



1998 303(d) PCB Listing for Chambers Creek Mussels: New Data

Abstract

The Washington State Department of Ecology (Ecology) placed Chambers Creek on the 1998 303(d) list for polychlorinated biphenyl (PCB) concentrations in edible shellfish tissue that exceeded the U.S. Environmental Protection Agency (EPA) National Toxics Rule criterion for human health. The listing was based on bay mussels (*Mytilus* sp.) collected by Ecology in 1995 near the creek's mouth on Puget Sound. Because the PCB concentrations were relatively low and because EPA recently revised their human health criterion for PCBs upward from 1.4 ug/Kg to 5.3 ug/Kg (wet weight), Ecology did more intensive sampling to determine if the 303(d) listing was still warranted. Results showed total PCB concentrations ranged from 3.1 to 3.9 ug/Kg. Therefore, it is recommended that the 303(d) listing for Chambers Creek be removed.

Background

Chambers Creek* is on the 1998 303(d) list for polychlorinated biphenyl (PCB) concentrations in edible shellfish tissue that exceed the EPA National Toxics Rule criterion for human health. The listing is based on bay mussels (*Mytilus* sp.) collected by the Washington State Department of Ecology (Ecology) in 1995 near the creek's mouth on Puget Sound (Johnson and Davis, 1996).

The Johnson and Davis study was a screening analysis of pesticides and PCBs in mussels collected from six marine locations. The sampling sites ranged from background areas (such as Padilla Bay) to areas known to be contaminated (such as the Hylebos and Duwamish waterways). Table 1 shows the PCB data from this study. Each sample was a single composite consisting of the entire soft parts from 33-84 individual mussels. The Chambers Creek sample was prepared from 33 mussels with a mean shell length of 51 mm. The samples were analyzed by the California Department of Fish & Game, Water Pollution Control Laboratory, using GC/ECD methods described in Rasmussen and Blethrow (1991) and Magoon (1993).

* Segment ID WA-12-1110/DO71CI

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Table 1. PCB Concentrations Measured in Marine Mussels Collected by Ecology in 1995.
(ug/Kg, wet weight)

	Hylebos Waterway	Duwamish Waterway	Budd Inlet	Chambers Creek	Ilwaco (Col. R.)	Padilla Bay
PCB-1016	nd	nd	nd	nd	nd	nd
PCB-1221	nd	nd	nd	nd	nd	nd
PCB-1232	nd	nd	nd	nd	nd	nd
PCB-1242	nd	nd	nd	nd	nd	nd
PCB-1248	18	nd	nd	nd	nd	nd
PCB-1254	46	32	21	6	6 N	2 J
PCB-1260	6 J	12 J	nd	2 J	nd	nd

From Johnson and Davis (1996)

nd = not detected

J = estimated value

N = tentatively identified

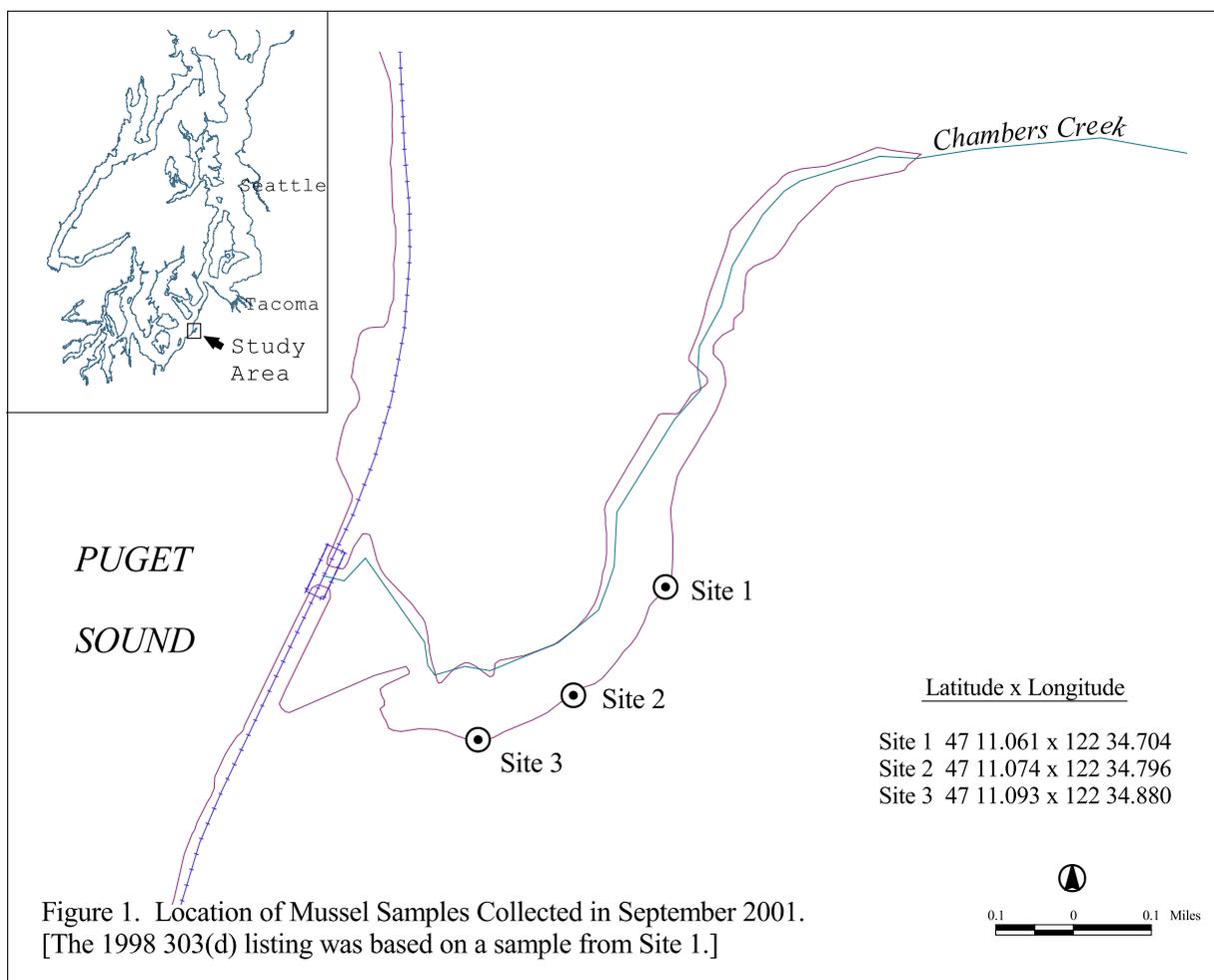
At the time the 1998 303(d) list was developed, the EPA human health criterion for PCBs was 1.4 ug/Kg (wet weight). The PCB-1254 concentration in the Chambers Creek mussels exceeded the listing criterion by a factor of approximately 4. The estimated PCB-1260 concentration marginally exceeded the criterion.

In 1998 EPA revised their human health criteria for PCBs (40 CFR 131, *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants: States' Compliance-Revision of Polychlorinated Biphenyls [PCBs] Criteria*). Based on EPA's reassessment of the cancer potency of PCBs, the new criterion was set at 5.3 ug/Kg.

In light of the relatively low PCB concentrations measured in the 1995 sample and the revised criterion, the Ecology Environmental Assessment Program did more intensive sampling to determine if the 303(d) listing for PCBs in Chambers Creek was still warranted.

Methods

Mussels were obtained from three sites within the Chambers Creek estuary on September 17, 2001 (Figure 1). Site 1 was at the upstream limit of marine mussel habitat. This is the same site sampled in 1995. Sites 2 and 3 were approximately 0.2 and 0.3 miles downstream of Site 1, respectively. Each sample was a single composite consisting of the entire soft parts from 30-50 mussels. The size range was 33-70 mm.



Sample collection, handling, and tissue preparation were identical to the procedures used in 1995. The samples were analyzed by the Ecology Manchester Environmental Laboratory by GC/ECD, using modifications of EPA SW-846 methods 3540, 3620, 3665, and 8082. A case narrative prepared by Manchester is attached. It assesses data quality in terms of sample holding times, method blanks, surrogate spikes, duplicate analyses, spiked sample analyses, and laboratory control samples. No significant problems were encountered in the analyses. The attached appendix has a complete copy of the chemical data.

Results

Results on the 2001 samples are summarized in Table 2. The PCB mixture detected in these samples most closely resembled -1254, consistent with the findings in 1995. Similar concentrations were found in all three samples, ranging from 3.1 to 3.9 ug/Kg. Concentrations appeared to decrease going downstream.

These more recent data, representing a larger sample size, show that PCB concentrations in Chambers Creek mussels are lower than the 5.3 ug/Kg human health criterion. Therefore, it is recommended that the 303(d) listing for PCBs in Chambers Creek be removed.

Table 2. PCB Concentrations Measured in Mussels from Chambers Creek Estuary Collected by Ecology on September 17, 2001 (ug/Kg, wet weight)

	Site 1	Site 1 dup.	Site 2	Site 3
PCB-1016	0.81 U	0.81 U	0.80 U	0.78 U
PCB-1221	0.81 U	0.81 U	0.80 U	0.78 U
PCB-1232	0.81 U	0.81 U	0.80 U	0.78 U
PCB-1242	0.81 U	0.81 U	0.80 U	0.78 U
PCB-1248	0.81 U	0.81 U	0.80 U	0.78 U
PCB-1254	3.9 NJ	3.5 NJ	3.2 NJ	3.1 NJ
PCB-1260	0.81 U	0.81 U	0.80 U	0.78 U

U = Not detected at or above reported result.

NJ = There is evidence that the analyte is present. The associated numerical result is an estimate.

References

Johnson, A. and D. Davis. 1996. Washington State Pesticide Monitoring Program: Pesticides and PCBs in Marine Mussels, 1995. Washington State Department of Ecology, Olympia, WA. Pub. No. 96-301.

Magoon, S. 1993. Request for Bid on Analytical Support Services for Analysis of Pesticides, PCBs, and Lipids in Fish Tissue (August 9, 1993). Manchester Environmental Laboratory, Washington State Department of Ecology, Manchester, WA.

Rasmussen, D. and H. Blethrow. 1991. Toxic Substances Monitoring Program, 1988-89. California Water Resources Control Board, Sacramento, CA. Rep. No. 91-1WQ.

Appendix

Laboratory Data Sheets



Manchester Environmental Laboratory
7411 Beach Dr E, Port Orchard, WA 98366

November 6, 2001

Subject: Chambers Creek Mussels PCBs
Samples: 01448000 - 01448002
Case No. 2061-01
Officer: Steven Golding
Analyst: Myrna Mandjikov

SUMMARY

The chromatographic pattern of the samples does not match any of the reported Aroclors. The sample patterns most closely resemble Aroclor 1254 and are quantified using the Aroclor 1254 calibration curve. There is evidence that the Aroclor 1254 in these samples have undergone extensive weathering. Therefore, the results reported are qualified as estimates, "NJ".

These samples appear to contain congeners of Polybrominated diphenyl ethers (PBDEs). PBDEs are components of flame-retardants. These environmental contaminants are beginning to gain attention as persistent pollutants although there is little information currently concerning their toxicity. The levels in the samples are approximately 1 ppb.

METHODS

The mussel tissue samples were extracted with hexane/methylene chloride 50/50 v/v using the Soxhlet extraction procedure. Each extract was eluted through a Florisil® column with 6% v/v preserved diethyl ether/hexane.

The extracts were solvent exchanged to iso-octane and treated with concentrated sulfuric acid. The extract volume was adjusted to 1 mL in iso-octane. These extracts were then analyzed by GC-ECD.

These methods are modifications of EPA SW- 846 methods 3540, 3620, 3665, and 8082.

BLANKS

No target analytes were detected in the blanks.

SURROGATES

All samples and blanks were spiked with decachlorobiphenyl (DCB) prior to extraction. All recoveries are within the acceptable range of 50 % - 150 %.

DUPLICATES

Sample 01448000 was prepared in duplicate. The relative percent difference (RPD) between the Aroclor 1254 results is 9%.

SPIKED AND DUPLICATE SPIKED SAMPLE

Sample 01448001 was prepared in triplicate. Two replicates were spiked with 1 ng of Aroclors 1016 and 1260. All Aroclors were recovered within 50 % - 150% of spiked concentration. The following are the percent recoveries and relative percent difference (RPD) between the recoveries:

	LMX1	LMX2	RPD
Aroclor 1016	97 %	100 %	3 %
Aroclor 1260	69 %	74 %	4 %

LABORATORY CONTROL SAMPLES (LCS)

Environmental Resource Associates' "PCBs in Soil" standard reference material was used for the preparation of the laboratory control sample for this analysis as there was not a tissue reference material available with certified Aroclor values. The recovery of the LCS (OCS1303A1) is 80 % of the certified value. This recovery is consistent with recoveries from previous PCB analysis. We are currently evaluating this control sample.

The certified value provided by the vendor is 12.6 mg/Kg with acceptance recovery limits of 31 % to 129% recovery.

HOLDING TIMES

The samples were extracted and analyzed within the recommended holding times.

DATA QUALIFIERS:

Code	Definition
J	The analyte was positively identified. The associated numerical result is an estimate.
NJ	There is evidence that the analyte is present. The associated numerical result is an estimate.
U	The analyte was not detected at or above the reported result.
UJ	The analyte was not detected at or above the reported estimated result.
Bold Type	The analyte was present in the sample. Used as a visual aid to locate detected compounds on the report sheet.

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs

LIMS Project ID: 2061-01

Sample: 01448000

Date Collected: 09/17/01

Method: SW8082

Field ID: CHAMBERS1

Date Prepared: 10/30/01

Matrix: Tissue

Project Officer: Steven Golding

Date Analyzed: 11/02/01

Units: ug/Kg ww

Analyte	Result	Qualifier
PCB - 1016	0.81	U
PCB - 1221	0.81	U
PCB - 1232	0.81	U
PCB - 1242	0.81	U
PCB - 1248	0.81	U
PCB - 1254	3.9	NJ
PCB - 1260	0.81	U

Surrogate Recoveries

Decachlorobiphenyl	85	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs		LIMS Project ID: 2061-01
Sample: 01448000 (duplicate - LDP1)	Date Collected: 09/17/01	Method: SW8082
Field ID: CHAMBERS1	Date Prepared: 10/30/01	Matrix: Tissue
Project Officer: Steven Golding	Date Analyzed: 11/02/01	Units: ug/Kg ww

Analyte	Result	Qualifier
PCB - 1016	0.81	U
PCB - 1221	0.81	U
PCB - 1232	0.81	U
PCB - 1242	0.81	U
PCB - 1248	0.81	U
PCB - 1254	3.5	NJ
PCB - 1260	0.81	U

Surrogate Recoveries

Decachlorobiphenyl	86	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs

LIMS Project ID: 2061-01

Sample: 01448001

Date Collected: 09/17/01

Method: SW8082

Field ID: CHAMBERS2

Date Prepared: 10/30/01

Matrix: Tissue

Project Officer: Steven Golding

Date Analyzed: 11/02/01

Units: ug/Kg ww

Analyte	Result	Qualifier
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PCB - 1016	0.80	U
PCB - 1221	0.80	U
PCB - 1232	0.80	U
PCB - 1242	0.80	U
PCB - 1248	0.80	U
PCB - 1254	3.2	NJ
PCB - 1260	0.80	U

Surrogate Recoveries

Decachlorobiphenyl	91	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs

LIMS Project ID: 2061-01

Sample: 01448001 (matrix spike - LMX1)

Date Collected: 09/17/01

Method: SW8082

Field ID: CHAMBERS2

Date Prepared: 10/30/01

Matrix: Tissue

Project Officer: Steven Golding

Date Analyzed: 11/02/01

Units: % Recovery

Analyte	Result	Qualifier
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PCB - 1016	97	
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PCB - 1260	69	
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Surrogate Recoveries

Decachlorobiphenyl	96	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs		LIMS Project ID: 2061-01
Sample: 01448001 (matrix spike - LMX2)	Date Collected: 09/17/01	Method: SW8082
Field ID: CHAMBERS2	Date Prepared: 10/30/01	Matrix: Tissue
Project Officer: Steven Golding	Date Analyzed: 11/02/01	Units: % Recovery

Analyte	Result	Qualifier
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PCB - 1016	100	
PCB - 1260	74	

Surrogate Recoveries

Decachlorobiphenyl	99	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs

LIMS Project ID: 2061-01

Sample: 01448002

Date Collected: 09/17/01

Method: SW8082

Field ID: CHAMBERS3

Date Prepared: 10/30/01

Matrix: Tissue

Project Officer: Steven Golding

Date Analyzed: 11/02/01

Units: ug/Kg ww

Analyte	Result	Qualifier
PCB - 1016	0.78	U
PCB - 1221	0.78	U
PCB - 1232	0.78	U
PCB - 1242	0.78	U
PCB - 1248	0.78	U
PCB - 1254	3.1	NJ
PCB - 1260	0.78	U

Surrogate Recoveries

Decachlorobiphenyl	91	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs

LIMS Project ID: 2061-01

Lab ID: OBT1303A1

Method: SW8082

QC Type: BLNK

Date Prepared: 10/30/01

Matrix: Tissue

Project Officer: Steven Golding

Date Analyzed: 11/02/01

Units: ug/Kg ww

Analyte	Result	Qualifier
PCB - 1016	0.78	U
PCB - 1221	0.78	U
PCB - 1232	0.78	U
PCB - 1242	0.78	U
PCB - 1248	0.78	U
PCB - 1254	0.78	U
PCB - 1260	0.78	U

Surrogate Recoveries

Decachlorobiphenyl	79	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs

LIMS Project ID: 2061-01

Lab ID: OBT1303A2

Method: SW8082

QC Type: BLNK

Date Prepared: 10/30/01

Matrix: Tissue

Project Officer: Steven Golding

Date Analyzed: 11/02/01

Units: ug/Kg ww

Analyte	Result	Qualifier
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PCB - 1016	0.78	U
PCB - 1221	0.78	U
PCB - 1232	0.78	U
PCB - 1242	0.78	U
PCB - 1248	0.78	U
PCB - 1254	0.78	U
PCB - 1260	0.78	U

Surrogate Recoveries

Decachlorobiphenyl	86	%
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Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Polychlorinated Biphenyls

Project Name: Chambers Creek Mussels PCBs

LIMS Project ID: 2061-01

Lab ID: OCT1303A1

Method: SW8082

QC Type: ERAS

Date Prepared: 10/30/01

Matrix: Tissue

Project Officer: Steven Golding

Date Analyzed: 11/03/01

Units: ug/Kg ww

Analyte	Result	Qualifier
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PCB - 1260	10100	
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Surrogate Recoveries

Decachlorobiphenyl	NC
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