# Quality Assurance Project Plan

# Verification of 1998 303(d) Listing for PCBs in Budd Inlet (Inner)

by
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October 2002

**303(d) listings addressed in this study:**
Budd Inlet (Inner – WA-13-0030/390KRD) – PCB-1254

Ecology EIM number: SGOL004

**Approvals**

| | |
|---|---|
| Approved by: | October 17, 2002 |
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| Approved by: | October 17, 2002 |
| Anise Ahmed, Acting Unit Sup., Water Cleanup Unit, WQ, SWRO | Date |
| Approved by: | October 22, 2002 |
| Kelly Susewind, Section Manager, WQ, SWRO | Date |
| Approved by: | October 23, 2002 |
| Steven Golding, Project Manager, Watershed Ecology Section | Date |
| Approved by: | November 5, 2002 |
| Dale Norton, Unit Supervisor, Contaminant Studies Unit | Date |
| Approved by: | October 16, 2002 |
| Will Kendra, Section Manager, Watershed Ecology Section | Date |
| Approved by: | November 14, 2002 |
| Stuart Magoon, Director, Manchester Environmental Laboratory | Date |
| Approved by: | October 17, 2002 |
| Cliff Kirchmer, Ecology Quality Assurance Officer | Date |

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# Abstract

Budd Inlet (Inner) was placed on the 1998 303(d) list for polychlorinated biphenyl (PCB) based on a single grab-composite mussel sample from a culvert at the mouth of Moxlie Creek where it enters East Bay  The sample was found to have PCBs most closely resembling Aroclor-1254, with a concentration of 21 µg/Kg (wet weight).  This exceeded the EPA human health criterion of 1.4 µg/Kg (wet weight) which was in effect at the time.

In 1998 EPA revised their health criteria for PCBs (EPA, 1999).  Based on EPA's reassessment of the cancer potency of PCBs, the new criterion was set at 5.3 µg/Kg (wet weight).

Because the 303(d) listing for PCB in Budd Inlet was based on a single sample at Moxlie Creek as it enters the inlet through a culvert, and in light of the revised criterion, this project will provide more intensive sampling to better represent the water segment and to determine if the listing is still warranted.

# Background/Problem Statement

Budd Inlet (Inner – segment ID WA-13-0030/390KRD) 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 analysis of bay mussels (*Mytilus* sp.) collected by Ecology in 1995 from the head of East Bay at the culvert at the mouth of Moxlie Creek (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.

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

| Aroclor Equivalent | 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 |
| Total PCBs | 70 (est.) | 44 (est.) | **21** | 8 (est.) | 6 (est.) | 2 (est.) |

From Johnson and Davis (1996)
nd = not detected
J = estimated value
N = tentatively identified

Aroclors in Table 1 are identified as "Aroclor equivalents," because PCBs in tissues may resemble one Aroclor more than another but not be clearly identifable as a particular Aroclor in its original manufactured form. PCBs found in the environment tend to become altered through weathering and/or metabolic processes, resulting in changes in their constituent PCB congeners.

Each sample consisted of the entire soft parts from 33-84 individual mussels. The Budd Inlet sample was prepared from 30 mussels with a mean shell length of 52 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).

At the time the 1998 303(d) list was developed, the EPA human health criterion for PCBs was 1.4 µg/Kg (wet weight). The PCB-1254 concentration in Budd Inlet mussels at the culvert at the mouth of Moxlie Creek exceeded the listing criteria by a factor of 15.

In 1998 EPA revised their health criteria for PCBs (40 CFR 131, Water Quality Standards: Establishment of a Numeric Criteria for Priortiy 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 µg/Kg (wet weight).

This project will provide more intensive sampling of mussels from the listed segment in East Bay to better represent the water segment and to determine if the listing is still warranted.

# Project Description

Sampling of bay mussels (Mytilus sp.) from three shoreline sites in Budd Inlet (inner) will be conducted to acquire data to evaluate whether the PCB listing is still warranted for Inner Budd Inlet (WA-13-0030/390KRD). The *Study Design* section of this report describes how sample number, location, and time of collection will be chosen to meet the requirements of Ecology Water Quality Program Policy 1-11. A finding that none of the samples collected from the three sites exceed the EPA human health criterion of 5.3 µg/Kg (wet weight) could form the basis for a recommendation to remove the 303(d) listing for Budd Inlet.

# Responsibilities

EAP Project Lead – Steven Golding (360/407-6702)
EAP Field Assistance – Paul Anderson (360/407-7548)
EAP Arcview Support – Randy Coots (360/407-6690)
EAP Toxics Studies Unit Supervisor – Dale Norton (360/407-6765)
Manchester Environmental Laboratory Director – Stuart Magoon (360/871-8801)
EIM Data Entry – Clay Keown (360/407-6533)
Ecology Quality Assurance Officer – Cliff Kirchmer (360/407-6455)

# Schedule

| | |
|---|---|
| September 6, 2002 | Collect mussel samples, Budd Inlet |
| November 4, 2002 | Submit samples to Manchester Environmental Laboratory |
| January 2003 | Laboratory analyses completed |
| March 2003 | Draft project report completed |
| April 2003 | Final project report completed |
| June 2003 | Data entered into EIM database |

# Data Quality Objectives and Decision Criteria

The quality of analytical data will be evaluated according to Manchester Environmental Laboratory's practices as described in Ecology's Lab User's Manual (Ecology, 2000). This review addresses sample preparation, instrument calibration and performance, completeness of the data package, holding times, checks for errors, and usefulness of the data. A case narrative of the analytical review accompanies the reported results.

A reporting limit of 1.0 µg/Kg (wet weight) will allow for a determination of whether results meet the EPA human health criterion of 5.3 µg/Kg (wet weight). Measurement quality objectives for the parameters of this study appear in Table 2.

Table 2. Measurement Quality Objectives

| Parameter | Accuracy (% deviation from true value) | Precision (RSD) | Bias (% of true value) | Reporting Limit (µg/Kg wet) |
|---|---|---|---|---|
| PCB Aroclor-equivalents (µg/Kg wet) | NA | NA | NA | 1.0 |
| Lipids (%) | 38* | 14* | 10 | 0.1 |

*Developed from Ecology's Environmental Assessment Program (EAP) data, *Washington State Toxics Monitoring Program: Exploratory Monitoring of Toxic Contaminants in Edible Fish Tissue and Freshwater Environments of Washington State.* Quality Assurance Project Plan prepared by Keith Seiders and Bill Yake, March 25, 2002.

The accuracy and precision of low-level Aroclor analyses varies with the nature of matrices, the identifiability of Aroclor-equivalents and interferences. Data quality for PCBs should be within acceptable limits specified in EPA method SW-846 8082: Surrogate recoveries of 50% - 150% and the acceptance recovery limits associated with the laboratory control standard.

# Study Design

Ecology Water Quality Program Policy 1-11 (effective August, 1993; revised September 2002) states that sampling to obtain data for 303(d) listing considerations "should represent the waterbody segment as a whole – spatially and over time – rather than limited or isolated conditions."

Mussels will be collected from four shoreline sites within inner Budd Inlet (Figure 1). Sites 1 through 3 are located within the 303(d) listed segment, which includes approximately ½ mile of shoreline. The three sites are located along the shoreline so as to provide spatial representation within the segment. Site 4 is at Priest Point Park near the northern boundary of the city of Olympia.

Because PCBs are persistent compounds and organics integrate concentrations in tissues over time, it is anticipated that a single collection will provide a temporally representative sample.

Policy 1-11 states that a single grab-composite sample made up of at least five separate fish provides sufficient data for 303(d) listing considerations. Three grab-composite samples of 30 or more muscles each will be collected for this study.

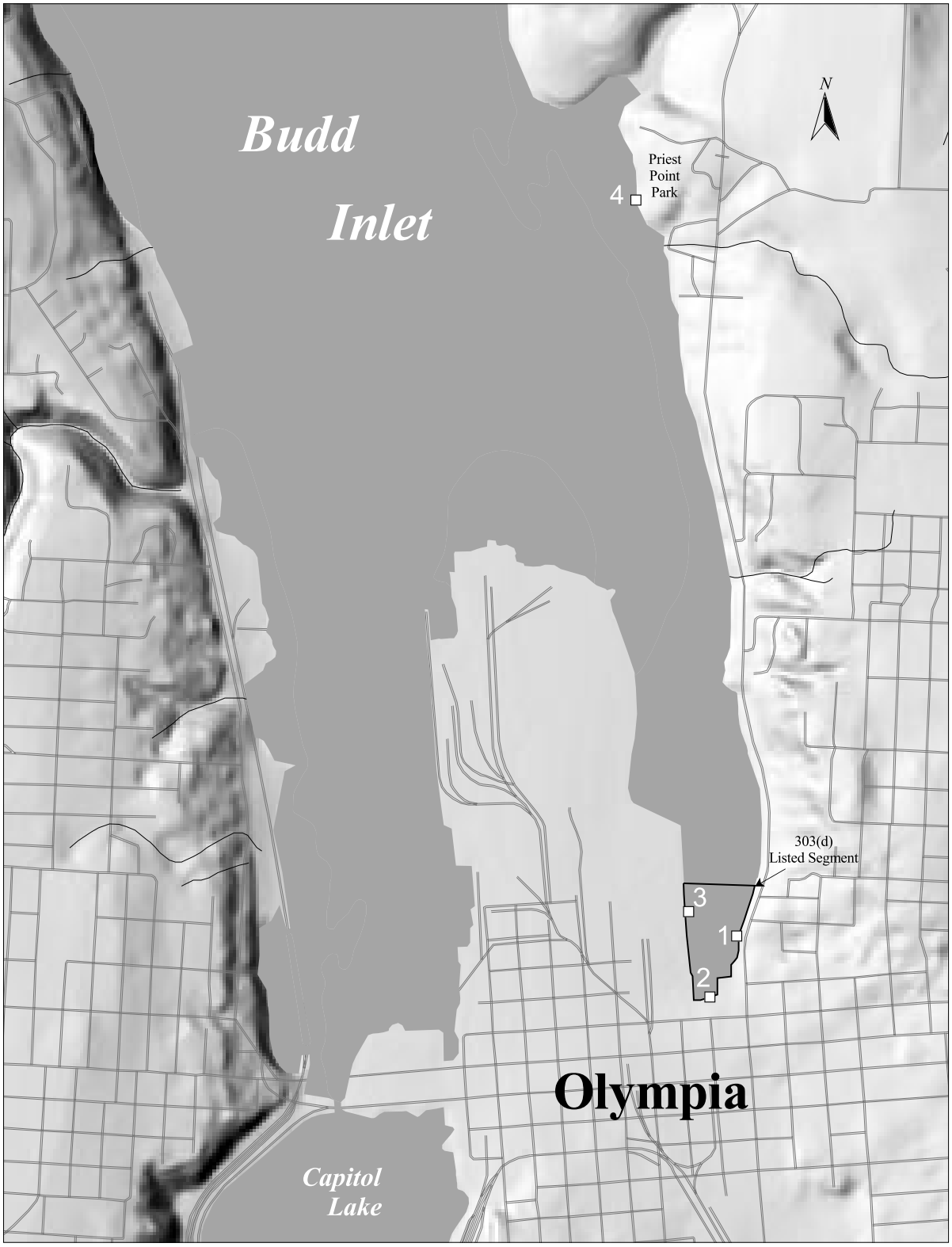


Figure 1 – Budd Inlet Mussel Sampling Locations

The two parameters of the study are PCB Aroclors-equivalents and % lipids. Sample collection, handling, and tissue preparation methods will be identical to the procedures used in 1995 to ensure that results will be comparable. The samples will be analyzed for PCB Aroclors by the Ecology Manchester Laboratory by GC/ECD, using modifications of EPA SW-846 methods 3540, 3620, 3665, and 8082.

# Field Procedures

Approximately 30 - 50 mussel samples will be collected from each of the three shoreline sites. The samples will be frozen and processed in November (within the 6-month holding time for PCB analysis of frozen samples -Ecology, 2000). The mean shell length and range will be noted. Equipment used to dissect and homogenize the samples will be cleaned with deionized water, laboratory grade acetone, and hexane. A summary of parameters, collection containers, preservation, and holding times appears in Table 3.

Table 3. Sample Size, Container, Preservation and Holding Time by Parameter

| Parameter | Sample Size | Container | Preservation | Holding Time |
|---|---|---|---|---|
| PCB Aroclors | 250 g | 8 oz., organic-free | Freeze | 6 months |
| Lipids (%) | 20 g | (from PCB container) | Freeze | NA |

# Laboratory Procedures

The samples will be analyzed for PCB Aroclors at the Ecology Manchester Laboratory by using GC/ECD, following modifications of EPA SW-846 methods 3540, 3620, 3665, and 8082. These procedures were used to analyze the 1995 sample with which the data for this project will be compared. A summary of laboratory procedures for the analysis of project samples appears in Table 4.

Table 4. Laboratory Procedures

| Analyte | Sample Matrix | Samples [Number/ Arrival Date] | Expected Range Of Results | Sample Prep Method | Analytical Method |
|---|---|---|---|---|---|
| PCB Aroclors | Tissue | 3<br>11/04/02 | 1-25 µg/Kg (wet weight) | homogenization | EPA SW-846 methods 3540, 3620, 3665, and 8082 |
| Lipid (%) | Tissue | 3<br>11/04/02 | 0.5 – 1.5 | homogenization | EPA (1980) |

# Quality Control Procedures

## Field Quality Control

The whole mussels in one sample will be separated into two groups, one of the groups to serve as the sample, the other as a replicate. While not a true field replicate in which each sample is collected at the site independently, a comparison of the replicate and sample results will provide an indication of variability. In addition to replicate samples, it is common in environmental studies for split samples to be prepared, particularly in studies involving enforcement, to prepare field replicate and split samples for analysis in order to estimate random variability and compare results between laboratories. Because the objective of this study is not to develop an estimate of PCB concentrations in mussels of inner Budd Bay, but rather to verify a 303(d) listing by determining whether PCB data for edible tissue of any sample exceed human health criteria, variability (precision) will not be estimated.

## Lab Quality Control

A matrix spike and duplicate matrix spike will be prepared from one of the samples in order to determine the percent recovery of the analytical method of determining PCB Aroclors. All samples and blanks will be spiked with decachlorobiphenyl (DCB), or other appropriate compound will be used as a surrogate to determine recoveries. A laboratory blank will be analyzed to verify that contamination is not affecting the reported results of sample analyses. Laboratory blank results may be particulary important in this study, since results may be near the reporting limit. OCS1303A1 or other appropriate reference material will be used as a laboratory control sample.

# Data Review and Validation

The data will be reviewed by Manchester Environmental Laboratory, and a case narrative will be prepared and submitted to the project manager with the project data. The case narrative will include an analysis of data quality in terms of sample holding times, method blanks, surrogate spikes, duplicate analyses, spiked sample analyses, and laboratory control samples. The project manager will review the case narrative for completeness, quality control, and the achievement of measurement quality objectives. Check standard, surrogate results, and spike recoveries will be assessed in accordance with the limits suggested in *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* (Lombard and Kirchmer, 2001).

# Data Quality Assessment

If the project data are complete and meet data quality requirements described in the *Data Review and Validation* section above, the PCB data will be considered of acceptable quality for comparison with the EPA human health criterion.

# Data Assessment

The data will be assessed by comparison of each sample result with the EPA human health criterion. The finding that no samples within the listed segment have a PCB concentration higher than the criterion would be consistent with a recommendation that the segment be excluded from the 303(d) list for PCB, whereas the finding that one or more exceed the criterion would constitute sufficient data for the segment to continue to be listed. Results of PCB analyses from the three sites in the listed segment will be compared with the reference site at Priest Point Park.

# References

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