KANE ENVIRONMENTAL INC

STEMEN ENVIRONMENTAL, INC.

Remedial Action Report

West Bay Marina
2100 West Bay Drive NW
Olympia, Washington 98502
Cleanup Site ID: 6873

Prepared For:

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ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
AOC	Area of Concern
ARI	Analytical Resources, Inc. (Tukwila, WA)
AUL	Activity Use Limitation
BMPs	Best Management Practices
bgs	Below Ground Surface
COC	Chain of Custody
CUL	Cleanup Level
DP	Direct Push
EC	Environmental Covenant
Ecology	The Washington State Department of Ecology
EMPC	Estimated Maximum Possible Concentration
EPA	US Environmental Protection Agency
ESN	Environmental Services Network, NW
FFS	Focused Feasibility Study
HCI	Hart Crowser, Inc.
MTCA	Model Toxics Control Act
QA/QC	Quality Assurance/Quality Control
RAR	Remedial Action Report
SMP	Stormwater Management Plan
TEQ	Toxics Equivalents
UST	Underground Storage Tank
WBM	West Bay marina
WBMA	West Bay Marina Association

1.0 INTRODUCTION

This Remedial Action Report (RAR) describes the remedial activities associated with excavation, disposal, and capping-in-place of dioxin/furan contaminated soil at the West Bay Marina. West Bay Marina (WBM) is located at 2100 West Bay Drive NW, Olympia, Washington, on the western shore of Budd Inlet in Olympia, Washington, and is herein referred to as "the Property". The affected northern portion of the Property is the area of concern (AOC) and is the subject of this report, and is herein referred to as "the Site". A Vicinity Map is provided as Figure 1. A Site Plan showing the Site in the northern portion of the Property is provided as Figure 2.

Agreed Order (AO) No. DE 11100 (Attachment A) was signed by the Washington State Department of Ecology (Ecology), and West Bay Marina Associates (WBMA), taking effect on July 2, 2015. This AO presented a process for excavation and removal for off-site disposal of dioxin/furan contaminated soil previously identified in the northern portion of the WBM property.

A *Final Cleanup Action Plan* for the Site completed by Ecology, dated September 25, 2014 (Ecology 2014), defined a remedial excavation of the Site to a depth of three (3) feet below ground surface (bgs). This target depth was based on data reported in a *Draft Final Focused Feasibility Study* (FFS), completed by Hart Crowser, Inc (HCI), dated July 11, 2014 (HCI 2014). The FFS recommended a three-foot-deep excavation depth based on data from their two surface (0-3 inches) samples collected in 2011, two Anchor QEA samples (likely collected from the surface to one-foot bgs) in 2010, and samples collected in 2012 on the adjacent property to the north which contained dioxins/furans in excess of Ecology cleanup level at depths between one foot and two feet bgs. The FFS relied primarily on the data from the adjacent property to the north in designing the remedial excavation in the AOC to a depth of three (3) feet bgs.

Due to the very limited data regarding the actual lateral and vertical extent of dioxin contamination, additional soil sampling and analyses were performed in advance of the remedial excavation. These data, collected in 2016, allowed for finalizing the perimeter and depth of the remedial excavation, while eliminating the need for analysis of additional confirmation samples to guide the extents of the excavation.

Based on the data obtained, and in conjunction with the Ecology Site Manager, an excavation plan and stormwater management plan were prepared. The remediation performed at the Site and presented in this report included two (2) major components:

- Excavation of dioxin contaminated soil from the Site for offsite disposal, and backfill with clean fill;
    - Excavation perimeter was defined as the accessible regions to the northwest, north, and east of the WBM office and shop structure in the northern portion of the Property;
    - Excavation depth was defined as two (2) feet bgs;
    - Excavated region was restored with clean imported topsoil.

- Completion of asphalt (and concrete) caps in the northern regions of the Site that were not excavated.

Since this cleanup action, consisting of partial excavation and capping, did not remove all dioxin contaminated soil from the Site, an *Environmental Covenant* (EC) has been prepared for approval by Ecology and recorded with Thurston County. The EC applies to an approximate area of 8,560 square feet in the northeastern corner of the WBM Property, and defines ongoing institutional controls, activity use limitations (AULs), and disclosure practices, in order to protect the health of residents, employees, and visitors to the WBM Property. A draft version of the EC is included as Attachment E.

This report includes sections detailing the Site characterization, as well as the remedial activities and Site restoration.

1.1 Property History and Description

West Bay Marina is located at 2100 West Bay Drive NW, Olympia, Washington, on the western shore of Budd Inlet in Olympia, Washington (a Site Plan is provided as Figure 2). The Site is bordered on the east by Budd Inlet of Puget Sound. Other adjacent properties include a vacant commercial site to the south, Dunlap Log Storage (a log sorting operation and storage facility) to the north, and a steep raised hillside and residential properties to the west. WBM is accessed on the west by West Bay Drive NW. The uplands marina property, Thurston County Parcel 09750018002, has been owned exclusively by WBMA since 1990. The parcel encompasses 3.01 acres and is used primarily for parking and storage. The parcel was first developed by the Buchanan Lumber Company in 1919, and was used for timber related activities through 1966, including a sawmill, veneer plant, and stud mill. A hog fuel burner reportedly occupied the northern portion of the parcel, and has been considered to be a potential source for dioxin contamination at the Site (HCI 2014).

The marina consists of structures on piles and 400 boat slips. The slips range in size from 20 to 70 feet and provide moorage for vessels up to 70 feet in length, including some live-aboard occupancy. Minor boat maintenance and repair activities occur on the Site; however, boat bottom work and major maintenance is referred to other boat yards. A small wooden building located in the northeastern corner of the property serves as the office. A larger, two-story wooden structure serves as the location for a restaurant operation (Tugboat Annie's). The restaurant is located mostly on the DNR Aquatic Lease and is an approved improvement.

2.0 SITE CHARACTERIZATION

Data regarding dioxin contamination in soil at the Site were initially obtained by previous environmental consultants in 2010 and 2011, and were confirmed and further delineated by Stemen Environmental/Kane Environmental in 2016.

2.1 Historical Data

Previous environmental reports were reviewed prior to design of the additional investigations and cleanup action. Significant investigations and remedial actions have been performed at WBM, including underground storage tank (UST) related activities and an evaluation of the condition of intertidal sediments. Two previous sampling events were performed relating specifically to the dioxin/furan contamination in the northern portion of the Property. These events were included in reports titled *Remedial Investigation Westbay Marina 2100 West Bay Drive NW Olympia, Washington*, prepared by Hart Crowser, Inc., dated June 30, 2011 (HCI 2011), and *Remedial Investigation Addendum Westbay Marina 2100 West Bay Drive NW Olympia, Washington* prepared by Hart Crowser, Inc., dated May 31, 2012 (HCI 2012).

In January 2010, Anchor QEA, collected samples from the northern portion of the Property and reported concentrations of dioxins/furans of 61.9 ng/kg and 14.2 ng/kg in near surface samples WB017 and WB018, respectively (Figure 3). (Note; all dioxin/furan concentrations reported are based on ½ the detection limit for non-detected constituents, and are reported as total toxics equivalents (TEQ).) These 2010 data exceeded the Model Toxics Control Act (MTCA) Method B cleanup level for dioxins/furans, which was 11 ng/kg TEQ at that time.

In March 2011, Hart Crowser, Inc. collected near surface soil samples (top 3 inches of soil) from four locations in the northern portion of the Property (Figure 3). While dioxins/furans were detected in all four soil samples, the western two results were below the MTCA Method B cleanup level of 11 ng/kg TEQ. The eastern two samples, HC-WB-US-001 and HC-WB-US-002, contained dioxin/furan TEQ results at 87.58 ng/kg and 21.51 ng/kg, respectively, far exceeding the applicable cleanup level.

In February 2012, Hart Crowser, Inc. collected seven samples from locations on the adjacent property to the north. Five (5) samples contained dioxin/furan concentrations exceeding the MTCA Method B Cleanup Level (CUL) at depths to a maximum of two (2) feet bgs.

Dioxin/furan sampling results from the Anchor QEA 2010 sampling and the Hart Crowser, Inc. 2011 sampling events are included as TABLE 1.

All referenced reports are located on the Ecology website:
https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=6873.

2.2 Data Obtained in 2016

In preparation to complete the cleanup action in compliance with the Agreed Order, some modification to the *Final Cleanup Action Plan West Bay Marina Olympia, Washington* prepared by Ecology, dated September 25, 2014, were implemented with approval of the Ecology Site manager. Due to the standard turn-around-time for dioxin/furan analysis of approximately three weeks, and the very high expense for each analysis of approximately $750, further site characterization in order to further delineate the extent of the dioxin/furan contaminated soil and define the boundaries and depth of the planned remedial excavation was conducted prior to the excavation operation.

A limited access direct push (DP) probe was provided by Environmental Service Network, NW (ESN) to collect soil samples in the northern portion of the Property on June 24, 2016. Thirteen borings were completed to a maximum depth of three (3) feet bgs (S1 – S13). Four (4) additional borings were completed on October 28, 2016 using a truck mounted DP drill rig (S14 – S17).

Completion of these investigatory borings and select sample analyses served to direct the scope of the subsequent remedial excavation and capping, and eliminated the need for confirmation sampling and analysis prior to excavation backfill (Section 3.0).

2.2.1 Soil Sample Collection

Soil samples from the DP borings were collected in acetate sample liners that were placed inside the DP sampling rod. Each soil sample was logged by a Kane Environmental environmental engineer for physical properties such as grain size, color, and moisture. Samples were homogenized in decontaminated stainless-steel bowls using decontaminated stainless-steel spoons. A portion was then placed into pre-cleaned laboratory prepared glass jars with Teflon lids. Soil sampling nomenclature identified each soil sample with a *"S"* for samples from the soil boring. Following this designation was a number which corresponded to that particular boring. The last number designated the sample depth. For example, soil sample *"S1:1-2"* was the first soil boring and the sample was a composite of soil collected between one (1) foot and two (2) feet bgs.

The soil samples were immediately placed into ice-filled coolers and delivered to Analytical Resources, Inc. (ARI), in Tukwila, Washington under standard chain-of-custody procedures.

2.2.3 QA/QC

Quality assurance (QA) and quality control (QC) measures were implemented during both the sampling and the analysis processes. Kane Environmental prepared the following QA samples in the field at the time of sample collection:

Duplicates: Kane Environmental collected one blind duplicate sample for every 20 samples collected. The blind duplicates were prepared from homogenized sample soil, and submitted to the laboratory with sample names designed to not indicate which soil sample they came from. One sample duplicate was

analyzed from the sampling batch collected on June 24, 2016, and one sample duplicate was analyzed from the sampling batch collected on October 28, 2016.

Field Equipment Blanks: Field equipment blanks were collected by wiping DP sampling equipment, specifically the sampler cutting shoe, with one sheet of *Ghost Wipe* (provided by the laboratory), and placing it into a precleaned glad jar. The wipes were then analyzed by the laboratory similar to soil samples.

Wipe Blank: One unused *Ghost Wipe* was analyzed for dioxins/furans similar to a soil sample.

2.2.4 Analytical Methods

Select soil samples from DP borings were analyzed for the following:

- Dioxins/Furans by EPA Method 1613B.

All analyses were performed in accordance with ARI's in-house Quality Assurance/Quality Control Plans. Sample analyses were performed in compliance with EPA analytical methods and Ecology guidelines. Samples were analyzed within specified holding times. All detection limits were within method requirements and no factors appeared to adversely affect data quality.

2.2.5 Results

Due to time and cost constraints presented in Section 2.2 above, not all soil samples collected were analyzed for dioxins/furans. Samples were chosen for analysis in order to gain a general delineation of the areal and vertical extent of dioxin/furan contamination, in order to plan and execute the subsequent remedial action procedures. Some soils borings completed in October 2016 had no soil analyses performed.

Data (displayed in Figure 3 and Table 2) show that near surface soils in the northern portion of the WBM Property were confirmed to be contaminated with dioxins, reported at total 2,3,7,8-TCDD equivalence, at concentrations exceeding the MTCA Method B CUL of 11 ng/kg (equivalent to parts-per trillion or ppt). locations S1 and S3 contained dioxin exceedances in soil between the ground surface and 2 feet bgs, while underlying soil collected between 2 and 3 feet bgs contained dioxins/furans below the 11 ppt CUL. However, soil samples collected from the eastern extent of the Site south of S1 and S2 (S7, S8, S9, and S10), contained the highest concentrations of dioxins/furans in near surface soils (149 ppt at location S10), with underlying soil remaining contaminated (84 ppt in a composite sample between 2 and 3 feet bgs at location S8). Results from the western region, showed no dioxin/furan exceedances in near surface soils at locations S6, S12, or S13, while slight exceedances were encountered down to 2-3 feet bgs at location S5.

Further investigation to the south showed that near surface dioxin/furan contamination extended variably to asphalt paved regions south of the office structure. Location S14 was in exceedance of 11 ppt, while dioxin/furan concentrations did not exceed 11 ppt at location S15.

3.0 REMEDIAL ACTIVITIES

This section addresses the excavation of dioxin contaminated soil for offsite disposal, and the placement of clean backfill, and asphalt and concrete caps to prevent contact with underlying dioxin contaminated soil remaining on the Property. The extents and depth of the remedial excavation was determined based on historic and current soil data, the accessibility of the contaminated soil for excavation, including the proximity to the shoreline and the bank of the creek, and the appropriateness and effectiveness of an asphalt cap. The boundary of the remedial excavation, and the asphalt and concrete caps, were approved by the Ecology Site Manager prior to initiating the remedial excavation. Photographs of Site preparation, excavation, and restoration activities are provided in Attachment B.

3.1 Remedial Excavation

Excavation of dioxin contaminated soil in the northern portion of the Property is presented below. The remedial excavation plan, including stormwater management best management practices (BMPs), is graphically depicted in Figure 4, and included the accessible vegetated area to the east, north, and northwest of the office/shop structure in the northern extent of the Property. The excavation depth was determined to be two (2) feet bgs.

3.1.1 Stormwater Management

A Stormwater Management Plan (SMP) was compiled and submitted to Ecology for approval prior to initiating any excavation activities on the Site. The management of any potential stormwater was to assure the following:

- No accumulating stormwater contacting excavated soil or exposed underlying soil may enter the Puget Sound, neither directly, nor by way of the creek to the north of the Site.
- Similarly, no soil, neither contaminated soil being excavated nor clean backfill material, may enter Puget Sound.

Excavation and backfill procedures, and stormwater BMPs, were tailored to the Site to assure compliance with the SMP. Figure 4 displays the SMP, including BMPs which were installed prior to initiating the excavation.

Mr. Neil Faulkenburg, the General Manager of West Bay Marina, obtained a Stormwater General Permit (Number 303228), and was responsible for managing compliance with the permit during remedial activities.

3.1.2 Excavation

Soil excavation was performed by Mr. Douglas Pettapiece, of Pacific Northwest Excavating, using a small skid-steer excavator. A large vacuum truck was provided by Drain Pro, Inc., and was used to transport loosened soil from the excavation into the vacuum truck. The vacuum truck was periodically emptied in the stockpile area. This technique was mostly used in the eastern and northeastern portions of the excavation.

As the excavation was extended to the west (in the region where the trees had been removed), the vacuum method was less effective (due to increased presence of roots and increasingly damp soils), and the proximity to the stockpile area allowed for soil transport by front-end loader.

The area of excavation (Figure 3) included approximately 1,025 square feet of the northern and northeastern extent of the Property to an approximate depth between 2 and 2.5 feet bgs. Deeper excavation was not possible in all areas in order to maintain the integrity of the northern and eastern shorelines, and to maintain the integrity of the foundation of the adjacent structure.

When encountered during the excavation process, large cobbles and boulders were segregated from the waste soil and were placed back in the open excavation prior to backfill (see Attachment B, Photographs 2, 4, and 6).

3.1.3 Stockpile

The covered area southwest of the excavation area (See Figure 4) was used to stockpile contaminated soil prior to trucking to the disposal facility. The stockpile was placed on plastic tarps, and was covered by plastic at night. After removal of all excavated soil for offsite disposal, the stockpile area was scraped with the loader bucked to ensure removal of any excavated soil that may have contacted the ground surface.

3.1.4 Disposal

A total of seven (7) truckloads of contaminated soil and contaminated disposable equipment were transferred from the Site to the Cowlitz County Landfill in Castle Rock, Washington. Disposal tickets and a summary table are included in Attachment C. A total of 89.94 tons of material (soil and tree roots) was excavated and disposed of offsite.

All hoses used in association with vacuum truck operations during the on-site soil removal activities were properly transported to an off-site disposal facility with the adversely impacted soils. The vacuum truck holding compartment was properly cleaned/decontaminated off-site at the Drain Pro operations facility, and decontamination water was disposed of according to their standard operating procedures.

3.1.5 Backfill

Topsoil was chosen to backfill the entire excavation, rather than using gravelly fill underlying a layer of topsoil. The topsoil backfill was delivered and stockpiled onsite. The topsoil backfill was placed in the excavated area using a conveyor belt delivery system provided by Ralph's Concrete Pumping, Inc. Topsoil was loaded into a hopper using a front-end loader, and was transported to the excavation on the high-boom conveyor. The delivery down tube was lowered to the maximum extent possible to eliminate dust and blowing soil.

Following placement of topsoil, the excavated area was hydro-seeded to promote growth of new grass, and irrigation of the newly planted grass is ongoing. The silt fencing and straw waddles placed along the creek and the shoreline will remain in place at least until the vegetation is well established.

3.2 Asphalt and Concrete Cap

Following backfill and restoration of the excavated area, the entire northern portion of the Property, except for the excavated area and the adjacent planted area to the west, was paved with asphalt to effectively cap in place all remaining dioxin contaminated soil. The newly paved area includes the northwestern portion of the Property which formerly included the metal pole tarped structure, and all areas south of the excavated area excluding the building locations. The Asphalt cap extended to the south to meet the previously paved portions of the parking lot, and was installed to incorporate the existing stormwater catch basin.

The region at the southeast corner of the office and workshop structure, south of the excavated area was capped with concrete. This region was the location of the most contaminated soil encountered during the site investigation (S10), but was unable to be effectively excavated due to the presence of significant buried electrical supply infrastructure. The added concrete and asphalt caps will remain in place to protect occupants of, and visitors to the Site, from exposure to underlying contaminated soil.

4.0 CONCLUSION

After further soil sampling and testing in 2016, the presence of dioxin/furan contaminated soil on the West Bay Marina Property was addressed in 2017 through a two-step process. Surficial contaminated soil was removed for offsite disposal (down to between 2 and 2.5 feet bgs) in the northern extent of the Property and topsoil backfill was placed and planted with grass. A total of 89.94 tons of material (soil and tree roots) was excavated and disposed of offsite. Dioxin/furan contaminated soil identified in regions to the south and southeast was effectively capped by placement of asphalt and concrete to prevent exposure to underlying soils by residents, visitors, and workers at the WBM Property.

An *Environmental Covenant* (EC) has been prepared to address the maintenance of the capped areas to prevent exposure, as well as to limit uses of the Site and stipulate other Site management practices. The EC applies to an approximate area of 8,560 square feet in the northeastern corner of the WBM Property, and defines ongoing institutional controls, activity use limitations (AULs), and disclosure practices, in order to protect the health of residents, employees, and visitors to the WBM Property. The EC is included as Attachment E.

5.0 REFERENCES

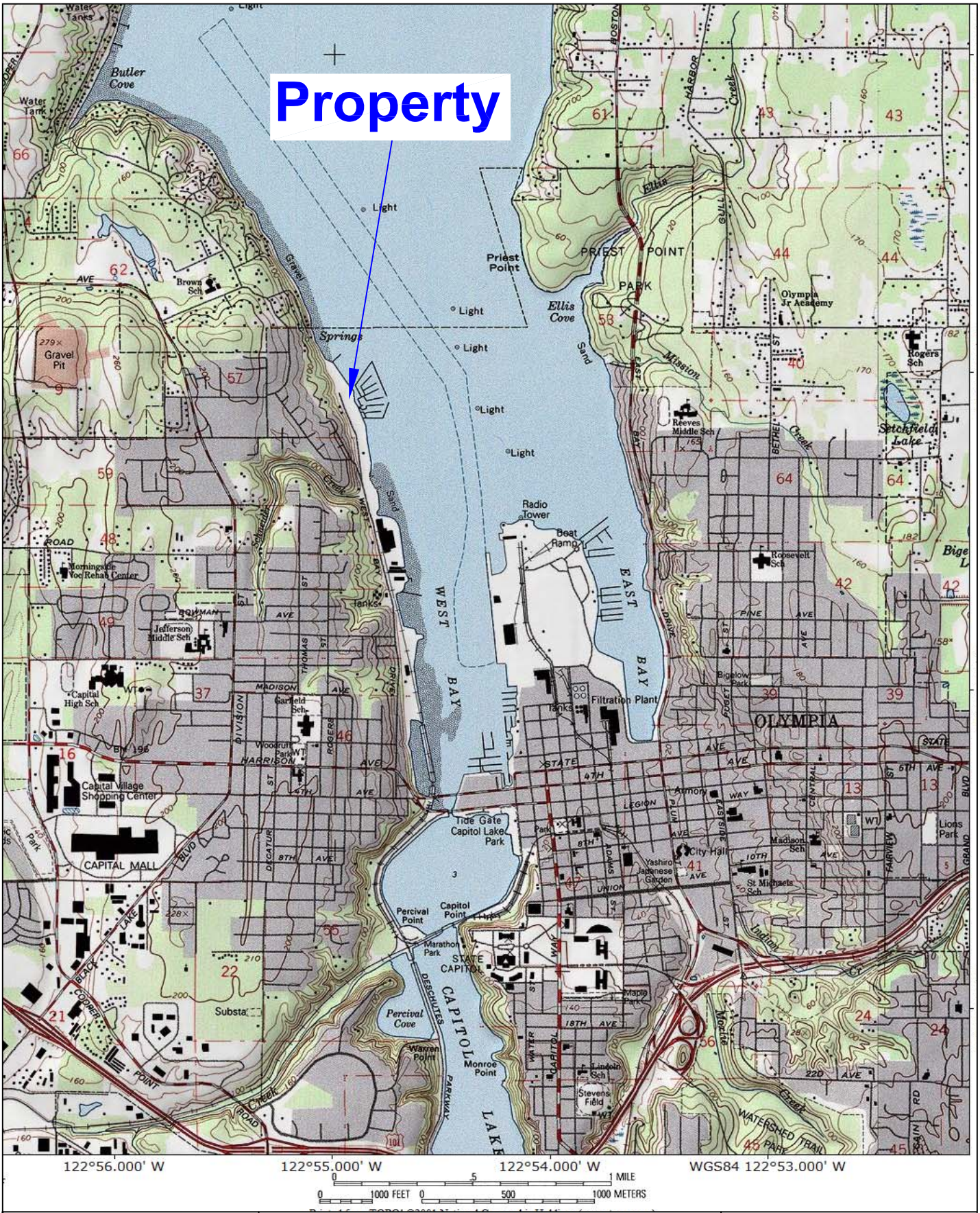
Hart Crowser, Inc., 2011, *Remedial Investigation, Westbay Marina, 2100 West Bay Drive NE, Olympia, WA.,* Prepared for the Washington State Department of Ecology, June 30, 2011.

Hart Crowser, Inc., 2012, *Remedial Investigation Addendum, Westbay Marina, 2100 West Bay Drive NE, Olympia, WA.,* Prepared for the Washington State Department of Ecology, May 31, 2012.

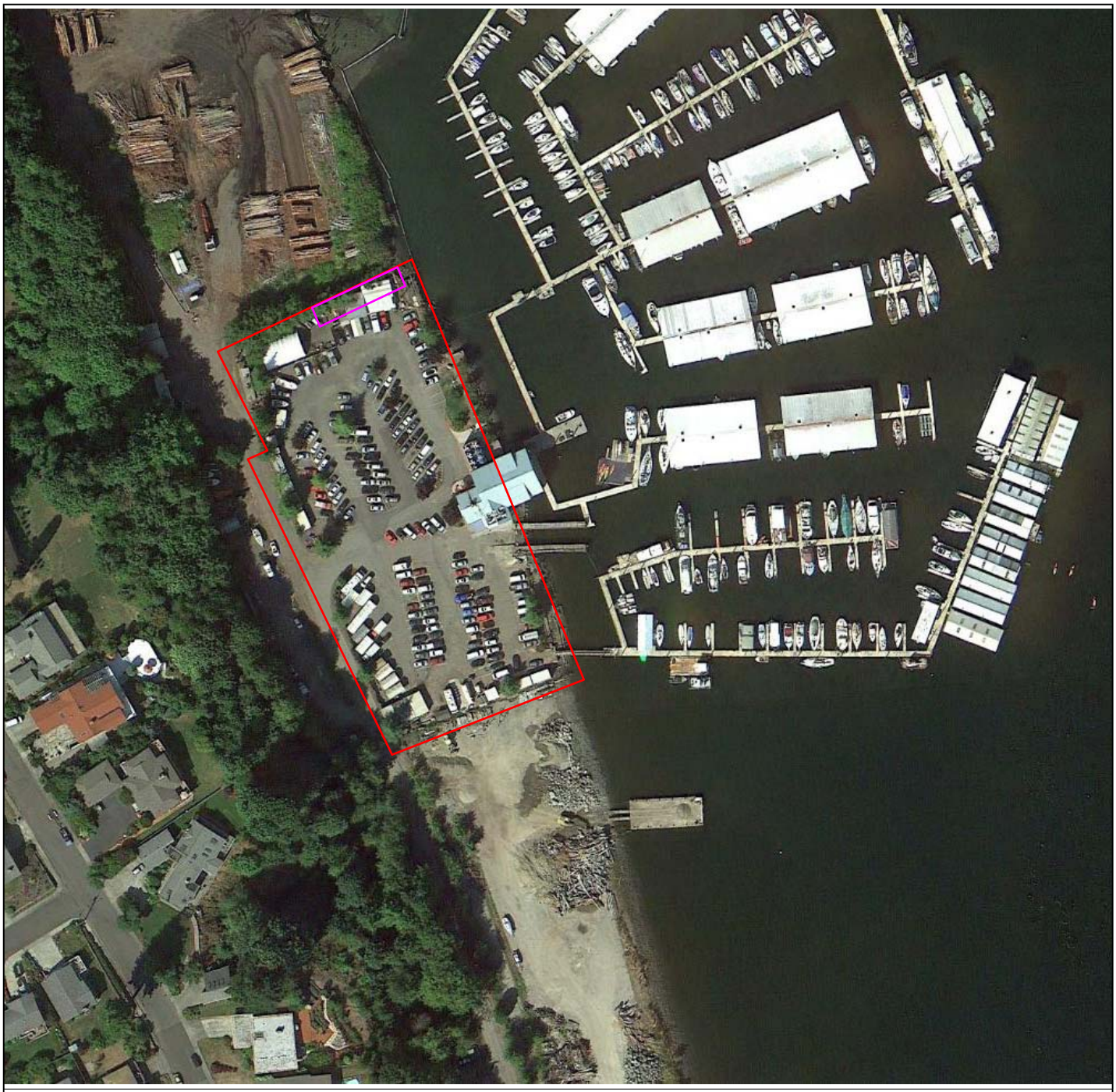
Hart Crowser, Inc., 2014, *Draft Final Focused Feasibility Study, West Bay Marina, 2100 West Bay Drive NE, Olympia, WA.,* Prepared for the Washington State Department of Ecology, July 11, 2014.

Washington State Department of Ecology, 2014, *Final Cleanup Action Plan, West Bay Marina, Olympia, Washington,* September 25, 2014.

FIGURES



Stemen Environmental KANE ENVIRONMENTAL INC	West Bay Marina 2100 West Bay Drive NW Olympia, Washington	Figure 1 Vicinity Map



LEGEND

Approximate Property Boundary

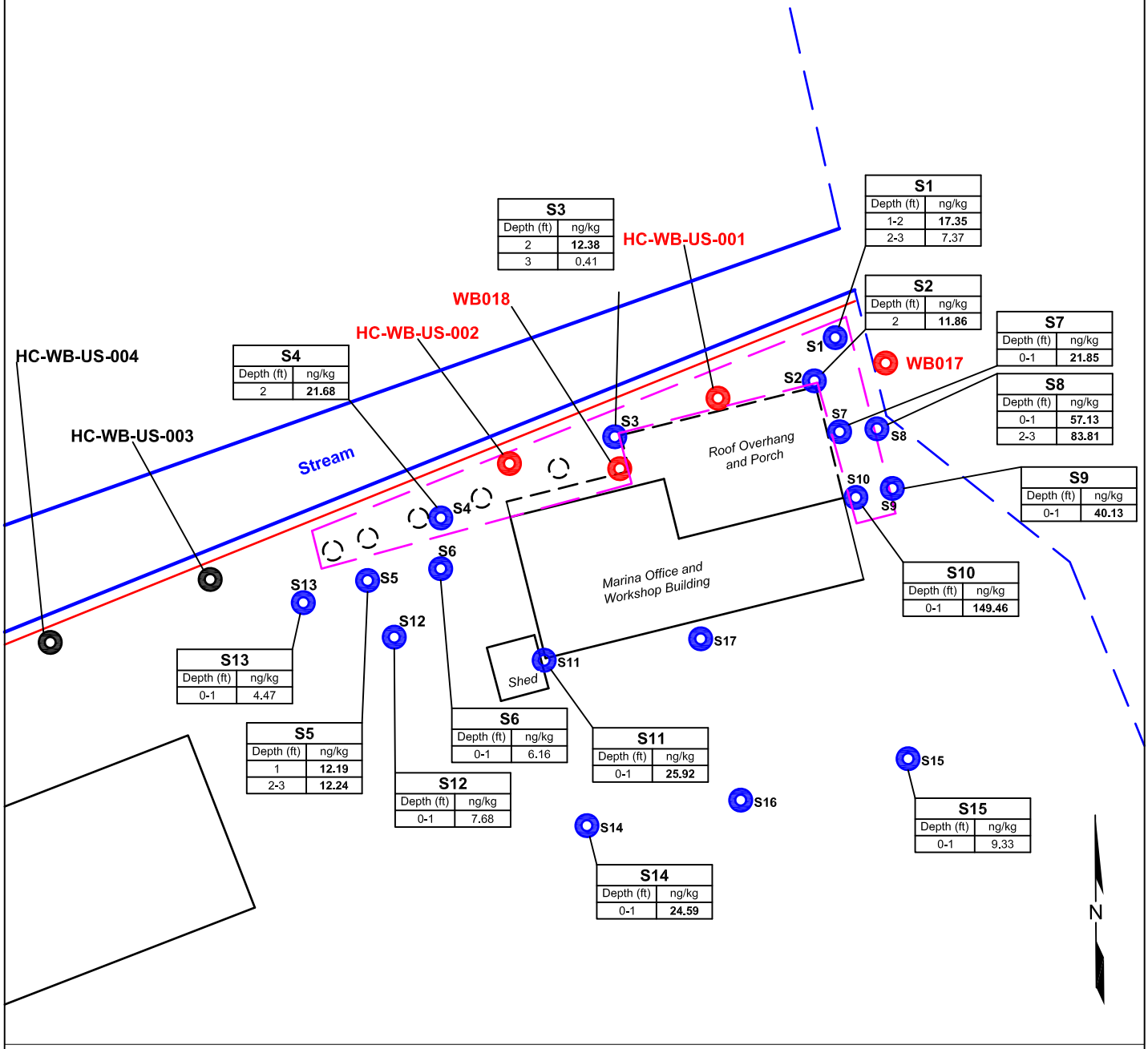
Approximate Region Identified with Dioxin/Furan Contamination in Soil

N

0 150 300

Approximate Scale in Feet

Stemen Environmental KANE ENVIRONMENTAL INC	West Bay Marina 2100 West Bay Drive NW Olympia, Washington	Figure 2 Site Plan



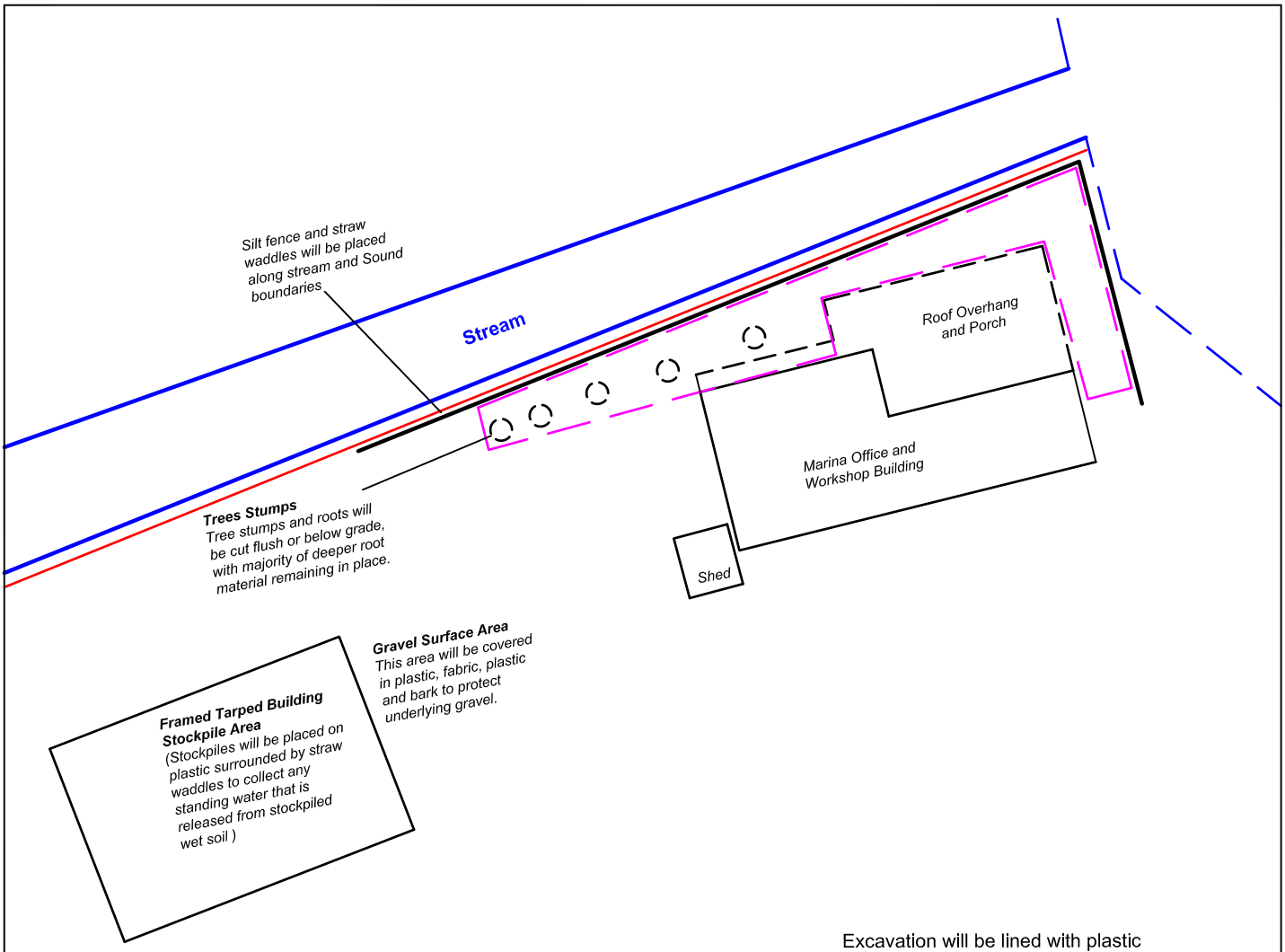
LEGEND

- Approximate Northern Property Boundary
- Approximate Location of Northern Stream Banks
- Approximate Eastern Shoreline Boundary
- Approximate Boundary of Remedial Excavation
- Tree Stumps
- Previously Sampled Locations, Dioxin/Furan Exceedances in Red (Results in Table 1)
- 2016 Direct Push Sampling Locations, Dioxin/Furan Data Reported in Parts-Per-Trillion (ppt) (Results in Bold Type Exceed MTCA CUL of 11 ng/kg)

0 25 50

Approximate Scale in Feet

Stemen Environmental KANE ENVIRONMENTAL INC	West Bay Marina 2100 West Bay Drive NW Olympia, Washington	Figure 3 Site Plan with Soil Sampling Locations, and Dioxin/Furan Results



Soils surrounding tree roots will be removed by vacuum excavation, and soils further east will be removed using a small excavator.

Excavation project will be scheduled to proceed during a forecasted dry period in June or July 2017. However, contingencies will be in place in case of rainfall during the excavation period.

Excavation will be lined with plastic at night to allowing any rainwater to collect Any water collecting in the lined excavation overnight will be pumped and containerized until turbidity testing and discharged to sewer, or transported for offsite disposal.

No stormwater that comes in contact with excavated contaminated material will be allowed to encounter uncontaminated soils, or runoff into water bodies.

N

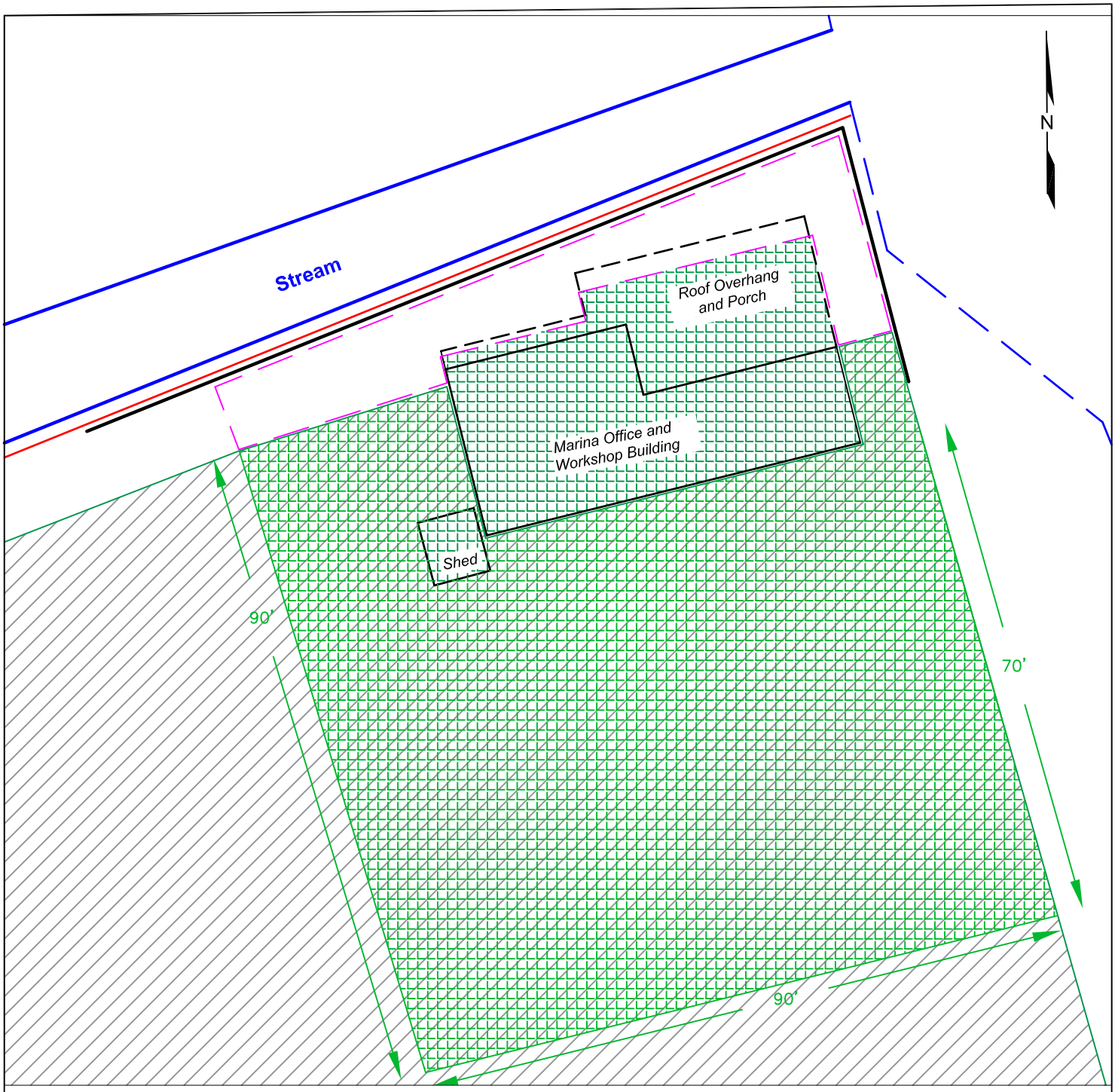
LEGEND

- Approximate Northern Property Boundary
- Approximate Location of Northern Stream Banks
- Approximate Boundary of Remedial Excavation
- Tree Stumps
- Approximate Eastern Shoreline Boundary
- Silt Fence and Straw Waddles: To be placed along the northern property boundary to protect the creek to the north, and along the eastern shoreline to protect from runoff into the Sound.

0 25 50

Approximate Scale in Feet

Stemen Environmental KANE ENVIRONMENTAL INC	West Bay Marina 2100 West Bay Drive NW Olympia, Washington	Figure 4 Site Plan with Excavation Plan, and Stormwater BMPs



LEGEND

- Northern Property Boundary
- Location of Streambanks
- Boundary of Remedial Excavation (Hydroseeded with Grass)
- Regions of Asphalt and Concrete Cap
- Region of Property Defined Under Environmental Covenant Control
- Buildings
- Areas Covered by Roof Overhangs
- Eastern Shoreline Boundary
- Silt Fence and Straw Waddles (Stormwater BMPs)

0 20 40

Scale in Feet

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KANE ENVIRONMENTAL INC

West Bay Marina
2100 West Bay Drive NW
Olympia, Washington

Figure 5
Site Plan Detail
Following
Remedial Excavation

TABLES

Anchor QEA, 2010

Table 1
Soil Results

	Sample ID:	MTCA Method B Direct Contact, Unrestricted Land Use Soil	MTCA Method C, Direct Contact, Unrestricted Land Use Soil	MTCA Method A Unrestricted Land Use Soil	WB-013-SO-100107	WB-014-SO-100107	WB-015-SO-100107	WB-016-SO-090819	WB-017-SO-100107	WB-018-SO-100107
	Sample Date:				1/7/2010	1/7/2010	1/7/2010	8/19/2009	1/7/2010	1/7/2010
	Sample Type:				N	N	N	N	N	N
Metals (mg/kg)										
	Copper	3000			**113**	**1360**	**76.6**	--	--	--
Dioxin Furans (ng/kg)										
	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)				--	--	--	--	**1.73**	1 U
	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)				--	--	--	--	**11.5**	5 U
	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)				--	--	--	--	**24.4**	5 U
	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)				--	--	--	--	**76.1**	**15.9**
	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)				--	--	--	--	**43.2**	**7.25**
	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)				--	--	--	--	**1650**	**363**
	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)				--	--	--	--	**9610 J**	**3000**
	2,3,7,8-Tetrachlorodibenzofuran (TCDF)				--	--	--	--	**11.2**	**2.27**
	1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)				--	--	--	--	**15.4**	5 U
	2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)				--	--	--	--	**14.9**	5 U
	1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)				--	--	--	--	**28.9**	**6.46**
	1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)				--	--	--	--	**15.9 J**	5 U
	1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)				--	--	--	--	**5.51**	5 U
	2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)				--	--	--	--	**16.4**	**7.83**
	1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)				--	--	--	--	**202**	**106**
	1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)				--	--	--	--	**14.2**	**6.21**
	1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)				--	--	--	--	**211**	**131**
	Total Tetrachlorodibenzo-p-dioxin (TCDD)				--	--	--	--	**66.6**	**11.3**
	Total Pentachlorodibenzo-p-dioxin (PeCDD)				--	--	--	--	**137 J**	**15.5**
	Total Hexachlorodibenzo-p-dioxin (HxCDD)				--	--	--	--	**631**	**111**
	Total Heptachlorodibenzo-p-dioxin (HpCDD)				--	--	--	--	**3400**	**798**
	Total Tetrachlorodibenzofuran (TCDF)				--	--	--	--	**127**	**44.9**
	Total Pentachlorodibenzofuran (PeCDF)				--	--	--	--	**178 J**	**61.8 J**
	Total Hexachlorodibenzofuran (HxCDF)				--	--	--	--	**365 J**	**150**
	Total Heptachlorodibenzofuran (HpCDF)				--	--	--	--	**542**	**313**
	Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)		1500		--	--	--	--	**61.9**	**9.66**
	Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)				--	--	--	--	**61.9**	**14.2**
Total Petroleum Hydrocarbons (mg/kg)										
	Diesel Range Hydrocarbons			2000	--	--	--	**35**	--	--
	Motor Oil Range			2000	--	--	--	**250**	--	--

Notes:
Bold = Detected result
J = Estimated value
U = Compound analyzed, but not detected above detection limit
N= Normal field sample
Toxicity Equivalency (TEQ) values as of 2005, World Health Organization.

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Table 2 - Analytical Results and TCDD TEQs for Upland Soil Samples

Sample ID	MTCA	HC-WB-US-001	HC-WB-US-002	HC-WB-US-003	HC-WB-US-004
Sampling Date	Method B	3/24/2011	3/24/2011	3/24/2011	3/24/2011
SDG	Criteria	SO75	SO75	SO75	SO75
Conventionals in %					
Total Solids		45.4	74.9	74.1	72
Dioxins in pg/g					
2,3,7,8-TCDD		1.03 UK	0.549 UK	0.201 UK	0.285 UK
1,2,3,7,8-PeCDD		10.9	2.01 T	1.64 T	1.48 T
1,2,3,4,7,8-HxCDD		19.3	2.77 T	2.2 T	2.19 T
1,2,3,6,7,8-HxCDD		120	31.9	8.1	8.6
1,2,3,7,8,9-HxCDD		42.9	7.93	5.38	4.99
1,2,3,4,6,7,8-HpCDD		2910	654	142	199
OCDD		17800	3970	1050	1380
2,3,7,8-TCDF		7.36	0.974 T	0.491 T	0.631 T
1,2,3,7,8-PeCDF		9.72	1.51 T	0.543 T	0.496 T
2,3,4,7,8-PeCDF		9.66	1.64 T	0.533 T	0.612 T
1,2,3,6,7,8-HxCDF		27.7	4.24 T	1.65 T	1.38 T
1,2,3,7,8,9-HxCDF		6.87	2.71 T	0.376 T	0.383 UK
1,2,3,4,7,8-HxCDF		25.9	6.12	1.13 T	1.59 T
2,3,4,6,7,8-HxCDF		36.4	7.11	1.94 T	1.89 T
1,2,3,4,6,7,8-HpCDF		852	431	27.4	59.3
1,2,3,4,7,8,9-HpCDF		35.8	7.83	1.41 T	3.15 T
OCDF		3370	656	80.8	291
Total TCDD		39	15.8	3.68	4.8
Total PeCDD		113	9.88	10.4	12.1
Total HxCDD		776	324	52.3	54.4
Total HpCDD		6540	1170	284	378
Total TCDF		129	15.9	10.6	13.1
Total PeCDF		223	36.1	12.4	13.5
Total HxCDF		943	249	35.5	51.3
Total HpCDF		2830	962	75.4	218
TEQ (Detects only)	11	87.06	21.24	5.99	6.94
TEQ (1/2 ND)	11	87.58	21.51	6.09	7.08

Notes:
Boxed value exceeds MTCA Method B unrestricted use or direct contact criteria
U = Not detected at the reporting limit indicated.
K = Ion ratios do not meet identification criteria acceptance limits for positive identification
T = Value is between the MDL and MRL

Table 2
Summary of Dioxins and Furans in Soil by EPA Method 1613B
West Bay Marina
2100 West Bay Drive Southwest
Olympia, WA

		S1:1-2 (6/24/2016)			S1:2-3 (6/24/2016)			S2:2 (6/24/2016)			S3:2 (6/24/2016)		
Chemical	TEF	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)
2,3,7,8-TCDF	0.1	3.33		0.333	1.17		0.117	6.36		0.636	3.32		0.332
2,3,7,8-TCDD	1	0.772	EMPC, J	0.772	0.338	EMPC, J	0.338	1.57		1.57	0.613	EMPC, J	0.613
1,2,3,7,8-PeCDF	0.03	4.23	B	0.1269	1.37		0.0411	4.36	B	0.1308	3.14	B	0.0942
2,3,4,7,8-PeCDF	0.3	3.75	B	1.125	1.41		0.423	3.36	B	1.008	2.58	B	0.774
1,2,3,7,8-PeCDD	1	4.47		4.47	1.74		1.74	5.93		5.93	3.32		3.32
1,2,3,4,7,8-HxCDF	0.1	5.83		0.583	2.39		0.239	3.44		0.344	5.33		0.533
1,2,3,6,7,8-HxCDF	0.1	3.71		0.371	1.58		0.158	2.66		0.266	3.22		0.322
2,3,4,6,7,8-HxCDF	0.1	4.12		0.412	1.91		0.191	2.51		0.251	3.56		0.356
1,2,3,7,8,9-HxCDF	0.1	2.58	B	0.258	0.913	EMPC, J	0.0913	0.760	EMPC, J, B	0.076	1.20	B	0.12
1,2,3,4,7,8-HxCDD	0.1	5.28		0.528	2.22	EMPC, B	0.222	2.33		0.233	2.96		0.296
1,2,3,6,7,8-HxCDD	0.1	21.4		2.14	9.29	B	0.929	5.37		0.537	12.9		1.29
1,2,3,7,8,9-HxCDD	0.1	10.0	B	1	4.77		0.477	4.57	B	0.457	6.29	B	0.629
1,2,3,4,6,7,8-HpCDF	0.01	54.1	B	0.541	24.1	B	0.241	7.08	B	0.0708	52.8	B	0.528
1,2,3,4,7,8,9-HpCDF	0.01	3.33	EMPC	0.0333	1.28		0.0128	0.871	J	0.00871	3.40		0.034
1,2,3,4,6,7,8-HpCDD	0.01	397	B	3.97	182	B	1.82	30.4	B	0.304	248	B	2.48
OCDF	0.0003	76.5	B	0.02295	36.6	B	0.01098	5.89	B	0.001767	84.8	B	0.02544
OCDD	0.0003	2210	B	0.663	1060	B	0.318	122	B	0.0366	2110	B	0.633
Total (ppt)				**17.35**			**7.37**			**11.86**			**12.38**

		S3:3 (6/24/2016)			S4:2 (6/24/2016)			S5:0-1 (6/24/2016)			S5:2-3 (6/24/2016)		
Chemical	TEF	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)
2,3,7,8-TCDF	0.1	0	U	0	1.58		0.158	3.52		0.352	0	U	0
2,3,7,8-TCDD	1	0	U	0	0.585	EMPC, J	0.585	0.434	EMPC, J	0.434	0	U	0
1,2,3,7,8-PeCDF	0.03	0	U	0	2.1	B	0.063	0.988	J, B	0.02964	0.474	EMPC, J	0.01422
2,3,4,7,8-PeCDF	0.3	0	U	0	2.25	B	0.675	3.70	B	1.11	0	U	0
1,2,3,7,8-PeCDD	1	0	U	0	7.05		7.05	2.35		2.35	2.17		2.17
1,2,3,4,7,8-HxCDF	0.1	0	U	0	3.91		0.391	2.86		0.286	2.34		0.234
1,2,3,6,7,8-HxCDF	0.1	0	U	0	6.06		0.606	2.59		0.259	2.99		0.299
2,3,4,6,7,8-HxCDF	0.1	0	U	0	6.97		0.697	3.60		0.36	3.92		0.392
1,2,3,7,8,9-HxCDF	0.1	0	U	0	1.95	B	0.195	1.44	B	0.144	0.774	EMPC, J	0.0774
1,2,3,4,7,8-HxCDD	0.1	0	U	0	9.50		0.95	3.11		0.311	2.72	B	0.272
1,2,3,6,7,8-HxCDD	0.1	0	U	0	27.6		2.76	13.0		1.3	12.7	B	1.27
1,2,3,7,8,9-HxCDD	0.1	0	U	0	21.1	B	2.11	6.67	B	0.667	5.78		0.578
1,2,3,4,6,7,8-HpCDF	0.01	2.14	B	0.0214	55.5	B	0.555	49.5	B	0.495	75.4	B	0.754
1,2,3,4,7,8,9-HpCDF	0.01	0	U	0	4.08		0.0408	3.24		0.0324	6.68		0.0668
1,2,3,4,6,7,8-HpCDD	0.01	9.84	B	0.0984	409	B	4.09	319	B	3.19	392	B	3.92
OCDF	0.0003	3.15	EMPC, B	0.000945	82.6	B	0.02478	98.5	B	0.02955	209	B	0.0627
OCDD	0.0003	76.8	B	0.02304	2420	B	0.726	2800	B	0.84	7110	E, B	2.133
Total (ppt)				**0.14**			**21.68**			**12.19**			**12.24**

Notes:

Shaded and bold values exceed the MTCA Method B Cleanup Level of 11 ng/kg.
ng/kg = nanograms per kilogram (equivalent to parts per trillion [ppt]).
TEQ = Toxicity Equivalance.
TEF = Toxicity Equivalence Factor.
J = The analyte was positvely identified. The numerical concentration listed is approximately the concentration of the analyte in the sample.
U = This analyte is not detected above the applicable reporting or detection limit.
B = Analyte detected in an associated Method Blank at a concentration greater than one-half of laboratory Reporting Limit or 5% of regulatory limit, or 5% of the analyte concentration in the sample.
EMPC = Estimated Maximum Possible Concentration, defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and/or confirmation ion has singal to noise in excess of 2.5 but does not meet identification criteria".

Table 2
Summary of Dioxins and Furans in Soil by EPA Method 1613B
West Bay Marina
2100 West Bay Drive Southwest
Olympia, WA

		S6:0-1 (6/24/2016)				S7:0-1 (6/24/2016)				S8:0-1 (6/24/2016)				S8:2-3 (6/24/2016)			
Chemical	TEF	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)
2,3,7,8-TCDF	0.1	0.838	J	0.0838	0.0838	6.75		0.675	0.675	35.7		3.57	3.57	267		26.7	26.7
2,3,7,8-TCDD	1	0.307	EMPC, J	0.307	0.307	0.780	EMPC, J	0.78	0.78	1.53	EMPC	1.53	1.53	17.1		17.1	17.1
1,2,3,7,8-PeCDF	0.03	0.826	J, B	0.02478	0.02478	9.85	B	0.2955	0.2955	53.4	B	1.602	1.602	65.0		1.95	1.95
2,3,4,7,8-PeCDF	0.3	0.887	EMPC, J, B	0.2661	0.2661	12.4	B	3.72	3.72	97.5	B	29.25	29.25	48.7		14.61	14.61
1,2,3,7,8-PeCDD	1	1.34		1.34	1.34	5.91		5.91	5.91	6.09		6.09	6.09	11.2		11.2	11.2
1,2,3,4,7,8-HxCDF	0.1	1.80		0.18	0.18	19.4		1.94	1.94	19.9		1.99	1.99	14.0		1.4	1.4
1,2,3,6,7,8-HxCDF	0.1	1.59		0.159	0.159	7.44		0.744	0.744	11.3		1.13	1.13	11.5		1.15	1.15
2,3,4,6,7,8-HxCDF	0.1	2.16		0.216	0.216	5.23		0.523	0.523	10.6		1.06	1.06	8.19		0.819	0.819
1,2,3,7,8,9-HxCDF	0.1	0.798	J, B	0.0798	0.0798	1.57	B	0.157	0.157	6.70	B	0.67	0.67	4.02		0.402	0.402
1,2,3,4,7,8-HxCDD	0.1	1.52		0.152	0.152	5.38		0.538	0.538	6.03		0.603	0.603	31.3	B	3.13	3.13
1,2,3,6,7,8-HxCDD	0.1	6.71		0.671	0.671	16.9		1.69	1.69	23.8		2.38	2.38	13.0	B	1.3	1.3
1,2,3,7,8,9-HxCDD	0.1	3.02	B	0.302	0.302	10.9	B	1.09	1.09	10.9	B	1.09	1.09	7.13		0.713	0.713
1,2,3,4,6,7,8-HpCDF	0.01	30.1	B	0.301	0.301	73.0	B	0.73	0.73	111	B	1.11	1.11	41.7	B	0.417	0.417
1,2,3,4,7,8,9-HpCDF	0.01	1.97		0.0197	0.0197	3.88		0.0388	0.0388	14.7		0.147	0.147	4.75		0.0475	0.0475
1,2,3,4,6,7,8-HpCDD	0.01	160	B	1.6	1.6	253	B	2.53	2.53	423	B	4.23	4.23	239	B	2.39	2.39
OCDF	0.0003	92.7	B	0.02781	0.02781	91.1	B	0.02733	0.02733	164	B	0.0492	0.0492	81.8	B	0.02454	0.02454
OCDD	0.0003	1420	B	0.426	0.426	1540	B	0.462	0.462	2080	B	0.624	0.624	1510	B	0.453	0.453
Total (ppt)				**6.16**	**6.16**			**21.85**	**21.85**			**57.13**	**57.13**			**83.81**	**83.81**

		S9:0-1 (6/24/2016)				S10:0-1 (6/24/2016)				S11:0-1 (6/24/2016)				S12:0-1 (6/24/2016)			
Chemical	TEF	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)
2,3,7,8-TCDF	0.1	5.86		0.586	0.586	42.3		4.23	4.23	2.29		0.229	0.229	1.02		0.102	0.102
2,3,7,8-TCDD	1	0.901	EMPC, J	0.901	0.901	1.75		1.75	1.75	0.781	J	0.781	0.781	0.289	EMPC, J	0.289	0.289
1,2,3,7,8-PeCDF	0.03	4.38		0.1314	0.1314	97.2		2.916	2.916	2.36		0.0708	0.0708	0.841	EMPC, J	0.02523	0.02523
2,3,4,7,8-PeCDF	0.3	19.60		5.88	5.88	92.6		27.78	27.78	2.39	EMPC	0.717	0.717	1.37	EMPC	0.411	0.411
1,2,3,7,8-PeCDD	1	4.89		4.89	4.89	15.7		15.7	15.7	4.23		4.23	4.23	1.65	EMPC	1.65	1.65
1,2,3,4,7,8-HxCDF	0.1	13.6		1.36	1.36	446		44.6	44.6	5.96		0.596	0.596	1.95		0.195	0.195
1,2,3,6,7,8-HxCDF	0.1	5.71		0.571	0.571	146		14.6	14.6	4.57		0.457	0.457	1.76		0.176	0.176
2,3,4,6,7,8-HxCDF	0.1	4.40	EMPC	0.44	0.44	76.5		7.65	7.65	7.27		0.727	0.727	1.69	EMPC	0.169	0.169
1,2,3,7,8,9-HxCDF	0.1	6.21		0.621	0.621	17.5		1.75	1.75	4.08	EMPC	0.408	0.408	0.776	EMPC, J	0.0776	0.0776
1,2,3,4,7,8-HxCDD	0.1	7.99	B	0.799	0.799	15.0	B	1.5	1.5	5.21	B	0.521	0.521	1.90	EMPC, B	0.19	0.19
1,2,3,6,7,8-HxCDD	0.1	36.5	B	3.65	3.65	43.7	B	4.37	4.37	44.6	B	4.46	4.46	8.54	B	0.854	0.854
1,2,3,7,8,9-HxCDD	0.1	11.4		1.14	1.14	28.9		2.89	2.89	12.6		1.26	1.26	4.14		0.414	0.414
1,2,3,4,6,7,8-HpCDF	0.01	116	B	1.16	1.16	1210	B	12.1	12.1	86.4	B	0.864	0.864	28.3	B	0.283	0.283
1,2,3,4,7,8,9-HpCDF	0.01	9.90		0.099	0.099	52.8		0.528	0.528	5.65		0.0565	0.0565	0.993	EMPC, J	0.00993	0.00993
1,2,3,4,6,7,8-HpCDD	0.01	1460	B	14.6	14.6	599	B	5.99	5.99	848	B	8.48	8.48	215	B	2.15	2.15
OCDF	0.0003	291	B	0.0873	0.0873	518	B	0.1554	0.1554	180	B	0.054	0.054	78.6	B	0.02358	0.02358
OCDD	0.0003	10700	E, B	3.21	3.21	3180	B	0.954	0.954	6680	E, B	2.004	2.004	2190	B	0.657	0.657
Total (ppt)				**40.13**	**40.13**			**149.46**	**149.46**			**25.92**	**25.92**			**7.68**	**7.68**

Notes:
ng/kg = nanograms per kilogram (equivalent to parts per trillion [ppt]).
TEQ = Toxicity Equivalance.
TEF = Toxicity Equivalence Factor.
J = The analyte was positvely identified. The numerical concentration listed is approximately the concentration of the analyte in the sample.
U = This analyte is not detected above the applicable reporting or detection limit.
E = The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
B = Analyte detected in an associated Method Blank at a concentration greater than one-half of laboratory Reporting Limit or 5% of regulatory limit, or 5% of the analyte concentration in the sample.
EMPC = Estimated Maximum Possible Concentration, defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and/or confirmation ion has singal to noise in excess of 2.5 but does not meet identification criteria".

Table 2
Summary of Dioxins and Furans in Soil by EPA Method 1613B
West Bay Marina
2100 West Bay Drive Southwest
Olympia, WA

		S13:0-1 (6/24/2016)				S14:0-1 (10/28/2016)				S15:0-1 (10/28/2016)			
Chemical	TEF	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)	Conc. (ng/kg)	Data Flags	TEQ (ng/kg)	TEQ 1/2 (ng/kg)
2,3,7,8-TCDF	0.1	0.483	J	0.0483	0.0483	10.1		1.01	1.01	0.831		0.0831	0.0831
2,3,7,8-TCDD	1	0.451	EMPC, J	0.451	0.451	1.24	EMPC, B	1.24	1.24	0.470	EMPC, J, B	0.47	0.47
1,2,3,7,8-PeCDF	0.03	0.497	J	0.01491	0.01491	10.2		0.306	0.306	0.826	J, B	0.02478	0.02478
2,3,4,7,8-PeCDF	0.3	0.597	EMPC, J	0.1791	0.1791	15.7		4.71	4.71	1.27		0.381	0.381
1,2,3,7,8-PeCDD	1	1.22		1.22	1.22	5.83		5.83	5.83	2.27		2.27	2.27
1,2,3,4,7,8-HxCDF	0.1	0.878	EMPC, J	0.0878	0.0878	15.1		1.51	1.51	3.32		0.332	0.332
1,2,3,6,7,8-HxCDF	0.1	0.869	J	0.0869	0.0869	14.1		1.41	1.41	1.74		0.174	0.174
2,3,4,6,7,8-HxCDF	0.1	1.38		0.138	0.138	15.9	B	1.59	1.59	2.54	B	0.254	0.254
1,2,3,7,8,9-HxCDF	0.1	0	U	0	0.02	3.27	B	0.327	0.327	0.891	J, B	0.0891	0.0891
1,2,3,4,7,8-HxCDD	0.1	0.915	EMPC, J, B	0.0915	0.0915	3.66	B	0.366	0.366	2.50	B	0.25	0.25
1,2,3,6,7,8-HxCDD	0.1	4.12	B	0.412	0.412	12.2	B	1.22	1.22	8.25	B	0.825	0.825
1,2,3,7,8,9-HxCDD	0.1	2.35	EMPC	0.235	0.235	6.79	B	0.679	0.679	6.44	B	0.644	0.644
1,2,3,4,6,7,8-HpCDF	0.01	15.8	B	0.158	0.158	76.0	B	0.76	0.76	41.9	B	0.419	0.419
1,2,3,4,7,8,9-HpCDF	0.01	0.944	EMPC, J	0.00944	0.00944	4.43	B	0.0443	0.0443	1.84	B	0.0184	0.0184
1,2,3,4,6,7,8-HpCDD	0.01	93.1	B	0.931	0.931	273	B	2.73	2.73	248	B	2.48	2.48
OCDF	0.0003	59.7	B	0.01791	0.01791	104	B	0.0312	0.0312	91.9	B	0.02757	0.02757
OCDD	0.0003	1290	B	0.387	0.387	2760	B	0.828	0.828	1970	B	0.591	0.591
Total (ppt)				**4.47**	**4.49**			**24.59**	**24.59**			**9.33**	**9.33**

Notes:
ng/kg = nanograms per kilogram (equivalent to parts per trillion [ppt]).
TEQ = Toxicity Equivalance.
TEF = Toxicity Equivalence Factor.
J = The analyte was positvely identified. The numerical concentration listed is approximately the concentration of the analyte in the sample.
U = This analyte is not detected above the applicable reporting or detection limit.
B = Analyte detected in an associated Method Blank at a concentration greater than one-half of laboratory Reporting Limit or 5% of regulatory limit, or 5% of the analyte concentration in the sample.
EMPC = Estimated Maximum Possible Concentration, defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and/or confirmation ion has singal to noise in excess of 2.5 but does not meet identification criteria".

ATTACHMENT A
AGREED ORDER NO. DE 11100

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

In the Matter of Remedial Action by:	AGREED ORDER
West Bay Marina Associates	No. DE 11100

TO: West Bay Marina Associates
Mr. Neil Falkenburg, Manager
2100 West Bay Drive NW
Olympia, WA 98502

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I. I. INTRODUCTION

The mutual objective of the State of Washington, Department of Ecology (Ecology) and West Bay Marina Associates (WBMA) under this Agreed Order (Order) is to provide for remedial action at a facility where there has been a release or threatened release of hazardous substances. This Order requires WBMA to provide for remedial action at a facility where there has been a release or threatened release of hazardous substances. Ecology believes the actions required by this Order are in the public interest.

II. JURISDICTION

This Agreed Order is issued pursuant to the Model Toxics Control Act (MTCA), RCW 70.105D.050(1).

III. PARTIES BOUND

This Agreed Order shall apply to and be binding upon the Parties to this Order, their successors and assigns. The undersigned representative of each party hereby certifies that he or she is fully authorized to enter into this Order and to execute and legally bind such party to comply with this Order. WBMA agrees to undertake all actions required by the terms and conditions of this Order. No change in ownership or corporate status shall alter WBMA's responsibility under this Order. WBMA shall provide a copy of this Order to all agents, contractors, and subcontractors retained to perform work required by this Order, and shall ensure that all work undertaken by such agents, contractors, and subcontractors complies with this Order.

IV. DEFINITIONS

Unless otherwise specified herein, the definitions set forth in RCW 70.105D and WAC 173-340 shall control the meanings of the terms in this Order.

A. Site: The Site is referred to as West Bay Marina and is generally located at 2100 West Bay Drive NW, Olympia, WA. The Site is defined by the extent of contamination caused by the release of hazardous substances at the Site. The Site is generally described in the Site Diagram (Exhibit A). The Site constitutes a facility under RCW 70.105D.020(8).

B. Parties: Refers to the State of Washington, Department of Ecology and WBMA.

C. Potentially Liable Person (PLP): Refers to WBMA.

D. Agreed Order or Order: Refers to this Order and each of the exhibits to this Order. All exhibits are integral and enforceable parts of this Order. The terms "Agreed Order" or "Order" shall include all exhibits to this Order.

V. FINDINGS OF FACT

Ecology makes the following findings of fact, without any express or implied admissions of such facts by WBMA:

A. On January 13, 1999, WBMA was issued a notice of penalty for owning an Underground Storage Tank (UST) system that was not in compliance with 1998 upgrade requirements.

B. During UST closure activities in 1999, petroleum hydrocarbons were discovered and reported to Ecology. Ecology recognized receipt of this release report by letter mailed to WBMA in April 1999.

C. The UST release was independently characterized by Stemen Environmental at the tanks, dispenser and associated fuel lines. Three USTs were removed, the fuel lines drained and capped, and the concrete anchoring slab was demolished. A total of 675 tons of petroleum contaminated soil was removed and properly treated offsite. Fifty-six tons of concrete and asphalt was removed for disposal/recycling. The work was documented in a report entitled Tank Removal and Independent Remedial Action Report dated August 1999.

D. Due to significant petroleum impacts to soil and the potential for impacts to groundwater and surface water, the site entered the Voluntary Cleanup Program on October 7, 1999. Based on review of the Tank Removal and Independent Remedial Action Report, Ecology issued an opinion letter dated November 29, 1999, requiring groundwater monitoring to determine if petroleum hydrocarbons were present above MTCA Method A cleanup levels.

E. As a result of Ecology's opinion letter, Stemen Environmental installed four groundwater monitoring wells and collected groundwater samples on December 16, 1999.

F. On June 12, 2004, Ecology received a report of a sheen (ERTS#541436) on the surface water from diesel spill at West Bay Marina. The diesel release was unrecoverable.

G. On July 12, 2004, Ecology received a report of a release (ERTS#542054) from a hydraulic trash compactor. Approximately three gallons of hydraulic oil leaked out and migrated to the surface water at the marina. A surface water sheen was boomed off and contained.

H. On April 7, 2006, a Notice of Pending Inactivity Determination Letter was sent to Stemen Environmental providing thirty (30) days to provide a work summary report or other documentation demonstrating that cleanup activities had occurred during the previous twelve (12) months. Ecology did not receive a response to this notice and the site was removed from the Voluntary Cleanup Program on May 9, 2006.

I. On May 29, 2006, Ecology received a report of a release (ERTS#555408) concerning a large sheen in Budd Inlet near West Bay Marina.

J. The December 27, 1999, groundwater investigation report by Stemen Environmental was not received by Ecology until June 6, 2007.

K. The Thurston County Health Department conducted a Site Hazard Assessment to address the 1999 UST removal project. On July 16, 2007, Thurston County Health Department recommended a No Further Action (NFA) for the tank removal project. Ecology's August 23, 2007, Hazardous Sites List Site Register Special Issue confirmed the No Further Action designation for the petroleum hydrocarbon release from the UST system. Other potential areas of concern were not addressed by this determination.

L. Ecology issued Order DE 5272 on April 9, 2008, ("2008 Order"), requiring WBMA to conduct a remedial investigation, feasibility study and a draft cleanup action plan.

M. On February 11, 2009, Ecology approved Anchor Environmental's RI/FS Work Plan for the site.

N. WBMA did not completed work as required by the final RI/FS work plan in accordance with the schedule, or the extension to the schedule granted by Ecology. Ecology extended the deadline for completion of remedial investigation field activities from October 31,

2009, until June 30, 2010, (provided WBMA submitted a revised schedule for remaining activities). *See* Letter from Guy Barrett, Ecology Site Manager, to Ed Berschinski, Anchor Environmental LLC (October 12, 2009). Ecology accepted WBMA's proposed schedule, with completion of remedial investigation field work by June 30, 2010. *See* Letter from Guy Barrett, Ecology Site Manager, to Ed Berschinski, Anchor Environmental LLC (December 1, 2009). This schedule was not met. Ecology determined that insufficient progress was being made in the preparation of the deliverables required by Section VII of the Agreed Order (Work to be Performed), and therefore Ecology completed and issued the final deliverables: the Remedial Investigation Report, the Feasibility Study, and the draft Cleanup Action Plan. *See* Agreed Order No. 5272, Section VII.6; *see also* Letter from Guy Barrett, Ecology Site Manager, to George W. Akers, Montgomery Perdue Blankinship & Austin, PLLC (December 23, 2010).

O. On April 24, 2012, Ecology sent a corrected notice notifying WBMA and other parties of interest of Ecology's intent to lien the subject property of costs incurred during further investigation and remediation of the site.

P. A Remedial Investigation (RI) Addendum on the site was completed by Hart Crowser on May 31, 2012, acting for Ecology. The remedial investigation identified concentrations of dioxin above MTCA cleanup levels.

Q. A Draft Final Focused Feasibility Study (FS) for the site was completed by Hart Crowser on March 28, 2014, acting for Ecology.

R. A Draft Final Cleanup Action Plan (dCAP) for the site was prepared by Ecology on July 11, 2014.

S. The RI Report, FS, dCAP and State Environmental Policy Act (SEPA) review were submitted for public notice from August 7, 2014, through September 8, 2014. Following the public comment period, a Responsiveness Summary addressing all the comments was sent out for public review. The documents were not changed and are considered final.

T. The Cleanup Action Plan for the site was finalized on September 25, 2014.

U. A Chain of Title report indicates WBMA has owned the property from 1984 to present.

VI. ECOLOGY DETERMINATIONS

Ecology makes the following determinations, without any express or implied admissions of such determinations (and underlying facts) by WBMA.

A. PLP is an "owner or operator" as defined in RCW 70.105D.020(22) of a "facility" as defined in RCW 70.105D.020(8).

B. Based upon all factors known to Ecology, a "release" or "threatened release" of "hazardous substance(s)" as defined in RCW 70.105D.020(32) and (13), respectively, has occurred at the Site.

C. Based upon credible evidence, Ecology issued a PLP status letter to WBMA dated July 3, 2007, pursuant to RCW 70.105D.040, .020(26), and WAC 173-340-500. After providing for notice and opportunity for comment, reviewing any comments submitted, and concluding that credible evidence supported a finding of potential liability, Ecology issued a determination that WBMA is a PLP under RCW 70.105D.040 and notified WBMA of this determination by letter dated August 6, 2007.

D. Pursuant to RCW 70.105D.030(1) and .050(1), Ecology may require PLPs to investigate or conduct other remedial actions with respect to any release or threatened release of hazardous substances, whenever it believes such action to be in the public interest. Based on the foregoing facts, Ecology believes the remedial actions required by this Order are in the public interest.

VII. WORK TO BE PERFORMED

Based on the Findings of Fact and Ecology Determinations, it is hereby ordered that WBMA take the following remedial actions at the Site and that these actions be conducted in accordance with WAC 173-340 unless otherwise specifically provided for herein:

A. As of the effective date of the Agreed Order, WBMA will implement the Cleanup Action Plan (Exhibit B) which includes, but is not limited to the following Scope of Work:

- Excavate soil containing dioxin/furan TEQs above CULs.
- Remove six trees within the Area of Concern.
- Dispose impacted soil and wood waste containing impacted soil to a Subtitle D landfill facility.
- Dispose of clean wood waste (not containing contaminated soil) to a composting facility.
- Collect soil samples of the excavation limits demonstrating compliance with MTCA.
- Backfill and restore site to grade. Replace trees.
- Prepare a report documenting cleanup activities and conformance with the CAP.

B. WBMA will submit to Ecology, as required in the CAP, an Engineering Design Report (EDR), construction plans and specifications and a Compliance Monitoring Plan. The EDR will include Sample and Analysis Plan (SAP). A final cleanup report shall be submitted to Ecology documenting the cleanup action.

C. Schedule of deliverables.

- Within ninety (90) days of the effective date of this Agreed Order, WBMA will submit an agency review draft Engineering Design Report (EDR), construction plans and specifications and draft compliance monitoring plan in accordance with the CAP. Ecology will review and comment on the agency review drafts.
- Within thirty (30) days of receipt of Ecology comments, WBMA will incorporate Ecology's comments and submit to Ecology the revised agency review draft EDR, construction plans and specifications and the final compliance monitoring plan. Upon Ecology approval, the documents will be considered final.
- The construction work will be completed within the drier months of 2015 (May through September).
- A Final Cleanup Report must be received within thirty (30) days of completion of all field work.

D. All plans or other deliverables submitted by WBMA for Ecology's review and approval under the CAP shall, upon Ecology's approval, become integral and enforceable parts of this Order.

E. If Ecology determines that WBMA has failed to make sufficient progress or failed to implement the remedial action, in whole or in part, Ecology may, after written notice to WBMA, perform any or all portions of the remedial action or at Ecology's discretion allow the WBMA opportunity to correct. WBMA shall reimburse Ecology for the costs of doing such work in accordance with Section VII.A (Remedial Action Costs). Ecology reserves the right to enforce requirements of this Order under Section X (Enforcement).

F. Except where necessary to abate an emergency situation, WBMA shall not perform any remedial actions at the Site outside those remedial actions required by this Order, unless Ecology concurs, in writing, with such additional remedial actions.

VIII. TERMS AND CONDITIONS

A. Remedial Action Costs

WBMA shall pay to Ecology costs incurred by Ecology pursuant to this Order and consistent with WAC 173-340-550(2). These costs shall include work performed by Ecology or its contractors for, or on, the Site under RCW 70.105D, including remedial actions and Order preparation, negotiation, oversight, and administration. These costs shall include work performed from and after October 1, 2014 and subsequent to the issuance of this Order. Ecology's costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). Ecology has accumulated $271,240.47 in remedial action costs related to this Site as of October 1, 2014 pursuant to the 2008 Order ("2008 Order Costs"), and collection of those 2008 Order Costs shall be separate from this Order and not included in the remedial actions costs provided for herein. For all costs incurred subsequent to October 1, 2014, WBMA shall pay the required amount within thirty (30) days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A

general statement of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Pursuant to WAC 173-340-550(4), failure to pay Ecology's costs within ninety (90) days of receipt of the itemized statement of costs will result in interest charges at the rate of twelve percent (12%) per annum, compounded monthly.

In addition to other available relief, pursuant to RCW 19.16.500, Ecology may utilize a collection agency and/or, pursuant to RCW 70.105D.055, file a lien against real property subject to the remedial actions to recover unreimbursed remedial action costs.

B. Designated Project Coordinators

The project coordinator for Ecology is:

Andrew Smith
PO Box 47775
Olympia, WA 98504
360-407-6316

The project coordinator for WBMA is:

Neil Falkenburg
2100 West Bay Drive NW
Olympia, WA 98502
360-943-2022

Each project coordinator shall be responsible for overseeing the implementation of this Order. Ecology's project coordinator will be Ecology's designated representative for the Site. To the maximum extent possible, communications between Ecology and WBMA, and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order shall be directed through the project coordinators. The project coordinators may designate, in writing, working level staff contacts for all or portions of the implementation of the work to be performed required by this Order.

Any party may change its respective project coordinator. Written notification shall be given to the other party at least ten (10) calendar days prior to the change.

C. Performance

All geologic and hydrogeologic work performed pursuant to this Order shall be under the supervision and direction of a geologist or hydrogeologist licensed by the State of Washington or

under the direct supervision of an engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43 and 18.220.

All engineering work performed pursuant to this Order shall be under the direct supervision of a professional engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

All construction work performed pursuant to this Order shall be under the direct supervision of a professional engineer or a qualified technician under the direct supervision of a professional engineer. The professional engineer must be registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

Any documents submitted containing geologic, hydrologic, or engineering work shall be under the seal of an appropriately licensed professional as required by RCW 18.43 and 18.220.

WBMA shall notify Ecology in writing of the identity of any engineer(s) and geologist(s), contractor(s) and subcontractor(s), and others to be used in carrying out the terms of this Order, in advance of their involvement at the Site.

D. Access

Ecology or any Ecology authorized representative shall have access, to enter and freely move about all property at the Site that WBMA either owns, controls, or has access rights to at all reasonable times for the purposes of, *inter alia*: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Order; reviewing WBMA's progress in carrying out the terms of this Order; conducting such tests or collecting such samples as Ecology may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Order; and verifying the data submitted to Ecology by WBMA. WBMA shall make all reasonable efforts to secure access rights for those properties within the Site not owned or controlled by WBMA where remedial activities or investigations will be performed pursuant to this Order. Ecology or any Ecology authorized representative shall give reasonable notice before entering any Site property owned or controlled by WBMA unless an emergency prevents such notice. All persons who access the Site pursuant

to this section shall comply with any applicable health and safety plan(s). Ecology employees and their representatives shall not be required to sign any liability release or waiver as a condition of Site property access.

E. Sampling, Data Submittal, and Availability

With respect to the implementation of this Order, WBMA shall make the results of all sampling, laboratory reports, and/or test results generated by it or on its behalf available to Ecology. Pursuant to WAC 173-340-840(5), all sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with Section VII (Work to be Performed), Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements), and/or any subsequent procedures specified by Ecology for data submittal.

If requested by Ecology, WBMA shall allow Ecology and/or its authorized representative to take split or duplicate samples of any samples collected by WBMA pursuant to implementation of this Order. WBMA shall notify Ecology two (2) days in advance of any sample collection or work activity at the Site. Ecology shall, upon request, allow WBMA and/or its authorized representative to take split or duplicate samples of any samples collected by Ecology pursuant to the implementation of this Order, provided that doing so does not interfere with Ecology's sampling. Without limitation on Ecology's rights under Section VIII.E (Access), Ecology shall notify WBMA prior to any sample collection activity unless an emergency prevents such notice.

In accordance with WAC 173-340-830(2)(a), all hazardous substance analyses shall be conducted by a laboratory accredited under WAC 173-50 for the specific analyses to be conducted, unless otherwise approved by Ecology.

F. Public Participation

A Public Participation Plan is required for this Site. Ecology shall review any existing Public Participation Plan to determine its continued appropriateness and whether it requires amendment, or if no plan exists, Ecology shall develop a Public Participation Plan alone or in conjunction with WBMA.

Ecology shall maintain the responsibility for public participation at the Site. However, WBMA shall cooperate with Ecology, and shall:

1. If agreed to by Ecology, develop appropriate mailing lists and prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans, remedial investigation/feasibility study reports, cleanup action plans, and engineering design reports. As appropriate, Ecology will edit, finalize, and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings.

2. Notify Ecology's project coordinator prior to the preparation of all press releases and fact sheets, and before major meetings with the interested public and local governments. Likewise, Ecology shall notify WBMA prior to the issuance of all press releases and fact sheets, and before major meetings with the interested public and local governments. For all press releases, fact sheets, meetings, and other outreach efforts by WBMA that do not receive prior Ecology approval, WBMA shall clearly indicate to its audience that the press release, fact sheet, meeting, or other outreach effort was not sponsored or endorsed by Ecology.

3. When requested by Ecology, participate in public presentations on the progress of the remedial action at the Site. Participation may be through attendance at public meetings to assist in answering questions or as a presenter.

4. When requested by Ecology, arrange and/or continue information repositories to be located at the following locations:

a. **Olympia Timberland Library**
313-8th St SE
Olympia, WA 98501-9300

b. **Ecology's Southwest Regional Office**
300 Desmond Drive
Lacey, WA 98504

At a minimum, copies of all public notices, fact sheets, and documents relating to public comment periods shall be promptly placed in these repositories. A copy of all documents related to this Site shall be maintained in the repository at Ecology's Southwest Regional Office in Lacey, Washington.

G. Retention of Records

During the pendency of this Order, and for ten (10) years from the date of completion of work performed pursuant to this Order, WBMA shall preserve all records, reports, documents, and underlying data in its possession relevant to the implementation of this Order and shall insert a similar record retention requirement into all contracts with project contractors and subcontractors. Upon request of Ecology, WBMA shall make all records available to Ecology and allow access for review within a reasonable time.

Nothing in this Order is intended to waive any right WBMA may have under applicable law to limit disclosure of documents protected by the attorney work-product privilege and/or the attorney-client privilege. If WBMA withholds any requested records based on an assertion of privilege, WBMA shall provide Ecology with a privilege log specifying the records withheld and the applicable privilege. No Site-related data collected pursuant to this Order shall be considered privileged.

H. Resolution of Disputes

1. In the event that WBMA elects to invoke dispute resolution WBMA must utilize the procedure set forth below.

a. Upon the triggering event (receipt of Ecology's project coordinator's written decision or an itemized billing statement), WBMA has fourteen (14) calendar days within which to notify Ecology's project coordinator in writing of its dispute ("Informal Dispute Notice").

b. The Parties' project coordinators shall then confer in an effort to resolve the dispute informally. The parties shall informally confer for up to fourteen (14) calendar days from receipt of the Informal Dispute Notice. If the project coordinators

cannot resolve the dispute within those fourteen (14) calendar days, then within seven (7) calendar days Ecology's project coordinator shall issue a written decision ("Informal Dispute Decision") stating: the nature of the dispute; the WBMA's position with regards to the dispute; Ecology's position with regards to the dispute; and the extent of resolution reached by informal discussion.

c. WBMA may then request regional management review of the dispute. This request ("Formal Dispute Notice") must be submitted in writing to the Southwest Region Toxics Cleanup Section Manager within seven (7) calendar days of receipt of Ecology's Informal Dispute Decision. The Formal Dispute Notice shall include a written statement of dispute setting forth: the nature of the dispute; the disputing Party's position with respect to the dispute; and the information relied upon to support its position.

d. The Section Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute ("Decision on Dispute") within thirty (30) calendar days of receipt of the Formal Dispute Notice. The Decision on Dispute shall be Ecology's final decision on the disputed matter.

2. The Parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used.

3. Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Order, unless Ecology agrees in writing to a schedule extension.

4. In case of a dispute, failure to either proceed with the work required by this Order or timely invoke dispute resolution may result in Ecology's determination that insufficient progress is being made in preparation of a deliverable, and may result in Ecology undertaking the work under Section VII.E (Work to be Performed) or initiating enforcement under Section X (Enforcement).

I. Extension of Schedule

1. An extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least thirty (30) days prior to expiration of the deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify:

a. The deadline that is sought to be extended;

b. The length of the extension sought;

c. The reason(s) for the extension; and

d. Any related deadline or schedule that would be affected if the extension were granted.

2. The burden shall be on WBMA to demonstrate to the satisfaction of Ecology that the request for such extension has been submitted in a timely fashion and that good cause exists for granting the extension. Good cause may include, but may not be limited to:

a. Circumstances beyond the reasonable control and despite the due diligence of WBMA including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by WBMA;

b. Acts of God, including fire, flood, blizzard, extreme temperatures, storm, or other unavoidable casualty; or

c. Endangerment as described in Section VIII.L (Endangerment).

However, neither increased costs of performance of the terms of this Order nor changed economic circumstances shall be considered circumstances beyond the reasonable control of WBMA.

3. Ecology shall act upon any written request for extension in a timely fashion. Ecology shall give WBMA written notification of any extensions granted pursuant to this Order. A requested extension shall not be effective until approved by Ecology. Unless the extension is

a substantial change, it shall not be necessary to amend this Order pursuant to Section VIII.K (Amendment of Order) when a schedule extension is granted.

4. An extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. Ecology may grant schedule extensions exceeding ninety (90) days only as a result of:

a. Delays in the issuance of a necessary permit which was applied for in a timely manner;

b. Other circumstances deemed exceptional or extraordinary by Ecology; or

c. Endangerment as described in Section VIII.L (Endangerment).

J. Amendment of Order

The project coordinators may verbally agree to minor changes to the work to be performed without formally amending this Order. Minor changes will be documented in writing by Ecology within seven (7) days of verbal agreement.

Except as provided in Section VIII.M (Reservation of Rights), substantial changes to the work to be performed shall require formal amendment of this Order. This Order may only be formally amended by the written consent of both Ecology and WBMA. WBMA shall submit a written request for amendment to Ecology for approval. Ecology shall indicate its approval or disapproval in writing and in a timely manner after the written request for amendment is received. If the amendment to this Order represents a substantial change, Ecology will provide public notice and opportunity to comment. Reasons for the disapproval of a proposed amendment to this Order shall be stated in writing. If Ecology does not agree to a proposed amendment, the disagreement may be addressed through the dispute resolution procedures described in Section VIII.I (Resolution of Disputes).

K. Endangerment

In the event Ecology determines that any activity being performed at the Site under this Order is creating or has the potential to create a danger to human health or the environment on or surrounding the Site, Ecology may direct WBMA to cease such activities for such period of time

as it deems necessary to abate the danger. WBMA shall immediately comply with such direction.

In the event WBMA determines that any activity being performed at the Site under this Order is creating or has the potential to create a danger to human health or the environment, WBMA may cease such activities. WBMA shall notify Ecology's project coordinator as soon as possible, but no later than twenty-four (24) hours after making such determination or ceasing such activities. Upon Ecology's direction, WBMA shall provide Ecology with documentation of the basis for the determination or cessation of such activities. If Ecology disagrees with WBMA's cessation of activities, it may direct WBMA to resume such activities.

If Ecology concurs with or orders a work stoppage pursuant to this section, WBMA's obligations with respect to the ceased activities shall be suspended until Ecology determines the danger is abated, and the time for performance of such activities, as well as the time for any other work dependent upon such activities, shall be extended in accordance with Section VIII.J (Extension of Schedule) for such period of time as Ecology determines is reasonable under the circumstances.

Nothing in this Order shall limit the authority of Ecology, its employees, agents, or contractors to take or require appropriate action in the event of an emergency.

L. Reservation of Rights

This Order is not a settlement under RCW 70.105D. Ecology's signature on this Order in no way constitutes a covenant not to sue or a compromise of any of Ecology's rights or authority. Ecology will not, however, bring an action against WBMA to recover remedial action costs paid to and received by Ecology under this Order. In addition, Ecology will not take additional enforcement actions against WBMA regarding remedial actions required by this Order, provided WBMA complies with this Order.

Ecology nevertheless reserves its rights under RCW 70.105D, including the right to require additional or different remedial actions at the Site should it deem such actions necessary to protect human health and the environment, and to issue orders requiring such remedial actions.

Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances at the Site.

By entering into this Order, WBMA does not admit to any liability for the Site. Although WBMA is committing to conducting the work required by this Order under the terms of this Order, WBMA expressly reserves all rights available under law, including but not limited to the right to seek cost recovery or contribution against third parties, and the right to assert any defenses to liability in the event of enforcement.

M. Transfer of Interest in Property

No voluntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Site shall be consummated by WBMA without provision for continued implementation of all requirements of this Order and implementation of any remedial actions found to be necessary as a result of this Order.

Prior to WBMA's transfer of any interest in all or any portion of the Site, and during the effective period of this Order, WBMA shall provide a copy of this Order to any prospective purchaser, lessee, transferee, assignee, or other successor in said interest; and, at least thirty (30) days prior to any transfer, WBMA shall notify Ecology of said transfer. Upon transfer of any interest, WBMA shall notify all transferees of the restrictions on the activities and uses of the property under this Order and incorporate any such use restrictions into the transfer documents.

N. Compliance with Applicable Laws

1. All actions carried out by WBMA pursuant to this Order shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits, except as provided in RCW 70.105D.090. The permits or specific federal, state, or local requirements that the agency has determined are applicable and that are known at the time of the execution of this Order have been identified in Exhibit C.

2. Pursuant to RCW 70.105D.090(1), WBMA is exempt from the procedural requirements of RCW 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 and of any laws requiring or authorizing local government permits or approvals. However, WBMA shall comply with the

substantive requirements of such permits or approvals. The exempt permits or approvals and the applicable substantive requirements of those permits or approvals, as they are known at the time of the execution of this Order, have been identified in Exhibit C.

WBMA has a continuing obligation to determine whether additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Order. In the event either Ecology or WBMA determines that additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Order, it shall promptly notify the other party of its determination. Ecology shall determine whether Ecology or WBMA shall be responsible to contact the appropriate state and/or local agencies. If Ecology so requires, WBMA shall promptly consult with the appropriate state and/or local agencies and provide Ecology with written documentation from those agencies of the substantive requirements those agencies believe are applicable to the remedial action. Ecology shall make the final determination on the additional substantive requirements that must be met by WBMA and on how WBMA must meet those requirements. Ecology shall inform WBMA in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Order. WBMA shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination.

3. Pursuant to RCW 70.105D.090(2), in the event Ecology determines that the exemption from complying with the procedural requirements of the laws referenced in RCW 70.105D.090(1) would result in the loss of approval from a federal agency that is necessary for the state to administer any federal law, the exemption shall not apply and WBMA shall comply with both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090(1), including any requirements to obtain permits.

O. Indemnification

WBMA agrees to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action (1) for death or injuries to persons, or (2) for loss or damage to property, to the extent arising from or on account of acts or omissions of WBMA, its officers, employees, agents, or contractors in entering into and implementing this Order. However, WBMA shall not indemnify the State of Washington nor save nor hold its employees and agents harmless from any claims or causes of action to the extent arising out of the negligent acts or omissions of the State of Washington, or the employees or agents of the State, in entering into or implementing this Order.

IX. SATISFACTION OF ORDER

The provisions of this Order shall be deemed satisfied upon WBMA's receipt of written notification from Ecology that WBMA has completed the remedial activity required by this Order, as amended by any modifications, and that WBMA has complied with all other provisions of this Agreed Order.

X. ENFORCEMENT

Pursuant to RCW 70.105D.050, this Order may be enforced as follows:

A. The Attorney General may bring an action to enforce this Order in a state or federal court.

B. The Attorney General may seek, by filing an action, if necessary, to recover amounts spent by Ecology for investigative and remedial actions and orders related to the Site.

C. A liable party who refuses, without sufficient cause, to comply with any term of this Order will be liable for:

1. Up to three (3) times the amount of any costs incurred by the State of Washington as a result of its refusal to comply.

2. Civil penalties of up to twenty-five thousand dollars ($25,000) per day for each day it refuses to comply.

D. This Order is not appealable to the Washington Pollution Control Hearings Board. This Order may be reviewed only as provided under RCW 70.105D.060.

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Effective date of this Order: July 2, 2015

West Bay Marina Associates

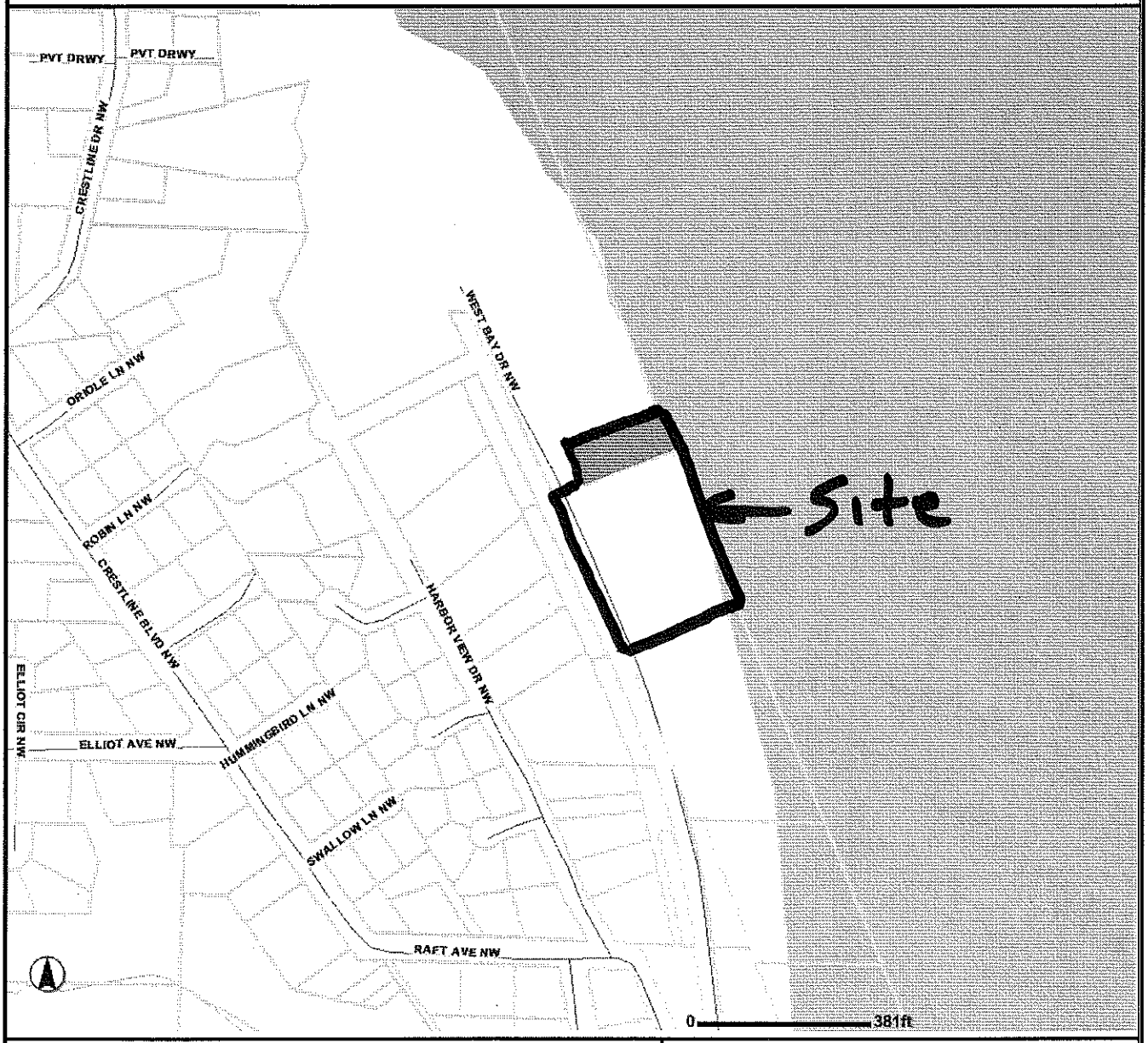
Neil Falkenburg
Manager
2100 West Bay Drive NW
Olympia, WA 98502
Telephone: 360-943-2022

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Rebecca S. Lawson, P.E., LHG
Section Manager
Toxics Cleanup Program
Southwest Regional Office
Telephone: 360-407-6241

Exhibit A.

West Bay Marina



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Final Cleanup Action Plan
West Bay Marina
Olympia, Washington

Prepared by the
Washington State
Department of Ecology

September 25, 2014

CONTENTS Page

CONTENTS (Continued)

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
BMP	best management practice
bgs	below ground surface
CAP	Cleanup Action Plan
COC	constituent of concern
CRZ	critical root zone
CSM	conceptual site model
CUL	cleanup level
CY	cubic yards
DCA	disproportionate cost analysis
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
FFS	focused feasibility study
MSW	municipal solid waste
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
OMC	Olympia Municipal Code
OHWM	ordinary high water mark
pg/g	picograms per gram or parts per trillion
POC	point of compliance
RAO	Remedial Action Objective
RCW	Revised Code of Washington
RI/FS	remedial investigation/feasibility study
SF	square feet
SWPPP	Stormwater Pollution Prevention Plan
TEQ	toxicity equivalency quotient
UST	underground storage tank
WAC	Washington Administrative Code
WBMA	West Bay Marina Associates

EXECUTIVE SUMMARY

This Cleanup Action Plan (CAP) was prepared for cleanup of the area of concern (AOC) identified at the West Bay Marina Site (site) in Olympia, Washington. The cleanup action described in this CAP was selected as the preferred remediation alternative in the focused feasibility study (FFS) performed for the site AOC (Hart Crowser 2014). The cleanup action focuses on remediation of soil at the north end of the site, which contains dioxins/furans in exceedance of regulatory criteria, to eliminate unacceptable risks to human health and the environment posed by the constituents of concern (COCs) to the greatest extent practicable. The cleanup action is limited to this AOC and does not include adjacent properties or the aquatic environment.

The site was first developed as a lumber mill by Buchanan Lumber Company in 1919 (Hart Crowser 2011). Between 1919 and 1966, the site was used for various activities including a sawmill, veneer plant, and stud mill. These timber-related facilities also included a hog fuel burner near the northern property line. It is suspected that operation of the former hog fuel burner may be a potential source of the dioxin/furan contamination detected in near-surface soil at the northern end of the site. Between 1966 and 2002, the site operated as a boatyard and marina. West Bay Marina Associates (WBMA) has owned the West Bay Marina since 1990. In 2002, boat maintenance and repair activities ceased at the site, and it has operated solely as a marina since that time (Anchor 2009a).

The AOC that is the focus of the cleanup action is located at the northern end of the site and is defined as the area of soil containing dioxin/furan toxicity equivalency quotients (TEQs) above the Model Toxics Control Act (MTCA) Method B direct-contact soil cleanup level of 11 picograms per gram (pg/g). The exceedance locations were determined in the remedial investigations conducted in 2010 and 2011 (Anchor 2010, Hart Crowser 2011), which identified four sample locations that exceeded the cleanup level. These sample locations are near the former hog fuel burner.

This CAP describes the preferred cleanup action that was selected for the AOC through the feasibility study evaluation process. In the FFS, six remediation alternatives were developed and evaluated per the criteria specified in the MTCA regulations (Chapter 173-340 WAC), of which Alternative 1a was selected as the preferred cleanup action. The selected remedy consists of the following elements:

- Removal of six trees located within the AOC;

- Excavation of soil containing dioxin/furan TEQs above the Method B cleanup level;
- Off-site disposal of excavated soil at a Subtitle D landfill facility;
- Off-site disposal of clean tree materials at a composting facility and disposal of wood materials containing contaminated soil at a Subtitle D landfill facility;
- Backfilling with clean material and site restoration;
- Institutional controls; and
- Compliance monitoring and maintenance.

Alternative 1a is judged to use permanent solutions to the maximum extent practicable. This alternative may present more short-term risks related to the off-site transport of contaminated soil and potentially more technical challenges during implementation to remove the existing trees in the AOC. However, compared to the other alternatives evaluated in the FFS, Alternative 1a was found to be:

- Equally or more protective;
- Equally or more permanent;
- Equally or more effective over the long term; and
- More administratively implementable.

Cleanup action implementation will be further developed during the remediation design process. Ecology will provide public notice and an opportunity for the public to review and comment on the FFS and this CAP, as required under WAC 173-340-600. The design phase to develop the project plans and specifications to implement the cleanup action would be performed after the public review process has been completed and public comments have been addressed. Implementation would be tentatively scheduled for the 2015 construction season.

DRAFT FINAL CLEANUP ACTION PLAN
WEST BAY MARINA
OLYMPIA, WASHINGTON

1.0 INTRODUCTION

This Cleanup Action Plan (CAP) was prepared to address cleanup of the West Bay Marina Site (site) located in Olympia, Washington (Figure 1). This CAP was prepared for the Washington State Department of Ecology (Ecology) per the requirements of the Model Toxics Control Act (MTCA; Chapter 70.105D RCW) and its implementing regulations (Chapter 173-340 WAC). This work is being completed under Ecology Agreed Order No. DE_5272 between Ecology and West Bay Marina Associates (WBMA).

The work for this CAP follows the previous work conducted by Anchor QEA for WBMA under an existing remedial investigation/feasibility study (RI/FS) Work Plan (Anchor 2009) and investigative work conducted by Hart Crowser in 2011 and 2012 (Hart Crowser 2011 and 2012). Results are presented in the Hart Crowser RI Report dated June 30, 2011, and RI Addendum dated May 31, 2012 (Hart Crowser 2011 and 2012). Hart Crowser subsequently completed a focused feasibility study (FFS) to identify the preferred remedial action for the area of concern identified at the north end of the site (Hart Crowser 2014b).

1.1 Elements of the Cleanup Action Plan

Elements of this CAP address requirements of WAC 173-340-380, which include:

- A description of the planned cleanup action;
- Rationale for selecting the proposed alternative;
- A summary of other cleanup action alternatives evaluated in the FFS;
- Cleanup standards for the contaminants and media of concern;
- A schedule for the planned implementation of the cleanup action plan;
- Description of institutional controls;
- Applicable state and federal laws;
- Preliminary determination of compliance with MTCA remedy selection criteria; and

- Types, levels, and amounts of contaminants remaining on site, and measures to prevent migration and contact.

Design and construction considerations for the proposed alternative will be further developed and evaluated in the Engineering Design Report (EDR) and project design plans and specifications.

1.2 Report Organization

Specific discussion points pertinent to the MTCA criteria are presented in subsequent sections organized as follows:

Section 2.0 Summary of Site Conditions. This section summarizes the historical uses of the property and its current land use. An overview of the results of the RI and other recent investigation work are also included. This information is used to develop the conceptual site model (CSM) also presented in this section.

Section 3.0 Cleanup Requirements. Remedial action objectives and cleanup standards for the site are identified in Section 3.0.

Section 4.0 Selected Remediation Alternative. The planned cleanup action is detailed in Section 4.0. The action includes tree preservation, excavation, off-site disposal, site restoration, and institutional controls.

Section 5.0 Remediation Alternatives Considered and Basis for Selecting the Remedy Selection. The other cleanup alternatives that were evaluated and the evaluation process are summarized in Section 5.0.

Section 6.0 Remediation Alternative Selection and Schedule. The work planned to implement the cleanup action and schedule are outlined in Section 6.0. This work includes preparation of the remedial design documentation, construction plans, and specifications.

Section 7.0 References. Section 7.0 lists references cited in this report.

2.0 SUMMARY OF SITE CONDITIONS

The site is located at 2100 West Bay Drive NW in Olympia, Washington, and is the location of a marina and restaurant. The project location is shown on Figure 1. The site encompasses just over 3 acres of upland, which is predominantly paved and is used for parking and storage.

2.1 Site History

The site was first developed as a lumber mill by Buchanan Lumber Company in 1919 (Hart Crowser 2011). Between 1919 and 1966, the site was used for various facilities including a sawmill, veneer plant, and stud mill. These timber-related facilities also included a hog fuel burner near the northern property line. It is suspected that operation of the former hog fuel burner was a potential source of the dioxin/furan contamination detected in near-surface soil at the northern end of the site. Site features are shown on Figure 2.

The current and assumed future use of the property is as a marina and restaurant facility. Future land use is not expected to change. It is assumed that the area of the remedial action will continue to be used as open space north of the office/supply buildings.

2.2 Summary of Environmental Conditions

Previous upland soil, groundwater, sediment, seep, and stream investigations were conducted at the West Bay Marina site in 1993, 1999, 2009, 2010, 2012, and 2014. These studies are listed below, the details of which are presented in the 2011 RI report and 2012 RI Addendum (Hart Crowser 2011 and 2012) and in Appendix A of the FFS (Hart Crowser 2014).

- Preliminary Environmental Assessment and Soil Remediation (Hart Crowser 1993);
- Underground Storage Tank (UST) Removal Site Assessment (Stemen Environmental 1999a and 1999b);
- 2009/2010 Remedial Investigation (Anchor 2009 and 2010);
- 2011 Remedial Investigation (Hart Crowser 2011); and
- 2014 Stream Assessment (Hart Crowser 2014).

Two cleanup actions were conducted at the site, which are described in detail in the 2011 RI report (Hart Crowser 2011). In 1993, Hart Crowser performed a cleanup of the soil in the southern ditch, removing the top 3 inches of soil, which contained elevated concentrations of copper. Additionally, approximately 55 tons of petroleum-impacted soil were removed from around an aboveground waste oil storage tank. In 1999, Stemen Environmental removed three USTs from the parking area at the site (Stemen Environmental 1999a). Approximately

675 tons of petroleum-impacted soil, 56 tons of demolition debris, and an unreported volume of oily water were removed from the UST excavation.

2.3 Conceptual Site Model

The CSM is based on the results of historical research and investigations, and the RI report and addendum (Hart Crowser 2011 and 2012). A discussion of the chemicals and media of concern, the fate and transport characteristics of released hazardous substances, and the potential exposure pathways is included in this section. The CSM served as the basis for developing technically feasible cleanup alternatives and selecting a preferred cleanup action for the area of concern (AOC) at the north end of the property, as documented in the FFS (Hart Crowser 2014). The CSM is dynamic and may be refined throughout the cleanup action process as additional information becomes available.

2.3.1 Contaminant Sources and Affected Media

Soil, groundwater, and air are media within the AOC that could potentially be affected by the constituents of concern (COCs) identified at the site. The 2011 RI identified dioxin/furan congeners as COCs for soil in the AOC as a potential exposure risk to human receptors (Hart Crowser 2011). It is suspected that the soil dioxin/furan contamination potentially arose from operation of the former hog fuel burner at the north end of the site. The RI did not find groundwater to be a medium of concern. Based on the chemical and physical properties of the COCs, air is generally not considered a medium of concern. However, dust generated during soil remediation activities in the AOC may present a potential exposure pathway for COCs bound to dust particulates.

2.3.2 Release Mechanisms and Transport Processes

Dioxin/furan compounds can be persistent environmental pollutants that do not readily break down in the subsurface environment. The half-life of dioxins/furans in the subsurface is long, potentially on the order of decades (EPA 2014). Dioxins/furans exhibit low vapor pressure, low water solubility, and strong adsorption to organic matter, which generally ensures their immobility in soil and sediment (ATSDR 1998). Dioxins/furans bound to soil are unlikely to leach into groundwater, but may enter the atmosphere or surface water when the soil particulates to which they are bound are transported by erosion processes, such as wind or surface runoff.

2.3.2 Receptors

Human exposure to dioxin/furans in site soil is considered a risk; however, ecological receptors are not considered to be at risk, according to the results of the terrestrial ecological risk assessment for the site (Hart Crowser 2011). Potential human receptors include marina employees and residents in addition to incidental receptors such as utility workers or site visitors who may be exposed to soil from the AOC.

2.3.3 Summary of Exposure Pathways

For a COC to present a risk to human health and/or the environment, the pathway from the COC to the receptor must be completed. The COC-to-receptor pathways judged to be present at the site are discussed by medium in this section.

Soil

Direct ingestion of or dermal contact with soil containing dioxins/furans is considered a potential exposure pathway. The soil in the area of the four samples (HC-WB-US-001, HC-WB-US-002, WB017, and WB018) with elevated dioxin/furan detections identified in the 2011 RI is not screened or fenced to prevent human access (Hart Crowser 2011). This area is also not covered with a clean vegetated soil cap or an impervious covering such as asphalt or cement. Accordingly, soil containing dioxins/furans in the AOC remains available for potential direct contact or ingestion. It is also susceptible to potential wind- or water-based erosion that could carry COCs to nearby marine sediment, freshwater runoff in the adjacent stream channel drainage, and marine water.

Groundwater

As the RI did not identify groundwater to be a medium of concern, it is not considered an exposure pathway for dioxins/furans.

Air

Air is not considered an exposure pathway from volatilization of dioxins/furans. Generation of airborne dust during cleanup activities or from soil that is not removed or otherwise contained could be a direct-contact exposure pathway.

3.0 CLEANUP REQUIREMENTS

The cleanup requirements include remedial action objectives (RAOs) and preliminary cleanup standards, which were developed to address MTCA regulatory requirements for site cleanup. These requirements address conditions relative to potential human and ecological receptor impacts. Together, the RAOs and cleanup standards provided the framework for evaluating remedial alternatives and for selecting a preferred alternative as summarized in Sections 4.0 and 5.0.

3.1 Remedial Action Objectives

The primary objective for the CAP focuses on substantially eliminating, reducing, and/or controlling unacceptable risks to human health and the environment posed by site COCs to the greatest extent practicable.

3.2 Cleanup Standards

Cleanup standards include cleanup levels (CULs) and points of compliance (POCs) as described in WAC 173-340-700 through WAC 173-340-760. The soil CUL for dioxins/furans is based on human health exposure because the terrestrial ecological risk assessment in the RI demonstrated that residual contamination in site soil was minor or *de minimis* and did not pose an ecological risk to wildlife. For the cleanup action, Ecology has established the MTCA Method B soil CUL of 11 pg/g (picograms per gram or parts per trillion) for dioxins/furans for unrestricted land use. It is assumed that the standard point of compliance will be applied to the cleanup action, which is defined to be throughout the AOC.

3.3 Applicable or Relevant and Appropriate Requirements

Cleanup standards must also incorporate other state and federal regulatory requirements applicable to the cleanup action and/or its location, as appropriate. This section identifies applicable or relevant and appropriate requirements (ARARs) for implementing the remedial action in the West Bay Marina site AOC. The ARARs focus on federal or state statutes, regulations, criteria, and guidelines. The specific types of ARARs for the preferred remediation alternative include contaminant-, location-, and action-specific ARARs, which are summarized in Table 1.

In general, only the substantive requirements of ARARs are applied to MTCA cleanup sites being conducted under a legally binding agreement with Ecology (WAC 173-340-710[9][b]). Thus, cleanup actions under a formal agreement with

Ecology are exempt from the administrative and procedural requirements specified in state and federal laws. This exemption also applies to permits or approvals required by local governments.

Contaminant-Specific ARARs. Contaminant-specific ARARs are usually health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical contaminant values that are generally recognized by the regulatory agencies as allowable to protect human health and the environment. As noted in Section 3.2, Ecology has established the MTCA Method B soil cleanup level of 11 pg/g for dioxins/furans for the site.

Action-Specific ARARs. Action-specific ARARs are pertinent to particular remediation methods and technologies, and to actions conducted to support cleanup. Action-specific ARARs are requirements that may need to be satisfied during the performance of a specific remedial action because they prescribe how certain activities (e.g., disposal practices, media monitoring programs) must occur.

Location-Specific ARARs. Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in a specific location. Some examples of special locations include floodplains, wetlands, historic sites, and sensitive ecosystems or habitats.

3.4 Definition of the Area of Concern

The AOC is located at the northern end of the West Bay Marina property and is defined as the area of soil containing dioxin/furan toxicity equivalency quotients (TEQs) above the cleanup level selected for the site (Figure 2). The exceedance locations are based on the results of remedial investigations conducted in 2010 and 2011 (Anchor 2010, Hart Crowser 2011), which identified four sample locations (HC-WB-US-001, HC-WB-US-002, WB017, and WB018) that exceeded the cleanup level. As shown on Figure 2, these sample locations are in the vicinity of the former hog fuel burner.

Specifically, the AOC is limited to the upland area located north of the office/supply buildings at the northern end of the West Bay Marina property but does not extend beyond the property boundary (Figure 2). Assuming that the property boundary extends to the stream channel between West Bay Marina and Dunlap Towing, the northern boundary of the AOC is limited by the channel line and trees located at the edge of the stream. The eastern boundary of the AOC is limited to the top of the slope before it descends to Budd Inlet. It is assumed that the western boundary extends to half the distance between soil

sample location HC-WB-US-002 (approximately 19 feet to the west of this sample location), which exceeds the cleanup level, and location HC-WB-US-003, which did not exceed the cleanup level. The cleanup action is limited to this AOC and does not include adjacent properties or the aquatic environment.

The AOC resides in the buffer area of the stream that flows along the northern property boundary. The buffer on the south side of the stream (where the AOC is located) is bounded by a building and gravel driveway; therefore, the buffer is defined as extending from the stream to the existing building and is approximately 17.5 feet wide.

4.0 SELECTED REMEDIATION ALTERNATIVE

The FFS evaluated six alternatives for remediation, of which Alternative 1a was selected as the preferred cleanup action. The selected remedy consists of excavation of soil containing dioxin/furan TEQs above the CUL, off-site disposal, and backfilling and restoration. A conceptual layout of the components of the proposed cleanup action is shown on Figure 3. The components are described in the following sections.

4.1 Excavation of Impacted Soil

Soil will be excavated within the AOC to a depth of 3 feet below ground surface (bgs). Heavy equipment sized to accommodate the constraints and accessibility of the AOC will be used to excavate the soil. Based on the AOC delineation and approximate tree locations, approximately 144 cubic yards (CY) of impacted material (about 215 tons) will be excavated and disposed of in the selected alternative. Excavation and staging of the soil will be conducted using best management practices (BMPs) including sedimentation control and erosion-prevention practices, such as installation of silt fences at the perimeter of the work area and using a stabilized construction entrance and exit. Additionally, dust suppression measures and BMPs (such as wetting soil, etc.) will be implemented during construction activities.

Performance monitoring will be conducted at the limits of excavation to verify that the contaminated material has been removed, which consists of soil sample collection and laboratory analysis for dioxins/furans.

4.2 Tree Removal

The selected alternative assumes that the trees within the AOC will be removed as part of the remediation work to allow for complete removal of contaminated

soil from the AOC. The trees in this area include two red alders and four larch conifers. We have assumed that each tree would be removed and processed on site using chainsaws and a wood chipper. Stumps would be removed separately by a hydraulic backhoe. Again, BMPs including dust suppression measures would be employed to prevent migration of dust. For the purposes of this CAP, we have assumed that the six trees are each approximately 30 feet tall and the trunks are 12 inches in diameter. Therefore, a total volume of about 5 CY (1.5 tons) of wood material will need to be disposed of. This processed wood material will be hauled and disposed of at a nearby composting facility (Silver Spring Organic, approximately 20 miles from the site). Any wood material containing residual dioxin/furan-impacted soil (such as the root ball of a tree) will be disposed of with the excavated soil at a Subtitle D landfill, as described below.

4.3 Off-Site Disposal

Excavated soil that is contaminated with dioxins/furans will be disposed of in a Subtitle D landfill as non-hazardous waste. The nearest Subtitle D municipal solid waste (MSW) disposal facility that accepts dioxin/furan-contaminated soil is the Roosevelt Regional Landfill, which is located approximately 250 miles from the site. However, contaminated materials will be hauled to a Centralia waste yard (30 miles from the site), loaded onto railcars, and transported to Roosevelt. Approximately 215 tons of impacted material will be excavated and disposed of in the Subtitle D landfill.

Following excavation and verification soil sampling and analysis, the area will be backfilled with clean fill material. Once backfilled with clean material, the area will be restored as described below.

4.4 Site Restoration

Once excavation, verification soil sampling and analysis, and backfilling have been completed, site restoration and slope stabilization will be completed. Additionally, it is assumed that six trees will be planted at the site to compensate for the removal of the six trees within the AOC. This includes implementing temporary and long-term erosion control measures, such as hydroseeding, until the vegetative cover in the AOC is sufficiently established to control erosion. The AOC will be returned to a grade that is similar to current conditions.

4.5 Stormwater Management

The excavation work will be conducted in accordance with the substantive provisions of the National Pollutant Discharge Elimination System (NPDES)

requirements for stormwater discharges from construction areas to minimize erosion and to prevent enhanced sediment loading to stream drainages or Budd Inlet. However, since the AOC and work areas associated with the cleanup action would constitute less than 1 acre, a NPDES Construction Surface Water General Permit would not be required. A stormwater pollution prevention plan (SWPPP) that stipulates erosion prevention, slope stabilization, and drainage collection measures will be developed and implemented. The SWPPP will also provide measures to protect the surface waters of Budd Inlet, and must be in place before construction begins.

4.6 Compliance Monitoring

Compliance monitoring will be implemented in accordance with WAC 173-340-410 and includes:

- **Protection Monitoring** to confirm that human health and the environment are adequately protected during the construction period of the cleanup action;

- **Performance Monitoring** to confirm that the cleanup action has attained cleanup standards and other performance standards; and

- **Confirmational Monitoring** to confirm the long-term effectiveness of the cleanup action once performance standards have been obtained.

Protection monitoring elements, including dust monitoring during excavation, will be addressed in the health and safety plan that will be created for the project.

Performance monitoring following soil excavation will begin with topographic surveys or similar grade control measures to verify that the excavation has achieved the desired cut elevation. Soil samples will be collected and analyzed from the base and walls of the excavation to confirm that the target CUL has been achieved, or to document the concentration of COCs that remain on the site. Related monitoring and documentation will include verifying the chemical quality of imported soil used for backfilling, placement to match pre-existing grade, and nominal compaction requirements to be established during the design phase.

Confirmational monitoring is a component of compliance monitoring that is intended to demonstrate the long-term effectiveness of the cleanup action once the CUL or other performance standards have been attained. Specific details for post-construction monitoring will be developed in a long-term monitoring plan

after preparing project plans and specifications in the design phase, which will conform to the general requirements of WAC 173-340-410.

4.7 Institutional Controls

As described in the MTCA regulations (WAC 173-340-440), institutional controls are intended to limit or prohibit activities that may interfere with the integrity of a cleanup action that would result in risk of exposure to contaminated soil at the site. These institutional controls may include on-site features (such as fences), educational programs (such as signage and public notices), legal mechanisms (such as land use restrictions, restrictive covenant, zoning designations, and building permit requirements), maintenance requirements for engineered controls (for example, containment caps), and financial assurances.

The aim of the selected remediation alternative is to remove all of the contaminated material within the AOC. Because soil impacted by dioxins/furans will be excavated and removed within the AOC, institutional controls will not be required under the selected alternative. Therefore, it is assumed that an environmental covenant and other institutional controls will not be required under this remedy.

4.8 Permitting and Planning Requirements

Because the AOC is located in the buffer area of a stream, additional permitting and planning requirements will potentially apply to remediation activities in this area. We assume that the stream buffer will be modified during the remediation work, but that no excavation will occur below the ordinary high water mark (OHWM) of the stream; therefore, a US Army Corps of Engineers Clean Water Act permit will not be required. However, the following City permits and planning measures may be required:

- Critical areas review and approval.
- Clearing and grading permit (including a grading plan and a drainage and erosion control plan).
- Once the concept of the design of the remediation has been determined, a pre-application meeting with the City of Olympia would be conducted to determine exactly what permits the City will require and what mitigation measures may be required.

5.0 REMEDIATION ALTERNATIVES CONSIDERED AND BASIS FOR REMEDY SELECTION

Six remediation alternatives were evaluated in the FFS. This section describes the alternatives that were developed and the MTCA criteria used to evaluate the alternatives.

5.1 FFS Alternatives Evaluated

The options evaluated in the FFS specifically included technologies considered to be capable of achieving the remedial action objectives, MTCA cleanup levels, and other regulatory requirements. Six remediation alternatives applicable to impacted media in the AOC were developed from these technologies. The components of the six remediation alternatives are summarized below.

- Alternative 1a included:

  - Excavation of soil containing dioxin/furan TEQs above the CUL;
  - Removal of six trees within the AOC;
  - Off-site disposal of impacted soil and wood waste containing impacted soil at a Subtitle D landfill facility;
  - Off-site disposal of clean wood waste at a composting facility;
  - Backfilling and site restoration; and
  - Compliance monitoring and maintenance.

- Alternative 1b included:

  - Excavation of soil containing dioxin/furan TEQs above the CUL;
  - Removal of six trees within the AOC;
  - Off-site incineration of impacted soil and wood waste containing impacted soil;
  - Off-site disposal of clean wood waste at a composting facility;
  - Backfilling and site restoration; and
  - Compliance monitoring and maintenance.

- Alternative 1c included:

  - Excavation of soil containing dioxin/furan TEQs above the CUL;
  - Tree preservation within the AOC;
  - Off-site disposal of impacted soil at a Subtitle D landfill facility;
  - Backfilling and site restoration;
  - Institutional controls; and
  - Compliance monitoring and maintenance.

- Alternative 1d included:

  - Excavation of soil containing dioxin/furan TEQs above the CUL;
  - Tree preservation within the AOC;
  - Off-site treatment of impacted soil by incineration;
  - Backfilling and site restoration;
  - Institutional controls; and
  - Compliance monitoring and maintenance.

- Alternative 2 included:

  - Capping of the entire surface of the AOC (excluding tree areas) with asphalt pavement;
  - Tree preservation and tree-friendly cover;
  - Institutional controls; and
  - Compliance monitoring and maintenance.

- Alternative 3 included:

  - Excavation of surface soil (top 6 inches) within the AOC (excluding tree areas);
  - Tree preservation and tree-friendly cover;
  - Placement of a continuous demarcation layer over the excavation floor following excavation of the AOC but before capping;
  - Capping of the AOC (except protected tree areas) with asphalt pavement following placement of the demarcation layer;
  - Off-site disposal of impacted soil at a Subtitle D landfill facility;
  - Institutional controls; and
  - Compliance monitoring and maintenance.

5.2 Evaluation Process

Ecology identifies within the MTCA regulations (WAC 173-340-360) the criteria that should be used to evaluate remediation alternatives. The purpose of the evaluation is to identify the relative advantages and disadvantages of each alternative and, thereby, assist in the decision-making process. This process was used in the FFS to identify the preferred alternative.

5.2.1 MTCA Evaluation Criteria

Key guiding requirements for evaluating remediation alternatives and remedial action selection for the site are listed in the MTCA regulations and detailed in the FFS. MTCA criteria consist of threshold requirements and other criteria listed

in WAC 173-340-360(2) (Minimum Requirements for Cleanup Actions) as listed in Table 2 and detailed in the FFS (Hart Crowser 2014).

MTCA places preference on permanent solutions to the maximum extent practicable based on a disproportionate cost analysis (DCA). DCA criteria include protectiveness, permanence, effectiveness over the long term, management of short-term risks, technical and administrative implementability, and consideration of public concerns. The benefits of the alternatives considered are balanced against relative costs for implementing each alternative. Preference is also placed on remedies that can be implemented in a shorter time, based on potential environmental risks and effects on current site use and associated site and surrounding area resources. The third criterion, public concerns, is addressed during comment periods for RI/FS documents, remedy selection decision, and subsequent CAP for remedy implementation. Table 3 presents the DCA evaluation from the FFS.

The DCA represents a test to determine whether incremental costs of a given alternative over a lower-cost option exceed the incremental degree of benefit achieved by the higher cost alternative. The most practicable permanent solution is identified as the baseline cleanup action alternative for FS evaluation. The referenced section of MTCA further specifies that, where alternatives are equal in benefits, the least costly alternative will be selected provided that the MTCA threshold and other requirements are met.

5.2.2 Remediation Alternative Evaluation

The ability of each cleanup alternative to meet applicable MTCA criteria was evaluated in Section 7.0 of the FFS and is presented in the attached Table 2.

The remediation alternative that most closely satisfies the threshold criteria and other MTCA requirements discussed in FFS Sections 6.1 and 6.2 is the preferred alternative for the site. Based on the evaluation of alternatives presented in FFS Section 7.0, the preferred remediation alternative is Alternative 1a, which involves excavation of dioxin/furan-impacted soil and off-site disposal in a Subtitle D landfill facility.

Under MTCA, the most practicable permanent solution is to be used as the baseline against which other alternatives are compared. Alternative 1a was the most permanent practicable solution and was used as the baseline for this comparison.

Although Alternatives 1a and 1b are the most permanent, Alternative 1a is judged to use permanent solutions to the maximum extent practicable.

Alternative 1b has significantly higher costs for minimal increase in protectiveness. Based on this large incremental cost difference, and the fact that both alternatives adequately address risks to possible receptors, Alternative 1a is the preferred alternative.

Alternative 1a may present more short-term risks (related to the off-site transport of contaminated soil) and potentially more technical challenges during implementation (to remove the existing trees and stumps within the AOC). However, using the DCA criteria to compare all four alternatives, Alternative 1a was found to be:

- Equally or more protective;
- Equally or more permanent;
- Equally or more effective over the long term; and
- More administratively implementable.

6.0 REMEDIATION ALTERNATIVE SELECTION AND SCHEDULE

Following the above MTCA analysis and DCA, Alternative 1a was identified as the preferred alternative for remedial action, pending public review and agency approval. Alternative 1a addresses protection of human health from the direct-contact exposure pathway. The estimated cost for Alternative 1a, based on the assumptions made in the FFS, is approximately $111,000 (-35 to +50 percent). A detailed cost estimate is presented in Table 4 for the conceptual remediation alternative. Estimated costs will be further refined in the remedial design stage of the cleanup action.

Cleanup action implementation will be further developed in the Engineering Design Report (EDR) and project design documents. Ecology will provide public notice and an opportunity for the public to review and comment on the FFS and this CAP, as required under WAC 173-340-600. The detailed design phase to develop the EDR and project plans and specifications would be performed after the public review process has been completed and public comments have been addressed. Implementation would be tentatively scheduled for the 2015 construction season.

7.0 REFERENCES

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Transfer of Sampling Data and Request for Time Extension. September 25, 2009.

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EPA 2014. Dioxins, Chemistry and Behavior. Contaminated Site Clean-Up Information. US Environmental Protection Agency. http://www.clu-in.org/contaminantfocus/default.focus/sec/Dioxins/cat/Chemistry_and_Behavior/

Hart Crowser, Inc. 1993. Preliminary Environmental Assessment and Soil Remediation, West Bay Marina, Olympia, Washington. Prepared for West Bay Marina Associates by Hart Crowser, Inc. July 20, 1993.

Hart Crowser 2011. Remedial Investigation, Westbay Marina, 2100 West Bay Drive NW, Olympia, WA. Prepared for the Washington State Department of Ecology by Hart Crowser, Inc. June 30, 2011.

Hart Crowser 2012. Remedial Investigation Addendum, Westbay Marina, 2100 West Bay Drive NW, Olympia, WA. Prepared for the Washington State Department of Ecology by Hart Crowser, Inc. May 31, 2012.

Hart Crowser 2014. Draft Final Focused Feasibility Study. West Bay Marina, 2100 West Bay Drive NW, Olympia, WA. Prepared for the Washington State Department of Ecology by Hart Crowser, Inc. June 20, 2014.

Stemen Environmental 1999a. Tank Removal and Independent Remedial Action Report. Prepared for West Bay Marina Associates by Stemen Environmental, Inc. August 1999.

Stemen Environmental 1999b. Groundwater Monitoring Well Installation and Groundwater Sampling for West Bay Marina. Prepared for Neil Falkenburg, West Bay Marina, by Stemen Environmental, Inc. December 1999.

Table 1 – Applicable or Relevant and Appropriate Requirements

Authority	Resource	Implementing Laws/Regulations	Applicability
Contaminant-Specific ARARs			
State	Soil	Washington State Model Toxics Control Act [RCW 70.105D; Chapter 173-340 WAC]	The Model Toxics Control Act (MTCA) soil cleanup levels are applicable.
Action-Specific ARARs			
Federal/ State	Surface Water	Federal Water Pollution Control Act-- National Pollution Discharge Elimination System [Clean Water Act; 33 USC § 1342, Section 402] and Implementing Regulations Washington State Construction Stormwater General Permit [RCW 90.48]	The NPDES program establishes requirements for point source discharges, including stormwater runoff. These requirements would be applicable for any point source discharge of stormwater during construction or following cleanup.
Federal/ State	Solid Waste	Transportation of Hazardous Materials [49 CFR Parts 105 to 177] [Chapter 446-50 WAC]	Transportation of hazardous waste or materials is required to meet state and federal requirements. This requirement is potentially applicable to alternatives that involve the off-site transport of impacted soil.
Federal	Solid Waste	Resource Conservation and Recovery Act [42 USC § 6901 et seq.], Subtitle D – Managing Municipal and Solid Waste [40 CFR Parts 257 and 258]	Subtitle D of RCRA establishes a framework for management of non-hazardous solid waste. These regulations establish guidelines and criteria from which states develop solid waste regulations. These requirements are applicable to the remediation alternatives that involve off-site disposal of impacted soil.
State	Solid Waste	Washington State Solid Waste Handling Standards [RCW 70.95; Chapter 173-350 WAC]	Washington State Solid Waste Handling Standards apply to facilities and activities that manage solid waste. The regulations set minimum functional performance standards for proper handling and disposal of solid waste; describe responsibilities of various entities; and stipulate requirements for solid waste handling facility location, design, construction, operation, and closure. These requirements are applicable to remediation alternatives that involve off-site disposal of impacted soil.
Federal	Air	Clean Air Act [42 USC § 7401 et seq.; 40 CFR Part 50]	The federal Clean Air Act creates a national framework designed to protect ambient air quality by limiting air emissions.
State	Air	Washington Clean Air Act and Implementing Regulations [Chapter 173-400-040(8) WAC]	These regulations require the owner or operator of a source of fugitive dust to take reasonable precautions to prevent fugitive dust from becoming airborne and to maintain and operate the source to minimize emissions. These regulations are applicable to all alternatives during construction.
State	Remedy Construction	Washington Industrial Safety and Health Act [RCW 49.17; Chapter 296-24 WAC]	Site worker and visitor health and safety requirements established by the Washington Industrial Safety and Health Act (WISHA) are to be met during implementation of the remedial action.
Local	Remedy Construction	Local Ordinances	Appropriate substantive requirements are to be met for implementation of the remedial action.
Location-Specific ARARs			
State	Shorelines and Surface Water	Shoreline Management Act of 1971 [RCW 90.58] and Implementing Regulations	Actions are prohibited within 200 feet of shorelines of statewide significance unless permitted. Remediation alternatives occur within 200 feet of Budd Inlet.
Local	Stream Buffer	Local Ordinance: Olympia Municipal Code, Streams and Important Riparian Areas [OMC 18.32.435]	The OMC requires 150-foot buffers for Type 4 and 5 streams, and 200-foot buffers for Type 3 streams. Remediation alternatives occur within this stream buffer.

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Table 2 – Remediation Alternative Evaluation

Selection Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Threshold Requirements: WAC 173-340-360(2)(a)						
Protect Human Health and the Environment	Protective. Removal of contaminated material eliminates direct-contact risk to human receptors. Approximately 144 CY of material will be removed under this alternative and disposed offsite at a Subtitle D landfill facility.	Protective. Removal of contaminated material eliminates direct-contact risk to human receptors. Approximately 144 CY of material will be removed under this alternative and incinerated off site.	Protective. Removal of contaminated material eliminates direct-contact risk to human receptors. Approximately 116 CY of material will be removed under this alternative and disposed offsite at a Subtitle D landfill facility.	Protective. Removal of contaminated material eliminates direct-contact risk to human receptors. Approximately 116 CY of material will be removed under this alternative and incinerated off site.	Protective. Capping prevents direct-contact risk to human receptors.	Protective. Removal of contaminated material in the upper 6 inches of soil eliminates direct-contact risk in the area of concern (AOC) and removes approximately 24 CY of impacted soil from the AOC. Following excavation, remaining impacted material in the AOC will be contained in place via capping.

Table 2 – Remediation Alternative Evaluation

Selection Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Comply with Cleanup Standards	Complies. Following removal, no contaminated soil exceeding the dioxin/furan cleanup level would remain in the AOC.	Complies. Following removal, no contaminated soil exceeding the dioxin/furan cleanup level would remain in the AOC.	Complies. Following removal, no contaminated soil exceeding the dioxin/furan cleanup level would remain in the AOC, except potentially in protected tree areas.	Complies. Following removal, no contaminated soil exceeding the dioxin/furan cleanup level would remain in the AOC, except potentially in protected tree areas.	Complies. The material left in place above the cleanup level will be contained via capping. Cleanup actions that involve containment can be deemed to meet cleanup standards if requirements set out in WAC 173-340-740(6)(f) are met (see Section 6.2.1).	Complies. The material left in place above the cleanup level will be contained via capping. Cleanup actions that involve containment can be deemed to meet cleanup standards if requirements set out in WAC 173-340-740(6)(f) are met (see Section 6.2.1).
Comply with Applicable State and Federal Laws	Complies. ARARs are judged to be attainable and do not affect the alternative selection process (see Table 1).	Complies. ARARs are judged to be attainable and do not affect the alternative selection process (see Table 1).	Complies. ARARs are judged to be attainable and do not affect the alternative selection process (see Table 1).	Complies. ARARs are judged to be attainable and do not affect the alternative selection process (see Table 1).	Complies. ARARs are judged to be attainable and do not affect the alternative selection process (see Table 1).	Complies. ARARs are judged to be attainable and do not affect the alternative selection process (see Table 1).
Provide for Compliance Monitoring	Provides for compliance monitoring in accordance with WAC 173-340-410 as described in Section 5.2.1.	Provides for compliance monitoring in accordance with WAC 173-340-410 as described in Section 5.2.2.	Provides for compliance monitoring in accordance with WAC 173-340-410 as described in Section 5.2.3.	Provides for compliance monitoring in accordance with WAC 173-340-410 as described in Section 5.2.4.	Provides for compliance monitoring in accordance with WAC 173-340-410 as described in Section 5.2.5.	Provides for compliance monitoring in accordance with WAC 173-340-410 as described in Section 5.2.6.

Table 2 – Remediation Alternative Evaluation

Selection Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Other Requirements: WAC 173-340-360(2)(b)						
Use Permanent Solutions to the Maximum Extent Practicable	Uses permanent solutions to the maximum extent practicable, as described in Section 6.2.1 and Table 3.	Uses permanent solutions but is not practicable, as described in Section 6.2.1 and Table 3.	Does not use permanent solutions to the extent provided in Alternatives 1a and 1b, as described in Section 6.2.1 and Table 3. Provides more permanence than Alternatives 2 and 3.	Does not use permanent solutions to the extent provided in Alternatives 1a and 1b, as described in Section 6.2.1 and Table 3. Also not practicable. Provides more permanence than Alternatives 2 and 3.	Does not use permanent solutions to the extent provided in Alternatives 1a and 1b, as described in Section 6.2.1 and Table 3.	Does not use permanent solutions to the extent provided in Alternatives 1a and 1b, as described in Section 6.2.1 and Table 3. Provides more permanence than Alternative 2.
Provide for a Reasonable Restoration Time Frame	Provides a reasonable restoration time frame. The work could be completed within one construction season.	Provides a reasonable restoration time frame. The work could be completed within one construction season.	Provides a reasonable restoration time frame to mitigate direct-contact exposure risk to receptors. However, some contaminated soil may remain contained within the AOC. The work could be completed within one construction season.	Provides a reasonable restoration time frame to mitigate direct-contact exposure risk to receptors. However, some contaminated soil may remain contained within the AOC. The work could be completed within one construction season.	Provides a reasonable restoration time frame to mitigate direct-contact exposure risk to receptors. However, contaminated soil will remain contained within the AOC. The work could be completed within one construction season.	Provides a reasonable restoration time frame to mitigate direct-contact exposure risk to receptors. However, contaminated soil will remain contained within the AOC. The work could be completed within one construction season.

Table 2 – Remediation Alternative Evaluation

Selection Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Consider Public Concerns	This criterion will be addressed during the public comment period for the FFS and Draft Cleanup Action Plan.					
Action-Specific Requirements: WAC 173-340-360(2)(c) through (h)						
Groundwater Cleanup Actions, WAC 173-340-360(2)(c)	Not applicable. There are no known dioxin/furan groundwater impacts at the site.					
Cleanup Actions for Soil at Current or Potential Future Residential Areas and for Soil at Schools and Child Care Centers, WAC 173-340-360(2)(d)	Complies. Alternative 1a meets the requirement because soil exceeding the cleanup level will be removed.	Complies. Alternative 1b meets the requirement because soil exceeding the cleanup level will be removed.	Complies. Alternative 1c meets the requirement because soil exceeding the cleanup level will be either removed or contained in place.	Complies. Alternative 1d meets the requirement because soil exceeding the cleanup level will be either removed or contained in place.	Complies. Alternative 2 meets the requirement because soil exceeding the cleanup level will be contained in place.	Complies. Alternative 3 meets the requirement because soil exceeding the cleanup level will be contained in place.

Table 2 – Remediation Alternative Evaluation

Selection Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Institutional Controls WAC 173-340-360(2)(e)	Complies. Alternative 1a does not rely primarily on institutional controls and monitoring.	Complies. Alternative 1b does not rely primarily on institutional controls and monitoring.	Complies. Alternative 1c may require institutional controls depending on the amount of contaminated soil remaining in protected tree areas; it does not rely primarily on institutional controls and monitoring.	Complies. Alternative 1d may require institutional controls depending on the amount of contaminated soil remaining in protected tree areas; it does not rely primarily on institutional controls and monitoring.	Complies. Alternative 2 uses institutional controls only to maintain the protectiveness of the cap; it does not rely primarily on institutional controls and monitoring.	Complies. Alternative 3 uses institutional controls only to maintain the protectiveness of the cap; it does not rely primarily on institutional controls and monitoring.
Releases and Migration WAC 173-340-360(2)(f)	Complies. Alternative 1a eliminates releases and migration of chemicals of concern (COCs) from the AOC by excavation and disposal.	Complies. Alternative 1b eliminates releases and migration of COCs from the AOC by excavation and disposal.	Complies. Alternative 1c minimizes releases and migration of COCs through the use of soil excavation to remove contaminated material and capping to contain remaining contaminated material in place.	Complies. Alternative 1d minimizes releases and migration of COCs through the use of soil excavation to remove contaminated material and capping to contain remaining contaminated material in place.	Complies. Alternative 2 contains COCs in place through capping. However, since dioxins/furans are relatively immobile in soil beneath the cap, their migration is not a concern.	Complies. Alternative 3 minimizes releases and migration of COCs through the use of surface soil excavation to remove contaminated material and capping to contain remaining contaminated material in place.
Dilution and Dispersion WAC 173-340-360(2)(g)	Complies. Alternative 1a does not rely on dilution and dispersion.	Complies. Alternative 1b does not rely on dilution and dispersion.	Complies. Alternative 1c does not rely on dilution and dispersion.	Complies. Alternative 1d does not rely on dilution and dispersion.	Complies. Alternative 2 does not rely on dilution and dispersion.	Complies. Alternative 3 does not rely on dilution and dispersion.

Table 2 – Remediation Alternative Evaluation

Selection Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Remediation Levels WAC 173-340-360(2)(h)	Not applicable. The alternatives do not involve remediation levels.					

Table 3 – Disproportionate Cost Analysis

Evaluation Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, Tree Protection, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, Tree Protection, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Protectiveness	Removal of hazardous substances would eliminate direct-contact risk to human receptors. Protectiveness would be achieved immediately upon completion of remedy. Alternatives 1a and 1b are judged to provide greater protectiveness than the other alternatives because they remove the contaminated material from the AOC.	Removal of hazardous substances would eliminate direct-contact risk to human receptors. Protectiveness would be achieved immediately upon completion of remedy. Alternatives 1a and 1b are judged to provide greater protectiveness than the other alternatives because they remove the contaminated material from the AOC.	Removal of hazardous substances in surface soil and capping would eliminate direct-contact risk to human receptors. Protectiveness would be achieved immediately upon completion of remedy. Alternatives 1c and 1d are considered more protective than Alternatives 2 and 3 but less protective than Alternatives 1a and 1b.	Removal of hazardous substances in surface soil and capping would eliminate direct-contact risk to human receptors. Protectiveness would be achieved immediately upon completion of remedy. Alternatives 1c and 1d are considered more protective than Alternatives 2 and 3 but less protective than Alternatives 1a and 1b.	Capping would prevent direct-contact risk to human receptors. Protectiveness would be achieved immediately upon completion of remedy. Alternative 2 is considered less protective than Alternatives 1a, 1b, 1c, 1d, and 3, since contaminated material will be contained in place in the AOC.	Removal of hazardous substances in surface soil and capping would eliminate direct-contact risk to human receptors. Protectiveness would be achieved immediately upon completion of remedy. Alternative 3 is considered more protective than Alternative 2 but less protective than Alternatives 1a, 1b, 1c, and 1d.
Permanence	Provides reduction in toxicity and volume of contaminants in the AOC. Risk of contaminant mobility would be eliminated by removing the contaminated soil and placing it in an off-site engineered, lined, and monitored landfill facility. For remediation of the areas of concern (AOC), Alternative 1a is considered more permanent than Alternatives 1c, 1d, 2, and 3, and as permanent as Alternative 1b.	Provides reduction in toxicity and volume of contaminants in the AOC. Risk of contaminant mobility would be eliminated by removing the contaminated soil and thermally treating it at a permitted incineration facility to achieve destruction of the contaminants. For remediation of the AOC, Alternative 1b is considered more permanent than Alternatives 1c, 1d, 2, and 3, and as permanent as Alternative 1a.	Provides reduction in toxicity and volume of contaminants in the AOC. Risk of contaminant mobility would be reduced by removing the contaminated soil and placing it in an off-site engineered, lined, and monitored landfill facility. Capping controls the mobility of contaminants remaining in place in the AOC. Long-term monitoring, maintenance, and institutional controls are required to maintain the integrity of the remedial action. For remediation of the AOC, Alternative 1c is considered less permanent than Alternatives 1a and 1b, but more permanent than Alternatives 2 and 3.	Provides reduction in toxicity and volume of contaminants in the AOC. Risk of contaminant mobility would be reduced removing the contaminated soil and thermally treating it at a permitted incineration facility to achieve destruction of the contaminants. Capping controls the mobility of contaminants remaining in place in the AOC. Long-term monitoring, maintenance, and institutional controls are required to maintain the integrity of the remedial action. For remediation of the AOC, Alternative 1d is considered less permanent than Alternatives 1a and 1b, but more permanent than Alternatives 2 and 3.	Capping provides less permanence than the soil removal alternatives but controls mobility of contaminants in the AOC. Long-term monitoring, maintenance, and institutional controls are required to maintain the integrity of the remedial action. Alternative 2 is considered the least permanent of the six alternatives.	Provides some reduction in toxicity and volume of contaminants. Risk of contaminant mobility would be greatly reduced by removing the surface layer of contaminated soil and placing it in an off-site engineered, lined, and monitored landfill facility. Capping controls the mobility of contaminants remaining in place in the AOC. Long-term monitoring, maintenance, and institutional controls are required to maintain the integrity of the remedial action. Alternative 3 is considered less permanent than Alternative 1a and 1b and more permanent than Alternative 2.
Cost	$111,000	$278,000	$106,000	$242,000	$107,000	$112,000
Effectiveness over the Long Term	Removal of contaminated soil from the AOC is very effective over the long term, since direct-contact exposure risk will be eliminated. Subtitle D landfills are proven and expected to be highly effective over the long term. Alternative 1a is	Removal of contaminated soil from the AOC is very effective over the long term, since direct-contact exposure risk will be eliminated. Incineration facilities are highly effective over the long term since contaminant mass will be destroyed.	Alternative 1c is considered more effective over the long term than Alternatives 2 and 3, but less effective than Alternatives 1a and 1b. Subtitle D landfills are proven and expected to be highly effective over the long term. Capping is a	Alternative 1d is considered more effective over the long term than Alternatives 2 and 3, but less effective than Alternatives 1a and 1b. Incineration facilities are highly effective over the long term since contaminant mass will be destroyed.	Capping is a proven technology that is expected to be effective over the long term for containing contaminated material in place. However, long-term effectiveness of the remedy relies on maintenance, monitoring, and institutional controls. Alternative 2 is	Alternative 3 is considered more effective over the long term than Alternative 2, but less effective than Alternatives 1a and 1b. Subtitle D landfills are proven and expected to be highly effective over the long term. Capping is a proven

Table 3 – Disproportionate Cost Analysis

Evaluation Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, Tree Protection, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, Tree Protection, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Effectiveness over the Long Term (continued)	considered equally effective over the long term for the AOC as Alternative 1b and more effective over the long term than the other alternatives.	Alternative 1b is considered equally effective over the long term for the AOC as Alternative 1a and more effective over the long term than the other alternatives.	proven technology that is expected to be effective over the long term for containing remaining contamination in place in the AOC. However, long-term effectiveness relies on maintenance, monitoring, and institutional controls.	Capping is a proven technology that is expected to be effective over the long term for containing remaining contamination in place in the AOC. However, long-term effectiveness relies on maintenance, monitoring, and institutional controls.	considered the least effective over the long term of the six remediation alternatives.	technology that is expected to be effective over the long term for containing remaining contamination in place in the AOC. However, long-term effectiveness relies on maintenance, monitoring, and institutional controls.
Management of Short-Term Risks	All of the remediation alternatives employ relatively common on-site construction activities with similar short-term risks. However, handling and off-site transport of contaminated soil pose additional short-term risks, such as potential direct-contact exposure risk to the transport personnel and risk of cross-contamination in the event of material loss or spillage during transport. For these reasons, Alternatives 1a and 1b are judged to have equivalent short-term risks, but greater short-term risks than Alternatives 1c, 1d, and 3, which also involves off-site transport of waste material but a lesser quantity. Alternative 2 presents the least short-term risk.	All of the remediation alternatives employ relatively common on-site construction activities with similar short-term risks. However, handling and off-site transport of contaminated soil pose additional short-term risks, such as potential direct-contact exposure risk to the transport personnel and risk of cross-contamination in the event of material loss or spillage during transport. For these reasons, Alternative 1b is judged to have equivalent short-term risks to Alternative 1a, and greater short-term risks than Alternative 3, which also involves off-site transport of waste material but a lesser quantity. Alternative 2 presents the least short-term risk.	All of the remediation alternatives employ relatively common on-site construction activities with similar short-term risks. Alternative 1c includes limited excavation and off-site transport and disposal, which pose additional short-term risks, but to a lesser extent than in Alternatives 1a and 1b and greater extent than Alternative 3. Alternatives 1a and 1b are judged to have greater short-term risks than Alternatives 1c, 1d, and 3. Alternative 2 presents the least short-term risk.	All of the remediation alternatives employ relatively common on-site construction activities with similar short-term risks. Alternative 1d includes limited excavation and off-site transport and disposal, which pose additional short-term risks, but to a lesser extent than in Alternatives 1a and 1b and greater extent than Alternative 3. Alternatives 1a and 1b are judged to have greater short-term risks than Alternatives 1c, 1d, and 3. Alternative 2 presents the least short-term risk.	All of the remediation alternatives employ relatively common on-site construction activities with similar short-term risks. However, in Alternative 2, contaminated soil will be contained in place, and no material will be removed and transported off site. For this reason, Alternative 2 presents the least short-term risk of the six remediation alternatives.	All of the remediation alternatives employ relatively common on-site construction activities with similar short-term risks. Alternative 3 includes limited excavation and off-site transport and disposal, which pose additional short-term risks, but to a lesser extent than in Alternatives 1a and 1b. Alternatives 1a and 1b are judged to have greater short-term risks than Alternatives 1c, 1d, and 3. Alternative 2 presents the least short-term risk.
Technical and Administrative Implementability	The excavation and hauling required for Alternative 1a may be staged to limit disruptions to the local infrastructure to the extent practicable, but some minor amount of business and traffic disruptions are likely to occur. Alternative 1a would have similar disruptions to Alternative 1b, but more disruptions than Alternative 3. Alternative 2 would likely present fewer disruptions during construction.	The excavation and hauling required for Alternative 1b may be staged to limit disruptions to the local infrastructure to the extent practicable, but some minor amount of business and traffic disruptions are likely to occur. Alternative 1b would have similar disruptions to Alternative 1a, but more disruptions than Alternative 3. Alternative 2 would likely present fewer disruptions during construction.	The excavation and hauling required for Alternative 1c may be staged to limit disruptions to the local infrastructure to the extent practicable, but some minor amount of business and traffic disruptions are likely to occur. Alternatives 1c and 1d would likely have more disruptions than the other four alternatives. Alternative 1c would need to	The excavation and hauling required for Alternative 1d may be staged to limit disruptions to the local infrastructure to the extent practicable, but some minor amount of business and traffic disruptions are likely to occur. Alternatives 1c and 1d would likely have more disruptions than the other four alternatives. Alternative 1d would need to	Alternative 2 would likely present fewer disruptions during construction than the other alternatives. Alternative 2 would need to overcome fewer technical obstacles during construction within the AOC, such as having to avoid subsurface impacts to tree roots. Alternative 2 would require obtaining an environmental covenant for the contaminated soil contained beneath the cap. The six alternatives	The excavation and hauling required for Alternative 3 may be staged to limit disruptions to the local infrastructure to the extent practicable, but some minor amount of business and traffic disruptions are likely to occur. Alternative 3 would have fewer disruptions than Alternatives 1a and 1b, but more than Alternative 2. Alternative 3 would need to

Table 3 – Disproportionate Cost Analysis

Evaluation Criteria	Alternative 1a: Excavation and Off-Site Disposal	Alternative 1b: Excavation and Off-Site Incineration	Alternative 1c: Excavation, Off-Site Disposal, Tree Protection, and Institutional Controls	Alternative 1d: Excavation, Off-Site Incineration, Tree Protection, and Institutional Controls	Alternative 2: Capping and Institutional Controls	Alternative 3: Limited Excavation, Capping, and Institutional Controls
Technical and Administrative Implementability (continued)	Alternative 1a would require characterization and acceptance of the contaminated soil waste by the disposal facility. Alternatives 1a and 1b are assumed to remove all of the contaminated soil within the AOC, and therefore an environmental covenant would not be required. The six alternatives are technically implementable, but Alternative 1a may pose greater technical challenges than Alternative 2, which requires less disturbance of the subsurface. Alternative 1a would have similar technical implementability compared to Alternatives 1b and 3. Alternatives 1a and 1b have similar administrative implementability and are judged to be equally administratively implementable as Alternative 2 and more administratively implementable than Alternatives 1c, 1d, and 3.	Alternatives 1b would require characterization and acceptance of the contaminated soil waste by the disposal facility. Alternatives 1a and 1b are assumed to remove all of the contaminated soil within the AOC, and therefore an environmental covenant would not be required. The six alternatives are technically implementable, but Alternative 1b may pose greater technical challenges than Alternative 2, which requires less disturbance of the subsurface. Alternative 1b would have similar technical implementability compared to Alternatives 1a and 3. Alternatives 1a and 1b have similar administrative implementability and are judged to be equally administratively implementable as Alternative 2 and more administratively implementable than Alternatives 1c, 1d, and 3.	overcome greater technical obstacles to avoid tree root impacts when conducting excavation activities within the AOC, in comparison to Alternative 2. Alternative 1c would require characterization and acceptance of the excavated contaminated soil waste by the disposal facility. Alternatives 1c, 1d, 2, and 3 would each require obtaining an environmental covenant for contaminated soil remaining in the AOC. The six alternatives are technically implementable, but Alternatives 1c, 1d, and 3 may pose greater technical challenges than Alternatives 1a, 1b, and 2. Alternatives 1c, 1d, and 3 are judged to be the least administratively implementable of the six alternatives, since they will require off-site waste management and the filing of an environmental covenant.	overcome greater technical obstacles to avoid tree root impacts when conducting excavation activities within the AOC, in comparison to Alternative 2. Alternative 1d would require characterization and acceptance of the excavated contaminated soil waste by the disposal facility. Alternatives 1c, 1d, 2, and 3 would each require obtaining an environmental covenant for the contaminated soil remaining in the AOC. The six alternatives are technically implementable, but Alternatives 1c, 1d, and 3 may pose greater technical challenges than Alternatives 1a, 1b, and 2. Alternatives 1c, 1d, and 3 are judged to be the least administratively implementable of the six alternatives, since they will require off-site waste management and the filing of an environmental covenant.	are technically implementable, but Alternative 2 may be more implementable than the other alternatives since it requires less disturbance of the subsurface and is less constrained by the presence of tree roots. Alternative 2 is judged to be equally administratively implementable as Alternatives 1a and 1b, but more administratively implementable than Alternative 3.	overcome greater technical obstacles to avoid tree root impacts when conducting excavation activities within the AOC, in comparison to Alternative 2. Alternative 3 would require characterization and acceptance of the excavated contaminated soil waste by the disposal facility. Both Alternatives 2 and 3 would require obtaining an environmental covenant for the contaminated soil contained beneath the cap. The six alternatives are technically implementable, but Alternative 3 may pose greater technical challenges than Alternative 2. Alternative 3 is judged to be the least administratively implementable of the four alternatives, since it will require off-site waste management and the filing of an environmental covenant.
Consideration of Public Concerns	This criterion will be addressed during the public comment period for the FFS and CAP.					

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Table 4 - Remediation Alternative 1a Estimated Cost Summary

Location:	West Bay Marina Olympia, WA
Phase:	Feasibility Study (-35% to +50%)
Base Year:	2013
Date:	July 2014

Description: Alternative 1a involves excavation and off-site disposal of soil containing COCs above the cleanup level at a permitted, engineered, lined, and monitored landfill facility. This cost estimate assumes that the material will be disposed of at a Subtitle D landfill. Following excavation, the AOC will be backfilled to grade with clean fill material. Trees within the AOC will be removed to facilitate complete removal of contaminated soil. It is assumed that an environmental covenant will not be required for this alternative.

CAPITAL COSTS

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL	NOTES
Excavation and Disposal					
Mobilization/Demobilization	1	LS	$ 5,000	$ 5,000	Engineer's estimate.
Temp. Erosion & Sedimentation Control Measures	1	LS	$ 3,000	$ 3,000	Engineer's estimate.
Excavation and Loading	144	CY	$ 31	$ 4,394	Hydraulic backhoe, 0.5 CY bucket. 2010 RSMeans 31 23 16.16 6030 and 9024.
Tree and Stump Removal	6	EA	$ 494	$ 2,964	Remove selected trees in AOC using chainsaw and chipper. Stump removal by hydraulic backhoe 2010 RSMeans 31 13 13.20 3050 and 2040.
Waste Transportation and Disposal	215	ton	$ 47	$ 10,121	Roosevelt Regional Landfill, Subtitle D MSW facility. Vendor quote.
Performance Sampling and Analysis	1	LS	$ 9,750	$ 9,750	Analytical cost only, labor assumed to be part of construction management, 1 sample per 100 SF.
Tree and Stump Material Disposal	1	LS	$ 335	$ 335	Haul material and disposal fee for compost facility.
Excavation and Disposal Subtotal				**$ 35,563**	
Restoration and Revegetation					
Backfilling	144	CY	$ 36	$ 5,204	Includes compaction in 12" layers, vibrating plate. 2010 RSMeans 31 23 23.13 1100.
Grading & Seeding	144	SY	$ 3.70	$ 532	Fine grading and seeding, incl. lime, fertilizer & seed, with equipment. 2010 RSMeans 32 91 19.13 1000.
Planting Trees	6	EA	$ 67	$ 402	Planting trees, medium soil, bagged and burlapped, 12"diameter ball, by hand. 2010 RSMeans 32 93 43.10 0600.
Restoration and Revegetation Subtotal				**$ 6,138**	
Contingency	15%	--	--	**$ 6,255**	Scope and bid contingency. Percentage of capital costs.
Permitting					
Pre-Application Meeting with City of Olympia	1	LS	$ 240	$ 240	City of Olympia 2014 land use planning application fees, pre-submission conference.
Critical Areas Review Permit Application	1	LS	$ 2,534	$ 2,534	Thurston County application and review fees.
Clearing and Grading Permit Application	1	LS	$ 500	$ 500	Engineer's estiamte.
Planning Documents	1	LS	$ 9,000	$ 9,000	Drainage/erosion control plans, mitigation planting plan, monitoring plan. Engineer's estiamte.
Permitting Subtotal				**$ 12,274**	

Table 4 - Remediation Alternative 1a Estimated Cost Summary

Location:	West Bay Marina Olympia, WA	**Description:** Alternative 1a involves excavation and off-site disposal of soil containing COCs above the cleanup level at a permitted, engineered, lined, and monitored landfill facility. This cost estimate assumes that the material will be disposed of at a Subtitle D landfill. Following excavation, the AOC will be backfilled to grade with clean fill material. Trees within the AOC will be removed to facilitate complete removal of contaminated soil. It is assumed that an environmental covenant will not be required for this alternative.				
Phase:	Feasibility Study (-35% to +50%)					
Base Year:	2013					
Date:	July 2014					

Professional/Technical Services					
Project Management	10%	--	--	$ 4,796	Percentage of capital cost + contingency. EPA 540-R-00-002.
Remedial Design	20%	--	--	$ 9,591	Percentage of capital cost + contingency. EPA 540-R-00-002.
Construction Management	15%	--	--	$ 7,193	Percentage of capital cost + contingency. EPA 540-R-00-002.
Professional/Technical Services Subtotal				**$ 21,580**	
TOTAL CAPITAL COST				**$ 81,809**	

ANNUAL O&M COSTS

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL	NOTES
Site Restoration Monitoring					
Site Inspections	1	YR	$ 500	$ 500	Engineer's estimate.
Site Restoration Monitoring Subtotal				**$ 500**	
Contingency	10%	--	--	**$ 50**	Scope and bid contingency. Percentage of annual costs.
Professional/Technical Services					
Project Management	10%	--	--	$ 55	Percentage of O&M costs + contingency. EPA 540-R-00-002.
Technical Support	10%	--	--	$ 55	Percentage of O&M costs + contingency. EPA 540-R-00-002.
Reporting	1	EA	$ 500	$ 500	Engineer's estimate.
Professional/Technical Services Subtotal				**$ 610**	
TOTAL ANNUAL O&M COST				**$ 1,160**	

PERIODIC COSTS

DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL	NOTES
Site Maintenance					
Site Maintenance	1	YR	$ 1,534	$ 1,534	25% of restoration and revegetation costs, every 2 years.
Contingency	10%	--	--	$ 153	Scope and bid contingency. Percentage of periodic cost.
Project Management	10%	--	--	$ 169	Percentage of O&M costs + contingency. EPA 540-R-00-002.
Site Maintenance Subtotal				**$ 1,857**	
Professional/Technical Services					
5-Year Reviews & Reporting	1	EA	$ 5,000	$ 5,000	Engineer's estimate. Years 5 and 10.
Professional/Technical Services Subtotal				**$ 5,000**	

Table 4 - Remediation Alternative 1a Estimated Cost Summary

Location:	West Bay Marina Olympia, WA
Phase:	Feasibility Study (-35% to +50%)
Base Year:	2013
Date:	July 2014

Description: Alternative 1a involves excavation and off-site disposal of soil containing COCs above the cleanup level at a permitted, engineered, lined, and monitored landfill facility. This cost estimate assumes that the material will be disposed of at a Subtitle D landfill. Following excavation, the AOC will be backfilled to grade with clean fill material. Trees within the AOC will be removed to facilitate complete removal of contaminated soil. It is assumed that an environmental covenant will not be required for this alternative.

PRESENT VALUE ANALYSIS

Discount Rate	1.0%
Total Years	10

COST TYPE	YEAR	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR	NET PRESENT VALUE	NOTES
Capital	0	$ 81,809	$ 81,809	1.000	$ 81,809	
Annual O&M	1 - 10	$ 11,600	$ 1,160	9.471	$ 10,987	
Periodic	2	$ 1,857	$ 1,857	0.980	$ 1,820	
Periodic	4	$ 1,857	$ 1,857	0.961	$ 1,784	
Periodic	5	$ 5,000	$ 5,000	0.951	$ 4,757	
Periodic	6	$ 1,857	$ 1,857	0.942	$ 1,749	
Periodic	8	$ 1,857	$ 1,857	0.923	$ 1,715	
Periodic	10	$ 6,857	$ 6,857	0.905	$ 6,207	
		$ 112,693			$ 110,829	

TOTAL NET PRESENT VALUE OF ALTERNATIVE 1A **$ 110,829**

Notes:
Cost estimate does not include sales tax.
Present value analysis uses a 10-year discount rate of 1.0 percent (http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c).

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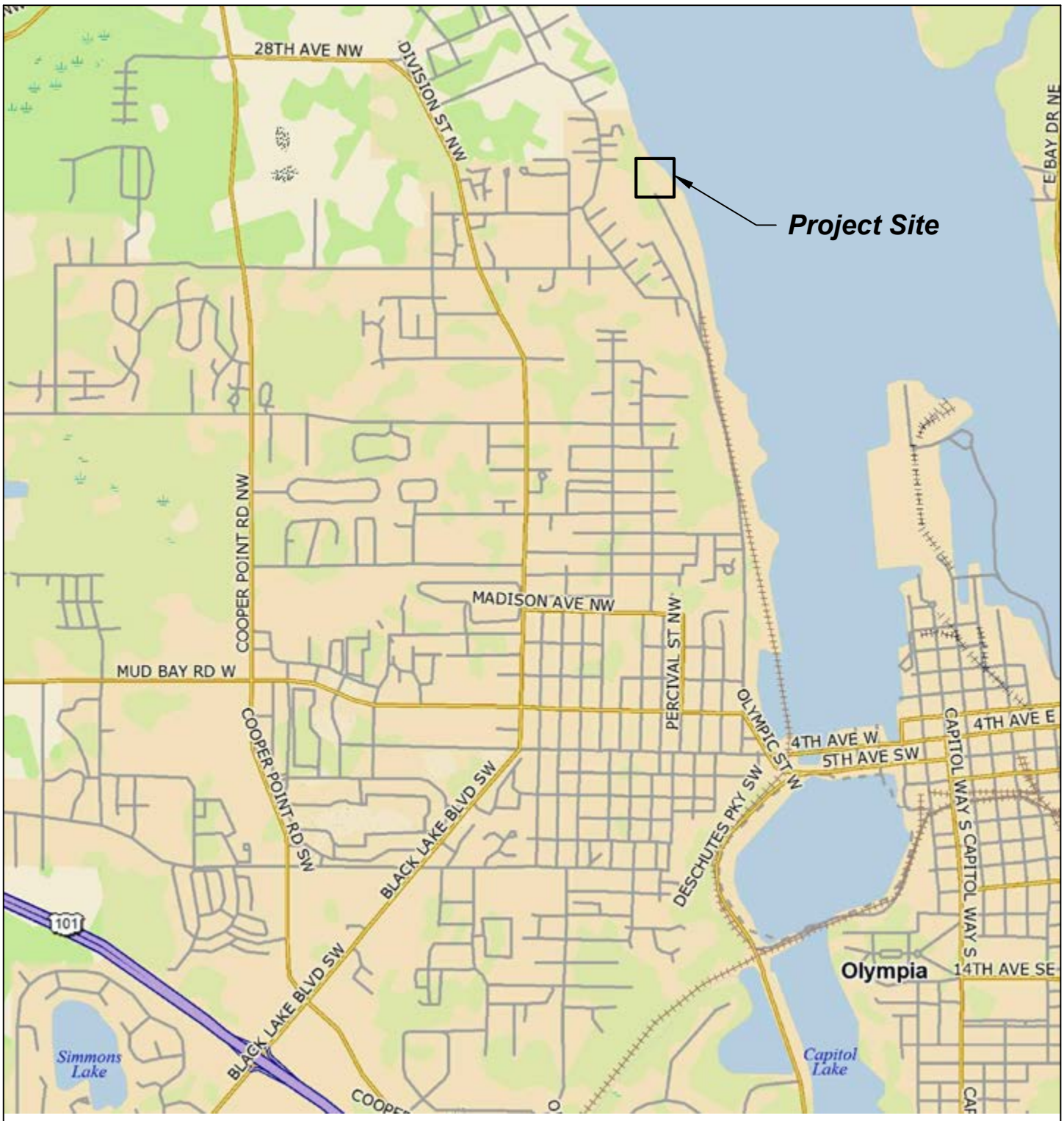
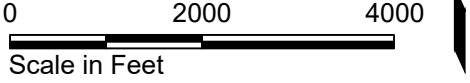


Source: Base map prepared from DeLorme Topo 7.0, 2007.



West Bay Marina
Olympia, Washington

Vicinity Map

17800-45 6/14

Figure **1**

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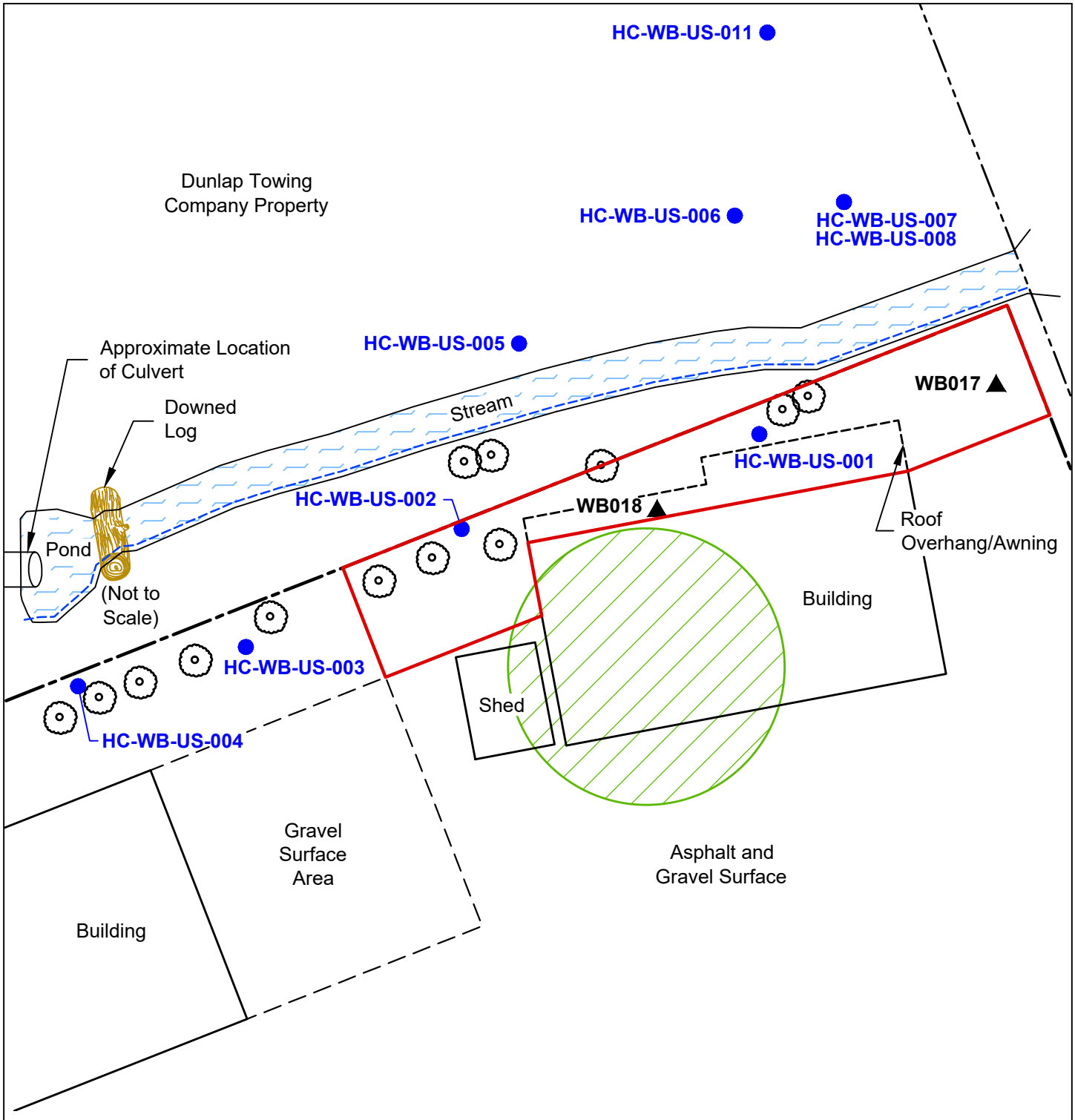

Source: Site plan digitized from aerial photograph from USGS Seamless Server, 2010, and field observations.

West Bay Marina
Olympia, Washington

Site Overview Map

17800-45 6/14

Figure
2

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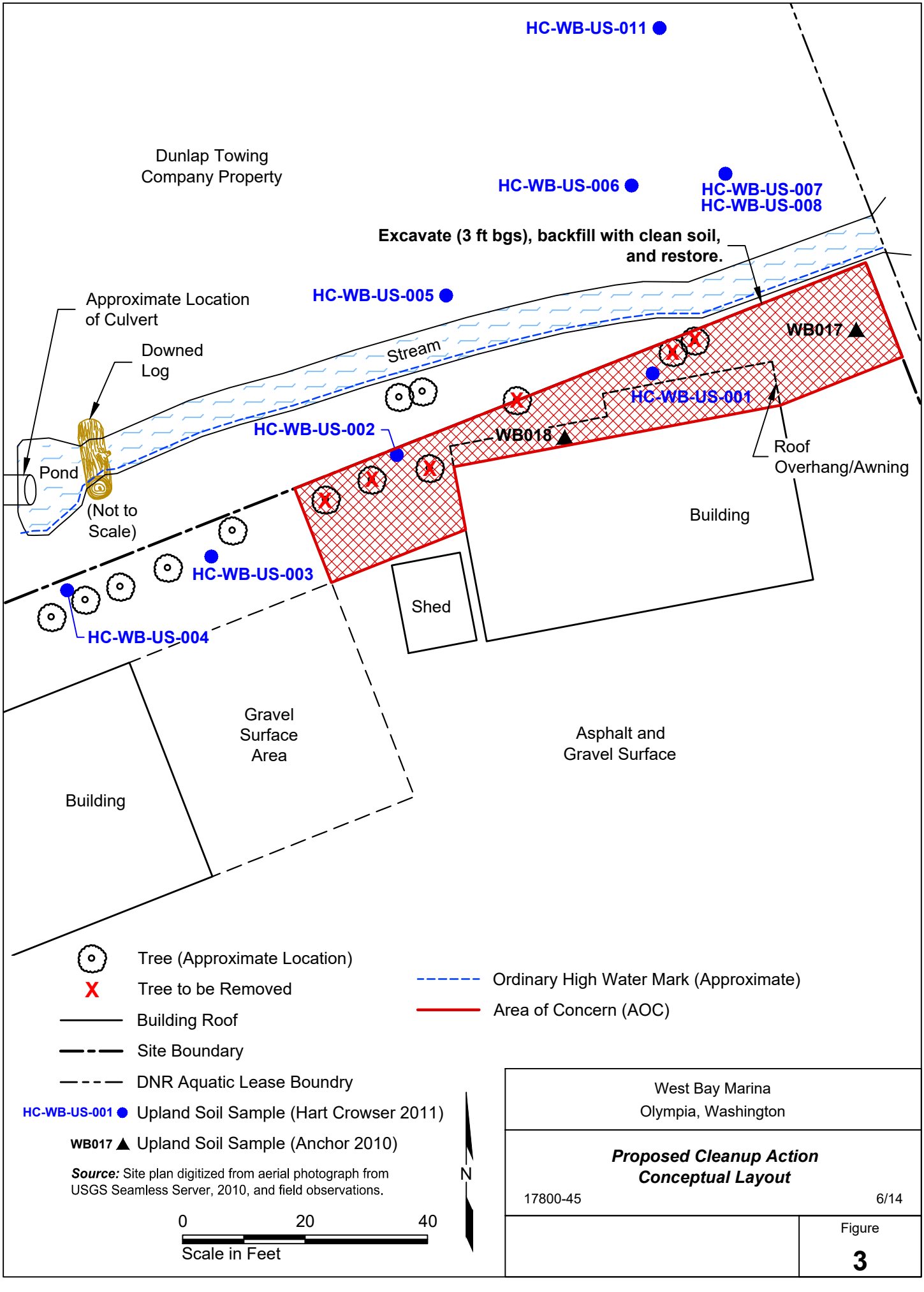

West Bay Marina
Olympia, Washington

Proposed Cleanup Action Conceptual Layout

17800-45 6/14

Figure
3

MAS 06/20/14 1780045-002thru005.dwg

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EXHIBIT C

PERMIT EXEMPTIONS AND SUBSTANTIVE REQUIREMENTS

The known permits and rules that are pertinent to this order and their respective substantive requirements are listed below. A contact and phone number are provided for the state agency or local government that would typically administer each permit or applicable regulation. Ecology will make a final determination regarding which substantive requirements will apply in situations where requirements conflict.

Permits pertinent to this action:

1. Grading Permit – City of Olympia (Contact: Community Planning and Development 360-753-8314)
2. Shoreline/Critical Areas Review – City of Olympia (Contact: Community Planning and Development 360-753-8314)
3. Hydraulic Project Approval – Washington Department of Fish and Wildlife (Contact: Darric Lowery 360-902-2425)
4. Construction Stormwater General Permit – Washington State Dept. of Ecology (Contact: Deborah Cornett 360-407-7269)

Permits potentially exempt and their substantive requirements.

1. City grading permit.
    a. Develop a Tree Protection and Replacement Plan
    b. Meet requirements in accordance with the grading application.
2. Shoreline/Critical Areas Review.
    a. Develop a Critical Areas Mitigation and Planting Plan
3. Hydraulic Project Approval.
    a. Adhere to Timing Restrictions- No work between March 15 and June 14.
    b. Develop a Mitigation Plan
    c. Develop an Erosion and Sediment Control Plan (TESC)
4. Construction Stormwater General Permit.
    a. Section S9-Stormwater Pollution Prevention Plan, Subsections A-E.

ATTACHMENT B
PHOTOGRAPHS

Photograph 1 – View east of the northern extent of the Property, showing installation of silt fencing along the northern and eastern excavation extents prior to placement of straw waddles.

Photograph 2 – View north from the eastern extent of the Property, showing initial excavation and vacuum removal of contaminated soils, and the stormwater BMPs protecting the marine environment from impacts.

Photograph 3 – View of the covered stockpile area in the northwestern portion of the Property, showing the vacuum truck discharging its first load to the tarped stockpile area.

Photograph 4 – View east from the northwest corner of the office structure, showing most of the completed northern excavated area prior to backfilling.

Photograph 5 – View east from the western extent of the northern excavation, showing the covered excavation area. The blue tarp covers a remaining tree stump and the white plastic covers the open excavation.

Photograph 6 – View east from the western extent of the excavation, showing the initial placement of topsoil backfill using the conveyor boom truck. The down tube was placed as low as possible to minimize dust.

Photograph 7 – View north from the southeast extent of the excavation, showing the completed topsoil backfill and silt fencing and straw waddles remaining in place.

Photograph 8 – View west from the western region of the excavation, showing the completed topsoil backfill and silt fencing and straw waddles remaining in place.

Photograph 9 – Viet east from the western extent of the excavation, showing the hydroseeded grass growing on the excavation backfill in the northern extent of the Property.

Photograph 10 – View south from the eastern portion of the excavation, showing the hydroseeded grass growing on the excavation backfill, and the newly installed concrete cap to the east of the building.

Photograph 11 – View north from the southwest corner of the office structure, showing a portion of the newly installed asphalt paved cap to the south of the structure, and the concrete cap to the east of the structure.

Photograph 12 – View west from the north-central portion of the Property, showing the southwest corner of the northern office structure (right) and the new asphalt cap in the northwestern portion of the Property.

ATTACHMENT C
SOIL DISPOSAL TICKETS

West Bay Marina
2100 West Bay drive NW
Olympia, Washington

Summary of Disposal Tickets

Load #	Transaction #	Truck ID	Date	Time Out	Tonnage
1	505135	PACIFICNW A123	6/29/2017	15:18	14.77
2*	505195	PNWA123	7/3/2017	8:02	15.77
3	505201	PNWA123	7/3/2017	8:30	12.75
4	505221	PNWA123	7/3/2017	12:10	15.73
5	505257	PNWEXC123	7/5/2017	8:28	12.42
6	505293	PACNW123	7/6/2017	8:22	10.13
7	505305	PACNW A123	7/6/2017	12:53	8.37
Total					**89.94**

* = Load #2 was delivered on 6/30/17 while the landfill gatehouse was unmanned. The date and time stamp represent when the load was logged, and the ticket was generated.

COWLITZ COUNTY DEPARTMENT OF PUBLIC WORKS
1600 13TH AVENUE SOUTH * KELSO, WA 98626
PHONE 577-3035 * LANDFILL SITE 274-6492
3434 SOUTH SILVER LAKE RD. * CASTLE ROCK, WA 98611
www.co.cowlitz.wa.us

RECEIPT

(3)

Transaction # 505201

	Time	Date	Lane
In:	08:04 AM	07/03/17	01
Out:	08:30 AM	07/03/17	02

Truck/Card#: PNWA123
Fleet #:
Bill Acct: 7639
Company: STEMEN ENIRONMENTAL

Vehicle: Dump Truck
Origin: PCS - Out Of County
Destination: Fulcher

Material: PCS - 5

Gross:	25.39 tons	50780 lbs
Tare:	12.64 tons	25280 lbs
Net:	12.75 tons	25500 lbs

Billing Information:

Payment Type:		
Tip Fee:	@	/TN
Tipper Fee:		
Agency Fee:		
Excise Tax:		
Cleanup Fee:		
Tax:		
Total Fee:		

Notes:

(1)

COWLITZ COUNTY DEPARTMENT OF PUBLIC WORKS
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PHONE 577-3035 * LANDFILL SITE 274-6492
3434 SOUTH SILVER LAKE RD. * CASTLE ROCK, WA 98611
www.co.cowlitz.wa.us

RECEIPT

(2)

Transaction # 505195

	Time	Date	Lane
In:	08:02 AM	07/03/17	KH
Out:	08:02 AM	07/03/17	KH

Truck/Card#: PNWA123
Fleet #:
Bill Acct: 7639
Company: STEMEN ENIRONMENTAL

Vehicle: Dump Truck
Origin: PCS - Out Of County
Destination: Fulcher

Material: PCS - 5

Gross:	28.32 tons	56640 lbs
Tare:	12.55 tons	25100 lbs
Net:	15.77 tons	31540 lbs

Billing Information:

Payment Type:	1 - Charge	
Tip Fee:	0.00 @	0.00/TN
Tipper Fee:	0.00	
Agency Fee:	0.00	
Excise Tax:	0.00	
Cleanup Fee:	0.00	
Tax:	0.00	
Total Fee:	0.00	

Notes:

(1)

(1)

COWLITZ COUNTY DEPARTMENT OF PUBLIC WORKS
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PHONE 577-3035 * LANDFILL SITE 274-6492
3434 SOUTH SILVER LAKE RD. * CASTLE ROCK, WA 98611
www.co.cowlitz.wa.us

RECEIPT

Transaction # 505135

	Time	Date	Lane
In:	02:59 PM	06/29/17	01
Out:	03:18 PM	06/29/17	02

Truck/Card#: PACIFICNW A123
Fleet #:
Bill Acct: 7639
Company: STEMEN ENIRONMENTAL

Vehicle: Dump Truck
Origin: PCS - Out Of County
Destination: Fulcher

Material: PCS - 5

Gross:	27.22 tons	54440 lbs
Tare:	12.45 tons	24900 lbs
Net:	14.77 tons	29540 lbs

Billing Information:

Payment Type:	1 - Charge	
Tip Fee:	0.00 @	0.00/TN
Tipper Fee:	0.00	
Agency Fee:	0.00	
Excise Tax:	0.00	
Cleanup Fee:	0.00	
Tax:	0.00	
Total Fee:	0.00	

Notes:

(1)

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RECEIPT (6)

Transaction # 505293

	Time	Date	Lane
In:	08:11 AM	07/06/17	01
Out:	08:22 AM	07/06/17	02

Truck/Card#: PACNW123
Fleet #:
Bill Acct: 7639
Company: STEMEN ENIRONMENTAL

Vehicle: Truck Trailer
Origin: PCS - Out Of County
Destination: Fulcher

Material: PCS - 5

Gross:	22.79 tons	45580 lbs
Tare:	12.66 tons	25320 lbs
Net:	10.13 tons	20260 lbs

Billing Information:

Payment Type:
Tip Fee: @ /TN
Tipper Fee:
Agency Fee:
Excise Tax:
Cleanup Fee:
Tax:
Total Fee:

Notes:

(1)

COWLITZ COUNTY DEPARTMENT OF PUBLIC WORKS
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3434 SOUTH SILVER LAKE RD. • CASTLE ROCK, WA 98611
www.co.cowlitz.wa.us
RECEIPT (5)

Transaction # 505257

	Time	Date	Lane
In:	08:16 AM	07/05/17	01
Out:	08:28 AM	07/05/17	02

Truck/Card#: PNWEXC123
Fleet #:
Bill Acct: 7639
Company: STEMEN ENIRONMENTAL

Vehicle: Dump Truck
Origin: PCS - Out Of County
Destination: Fulcher

Material: PCS - 5

Gross:	24.85 tons	49700 lbs
Tare:	12.43 tons	24860 lbs
Net:	12.42 tons	24840 lbs

Billing Information:

Payment Type:
Tip Fee: @ /TN
Tipper Fee:
Agency Fee:
Excise Tax:
Cleanup Fee:
Tax:
Total Fee:

Notes:

(1)

COWLITZ COUNTY DEPARTMENT OF PUBLIC WORKS
1600 13TH AVENUE SOUTH • KELSO, WA 98626
PHONE 577-3035 • LANDFILL SITE 274-6492
3434 SOUTH SILVER LAKE RD. • CASTLE ROCK, WA 98611
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RECEIPT (4)

Transaction # 505221

	Time	Date	Lane
In:	11:59 AM	07/03/17	01
Out:	12:10 PM	07/03/17	02

Truck/Card#: PNWA123
Fleet #:
Bill Acct: 7639
Company: STEMEN ENIRONMENTAL

Vehicle: Dump Truck
Origin: PCS - Out Of County
Destination: Fulcher

Material: PCS - 5

Gross:	28.37 tons	56740 lbs
Tare:	12.64 tons	25280 lbs
Net:	15.73 tons	31460 lbs

Billing Information:

Payment Type:
Tip Fee: @ /TN
Tipper Fee:
Agency Fee:
Excise Tax:
Cleanup Fee:
Tax:
Total Fee:

Notes:

(1)

COWLITZ COUNTY DEPARTMENT OF PUBLIC WORKS
1600 13TH AVENUE SOUTH • KELSO, WA 98626
PHONE 577-3035 • LANDFILL SITE 274-6492
3434 SOUTH SILVER LAKE RD. • CASTLE ROCK, WA 98611
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R E C E I P T

7

Transaction # 505305

	Time	Date	Lane
In:	12:40 PM	07/06/17	01
Out:	12:53 PM	07/06/17	02

Truck/Card#: PACNW A123
Fleet #:
Bill Acct: 7639
Company: STEMEN ENIRONMENTAL

Vehicle: Dump Truck
Origin: PCS - Out Of County
Destination: Fulcher

Material: PCS - 5

Gross:	20.89 tons	41780 lbs
Tare:	12.52 tons	25040 lbs
Net:	8.37 tons	16740 lbs

Billing Information:

Payment Type:
Tip Fee: @ /TN
Tipper Fee:
Agency Fee:
Excise Tax:
Cleanup Fee:
Tax:

Total Fee:

Notes:

(1)

ATTACHMENT D
ANALYTICAL LABORATORY REPORTS

Analytical Resources, Incorporated
Analytical Chemists and Consultants

22 July 2016

Paul Stemen
Stemen Environmental, Inc.
5724 Puget Beach Road NE
Olympia, WA 98516

RE: West Bay Marina

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
16G0055	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the reqirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

Mark Harris, Project Manager

nelac Cert# 100006

PJLA Testing Accreditation # 66169

File not found: Work\16G\16G0055_COC_00.pdf

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S1:1-2	16G0055-01	Solid	24-Jun-2016 09:50	24-Jun-2016 16:16
S2:2	16G0055-02	Solid	24-Jun-2016 10:12	24-Jun-2016 16:16
S4:2	16G0055-03	Solid	24-Jun-2016 13:35	24-Jun-2016 16:16
S5:0-1	16G0055-04	Solid	24-Jun-2016 11:55	24-Jun-2016 16:16
S6:0-1	16G0055-05	Solid	24-Jun-2016 11:40	24-Jun-2016 16:16
S7:0-1	16G0055-06	Solid	24-Jun-2016 11:10	24-Jun-2016 16:16
S8:0-1	16G0055-07	Solid	24-Jun-2016 10:30	24-Jun-2016 16:16
S3:2	16G0055-08	Solid	24-Jun-2016 11:28	24-Jun-2016 16:16
Duplicate 1	16G0055-09	Solid	24-Jun-2016 00:00	24-Jun-2016 16:16
Wipe Blank 1	16G0055-10	Wipes	24-Jun-2016 09:00	24-Jun-2016 16:16
Equipment Blank 1	16G0055-11	Wipes	24-Jun-2016 09:58	24-Jun-2016 16:16

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

All analyses proceeded without incident of note.

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Analytical Resources, Incorporated
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Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S1:1-2

16G0055-01 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**85.76**	%	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S1:1-2

16G0055-01 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 17:46

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.68 g (wet)	Dry Weight:10.02 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 85.76
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.738	0.655-0.886		0.998	**3.33**	ng/kg	
2,3,7,8-TCDD	1	0.557	0.655-0.886		0.998	**0.772**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.456	1.318-1.783		0.998	**4.23**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.604	1.318-1.783		0.998	**3.75**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.651	1.318-1.783		0.998	**4.47**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.247	1.054-1.426		0.998	**5.83**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.212	1.054-1.426		0.998	**3.71**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.262	1.054-1.426		0.998	**4.12**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.082	1.054-1.426		0.998	**2.58**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.341	1.054-1.426		0.998	**5.28**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.213	1.054-1.426		0.998	**21.4**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.154	1.054-1.426		0.998	**10.0**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.040	0.893-1.208		0.998	**54.1**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.855	0.893-1.208		0.998	**3.33**	ng/kg	EMPC
1,2,3,4,6,7,8-HpCDD	1	1.031	0.893-1.208		0.998	**397**	ng/kg	B
OCDF	1	0.891	0.757-1.024		2.00	**76.5**	ng/kg	B
OCDD	1	0.891	0.757-1.024		2.00	**2210**	ng/kg	B
Homologue group								
Total TCDF	1				0.998	**79.4**	ng/kg	
Total TCDD	1				0.998	**56.5**	ng/kg	B
Total PeCDF	1				0.998	**70.8**	ng/kg	B
Total PeCDD	1				0.998	**76.7**	ng/kg	B
Total HxCDF	1				0.998	**117**	ng/kg	B
Total HxCDD	1				0.998	**175**	ng/kg	B
Total HpCDF	1				0.998	**161**	ng/kg	B
Total HpCDD	1				0.998	**815**	ng/kg	B

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S1:1-2

16G0055-01 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 17:46

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						17.35		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						17.35		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S1:1-2

16G0055-01 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 17:46

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.784*	*0.655-0.886*		*24-169 %*	*84.5*	*%*	
13C12-2,3,7,8-TCDD	1	*0.804*	*0.655-0.886*		*25-164 %*	*80.7*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.564*	*1.318-1.783*		*24-185 %*	*78.4*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.571*	*1.318-1.783*		*21-178 %*	*79.6*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.586*	*1.318-1.783*		*25-181 %*	*73.7*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.524*	*0.434-0.587*		*26-152 %*	*98.0*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.519*	*0.434-0.587*		*26-123 %*	*91.7*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.526*	*0.434-0.587*		*28-136 %*	*91.1*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.519*	*0.434-0.587*		*29-147 %*	*93.5*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.295*	*1.054-1.426*		*32-141 %*	*96.5*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.242*	*1.054-1.426*		*28-130 %*	*90.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.445*	*0.374-0.506*		*28-143 %*	*85.0*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.443*	*0.374-0.506*		*26-138 %*	*76.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.058*	*0.893-1.208*		*23-140 %*	*84.0*	*%*	
13C12-OCDD	1	*0.892*	*0.757-1.024*		*17-157 %*	*65.6*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*89.5*	*%*	

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S2:2

16G0055-02 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**84.74**	%	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S2:2

16G0055-02 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 18:40

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.96 g (wet)	Dry Weight:10.13 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 84.74
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.756	0.655-0.886		0.987	**6.36**	ng/kg	
2,3,7,8-TCDD	1	0.667	0.655-0.886		0.987	**1.57**	ng/kg	
1,2,3,7,8-PeCDF	1	1.552	1.318-1.783		0.987	**4.36**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.445	1.318-1.783		0.987	**3.36**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.515	1.318-1.783		0.987	**5.93**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.300	1.054-1.426		0.987	**3.44**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.171	1.054-1.426		0.987	**2.66**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.210	1.054-1.426		0.987	**2.51**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.555	1.054-1.426		0.987	**0.760**	ng/kg	EMPC, J, B
1,2,3,4,7,8-HxCDD	1	1.169	1.054-1.426		0.987	**2.33**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.366	1.054-1.426		0.987	**5.37**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.302	1.054-1.426		0.987	**4.57**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.098	0.893-1.208		0.987	**7.08**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.950	0.893-1.208		0.987	**0.871**	ng/kg	J
1,2,3,4,6,7,8-HpCDD	1	1.036	0.893-1.208		0.987	**30.4**	ng/kg	B
OCDF	1	0.793	0.757-1.024		1.97	**5.89**	ng/kg	B
OCDD	1	0.897	0.757-1.024		1.97	**122**	ng/kg	B
Homologue group								
Total TCDF	1				0.987	**127**	ng/kg	
Total TCDD	1				0.987	**445**	ng/kg	B
Total PeCDF	1				0.987	**52.4**	ng/kg	B
Total PeCDD	1				0.987	**262**	ng/kg	B
Total HxCDF	1				0.987	**25.9**	ng/kg	B
Total HxCDD	1				0.987	**208**	ng/kg	B
Total HpCDF	1				0.987	**13.1**	ng/kg	B
Total HpCDD	1				0.987	**61.3**	ng/kg	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S2:2

16G0055-02 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 18:40

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						11.86		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						11.86		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S2:2

16G0055-02 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 18:40

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.781*	*0.655-0.886*		*24-169 %*	*86.1*	*%*	
13C12-2,3,7,8-TCDD	1	*0.787*	*0.655-0.886*		*25-164 %*	*82.6*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.583*	*1.318-1.783*		*24-185 %*	*82.3*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.587*	*1.318-1.783*		*21-178 %*	*81.7*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.590*	*1.318-1.783*		*25-181 %*	*76.9*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.522*	*0.434-0.587*		*26-152 %*	*96.8*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.528*	*0.434-0.587*		*26-123 %*	*90.2*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.522*	*0.434-0.587*		*28-136 %*	*87.6*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.532*	*0.434-0.587*		*29-147 %*	*86.6*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.274*	*1.054-1.426*		*32-141 %*	*93.6*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.263*	*1.054-1.426*		*28-130 %*	*87.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.451*	*0.374-0.506*		*28-143 %*	*82.3*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.444*	*0.374-0.506*		*26-138 %*	*71.0*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.058*	*0.893-1.208*		*23-140 %*	*80.6*	*%*	
13C12-OCDD	1	*0.904*	*0.757-1.024*		*17-157 %*	*55.9*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*93.9*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S4:2

16G0055-03 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**88.58**	%	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S4:2

16G0055-03 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 20:33

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.34 g (wet)	Dry Weight:10.04 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 88.58
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.762	0.655-0.886		0.996	**1.58**	ng/kg	
2,3,7,8-TCDD	1	0.639	0.655-0.886		0.996	**0.585**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.611	1.318-1.783		0.996	**2.10**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.377	1.318-1.783		0.996	**2.25**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.583	1.318-1.783		0.996	**7.05**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.127	1.054-1.426		0.996	**3.91**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.310	1.054-1.426		0.996	**6.06**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.316	1.054-1.426		0.996	**6.97**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.145	1.054-1.426		0.996	**1.95**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.268	1.054-1.426		0.996	**9.50**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.253	1.054-1.426		0.996	**27.6**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.255	1.054-1.426		0.996	**21.1**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.024	0.893-1.208		0.996	**55.5**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.108	0.893-1.208		0.996	**4.08**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.044	0.893-1.208		0.996	**409**	ng/kg	B
OCDF	1	0.875	0.757-1.024		1.99	**82.6**	ng/kg	B
OCDD	1	0.879	0.757-1.024		1.99	**2420**	ng/kg	B
Homologue group								
Total TCDF	1				0.996	**50.2**	ng/kg	
Total TCDD	1				0.996	**10.6**	ng/kg	B
Total PeCDF	1				0.996	**62.9**	ng/kg	B
Total PeCDD	1				0.996	**34.8**	ng/kg	B
Total HxCDF	1				0.996	**123**	ng/kg	B
Total HxCDD	1				0.996	**166**	ng/kg	B
Total HpCDF	1				0.996	**148**	ng/kg	B
Total HpCDD	1				0.996	**759**	ng/kg	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S4:2

16G0055-03 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 20:33

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						21.68		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						21.68		

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S4:2

16G0055-03 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 20:33

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.788*	*0.655-0.886*		*24-169 %*	*82.7*	*%*	
13C12-2,3,7,8-TCDD	1	*0.778*	*0.655-0.886*		*25-164 %*	*86.1*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.576*	*1.318-1.783*		*24-185 %*	*81.3*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.569*	*1.318-1.783*		*21-178 %*	*83.3*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.573*	*1.318-1.783*		*25-181 %*	*78.0*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.510*	*0.434-0.587*		*26-152 %*	*99.0*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.528*	*0.434-0.587*		*26-123 %*	*90.3*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.522*	*0.434-0.587*		*28-136 %*	*87.6*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.525*	*0.434-0.587*		*29-147 %*	*82.1*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.278*	*1.054-1.426*		*32-141 %*	*95.9*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.244*	*1.054-1.426*		*28-130 %*	*89.7*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.461*	*0.374-0.506*		*28-143 %*	*68.7*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.449*	*0.374-0.506*		*26-138 %*	*64.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.063*	*0.893-1.208*		*23-140 %*	*70.1*	*%*	
13C12-OCDD	1	*0.888*	*0.757-1.024*		*17-157 %*	*43.5*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*95.7*	*%*	

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Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S5:0-1

16G0055-04 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**88.82**	%	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S5:0-1

16G0055-04 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 21:33

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.32 g (wet)	Dry Weight:10.05 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 88.82
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.765	0.655-0.886		0.995	**3.52**	ng/kg	
2,3,7,8-TCDD	1	0.380	0.655-0.886		0.995	**0.434**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.613	1.318-1.783		0.995	**0.988**	ng/kg	J, B
2,3,4,7,8-PeCDF	1	1.548	1.318-1.783		0.995	**3.70**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.698	1.318-1.783		0.995	**2.35**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.375	1.054-1.426		0.995	**2.86**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.209	1.054-1.426		0.995	**2.59**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.229	1.054-1.426		0.995	**3.60**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.123	1.054-1.426		0.995	**1.44**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.181	1.054-1.426		0.995	**3.11**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.237	1.054-1.426		0.995	**13.0**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.188	1.054-1.426		0.995	**6.67**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.033	0.893-1.208		0.995	**49.5**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.027	0.893-1.208		0.995	**3.24**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.033	0.893-1.208		0.995	**319**	ng/kg	B
OCDF	1	0.883	0.757-1.024		1.99	**98.5**	ng/kg	B
OCDD	1	0.892	0.757-1.024		1.99	**2800**	ng/kg	B
Homologue group								
Total TCDF	1				0.995	**116**	ng/kg	
Total TCDD	1				0.995	**9.50**	ng/kg	B
Total PeCDF	1				0.995	**87.5**	ng/kg	B
Total PeCDD	1				0.995	**22.2**	ng/kg	B
Total HxCDF	1				0.995	**99.1**	ng/kg	B
Total HxCDD	1				0.995	**138**	ng/kg	B
Total HpCDF	1				0.995	**158**	ng/kg	B
Total HpCDD	1				0.995	**919**	ng/kg	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S5:0-1

16G0055-04 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 21:33

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						12.19		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						12.19		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S5:0-1

16G0055-04 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 21:33

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.782*	*0.655-0.886*		*24-169 %*	*81.9*	*%*	
13C12-2,3,7,8-TCDD	1	*0.773*	*0.655-0.886*		*25-164 %*	*83.4*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.572*	*1.318-1.783*		*24-185 %*	*77.6*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.587*	*1.318-1.783*		*21-178 %*	*78.7*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.582*	*1.318-1.783*		*25-181 %*	*80.7*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.521*	*0.434-0.587*		*26-152 %*	*88.9*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.521*	*0.434-0.587*		*26-123 %*	*82.0*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.520*	*0.434-0.587*		*28-136 %*	*81.4*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.522*	*0.434-0.587*		*29-147 %*	*76.8*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.288*	*1.054-1.426*		*32-141 %*	*89.9*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.263*	*1.054-1.426*		*28-130 %*	*81.0*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.450*	*0.374-0.506*		*28-143 %*	*64.6*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.457*	*0.374-0.506*		*26-138 %*	*59.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.073*	*0.893-1.208*		*23-140 %*	*66.9*	*%*	
13C12-OCDD	1	*0.893*	*0.757-1.024*		*17-157 %*	*43.9*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*93.5*	*%*	

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S6:0-1

16G0055-05 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**89.12**	%	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S6:0-1

16G0055-05 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 22:27

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.36 g (wet)	Dry Weight:10.12 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 89.12
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.750	0.655-0.886		0.988	**0.838**	ng/kg	J
2,3,7,8-TCDD	1	0.394	0.655-0.886		0.988	**0.307**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.389	1.318-1.783		0.988	**0.826**	ng/kg	J, B
2,3,4,7,8-PeCDF	1	1.176	1.318-1.783		0.988	**0.887**	ng/kg	EMPC, B, J
1,2,3,7,8-PeCDD	1	1.507	1.318-1.783		0.988	**1.34**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.405	1.054-1.426		0.988	**1.80**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.184	1.054-1.426		0.988	**1.59**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.378	1.054-1.426		0.988	**2.16**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.201	1.054-1.426		0.988	**0.798**	ng/kg	J, B
1,2,3,4,7,8-HxCDD	1	1.102	1.054-1.426		0.988	**1.52**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.216	1.054-1.426		0.988	**6.71**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.226	1.054-1.426		0.988	**3.02**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	0.997	0.893-1.208		0.988	**30.1**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.928	0.893-1.208		0.988	**1.97**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.053	0.893-1.208		0.988	**160**	ng/kg	B
OCDF	1	0.910	0.757-1.024		1.98	**92.7**	ng/kg	B
OCDD	1	0.900	0.757-1.024		1.98	**1420**	ng/kg	B
Homologue group								
Total TCDF	1				0.988	**22.1**	ng/kg	
Total TCDD	1				0.988	**5.88**	ng/kg	B
Total PeCDF	1				0.988	**22.8**	ng/kg	B
Total PeCDD	1				0.988	**14.4**	ng/kg	B
Total HxCDF	1				0.988	**51.6**	ng/kg	B
Total HxCDD	1				0.988	**61.1**	ng/kg	B
Total HpCDF	1				0.988	**114**	ng/kg	B
Total HpCDD	1				0.988	**477**	ng/kg	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S6:0-1

16G0055-05 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 22:27

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						6.16		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						6.16		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S6:0-1

16G0055-05 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 22:27

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.785*	*0.655-0.886*		*24-169 %*	*85.7*	*%*	
13C12-2,3,7,8-TCDD	1	*0.780*	*0.655-0.886*		*25-164 %*	*85.0*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.567*	*1.318-1.783*		*24-185 %*	*82.5*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.573*	*1.318-1.783*		*21-178 %*	*84.3*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.588*	*1.318-1.783*		*25-181 %*	*85.3*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.524*	*0.434-0.587*		*26-152 %*	*89.8*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*26-123 %*	*83.3*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*28-136 %*	*83.8*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.517*	*0.434-0.587*		*29-147 %*	*79.4*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.266*	*1.054-1.426*		*32-141 %*	*91.0*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.241*	*1.054-1.426*		*28-130 %*	*83.5*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.451*	*0.374-0.506*		*28-143 %*	*70.3*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.447*	*0.374-0.506*		*26-138 %*	*66.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.054*	*0.893-1.208*		*23-140 %*	*73.4*	*%*	
13C12-OCDD	1	*0.896*	*0.757-1.024*		*17-157 %*	*52.6*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*94.0*	*%*	

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S7:0-1

16G0055-06 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**88.40**	%	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S7:0-1

16G0055-06 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 23:21

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.41 g (wet)	Dry Weight:10.09 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 88.40
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.748	0.655-0.886		0.991	**6.75**	ng/kg	
2,3,7,8-TCDD	1	0.645	0.655-0.886		0.991	**0.780**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.548	1.318-1.783		0.991	**9.85**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.586	1.318-1.783		0.991	**12.4**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.565	1.318-1.783		0.991	**5.91**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.230	1.054-1.426		0.991	**19.4**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.240	1.054-1.426		0.991	**7.44**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.212	1.054-1.426		0.991	**5.23**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.212	1.054-1.426		0.991	**1.57**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.327	1.054-1.426		0.991	**5.38**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.206	1.054-1.426		0.991	**16.9**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.276	1.054-1.426		0.991	**10.9**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.044	0.893-1.208		0.991	**73.0**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.028	0.893-1.208		0.991	**3.88**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.033	0.893-1.208		0.991	**253**	ng/kg	B
OCDF	1	0.880	0.757-1.024		1.98	**91.1**	ng/kg	B
OCDD	1	0.894	0.757-1.024		1.98	**1540**	ng/kg	B
Homologue group								
Total TCDF	1				0.991	**280**	ng/kg	
Total TCDD	1				0.991	**117**	ng/kg	B
Total PeCDF	1				0.991	**149**	ng/kg	B
Total PeCDD	1				0.991	**170**	ng/kg	B
Total HxCDF	1				0.991	**118**	ng/kg	B
Total HxCDD	1				0.991	**299**	ng/kg	B
Total HpCDF	1				0.991	**160**	ng/kg	B
Total HpCDD	1				0.991	**660**	ng/kg	B

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Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S7:0-1

16G0055-06 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 23:21

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						21.85		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						21.85		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S7:0-1

16G0055-06 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 23:21

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.782*	*0.655-0.886*		*24-169 %*	*87.4*	*%*	
13C12-2,3,7,8-TCDD	1	*0.773*	*0.655-0.886*		*25-164 %*	*86.9*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.582*	*1.318-1.783*		*24-185 %*	*86.7*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.562*	*1.318-1.783*		*21-178 %*	*89.4*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.584*	*1.318-1.783*		*25-181 %*	*89.3*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.509*	*0.434-0.587*		*26-152 %*	*89.9*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.521*	*0.434-0.587*		*26-123 %*	*82.2*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.521*	*0.434-0.587*		*28-136 %*	*84.8*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.533*	*0.434-0.587*		*29-147 %*	*83.1*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.277*	*1.054-1.426*		*32-141 %*	*92.4*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.259*	*1.054-1.426*		*28-130 %*	*83.5*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.452*	*0.374-0.506*		*28-143 %*	*75.0*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.453*	*0.374-0.506*		*26-138 %*	*72.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.059*	*0.893-1.208*		*23-140 %*	*79.8*	*%*	
13C12-OCDD	1	*0.902*	*0.757-1.024*		*17-157 %*	*60.1*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*95.5*	*%*	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S8:0-1

16G0055-07 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**89.55**	%	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S8:0-1

16G0055-07 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 00:15

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.18 g (wet)	Dry Weight:10.01 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 89.55
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.824	0.655-0.886		0.999	**35.7**	ng/kg	
2,3,7,8-TCDD	1	0.918	0.655-0.886		0.999	**1.53**	ng/kg	EMPC
1,2,3,7,8-PeCDF	1	1.464	1.318-1.783		0.999	**53.4**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.561	1.318-1.783		0.999	**97.5**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.478	1.318-1.783		0.999	**6.09**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.217	1.054-1.426		0.999	**19.9**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.232	1.054-1.426		0.999	**11.3**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.269	1.054-1.426		0.999	**10.6**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.157	1.054-1.426		0.999	**6.70**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.167	1.054-1.426		0.999	**6.03**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.242	1.054-1.426		0.999	**23.8**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.177	1.054-1.426		0.999	**10.9**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.033	0.893-1.208		0.999	**111**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.999	0.893-1.208		0.999	**14.7**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.042	0.893-1.208		0.999	**423**	ng/kg	B
OCDF	1	0.894	0.757-1.024		2.00	**164**	ng/kg	B
OCDD	1	0.891	0.757-1.024		2.00	**2080**	ng/kg	B
Homologue group								
Total TCDF	1				0.999	**4350**	ng/kg	
Total TCDD	1				0.999	**65.2**	ng/kg	B
Total PeCDF	1				0.999	**1460**	ng/kg	B
Total PeCDD	1				0.999	**117**	ng/kg	B
Total HxCDF	1				0.999	**253**	ng/kg	B
Total HxCDD	1				0.999	**230**	ng/kg	B
Total HpCDF	1				0.999	**335**	ng/kg	B
Total HpCDD	1				0.999	**1180**	ng/kg	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S8:0-1

16G0055-07 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 00:15

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						57.13		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						57.13		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S8:0-1

16G0055-07 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 00:15

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.783*	*0.655-0.886*		*24-169 %*	*86.1*	*%*	
13C12-2,3,7,8-TCDD	1	*0.796*	*0.655-0.886*		*25-164 %*	*87.7*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.541*	*1.318-1.783*		*24-185 %*	*91.0*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.522*	*1.318-1.783*		*21-178 %*	*94.6*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.569*	*1.318-1.783*		*25-181 %*	*92.5*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.517*	*0.434-0.587*		*26-152 %*	*85.8*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.522*	*0.434-0.587*		*26-123 %*	*79.3*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*28-136 %*	*81.3*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.522*	*0.434-0.587*		*29-147 %*	*74.3*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.288*	*1.054-1.426*		*32-141 %*	*88.6*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.248*	*1.054-1.426*		*28-130 %*	*81.8*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.451*	*0.374-0.506*		*28-143 %*	*72.8*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.448*	*0.374-0.506*		*26-138 %*	*71.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.060*	*0.893-1.208*		*23-140 %*	*77.9*	*%*	
13C12-OCDD	1	*0.899*	*0.757-1.024*		*17-157 %*	*60.8*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*116*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S3:2

16G0055-08 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A

Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**89.12**	%	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S3:2

16G0055-08 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 01:09

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.3 g (wet)	Dry Weight:10.07 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 89.12
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.779	0.655-0.886		0.993	**3.32**	ng/kg	
2,3,7,8-TCDD	1	0.522	0.655-0.886		0.993	**0.613**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.545	1.318-1.783		0.993	**3.14**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.692	1.318-1.783		0.993	**2.58**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.506	1.318-1.783		0.993	**3.32**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.220	1.054-1.426		0.993	**5.33**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.239	1.054-1.426		0.993	**3.22**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.267	1.054-1.426		0.993	**3.56**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.210	1.054-1.426		0.993	**1.20**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.104	1.054-1.426		0.993	**2.96**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.256	1.054-1.426		0.993	**12.9**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.269	1.054-1.426		0.993	**6.29**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.036	0.893-1.208		0.993	**52.8**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.999	0.893-1.208		0.993	**3.40**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.042	0.893-1.208		0.993	**248**	ng/kg	B
OCDF	1	0.894	0.757-1.024		1.99	**84.8**	ng/kg	B
OCDD	1	0.889	0.757-1.024		1.99	**2110**	ng/kg	B
Homologue group								
Total TCDF	1				0.993	**47.8**	ng/kg	
Total TCDD	1				0.993	**30.9**	ng/kg	B
Total PeCDF	1				0.993	**45.8**	ng/kg	B
Total PeCDD	1				0.993	**47.8**	ng/kg	B
Total HxCDF	1				0.993	**91.3**	ng/kg	B
Total HxCDD	1				0.993	**108**	ng/kg	B
Total HpCDF	1				0.993	**167**	ng/kg	B
Total HpCDD	1				0.993	**539**	ng/kg	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S3:2

16G0055-08 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 01:09

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						12.38		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						12.38		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

S3:2

16G0055-08 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 01:09

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.786*	*0.655-0.886*		*24-169 %*	*92.5*	*%*	
13C12-2,3,7,8-TCDD	1	*0.792*	*0.655-0.886*		*25-164 %*	*96.9*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.578*	*1.318-1.783*		*24-185 %*	*96.2*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.565*	*1.318-1.783*		*21-178 %*	*101*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.583*	*1.318-1.783*		*25-181 %*	*102*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.513*	*0.434-0.587*		*26-152 %*	*93.7*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.522*	*0.434-0.587*		*26-123 %*	*87.5*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*28-136 %*	*90.3*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.522*	*0.434-0.587*		*29-147 %*	*89.9*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.277*	*1.054-1.426*		*32-141 %*	*96.4*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.266*	*1.054-1.426*		*28-130 %*	*89.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.455*	*0.374-0.506*		*28-143 %*	*83.4*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.459*	*0.374-0.506*		*26-138 %*	*81.6*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.058*	*0.893-1.208*		*23-140 %*	*89.3*	*%*	
13C12-OCDD	1	*0.898*	*0.757-1.024*		*17-157 %*	*71.8*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*108*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Duplicate 1

16G0055-09 (Solid)

Extractions

Method: PSEP 1986
Instrument: N/A
Analyzed: 20-Jul-2016 15:49

Sample Preparation: Preparation Method: No Prep-Organics
Preparation Batch: BEG0138
Prepared: 20-Jul-2016
Sample Size: 1 g (wet)
Final Volume: 1 g
Dry Weight: g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.01	**87.63**	%	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Duplicate 1

16G0055-09 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 02:03

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0128	Sample Size: 11.47 g (wet)	Dry Weight:10.05 g
	Prepared: 30-Jun-2016	Final Volume: 20 uL	% Solids: 87.63
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEG0061	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEG0060	Initial Volume: 20 mL	
	Cleaned: 01-Jul-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEG0062	Initial Volume: 20 mL	
	Cleaned: 05-Jul-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.858	0.655-0.886		0.995	**3.54**	ng/kg	
2,3,7,8-TCDD	1	0.549	0.655-0.886		0.995	**0.706**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.490	1.318-1.783		0.995	**3.78**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.549	1.318-1.783		0.995	**3.32**	ng/kg	B
1,2,3,7,8-PeCDD	1	1.712	1.318-1.783		0.995	**4.26**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.267	1.054-1.426		0.995	**6.19**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.266	1.054-1.426		0.995	**3.80**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.250	1.054-1.426		0.995	**4.44**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.206	1.054-1.426		0.995	**1.97**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.278	1.054-1.426		0.995	**5.51**	ng/kg	
1,2,3,6,7,8-HxCDD	1	1.286	1.054-1.426		0.995	**21.9**	ng/kg	
1,2,3,7,8,9-HxCDD	1	1.210	1.054-1.426		0.995	**10.4**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.036	0.893-1.208		0.995	**56.3**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.899	0.893-1.208		0.995	**3.38**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.049	0.893-1.208		0.995	**420**	ng/kg	B
OCDF	1	0.879	0.757-1.024		1.99	**76.3**	ng/kg	B
OCDD	1	0.889	0.757-1.024		1.99	**2310**	ng/kg	B
Homologue group								
Total TCDF	1				0.995	**72.8**	ng/kg	
Total TCDD	1				0.995	**68.1**	ng/kg	B
Total PeCDF	1				0.995	**65.0**	ng/kg	B
Total PeCDD	1				0.995	**74.2**	ng/kg	B
Total HxCDF	1				0.995	**117**	ng/kg	B
Total HxCDD	1				0.995	**169**	ng/kg	B
Total HpCDF	1				0.995	**161**	ng/kg	B
Total HpCDD	1				0.995	**827**	ng/kg	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Duplicate 1

16G0055-09 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 02:03

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						17.36		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						17.36		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Duplicate 1

16G0055-09 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 19-Jul-2016 02:03

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.789*	*0.655-0.886*		*24-169 %*	*92.3*	*%*	
13C12-2,3,7,8-TCDD	1	*0.784*	*0.655-0.886*		*25-164 %*	*88.2*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.583*	*1.318-1.783*		*24-185 %*	*89.9*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.572*	*1.318-1.783*		*21-178 %*	*91.1*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.564*	*1.318-1.783*		*25-181 %*	*89.8*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.519*	*0.434-0.587*		*26-152 %*	*90.9*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*26-123 %*	*85.3*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.521*	*0.434-0.587*		*28-136 %*	*88.4*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.517*	*0.434-0.587*		*29-147 %*	*91.2*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.298*	*1.054-1.426*		*32-141 %*	*93.5*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.262*	*1.054-1.426*		*28-130 %*	*86.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.461*	*0.374-0.506*		*28-143 %*	*81.7*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.447*	*0.374-0.506*		*26-138 %*	*80.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.060*	*0.893-1.208*		*23-140 %*	*87.0*	*%*	
13C12-OCDD	1	*0.899*	*0.757-1.024*		*17-157 %*	*67.9*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*96.9*	*%*	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Wipe Blank 1

16G0055-10 (Wipes)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01
Analyzed: 18-Jul-2016 14:11

Sample Preparation:	Preparation Method: EPA 1613	
	Preparation Batch: BEG0130	Sample Size: 1 Wipe (wet)
	Prepared: 11-Jul-2016	Final Volume: 20 uL
Sample Cleanup:	Cleanup Method: Silica Gel	
	Cleanup Batch: CEG0063	Initial Volume: 20 mL
	Cleaned: 11-Jul-2016	Final Volume: 20 mL
Sample Cleanup:	Cleanup Method: Florisil	
	Cleanup Batch: CEG0064	Initial Volume: 20 mL
	Cleaned: 11-Jul-2016	Final Volume: 20 mL

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1		0.655-0.886		0.100	ND	ng/kg	U
2,3,7,8-TCDD	1		0.655-0.886		0.100	ND	ng/kg	U
1,2,3,7,8-PeCDF	1	2.424	1.318-1.783		0.500	**1.66**	ng/kg	EMPC
2,3,4,7,8-PeCDF	1	1.821	1.318-1.783		0.500	**1.36**	ng/kg	EMPC
1,2,3,7,8-PeCDD	1	1.280	1.318-1.783		0.500	**1.10**	ng/kg	EMPC
1,2,3,4,7,8-HxCDF	1	1.526	1.054-1.426		0.500	**1.41**	ng/kg	EMPC
1,2,3,6,7,8-HxCDF	1	1.367	1.054-1.426		0.500	**1.25**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.390	1.054-1.426		0.500	**0.583**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.570	1.054-1.426		0.500	**2.71**	ng/kg	EMPC, B
1,2,3,4,7,8-HxCDD	1		1.054-1.426		0.500	ND	ng/kg	U
1,2,3,6,7,8-HxCDD	1		1.054-1.426		0.500	ND	ng/kg	U
1,2,3,7,8,9-HxCDD	1	1.253	1.054-1.426		0.500	**1.77**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	0.566	0.893-1.208		0.500	**1.67**	ng/kg	EMPC
1,2,3,4,7,8,9-HpCDF	1	0.450	0.893-1.208		0.500	**1.27**	ng/kg	EMPC
1,2,3,4,6,7,8-HpCDD	1	1.002	0.893-1.208		0.500	**3.18**	ng/kg	
OCDF	1	0.854	0.757-1.024		1.00	**7.65**	ng/kg	
OCDD	1	0.416	0.757-1.024		1.00	**19.5**	ng/kg	EMPC, B
Homologue group								
Total TCDF	1				0.100	ND	ng/kg	U
Total TCDD	1				0.100	ND	ng/kg	U
Total PeCDF	1				0.100	**3.02**	ng/kg	
Total PeCDD	1				0.100	**1.10**	ng/kg	
Total HxCDF	1				0.100	**5.96**	ng/kg	B
Total HxCDD	1				0.100	**1.77**	ng/kg	
Total HpCDF	1				0.100	**4.16**	ng/kg	
Total HpCDD	1				0.100	**3.18**	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	2.40
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	400.29

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Wipe Blank 1

16G0055-10 (Wipes)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 14:11

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.782*	*0.655-0.886*		*24-169 %*	*86.5*	*%*	
13C12-2,3,7,8-TCDD	1	*0.803*	*0.655-0.886*		*25-164 %*	*82.5*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.577*	*1.318-1.783*		*24-185 %*	*80.6*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.582*	*1.318-1.783*		*21-178 %*	*83.5*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.581*	*1.318-1.783*		*25-181 %*	*77.6*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.516*	*0.434-0.587*		*26-152 %*	*114*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.509*	*0.434-0.587*		*26-123 %*	*107*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*28-136 %*	*102*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.530*	*0.434-0.587*		*29-147 %*	*87.7*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.272*	*1.054-1.426*		*32-141 %*	*107*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.268*	*1.054-1.426*		*28-130 %*	*98.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.445*	*0.374-0.506*		*28-143 %*	*95.7*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.439*	*0.374-0.506*		*26-138 %*	*75.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.050*	*0.893-1.208*		*23-140 %*	*86.8*	*%*	
13C12-OCDD	1	*0.892*	*0.757-1.024*		*17-157 %*	*60.9*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*0.0*	*%*	*Xa, U*

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Equipment Blank 1

16G0055-11 (Wipes)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01
Analyzed: 18-Jul-2016 15:05

Sample Preparation:	Preparation Method: EPA 1613	
	Preparation Batch: BEG0130	Sample Size: 1 Wipe (wet)
	Prepared: 11-Jul-2016	Final Volume: 20 uL
Sample Cleanup:	Cleanup Method: Silica Gel	
	Cleanup Batch: CEG0063	Initial Volume: 20 mL
	Cleaned: 11-Jul-2016	Final Volume: 20 mL
Sample Cleanup:	Cleanup Method: Florisil	
	Cleanup Batch: CEG0064	Initial Volume: 20 mL
	Cleaned: 11-Jul-2016	Final Volume: 20 mL

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.598	0.655-0.886		0.100	**0.562**	ng/kg	EMPC
2,3,7,8-TCDD	1		0.655-0.886		0.100	ND	ng/kg	U
1,2,3,7,8-PeCDF	1		1.318-1.783		0.500	ND	ng/kg	U
2,3,4,7,8-PeCDF	1		1.318-1.783		0.500	ND	ng/kg	U
1,2,3,7,8-PeCDD	1		1.318-1.783		0.500	ND	ng/kg	U
1,2,3,4,7,8-HxCDF	1		1.054-1.426		0.500	ND	ng/kg	U
1,2,3,6,7,8-HxCDF	1		1.054-1.426		0.500	ND	ng/kg	U
2,3,4,6,7,8-HxCDF	1	0.757	1.054-1.426		0.500	**0.801**	ng/kg	EMPC
1,2,3,7,8,9-HxCDF	1	0.966	1.054-1.426		0.500	**0.663**	ng/kg	EMPC, B
1,2,3,4,7,8-HxCDD	1		1.054-1.426		0.500	ND	ng/kg	U
1,2,3,6,7,8-HxCDD	1		1.054-1.426		0.500	ND	ng/kg	U
1,2,3,7,8,9-HxCDD	1		1.054-1.426		0.500	ND	ng/kg	U
1,2,3,4,6,7,8-HpCDF	1	0.769	0.893-1.208		0.500	**0.849**	ng/kg	EMPC
1,2,3,4,7,8,9-HpCDF	1		0.893-1.208		0.500	ND	ng/kg	U
1,2,3,4,6,7,8-HpCDD	1	0.759	0.893-1.208		0.500	**1.14**	ng/kg	EMPC
OCDF	1	1.587	0.757-1.024		1.00	**4.62**	ng/kg	EMPC
OCDD	1	0.896	0.757-1.024		1.00	**116**	ng/kg	B
Homologue group								
Total TCDF	1				0.100	**0.562**	ng/kg	
Total TCDD	1				0.100	ND	ng/kg	U
Total PeCDF	1				0.100	ND	ng/kg	U
Total PeCDD	1				0.100	ND	ng/kg	U
Total HxCDF	1				0.100	**1.46**	ng/kg	B
Total HxCDD	1				0.100	ND	ng/kg	U
Total HpCDF	1				0.100	**2.83**	ng/kg	
Total HpCDD	1				0.100	**5.94**	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	0.26
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	1047.21

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Equipment Blank 1

16G0055-11 (Wipes)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 18-Jul-2016 15:05

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.789*	*0.655-0.886*		*24-169 %*	*78.3*	*%*	
13C12-2,3,7,8-TCDD	1	*0.793*	*0.655-0.886*		*25-164 %*	*75.7*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.574*	*1.318-1.783*		*24-185 %*	*73.0*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.579*	*1.318-1.783*		*21-178 %*	*74.9*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.590*	*1.318-1.783*		*25-181 %*	*69.8*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.516*	*0.434-0.587*		*26-152 %*	*104*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.520*	*0.434-0.587*		*26-123 %*	*95.3*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.520*	*0.434-0.587*		*28-136 %*	*91.0*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.520*	*0.434-0.587*		*29-147 %*	*81.5*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.277*	*1.054-1.426*		*32-141 %*	*95.6*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.281*	*1.054-1.426*		*28-130 %*	*91.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.451*	*0.374-0.506*		*28-143 %*	*88.6*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.455*	*0.374-0.506*		*26-138 %*	*71.3*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.055*	*0.893-1.208*		*23-140 %*	*79.4*	*%*	
13C12-OCDD	1	*0.906*	*0.757-1.024*		*17-157 %*	*55.2*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*0.0*	*%*	*Xa*

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0128 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BEG0128-BLK1)				Prepared: 30-Jun-2016 Analyzed: 18-Jul-2016 15:59							
2,3,7,8-TCDF		0.655-0.886	0.045	1.00	ND	ng/kg					U
2,3,7,8-TCDD		0.655-0.886	0.060	1.00	ND	ng/kg					U
1,2,3,7,8-PeCDF	0.994	1.318-1.783		1.00	0.0646	ng/kg					EMPC, J
2,3,4,7,8-PeCDF	0.405	1.318-1.783		1.00	0.0419	ng/kg					EMPC, J
1,2,3,7,8-PeCDD		1.318-1.783	0.088	1.00	ND	ng/kg					U
1,2,3,4,7,8-HxCDF		1.054-1.426	0.055	1.00	ND	ng/kg					U
1,2,3,6,7,8-HxCDF		1.054-1.426	0.051	1.00	ND	ng/kg					U
2,3,4,6,7,8-HxCDF		1.054-1.426	0.060	1.00	ND	ng/kg					U
1,2,3,7,8,9-HxCDF	2.832	1.054-1.426		1.00	0.105	ng/kg					EMPC, J
1,2,3,4,7,8-HxCDD		1.054-1.426	0.180	1.00	ND	ng/kg					U
1,2,3,6,7,8-HxCDD		1.054-1.426	0.188	1.00	ND	ng/kg					U
1,2,3,7,8,9-HxCDD	2.113	1.054-1.426		1.00	0.286	ng/kg					EMPC, J
1,2,3,4,6,7,8-HpCDF	0.540	0.893-1.208		1.00	0.218	ng/kg					EMPC, J
1,2,3,4,7,8,9-HpCDF		0.893-1.208	0.111	1.00	ND	ng/kg					U
1,2,3,4,6,7,8-HpCDD	0.817	0.893-1.208		1.00	2.21	ng/kg					EMPC
OCDF	0.995	0.757-1.024		2.00	1.68	ng/kg					J
OCDD	0.873	0.757-1.024		2.00	21.1	ng/kg					
Homologue group											
Total TCDF				1.00	ND	ng/kg					U
Total TCDD				1.00	0.288	ng/kg					J
Total PeCDF				1.00	0.106	ng/kg					J
Total PeCDD				1.00	0.335	ng/kg					J
Total HxCDF				1.00	0.216	ng/kg					J
Total HxCDD				1.00	2.07	ng/kg					
Total HpCDF				1.00	0.917	ng/kg					J
Total HpCDD				1.00	6.39	ng/kg					

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.08

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 0.19

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0128 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BEG0128-BLK1)				Prepared: 30-Jun-2016 Analyzed: 18-Jul-2016 15:59							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.779*	*0.655-0.886*			*86.9*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.793*	*0.655-0.886*			*82.7*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.597*	*1.318-1.783*			*75.4*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.561*	*1.318-1.783*			*72.9*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.551*	*1.318-1.783*			*70.4*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.514*	*0.434-0.587*			*107*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.522*	*0.434-0.587*			*102*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.521*	*0.434-0.587*			*97.1*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.530*	*0.434-0.587*			*82.7*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.297*	*1.054-1.426*			*104*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.264*	*1.054-1.426*			*96.6*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.450*	*0.374-0.506*			*89.4*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.455*	*0.374-0.506*			*71.0*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.051*	*0.893-1.208*			*83.3*	*%*		*23-140 %*			
13C12-OCDD	*0.894*	*0.757-1.024*			*54.4*	*%*		*17-157 %*			
37C14-2,3,7,8-TCDD					*91.6*	*%*		*35-197 %*			
LCS (BEG0128-BS1)				Prepared: 30-Jun-2016 Analyzed: 18-Jul-2016 16:53							
2,3,7,8-TCDF	0.758	0.655-0.886		1.00	20.8	ng/kg	104	75-158 %			
2,3,7,8-TCDD	0.760	0.655-0.886		1.00	21.2	ng/kg	106	67-158 %			
1,2,3,7,8-PeCDF	1.572	1.318-1.783		1.00	105	ng/kg	105	80-134 %			B
2,3,4,7,8-PeCDF	1.581	1.318-1.783		1.00	103	ng/kg	103	68-160 %			B
1,2,3,7,8-PeCDD	1.549	1.318-1.783		1.00	108	ng/kg	108	70-142 %			
1,2,3,4,7,8-HxCDF	1.242	1.054-1.426		1.00	105	ng/kg	105	72-134 %			
1,2,3,6,7,8-HxCDF	1.218	1.054-1.426		1.00	105	ng/kg	105	84-130 %			
2,3,4,6,7,8-HxCDF	1.250	1.054-1.426		1.00	106	ng/kg	106	70-156 %			
1,2,3,7,8,9-HxCDF	1.248	1.054-1.426		1.00	107	ng/kg	107	78-130 %			B
1,2,3,4,7,8-HxCDD	1.262	1.054-1.426		1.00	104	ng/kg	104	70-164 %			
1,2,3,6,7,8-HxCDD	1.281	1.054-1.426		1.00	108	ng/kg	108	76-134 %			
1,2,3,7,8,9-HxCDD	1.260	1.054-1.426		1.00	104	ng/kg	104	64-162 %			B
1,2,3,4,6,7,8-HpCDF	1.048	0.893-1.208		1.00	110	ng/kg	110	82-122 %			B
1,2,3,4,7,8,9-HpCDF	1.075	0.893-1.208		1.00	104	ng/kg	104	78-138 %			
1,2,3,4,6,7,8-HpCDD	1.069	0.893-1.208		1.00	109	ng/kg	109	70-140 %			B
OCDF	0.890	0.757-1.024		2.00	207	ng/kg	104	63-170 %			B
OCDD	0.917	0.757-1.024		2.00	217	ng/kg	109	78-144 %			B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0128 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BEG0128-BS1)	Prepared: 30-Jun-2016 Analyzed: 18-Jul-2016 16:53										

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0128 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BEG0128-BS1)				Prepared: 30-Jun-2016 Analyzed: 18-Jul-2016 16:53							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.782*	*0.655-0.886*			*88.0*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.778*	*0.655-0.886*			*88.0*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.581*	*1.318-1.783*			*79.3*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.588*	*1.318-1.783*			*78.8*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.577*	*1.318-1.783*			*76.5*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.515*	*0.434-0.587*			*101*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.529*	*0.434-0.587*			*96.0*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.517*	*0.434-0.587*			*92.3*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.512*	*0.434-0.587*			*83.0*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.306*	*1.054-1.426*			*99.2*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.273*	*1.054-1.426*			*92.2*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.452*	*0.374-0.506*			*86.5*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.443*	*0.374-0.506*			*72.6*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.055*	*0.893-1.208*			*83.9*	*%*		*23-140 %*			
13C12-OCDD	*0.920*	*0.757-1.024*			*56.5*	*%*		*17-157 %*			
37C14-2,3,7,8-TCDD					*95.5*	*%*		*35-197 %*			

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0130 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BEG0130-BLK1)				Prepared: 11-Jul-2016 Analyzed: 18-Jul-2016 12:25							
2,3,7,8-TCDF		0.655-0.886		0.100	ND	ng/kg					U
2,3,7,8-TCDD		0.655-0.886		0.100	ND	ng/kg					U
1,2,3,7,8-PeCDF		1.318-1.783		0.500	ND	ng/kg					U
2,3,4,7,8-PeCDF		1.318-1.783		0.500	ND	ng/kg					U
1,2,3,7,8-PeCDD		1.318-1.783		0.500	ND	ng/kg					U
1,2,3,4,7,8-HxCDF		1.054-1.426		0.500	ND	ng/kg					U
1,2,3,6,7,8-HxCDF		1.054-1.426		0.500	ND	ng/kg					U
2,3,4,6,7,8-HxCDF		1.054-1.426		0.500	ND	ng/kg					U
1,2,3,7,8,9-HxCDF	0.778	1.054-1.426		0.500	1.36	ng/kg					EMPC
1,2,3,4,7,8-HxCDD		1.054-1.426		0.500	ND	ng/kg					U
1,2,3,6,7,8-HxCDD		1.054-1.426		0.500	ND	ng/kg					U
1,2,3,7,8,9-HxCDD		1.054-1.426		0.500	ND	ng/kg					U
1,2,3,4,6,7,8-HpCDF		0.893-1.208		0.500	ND	ng/kg					U
1,2,3,4,7,8,9-HpCDF		0.893-1.208		0.500	ND	ng/kg					U
1,2,3,4,6,7,8-HpCDD		0.893-1.208		0.500	ND	ng/kg					U
OCDF		0.757-1.024		1.00	ND	ng/kg					U
OCDD	0.773	0.757-1.024		1.00	12.2	ng/kg					
Homologue group											
Total TCDF				0.100	ND	ng/kg					U
Total TCDD				0.100	ND	ng/kg					U
Total PeCDF				0.100	ND	ng/kg					U
Total PeCDD				0.100	ND	ng/kg					U
Total HxCDF				0.100	1.36	ng/kg					
Total HxCDD				0.100	ND	ng/kg					U
Total HpCDF				0.100	ND	ng/kg					U
Total HpCDD				0.100	ND	ng/kg					U

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.14

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 1.69

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0130 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BEG0130-BLK1)				Prepared: 11-Jul-2016 Analyzed: 18-Jul-2016 12:25							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.780*	*0.655-0.886*			*77.1*	*%*				*24-169 %*	
13C12-2,3,7,8-TCDD	*0.784*	*0.655-0.886*			*74.9*	*%*				*25-164 %*	
13C12-1,2,3,7,8-PeCDF	*1.579*	*1.318-1.783*			*71.7*	*%*				*24-185 %*	
13C12-2,3,4,7,8-PeCDF	*1.544*	*1.318-1.783*			*73.1*	*%*				*21-178 %*	
13C12-1,2,3,7,8-PeCDD	*1.586*	*1.318-1.783*			*69.3*	*%*				*25-181 %*	
13C12-1,2,3,4,7,8-HxCDF	*0.515*	*0.434-0.587*			*105*	*%*				*26-152 %*	
13C12-1,2,3,6,7,8-HxCDF	*0.519*	*0.434-0.587*			*97.5*	*%*				*26-123 %*	
13C12-2,3,4,6,7,8-HxCDF	*0.530*	*0.434-0.587*			*92.7*	*%*				*28-136 %*	
13C12-1,2,3,7,8,9-HxCDF	*0.526*	*0.434-0.587*			*78.6*	*%*				*29-147 %*	
13C12-1,2,3,4,7,8-HxCDD	*1.259*	*1.054-1.426*			*98.1*	*%*				*32-141 %*	
13C12-1,2,3,6,7,8-HxCDD	*1.227*	*1.054-1.426*			*91.1*	*%*				*28-130 %*	
13C12-1,2,3,4,6,7,8-HpCDF	*0.450*	*0.374-0.506*			*86.8*	*%*				*28-143 %*	
13C12-1,2,3,4,7,8,9-HpCDF	*0.447*	*0.374-0.506*			*70.2*	*%*				*26-138 %*	
13C12-1,2,3,4,6,7,8-HpCDD	*1.074*	*0.893-1.208*			*79.5*	*%*				*23-140 %*	
13C12-OCDD	*0.913*	*0.757-1.024*			*55.2*	*%*				*17-157 %*	
37C14-2,3,7,8-TCDD										*35-197 %*	*X, U*
LCS (BEG0130-BS1)				Prepared: 11-Jul-2016 Analyzed: 18-Jul-2016 13:17							
2,3,7,8-TCDF	0.809	0.655-0.886		0.100	223	ng/kg	112	75-158 %			
2,3,7,8-TCDD	0.821	0.655-0.886		0.100	222	ng/kg	111	67-158 %			
1,2,3,7,8-PeCDF	1.557	1.318-1.783		0.500	1110	ng/kg	111	80-134 %			
2,3,4,7,8-PeCDF	1.541	1.318-1.783		0.500	1060	ng/kg	106	68-160 %			
1,2,3,7,8-PeCDD	1.563	1.318-1.783		0.500	1110	ng/kg	111	70-142 %			
1,2,3,4,7,8-HxCDF	1.219	1.054-1.426		0.500	1090	ng/kg	109	72-134 %			
1,2,3,6,7,8-HxCDF	1.248	1.054-1.426		0.500	1100	ng/kg	110	84-130 %			
2,3,4,6,7,8-HxCDF	1.215	1.054-1.426		0.500	1110	ng/kg	111	70-156 %			
1,2,3,7,8,9-HxCDF	1.220	1.054-1.426		0.500	1100	ng/kg	110	78-130 %			B
1,2,3,4,7,8-HxCDD	1.238	1.054-1.426		0.500	1100	ng/kg	110	70-164 %			
1,2,3,6,7,8-HxCDD	1.251	1.054-1.426		0.500	1120	ng/kg	112	76-134 %			
1,2,3,7,8,9-HxCDD	1.230	1.054-1.426		0.500	1020	ng/kg	102	64-162 %			
1,2,3,4,6,7,8-HpCDF	1.015	0.893-1.208		0.500	1090	ng/kg	109	82-122 %			
1,2,3,4,7,8,9-HpCDF	1.020	0.893-1.208		0.500	1070	ng/kg	107	78-138 %			
1,2,3,4,6,7,8-HpCDD	1.053	0.893-1.208		0.500	1120	ng/kg	112	70-140 %			
OCDF	0.906	0.757-1.024		1.00	2160	ng/kg	108	63-170 %			
OCDD	0.890	0.757-1.024		1.00	2080	ng/kg	104	78-144 %			B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0130 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BEG0130-BS1)	Prepared: 11-Jul-2016 Analyzed: 18-Jul-2016 13:17										

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Dioxins/Furans - Quality Control

Batch BEG0130 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BEG0130-BS1)				Prepared: 11-Jul-2016 Analyzed: 18-Jul-2016 13:17							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.784*	*0.655-0.886*			*77.1*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.785*	*0.655-0.886*			*75.0*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.568*	*1.318-1.783*			*72.0*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.579*	*1.318-1.783*			*73.7*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.569*	*1.318-1.783*			*69.4*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.524*	*0.434-0.587*			*105*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.512*	*0.434-0.587*			*97.6*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.530*	*0.434-0.587*			*95.0*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.515*	*0.434-0.587*			*80.9*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.260*	*1.054-1.426*			*100*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.230*	*1.054-1.426*			*93.2*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.447*	*0.374-0.506*			*90.0*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.454*	*0.374-0.506*			*71.9*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.069*	*0.893-1.208*			*81.4*	*%*		*23-140 %*			
13C12-OCDD	*0.889*	*0.757-1.024*			*57.1*	*%*		*17-157 %*			

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Certified Analyses included in this Report

Analyte	Certifications
EPA 1613B in Solid	
2,3,7,8-TCDF	DoD-ELAP,NELAP,WADOE
2,3,7,8-TCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
2,3,4,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
2,3,4,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8,9-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDD	DoD-ELAP,NELAP,WADOE
OCDF	DoD-ELAP,NELAP,WADOE
OCDD	DoD-ELAP,NELAP,WADOE
Total TCDF	DoD-ELAP,NELAP,WADOE
Total TCDD	DoD-ELAP,NELAP,WADOE
Total PeCDF	DoD-ELAP,NELAP,WADOE
Total PeCDD	DoD-ELAP,NELAP,WADOE
Total HxCDF	DoD-ELAP,NELAP,WADOE
Total HxCDD	DoD-ELAP,NELAP,WADOE
Total HpCDF	DoD-ELAP,NELAP,WADOE
Total HpCDD	DoD-ELAP,NELAP,WADOE
13C12-2,3,7,8-TCDF	DoD-ELAP
13C12-2,3,7,8-TCDD	DoD-ELAP
13C12-1,2,3,7,8-PeCDF	DoD-ELAP
13C12-2,3,4,7,8-PeCDF	DoD-ELAP
13C12-1,2,3,7,8-PeCDD	DoD-ELAP
13C12-1,2,3,4,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,6,7,8-HxCDF	DoD-ELAP
13C12-2,3,4,6,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,7,8,9-HxCDF	DoD-ELAP
13C12-1,2,3,4,7,8-HxCDD	DoD-ELAP

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

13C12-1,2,3,6,7,8-HxCDD	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDF	DoD-ELAP
13C12-1,2,3,4,7,8,9-HpCDF	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDD	DoD-ELAP
13C12-OCDD	DoD-ELAP
37C14-2,3,7,8-TCDD	DoD-ELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2016
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	22-Jul-2016 12:23

Notes and Definitions

Xa	X
X	Cleanup surrogate not spiked in extracted
U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
EMPC	Estimated Maximum Possible Concentration qualifier for HRGCMS Dioxin
B	This analyte was detected in the method blank.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

15 August 2016

Paul Stemen
Stemen Environmental, Inc.
5724 Puget Beach Road NE
Olympia, WA 98516

RE: West Bay Marina

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
16G0085	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the reqirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

Mark Harris, Project Manager

nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S1:2-3	16G0085-01	Solid	24-Jun-2016 09:57	24-Jun-2016 16:35
S5:2-3	16G0085-02	Solid	24-Jun-2016 12:02	24-Jun-2016 16:35
S8:2-3	16G0085-03	Solid	24-Jun-2016 10:40	24-Jun-2016 16:35
S9:0-1	16G0085-04	Solid	24-Jun-2016 10:45	24-Jun-2016 16:35
S10:0-1	16G0085-05	Solid	24-Jun-2016 10:55	24-Jun-2016 16:35
S11:0-1	16G0085-06	Solid	24-Jun-2016 13:42	24-Jun-2016 16:35
S12:0-1	16G0085-07	Solid	24-Jun-2016 12:40	24-Jun-2016 16:35
S13:0-1	16G0085-08	Solid	24-Jun-2016 12:10	24-Jun-2016 16:35
S3:3	16G0085-09	Solid	24-Jun-2016 11:30	24-Jun-2016 16:35

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Analytical Resources, Incorporated
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Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

These analyses proceeded without incident of note.

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S1:2-3

16G0085-01 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 02:36

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 11.52 g (wet)	Dry Weight:10.01 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 86.86
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.798	0.655-0.886		0.999	**1.17**	ng/kg	
2,3,7,8-TCDD	1	0.304	0.655-0.886		0.999	**0.338**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.603	1.318-1.783		0.999	**1.37**	ng/kg	
2,3,4,7,8-PeCDF	1	1.511	1.318-1.783		0.999	**1.41**	ng/kg	
1,2,3,7,8-PeCDD	1	1.589	1.318-1.783		0.999	**1.74**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.236	1.054-1.426		0.999	**2.39**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.201	1.054-1.426		0.999	**1.58**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.176	1.054-1.426		0.999	**1.91**	ng/kg	
1,2,3,7,8,9-HxCDF	1	0.899	1.054-1.426		0.999	**0.913**	ng/kg	EMPC, J
1,2,3,4,7,8-HxCDD	1	1.477	1.054-1.426		0.999	**2.22**	ng/kg	EMPC, B
1,2,3,6,7,8-HxCDD	1	1.359	1.054-1.426		0.999	**9.29**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.187	1.054-1.426		0.999	**4.77**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	1.035	0.893-1.208		0.999	**24.1**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.079	0.893-1.208		0.999	**1.28**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.027	0.893-1.208		0.999	**182**	ng/kg	B
OCDF	1	0.894	0.757-1.024		2.00	**36.6**	ng/kg	B
OCDD	1	0.885	0.757-1.024		9.99	**1060**	ng/kg	B
Homologue group								
Total TCDF	1				0.999	**26.8**	ng/kg	
Total TCDD	1				0.999	**21.3**	ng/kg	
Total PeCDF	1				0.999	**26.1**	ng/kg	
Total PeCDD	1				0.999	**27.0**	ng/kg	
Total HxCDF	1				0.999	**50.0**	ng/kg	
Total HxCDD	1				0.999	**93.4**	ng/kg	

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Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S1:2-3

16G0085-01 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 02:36

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				0.999	**68.6**	ng/kg	
Total HpCDD	1				0.999	**360**	ng/kg	
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						7.37		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						7.37		

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S1:2-3

16G0085-01 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 02:36

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.780*	*0.655-0.886*		*24-169 %*	*85.1*	*%*	
13C12-2,3,7,8-TCDD	1	*0.792*	*0.655-0.886*		*25-164 %*	*83.1*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.566*	*1.318-1.783*		*24-185 %*	*75.4*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.591*	*1.318-1.783*		*21-178 %*	*75.4*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.575*	*1.318-1.783*		*25-181 %*	*75.6*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.519*	*0.434-0.587*		*26-152 %*	*87.5*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.517*	*0.434-0.587*		*26-123 %*	*82.1*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.521*	*0.434-0.587*		*28-136 %*	*83.8*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.514*	*0.434-0.587*		*29-147 %*	*83.1*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.270*	*1.054-1.426*		*32-141 %*	*89.9*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.259*	*1.054-1.426*		*28-130 %*	*82.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.447*	*0.374-0.506*		*28-143 %*	*71.1*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.451*	*0.374-0.506*		*26-138 %*	*75.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.052*	*0.893-1.208*		*23-140 %*	*77.5*	*%*	
13C12-OCDD	1	*0.894*	*0.757-1.024*		*17-157 %*	*60.3*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*90.7*	*%*	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S5:2-3

16G0085-02 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 03:37

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 10.92 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 91.62
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1		0.655-0.886	0.422	1.00	ND	ng/kg	U
2,3,7,8-TCDD	1		0.655-0.886	0.236	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDF	1	1.218	1.318-1.783		1.00	**0.474**	ng/kg	EMPC, J
2,3,4,7,8-PeCDF	1		1.318-1.783	0.255	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDD	1	1.331	1.318-1.783		1.00	**2.17**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.237	1.054-1.426		1.00	**2.34**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.312	1.054-1.426		1.00	**2.99**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.367	1.054-1.426		1.00	**3.92**	ng/kg	
1,2,3,7,8,9-HxCDF	1	0.809	1.054-1.426		1.00	**0.774**	ng/kg	EMPC, J
1,2,3,4,7,8-HxCDD	1	1.196	1.054-1.426		1.00	**2.72**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.181	1.054-1.426		1.00	**12.7**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.374	1.054-1.426		1.00	**5.78**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	1.027	0.893-1.208		1.00	**75.4**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.168	0.893-1.208		1.00	**6.68**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.038	0.893-1.208		1.00	**392**	ng/kg	B
OCDF	1	0.906	0.757-1.024		2.00	**209**	ng/kg	B
OCDD	1	0.896	0.757-1.024		10.0	**7110**	ng/kg	E, B
Homologue group								
Total TCDF	1				1.00	**21.4**	ng/kg	
Total TCDD	1				1.00	**9.26**	ng/kg	
Total PeCDF	1				1.00	**33.0**	ng/kg	
Total PeCDD	1				1.00	**18.4**	ng/kg	
Total HxCDF	1				1.00	**112**	ng/kg	
Total HxCDD	1				1.00	**96.6**	ng/kg	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S5:2-3

16G0085-02 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 03:37

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**276**	ng/kg	
Total HpCDD	1				1.00	**791**	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	12.24
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	12.42

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S5:2-3

16G0085-02 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 03:37

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.780*	*0.655-0.886*		*24-169 %*	*86.5*	*%*	
13C12-2,3,7,8-TCDD	1	*0.793*	*0.655-0.886*		*25-164 %*	*88.6*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.581*	*1.318-1.783*		*24-185 %*	*72.5*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.572*	*1.318-1.783*		*21-178 %*	*73.2*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.597*	*1.318-1.783*		*25-181 %*	*72.4*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.503*	*0.434-0.587*		*26-152 %*	*100*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.512*	*0.434-0.587*		*26-123 %*	*93.6*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.520*	*0.434-0.587*		*28-136 %*	*92.3*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.523*	*0.434-0.587*		*29-147 %*	*94.3*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.263*	*1.054-1.426*		*32-141 %*	*98.4*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.268*	*1.054-1.426*		*28-130 %*	*93.3*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.447*	*0.374-0.506*		*28-143 %*	*73.0*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.439*	*0.374-0.506*		*26-138 %*	*78.7*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.062*	*0.893-1.208*		*23-140 %*	*78.9*	*%*	
13C12-OCDD	1	*0.895*	*0.757-1.024*		*17-157 %*	*64.6*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*97.6*	*%*	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S8:2-3

16G0085-03 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 04:30

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 20.27 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 49.33
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.773	0.655-0.886		1.00	**267**	ng/kg	
2,3,7,8-TCDD	1	0.781	0.655-0.886		1.00	**17.1**	ng/kg	
1,2,3,7,8-PeCDF	1	1.597	1.318-1.783		1.00	**65.0**	ng/kg	
2,3,4,7,8-PeCDF	1	1.585	1.318-1.783		1.00	**48.7**	ng/kg	
1,2,3,7,8-PeCDD	1	1.501	1.318-1.783		1.00	**11.2**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.191	1.054-1.426		1.00	**14.0**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.193	1.054-1.426		1.00	**11.5**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.117	1.054-1.426		1.00	**8.19**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.150	1.054-1.426		1.00	**4.02**	ng/kg	
1,2,3,4,7,8-HxCDD	1	1.209	1.054-1.426		1.00	**31.3**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.272	1.054-1.426		1.00	**13.0**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.307	1.054-1.426		1.00	**7.13**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	1.003	0.893-1.208		1.00	**41.7**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.142	0.893-1.208		1.00	**4.75**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.041	0.893-1.208		1.00	**239**	ng/kg	B
OCDF	1	0.913	0.757-1.024		2.00	**81.8**	ng/kg	B
OCDD	1	0.897	0.757-1.024		10.0	**1510**	ng/kg	B
Homologue group								
Total TCDF	1				1.00	**5060**	ng/kg	
Total TCDD	1				1.00	**353**	ng/kg	
Total PeCDF	1				1.00	**1060**	ng/kg	
Total PeCDD	1				1.00	**182**	ng/kg	
Total HxCDF	1				1.00	**157**	ng/kg	
Total HxCDD	1				1.00	**206**	ng/kg	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S8:2-3

16G0085-03 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 04:30

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**137**	ng/kg	
Total HpCDD	1				1.00	**473**	ng/kg	
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						83.81		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						83.81		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S8:2-3

16G0085-03 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 04:30

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.781*	*0.655-0.886*		*24-169 %*	*74.8*	*%*	
13C12-2,3,7,8-TCDD	1	*0.783*	*0.655-0.886*		*25-164 %*	*78.7*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.583*	*1.318-1.783*		*24-185 %*	*64.0*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.547*	*1.318-1.783*		*21-178 %*	*66.0*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.609*	*1.318-1.783*		*25-181 %*	*66.5*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.520*	*0.434-0.587*		*26-152 %*	*84.0*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.520*	*0.434-0.587*		*26-123 %*	*77.7*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.521*	*0.434-0.587*		*28-136 %*	*77.3*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.524*	*0.434-0.587*		*29-147 %*	*66.5*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.262*	*1.054-1.426*		*32-141 %*	*86.1*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.264*	*1.054-1.426*		*28-130 %*	*78.5*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.445*	*0.374-0.506*		*28-143 %*	*55.5*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.469*	*0.374-0.506*		*26-138 %*	*48.8*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.072*	*0.893-1.208*		*23-140 %*	*54.9*	*%*	
13C12-OCDD	1	*0.903*	*0.757-1.024*		*17-157 %*	*32.4*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*99.0*	*%*	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S9:0-1

16G0085-04 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 05:23

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 10.86 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 92.07
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.771	0.655-0.886		1.00	**5.86**	ng/kg	
2,3,7,8-TCDD	1	0.612	0.655-0.886		1.00	**0.901**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.783	1.318-1.783		1.00	**4.38**	ng/kg	
2,3,4,7,8-PeCDF	1	1.553	1.318-1.783		1.00	**19.6**	ng/kg	
1,2,3,7,8-PeCDD	1	1.524	1.318-1.783		1.00	**4.89**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.212	1.054-1.426		1.00	**13.6**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.229	1.054-1.426		1.00	**5.71**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.587	1.054-1.426		1.00	**4.40**	ng/kg	EMPC
1,2,3,7,8,9-HxCDF	1	1.129	1.054-1.426		1.00	**6.21**	ng/kg	
1,2,3,4,7,8-HxCDD	1	1.171	1.054-1.426		1.00	**7.99**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.210	1.054-1.426		1.00	**36.5**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.314	1.054-1.426		1.00	**11.4**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	1.021	0.893-1.208		1.00	**116**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.004	0.893-1.208		1.00	**9.90**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.041	0.893-1.208		1.00	**1460**	ng/kg	B
OCDF	1	0.879	0.757-1.024		2.00	**291**	ng/kg	B
OCDD	1	0.895	0.757-1.024		10.0	**10700**	ng/kg	E, B
Homologue group								
Total TCDF	1				1.00	**687**	ng/kg	
Total TCDD	1				1.00	**88.1**	ng/kg	
Total PeCDF	1				1.00	**467**	ng/kg	
Total PeCDD	1				1.00	**105**	ng/kg	
Total HxCDF	1				1.00	**248**	ng/kg	
Total HxCDD	1				1.00	**683**	ng/kg	

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S9:0-1

16G0085-04 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 05:23

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**407**	ng/kg	
Total HpCDD	1				1.00	**7320**	ng/kg	
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						40.13		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						40.13		

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S9:0-1

16G0085-04 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 05:23

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.769*	*0.655-0.886*		*24-169 %*	*92.4*	*%*	
13C12-2,3,7,8-TCDD	1	*0.790*	*0.655-0.886*		*25-164 %*	*84.0*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.583*	*1.318-1.783*		*24-185 %*	*69.3*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.526*	*1.318-1.783*		*21-178 %*	*68.7*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.606*	*1.318-1.783*		*25-181 %*	*65.7*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.512*	*0.434-0.587*		*26-152 %*	*92.4*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.526*	*0.434-0.587*		*26-123 %*	*87.9*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.518*	*0.434-0.587*		*28-136 %*	*89.3*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.521*	*0.434-0.587*		*29-147 %*	*82.6*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.286*	*1.054-1.426*		*32-141 %*	*95.5*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.283*	*1.054-1.426*		*28-130 %*	*87.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.445*	*0.374-0.506*		*28-143 %*	*60.8*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.460*	*0.374-0.506*		*26-138 %*	*57.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.063*	*0.893-1.208*		*23-140 %*	*63.1*	*%*	
13C12-OCDD	1	*0.886*	*0.757-1.024*		*17-157 %*	*41.8*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*92.3*	*%*	

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S10:0-1

16G0085-05 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 06:16

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 12.11 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 82.57
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.777	0.655-0.886		1.00	**42.3**	ng/kg	
2,3,7,8-TCDD	1	0.822	0.655-0.886		1.00	**1.75**	ng/kg	
1,2,3,7,8-PeCDF	1	1.576	1.318-1.783		1.00	**97.2**	ng/kg	
2,3,4,7,8-PeCDF	1	1.555	1.318-1.783		1.00	**92.6**	ng/kg	
1,2,3,7,8-PeCDD	1	1.653	1.318-1.783		1.00	**15.7**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.230	1.054-1.426		1.00	**446**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.216	1.054-1.426		1.00	**146**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.259	1.054-1.426		1.00	**76.5**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.173	1.054-1.426		1.00	**17.5**	ng/kg	
1,2,3,4,7,8-HxCDD	1	1.213	1.054-1.426		1.00	**15.0**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.270	1.054-1.426		1.00	**43.7**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.268	1.054-1.426		1.00	**28.9**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	1.031	0.893-1.208		1.00	**1210**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.985	0.893-1.208		1.00	**52.8**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.036	0.893-1.208		1.00	**599**	ng/kg	B
OCDF	1	0.879	0.757-1.024		2.00	**518**	ng/kg	B
OCDD	1	0.892	0.757-1.024		10.0	**3180**	ng/kg	B
Homologue group								
Total TCDF	1				1.00	**2490**	ng/kg	
Total TCDD	1				1.00	**226**	ng/kg	
Total PeCDF	1				1.00	**1340**	ng/kg	
Total PeCDD	1				1.00	**352**	ng/kg	
Total HxCDF	1				1.00	**1650**	ng/kg	
Total HxCDD	1				1.00	**632**	ng/kg	

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Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S10:0-1

16G0085-05 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 06:16

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**1650**	ng/kg	
Total HpCDD	1				1.00	**1280**	ng/kg	
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						149.46		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						149.46		

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S10:0-1

16G0085-05 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 06:16

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.791*	*0.655-0.886*		*24-169 %*	*83.5*	*%*	
13C12-2,3,7,8-TCDD	1	*0.789*	*0.655-0.886*		*25-164 %*	*86.0*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.605*	*1.318-1.783*		*24-185 %*	*72.9*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.516*	*1.318-1.783*		*21-178 %*	*75.0*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.566*	*1.318-1.783*		*25-181 %*	*73.9*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.532*	*0.434-0.587*		*26-152 %*	*86.8*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.519*	*0.434-0.587*		*26-123 %*	*80.5*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*28-136 %*	*78.6*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.519*	*0.434-0.587*		*29-147 %*	*82.3*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.275*	*1.054-1.426*		*32-141 %*	*85.4*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.256*	*1.054-1.426*		*28-130 %*	*81.6*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.450*	*0.374-0.506*		*28-143 %*	*63.5*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.437*	*0.374-0.506*		*26-138 %*	*67.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.043*	*0.893-1.208*		*23-140 %*	*68.6*	*%*	
13C12-OCDD	1	*0.899*	*0.757-1.024*		*17-157 %*	*53.0*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*99.7*	*%*	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S11:0-1

16G0085-06 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 07:10

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 12.22 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 81.82
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.762	0.655-0.886		1.00	**2.29**	ng/kg	
2,3,7,8-TCDD	1	0.809	0.655-0.886		1.00	**0.781**	ng/kg	J
1,2,3,7,8-PeCDF	1	1.602	1.318-1.783		1.00	**2.36**	ng/kg	
2,3,4,7,8-PeCDF	1	1.908	1.318-1.783		1.00	**2.39**	ng/kg	EMPC
1,2,3,7,8-PeCDD	1	1.576	1.318-1.783		1.00	**4.23**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.206	1.054-1.426		1.00	**5.96**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.364	1.054-1.426		1.00	**4.57**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.254	1.054-1.426		1.00	**7.27**	ng/kg	
1,2,3,7,8,9-HxCDF	1	1.763	1.054-1.426		1.00	**4.08**	ng/kg	EMPC
1,2,3,4,7,8-HxCDD	1	1.150	1.054-1.426		1.00	**5.21**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.344	1.054-1.426		1.00	**44.6**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.362	1.054-1.426		1.00	**12.6**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	1.060	0.893-1.208		1.00	**86.4**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.066	0.893-1.208		1.00	**5.65**	ng/kg	
1,2,3,4,6,7,8-HpCDD	1	1.048	0.893-1.208		1.00	**848**	ng/kg	B
OCDF	1	0.908	0.757-1.024		2.00	**180**	ng/kg	B
OCDD	1	0.895	0.757-1.024		10.0	**6680**	ng/kg	E, B
Homologue group								
Total TCDF	1				1.00	**50.5**	ng/kg	
Total TCDD	1				1.00	**25.4**	ng/kg	
Total PeCDF	1				1.00	**57.3**	ng/kg	
Total PeCDD	1				1.00	**40.4**	ng/kg	
Total HxCDF	1				1.00	**166**	ng/kg	
Total HxCDD	1				1.00	**259**	ng/kg	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S11:0-1

16G0085-06 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 07:10

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**276**	ng/kg	
Total HpCDD	1				1.00	**1590**	ng/kg	
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						25.92		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						25.92		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S11:0-1

16G0085-06 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 07:10

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.780*	*0.655-0.886*		*24-169 %*	*81.1*	*%*	
13C12-2,3,7,8-TCDD	1	*0.793*	*0.655-0.886*		*25-164 %*	*83.8*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.591*	*1.318-1.783*		*24-185 %*	*67.0*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.572*	*1.318-1.783*		*21-178 %*	*67.4*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.605*	*1.318-1.783*		*25-181 %*	*66.5*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.511*	*0.434-0.587*		*26-152 %*	*87.5*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.512*	*0.434-0.587*		*26-123 %*	*79.6*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*28-136 %*	*78.4*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.521*	*0.434-0.587*		*29-147 %*	*83.7*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.267*	*1.054-1.426*		*32-141 %*	*83.4*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.273*	*1.054-1.426*		*28-130 %*	*81.6*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.467*	*0.374-0.506*		*28-143 %*	*70.4*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.451*	*0.374-0.506*		*26-138 %*	*77.2*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.098*	*0.893-1.208*		*23-140 %*	*75.0*	*%*	
13C12-OCDD	1	*0.882*	*0.757-1.024*		*17-157 %*	*70.3*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*91.4*	*%*	

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Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S12:0-1

16G0085-07 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 08:03

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 12.1 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 82.67
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.742	0.655-0.886		1.00	**1.02**	ng/kg	
2,3,7,8-TCDD	1	0.301	0.655-0.886		1.00	**0.289**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.826	1.318-1.783		1.00	**0.841**	ng/kg	EMPC, J
2,3,4,7,8-PeCDF	1	1.825	1.318-1.783		1.00	**1.37**	ng/kg	EMPC
1,2,3,7,8-PeCDD	1	1.831	1.318-1.783		1.00	**1.65**	ng/kg	EMPC
1,2,3,4,7,8-HxCDF	1	1.151	1.054-1.426		1.00	**1.95**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.386	1.054-1.426		1.00	**1.76**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.598	1.054-1.426		1.00	**1.69**	ng/kg	EMPC
1,2,3,7,8,9-HxCDF	1	0.873	1.054-1.426		1.00	**0.776**	ng/kg	EMPC, J
1,2,3,4,7,8-HxCDD	1	1.519	1.054-1.426		1.00	**1.90**	ng/kg	EMPC, B
1,2,3,6,7,8-HxCDD	1	1.292	1.054-1.426		1.00	**8.54**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.140	1.054-1.426		1.00	**4.14**	ng/kg	
1,2,3,4,6,7,8-HpCDF	1	1.029	0.893-1.208		1.00	**28.3**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.804	0.893-1.208		1.00	**0.993**	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDD	1	1.067	0.893-1.208		1.00	**215**	ng/kg	B
OCDF	1	0.833	0.757-1.024		2.00	**78.6**	ng/kg	B
OCDD	1	0.880	0.757-1.024		10.0	**2190**	ng/kg	B
Homologue group								
Total TCDF	1				1.00	**24.0**	ng/kg	
Total TCDD	1				1.00	**8.08**	ng/kg	
Total PeCDF	1				1.00	**28.4**	ng/kg	
Total PeCDD	1				1.00	**13.3**	ng/kg	
Total HxCDF	1				1.00	**54.4**	ng/kg	
Total HxCDD	1				1.00	**72.3**	ng/kg	

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S12:0-1

16G0085-07 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 08:03

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**92.2**	ng/kg	
Total HpCDD	1				1.00	**531**	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	7.68
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	7.68

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S12:0-1

16G0085-07 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 08:03

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.789*	*0.655-0.886*		*24-169 %*	*80.3*	*%*	
13C12-2,3,7,8-TCDD	1	*0.793*	*0.655-0.886*		*25-164 %*	*80.8*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.567*	*1.318-1.783*		*24-185 %*	*66.7*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.612*	*1.318-1.783*		*21-178 %*	*66.5*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.571*	*1.318-1.783*		*25-181 %*	*66.0*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.519*	*0.434-0.587*		*26-152 %*	*89.7*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.512*	*0.434-0.587*		*26-123 %*	*81.0*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.524*	*0.434-0.587*		*28-136 %*	*84.0*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.523*	*0.434-0.587*		*29-147 %*	*78.0*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.263*	*1.054-1.426*		*32-141 %*	*89.3*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.291*	*1.054-1.426*		*28-130 %*	*82.4*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.444*	*0.374-0.506*		*28-143 %*	*61.5*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.440*	*0.374-0.506*		*26-138 %*	*58.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.075*	*0.893-1.208*		*23-140 %*	*61.7*	*%*	
13C12-OCDD	1	*0.927*	*0.757-1.024*		*17-157 %*	*43.0*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*89.2*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S13:0-1

16G0085-08 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 08:56

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 10.66 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 93.79
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.657	0.655-0.886		1.00	**0.483**	ng/kg	J
2,3,7,8-TCDD	1	0.527	0.655-0.886		1.00	**0.451**	ng/kg	EMPC, J
1,2,3,7,8-PeCDF	1	1.725	1.318-1.783		1.00	**0.497**	ng/kg	J
2,3,4,7,8-PeCDF	1	1.044	1.318-1.783		1.00	**0.597**	ng/kg	EMPC, J
1,2,3,7,8-PeCDD	1	1.608	1.318-1.783		1.00	**1.22**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.527	1.054-1.426		1.00	**0.878**	ng/kg	EMPC, J
1,2,3,6,7,8-HxCDF	1	1.389	1.054-1.426		1.00	**0.869**	ng/kg	J
2,3,4,6,7,8-HxCDF	1	1.135	1.054-1.426		1.00	**1.38**	ng/kg	
1,2,3,7,8,9-HxCDF	1		1.054-1.426	0.4	1.00	ND	ng/kg	U
1,2,3,4,7,8-HxCDD	1	1.516	1.054-1.426		1.00	**0.915**	ng/kg	EMPC, J, B
1,2,3,6,7,8-HxCDD	1	1.353	1.054-1.426		1.00	**4.12**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.462	1.054-1.426		1.00	**2.35**	ng/kg	EMPC
1,2,3,4,6,7,8-HpCDF	1	1.047	0.893-1.208		1.00	**15.8**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.865	0.893-1.208		1.00	**0.944**	ng/kg	EMPC, J
1,2,3,4,6,7,8-HpCDD	1	1.084	0.893-1.208		1.00	**93.1**	ng/kg	B
OCDF	1	0.882	0.757-1.024		2.00	**59.7**	ng/kg	B
OCDD	1	0.895	0.757-1.024		10.0	**1290**	ng/kg	B
Homologue group								
Total TCDF	1				1.00	**15.6**	ng/kg	
Total TCDD	1				1.00	**5.25**	ng/kg	
Total PeCDF	1				1.00	**14.4**	ng/kg	
Total PeCDD	1				1.00	**9.52**	ng/kg	
Total HxCDF	1				1.00	**26.2**	ng/kg	
Total HxCDD	1				1.00	**39.2**	ng/kg	

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S13:0-1

16G0085-08 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 08:56

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**54.1**	ng/kg	
Total HpCDD	1				1.00	**209**	ng/kg	
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						4.47		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						4.49		

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Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S13:0-1

16G0085-08 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 08:56

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.782*	*0.655-0.886*		*24-169 %*	*81.1*	*%*	
13C12-2,3,7,8-TCDD	1	*0.786*	*0.655-0.886*		*25-164 %*	*80.8*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.582*	*1.318-1.783*		*24-185 %*	*69.1*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.584*	*1.318-1.783*		*21-178 %*	*67.8*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.580*	*1.318-1.783*		*25-181 %*	*67.5*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.522*	*0.434-0.587*		*26-152 %*	*89.2*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.525*	*0.434-0.587*		*26-123 %*	*83.0*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.526*	*0.434-0.587*		*28-136 %*	*84.1*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.523*	*0.434-0.587*		*29-147 %*	*78.4*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.263*	*1.054-1.426*		*32-141 %*	*89.7*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.191*	*1.054-1.426*		*28-130 %*	*83.3*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.442*	*0.374-0.506*		*28-143 %*	*59.4*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.435*	*0.374-0.506*		*26-138 %*	*56.0*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.061*	*0.893-1.208*		*23-140 %*	*59.7*	*%*	
13C12-OCDD	1	*0.906*	*0.757-1.024*		*17-157 %*	*40.0*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*89.7*	*%*	

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6201

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S3:3

16G0085-09 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 09:49

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEG0270	Sample Size: 10.56 g (wet)	Dry Weight:10.00 g
	Prepared: 01-Aug-2016	Final Volume: 20 uL	% Solids: 94.68
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEH0017	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEH0016	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEH0018	Initial Volume: 20 mL	
	Cleaned: 03-Aug-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1		0.655-0.886	0.099	1.00	ND	ng/kg	U
2,3,7,8-TCDD	1		0.655-0.886	0.123	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDF	1		1.318-1.783	0.141	1.00	ND	ng/kg	U
2,3,4,7,8-PeCDF	1		1.318-1.783	0.153	1.00	ND	ng/kg	U
1,2,3,7,8-PeCDD	1		1.318-1.783	0.193	1.00	ND	ng/kg	U
1,2,3,4,7,8-HxCDF	1		1.054-1.426	0.19	1.00	ND	ng/kg	U
1,2,3,6,7,8-HxCDF	1		1.054-1.426	0.177	1.00	ND	ng/kg	U
2,3,4,6,7,8-HxCDF	1		1.054-1.426	0.197	1.00	ND	ng/kg	U
1,2,3,7,8,9-HxCDF	1		1.054-1.426	0.271	1.00	ND	ng/kg	U
1,2,3,4,7,8-HxCDD	1		1.054-1.426	0.252	1.00	ND	ng/kg	U
1,2,3,6,7,8-HxCDD	1		1.054-1.426	0.261	1.00	ND	ng/kg	U
1,2,3,7,8,9-HxCDD	1		1.054-1.426	0.271	1.00	ND	ng/kg	U
1,2,3,4,6,7,8-HpCDF	1	1.135	0.893-1.208		1.00	**2.14**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1		0.893-1.208	0.359	1.00	ND	ng/kg	U
1,2,3,4,6,7,8-HpCDD	1	1.010	0.893-1.208		1.00	**9.84**	ng/kg	B
OCDF	1	1.082	0.757-1.024		2.00	**3.15**	ng/kg	EMPC, B
OCDD	1	0.891	0.757-1.024		10.0	**76.8**	ng/kg	B
Homologue group								
Total TCDF	1				1.00	**0.195**	ng/kg	
Total TCDD	1				1.00	**2.11**	ng/kg	
Total PeCDF	1				1.00	**0.878**	ng/kg	
Total PeCDD	1				1.00	**0.732**	ng/kg	
Total HxCDF	1				1.00	**2.97**	ng/kg	
Total HxCDD	1				1.00	**4.02**	ng/kg	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S3:3

16G0085-09 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 09:49

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HpCDF	1				1.00	**6.81**	ng/kg	
Total HpCDD	1				1.00	**21.6**	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	0.14
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	0.41

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

S3:3

16G0085-09 (Solid)

Dioxins/Furans

Method: EPA 1613B

Instrument: AUTOSPEC01

Analyzed: 10-Aug-2016 09:49

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.775*	*0.655-0.886*		*24-169 %*	*82.2*	*%*	
13C12-2,3,7,8-TCDD	1	*0.783*	*0.655-0.886*		*25-164 %*	*83.9*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.539*	*1.318-1.783*		*24-185 %*	*75.5*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.582*	*1.318-1.783*		*21-178 %*	*71.3*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.595*	*1.318-1.783*		*25-181 %*	*74.3*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.515*	*0.434-0.587*		*26-152 %*	*86.0*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.510*	*0.434-0.587*		*26-123 %*	*85.1*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.513*	*0.434-0.587*		*28-136 %*	*84.1*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.518*	*0.434-0.587*		*29-147 %*	*73.1*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.268*	*1.054-1.426*		*32-141 %*	*92.4*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.290*	*1.054-1.426*		*28-130 %*	*86.5*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.435*	*0.374-0.506*		*28-143 %*	*63.3*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.456*	*0.374-0.506*		*26-138 %*	*60.3*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.064*	*0.893-1.208*		*23-140 %*	*68.2*	*%*	
13C12-OCDD	1	*0.882*	*0.757-1.024*		*17-157 %*	*48.9*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*92.3*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

Dioxins/Furans - Quality Control

Batch BEG0270 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
BLK (BEG0270-BLK1)				Prepared: 01-Aug-2016 Analyzed: 09-Aug-2016 17:39							
2,3,7,8-TCDF		0.655-0.886	0.094	1.00	ND	ng/kg					U
2,3,7,8-TCDD		0.655-0.886	0.099	1.00	ND	ng/kg					U
1,2,3,7,8-PeCDF		1.318-1.783	0.097	1.00	ND	ng/kg					U
2,3,4,7,8-PeCDF		1.318-1.783	0.097	1.00	ND	ng/kg					U
1,2,3,7,8-PeCDD		1.318-1.783	0.159	1.00	ND	ng/kg					U
1,2,3,4,7,8-HxCDF		1.054-1.426	0.097	1.00	ND	ng/kg					U
1,2,3,6,7,8-HxCDF		1.054-1.426	0.094	1.00	ND	ng/kg					U
2,3,4,6,7,8-HxCDF		1.054-1.426	0.105	1.00	ND	ng/kg					U
1,2,3,7,8,9-HxCDF		1.054-1.426	0.142	1.00	ND	ng/kg					U
1,2,3,4,7,8-HxCDD	2.324	1.054-1.426		1.00	0.169	ng/kg					EMPC, J
1,2,3,6,7,8-HxCDD	1.428	1.054-1.426		1.00	0.134	ng/kg					EMPC, J
1,2,3,7,8,9-HxCDD		1.054-1.426	0.138	1.00	ND	ng/kg					U
1,2,3,4,6,7,8-HpCDF	1.166	0.893-1.208		1.00	0.616	ng/kg					J
1,2,3,4,7,8,9-HpCDF		0.893-1.208	0.225	1.00	ND	ng/kg					U
1,2,3,4,6,7,8-HpCDD	1.140	0.893-1.208		1.00	2.35	ng/kg					
OCDF	1.050	0.757-1.024		2.00	6.18	ng/kg					EMPC
OCDD	0.938	0.757-1.024		10.0	41.2	ng/kg					
Homologue group											
Total TCDF				1.00	ND	ng/kg					
Total TCDD				1.00	0.795	ng/kg					
Total PeCDF				1.00	ND	ng/kg					
Total PeCDD				1.00	0.255	ng/kg					
Total HxCDF				1.00	0.222	ng/kg					
Total HxCDD				1.00	1.55	ng/kg					
Total HpCDF				1.00	2.62	ng/kg					
Total HpCDD				1.00	4.74	ng/kg					

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.07

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 0.25

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

Dioxins/Furans - Quality Control

Batch BEG0270 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
BLK (BEG0270-BLK1)				Prepared: 01-Aug-2016 Analyzed: 09-Aug-2016 17:39							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.789*	*0.655-0.886*			*85.0*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.786*	*0.655-0.886*			*88.0*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.588*	*1.318-1.783*			*79.6*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.577*	*1.318-1.783*			*80.4*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.593*	*1.318-1.783*			*79.6*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.513*	*0.434-0.587*			*95.3*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.522*	*0.434-0.587*			*93.0*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.522*	*0.434-0.587*			*90.7*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.523*	*0.434-0.587*			*84.5*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.283*	*1.054-1.426*			*95.0*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.280*	*1.054-1.426*			*92.7*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.443*	*0.374-0.506*			*83.4*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.446*	*0.374-0.506*			*77.7*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.040*	*0.893-1.208*			*85.2*	*%*		*23-140 %*			
13C12-OCDD	*0.892*	*0.757-1.024*			*65.4*	*%*		*17-157 %*			
37C14-2,3,7,8-TCDD					*96.1*	*%*		*35-197 %*			
LCS (BEG0270-BS1)				Prepared: 01-Aug-2016 Analyzed: 09-Aug-2016 18:32							
2,3,7,8-TCDF	0.761	0.655-0.886		1.00	20.9	ng/kg	104	75-158 %			
2,3,7,8-TCDD	0.790	0.655-0.886		1.00	20.7	ng/kg	103	67-158 %			
1,2,3,7,8-PeCDF	1.604	1.318-1.783		1.00	104	ng/kg	104	80-134 %			
2,3,4,7,8-PeCDF	1.557	1.318-1.783		1.00	100	ng/kg	100	68-160 %			
1,2,3,7,8-PeCDD	1.526	1.318-1.783		1.00	101	ng/kg	101	70-142 %			
1,2,3,4,7,8-HxCDF	1.258	1.054-1.426		1.00	103	ng/kg	103	72-134 %			
1,2,3,6,7,8-HxCDF	1.262	1.054-1.426		1.00	103	ng/kg	103	84-130 %			
2,3,4,6,7,8-HxCDF	1.200	1.054-1.426		1.00	105	ng/kg	105	70-156 %			
1,2,3,7,8,9-HxCDF	1.255	1.054-1.426		1.00	103	ng/kg	103	78-130 %			
1,2,3,4,7,8-HxCDD	1.257	1.054-1.426		1.00	104	ng/kg	104	70-164 %			B
1,2,3,6,7,8-HxCDD	1.256	1.054-1.426		1.00	102	ng/kg	102	76-134 %			B
1,2,3,7,8,9-HxCDD	1.262	1.054-1.426		1.00	93.2	ng/kg	93.2	64-162 %			
1,2,3,4,6,7,8-HpCDF	1.039	0.893-1.208		1.00	105	ng/kg	105	82-122 %			B
1,2,3,4,7,8,9-HpCDF	1.026	0.893-1.208		1.00	100	ng/kg	100	78-138 %			
1,2,3,4,6,7,8-HpCDD	1.031	0.893-1.208		1.00	107	ng/kg	107	70-140 %			B
OCDF	0.924	0.757-1.024		2.00	205	ng/kg	103	63-170 %			B
OCDD	0.902	0.757-1.024		10.0	212	ng/kg	106	78-144 %			B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

Dioxins/Furans - Quality Control

Batch BEG0270 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BEG0270-BS1)	Prepared: 01-Aug-2016 Analyzed: 09-Aug-2016 18:32										

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

Dioxins/Furans - Quality Control

Batch BEG0270 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BEG0270-BS1)				Prepared: 01-Aug-2016 Analyzed: 09-Aug-2016 18:32							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.786*	*0.655-0.886*			*85.2*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.790*	*0.655-0.886*			*84.1*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.570*	*1.318-1.783*			*77.2*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.594*	*1.318-1.783*			*77.6*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.616*	*1.318-1.783*			*79.0*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.521*	*0.434-0.587*			*87.1*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.518*	*0.434-0.587*			*85.2*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.512*	*0.434-0.587*			*90.2*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.512*	*0.434-0.587*			*78.5*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.293*	*1.054-1.426*			*97.9*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.242*	*1.054-1.426*			*97.9*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.458*	*0.374-0.506*			*78.7*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.442*	*0.374-0.506*			*73.3*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.092*	*0.893-1.208*			*78.1*	*%*		*23-140 %*			
13C12-OCDD	*0.887*	*0.757-1.024*			*60.6*	*%*		*17-157 %*			
37C14-2,3,7,8-TCDD					*93.2*	*%*		*35-197 %*			

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

Certified Analyses included in this Report

Analyte	Certifications
EPA 1613B in Solid	
2,3,7,8-TCDF	DoD-ELAP,NELAP,WADOE
2,3,7,8-TCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
2,3,4,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
2,3,4,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8,9-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDD	DoD-ELAP,NELAP,WADOE
OCDF	DoD-ELAP,NELAP,WADOE
OCDD	DoD-ELAP,NELAP,WADOE
Total TCDF	DoD-ELAP,NELAP,WADOE
Total TCDD	DoD-ELAP,NELAP,WADOE
Total PeCDF	DoD-ELAP,NELAP,WADOE
Total PeCDD	DoD-ELAP,NELAP,WADOE
Total HxCDF	DoD-ELAP,NELAP,WADOE
Total HxCDD	DoD-ELAP,NELAP,WADOE
Total HpCDF	DoD-ELAP,NELAP,WADOE
Total HpCDD	DoD-ELAP,NELAP,WADOE
13C12-2,3,7,8-TCDF	DoD-ELAP
13C12-2,3,7,8-TCDD	DoD-ELAP
13C12-1,2,3,7,8-PeCDF	DoD-ELAP
13C12-2,3,4,7,8-PeCDF	DoD-ELAP
13C12-1,2,3,7,8-PeCDD	DoD-ELAP
13C12-1,2,3,4,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,6,7,8-HxCDF	DoD-ELAP
13C12-2,3,4,6,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,7,8,9-HxCDF	DoD-ELAP
13C12-1,2,3,4,7,8-HxCDD	DoD-ELAP

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

13C12-1,2,3,6,7,8-HxCDD	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDF	DoD-ELAP
13C12-1,2,3,4,7,8,9-HpCDF	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDD	DoD-ELAP
13C12-OCDD	DoD-ELAP
37C14-2,3,7,8-TCDD	DoD-ELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2016
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017

Analytical Report

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	15-Aug-2016 10:39

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
EMPC	Estimated Maximum Possible Concentration qualifier for HRGCMS Dioxin
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
B	This analyte was detected in the method blank.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

17 November 2016

Paul Stemen
Stemen Environmental, Inc.
5724 Puget Beach Road NE
Olympia, WA 98516

RE: West Bay Marina

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
16J0502	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the reqirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

Mark Harris, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Cert# 100006

PJLA Testing
Accreditation # 66169

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 16J0502	Turn-around Requested: Normal	Page: 1 of 2	
ARI Client Company: Stemen Environmental	Phone:	Date: 10/28/2016	Ice Present? Yes
Client Contact: Paul Stemen		No. of Coolers: 1	Cooler Temps: 5.3
Client Project Name: West Bay Marina			
Client Project #:	Samplers: EN		

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Dioxins/Furans								Notes/Comments
Wipe Blank	10/28	1000	Wipe	1									
Wipe A		1110	Wipe	1									
Dup 1A		N/A	Soil	1	X								
S14: 0-1		1010		1	X								
S14: 2		1012		1									
S14: 3		1015		1									
S15: 0-1		1025		1	X								
S15: 2		1027		1									
S15: 3		1030		1									
S16: 0-1		1040		1									

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
hold remaining samples	Printed Name: Eric Nassan	Printed Name: Justy Meyer	Printed Name:	Printed Name:
	Company: Kane/Stemen	Company: ARI	Company:	Company:
	Date & Time: 10/28/16 1506	Date & Time: 10-28-16 1506	Date & Time:	Date & Time:

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 1650502	Turn-around Requested: Normal	Page: 2 of 2	
ARI Client Company: Stemen Environmental	Phone:	Date: 10/28/2016	Ice Present?
Client Contact: Paul Stemen		No. of Coolers:	Cooler Temps:
Client Project Name: West Bay Marina			
Client Project #:	Samplers: EN		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: dioxins/furans								Notes/Comments
S16:2	10/28	1042	Soil	1									
S16:2.5	"	1045	"	1									
S17:0-1	"	1100	"	1									
S17:2	"	1102	"	1									
S17:3	"	1105	"	1									

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Eric Nassuna	Printed Name: Justin Meyer	Printed Name:	Printed Name:
	Company: Kane/Stemen	Company: ARI	Company:	Company:
	Date & Time: 10/28/16 1506	Date & Time: 10-28-16 1506	Date & Time:	Date & Time:

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Stemen Environmental Project Name: Wet Bay Mooring

COC No(s): _____ NA Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 1650502 Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry): 5.3

Time: _____

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: D00527G

Cooler Accepted by: JM Date: 10-28-16 Time: 1506

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____			
Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Was Sample Split by ARI : NA YES Date/Time: _____ Equipment: _____ Split by: _____

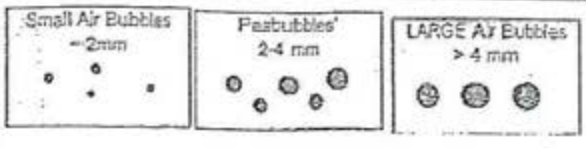
Samples Logged by: TR Date: 10-31-16 Time: 1116

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____



Small → "sm" (< 2 mm)
Peabubbles → "pb" (2 to < 4 mm)
Large → "lg" (4 to < 6 mm)
Headspace → "hs" (> 6 mm)

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Dup A	16J0502-01	Solid	28-Oct-2016 00:00	28-Oct-2016 15:06
S14:0-1	16J0502-02	Solid	28-Oct-2016 10:10	28-Oct-2016 15:06
S15:0-1	16J0502-03	Solid	28-Oct-2016 10:25	28-Oct-2016 15:06
Wipe Blank	16J0502-04	Solid	28-Oct-2016 10:00	28-Oct-2016 15:06
Wipe A	16J0502-05	Solid	28-Oct-2016 11:10	28-Oct-2016 15:06
S14:2	16J0502-06	Solid	28-Oct-2016 10:12	28-Oct-2016 15:06
S14:3	16J0502-07	Solid	28-Oct-2016 10:15	28-Oct-2016 15:06
S15:2	16J0502-08	Solid	28-Oct-2016 10:27	28-Oct-2016 15:06
S15:3	16J0502-09	Solid	28-Oct-2016 10:30	28-Oct-2016 15:06
S16:0-1	16J0502-10	Solid	28-Oct-2016 10:40	28-Oct-2016 15:06
S16:2	16J0502-11	Solid	28-Oct-2016 10:42	28-Oct-2016 15:06
S16:2.5	16J0502-12	Solid	28-Oct-2016 10:45	28-Oct-2016 15:06
S17:0-1	16J0502-13	Solid	28-Oct-2016 11:00	28-Oct-2016 15:06
S17:2	16J0502-14	Solid	28-Oct-2016 11:02	28-Oct-2016 15:06
S17:3	16J0502-15	Solid	28-Oct-2016 11:05	28-Oct-2016 15:06

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Case Narrative

CASE NARRATIVE

Client: Stemen Environmental, Inc.
Project: West Bay Marina
Workorder: 16J0502

Sample receipt

15 samples were received 28-Oct-2016 15:06 under ARI workorder 16J0502. For details regarding sample receipt, please refer to the Cooler Receipt Form. Twelve samples were placed on hold as specified. The remaining samples were analyzed for dioxins/furans as requested.

Dioxin/Furans - EPA Method 1613B

These samples were extracted and analyzed within the recommended holding times. Analysis was performed using an application specific column recently developed by Restek. The RTX-Dioxin2 column has unique isomer separation for the 2378-TCDF, eliminating the need for confirmation analysis.

All initial and continuing calibrations were within method requirements.

The areas for all internal standards were within established QC limits.

The percent recoveries for all compounds were within established QC limits for the cleanup standards.

Several target compounds were detected in the method blank (MB) between the EDLs and the RLs. All detected compounds have been flagged with a "J" qualifier to indicate the MB contamination.

The percent recoveries and RPDs for all compounds were within established QC limits for the LCS (BS)/LCSD (BSD).

The percent recoveries for the OPR (Ongoing Precision and Recovery) standard were within established QC limits.

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dup A

16J0502-01 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 10/28/2016 00:00
Instrument: AUTOSPEC01 — Analyzed: 11/10/2016 02:02

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEK0165	Sample Size: 12.95 g (wet)	Dry Weight:10.06 g
	Prepared: 11/07/2016 12:40	Final Volume: 20 uL	% Solids: 77.66
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEK0055	Initial Volume: 20 mL	
	Cleaned: 09-Nov-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEK0054	Initial Volume: 20 mL	
	Cleaned: 08-Nov-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEK0056	Initial Volume: 20 mL	
	Cleaned: 09-Nov-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.768	0.655-0.886		0.994	**1.09**	ng/kg	
2,3,7,8-TCDD	1	0.573	0.655-0.886		0.994	**0.395**	ng/kg	EMPC, J, B
1,2,3,7,8-PeCDF	1	1.733	1.318-1.783		0.994	**1.08**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.636	1.318-1.783		0.994	**1.62**	ng/kg	
1,2,3,7,8-PeCDD	1	1.754	1.318-1.783		0.994	**2.01**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.266	1.054-1.426		0.994	**4.33**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.076	1.054-1.426		0.994	**2.24**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.334	1.054-1.426		0.994	**3.10**	ng/kg	B
1,2,3,7,8,9-HxCDF	1	1.611	1.054-1.426		0.994	**0.973**	ng/kg	EMPC, J, B
1,2,3,4,7,8-HxCDD	1	1.110	1.054-1.426		0.994	**1.86**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.191	1.054-1.426		0.994	**8.08**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.316	1.054-1.426		0.994	**6.00**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.042	0.893-1.208		0.994	**49.8**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	1.026	0.893-1.208		0.994	**2.09**	ng/kg	B
1,2,3,4,6,7,8-HpCDD	1	1.034	0.893-1.208		2.49	**187**	ng/kg	B
OCDF	1	0.883	0.757-1.024		1.99	**96.2**	ng/kg	B
OCDD	1	0.891	0.757-1.024		9.94	**1320**	ng/kg	B
Homologue group								
Total TCDF	1				0.994	**24.9**	ng/kg	
Total TCDD	1				0.994	**15.9**	ng/kg	
Total PeCDF	1				0.994	**38.0**	ng/kg	
Total PeCDD	1				0.994	**21.4**	ng/kg	
Total HxCDF	1				0.994	**75.5**	ng/kg	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dup A
16J0502-01 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Sampled: 10/28/2016 00:00
Analyzed: 11/10/2016 02:02

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HxCDD	1				0.994	**75.7**	ng/kg	
Total HpCDF	1				0.994	**131**	ng/kg	
Total HpCDD	1				0.994	**438**	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	8.50
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	8.50

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dup A

16J0502-01 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Sampled: 10/28/2016 00:00
Analyzed: 11/10/2016 02:02

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.778*	*0.655-0.886*		*24-169 %*	*91.9*	*%*	
13C12-2,3,7,8-TCDD	1	*0.785*	*0.655-0.886*		*25-164 %*	*93.8*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.590*	*1.318-1.783*		*24-185 %*	*88.9*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.588*	*1.318-1.783*		*21-178 %*	*92.7*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.573*	*1.318-1.783*		*25-181 %*	*93.6*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.513*	*0.434-0.587*		*26-152 %*	*84.9*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.522*	*0.434-0.587*		*26-123 %*	*79.9*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.516*	*0.434-0.587*		*28-136 %*	*82.8*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.526*	*0.434-0.587*		*29-147 %*	*87.7*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.291*	*1.054-1.426*		*32-141 %*	*88.1*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.257*	*1.054-1.426*		*28-130 %*	*83.6*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.454*	*0.374-0.506*		*28-143 %*	*75.5*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.451*	*0.374-0.506*		*26-138 %*	*80.9*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.043*	*0.893-1.208*		*23-140 %*	*83.7*	*%*	
13C12-OCDD	1	*0.908*	*0.757-1.024*		*17-157 %*	*71.2*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*101*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

S14:0-1

16J0502-02 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 10/28/2016 10:10
Instrument: AUTOSPEC01 — Analyzed: 11/10/2016 02:55

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEK0165	Sample Size: 12.45 g (wet)	Dry Weight:10.11 g
	Prepared: 11/07/2016 12:40	Final Volume: 20 uL	% Solids: 81.23
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEK0055	Initial Volume: 20 mL	
	Cleaned: 09-Nov-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEK0054	Initial Volume: 20 mL	
	Cleaned: 08-Nov-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEK0056	Initial Volume: 20 mL	
	Cleaned: 09-Nov-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.749	0.655-0.886		0.989	**10.1**	ng/kg	
2,3,7,8-TCDD	1	0.592	0.655-0.886		0.989	**1.24**	ng/kg	EMPC, B
1,2,3,7,8-PeCDF	1	1.440	1.318-1.783		0.989	**10.2**	ng/kg	B
2,3,4,7,8-PeCDF	1	1.508	1.318-1.783		0.989	**15.7**	ng/kg	
1,2,3,7,8-PeCDD	1	1.539	1.318-1.783		0.989	**5.83**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.256	1.054-1.426		0.989	**15.1**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.260	1.054-1.426		0.989	**14.1**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.248	1.054-1.426		0.989	**15.9**	ng/kg	B
1,2,3,7,8,9-HxCDF	1	1.248	1.054-1.426		0.989	**3.27**	ng/kg	B
1,2,3,4,7,8-HxCDD	1	1.375	1.054-1.426		0.989	**3.66**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.301	1.054-1.426		0.989	**12.2**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.211	1.054-1.426		0.989	**6.79**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.034	0.893-1.208		0.989	**76.0**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.961	0.893-1.208		0.989	**4.43**	ng/kg	B
1,2,3,4,6,7,8-HpCDD	1	1.034	0.893-1.208		2.47	**273**	ng/kg	B
OCDF	1	0.904	0.757-1.024		1.98	**104**	ng/kg	B
OCDD	1	0.897	0.757-1.024		9.89	**2760**	ng/kg	B
Homologue group								
Total TCDF	1				0.989	**355**	ng/kg	
Total TCDD	1				0.989	**40.8**	ng/kg	
Total PeCDF	1				0.989	**245**	ng/kg	
Total PeCDD	1				0.989	**45.4**	ng/kg	
Total HxCDF	1				0.989	**186**	ng/kg	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

S14:0-1

16J0502-02 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Sampled: 10/28/2016 10:10
Analyzed: 11/10/2016 02:55

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HxCDD	1				0.989	**102**	ng/kg	
Total HpCDF	1				0.989	**184**	ng/kg	
Total HpCDD	1				0.989	**595**	ng/kg	
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):						24.59		
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):						24.59		

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

S14:0-1

16J0502-02 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Sampled: 10/28/2016 10:10
Analyzed: 11/10/2016 02:55

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.781*	*0.655-0.886*		*24-169 %*	*89.4*	*%*	
13C12-2,3,7,8-TCDD	1	*0.788*	*0.655-0.886*		*25-164 %*	*92.1*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.579*	*1.318-1.783*		*24-185 %*	*87.1*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.594*	*1.318-1.783*		*21-178 %*	*90.8*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.596*	*1.318-1.783*		*25-181 %*	*92.6*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.517*	*0.434-0.587*		*26-152 %*	*83.4*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.523*	*0.434-0.587*		*26-123 %*	*77.8*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.517*	*0.434-0.587*		*28-136 %*	*82.1*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.527*	*0.434-0.587*		*29-147 %*	*84.4*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.299*	*1.054-1.426*		*32-141 %*	*87.5*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.281*	*1.054-1.426*		*28-130 %*	*82.8*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.449*	*0.374-0.506*		*28-143 %*	*75.3*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.445*	*0.374-0.506*		*26-138 %*	*81.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.049*	*0.893-1.208*		*23-140 %*	*82.2*	*%*	
13C12-OCDD	1	*0.902*	*0.757-1.024*		*17-157 %*	*71.3*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*103*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

S15:0-1

16J0502-03 (Solid)

Dioxins/Furans

Method: EPA 1613B — Sampled: 10/28/2016 10:25
Instrument: AUTOSPEC01 — Analyzed: 11/10/2016 03:48

Sample Preparation:	Preparation Method: EPA 1613		
	Preparation Batch: BEK0165	Sample Size: 12.69 g (wet)	Dry Weight:10.04 g
	Prepared: 11/07/2016 12:40	Final Volume: 20 uL	% Solids: 79.14
Sample Cleanup:	Cleanup Method: Silica Gel		
	Cleanup Batch: CEK0055	Initial Volume: 20 mL	
	Cleaned: 09-Nov-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		
	Cleanup Batch: CEK0054	Initial Volume: 20 mL	
	Cleaned: 08-Nov-2016	Final Volume: 20 mL	
Sample Cleanup:	Cleanup Method: Florisil		
	Cleanup Batch: CEK0056	Initial Volume: 20 mL	
	Cleaned: 09-Nov-2016	Final Volume: 20 mL	

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
2,3,7,8-TCDF	1	0.787	0.655-0.886		0.996	**0.831**	ng/kg	J
2,3,7,8-TCDD	1	0.519	0.655-0.886		0.996	**0.470**	ng/kg	EMPC, J, B
1,2,3,7,8-PeCDF	1	1.364	1.318-1.783		0.996	**0.826**	ng/kg	J, B
2,3,4,7,8-PeCDF	1	1.656	1.318-1.783		0.996	**1.27**	ng/kg	
1,2,3,7,8-PeCDD	1	1.423	1.318-1.783		0.996	**2.27**	ng/kg	
1,2,3,4,7,8-HxCDF	1	1.297	1.054-1.426		0.996	**3.32**	ng/kg	
1,2,3,6,7,8-HxCDF	1	1.205	1.054-1.426		0.996	**1.74**	ng/kg	
2,3,4,6,7,8-HxCDF	1	1.099	1.054-1.426		0.996	**2.54**	ng/kg	B
1,2,3,7,8,9-HxCDF	1	1.381	1.054-1.426		0.996	**0.891**	ng/kg	J, B
1,2,3,4,7,8-HxCDD	1	1.256	1.054-1.426		0.996	**2.50**	ng/kg	B
1,2,3,6,7,8-HxCDD	1	1.261	1.054-1.426		0.996	**8.25**	ng/kg	B
1,2,3,7,8,9-HxCDD	1	1.335	1.054-1.426		0.996	**6.44**	ng/kg	B
1,2,3,4,6,7,8-HpCDF	1	1.038	0.893-1.208		0.996	**41.9**	ng/kg	B
1,2,3,4,7,8,9-HpCDF	1	0.923	0.893-1.208		0.996	**1.84**	ng/kg	B
1,2,3,4,6,7,8-HpCDD	1	1.045	0.893-1.208		2.49	**248**	ng/kg	B
OCDF	1	0.888	0.757-1.024		1.99	**91.9**	ng/kg	B
OCDD	1	0.898	0.757-1.024		9.96	**1970**	ng/kg	B
Homologue group								
Total TCDF	1				0.996	**19.2**	ng/kg	
Total TCDD	1				0.996	**9.52**	ng/kg	
Total PeCDF	1				0.996	**29.3**	ng/kg	
Total PeCDD	1				0.996	**18.2**	ng/kg	
Total HxCDF	1				0.996	**62.6**	ng/kg	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

S15:0-1

16J0502-03 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Sampled: 10/28/2016 10:25
Analyzed: 11/10/2016 03:48

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Total HxCDD	1				0.996	**86.7**	ng/kg	
Total HpCDF	1				0.996	**112**	ng/kg	
Total HpCDD	1				0.996	**599**	ng/kg	

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC):	9.33
Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC):	9.33

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

S15:0-1

16J0502-03 (Solid)

Dioxins/Furans

Method: EPA 1613B
Instrument: AUTOSPEC01

Sampled: 10/28/2016 10:25
Analyzed: 11/10/2016 03:48

Analyte	DF/Split	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	Notes
Labeled compounds								
13C12-2,3,7,8-TCDF	1	*0.781*	*0.655-0.886*		*24-169 %*	*87.2*	*%*	
13C12-2,3,7,8-TCDD	1	*0.786*	*0.655-0.886*		*25-164 %*	*90.7*	*%*	
13C12-1,2,3,7,8-PeCDF	1	*1.596*	*1.318-1.783*		*24-185 %*	*85.3*	*%*	
13C12-2,3,4,7,8-PeCDF	1	*1.583*	*1.318-1.783*		*21-178 %*	*88.7*	*%*	
13C12-1,2,3,7,8-PeCDD	1	*1.566*	*1.318-1.783*		*25-181 %*	*90.2*	*%*	
13C12-1,2,3,4,7,8-HxCDF	1	*0.524*	*0.434-0.587*		*26-152 %*	*82.0*	*%*	
13C12-1,2,3,6,7,8-HxCDF	1	*0.525*	*0.434-0.587*		*26-123 %*	*75.3*	*%*	
13C12-2,3,4,6,7,8-HxCDF	1	*0.517*	*0.434-0.587*		*28-136 %*	*78.1*	*%*	
13C12-1,2,3,7,8,9-HxCDF	1	*0.512*	*0.434-0.587*		*29-147 %*	*81.7*	*%*	
13C12-1,2,3,4,7,8-HxCDD	1	*1.274*	*1.054-1.426*		*32-141 %*	*85.5*	*%*	
13C12-1,2,3,6,7,8-HxCDD	1	*1.261*	*1.054-1.426*		*28-130 %*	*78.6*	*%*	
13C12-1,2,3,4,6,7,8-HpCDF	1	*0.451*	*0.374-0.506*		*28-143 %*	*68.6*	*%*	
13C12-1,2,3,4,7,8,9-HpCDF	1	*0.449*	*0.374-0.506*		*26-138 %*	*71.1*	*%*	
13C12-1,2,3,4,6,7,8-HpCDD	1	*1.052*	*0.893-1.208*		*23-140 %*	*74.9*	*%*	
13C12-OCDD	1	*0.889*	*0.757-1.024*		*17-157 %*	*61.7*	*%*	
37C14-2,3,7,8-TCDD	1				*35-197 %*	*101*	*%*	

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dioxins/Furans - Quality Control

Batch BEK0165 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
DBLK07 (BEK0165-BLK1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 14:15							
2,3,7,8-TCDF		0.655-0.886	0.037	1.00	ND	ng/kg					U
2,3,7,8-TCDD	0.289	0.655-0.886		1.00	0.166	ng/kg					EMPC, J
1,2,3,7,8-PeCDF	2.512	1.318-1.783		1.00	0.0894	ng/kg					EMPC, J
2,3,4,7,8-PeCDF		1.318-1.783	0.055	1.00	ND	ng/kg					U
1,2,3,7,8-PeCDD		1.318-1.783	0.096	1.00	ND	ng/kg					U
1,2,3,4,7,8-HxCDF		1.054-1.426	0.051	1.00	ND	ng/kg					U
1,2,3,6,7,8-HxCDF		1.054-1.426	0.051	1.00	ND	ng/kg					U
2,3,4,6,7,8-HxCDF	1.035	1.054-1.426		1.00	0.0736	ng/kg					EMPC, J
1,2,3,7,8,9-HxCDF	0.730	1.054-1.426		1.00	0.136	ng/kg					EMPC, J
1,2,3,4,7,8-HxCDD	1.618	1.054-1.426		1.00	0.161	ng/kg					EMPC, J
1,2,3,6,7,8-HxCDD	0.860	1.054-1.426		1.00	0.169	ng/kg					EMPC, J
1,2,3,7,8,9-HxCDD	1.627	1.054-1.426		1.00	0.395	ng/kg					EMPC, J
1,2,3,4,6,7,8-HpCDF	1.093	0.893-1.208		1.00	0.314	ng/kg					J
1,2,3,4,7,8,9-HpCDF	0.939	0.893-1.208		1.00	0.114	ng/kg					J
1,2,3,4,6,7,8-HpCDD	1.071	0.893-1.208		2.50	4.08	ng/kg					
OCDF	0.801	0.757-1.024		2.00	1.37	ng/kg					J
OCDD	0.877	0.757-1.024		10.0	33.1	ng/kg					
Homologue group											
Total TCDF				1.00	0.0302	ng/kg					
Total TCDD				1.00	1.31	ng/kg					
Total PeCDF				1.00	0.0894	ng/kg					
Total PeCDD				1.00	0.227	ng/kg					
Total HxCDF				1.00	0.209	ng/kg					
Total HxCDD				1.00	3.44	ng/kg					
Total HpCDF				1.00	0.887	ng/kg					
Total HpCDD				1.00	10.0	ng/kg					

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.32

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 0.38

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dioxins/Furans - Quality Control

Batch BEK0165 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
DBLK07 (BEK0165-BLK1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 14:15							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.772*	*0.655-0.886*			*91.0*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.780*	*0.655-0.886*			*92.2*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.625*	*1.318-1.783*			*87.6*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.567*	*1.318-1.783*			*87.1*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.621*	*1.318-1.783*			*87.5*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.530*	*0.434-0.587*			*86.5*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.531*	*0.434-0.587*			*84.7*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.516*	*0.434-0.587*			*84.5*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.530*	*0.434-0.587*			*86.2*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.278*	*1.054-1.426*			*91.9*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.238*	*1.054-1.426*			*87.2*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.448*	*0.374-0.506*			*79.9*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.460*	*0.374-0.506*			*84.5*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.040*	*0.893-1.208*			*89.6*	*%*		*23-140 %*			
13C12-OCDD	*0.910*	*0.757-1.024*			*77.8*	*%*		*17-157 %*			
37C14-2,3,7,8-TCDD					*99.9*	*%*		*35-197 %*			
DLCS07 (BEK0165-BS1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 15:06							
2,3,7,8-TCDF	0.755	0.655-0.886		1.00	21.3	ng/kg	107	75-158 %			
2,3,7,8-TCDD	0.775	0.655-0.886		1.00	21.1	ng/kg	106	67-158 %			B
1,2,3,7,8-PeCDF	1.569	1.318-1.783		1.00	103	ng/kg	103	80-134 %			B
2,3,4,7,8-PeCDF	1.556	1.318-1.783		1.00	101	ng/kg	101	68-160 %			
1,2,3,7,8-PeCDD	1.559	1.318-1.783		1.00	107	ng/kg	107	70-142 %			
1,2,3,4,7,8-HxCDF	1.220	1.054-1.426		1.00	103	ng/kg	103	72-134 %			
1,2,3,6,7,8-HxCDF	1.231	1.054-1.426		1.00	102	ng/kg	102	84-130 %			
2,3,4,6,7,8-HxCDF	1.231	1.054-1.426		1.00	106	ng/kg	106	70-156 %			B
1,2,3,7,8,9-HxCDF	1.277	1.054-1.426		1.00	104	ng/kg	104	78-130 %			B
1,2,3,4,7,8-HxCDD	1.265	1.054-1.426		1.00	102	ng/kg	102	70-164 %			B
1,2,3,6,7,8-HxCDD	1.215	1.054-1.426		1.00	107	ng/kg	107	76-134 %			B
1,2,3,7,8,9-HxCDD	1.240	1.054-1.426		1.00	109	ng/kg	109	64-162 %			B
1,2,3,4,6,7,8-HpCDF	1.016	0.893-1.208		1.00	108	ng/kg	108	82-122 %			B
1,2,3,4,7,8,9-HpCDF	1.060	0.893-1.208		1.00	102	ng/kg	102	78-138 %			B
1,2,3,4,6,7,8-HpCDD	1.064	0.893-1.208		2.50	107	ng/kg	107	70-140 %			B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dioxins/Furans - Quality Control

Batch BEK0165 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
DLCS07 (BEK0165-BS1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 15:06							
OCDF	0.914	0.757-1.024		2.00	209	ng/kg	105	63-170 %			B
OCDD	0.859	0.757-1.024		10.0	218	ng/kg	109	78-144 %			B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dioxins/Furans - Quality Control

Batch BEK0165 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
DLCS07 (BEK0165-BS1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 15:06							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.788*	*0.655-0.886*			*87.4*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.785*	*0.655-0.886*			*90.2*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.567*	*1.318-1.783*			*88.8*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.586*	*1.318-1.783*			*88.4*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.564*	*1.318-1.783*			*89.0*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.520*	*0.434-0.587*			*85.0*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.535*	*0.434-0.587*			*82.8*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.523*	*0.434-0.587*			*82.6*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.520*	*0.434-0.587*			*84.6*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.264*	*1.054-1.426*			*89.8*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.270*	*1.054-1.426*			*82.4*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.462*	*0.374-0.506*			*77.8*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.452*	*0.374-0.506*			*84.2*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.038*	*0.893-1.208*			*86.4*	*%*		*23-140 %*			
13C12-OCDD	*0.886*	*0.757-1.024*			*76.5*	*%*		*17-157 %*			
37C14-2,3,7,8-TCDD					*96.6*	*%*		*35-197 %*			
DLCSD07 (BEK0165-BSD1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 16:06							
2,3,7,8-TCDF	0.771	0.655-0.886		1.00	21.4	ng/kg	107	75-158 %	0.56	25	
2,3,7,8-TCDD	0.795	0.655-0.886		1.00	21.2	ng/kg	106	67-158 %	0.60	25	B
1,2,3,7,8-PeCDF	1.561	1.318-1.783		1.00	103	ng/kg	103	80-134 %	0.59	25	B
2,3,4,7,8-PeCDF	1.574	1.318-1.783		1.00	102	ng/kg	102	68-160 %	0.19	25	
1,2,3,7,8-PeCDD	1.570	1.318-1.783		1.00	106	ng/kg	106	70-142 %	1.19	25	
1,2,3,4,7,8-HxCDF	1.256	1.054-1.426		1.00	102	ng/kg	102	72-134 %	0.38	25	
1,2,3,6,7,8-HxCDF	1.186	1.054-1.426		1.00	102	ng/kg	102	84-130 %	0.14	25	
2,3,4,6,7,8-HxCDF	1.235	1.054-1.426		1.00	103	ng/kg	103	70-156 %	2.10	25	B
1,2,3,7,8,9-HxCDF	1.244	1.054-1.426		1.00	104	ng/kg	104	78-130 %	0.05	25	B
1,2,3,4,7,8-HxCDD	1.246	1.054-1.426		1.00	103	ng/kg	103	70-164 %	1.71	25	B
1,2,3,6,7,8-HxCDD	1.255	1.054-1.426		1.00	105	ng/kg	105	76-134 %	1.87	25	B
1,2,3,7,8,9-HxCDD	1.259	1.054-1.426		1.00	108	ng/kg	108	64-162 %	0.70	25	B
1,2,3,4,6,7,8-HpCDF	1.062	0.893-1.208		1.00	109	ng/kg	109	82-122 %	0.99	25	B
1,2,3,4,7,8,9-HpCDF	1.056	0.893-1.208		1.00	100	ng/kg	100	78-138 %	1.79	25	B
1,2,3,4,6,7,8-HpCDD	1.045	0.893-1.208		2.50	107	ng/kg	107	70-140 %	0.23	25	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dioxins/Furans - Quality Control

Batch BEK0165 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
DLCSD07 (BEK0165-BSD1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 16:06							
OCDF	0.901	0.757-1.024		2.00	208	ng/kg	104	63-170 %	0.86	25	B
OCDD	0.862	0.757-1.024		10.0	206	ng/kg	103	78-144 %	5.79	25	B

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Dioxins/Furans - Quality Control

Batch BEK0165 - EPA 1613

Instrument: AUTOSPEC01

QC Sample/Analyte	Ion Ratio	Ratio Limits	EDL	Reporting Limit	Result	Units	%REC	%REC Limits	RPD	RPD Limit	Notes
DLCSD07 (BEK0165-BSD1)				Prepared: 07-Nov-2016 Analyzed: 09-Nov-2016 16:06							
Labeled compounds											
13C12-2,3,7,8-TCDF	*0.776*	*0.655-0.886*			*92.2*	*%*		*24-169 %*			
13C12-2,3,7,8-TCDD	*0.777*	*0.655-0.886*			*93.6*	*%*		*25-164 %*			
13C12-1,2,3,7,8-PeCDF	*1.582*	*1.318-1.783*			*90.5*	*%*		*24-185 %*			
13C12-2,3,4,7,8-PeCDF	*1.581*	*1.318-1.783*			*86.7*	*%*		*21-178 %*			
13C12-1,2,3,7,8-PeCDD	*1.564*	*1.318-1.783*			*88.5*	*%*		*25-181 %*			
13C12-1,2,3,4,7,8-HxCDF	*0.520*	*0.434-0.587*			*92.3*	*%*		*26-152 %*			
13C12-1,2,3,6,7,8-HxCDF	*0.506*	*0.434-0.587*			*92.1*	*%*		*26-123 %*			
13C12-2,3,4,6,7,8-HxCDF	*0.519*	*0.434-0.587*			*88.7*	*%*		*28-136 %*			
13C12-1,2,3,7,8,9-HxCDF	*0.512*	*0.434-0.587*			*89.3*	*%*		*29-147 %*			
13C12-1,2,3,4,7,8-HxCDD	*1.288*	*1.054-1.426*			*95.0*	*%*		*32-141 %*			
13C12-1,2,3,6,7,8-HxCDD	*1.268*	*1.054-1.426*			*91.5*	*%*		*28-130 %*			
13C12-1,2,3,4,6,7,8-HpCDF	*0.446*	*0.374-0.506*			*83.1*	*%*		*28-143 %*			
13C12-1,2,3,4,7,8,9-HpCDF	*0.456*	*0.374-0.506*			*87.9*	*%*		*26-138 %*			
13C12-1,2,3,4,6,7,8-HpCDD	*1.006*	*0.893-1.208*			*91.6*	*%*		*23-140 %*			
13C12-OCDD	*0.889*	*0.757-1.024*			*80.0*	*%*		*17-157 %*			
37C14-2,3,7,8-TCDD					*102*	*%*		*35-197 %*			

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Certified Analyses included in this Report

Analyte	Certifications
EPA 1613B in Solid	
2,3,7,8-TCDF	DoD-ELAP,NELAP,WADOE
2,3,7,8-TCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
2,3,4,7,8-PeCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8-PeCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
2,3,4,6,7,8-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,6,7,8-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,7,8,9-HxCDD	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,7,8,9-HpCDF	DoD-ELAP,NELAP,WADOE
1,2,3,4,6,7,8-HpCDD	DoD-ELAP,NELAP,WADOE
OCDF	DoD-ELAP,NELAP,WADOE
OCDD	DoD-ELAP,NELAP,WADOE
Total TCDF	DoD-ELAP,NELAP,WADOE
Total TCDD	DoD-ELAP,NELAP,WADOE
Total PeCDF	DoD-ELAP,NELAP,WADOE
Total PeCDD	DoD-ELAP,NELAP,WADOE
Total HxCDF	DoD-ELAP,NELAP,WADOE
Total HxCDD	DoD-ELAP,NELAP,WADOE
Total HpCDF	DoD-ELAP,NELAP,WADOE
Total HpCDD	DoD-ELAP,NELAP,WADOE
13C12-2,3,7,8-TCDF	DoD-ELAP
13C12-2,3,7,8-TCDD	DoD-ELAP
13C12-1,2,3,7,8-PeCDF	DoD-ELAP
13C12-2,3,4,7,8-PeCDF	DoD-ELAP
13C12-1,2,3,7,8-PeCDD	DoD-ELAP
13C12-1,2,3,4,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,6,7,8-HxCDF	DoD-ELAP
13C12-2,3,4,6,7,8-HxCDF	DoD-ELAP
13C12-1,2,3,7,8,9-HxCDF	DoD-ELAP

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

13C12-1,2,3,4,7,8-HxCDD	DoD-ELAP
13C12-1,2,3,6,7,8-HxCDD	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDF	DoD-ELAP
13C12-1,2,3,4,7,8,9-HpCDF	DoD-ELAP
13C12-1,2,3,4,6,7,8-HpCDD	DoD-ELAP
13C12-OCDD	DoD-ELAP
37C14-2,3,7,8-TCDD	DoD-ELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017

Stemen Environmental, Inc.	Project: West Bay Marina	
5724 Puget Beach Road NE	Project Number: [none]	**Reported:**
Olympia, WA 98516	Project Manager: Paul Stemen	17-Nov-2016 12:21

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
EMPC	Estimated Maximum Possible Concentration qualifier for HRGCMS Dioxin
B	This analyte was detected in the method blank.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

ATTACHMENT E
ENVIRONMENTAL COVENANT

After Recording Return
Original Signed Covenant
to:

Electronic Copy

Andrew Smith
Toxics Cleanup Program
Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

Environmental Covenant

Grantor: West Bay Marina Associates
Grantee: State of Washington, Department of Ecology (hereafter "Ecology")
Brief Legal Description: PLUM DLC & FCT BEING PTN TR A BLA-53352/574 DAF: BEG NE COR 8408020110; N22-58-27W 107.95F ALG INNER HRBR LN; S66-44-33W 109.08F; S17-24-54E 105.21F; N67-39-05E 207.29F POB.
Tax Parcel Nos.: 09750018003
Cross Reference: 4651229

RECITALS

a. This document is an environmental (restrictive) covenant (hereafter "Covenant") executed pursuant to the Model Toxics Control Act ("MTCA"), chapter 70.105D RCW, and Uniform Environmental Covenants Act ("UECA"), chapter 64.70 RCW.

b. The Property that is the subject of this Covenant is part or all of a site commonly known as West Bay Marina under Ecology Facility ID No. 92753273. The Property is legally described in Exhibit A, and illustrated in Exhibit B, both of which are attached (hereafter "Property"). If there are differences between these two Exhibits, the legal description in Exhibit A shall prevail.

c. The Property is the subject of remedial action conducted under MTCA. This Covenant is required because residual contamination remains on the Property after completion of remedial actions. Specifically, the following principal contaminants remain on the Property:

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01/08/2020 10:47 AM Covenant
Thurston County Washington
WESTBAY MARINA ASSOCIATES

Medium	Principal Contaminants Present
Soil	Dioxins, Furans
Groundwater	N/A
Surface Water/Sediment	N/A

d. It is the purpose of this Covenant to restrict certain activities and uses of the Property to protect human health and the environment and the integrity of remedial actions conducted at the site. Records describing the extent of residual contamination and remedial actions conducted are available through Ecology.

e. This Covenant grants Ecology certain rights under UECA and as specified in this Covenant. As a Holder of this Covenant under UECA, Ecology has an interest in real property, however, this is not an ownership interest which equates to liability under MTCA or the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 *et seq.* The rights of Ecology as an "agency" under UECA, other than its' right as a holder, are not an interest in real property.

f. This Covenant amends and supercedes and replaces in its entirety that certain Covenant recorded October 4, 2018 under Thurston County recording number 4651229.

COVENANT

West Bay Marina Associates, as Grantor and fee simple owner of the Property, hereby grants to the Washington State Department of Ecology, and its successors and assignees, the following covenants. Furthermore, it is the intent of the Grantor that such covenants shall supersede any prior interests the GRANTOR has in the property and run with the land and be binding on all current and future owners of any portion of, or interest in, the Property.

Section 1. General Restrictions and Requirements.

The following general restrictions and requirements shall apply to the Property:

a. Interference with Remedial Action. The Grantor shall not engage in any activity on the Property that may impact or interfere with the remedial action and any operation, maintenance, inspection or monitoring of that remedial action without prior written approval from Ecology.

b. Protection of Human Health and the Environment. The Grantor shall not engage in any activity on the Property that may threaten continued protection of human health or the environment without prior written approval from Ecology. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as a part of the remedial action or that exacerbates or creates a new exposure to residual contamination remaining on the Property.

c. Continued Compliance Required. Grantor shall not convey any interest in any portion of the Property without providing for the continued adequate and complete operation, maintenance and monitoring of remedial actions and continued compliance with this Covenant.

d. Leases. Grantor shall restrict any lease for any portion of the Property to uses and activities consistent with this Covenant and notify all lessees of the restrictions on the use of the Property.

e. Preservation of Reference Monuments. Grantor shall make a good faith effort to preserve any reference monuments and boundary markers used to define the areal extent of coverage of this Covenant. Should a monument or marker be damaged or destroyed, Grantor shall have it replaced by a licensed professional surveyor within 30 days of discovery of the damage or destruction.

Section 2. Specific Prohibitions and Requirements.

In addition to the general restrictions in Section 1 of this Covenant, the following additional specific restrictions and requirements shall apply to the Property.

Containment of Soil/Waste Materials. The remedial action for the Property is based on containing contaminated soils under a cap consisting of the West Bay Marina office building, concrete capped sidewalks/areas, and surrounding asphalt paved areas as illustrated in Exhibit B (Site Plan Detail Following Remedial Excavation). The primary purpose of this cap is to protect from direct contact with the contaminants. As such, the following restrictions shall apply within the area shown on Exhibit B as "Region of Property Defined under Environmental Covenant Control" (Restricted Area).

Any activity within the Restricted Area that will compromise the integrity of the Containment Cap including: drilling; digging; piercing the cap with sampling device, post, stake or similar device; grading; excavation; installation of underground utilities; removal of the cap; or, application of loads in excess of the cap load bearing capacity, is prohibited without prior written approval by Ecology. The Containment Cap is defined by the asphalt, concrete and structures covering the soil contamination within the Restricted Area on Exhibit B. The Grantor shall report to Ecology within forty-eight (48) hours of the discovery of any damage to the Containment Cap. Unless an alternative plan has been approved by Ecology in writing, the Grantor shall promptly repair the damage and submit a report documenting this work to Ecology within thirty (30) days of completing the repairs.

The Grantor shall not alter or remove the existing structures within the Restricted Area in any manner that would expose said contaminated soil and waste materials, result in a release to the environment of said contaminants, or create a new exposure pathway, without prior written approval of Ecology. Should the Grantor propose to remove all or a portion of the existing structures illustrated in Exhibit B that access to the underlying

contamination is feasible, Ecology may require treatment or removal of the underlying contaminated soil and waste materials.

As required by Ecology, but not more often than every 5 years, the property owner shall provide to Ecology a report with photographs and a description of the condition of the Containment Cap, also detailing any necessary or anticipated maintenance for the Containment Cap or changes to conditions at the Site affecting the remedy.

Section 3. Access.

a. The Grantor shall maintain clear access to all remedial action components necessary to construct, operate, inspect, monitor and maintain the remedial action.

b. The Grantor freely and voluntarily grants Ecology and its authorized representatives, upon reasonable notice, the right to enter the Property at reasonable times to evaluate the effectiveness of this Covenant and associated remedial actions, and enforce compliance with this Covenant and those actions, including the right to take samples, inspect any remedial actions conducted on the Property, and to inspect related records.

c. No right of access or use by a third party to any portion of the Property is conveyed by this instrument.

Section 4. Notice Requirements.

a. Conveyance of Any Interest. The Grantor, when conveying any interest of the Property including but not limited to title, easement, leases, and security or other interests, must:

i. Provide written notice to Ecology of the intended conveyance at least thirty (30) days in advance of the conveyance.

ii. Include in the conveying document a notice in substantially the following form, as well as a complete copy of this Covenant:

NOTICE: THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL COVENANT GRANTED TO THE WASHINGTON STATE DEPARTMENT OF ECOLOGY ON [DATE OF THIS COVENANT] AND RECORDED WITH THE THURSTON COUNTY AUDITOR UNDER RECORDING NUMBER [RECORDING NUMBER]. USES AND ACTIVITIES ON THIS PROPERTY MUST COMPLY WITH THAT COVENANT, A COMPLETE COPY OF WHICH IS ATTACHED TO THIS DOCUMENT.

iii. Unless otherwise agreed to in writing by Ecology, provide Ecology with a complete copy of the executed document within thirty (30) days of the date of execution of such document.

b. Reporting Violations. Should the Grantor become aware of any violation of this Covenant, Grantor shall promptly report such violation in writing to Ecology.

c. Emergencies. For any emergency or significant change in site conditions due to Acts of Nature (for example, flood or fire) resulting in a violation of this Covenant, the Grantor is authorized to respond to such an event in accordance with state and federal law. The Grantor must notify Ecology in writing of the event and response actions planned or taken as soon as practical but no later than within 24 hours of the discovery of the event.

d. Notification procedure. Any required written notice, approval, reporting or other communication shall be personally delivered or sent by first class mail to the following persons. Any change in this contact information shall be submitted in writing to all parties to this Covenant. Upon mutual agreement of the parties to this Covenant, an alternative to personal delivery or first-class mail, such as e-mail or other electronic means, may be used for these communications.

Neil Falkenburg West Bay Marina Associates 2100 W Bay Dr NW Olympia, WA 98502 Phone: (360) 946-2022	Environmental Covenants Coordinator Washington State Department of Ecology Toxics Cleanup Program P.O. Box 47600 Olympia, WA 98504 – 7600 (360) 407-6000 ToxicsCleanupProgramHQ@ecy.wa.gov

Section 5. Modification or Termination.

a. Grantor must provide written notice and obtain approval from Ecology at least sixty (60) days in advance of any proposed activity or use of the Property in a manner that is inconsistent with this Covenant. For any proposal that is inconsistent with this Covenant and permanently modifies an activity or use restriction at the site:

i. Ecology must issue a public notice and provide an opportunity for the public to comment on the proposal; and

ii. If Ecology approves of the proposal, the Covenant must be amended to reflect the change before the activity or use can proceed.

b. If the conditions at the site requiring a Covenant have changed or no longer exist, then the Grantor may submit a request to Ecology that this Covenant be amended or

terminated. Any amendment or termination of this Covenant must follow the procedures in MTCA and UECA and any rules promulgated under these chapters.

c. By signing this agreement, per RCW 64.70.100, the original signatories to this agreement, other than Ecology, agree to waive all rights to sign amendments to and termination of this Covenant.

Section 6. Enforcement and Construction.

a. This Covenant is being freely and voluntarily granted by the Grantor.

b. Within ten (10) days of execution of this Covenant, Grantor shall provide Ecology with an original signed Covenant and proof of recording and a copy of the Covenant and proof of recording to others required by RCW 64.70.070.

c. Ecology shall be entitled to enforce the terms of this Covenant by resort to specific performance or legal process. All remedies available in this Covenant shall be in addition to any and all remedies at law or in equity, including MTCA and UECA. Enforcement of the terms of this Covenant shall be at the discretion of Ecology, and any forbearance, delay or omission to exercise its rights under this Covenant in the event of a breach of any term of this Covenant is not a waiver by Ecology of that term or of any subsequent breach of that term, or any other term in this Covenant, or of any rights of Ecology under this Covenant.

d. The Grantor shall be responsible for all costs associated with implementation of this Covenant. Furthermore, the Grantor, upon request by Ecology, shall be obligated to pay for Ecology's costs to process a request for any modification or termination of this Covenant and any approval required by this Covenant.

e. This Covenant shall be liberally construed to meet the intent of MTCA and UECA.

f. The provisions of this Covenant shall be severable. If any provision in this Covenant or its application to any person or circumstance is held invalid, the remainder of this Covenant or its application to any person or circumstance is not affected and shall continue in full force and effect as though such void provision had not been contained herein.

g. A heading used at the beginning of any section or paragraph or exhibit of this Covenant may be used to aid in the interpretation of that section or paragraph or exhibit but does not override the specific requirements in that section or paragraph.

The undersigned Grantor warrants it holds the title to the Property and has authority to execute this Covenant.

EXECUTED this 19 day of December, 2019.

GRANTOR:

WEST BAY MARINA ASSOCIATES

By: Neil G. Falkenberg
Its: Gen. Mgr.

STATE OF WASHINGTON)
) ss.
COUNTY OF THURSTON)

This record was acknowledged before me on Dec 19, 2019 by Neil G Falkenberg as General Mgr of West Bay Marina Associates.

NOTARY PUBLIC
STATE OF WASHINGTON
JESSICA I. ROBINSON
My Appointment Expires
OCTOBER 29, 2020

Notarial Stamp/Seal

Name: Jessica Robinson
NOTARY PUBLIC, State of Washington
My appointment expires Oct 29, 2020

The Department of Ecology, hereby accepts the status as GRANTEE and HOLDER of the above Environmental Covenant.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By: Rebecca S. Lawson
Title: SW REGION MANAGER
Dated: 1/7/2020

STATE OF WASHINGTON

COUNTY OF THURSTON

On this 7th day of January, 2020 I certify that Rebecca S. Lawson personally appeared before me, acknowledged that **he/she** is the SWRO-TCP Manager of the state agency that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed, for the uses and purposes therein mentioned, and on oath stated that **he/she** was authorized to execute said instrument for said state agency.

Treasure A Mitchell
Notary Public in and for the
State of Washington
Residing at McCleary, WA
My appointment expires 8/2/2023

Exhibit A

LEGAL DESCRIPTION

That portion of Parcel A of Boundary Line Adjustment No. BLA-SS-5335 as recorded September 6, 1984 under Auditor's File No. 8409060030, described as follows:

That part of Plumb Donation Claim No. 57, Township 18 North, Range 2 West, W.M., and of Blocks 385 and 386 of Olympia Tide Lands and of adjoining vacated street, described as follows:

Beginning at point North 22° 02' 47" West 252.99 feet from a point on the South line of said Plumb Claim, North 89° 51' 12" East 206.41 feet from the intersection of the Easterly line of Harbor View Drive in West Bay Hills as recorded in Volume 12 of Plats, page 83, therewith; running thence North 22° 02' 47" West 39.85 feet, North 26° West 105.79 feet and North 56° 26' 20" East 4.19 feet more or less to the Westerly line of a former right of way of Port Townsend Southern Railroad Company; thence Northwesterly along said Westerly line of the right of way 220 feet more or less; thence North 67° 39' 05" East 351.74 feet more or less to the Inner Harbor Line of Budd Inlet; thence South 22° 58' 27" East along said Harbor Line 365.62 feet; thence South 67° 39' 05" West 330 feet more or less to the point of beginning; EXCEPTING THEREFROM West Bay Drive.

In Thurston County, Washington.

Exhibit B

FIGURE 3-SITE PLAN DETAIL FOLLOWING REMEDIAL EXCAVATION