QEAFATE model is the best available tool for making such long-term projections and can do so within an acceptable range of accuracy for an FS analysis. The existing model projections are entirely consistent with the findings of 2014 PCB surface sediment data, both of which show a similar decline in sediment PCB concentrations over the last approximately 10 years.[95] The LWG would like to meet with EPA and its modelling experts to better understand their concerns with the QEAFate model and to discuss potential refinements to or additional tests of the model that might enhance EPA's confidence in the model's ability to predict natural recovery and the long-term effectiveness of the alternatives. Pre-construction baseline data and other information collected during remedial design will further reduce uncertainty and help refine the model.

3. Improve the Accuracy and Transparency of the Assumptions behind the Remedial Alternatives and Explain How Additional Risk Reduction Justifies Higher Cost Actions

The EPA FS relies on qualitative analyses, conservative or unrealistic assumptions, and incomplete or missing information, leading to the development of unrealistic remedies that are not readily implementable and are not appropriately linked to risk.

3.1 Remove "Principal Threat Waste" Designation from Materials that Can Be Reliably Contained

EPA guidance states that wastes will not always be "readily classifiable as either a principal or low level threat waste, and thus no general expectations on how to best manage these source materials of moderate toxicity and mobility will necessarily apply."[96] The concept of PTW was developed in order to streamline the remedy selection process rather than be a "mandatory waste classification requirement."[97] We understand this is an area in which CSTAG members have considerable expertise, and we look forward to reviewing their recommendations.

The delineation of PTW in the EPA FS is inconsistent with the NCP and EPA guidance and is unprecedented in contaminated sediment sites throughout all EPA regions and is unnecessary for selecting a remedial alternative that is protective of human health and ecological receptors. Important engineering factors associated with PTW (e.g., treatment alternatives and feasibility) are insufficiently considered in the EPA FS.

EPA defines areas as PTW without evaluating whether contaminants are or can be reliably contained. "Principal threats are characterized as waste that cannot be reliably controlled in place, such as liquids, highly mobile materials (e.g., solvents), and high concentrations of toxic compounds (e.g., several orders of magnitude above levels that allow for unrestricted use and unlimited exposure)."[98] Thus, only the areas that EPA designates as "not reliably contained" have the potential to actually be defined as PTW. Such an evaluation has not been performed to define PTW within the site.

EPA's "not reliably contained" analysis resulting in the use of a so-called "super cap" is technically incorrect. EPA delineates the need for the "super cap" based on generalized site-wide groundwater seepage potential rather than localized knowledge and calculations available in the RI. Further, groundwater control systems exist at both Gasco and Arkema sites. At the Gasco site, the groundwater source control system has been shown to cause negative seepage (i.e., movement of river water down into the sediment bed) over broad areas of the offshore sediments, but

[93] EPA FS, Section 4.3.3
[94] EPA 2005a
[95] The LWG can provide additional information comparing model results to the 2014 PCB sediment data.
[96] EPA 1991, p. 2
[97] EPA 1991, p. 2
[98] NCP Preamble, 55 FR 8666 at 8703 (March 8, 1990)

EPA's super cap analysis assumes that positive groundwater seepage out into the river is still occurring. Using appropriate seepage parameters where groundwater source control systems exist would result in no identification of "not reliably contained" material at the Gasco site. A similar analysis is appropriate for sediments offshore of the Arkema site, which has installed a slurry wall and a groundwater extraction and treatment system designed to prevent migration from the uplands to the river. EPA should consider the specifics of that groundwater control system, as well as other areas with significantly lower than average groundwater gradients.

3.1.1 Evaluate Toxicity Consistently with PTW Guidance and the BHHRA

EPA's *A Guide to Principal Threat and Low Level Threat Wastes*[99] defines PTW as "source material" "that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, to surface water, to air, or act as a source for direct exposure." Source materials "include liquids and other highly mobile materials (e.g., solvents) or materials having high concentrations of toxic compounds. No 'threshold level' of toxicity/risk has been established to equate to 'principal threat.' However, where toxicity <u>and</u> mobility of source material combine to pose a potential risk of 10^{-3} or greater, generally treatment alternatives should be evaluated."[100]

Section 3 of the EPA FS delineates PTW based solely on the following two characteristics: 1) areas where sediment concentrations exceed human health cancer risks of 10^{-3}, and 2) areas in which nonaqueous phase liquids (NAPLs) are present in surface sediment. To address the first point, the EPA FS identifies "highly toxic" sediment by multiplying 10^{-6} cancer risk PRGs by 1,000 to identify sediment thresholds that correspond to 10^{-3} cancer risk. This approach is inconsistent with both EPA guidance and with the BHHRA.

Most importantly, EPA guidance[101] describes PTW as a source for "direct exposure." The fish consumption pathways are, by definition, indirect pathways from sediment through fish to people, and these pathways do not represent "direct" exposures from sediment contaminants as described in the guidance.

Even if it were appropriate to use indirect exposure to define PTW, if CTE scenarios (as discussed in Section 1.2.1.) were used in an evaluation of PTW for PCBs, the concentration threshold would be closer to 20,000 µg/kg, which is much higher than any concentrations detected at the site. Section 3.2.1 of the EPA FS designates PTW thresholds for dioxin/furan toxic equivalent (TEQ), total DDx, and PAHs even though risks for these COCs reported in the BHHRA do not exceed 10^{-3}. There is no basis for defining PTW based on dioxin/furan TEQ, total DDx, and PAHs, and the definition of PTW for these constituents should be removed from the PTW evaluation.

Finally, the point-by-point application of the EPA FS PTW thresholds is inconsistent with the spatial and temporal scales associated with the indirect exposure fish consumption pathway as described in the BHHRA. Exposures in the BHHRA are modeled over exposure units that represent individual areas where exposures are likely to occur (i.e., a specific beach or fishing area). For bioaccumulative constituents like PCBs, sediment concentrations within the exposure units are averaged to best represent that human exposures are averaged over time and space. The exposure units for the fish consumption pathway ranged from site-wide to individual EPA river miles, depending on the home range of the fish species. In its delineation of PTW, however, the EPA FS uses the "highly toxic PTW thresholds" as not-to-exceed sediment concentrations without regard to the spatial scale over which fish exposures actually occur. When applied to a fish consumption exposure scenario, a 10^{-3} level of risk would apply to area averages that combine relatively high and low sediment concentrations. Sediment concentrations averaged over reasonable fish exposure units (e.g., 1-mile increments) are less likely to ever exceed the EPA FS's overly conservative PTW thresholds.

The PTW threshold concentrations proposed in the EPA FS would be considered completely safe under established remedial and regulatory scenarios. For example, the EPA FS's PTW level for PCBs of 200 µg/kg is below EPA's Regional Screening Levels (RSL) for residential soil, which range from 230 to 3,900 µg/kg.[102] DEQ's risk-based

[99] EPA 1991, p. 1
[100] EPA 1991, pp. 1-2, emphasis added
[101] EPA 1991
[102] http://www2.epa.gov/risk/risk-based-screening-table-generic-tables

residential soil cleanup standard for PCBs is 200 µg/kg. The PTW approach of the EPA FS results in large relatively low-concentration areas of the site being identified as PTW. For example, large PTW areas exist outside much of the SMA footprint of the smaller alternatives (e.g., Alternatives B and C). In fact, PCB PTW level is equal to the Alternative D RAL, which could suggest an intrinsic bias against Alternatives B and C, both of which include unremediated sediment areas with PCB concentrations above the proposed PTW threshold.

The EPA FS is using extremely low dioxin/furan PRGs for PTW determinations that the LWG has previously commented are technically incorrect and not reflective of actual baseline risks.[103] Also, as noted above for PCBs, the dioxin and furan PTW levels in the EPA FS are extremely low compared to established regulatory programs. For example, the tetrachlorodibenzo-p-dioxin (TCDD) PTW level in the EPA FS is 10 nanograms per kilogram (ng/kg; or parts per trillion) in Table 3.2-1 of the EPA FS, while EPA's soil remedial goal for residential areas is 50 ng/kg.

3.1.2 Evaluate Stability and Mobility of Sediments When Determining PTW

The EPA FS simply equates PTW with a threshold carcinogenic risk value, regardless of and without clearly understanding the materials' stability or mobility. "The concept of principal threat waste and low level threat waste as developed by EPA in the NCP is to be applied on a site-specific basis when characterizing source material."[104] The EPA FS does not explain how PCB concentrations at 200 µg/kg act as "source material" in the river. It is inappropriate and insufficient to define "source material" solely by the level of risk associated with that material—doing so is inconsistent with the NCP and EPA guidance regarding PTW. Further, EPA uses inapplicable and inferential evidence to identify potentially highly mobile PTW (i.e., NAPL) in a manner that is inconsistent with the PTW guidance. The highly mobile aspect of the PTW definition should be applied for NAPL consistent with situations described in the guidance[105] such as "pools of NAPLs" submerged beneath groundwater or in fractured bedrock, "NAPLs floating on groundwater" or where physical processes are likely to mobilize "source materials." EPA's identification of any potential NAPL as PTW (e.g., solid tar materials at Gasco, inconclusive evidence from Arkema cores, and trace NAPL evidence such as "blebs and globules") is clearly inconsistent with the terms used in the guidance, such as "pools of NAPLs."[106]

The EPA FS provides no analysis of sediment mobility, nor is there any explanation of how material with sediment concentrations above the PTW thresholds identified in the EPA FS poses risks associated with contaminant mobility. In contrast, EPA explicitly warns against such an approach:

> Principal and low level threat waste should not necessarily be equated with the risks posed by site contaminants via various exposure pathways. Although the characterization of some material as principal or low level threats takes into account toxicity (and is thus related to degree of risk posed assuming exposure occurs) characterizing a waste as a principal threat does not mean that the waste poses the primary risk at the site.[107]

3.1.3 Maintain Consistency with PTW Approach at Other Sediment Sites

The LWG conducted a ROD search using the EPA ROD System.[108] Search terms used were "principal threat waste," "principal waste," and "PTW." Additionally, full-text RODs issued after 2012 were obtained by searching the EPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database. Table 4 summarizes the search results, the outcome of which demonstrates that EPA's reliance upon a risk-based definition of PTW without considering mobility or the risk of direct exposure, as presented in Section 3 of the EPA FS, does not conform to EPA's approach to PTW at other Superfund sites.

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[103] LWG 2014a, 2015a, 2015b
[104] EPA 1991
[105] EPA 1991
[106] EPA's 2009 Administrative Settlement Agreement and Order on Consent for the Gasco Sediment Site (the 2009 Gasco Order) includes specific protocols for management of identified "substantial product," including potentially mobile DNAPL.
[107] EPA 1991, p. 2
[108] www.epa.gov/superfund/sites/rods/, as of August 2015

Two additional recent high-profile sediment sites address PTW and are relevant to the application of the PTW concept in Portland Harbor: the Lower Passaic River and the Housatonic River (Rest of River). They are not included in Table 4 because RODs have not yet been issued for either site.

In the Proposed Plan for the Lower Passaic River, EPA states that "identification of principal and low level threats is made…to help streamline and focus the remedy selection process, not as a mandatory waste classification requirement."[109] In EPA Region II's response to the NRRB, EPA states that the "Region concluded that the principal threat/low level threat waste concept does not help streamline and focus the remedy selection process."[110] Region II considers the highest concentration sediments in the river to be PTW, based on toxicity, but that it can be reliably contained without treatment.[111]

EPA indicated that PTW is present within the Housatonic River (Rest of River) because human health risks from fish consumption exceed 10^{-3}.[112] However, PTW was not delineated even though sediment PCB concentrations exceeded 500 mg/kg. In its response to the NRRB, EPA references EPA guidance[113] as a basis for not delineating PTW sediments for treatment.[114] EPA says that "although the NCP provides a preference for [PTW] treatment, treatment has frequently not been selected for contaminated sediment…Based on available technology, treatment is not considered practicable at most sediment sites…[and] in situ containment can also be effective for [PTW], where that approach represents the best balance of the NCP nine remedy selection criteria."[115]

[109] EPA 2014b, p. 2
[110] EPA 2014d
[111] EPA 2014d
[112] Weston 2011
[113] EPA 2005a
[114] EPA 2012
[115] EPA, p. 5

Table 4. Precedent for PCB PTW in RODs from Sediment Cleanup Sites

Site	Location	ROD Year	PTW Defined	PTW Present	PTW Levels	Maximum Reported Risk	PTW Applications
Lockheed West Seattle	Seattle, WA Region 10	2013	Yes	No	50 mg/kg	3×10^{-3}	Maximum surface sediment concentration observed was 3 mg/kg. No PTW delineated on-site.[116]
Sheboygan Harbor	Sheboygan, WI Region 5	2000	Yes	Yes	50 mg/kg	1×10^{-2}	Surface-sediment fish-consumption-based PRG is 0.5 mg/kg (10^{-4} risk). Source material presenting levels of risk "several orders of magnitude" greater than the PRG are considered PTW. PTW threshold corresponds to 10^{-2} risk (50 mg/kg). Only areas subject to mobility are defined as PTW.[117]
Fox River OU1/OU2	Lower Fox River & Green Bay, WI Region 5	2002	Yes	Yes	N/A	7.2×10^{-4}	Source material resulting in risk > 10^{-3} defined as PTW. Though the ROD says such waste is present, the maximum risk reported in the ROD is 7.2 X 10^{-4}. It is impracticable to delineate PTW specifically, but the remedy is expected to remove all PTW.[118]
Lower Duwamish Waterway	Seattle and Tukwila, WA Region 10	2014	Yes	No	N/A	3×10^{-3}	Direct contact risk used to define PTW. Whereas seafood consumption risks were estimated in excess of 10^{-3}, direct contact risks were below 10^{-3}. No PTW was delineated on-site. The maximum surface PCB concentration was 890 mg/kg.[119]
Hudson River PCBs (OU2)	Hudson River, NY Region 2	2002	Yes	Yes	Section 1: 3 g/m^2 Tri+PCBs; Section 2: 10 g/m^2 Tri+PCBs	1×10^{-3}	The ROD-defined PTW, as represented by mass per unit area measurements, are 3 g/m^2 Tri+ PCBs in River Section 1 and 10 g/m^2 Tri+ PCBs in River Section 2. No indication that PTW was used to delineate the remedy during remedial design and implementation.[120]
Grasse River	Massena, NY Region 2	2013	No	Yes	N/A	2×10^{-2}	Most highly contaminated sediment classified as PTW (unquantified) due to its role as a PCB source to surface water and fish. PTW can be contained reliably under an armored cap, and PTW treatment is neither practicable nor cost effective.[121]

[116] EPA 2013a
[117] EPA 2000b
[118] EPA 2002d
[119] EPA 2014c
[120] EPA 2002c
[121] EPA 2013b

The LWG's concerns with EPA's technology assignment approach are best illustrated by comparing the actual sediment remedy constructed at the McCormick and Baxter Superfund site (a separate NPL site in Portland Harbor) to the remedy that would have been selected for this area using EPA's FS technology assignment process. The actual cost of the cap construction at the McCormick and Baxter site was $12 million,[122] and has been shown to be highly effective through several years of post-construction monitoring. The LWG applied EPA's FS technology assignment process as closely as possible using the information presented in Section 3, which resulted in additional cleanup actions to address PTW, ex situ treatment, and disposal that were not part of the actual capping remedy. We determined that the likely construction costs for EPA's FS approach as applied to the McCormick and Baxter site would be approximately $370 million (with no net present value calculation and excluding any contingency allowance, operations and maintenance costs, and long-term monitoring costs).

3.2 Do Not Require Treatment of PTW when No Additional Risk Reduction Is Achieved

Although the EPA FS asserts that treatment of PTW is only a "preference," the document's decision trees indicate that PTW is almost always subject to treatment including reactive armored caps, reactive residual cover layers after PTW is removed (apparently, regardless of post-dredge residual concentrations), in situ treatment, or ex situ treatment after removal and before disposal.[123]

The EPA FS's PTW approach contributes substantial ex situ and in situ treatment components to both removal and in-place technologies for all alternatives both inside and outside of SMAs, as well as extensive sheet piles (and associated costs) for removal in some areas. For example, Alternative B involves ex situ treatment of 240,840 to 321,120 cubic yards (cy) of sediment, which is about 39% of the total volume removed under this alternative. PTW guidance does not support the need for treatment for all the materials falling within the EPA FS' wide definition of PTW for this site.

From a purely engineering perspective, it is unnecessary to conduct ex situ treatment of EPA FS-identified PTW before disposing of this material in a permitted landfill. The landfill acceptability criteria the EPA FS discusses in Section 3 indicate that some types of Draft-FS-designated PTW would be reliably contained at the landfill without need for prior ex situ treatment. This issue should be evaluated on an SMA-specific basis as part of remediation waste profiling.[124]

3.3 Assign and Compare Technologies on a Localized Scale

The use of a prescriptive set of technology evaluation and scoring criteria to determine the technologies to be applied in each area of the site rigidly assigns technologies to respective area in the river, without appropriately comparing technology options.[125] By assigning one technology to the same sediment areas in the technology screening step,[126] the technology assignment prevents meaningful comparison of technology performance and limits the evaluation of multiple technologies in Section 4 of the EPA FS.[127]

This approach is inconsistent with the NCP, which requires the comparison of remedy alternative based on the nine NCP criteria. In effect, the EPA FS presented alternatives defined and differentiated by the size of the SMAs. In other words, the EPA FS evaluates how much to dredge or cap to achieve remedy-specific RAL, not whether to dredge or cap within an SMA as defined by the RAL. Thus, the EPA FS does not adequately compare the relative

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[122] EPA 2005b

[123] Containment was used at the Grasse River Superfund Site where treatment was not prescribed for PTW because in 2013 "[US]EPA does not believe that treatment of the principal threat wastes is practicable or cost effective given the widespread nature of the sediment contamination and the high volume of sediment that would need to be addressed" (EPA 2013b, p. 49).

[124] For example, the 2009 Gasco Order contains a highly detailed protocol for managing dredged materials prior to disposal. The terms of the 2009 Gasco Order should be incorporated into EPA's FS, and similar remediation waste management criteria could be developed at other SMAs during remedial design.

[125] EPA (1988) indicates the FS should "assemble the selected representative technologies into alternatives representing a range of treatment and containment combinations, as appropriate" (p. 4-3). EPA (2005a) indicates, "The project manager should take into account the size, characteristics, and complexity of the site. However, due to the limited number of approaches that may be available for contaminated sediment, generally project managers should evaluate each approach carefully, including the three major approaches (MNR, in-situ capping, and removal through dredging or excavation) at every sediment site at which they might be appropriate" (p. 3-2).

[126] EPA 2015b, Section 3

[127] EPA 2015b

effectiveness of dredging, capping, MNR, thin-cover placement, use of activated carbon, or other remedies for any specific area. EPA's FS simply compares one set of RALs against another—just larger areas of active remediation versus smaller areas.

Direct detailed comparisons of one technology to another would also allow the community to provide meaningful comment on the tradeoffs between more aggressive options that might result in shorter restoration timeframes and less aggressive options that might have fewer quality of life impacts.

The LWG reviewed FS alternatives developed for five other large sediment sites (Duwamish, Fox, Hudson, Lower Passaic Focused FS, and Housatonic Rest of the River), and in every case, those studies included alternatives that compared the application of one technology (e.g., dredging) to another (e.g., capping) as applied to the same areas of sediments.

EPA's approach also ignores fundamental facts about the localized nature of dredging versus capping in general. As the RALs decrease, the depth of contamination increases, the dredge volumes increase, and the potential for dredging impacts on stable slopes and nearby structure stability increases. Also, as RALs decrease, the ability of dredging alone to effectively meet the RALs decreases. And the potential effectiveness of a post-dredging cap or cover to provide chemical isolation of remaining contamination increases. These general facts support the concept that the technology assignments could change at a given location across a range of potential RALs and alternatives. In contrast, EPA's scoring approach does not even recognize depth of contamination as an implementability factor related to selection of dredging.

EPA should evaluate technologies on a more localized and detailed scale so that it can demonstrate that its remedy selection will cost effectively optimize risk reduction. If it does not do so in the FS, EPA must allow flexibility to refine technologies and engineering processes during remedial design rather than rigidly apply a prescriptive technology-assignment matrix.[128] This approach would allow flexibility in technology selection on an SMA-specific basis so long as the performance goals (risk reduction or SWACs) are met.

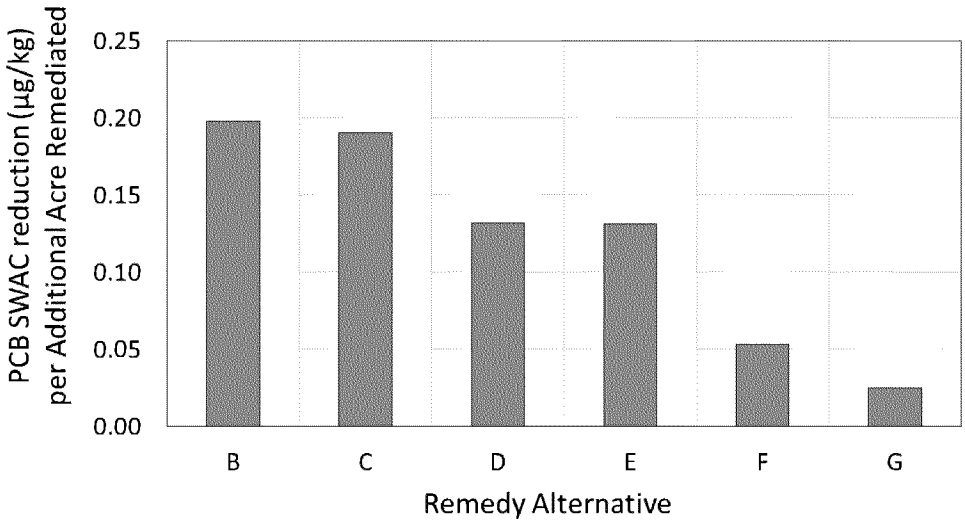
3.4 Compare Long-term Effectiveness of the Alternatives Quantitatively

For reasons that remain unclear to the LWG, only Alternative C was screened out during the qualitative screening discussion in the EPA FS. EPA's stated rationale was that between Alternatives B and C there is a small incremental increase in quantities of dredge and borrow materials and a small incremental decrease in the time-zero SWACs estimated for immediately after construction. A better common-sense measure of effectiveness would be to critically examine alternatives that involve a large incremental increase in active remediation acres while obtaining a relatively small decrease in the SWACs achieved.

Figure 2 uses such an approach and compares the incremental change in active remediation acres and the additional PCB SWAC reduction achieved by moving to each successively larger alternative. The largest PCB SWAC reductions are associated with remedy Alternatives B and C; both achieve comparable SWAC reductions in proportion to the areas remediated. Because the post-remedy SWAC for Alternative B is estimated to be approximately 49 µg/kg after remediating 212 acres, the PCB SWAC reduction per acre remediated is (87-49 µg/kg)/212 acres, or 0.20 µg/kg-ac. The remediation efficiency drops off for Alternatives D and E; i.e., the remediation efficiency for Alternatives D and E is approximately 30% less than for Alternatives B and C. Figure 2 shows that minimal PCB SWAC reduction realized for each additional acre remediated under Alternatives F and G. Alternatives F and G are only 13% to 28% as efficient Alternatives B and C. Based on this analysis, EPA should screen out Alternatives F and G and should retain Alternative C for further evaluation.

[128] For example, the 2012 draft EE/CA for the Gasco Sediments Site evaluates a range of technologies using comprehensive site-specific data at a high degree of detail to develop remedial alternatives for that location. These detailed SMA-specific alternatives should serve as the basis for remedy selection at the Gasco site, not the technology assignments based on the generic assumptions used in the EPA FS.

Figure 2. Comparative Remedy Effectiveness Summary



3.5 Use Practical, Real World Construction Assumptions to Evaluate Short-term Effectiveness

EPA must evaluate the short-term effectiveness of its alternatives, "considering… (1) Short-term risks that might be posed to the community during implementation of an alternative; (2) Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures; (3) Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and (4) Time until protection is achieved."[129] EPA indicates that both short- and long-term impacts should factor into risk-based decision making, stating that "short-term and long-term risks to human health and the environment that may be introduced by implementing each of the remedial alternatives should be estimated and considered in the remedy selection process."[130]

Certain remedies, such as MNR, have "few implementation risks beyond those associated with accompanying monitoring programs,"[131] while more active remedial strategies "can adversely impact existing ecosystems and can remobilize contaminants, resulting in additional risks to humans and the environment."[132] In particular, "[m]onitoring data demonstrate that dredging can have short-term adverse effects, including increased contaminant concentrations in the water, increased contaminant concentrations in the tissues of caged fish adjacent to the dredging activity, and short-term increases in tissue contaminant concentrations in other resident biota."[133] If short-term risks associated with a remedial alternative are neglected when evaluating alternatives, "a biased decision will be reached, and the environment might be damaged with a reduction of risk, or in some cases, risks might be increased due to inappropriate or unnecessary remedial actions."[134] Therefore, "the broad range of risks at a site—before, during, and after application of a risk management option—should be assessed so that the overall risk reduction from application of the option is clear."[135]

The EPA FS inadequately addresses short-term effectiveness, particularly for an FS with remedies that may require decades to complete. Analyzing short-term effectiveness acknowledges and qualitatively identifies impacts to the community, construction workers, and the environment. However, the EPA FS makes no attempt to quantify those

[129] 40 CFR 300.430(a)(9)(iii)(e)
[130] EPA 2005a, pp. 2-14
[131] Magar et al. 2009, pp. 6-12
[132] NRC 2001, p. 7
[133] NRC 2007, p. 6
[134] NRC 2001, p. 171
[135] NRC 2001, p. 10

impacts. For example, the LWG's 2012 Draft FS quantified the risk of worker injury and death and found that Alternative F-r would be expected to cause 51 non-fatal injuries and result in a 21% chance of a fatality.[136] (EPA's Alternatives F and G are even larger than this 2012 Draft FS alternative.) In general, the risk of fatal injury among construction workers of the type who will perform this work is 9.7 fatalities in 100,000 workers, which corresponds to a fatality risk of approximately 10^{-4}. The likelihood of significant injury or fatality is based on actual workplace data compiled by OSHA and is, therefore, far more certain than any of the potential excess cancer and non-cancer risks calculated in the BHHRA, yet the EPA FS does not include an evaluation of the likely short-term injuries and fatalities (e.g., construction related) against potential long-term chemical exposure risks. Although some of the implementation risks can be managed through appropriate and aggressively implemented worker safety programs and health and safety plans, the above injury and fatality statistics mostly involve projects that are in compliance with similar types of safety programs, and thus, risks to workers cannot be eliminated entirely.

As with long-term effectiveness, the short-term effectiveness comparison of alternatives is qualitative in EPA's FS and simply states, "Implementation of Alternative B would have the least impact to the community, workers, and the environment during construction while Alternative G would have the longest impact. However, Alternative B would have the longest impact to the community and environment until RAOs are met, while Alternative G would have the shortest impact." As discussed previously, these qualitative evaluations of time to meet RAOs are unsupported and unlikely to be correct (Figure 1). The FS should examine how increased risks to the community, to workers, and to the environment through resuspension, release, and excess energy use and carbon output balance against the perceived risk reduction associated with each remedy.

For example, EPA should conduct a quantitative dredge release evaluation as part of the short-term effectiveness assessment. Because EPA guidance emphasizes the importance of quantifying dredge releases on a site-specific basis,[137] a dredge release evaluation should incorporate the following components:

- Ensure that dredge release data compiled from other projects are technically valid and relevant to the range of conditions in Portland Harbor.
- Consistent with guidance,[138] EPA should consider a wide range of recent (i.e., last 10 years) dredging projects when compiling information on dredge release rates, not just those that have achieved best-case outcomes.
- To the extent that EPA assumes very rigorous and successful dredging best management practices that successfully constrain dredge release rates, the impact of those assumptions needs to be consistently carried through to estimates of dredging production rates, construction durations, and costs.[139]

3.6 Evaluate Implementability Using Realistic Information when Comparing Remedies

For implementability, the EPA FS indicates in one sentence that more construction is involved as the alternatives progress from B to G; however, there is no actual discussion of the implementability issues involved with any of the alternatives. Using Alternative G as an example, the EPA FS does not discuss the obvious implementability issues associated with such large sediment remediation projects, including the following:

1. Precision dredging involving 6 to 9 million cy of sediment over 18 years with multiple water quality best management practices and requirements
2. Implementing the remedy will require, at a minimum, a continuous 24-hours-a-day/6-days-a-week schedule for the entire multiyear project with no allowable time for related construction operations

[136] USDL 2011
[137] EPA 2005a, Section 6.5.5, p. 6-22
[138] EPA 2005a, Section 6.2, p. 6-3 – 6-4
[139] EPA 2005a, Section 6.5.5, p. 6-22

3. Importing 2.3 million cy capping and cover material

4. Installing and removing large areas of sheetpile or coffer dams partially obstructing the navigation channel

5. Treating (ex situ) a significant percentage of the dredged material using thermal desorption, which has never been applied to a sediment project of this size

6. Instituting permanent regulated navigation areas for 236 acres of caps (11% of the site)

7. Building a dewatering facility and water treatment plant that will operate for nearly the entire construction period

8. Finding a 140-acre shoreline property, which per recent Port of Portland investigations does not exist, nearby and developing it into a large transload facility

9. Managing rail and highway capacity to handle the large volumes of sediment associated with each remedy

All of these concerns are substantial issues regardless of the scale of the remedy and are magnified with increasing remedy size and magnitude.

3.7 Use Accurate Cost Information to Evaluate Cost Effectiveness

In selecting a remedy, EPA must evaluate the cost effectiveness of its remedial alternatives. A Superfund remedy must "provide for cost-effective response,"[140] so long as "it first satisfies the threshold criteria"[141] of protectiveness and compliance with Applicable or Relevant and Appropriate Requirements (ARARs). The NCP deems a remedy "cost-effective if its costs are proportional to its overall effectiveness."[142] The NCP preamble explains, "In analyzing an individual alternative, the decision-maker should compare…the relative magnitude of cost to effectiveness of that alternative. In comparing alternatives to one another, the decision-maker should examine incremental cost differences in relation to incremental differences in effectiveness."[143] Furthermore, "if the difference in effectiveness is small but the difference in cost is very large, a proportional relationship between the alternatives does not exist," and "[t]he more expensive remedy may not be cost-effective."[144]

The information needed to make the cost effectiveness determination during remedy selection comes from the comparative analysis of cost in the FS. This comparative analysis comprises an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs (i.e., relative advantages and disadvantages) among them.[145]

EPA guidance reinforces the need to weigh remedial alternative cost against incremental risk reduction, stating that "[t]he evaluation of an alternative's cost effectiveness is usually concerned with the reasonableness of the relationship between the effectiveness afforded by each alternative and its costs when compared to other available options."[146] A "[c]areful evaluation of site risks…help[s] to prevent implementation of costly remediation programs that may not be warranted."[147] To determine the relative cost effectiveness of a remedial alternative, an accurate analysis of its cost is required. According to the NCP, the cost estimate should be comprehensive and include "(1) Capital costs, including both direct and indirect costs (2) Annual operations and maintenance costs; and (3) Net present value of capital and O&M costs."[148] Additionally, in *Contaminated Sediments Remediation: Remedy Selection for Contaminated Sediments*, the Interstate Technology Regulatory Council (ITRC) indicates that "[m]any

[140] 42 U.S.C. 9621
[141] 40 CFR 300.430(f)(1)(ii)(D)
[142] 40 CFR 300.430(f)(1)(ii)(D)
[143] Preamble, 55 FR 8728
[144] Preamble, 55 FR 8728
[145] NCP, 1990 @ 55 FR 8719
[146] EPA 2005a, pp. 7-3
[147] EPA 1996a, p. 2
[148] 40 CFR 300.430 (e)(9)(iii)(G)

factors beyond the cost of the technology being evaluated must be considered, such as material costs, transportation costs, storage costs, and monitoring costs."[149]

EPA's *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* describes data sources that should be used to generate cost estimates, which include "cost curves, generic unit costs, vendor information, standard cost estimating guides, historical cost data, and estimates for similar projects, as modified for the specific site."[150] Overall, properly evaluating the cost and cost effectiveness of each remedial alternative is crucial to ensuring compliance with CERCLA and NCP directives.

EPA's cost estimates in the FS are based on unrealistic assumptions, omit critical cost components, and contain errors. For example,

- EPA provides virtually no details on how quantities (e.g., volumes dredged, acres capped, volumes of import material) are determined for each alternative. For example, based on the amount of information available, the LWG has commented that the volumes for dredging appear substantially underestimated for all alternatives

- Appendix G cost estimates includes "periodic costs" between $337-million and $977-million but with little detail provided on how those values were generated

- No supporting information for estimating the quantities and cost of riverbank treatment and disposal between $100 and $600 per ton

- Unclear whether non-RCRA, non-PTW remediation waste would be treated prior to disposal[151]

- Underestimated costs for a trans-load facility

- No costs assigned for dewater treatment described in the main text

- Inconsistent mitigation cost values

- Use of the 7% discount rate at a site at which EPA has named multiple government agencies as PRPs, acknowledges that many non-public PRPs will rely on insurance proceeds to fund remedy implementation, and may require performing parties to provide financial assurance using a discount rate as low as the treasury rate (1.4% in 2015)[152]

- No consideration of cost impacts related to extensive and innovative dredge and dredge BMP methods contemplated by the FS

- Some individual quantities are inconsistent across text and tables by as much as 100% (e.g., total construction acres, ex situ treatment volumes), calling into question EPA's assessment that the required cost accuracy of +50% to -30% range was met.

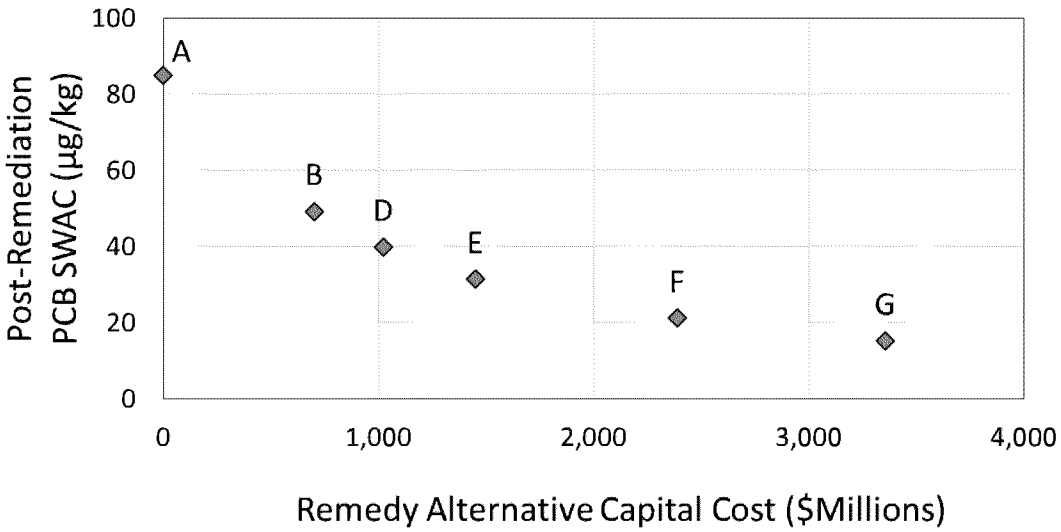
In addition, costs must be broken down on an SMA-basis so that EPA can evaluate the cost effectiveness of its selected remedy in areas of the site that pose more or less risk and so that responsible parties have the information

[149] ITRC 2014, p. 56
[150] EPA 2000c, p. 2-5
[151] Although RCRA land disposal restrictions apply only to RCRA hazardous waste EPA appears to use RCRA land disposal restriction values to identify large areas of non-RCRA remediation waste that must be treated prior to disposal if excavated or dredged. Treatment of non-hazardous remediation wastes to LDRs has not been (and should not be) identified as an ARAR for the site, and so it is unclear on what EPA bases this requirement. However, EPA's cost assumptions do not appear to include any costs associated with treatment to LDRs, and so it is therefore impossible for EPA to evaluate whether the cost of treatment and, potentially, disposal at a Subtitle C facility of thousands of cubic yards of material that meets the acceptance criteria for Subtitle D disposal is justified by any incremental reduction in risk.
[152] EPA 2015c

necessary to negotiate with EPA toward consent decrees to implement EPA's remedy through a performance settlement.

Figure 3 shows the cost effectiveness for each remedial alternative by plotting the EPA FS post-construction site-wide PCB SWACs with the EPA costs to implement each alternative using PCBs as an example. More cost-effective alternatives are those that achieve the largest decrease in SWAC (y-axis), given the smallest increase in cost (x-axis). Alternative B results in the largest decrease in PCB SWAC concentration for every dollar spent. The remaining alternatives yield only modest decreases in PCB concentrations over rapidly increasing costs to implement.

Figure 3. Cost Effectiveness Evaluation of Remedial Alternatives A, B, D, E, F, and G



EPA's FS provides time-zero post-remediation SWAC concentrations and related residual risk estimates as the only metric that can serve as a proxy for risk reduction. As noted above, this residual risk assessment is inconsistent with the BLRAs in multiple respects and results in risk estimates for the no action alternative that are usually substantially higher than found in the BLRAs. All of this indicates that EPA's residual risk assessment does not accurately describe the actual risk reductions of any of the alternatives. A more thorough cost-effectiveness evaluation should be conducted that explicitly focuses on accurate and appropriate estimates of risk reduction. Figure 3 shows the only quantitative information on risk reduction provided in the EPA FS.

Selection of any of the dredging-focused higher cost remedies under consideration in the absence of material additional risk reduction relative to the significant incremental cost would be inconsistent with CERCLA, the NCP, and the Sediment Guidance, which all expressly require that remedies be cost-effective.[153] In the NCP, cost effectiveness is defined as "costs [that] are proportional to [a remedy's] overall effectiveness." As noted in EPA's FS Table 4.3-2, all of the remedial alternatives identified are ranked as "+" (protective). Consequently, the high cost remedial alternatives in the EPA FS do not provide material incremental risk reduction proportional to their significant incremental costs and should not be selected.

3.8 Revise the FS Evaluations

Overall, the EPA FS remedy evaluation has been developed largely on a qualitative basis. Each alternative should include all reasonably anticipated elements required to perform that alternative and, where available, should be

[153] 42 U.S.C. §9621(a); 40 CFR §300.430(f)(1)(ii)(D); EPA 2005a, p. 7-3

based on costs and durations seen on recent projects to perform the same or similar sediment remediation work. The preferred remedial alternative should be cost-effective and should demonstrate how its costs are proportional to its effectiveness in reducing risk. Specific quantitative analyses that should be included in the evaluation of balancing criteria but were not included in the EPA FS are listed below.[154]

- Estimate residual risks following remedy construction that:
  - Is consistent with the baseline risk assessment approaches and results;
  - Incorporates the most recent sediment and fish tissue data that most realistically reflect current conditions at the site; and
  - Relies on realistic estimates of construction durations and natural recovery processes.

- Quantify short-term remedy implementation risks that:
  - Include estimates of realistic short-term environmental impacts (e.g., dredge releases) that take into account the full range of recent case studies;
  - Quantify potential risks to construction workers and the general public from the sediment removal, transportation, and treatment; and
  - Estimates community impacts from long-term dredging and capping operations on the river (e.g., recreational uses, light, noise, emissions, etc.).

- Consider the feasibility and implementability of the remedial alternatives including, but not limited to:
  - Identification and staging of sediment transload and water and sediment treatment facilities;
  - Evaluation of whether dredge production rates included in the EPA FS can be maintained over the entire project schedule (e.g., contingencies for weather);
  - Community acceptance;
  - Obstructions to the navigation channel;
  - Thermal treatment of millions of cubic yards of sediment; and
  - The incremental reductions in risk based on increasing remedy footprints.

- Quantify the cost to implement each alternative, including an evaluation of the incremental reductions in risk based on increasing implementation costs.

4. Maximize Flexibility in Remedy Design and Implementation

The Portland Harbor Superfund Site is large and includes an extraordinarily complex array of chemicals, sources, and physical environments. Developing a single FS for the entire site requires simplifying assumptions that create disparities in applicability and/or appropriateness of the FS technology assignments among the varied cleanup areas within the site. Other large sites (including the Housatonic, Lower Passaic, and Fox rivers) have been divided into segments, sometimes OUs, because of similar varied conditions.

EPA has developed a set of overly prescriptive rules for assigning technologies for cleanup and disposal derived from simplifying assumptions that unnecessarily narrow the scope of potential cleanup or disposal options among the alternatives. A broader range of options and technology combinations would have resulted if separate RI/FS projects would have been implemented for the major SMAs.[155] If EPA moves to remedy selection now, the Proposed Plan and ROD for Portland Harbor must include flexibility for site-specific (e.g., SMA-specific) decisions during design and implementation. Because "there is no presumptive remedy for any contaminated sediment site, regardless of the contaminant or level of risk,"[156] EPA stresses that "[i]t is important to remain flexible when evaluating sediment alternatives and when considering approaches that at first may not appear the most appropriate for a given environment."[157] NRC guidance stresses that the "management of contaminated [sediment sites] needs to

[154] A more comprehensive discussion of information and analyses that should be included in the FS can be found in the LWG's *List of Significant Issues on EPA Feasibility Study Section 3 and 4* (LWG 2015c) and *Additional Comments on EPA's Revised FS Section 3 and 4* (LWG 2015d).
[155] See, e.g., the 2012 Draft EE/CA for the Gasco Sediment Site.
[156] EPA 2005a, p. 7-16
[157] EPA 2005a, p. 7-5

embrace a more flexible and adaptive approach to accommodate unanticipated factors, new knowledge, technology changes, and results of field pilot tests."[158]

While "a flexible risk-based approach"[159] is an important consideration during the FS process, it also can be incorporated into decision documents for Superfund sites. EPA's *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and other Remedy Selection Decision Documents* states that the discussion of the selected remedy "should mention that the remedy may change somewhat as a result of the remedial design and construction processes."[160] For example, in the Fox River and Green Bay ROD for OU1 and OU2, in situ capping was selected as a "contingent remedy" to supplement sediment removal in certain areas. By including this option, EPA "sought to create the ROD flexibility described in the Principles memorandum and the NCP. Such flexibility [would] allow for 'mid-course corrections' in the selected remedy based on what is learned from remedial activities undertaken early in the process."[161]

Also, the remedy design and remedial action processes should respond to data collected after issuing decision documents. "An iterative approach to site investigation and remedy implementation that provides the opportunity to respond to new information and conditions throughout the lifecycle of a site,"[162] is necessary "in remedy selection and implementation at large, complex [sites]."[163] Moreover, by using flexible approaches "[d]uring remedy implementation, EPA can evaluate remedy performance and modify operations to more efficiently attain RAOs."[164] Incorporating the principles of flexibility throughout remedy selection, design, and implementation will support an efficient cleanup.

4.1 Allow Flexibility to Refine and Adjust Technologies and Process Options During Remedial Design

The EPA FS relies on broad assumptions and generalizations to complete its analysis of remedial alternatives. Whereas such assumptions may have facilitated the evaluation of alternatives, they should not be used in the Proposed Plan or ROD as prescriptive requirements for remedial design/remedial action (RD/RA). Instead, flexibility should be integrated into the Proposed Plan and ROD to allow for the following changes:

- The FS, Proposed Plan, and ROD should recognize that additional site data will be collected during RD/RA, and they should allow for the appropriate use of these data in RD/RA to refine and implement cost-effective sediment remedies. As needed, refinement decisions (e.g., technology assignments based on changing conditions) could be based on criteria set forth in the FS, Proposed Plan, and ROD.

- Even if new data are not available, the FS, Proposed Plan, and ROD should include text that clearly articulates how flexibility in RD/RA will be utilized to make appropriate decisions to cost-effectively achieve risk reduction on an area-by-area or site-wide basis (including refinement of areas and volumes of active remediation, and the site-specific technologies employed, as appropriate).

4.2 Allow Flexibility When Delineating SMAs during RD/RA

It is unclear how the remedial design process will be implemented, but it is assumed that remedial designs will be prepared to address discrete subareas of the overall site. Each subarea design will involve more site-specific engineering assessments even in the absence of any new data. Further, each subarea design will likely require collection of substantially more site-specific, detailed information than is currently available. These site-specific engineering assessments and additional site-specific information will be used to refine the sediment remedy beyond the broad assumptions and generalizations in the EPA FS. New information may include improved and more up-to-date delineation of SMA footprints and COC deposit depths, characterization of geotechnical conditions,

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[158] NRC 2007 p. 249
[159] EPA 2002b, p. 5
[160] EPA 1999, p. 6-40
[161] EPA 2002d, p. 1-8
[162] EPA's *Superfund Remedial Program Review Action Plan* (EPA 2013c) p. 8
[163] NRC 2007, p. 14
[164] EPA 2013c, p. 9

hydrodynamics analyses, assessment of current and expected future water-dependent and shoreline uses, and analysis of shoreline and navigational infrastructure.

SMAs are expected to change because of natural sediment transport and sedimentation processes in the river. Based on lines of evidence presented in LWG's 2012 Draft FS,[165] as well as subsequently collected data (primarily 2011/2012 PCB data for smallmouth bass whole-body fish tissue, 2014 sedimentation bathymetry data, and 2014 site-wide sediment PCB data), natural recovery of COCs in surface sediments is a known ongoing process occurring within the site. SMAs delineated using the RALs defined in the EPA FS will change over time as natural recovery processes cause some areas to decline below those RALs. The revised FS should continue to recognize, and the Proposed Plan and ROD should allow for, changes in SMAs and remedial technology and process option selections in RD/RA based on the most recent and comprehensive data available relevant to ongoing natural recovery. We acknowledge the inherent uncertainties in predicting MNR; such uncertainties can be managed through long-term monitoring and careful assessment of conditions.

4.3 Separate the Site into Operable Units Focused on the Most Important SMAs

Separating the Portland Harbor Superfund Site into multiple OUs could facilitate a more effective and timely remediation and risk reduction effort. There is significant precedence for this approach, and it is well documented in guidance. "The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site."[166] In addition, "[s]ites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of total site cleanup."[167] EPA's ROD guidance states that "the cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site" and "[d]ue to the fact that many Superfund sites are complex and have multiple contamination problems or areas, they are generally divided into several operable units for the purpose of managing the site-wide response action."[168]

Given the large areal extent of the Portland Harbor, heterogeneous nature of sediment contamination and physical characteristics of this site, breaking the site into OUs and implementing the remedies in a systematic manner could be the most appropriate approach for timely risk reduction and controlling sources of contamination. OUs will allow EPA to identify and evaluate remedy technologies during remedy design by taking into account a more detailed evaluation and engineering assessments of existing information, new baseline conditions, the physical characteristics of the sediments, the hydrodynamic conditions, and the types of exposures mitigated (e.g., high concentration areas) in particular OUs. Remediation in high priority areas can then be expedited by enabling a phased remediation approach followed by a period of monitoring in order to evaluate the effectiveness of these remedial actions, consistent with EPA guidance.[169] Finally, OUs will not preclude the realization of cost efficiencies through the sharing of staging facilities and equipment as remedy construction shifts from one OU to another. Overall, dividing the site into OUs can facilitate management of the Portland Harbor site by allowing for a cost effective, manageable, and implementable remedy.

Other Superfund sites provide precedent for using OUs to address similar issues of site complexity and remedy implementation. For example, the Fox River (Region 5) site was divided into 5 OUs on the basis of physical features and historical data,[170] and the Housatonic and Hudson Rivers have been divided into units or work areas for phased approaches to remediation.[171] Similarly, the Harbor Island and Wyckoff-Eagle Harbor NPL sites in Region 10 were divided into separate in-water OUs. Harbor Island was split into multiple OUs because EPA

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[165] Anchor QEA et al. 2012
[166] 40 CFR 300.5
[167] 40 CFR 300.430(a)(1)(ii)(A)
[168] EPA 1999
[169] EPA 2002b
[170] EPA 2002d
[171] EPA 2002c

determined it "could be managed more efficiently,"[172] and Wyckoff-Eagle Harbor was divided into OUs because of differences in "environmental media, sources of contamination, public accessibility, enforcement strategies, and environmental risks in different areas of the…site."[173]

4.4 Incorporate Flexibility into the ROD

Flexibility should be integrated into the Proposed Plan and ROD to allow for the following changes:

- The FS, Proposed Plan, and ROD should recognize that the site has changed considerably and that additional site data will be collected during RD/RA, and they should allow for the appropriate use of these data in RD/RA to refine and implement cost-effective sediment remedies. As needed, refinement decisions (e.g., technology assignments based on changing conditions) could be based on criteria set forth in the FS, Proposed Plan, and ROD. (We acknowledge that the EPA FS already recognizes that site conditions may change due to ongoing natural recovery processes.)

- The FS, Proposed Plan, and ROD should incorporate flexibility into technology assignments based on more site-specific engineering assessments, even if new data are not available. The LWG recognizes that the FS technology evaluation process requires an understanding of technology options and requires the assignment of technologies to specific areas. However, it is equally important to recognize that these assignments are made with limited detailed information on specific areas and that much more site-specific engineering evaluations will be conducted and knowledge will be acquired during design.

- EPA should consider the use of contingent remedies to address site-wide risks as well as to address uncertainties within SMAs. Where significant uncertainty about the effectiveness of a technology at a particular SMA or the time frame to attain cleanup levels across an exposure area remains at the time of the ROD, use of contingent remedies would allow EPA administrative and engineering flexibility to adjust to conditions at the site during remedy implementation. For example, the contingent remedy for the Fox River, provides:

  > Contingent remedies…
  >
  > - [Shall provide] the same level of protection to human health and the environment as the selected remedy…
  > - …shall not take more time to implement than the selected remedy
  > - …shall comply with all necessary regulatory, administrative and technical requirements…[174]

  Contingent remedies have been used successfully at other Oregon sites, including at the McCormick and Baxter Superfund Site, where the contingent remedy for groundwater required installation of a physical barrier if NAPL was not controlled hydraulically or if the barrier proved more cost effective.[175]

- The FS, Proposed Plan, and ROD should clearly articulate how flexibility in RD/RA will be used to make appropriate remedy modifications to cost-effectively achieve risk reduction on an area-by-area or site-wide basis (including modifications to areas and volumes of active remediation, and the site-specific technologies employed, as appropriate).

Incorporating the principles of flexibility throughout remedy selection, design, and implementation will support an efficient cleanup process for the site.

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[172] EPA 1993b, p. 2
[173] EPA 1996b, p. 6
[174] EPA 2002d
[175] EPA 2006 ROD for McCormick and Baxter

5. LWG Recommended Remedy

If EPA follows the recommended approach set out by the LWG in this letter, including reasonable PRGs based on appropriate risk management, the resulting remedy would have the following characteristics:

- RALs that are appropriately applied to surface sediments consistent with the methods and results of the BLRAs and that focus on active remediation of the highest contaminant concentrations:
  - PCB RAL of 1,000 µg/kg
  - DDE RAL of 1,000 µg/kg
  - cPAH (as BaPEq) RAL of 20,000 µg/kg
  - Designated CBRAs consistent with the multiple lines of evidence evaluation of benthic toxicity in the BERA
- Flexible technology assignments assigned to SMAs or OUs, with an appropriate balance of removal and in-place technologies at the harbor-wide scale (e.g., capping, in situ treatment, and EMNR). We anticipate this will equate to approximately 50% dredging and 50% in-place technologies (by site-wide acreage). Technology assignment must take into account that the longer it takes to implement the remedy, the longer the impact to the river and the fish, and the longer it takes the system to recover.
- No identified PTW beyond management of identified "substantial product" at the Gasco Sediment Site consistent with 2009 Gasco Order.
- Appropriate application of in situ and ex situ treatment of a significant volume of materials at the site through application of the above appropriate RALs and technology assignments.
- Use of OUs to manage the site based on the localized chemical and physical characteristics.
- Exclude riverbank soils remedies (leaving those to be designed and implemented through either DEQ upland source control program or future sediment remedial designs).
- Refinement of technology process options in remedial design (e.g., types of dredging and dredge BMPs, types of treatment, and habitat and flood mitigation methods).

Figure 1 shows that short- and long-term outcomes associated with various sets of RALs on site-wide PCB SWACs are very similar. Charting the recovery of other COCs would result in similar curves. Therefore, consistent with EPA's FS and the analysis summarized in Figure 1, such an alternative would be protective and compliant with ARARs and would be a cost-effective, implementable remedy. The areal extent of SMAs developed under this alternative would be defined based upon evaluation of data collected in remedial design, and the general balance of technology assignments would be refined or modified during remedial design as appropriate based upon site-specific engineering evaluations and design data. The LWG believes this remedy could be implemented through settlement within a reasonable time frame following the ROD.

Conclusion

The LWG appreciates the opportunity to comment to the NRRB and looks forward to the NRRB's feedback. All of EPA's alternatives meet the threshold criterion of protectiveness. As shown by Figure 1, the LWG's recommended remedy is also protective. All EPA alternatives and the LWG-recommended remedy achieve nearly indistinguishable reductions in risk in relatively the same amount of time. Therefore, active remedies should focus on discrete areas of higher sediment concentration that present the most significant risks, as identified in the risk assessments.

By addressing the significant technical issues with the EPA FS and applying sound risk management principles to baseline risk assessment outputs, EPA could revise the FS to provide a more solid foundation for selection of a remedy:

- The FS should prioritize the most significant and pervasive risks and align remedy selection with sound risk management principles. The sediment remedy should be focused on measurable and meaningful reductions in risk, particularly related to fish consumption.

- Remedies should be transparently aligned with risks identified in the baseline risk assessment.

- The selected remedy should consider other measures to further reduce fish consumption risks. No sediment remedy under consideration will entirely eliminate risk from fish consumption or eliminate the need for fish advisories in the main stem Willamette River, due to regional (watershed) sources of contamination.

- Quantitative analyses must underlie remedy evaluation and selection. Without a coherent CSM and a quantitative method to evaluate effectiveness, EPA's FS cannot present a sufficient evaluation of the alternatives' protectiveness or a reliable foundation for remedy selection. Existing tools should be incorporated into the FS.

- EPA should reassess its approach to PTW to ensure consistency with both EPA guidance and precedence at other sites. Inappropriately designating PTW in vast areas of the Portland Harbor significantly increases remedy cost without any resulting risk reduction, and treatment without demonstrated risk reduction is inconsistent with the NCP and CERCLA guidance.

- EPA should improve evaluation of technologies, construction outcomes and impacts, implementation issues, and their associated costs. By improving its consideration of technology effectiveness for specific SMAs, construction impacts, effectiveness, implementation details, and realistic cost assumptions, EPA's FS can enable more robust, quantitative evaluation of remedial alternatives.

- Flexibility in remedial design will enable risk-based cleanup goals to be achieved in a timely, effective, and cost-efficient manner. EPA should accommodate flexibility for site-specific engineering assessments (e.g., OU or smaller), including the exact technologies used and the areas and volumes requiring active cleanup. In addition, contingent remedies can help EPA manage the inherent uncertainties with such a large site.

By following the recommended approach set out by the LWG in this letter, including reasonable PRGs based on appropriate risk management, a Portland Harbor remedy would look very much like the LWG's recommended remedy. The LWG's recommended remedy is protective, implementable, cost-effective, and most likely to lead to a consent decree for performance. The LWG appreciates the NRRB's consideration of these comments and respectfully requests that the NRRB consider the LWG's recommended remedy in its comments on the Portland Harbor site.

Sincerely,

The Lower Willamette Group

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Subject: docs
2015-09-08 LWG Significant Issues List FS Sec 3 and 4.pdf
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Thanks,

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LIST OF SIGNIFICANT ISSUES WITH EPA'S REVISED FS SECTIONS 3 AND 4

1 INTRODUCTION

This memorandum contains a list of significant issues with EPA's Portland Harbor Site (Site) Revised FS Section 3 dated July 29, 2015 and Section 4 dated August 18, 2015. This list was prepared in response to a request from EPA for the LWG to present their "significant concerns" with EPA's draft FS within 21 days of receipt of the revised FS Section 4 to "help inform the conceptual remedy."[1]

This document presents detailed descriptions of nineteen (19) significant issues. Table 1 demonstrates how each issue could greatly impact the conceptual plan by cross-referencing each significant issue with a) key FS technical themes; and b) the seven CERCLA criteria associated with the detailed analysis of alternatives:

- Two threshold criteria (protection of human health and the environment, and compliance with ARARs), and
- Five balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability; and cost).

As demonstrated on Table 1, each and every one of the 19 issues is significant because of the ripple effect it has on numerous components of the detailed analysis of alternatives, and hence the conceptual plan. The ensuing comments for each significant issue describe in detail the fundamental flaws identified with EPA's approach. Collectively, these flaws result in a biased set of analyses aimed at supporting the false premise that removal and treatment is the presumptive remedy for contaminated sediment.

[1] Email from Lori Cohen dated April 7, 2015, conveying a memorandum from Jim Woolford that presented EPA's process and schedule for developing the draft FS, conceptual plan, and meeting with the National Remedy Review Board (NRRB).

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Table 1. Categories of Feasibility Study Significant Issues

		Key FS Technical Themes				CERCLA FS Evaluation Criteria						
No.	Issue	Development of Alternatives	Implement -ation	Cost	Detailed Analysis of Alternatives	Protective-ness	Compliance w/ ARARs	Long-term Effectiveness	Reduction of Toxicity - Treatment	Short-term Effectiveness	Implement -ability	Cost
1	Technology Assignments	X		X		X		X		X	X	X
2	Principal Threat Waste	X		X		X		X	X		X	X
3	Remedial Action Levels	X		X		X		X		X	X	X
4	Inclusion of Riverbanks	X	X	X		X					X	X
5	Construction Durations	X	X	X				X		X	X	X
6	Volumes	X	X	X						X	X	X
7	Lack of Integrated Designs	X	X	X			X				X	X
8	Discussion of MNR	X				X		X		X		
9	Dredge Release Evaluation	X	X	X		X	X			X	X	X
10	Perfunctory Alternative Screening	X		X		X					X	X
11	Sheetpiles and Other BMPs	X	X	X			X			X	X	X
12	CDF Acceptance Criteria		X		X		X	X	X		X	
13	Incomplete Evaluation of Alternatives			X	X	X	X	X		X	X	X
14	Limited Long-term and Short-term Evaluation				X	X	X	X		X		
15	Inappropriate Benthic Risk Analysis	X			X	X		X				
16	Cost Estimates			X	X							X
17	Risk Inconsistency	X			X	X		X		X		
18	Inappropriate RCRA and Other Waste Determination	X	X	X	X	X	X	X	X		X	X
19	Low Level of Clarity and Consistency	X	X	X	X	X	X	X	X	X	X	X

Notes:

ARAR - Applicable or Relevant and Appropriate Requirement

BMP - best management practice

CDF - confined disposal facility

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

FS - Feasibility Study

MNR - monitored natural recovery

RCRA - Resource Conservation and Recovery Act

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2 SIGNIFICANT ISSUE COMMENTS

1. **Technology Assignments** – EPA's revised FS uses a prescriptive set of technology evaluation criteria to determine which technologies will be applied to which areas of the Site. Although we understand that technology assignments are necessary for FS-level alternative development, the LWG continues to believe that such a prescriptive approach based on an FS level of detail will not appropriately or accurately predict the most appropriate technology assignments for Remedial Design (RD) (see LWG-written comments and discussions from April to July 2014; e.g., LWG 2014a). The LWG disagrees that the prescriptive approach in FS Section 3 should be used moving forward into the Proposed Plan, Record of Decision (ROD), and RD. The LWG's past and current comments are consistent with remediation guidance (EPA 1988, 2005a) as detailed for specific issues discussed below:

    a. As previously commented (LWG 2014a), the LWG has many technical disagreements about the scores that were applied to the various technologies. The scores favor dredging and fundamentally misrepresent how engineered caps are designed as required by guidance (discussed more in Comment 1g below; Palermo et al. 1998). Thus, the LWG cannot agree that EPA's revised FS scoring approach is objective and "unbiased" as EPA asserted at the July 31, 2015 roll-out meeting.

    EPA also is substantially increasing Portland Harbor remediation costs without demonstrating an improvement in the remedy. The overall problems with EPA's technology assignment approach are best illustrated by comparing the actual sediment remedy constructed at the McCormick and Baxter site to the remedy that would have been selected for this area using EPA's technology assignment process. LWG applied EPA's process as closely as possible following the available information in Section 3, including PTW, ex situ treatment, and disposal steps. We determined that the likely construction costs for EPA's approach as applied to the McCormick and Baxter site would be approximately $370 million (with no net present value calculation and excluding any contingency allowance, operations and maintenance costs, and long-term monitoring costs). (Additional details of this analysis can be supplied.) The actual cost of the cap construction at the McCormick and Baxter site was $12 million (EPA 2005b). The McCormick and Baxter capping remedy has been shown to be highly effective through several years of post-construction monitoring. Capping is likely an equally effective technology over much of the rest of the Portland Harbor Site (outside the navigation channel) consistent with the findings of the 2012 draft FS. Thus, for other areas within Portland Harbor like McCormick and Baxter that have potential groundwater plumes, potential NAPL in sediments, potential PTW (using EPA's definitions), and shoreline sediment contamination, this comparison indicates that EPA is increasing Portland Harbor remediation costs by approximately 30 times with no demonstrated commensurate increase in effectiveness or protectiveness of the remedy.

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b. EPA does not consider physical and engineering constraints that may preclude feasible dredging of deep contamination in the scoring of removal as a technology (see Figure 3.3-14b). This results in EPA designating removal for many areas and then having to cap or backfill those same areas anyway because complete removal is infeasible. Although Figure 3.3-36 provides a general depiction of depth of contamination, this information is not evaluated as a feasibility issue in the scoring matrix for dredging or any other technology.

c. EPA's approach does not develop alternatives that compare the effectiveness (or other FS criteria) of one technology to another as applied to the same patch of sediments, as is indicated by FS and sediment remediation guidance. EPA (1988) indicates the FS should "assemble the selected representative technologies into alternatives representing a range of treatment and containment combinations, as appropriate" (p. 4-3). EPA (2005a) indicates, "The project manager should take into account the size, characteristics, and complexity of the site. However, due to the limited number of approaches that may be available for contaminated sediment, generally project managers should evaluate each approach carefully, including the three major approaches (MNR, in-situ capping, and removal through dredging or excavation) at every sediment site at which they might be appropriate" (p. 3-2). The LWG reviewed FS alternatives developed for five other large sediment sites (Duwamish, Fox, Hudson, Lower Passaic Focused FS, and Housatonic Rest of the River), and in every case, those studies included alternatives that compared the application of one technology (e.g., dredging) to another (e.g., capping) as applied to the same areas of sediments. The LWG can provide additional supporting documentation on compliance with guidance and precedents at other sites, if desired. In contrast, EPA has provided very few references to support its conclusions and recommendations. Direct detailed comparisons of one technology to another would also allow the community to provide meaningful comment on the tradeoffs between more aggressive options that might result in shorter restoration timeframes and less aggressive options that might have fewer quality of life impacts.

   Beyond guidance requirements, EPA's approach ignores fundamental facts about dredging versus capping in general. As the RALs decrease, the depth of contamination becomes deeper, the dredge volumes increase, and the potential for dredging impacts on stable slopes and nearby structure stability increases. Also, as RALs decrease, the ability of dredging alone to effectively meet the RALs is decreased. And the potential effectiveness of a post-dredging cap or cover to provide chemical isolation of remaining contamination increases. These general facts support the concept that the technology assignments should change at a given location across a range of potential RALs and alternatives.

d. EPA's scoring matrix approach does not consider the relative scores of the various technologies. For example, if dredging and capping have a difference in total score of one point for a particular area, they are likely to be nearly

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equal in terms of feasibility in that area (no strong preference for either technology is indicated). Conversely, a score differential of 5 would indicate a markedly different relative feasibility that may truly indicate one of the technologies is better suited than the other one to that particular area. Instead, EPA simply picks the highest score without considering the magnitude of the scores.

e. EPA's text is unclear whether the prescriptive technology assignment approach is intended for FS assumptions only or will be the basis of ROD or RD determinations. EPA indicated at the July 31, 2015 roll-out meeting that EPA intended for the prescriptive approach to be used, perhaps with refinements, in the ROD as well the FS. For the reasons stated above, the LWG disagrees. Instead, the ROD requirements for technology assignments should be based on performance metrics (e.g., the technology must meet water quality ARARs) and allow RD site-specific integrated engineering assessments to meet those performance requirements at any given location. The LWG has prepared alternate technology decision trees that illustrate how such a performance-based ROD approach supported by RD engineering assessments can accomplished. The LWG can provide these alternate decision trees to facilitate discussions of Proposed Plan contents and ROD requirements.

f. Many steps in EPA's technology assignment approach lack critical analysis (see Comment 19 for more details). For example, EPA indicates that, in some cases, a post-dredge sand cover with activated carbon intermixed (a "reactive layer") will be placed in areas designated by EPA as PTW, after these areas have already been dredged to the RAL. EPA assumed that 2.5% of the dredged material concentration would remain in the post-dredge surface for long-term effectiveness evaluations. Using a PCB concentration of 200 µg/kg (EPA's highly toxic PTW threshold for PCBs[2]), the post-dredge surface sediment layer would have 5 µg/kg of PCBs, which is lower than EPA's background-based PCB Preliminary Remediation Goal (PRG). EPA does not explain why surface sediment concentrations below background levels would require activated carbon treatment.

g. The LWG disagrees with many of the specific assumptions used in the technology assignment approach related to cap design. EPA creates an artificial distinction between "engineered caps" (or sometimes just called "caps") and "armored caps," which ignores several of the recommended approaches on cap design in the capping guidance documents (Palermo et. al 1998). This fundamental guidance on cap design is not referenced in Section 3. For example, the capping guidance is clear that caps must be designed to withstand erosional forces present (e.g., river currents, propwash, and wave action), and all cap designs include an armor component as necessary to resist those erosional forces. Similarly, all caps must be designed for stability on any sloping surface present, and several techniques exist to engineer stable

[2] See Comment 2 with regards to LWG's disagreements with EPA's PTW approach.

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caps on slopes up to 30 to 40% (LWG 2014b). Thus, EPA's determination that "engineered caps" are less feasible in erosional areas than "armored caps" and that certain caps will be less stable on steeper slopes does not consider all the attributes of a properly designed cap as presented in the guidance.

h. EPA's technology assignment approach uses many technically simplistic assumptions, but it is procedurally difficult to follow. EPA's assignment includes two major process steps, a scoring matrix followed by a set of decision trees, with three large decision trees needed just to explain the second major step. There are numerous inconsistencies between the Section 3 text and the figures and decision trees that attempt to explain the approach. Examples of some of these inconsistencies are provided in Comment 19 below. Thus, it is difficult to determine all the technical issues that may exist with the overall approach.

2. **Principal Threat Waste** – The LWG previously commented (LWG 2014c) that a precise identification and highly quantitative evaluation of PTW at the Site is not necessary or productive for completing the revised FS and is not necessary for EPA's selection of a remedial alternative. Per those past comments, EPA's proposed PTW approach is inconsistent with guidance on PTW (EPA 1991) in several respects. The LWG disagrees with EPA's logic and approach for determining PTW.

   First, EPA uses fish consumption scenarios to determine "direct" cancer risk highly toxic thresholds in excess of 10^{-3}. Before applying such thresholds for PTW identification, the presence of actual risks greater than 10^{-3} needs to be determined. In fact, greater than 10^{-3} risk was not found in the EPA-approved Baseline Human Health Risk Assessment (BHHRA) for dioxin/furan TEQ, total DDx, or BaPEq for any scenario evaluated. Therefore, the definition of highly toxic as described by EPA (1991) is only potentially applicable to total PCBs.

   Second, as described in LWG's past PTW comments (LWG 2014c) greater than 10^{-3} cancer risk was found for PCBs in the BHHRA for three fish consumption scenarios: subsistence (mixed diet, fillet), recreational (mixed diet, fillet), and tribal (whole body and fillet). But EPA guidance (1991) describes PTW materials as a source for "direct exposure." The fish consumption pathways are, by definition, indirect pathways from sediment through fish to people, and these pathways do not represent "direct" exposures from sediment contaminants as described in the guidance. See the LWG's 2014 PTW comments for more details on this issue (LWG 2014c).

   Third, the point-by-point application of EPA's highly toxic thresholds is entirely inconsistent with the spatial and temporal scales associated with this indirect exposure as described in the BHHRA. This includes that people catch fish over multiple areas and fishing events and that the fish range across different areas during those timeframes.

   Fourth, EPA uses inapplicable and inferential evidence to identify potentially highly mobile (i.e., NAPL) material in a manner that is inconsistent with the intent of the PTW guidance. The highly mobile aspect of the PTW definition should be applied for NAPL consistent with situations described in the guidance (EPA 1991), such as "pools of NAPLs submerged beneath ground water or in fractured bedrock, NAPLs floating on

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ground water" or where physical processes are likely to mobilize "source materials" as defined in the guidance. EPA's identification of any potential NAPL as PTW is inappropriate and inconsistent with the guidance. For example, EPA identifies solid tar materials at Gasco as analogous to highly mobile liquids, which the guidance defines as "liquids and other highly mobile materials (e.g., solvents)." Also, at the Arkema Site, continuous cores have been visually logged and hundreds of samples have been analyzed at the laboratory and, to date, no chlorobenzene NAPL has been found in Arkema sediments. EPA also uses any visual trace observations of NAPL, such as "blebs and globules," to identify highly mobile PTW. This approach is clearly inconsistent with the terms used in the guidance, such as "pools of NAPLs" as quoted above. See LWG 2014c for more description of how EPA's highly mobile PTW approach is inconsistent with the PTW guidance.

Also, EPA's PTW approach is inconsistent with the approach taken at other large river sediment remediation sites, including EPA's recent Region 10 ROD for the Lower Duwamish Waterway, where the maximum sediment PCB concentration was 220 mg/kg. Nonetheless, EPA determined the Duwamish sediments are generally "low-level threat waste" (EPA 2013). In comparison, at Portland Harbor, the maximum PCB concentration is 36 mg/kg, and EPA is identifying concentrations of 0.2 mg/kg as PTW. The LWG's PTW comments (LWG 2014c) review the PTW approach at five other large sediments sites, mostly with much higher contaminant levels than Portland Harbor. All of those sites also do not identify specific PTW areas in the FS process.

Additional specific issues related to the PTW text in Section 3 include:

a. EPA defines areas as PTW without including the reliably contained step of the evaluation described in the NCP and guidance (EPA 1991). Without the reliably contained evaluation included, these areas cannot be appropriately defined as PTW. In other words, only the areas that EPA designates as "not reliably contained PTW" have the potential to actually be defined as PTW. See NCP Preamble, 55 FR 8666 at 8703 (March 8, 1990): "Principal threats are characterized as waste that cannot be reliably controlled in place, such as liquids, highly mobile materials (e.g., solvents), and high concentrations of toxic compounds (e.g., several orders of magnitude above levels that allow for unrestricted use and unlimited exposure)."

b. EPA's not reliably contained analysis using the so called "super cap" approach is also technically incorrect. EPA uses generalized Site-wide groundwater seepage rates for the super cap analysis rather than more localized estimates available in the RI. Further, groundwater control systems exist at both Gasco and Arkema sites, which EPA states were not considered in the analysis. For example, at the Gasco site, the groundwater source control system has been shown to cause negative seepage (i.e., movement of river water down into the sediment bed) over broad areas of the offshore sediments, but EPA's super cap analysis assumes that positive groundwater seepage out into the river is still occurring. Using appropriate seepage parameters where groundwater source control systems exist would result in no identification of not reliably contained material at the Gasco site. A similar

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analysis is appropriate for sediments offshore of the Arkema site, which has installed a slurry wall and a groundwater extraction and treatment system designed to prevent migration from the uplands to the river. EPA should consider the specifics of that groundwater control system, as well as other areas with significantly lower than average groundwater gradients (e.g., RM 2-4 East).

c. EPA's PTW approach results in large relatively low concentration areas of the Site being identified as PTW. For example, large PTW areas exist outside much of the SMA footprint of the smaller alternatives (e.g., Alternatives B and C), which is a unique circumstance for a sediment FS as far as we are aware.[3] Further, the concentrations that EPA is proposing as PTW would be considered completely safe under other common remedial and regulatory scenarios. For example, EPA's PTW level for PCBs of 200 µg/kg is below EPA's Regional Screening Levels (RSL) for residential soil, which range from 230 to 3900 µg/kg (per EPA's June 2015 RSL residential soil table carcinogenic risk values for total PCBs). DEQ's risk-based residential soil cleanup standard for PCBs is 200 µg/kg. Although EPA indicates that PTW is only a "preference" for treatment, EPA's decision trees indicate that PTW is almost always subject to treatment including reactive armored caps, reactive residual cover layers after PTW is removed, in situ treatment, or ex situ treatment after removal and before disposal. Regarding ex situ treatment, EPA determines that any PTW that is based on NAPL (including trace observations per above) and PTW related to cPAHs or DDx must be ex situ treated. Essentially, the only situation where removed PTW does not need to be ex situ treated is for high concentration materials above the PCBs and dioxin/furan PTW thresholds. EPA's PTW approach contributes substantial ex situ and in situ treatment components to both removal and in-place technologies for all alternatives both inside and outside of SMAs, as well as extensive sheetpiles (and associated costs) for removal in some areas. For example, Alternative B involves ex situ treatment of 240,840 to 321,120 cubic yards (cy) of sediment, which is about 39% of the total volume removed under this alternative.[4] (Although EPA orally indicated on August 27 that much of this volume is due to RCRA hazardous waste determinations, this is not verifiable based on review of the information contained in EPA's cost appendix. See Comment 18 for more comments on RCRA hazardous waste determinations.) Per above, the PTW guidance does not support the need for treatment for all the materials falling within EPA's wide definition of PTW for this Site.

d. EPA is using extremely low dioxin/furan PRGs for PTW determinations that the LWG has previously commented are technically incorrect and not reflective of actual baseline risks (LWG 2014d, 2015a, 2015b). Also, as noted

[3] Also, this outcome is completely contrary to EPA's recent PTW determinations in the Lower Duwamish ROD as noted above.

[4] EPA's volumetric quantities vary inconsistently between different text and table locations. Consequently, this estimate is based on one set of values provided by EPA.

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above for PCBs, EPA's dioxin and furan PTW levels are extremely low as compared to other common regulatory programs. For example, EPA's TCDD PTW level is 10 ng/kg in Table 3.2-1, while EPA's soil remedial goal for residential areas is 50 ng/kg.[5]

e. From a purely engineering perspective, it is not be necessary to conduct ex situ treatment of EPA-identified PTW before disposing of this material in a permitted landfill. The landfill acceptability criteria EPA discusses in Section 3 indicate that most of the PTW (as defined by EPA) would be reliably contained at the landfill without need for prior ex situ treatment (not just PCB and dioxin/furan PTW).

3. **Remedial Action Levels** – The LWG disagrees with EPA's dioxin/furan, TPAH, and DDx RALs for reasons discussed below. Also, the problematic absence of any evaluation of benthic risks as part of alternative development in Section 3 is discussed in Comment 3d.

   a. **Dioxin/Furan RALs** – The LWG does not agree that dioxin/furan RALs are necessary to define SMAs or select an effective remedy for the Site. EPA's Table 3.7-1 shows that the percent reduction in time-zero Surface-area Weighted Average Concentrations (SWACs) calculated by EPA for three dioxin congeners. The TCDD and PeCDD SWAC reductions for Alternative G are in the 60- to 70-percent range, which is a relatively low percent reduction as compared to the other RAL chemicals in the table. In contrast, the SWAC reduction for PeCDF starts at 89 percent for Alternative B and ends at 97 percent for Alternative G, which indicates that the range of RALs provides no meaningful differentiation in SWAC reduction for this congener. EPA has indicated (orally on August 27, 2015) that this is due to the paucity of data on detected dioxin/furan at the Site. However, the low data density and high non-detect frequency for the dioxin/furan dataset should be a reason to reconsider the value of dioxin/furan RALs, rather than a reason to explain the poor performance of such RALs.

      The insignificance of these SWAC reductions is more clearly illustrated by comparing the dioxin/furan SWACs achieved to EPA's own dioxin/furan PRGs by calculation of a SWAC exceedance factor—a factor above the PRG. This can be illustrated by comparing SWAC exceedance factors with and without EPA's proposed dioxin/furan RALs as shown in the tables below. The tables show that a RAL set that includes dioxin/furan RALs does not get the remedy meaningfully closer to acceptable risk levels as represented by EPA's PRGs. Details of this analysis can be provided. (EPA indicated orally on August 27, 2015, that EPA does not evaluate Site-wide SWACs, only SWACs on a rolling river mile basis. This is clearly incorrect given that the evaluation of each

[5] Per EPA's website (http://www.epa.gov/superfund/health/contaminants/dioxin/dioxinsoil.html): "For example, the PRG calculated using the new RfD of 0.7 pg/kg-day (picogram per kilogram-day) and EPA non-adjusted exposure factors would be 50 parts per trillion (ppt) toxicity equivalence (TEQ) for residential soil and 664 ppt TEQ for commercial/industrial soil."

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alternative in Section 4 starts with a presentation of Site-wide time-zero SWACs. Also, EPA's own dioxin/furan PRGs are based on the osprey egg endpoint, which is assessed on a Site-wide spatial scale in the BERA. Thus, the Site-wide spatial scale is actually the most relevant scale for an analysis of dioxin/furan RALs.) For example, for PeCDD, Alternative F without dioxin/furan RALs achieves SWACs 310 times greater that EPA's PeCDD PRG, while adding the dioxin/furan RALs achieves SWACs for this same alternative that are still 256 times above the same PRG. (Also, conducting this evaluation on a rolling river mile basis would not change this conclusion. Specific rolling river miles would range much further above the PRG than this Site-wide assessment.) Similarly, the addition of the dioxin/furan RALs only slightly reduces the SWAC exceedance factors for PeCDF and TCDD across all alternatives, and none of the alternatives are estimated to achieve SWACs that are below those PRGs.

SWAC Exceedance Factor above the PRGs – without EPA's Dioxin/Furan RALs

Alternative	PeCDD	PeCDF	TCDD
B	409	2.3	9.4
C	407	2.3	9.4
D	401	2.3	9.3
E	360	1.8	6.7
F	310	1.7	6.0

SWAC Exceedance Factor above the PRGs – with EPA's Dioxin/Furan RALs

Alternative	PeCDD	PeCDF	TCDD
B	354	2.1	6.6
C	341	2.1	6.5
D	314	2.0	6.3
E	293	1.4	5.8
F	256	1.3	5.5

Also, for all of the dioxin/furan RALs EPA uses the exact same RAL numeric value to represent more than one alternative. For example, for TCDD, EPA proposes using the same RAL value of 0.002 µg/kg for Alternatives B, C, and D and the same RAL value of 0.0006 µg/kg for Alternative E, F, and G. This approach substantially constrains the alternatives from providing any meaningful changes in SWAC reduction or the SMA shapes and areas defined. Essentially, EPA is only providing three alternatives with regards to dioxin/furans. This appears to conflict with EPA's approach where the RALs (as opposed to technology assignments discussed in Comment 1) are the only real difference among alternatives. Thus, in the case of dioxin/furans, the

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alternatives have no variation in technology assignments and very little meaningful variation in term of RALs as well.

b. **TPAH RALs** – Per discussions at the 2014 FS technical meetings, the LWG disagrees that TPAH RALs should be used instead of cPAH RALs (expressed as BaPEq). BaPEq is consistent with the methods and results of the BHHRA, which were assessed in terms of total cancer risk from cPAHs on a BaPEq basis. Following the risk-based approach called for in the guidance,[6] RALs should be consistent with the methods and findings of the BLRAs to ensure that sediment remedies are "risk-based" (i.e., result in effective risk reduction). Further, EPA's latest Section 2 human health PAH PRGs are all expressed as BaPEq. Therefore, use of BaPEq RALs allows for a direct comparison on a consistent basis between the RALs and the PRGs, whereas TPAH RALs do not. Further, the use of BaPEq RALs for human health and Comprehensive Benthic Risk Areas (CBRAs)[7] for ecological risks addresses all of the PAH-related potentially unacceptable risks found in the BLRAs.

   Also, the BaPEq RALs should only be applied to human health exposure areas outside the navigation channel consistent with the risk-based approach called for in the guidance. The cPAH risks related to sediment direct contact and shellfish consumption exposures occur only outside the navigation channel (along the shoreline), and as a result, BaPEq RALs associated with these potential risks should be applied in these areas only. The only remaining human health potential unacceptable risk identified in the BHHRA was for the fish consumption scenario, which was determined using cPAH concentration data in fish tissue. There is no valid relationship between cPAH fish tissue and sediment concentrations at the Site, or any other sediments site, due to the rapid metabolism of PAHs by vertebrate fish (see LWG 2014d, 2015a, 2015b for additional details and references). Carcinogenic PAHs represent less than 1% of the cumulative risks to people eating fish and are, therefore, not a good reason to expand the remedy by hundreds of millions of dollars on the basis of a technically inappropriate PRG, given that there is no reasonable expectation that such an expansion could have any meaningful impact at all on the overall fish consumption risk. Because the BaPEq RALs can only be linked to effective risk reduction along the shoreline (using the BHHRA findings and the resulting appropriate PRGs for sediment direct contact and shellfish consumption), these RALs should only be applied along the shoreline outside of the navigation channel.

[6] EPA guidance (2005a) discusses "Risk Management Principles and Remedial Approaches" and clearly describes that the cleanup should use a "risk-based framework"; "select site-specific, project-specific, and sediment specific risk management approaches that will achieve risk-based goals"; and "ensure that sediment cleanup levels are clearly tied to risk management goals" (p. 1 – 5).

[7] See Comment 15 for more details on the LWG's position regarding benthic risk and EPA's removal of the CBRAs from the revised FS.

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c. **DDx RALs** – Although the LWG agrees with the use of DDx RALs as a general concept[8] instead of individual DDD, DDE, and DDT RALs in the 2012 draft FS, the LWG disagrees with the upper end of the RAL curve selected by EPA. There is little differentiation in the areas mapped using EPA's B, C, and D RALs. For example, according to EPA's Table 3.3-4, within the RM 7W area, the acreages defined by EPA's DDx RALs for Alternatives B, C, and D are 10, 12, and 15 acres, respectively. EPA further indicates these RALs achieve Site-wide SWACs of 21, 20, and 19 ppb, respectively. Thus, this range of RALs represents virtually no substantial difference in areas remediated or risk reduction likely achieved. Instead, EPA should use DDx RALs of 8000, 1000, and 500 µg/kg for Alternatives B, C, and D, respectively. This RAL set would provide a wider differentiation between the active remediation acres and resulting SWACs achieved across these three alternatives. In addition, the LWG has the following specific concerns about EPA's DDx RAL analysis:

   i. Table 3.3-4 presents an inappropriate comparison of DDx RALs to a SWAC derived for a localized area of RM 6.6 to 7.8. EPA does not explain the basis for evaluating DDx across this area rather than an area that is consistent with the spatial scale evaluated in the BLRAs most related to appropriately calculated DDx PRGs. As noted above, RALs should be developed consistent with the BLRAs to be consistent with FS guidance.

   ii. The LWG's original position in 2011 was to use DDE RALs as a surrogate for DDD and DDT (and as a result, for total DDx). However, EPA expressed concerns in 2011 and again in 2014 FS technical discussions that the DDE RALs, by themselves, might not sufficiently bound areas of elevated DDD and DDT sediment concentrations. No supporting technical basis was provided by EPA for this concern, and none is provided in Sections 3 and 4. The determination of bounding COCs for RAL development is an evaluation that requires best professional judgment that must be clearly explained. In addition, the 2012 LWG draft FS indicates that potentially unacceptable risks associated with DDx are based only on the most conservative fish consumption pathway and are localized to RM 7, where DDx contributes only 3% of the cumulative potentially unacceptable risks. Given that EPA does not explain the reasons for the conversion from separate RALs to one combined set of DDx RALs, the LWG's proposal above may not fully resolve the LWG's concerns regarding EPA's DDx RAL approach.

d. **Comprehensive Benthic Risk Areas** – EPA makes no mention of the CBRAs in the FS Section 3 text or how those risks are addressed through the proposed RALs and SMAs. See Comments 15 and 17 for more information

[8] However, the LWG does not necessarily agree with how EPA made the conversion from separate RALs to a combined DDx RAL or with the EPA's DDx RAL values as noted further below in this comment.

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regarding the LWG's position on benthic risk and need for consistency with the risk assessments.

e. EPA indicates in Section 3 that the RALs were selected using RAL curves and considering the zone of maximum incremental SWAC reduction, the zone of marginal incremental SWAC reduction, the knee of the curve, and spatial distribution of the RAL points on the curve. The LWG generally agrees with these RAL selection criteria, which are similar to those stated in the 2012 draft FS. However, a cursory review of the RAL curves presented indicates a wide difference in the RAL points chosen along these curves across the various chemicals. Considering the EPA stated selection criteria either individually or together, there is no discernable consistency in the RAL points selected on the curve for one chemical to the points on the curve selected for another chemical. Thus, the stated selection criteria do not appear to be followed.

4. **Inclusion of Riverbank Soils in the Sediment Remedy** – EPA's new approach for the riverbanks confounds existing and pending regulatory agreements between DEQ and upland PRPs regarding the evaluation and remediation of riverbanks. For example, the Evraz riverbank is being remediated this summer as a DEQ source control action, and the measure is generally consistent with the EPA revised FS approach. However, the Evraz riverbank is still included in the revised FS. DEQ is indicating at the Gasco and Arkema sites that the riverbanks still need to be included in the ongoing upland FSs, even though this would result in identification of likely different riverbank alternatives and remedies simultaneously under two different regulatory programs. Per past LWG comments on EPA's revised FS Sections 1 and 2 (LWG 2014d, 2015a, 2015b), the riverbank soils should remain part of the upland source control program directed by DEQ. This will allow the performing parties the necessary flexibility to integrate the riverbank and sediment remedies in a site-specific fashion that is not bound by broad FS-level assumptions.

   Further, the source control and remediation of riverbank soils needs to be integrated with any adjacent sediment remedy to be feasible and effective. This integration is typically very complex and needs to consider: the areas and depths of soil and sediment contamination, slope stability, slope layback, interactions with surface water runoff and groundwater discharge, potential interference with shoreline and upland structures, erosion protection, vegetation, habitat considerations, and shoreline regulations. EPA addresses this complexity across miles of Site shoreline with a very simplistic analysis and a few broad assumptions that are not well described. Thus, EPA cannot accomplish in the time available a reasonable integration of the riverbank source controls with the sediment remedy in the revised FS. Any riverbank source control not accomplished under DEQ should be integrated with the sediment remedy at the RD phase.

   Beyond the central issue that riverbanks should not be included in the FS at all, the LWG has the following specific concerns with EPA's FS approach for riverbank soils:

   a. EPA indicates, "Caps will likely need to be placed on much of these banks and volumes are estimated by assuming that all the banks are currently vertical and need to meet a minimum slope of 1.7H:1V." Clearly, most of the

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riverbanks are not nearly vertical, and some of them may currently have a shallower slope than 1.7H:1V. (The rationale for the very specific 1.7H:1V slope requirement, which equates to a nearly 60% slope is not explained.) Further, Section 3 goes on to present the alternatives with a different requirement: "In this alternative, 9,624 lineal feet of riverbank are assumed to be laid back to a slope of 5H:1V and covered with either an armored cap or an engineered cap using beach mix or vegetation." (The rationale for this slope is also not explained.) Consequently, it is unclear whether EPA is assuming slopes will be regraded to 1.7H:1V or 5H:1V or some combination of the two. If EPA is assuming a nearly 60% slope, the cap, backfill, and beach mix materials described in the Section 3 conceptual riverbank design are unlikely to stay in place without considerable additional engineering including potentially further lay back of that slope. Also, EPA does not describe in figures or text which portions of riverbank are included in each remedial alternative.

b. EPA does not present a schematic design that shows how these slope revisions are assumed to occur or are integrated with the adjacent sediment technologies. This raises many questions about the assumed approach, including integration of the slope (whichever slope is assumed) with the sediment technology assignments, where the slope starts and stops, and assumed elevation mark for distinguishing between sediment and riverbank technologies.

c. EPA has included some new DEQ data on riverbank soils contaminant concentrations in this analysis, but the details of those data additions have not been described by EPA, and no supporting database is available to better understand EPA's contaminant distribution decisions for riverbank soils. The RI and FS databases have very specific and detailed data quality and data usability criteria that take considerable time to address so that a consistent overall database is developed. It is unclear whether EPA considered these EPA-directed and long-established project protocols.

5. **Production Rates and Construction Durations** – EPA assumes aggressively fast production rates and construction durations and simultaneously directs numerous requirements for innovative dredge Best Management Practices (BMPs), precision dredging techniques, use of sheetpile barriers in some areas, a centralized transload and upland ex situ treatment facility (which will act as a process bottleneck), and a centralized upland water treatment system (which will also act as a bottleneck).[9] EPA also assumes that the remediation across the entire Site will be conducted as one overall seamless project from start to finish over periods of up to 18 years. Further, the original July 29 draft Section 3 provided insufficient information to determine the exact production rates assumed. EPA provided some additional text on August 14, 2015, that clarified the assumed production rates, but this text does not try to resolve the mismatch between the aggressive production rates and inherent delays caused by the other

[9] See Comment 5c for more discussion of bottlenecks.

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extensive dredge requirements. Regardless, EPA estimates that the construction durations will be less than half the pace assumed for the 2012 draft FS (e.g., the Alternative F duration is 28 years in the draft FS and 12 years in EPA's revised FS Section 3, even though EPA also estimates substantially larger dredge volumes for the revised FS). Guidance is clear that the FS needs to fully evaluate the time and cost implications of any process options intended to reduce construction impacts, particularly those associated with unavoidable dredge releases. EPA (2005a) indicates, "Project managers should be aware that most engineering measures implemented to reduce resuspension also reduce dredging efficiency. Estimates of production rates, cost, and project time frame should take these measures into account."

a. Per past LWG comments (LWG 2014e), the LWG disagrees with many of EPA's production rate assumptions and the applicability of data from other dissimilar sites used to support those production rates. In addition, much of EPA's accelerated schedule seems to be driven by assuming that construction will take place for 24 hours per day, rather than 12 hours per day, which was the 2012 draft FS assumption. EPA notes in Section 3, "The daily and weekly durations of removal operations may be refined if community 'quality of life' concerns (such as night-time noise or light pollution) are identified." If these operations are refined to exclude dredging at night, all of EPA's alternative durations will extend out by approximately a factor of two. In the Lower Duwamish Waterway FS, a combination of 12- and 24-hour days were examined (see details below in Comment 5c). Also, the Duwamish early action projects so far have proceeded mostly on a 12-hour/day work schedule, or if they have included longer durations (e.g., the Boeing project work extended up to 20 hours per day), much of this time is not actually spent actively dredging (see Comment 5c). The Lower Duwamish Waterway appears to have less residential neighborhoods within close distance of the remediation area as compared to Portland Harbor, and yet EPA is assuming that there will be fewer quality of life concerns associated with around the clock dredging in Portland Harbor.

   Also, numerous upland support activities beyond just the dredging and capping itself may have a larger impact on the community, particularly at night. It is noteworthy that EPA's Section 4 cost estimate assumes that trucks will transport materials from the transload facility to off-site landfills. For all the alternatives, this represents a huge increase in the amount of local truck traffic through local neighborhoods, with half of that traffic occurring at night. These disturbances would be in addition to traffic bringing equipment, personnel, and materials to the Site for building and operation of the transload and water treatment facilities. Operation of the transload and water treatment facilities would also involve upland noise and light impacts, which are issues that have previously been a concern in the community (e.g., beeping alert sounds from facility vehicles and facility safety lighting).

b. The 24-hours-a-day/6-days-a-week assumption significantly hampers the contractor's makeup time when weather, equipment downtime, adjustments to

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BMPs, or other delays slow planned production rates especially on long projects with limited construction windows. Therefore, EPA's aggressive work schedule assumption does not match how that work will likely proceed.

c. EPA does not discuss or appear to include any time for preparation of dredging areas (e.g., placement and removal of silt curtains, and particularly, sheet pile walls), moving operations from one dredge area to another (e.g., stepping time), and placement of materials (EMNR layers, capping materials, backfill, etc.). The Lower Duwamish FS considered many of these additional factors and used a 60% efficiency rate (i.e., dredging only takes place during 60% of the daily construction period). The Duwamish FS also considered days off for holidays, downtime to accommodate associated construction like piling and dock work, weather and other delay days, and a period at the end of each construction window without dredging activity to allow for time to place capping, backfill, and EMNR materials. EPA's FS text addresses none of these issues.

   In addition, EPA does not clearly address the potential effects of process bottlenecks at transload, ex situ treatment, or water treatment facilities. EPA indicated in supplemental production rate text that bottlenecks can be avoided by building very large facilities. However, the implementability issues created by finding and developing very large shoreline properties for this purpose are not discussed in Section 3. Further, the Section 4 cost estimates do not appear to include any water treatment costs and only some aspects of the costs associated with developing a very large transload facility (i.e., EPA assumed 140-acre facility but did not fully cost it). It is entirely unclear to what extent such a large transload facility can be realistically identified and developed considering the current availability of suitable shoreline properties. Under any scenario, the siting and development of sediment and water staging, handling, treatment, and transloading facilities could easily be a multi-year process, which does not appear to be accounted for in EPA's duration estimates.

6. **Volumes** – EPA uses a very simplistic approach to estimating dredge volumes, which has a large potential to substantially underestimate the dredge volumes eventually determined in RD. It is possible that this one issue, by itself, would lead to cost estimates outside the guidance prescribed +50 to -30% range (EPA 2000). However, when added to other issues of inconsistencies and errors noted in Section 3 (see Comment 19 below), EPA's simplistic volume estimating approach could substantially contribute to development of costs well outside this prescribed range. EPA indicates that it used maps contoured using core data, and assigned the depth to the applicable RAL for each 10-foot by 10-foot grid cell on the map. EPA then assumes that each grid cell is removed to this depth in a cookie-cutter fashion with a 1-foot overdredge allowance. EPA calls this the "neat" volume. Unlike the 2012 draft FS, EPA did not determine FS-level dredge prisms. These prisms typically incorporate stable slope assumptions, offsets from structures,

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integration with adjacent technologies, and a residual "cleanup" pass depth.[10] EPA's volumes also do not consider engineering factors addressing the uncertainty in FS-level volume estimates as compared to design-level estimates (e.g., allowance for new inventory discovered during design sampling, design-level prisms, and transition slopes from deep to shallow dredge cuts). EPA instead uses general factors of 1.5 and 2 times their calculated neat volume to address all these issues. The result is a very approximate volume estimate and likely a substantial underestimate of future design volumes.

7. **Lack of Integrated Designs** – As described for the technology assignments Comment 1 above, EPA uses a series of broad assumptions or rules to assign the base technologies (i.e., dredging, capping, enhanced monitored natural recovery [EMNR]). EPA also adds numerous process option rules to many of the base technologies that are described by EPA in various subsections to address a variety of other issues not directly related to sediment remediation (e.g., habitat mitigation, flooding concerns, and concerns about the creation of "new land"). In contrast, the 2012 draft FS addressed each issue separately to determine the potential overall effect on remedy costs, without defining specific assumptions on how those issues would be integrated into the overall design. For example, the 2012 draft FS calculates overall habitat mitigation credits and debits for each alternative and assigns overall costs that will compensate for any net debits for each alternative based on data from past habitat mitigation projects. This approach avoids assuming that the mitigation must be constructed and integrated into the remedial design in a specific prescribed way as EPA does in the revised FS. In Section 3, EPA presents broad rules that include:

   - Avoiding "creating new land" in shallow water areas by pre-dredging prior to any cap placement
   - Addressing "habitat mitigation" by filling dredge prisms to pre-existing elevations, laying back riverbank slopes to 5H:1V, and using "beach mix covers" at the surface of some dredge backfills and caps
   - Addressing "flood issues" by pre-dredging cap areas to create a localized balance of fill and cut
   - Addressing dredge residuals (e.g., post-dredge covers)

   The LWG previously commented (LWG 2014f) that the EPA additional rules:

   - Will not accurately reflect future decisions made in RD and that these topics should be determined in design on a site-specific basis
   - Are not able to provide an FS-level integration of alternative features that consistently addresses habitat mitigation, water surface area loss, navigation needs, flood concerns, and dredge residuals control simultaneously
   - Do not account for an allowance for potential future maintenance dredging, potential future deepening, allowable overdredge, and operational buffers such

[10] Although EPA mentions elsewhere that one residual cleanup pass is assumed for dredging operations in general, this is not mentioned in the paragraph describing the volume calculations.

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that any caps or covers placed in navigational areas would not be subsequently impacted by navigation or removed by future maintenance dredging.

In fact, some of the rules presented by EPA actually exacerbate one issue while attempting to address another. For example, EPA's rule to fill dredge prisms in an attempt to simply address mitigation issues exacerbates flooding issues by reducing the river hydraulic cross section that would be created by dredging in the first place. Instead EPA should be evaluating the alternatives comprehensively for their potential impact on flood rise using appropriate flood models, such as the HEC-RAS model that EPA required the LWG use and present in the 2012 draft FS. This information should then be used to determine whether any additional flood mitigation costs should generally be added to the alternatives. The EPA-required 2012 draft FS flood modeling found that none of the draft FS alternatives (even those containing substantial capping and CDF facilities) caused substantial rises in flood elevations. Additional examples of the contradictory nature of some of EPA's preliminary rules are provided in past LWG comments (LWG 2014f).

Beyond the LWG's past comments, the EPA Section 3 process option rules create some new LWG concerns including the following:

a. Dredging and then capping back in shallow areas will often reveal higher concentrations of subsurface contaminants, which are then capped. This potentially creates a need for a more robust cap as compared to simply capping lower concentration surface contamination in the first place. Whether dredging and capping back can cost effectively be used to balance flood or creation of "new land" concerns, as compared to designing an overall remedy that balances cut and fill elsewhere, is more easily and cost-effectively addressed in RD.

b. EPA often places backfill, sand, beach mix, and activated carbon in various navigational, intermediate, and shallow sediment areas. EPA pays close attention to erosion concerns for caps in the technology assignment scoring matrix, particularly in shallow areas subject to wave action, but these additional process options are assumed with no apparent consideration of the potential for these materials to stay in place. Placing 6 inches of sand cover after dredging is a standard practice, which accounts for some portion of the material being redistributed across or outside the dredge area. However, EPA appears to make similar assumptions about in situ treatment layers and post-dredge covers incorporating activated carbon. These are considerably more expensive to place and then provide no benefit if subsequently lost through erosion. This is another aspect of how EPA's technology assignments do not accurately predict determinations that will be made in RD using appropriate engineering assessments.

c. It is unclear how the mitigation costs developed in the mitigation appendix (Appendix J) are consistent with the mitigation process option rules that EPA added to the technology assignments (e.g., backfill and beach mix additions). That appendix describes a simplistic approach that assumes that each acre impacted by an alternative provides full habitat function and that the function

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is completely lost due to the dredging or capping activity. Thus, the presumed habitat benefits associated with some of these process option rules are completely unaccounted for in EPA's mitigation cost analysis. EPA is adding costly options to the alternatives to improve habitat and then simultaneously assuming the addition of those options has no benefit in reducing habitat mitigation costs. This calls into question how these habitat-based process option rules provide any benefit to the revised FS or improve the habitat features of the alternatives developed. Comment 16d discusses the mitigation costing issues in more detail.

8. **Discussion and Analysis of Monitored Natural Recovery Is Biased** – The MNR evaluation includes text scattered across Sections 3 and 4. The overall MNR evaluation presented across these two sections is very limited and technically inappropriate in many respects. Overall, EPA suggests that MNR is potentially appropriate for the Site with many caveats and doubts expressed in that assessment. In actual fact, the case for MNR at the Site is strong given that there are multiple lines of evidence supporting the ongoing occurrence of MNR well in excess of the lines of evidence presented by EPA. The simplistic MNR analysis in Sections 3 and 4, appears to cast doubt on the validity of MNR as a potentially feasible process for the Site, which is a misleading representation of the data.

   In Section 3, EPA presents a very simplistic MNR analysis, which generally assumes that MNR will take place outside any active remediation areas based on: 1) surface to subsurface sediment concentration ratios; and 2) a simple deposition rate calculation using two of the time series bathymetry datasets. In Section 4, EPA slightly expands upon the evaluation of MNR, including a different analysis of the time series bathymetry, a brief discussion of maintenance dredging history as an indication of deposition, and a perfunctory discussion of the 2012 smallmouth fish tissue PCB data. Generally, it is unclear why there are two separate and somewhat conflicting MNR evaluations spread across these two sections, particularly given that neither section references the other.

   EPA's analysis does not include the full lines of evidence strongly supporting the presence of ongoing natural recovery at the Site. The LWG has provided this information in past submittals to EPA including the 2012 draft FS, a detailed presentation of smallmouth bass fish tissue concentrations (Anchor QEA 2013), and estimated equilibrium levels for the Site (LWG 2014d, 2014g). In summary, the lines of evidence for ongoing natural recovery at the Site are:

   - Sources are being progressively controlled. DEQ's latest source control report (DEQ 2014) indicates DEQ has completed source control evaluations and implemented (or will implement) controls on one or more potential pathways at approximately 119 of 168 sites examined in detail to date.
   - The aggregate information from five multi-beam surveys indicates widespread deposition of sediments across many areas of the Site. Although EPA emphasizes the uncertainties of the data, for reasons detailed below, the LWG disagrees these data present substantial uncertainties about deposition.

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- Sediment trap and suspended sediment data clearly show that incoming settling sediment has substantially lower contaminant concentrations than most of the Site bedded sediment, which will drive bedded sediment concentrations lower over time.
- Radio-isotope coring data, although limited, indicates deposition rates consistent with other measures such as the bathymetry time series.
- Site surface sediment grain sizes are fine-grained across the majority of the Site, strongly indicating a long term depositional environment exists in these areas.
- Surface to subsurface sediment concentration ratios in most areas of the Site indicate newer surface strata contain lower concentrations than older subsurface strata, which illustrates that surface sediment concentrations are decreasing over time.
- Surface sediment concentrations measured over time (i.e., time series) indicate surface sediments have decreasing contaminant concentrations. The 2012 draft FS data are somewhat limited, but new PCB data collected in 2014 by other parties may provide additional useful information for this line of evidence.
- Smallmouth bass PCB tissue measurements made in 2002, 2007, and 2012 indicate statistically significant declines in tissue concentrations across almost all areas of the Site (Anchor QEA 2013). Differences in sampling and compositing schemes across the years can be controlled to determine statistically valid results.
- Comparisons of sediment profile images collected in 2001 (by the LWG) and 2013 (by other parties) indicate that much of the Site now has well established Stage 3 benthic communities indicative of stable and recovering substrates.
- Simple modeling (such as EPA's SEDCAM modeling, which was not provided in Section 3 or 4) and complex modeling (such as the 2012 draft FS QEA FATE model and coupled dynamic Food Web Model) all generally indicate recovery of surface sediments over a reasonable timeframe toward a relatively consistent range of potential equilibrium levels.

Specific issues relevant to the EPA Section 3 and 4 MNR evaluations include:

a. In Section 3, EPA's MNR text starts by discussing that MNR is not usually selected as a "stand-alone" technology per guidance. Although this is consistent with guidance, neither the LWG nor EPA proposes to use MNR as a stand-alone remedy. The Section 3 text then goes on to list a series of cautions and conditions about MNR in bullet points, apparently intended to support the opening contention that MNR is not a good stand-alone remedy. Further, some of the conditions noted in the bullet points as conducive to natural recovery are actually present or strongly indicated in Portland Harbor. Therefore, the purpose of this discussion in light of EPA's selection of MNR as a component of all alternatives is unclear and should not be relied upon to undermine the substantial evidence supporting MNR as a major component of the overall remedy.

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b. EPA's Section 3 discussion of surface to subsurface sediment chemical concentration ratios within the Site is misleading. For example, EPA uses a surface to subsurface ratio of 0.5 (which is more conservative) to indicate likely MNR, whereas the 2012 draft FS uses a ratio of 0.67. EPA does not discuss the rationale for the selection of this more conservative ratio, or why it leads to any more valid conclusions about natural recovery at the Site.

c. EPA's Section 3 discussion of deposition rates within the Site is misleading. EPA appears to have ignored the LWG's comments in October 2014 where the LWG described differences in the definition of areas that are "reliably depositional." EPA continues to use the "typical bathymetric survey measurement error" of 6 inches or 15 cm (which equates to 2.5 cm per year (cm/yr) over the period of 2002 to 2009) to define areas that are reliably depositional. Measurement error in a bathymetric survey is a random error (i.e., there is no bias) with an average value of 0 cm for many measurements. These data are normally distributed, so that a 15-cm measurement error is a very rare occurrence (e.g., at the 3-sigma level, which has a probability of occurrence of less than 1% for a single measurement). Thus, EPA's use of a +15-cm measurement error at a single location (10-foot grid) to specify the 2.5 cm/yr deposition threshold is extremely conservative. Further, evaluating and interpreting bed elevation changes on a 10-foot grid is not appropriate due to inherent measurement uncertainty at this small spatial scale. Averaging bathymetry data over larger spatial scales provides a more reliable method for analyzing bed elevation changes because the effects of measurement error on the results decrease as the spatial scale increases. This approach was used by LWG in the 2012 draft FS to analyze bed elevation changes over a wide range of spatial scales in the Lower Willamette River.

   The uncertainty in EPA's analysis results can be significantly reduced simply by averaging the bathymetry data over slightly larger spatial scales. For example:

   i. Using a 20-foot grid (i.e., averaging of four data points from the 10-foot grid) would reduce the measurement uncertainty by a factor of 2 (i.e., +7.5 cm), which would reduce the deposition threshold to 1.25 cm/yr.

   ii. Using a 30-foot grid (i.e., averaging of nine data points from the 10-foot grid) would reduce the measurement uncertainty by approximately a factor of 3 (i.e., +5 cm), which would reduce the deposition threshold to about 1 cm/yr.

   Thus, using the data over appropriate spatial scales, it can be reliably determined that areas experiencing more than 7.5 cm of deposition over the 6-year period between 2003 and 2009 are depositional (equating to 1.25 cm/yr). This difference between EPA and LWG's approach results in a large change in the amount of Site area characterized as reliably depositional (the LWG method results in 63%; the EPA method results in 47%).

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d. In Section 4, EPA uses a different approach that biases results when evaluating temporal changes in bathymetry data between 2002 and 2009 and is inconsistent with recent Sediment Erosion and Deposition Assessment (SEDA) guidance (Hayter et al. 2014). EPA concluded that "many areas of the site are in dynamic equilibrium" and "for many areas of the site, the determination of deposition, and the assertion that burial is a viable long-term recovery mechanism, is highly dependent on which survey pair is selected." Generally, temporal changes in the Lower Willamette River (LWR) bathymetry (and similar river systems) are dynamic, with alternating periods of gross deposition and erosion occurring in localized areas. The bathymetry data clearly show that net deposition occurs over large portions of the LWR during the overall multi-year period (e.g., 2002 to 2009) examined as discussed in Comment 8c above. The net deposition process during a multi-year period does not typically correspond to steady continuous deposition; net deposition is due to a cumulative increase in bed elevation that results from alternating periods of deposition and erosion, with gross deposition being greater than gross erosion over a long period. This is not a surprising or unusual finding for this or similar river systems. Consequently, EPA's emphasis on comparisons between various individual pairs of bathymetry surveys ignores the overall trends represented by the bathymetry series as a whole. The FS is also misleading regarding the uncertainty of this information, given these dynamic sedimentation processes are routinely evaluated at sediment remediation sites using time series bathymetry data. Such routine methods are used in the 2012 draft FS and are consistent with the most recent guidance (Hayter et al. 2014). EPA does not reference this guidance in the Section 3 or 4 bathymetry discussions.

e. In Section 4, EPA devotes one paragraph to a discussion of the 2012 smallmouth bass tissue PCB data. EPA indicates that an "exact comparison" between 2002, 2007, and 2012 smallmouth bass tissue data is not possible because the "sampling and compositing schemes vary between years." The LWG provided a detailed presentation to EPA in March of 2013 comparing the tissue data across these years, including several types of statistical tests and other trend comparisons (Anchor QEA 2013). That LWG presentation showed that, in many respects, the differences in sampling and compositing across sample years can be controlled to obtain statistically meaningful information regarding clear declines in fish tissue PCB concentrations. EPA included in Section 4 the single most simplistic graph from the start of the LWG's presentation, which was intended to merely summarize the data that are available, not demonstrate observed declines. EPA concludes from this one misused graph that the data are only "suggestive of declines." The text ignores all of the other detailed information and graphs available that more clearly show the tissue PCB declines, and EPA ignores all of the statistical analysis provided by the LWG. Consequently, EPA substantially understates the role of these data as a strong line of evidence for the effectiveness of MNR at the Site.

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9. **Dredge Releases Only Qualitatively Evaluated** – EPA discusses dredge release issues in several paragraphs in Section 3 and evaluates them qualitatively in the Section 4, but neither Sections 3 nor 4 contain any quantitative assessment of potential dredge releases associated with the alternatives. Dredging releases are a well-recognized issue related to the short-term effectiveness of sediment removal that increases both human health and ecological risks. It is one of the main contributors to construction phase environmental impacts, particularly for alternatives that involve substantial dredging, such as those proposed by EPA. Per guidance (EPA 2005a), a comprehensive and quantitative evaluation of those impacts is required:

   - "Generally, the project manager should assess all causes of resuspension and realistically predict likely contaminant releases during a dredging operation."
   - "To the extent possible, the project manager should estimate total dredging losses on a site-specific basis and consider them in the comparison of alternatives during the feasibility study."
   - "Dredging residuals have been underestimated at some sites, even when obvious complicating factors are not present."
   - "Project managers should be aware that most engineering measures implemented to reduce resuspension also reduce dredging efficiency. Estimates of production rates, cost, and project time frame should take these measures into account."
   - "The strategy for the project manager should be to minimize the resuspension levels generated by any specific dredge type, while also ensuring that the project can be implemented in a reasonable time frame."

   The LWG disagrees with several aspects of EPA's limited analysis of dredge releases.

   a. EPA uses limited qualitative evaluations of the range of release rates that can be expected for typical environmental dredging projects and the role of post-residual covers in reducing release rates. In a memorandum provided in 2013 (which are not cited in the revised FS) EPA relies on two recent projects (Lower Duwamish Boeing Plant 2 Early Action Area dredging and the Hudson River Phase 2 dredging) to support the contention that 1 percent overall releases are likely across Portland Harbor. The 1 percent release rate for the Boeing project is not supportable from the actual project data. EPA ignores the six case studies presented in Table 6.2-12 of the 2012 draft FS constructed from 2004 to 2009, all of which are based on detailed site specific data collection as summarized in the table. Thus, EPA is establishing a 1-percent release rate based on one project (Hudson River Phase 2) that appears to be one of the lowest release rates documented to date. Further, EPA is applying this optimistic release rate from a site that is entirely different both chemically and physically from the Portland Harbor Site, which includes 10 river miles of highly varying physical and chemical conditions. The 2012 draft FS provides summaries of six case studies from within the last 10 years with observed average total release rates in the 3% range, and the LWG still

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believes this is a more realistic assumption for the revised FS. More details supporting the LWG's disagreements on this subject can be provided.

b. EPA describes on page 3-19 relatively detailed requirements for determining dredge completion and post-dredge sampling of the residuals, which in this particular case appears far too detailed for an FS-level discussion and does not appear to help determine the characteristics of the alternatives presented in Section 3. As described under Comment 1, EPA should leave such specific determinations to a performance-based ROD approach supported by a site-specific engineering assessment in RD.

10. **Perfunctory Alternative Screening** – EPA devotes one page of qualitative text to the alternative screening process. Effectiveness, implementability, and cost of Alternatives B through G are briefly discussed. This analysis is insufficient to screen and identify the alternatives that should receive detailed evaluation in Section 4.

    a. For effectiveness, EPA estimates the time-zero SWACs for each alternative immediately after construction by assuming all actively remediated areas achieve a post-construction concentration of zero. However, EPA does not consider whether these SWACs represent a meaningful reduction in sediment relative to unacceptable risk levels or background or equilibrium conditions. Although a full residual risk assessment is not necessary at a screening level, some comparison to risk levels such as appropriately calculated PRGs would provide for a more reliable screening of the alternatives. Further, EPA does not discuss the fact that SWACs immediately after construction are not a good measure of the long-term outcomes for the alternatives or the qualitative similarities and differences in the expected or estimated long-term outcomes of the alternatives (see Comment 14 for more details). EPA further implies that alternatives that rely more on MNR are potentially less effective, although the guidance (EPA 2005a) is clear that there is no presumptive preference for one type of remedial technology or another; rather, the goal is risk reduction.

    b. For implementability, EPA discusses in one sentence that more construction is involved as the alternatives progress from B to G. There is not any actual discussion of the implementability issues involved with any of the alternatives. Using Alternative G as an example, EPA does not discuss the obvious implementability issues associated with such large sediment remediation projects including:

        i. Precision dredging involving 6 to 9 million cy of sediment over 18 years[11] with multiple water quality BMPs and requirements

        ii. Construction on a continuous 24-hours-a-day/6-days-a-week schedule for the entire multi-year project with no allowable time for related construction operations (e.g., the efficiency rate discussed above)

        iii. Import of 2.3 million cy capping and cover material[12]

[11] This is EPA's estimate. Based on the discussion in the durations issue above, we would approximately estimate the time to complete Alternative G at more like 36 years (approximately twice as long as EPA's estimate).

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iv. Installation and removal of large areas of sheetpile or coffer dams partially obstructing the navigation channel[13]

v. Ex situ treatment of a significant percentage of the dredged material using thermal desorption, which has never been applied to a sediments project of this size

vi. Institution of permanent regulated navigation areas for 236 acres of caps (11% of the Site)

vii. Building a water treatment plant that will operate for nearly the entire construction period

viii. Finding a 140-acre shoreline property nearby and developing it into a large transload facility

Further, there are significant equipment and contracting issues associated with executing multi-year projects where tens of millions of dollars of equipment need to be mobilized to the Site. Also, this equipment will need to stand idle (or perhaps in a few instances be moved temporarily to coincidentally available nearby construction efforts) for two thirds of each year while the construction window is closed.

c. No cost estimates are presented in Section 3. Costs are typically part of the alternative development process and are one of the characteristics that help describe and compare the alternatives for screening purposes. EPA mentions that costs are expected to increase as the alternative size increases, but this gives no sense of the relative magnitude of the costs across the alternatives (i.e., based on the discussion, it is unclear whether Alternative G is twice as expensive as Alternative B or ten times as expensive).

d. The only alternative screened out in EPA's qualitative screening discussion is Alternative C. EPA's rationale is that between Alternatives B and C there is a small incremental increase in quantities of dredge and borrow materials and a small incremental decrease in the time-zero SWACs estimated for immediately after construction. This logic is unclear. A better common sense measure of effectiveness for unit effort would be to examine alternatives that involve a large incremental increase in active remediation acres while obtaining a small decrease in the SWACs achieved. The table below uses such an approach and compares the incremental change in active remediation

[12] This may not include dredge prism backfill material volumes due to the lack of detail in EPA's estimates.

[13] EPA indicates that sheetpile walls will be constructed in two select areas regardless of water depth, which would result in sheetpiles at least partially inside the navigation channel. But EPA provided no schematic to determine the proposed sheetpile locations. Also, cofferdams or king piles would likely need to be used in water depths in excess of 40 feet, or perhaps even less.

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acres and the additional PCB SWAC reduction achieved by moving to each successively larger alternative. This is summarized in the last column as number of active remediation acres required to achieve each percent of SWAC reduction. For example, for Alternative C, an additional 5 acres must be remediated to obtain a 1 percent change in the SWAC. Conversely, for Alternative G an additional 40 acres of active remediation is needed to achieve a 1 percent SWAC reduction. By this more straight-forward measure, Alternative C represents a very effective incremental decrease in time-zero SWACs. As a result, EPA should screen out Alternative G (and possibly Alternative F) and retain Alternative C.

Alternative	PCB SWAC Percent Decrease between Alternatives	Alternative Active Remediation Acreage	Added Acres between Alternatives	Number of Acres Added for Each Percent of SWAC Reduction
B	58	212	212	4
C	4	233	21	5
D	7	286	53	8
E	10	362	76	8
F	12	588	226	19
G	7	868	280	40

11. **Use of Sheetpiles and Other BMPs** – EPA's approach for the assumed construction and use of sheetpile barrier walls as dredge water quality control measures is not explained in EPA's text or appendices. The 2012 draft FS presents considerable information and case studies supporting the contention that sheetpile walls are generally not a cost-effective means of minimizing dredge releases (i.e., they are both expensive and are not water-tight barriers that eliminate dredge releases as is often assumed). Also, the relative cost benefit of using sheetpiles is not discussed or evaluated. The following minimum description of the sheetpile approach would be needed in order to understand the feasibility and costs of this requirement:

    - An approximate schematic showing the area enclosed and the assumed height of the sheetpiles. This would also show whether and to what extent EPA is proposing partial obstruction of the navigation channel with deep water sheetpiling.
    - A description of the type of sheetpiling proposed, particularly given that unsupported sheetpiles will not be constructible in water in excess of 40 feet deep (perhaps shallower). This will require king piles or coffer dams, which are more expensive to obtain, install, and remove.
    - EPA indicates that NAPL areas would be enclosed by sheetpile, but given that some NAPL areas may be capped (if we understand EPA's technology assignment approach correctly), it is unclear which areas would be enclosed and which would not.

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- At least some analysis of the incremental benefits that could be expected (if any) relative to the cost of adding sheet pile walls to certain dredging locations.

In addition, the sheetpiling costs used in the cost appendix underestimate the costs of cofferdams, which would appear necessary in some of the water depths and bedded sediment conditions identified by EPA. The revised FS contains no provisions for the extensive bracing/anchoring that would be required to address hydraulic forces and/or restricted embedment depths where bedrock is present.

Similar to the technology assignment (Comment 1) and integrated design (Comment 7) issues, general rules and assumptions for sheet piles, coffer dams, and other water quality BMPs (such as silt curtains) should only be used to support FS-level evaluations. Such FS-level assumptions should not be used as requirements for eventual construction BMPs that are best determined through detailed evaluations that will be necessary during remedial design. Design level water quality BMPs should be determined using a performance-based requirements in the ROD and using engineering assessments in RD (i.e., the performance goal should be to meet the water quality standards consistent with the substantive requirements of water quality ARARs).

12. **CDF Acceptance Criteria and Related Issues** – EPA has changed some of the CDF acceptance criteria and performance standards (Table 3.3-8) since the T4 CDF 60% design, even though EPA references that design as the source of the criteria and standards. The LWG disagrees with many of these changes, particularly because no rationale is provided for why the changes make the remedy more protective or effective. Although every instance of potential LWG disagreements with EPA's new CDF text is not noted here, the LWG disagrees with the following major EPA changes:

    a. EPA indicates that "Sediments that would designate as RCRA or State hazardous waste, whether listed waste or characteristic waste are not eligible for placement in the CDF." However, the T4 CDF 60% design criterion includes the words "without adequate treatment." This is an important distinction that may allow a considerable volume of treated materials to be placed in the CDF. Similarly, EPA unacceptably excludes the "without adequate treatment" clause in the "No Free Oil" criterion.

    b. EPA adds a new criterion regarding the "Waste or Contaminated Media Warranting Additional Management," which EPA defines elsewhere in Section 3 as manufactured gas plant (MGP) related materials that fail the TCLP test for one or more chemicals. As noted above, material that is treated to pass the TCLP test should be acceptable for placement in the CDF to be consistent with the T4 CDF 60% design criteria.

    c. EPA added the words "NAPL" to the "no free oil" criteria from the T4 60% design. As noted above, elsewhere in Section 3, EPA defines NAPL as any instance of oil (e.g., blebs and globules) and including instances of solid tar found at Gasco. Consequently, EPA has revised the T4 CDF 60% design "no free oil" criterion to now exclude a much broader range of contaminated sediments than was originally intended for the T4 CDF design. EPA provides

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no rationale for why these additional materials could not be effectively disposed of in a CDF.

d. Table 3.3-8 contains text that "alternative standards may be developed during remedial design." This new language causes a great deal of uncertainty regarding potential construction of a CDF moving forward into design. It is unclear why EPA is no longer willing to support the T4 CDF performance standards that were defined through extensive deliberations on that project.

e. Figure 3.3-40 indicates that PTW that is not reliably contained must be disposed of at an upland landfill. The figure also indicates that reliably containable PTW[14] must be treated before placement in a CDF. Thus, EPA appears to use the PTW designation, which guidance intends solely to assist in a "preference for treatment" assessment, to determine whether material can be effectively contained in a CDF. It is inappropriate for EPA to use information related to in situ toxicity of the sediments and/or an in situ model (i.e., EPA's "super cap" modeling, which assumes in situ contaminated sediment conditions and groundwater movement) to determine whether those sediments can be reliably contained in a different CDF location with entirely different groundwater flow conditions and containment design. A CDF-specific long-term groundwater transport model that describes the CDF design and surrounding environmental conditions must be used to determine sediments that can be effectively contained within that CDF. Such a CDF model was used and extensively reviewed by EPA during the T4 CDF 60% design development. That modeling determined that sediments from ten Site areas with relatively higher contaminant concentrations were suitable for placement in the T4 CDF.

f. The Figure 3.3-40 flow chart appears to expand the restrictions for material eligible for the T4 CDF and is inconsistent with Section 3.3.5.1. Section 3.3.5.1 states the following (page 3-23):

> "Dredged material subject to requirements of a permit that has been issued under Section 404 of the CWA is excluded from the definition of hazardous waste [40 CFR 261.4(g)]. This provision is discussed in the Hazardous Waste Identification Rule (HWIR) (63 FR 65874, 65921; November 30, 1998). Oregon State adopted the HWIR rule in 2003. This rule means that RCRA regulatory requirements do not apply to sediment dredged at the Portland Harbor Site and disposed of on-site, such as at the Terminal 4 CDF, if the material otherwise meets the CDF acceptance criteria."

RCRA regulatory requirements do not apply to sediment that is dredged from the Portland Harbor site and placed on site in a CDF. Similarly, DEQ indicated during the Arkema EE/CA discussions that the state follows the RCRA HWIR. Consequently, dredged sediments containing DDx or other

[14] Per Comment 2, the LWG disagrees that reliably containable material meets the PTW definition at all.

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pesticides could also be placed in a CDF, even if it would otherwise be determined to be a state hazardous waste per the Oregon Pesticide Residue Rule.

13. **Incomplete Evaluation of Alternatives** – EPA indicates that the evaluation of alternatives in Section 4 is "qualitative" in some respects. In fact, the evaluation is almost entirely qualitative, and most results and conclusions about the performance of the various alternatives against the FS evaluation criteria are presented as a series of subjective statements. This approach is in stark contrast to the LWG's 2012 draft FS, which contained quantitative and detailed data analyses supporting alternative evaluation methods and results. To illustrate EPA's subjective approach, Table 2, below, provides a comparison of EPA's revised FS Section 4 methods to those used in the 2012 draft FS, often as required by EPA at the time, for each of the seven FS alternatives evaluation criteria.

    EPA summarizes the eight page comparative analysis at the end of Section 4 in Table 4.3-1 by merely condensing the qualitative and subjective statements from the text. This information is further summarized in a dot chart in Table 4.3-2 with the same title as the title of Table 4.3-1, "Summary of Comparative Analysis of Alternatives." Neither the text nor the resulting summary tables address key central questions relevant to the appropriate evaluation of the alternatives against the FS criteria, such as:

    - How does EPA determine that all the alternatives are protective given that EPA's time-zero SWAC analysis indicates that none of the alternatives achieves all of the sediment Remedial Action Objectives (RAOs) and related sediment PRGs? Also, the Section 4 text fails to explain that MNR is not expected to achieve acceptable risk levels indicated by the Section 2 RAOs because, in many cases, those risk levels are below background or equilibrium levels expected for the Site.[15] Therefore, what is the role of background in achieving RAOs and protectiveness in general?
    - How does EPA determine that all alternatives comply with Applicable or Relevant and Appropriate Requirements (ARARs), given that some surface water quality ARARs are not met in upstream river water? What is the role of ARAR waivers in EPA's determination that ARARs will be met?
    - How does EPA determine the relative long-term effectiveness of the alternatives, given that EPA makes only short-term estimates of sediment concentrations (i.e., time-zero SWACs)? Time-zero SWAC-based risk metrics used by EPA to evaluate and compare alternatives against RAOs 1 and 2 indicate that there is marginal, if any, benefit to additional active sediment remediation beyond Alternative B. Similarly, how can the long-term effectiveness related to surface water RAOs be assessed, given no estimates (qualitative or otherwise) are made for long-term surface water and tissue concentrations?

[15] Although a few of the Section 2 PRGs are based on EPA's calculations of background levels (e.g., RAO 2 PCB PRG), the RAOs themselves call for achievement of acceptable risk levels without mention of background conditions.

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- How does EPA determine the relative short-term effectiveness of the alternatives, given EPA makes no quantitative estimates of the short-term impacts to water quality or the time until protection is achieved (or other impacts like worker safety)? How can the balance of risks associated with short-term construction impacts and time to achieve RAOs be accurately determined?
- How can the alternative costs be even generally verified as accurate if the methods to calculate the quantities shown are not clearly presented (in either Section 3 or Section 4) and all associated quantities and costs are presented only on an aggregate Site-wide basis?

EPA's sediment guidance (EPA 2005a) addresses the role of quantitative estimates in making these critical decisions:

> "The time needed until protection is achieved can be difficult to assess at sediment sites, especially where bioaccumulative contaminants are present. Generally, for sites where risk is due to contaminants in the food chain, time to achieve protection can be estimated using models. These models may have significant uncertainty, but may be useful for predicting whether or not there are significant differences between times to achieve protection using different alternatives. When comparing time to achieve protection from MNR to that for active remedies such as capping and dredging, it is generally important to include the time for design and implementation of the active remedies in the analysis."

This guidance is particularly relevant for large and complex sites like Portland Harbor where uncertainties are often greater and quantitative estimates help to understand those Site uncertainties and better support appropriate remedy decision-making. For example, EPA Region 10 just recently completed decision-making using such quantitative approaches for the similarly complex Lower Duwamish Waterway site (EPA 2014).

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Table 2. Comparison of Alternative Evaluation Methods for EPA's Revised FS Section 4 and LWG's 2012 Draft FS.

FS Evaluation Criteria	EPA's Revised FS Section 4	LWG's 2012 Draft FS
Protectiveness	• "This criterion draws on the assessments conducted under other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs." See the description of methods under these other evaluation criteria below. • Percent reductions in SWACs, and residual risks for those SWACs, immediately after construction is complete (i.e., "time-zero") for Remedial Action Level (RAL) chemicals are the only quantitative assessments presented. (As noted elsewhere in these comments, time-zero SWACs and risks are not in any way representative of the long-term outcome or overall protectiveness of the alternatives.)	• "The primary information used to make this determination is projected changes in surface sediment, fish tissue, and water column chemicals of concern concentrations derived from model simulations of each comprehensive alternative both during and after construction, and comparison of these projections with the range of sediment remedial goals, target tissue levels, and water quality criteria, respectively, as well as the timeframes to achieve such levels."
	• Unsupported statements are made about protectiveness of riverbank components of the remedy such as: "However, the extent excavation and capping under this alternative may not be sufficient to deal with the extent of the contamination in riverbank soils that may recontaminate the river sediments."	• Riverbanks were not included in the 2012 draft FS, per EPA direction at that time.
Compliance with Applicable or Relevant and Appropriate Requirement (ARARs)	• Descriptions of the alternatives are compared to ARARs summarized in the Section 2 tables.	• Descriptions of the alternatives are compared to ARARs. (ARARs not specifically noted in this table were handled using similar descriptive text in both EPA's Revised FS and the 2012 draft FS.)
	• Unsupported statements are made about the ability to meet water quality ARARs, such as: "Implementation of the alternative in conjunction with adequate upland source control measures over time are not expected to cause or contribute to exceedances of numeric human health and aquatic life water quality criteria and drinking water MCLGs and MCLs."	• "Short- and long-term surface water quality [modeling] projections for each alternative were compared with state and federal surface water quality standards and criteria."
	• An unsupported assumption is made about the ability to meet Oregon Cleanup Laws, such as: "Oregon's risk standards for degree of cleanup for hazardous substances will be met over time through implementation of remedial technologies, ICs, and monitoring."	• "Long-term sediment concentration [modeling] projections for each alternative were compared to potential cleanup value requirements included in this ARAR."
	• "A simplified approach was used that assumed armored	• Appendix M (approximately 400 pages) describes an

FS Evaluation Criteria	EPA's Revised FS Section 4	LWG's 2012 Draft FS
	and reactive caps within shallow water areas and riverbanks would result in unavoidable impacts that would require compensatory mitigation. This approach is presented in Appendix J." Appendix J contains 7 pages of text describing an approach that assumes that each acre impacted is fully functioning and that the function is fully lost due to the dredge or cap activity, which is clearly an incorrect assumption. The text also notes that "a compensatory mitigation framework will be developed."	"equivalency analysis," proposed compensatory mitigation framework, and estimated mitigation required to compensate for unavoidable adverse effects based on the actual existing and proposed habitat functions in areas addressed by each alternative.
	• Compliance with the Endangered Species Act is described as a future process of Biological Assessment (BA) development.	• The LWG submitted a draft BA for EPA consideration under separate cover at the same time as the 2012 draft FS.
	• Compliance with Federal Emergency Management Act flood and wetland regulations is described as a future process of alternative analysis and design.	• "A one-dimensional hydrodynamic model (HEC-RAS) of the Lower Willamette River and Multnomah Channel was used to evaluate compliance of each of the comprehensive alternatives with this ARAR (Appendix Lb)." This modeling was required by EPA at the time.
	• EPA compares Site bulk sediment levels to very conservative Toxicity Characteristic Leaching Procedure (TCLP)-based bulk sediment screening levels and land disposal restriction levels to determine relatively extensive areas of Resource Conservation and Recovery Act (RCRA) hazardous waste.	• Section 5 of the 2012 draft FS compares actual TCLP results to actual TCLP (liquid) criteria and F002 waste requirements to determine a few limited areas of RCRA waste.
Long-term Effectiveness	• The residual risks associated with time-zero SWACs are presented. (As noted elsewhere in these comments, time-zero SWACs and risks are not in any way representative of the long-term effectiveness of the alternatives. EPA defines long-term effectiveness as follows: "The evaluation of long-term effectiveness and permanence evaluation starts at the time RAOs and PRGs are met." The Remedial Action Objectives (RAOs) are mostly not met at time-zero as indicated by EPA's analysis.)	• "The QEAFATE model was used to project the following long-term contaminant concentrations [in sediments, water, and tissue] resulting from implementation of each alternative…"
	• Recontamination potential is evaluated through qualitative statements: "Because contamination within the areas of	• "This evaluation included examination of recontamination potential [using modeling information]

FS Evaluation Criteria	EPA's Revised FS Section 4	LWG's 2012 Draft FS
	construction is either removed, covered or treated in-situ, the overall concentrations of contamination available for resuspension is less than under Alternative A. Thus, there is less potential for contamination from source areas to continue to recontaminate other areas of the site and allow for MNR processes to occur."	at smaller spatial scales and assessed recontamination potential from ongoing known sources (e.g., stormwater, permitted industrial discharges, groundwater, and upstream inputs), along with localized recontamination due to dredging-related resuspension in adjacent areas."
	• Surface and groundwater are evaluated through qualitative statements: "In addition, some of the areas where groundwater contamination is discharging to the river will be capped to eliminate or reduce this discharge, which in combination with lower overall contaminant concentrations in surface sediment will decrease the time needed to achieve RAOs 3, 4, 7, and 8." Stormwater and upstream sources are not addressed.	• For groundwater: "These evaluations used QEAFATE model projections, which incorporated identified groundwater plumes (Appendix Ha, Section 3.2), to assess long-term surface water and sediment quality changes in groundwater discharge areas."
	• The long-term effectiveness of confined disposal facilities (CDFs) is not discussed.	• "The long-term effectiveness of on-Site disposal options included in each alternative was evaluated against the FS CDF Performance Standards (EPA 2010e and LWG 2010a and b; Appendix O) as defined in Section 6.2.9. The evaluations against the performance standards include modeling projections of CDF long-term contaminant isolation effectiveness presented in Appendix Jb."
	• Other aspects of long-term effectiveness (e.g., Adequacy and Reliability of Controls) not listed in this table are evaluated through general descriptions in both EPA's revised FS and the 2012 draft FS.	• Other aspects of long-term effectiveness (e.g., Adequacy and Reliability of Controls) not listed in this table are evaluated through general descriptions in both EPA's revised FS and the 2012 draft FS.
Reduction of Toxicity	• This criterion is evaluated through comparison of the volumes of ex situ treatment and acreages of in situ treatment provided by each alternative.	• The 2012 draft FS evaluates this criterion similar to EPA's revised FS.

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FS Evaluation Criteria	EPA's Revised FS Section 4	LWG's 2012 Draft FS
Short-term Effectiveness	• Community protection is evaluated by comparing the quantities and durations of the alternatives and qualitative statements such as: "Construction and operation activities may result in temporary noise, light, odors, potential air quality impacts and disruptions to commercial and recreational river users on both sides of the river. However, the actual duration at any specific location would be less than the overall construction period."	• Community protection is evaluated in a quality of life analysis in Appendix U with separate sections on aesthetics, odors and dust, noise, recreation, traffic, and navigation.
	• Work protection is evaluated through qualitative statements about the alternative durations such as: "Overall, the risks associated with this alternative would be less than for alternatives D though G due to the shorter construction period."	• "Protection of workers during construction of each alternative was assessed using calculated estimates of non-fatal and fatal injuries using incident occurrence rate data in conjunction with the anticipated construction operations associated with each alternative."
	• Environmental impacts and best management practices are discussed through mostly qualitative and non-comparative statements such as "Sediment removal may result in short-term adverse impacts to the river, including: o exposure of fish and other biota to suspended and dissolved contaminants in the water column, temporary loss of benthos and habitat for the ecological community in dredged areas, o increased emissions from construction and transportation equipment." o Environmental impacts associated with CDFs are not discussed.	• Environmental impacts are evaluated through quantitative and detailed analyses including: o "Water quality, recontamination, and downstream transport during construction were evaluated using QEAFATE model projections throughout the Site. Model-projected water column concentrations were compared to water quality criteria and benchmarks, while sediment quality projections were compared to remedial goals and RALs." Appendix U details results. o "The potential impacts of GHG and air pollutant emissions during construction of each alternative were estimated using standard air inventory calculation methods as described in Appendix Ic." o "The potential short-term impacts to water quality from on-Site disposal facility construction and filling for disposal options associated with each alternative were evaluated through review of the FS CDF Performance Standards."
	• Time protection is addressed through comparison of	• "The approximate timeframes required to achieve RAOs

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FS Evaluation Criteria	EPA's Revised FS Section 4	LWG's 2012 Draft FS
	construction durations (which do not represent achievement of protection) and entirely unsupported statements, such as: "Following the estimated construction time, Alternative B would take the longest time to meet RAOs and PRGs, as the residual contaminant concentrations would be the greater than Alternative B through G, requiring more time for MNR processed to achieve the RAOs and success would be more uncertain." No quantitative analysis is conducted to support that the time to meet RAOs would be greater for smaller alternatives (see Comments 13 and 14 for more detail). Also, EPA uses time-zero SWACs to assess short-term effectiveness, which, confusingly, is the same metric used to determine long-term effectiveness.	were evaluated by comparing projected changes over time in sediment and tissue COC concentrations projected using the QEAFATE and Food Web Models to the ranges of sediment remedial goals and target tissue levels."
	• EPA's revised FS does not discuss green remediation practices and their potential use at the Site.	• In order to comply with EPA Section 10 requirements to consider green remediation opportunities as a potential means to reduce the environmental footprint of the remedial action, the 2012 draft FS Appendix N (46 pages) reviews current green remediation guidance and policy, identifies green remediation technologies and practices, and evaluates their applicability and feasibility to the remedial alternatives as identified in the 2012 draft FS.
Implementability	• Implementability is assessed through descriptive comparisons of durations and quantities involved with each alternative.	• Implementability is assessed through descriptive comparisons of durations, which the 2012 draft FS demonstrates are directly and proportionally related to the quantities involved with each alternative.
Cost	• Quantitative current-year and net present value cost estimates are included, but are presented only on a Site-wide basis. Quantities or costs related to specific Sediment Management Areas (SMAs) or Sediment Decision Units (SDUs; or any other type of subarea) contributing to overall costs are not presented in any way.	• Quantitative current-year and net present value cost estimates are presented including the cost buildup procedures by subSMA.
	• Details in the cost appendix "pdf" file includes additional details on cost assumptions, all on a Site-wide basis only.	• Details include comprehensive executable Microsoft Excel files down to the subSMA spatial scale.

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14. **Unclear and Unsupported Long-Term and Short-Term Effectiveness Evaluations –** As noted above, EPA does not provide quantitative long-term effectiveness estimates and very limited quantitative short-term effectiveness estimates. While the LWG acknowledges uncertainties in numerical estimates of some of the parameters involved (which are clearly described and evaluated through sensitivity analyses in the LWG's 2012 draft FS), there are appropriate methods to address these uncertainties, consistent with EPA guidance and recent EPA FS evaluations at other similar sites, as noted above. For example, The Lower Duwamish Waterway FS had many similar uncertainties, but a more balanced quantitative evaluation included in that FS proved key in those comparative evaluations (AECOM 2012). Dismissing or overly simplifying quantitative estimates of bioaccumulation, sediment transport, natural recovery, and dredging releases in the comparative evaluation of alternatives inappropriately biases the long- and short-term effectiveness evaluations. Specific issues created by EPA's approach include:

    a. EPA clearly defines that, "The evaluation of long-term effectiveness and permanence evaluation starts at the time RAOs and PRGs are met." EPA then relies on time-zero SWACs to estimate residual risks under the long-term effectiveness subsection. Given that time-zero SWACs represent estimated conditions immediately after construction completion, they do not estimate conditions after the RAOs and PRGs are met. EPA states earlier in Section 4 that time-zero SWACs are used because long-term modeling is considered "unreliable," but this does not explain how time-zero estimates are in any way relevant to evaluation of the criterion.

    b. EPA then uses the same time-zero SWACs to also evaluate the short-term effectiveness of the alternatives. Therefore, there is no differentiation between the metrics used to evaluate the long- and short-term effectiveness criteria. Again, EPA does not discuss how the same time-zero estimates can be used to evaluate both timeframes.

    c. Because time-zero SWACs do not represent long-term outcomes, EPA only provides a "qualitative" (i.e., highly subjective) discussion of the actual expected long-term outcomes for the alternatives. For example, EPA assumes that RAOs not met at time-zero will be met over some unknown amount of time due to MNR. However, acceptable risk levels defined in the Section 2 RAOs are often below background or equilibrium levels expected for the Site. EPA does not discuss how it is envisioned that all the acceptable risk levels below background could possibly be met over time through MNR.

    d. EPA describes the ability to estimate natural recovery and long-term outcomes of the alternatives as highly uncertain. Yet EPA asserts that the smaller alternatives (i.e., Alternatives B and D) will not achieve the RAOs as quickly as the larger alternatives (i.e., E, F, and G). Given EPA's stated concerns about predicting the uncertainties associated with the pace and timeframe of natural recovery, it is entirely unclear how EPA reaches this conclusion. A simple analysis of the alternative construction durations and the best available empirical estimate of the pace of natural recovery shown in Table 3, below, clearly illustrates that EPA's conclusions are unsupported.

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The upper half of Table 3 presents EPA's construction durations and the LWG's best estimate of natural recovery rates (expressed as a half-life of 10 years) based on the observed decline in smallmouth fish tissue PCB concentrations sampled over the period from 2002 to 2012 (i.e., using empirical data, not modeling estimates; Anchor QEA 2013). The table shows that Alternatives B through F would all be expected to achieve PCB SWACs equivalent to Alternative G (within the margin of EPA-accepted analytical variability) by or before the time that Alternative G construction could be completed. Further, Table 3 does not include estimates of natural recovery between now and the start of construction (which is "Year 1" in the table). The best-case scenario for the first year of construction would be at least 2022 (assuming ROD in 2017, Consent Decree in 2019, and RD approvals in 2021). This means that natural recovery will have taken place for an additional 7 years before construction starts on any of these alternatives, and this time to start construction is conservatively *not* included in the Table 3 estimated SWACs. Thus, EPA cannot necessarily conclude that Alternatives G will achieve RAOs quicker than the smaller alternatives, as EPA indicates in Section 4.

The lower half of Table 3 presents the same comparison assuming a 12 hours/day construction schedule, instead of EPA's assumption that construction will proceed 24 hours/day. The LWG has strongly disagreed that a continuous 24 hours/day construction schedule over many years is a reasonable expectation for this Site. Again, the assumption is that no natural recovery takes place between now and the start of construction in at least 2022, which is very likely to be incorrect. Thus, considering the uncertainty of EPA's aggressively fast construction durations, the lower half of Table 3 shows that it is even less likely that larger alternatives (e.g., F and G) would achieve RAOs any quicker than the smaller alternatives.

The Table 3 analysis is simplistic and is not a complete evaluation of the time to achieve RAOs, such as provided in the 2012 draft FS using the QEAFATE modeling approach. For example, the pace of natural recovery would be expected to be faster than indicated in Table 3 because these calculations do not include estimates of natural recovery before or during the construction period. Further, EPA would likely argue that the half-life of 10 years assumed is highly uncertain, while the LWG would argue that the ability to construct these alternatives within EPA's estimated durations is highly uncertain. Consequently, Table 3 is not intended to represent the best interpretation of time to meet RAOs for the Site. Rather, Table 3 illustrates, using EPA's information and stated concern about evaluation uncertainties, that EPA's conclusions regarding larger alternatives meeting the RAOs more quickly are based on unsupported assumptions. Even a simple quantitative analysis, such as Table 3, is sufficient to show the bias in EPA's conclusions in light of the recognized uncertainties regarding the short- and long-term effectiveness of the alternatives.

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Table 3. Illustration of the Implications of the EPA Recognized Uncertainties in Predicting Time to Achieve RAOs.

PCB SWACs (ppb) Comparison Using EPA's 24-hour/day Assumption for Alternative Durations

Best Estimate Natural Recovery Half Life (yrs)* = 10

EPA Alternatives	Years**																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A (no action)	85	79.1	73.6	68.5	63.8	59.4	55.2	51.4	47.9	44.5	41.4	38.6	35.9	33.4	31.1	28.9	26.9	25.1
B				49.3	45.9	42.7	39.7	37.0	34.4	32.0	29.8	27.8	25.8	24.0	22.4	20.8	19.4	18.0
D					40.0	37.2	34.6	32.2	30.0	27.9	26.0	24.2	22.5	20.9	19.5	18.1	16.9	15.7
E							31.5	29.3	27.2	25.4	23.6	22.0	20.4	19.0	17.7	16.5	15.3	14.3
F												21.3	19.8	18.4	17.1	15.9	14.8	13.8
G																		15.3

PCB SWACs (ppb) Comparison Using LWG's 12-hour/day Assumption for Alternative Durations

EPA Alternatives	Years**																																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
A (no action)	85	79	74	69	64	59	55	51	48	45	41	39	36	33	31	29	27	25	23	22	20	19	18	16	15	14	13	12	11	11	10	9	9	8	7	7
B								49	46	43	40	37	34	32	30	28	26	24	22	21	19	18	17	16	15	14	13	12	11	10	10	9	8	8	7	7
D										40	37	35	32	30	28	26	24	23	21	20	18	17	16	15	14	13	12	11	10	10	9	8	8	7	7	6
E														32	29	27	25	24	22	20	19	17	17	15	14	13	12	12	11	10	9	9	8	8	7	7
F																								21	20	18	17	16	15	14	13	12	11	10	10	9
G																																				15

Duration of alternative construction

XX Year construction is completed and EPA estimated SWAC at that time.

XX Year that alternative achieves the Alternative G post-construction SWAC, plus 20% (i.e., plus or minus 20% is the EPA acceptable analytical accuracy for organic compounds) using estimated natural recovery rate.

* Estimated natural recovery rate based on average smallmouth bass fish tissue half-lives using 2002, 2007, and 2012 data. Recent 2014 PCB sediment data appear to be approximately equivalent to this half-life.

** The years start at the assumed start of construction. The best-case scenario for the first year of construction would be at least 2022 (assuming ROD in 2017, Consent Decree in 2019, and RD approvals in 2021). This means that natural recovery will have taken place for an additional 7 years before construction starts on any of these alternatives, and this time to start is conservatively not included in the above estimated SWAC reductions.

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e. As discussed in Comment 13, EPA makes no quantitative evaluations of short-term effectiveness for worker protection, air emissions, water quality impacts, or time to achieve protection (e.g., time to achieve the RAOs). (As shown in Table 2, the 2012 draft FS contains well-accepted, guidance-based methods to quantitatively estimate all of these impacts, but EPA chose not to use any of these tools.) Thus, there is no way for EPA to actually evaluate the balance of the construction impacts and time to achieve RAOs. For example, because dredging water quality and other construction impacts are expected for a duration of up to at least 18 years (for Alternative G using EPA's estimates), how much quicker do the RAOs need to be met to justify those impacts? If the dredging water quality impacts (and associated impacts to fish tissue concentrations) are estimated as very significant, the achievement of RAOs by a more construction intensive alternative needs to be much quicker than other alternatives to justify those significant water quality impacts. An entirely different conclusion might be reached if the dredging water quality impacts are estimated to be minimal for 18 years. But EPA makes no quantitative estimates of the magnitude of water quality impacts, despite the ready availability of commonly applied ERDC dredge water quality models such as the DREDGE model (ERDC 2015). Consequently, EPA's conclusions regarding the balance of short-term effectiveness across these overall impacts are unsupported and completely subjective.

f. EPA's short-term impacts evaluation (impact on community, workers, and environment) consists of making unsupported subjective statements about these likely impacts. EPA's evaluation fails to meet CERCLA requirements, which states, "The potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment," must be evaluated during remedy selection. See 42 U.S.C. § 9621(b)(1)(G). Additionally, 40 CFR 300.430(e)(9)(iii)(E) requires that an FS evaluate the following: short-term risks that might be posed to the community during implementation of an alternative, potential impacts on workers during remedial action and the effectiveness and reliability of protective measures, and potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation.

   Although Section 4 includes some general statements about these short-term impact issues, this does not fully address the regulatory requirements noted above. Rather, EPA often assumes negative impacts generated by the project will be controlled or eliminated during implementation through BMPs or similar measures (e.g., particularly with regard to dredging releases). A quantitative analysis of short-term risks is an essential element of a defensible FS. As the LWG has demonstrated in its 2012 draft FS, using available occupational and actuarial data, the worker risks generated by implementing each alternative can be predicted with greater certainty than the risks predicted from long-term exposure to sediment. For example, each truck trip to the proposed disposal facility generates over $1x10^{-6}$ risk of a fatality. Also, as

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discussed in Comment 5a, EPA does not assess community impacts at a reasonable level of detail.

15. **Inappropriate Benthic Risk Analysis** – EPA does not mention benthic community risks in the Section 3 RAL, SDU, or SMA development text (as noted in Comment 3). EPA must develop and evaluate alternatives that fully consider benthic risks using methods that are consistent with the BERA. Although EPA conducts an extensive SDU analysis to assess whether the selected RALs bound other risk pathways, EPA does not discuss the extent to which these RALs are expected to bound and address benthic community risks. In contrast, the 2012 draft FS included a detailed evaluation of and determination of benthic risk SMAs using the CBRA approach, as required by EPA at the time.

    Then in Section 4, EPA evaluates the alternatives for their ability to adequately address benthic community risks. EPA concludes that all the alternatives do not address through active remediation a "substantial" portion of the benthic community risks. For example, EPA states for Alternative G, "There are a substantial number of locations where unacceptable benthic risk (identified via bioassays or predicted via the Logistic Regression Model [LRM]) are not encompassed by the areas of construction as shown on Figure 4.2-11." EPA states that the remaining benthic risks will be addressed through MNR. While it is reasonable to address low-level risks through MNR (including benthic risks), EPA has constructed alternatives that ignore benthic risk and then demerits those same alternatives in the effectiveness evaluation for failing to adequately address benthic risks.

    EPA's benthic risk approach is particularly inconsistent given that EPA made multiple changes to the RALs between the draft and revised FS because EPA deemed the 2012 draft FS RALs for PAHs, DDE, and dioxin/furans as "not protective." This decision resulted in extensive work to recalculate all the SMAs and alternative quantities and costs. EPA does not attempt to explain in Section 4 whether EPA could have avoided all of this rework and instead similarly decided that MNR would address relatively low-level risks for PAHs, DDx, and dioxin/furans that EPA deemed were not directly addressed by the 2012 draft FS RALs. There are some important additional technical issues with EPA's benthic risk approach as follows:

    a. EPA's method for defining benthic risks requires additional explanation. EPA provides one figure series (Figure 4.2-11 and Figures 4.2-14 through 17) and two statements regarding the methods used: 1) "Identified via bioassays or predicted via the LRM"; and 2) "Additionally, benthic risk is evaluated by determining the percentage of measured or predicted benthic toxicity points addressed by the construction of the alternative." The term "toxicity points" is new and not defined. Consequently, these results are not reproducible and the subsequent, related conclusions appear unsupported.

    b. From examination of the cited figures, it appears that EPA used any instance of a Level 2 or Level 3 bioassay hit and any exceedance of the LRM benthic screening levels to determine that "benthic risk" was present at any given sampling station. The BERA is clear that individual benthic toxicity lines of evidence are insufficient to fully characterize benthic risks at the Site.

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Therefore, EPA's "toxicity points" methodology appears inconsistent with the EPA-approved BERA. This is despite EPA indicating that risks were evaluated in Section 4 "consistent with the BERA." Further, the BERA is clear that the LRM screening levels are relatively poorly correlated with observed toxicity as compared to the FPM model. EPA provides no justification for focusing on the LRM screening levels rather than other available screening levels from the BERA. Further, EPA appears to not be using the EPA-proposed benthic toxicity PRGs from Section 2, which EPA indicates in Section 2 determine attainment of RAO 5.

16. **Inappropriate Cost Estimates** – EPA's costs estimate methods and results are insufficiently detailed to support the FS evaluations and consistently minimize the apparent costs of the larger alternatives and dredging, as compared to the smaller alternatives and capping. Given the lack of supporting information and the compounding effect of the many errors and inconsistencies with the limited information that is provided, it appears highly unlikely the overall cost estimates would achieve the +50% to -30% precision required by EPA FS costing guidance (EPA 2000).

    a. Section 3 does not contain any details on the development of alternative quantities, such as areas, dredge volumes, and placed material volumes (e.g., caps and backfills), and as noted in the Section 3 significant issues, the total quantities that are provided are often inconsistent in various text and table locations, sometimes with variations in excess of 100%. Given that much of the alternative costs are developed using unit costs (i.e., dollar cost per unit of quantity), understanding the process steps and accuracy of quantity estimates represents half of the typical costing procedure but is almost completely undescribed.

    b. The cost estimates for each alternative are presented on a Site-wide basis only, with no spatial differentiation within the Site. It is impossible to determine the subareas (such as SMAs or SDUs) within the Site from which quantities or costs originate. In contrast, the 2012 draft FS contained detailed executable Excel spreadsheets that showed the "build up" of the costs starting from a subSMA spatial scale.

    c. Overall, EPA's cost estimates are much higher than the alternatives presented in the 2012 draft FS, but the additional effectiveness and protectiveness provided by these additional expenditures is entirely unclear for reasons discussed in Comments 13 and 14 above. Further, EPA has substantially and proportionally increased the costs of the smaller alternatives, as compared to the larger alternatives. For example, EPA's Alternative B Net Present Value (NPV) cost estimate is 2.4 to 4.7 times more expensive than the 2012 draft FS Alternatives B-i and B-r, while EPA's Alternative G NPV cost estimate is 1.4 to 2.8 times more expensive than the 2012 draft FS Alternatives F-i and F-r. Thus, as compared to the 2012 draft FS, the costs of EPA's smaller alternatives have increased by approximately 70% more than the cost increases associated with the larger alternatives. EPA's Alternative B NPV cost is now approximately $791 million (Table 4.3-1), as compared to the

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2012 draft FS Alternative B range of $169 to $330 million. And EPA screens out Alternative C entirely in Section 3, so the next EPA alternative is Alternative D at an NPV cost of $1.1 billion. As a result, there is no longer any reasonably defined "low cost alternative" to support evaluation of a wide range of potentially cost-effective remedies for the Site.[16]

d. Appendix J (Compensatory Mitigation Requirements), Section J3.2 (FS Mitigation Assumptions and Cost Evaluation) describes the simplified approach that was used to determine the extent of mitigation that could be required under each alternative and to develop potential mitigation costs. The approach includes totaling acreages of shallow water and river bank areas with cap and dredge technology assignments that are then multiplied by a unit cost (per acre) for mitigation.

   This approach assumes that each acre impacted is fully functioning and that the function is completely lost due to the dredge or cap activity. This is not a reasonable assumption given that most shoreline and bank areas in the harbor are degraded and provide limited habitat function and value (e.g., presence of contaminants, steep slope, and limited riparian area). Therefore, all of the mitigation costs provided are likely conservatively high. This approach yields large dollar amounts for mitigation across the alternatives ($32 million to $382 million over 14 to 163 acres). During design when actual existing and proposed habitat conditions are considered, the actual mitigation needs will likely be significantly lower.

e. EPA increased some cost assumptions for capping, which favor making capping more expensive relative to dredging. (By contrast, as discussed in Comment 16f below, EPA minimizes the costs of many aspects of dredging.) EPA increased cap placement and material purchase costs 35% above the 2012 draft FS unit rates with no explanation. Similarly, EPA increased armor placement and material purchase by 83% with no explanation.

f. Despite adjusting the overall range of costs substantially upward, EPA appears to also be using a number of assumptions that make the larger and dredging-intensive alternatives appear optimistically less costly. Examples include:

   i. EPA used a 7% discount rate, which is indicated on the first page of EPA cost estimate guidance for FSs (EPA 2000). However, the second complete paragraph on page 4-5 of that guidance indicates that a different discount rate can be used as long as it is justified consistent with OMB Circular A-94. Accordingly, the 2012 draft FS used a discount rate of 2.3%, consistent with guidance as explained in that document. The equivalent treasury rate for 2015 is 1.4%, which is a much more appropriate discount rate at a site where the PRPs include the

[16] This is particularly true given that the 2012 draft FS concluded that Alternative B was the most cost-effective alternative, and EPA has not shown in the revised FS why this conclusion is false for reasons stated in Comments 13 and 14.

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United States, the State of Oregon, municipalities, public utilities, and many parties whose principal or only source of funding for cleanup are insurance funds outside their investment control. The effect of EPA's higher discount rate is that the larger alternatives with greater construction durations are heavily discounted (i.e., Alternative E is discounted a total of 41% and Alternative G is discounted by 77%).

ii. EPA used an unexplained mobilization/demobilization factor of 1.6%, while the 2012 draft FS used 15% factor based on project experience at similar sites.

iii. EPA used a contingency factor of only 20%, while the 2012 draft FS used 40%. EPA guidance indicates that the overall contingency for an FS should be in the 20 to 45% range. Thus, EPA is using the lowest possible contingency factor allowed by guidance. EPA cites guidance indicating that larger projects with high costs may have lower overall contingency factors. This may be true for some types of projects, but given the complexity of this Site and the large number of issues that will be refined in design, using the lowest possible contingency factor appears very optimistic and greatly decreases the costs of the alternatives, particularly the largest alternatives.

iv. EPA used lower percentages for Project Management (2%), Remedial Design (2%), and construction management (3%) than EPA guidance (5%, 6%, and 6%, respectively). These factors are also lower than the 2012 draft FS, which used 15% for remedial design and a monthly rate for project management and construction management.

v. EPA used a 1.75 factor times the "neat" volume to obtain total volumes for each alternative (average of the 1.5 to 2.0 range indicated by EPA). The 2012 draft FS approach included specific factors applied to actual FS-level dredge prisms to estimate overall volumes, whereas EPA's simplistic neat volume approach sets a depth for each 10 × 10-foot "pixel." EPA's approach underestimates dredge volumes, as the LWG has previously commented (LWG 2014a). Consequently, EPA's volume factor of 1.75 is optimistically low.

vi. EPA is assuming a 140-acre offloading facility will be developed somewhere on the river, as compared to the 2012 draft FS assumption of a 20-acre facility. EPA then assumes the same development costs for this facility as the 2012 draft FS, despite EPA's assumed facility being 7 times larger. (EPA adjusted some other facility costs to partially account for this much larger facility.)

vii. EPA assumes that all dredge dewater must be treated at a dedicated water treatment facility before discharge to the river. This will require extremely robust and costly treatment methods to meet low water quality criteria and state standards. However, EPA includes no water treatment costs for water generated during dredging. Even typical environmental

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dredging practices create large volumes of dewater. Further, EPA also assumes widespread use of an articulated arm bucket, which generates relatively greater amounts of water (i.e., approximately a cubic yard of water will be generated for each cubic yard of dredge material). Consequently, the absence of water treatment costs is a significant omission in the cost estimates.

viii. EPA conducted a cost sensitivity analysis, although it does not appear to be used in the main text of Section 4. The sensitivity analysis does not vary many of the factors that are expected to contribute most to variations in costs (some of which are described above). Also, there are several aspects of the sensitivity analysis that are incorrect or represent impossible situations not reflective of actual cost variations. For example, EPA varies alternative durations without varying the associated capital costs. EPA also varies the volumes by small factors without varying the resulting construction durations. Consequently, the sensitivity analyses do not represent a reasonable evaluation of whether EPA's cost estimates are within the guidance requirement of +50 to -30% precision.

g. There are significant equipment and contracting issues associated with executing multi-year projects where tens of millions of dollars of equipment need to be mobilized to the Site. The cost estimates do not factor in the standby costs created by idle equipment for two thirds of each year while the construction window is closed.

h. Other aspects of EPA's FS methods that appear to underestimate costs that are noted in other comments include:

i. Optimistic construction durations reduce costs related to labor or equipment time.

ii. Volumes, and therefore associated removal costs, appear likely to be underestimated.

iii. The cost impacts related to use of innovative and extensive techniques to reduce dredge releases do not appear to be considered.

17. **Risk Inconsistency** – EPA's methods and results are often inconsistent with the BLRAs throughout the FS including Sections 2, 3, 4. This culminates in Section 4 with a residual risk assessment that departs significantly from the methods and findings of the BLRAs. The LWG has commented to EPA on numerous occasions (e.g., LWG 2014d, 2015a, 2015b) that EPA should include risk management steps in the FS consistent with guidance. These comments include that EPA should address only those potential risks for contaminants, media, and pathways that were clearly found to pose unacceptable risks in the BLRAs and that EPA should further focus on the subset of unacceptable risks that are required for selecting an effective and protective remedy using all of the FS criteria. Instead, EPA has departed from the BLRAs and applied virtually none of the risk

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management steps noted in guidance such as the 2005 sediment remediation guidance and EPA's 11 Risk Management Principles Memorandum for, "making scientifically sound and nationally consistent risk management decisions at contaminated sediment sites." The relevance of this guidance to risk management steps in the FS is reviewed in detail in Sections 10.1 and 10.2 of the 2012 draft FS. In summary, EPA guidance (2005a) discusses "Risk Management Principles and Remedial Approaches" and clearly describes that the cleanup should use a "risk-based framework"; "select site-specific, project-specific, and sediment specific risk management approaches that will achieve risk-based goals"; and "ensure that sediment cleanup levels are clearly tied to risk management goals" (p. 1 – 5).

Specific issues related to EPA's lack of consistency with the BLRAs, residual risk assessments, and lack of risk management include:

a. Per the LWG's 2014 Section 2 comments (LWG 2014d) and consistent with law, EPA guidance, and precedents from other sediment sites as detailed in past comments:

   i. RAOs, COCs, and PRGs should only be designated for contaminant exposure scenario pairs (ecological or human health receptors and pathways) for which the EPA-approved BLRAs identified potentially unacceptable risk from in-river media (e.g., not potential upland source media, and ARARs should not be used to develop PRGs for non-COCs).

   ii. PRGs should be established and applied for these COCs consistent with risk assessment methods (e.g., spatial scales) and only where sufficient technically valid information exists to do so.

   iii. The FS should focus on those COCs and PRGs that are technically practicable to achieve and for which acceptable risk levels can be reached through the sediment remedial action alternatives being evaluated in the FS.

   iv. COCs and PRGs should only be established if reasonably conservative risk management approaches indicate that a contaminant is significantly contributing to risk and that evaluation of remedial alternatives with respect to a PRG for a particular COC/exposure pathway pairing is required in order to select a protective remedy.

   v. Consistent with EPA background guidance (EPA 2002), PRGs should not be set below reasonably achievable anthropogenic background levels (this includes the concept of "equilibrium" as explained in LWG 2014g).

   The LWG's Section 2 comments (LWG 2014d) detail how each of these concepts is consistent with remediation regulations and guidance.

b. Similarly, RALs for each COC should be applied consistent with the exposure and potentially unacceptable risk areas defined for that COC in the BLRAs (e.g., RALs should not be applied where the exposure pathway or unacceptable risks for those COCs do not currently exist). This is consistent

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with the "risk-based framework" required by guidance, as cited above. The issue of RAL consistency with the BLRAs is also noted in the Comment 3.

c. EPA presents a residual risk evaluation in Section 4 and indicates that the risks were calculated using methods consistent with the BLRAs. No details are provided on how the risk calculations where performed. Appendix H is entitled "Residual Risk Evaluation," but this appendix only contains a brief description of how time-zero SWACs were estimated on a rolling river mile basis. Additional information on the exposure assumptions, exposure point concentrations (for both sediment and tissue), and toxicity values is needed to evaluate consistency with the BLRAs. EPA's statement of consistency with BLRA methods is not enough to ensure that the methods are fully understandable or reproducible. Regardless, even based on the limited information presented, it is clear that EPA's methods are not consistent with the BLRAs in at least several respects. Examples include:

   i. For human health sediment direct contact, time-zero SWACs were generated for shoreline areas (excluding the navigation channel) on a 1-river mile spatial scale, according to Appendix H. (However, the main text indicates instead that 0.5 river mile spatial scales were used. Also, Figure 4.2-1 suggests that EPA included the navigation channel in RAO 1 assessment, which would be incorrect.) Regardless, of how EPA actually did the assessment, sediment direct contact risks were evaluated in the BHHRA for shoreline *half* river miles, excluding the navigation channel.

   ii. For human health fish consumption risks, SWACs were generated on a 1-river mile basis longitudinally split into the two shoreline areas and the navigation channel. However, in the BHHRA risks were evaluated by whole river miles with no longitudinal splitting for recreational fish consumption. Further, it is unclear which fish consumption scenario is actually being presented in the residual risk figures. If the subsistence fisher scenario is being presented, this was evaluated on a Site-wide basis in the BHHRA (not by river mile). The text on page 4-6 indicates that EPA calculated tissue concentrations from the SWAC estimates, but no tissue concentrations are presented. The text also indicates that these estimated tissue concentrations were compared to the PRGs for RAO 2. The LWG indicated in the Section 2 comments (LWG 2014b, 2015a, 2015b) disagreement with several aspects of EPA's tissue PRG calculations (and that such tissue levels should be classified as PRGs at all) because EPA was not consistent with the BHHRA methods.

   iii. The human health residual risks for Alternative A are higher than the maximum risks calculated in the BHHRA, which indicates there are inconsistencies (residual risks should not be higher than baseline). The highest non-cancer risk for a breastfeeding infant in the BHHRA was 10,000. The residual risk assessment indicates the highest non-cancer risk for a breastfeeding infant would be 210,000.

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iv. There is a significant disconnect between the BHHRA and residual risks for RAO 2 for dioxins/furans. For a breastfeeding infant, the highest hazard quotients for dioxin/furan TEQ calculated in the BHHRA were 10 on a Site-wide basis (tribal fish consumption, whole body diet) and 10 on a river-mile basis (recreational RME consumption, RM 7). Figure 4.2-4c(1) indicates that the HQ from HxCDF alone (not the entire TEQ) is more than 14,000 for Alternative A. For a child, the highest hazard quotients for dioxin/furan TEQ calculated in the BHHRA were also 10 on a Site-wide basis (tribal fish consumption, whole body diet) and 10 on a river-mile basis (recreational RME consumption, RM 7). Figure 4.2-3f(1) shows a HQ greater than 30 for just HxCDF. The RfD has changed since the BHHRA was completed, but that does not account for the difference between the BHHRA and residual risks.

v. Continued exclusion of the site use factor from the BHHRA for BaPEq RAO 1 PRG (106 µg/kg) results in concluding that not even Alternative G will result in SWACs meeting the PRG at time zero in east and west river miles (per EPA's Table 4.2-1). However, if the BHHRA site use factor is accurately applied to this PRG (424 µg/kg), Alternative A appears to achieve RAO 1 in all East RMs (according to EPA's Figure 4.2-7b).

vi. Residual risk figures should show and Section 4 should discuss human health risks compared to a 10^{-4} threshold in addition to the 10^{-6} threshold to fully evaluate the range of effectiveness. EPA's Section 2 presents PRGs calculated on both a 10^{-4} and 10^{-6} thresholds. EPA should evaluate alternatives in the entire acceptable risk range (10^{-4} to 10^{-6}) against the FS evaluation, not just variations of RALs all targeted at 10^{-6} or lower risk.

vii. For ecological sediment direct contact, SWACs were generated on a 0.2-mile basis with longitudinal splitting. This spatial scale may or may not be representative of the combined lines of evidence approach used in the BERA to assess benthic risks, given areas of benthic risk were defined for various sized clusters of sampling stations. Further, the hazard quotients presented in the figures appear to be generated by simply dividing the SWAC by the individual PRGs in Section 2, which are mostly based on generic literature Probable Effects Concentrations (PECs). The LWG has already commented on Section 2 (LWG 2014b, 2015a, 2015b) that use of the individual PECs is not consistent with the BERA determinations of benthic risks using multiple lines of evidence.

viii. For ecological bioaccumulation risks, SWACs were generated on a 1-river mile basis with longitudinal splitting. However, the receptors that appear to be used in the residual risk calculations were evaluated over various exposure spatial scales. For example, osprey egg assessment appears to be the receptor of choice for dioxin/furans and DDE, and osprey exposure was assessed in the BERA on a much larger

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spatial scale than 1 river mile. Thus, it is unclear how EPA's one spatial scale assessment can be consistent with all of these various BERA assessments. Further, the LWG has already commented for Section 2 that some of the receptors EPA focuses on for RAO 6 PRG development, and EPA presumably is focusing on for this residual risk assessment, are inappropriate and inconsistent with the BERA for reasons detailed in those past comments (LWG 2014b, 2015a, 2015b).

ix. The statement in Section 4.1.6.1 that "ecological hazard quotients are calculated using the estimated sediment concentrations and the risk-based PRGs for RAOs 5 and 6, consistent with the process used in the BERA" is misleading in its claim that RAO 5 and 6 PRGs are risk-based. The assertion that this EPA process used to calculate ecological hazard quotients is consistent with the BERA is obviously wrong because ecological hazard quotients that EPA reports in Section 4.2.1 for alternative A (no action) are much higher than BERA HQs. The residual risk assessment is also apparently inconsistent with the BERA in its use of "ecological hazard indices," although this is unclear because EPA has not defined the term.

x. The residual ecological risk assessment is inconsistent with the BERA in asserting that riverbank soil poses risk. No analysis is provided to back up this assertion and no analysis of riverbank soils (as defined in the RI) were assessed in the BERA.

xi. Despite EPA providing few method details, these aspects of EPA's residual risk methods can be shown to be inconsistent with the BLRAs. This suggests it is highly likely that other details of the methods, if they were known, would also be inconsistent with the BLRA methods.

18. **Inappropriate Resource Conservation and Recovery Act and Other Waste Determinations** – Sections 3 and 4 present several determinations regarding RCRA hazardous waste and the Oregon Pesticide Residue Rule that are inconsistent between sections or incorrect. These include:

a. The LWG disagrees with EPA's assumptions regarding the potential designation of sediments offshore of the Arkema site as State-listed wastes under the Oregon Pesticide Residue Rule. This designation was disputed by LSS during the Arkema EE/CA, and EPA has yet to resolve this issue with DEQ. EPA's interpretation of the Oregon Pesticide Residue Rule will not be resolved through further testing, as suggested by Section 3.3.5.1 in the FS: "Appropriate testing will need to be conducted to determine if sediment removed from the approximate areas shown on Figure 3.3-39 contains these listed RCRA- or State-listed wastes."

b. EPA indicates that there is RCRA hazardous waste in sediment off of the Arkema Site due to chlorobenzene (see Fig.4.2-2d). (Incidentally, the green area shown in this figure is not the highest sediment concentration for chlorobenzene in this area. Consequently, it is unclear how EPA arrived at

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the green area noted in the figure.) During the Arkema EECA characterization work, 15 cores were obtained from the area of highest sediment contamination (between the docks) and run for a full TCLP analysis. Regarding chlorobenzene, in order for it to be a characteristic (toxicity) hazardous waste, it would have to exceed 100 mg/L chlorobenzene Toxicity Characteristic Leaching Procedure (TCLP) level. The highest TCLP concentration result for chlorobenzene in the EE/CA sampling was 22 mg/L, and the average was less than 5 mg/L. Therefore, it is technically incorrect for EPA to designate any sediment off the Arkema Site as characteristic hazardous waste based upon the presence of chlorobenzene.

c. Page 4-23 presents additional EPA determinations beyond those presented in Section 3 regarding RCRA waste determinations. EPA indicates in Section 4 that TCLP bulk sediment screening levels are used to determine likely RCRA hazardous wastes. However, Section 3 indicates that actual TCLP (leachate liquid) results are used for RCRA hazardous waste determinations. In general, it is inappropriate to use bulk sediment TCLP screening levels for determinations of hazardous waste, even at an FS level, particularly when an extensive set of actual TCLP results are available. The primary reason is that the bulk sediment screening levels assume that all of the chemical present in the bulk sediment will be leached out during the TCLP test. This is almost never the case, so such screening levels are as conservative as possible. Also, the FS TCLP data were collected under an EPA-approved field sampling plan. EPA provides no rationale for why bulk sediment screening levels are used in Section 4 instead of the EPA-directed TCLP results used in Section 3.

d. EPA appears to use RCRA Land Disposal Restriction (LDR) values to identify large areas of soil and sediment that must be treated prior to disposal if excavated or dredged. Section 4.2.2.2 (page 4-23) states, "Waste will also be sampled as generated to determine any volumes that exceed Land Disposal Restrictions (LDRs) and will require the prescribed treatment prior to disposal. LDR values have been established for 39 COCs as shown in Table 4.2-11. The RI data set indicates that 32 COCs exceed the criteria. The locations where these criteria are exceeded is presented on Figures 4.2-13a-e." We read this text and the referenced table and figures to suggest that all dredged sediments with concentrations exceeding the values on Table 4.2-11 must be treated prior to disposal.

   RCRA land disposal restrictions apply only to RCRA "hazardous wastes." 40 CFR §268.1(b): "The requirements of this part apply to persons who generate or transport hazardous waste." "To be subject to the land disposal restrictions, a waste must first be a RCRA hazardous waste. Unless a waste meets the definition of a solid and hazardous waste, its disposal will not be subject to the LDR program." *Introduction to Land Disposal Restrictions*, p. 5 (EPA530-8-05-013, September 2005). *See also, Management of Remediation Waste Under RCRA*, p. 2 (EPA530-F-98-026, October 14, 1998) ("Note that not all remediation wastes are subject to RCRA Subtitle C hazardous waste requirements. As with any other solid waste, remediation

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wastes are subject to RCRA Subtitle C only if they are listed or identified hazardous waste. Environmental media are subject to RCRA Subtitle C only if they contain listed hazardous waste, or exhibit a characteristic of hazardous waste.") Many of the LDR values identified in Table 4.2-11 are well below DEQ risk-based cleanup values for residential soil, and non-RCRA hazardous waste remediation wastes can safely be managed in Subtitle D landfills without prior treatment.

i. EPA's Section 3 presents only one instance of TCLP results indicating toxic hazardous waste (near Arkema) and another instance of a TCLP exceedance at Gasco, where EPA notes that MGP wastes are "by definition not RCRA hazardous wastes per 40 CFR §261.24(a)." EPA notes two specific and spatially limited instances of potential listed waste. Other than in these limited areas, RCRA LDRs are not even potentially applicable and should not be considered in the FS or in remedy selection. See *Management of Remediation Waste Under RCRA* (p. 6): "If hazardous waste was originally disposed of before the effective dates of applicable land disposal restrictions and media contaminated by the waste are determined not to contain hazardous waste when first generated (i.e., removed from the land, or area of contamination), the media are not subject to RCRA requirements, including LDRs."

ii. Although there are no references for the LDRs identified on Table 4.2-11, the values appear to be the Universal Treatment Standard (UTS) values found in 40 CFR 268.48 Table UTS. Where LDRs may be applicable at this Site because of the presence of listed or characteristic RCRA wastes, 40 CFR §268.49 provides alternative treatment standards for soil (including sediment) containing hazardous waste. Generally, 40 CFR §268.49 requires that soil containing a listed hazardous waste or exhibiting the toxicity characteristic of hazardous waste must be treated prior to land disposal to remove 90% of the underlying hazardous constituent concentrations or to 10 times the UTS, whichever would be achieved first. That is, the LDR values in EPA's table are low by a factor of at least 10.

EPA's disposal decision tree (Figure 3.3-40) indicates that RCRA hazardous waste will be ex situ treated and then disposed of in a Subtitle C landfill. But the cost appendix (G) makes no mention of any treatment or disposal requirements and associated costs assumed for RCRA hazardous waste. Consequently, it is unclear whether EPA actually included in any alternatives an assumption of ex situ treatment and Subtitle C disposal any of the potential RCRA hazardous waste discussed in Sections 3 and 4.

19. **Low Level of Detail, Clarity, and Consistency** - EPA does not present intermediate details that lead to many of the estimates made in Section 3 (e.g., quantities, durations, locations of various Site or alternative features, etc.). Also, many alternative requirements are simply stated with little or no explanation of the reasoning behind the

choices involved. Further, many aspects to EPA's descriptions are inconsistent between locations in the text, between text and figures, or between text and tables. This makes the overall approach difficult to understand, and it is not currently reproducible even to a general degree.

Some examples of the inconsistencies and missing information in Section 3 include (but are not limited to):

a. EPA does not explain how the PTW highly toxic thresholds were derived. EPA orally referred at the July 29, 2015 roll-out meeting to a 2014 EPA Technical Memorandum. The memorandum was stamped preliminary draft and contains multiple other methods that EPA appears to have abandoned or revised in the interim. This memorandum therefore does not provide a clear description of EPA's current methods. Also, the LWG commented on the memorandum (LWG 2014c) and EPA appears to have rejected those comments in total.

b. The rationales for several aspects of the RAL determination methods are not explained. For example, why did EPA use Site-wide RAL curves almost exclusively after commenting repeatedly on the 2012 draft FS that there was too much focus on Site-wide spatial scales during RAL development and other FS steps? Similarly, why does EPA show a smaller scale RAL curve for DDx only? This selective use of a smaller spatial scale for this particular COI appears arbitrary. Why do so called "Site-wide" RAL curves range in acreage covered from 2,200 acres to 180 acres? How do any of these RAL curve spatial scales relate to PRGs being compared to, which should applied using spatial scales at least roughly similar to the exposure assumption spatial scales in the BLRAs? Where do the background replacement values come from and why are they appropriate? We assume that the TPAH PRG of 970 ppb is an error, as the RAO 5 PRG used both in Sections 2 and 4 is 23,000 µg/kg.

c. EPA does not explain the rationale or process for many aspects of the proposed technology assignment approach. For example, the "smoothing" step is only described as an "algorithm." The algorithm is not in any way described and the results before and after the smoothing step are not presented (at least in a way that can be identified as such). Further, Figures 3.3-27a-f present the technology assignments resulting from the scoring matrix and are introduced well after the smoothing algorithm is mentioned. Yet these figures contain many very small scale assignments of dredging or capping that appear to constitute only a few pixels each. It is unclear whether this is the "smoothed" version or not.

d. EPA shows more than 2500 acres although it has agreed in the past that the Site is about 2200 acres. Also, EPA shows technology assignments downstream of RM 1.8. EPA indicated in the August 13 conference call that EPA did not intend to expand the Site area, but the above Site acreage and mapping inconsistencies have not been explained by EPA.

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e. The technology assignment scoring matrix is presented as applying to the entire Site with only a couple of "off ramps" to the process identified. Examination of the decision trees for shallow, intermediate, and deep areas show that the scoring matrix is only used and applied in the intermediate areas (which constitute a fraction of the Site). Thus, it appears other a priori decisions that are not fully explained lead to the selection of remedial technologies over the majority of the Site area, or alternatively, the actual approach used by EPA is unclear.

f. There are multiple inconsistencies between the text and technology assignment decision trees including the following examples:

- As noted briefly above, Figures 3.3-27 and 3.6-02 through 07 show different technology assignments in a number of intermediate to shallow areas throughout the Site. EPA could not readily identify in the July 29, 2015 meeting the sources of differences in technology assignments between the two maps. It is unclear that either map is consistent with the technology scoring matrix and decision trees presented in Section 3.
- All text describing decision points in the decision trees involving PTW discuss that certain decisions are based on the presence of NAPL and PTW that is not reliably contained. However, all the decision trees make a distinction between PTW that is not reliably contained and PTW that is reliably contained[17]. NAPL and its role in the decision process is not mentioned in any of the decision trees. Consequently, it is unclear on every decision tree point involving PTW exactly which sediment characteristics are actually being considered in those decisions.
- EPA indicates in the text about intermediate areas that, "Contaminated sediment will be dredged to the lesser of the RAL concentrations or 15 feet (assumed maximum depth since special design and side slope stabilization considerations would need to be conducted on an area-specific basis). If NAPL or PTW that is not reliably contained has been identified in a dredge area, then either an armored reactive cap or a reactive residual layer is assumed. Otherwise, a residual layer is assumed." However, the decision tree figure for intermediate areas indicates a distinction between PTW that is not reliably contained and PTW that is reliably contained. Following the decisions path for PTW that is reliably contained, all post-dredge options assume a "reactive residual layer" not a "residual layer." A similar inconsistency exists between the text and decision trees presenting the approach for navigation channel areas.

[17] As noted above, the LWG disagrees that there is such a thing as PTW that can be reliably contained, given that EPA' PTW guidance indicates reliably contained is one of the criteria used to define PTW.

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- EPA indicates in the text for shallow areas that, "Contaminated sediment will be dredged to the lesser of the RAL concentrations or a maximum depth of 5 feet, and the dredged material will be replaced with an engineered cap to previous elevation. Otherwise, the contaminated sediment will be dredged 3 feet and replaced with an engineered cap." However, the shallow area decision tree figure shows that for the "otherwise" step that areas dredged to 3 feet that are not PTW that is not reliably contained might be assigned either an engineered cap or a reactive cap depending on whether they are in a groundwater plume area.

g. Methods and site data used for defining NAPL in cores shown in Figures 3.3-28 and 29 are not described. In the July 29, 2015 roll-out meeting EPA indicated that "site data were used" in this determination. However, for example, the NAPL area defined in Figure 3.3-29 for the Gasco area differs somewhat from the substantial product areas delineated for the Gasco EE/CA, using methods previously directed by EPA on that site. Similarly, LSS has indicated in past comments that no evidence of NAPL exists in cores near the Arkema site, and yet EPA defines some NAPL areas in this region in Figure 3.3-28. Given that there is no obvious agreement on the NAPL areas defined in these figures, this strongly indicates the need for EPA to carefully explain the methods and rationale leading to these NAPL figures.

h. In general, Figure 3.3-40 is inconsistent with the text of Sections 3 and 4 (which are inconsistent with each other). The sediment and soil disposal decision tree framework presented in Figure 3.3-40 does not identify a treatment step for PTW that cannot be reliably contained, and provides an option for the waste to be disposed in either Subtitle C or D. However, the Section 4 text for each alternative states that removed PTW that is not reliably contained is assumed to undergo ex situ treatment. (For example see Section 4.2.2.4 Reduction of Toxicity, Mobility or Volume.) Figure 3.3-40 also indicates that treatment is required for PTW containing source material, PAHs or DDx, but that after treatment the waste can be disposed in Subtitle C or D or even the CDF depending on a number of factors. Section 4.3.4 text inconsistently states "All PTW treated ex-situ in Alternatives B through G is assumed to be disposed at a RCRA Subtitle C facility." Footnote 1 of the decision tree appears to state that MGP remediation waste may require special management not only if it exceeds TCLP criteria but also in the case of "special considerations such as worker safety and equipment decontamination." It is unclear precisely what this means, but we are unaware of what criteria EPA would use to determine that "special considerations" required Subtitle C disposal of MGP remediation waste or any regulatory basis for those "special considerations," let alone for the application of land disposal restrictions to non-RCRA hazardous waste. Figure 3.3-40 is inconsistent with the 2009 EPA order for the Gasco Sediment Site.

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i. Critical terms used to describe remedial technologies are not clearly defined and are intermixed. For example, as noted above, EPA refers many times to "caps," "engineered caps," and "armored caps" among other formulations. It is unclear when these are referring to the same or different types of caps.

j. The methods EPA uses to derive the quantities shown in Section 3.6 are poorly explained or unexplained. Also, a rapid review of the quantities presented in Section 3 shows multiple inconsistencies and apparent errors. One example is that Section 3.6.3.3 indicates for Alternative B that ex situ treatment is assumed for "273,440 to 364,590 cy of the dredge material" in intermediate areas only. However, Section 3.6.3 indicates that for the entire Alternative B "ex-situ treatment of 240,840 to 321,120 cy" will occur. How can the ex situ treatment in the intermediate portion of on an alternative be larger than the volume of ex situ treatment for the entire alternative?

k. Institutional controls are introduced for each technology. However, except under capping, this text mostly discusses issues related to Site-wide fish advisories that are not linked directly to any particular technology. Also, the text varies between these sections in unexplained ways. There is also a "common elements" discussion where institutional controls are discussed again in yet another slightly different way. As a result, the role of institutional controls as part of individual technologies and in the overall alternatives is generally unclear.

l. Many of the statements in the text are actually simplified assumptions that are not supported or are supported by citing just one reference (that may not actually support the statement in question). For example, EPA states, "Articulated fixed-arm dredges are the preferred dredging option due to the greater bucket control that can be achieved with this dredge type versus cable-operated dredges. This greater bucket control has proven to limit contaminant resuspension and release at other sediment sites (AMEC et al. 2012)." Anchor QEA disagrees that the reference noted provides sufficient information to suggest, much less prove, that articulated fixed-arm dredges do a significantly better job of limiting contaminant resuspension. The LWG disagree with EPA making major decisions about dredging methods based on one reference of questionable relevance and ignoring information from other recent projects (as presented in the 2012 draft FS). Further it is inappropriate to make such a statement about a particular dredging method, without acknowledging that actual construction means and methods should be determined during remedial design based on site- specific considerations and construction performance requirements set forth in remedial design documents.

m. EPA indicates that a review of chemical concentrations (particularly metals) across the Site indicated the potential for additional sediments to be classified as characteristic hazardous wastes based on the RCRA toxicity criteria. This review is not explained further. How was the review done? Is it the same as the review presented later in Section 4? What samples and locations exceeded RCRA toxicity criteria and for what chemicals? How did these

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determinations play into alternative development, given that the cost appendix does not indicate any additional ex situ treatment or disposal decisions related to RCRA hazardous waste?

n. EPA indicates that "maximum contaminant concentrations in sediment suitable for placement in the CDF were derived in the T4 60 Percent Design (Anchor QEA 2011), and are provided in Appendix D." However, Appendix D exclusively presents cap modeling methods and results used to identify PTW that is not reliably contained. Is EPA implying that this same modeling approach for the PTW evaluation was used to determine materials that can be placed in a CDF? If so, how do the cap modeling methods sufficiently mimic a CDF berm and containment design presented in the T4 60 percent Design?

o. EPA's technology decision trees contain references to "groundwater plume" areas. However, no map of the assumed groundwater plume areas is presented anywhere in Section 3. Consequently, it is impossible to determine where these decision points apply in the overall technology assignment approach. EPA indicated in the July 29, 2015 roll-out meeting that the RI groundwater information was used to define plume areas. As far as we are aware, the RI information does not indicate exact areas of each groundwater plume. Consequently, some intermediate steps remain unexplained that make the analysis impossible to reproduce.

p. EPA provides no back up data, appendix, or methods statements that describe how alternative durations and construction schedules were determined. A couple of pieces of information are provided regarding "productivity" including the number of days of dredging per season and that dredging is assumed to occur 24 hours a day and 6 days a week. EPA provided some additional production rate text on August 14, 2015, but this text does not address issues related to dredging efficiency (see Comment 5c), throughput time of the thermal desorption ex situ treatment plant, time allowed for sheetpile and other BMP installation and removal, time allowed for structure removal (which EPA indicates will happen for disused structures), how capping and other material placement activities are expected to occur, and construction sequencing details.

q. EPA indicates, "Estimates of shear stress throughout the Site are shown on Figure 3.3-18." The shear stress map is not very informative, because EPA compared these values to a critical shear stress value to identify erosional areas. A map of the resulting erosional areas should be presented. Without this information, the matrix scoring approach for erosional areas cannot be understood or reproduced. Also, Figure 3.3-18 incorrectly presents bed shear stress for the 25-year event, not the 2-year event as indicated.

r. As noted above in the discussion of the riverbank issue, the riverbank remediation approach appears to be very simplistic, but there is far too little detail to reproduce or even fully understand the approach, and there are major inconsistencies in the approach as described (see above discussion of regrading to 1.7V:1H versus 1V:5H slopes).

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s. Table 3.6-3 presents "import volumes," which is specifically noted to include material for "Containment, Dredge Residuals Management, and In-Situ Treatment." However, EPA's technology decision trees also specify complete backfill of dredge prisms in a large proportion of the dredge areas. It is unclear whether these backfill volumes are included in EPA's analysis or not. Given the different purpose of dredge backfill, these volumes should be called out separately.

t. Regarding PTW determinations, Table 3.3-7 notes that only chlorobenzene and naphthalene cannot be reliably contained. However, page 3-21 says PCBs and dioxins/furans can be reliably contained, but "an additional evaluation will need to be conducted on dredged sediment containing any PTW related to NAPL, PAHs or DDx. Thus, ex situ treatment is applied to dredged sediment and soil containing these contaminants." The rationale for conducting a detailed PTW reliably contained analysis and then ignoring the results for NAPL, PAHs, and DDx is entirely unexplained. It is also unclear from the cost appendix whether EPA actually included areas above the PTW high-concentration threshold for PAHs and DDx as part of the ex situ treatment volumes or not.

u. EPA has never provided a description of or the actual FS database that was updated by EPA to incorporate new upland riverbank soils data from the DEQ source control program and newer data collected by the City at RM6E and by the RM11E Group and City at RM11E. If EPA added new data it is unclear whether established data quality review procedures were followed in updating the database. Consequently, it is not possible to check or reproduce certain data analysis steps such as mapping concentrations. If the newer data were not used by EPA, the LWG would like to know how EPA intends to use these data in development of the conceptual remedy and proposed plan.

Some examples of inconsistencies and missing information in Section 4 include:

a. Most of the references are missing.

b. Information referred to in appendices does not exist in some cases (e.g., additional residual risk figures purported to be in Appendix H are not present).

c. Costs from Table CS-ALT in Appendix G do not match the costs presented in Table 4.3-1 or Table 4.3-2.

d. The costs in Table 4.3-1 and 4.3-2 do not match each other.

e. The areas and volumes presented in Section 3 are not consistent with the areas and volumes presented in Table 4.3-1 in most cases.

f. The construction durations presented in Table 4.3-2 are consistent with those provided in Section 3.

g. The alternative maps included in Section 4 (Figures 4.2-11 and 4.2-14 through 4.2-17) match Figures 3.6-02 through 3.6-07 from Section 3, which are the

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figures that EPA indicated verbally during the August 13, 2015 conference call were incorrect.

h. As noted above, RCRA waste determinations on page 4-23 appear to conflict with determinations described in Section 3. Requirements for treatment of large areas of the Site indicated by figures cited on page 4-23 do not appear to be included in Section 3 quantities and, therefore, may not be included in Section 4 costs. It is unclear whether this is purposeful or not.

i. EPA indicates that Site-wide residual risk estimates were also made, but no Site-wide results are presented.

j. Page 4-6 indicates that "predicted concentrations in sediment at MNR Year 0 are used to estimate concentrations in fish and shellfish tissue." No estimates of tissue concentrations are subsequently presented.

k. Appendix H indicates, "Results of the risk reduction evaluation are presented in Section XX and Appendix YY." The references to other sections and appendices are incomplete and no additional appendix relevant to this subject appears to exist.

l. There are inconsistencies in the presentation of residual risks. For example, Section 4.2.2 regarding magnitude of residual risk for RAO 1 for Alternative B is given as "generally less than 5×10^{-5}," while Table 4.3-1 indicates risks for RAO 1 as "3×10^{-5}."

m. There are inconsistencies in dredge volumes given in the text and tables. Using Alternative B as an example, dredge volumes are given in Table 4.3-1 and Section 4.2.2.3 as 872,000 cy and in Section 4.2.2.6 as 462,000 cy. Additionally, Table 4.3-2 indicates 892,000 cy for disposal.

n. There are inconsistencies between capping volumes presented in the text and capping volumes listed in tables. Using Alternative B as an example, Section 4.2.2.3 states that "Various caps would be placed over 34 acres of the site," while Table 4.3-2 includes 7 acres of capping and 7 acres of in situ treatment.

o. Table 4.3-1 does not include any O&M costs. Costs associated with long-term O&M are given in Sections 4.2.1-4.2.6. For example, Section 4.2.2.7 states that long-term O&M for Alternative B is estimated to be $596,500,00 ($14,560,000 in present value) over an additional 70 years.

p. Section 4 introduces PRGs for dioxin/furan congeners that were not included in Section 2. The following PRGs are included in EPA's Table 4.2-1:

    i. HxCDF: Section 2 does not include a PRG for RAO 1 for this congener and three other congeners listed below. Section 2 presents only a 2,3,7,8-TCDD TEQ PRG for RAO 1. The HxCDF PRG in Table 4.2-1 happens to be equal to the TCDD PRG of 0.001µg/kg divided by the TEF but that does not appear to be the case for all congeners (e.g., PeCDF).

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ii. EPA's August 18, 2015 Table 4.2-1 and related figures also present a PRG for RAO 2 for this congener of 0.001 µg/kg (denoted "background ND"). EPA's July 29, 2015 Section 2 presented an HxCDF PRG for RAO 2 of 0.000002 µg/kg. No background value was summarized in Section 2 for HxCDF, and therefore, it is unclear where this PRG came from.

iii. PeCDD, PeCDF, TCDF - Section 2 does not include a PRG for RAO 1 for these congeners. Section 2 presents only a 2,3,7,8-TCDD TEQ PRG for RAO 1. Evaluating the remedy effectiveness for alternatives using these PRGs is therefore inconsistent with Section 2.

iv. HxCDF RAO 6 PRG is inaccurately presented as being based on otter exposures in Table 4.2-1. Per EPA Section 2, the PRG of 0.003 µg/kg is based on Osprey (egg) per EPA Section 2.

q. The final page of Appendix H indicates that post-remediation SWACs for RAO 1 were evaluated on a rolling whole RM basis, which is not consistent with Figures 4.2-1a and b which present SWACs on a 0.5 RM basis.

r. The y axis label for the ecological residual risk figures presented in Section 4 may be misleading and should be clarified that the data represent HQs, rather than "risk".

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Re: List of significant comments on EPA Feasibility Study Section 3 and 4 (Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240)

Dear Kristine:

Consistent with Jim Woolford's instructions (conveyed by Cami Grandinetti in an April 7, 2015 email), the Lower Willamette Group is submitting its list of significant comments on Sections 3 and 4 of EPA's Feasibility Study within three weeks of our August 21 receipt of Section 4.

Although our review of the EPA FS is ongoing,[1] the enclosed technical memorandum discusses flawed assumptions, serious technical deficiencies, and major policy inconsistencies amounting to systemic errors that cannot be addressed in an isolated manner because they go to the core of alternatives development. The following examples illustrate that the LWG's concerns do not seek mere refinements at the margins but rather identify fundamental flaws in EPA's methodologies, resulting in conclusions that are contrary to our understanding of National Contingency Plan (NCP) requirements and relevant EPA guidance and therefore preclude any useful comparison of remedial alternatives.

1) Incomplete evaluation of the alternatives and their effectiveness. The FS does not present technically supportable analyses to make a meaningful comparison of the set of alternatives. The individual and comparative analysis of alternatives is almost entirely qualitative, and most of the results and conclusions on the evaluation of the alternatives using the NCP criteria are unsupported and highly subjective. The lack of meaningful and reproducible metrics results in a qualitative and highly subjective comparison of the effectiveness of and differentiation among the alternatives. In particular, the absence of quantitative analysis for the long-term effectiveness evaluation, such as estimates on future sediment concentrations after construction completion, obviates the required long-term effectiveness and protectiveness evaluations. There is no basis in EPA's FS to state that the smaller alternatives will not achieve the same risk reduction as the larger alternatives without any estimate of sediment concentrations or other quantitative assessment.

[1] The LWG has submitted a written request for additional information related to EPA's FS.

EPA's evaluation includes no attempt to quantify natural recovery. Although EPA acknowledges that natural recovery is occurring at Portland Harbor, EPA has discarded nearly all the empirical data and analyses presented in the Remedial Investigation Report, along with both the QEAFate model developed by the LWG for the 2012 draft FS and its own SEDCAM model, in favor of a highly qualitative estimate of the role of natural recovery in the long term effectiveness of the alternatives. This decision leaves EPA with only a single quantifiable measure of performance for its alternatives: estimated sediment concentrations immediately following construction.

We don't understand EPA's decision to abandon its efforts to quantify natural recovery. The EPA Sediment Guidance counsels:

> "The time needed until protection is achieved can be difficult to assess at sediment sites, especially where bioaccumulative contaminants are present. Generally, for sites where risk is due to contaminants in the food chain, time to achieve protection can be estimated using models. These models may have significant uncertainty, but may be useful for predicting whether or not there are significant differences between times to achieve protection using different alternatives. When comparing time to achieve protection from MNR to that for active remedies such as capping and dredging, it is generally important to include the time for design and implementation of the active remedies in the analysis."[2]

Recovery curves generated by EPA's SEDCAM model[3] show a general trend of natural recovery within a reasonable timeframe similar to the LWG's QEAFate model. The outputs by two independent models, which correlate with the empirical data, would seem to reduce the uncertainty associated with the QEAFate model rather than support EPA's conclusion that all models are too unreliable for the purposes of the FS.

EPA's decision to abandon efforts to quantify natural recovery undermines the validity of the detailed analysis of alternatives in the FS:

- EPA is left with no real measure to demonstrate that the threshold criterion of protectiveness is met by <u>any</u> of its alternatives. EPA's "Summary of Comparative Analysis of Alternatives" (Table 4.3-1), for example, states, for every alternative, "Time to achieve protectiveness through MNR is uncertain."
- EPA is unable to compare the time to achieve RAOs and other short- and long-term effectiveness criteria in any more than the most general terms (For Alternative F, the "estimated time to achieve RAOs is uncertain, but less than for E"). These conclusions are not supported by the Conceptual Site Model as detailed in the attached Comment 13.
- The lack of any quantitative analysis of natural recovery precludes any meaningful evaluation of the cost effectiveness of the alternatives. For

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[2] *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*. EPA Office of Solid Waste and Emergency Response. §2.4.1 OSWER 9355.0-85. December 2005.

[3] Please see Attachment 1. EPA showed these recovery curves at the July 31 FS "roll out" meeting.

example, will the $1.5 billion cost differential between Alternatives G and B get us to protectiveness 10 years sooner, 1 year sooner or ever?

2) EPA's set of alternatives are not implementable as described in the FS. The FS fails to adequately consider critical implementation issues that will substantially increase the time, difficulty, and cost of conducting the cleanup. Many of EPA's assumptions about production times, volumes and costs are inconsistent with experience at other sediment sites and do not appear to be physically possible in practice. To take just one example, EPA's production calculations assume that dredging will proceed 24 hours per day, 6 days per week, during the entire four month in-water work window each year, for many years on end. EPA's assumptions do not include any estimate of dredging efficiency (as was used in the Duwamish FS), including time necessary to reposition the dredge along its dredging lane, move barges receiving the dredged materials in and out of the work area, install and maintain water quality controls or perform water quality monitoring. EPA also briefly mentions but quickly dismisses the very probable objection of the community to light and noise pollution in nearby residential neighborhoods associated with long term 24 hour construction work. For these and other reasons, EPA's production assumptions are demonstrably incapable of attainment in the real world, and result in a skewed comparison of alternatives re short- and long-term effectiveness and implementability.

   The unrealistically optimistic production rates lead to significant underestimation of both construction time frames and potential remedy costs. Overly optimistic estimates about the time to complete construction undermine EPA's assessment of the long- and short-term effectiveness of each alternative (longer time required to reach RAOs, longer short term risk due to higher fish tissue concentrations during construction, more quality of life disruption to the community, etc.) and compound in a way that could significantly change the conclusions about more aggressive approaches (if EPA's production rates are off by a factor of 2, Alternative B would take 8 years, rather than 4 years to complete, whereas Alternative G would be in construction for 36 years rather than 18). Similarly, underestimation of likely actual remedy costs precludes meaningful comparison of the cost effectiveness of EPA's alternatives, as required by the NCP. As discussed above, this problem is compounded by the lack of any metric to consider the effects of natural recovery before, during, or following construction.

   The extremely high costs for the five alternatives (ranging from $1 billion to $4 billion in current dollars) are not proportional to the overall effectiveness of these alternatives, and the alternatives are impracticable to implement. In comparison, the LWG identified a set of alternatives that achieved substantial and similar risk reduction, were implementable, and cost-proportional to the alternatives' overall effectiveness. In the LWG's draft FS, the greatest degree of overall effectiveness was achieved by alternatives that ranged in cost from $169 to $398 million.

3) Significant divergence from how issues handled at other sediment sites. EPA prematurely and prescriptively applies a number of requirements increasing the cleanup costs by hundreds of millions of dollars while achieving no real risk

reduction benefit at the Site. EPA's application of extremely low and unprecedented thresholds to identify "principal threat waste" means large quantities of material that EPA acknowledges can be reliably controlled through capping will be subject to costly in situ treatment that provides no actual additional risk reduction. Other "principal threat" materials removed from sediments or riverbanks must be treated prior to disposal in a permitted landfill, although EPA undertakes no analysis of whether treatment prior to landfilling has any risk benefit. Similarly, EPA's FS seems to indicate that dredged or excavated materials that are not hazardous wastes must nonetheless meet hazardous waste land disposal restrictions – and not merely the land disposal restrictions applicable to remediation waste, but those applicable to as-generated industrial hazardous wastes (most of which are, again, well below DEQ risk-based cleanup standards for soil). The significant burdens EPA's FS places on the management of remediation wastes have the potential to increase costs by hundreds of millions of dollars without any associated risk reduction.

Prescriptive assignment of treatment technologies across all alternatives is inconsistent with the NCP requirement to develop a range of alternatives requiring different degrees of treatment for source materials. 40 CFR 300.340(3)(i). It results in more aggressive remedial alternatives scoring higher for "reduction of toxicity" because of "treatment" without any quantitative or even qualitative evaluation of whether the reduction in toxicity is achieved by the treatment technology or simply by preventing exposure. Requiring unnecessary treatment of risks already controlled through capping or removal and offsite disposal certainly increases cost, but the absence of any alternatives that include less treatment preclude any evaluation of the cost effectiveness of treating these materials.

One real point of comparison is the McCormick & Baxter NPL site, the in-water portion of which is within the Portland Harbor site. EPA has concluded that the existing sediment cap at McCormick & Baxter "is protective of human health and the environment because the remedy required by the ROD has been implemented, and is working as intended."[4] The in-water remedy at the McCormick & Baxter site cost $12 million.[5] If the approach from EPA's FS were applied to McCormick & Baxter, construction costs would range between $445 million and $520 million[6], largely because the contamination at McCormick & Baxter would qualify as "principal threat waste" per EPA's unprecedented definition of that concept.

4) Focus on mass removal rather than risk reduction. EPA's FS focuses on reducing chemical concentrations rather than on managing the most important risks at the site. All of EPA's alternatives are evaluated solely against the highest risk estimates and most conservative risk scenarios identified in the baseline risk assessments in the absence of any application of risk management principles, and in ways that are themselves inconsistent with the risk assessments. The effectiveness of the

[4] *Third Five-Year Review Report, McCormick & Baxter Creosoting Company Superfund Site* (EPA and DEQ, September 2011)
[5] *Preliminary Close Out Report, McCormick & Baxter Creosoting Company Superfund Site* (EPA, September 2005)

alternatives at cleaning up PCBs, for example, is evaluated based upon a far more conservative assumption (1 river mile exposure area split longitudinally into three parts) than was used in the Baseline Human Health Risk Assessment (one whole river mile for smallmouth bass fish consumption and as large as site-wide for other exposures). EPA's alternatives require large areas of total PAH cleanup, despite the fact that carcinogenic PAHs represent less than 1% of the cumulative risks to people who eat fish, and EPA has no technical basis to expect that cleaning up large areas of PAHs would have any meaningful impact (i.e., reduction) on overall fish consumption risk. Although EPA's approved Baseline Ecological Risk Assessment defined areas of benthic risk through a nuanced comprehensive benthic risk area approach that considered multiple lines of evidence, the FS completely abandons the comprehensive benthic approach in favor of some off-the-shelf screening level values, and then demerits all of its alternatives because they do not comprehensively address benthic risk.

EPA's decision to focus so intensely on contaminant mass reduction means that the FS includes no tools for EPA and other stakeholders to evaluate the magnitude of meaningful risk reduction achieved by the various alternatives against other important considerations. EPA's FS does not include information necessary for EPA to compare, rank, and prioritize risk and compare the cost effectiveness of cleanup options to reduce that risk.

5) Prescriptive technology assignments. EPA uses a prescriptive set of technology evaluation and scoring criteria to determine the technologies to be applied in each area of the Site. By assigning one technology to the same sediment areas in the technology screening step, the technology assignment prevents meaningful comparison of the performance of technologies and limits the evaluation of multiple technologies performing equally effectively. And because the technology assignment is based on an FS level of information, the prescriptive set of evaluation criteria will not appropriately or accurately predict the most appropriate technology assignments or configurations for Remedial Design (RD). Finally, this prescriptive approach does not accommodate flexibility for RD when additional information and analysis will be conducted.

These examples illustrate that simply modifying or correcting a few assumptions and calculations will not shore up the alternatives development and evaluation in EPA's FS.

[6] Using EPA's methods as best we can reproduce them, this includes a contingency range from 20% to 40%, presented in 2015 current dollars, and not including long term operations, maintenance, and monitoring costs.

As a result, the LWG is concerned that EPA's FS does not currently present alternatives that are likely to be implemented by potentially responsible parties through settlement. The LWG strongly urges EPA to resolve these systemic problems with the FS before using it as a foundation for remedy selection.

Sincerely,

Bob Wyatt

cc:

Jim Woolford, U.S. Environmental Protection Agency
Steve Ells, U.S. Environmental Protection Agency
Cami Grandinetti, U.S. Environmental Protection Agency, Region 10
Sean Sheldrake, U.S. Environmental Protection Agency, Region 10
Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of the Grand Ronde Community of Oregon
Confederated Tribes of Siletz Indians of Oregon
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon
Nez Perce Tribe
Oregon Department of Fish & Wildlife
United States Fish & Wildlife
Oregon Department of Environmental Quality
LWG Legal
LWG Repository

INFORMATION NEEDS TO ENABLE REVIEW OF EPA'S REVISED FS SECTIONS 3 AND 4

1. Please provide the technical memoranda, communications, and other documentation that details EPA's methods for deriving PTW highly toxic thresholds. EPA referred, at the July 29, 2015 roll-out meeting, to a 2014 EPA Technical Memorandum for these methods. That memorandum was stamped preliminary draft and contains multiple other methods that EPA appears to have abandoned or revised in the interim. Please provide the memoranda and other documents that address or explain which methods were considered, which were adopted, which were rejected and why they were adopted or rejected.
2. The technology assignment scoring matrix (Figure 3.3-14b) is presented as applying to the entire Site with only a couple of "off ramps" to the process identified (Figure 3.3-14a). Examination of the decision trees (Figures 3.6-01a-c) for shallow, intermediate, and Navigation Channel/Future Maintenance Dredge areas show that the scoring matrix is only used and applied in the intermediate areas (which constitute a fraction of the Site). Please provide the memoranda, communications, and other documents that address or explain the relationship between the technology assignment scoring matrix, each of the three decision trees, and any additional steps taken to select technologies for alternatives.
3. EPA states in Section 3.3.2.3 that there are instances when an area does not receive a technology score (an outcome when the areas does not achieve a threshold for any of the criteria). Please provide the technical memoranda, communications, and other documents that address or explain what technology is assumed for those areas?
4. Section 3.3.2 discusses a two-step process for applying technologies. "The second step transforms segmented and isolated pixel-level technology assignments (resulting from a strict interpretation of the GIS output) to a predominant technology assignment by applying a smoothing algorithm that eliminates some of the small scale variability in the output and assigns a technology to the majority of the pixels within each SMA." Please provide the memoranda, communications, and other documents that address or explain the origin and details of the "smoothing algorithm" and how it was or was not employed in EPA's FS.
5. Please provide the memoranda, communications, and other documents that address or explain the details of how groundwater plume areas were identified. Please also provide the maps showing resulting plume areas as referenced on the technology decision trees for shallow and intermediate areas (Figure 3.6-01b and c).
6. Please provide the maps and other documents that identify the location of the actual erosion areas identified by EPA based on sheer stress.
7. Please provide the technical memoranda, communications, and other documents that address or explain EPA's rationale for using the 0.5 surface to subsurface sediment chemical concentration ratio for evaluation of natural recovery at the site.
8. Please provide the technical memoranda, communications, and other documents that address or explain how different types of PTW (NAPL, not reliably contained, high concentration) are assigned technologies and disposal requirements. For example, the

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sediment and soil disposal decision tree framework presented in Figure 3.3-40 does not identify a treatment step for "PTW that cannot be reliably contained", and provides an option for the waste to be disposed in either Subtitle C or D. However, the Section 4 text for each alternative states that such removed PTW is assumed to undergo ex situ treatment. (For example see Section 4.2.2.4 Reduction of Toxicity, Mobility or Volume.) Figure 3.3-40 also indicates that treatment is required for PTW containing source material, PAHs or DDx, but that after treatment the waste can be disposed in Subtitle C or D or even the CDF depending on a number of factors. Section 4.3.4 text states "All PTW treated ex-situ in Alternatives B through G is assumed to be disposed at a RCRA Subtitle C facility." Please provide the technical memoranda, communications, and other documents that address or explain the discrepancy between these two PTW disposal decision trees.

9. Please provide any maps showing the different types of PTW identified (i.e., "not reliably contained", high concentration, NAPL, "source material", "highly mobile") and maps, documents, memoranda, or other communications that address or identify the technologies and disposal requirements assumed in each area of identified PTW.

10. Regarding PTW determinations, Table 3.3-7 notes that only chlorobenzene and naphthalene "cannot be reliably contained". However, page 3-21 says PCBs and dioxins/furans can be reliably contained, but "an additional evaluation will need to be conducted on dredged sediment containing any PTW related to NAPL, PAHs or DDx. Thus, ex-situ treatment is applied to dredged sediment and soil containing these contaminants." Please provide the technical memoranda, communications, and other documents that address or explain the rationale for conducting a detailed PTW "reliably contained" analysis and then not applying the results to NAPL, PAHs, and DDx materials. The cost appendix appears to focus on NAPL and "not reliably contained material" for ex situ treatment and subtitle C disposal. Please provide the memoranda, cost information, communications, and other documents that address, show, or explain whether PAH and DDx high concentration material was assumed to receive ex situ treatment or not.

11. EPA indicates on page 3-24 that a review of chemical concentrations (particularly metals) across the Site indicated the potential for additional sediments to be classified as characteristic hazardous wastes based on the RCRA toxicity criteria. This review is not explained further in Section 3. In Section 4 a separate discussion on RCRA implies that some areas were assumed to be RCRA hazardous waste, but this discussion is not tied back to the Section 3 discussion of RCRA or alternative development. Please provide the technical memoranda, communications, and other documents that address or explain:

    a. Which approach to RCRA waste determination (Section 3 or Section 4) was used to develop the alternatives.
    b. How the review described in Section 3 was performed.
    c. How this "review" related to the information presented in Section 4.
    d. Which samples and locations exceeded RCRA toxicity criteria and for what chemicals (i.e., the tables which contained the information used to develop the maps in EPA's FS).

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e. Whether the Section 3 alternative quantities and Section 4 alternative costs assume that all removed sediments within the LDR-exceedance boundaries identified in Figures 4.2-13a-d and Figure 4.2-2d undergo ex situ treatment (i.e., incineration per LDR) followed by Subtitle C disposal?
f. What are the quantities and costs associated with handling and disposal of assumed RCRA hazardous waste presented either in the main text or the cost appendix?
g. The locations for, including maps showing, disposal and treatment requirements for all areas of assumed RCRA hazardous waste.
h. Why certain areas were assumed to have sediments that would be required to be treated as RCRA hazardous waste, and what those disposal and treatment assumptions used for these situations.

12. Footnote 3 in the sediment and soil disposal decision tree framework presented in Figure 3.3-40 states "Sediment adjacent to and down river of the Arkema site contains DDT-manufacturing waste residue and if this material is taken off-site for disposal, it becomes subject to the Oregon Pesticide Residue Rule (Oregon Administrative Rule 340-109)." Please provide the technical memoranda, communications, and other documents that address, show, or explain:
    a. What areas and specific volumes of the removed material with detections of DDx compounds down river of Arkema were used in EPA's Section 4 cost estimates, and what was assumed to be subject to the Oregon Pesticide Residue Rule?
    b. What proportion of these materials EPA assumed would require Subtitle C versus Subtitle D disposal based on the "contained in" decision point identified in the soil disposal decision tree framework presented in Figure 3.3-40?
13. Please provide the technical memoranda, l communications, and other documents that address or explain EPA's selection of thermal desorption as the representative ex situ treatment option (e.g., as compared to solidification/stabilization).
14. Please provide the technical memoranda, communications, and other documents that address, describe, or explain EPA's methods and site data used for defining NAPL in the cores shown in Figures 3.3-28 and 29. (e.g., EPA's Gasco figure does not match the Gasco EE/CA figures).
15. Please provide the technical memoranda, communications, and other documents that address or explain:
    a. Why EPA shows a smaller scale RAL curve for DDx only.
    b. Why so called "Site-wide" RAL curves range in acreage covered from 2,200 acres to 180 acres.
16. Please provide the technical memoranda, communications, and other documents that address or identify whether any other smaller spatial scale (not Site-wide) RAL curves were developed for any of the RAL COCs, including copies of any such curves that were developed, and why such curves were not included in EPA's FS.

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17. Please provide the technical memoranda, communications, and other documents that address or explain where "background" replacement values for Dioxin/Furan RAL curves come from, how they were developed, and why are they appropriate.
18. Please provide the technical memoranda, communications, and other documents that address or explain why the MDL replacement value is used for the PeCDD RAL curve but background concentrations are used for other RAL curves and/or how a particular MDL was selected from the multiple MDL's in the project database.
19. Please provide the technical memoranda, communications, and other documents that address or explain the derivation of the 970 ppb PRG used to generate the TPAH RAL curve shown in Figure 3.3-2 and any other information on the use of TPAH RALs to evaluate alternatives for addressing cPAH risk.
20. From Figure 4.2-11, EPA appears to have used bioassays (in some way) and LRM (in some way) to determine the presence of benthic risk, which is described as "toxicity points" in the Section 4 text. Please provide the technical memoranda, communications, and other documents that address or explain how a "toxicity point" was determined from the benthic toxicity LOEs in general.
21. Please provide the technical maps, memoranda, communications, and other documents that address, show, or explain the lengths and locations of riverbank remediation that have been included in each remedial alternative analyzed in EPA's FS.
22. Please provide the maps, technical memoranda, communications, and other documents that address, explain, or show Cross-section schematic(s) of assumed riverbank remediation designs (i.e., one schematic for each different type of design assumption, if more than one assumption exists) including assumed existing and required slopes and integration into sediment remedy.
23. Please provide the maps, technical memoranda, communications, and other documents that address, show, or explain where on the various riverbanks that "beach mix" vs. "vegetation" (p.3-35) was assumed to be applied.
24. Please provide all riverbank data (in Access or Excel format) used in the riverbank evaluation and the technical memoranda, communications, and other documents that address or explain EPA's quality or validation evaluation steps for those data.
25. Please provide the maps, technical memoranda, communications, and other documents that address, explain, or are related to EPA's sheetpile approach, including:
    a. Any schematics showing the area enclosed, the linear feet of sheetpiles, and the assumed height of the sheetpiles;
    b. Descriptions of the sheetpiling proposed;
    c. Assessments of the feasibility of construction of unsupported sheetpiles in water in excess of 40 feet deep;
    d. Identification and description of the NAPL areas that would be enclosed and those which would not. Note that EPA indicates that NAPL areas would be enclosed by sheetpile, but that some NAPL areas may be capped (if we understand EPA's technology assignment approach correctly).

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26. EPA indicates that "maximum contaminant concentrations in sediment suitable for placement in the CDF were derived in the T4 60 Percent Design (Anchor QEA 2011), and are provided in Appendix D." However, Appendix D exclusively presents cap modeling methods and results used to identify PTW that is not reliably contained. Please provide the technical memoranda, communications, and other documents that address or explain:
    a. Whether EPA is indicating that this same modeling approach for the PTW evaluation was used to determine materials that can be placed in a CDF;
    b. What are the maximum contaminant concentrations in sediment suitable for placement in the CDF;
    c. The rationale for why some of the CDF criteria were changed from T4 60% design (e.g., "without adequate treatment" was removed, "NAPL" was added to no free oil criterion, and a new criterion for "Waste or Contaminated Media Warranting Additional Management was added);
    d. How EPA reached its assumptions or conclusions about the CDF for the FS.
27. A number of figures that provided detailed information on a site-wide basis do not display well when zooming in to look at individual SMAs. These figures are listed below. Please provide GIS files for the figures listed below or pdf versions with higher resolution:
    a. Figure 3.2-03_PTW-Concentrations.pdf
    b. Figure 3.3-13_SMAs_REV 2.pdf
    c. Figure 3.3-20_Surface-Subsurface-Sed-Ratios.pdf
    d. Figure 3.3-27a through f_Matrix-Tech-Assign
    e. Figure 3.3-28_Arkema-NAPL-PTW.pdf
    f. Figure 3.3-29_Gasco_NAPL-PTW.pdf
    g. Figure 3.6-02 through 07 Tech-Assign-Alt B through F
28. Please provide the technical memoranda, communications, and other documents that address, support, or explain EPA's construction duration assumptions for non-dredging related activities (e.g., time for moving and maintaining dredges, capping, placement of backfill, EMNR, in-situ treatment materials, building of CDFs, placement/removal of sheet piles etc.).
29. EPA presented SEDCAM modeling results during the July 31st "roll-out" meeting that showed long term sediment estimates. Those results were not included in Section 4. Please provide the technical memoranda, communications, and other documents that address, support, document, or explain those results, including the recovery curves shown at the meeting. Please also provide the technical memoranda, communications, and other documents that address, describe, support, or explain the modeling methods.

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30. Please provide the technical memoranda, communications, and other documents that address, describe, support, or explain the import volumes, and assumptions about backfill volumes, in Table 3.6-3.
31. Please provide the missing references for Section 4.
32. Please provide the technical memoranda, communications, and other documents that address, document, or explain how risk calculations for residual risk assessment were performed and how residual risk estimates were generated. (Note that this information was not included in EPA's Appendix H, which only includes methods for calculating time-zero SWACs.)
33. Page 4-8 indicates "While some residual risk figures are presented in this section, all the residual risk figures are provided in Appendix H." Unfortunately, this assertion appears to be inaccurate. No such figures are provided in Appendix H. Please provide the technical memoranda, communications, and other documents that address, document, or explain the residual risk figures provided, and any additional residual risk figures that are not included in EPA's FS.
34. Page 4-1 indicates "Site-wide and smaller spatial scales were used to understand the effects of the alternatives in reaching the RAOs." Please provide the technical memoranda, communications, and other documents that address, document, or explain the residual risk estimates made on a Site-wide basis.
35. Please provide technical memoranda, communications, and other documents that address, document, or explain which fish consumption scenario is being presented in the RAO 2 residual risk figures?
36. The text on page 4-6 indicates that EPA calculated tissue concentrations from SWAC estimates, but no tissue concentrations are presented. The text also indicates that these estimated tissue concentrations were compared to the PRGs for RAO 2. Please provide the technical memoranda, communications or other documents that address, document, or explain these analyses and the comparisons?
37. EPA indicates (p. 4-3) "While the physical CSM emphasizes the importance of bedload transport indicating that about half the sediment load into the site occurs from bedload transport, the HST model does not include this transport process." Please provide the technical memoranda, communications or other documents that address, document, or explain the CSM that EPA is referring to that discusses the amount of bedload transport expected and the reasons for the conclusions contained in that CSM referred to on p. 4-3. (Please note that FS Section 1 does not contain a CSM description that addresses this issue.)
38. It is difficult to determine areas and quantities that EPA determined for each outcome indicated in the technology decision trees (Figures 3.6-01a-c and Figure 3.3-40). Please provide the technical memoranda, communications, and other documents that address, document, or explain the quantities for each alternative (including acreages for capping, EMNR, in-situ treatment, etc. and volumes for dredging, ex-situ treatment, and disposal options resulting from the application of the technology decision trees.) Please also provide any maps (and GIS files) that show where each detailed technology or

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combination of technologies indicated in the decision trees is applied to each different sub-area or pixel. Currently the maps in Section 3 and 4 only show generalized areas of EMNR, In-situ treatment, capping, dredging and dredge/capping. Examples of additional technology assumptions discussed in EPA's FS but not shown on the maps in EPA's FS include (but may not be limited to):

a. Reactive armored cap
b. Armored cap
c. Reactive cap
d. Engineered cap
e. Dredge to DOCR/reactive residual layer
f. Dredge to DOCR/reactive residual and backfill
g. Dredge to 15 ft/significantly augmented reactive cap
h. Dredge to 15 ft/significantly augmented reactive cap and backfill
i. Dredge to 15 ft/reactive residual layer
j. Dredge to 15ft/residual layer
k. Dredge to 3 ft/Reactive armored cap
l. Dredge to DOCR and backfill
m. Dredge to DOCR/residual layer
n. Dredge to 3ft/reactive engineered cap
o. Dredge to 3 ft/engineered cap
p. Dredge to depth of PTW/reactive residual layer
q. Upland D disposal
r. Upland C disposal without ex-situ treatment
s. Upland D disposal after ex-situ treatment
t. Upland C disposal after ex-situ treatment

Please provide the technical memoranda, communications, and other documents, including maps, that address, document, or explain the subsequent (assumed) steps for any removed material. Please provide the technical memoranda, communications, and other documents, including maps, that address, document, or explain the areas, quantities and technologies assigned for each outcome or location. Thus, in dredging areas, the documentation necessary to define which areas are assumed to be ex-situ treated and disposed of at Subtitle C or D or CDF facilities directly or after ex-situ treatment.

39. The cost estimates for each alternative are presented on a Site-wide basis only, with no spatial differentiation within the Site. The information contained in EPA's FS does not permit us to determine the subareas (such as SMAs or SDUs) within the Site from which quantities or costs originate. Please provide the technical memoranda, communications, or other documents that address, document, or explain, on a disaggregated basis, EPA's cost information as it was broken down by the smallest spatial scale (e.g. pixel by pixel) used to identify quantities and costs for the alternatives.

40. Please provide the technical memoranda, communications, and other documents that address, document, or explain why some of the Section 4 dioxin/furan PRGs differ from the Section 2 dioxin/furan PRGs. We need this information to understand EPS's proposed dioxin/furan PRGs.

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41. For the RAO 1 residual risk assessment, the main text indicates that SWACs were generated on a 0.5 RM basis. Appendix H indicates a 1 river mile basis. Please provide the technical memoranda, communications, or other documents that address, document, or explain this component of EPA's residual risk assessment and that would enable us to determine which is correct.
42. Figure 4.2-1 indicates that risks in the navigation channel were assessed for RAO 1 (the text indicates is not applicable to RAO 1). Please clarify that EPA is not applying RAO 1 in the navigation channel, and provide the technical memoranda, communications, and other documents that address, document, or explain EPA's rationale for applying RAO 1 in the navigation channel. Please also provide the technical memoranda, communications, or other documents that address, document, or explain EPA's apparent use of the value of 210,000 highest non-cancer risk for a breastfeeding infant for Alternative A.

REQUESTS FOR CORRECTED INFORMATION

1. Figures 3.3-27 and 3.6-02 through 07 show different technology assignments in a number of intermediate to shallow areas throughout the Site. EPA indicated verbally on August 13th that the Section 3.6 figures were incorrect, and the Section 4 figures (Figure 4.2-11 and 4.2-14 through 4.2-17) also appear to match the incorrect Section 3.6 Figures (e.g. river mile 6.5E). Corrected versions of these figures are requested.
2. Differences in Sections 3 and 4 costs, areas, volumes, and durations are different in various tables and text. Please supply the correct values. Examples of inconsistencies were provided in an August 14th memo from the LWG.
3. EPA indicates in the text for shallow areas that, "Contaminated sediment will be dredged to the lesser of the RAL concentrations or a maximum depth of 5 feet, and the dredged material will be replaced with an engineered cap to previous elevation. Otherwise, the contaminated sediment will be dredged 3 feet and replaced with an engineered cap." However, the shallow area decision tree figure shows that for the "otherwise" step that areas dredged to 3 feet that are not PTW that is not reliably contained might be assigned either an engineered cap or a reactive cap depending on whether they are in a groundwater plume area. Which is correct?
4. For a breastfeeding infant, the highest hazard quotients for dioxin/furan TEQ calculated in the BHHRA were 10 on a Site-wide basis (tribal fish consumption, whole body diet) and 10 on a river-mile basis (recreational RME consumption, RM 7). Figure 4.2-4c(1) indicates that the HQ from HxCDF alone (not the entire TEQ) is more than 14,000 for Alternative A. For a child, the highest hazard quotients for dioxin/furan TEQ calculated in the BHHRA were also 10 on a Site-wide basis (tribal fish consumption, whole body diet) and 10 on a river-mile basis (recreational RME consumption, RM 7). Figure 4.2-3f(1) shows a HQ greater than 30 for just HxCDF. Are these values and figures correct? If not, please supply the correct information.
5. Figures 3.3-27 and 3.6-02 through 07 show remediation areas downstream of RM 1.9. This is inconsistent with Section 1 which states: "This FS focuses on approximately ten

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miles of the lower Willamette River from River Mile (RM) 1.9 (at the upriver end of the Port of Portland's Terminal 5) to RM 11.8 (near the Broadway Bridge), sometimes referred to as the "site" in this FS for convenience." It is unclear if this is an error in the mapping only or carries through to assignments of technologies and various alternative quantity estimates. For example, Table 3.7-2 shows a total Site area (when the MNR and constructed areas are added together) of about 2,450 acres, which is larger than the Site area defined in Section 1 of EPA's revised FS (i.e., approximately 2,200 acres). This may be an unrelated inconsistency. Can EPA explain the inconsistencies? Are areas shown on the Section 3 figures included in Table 3.7-2 or other summary tables? Is EPA planning on correcting the total acreage of the Site? If so, please provide the correct information.

6. Two sentences in Section 3.3.2.1 contradict themselves: "Separate NPL sites within the Portland Harbor Site, Gould and McCormick and Baxter, where a final remedy has been implemented have been excluded from this analysis. This exclusion applies solely to the McCormick and Baxter site where the cleanup action included placement of a sediment cap." Please indicate whether Gould is included or not.

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