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Ambient Monitoring for Sinclair and Dyes Inlets, Puget Sound, Washington: Chemical Analyses for 2010 Regional Mussel Watch (AMB02)

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Space and Naval Warfare Systems Center
Bremerton, Washington

September 2010

Prepared for the
Puget Sound Naval Shipyard and
Intermediate Maintenance Facility
Project ENVVEST
Bremerton, Washington
under Contract MIPR # N4523A10MP00034

Pacific Northwest National Laboratory
Richland, Washington

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ABSTRACT

The Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS&IMF) and Naval Base Kitsap-Bremerton (Shipyard) located in Bremerton, WA are committed to a culture of continuous process improvement for all aspects of Shipyard operations, including reducing the releases of hazardous materials and waste in discharges from the Shipyard. Under the Project ENVVEST Final Project Agreement, a cooperative project among PSNS&IMF, the Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology), and local stakeholders (US Navy, EPA and Ecology 2002) has been helping to improve the environmental quality of the Sinclair and Dyes Inlet Watershed (ENVVEST 2006). An ambient monitoring program for sediment, water, and indigenous mussels began in 2009 to assess the status and trend of ecological resources, assess the effectiveness of cleanup and pollution control measures, and determine if discharges from all sources are protective of beneficial uses including aquatic life. This document presents the 2010 chemical residue data and stable isotopes of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) for the regional mussel watch stations located in Sinclair Inlet, Dyes Inlet, Port Orchard Passage, Rich Passage, Agate Passage, Liberty Bay, and Keyport Lagoon. Indigenous bivalves were collected from a small boat and/or from along the shoreline, measured, composited, and analyzed for a suite of trace metals and organic contaminants. The trace metals included silver, arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc. The organic contaminants included the list of NOAA Status and Trends 20 polychlorinated biphenyls (PCB) congeners and suite of parent and methylated polycyclic aromatic hydrocarbons (PAHs). These chemical residue data provide the first year of the biota ambient monitoring.

Table of Content

Introduction

Sinclair Inlet and Dyes Inlet were listed on the State of Washington's 1998 Section 303(d) list of impaired waters because of fecal coliform contamination in marine waters and tributary streams, heavy metals and toxic organics in the bottom sediments, and polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyl (PCBs), aldrin, dieldrin, mercury (Hg), and arsenic (As) in the tissues of marine organisms. The Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS&IMF) and Naval Base Kitsap-Bremerton (referred to as Shipyard) located in Bremerton, WA are committed to a culture of continuous process improvement for all aspects of Shipyard operations, including reducing the releases of hazardous materials and waste in discharges from the Shipyard. Under the Project ENVVEST Final Project Agreement, a cooperative project among PSNS&IMF, the Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology), and local stakeholders (US Navy, EPA and Ecology 2002) has been helping to improve the environmental quality of the Sinclair and Dyes Inlet Watershed (ENVVEST 2006). An ambient monitoring program for sediment, water, and indigenous mussels began in 2009 to assess the status and trend of ecological resources, assess the effectiveness of cleanup and pollution control measures, and determine if discharges from all sources are protective of beneficial uses including aquatic life.

The objectives of this monitoring are to 1) establish a baseline for assessing continuous process improvement, 2) provide data for validation of proposed mixing zones and model verification, 3) provide data to inform the development of discharge limits and verify and validate discharge models, 4) assess total loading of all contaminants into the receiving water, 5) obtain data and information on toxicity for NPDES permit requirements for the Shipyard, and 6) develop procedures needed to meet ambient monitoring requirements for water, sediment, and biota in support of adaptive management actions.

This document presents the 2010 chemical residue data and stable isotopes of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) for the regional mussel watch stations located in Sinclair Inlet, Dyes Inlet, Port Orchard Passage, Rich Passage, Agate Passage, Liberty Bay, and Keyport Lagoon. Indigenous bivalves were collected from a small boat and/or from along the shoreline, measured, composited, and analyzed for a suite of trace metals and organic contaminants. The trace metals included silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), and zinc (Zn). The organic contaminants included the list of NOAA Status and Trends 20 polychlorinated biphenyls (PCB) congeners and suite of parent and methylated polycyclic aromatic hydrocarbons (PAHs). These chemical residue data provide the first year of the biota ambient monitoring.

For additional project information on biological monitoring see the following documents:

- 2003 Sinclair and Dyes Inlet TMDL Study: Biological Sampling and Analysis for Metals and PCBs (Brandenberger et al. 2003)

- Biological Sampling and Analysis in Sinclair and Dyes Inlets, Washington: Chemical Analyses for 2005 Puget Sound Biota Study (Brandenberger et al. 2006a,b)
- Biological Sampling and Analysis in Sinclair and Dyes Inlets, Washington: Chemical Analyses for 2007 Puget Sound Biota Study (Brandenberger et al. 2008)
- Contaminate Residues in Demersal Fish, Invetebrates, and Deployed Mussels in Selected Areas of The Puget Sound, WA (Johnston et al. 2007).
- Sampling and Analysis Plan for Ambient Monitoring and Toxicity Testing for Sinclair and Dyes Inlets, Puget Sound, Washington (Johnston et al. 2009)

Sample Collection and Analysis

Twenty-four regional indigenous bivalve monitoring stations were established and sampled following procedures recommended by the National Oceanic and Atmospheric Administration (NOAA) Mussel Watch Program (NOAA 2009; SCMRC 2009) and documented in the ENVVEST ambient monitoring sampling and analysis plan (Johnston et al. 2009).. The target species for collection were blue mussels, *Mytilus* spp. (*Mytilus trossulus*, *M. californianus*, or *M. galloprovincialis*). Table 1 provides the station identification, site code for the database, and the coordinates for the location. The following information was recorded on the chain of custody sheet: station id, replicate number, date, time, and GPS coordinates of sampling location. A site description was also provided including, at a minimum, substrate type, habitat characteristics, presence/absence of creosote pilings, visible sheen of oil, and any other important factors associated with the collection. At each sampling location about 30-50 live specimens (> 1.5 inches) were collected at three replicate locations within a 150 ft radius of the station location. The mussels will collected by cutting their byssus threads, brushing off as much sediment, barnacles, or other debris, and placing the mussels into labeled Ziploc bags along with water proof labels (station #, bag #, and collectors). Each station composite included from 123-577 specimens. The specimens were kept on ice until they were transferred to the Pacific Northwest National Marine Science Laboratory (MSL) for processing.

Mussels from 24 sampling locations were collected by the U.S. Navy and hand delivered to MSL. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite (see Table 2). The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The soft tissues from each of the three sampling areas representing a station were composited into each of three pre-cleaned glass 8oz. jars. All jars were composited and ground in a pre-cleaned titanium blender to ensure homogenization. Aliquots were then placed into 1) 4 oz. pre-cleaned polypropylene jar for metals and isotopes, 2) 8oz. pre-cleaned glass jar for organics, and 3) 8 oz. pre-cleaned glass jar for archival. All aliquots were stored at -20°C. The aliquot for metals and stable isotopes was then lypholized and ground using a ball mill shaker system. An approximately 2g aliquot of the dried and ground tissue was removed and

sent to Dr. Jay Brandes, Skidaway Institute for Oceanography for $\delta^{13}C$ and $\delta^{15}N$. Detailed descriptions of the analytical methods and quality control procedures for each parameter are provided in the quality control narrative accompanying each table. In summary, the dried, homogenized tissue was digested using an aqua regia mixture and analyzed for Ag, As, Cd and Pb using inductively coupled plasma mass spectrometry (ICP-MS); Cr, Cu, Ni, and Zn using inductively coupled optical emissions spectroscopy (ICP-OES); and Hg by cold vapor atomic absorption (CVAA).

The $\delta^{13}C$ and $\delta^{15}N$ analyses were performed on freeze dried, ground samples using a ThermoFinnigan Delta V plus stable isotope mass spectrometer coupled to a Thermo Flash elemental analyzer. Internal laboratory standards composed of marine chitin (Fisher Scientific) and calibrated to NIST standards were employed to correct sample data to international reference scales. Values are given vs. vPDB (C) and air (N) standard scales.

Tissue samples were extracted for PAHs and PCB congeners following MSL standard operating procedures based on the NOAA National Status and Trends (NS&T) methods. Extracts intended for PAH analyses were analyzed using gas chromatography mass spectrometry (GC/MS) and extracts for PCB analyses were analyzed using gas chromatography with electron capture detection (GC/ECD). Sample data were quantified by the method of internal standards using the surrogate compounds. The list of organic compounds analyzed is as follows:

PCBs	Parent PAHs	Methylated (alkylated)
Cl2(8)	Naphthalene	C1-Naphthalenes
Cl3(18)	Biphenyl	C2-Naphthalenes
Cl3(28)	Acenaphthylene	C3-Naphthalenes
Cl4(44)	Acenaphthene	C4-Naphthalenes
Cl4(52)	Fluorene	C1-Fluorenes
Cl4(66)	Anthracene	C2-Fluorenes
Cl4(77)	Phenanthrene	C3-Fluorenes
Cl5(101)	Dibenzothiophene	C1-Phenanthrenes/Anthracenes
Cl5(105)	Fluoranthene	C2-Phenanthrenes/Anthracenes
Cl5(118)	Pyrene	C3-Phenanthrenes/Anthracenes
Cl5(126)	Benzo(a)anthracene	C4-Phenanthrenes/Anthracenes
Cl6(128)	Chrysene	C1-Dibenzothiophenes
Cl6(138)	Benzo(b)fluoranthene	C2-Dibenzothiophenes
Cl6(153)	Benzo(k)fluoranthene	C3-Dibenzothiophenes
Cl7(170)	Benzo(e)pyrene	C4-Dibenzothiophenes
Cl7(180)	Benzo(a)pyrene	C1-Fluoranthenes/Pyrenes
Cl7(187)	Perylene	C2-Fluoranthenes/Pyrenes
Cl8(195)	Indeno(1,2,3-cd)pyrene	C3-Fluoranthenes/Pyrenes
Cl8(200)	Dibenz(a,h)anthracene	C1-Chrysenes
Cl9(206)	Benzo(g,h,i)perylene	C2-Chrysenes
Cl10(209)		C3-Chrysenes
		C4-Chrysenes

Table 1. ENVVEST Regional Mussel Watch Stations established in 2010 including station name, site code, coordinates, description and substrate type.

Site Name	Site Code:	Latitude:	Longitude:	Station Description:	Substrate:	Creosote
Manchester Lab Pier	MLPIER	47.5736500	-122.5450900	Clam Bay at Manchester Lab pier on floating dock	Creosite piling	Yes
Sinclair Inlet Waterman Point	SIWP	47.5844700	-122.5704400	On rocks seaward of nav light, small mussels	rocks	No
Sinclair Inlet Ross Point	SIRP	47.5399200	-122.6619000	Just east of point, rocky, cobble, & sand. Mussels embedded in beach face and on rocks	rocky cobble and sand	No
PSNS NAVSTA Mid (CP)	PS04	47.5544920	-122.6472150	East side of Charlie Pier on line hanging in water	nylon line	Yes
PSNS NAVSTA West (DP)	PS03	47.5559300	-122.6513720	On steel cable at SW end of small boat dock under stairs; Both samples from same location.	steel cable	Yes
PSNS CIA West (6)	PS06	47.5529760	-122.6426140	SE end of mole pier of DD6 near Pier B construction.	steel cable	Yes
PSNS CIA MidE (5)	PS08	47.5580000	-122.6385000	On barge near DD5 off mooring on steel cable	steel cable	Yes
PSNS CIA MidW (4)	PS09	47.5601000	-122.6363000	Off cement quay wall on steel cable haning in water ~15ft.	steel cable	No
PSNS CIA East (3)	PS11	47.5605000	-122.6299000	Sampled from log and cable attached to quay wall	log, steel cable	No
Sinclair Inlet Sinclair Marina	SISIM	47.5408000	-122.6420500	Public pier east of marina on floating dock from tires	rubber tire	No
Sinclair Inlet Port Orchard Marina	SIPOM	47.5431000	-122.6355000	On foot ferry dock near passage to loading platform	dock	No
Port Orchard Passage Illahee State Park	POPISP	47.5996000	-122.5942700	On pier off floating dock and beach S. of pier on woody debris (large log).	woody debris	No
Port Orchard Passage Illahee Port Dock	POPIPD	47.6126550	-122.5953650	Illahee Port floating dock and under pier on wooden crossbar	wood pier	No

Table 1. ENVVEST Regional Mussel Watch Stations established in 2010 including station name, site code, coordinates, description and substrate type.

Site Name	Site Code:	Latitude:	Longitude:	Station Description:	Substrate:	Creosote
Port Washington Narrows Lions Park	PWNLP	47.5841610	-122.6438430	On Northern edge of large extensive mussel bed	sand and cobbles on intertidal mud flat	No
Dyes Inlet Old Town Silverdale	DYOTS	47.6432000	-122.6950000	Old Town Silverdale pier on pilings under pier and floating dock	concrete piling	No
PSNS Inactive Fleet Callow Ave OF	PS01	47.5536960	-122.6574460	West end of Shipyard between carrier and Charleston Beech near Callow Ave OF	electrical cable	No
Sinclair Inlet head at Gorst	SIGST	47.5330000	-122.6800600	Head of Sinclair Inlet on western most permanet mooring	steel mooring	No
Dyes Inlet Ostrich Bay Ammo Pier	DYOBAP	47.5864000	-122.6868900	Dyes Inlet Ostrich Bay on end of abandonded ammo pier at Jackson Park	concrete piling	No
Port Orchard Passage Brownsville	POPBWN	47.6524610	-122.6125100	Brownsville Marina in Port Orchard Passage	cement dock	No
Keyport Lagoon	KPTLAG	47.6967751	-122.6190390	Keyport Lagoon inside lagoon near weir and outside lagoon in shellfish bed and on concrete radio tower base	muddy beach; shellfish bed, cement tower	No
Keyport NUWC Pier	KPTPIER	47.7049500	-122.6186800	NUWC Keyport pier on floating dock and steel pilings	steel pilings	No
Liberty Bay Poulsbo Marine Science Center	LBPMSC	47.7323010	-122.6487550	Poulsbo Marina at end of guest dock	cement dock	No
Agate Pass Kiana Lodge	APKIANA	47.7017600	-122.5812100	Suquamish Kiana Lodge at the end of floating dock	dock	Yes
Agate Pass BI Hidden Cove Beach	APHCB	47.6908440	-122.5662080	Bainbridge Island at the W end of Hidden Cove Rd.	rocks and cobbles	No

Table 2. ENVVEST AMB02 mussel watch collection information, March 2010.

Sponsor ID	Station ID	No. Mussels in Comp	Average length (mm)	Stdev
20100112MUS01-C	PS04	194	45	7.9
20100112MUS02-C	PS03	194	46	6.7
20100112MUS03-C	PS06	329	47	7.3
20100112MUS04-C	PS08	530	37	7.0
20100112MUS05-C	PS09	123	49	9.3
20100112MUS06-C	PS11	333	41	7.6
20100112MUS07-C	SISIM	179	48	12
20100112MUS09-C	POPISP	577	33	7.5
20100112MUS08-C	SIPOM	219	41	7.3
20100112MUS10-C	POPIPD	253	46	6.3
20100112MUS11-C	PWNLP	440	40	5.5
20100112MUS12-C	DYOTS	291	41	11
MW10EN01-C	MLPIER	357	42	8.1
MW10EN03-C	SIWP	300	26	5.0
MW10EN06-C	SIRP	177	32	7.5
MFEB4-001C	POPBWN	338	40	6.5
MFEB4-007C	KPTPIER	273	38	9.2
MFEB4-013C	KPTLAG	204	43	13
MFEB4-019C	APHCB	342	26	3.7
MFEB4-023C	APKIANA	248	44	7.4
MFEB4-029C	LBPMSC	319	33	10
AMB02-301C	DYOBAP	304	39	9.6
AMB02-295C	SIGST	281	41	4.5
AMB02-102C	PS01	272	42	6.5

Field Data Summary

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g WET wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Collection Date	# Mussels in Comp	Average lenth (mm)	Percent Moisture	Ag	As	Cd	Pb	Cr	Cu
				Instrument:					*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*	*ICP-OES*
Laboratory Achieved Method Detection Limits (tissue)								*85.9*	0.00044	0.016	0.00041	0.00048	0.0049	0.013
Reporting Limit (MDL* 3.18)									**0.001**	**0.05**	**0.0013**	**0.002**	**0.02**	**0.04**
20100112MUS01-C	PS04	Composite	Mussels	3106-215	01/12/10	194	45.3	86.6	0.00127	0.840	0.244	0.167	0.103	1.38
20100112MUS02-C	PS03	Composite	Mussels	3106-216	01/12/10	194	45.6	88.2	0.00153	0.773	0.247	0.234	0.096	1.15
20100112MUS03-C	PS06	Composite	Mussels	3106-217	01/12/10	329	47.3	87.8	0.00202	0.772	0.241	0.126	0.106	1.22
20100112MUS04-C	PS08	Composite	Mussels	3106-218	01/12/10	530	37.1	88.3	0.00625	0.835	0.263	0.228	0.126	4.35
20100112MUS05-C	PS09	Composite	Mussels	3106-219	01/12/10	123	48.7	88.7	0.00213	0.777	0.238	0.180	0.107	1.50
20100112MUS06-C	PS11	Composite	Mussels	3106-220	01/12/10	333	41.0	87.9	0.00315	0.934	0.260	0.340	0.236	2.15
20100112MUS07-C	SISIM	Composite	Mussels	3106-221	01/12/10	179	48.0	88.6	0.00157	0.748	0.278	0.164	0.197	1.18
20100112MUS09-C	POPISP	Composite	Mussels	3106-222	01/12/10	577	33.0	82.3	0.00619	1.28	0.379	0.160	0.535	1.30
20100112MUS08-C	SIPOM	Composite	Mussels	3106-223	01/12/10	219	41.0	86.9	0.00142	0.857	0.284	0.135	0.111	1.81
20100112MUS10-C	POPIPD	Composite	Mussels	3106-224	01/12/10	253	46.0	83.8	0.00607	1.12	0.430	0.124	0.273	1.07
20100112MUS11-C	PWNLP	Composite	Mussels	3106-225	01/12/10	440	40.0	83.9	0.00606	1.07	0.289	0.259	0.387	1.24
20100112MUS12-C	DYOTS	Composite	Mussels	3106-226	01/12/10	291	41.0	83.4	0.00772	1.28	0.351	0.202	0.279	1.27
MW10EN01-C	MLPIER	Composite	Mussels	3106-227	01/08/10	357	41.8	88.4	0.00311	1.01	0.489	0.074	0.107	0.828
MW10EN03-C	SIWP	Composite	Mussels	3106-228	01/08/10	300	25.9	87.4	0.00424	1.07	0.295	0.269	0.206	1.08
MW10EN06-C	SIRP	Composite	Mussels	3106-229	01/08/10	177	31.5	88.7	0.00373	0.892	0.299	0.221	0.359	1.24
MFEB4-001C	POPBWN	Composite	Mussels	3106-230	02/04/10	338	40.0	85.5	0.00291	1.38	0.382	0.116	0.177	2.01
MFEB4-007C	KPTPIER	Composite	Mussels	3106-231	02/04/10	273	38.0	83.6	0.00548	1.23	0.461	0.135	0.153	1.17
MFEB4-013C	KPTLAG	Composite	Mussels	3106-232	02/04/10	204	43.0	88.0	0.00529	1.14	0.558	0.246	0.299	1.00
MFEB4-019C	APHCB	Composite	Mussels	3106-233	02/04/10	342	26.0	84.9	0.00682	1.34	0.490	0.152	0.833	1.40
MFEB4-023C	APKIANA	Composite	Mussels	3106-234	02/04/10	248	44.0	83.1	0.00700	1.94	0.568	0.109	0.182	1.45
MFEB4-029C	LBPMSC	Composite	Mussels	3106-235	02/04/10	319	33.0	83.5	0.00318	1.57	0.437	0.198	0.205	3.92
AMB02-301C	DYOBAP	Composite	Mussels	3106-236	02/03/10	304	39.0	83.5	0.00690	1.34	0.536	0.249	0.197	1.28
AMB02-295C	SIGST	Composite	Mussels	3106-237	02/03/10	281	41.0	84.2	0.00304	0.833	0.232	0.136	0.127	1.80
AMB02-102C	PS01	Composite	Mussels	3106-238	02/02/10	272	42.0	84.8	0.00359	1.02	0.409	0.192	0.166	1.76

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PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g WET wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Ni	Zn	Hg
				Instrument:	*ICP-OES*	*ICP-OES*	*CVAA*
Laboratory Achieved Method Detection Limits (tissue)					0.0058	0.0025	0.00062
Reporting Limit (MDL* 3.18)					**0.02**	**0.008**	**0.002**
20100112MUS01-C	PS04	Composite	Mussels	3106-215	0.0902	28.1	0.0152
20100112MUS02-C	PS03	Composite	Mussels	3106-216	0.0732	24.4	0.0465
20100112MUS03-C	PS06	Composite	Mussels	3106-217	0.0980	24.1	0.0146
20100112MUS04-C	PS08	Composite	Mussels	3106-218	0.128	31.5	0.0185
20100112MUS05-C	PS09	Composite	Mussels	3106-219	0.0964	23.7	0.0157
20100112MUS06-C	PS11	Composite	Mussels	3106-220	0.310	36.2	0.0164
20100112MUS07-C	SISIM	Composite	Mussels	3106-221	0.170	23.0	0.0176
20100112MUS09-C	POPISP	Composite	Mussels	3106-222	0.529	22.5	0.0158
20100112MUS08-C	SIPOM	Composite	Mussels	3106-223	0.080	32.0	0.0180
20100112MUS10-C	POPIPD	Composite	Mussels	3106-224	0.246	20.7	0.0136
20100112MUS11-C	PWNLP	Composite	Mussels	3106-225	0.309	29.8	0.0232
20100112MUS12-C	DYOTS	Composite	Mussels	3106-226	0.258	24.4	0.0288
MW10EN01-C	MLPIER	Composite	Mussels	3106-227	0.136	15.3	0.0109
MW10EN03-C	SIWP	Composite	Mussels	3106-228	0.206	24.7	0.0163
MW10EN06-C	SIRP	Composite	Mussels	3106-229	0.333	24.9	0.0221
MFEB4-001C	POPBWN	Composite	Mussels	3106-230	0.176	27.1	0.0184
MFEB4-007C	KPTPIER	Composite	Mussels	3106-231	0.150	25.5	0.0167
MFEB4-013C	KPTLAG	Composite	Mussels	3106-232	0.297	25.8	0.0176
MFEB4-019C	APHCB	Composite	Mussels	3106-233	0.542	28.7	0.0164
MFEB4-023C	APKIANA	Composite	Mussels	3106-234	0.198	27.2	0.0187
MFEB4-029C	LBPMSC	Composite	Mussels	3106-235	0.208	39.5	0.0231
AMB02-301C	DYOBAP	Composite	Mussels	3106-236	0.201	29.5	0.0253
AMB02-295C	SIGST	Composite	Mussels	3106-237	0.124	39.5	0.0141
AMB02-102C	PS01	Composite	Mussels	3106-238	0.139	33.8	0.0200

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Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Collection Date	# Mussels in Comp	Average lenth (mm)	Percent Moisture	Ag	As	Cd	Pb	Cr	Cu
				Instrument:					*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*	*ICP-OES*
Laboratory Achieved Method Detection Limits (tissue)									**0.0031**	**0.11**	**0.0029**	**0.0034**	**0.035**	**0.094**
Reporting Limit (MDL* 3.18)									**0.010**	**0.35**	**0.0092**	**0.011**	**0.11**	**0.30**
20100112MUS01-C	PS04	Composite	Mussels	3106-215	01/12/10	194	45.3	86.6	0.00945	6.26	1.82	1.25	0.766	10.3
20100112MUS02-C	PS03	Composite	Mussels	3106-216	01/12/10	194	45.6	88.2	0.0130	6.56	2.10	1.99	0.816	9.78
20100112MUS03-C	PS06	Composite	Mussels	3106-217	01/12/10	329	47.3	87.8	0.0166	6.34	1.98	1.03	0.871	10.0
20100112MUS04-C	PS08	Composite	Mussels	3106-218	01/12/10	530	37.1	88.3	0.0535	7.16	2.25	1.96	1.08	37.3
20100112MUS05-C	PS09	Composite	Mussels	3106-219	01/12/10	123	48.7	88.7	0.0189	6.90	2.12	1.60	0.949	13.3
20100112MUS06-C	PS11	Composite	Mussels	3106-220	01/12/10	333	41.0	87.9	0.0260	7.70	2.14	2.80	1.95	17.7
20100112MUS07-C	SISIM	Composite	Mussels	3106-221	01/12/10	179	48.0	88.6	0.0138	6.55	2.44	1.43	1.73	10.3
20100112MUS09-C	POPISP	Composite	Mussels	3106-222	01/12/10	577	33.0	82.3	0.0349	7.24	2.14	0.902	3.02	7.32
20100112MUS08-C	SIPOM	Composite	Mussels	3106-223	01/12/10	219	41.0	86.9	0.0108	6.54	2.17	1.03	0.851	13.8
20100112MUS10-C	POPIPD	Composite	Mussels	3106-224	01/12/10	253	46.0	83.8	0.0375	6.92	2.66	0.766	1.69	6.62
20100112MUS11-C	PWNLP	Composite	Mussels	3106-225	01/12/10	440	40.0	83.9	0.0377	6.67	1.79	1.61	2.41	7.71
20100112MUS12-C	DYOTS	Composite	Mussels	3106-226	01/12/10	291	41.0	83.4	0.0465	7.72	2.11	1.22	1.68	7.64
MW10EN01-C	MLPIER	Composite	Mussels	3106-227	01/08/10	357	41.8	88.4	0.0267	8.71	4.20	0.637	0.920	7.12
MW10EN03-C	SIWP	Composite	Mussels	3106-228	01/08/10	300	25.9	87.4	0.0336	8.46	2.34	2.13	1.63	8.57
MW10EN06-C	SIRP	Composite	Mussels	3106-229	01/08/10	177	31.5	88.7	0.0330	7.89	2.65	1.95	3.17	11.0
MFEB4-001C	POPBWN	Composite	Mussels	3106-230	02/04/10	338	40.0	85.5	0.0201	9.57	2.65	0.801	1.22	13.9
MFEB4-007C	KPTPIER	Composite	Mussels	3106-231	02/04/10	273	38.0	83.6	0.0335	7.53	2.82	0.829	0.938	7.17
MFEB4-013C	KPTLAG	Composite	Mussels	3106-232	02/04/10	204	43.0	88.0	0.0440	9.47	4.65	2.05	2.48	8.34
MFEB4-019C	APHCB	Composite	Mussels	3106-233	02/04/10	342	26.0	84.9	0.0451	8.88	3.24	1.01	5.51	9.26
MFEB4-023C	APKIANA	Composite	Mussels	3106-234	02/04/10	248	44.0	83.1	0.0414	11.5	3.37	0.644	1.08	8.56
MFEB4-029C	LBPMSC	Composite	Mussels	3106-235	02/04/10	319	33.0	83.5	0.0193	9.51	2.65	1.20	1.24	23.7
AMB02-301C	DYOBAP	Composite	Mussels	3106-236	02/03/10	304	39.0	83.5	0.0419	8.14	3.25	1.51	1.20	7.79
AMB02-295C	SIGST	Composite	Mussels	3106-237	02/03/10	281	41.0	84.2	0.0192	5.26	1.46	0.857	0.801	11.4
AMB02-102C	PS01	Composite	Mussels	3106-238	02/02/10	272	42.0	84.8	0.0236	6.73	2.69	1.26	1.09	11.6

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Ni	Zn	Hg	CVAA Batch ID	ICP-OES Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-OES*	*ICP-OES*	*CVAA*			
Laboratory Achieved Method Detection Limits (tissue)					**0.041**	**0.018**	**0.0044**			
Reporting Limit (MDL* 3.18)					**0.13**	**0.057**	**0.014**			
20100112MUS01-C	PS04	Composite	Mussels	3106-215	0.673	210	0.114	050610HGBL	I042310A	042110-6100
20100112MUS02-C	PS03	Composite	Mussels	3106-216	0.622	207	0.395	050610HGBL	I042310A	042110-6100
20100112MUS03-C	PS06	Composite	Mussels	3106-217	0.804	198	0.120	050610HGBL	I042310A	042110-6100
20100112MUS04-C	PS08	Composite	Mussels	3106-218	1.09	270	0.159	050610HGBL	I042310A	042110-6100
20100112MUS05-C	PS09	Composite	Mussels	3106-219	0.857	210	0.140	050610HGBL	I042310A	042110-6100
20100112MUS06-C	PS11	Composite	Mussels	3106-220	2.56	299	0.136	050610HGBL	I042310A	042110-6100
20100112MUS07-C	SISIM	Composite	Mussels	3106-221	1.49	202	0.154	050610HGBL	I042310A	042110-6100
20100112MUS09-C	POPISP	Composite	Mussels	3106-222	2.99	127	0.0893	050610HGBL	I042310A	042110-6100
20100112MUS08-C	SIPOM	Composite	Mussels	3106-223	0.607	244	0.138	050610HGBL	I042310A	042110-6100
20100112MUS10-C	POPIPD	Composite	Mussels	3106-224	1.52	128	0.0842	050610HGBL	I042310A	042110-6100
20100112MUS11-C	PWNLP	Composite	Mussels	3106-225	1.92	185	0.144	050610HGBL	I042310A	042110-6100
20100112MUS12-C	DYOTS	Composite	Mussels	3106-226	1.55	147	0.173	050610HGBL	I042310A	042110-6100
MW10EN01-C	MLPIER	Composite	Mussels	3106-227	1.17	131	0.0935	050610HGBL	I042310A	042110-6100
MW10EN03-C	SIWP	Composite	Mussels	3106-228	1.64	196	0.129	050610HGBL	I042310A	042110-6100
MW10EN06-C	SIRP	Composite	Mussels	3106-229	2.95	221	0.196	050610HGBL	I042310A	042110-6100
MFEB4-001C	POPBWN	Composite	Mussels	3106-230	1.22	188	0.127	050610HGBL	I042310A	042110-6100
MFEB4-007C	KPTPIER	Composite	Mussels	3106-231	0.919	156	0.102	050610HGBL	I042310A	042110-6100
MFEB4-013C	KPTLAG	Composite	Mussels	3106-232	2.47	215	0.146	050610HGBL	I042310A	042110-6100
MFEB4-019C	APHCB	Composite	Mussels	3106-233	3.59	190	0.109	050610HGBL	I042310A	042110-6100
MFEB4-023C	APKIANA	Composite	Mussels	3106-234	1.17	161	0.111	050610HGBL	I042310A	042110-6100
MFEB4-029C	LBPMSC	Composite	Mussels	3106-235	1.26	239	0.140	050610HGBL	I042310A	042110-6100
AMB02-301C	DYOBAP	Composite	Mussels	3106-236	1.22	179	0.154	050610HGBL	I042310A	042110-6100
AMB02-295C	SIGST	Composite	Mussels	3106-237	0.784	249	0.0891	050610HGBL	I042310A	042110-6100
AMB02-102C	PS01	Composite	Mussels	3106-238	0.912	222	0.132	050610HGBL	I042310A	042110-6100

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:	**MDL**	**RL**	**3106-200**	**3106-199**	**3106-198**	**3106-197**
Station:			POPIPD	SIPOM	POPISP	SISIM
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070210PAH	070210PAH	070210PAH	070210PAH
Sample Weight (g):			11.99	11.45	9.98	11.52
%Moisture:			83.83	86.90	82.29	88.58
Average %Lipids (dry wt):			8.40	7.78	8.85	6.99
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/2/2010	7/2/2010	7/2/2010	7/2/2010
Analysis Date:			7/8/2010	7/8/2010	7/8/2010	7/8/2010
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.19 J	0.25	0.24	0.26
Cl3(18)	0.15	0.2	0.15 U	0.21	0.16	J 0.24
Cl3(28)	0.02	0.2	0.10 J	0.20 J	0.15 J	0.22
Cl4(44)	0.02	0.2	0.14 J	0.27	0.21	0.34
Cl4(52)	0.05	0.2	0.32	0.62	0.48	0.77
Cl4(66)	0.08	0.2	0.23	0.47	0.30	0.70
Cl4(77)	0.15	0.2	0.49	0.87	0.65	1.08
Cl5(101)	0.17	0.2	1.00	1.83	1.45	2.43
Cl5(105)	0.03	0.2	0.24	0.56	0.32	0.70
Cl5(118)	0.10	0.2	0.83	1.79	1.12	2.30
Cl5(126)	0.07	0.2	0.67	0.86	0.94	0.98
Cl6(128)	0.04	0.2	0.29	0.41	0.36	0.48
Cl6(138)	0.13	0.2	1.46	2.21	1.98	2.79
Cl6(153)	0.18	0.2	1.79	2.55	2.43	3.19
Cl7(170)	0.02	0.2	0.09 J	0.09 J	0.14 J	0.11 J
Cl7(180)	0.03	0.2	0.25	0.35	0.44	0.37
Cl7(187)	0.08	0.2	0.72	0.92	1.00	1.02
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.26	0.35	0.37	0.40
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			18.46	29.63	25.49	36.80
SURROGATE RECOVERIES						
Cl3(30)			89%	87%	76%	75%
Cl4(65)			96%	99%	87%	84%
Cl8(198)			92%	75%	70%	74%

[1] Sum of PCBs follows O'Conner (2002) and includes the MDL for non-detects

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:	**MDL**	**RL**	**3106-191**	**3106-192**	**3106-193**	**3106-194**
Station:			PS04	PS03	PS06	PS08
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070610PAH	070610PAH	070610PAH	070610PAH
Sample Weight (g):			11.59	11.49	11.06	11.29
%Moisture:			86.49	88.23	87.82	88.33
Average %Lipids (dry wt):			6.87	6.62	6.65	7.47
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/6/2010	7/6/2010	7/6/2010	7/6/2010
Analysis Date:			8/3/2010	8/3/2010	8/3/2010	8/3/2010
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.32	0.31	0.29	0.34
Cl3(18)	0.15	0.2	0.31	0.31	0.28	0.28
Cl3(28)	0.02	0.2	0.21	0.26	0.21	0.20
Cl4(44)	0.02	0.2	0.31	0.37	0.32	0.30
Cl4(52)	0.05	0.2	0.77	0.84	0.80	0.67
Cl4(66)	0.08	0.2	0.53	0.60	0.63	0.48
Cl4(77)	0.15	0.2	0.87	1.01	1.05	1.06
Cl5(101)	0.17	0.2	2.41	2.62	2.60	2.37
Cl5(105)	0.03	0.2	0.58	0.71	0.73	0.80
Cl5(118)	0.10	0.2	1.83	2.26	2.24	2.26
Cl5(126)	0.07	0.2	1.27	1.48	1.46	1.41
Cl6(128)	0.04	0.2	0.47	0.57	0.56	0.59
Cl6(138)	0.13	0.2	2.90	3.66	3.43	3.52
Cl6(153)	0.18	0.2	3.44	4.33	3.97	3.74
Cl7(170)	0.02	0.2	0.17 J	0.19 J	0.19 J	0.22
Cl7(180)	0.03	0.2	0.69	0.86	0.84	0.96
Cl7(187)	0.08	0.2	1.31	1.64	1.54	1.47
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.54	0.65	0.62	0.64
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			37.90	45.36	43.57	42.64
SURROGATE RECOVERIES						
Cl3(30)			82%	91%	90%	84%
Cl4(65)			90%	100%	99%	93%
Cl8(198)			73%	75%	74%	69%

[1] Sum of PCBs follows O'Conner (2002) and incl

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:	**MDL**	**RL**	**3106-195**	**3106-196**	**3106-201**	**3106-202**
Station:			PS09	PS11	PWNLP	DYOTS
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070610PAH	070610PAH	071910PAH	071910PAH
Sample Weight (g):			11.86	12.46	11.4	13.26
%Moisture:			88.74	87.88	83.92	83.37
Average %Lipids (dry wt):			6.24	6.96	9.40	8.61
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/6/2010	7/6/2010	7/19/2010	7/19/2010
Analysis Date:			8/3/2010	8/3/2010	8/4/2010	8/4/2010
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.46	0.23	0.22	0.30
Cl3(18)	0.15	0.2	0.45	0.22	0.15 U	0.21
Cl3(28)	0.02	0.2	0.23	0.20 J	0.11 J	0.16 J
Cl4(44)	0.02	0.2	0.49	0.26	0.17 J	0.22
Cl4(52)	0.05	0.2	1.07	0.65	0.41	0.55
Cl4(66)	0.08	0.2	0.80	0.49	0.28	0.40
Cl4(77)	0.15	0.2	1.89	1.09	0.73	0.82
Cl5(101)	0.17	0.2	5.11	2.54	1.50	1.68
Cl5(105)	0.03	0.2	1.33	0.75	0.41	0.45
Cl5(118)	0.10	0.2	4.10	2.39	1.41	1.54
Cl5(126)	0.07	0.2	3.04	1.52	1.05	0.99
Cl6(128)	0.04	0.2	0.97	0.59	0.38	0.42
Cl6(138)	0.13	0.2	8.13	3.78	2.30	2.33
Cl6(153)	0.18	0.2	10.67	4.26	2.87	2.85
Cl7(170)	0.02	0.2	0.44	0.18 J	0.13 J	0.09 J
Cl7(180)	0.03	0.2	2.14	0.87	0.40	0.28
Cl7(187)	0.08	0.2	3.13	1.59	1.12	1.05
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	1.31	0.65	0.41	0.38
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			91.54	44.56	28.09	29.48
SURROGATE RECOVERIES						
Cl3(30)			84%	83%	85%	84%
Cl4(65)			92%	92%	98%	94%
Cl8(198)			66%	64%	67%	68%

[1] Sum of PCBs follows O'Conner (2002) and incl

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:	**MDL**	**RL**	**3106-203**	**3106-204**	**3106-205**	**3106-206**
Station:			MLPIER	SIWP	SIRP	POPBWN
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			071910PAH	071910PAH	071910PAH	071910PAH
Sample Weight (g):			13.1	11.59	11.82	12.08
%Moisture:			88.37	87.37	88.69	85.55
Average %Lipids (dry wt):			6.40	5.43	5.42	8.07
Collection Date:			1/8/2010	1/8/2010	1/8/2010	2/4/2010
Extraction Date:			7/19/2010	7/19/2010	7/19/2010	7/19/2010
Analysis Date:			8/4/2010	8/4/2010	8/4/2010	8/4/2010
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.18 J	0.17 J	0.20 0.20	J
Cl3(18)	0.15	0.2	0.18 J	0.15 U	0.16 J	0.17 J
Cl3(28)	0.02	0.2	0.07 J	0.08 J	0.12 J	0.17 J
Cl4(44)	0.02	0.2	0.13 J	0.10 J	0.15 J	0.18 J
Cl4(52)	0.05	0.2	0.31 0.25	0.41	0.41	
Cl4(66)	0.08	0.2	0.17 J	0.14 J	0.29 0.35	
Cl4(77)	0.15	0.2	0.47 0.39	0.64	0.54	
Cl5(101)	0.17	0.2	1.18 0.82	1.63	1.19	
Cl5(105)	0.03	0.2	0.19 J	0.20 J	0.47 0.31	
Cl5(118)	0.10	0.2	0.81 0.78	1.46	1.07	
Cl5(126)	0.07	0.2	1.60 0.68	1.04	0.71	
Cl6(128)	0.04	0.2	0.31 0.24	0.38	0.29	
Cl6(138)	0.13	0.2	2.48 1.33	2.23	1.63	
Cl6(153)	0.18	0.2	3.46 1.70	2.73	2.01	
Cl7(170)	0.02	0.2	0.17 J	0.11 J	0.13 J	0.06 J
Cl7(180)	0.03	0.2	0.88 0.26	0.42	0.23	
Cl7(187)	0.08	0.2	1.62 0.71	1.04	0.74	
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.73 0.24	0.42	0.26	
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			29.92	16.73	27.89	21.07
SURROGATE RECOVERIES						
Cl3(30)			75%	78%	74%	65%
Cl4(65)			82%	92%	85%	78%
Cl8(198)			70%	70%	64%	58%

[1] Sum of PCBs follows O'Conner (2002) and incl

BATTELLE MARINE SCIENCE LABORATORIES
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Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:	**MDL**	**RL**	**3107-207**	**3106-208**	**3106-209**	**3106-210**
Station:			KPTPIER	KPTLAG	APHCB	APKIANA
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			071910PAH	071910PAH	071910PAH	072910PAH
Sample Weight (g):			11.62	12.8	11.6	11.63
%Moisture:			83.65	87.99	84.88	83.12
Average %Lipids (dry wt):			7.92	7.55	5.52	7.57
Collection Date:			2/4/2010	2/4/2010	2/4/2010	2/4/2010
Extraction Date:			7/19/2010	7/19/2010	7/19/2010	7/29/2010
Analysis Date:			8/4/2010	8/4/2010	8/6/2010	8/6/2010
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.25 0.21	0.17	J	0.18 J
Cl3(18)	0.15	0.2	0.18 J	0.15 U	0.15 U	0.15 U
Cl3(28)	0.02	0.2	0.17 J	0.10 J	0.08 J	0.10 J
Cl4(44)	0.02	0.2	0.18 J	0.12 J	0.12 J	0.13 J
Cl4(52)	0.05	0.2	0.48 0.29	0.24	0.32	
Cl4(66)	0.08	0.2	0.31 0.19	J	0.12 J	0.20 J
Cl4(77)	0.15	0.2	0.67 0.45	0.36	0.41	
Cl5(101)	0.17	0.2	1.40 1.00	0.78	1.03	
Cl5(105)	0.03	0.2	0.35 0.27	0.19	J	0.25
Cl5(118)	0.10	0.2	1.20 0.95	0.65	0.81	
Cl5(126)	0.07	0.2	0.73 0.58	0.56	0.62	
Cl6(128)	0.04	0.2	0.34 0.26	0.21	0.29	
Cl6(138)	0.13	0.2	1.81 1.45	1.23	1.54	
Cl6(153)	0.18	0.2	2.16 1.74	1.53	1.93	
Cl7(170)	0.02	0.2	0.08 J	0.06 J	0.07 J	0.08 J
Cl7(180)	0.03	0.2	0.20 0.15	J	0.22 0.26	
Cl7(187)	0.08	0.2	0.77 0.61	0.60	0.72	
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.27 0.20	J	0.19 J	0.22
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			23.15	17.60	14.99	18.52
SURROGATE RECOVERIES						
Cl3(30)			81%	81%	63%	85%
Cl4(65)			91%	88%	77%	94%
Cl8(198)			68%	64%	64%	70%

[1] Sum of PCBs follows O'Conner (2002) and incl

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:	**MDL**	**RL**	**3106-211**	**3106-212**	**3106-213**	**3106-214**
Station:			LBPMSC	DYOBAP	SIGST	PS01
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			072910PAH	072910PAH	072910PAH	072910PAH
Sample Weight (g):			11.45	12.05	12.31	13.03
%Moisture:			83.49	83.51	84.23	84.79
Average %Lipids (dry wt):			7.02	7.97	9.08	8.63
Collection Date:			2/4/2010	2/3/2010	2/3/2010	2/2/2010
Extraction Date:			7/29/2010	7/29/2010	7/29/2010	7/29/2010
Analysis Date:			8/6/2010	8/6/2010	8/6/2010	8/6/2010
Units (wet wt):	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Cl2(8)	0.16	0.2	0.19 J	0.20 0.38	0.29	
Cl3(18)	0.15	0.2	0.15 U	0.15 U	0.36 0.29	
Cl3(28)	0.02	0.2	0.16 J	0.11 J	0.43 0.28	
Cl4(44)	0.02	0.2	0.17 J	0.13 J	0.51 0.40	
Cl4(52)	0.05	0.2	0.40 0.37	1.33	1.00	
Cl4(66)	0.08	0.2	0.32 0.26	0.93	0.65	
Cl4(77)	0.15	0.2	0.49 0.55	1.58	1.12	
Cl5(101)	0.17	0.2	1.16 1.23	3.64	2.88	
Cl5(105)	0.03	0.2	0.35 0.31	1.01	0.71	
Cl5(118)	0.10	0.2	1.06 1.10	3.05	2.43	
Cl5(126)	0.07	0.2	0.53 0.81	1.43	1.53	
Cl6(128)	0.04	0.2	0.30 0.33	0.73	0.60	
Cl6(138)	0.13	0.2	1.52 1.75	4.35	3.68	
Cl6(153)	0.18	0.2	1.72 2.17	4.75	4.46	
Cl7(170)	0.02	0.2	0.05 J	0.07 J	0.17 J	0.14 J
Cl7(180)	0.03	0.2	0.15 J	0.19 J	0.78 0.72	
Cl7(187)	0.08	0.2	0.63 0.87	1.53	1.61	
Cl8(195)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08	0.2	0.20 J	0.30 0.58	0.63	
Cl9(206)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01	0.2	0.01 U	0.01 U	0.01 U	0.01 U
Sum PCB congeners[1]			19.18	21.84	55.09	46.85
SURROGATE RECOVERIES						
Cl3(30)			82%	83%	77%	67%
Cl4(65)			95%	96%	88%	75%
Cl8(198)			63%	70%	67%	53%

[1] Sum of PCBs follows O'Conner (2002) and incl

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-200**	**3106-199**	**3106-198**	**3106-197**
Station:			POPIPD	SIPOM	POPISP	SISIM
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070210PAH	070210PAH	070210PAH	070210PAH
Sample Weight (g):			11.99	11.45	9.98	11.52
%Moisture:			83.83	86.90	82.29	88.58
Average %Lipids (dry wt):			8.40	7.78	8.85	6.99
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/2/2010	7/2/2010	7/2/2010	7/2/2010
Analysis Date:			8/12/2010	8/12/2010	8/12/2010	8/12/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Naphthalene	1.82	1.82	5.73 B	5.00 B	31.4 B	4.10 B
C1-Naphthalenes	1.82	1.82	3.71 B	5.44 B	34.5 B	4.22 B
C2-Naphthalenes	3.61	1.82	9.19 11.3		35.8	8.81
C3-Naphthalenes	3.61	1.82	7.69 19.4		23.2	9.86
C4-Naphthalenes	3.61	1.82	4.72 21.6		9.00	7.44
Biphenyl	2.86	1.82	2.86 U	2.86 U	9.89 2.86	U
Acenaphthylene	1.68	1.82	1.68 U	1.68 U	4.17 2.45	
Acenaphthene	2.29	1.82	3.48 2.29	U	62.9	2.29 U
Fluorene	2.75	1.82	3.98 2.75	U	39.2	2.75 U
C1-Fluorenes	2.17	1.82	16.4 16.6		26.6	11.7
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	0.42	1.82	5.49 3.29		12.2	5.47
Phenanthrene	1.10	1.82	17.4 18.0		55.7	21.0
C1-Phenanthrenes/Anthracenes	1.18	1.82	63.8 50.5		83.9	41.4
C2-Phenanthrenes/Anthracenes	0.10	1.82	13.7 62.4		20.8	26.1
C3-Phenanthrenes/Anthracenes	0.10	1.82	16.0 39.9		43.4	20.2
C4-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	33.9 0.10	U	0.10 U
Dibenzothiophene	0.40	1.82	0.68 J	1.08 J	4.18 0.88	J
C1-Dibenzothiophenes	0.40	1.82	1.65 J	3.30 2.83		1.56 J
C2-Dibenzothiophenes	0.40	1.82	3.70 9.66		0.40 U	5.30
C3-Dibenzothiophenes	0.40	1.82	0.40 U	10.7 0.40	U	8.92
C4-Dibenzothiophenes	0.40	1.82	3.70 8.50		0.40 U	8.25
Fluoranthene	0.81	1.82	17.4 38.0		47.5	45.0
Pyrene	0.35	1.82	8.62 24.9		25.2	29.8
C1-Fluoranthenes/Pyrenes	0.81	1.82	11.4 18.5		28.7	22.9
C2-Fluoranthenes/Pyrenes	0.81	1.82	3.23 9.05		8.26	11.0
C3-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	0.54	1.82	5.93 7.10		17.8	14.9
Chrysene	0.87	1.82	13.8 16.4		40.3	31.0
C1-Chrysenes	0.87	1.82	3.35 5.96		8.38	10.1
C2-Chrysenes	0.87	1.82	0.87 U	6.72 0.87	U	9.49
C3-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	4.15
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	6.42 8.35		22.6	15.6
Benzo(k)fluoranthene	0.21	1.82	2.85 3.39		7.76	6.60
Benzo(e)pyrene	0.22	1.82	3.70 6.29		12.8	11.1
Benzo(a)pyrene	0.23	1.82	2.13 1.64	J	7.69	2.97
Perylene	0.25	1.82	1.70 J	1.06 J	3.21 1.97	
Indeno(1,2,3-cd)pyrene	0.14	1.82	1.64 J	1.21 J	3.81 1.90	
Dibenz(a,h)anthracene	0.06	1.82	0.06 U	0.06 U	1.47 J	0.64 J
Benzo(g,h,i)perylene	0.22	1.82	1.21 J	1.98 3.60		2.89

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-200**	**3106-199**	**3106-198**	**3106-197**
Station:			POPIPD	SIPOM	POPISP	SISIM
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070210PAH	070210PAH	070210PAH	070210PAH
Sample Weight (g):			11.99	11.45	9.98	11.52
%Moisture:			83.83	86.90	82.29	88.58
Average %Lipids (dry wt):			8.40	7.78	8.85	6.99
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/2/2010	7/2/2010	7/2/2010	7/2/2010
Analysis Date:			8/12/2010	8/12/2010	8/12/2010	8/12/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]			277	488	748	424
Sum of Parent PAHs			107	147	413	206
SURROGATE RECOVERIES (%Rec)						
d8-Naphthalene			64%	57%	75%	64%
d10-Acenaphthene			81%	72%	80%	74%
d10-Phenanthrene			94%	93%	94%	91%
d12-Chrysene			91%	89%	93%	88%
d12-Perylene			87%	87%	89%	87%

[1] Sum of PAHs includes the MDL for non-detects

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-191**	**3106-192**	**3106-193**	**3106-194**
Station:			PS04	PS03	PS06	PS08
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070610PAH	070610PAH	070610PAH	070610PAH
Sample Weight (g):			11.59	11.49	11.06	11.29
%Moisture:			86.49	88.23	87.82	88.33
Average %Lipids (dry wt):			6.87	6.62	6.65	7.47
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/6/2010	7/6/2010	7/6/2010	7/6/2010
Analysis Date:			8/19/2010	8/19/2010	8/19/2010	8/19/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Naphthalene	1.82	1.82	3.24 3.70		3.31	7.03 *
C1-Naphthalenes	1.82	1.82	3.17 3.32		3.05	6.51 *
C2-Naphthalenes	3.61	1.82	6.98 7.24		7.01	14.6
C3-Naphthalenes	3.61	1.82	7.74 9.40		7.61	15.8
C4-Naphthalenes	3.61	1.82	6.84 7.77		4.92	20.9
Biphenyl	2.86	1.82	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	1.68	1.82	1.88 1.68	U	1.68 U	3.36
Acenaphthene	2.29	1.82	2.29 U	2.29 U	2.29 U	2.32
Fluorene	2.75	1.82	2.75 U	3.14 2.75	U	3.83
C1-Fluorenes	2.17	1.82	13.1 17.1		14.9	20.6
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	0.42	1.82	5.73 8.14		4.31	6.75
Phenanthrene	1.10	1.82	20.7 23.2		14.0	32.5
C1-Phenanthrenes/Anthracenes	1.18	1.82	21.8 23.3		18.9	54.8
C2-Phenanthrenes/Anthracenes	0.10	1.82	23.0 29.3		19.7	64.4
C3-Phenanthrenes/Anthracenes	0.10	1.82	15.6 22.3		15.3	68.7
C4-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	0.10 U	0.10 U	0.10 U
Dibenzothiophene	0.40	1.82	0.79 J	1.04 J	0.71 J	1.53 J
C1-Dibenzothiophenes	0.40	1.82	1.35 J	1.78 J	1.55 J	3.86
C2-Dibenzothiophenes	0.40	1.82	4.56 5.63		5.48	13.6
C3-Dibenzothiophenes	0.40	1.82	6.66 9.36		5.71	12.5
C4-Dibenzothiophenes	0.40	1.82	6.89 12.9		8.23	10.6
Fluoranthene	0.81	1.82	48.1 52.7		26.0	78.1
Pyrene	0.35	1.82	26.6 32.8		17.6	47.9
C1-Fluoranthenes/Pyrenes	0.81	1.82	22.4 28.2		14.7	33.0
C2-Fluoranthenes/Pyrenes	0.81	1.82	9.29 15.4		7.36	17.7
C3-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	12.1 0.81	U	10.4
Benzo(a)anthracene	0.54	1.82	19.3 23.8		12.1	26.8
Chrysene	0.87	1.82	29.1 35.2		19.6	46.3
C1-Chrysenes	0.87	1.82	8.96 14.4		7.14	14.6
C2-Chrysenes	0.87	1.82	7.64 13.3		7.19	11.5
C3-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	15.7 25.7		10.7	24.3
Benzo(k)fluoranthene	0.21	1.82	7.54 10.9		4.96	11.0
Benzo(e)pyrene	0.22	1.82	9.79 16.0		6.71	14.4
Benzo(a)pyrene	0.23	1.82	4.71 7.80		3.53	5.93
Perylene	0.25	1.82	1.82 2.86		1.32 J	2.35
Indeno(1,2,3-cd)pyrene	0.14	1.82	2.41 0.87	J	2.68	4.25
Dibenz(a,h)anthracene	0.06	1.82	0.06 U	0.06 U	0.06 U	0.06 U
Benzo(g,h,i)perylene	0.22	1.82	1.93 0.92	J	6.00	3.99

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-191**	**3106-192**	**3106-193**	**3106-194**
Station:			PS04	PS03	PS06	PS08
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070610PAH	070610PAH	070610PAH	070610PAH
Sample Weight (g):			11.59	11.49	11.06	11.29
%Moisture:			86.49	88.23	87.82	88.33
Average %Lipids (dry wt):			6.87	6.62	6.65	7.47
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/6/2010	7/6/2010	7/6/2010	7/6/2010
Analysis Date:			8/19/2010	8/19/2010	8/19/2010	8/19/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]			380	495	299	726
Sum of Parent PAHs			207	256	143	326
SURROGATE RECOVERIES (%Rec)						
d8-Naphthalene			44%	56%	54%	37% #
d10-Acenaphthene			69%	75%	77%	66%
d10-Phenanthrene			88%	89%	95%	87%
d12-Chrysene			88%	84%	87%	85%
d12-Perylene			89%	87%	87%	77%

[1] Sum of PAHs includes the MDL for non-detects

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-195**	**3106-196**	**3106-201**	**3106-202**
Station:			PS09	PS11	PWNLP	DYOTS
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070610PAH	070610PAH	071910PAH	071910PAH
Sample Weight (g):			11.86	12.46	11.4	13.26
%Moisture:			88.74	87.88	83.92	83.37
Average %Lipids (dry wt):			6.24	6.96	9.40	8.61
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/6/2010	7/6/2010	7/19/2010	7/19/2010
Analysis Date:			8/19/2010	8/19/2010	8/13/2010	8/13/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Naphthalene	1.82	1.82	5.85 41.7		14.0 B*	6.99 B*
C1-Naphthalenes	1.82	1.82	4.81 30.9		8.16 *	4.61 *
C2-Naphthalenes	3.61	1.82	7.88	36.0 10.9	9.32	
C3-Naphthalenes	3.61	1.82	7.48	26.8 11.1	10.8	
C4-Naphthalenes	3.61	1.82	6.95	13.1 7.21	8.44	
Biphenyl	2.86	1.82	2.86 U	6.56 2.86	U	2.86 U
Acenaphthylene	1.68	1.82	2.15 5.71		1.68 U	2.50
Acenaphthene	2.29	1.82	2.45 37.1		2.29 U	2.84
Fluorene	2.75	1.82	3.21 46.5		2.75 U	3.11
C1-Fluorenes	2.17	1.82	14.7	25.6 28.0	31.9	
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	0.42	1.82	5.31	22.8 2.56	4.90	
Phenanthrene	1.10	1.82	30.9	516.2 6.50	16.2	
C1-Phenanthrenes/Anthracenes	1.18	1.82	22.2	184.7 9.14	18.1	
C2-Phenanthrenes/Anthracenes	0.10	1.82	23.6	92.5 11.8	17.3	
C3-Phenanthrenes/Anthracenes	0.10	1.82	17.6	39.3 12.9	23.1	
C4-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	0.10 U	0.10 U	0.10 U
Dibenzothiophene	0.40	1.82	1.43 J	27.1 0.40	U	0.61 J
C1-Dibenzothiophenes	0.40	1.82	1.72 J	12.1 1.24	J	1.43 J
C2-Dibenzothiophenes	0.40	1.82	5.82	11.1 4.27	5.69	
C3-Dibenzothiophenes	0.40	1.82	8.56	8.76 5.60	5.21	
C4-Dibenzothiophenes	0.40	1.82	8.60	9.16 4.42	7.10	
Fluoranthene	0.81	1.82	46.2	497.3 8.66	26.2	
Pyrene	0.35	1.82	28.3	299.3 5.87	17.0	
C1-Fluoranthenes/Pyrenes	0.81	1.82	18.6	96.4 6.61	13.4	
C2-Fluoranthenes/Pyrenes	0.81	1.82	14.5	131.6 3.90	5.68	
C3-Fluoranthenes/Pyrenes	0.81	1.82	8.90 33.1		0.81 U	0.81 U
Benzo(a)anthracene	0.54	1.82	20.0	50.3 3.49	9.66	
Chrysene	0.87	1.82	31.3	118.1 7.85	15.6	
C1-Chrysenes	0.87	1.82	9.10	25.2 3.88	6.02	
C2-Chrysenes	0.87	1.82	9.18	16.7 6.61	7.79	
C3-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	18.3	58.0 5.12	9.26	
Benzo(k)fluoranthene	0.21	1.82	7.32	22.0 2.04	3.59	
Benzo(e)pyrene	0.22	1.82	10.6	27.5 3.42	7.06	
Benzo(a)pyrene	0.23	1.82	5.92 14.0		1.60 J	2.18
Perylene	0.25	1.82	2.03 3.75		1.31 J	1.96
Indeno(1,2,3-cd)pyrene	0.14	1.82	1.61 J	2.19 1.78	J	1.33 J
Dibenz(a,h)anthracene	0.06	1.82	0.06 U	3.11 0.06	U	0.06 U
Benzo(g,h,i)perylene	0.22	1.82	0.74 J	4.32 2.27	2.04	

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-195**	**3106-196**	**3106-201**	**3106-202**
Station:			PS09	PS11	PWNLP	DYOTS
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			070610PAH	070610PAH	071910PAH	071910PAH
Sample Weight (g):			11.86	12.46	11.4	13.26
%Moisture:			88.74	87.88	83.92	83.37
Average %Lipids (dry wt):			6.24	6.96	9.40	8.61
Collection Date:			1/12/2010	1/12/2010	1/12/2010	1/12/2010
Extraction Date:			7/6/2010	7/6/2010	7/19/2010	7/19/2010
Analysis Date:			8/19/2010	8/19/2010	8/13/2010	8/13/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]			423	2603	219	319
Sum of Parent PAHs			227	1804	77	136
SURROGATE RECOVERIES (%Rec)						
d8-Naphthalene			57%	59%	35% #	38% #
d10-Acenaphthene			82%	83%	61%	64%
d10-Phenanthrene			91%	96%	90%	86%
d12-Chrysene			78%	89%	91%	86%
d12-Perylene			75%	89%	90%	79%

[1] Sum of PAHs includes the MDL for non-detects

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-203**	**3106-204**	**3106-205**	**3106-206**
Station:			MLPIER	SIWP	SIRP	POPBWN
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			071910PAH	071910PAH	071910PAH	071910PAH
Sample Weight (g):			13.1	11.59	11.82	12.08
%Moisture:			88.37	87.37	88.69	85.55
Average %Lipids (dry wt):			6.40	5.43	5.42	8.07
Collection Date:			1/8/2010	1/8/2010	1/8/2010	2/4/2010
Extraction Date:			7/19/2010	7/19/2010	7/19/2010	7/19/2010
Analysis Date:			8/13/2010	8/12/2010	8/13/2010	8/5/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Naphthalene	1.82	1.82	3.62 B	7.41 B	7.38 B*	3.85 B*
C1-Naphthalenes	1.82	1.82	2.72 3.32	4.19	*	5.06 *
C2-Naphthalenes	3.61	1.82	5.89 9.21	9.44	18.1	
C3-Naphthalenes	3.61	1.82	7.81 6.70	9.79	34.2	
C4-Naphthalenes	3.61	1.82	7.63 5.09	4.54	25.3	
Biphenyl	2.86	1.82	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	1.68	1.82	11.8 1.68	U	1.68 U	1.68 U
Acenaphthene	2.29	1.82	7.52 2.29	U	2.29 U	2.29 U
Fluorene	2.75	1.82	7.71 2.75	U	2.75 U	2.75 U
C1-Fluorenes	2.17	1.82	11.5 16.1	9.15	10.7	
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	0.42	1.82	14.9 0.99	J	1.35 J	2.81
Phenanthrene	1.10	1.82	62.2 5.49	7.16	13.9	
C1-Phenanthrenes/Anthracenes	1.18	1.82	46.8 5.15	5.14	28.3	
C2-Phenanthrenes/Anthracenes	0.10	1.82	57.0 13.3	11.2	43.9	
C3-Phenanthrenes/Anthracenes	0.10	1.82	84.3 81.9	53.6	45.6	
C4-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	0.10 U	0.10 U	30.4
Dibenzothiophene	0.40	1.82	3.53 0.40	U	0.63 J	0.40 U
C1-Dibenzothiophenes	0.40	1.82	4.12 0.40	U	0.40 U	1.83
C2-Dibenzothiophenes	0.40	1.82	12.6 0.40	U	0.40 U	7.30
C3-Dibenzothiophenes	0.40	1.82	11.2 0.40	U	0.40 U	12.3
C4-Dibenzothiophenes	0.40	1.82	6.52 0.40	U	0.40 U	12.2
Fluoranthene	0.81	1.82	383.8 5.98	7.84	33.8	
Pyrene	0.35	1.82	174.5 3.27	4.63	22.7	
C1-Fluoranthenes/Pyrenes	0.81	1.82	76.9 3.42	4.53	17.8	
C2-Fluoranthenes/Pyrenes	0.81	1.82	42.3 0.81	U	0.81 U	8.73
C3-Fluoranthenes/Pyrenes	0.81	1.82	14.3 0.81	U	0.81 U	0.81 U
Benzo(a)anthracene	0.54	1.82	41.9 2.19	3.18	8.47	
Chrysene	0.87	1.82	105.4 4.91	6.51	18.8	
C1-Chrysenes	0.87	1.82	21.9 0.87	U	4.93 7.14	
C2-Chrysenes	0.87	1.82	10.6 0.87	U	2.97 5.43	
C3-Chrysenes	0.87	1.82	5.00 0.87	U	0.87 U	0.87 U
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	59.6 2.18	3.30	9.76	
Benzo(k)fluoranthene	0.21	1.82	22.5 0.86	J	1.32 J	4.03
Benzo(e)pyrene	0.22	1.82	27.6 1.43	J	2.78 6.42	
Benzo(a)pyrene	0.23	1.82	19.4 0.71	J	1.07 J	2.57
Perylene	0.25	1.82	4.78 0.69	J	0.83 J	1.84
Indeno(1,2,3-cd)pyrene	0.14	1.82	9.83 0.52	J	0.77 J	1.57 J
Dibenz(a,h)anthracene	0.06	1.82	2.89 0.06	U	0.06 U	0.06 U
Benzo(g,h,i)perylene	0.22	1.82	8.33 0.74	J	1.18 J	1.97

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-203**	**3106-204**	**3106-205**	**3106-206**
Station:			MLPIER	SIWP	SIRP	POPBWN
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			071910PAH	071910PAH	071910PAH	071910PAH
Sample Weight (g):			13.1	11.59	11.82	12.08
%Moisture:			88.37	87.37	88.69	85.55
Average %Lipids (dry wt):			6.40	5.43	5.42	8.07
Collection Date:			1/8/2010	1/8/2010	1/8/2010	2/4/2010
Extraction Date:			7/19/2010	7/19/2010	7/19/2010	7/19/2010
Analysis Date:			8/13/2010	8/12/2010	8/13/2010	8/5/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]			1409	203	188	464
Sum of Parent PAHs			975	47	60	143
SURROGATE RECOVERIES (%Rec)						
d8-Naphthalene			41%	47%	32% #	29% #
d10-Acenaphthene			76%	60%	60%	56%
d10-Phenanthrene			88%	88%	87%	52%
d12-Chrysene			88%	89%	90%	69%
d12-Perylene			85%	84%	84%	67%

[1] Sum of PAHs includes the MDL for non-detects

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3107-207**	**3106-208**	**3106-209**	**3106-210**
Station:			KPTPIER	KPTLAG	APHCB	APKIANA
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			071910PAH	071910PAH	071910PAH	072910PAH
Sample Weight (g):			11.62	12.8	11.6	11.63
%Moisture:			83.65	87.99	84.88	83.12
Average %Lipids (dry wt):			7.92	7.55	5.52	7.57
Collection Date:			2/4/2010	2/4/2010	2/4/2010	2/4/2010
Extraction Date:			7/19/2010	7/19/2010	7/19/2010	7/29/2010
Analysis Date:			8/5/2010	8/5/2010	8/8/2010	8/7/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Naphthalene	1.82	1.82	3.86 B	4.33 B	17.2 B	2.77 B
C1-Naphthalenes	1.82	1.82	3.68	3.11	18.4	1.86
C2-Naphthalenes	3.61	1.82	21.0	12.4	50.9	10.7
C3-Naphthalenes	3.61	1.82	11.6	4.65	33.4	9.92
C4-Naphthalenes	3.61	1.82	18.2	3.61 U	12.3	5.66
Biphenyl	2.86	1.82	2.86 U	2.86 U	5.51	2.86 U
Acenaphthylene	1.68	1.82	1.97	1.68 U	4.06	1.68 U
Acenaphthene	2.29	1.82	2.29 U	2.29 U	69.0	2.29 U
Fluorene	2.75	1.82	2.75 U	2.75 U	63.4	2.75 U
C1-Fluorenes	2.17	1.82	14.1	7.73	24.3	9.33
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	0.42	1.82	3.24	2.18	45.1	1.77 J
Phenanthrene	1.10	1.82	8.70	8.87	141.8	6.96
C1-Phenanthrenes/Anthracenes	1.18	1.82	16.5	8.75	59.7	9.89
C2-Phenanthrenes/Anthracenes	0.10	1.82	31.4	8.10	27.2	8.77
C3-Phenanthrenes/Anthracenes	0.10	1.82	35.4	14.5	13.4	13.4
C4-Phenanthrenes/Anthracenes	0.10	1.82	0.10 U	0.10 U	0.10 U	0.10 U
Dibenzothiophene	0.40	1.82	0.40 U	0.40 U	9.00	0.40 U
C1-Dibenzothiophenes	0.40	1.82	4.76	0.85 J	4.35	0.87 J
C2-Dibenzothiophenes	0.40	1.82	20.4	3.57	5.49	0.40 U
C3-Dibenzothiophenes	0.40	1.82	21.1	2.94	3.85	2.59
C4-Dibenzothiophenes	0.40	1.82	14.7	0.40 U	0.40 U	2.86
Fluoranthene	0.81	1.82	17.2	14.4	131	11.7
Pyrene	0.35	1.82	10.4	10.3	81.5	5.74
C1-Fluoranthenes/Pyrenes	0.81	1.82	9.11	8.13	73.1	6.59
C2-Fluoranthenes/Pyrenes	0.81	1.82	4.86	3.85	15.5	2.67
C3-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	0.54	1.82	4.12	6.59	64.1	4.79
Chrysene	0.87	1.82	7.79	8.67	118	8.63
C1-Chrysenes	0.87	1.82	4.12	3.34	16.3	3.16
C2-Chrysenes	0.87	1.82	5.40	4.71	6.76	3.83
C3-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	4.92	4.59	27.3	4.26
Benzo(k)fluoranthene	0.21	1.82	1.87	1.39 J	11.0	1.68 J
Benzo(e)pyrene	0.22	1.82	3.96	2.94	12.9	3.11
Benzo(a)pyrene	0.23	1.82	1.52 J	2.15	14.7	1.99
Perylene	0.25	1.82	1.16 J	1.17 J	4.24	0.88 J
Indeno(1,2,3-cd)pyrene	0.14	1.82	1.01 J	0.85 J	5.97	0.72 J
Dibenz(a,h)anthracene	0.06	1.82	0.06 U	0.06 U	2.12	0.06 U
Benzo(g,h,i)perylene	0.22	1.82	1.07 J	0.92 J	4.47	0.82 J

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3107-207**	**3106-208**	**3106-209**	**3106-210**
Station:			KPTPIER	KPTLAG	APHCB	APKIANA
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			071910PAH	071910PAH	071910PAH	072910PAH
Sample Weight (g):			11.62	12.8	11.6	11.63
%Moisture:			83.65	87.99	84.88	83.12
Average %Lipids (dry wt):			7.92	7.55	5.52	7.57
Collection Date:			2/4/2010	2/4/2010	2/4/2010	2/4/2010
Extraction Date:			7/19/2010	7/19/2010	7/19/2010	7/29/2010
Analysis Date:			8/5/2010	8/5/2010	8/8/2010	8/7/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]			325	177	1205	165
Sum of Parent PAHs			81	79	833	66
SURROGATE RECOVERIES (%Rec)						
d8-Naphthalene			64%	50%	69%	67%
d10-Acenaphthene			62%	97%	64%	66%
d10-Phenanthrene			86%	87%	81%	88%
d12-Chrysene			74%	70%	73%	65%
d12-Perylene			67%	65%	69%	69%

[1] Sum of PAHs includes the MDL for non-detects

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-211**	**3106-212**	**3106-213**	**3106-214**
Station:			LBPMSC	DYOBAP	SIGST	PS01
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			072910PAH	072910PAH	072910PAH	072910PAH
Sample Weight (g):			11.45	12.05	12.31	13.03
%Moisture:			83.49	83.51	84.23	84.79
Average %Lipids (dry wt):			7.02	7.97	9.08	8.63
Collection Date:			2/4/2010	2/3/2010	2/3/2010	2/2/2010
Extraction Date:			7/29/2010	7/29/2010	7/29/2010	7/29/2010
Analysis Date:			8/7/2010	8/7/2010	8/7/2010	8/7/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Naphthalene	1.82	1.82	3.52 B	2.23 B	3.80 B	3.17 B
C1-Naphthalenes	1.82	1.82	5.48 1.98	2.66	2.47	
C2-Naphthalenes	3.61	1.82	14.0 8.87	17.8	14.2	
C3-Naphthalenes	3.61	1.82	22.5 9.91	14.7	10.6	
C4-Naphthalenes	3.61	1.82	29.7 3.75	8.21	6.33	
Biphenyl	2.86	1.82	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	1.68	1.82	2.34 1.68	U	1.80 J	1.68 U
Acenaphthene	2.29	1.82	2.29 U	2.29 U	2.29 U	2.29 U
Fluorene	2.75	1.82	2.75 U	2.75 U	2.75 U	2.75 U
C1-Fluorenes	2.17	1.82	12.1 11.6	14.1	9.91	
C2-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17	1.82	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	0.42	1.82	4.98 1.60	J	2.65 2.41	
Phenanthrene	1.10	1.82	27.4 4.28	6.47	6.07	
C1-Phenanthrenes/Anthracenes	1.18	1.82	45.4 10.2	17.8	13.7	
C2-Phenanthrenes/Anthracenes	0.10	1.82	61.9 7.58	14.4	14.0	
C3-Phenanthrenes/Anthracenes	0.10	1.82	51.9 14.6	95.3	27.7	
C4-Phenanthrenes/Anthracenes	0.10	1.82	46.0 0.10	U	0.10 U	0.10 U
Dibenzothiophene	0.40	1.82	1.79 J	0.40 U	0.40 U	0.40 U
C1-Dibenzothiophenes	0.40	1.82	8.49 0.40	U	0.40 U	0.98 J
C2-Dibenzothiophenes	0.40	1.82	25.9 0.40	U	7.57 6.09	
C3-Dibenzothiophenes	0.40	1.82	22.7 2.53	7.78	8.28	
C4-Dibenzothiophenes	0.40	1.82	14.8 0.40	U	0.40 U	10.8
Fluoranthene	0.81	1.82	84.0 6.47	10.8	12.3	
Pyrene	0.35	1.82	47.9 4.06	6.48	8.72	
C1-Fluoranthenes/Pyrenes	0.81	1.82	33.7 4.98	10.9	9.43	
C2-Fluoranthenes/Pyrenes	0.81	1.82	16.2 2.44	0.81	U	5.68
C3-Fluoranthenes/Pyrenes	0.81	1.82	0.81 U	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	0.54	1.82	22.7 2.68	4.52	6.00	
Chrysene	0.87	1.82	42.2 4.50	5.64	9.84	
C1-Chrysenes	0.87	1.82	11.9 3.67	7.21	6.98	
C2-Chrysenes	0.87	1.82	7.68 3.93	5.02	8.27	
C3-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	3.42
C4-Chrysenes	0.87	1.82	0.87 U	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37	1.82	17.4 3.25	3.01	6.02	
Benzo(k)fluoranthene	0.21	1.82	6.09 1.19	J	1.20 J	2.15
Benzo(e)pyrene	0.22	1.82	12.5 1.92	2.46	4.58	
Benzo(a)pyrene	0.23	1.82	3.29 1.09	J	0.99 J	1.81 J
Perylene	0.25	1.82	2.24 0.71	J	0.82 J	1.13 J
Indeno(1,2,3-cd)pyrene	0.14	1.82	2.01 0.91	J	0.44 J	1.10 J
Dibenz(a,h)anthracene	0.06	1.82	0.06 U	0.06 U	0.06 U	0.06 U
Benzo(g,h,i)perylene	0.22	1.82	2.32 1.18	J	0.64 J	1.66 J

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Sample Name:			**3106-211**	**3106-212**	**3106-213**	**3106-214**
Station:			LBPMSC	DYOBAP	SIGST	PS01
Sample Type:			Reg_Sample	Reg_Sample	Reg_Sample	Reg_Sample
Matrix:			TISSUE	TISSUE	TISSUE	TISSUE
Batch ID:			072910PAH	072910PAH	072910PAH	072910PAH
Sample Weight (g):			11.45	12.05	12.31	13.03
%Moisture:			83.49	83.51	84.23	84.79
Average %Lipids (dry wt):			7.02	7.97	9.08	8.63
Collection Date:			2/4/2010	2/3/2010	2/3/2010	2/2/2010
Extraction Date:			7/29/2010	7/29/2010	7/29/2010	7/29/2010
Analysis Date:			8/7/2010	8/7/2010	8/7/2010	8/7/2010
Units (wet wt):	**MDL (ng/g)**	**RL**	**ng/g**	**ng/g**	**ng/g**	**ng/g**
Sum of PAHs Measured[1]			728	140	292	242
Sum of Parent PAHs			291	46	60	77
SURROGATE RECOVERIES (%Rec)						
d8-Naphthalene			63%	75%	52%	46%
d10-Acenaphthene			107%	69%	73%	60%
d10-Phenanthrene			88%	87%	87%	75%
d12-Chrysene			69%	71%	74%	60%
d12-Perylene			72%	69%	64%	58%

[1] Sum of PAHs includes the MDL for non-detects

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

ENVVEST
Biota Studies
2010 Mussel Study
Stable Isotopes

Station Location	Description	Station Code	Organism	MSL Code	Collection Date	$\delta^{15}N$	$\delta^{13}C$
PSNS	PNSN Inactive Fleet Callow Ave OF	PS01	Mussel	3106-238	02/02/10	11.01	-20.57
PSNS	PSNS NAVSTA Mid (CP)	PS04	Mussel	3106-215	01/12/10	9.74	-18.65
PSNS	PSNS NAVSTA West (DP)	PS03	Mussel	3106-216	01/12/10	9.93	-18.68
PSNS	PSNS CIA West (6)	PS06	Mussel	3106-217	01/12/10	10.05	-18.69
PSNS	PSNS CIA MidE (5)	PS08	Mussel	3106-218	01/12/10	10.03	-18.72
PSNS	PSNS CIA MidW (4)	PS09	Mussel	3106-219	01/12/10	10.01	-17.48
PSNS	PSNS CIA East (3)	PS11	Mussel	3106-220	01/12/10	9.90	-18.17
Sinclair Inlet	Sinclair Inlet Sinclair Marina	SISIM	Mussel	3106-221	01/12/10	9.81	-19.02
Sinclair Inlet	Sinclair Inlet Port Orchard Marina	SIPOM	Mussel	3106-223	01/12/10	10.15	-18.05
Sinclair Inlet	Sinclair Inlet Waterman Point	SIWP	Mussel	3106-228	01/08/10	9.93	-17.74
Sinclair Inlet	Sinclair Inlet Ross Point	SIRP	Mussel	3106-229	01/08/10	10.12	-18.42
Sinclair Inlet	Sinclair Inlet head at Gorst	SIGST	Mussel	3106-237	02/03/10	10.44	-22.41
Port Orchard	Port Orchard Pass Illahee State Park	POPISP	Mussel	3106-222	01/12/10	9.44	-18.48
Port Orchard	Port Orchard Pass Illahee State Dock	POPIPD	Mussel	3106-224	01/12/10	9.42	-18.17
Port Orchard	Port Orchard Passage Brownsville	POPBWN	Mussel	3106-230	02/04/10	10.69	-20.02
Dyes Inlet	Port Washington Narrows Lions Park	PWNLP	Mussel	3106-225	01/12/10	10.10	-17.84
Dyes Inlet	Dyes Inlet Old Town Silverdale	DYOTS	Mussel	3106-226	01/12/10	10.12	-18.63
Dyes Inlet	Dyes Inlet Ostrich Bay Ammo Pier	DYOBAP	Mussel	3106-236	02/03/10	10.72	-18.90
Rich Passage	Manchester Lab Pier	MLPIER	Mussel	3106-227	01/08/10	10.39	-18.27
Keyport Passage	Keyport NUWC Pier	KPTPIER	Mussel	3106-231	02/04/10	9.99	-18.96
Keyport Passage	Keyport Lagoon	KPTLAG	Mussel	3106-232	02/04/10	10.10	-20.26
Keyport Passage	Liberty Bay Poulsbo Marina Science Center	LBPMSC	Mussel	3106-235	02/04/10	9.36	-21.35
Agate Passage	Agate Pass BI Hidden Cove Beach	APHCB	Mussel	3106-233	02/04/10	10.66	-18.92
Agate Passage	Agate Pass Kiana Lodge	APKIANA	Mussel	3106-234	02/04/10	11.44	-18.97

QA/QC Sample Results

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Collection Date	# Mussels in Comp	Average lenth (mm)	Percent Moisture	Ag	As	Cd	Pb	Cr	Cu
				Instrument:					*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*	*ICP-OES*
Laboratory Achieved Method Detection Limits (tissue)									**0.0031**	**0.11**	**0.0029**	**0.0034**	**0.035**	**0.094**
Reporting Limit (MDL* 3.18)									**0.010**	**0.35**	**0.0092**	**0.011**	**0.11**	**0.30**
METHOD BLANKS														
MB-1				Blank R1 041410					0.0031 U	0.126 J	0.0029 U	0.0034 U	0.035 U	0.094 U
MB-2				Blank R2 041410					0.0031 U	0.250 J	0.0029 U	0.0034 U	0.035 U	0.094 U
LABORATORY CONTROL SAMPLES														
MB-1				Blank R1 041410					0.0031 U	0.126 J	0.0029 U	0.0034 U	0.035 U	0.094 U
LCS-1				LCS R1 041410					2.00	1.93	1.96	2.04	2.03	1.98
				Spiking Level					2	2	2	2	2	2
				Percent Recovery, LCS					**100%**	**90%**	**98%**	**102%**	**102%**	**99%**
MB-2				Blank R2 041410					0.0031 U	0.250 J	0.0029 U	0.0034 U	0.035 U	0.094 U
LCS-1				LCS R2 041410					1.89	2.17	1.94	1.92	2.04	1.96
				Spiking Level					2	2	2	2	2	2
				Percent Recovery, LCS					**94%**	**96%**	**97%**	**96%**	**102%**	**98%**
MATRIX SPIKE RESULTS														
20100112MUS05-C	PS09	Composite	Mussels	3106-219	01/12/10	123	48.7	88.7	0.0189	6.90	2.12	1.60	0.949	13.3
MS-1				3106-219MS					1.93	33.4	4.31	3.67	3.00	40.6
MSD-1				3106-219MSD					1.92	33.6	4.21	3.72	2.93	40.8
				Spiking Level, MS					2.11	26.3	2.11	2.11	2.11	26.3
				Spiking Level, MSD					2.13	26.7	2.13	2.13	2.13	26.7
				Percent Recovery, MS					**91%**	**101%**	**104%**	**99%**	**97%**	**104%**
				Percent Recovery, MSD					**89%**	**100%**	**98%**	**99%**	**93%**	**103%**
				RPD					**2.0%**	**0.8%**	**5.7%**	**0.8%**	**4.9%**	**0.6%**
MFEB4-029C	LBPMSC	Composite	Mussels	3106-235	02/04/10	319	33.0	83.5	0.0193	9.51	2.65	1.20	1.24	23.7
MS-2				3106-235MS					1.87	34.5	27.0	3.29	3.25	48.8
MSD-2				3106-235MSD					1.83	33.7	27.1	3.14	3.14	48.8
				Spiking Level, MS					2.06	25.2	25.2	2.06	2.06	25.2
				Spiking Level, MSD					2.00	25.5	25.5	2.00	2.00	25.5
				Percent Recovery, MS					**90%**	**99%**	**97%**	**102%**	**98%**	**99%**
				Percent Recovery, MSD					**91%**	**95%**	**96%**	**97%**	**95%**	**98%**
				RPD					**1.0%**	**4.3%**	**0.8%**	**4.4%**	**2.5%**	**1.0%**

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Ni	Zn	Hg	CVAA Batch ID	ICP-OES Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-OES*	*ICP-OES*	*CVAA*			
Laboratory Achieved Method Detection Limits (tissue)					**0.041**	**0.018**	**0.0044**			
Reporting Limit (MDL* 3.18)					**0.13**	**0.057**	**0.014**			
METHOD BLANKS										
MB-1				Blank R1 041410	0.041 U	0.018 U	0.00950 J	050610HGBL	I042310A	042110-6100
MB-2				Blank R2 041410	0.041 U	0.0249 J	0.00820 J	050610HGBL	I042310A	042110-6100
LABORATORY CONTROL SAMPLES										
MB-1				Blank R1 041410	0.041 U	0.018 U	0.00950 J	050610HGBL	I042310A	042110-6100
LCS-1				LCS R1 041410	2.08	2.00	1.99	050610HGBL	I042310A	042110-6100
				Spiking Level	2	2	2			
				Percent Recovery, LCS	**104%**	**100%**	**99%**			
MB-2				Blank R2 041410	0.041 U	0.025 J	0.00820 J	050610HGBL	I042310A	042110-6100
LCS-1				LCS R2 041410	2.07	2.04	1.94	050610HGBL	I042310A	042110-6100
				Spiking Level	2	2	2			
				Percent Recovery, LCS	**103%**	**101%**	**97%**			
MATRIX SPIKE RESULTS										
20100112MUS05-C	PS09	Composite	Mussels	3106-219	0.857	210	0.140	050610HGBL	I042310A	042110-6100
MS-1				3106-219MS	2.86	355	2.16	050610HGBL	I042310A	042110-6100
MSD-1				3106-219MSD	2.98	364	2.13	050610HGBL	I042310A	042110-6100
				Spiking Level, MS	2.11	132	2.11			
				Spiking Level, MSD	2.13	133	2.13			
				Percent Recovery, MS	**95%**	**110%**	**96%**			
				Percent Recovery, MSD	**100%**	**116%**	**93%**			
				RPD	**4.5%**	**5.3%**	**2.7%**			
MFEB4-029C	LBPMSC	Composite	Mussels	3106-235	1.26	239	0.140	050610HGBL	I042310A	042110-6100
MS-2				3106-235MS	3.21	369	2.10	050610HGBL	I042310A	042110-6100
MSD-2				3106-235MSD	2.93	358	1.99	050610HGBL	I042310A	042110-6100
				Spiking Level, MS	2.06	126	2.06			
				Spiking Level, MSD	2.00	127	2.00			
				Percent Recovery, MS	**95%**	**103%**	**95%**			
				Percent Recovery, MSD	**84%**	**94%**	**93%**			
				RPD	**12.5%**	**9.6%**	**2.7%**			

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Collection Date	# Mussels in Comp	Average lenth (mm)	Percent Moisture	Ag	As	Cd	Pb	Cr	Cu
				Instrument:					*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-OES*	*ICP-OES*
REPLICATE PRECISION														
20100112MUS01-C	PS04	Composite	Mussels	3106-215	01/12/10	194	45.3	86.6	0.00945	6.26	1.82	1.25	0.766	10.3
20100112MUS01-C	PS04	Composite	Mussels	3106-215r2	01/12/10	194	45.3	86.6	0.00967	6.08	1.83	1.21	0.777	10.2
				Mean					**0.00956**	**6.17**	**1.83**	**1.23**	**0.772**	**10.3**
				RPD					**2.3%**	**3.0%**	**0.4%**	**3.3%**	**1.4%**	**0.5%**
AMB02-102C	PS01	Composite	Mussels	3106-238	02/02/10	272	42.0	84.8	0.0236	6.73	2.69	1.26	1.09	11.6
AMB02-102C	PS01	Composite	Mussels	3106-238r2	02/02/10	272	42.0	84.8	0.0249	6.68	2.72	1.28	1.11	11.7
				Mean					**0.0243**	**6.70**	**2.71**	**1.27**	**1.10**	**11.7**
				RPD					**5.6%**	**0.8%**	**1.3%**	**1.7%**	**1.9%**	**1.6%**
STANDARD REFERENCE MATERIAL														
SRM-1				1566b R1 041410				0.0	0.599	6.61	2.35	0.307	0.480	68.5
SRM-2				1566b R2 041410				0.0	0.576	6.91	2.38	0.298	0.457	67.8
				Certified Value					**0.666**	**7.65**	**2.48**	**0.308**	**NC**	**71.6**
				Percent Difference					**10%**	**14%**	**5%**	**0%**		**4%**
				Percent Difference					**14%**	**10%**	**4%**	**3%**		**5%**

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
PM: Jill Brandenberger 360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
Metals in Tissue
UNITS: µg/g dry wt.

Sample ID - Metals	Station Code	Fraction	Sample Type	MSL Code	Ni	Zn	Hg	CVAA Batch ID	ICP-OES Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-OES*	*ICP-OES*	*CVAA*			
REPLICATE PRECISION										
20100112MUS01-C	PS04	Composite	Mussels	3106-215	0.673	210	0.114	050610HGBL	I042310A	042110-6100
20100112MUS01-C	PS04	Composite	Mussels	3106-215r2	0.732	208	0.124	050610HGBL	I042310A	042110-6100
				Mean	**0.702**	**209**	**0.119**			
				RPD	**8.4%**	**0.7%**	**9.2%**			
AMB02-102C	PS01	Composite	Mussels	3106-238	0.912	222	0.132	050610HGBL	I042310A	042110-6100
AMB02-102C	PS01	Composite	Mussels	3106-238r2	0.946	225	0.128	050610HGBL	I042310A	042110-6100
				Mean	**0.929**	**224**	**0.130**			
				RPD	**3.6%**	**1.4%**	**3.0%**			
STANDARD REFERENCE MATERIAL										
SRM-1				1566b R1 041410	1.00	1481	0.0380	050610HGBL	I042310A	042110-6100
SRM-2				1566b R2 041410	0.993	1476	0.0368	050610HGBL	I042310A	042110-6100
				Certified Value	**1.04**	**1424**	**0.0371**			
				Percent Difference	**4%**	**4%**	**2%**			
				Percent Difference	**5%**	**4%**	**1%**			

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

ENVVEST 2010_AMB02
Metals in Mussel Samples

DATA QUALIFIERS:

c	Exceeds DQO but meets contingency criteria of either:
1	SRM certified <10x MDL
2	Insufficient spiking level relative to native sample concentrations
3	Sample concentration <10x MDL
U	Analyte not detected at or above the MDL, MDL reported
J	Analyte detected above the MDL, but less than the RL
--	Not analyzed
NA	Not applicable/available
N	Spiked sample recovery outside QC criterion of 70-130%
NC	Not Certified
&	Accuracy result outside QC criterion of ≤20% PD
*	Precision result outside QC criterion of <30%
NS	Sample not spiked for this analyte
B	Analyte detected in the method blank > RL
	and sample concentration < 10 times detected blank value
b	Data are blank corrected using the batch specific procedural blank

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary

Sample Name:	BLK070210	BLK070610	BLK071910	BLK072910	BLK080610
Sample Type;	MB	MB	MB	MB	MB
Matrix:	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]
Batch ID:	070210PCB	070610PCB	071910PCB	072910PCB	080610PCB
Sample Weight (g):	devided by 10 g	devided by 10 g	devided by 10 g	devided by 10 g	devided by 10 g
Extraction Date:	7/2/2010	7/6/2010	7/19/2010	7/29/2010	8/6/2010
Analysis Date:	7/8/2010	8/3/2010	8/4/2010	8/6/2010	8/10/2010
Units (wet wt):	ng/g	ng/g	ng/g	ng/g	ng/g
Cl2(8)	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Cl3(18)	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Cl3(28)	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Cl4(44)	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Cl4(52)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Cl4(66)	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
Cl4(77)	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Cl5(101)	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Cl5(105)	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Cl5(118)	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Cl5(126)	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U
Cl6(128)	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Cl6(138)	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
Cl6(153)	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Cl7(170)	0.02 U	0.02 J	0.02 U	0.02 U	0.02 U
Cl7(180)	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Cl7(187)	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
Cl8(195)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl8(200)	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
Cl9(206)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cl10(209)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
SURROGATE RECOVERY (%Rec)					
Cl3(30)	73%	81%	67%	82%	74%
Cl4(65)	78%	83%	76%	88%	79%
Cl8(198)	84%	84%	78%	84%	91%

[1] Diatomaceous earth & Sodium Sulfate are the drying and dispersing agents (mixed with sample) used in the extraction

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1529 West Sequim Ba
Sequim, Washington 9
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary

Sample Name:	3106-200	Spike amount	3106-200SPK1	3106-200SPK1	Spike amount	3106-200SPK2	3106-200SPK2
Sample Type;	Reg_Sample	Standards	MS	MS	Standards	MS	MS
Matrix:	TISSUE		TISSUE	TISSUE		TISSUE	TISSUE
Batch ID:	070210PCB		070210PCB	070210PCB		080610PCB	080610PCB
Sample Weight (g):	11.99		10.68	10.68		10.44	10.44
Extraction Date:	7/2/2010		7/2/2010	7/2/2010		8/6/2010	8/6/2010
Analysis Date:	7/8/2010		7/8/2010	7/8/2010		8/10/2010	8/10/2010
Units (wet wt):	ng/g	ng	ng/g	REC	ng	ng/g	REC
Cl2(8)	0.19 J	25	2.61	104%	25	2.71	105%
Cl3(18)	0.15 U	25	2.63	113%	25	2.55	107%
Cl3(28)	0.10 J	25	2.46	101%	25	2.42	97%
Cl4(44)	0.14 J	25	2.47	99%	25	2.41	95%
Cl4(52)	0.32	25	2.65	99%	25	2.57	94%
Cl4(66)	0.23	25	2.73	107%	25	2.66	102%
Cl4(77)	0.49	25	1.21	31% &	25	2.37	79%
Cl5(101)	1.00	25	3.56	109%	25	3.40	100%
Cl5(105)	0.24	25	2.60	101%	25	2.70	103%
Cl5(118)	0.83	25	3.09	97%	25	3.26	101%
Cl5(126)	0.67	25	2.72	88%	25	2.93	94%
Cl6(128)	0.29	25	2.66	101%	25	2.70	100%
Cl6(138)	1.46	25	3.80	100%	25	3.90	102%
Cl6(153)	1.79	25	4.03	96%	25	4.24	102%
Cl7(170)	0.09 J	25	2.29	94%	25	2.36	95%
Cl7(180)	0.25	25	2.54	98%	25	2.58	97%
Cl7(187)	0.72	25	2.95	95%	25	3.05	97%
Cl8(195)	0.01 U	25	2.35	100%	25	2.39	100%
Cl8(200)	0.26	25	2.47	94%	25	2.57	97%
Cl9(206)	0.01 U	25	2.46	105%	25	2.52	105%
Cl10(209)	0.01 U	25	2.43	104%	25	2.49	104%
SURROGATE RECOVERY (%Rec)							
Cl3(30)	89%		75%			82%	
Cl4(65)	96%		85%			92%	
Cl8(198)	92%		79%			82%	

[1] Diatomaceous earth a

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360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary

Sample Name:	SIPOM 3106-199	SIPOM 3106-199B		SIWP 3106-204	SIWP 3106-204B	
Sample Type;	Reg_Sample	Duplicate		Reg_Sample	Duplicate	
Matrix:	TISSUE	TISSUE		TISSUE	TISSUE	
Batch ID:	070210PCB	070210PCB		071910PCB	072910PCB	
Sample Weight (g):	11.45	11.44		11.59	11.12	
Extraction Date:	7/2/2010	7/2/2010		7/19/2010	7/29/2010	
Analysis Date:	7/8/2010	7/8/2010		8/4/2010	8/6/2010	
Units (wet wt):	ng/g	ng/g	RPD	ng/g	ng/g	RPD
Cl2(8)	0.25	0.24	4%	0.17 J	0.18 J	4%
Cl3(18)	0.21	0.20	3%	0.15 U	0.15 U	
Cl3(28)	0.20 J	0.21	5%	0.08 J	0.07 J	12%
Cl4(44)	0.27	0.27	1%	0.10 J	0.10 J	0%
Cl4(52)	0.62	0.61	2%	0.25 0.23		6%
Cl4(66)	0.47	0.46	3%	0.14 J	0.14 J	0%
Cl4(77)	0.87	0.85	2%	0.39 0.36		7%
Cl5(101)	1.83	1.91	5%	0.82 0.85		4%
Cl5(105)	0.56	0.57	3%	0.20 J	0.19 J	3%
Cl5(118)	1.79	1.75	2%	0.78 0.75		4%
Cl5(126)	0.86	0.84	3%	0.68 0.65		4%
Cl6(128)	0.41	0.38	7%	0.24 0.22		7%
Cl6(138)	2.21	2.24	1%	1.33 1.32		0%
Cl6(153)	2.55	2.53	1%	1.70 1.64		4%
Cl7(170)	0.09 J	0.10 J	7%	0.11 J	0.09 J	15%
Cl7(180)	0.35	0.36 3%		0.26	0.26	0%
Cl7(187)	0.92	0.92 0%		0.71	0.71	0%
Cl8(195)	0.01 U	0.01 U		0.01 U	0.01 U	
Cl8(200)	0.35	0.37 4%		0.24	0.24	1%
Cl9(206)	0.01 U	0.01 U		0.01 U	0.01 U	
Cl10(209)	0.01 U	0.01 U		0.01 U	0.01 U	
SURROGATE RECOVERY (%Rec)						
Cl3(30)	87%	86%		78%	87%	
Cl4(65)	99%	94%		92%	99%	
Cl8(198)	75%	71%		70%	76%	

[1] Diatomaceous earth a

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2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PCBs in Indigenous Mussels
Data Qualifiers for PCBs

Data Qualifiers

U	Not detected at or above laboratory achieved detection limit; MDL reported
J	Analyte concentration is less that the RL, but greater than the MDL
B	Analyte detected in the method blank above the RL, sample concentration <10x detected blank value
&	Outside Project DQO for spike recovery (40-120%), replicate analysis (<30%), or SRM PD (<30%)
D	Results determined from dilution
c	Exceeds Project DQO but meets contingency criteria
#	Outside Project DQOs for surrogate Recovery (40-120%)
*	Associated surrogate recovery exceeds DQO guidelines

[1] NOAA Status and Trends method of summing congeners (sum PCB congeners*2) [NOAA, 1995; O'Connor, 2002].

NOAA (1995). Magnitude and Extent of Sediment Toxicity in the Hudson-Raritan Estuary. NOAA Tech. Memo. NOS ORCA 88. Silver Springs, MD. 242pp.

O'Connor, T.P. (2002). National distribution of chemical concentrations in mussels and oysters in the USA. Marine Environmental Research 53:117-143.

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2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary 2010 Mussel Study

Sample Name:	BLK070210	BLK070610	BLK071910	BLK072910	BLK080610
Sample Type:	MB	MB	MB	MB	MB
Matrix:	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]
Batch ID:	070210PAH	070610PAH	071910PAH	072910PAH	080610PAH
Sample Weight (g):	devided by 10 g	devided by 10 g	devided by 10 g	devided by 10 g	devided by 10 g
Extraction Date:	7/2/2010	7/6/2010	7/19/2010	7/29/2010	8/6/2010
Analysis Date:	8/12/2010	8/19/2010	8/27/2010	8/7/2010	8/11/2010
Units (wet wt):	ng/g	ng/g	ng/g	ng/g	ng/g
Naphthalene	12.13	1.82 U	2.66	4.36	0.70 U
C1-Naphthalenes	5.05	1.82 U	1.82 U	1.82 U	1.82 U
C2-Naphthalenes	3.61 U	3.61 U	3.61 U	3.61 U	3.61 U
C3-Naphthalenes	3.61 U	3.61 U	3.61 U	3.61 U	3.61 U
C4-Naphthalenes	3.61 U	3.61 U	3.61 U	3.61 U	3.61 U
Biphenyl	2.86 U	2.86 U	2.86 U	2.86 U	2.86 U
Acenaphthylene	1.68 U	1.68 U	1.68 U	1.68 U	1.68 U
Acenaphthene	2.29 U	2.29 U	2.29 U	2.29 U	2.29 U
Fluorene	2.75 U	2.75 U	2.75 U	2.75 U	2.75 U
C1-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U	2.17 U
C2-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U	2.17 U
C3-Fluorenes	2.17 U	2.17 U	2.17 U	2.17 U	2.17 U
Anthracene	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
Phenanthrene	1.10 U	1.10 U	1.10 U	1.10 U	1.10 U
C1-Phenanthrenes/Anthracenes	1.18 U	1.18 U	1.18 U	1.18 U	1.18 U
C2-Phenanthrenes/Anthracenes	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
C3-Phenanthrenes/Anthracenes	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
C4-Phenanthrenes/Anthracenes	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Dibenzothiophene	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
C1-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
C2-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
C3-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
C4-Dibenzothiophenes	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
Fluoranthene	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U
Pyrene	0.44 J	0.35 U	0.35 U	0.35 U	0.35 U
C1-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U
C2-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U
Benzo(a)anthracene	0.54 U	0.54 U*	0.54 U	0.54 U	0.54 U
Chrysene	0.87 U	0.87 U*	0.87 U	0.87 U	0.87 U
C1-Chrysenes	0.87 U	0.87 U*	0.87 U	0.87 U	0.87 U
C2-Chrysenes	0.87 U	0.87 U*	0.87 U	0.87 U	0.87 U
C3-Chrysenes	0.87 U	0.87 U*	0.87 U	0.87 U	0.87 U
C4-Chrysenes	0.87 U	0.87 U*	0.87 U	0.87 U	0.87 U
Benzo(b)fluoranthene	0.37 U	0.37 U*	0.37 U	0.37 U	0.37 U
Benzo(k)fluoranthene	0.21 U	0.21 U*	0.21 U	0.21 U	0.21 U
Benzo(e)pyrene	0.22 U	0.22 U*	0.22 U	0.22 U	0.22 U
Benzo(a)pyrene	0.23 U	0.23 U*	0.23 U	0.23 U	0.23 U
Perylene	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

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360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary 2010 Mussel Study

Sample Name:	BLK070210	BLK070610	BLK071910	BLK072910	BLK080610
Sample Type:	MB	MB	MB	MB	MB
Matrix:	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]	Diatomaceous earth & Sodium Sulfate[1]
Batch ID:	070210PAH	070610PAH	071910PAH	072910PAH	080610PAH
Sample Weight (g):	devided by 10 g	devided by 10 g	devided by 10 g	devided by 10 g	devided by 10 g
Extraction Date:	7/2/2010	7/6/2010	7/19/2010	7/29/2010	8/6/2010
Analysis Date:	8/12/2010	8/19/2010	8/27/2010	8/7/2010	8/11/2010
Units (wet wt):	ng/g	ng/g	ng/g	ng/g	ng/g
Indeno(1,2,3-cd)pyrene	0.14 U	0.14 U*	0.14 U	0.14 U	0.14 U
Dibenz(a,h)anthracene	0.06 U	0.06 U*	0.06 U	0.06 U	0.06 U
Benzo(g,h,i)perylene	0.22 U	0.22 U*	0.22 U	0.22 U	0.22 U
SURROGATE RECOVERIES (%Rec)					
d8-Naphthalene	71%	88%	41%	98%	97%
d10-Acenaphthene	93%	84%	58%	76%	112%
d10-Phenanthrene	81%	81%	72%	78%	82%
d12-Chrysene	96%	125% #	88%	70%	103%
d12-Perylene	88%	110%	84%	67%	95%

[1] Diatomaceous earth & Sodium Sulfate are the drying and dispersing agents (mixed with sample) used in the extraction

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360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary 2010 Mussel Study

Sample Name:	3106-200	Spike Amt	3106-200SPK1	3106-200SPK1	Spike Amt	3106-200SPK2	3106-200SPK2
Sample Type:	Reg_Sample	Standards	MS	MS	Standards	MS	MS
Matrix:	TISSUE		TISSUE	TISSUE		TISSUE	TISSUE
Batch ID:	070210PAH		070210PAH	070210PAH		080610PAH	080610PAH
Sample Weight (g):	11.99		10.68	10.68		10.44	10.44
Extraction Date:	7/2/2010		7/2/2010	7/2/2010		8/6/2010	8/6/2010
Analysis Date:	8/12/2010		8/13/2010	8/13/2010		8/11/2010	8/11/2010
Units (wet wt):	ng/g	ng	ng/g	PCT_REC	ng	ng	PCT_REC
Naphthalene	5.73 B	100	22.79 B	182% c	100	15.65	104%
C1-Naphthalenes	3.71 B						
C2-Naphthalenes	9.19						
C3-Naphthalenes	7.69						
C4-Naphthalenes	4.72						
Biphenyl	2.86 U	100	12.90	138% &	100	11.13	116%
Acenaphthylene	1.68 U	100	12.65	135% &	100	11.01	115%
Acenaphthene	3.48 100		14.82	121% &	100	13.84	108%
Fluorene	3.98 100		17.24	142% &	100	11.34	77%
C1-Fluorenes	16.40						
C2-Fluorenes	2.17 U						
C3-Fluorenes	2.17 U						
Anthracene	5.49 100		12.85	79%	100	12.09	69%
Phenanthrene	17.36 100		26.08	93%	100	25.94	90%
C1-Phenanthrenes/Anthracenes	63.78						
C2-Phenanthrenes/Anthracenes	13.68						
C3-Phenanthrenes/Anthracenes	16.04						
C4-Phenanthrenes/Anthracenes	0.10 U						
Dibenzothiophene	0.68 J	100	9.36	93%	100	9.16	88%
C1-Dibenzothiophenes	1.65 J						
C2-Dibenzothiophenes	3.70						
C3-Dibenzothiophenes	0.40 U						
C4-Dibenzothiophenes	3.70						
Fluoranthene	17.36 100		26.01	92%	100	29.20	124%
Pyrene	8.62 100		16.74	87%	100	19.06	109%
C1-Fluoranthenes/Pyrenes	11.35						
C2-Fluoranthenes/Pyrenes	3.23						
C3-Fluoranthenes/Pyrenes	0.81 U						
Benzo(a)anthracene	5.93 100		15.83	106%	100	15.97	105%
Chrysene	13.81 100		20.87	75%	100	21.64	82%
C1-Chrysenes	3.35						
C2-Chrysenes	0.87 U						
C3-Chrysenes	0.87 U						
C4-Chrysenes	0.87 U						
Benzo(b)fluoranthene	6.42 100		16.15	104%	100	15.90	99%
Benzo(k)fluoranthene	2.85 100		12.36	102%	100	12.02	96%
Benzo(e)pyrene	3.70 100		10.66	74%	100	10.61	72%
Benzo(a)pyrene	2.13 100		10.74	92%	100	10.61	88%
Perylene	1.70 J	100	11.34	103%	100	10.62	93%

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Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary 2010 Mussel Study

Sample Name:	3106-200	Spike Amt	3106-200SPK1	3106-200SPK1	Spike Amt	3106-200SPK2	3106-200SPK2
Sample Type:	Reg_Sample	Standards	MS	MS	Standards	MS	MS
Matrix:	TISSUE		TISSUE	TISSUE		TISSUE	TISSUE
Batch ID:	070210PAH		070210PAH	070210PAH		080610PAH	080610PAH
Sample Weight (g):	11.99		10.68	10.68		10.44	10.44
Extraction Date:	7/2/2010		7/2/2010	7/2/2010		8/6/2010	8/6/2010
Analysis Date:	8/12/2010		8/13/2010	8/13/2010		8/11/2010	8/11/2010
Units (wet wt):	ng/g	ng	ng/g	PCT_REC	ng	ng	PCT_REC
Indeno(1,2,3-cd)pyrene	1.64 J	100	10.02	89%	100	9.48	82%
Dibenz(a,h)anthracene	0.06 U	100	8.88	95%	100	8.45	88%
Benzo(g,h,i)perylene	1.21 J	100	10.00	94%	100	9.71	89%
SURROGATE RECOVERIES (%Rec)							
d8-Naphthalene	64%		40%			54%	
d10-Acenaphthene	81%		62%			94%	
d10-Phenanthrene	94%		89%			93%	
d12-Chrysene	91%		92%			91%	
d12-Perylene	87%		87%			89%	

[1] Diatomaceous earth & Sodium Sulfate are the drying and dispersing agents (mixed with sample) used in the extraction

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360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary 2010 Mussel Study

Sample Name:	SIPOM 3106-199	SIPOM 3106-199B		SIWP 3106-204	SIWP 3106-204B	
Sample Type:	Reg_Sample	Duplicate		Reg_Sample	Duplicate	
Matrix:	TISSUE	TISSUE		TISSUE	TISSUE	
Batch ID:	070210PAH	070210PAH		071910PAH	072910PAH	
Sample Weight (g):	11.45	11.44		11.59	11.12	
Extraction Date:	7/2/2010	7/2/2010		7/19/2010	7/29/2010	
Analysis Date:	8/12/2010	8/12/2010		8/12/2010	8/12/2010	
Units (wet wt):	ng/g	ng/g	RPD	ng/g	ng/g	RPD
Naphthalene	5.00 B	9.82	65% c	7.41 B	2.33 B	104% c
C1-Naphthalenes	5.44 B	6.53 3.32			1.82 U	
C2-Naphthalenes	11.35 13.26			9.21	5.43	
C3-Naphthalenes	19.36 21.00			6.70	3.61 U	
C4-Naphthalenes	21.55 24.18			5.09	4.21	
Biphenyl	2.86 U	2.86 U		2.86 U	0.61 U	
Acenaphthylene	1.68 U	1.72 J		1.68 U	0.37 U	
Acenaphthene	2.29 U	2.29 U		2.29 U	0.58 U	
Fluorene	2.75 U	2.82 2.75		U	0.74 U	
C1-Fluorenes	16.61 14.40			16.12	9.00	
C2-Fluorenes	2.17 U	2.17 U		2.17 U	2.17 U	
C3-Fluorenes	2.17 U	2.17 U		2.17 U	2.17 U	
Anthracene	3.29 3.32		1%	0.99 J	0.93 J	6%
Phenanthrene	17.95 19.28		7%	5.49	4.94	11%
C1-Phenanthrenes/Anthracenes	50.47 55.97			5.15	8.96	
C2-Phenanthrenes/Anthracenes	62.35 64.50			13.31	9.47	
C3-Phenanthrenes/Anthracenes	39.94 40.67			81.93	63.53	
C4-Phenanthrenes/Anthracenes	33.89 34.56			0.10 U	0.10 U	
Dibenzothiophene	1.08 J	1.09 J	1%	0.40 U	0.46 J	
C1-Dibenzothiophenes	3.30 3.57			0.40 U	0.40 U	
C2-Dibenzothiophenes	9.66 9.36			0.40 U	0.40 U	
C3-Dibenzothiophenes	10.68 10.44			0.40 U	0.40 U	
C4-Dibenzothiophenes	8.50 7.61			0.40 U	0.40 U	
Fluoranthene &	38.00 39.68		4%	5.98	5.21	14%
Pyrene	24.90 23.74		5%	3.27	2.88	13%
C1-Fluoranthenes/Pyrenes	18.50 18.95			3.42	3.48	
C2-Fluoranthenes/Pyrenes	9.05 8.44			0.81 U	0.81 U	
C3-Fluoranthenes/Pyrenes	0.81 U	0.81 U		0.81 U	0.81 U	
Benzo(a)anthracene	7.10 7.22		2%	2.19	2.04	7%
Chrysene	16.44 16.72		2%	4.91	4.53	8%
C1-Chrysenes	5.96 6.38			0.87 U	0.87 U	
C2-Chrysenes	6.72 6.04			0.87 U	0.87 U	
C3-Chrysenes	0.87 U	0.87 U		0.87 U	0.87 U	
C4-Chrysenes	0.87 U	0.87 U		0.87 U	0.87 U	
Benzo(b)fluoranthene	8.35 8.40		1%	2.18	2.20	1%
Benzo(k)fluoranthene	3.39 3.31		2%	0.86 J	0.91 J	5%
Benzo(e)pyrene	6.29 6.28		0%	1.43 J	1.40 J	2%
Benzo(a)pyrene	1.64 J	1.58 J	3%	0.71 J	0.65 J	9%
Perylene	1.06 J	1.15 J	8%	0.69 J	0.69 J	1%

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360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.
QC Summary 2010 Mussel Study

Sample Name:	SIPOM 3106-199	SIPOM 3106-199B		SIWP 3106-204	SIWP 3106-204B	
Sample Type:	Reg_Sample	Duplicate		Reg_Sample	Duplicate	
Matrix:	TISSUE	TISSUE		TISSUE	TISSUE	
Batch ID:	070210PAH	070210PAH		071910PAH	072910PAH	
Sample Weight (g):	11.45	11.44		11.59	11.12	
Extraction Date:	7/2/2010	7/2/2010		7/19/2010	7/29/2010	
Analysis Date:	8/12/2010	8/12/2010		8/12/2010	8/12/2010	
Units (wet wt):	ng/g	ng/g	RPD	ng/g	ng/g	RPD
Indeno(1,2,3-cd)pyrene	1.21 J	1.16 J	5%	0.52 J	0.52 J	1%
Dibenz(a,h)anthracene	0.06 U	0.06 U		0.06 U	0.06 U	
Benzo(g,h,i)perylene	1.98 1.64 J		19%	0.74 J	0.71 J	4%
SURROGATE RECOVERIES (%Rec)						
d8-Naphthalene	57%	49%		47%	70%	
d10-Acenaphthene	72%	71%		60%	75%	
d10-Phenanthrene	93%	90%		88%	94%	
d12-Chrysene	89%	87%		89%	93%	
d12-Perylene	87%	81%		84%	87%	

[1] Diatomaceous earth & Sodium Sulfate are the drying and dispersing agents (mixed with sample) used in the extraction

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

2010 Regional Mussel Watch - AMB02
ENVVEST 2010
PAHs in Indigenous Mussels
UNITS: ng/g wet wt.

Data Qualifiers

U	Not detected at or above laboratory achieved detection limit; MDL reported
J	Analyte concentration is less that the RL, but greater than the MDL
B	Analyte detected in the method blank above the RL, sample concentration <10x detected blank value
&	Outside Project DQO for spike recovery (40-120%), replicate analysis (<30%), or SRM PD (<30%)
D	Results determined from dilution
c	Exceeds Project DQO but meets contingency criteria
#	Outside Project DQOs for surrogate Recovery (40-120%)
*	Associated surrogate recovery exceeds DQO guidelines

QA Narratives

QA/QC NARRATIVE

PROJECT: Regional Mussel Watch AMB02 – 2010

PARAMETER: Metals: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), and zinc (Zn)

LABORATORY: Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX: Tissues (*indigenous mussels*)

SAMPLE CUSTODY AND PROCESSING: Mussels from 24 sampling locations were collected by the U.S. Navy following NOAA Mussel watch protocol and hand delivered to MSL on 01/09/10, 01/13/2010, 02/02/2010, 02/03/2010, and 02/05/2010. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite. The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The composites were split into three containers: 1) polypropylene pre-cleaned vial, tarred for percent moisture determination and metals analyses, 2) 8 oz. pre-cleaned glass jar for organic compound analyses, and 3) 8 oz. pre-cleaned glass jar for archival. The following quality control summary addresses the analyses of the 24 composite samples for trace metals. The composite samples were assigned a Battelle Central File (CF) identification number (3106). All project information was entered into Battelle's laboratory information and sample tracking system.

The following lists information on sample receipt and processing activities:

Chemistry Lab ID	**3106*215-238**
Description	*mussels*
Collection dates	01/08/10, 01/12/10, and 02/02 through 02/04/10
Laboratory arrival date	01/09/10, 01/13/2010, 02/02/2010, 02/03/2010, and 02/05/2010
Cooler temperatures, on arrival	4±2°C
Digestion (aqua regia)	04/14/10
CVAA Analysis Date (Hg)	05/06/10
ICP-OES Analysis Date (Cr, Cu, Ni, Zn)	04/23/10
ICP-MS Analysis Date (Ag, As, Cd, Pb)	04/21/10

QA/QC NARRATIVE

QA/QC DATA QUALITY OBJECTIVES:

Analyte	Analytical Method	Range of Recovery	SRM Accuracy	Relative Precision	MDL (µg/g dry wt.) [a]	RL (µg/g dry wt.) [b]
Silver	ICP-MS	70-130%	≤20%	≤30%	0.0031	0.010
Arsenic	ICP-MS	70-130%	≤20%	≤30%	0.11	0.35
Cadmium	ICP-MS	70-130%	≤20%	≤30%	0.0029	0.0092
Chromium	ICP-OES	70-130%	≤20%	≤30%	0.035	0.11
Copper	ICP-OES	70-130%	≤20%	≤30%	0.094	0.30
Mercury	CVAA	70-130%	≤20%	≤30%	0.0044	0.014
Nickel	ICP-OES	70-130%	≤20%	≤30%	0.041	0.13
Lead	ICP-MS	70-130%	≤20%	≤30%	0.0034	0.011
Zinc	ICP-OES	70-130%	≤20%	≤30%	0.018	0.057

(a) Achieved method detection limits (MDLs) reported from the annual MDL study using seven replicates of a tissue matrix prepared and analyzed as samples.
(b) The reporting limit (RL) was determined as 3.18 times the achieved MDL.

METHODS:

Tissue samples were homogenized at MSL using a titanium blender, aliquoted for metals, and stored at -80±2˚C until lyophilization according to MSL-C-003. The samples were analyzed for nine metals including Ag, As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn. Tissue samples were digested according to Battelle SOP MSL-I-024, *Mixed Acid Tissue Digestion*. An approximately 500-mg aliquot of each dried, homogeneous sample was combined with nitric and hydrochloric acids (aqua regia) in a Teflon vessel and heated in an oven at 130ºC (±10ºC) for a minimum of eight hours. After heating and cooling, deionized water was added to the acid-digested tissue to achieve analysis volume and the digestates were submitted for analysis by three methods.

Digested samples were analyzed for Hg by cold-vapor atomic absorption spectroscopy (CVAA) according to Battelle SOP MSL-I-016, *Total Mercury in Tissues and Sediments by Cold Vapor Atomic Absorption*, which is based on EPA Method 245.6, *Determination of Mercury in Tissue by Cold Vapor Atomic Absorption Spectrometry*.

Digested samples were analyzed for Cr, Cu, Ni, and Zn using inductively coupled plasma optical emissions spectroscopy (ICP-OES) according to Battelle SOP MSL-I-033, *Determination of Elements in Aqueous and Digestate Samples by ICP-OES*. This procedure is based on two methods modified and adapted for analysis of low level samples: EPA Method 6010B and 200.7.

Digested samples were analyzed for Ag, As, Cd, and Pb using inductively coupled plasma-mass spectrometry (ICP-MS) according to Battelle SOP MSL-I-022, *Determination of Elements in Aqueous and Digestate Samples by ICP/MS*. This procedure is based on two methods modified and adapted for analysis of solid sample digestates: EPA Method 1638, *Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry* and EPA Method 200.8, *Determination of Trace Elements in Water and Wastes by Inductively Coupled Plasma – Mass Spectrometry.*

All results were determined and reported in units of µg/g on a dry-weight basis and converted to µg/g wet-weight. The formula for this conversion is dry-weight concentration * (sample percent dry weight/100).

QA/QC NARRATIVE

HOLDING TIMES: The EPA Method 1631 Appendix A provides a holding time for Hg in frozen tissue samples of one year from collection to analysis. This holding time was achieved for all metals.

DETECTION LIMITS AND DATA QUALIFIERS: The MSL standard operating procedure for the determination of method detection limits (MDLs) is MSL-Q-007-08. This procedure describes the determination of MDLs, instrument detection limits (IDLs), reporting limits (RLs), and quantitation limits (QLs) as described in the Federal Register (40 CFR Part 136, Appendix B). The reporting limit (RL) is defined as 3.18 times the MDL for the matrix of interest and the instrument. The 3.18 value is based on the Student's t value for 7-10 replicates analyzed in our MDL study. The 40 CFR Part 136, Appendix B uses at least 7 replicates of the matrix, digested as independent samples, and then analyzed by the instrument of interest. The standard deviation is then multiplied by the student's t value for n-1 replicates. Sample concentrations were evaluated and flagged to the following criteria:

U Analyte not detected at or above the MDL, MDL reported

J Analyte detected above the MDL, but less than the RL

N Spiked sample recovery outside QC criterion of 70-130%

& Accuracy result outside QC criterion of ≤20% PD

* Precision result outside QC criterion of <30%

B Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value

c Exceeds data quality objective but meets contingency criterion

METHOD BLANKS: Method blanks were analyzed at a minimum frequency of one each per 20 field samples or analytical batch. Two method blanks were analyzed with the samples for all metals. The concentrations were less than RL for all metals.

LABORATORY CONTROL SAMPLE/BLANK SPIKE ACCURACY: Blank spikes/laboratory control samples (LCS) were analyzed at a frequency of one each per 20 field samples. The LCS recoveries were within the QC acceptance criterion of 70% to 130% recovery.

MATRIX SPIKE ACCURACY: Matrix spikes and matrix spike duplicates were analyzed at a frequency of one each per 20 field samples. Matrix spike recoveries were within the QC acceptance criterion of 70% to130% recovery for all metals.

REPLICATE PRECISION: Analytical precision was evaluated using two methods: 1) laboratory duplicate and 2) duplicate matrix spikes. Replicate analyses were performed at a frequency of one set per 20 field samples. Precision of replicate analyses was expressed as the relative percent difference (RPD) of replicate results. The RPDs for both the laboratory duplicates and duplicate matrix spikes were within the QC limits of ≤30% for all metals.

STANDARD REFERENCE MATERIAL ACCURACY: The SRM accuracy was expressed as the percent difference (PD) between the measured and certified SRM concentrations. Recovery of a particular analyte exceeded QC criteria if the PD exceeded 20% PD. The SRM 1566b Oyster Tissue was analyzed at a frequency of one per 20 field samples. The recoveries for certified or referenced metals were within the QC acceptance criterion for all metals.

PCB – Tissue QA/QC SUMMARY

PROJECT:	ENVVEST Regional Mussel Watch AMB02 – 2010
PARAMETER:	Polychlorinated Biphenyls (PCBs)
LABORATORY:	Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX:	Tissues (*indigenous mussels*)
SAMPLE CUSTODY:	Mussels from 24 sampling locations were collected by the U.S. Navy following NOAA Mussel watch protocol and hand delivered to MSL on 01/09/10, 01/13/2010, 02/02/2010, 02/03/2010, and 02/05/2010. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite. The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The composites were split into three containers: 1) polypropylene pre-cleaned vial, tarred for percent moisture determination and metals analyses, 2) 8 oz. pre-cleaned glass jar for organic compound analyses, and 3) 8 oz. pre-cleaned glass jar for archival. The following quality control summary addresses the analyses of the 24 composite samples for PCBs. The composite samples were assigned a Battelle Central File (CF) identification number (3106). All project information was entered into Battelle's laboratory information and sample tracking system.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	LCS/MS Recovery	Sample Replicate Relative Precision	Detection Limits (ng/g wet)
PCB	NOAA Status & Trends	<MDL	40-120%	40-120% Recovery[1]	≤30% RPD[2]	~0.01 – 0.18

[1] Target spike must be >5 x native concentration.
[2] Applies to analytes >10x sample specific MDL.

METHOD: Tissue samples were extracted for PCB following general National Atmospheric and Oceanic Administration (NOAA) National Status and Trends (NS&T) methods. Approximately 10 g of tissue was mixed with anhydrous sodium sulfate, spiked with surrogates and extracted with methylene chloride using accelerated solvent extractor (ASE). The extract was concentrated, and processed through alumina cleanup column, concentrated, and further purified by the florisil cleanup column. The extract after florisil cleanup was concentrated and fortified with internal standard (IS), and submitted for analysis. Extracts intended for PCB analyses were analyzed using gas chromatography with electron capture detection (GC/ECD), following Battelle SOP O-016. Sample data were quantified by the method of internal standards using the surrogate compounds.

PCB – Tissue QA/QC SUMMARY

HOLDING TIMES: Tissue samples were stored frozen until sample preparation. Samples were prepared for analyses in five analytical batches and were extracted within the 1-year holding time for sample collection and analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
070210PCB	7/2/2010	7/8/2010
070610PCB	7/6/2010	8/3/2010
071910PCB	7/19/2010	8/4/2010
072910PCB	7/29/2010	8/6/2010
080610PCB	8/6/2010	8/10/2010

BLANKS: A procedural blank (MB) was prepared with each analytical batch. The blank was analyzed to ensure the sample extraction and analysis methods were free of contamination.

Exceedences – No exceedences noted.

Comments – None.

MATRIX SPIKES: Two matrix spikes (MS) were prepared. The percent recoveries of PCB were calculated to measure data quality in terms of accuracy.

Exceedences – One exceedences noted.

Comments – In one matrix spike sample, the recovery of PCB 77 (31%) is slightly lower than the laboratory control limits (40 – 120%).

Duplicate Samples: Two duplicate samples (DUPs) were prepared. The relative percent differences (RPD) of PCB were calculated to measure data quality in terms of precision.

Exceedences – No exceedences noted.

Comments – None.

SURROGATES Three surrogate compounds were added prior to extraction, including PCB 30, PCB 65, and PCB 198. The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).

Exceedences – No exceedences noted.

Comments – None.

PAH – Tissue QA/QC SUMMARY

PROJECT:	ENVVEST Regional Mussel Watch AMB02 – 2010
PARAMETER:	Polycyclic Aromatic Hydrocarbons (PAHs)
LABORATORY:	Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX:	Tissues (*indigenous mussels*)
SAMPLE CUSTODY:	Mussels from 24 sampling locations were collected by the U.S. Navy following NOAA Mussel watch protocol and hand delivered to MSL on 01/09/10, 01/13/2010, 02/02/2010, 02/03/2010, and 02/05/2010. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite. The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The composites were split into three containers: 1) polypropylene pre-cleaned vial, tarred for percent moisture determination and metals analyses, 2) 8 oz. pre-cleaned glass jar for organic compound analyses, and 3) 8 oz. pre-cleaned glass jar for archival. The following quality control summary addresses the analyses of the 24 composite samples for parent and selected akylated/methylated. The composite samples were assigned a Battelle Central File (CF) identification number (3106). All project information was entered into Battelle's laboratory information and sample tracking system.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	LCS/MS Recovery	Sample Replicate Relative Precision	Detection Limits (ng/g wet)
PAH	NOAA Status & Trends	<MDL	40-120%	40-120% Recovery[1]	≤30% RPD[2]	~0.1 – 3.6

[1] Target spike must be >5 x native concentration.
[2] Applies to analytes >10x sample specific MDL.

METHOD: Tissue samples were extracted for PAHs following general National Atmospheric and Oceanic Administration (NOAA) National Status and Trends (NS&T) methods. Approximately 10 g of tissue was mixed with anhydrous sodium sulfate, spiked with surrogates and extracted with methylene chloride using accelerated solvent extractor (ASE). The extract was concentrated, and processed through an alumina cleanup column, concentrated, and fortified with internal standard (IS), and submitted for analysis. Extracts intended for PAH analyses were analyzed using gas chromatography mass spectrometry (GC/MS), following Battelle SOP O-015. Sample data were quantified by the method of internal standards using the surrogate compounds.

PAH – Tissue QA/QC SUMMARY

HOLDING TIMES: Tissue samples were stored frozen until sample preparation. Samples were prepared for analyses in five analytical batches and were extracted within the 1-year holding time for sample collection and analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
070210PAH	7/2/2010	8/12/2010
070610PAH	7/6/2010	8/19/2010*
071910PAH	7/19/2010	8/12/2010
072910PAH	7/29/2010	8/7/2010
080610PAH	8/6/2010	8/11/2010

* Initial analysis occurred 7/9/2010, however, reported concentrations for this batch are outside of the 40 days due to instrument problem. The extracts were stored in the -20°C freezer before re-analysis.

BLANKS: A procedural blank (MB) was prepared with each analytical batch. The blank was analyzed to ensure the sample extraction and analyses methods were free of contamination.
Exceedences – One of five blanks exceeded the reporting limit (RL) for naphthalene; "B" qualifiers applied.
Comments – Naphthalene and C1-Naphthalene were detected in some blanks. "B" qualifiers were applied to these concentration when indicating the level detected in the samples were <10x the blank concentration. Minimal data impact. No further corrective action taken.

MATRIX SPIKES: Two matrix spikes (MS) were prepared. The percent recoveries of PAHs were calculated to measure data quality in terms of accuracy.
Exceedences – Six recovery exceedences were noted.
Comments – In two matrix spikes, six spike recoveries were not within the laboratory control limits (40 – 120%). Those six compounds with recoveries great than 120% are naphthalene, biphenyl, acenaphthylene, acenaphthene, fluorene, and fluoranthene. However, the concentration spiked was not >10 times the concentration in the background material and therefore was not appropriate for data quality assessment.

Duplicate Samples: Two duplicate samples (DUPs) were prepared. The relative percent differences (RPD) of parent PAHs were calculated to measure data quality in terms of precision.
Exceedences – Two RPD exceedences noted.
Comments – In two duplicate samples, the two observed RPDs were not within the laboratory control limits (≤30%) both are naphthalene. All other PAHs with concentrations higher than the reporting limit have relatively narrow RPD (0-19%). Naphthalene has been detected in the associated method blanks (MB) and thus may be a factor in the duplicate precision of this compound. However, the concentration of naphthalene in these samples are not >10 times the MDL.

SURROGATES Five surrogate compounds were added prior to extraction, including naphthalene-d8, acenaphthene-d10, phenanthrene-d10, chrysene-d12, and perylene-d12. The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).
Exceedences – Five exceedences noted.
Comments – Four Naphthalene-d8 (29%-38%) are slightly lower than laboratory control limits (40 – 120%).

PROJECT: ENVVEST Ambient Monitoring, AMB02 Regional Mussel Watch

PARAMETER: Stable Isotopes of Carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$)

LABORATORY: Dr. Jay Brandes, Skidaway Institute for Oceanography

MATRIX: Indigenous Mussels

SAMPLE CUSTODY AND PROCESSING: Mussels from 24 sampling locations were collected by the U.S. Navy following NOAA Mussel watch protocol and hand delivered to MSL on 01/09/10, 01/13/2010, 02/02/2010, 02/03/2010, and 02/05/2010. The live mussels were stored at -20°C until they were measured and shucked. The length of each mussel added to the composite sample was recorded along with the total number of specimens in each composite. The mussels were rinsed with deionized water, shucked using a ceramic knife, and composites were homogenized to an even color and consistency using a titanium blender. The composites were split into three containers: 1) polypropylene pre-cleaned vial, tarred for percent moisture determination and metals analyses, 2) 8 oz. pre-cleaned glass jar for organic compound analyses, and 3) 8 oz. pre-cleaned glass jar for archival. The following quality control summary addresses the analyses of the 24 composite samples for trace metals. The composite samples were assigned a Battelle Central File (CF) identification number (3106). All project information was entered into Battelle's laboratory information and sample tracking system. Homogenized, lyophilized tissue aliquots were sent to Skidaway Institute of Oceanography.

The following lists information on sample receipt and processing activities:

MSL Lab ID	See Table
Collection dates	01/08/10, 01/12/10, and 02/02 through 02/04/10

METHODS/Discussion: Carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) analyses were performed on freeze dried, ground samples using a ThermoFinnigan Delta V plus stable isotope mass spectrometer coupled to a Thermo Flash elemental analyzer. Internal laboratory standards composed of marine chitin (Fisher Scientific) and calibrated to NIST standards were employed to correct sample data to international reference scales. Typical sample sizes analyzed were 0.5 to 1.0 mg. Typical precision of repeated chitin internal standards was 0.1‰ for C and 0.2‰ for N (1 SD). Values are given vs. vPDB (C) and air (N) standard scales.

Sample isotopic values are plotted in Figure 1 along with the 2007 biota data. Most samples fall along a group with a trend of co-varying C and N values. Literature values for isotopic changes between trophic levels predict a shift of +0-1‰ for C and 2-4‰ for N (Fry 1991; Hansson et al. 1997; Fantle et al. 1999; Benstead et al. 2006). Several conclusions can be drawn from this dataset. First, most organisms appear to be using a marine planktonic food source of around -20 to -22 per mil in C and 6-8 in N. Both these numbers are reasonable, the C is the average isotopic value for phytoplankton (Fry 1996) and the N value matches well with values of 5-6 measured for marine nitrate isotopes in the region (Brandes 1997). If the assumption is made that this is the food source, then the mussels are generally in the first trophic level, while the other biota samples are in the second or third trophic level. Basically anything from about 11-13 in $\delta^{15}N$ is in the second level and 14-16 $\delta^{15}N$ is in the third. There is a lot of overlap suggesting that several organisms are mixotrophs. There are two noticeable outlier groups. The benthic primary producer seagrass isotopic values are enriched in ^{13}C and depleted in ^{15}N. This value is distinct enough in carbon isotopic value to strongly influence consumers utilizing this food source. Most of the samples do not appear to reflect such utilization with the exception of the sample points 16-18 (Shiner Perch from Vendovi).

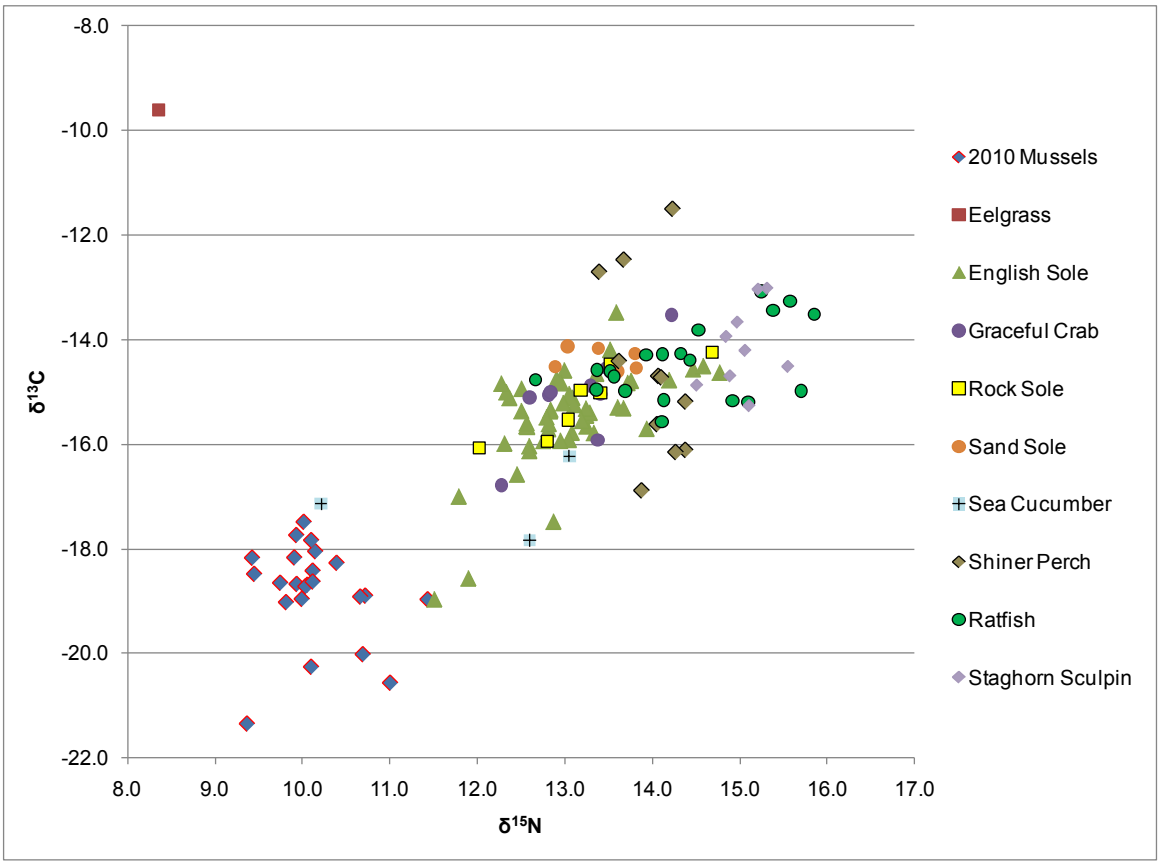

Figure 1. Stable carbon and nitrogen isotope ratios for the 2010 indigenous mussels compared to the PSAMP 2007 biota data.

Sample Custody Records

- Field Collection Worksheets
- Composites
- Sample Login

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/8/2010
Page: 1 of 1
COC Number: COC20100108

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: 43043
Project Name: TMDL in Sinclair & Dyes Inlets
Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: Mussel sampling w/ WDFW
Sampling Locations: Manchester Lab Pier (MLPIER), Sinclair Inlet Waterman Pt (SIWP) & Ross Point (~~SRP~~ SIRP)

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road, Sequim, WA 98382
Attention: Jill Brandenberger

Lab. Use only: Lab ID	Sample ID	Collection Date/Time	Matrix	Transvest mussel	Metals, PAH, PCB	Gonadal Index	No. of containers	StationID	Comments
	MW10EN01-1	1/8/10 1513	Mussel	x	x			MLPIER	Manchester Lab Pier #1
	MW10EN01-2	1530		x	x				" " #2
	MW10EN01-3	1545		x	x				" " #3
	MW10EN02-1	1513				x			" " #1 HIST
	MW10EN02-2	1530				x			" " #2 HIST
	MW10EN02-3	1545				x			" " #3 HIST
	MW10EN03-1	1715		x	x			SIWP	Waterman Pt. #1
	MW10EN03-2	1900		x	x				Waterman Pt #2
	MW10EN04	1715				x			Waterman Pt Composite
	MW10EN05-1	1900		x	x			SRP	Sinclair Inlet Ross Pt #1
	MW10EN05-2	2020		x	x			SIRP	Sinclair Inlet Ross Pt #2
	MW10EN05-3	2100		x	x				" " " #3
	MW10EN06-1	1900				x			" " " Histo #1
	MW10EN06-2	2020				x			" " " Histo #2
	MW10EN06-3	2100				x			" " " Histo #3

Testing Parameters

Observations, Instructions

Relinquished by:
Bob Johnston — 1/9/2010
Signature — Date — Time
RK Johnston — TEC — 1351
Printed Name — Company

Received by:
JM Brandenberger — 1/9/2010
Signature — Date — Time
JM Brandenberger — 1351 — PNNL
Printed Name — Company

Total # of Containers
Shipment Method: Ground Transfer by
Shipment Method: Cargo
Sample Disposition:

Relinquished by:
Signature — Date — Time
Printed Name — Company

Received by:
Signature — Date — Time
Printed Name — Company

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/12/2010
Page: 1 of 3
COC Number: 20100112A

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: 43043

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger

Phone: (360) 681-3668

EVENT: Mussel Watch Sampling
Sinclair & Dyes Inlets

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Collection Date/Time	Matrix	ENVVEST Mussels	metals + Hg	PAHs	PCBs	Stable isotopes	Lipids	Length	No. of containers	StationID	Comments
	20100112MUS01-1	1/12/10 0909	Live mussel									PS04-1	PS Charlie Pier End
	20100112MUS01-2											PS04-2	Charlie Pier SW end
	20100112MUS01-3											PS04-3	Charlie Pier S side
	20100112MUS02-1											PS03-1	near OF PSNS015
	20100112MUS02-2											PS03-2	" PSNS015
	20100112MUS02-3											PS03-3	" PSNS015
	MUS03-1											PS06-1	DD6 E end on Quay wall
	MUS03-2											PS06-2	DD6 near OF19
	MUS03-3											PS06-3	DD6 near OF19
	MUS04-1											PS08-1	DD5 off Barge
	MUS04-2											PS08-2	DD5 off Barge
	MUS04-3											PS08-3	DD5 off Barge
	MUS05-1											PS09-1	DD4 OF18
	MUS05-2											PS09-2	DD4 OF18
	MUS05-3											PS09-3	DD4 OF18

Relinquished by:
RK Johnston — 1/13/2010
Signature — Date — Time
RK Johnston — TEC
Printed Name — Company

Received by:
Jill Brandenberger — 1/13/2010 — 1330
Signature — Date — Time
Jill Brandenberger — Battelle
Printed Name — Company

Total # of Containers
Shipment Method:
Shipment Method:
Sample Disposition:

Relinquished by:
Signature — Date — Time
Printed Name — Company

Received by:
Signature — Date — Time
Printed Name — Company

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/12/2010
Page: 2 of 3
COC Number: COC20100112B

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: 43043

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger

Phone: (360) 681-3668

EVENT: Mussel Watch Sampling
Sinclair & Dyes Inlet

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

* Should be PS11 based on email from RKJ dtd 5/20/10. CBM 5/20/10

Lab. Use only: Lab ID	Sample ID	Collection Date/Time	Matrix	Enviest Mussels	Metals + Hg	PAHs	PCBs	Stable Isotopes	Lipids	Length	No. of containers	StationID	Comments
	20100112MUS06-1	1/12/10 1400	Mussel									PS10-1	Dry Dock 3 (PS11) *
	MUS06-2	1405									*	PS10-2	Dry Dock 3 (PS11) *
	MUS06-3	1410										PS10-3	Dry Dock 3 (PS11) *
	MUS07-1	1715										SIS1M-1	Sinclair Marina
	MUS07-2	1720										SIS1M-2	"
	MUS07-3	1725										SIS1M-3	"
	MUS08-1	1800										SIPOM-1	Port Orchard Marina
	MUS08-2	1805										SIPOM-2	" "
	MUS08-3	1810										SIPOM-3	" "
	MUS09-1	1900										POPISP-1	Port Orchard Pass Illahee State Park
	MUS09-2	1910										POPISP-2	Illahee State Park
	MUS09-3	1920										POPISP-3	" " "
	MUS10-1	2000										POPIPD-1	Illahee Port Dock
	MUS10-2	2010										POPIPD-2	Illahee Port Dock
	MUS10-3	2020										POPIPD-3	Illahee Port Dock

Relinquished by:
RK Johnston 1/13/2010
Signature Date Time
RK Johnston TEC
Printed Name Company

Received by:
JM Brandenberger 1/13/2010 1330
Signature Date Time
Jill Brandenberger Battelle
Printed Name Company

Total # of Containers

Shipment Method:

Shipment Method:

Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature Date Time
Printed Name Company

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/12/2010
Page: 3 of 3
COC Number: 20100112C

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: 43043

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger

Phone: (360) 681-3668

EVENT: Mussel Watch Sampling
Sinclair & Dyes Inlets

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Collection Date/Time	Matrix	Live mussels	ENVVEST Mussel	Metals+Hg	PAHs	PCBs	Stable isotopes	Lipids	Length	No. of containers	StationID	Comments
	20100112MUS11-1	1/12/10 2200			-	-	-	-	-	-	-		PWNLP-1	Port Wash. Narrows Lions Park
	MUS11-2	2210											PWNLP-2	Lions Park
	MUS11-3	2220											PWNLP-3	Lions Park
	MUS12-1	2300											DYOTS-1	Dyes Inlet Old Town Silverdale
	MUS12-2	2310											DYOTS-2	Old Town Silverdale
	MUS12-3B	2320	↓										DYOTS-3B	Old Town Silverdale
	MUS12-3B	2326	↓										DYOT-3B	Storm Sample

Relinquished by:
RK Johnston 1/13/2010
Signature Date Time
RK Johnston TEC
Printed Name Company

Received by:
JM Brandenberger 1/13/2010 1330
Signature Date Time
Jill Brandenberger Battelle
Printed Name Company

Total # of Containers
Shipment Method:
Shipment Method:
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature Date Time
Printed Name Company

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM
Date: 2/2/2010
Page: 7 of 7
COC Number:

SSC-Pacific
Bioassy Testing Laboratory
Code 71751 Environmental Sciences Branch

Project No.:
Project Name: ENVVEST Ambient Monitoring
Project Manager:
Phone:

EVENT:

Address:
Attention: Gunther Rosen
Observations, Instructions

Testing Parameters

Lab. Use only: Lab ID	Sample ID (AMB02-)	Sample Label	Collection Date/Time (2/2/2010)	Matrix	Field Temp	~~Toxicity~~ Metals (T/D)	~~Temp (°C)~~ T Hg	~~DO (mg/L)~~ TSS/TS	pH ~~(units)~~ Nuts/TOC	Salinity (ppt) OSAL	~~Alkalinity (mg/L as CaCO3)~~ O&G	~~Hardness (mg/L as CaCO3)~~ DOC	~~Total Chlorine (mg/L)~~	Mussel Contaminants	~~No. of containers~~ Mussel GI, Lipid, Isotopes	StationID	Comments
31064-20	AMB02-091	PS01 TME	1421	NS		X	X									PS01	
CAS	092	PS01 TSS	1421	NS				X								PS01	
	093	PS01 NUTS	1421	NS					X							PS01	
	094	PS01 DOC	1430	NS								X				PS01	
UW	095	PS01 OSAL	1430	NS						X						PS01	
CAS	096	PS01 O&G	1430	NS							X					PS01	
31064-21	097	PS02 TME	1442	NS		X	X									PS02	
CAS	098	PS02 TSS	1444	NS				X								PS02	
	099	PS02 NUTS	1444	NS					X							PS02	
	100	PS02 DOC	1447	NS								X				PS02	
UW	101	PS02 OSAL	1447	NS						X						PS02	
31064-22	-102	PS01-1 mussel	1430	Mus										X		PS01	mussel station 1
23	-103	PS01-~~M~~ mussel Histo	1430	Mus											X		mussel station 1 Histo
24	-104	PS01-2 mussel	1435	Mus										X			mussel Station 2
25	-105	PS01-2 Histo mussel	1435	Mus											X		mussel station 2 Histo
26	-106	PS01-3 mussel	1445	Mus										X			mussel Station 3
31064-27	-107	PS01-3 Histo mussel	1445	Mus											X		mussel Station 3 Histo

Relinquished by:
[signature] 2/2/10 1800
Signature Date Time
TEC Hand carried
Printed Name Company

Received by:
Signature
Printed Name

Total # of Containers:
Shipment Method:
Shipment Method:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to ENVVEST Technical Coordinator

SAMPLE CHAIN OF CUSTODY FORM

Date: 2/3/10
Page: 1 of 8
COC Number:

1062 for MUSSELS
5/20/10

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.:

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT:

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Sample Lable	Collection Date/Time	Matrix	Metals (Total/Dissolved)	Total Hg	TS/TSS	Nuts/TOC	DOC	Oil&Grease	PAL		mussels	No. of containers	StationID	Comments
	AMB02-		2/3/10													
	AMB02-290	PSIQ - TIME	1506		X	X								1	PSIQ	
	AMB02-291	TSS	1506				X							1		
	292	NUT	1506					X						1		
	293	DOC	1506						X					1		
	294	↓ OSAL	1506								X			1	↓	
	295	SIGST - 1	1015										X		SIGST	
	296	SIGST-1 Histo	1015										X			
	297	SIGST-2	1020										X			
	298	SIGST-2 Histo	1020										X			
	299	SIGST-3	1025										X			
	300	SIGST-3 Histo	1025										X		↓	
	301	DYOBAP-1	1420										X		DYOBAP	
	302	DYOBAP-1 Hist	1420										X			
	303	DYOBAP-2	1425										X			
	304	DYOBAP-2 Hist	1425										X		↓	

Relinquished by:
2/3/2010 1705
Signature Date Time
PNNL
Printed Name Company

Received by:
Signature
Printed Name

Total # of Containers
Shipment Method:
Shipment Method:
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to
Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM

Date: 2/3/10
Page: 8 of 8
COC Number:

2 of 2 for Mussels 5/20/10

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.:

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT:

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

Lab. Use only: Lab ID	Sample ID (AMB02)	Sample Lable	Collection Date/Time (2/3/10)	Matrix	Metals (Total/Dissolved)	Total Hg	TS/TSS	Nuts/TOC	DOC	Oil&Grease		Mussels		No. of containers	StationID	Comments
	AMB02-305	DYOBAP-3	1427									X			DYOBAP ↓	
	-306	DYOBAP-3 Hist	1427									X				
	-307	EB 020210 TME	1910		X	X										
	-308	EB 020310 TME	1910		X	X										

Relinquished by: _____ 2/3/2010 1705
Signature Date Time
_____ PNWL
Printed Name Company

Received by: _____
Signature
_____
Printed Name

Total # of Containers
Shipment Method:
Shipment Method:
Sample Disposition:

Relinquished by: _____
Signature Date Time
_____
Printed Name Company

Received by: _____
Signature
_____
Printed Name

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to
Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM

Date: 2/4/2010
Page: 1 of 3
COC Number:

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.:

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: Mussel sampling N, Port Orchard Passage

Testing Parameters

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger
Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Sample Lable	Collection Date/Time	Matrix	Metals (Total/Dissolved)	Total Hg	TSS Lipid	Nutrients PAH/PCBs	DDC Isotopes	Oil&Grease	Gonadal Index			No. of containers	StationID	Comments
	MFEB4-001	POPBWN-1	1106	Mussel Tissue	X	X	X	X	X						POPBWN	
	-002	POPBWN-1Histo	1606								X				POPBWN	
	-003	POPBWN-2	1120		X	X	X	X	X						POPBWN	
	-004	POPBWN-2HISTO	1120								X				POPBWN	
	-005	POPBWN-3	1141		X	X	X	X	X						POPBWN	
	-006	POPBWN-3Histo	1141								X				POPBWN	
	-007	KPTPIER-1	1301		X	X	X	X	X		.				KPTPIER	Steel Piling
	-008	KPTPIER-1Histo	1301								X				KPTPIER	
	-009	KPTPIER-2	1310		X	X	X	X	X						KPTPIER	Steel Piling
	-010	KPTPIER-2Histo	1310								X				KPTPIER	
	-011	KPTPIER-3	1320		X	X	X	X	X						KPTPIER	Floating Dock
	-012	KPTPIER-3Histo	1320								X				KPTPIER	
	-013	KPTLAG-1	1412		X	X	X	X	X						KPTLAG	cement tower outside Lag
	-014	KPTLAGHisto	1412 ~~1320~~								X				KPTLAG	
	-015	KPTLAG-2	1420		Y	X	X	X	X						KPTLAG	on beach outside Lagoon

Relinquished by: RK [illegible] 2/5/2010
Signature Date Time
Printed Name Company

Received by: [illegible] 2/5/2010
Signature PNNL
Printed Name

Total # of Containers
Shipment Method:
Shipment Method:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to
Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM

Date: 2/4/2010

Page: 2 of 3

COC Number:

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.:

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger

Phone: (360) 681-3668

EVENT: Mussel Sampling NPOP

Testing Parameters

Laboratory: Battelle MSL

Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Sample Lable	Collection Date/Time	Matrix	Metals (~~Total/Dissolved~~)	Total Hg	~~Tributyltin~~ PAH/PCB	~~Nutrients~~ TOC Lipids	DDE Isotopes	~~Oil & Grease~~	Gonadal Index		No. of containers	StationID	Comments
	MFE84		2/4/2010	Tissue											
	-016	KPTLAG-2 Histo	1420	mussel							X			KPTLAG	
	-017	KPTLAG-3	1450		X	X	X	X	X					KPTLAG	inside Lagoon behind weir
	-018	KPTLAG-3 Histo	1450								X			KPTLAG	
	-019	APHCB-1	1626		X	X	X	X	X					APHCB	on Big Rock
	-020	APHCB-1 Histo	1626								X			APHCB	
	-021	APHCB-2	1700		X	X	X	X	X					APHCB	Along Beach
	-022	APHCB-2 Histo	1700								X			APHCB	
	-023	APKIANA-1	1800		X	X	X	X	X				2mm	APHCB	Floating dock nylon line 5"
	-024	APKIANA-1 Histo	1400								X		2/5/10	APKIANA	
	-025	APKIANA-2	1405		X	X	X	X	X					APKIANA	Floating dock nylon line 5"
	-026	APKIANA-2 Histo	1405								X			APKIANA	
	-027	APKIANA-3	1420		X	X	X	X	X					APKIANA	floating dock rubber float
	-028	APKIANA-3 Histo	1420								X			APKIANA	
	-029	LBPMSC-1	2020		X	X	X	X	X					LB PMSL	cement dock
	-030	LBPMSC-1 Histo	2020								X			LB PMSL	

Relinquished by: RK [illegible] Signature 2/5/2010 Date Time

Printed Name Company

Received by: [illegible] 2/5/2010 Signature PNNL

Printed Name

Total # of Containers

Shipment Method:

Shipment Method:

Relinquished by:

Signature Date Time

Printed Name Company

Received by:

Signature

Printed Name

Sample Disposition:

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to
Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM

Date: 2/4/2010
Page: 3 of 3
COC Number: 3

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.:

Project Name: ENVVEST Ambient Monitoring
Mussel Watch Stations

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: Mussel Sampling
NPOP

Testing Parameters

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Lab. Use only: Lab ID	Sample ID (MFEB4-)	Sample Lable	Collection Date/Time (2/4/2020)	Matrix (Tissue)	Metals (~~Total/Dissolved~~)	Total Hg	~~TBT~~s PAH/PCB	~~Nutrients~~ Lipids	DDC isotopes	~~Oil&Grease~~	Gonads (Index)			No. of containers	StationID	Comments
	-031	LBPMSC-2	2025	Mussel	X	X	X	X	X						LBPMSC	cement dock
	-032	LBPMSC-2 Histo	2025	|							X				LBPMSC	
	-033	LBPMSC-3	2030	|	X	X	X	X	X						LBPMSC	cement dock
	-034	LBPMSC-3 Histo	2030	|							X				LBPMSC	

Relinquished by: RK [illegible]
Signature — Date: 2/5/2010 — Time
Printed Name — Company

Received by: [signature]
Signature — Date: 2/5/2010
Printed Name

Total # of Containers
Shipment Method:
Shipment Method:
Sample Disposition:

Relinquished by:
Signature — Date — Time
Printed Name — Company

Received by:
Signature
Printed Name

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

MUSSEL WATCH PROGRAM DATA SHEET

Site: Puget Sound Naval Shipyard PS01 **Site Code:** PS01

Date: 2/2/2010 **Time Arrive:** 1421 **Time Leave:** 1455

Latitude: 47,55385 **Longitude:** 122.65785

Weather: clear w/ Sun

Mussel Collectors: Bob Johnston

Data Recorder: Johnston

SITE WATER PARAMETERS

Water Temperature (°C): 8.7 **~~Salinity (ppt)~~ Conductivity:** 50,027 Microsiemens/cm

Tidal Station: pH 7.62; Turb 2.9, DO 8.41 mg/L Bremerton, Sinclair Inlet, port orchard

Time of Low Tide: 1337 **Height of Low Tide:** 2.8 ft. ☑ m. ☐

STATION DESCRIPTIONS

STATION 1

Latitude: _____ **Longitude:** _____ **Start Time:** 1430

Station Description: off of electrical cable hanging in water Top 6-12ft depth

Substrate: electrical cable upper end **Height of Collection:** _____ ft. -1 m. ☐

Highest Distribution of Mussels *(compared to water level at time of collection)*: -6

Species Collected: mytilus spp.

STATION 2

Latitude: _____ **Longitude:** _____ **Start Time:** 1435

Station Description: off of electrical cable hanging in water 12-18 ft depth

Substrate: electrical cable lower end **Height of Collection:** _____ ft. -12 m. ☐

Highest Distribution of Mussels *(compared to water level at time of collection)*: ~~-12~~ -6

Species Collected: mytilus spp.

STATION 3

Latitude: _____ **Longitude:** _____ **Start Time:** 1445

Station Description: On beach next to sampling location

Substrate: rock **Height of Collection:** _____ ft. 4 m. ☐

Highest Distribution of Mussels *(compared to water level at time of collection)*: +8

Species Collected: mytilus spp.

Check Boxes for Site Conditions:

✓	Condition	PS01 Description 2/2/2010
	Creosote	no
	Oil on water	No
	Oil on beach	no
	Garbage	

Observations and General Notes (i.e. interesting or unusual conditions, information, comments, etc):

In ~~co~~ west end of Shipyard in corner between carrier (Independence) and Charleston Beach directly near where Callow Ave outfall discharges. Mussels were collected from electrical cable hanging in the water of of the bow of carrier - 1st Sample was from 6'-12' of submerged cable & second sample was 12'-18' ft of submerged cable. 3 sample came from beach on rocks just above low tide

Station Log

Sample Collector	Jacquelyn Young / Bob	PSNS Project ENVVEST		Page 1 of 1
Sampling Team	Johnston, Brandenburg, Johnston	Ambient Monitoring		
Organization	Rosen, Yeager, Young, Beck			
Use pre-assigned id	mm/dd/yy hh:mm	PSNS/SSC-PAE/BMSL mm/dd/yy hh:mm		

StationID	Time Arrive Date/Time	Time Leave Date/Time	Station Type	LAT	LONG	Remarks/ Comments
PS07	2/8/2010 0933	0948	NS	47°33.346 N	122°38.515 W	
PS06	0952	0957	NS	47°33.188 N	122°38.516 W	
PS14	1001	1012	NS	47.55256° N	122.64230° W	
PS03	1019	1028	NS	47.55581° N	122.65170° W	
PS04	1035	1040	NS	47.55433° N	122.64718° W	
PS05	1042	1048	NS	47.55595° N	122.64521° W	oil sheen on water Pier B
PS08	1056	1106	NS	47.55792	122.63876	DD5
PS15	1111	1135	NS	47.55586	122.63652	At Barrier off CIA
PS09	1138	1155 (est)	NS	47.56012	122.63557	DD4 / Returned to finger Pier broken Hydraulic line
PS07	1205	1224		47.55598	122.64197	Finger Pier No Sample, New Boat
PS11	1235	1245	NS	47.56070	122.62973	DD3
PS16	1251	1258	NS	47.55843	122.62867	end of Pier
PS11	1302	1308	NS	47.56644	122.63267	DD 2 next to APL-4 Barge
M3.1	1321	1327	M	47.56123	122.61076	Mid Channel / no thermocline no pycnocline
BJ-EST	1345	1352	NS	47.54771	122.62889	Blackjack Cr. Est.
M4	1404	1415	M	47.54274	122.66508	~~Goat~~ mid off Ross Pt.
PS01	1421	1436	NS	47.55385	122.65785	Callow Ave OF
PS02	1442	1449	NS	47.55400	122.65513	
PS						

Station Type: Marine (M), Nearshore (NS), Stream (S), Stormwater (SW), Outfall (OF), Mussel (Mussel), Sediment (Sed); Other - specify

Ambient monitoring Feb 2010
ENVVESTO

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 31060 Sample No(s): 1- Batch: 1

Project Name: _____ Project Manager: _____

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: _____ WP# _____

Yes	No	
☐	☐	Navy-type Project (requires high-level sample tracking procedures)
☐	☐	USDA Samples (see Compliance Agreement Checklist) — PM Verification:
☐	☐	Filter Samples: Amount: Entire sample Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
☐	☐	Special instructions:

Sample Preservation Instructions:

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☑	Custody seal present — Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each) — #1 3.5 °C, #2 2.8 °C, #3 4.7 °C, #4 5.2 °C, #5 5.8 °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)
☑	☐	☐	Were all chain of custody forms signed and dated?
☑	☐	☐	Were samples filtered at MSL?

Comment/Remedy: _____

Sample condition(s): (Acceptable) Other (explain):

Container type: (Teflon) (Poly) (Glass) Cap. Vial Other: _____

Notes: _____

Completed By: _____ Date/Time: 2/2/10 1910

SAMPLE PRESERVATION

☐ Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)

☐ Random pH checked for ~10% of samples (use dip paper) Sample IDs: _____

☐ Complete pH check required for project (use pH meter and record on pH Record form)

☐ Sample(s) were preserved at MSL

Type:			
	☑	0.2% HNO3	Notes: 1209050 ← Lot#
	☐	0.5% HCl (Hg samples)	Notes: Lot#
	☐	Refrigerate/Freeze	Notes:
	☐	Other	Notes:

Completed By: _____ Date/Time: 2/2/10 2105

Storage Shelf: _____

Battelle Marine Sciences Labs, 1529 West Sequim Bay Rd, Sequim, Washington 98362 PH: (360) 681-4565

SAMPLE CHAIN OF CUSTODY FORM

Date: 4/5/10

Page: 1 of 2

COMPOSITES

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

Project Name: ENVEST Amb Mon.

Chemistry Task Manager: Jill Brandenberger

Phone Number: 360-681-4564

Laboratory:

Address:

Attention:

Testing Parameters

Observations, Instructions

NOTE: JUST USE "C" not "comp" per RKJ email examples dtd 4/20/10 cjm 5/20/10. 1/12/10

Organics ~~Metals~~

Mussel

*Should be PS11 based on email from RKJ dtd 5/20/10 cjm 5/20/10

Metals Organics

Sample ID	Collection Date	MSL ID	Matrix	Alkalinity	Hardness	Total Solids	Total Suspended Solids	O-Phosphate	BOD	TPH	LISST	Nitrate+Nitrite	Total Phosphorus	TKN	Ammonia	TOC	DOC	Total Metals	Dissolved Metals	Organics	No. of containers	Station ID
20100112MUS01-comp		3106.191																X		X		PS04-comp 3106.215
20100112MUS02-comp		192																X		X		PS03-comp 216
MUS03-comp		193																X		X		PS06-comp 217
MUS04-comp		194																X		X		PS08-comp 218
MUS05-comp		195																X		X		PS09-comp 219
MUS06-comp		196																X		X	*	PS10-comp 220
MUS07-comp		197																X		X		SISM-comp 221
MUS09-comp		198																X		X		POPISP-comp 222
MUS08-comp		199																X		X		SIPOM-comp 223
MUS10-comp		200																X		X		POPIPD-comp 224
MUS11-comp		201																X		X		PWNLP-comp 225
MUS12-comp		202																X		X		DYOTS-comp 226
MW10EN01-comp	(1/8/10) 3106	203																X		X		MLPIER-comp 3106.227
																		4		4		Total # of Containers= 0

Relinquished by:

Signature Date Time

Printed Name Company

Received by: 04/07/10 1500

Signature Date Time

MLF McGahan MSL

Printed Name Company

Shipment Method:

Special Requirements or Conditions:

Sample Disposition:

Relinquished by:

Signature Date Time

Printed Name Company

Received by:

Signature Date Time

Printed Name Company

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE CHAIN OF CUSTODY FORM
Date: 4/5/10
Page: ~~2~~ ~~1~~ 2 of 2

COMPOSITES

Battelle
Marine Sciences Laboratory
1529 W. Sequim Bay Road
Sequim, Washington 98382

Project Name: ENVEST Amb. Mon.
Chemistry Task Manager: Jill Brandenberger
Phone Number: 360-681-4564

Mussel watch Samping

Laboratory: Battelle MSL
Address:
Attention:

See note on page 182 (Just use "C" not "comp") [initials] 5/20/10

Testing Parameters | Observations, Instructions

Sample ID	Collection Date	MSL ID	Matrix	Alkalinity	Hardness	Total Solids	Total Suspended Solids	O-Phosphate	BOD	TPH	LISST	Nitrate+Nitrite	Total Phosphorus	TKN	Ammonia	TOC	DOC	Total Metals	Dissolved Metals	Organics	No. of containers	Station ID
	1/8/10	Organics ~~Metals~~	Mussel																			Metals ~~organics~~
MW10EW02-comp		3106.204																X		X		SIWP-Comp 3106.228
MW10EN05-Comp		205																X		X		SIRP-Comp 229
MFEB4006-Comp	2/4/10	206																X		X		POPBWN-Comp 230
MFEB4007-Comp		207																X		X		KPTPIER-Comp 231
MFEB4013-Comp		208																X		X		KPTLAG-Comp 232
MFEB4-019-Comp		209																X		X		APHCB-Comp 233
MFEB4-023-Comp		210																X		X		APKFANA-Comp 234
MFEB4-029-Comp		3106.211																X		X		LBPMSC-Comp 235
		212																X		X		DYOBAP-Comp 236
		213																X		X		SIGST-Comp 237
		214																X		X		PSO1-Comp 3106.238
																		~~X~~		~~X~~		~~LBPMSC-Comp~~

Total # of Containers= 0

Relinquished by:
Signature Date Time
Printed Name Company

Received by: [signature] 04/07/10 1500
Signature Date Time
MLFMcMahan MSL
Printed Name Company

Shipment Method:
Special Requirements or Conditions:
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature Date Time
Printed Name Company

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

SAMPLE LOGIN

Project Manager: Brandenberger
Date Received: 4/7/2010
Batch: 6
Login Designee: McGahan

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Ambient Monitoring, March 2010**

Sponsor ID	Station ID	Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
20100112MUS01-C	PS04	PSNS NAVSTA Mid (CP)	3106-191	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS02-C	PS03	PSNS NAVSTA West (DP)	3106-192	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS03-C	PS06	PSNS CIA West (6)	3106-193	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS04-C	PS08	PSNS CIA MidE (5)	3106-194	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS05-C	PS09	PSNS CIA MidW (4)	3106-195	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS06-C	PS11	PSNS CIA East (3)	3106-196	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS07-C	SISIM	Sinclair Inlet Sinclair Marina	3106-197	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS09-C	POPISP	Port Orchard Pass Illahee State Park	3106-198	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS08-C	SIPOM	Sinclair Inlet Port Orchard Marina	3106-199	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS10-C	POPIPD	Port Orchard Pass Illahee State Dock	3106-200	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS11-C	PWNLP	Port Washington Narrows Lions Park	3106-201	mussel Comp	Outside Freezer	Organics	01/12/10
20100112MUS12-C	DYOTS	Dyes Inlet Old Town Silverdale	3106-202	mussel Comp	Outside Freezer	Organics	01/12/10
MW10EN01-C	MLPIER	Manchester Lab Pier	3106-203	mussel Comp	Outside Freezer	Organics	01/08/10
MW10EN03-C	SIWP	Sinclair Inlet Waterman Point	3106-204	mussel Comp	Outside Freezer	Organics	01/08/10
MW10EN06-C	SIRP	Sinclair Inlet Ross Point	3106-205	mussel Comp	Outside Freezer	Organics	01/08/10
MFEB4-001C	POPBWN	Port Orchard Passage Brownsville	3106-206	mussel Comp	Outside Freezer	Organics	02/04/10
MFEB4-007C	KPTPIER	Keyport NUWC Pier	3106-207	mussel Comp	Outside Freezer	Organics	02/04/10
MFEB4-013C	KPTLAG	Keyport Lagoon	3106-208	mussel Comp	Outside Freezer	Organics	02/04/10
MFEB4-019C	APHCB	Agate Pass BI Hidden Cove Beach	3106-209	mussel Comp	Outside Freezer	Organics	02/04/10
MFEB4-023C	APKIANA	Agate Pass Kiana Lodge	3106-210	mussel Comp	Outside Freezer	Organics	02/04/10

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project Manager: Brandenberger
Date Received: 4/7/2010
Batch: 6
Login Designee: McGahan

Project: **ENVVEST Ambient Monitoring, March 2010**

Sponsor ID	Station ID	Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
MFEB4-029C	LBPMSC	Liberty Bay Poulsbo Marina Science Center	3106-211	mussel Comp	Outside Freezer	Organics	02/04/10
AMB02-301C	DYOBAP	Dyes Inlet Ostrich Bay Ammo Pier	3106-212	mussel Comp	Outside Freezer	Organics	02/03/10
AMB02-295C	SIGST	Sinclair Inlet head at Gorst	3106-213	mussel Comp	Outside Freezer	Organics	02/03/10
AMB02-102C	PS01	PNSN Inactive Fleet Callow Ave OF	3106-214	mussel Comp	Outside Freezer	Organics	02/02/10

SAMPLE LOGIN

Project Manager: Brandenberger
Date Received: 4/7/2010
Batch: 6
Login Designee: McGahan

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Ambient Monitoring, March 2010**

Sponsor ID	Station ID	Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
20100112MUS01-C	PS04	PSNS NAVSTA Mid (CP)	3106-215	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS02-C	PS03	PSNS NAVSTA West (DP)	3106-216	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS03-C	PS06	PSNS CIA West (6)	3106-217	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS04-C	PS08	PSNS CIA MidE (5)	3106-218	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS05-C	PS09	PSNS CIA MidW (4)	3106-219	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS06-C	PS11	PSNS CIA East (3)	3106-220	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS07-C	SISIM	Sinclair Inlet Sinclair Marina	3106-221	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS09-C	POPISP	Port Orchard Pass Illahee State Park	3106-222	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS08-C	SIPOM	Sinclair Inlet Port Orchard Marina	3106-223	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS10-C	POPIPD	Port Orchard Pass Illahee State Dock	3106-224	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS11-C	PWNLP	Port Washington Narrows Lions Park	3106-225	mussel Comp	Deep Freezer B-2	metals	01/12/10
20100112MUS12-C	DYOTS	Dyes Inlet Old Town Silverdale	3106-226	mussel Comp	Deep Freezer B-2	metals	01/12/10
MW10EN01-C	MLPIER	Manchester Lab Pier	3106-227	mussel Comp	Deep Freezer B-2	metals	01/08/10
MW10EN03-C	SIWP	Sinclair Inlet Waterman Point	3106-228	mussel Comp	Deep Freezer B-2	metals	01/08/10
MW10EN06-C	SIRP	Sinclair Inlet Ross Point	3106-229	mussel Comp	Deep Freezer B-2	metals	01/08/10
MFEB4-001C	POPBWN	Port Orchard Passage Brownsville	3106-230	mussel Comp	Deep Freezer B-2	metals	02/04/10
MFEB4-007C	KPTPIER	Keyport NUWC Pier	3106-231	mussel Comp	Deep Freezer B-2	metals	02/04/10
MFEB4-013C	KPTLAG	Keyport Lagoon	3106-232	mussel Comp	Deep Freezer B-2	metals	02/04/10
MFEB4-019C	APHCB	Agate Pass BI Hidden Cove Beach	3106-233	mussel Comp	Deep Freezer B-2	metals	02/04/10
MFEB4-023C	APKIANA	Agate Pass Kiana Lodge	3106-234	mussel Comp	Deep Freezer B-2	metals	02/04/10

SAMPLE LOGIN

Project Manager: Brandenberger
Date Received: 4/7/2010
Batch: 6
Login Designee: McGahan

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Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Ambient Monitoring, March 2010**

Sponsor ID	Station ID	Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
MFEB4-029C	LBPMSC	Liberty Bay Poulsbo Marina Science Center	3106-235	mussel Comp	Deep Freezer B-2	metals	02/04/10
AMB02-301C	DYOBAP	Dyes Inlet Ostrich Bay Ammo Pier	3106-236	mussel Comp	Deep Freezer B-2	metals	02/03/10
AMB02-295C	SIGST	Sinclair Inlet head at Gorst	3106-237	mussel Comp	Deep Freezer B-2	metals	02/03/10
AMB02-102C	PS01	PNSN Inactive Fleet Callow Ave OF	3106-238	mussel Comp	Deep Freezer B-2	metals	02/02/10

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3106 Sample No(s): 191 - 238 (COMPOSITE) Batch: 6

Project Name: Everest Ambient Monitoring March 2010 Project Manager: Brandenberger

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: _____ WP# _____

Yes	No	
☐	☐	Navy-type Project (requires high-level sample tracking procedures)
☐	☐	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☐	☐	Filter Samples: Amount: Entire sample Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
☐	☐	Special instructions:

Sample Preservation Instructions:

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☒	Custody seal present Seal intact? YES NO
☐	☐	☒	Cooler temperature (acceptable range: 4±2°C or solids:frozen) _____ °C
			(if multiple coolers, note temp. of each) _____ °C
☐	☐	☒	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)
			Comment/Remedy: Samples hand carried & placed in outside freezer
☒	☐	☐	Were all chain of custody forms signed and dated?
☐	☒	☐	Were samples filtered at MSL?

Sample condition(s): ~~Acceptable~~ ~~Other (explain):~~

Container type: ~~Teflon~~ ~~Poly~~ ~~Glass~~ ~~Cap. Vial~~ Other: _____

Notes: _____

Completed By: _____ Date/Time: 04/07/10 1500

SAMPLE PRESERVATION

☐	Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)
☐	Random pH checked for ~10% of samples (use dip paper) Sample IDs: _____
☐	Complete pH check required for project (use pH meter and record on pH Record form)
☐	Sample(s) were preserved at MSL

Type:			
~~Type:~~	☐	~~0.2% HNO3~~	~~Notes:~~ ~~Lot#~~
	☐	0.5% HCl (Hg samples)	Notes: Lot#
	☒	Refrigerate/Freeze	Notes: 191-214 outside freezer 215-238 deep freezer
	☐	Other	Notes:

Completed By: _____ Date/Time: 04/07/10 1545

Storage Shelf: deep freezer B-2

References

References

Brandenberger JM, CR Suslick, and RK Johnston. 2008. Biological Sampling and Analysis in Sinclair and Dyes Inlets, Washington: Chemical Analyses for 2007 Puget Sound Biota Study. Pacific Northwest National Laboratory, Richland, WA. Technical Report No. PNNL-17948.

Brandenberger JM, CR Suslick, and RK Johnston. 2006a. Biological Sampling and Analysis in Sinclair and Dyes Inlets, Washington: Chemical Analyses for the Caged Mussel Study. Pacific Northwest National Laboratory, Richland, WA. PNNL-15835.

Brandenberger JM, CR Suslick, and RK Johnston. 2006b. Biological Sampling and Analysis in Sinclair and Dyes Inlets, Washington: Chemical Analyses for 2005 Puget Sound Biota Study. Pacific Northwest National Laboratory, Richland, WA. PNNL-15834.

Brandenberger JM, CR Suslick, and RK Johnston. 2003. 2003 Sinclair and Dyes Inlet TMDL Study: Biological Sampling and Analysis for Metals and PCBs. Pacific Northwest National Laboratory, Richland, WA.

ENVVEST (Johnston, R.K). 2006. Puget Sound Naval Shipyard & Intermediate Maintenance Facility Project ENVVEST Community Update June 2006. Brochure and CD. Marine Environmental Support Office-NW, Space and Naval Warfare Systems Center, Bremerton, WA. August 2006. Ecology Publication Number 06-10-54 http://www.ecy.wa.gov/biblio/0610054.html

Johnston, R.K., G.H. Rosen, J.M. Brandenberger, V.S. Whitney, and J.M. Wright. 2009. Sampling and Analysis Plan for Ambient Monitoring and Toxicity Testing for Sinclair and Dyes Inlets, Puget Sound, Washington. ENVVEST Planning Document.

Johnston RK, DE Leisle, JM Brandenberger, SA Steinert, M Salazar, and SM Salazar. 2007. Contaminate Residues in Demersal Fish, Invetebrates, and Deployed Mussels in Selected Areas of The Puget Sound, WA. In proceedings from 2007 Georgia Basin Puget Sound Conference, Vancouver, British Columbia, March 26-29, 2007, p. 9 pages. PNNL-SA-55152.

National Oceanic and Atmospheric Administration (NOAA) 2009. National Status & Trends Mussel Watch Program: Mussel Watch Site Descriptions and Sampling Procedures for Washington State

SCMRC 2009. Mussel Watch Monitoring Protocols.