# Memo

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**To:** Steve Teel, LGH (Ecology)

**From:** Hannah Morse, EIT and Chris Waldron, P.E.

**Cc:** Jake Lund, P.E. (City of Olympia), Chance Asher (Ecology), Nicholas Acklam (Ecology), Troy Bussey, P.E. (PIONEER)

**Date:** August 26, 2021

**Subject:** Meeting Minutes from 08/19/2021 Meeting with Ecology to Discuss Sediment Comments on the 2015 Solid Wood RI/FS Report

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The purpose of this memo is to document the minutes from the meeting with the Washington State Department of Ecology (Ecology) on August 19, 2021. The purpose of this meeting was to provide feedback and response to sediment-related comments provided by Ecology on May 19, 2021 regarding the Remedial Investigation/Feasibility Study (RI/FS) Report for the City of Olympia's (City's) Solid Wood, Inc. Site dated October 5, 2015.

## Meeting Minutes

**Who Attended:**

- Jake Lund (City of Olympia)
- Steve Teel (Ecology)
- Chance Asher (Ecology)
- Nicholas Acklam (Ecology)
- Chris Waldron (PIONEER Technologies Corporation [PIONEER])
- Troy Bussey (PIONEER)
- Hannah Morse (PIONEER)

Below is a summary of the Solid Wood, Inc. Site RI/FS Sediment Discussion:

1. Ecology Comment: Inappropriate Screening Levels (Ecology Comments #9, 10a, #10c, and C).

   *Summary: Ecology agreed that the screening levels were not inappropriate when the RI/FS report was developed but are now outdated because of new SCUM II Guidance. Action items:*

   a) Incorporate more information on the basis/development of the TPH-D/TPH-HO screening level (100 mg/kg – conditional value provided by Ecology)

   b) Add text describing that the bioassays were driven by TPH-D/TPH-HO exceedances and not SMS criteria exceedances

   c) Add discussion that the SMS benthic criteria (except 1 location) all passed (i.e., below SCO) and because of this a station-by-station bioassay approach was not warranted (see SMS rule 560(7)(c))

   d) Revise the CSM to discuss tribal scenarios (fishing, fish consumption)

2. Ecology Comment: Inaccurate Use of Bioassays and Interpretation of Biological and Chemical Exceedances (Ecology Comment D).

   *Summary: Ecology agreed that that the use of bioassays and the interpretation of biological/chemical exceedances was not inaccurate. Ecology agreed that the RI/FS report needs to be revised to provide more*

*context explaining how locations for bioassays/chemical testing were selected and how the bioassay/chemical exceedances were interpreted based on these results. Most of this information was presented in Work Plan(s) and the 2015 Sediment Summary Tech Memo that was presented in an Appendix of the RI/FS report. This information will be summarized in the main text. Action Items:*

a) Incorporate text from the 2015 Tech Memo regarding the sediment evaluation[1]

b) For sample SD-30/SD-33 (only bioassay exceedance), remove language that this sample is an upland sample and add language focusing on the sieve results (e.g., no organic material in the sample, no wood debris, etc.). Add text that there is no indication that this sample result is of concern or tied to Solid Wood, Inc. historical activities

3. Ecology Comment: Insufficient Chemicals Analyzed and/or Evaluated (Ecology Comment E)

*Summary: Ecology agreed that the chemicals that were analyzed/evaluated in the RI/FS report were sufficient. Action Items:*

a) Add/clarify/revise text to clarify what analytics were run, that synoptic samples were run for sediment, and the purpose for additional investigation (e.g., why TPH-D/TPH-HO sampling is double that of SMS criteria samples, why bioassays were not ran everywhere)

4. Ecology Comment: Insufficient Sampling to Define Nature and Extent of Contamination (Ecology Comment #3 and G)

*Summary: Ecology agreed that the nature and extent of contamination in Sediment had been defined in all areas except the area bounded by SD03 to the south and SD23 to the north (i.e., proximate to 3 outfalls (see photo). Both intertidal and subtidal sediment need to be assessed in this area. Action Items:*

a) Conduct a Site visit and take photos of the 3 outfalls located south of the beach area

b) Develop outline/proposal for sediment sampling (discuss with Ecology prior to developing a WP):

i. Inner tidal samples south of west bay park near three existing outfalls

- Analyzed for Full SMS Suite (only concerned about the biologically active zone [BAZ])
- Collect subsurface sediment samples (~2 feet bgs) to evaluate potential impacts to human health (e.g., clam diggers/beach combers).

ii. Collect subtidal sediment samples from the BAZ and perform a field sieve analysis. Follow Ecology's Wood Waste Guidance (https://apps.ecology.wa.gov/publications/SummaryPages/0909044.html)

- If wood debris > 25%, perform subtidal chemical analysis and bioassays

iii. Evaluate if inner tidal samples are representative of subtidal conditions/concentrations

- Evaluate based on cPAH and dioxin/furan in Puget Sound Regional Background report (https://apps.ecology.wa.gov/publications/SummaryPages/1809117.html)
- Develop SWAC for Mercury, Arsenic, cPAHs, dioxin/furans (see Slide 15 of the PPT) and compare to natural background/regional background.

[1] PIONEER. 2015. November 2014 Supplemental Sediment Sampling Results for the Solid Wood Incorporated Site. February 2.

5. General Comments

   *Summary: Discussed some general items in the RI/FS Report (e.g., cPAHs) and the need for additional meetings to resolve outstanding comments. Schedule is TBD. Action Items:*

   a) Explain that total cPAHs at 1.2 mg/kg in 2-3' SD-14 sample is solely responsible for driving average cPAHs concentration near background
      i. Verify SD-14 is in-place and was not removed during an Interim Action or other Action at the Site.
   b) Discuss potable water classification and soil-to-groundwater pathway with Steve Teel (WA Dept. Ecology)
   c) Revise RI/FS based on agreed-to comments/revisions

## Summary of Path Forward

Below is a summary of the action items from the Solid Wood, Inc. Site RI/FS Sediment Discussion:

1. Schedule a Site walk to collect photos of the 3 existing outfalls
2. Develop a preliminary sampling plan/outline for addressing sediment data gaps and potential subtidal wood debris uncertainties
   a) Set up a call with Ecology to discuss proposed sampling plan
   b) Develop sampling Work Plan for Ecology review/approval

## Enclosures

| | |
|---|---|
| Attachment #1 | Solid Wood RI/FS RTC Sediment Presentation (dated 08/19/2021) |

# West Bay Park RI/FS

## (Solid Wood Inc. Site)

## SEDIMENT DISCUSSION

Response/Discussion of Ecology's Significant Comments

and

Path Forward for the RI/FS Report

# Meeting Agenda

- Review, clarify, discuss, and respond to SEDIMENT comments provided by Ecology on May 19, 2021:
  - Inappropriate Screening Levels (Ecology Comments #9, #10a, #10c, and C)
  - Inaccurate use of bioassays and interpretation of biological and chemical exceedances (Ecology Comment D)
  - Insufficient chemicals analyzed and/or evaluated (Ecology Comment E)
  - Insufficient sampling to define nature and extent of contamination (Ecology Comment #3 and G)
- Response/Discussion:
  - All sediment work was performed per Ecology-approved Work Plans.
  - Sediment sampling results/bioassays were documented in a 2014 PIONEER Tech Memo, which was approved by Ecology, prior to development of the RI/FS Report.
    - No Exceedances of SMS Criteria[1] – Exceedances of Ecology Screening Level for TPH-HO+TPH-D (100 mg/kg)
    - Bioassay Testing Passed SMS bioassay criteria for SQS and CSL.

[1] Except for fluoranthene at SD14 & SD19. The maximum detected concentration was 2.1 mg/kg which exceeded the AET SCO of 1.7 mg/kg but did not exceed the AET CSL of 2.5 mg/kg. Fluroranthene was detected in 26 of the 32 samples were collected (i.e., 81% frequncey of detection).

# Sediment Sample Locations


**-All exceedances (except for 3) were for Ecology's TPH-D/TPH-HO screening level of 100 mg/kg**

**2 Exceedances were for fluoranthene (SD14, SD19)**

**1 Exceedance for 2,3,7,8-TCDD TEQ screening level (SD06)**

**Legend**

Piling Removal Area

Sediment Sample Locations

- No SL Exceedance
- SL Exceedance

Biological Test Results

- Fail (one bioassay)
- Pass all three bioassays

Table 3-6: SL Exceedances in Sediment

| Constituent | Number of Samples | Number of Detected Results | Frequency of Detection (%) | Maximum Detected Concentration (mg/kg) | Sediment Management Standards (WAC 173-204) | | Apparent Effects Threshold | | Final SL[1] (mg/kg) | Does the Maximum Detected Concentration Exceed the SL? |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SCO | CSL | SCO | CSL | | |
| **Total Petroleum Hydrocarbons (mg/kg dry weight)** | | | | | | | | | | |
| TPH-D | 68 | 14 | 21 | 94 | -- | -- | 100 | -- | 100 | No |
| TPH-HO | 68 | 42 | 62 | 1,500 | -- | -- | 100 | -- | 100 | **Yes** |
| **Metals (mg/kg dry weight)** | | | | | | | | | | |
| Cadmium | 9 | 2 | 22 | 1.1 | 5.1 | 6.7 | 5.1 | 6.7 | 5.1 | No |
| Chromium, Total | 10 | 10 | 100 | 28 | 260 | 270 | 260 | 270 | 260 | No |
| Copper | 9 | 9 | 100 | 39 | 390 | 390 | 390 | 390 | 390 | No |
| Lead | 10 | 4 | 40 | 15 | 450 | 530 | 450 | 530 | 450 | No |
| Zinc | 9 | 9 | 100 | 66 | 410 | 960 | 410 | 960 | 410 | No |
| **VOCs (mg/kg organic carbon)[4]** | | | | | | | | | | |
| 2-Methylnaphthalene | 32 | 3 | 9.4 | 0.034 | -- | -- | 0.67 | 0.67 | 0.67 | No |
| 2-Methylnaphthalene, OC-Normalized | 28 | 3 | 10.7 | 1.0 | 38 | 64 | -- | -- | 38 | No |
| Acenaphthene | 32 | 2 | 6.3 | 0.031 | -- | -- | 0.50 | 0.50 | 0.50 | No |
| Acenaphthene, OC-Normalized | 28 | 2 | 7.1 | 0.77 | 16 | 57 | -- | -- | 16 | No |
| Acenaphthylene | 32 | 8 | 25 | 0.15 | -- | -- | 1.3 | 1.3 | 1.3 | No |
| Acenaphthylene, OC-Normalized | 28 | 8 | 29 | 1.4 | 66 | 66 | -- | -- | 66 | No |
| Anthracene | 32 | 13 | 41 | 0.26 | -- | -- | 0.96 | 0.96 | 0.96 | No |
| Anthracene, OC-Normalized | 28 | 12 | 43 | 3.5 | 220 | 1,200 | -- | -- | 220 | No |
| Benz[a]anthracene | 32 | 24 | 75 | 0.92 | -- | -- | 1.3 | 1.6 | 1.3 | No |
| Benz[a]anthracene, OC-Normalized | 28 | 20 | 71 | 8.7 | 110 | 270 | -- | -- | 110 | No |
| Benzo(g,h,i)perylene | 33 | 22 | 67 | 0.49 | -- | -- | 0.67 | 0.72 | 0.67 | No |
| Benzo(g,h,i)perylene, OC-Normalized | 29 | 20 | 69 | 4.6 | 31 | 78 | -- | -- | 31 | No |
| Benzo[a]pyrene | 33 | 25 | 76 | 0.90 | -- | -- | 1.6 | 1.6 | 1.6 | No |
| Benzo[a]pyrene, OC-Normalized | 29 | 21 | 72 | 8.5 | 99 | 210 | -- | -- | 99 | No |
| Benzo[b]fluoranthene | 33 | 26 | 79 | 0.66 | -- | -- | -- | -- | No Value[2] | No |
| Benzo[b]fluoranthene, OC-Normalized | 29 | 22 | 76 | 6.2 | -- | -- | -- | -- | No Value[2] | No |
| Benzo[k]fluoranthene | 33 | 16 | 48 | 0.78 | -- | -- | -- | -- | No Value[2] | No |
| Benzo[k]fluoranthene, OC-Normalized | 29 | 15 | 52 | 7.4 | -- | -- | -- | -- | No Value[2] | No |
| Bis(2-ethylhexyl)phthalate | 14 | 2 | 14 | 0.13 | -- | -- | 1.3 | 3.1 | 1.3 | No |
| Bis(2-ethylhexyl)phthalate, OC-Normalized | 10 | 2 | 20 | 6.3 | 47 | 78 | -- | -- | 47 | No |
| Chrysene | 32 | 25 | 78 | 1.0 | -- | -- | 1.4 | 2.8 | 1.4 | No |
| Chrysene, OC-Normalized | 28 | 21 | 75 | 9.4 | 110 | 460 | -- | -- | 110 | No |
| Dibenz[a,h]anthracene | 33 | 6 | 18 | 0.14 | -- | -- | 0.23 | 0.23 | 0.23 | No |
| Dibenz[a,h]anthracene, OC-Normalized | 29 | 6 | 21 | 1.3 | 12 | 33 | -- | -- | 12 | No |
| Fluoranthene | 32 | 26 | 81 | 2.1 | -- | -- | 1.7 | 2.5 | 1.7 | **Yes** |
| Fluoranthene, OC-Normalized | 28 | 22 | 79 | 38 | 160 | 1,200 | -- | -- | 160 | No |
| Fluorene | 32 | 5 | 16 | 0.058 | -- | -- | 0.54 | 0.54 | 0.54 | No |
| Fluorene, OC-Normalized | 28 | 5 | 18 | 1.1 | 23 | 79 | -- | -- | 23 | No |
| Indeno[1,2,3-cd]pyrene | 33 | 19 | 58 | 0.46 | -- | -- | 0.60 | 0.69 | 0.60 | No |
| Indeno[1,2,3-cd]pyrene, OC-Normalized | 29 | 18 | 62 | 4.3 | 34 | 88 | -- | -- | 34 | No |
| Naphthalene | 32 | 7 | 22 | 0.096 | -- | -- | 2.1 | 2.1 | 2.1 | No |
| Naphthalene, OC-Normalized | 28 | 7 | 25 | 5.3 | 99 | 170 | -- | -- | 99 | No |
| Phenanthrene | 32 | 23 | 72 | 0.80 | -- | -- | 1.5 | 1.5 | 1.5 | No |
| Phenanthrene, OC-Normalized | 28 | 20 | 71 | 12 | 100 | 480 | -- | -- | 100 | No |
| Pyrene | 32 | 26 | 81 | 1.8 | -- | -- | 2.6 | 3.3 | 2.6 | No |
| Pyrene, OC-Normalized | 28 | 22 | 79 | 18 | 1,000 | 1,400 | -- | -- | 1,000 | No |
| Total Benzofluoranthenes | 33 | 26 | 79 | 1.4 | -- | -- | 3.2 | 3.6 | 3.2 | No |
| Total Benzofluoranthenes, OC-Normalized | 29 | 22 | 76 | 14 | 230 | 450 | -- | -- | 230 | No |
| Total Carcinogenic PAHS (BaP TEQs)[3] | 33 | 27 | 82 | 1.2 | -- | -- | -- | -- | No Value | No |
| Total Naphthalenes | 32 | 7 | 22 | 0.13 | -- | -- | -- | -- | No Value | No |
| **Phenols (mg/kg dry weight)** | | | | | | | | | | |
| Phenol | 13 | 1 | 7.7 | 0.15 | 0.42 | 1.2 | 0.42 | 1.2 | 0.42 | No |
| **Dioxins/Furans (ng/kg dry weight)** | | | | | | | | | | |
| Total Dioxins/Furans (2,3,7,8-TCDD TEQs)[3] | 15 | 15 | 100 | 12 | -- | -- | 11 | -- | 11 | **Yes** |

**Table Notes:**

AET: Apparent Effects Threshold
BaP: Benzo(a)pyrene
CSL: Cleanup Screening Level
OC: Organic Carbon
SCO: Sediment Cleanup Objective
TEQ: Toxic Equivalents

- Shaded cells indicate that the maximum detected constituent concentration exceeds the applicable SL.
- The final SL is the minimum of the SCO and CSL (as appropriate).
- Benzo[b]fluoranthene and benzo[k]fluoranthene were considered under Total Benzofluoranthenes.
- Total TCDD-TEQ and BaP TEQs calculated by multiplying the isomer concentrations by the toxicity equivalency factor (WAC 173-340-900 Table 708-1 and 708-2) and summing all isomers. Half the reporting limit was used for non-detected isomers.
- Constituents were organic carbon (OC) normalized by dividing the constituent concentration by the sample-specific total OC concentration.

# Sediment – Inappropriate Screening Levels (Ecology Comments #9, #10a, #10c, and C)

- Ecology Comment: Inappropriate Sediment Screening Levels: Chemistry results were compared to the SMS benthic criteria, with the exception of dioxins/furans which were compared to MTCA soil values.
  - The 11 ng/kg TEQ screening was not "inappropriate" as stated in the comment. This value was based on the screening levels presented in the Ecology-approved RI/FS Work Plan (Parametrix 2008).
    - The SMS does not include a screening level for dioxins/furans
    - When the RI/FS was developed, the SCUM guidance had not been revised to include "sediment screening levels for the protection of human health and higher trophic levels" values referenced in Ecology's comment
    - The 11 ng/kg TEQ screening level is based on unrestricted direct contact with soil that is protective of recreational beachcombers which were included in the CSM.
    - The 11 ng/kg TEQ screening level was applied to Beach Sediments only – proximate to the former wood burner that was located on the point.
    - The 11 ng/kg TEQ screening level is similar to the screening level used to evaluate Priest Point Park Sediments by the Department of Health in 2011.
  - Note: There was a similar Ecology comment for cPAHs.

# Sediment – Inaccurate use of Bioassays and Interpretation of Biological/Chemical Exceedances (Ecology Comment D)

- Ecology Comment: Inaccurate use of bioassays and interpretation of biological and chemical exceedances: Under the SMS, bioassay results can override chemistry exceedances of the benthic chemical criteria. However, there were a few inaccuracies on the use of bioassays as follows…
- Response/Discussion:
  - Analyzing Bioassays for Dioxins/Furans
    - Dioxins/Furans were included based on upland identification dioxins/furans as a COPC when performing the Interim Action in Area D.
    - MTCA Soil Screening Level for unrestricted land use was used for evaluating dioxins/furans in sediment
      - Results of the bioassays and toxicity testing indicated dioxins/furans in sediment were not of concern and no further evaluation was warranted
      - At the time of developing the work plan (2008) and the RI/FS (2015), the SCUM guidance on background concentrations and/or PQLs did not exist
  - Sediment sample location SD30/SD33 was the only sample that resulted in a failure in one bioassay
    - SD30/SD33 is located in the transition zone between soil and sediment and resembled characteristics of Site soils, which likely attributed to the failure
    - This sample is surrounded by samples that passed all three bioassays
    - This sample is upland in respect to all other sediment samples, where no wood waste was documented and/or observed. If wood waste was a potential source of contamination, it is expected wood waste would have been documented in other bioassay results.


TECHNICAL MEMORANDUM

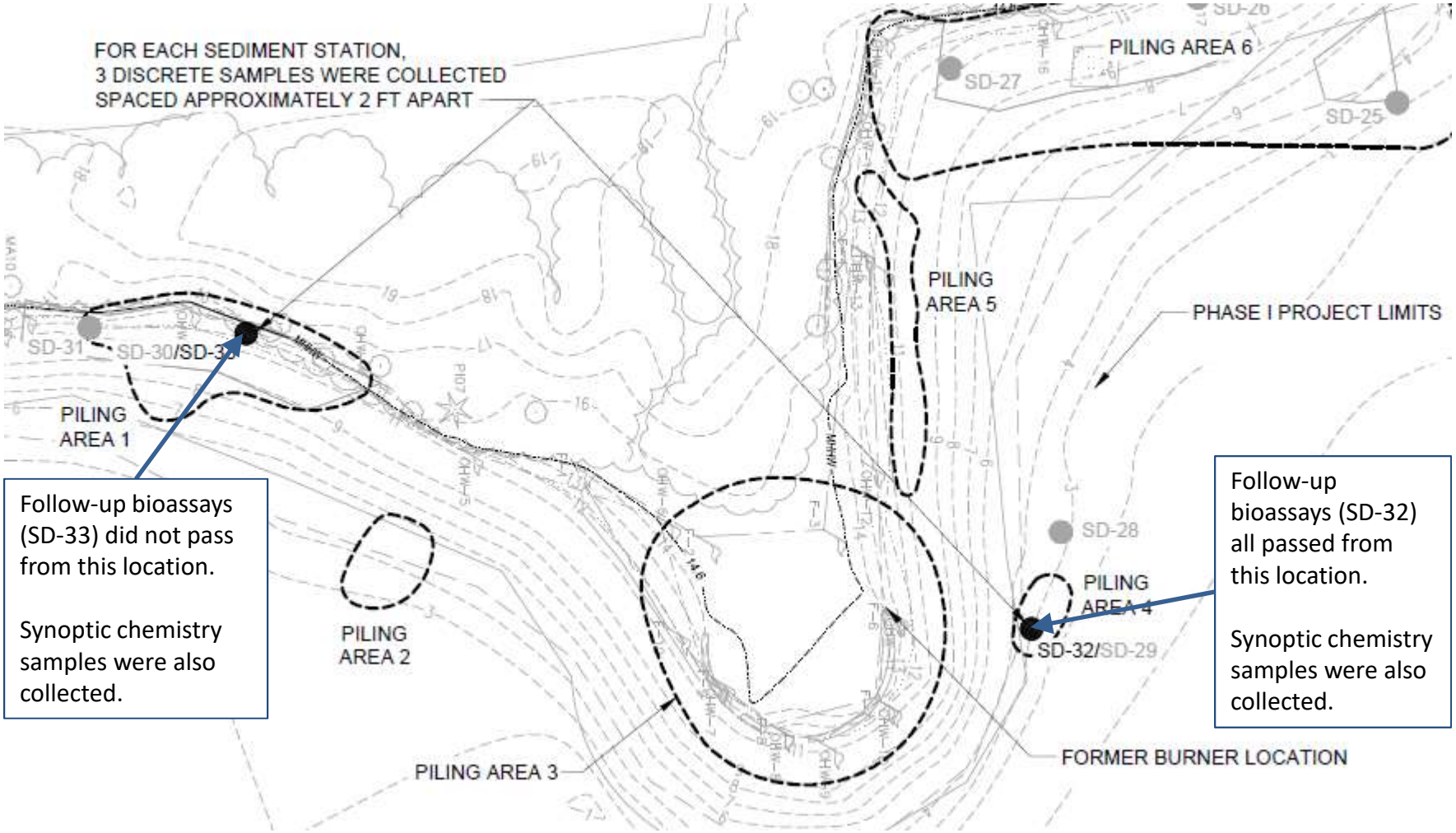

FOR EACH SEDIMENT STATION,
3 DISCRETE SAMPLES WERE COLLECTED
SPACED APPROXIMATELY 2 FT APART
PILING AREA 6
SD-27
SD-25
PILING AREA 5
PHASE I PROJECT LIMITS
SD-31
SD-30/SD-33
PILING AREA 1
Follow-up bioassays (SD-33) did not pass from this location.
Synoptic chemistry samples were also collected.
PILING AREA 2
SD-28
PILING AREA 4
SD-32/SD-29
Follow-up bioassays (SD-32) all passed from this location.
Synoptic chemistry samples were also collected.
PILING AREA 3
FORMER BURNER LOCATION

**Table 3-6: SL Exceedances in Sediment**

| Constituent | Number of Samples | Number of Detected Results | Frequency of Detection (%) | Maximum Detected Concentration (mg/kg) | Sediment Management Standards (WAC 173-204) | | Apparent Effects Threshold | | Final SL[1] (mg/kg) | Does the Maximum Detected Concentration Exceed the SL? |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SCO | CSL | SCO | CSL | | |
| **Total Petroleum Hydrocarbons (mg/kg dry weight)** | | | | | | | | | | |
| TPH-D | 68 | 14 | 21 | 94 | -- | -- | 100 | -- | 100 | No |
| TPH-HO | 68 | 42 | 62 | 1,500 | -- | -- | 100 | -- | 100 | **Yes** |
| **VOCs (mg/kg organic carbon)[4]** | | | | | | | | | | |
| Fluoranthene | 32 | 26 | 81 | 2.1 | -- | -- | 1.7 | 2.5 | 1.7 | **Yes** |
| **Dioxins/Furans (ng/kg dry weight)** | | | | | | | | | | |
| Total Dioxins/Furans (2,3,7,8-TCDD TEQs)[3] | 15 | 15 | 100 | 12 | -- | -- | 11 | -- | 11 | **Yes** |

**Notes:**

AET: Apparent Effects Threshold

BaP: Benzo(a)pyrene

CSL: Cleanup Screening Level

OC: Organic Carbon

SCO: Sediment Cleanup Objective

TEQ: Toxic Equivalents

Shaded cells indicate that the maximum detected constituent concentration exceeds the applicable SL.

[1] The final SL is the minimum of the SCO and CSL (as appropriate).

[2] Benzo[b]fluoranthene and benzo[k]fluoranthene were considered under Total Benzofluoranthenes.

[3] Total TCDD-TEQ and BaP TEQs calculated by multiplying the isomer concentrations by the toxicity equivalency factor (WAC 173-340-900 Table 708-1 and 708-2) and summing all isomers. Half the reporting limit was used for non-detected isomers.

[4] Constituents were organic carbon (OC) normalized by dividing the constituent concentration by the sample-specific total OC concentration.

**Table 3-7: Sediment COC Evaluation**

| Constituent | Maximum Detected Concentration (mg/kg) | Final SL (mg/kg) | Sample Locations Where Constituent Exceeded SL | Sample Date of Exceedance | Has the Exceedance been Addressed? | COC? |
|---|---|---|---|---|---|---|
| **Total Petroleum Hydrocarbons (mg/kg dry weight)** | | | | | | |
| TPH-HO | 1,500 | 100 | Multiple sample locations | Multiple dates | Yes. Bioassays have been performed according to the SMS at select sample locations. All bioassays passed.[1,2] | No |
| **Semi-volatiles (mg/kg organic carbon)[2]** | | | | | | |
| Fluoranthene | 2.1 | 1.7 | SD14 | 5/28/2008 | Yes. Bioassays have been performed according to the SMS at select sample locations. All bioassays passed.[1,2.] | No |
| | | | SD19 | 6/2/2008 | Yes. Concentrations at SD19 were similar to concentrations at SD14. Since bioassays near SD14 passed, the results of the SD14 bioassays are considered representative of conditions at SD19. | |
| **Dioxins/Furans (ng/kg dry weight)** | | | | | | |
| Total Dioxin/Furans (2,3,7,8-TCDD TEQs) | 12 | 11 | SD06 | 2/8/2007 | Yes. Bioassays have been performed according to the SMS at select sample locations and all bioassays passed.[1,2] Additionally, the sample concentration did not suggest a potential risk for recreational exposures (Parametrix 2007). | No |

**Notes:**

TEQ: Toxic Equivalents

[1]All but two bioassays passed. However, the sample locations (SD29 and SD30) were resampled and the bioassay tests were repeated. Sample location SD29 passed all bioassay retests on the repeated sample. The initial failure was attributed to elevated ammonia concentrations from test organism mortality. Sample location SD30 failed one bioassay test on both the initial and repeated sample. However, both failures were attributed to the upland nature of the sediment samples.

[2] SMS criteria designate passed sediment samples as:

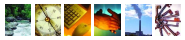
a) Initial designation. Sediments that have been chemically analyzed for the applicable chemical concentration criteria of WAC 173-204-320 through 173-204-340 shall be designated as follows:

i) Sediments with constituent concentrations equal to or less than all the applicable constituent and human health criteria are designated as having no adverse effects on biological resources, not posing a significant health threat to humans, and pass the applicable SQS of WAC 173-204-320 through 173-204-340.

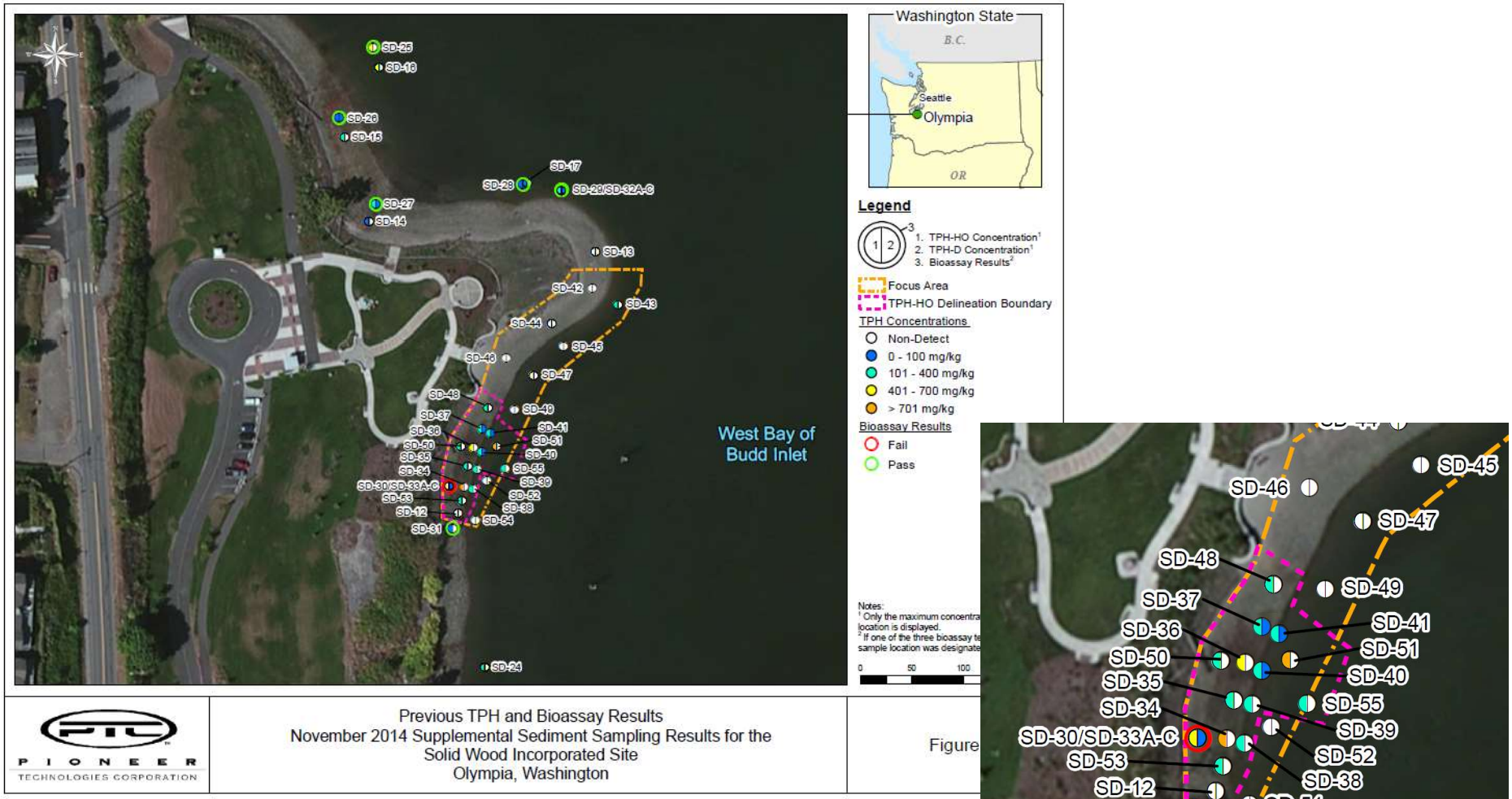
ii) Sediments with constituent concentrations that exceed any one applicable constituent or human health criterion in WAC 173-204-320 through 173-204-340 are designated as having adverse effects on biological resources or posing significant human health threats, and fail the SQS of WAC 173-204-320 through 173-204-340, pending confirmatory designation.

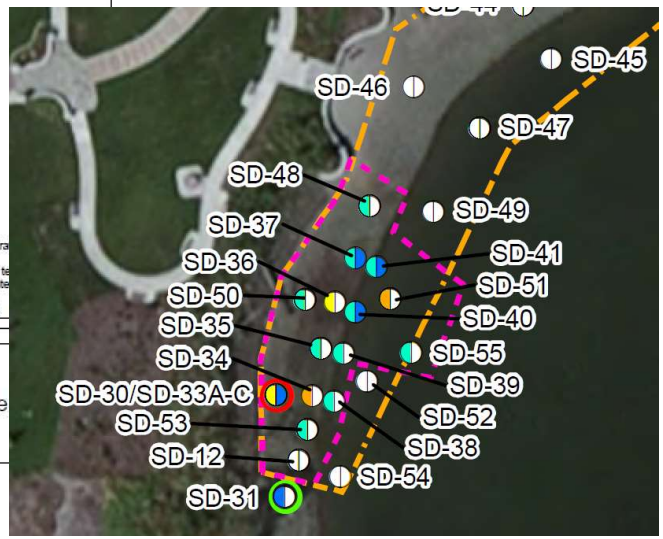
b) Confirmatory designation. Any person or the department may confirm the designation of sediments which have either passed or failed initial designation procedures using the applicable biological testing of WAC 173-204-315. Sediment samples that pass all the required confirmatory biological tests are designated as passing the applicable SQS of WAC 173-204-320 through 173-204-340, notwithstanding the sediment's previous initial designation.

[3] Total TCDD-TEQ calculated by multiplying the isomer concentrations by the toxicity equivalency factor (WAC 173-340-900 Table 708-1) and summing all isomers. Half the reporting limit was used for non-detected isomers.

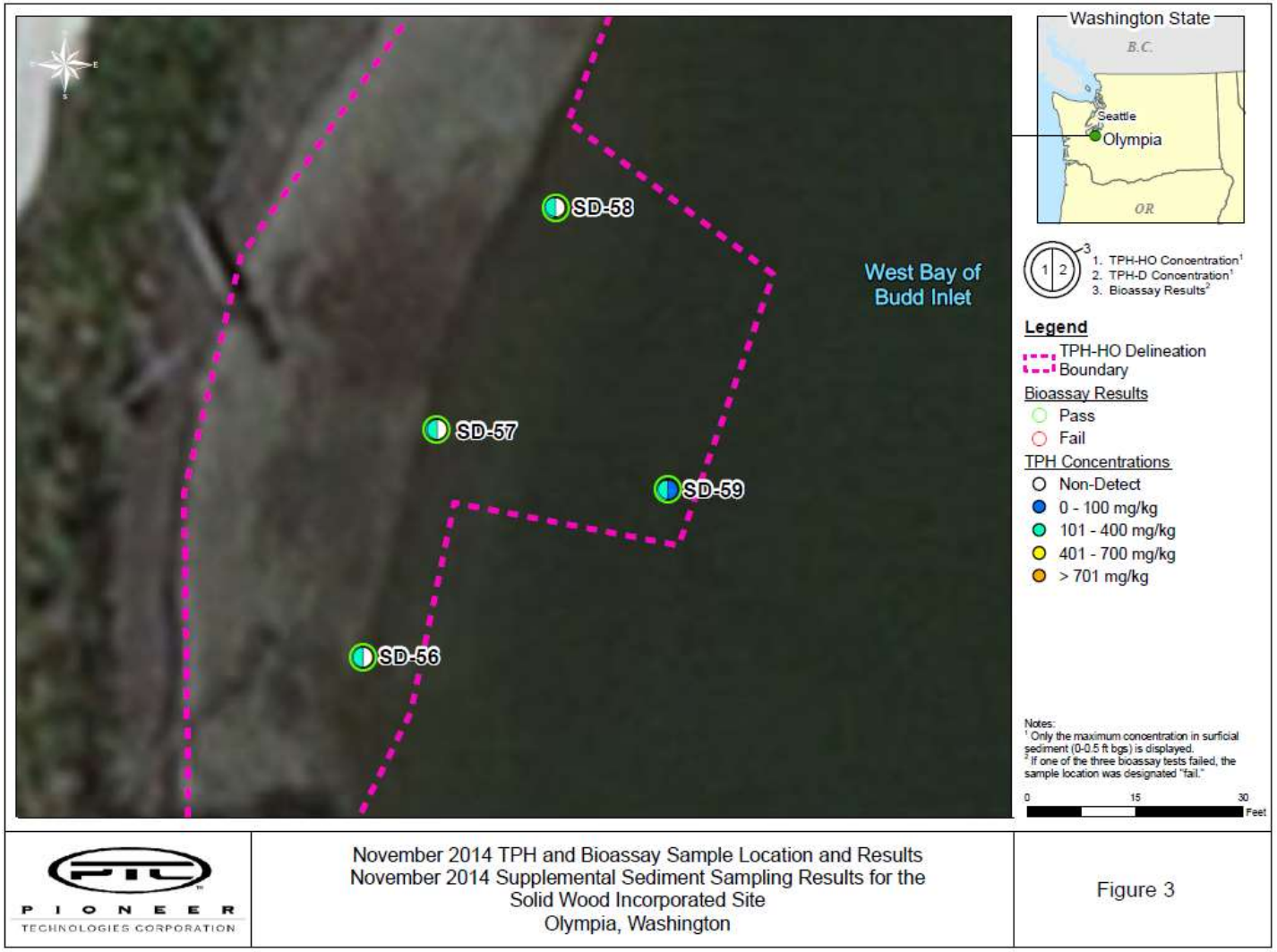


# 2014 Sediment Sample Locations



# 2014 Sediment Sample Locations + Bioassay Results



# Sediment – Inaccurate use of Bioassays and Interpretation of Biological/Chemical Exceedances (Ecology Comment D)

- Ecology Comment: Only 11 stations were analyzed for bioassays and it does not appear they were analyzed from synoptic samples –AND– each station that exceeded the benthic chemical criteria - but did not have bioassays analyzed on a synoptic sample - should be documented as an exceedance of the benthic chemical criteria.
- Response/Discussion:
  - Synoptic chemistry samples were collected with the bioassay samples.
  - Several addendums to the work plan were approved by Ecology, which outlined additional sediment samples to be collected for chemical analysis and bioassay testing
  - Bioassays were collected throughout the Site and were considered representative of the varying chemistry and sediment conditions
  - Based on the chemistry data, TPHs were the primary concern in sediment
    - Results of the bioassays do not indicate an unacceptable risk to the benthic community and no further action is warranted in Site sediments
  - The Ecology approved work plan did not require that each sediment station that exceeded SMS criteria also have a bioassay performed. This also is not how bioassay tests have historically been performed and/or required by Ecology under the SMS.

# Sediment – Insufficient Chemicals Analyzed/Evaluated (Ecology Comment E)

- Ecology's Comment: Insufficient chemicals analyzed and/or evaluated. It appears that some chemicals were not analyzed, not evaluated in the report, or not compared to the correct criteria. Typically, the full suite of SMS chemicals should be analyzed along with other bioaccumulative chemicals (e.g., dioxins/furans and cPAHs).
- Response/Discussion:
  - For each sampling event, a work plan was developed which specified the proposed sample locations, chemicals to be analyzed, established screening criteria, and where (if any) bioassays would be performed.
    - Sediment investigations (conducted as part of the RI/FS and IAs) characterized concentrations of SMS analytes and TPH-D/TPH-HO
    - No Exceedances of SMS Criteria[1]: Full SMS list run on 30+ samples.
    - Exceedances of Ecology Screening Level for TPH-HO+TPH-D (100 mg/kg)
      - Ecology's focus shifted to TPH-D/TPH-HO: TPH run on 68 samples.
      - No upland sources (post Interim Removal Actions) for metals soil (e.g., arsenic, mercury, cadmium, silver, other metals) not detected or detected below MTCA Direct Contract Screening Levels.
  - Ecology's primary concern with sediment was not bioaccumulatives (as indicated in the comments)
    - The concern was TPH-D/TPH-HO because multiple sediment sampling stations exceeded the Ecology-provided screening level of 100 mg/kg (Note: No TPH-D/TPH-HO screening level is developed in the Sediment Management Standards [SMS])
    - To address Ecology's concerns with TPH-D/TPH-HO, several bioassays were performed on sediment samples and Ecology required further characterization of TPH-D/TPH-HO concentrations in sediment

[1] Except for fluoranthene at SD14 & SD19. The maximum detected concentration was 2.1 mg/kg which exceeded the AET SCO of 1.7 mg/kg but did not exceed the AET CSL of 2.5 mg/kg. Fluroranthene was detected in 26 of the 32 samples were collected (i.e., 81% frequncey of detection).

# Sediment – Mercury, Arsenic, cPAH, Dioxin/Furans Statistical Summary

| Cas No | Analyte | Units | # Samples | # Detects | Min DL | Max DL | Min Detect | Max Detect | Mean | Median | Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7439-97-6 | Mercury (elemental) | mg/kg | 22 | 0 | 0.20 | 0.46 | 0.0 | 0.0 | 0.15 | 0.14 | 0.14 |
| 7440-38-2 | Arsenic, Inorganic | mg/kg | 22 | 0 | 11 | 28 | 0.0 | 0.0 | 10 | 10 | 9 |
| CPAH-TEQ | Total Carcinogenic PAHS (BaP TEQs) | mg/kg | 37 | 31 | 0.011 | 0.015 | 0.00012 | 1.2 | 0.080 | 0.037 | 0.0064 |
| DIOXIN-TEQ | Total Dioxin/Furans (2,3,7,8-TCDD TEQs) | mg/kg | 25 | 25 | 0.0 | 0.0 | 0.000000029 | 0.000012 | 0.0000047 | 0.0000046 | N/A |

| Cas No | Analyte | Natural Background (mg/kg) | Regional Background (mg/kg) |
|---|---|---|---|
| 7439-97-6 | Mercury (elemental) | 0.2 | n/a |
| 7440-38-2 | Arsenic, Inorganic | 11 | n/a |
| CPAH-TEQ | Total Carcinogenic PAHS (BaP TEQs) | 0.021 | 0.078 |
| DIOXIN-TEQ | Total Dioxin/Furans (2,3,7,8-TCDD TEQs) | 4E-06 | 1.9E-05 |

**Final Report available for review at these locations:**

Ecology's Southwest Regional Office
300 Desmond Drive SE Lacey, WA 98503
By appointment only:
Contact Susie Baxter,
PublicDisclosureSWRO@ecy.wa.gov,
Or (360) 407-6365

Final Report Website
https://fortress.wa.gov/ecy/publications/SummaryPages/1809117.pdf

Budd Inlet Website
https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=2245

Oakland Bay and Shelton Harbor Website
https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=13007

## Results

Ecology used the existing data to calculate regional background for dioxins/furans and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). The regional and natural background levels are presented in Table 1.

Ecology will use these regional background levels when setting cleanup levels in the following inlets and bays:

- Budd Inlet: cPAHs, dioxins/furans
- Shelton Harbor : cPAHs, dioxins/furans
- Oakland Bay outside Shelton Harbor: dioxins/furans

Ecology will consider whether regional background applies to other areas of South Puget Sound on a site-specific basis.

Table 1. Regional and natural background levels for South Puget Sound

| Analyte | Regional Background | Natural Background |
|---|---|---|
| Dioxins/Furans | 19 ng/kg TEQ | 4 ng/kg TEQ |
| cPAHs | 78 µg/kg TEQ | 21 µg/kg TEQ |

**Table 10-1.** Calculated values (90/90 UTL) for marine sediment natural background from the data sets in Appendix I and Bold study (DMMP, 2009).

| Chemical | Natural Background 90/90 UTL (dry weight) |
|---|---|
| **Dioxins / Furans**[a] (ppt [ng/kg] sum TEQ) | 4 |
| **Dioxin-Like Polychlorinated Biphenyl Congeners**[b] (ppt [ng/kg] sum TEQ) | 0.2 |
| **Total Polychlorinated Biphenyl Congeners**[c] (ppt [ng/kg]) | 3500 |
| **Carcinogenic Polycyclic Aromatic Hydrocarbons**[d] (ppb [µg/kg] sum TEQ) | 21 |
| **Arsenic** (ppm [mg/kg]) | 11 |
| **Cadmium** (ppm [mg/kg]) | 0.8 |
| **Chromium** (ppm [mg/kg]) | 62 |
| **Copper** (ppm [mg/kg]) | 45 |
| **Lead** (ppm [mg/kg]) | 21 |
| **Mercury** (ppm [mg/kg]) | 0.2 |
| **Nickel** (ppm [mg/kg]) | 50 |
| **Silver** (ppm [mg/kg]) | 0.24 |
| **Zinc** (ppm [mg/kg]) | 93 |

This table is intended as a guide for marine sediment natural background values. The values calculated are from Appendix I using the process recommended in this chapter.

# Sediment – Mercury, Arsenic, cPAH, Dioxin/Furans Exceedance Summary

| Cas No | Analyte | Ratio of Max Detect to Natural Background | Ratio of Max Detect to Regional Background | Ratio of Mean to Natural Background | Ratio of Mean to Regional Background |
|---|---|---|---|---|---|
| 7439-97-6 | Mercury (elemental) | n/a (all NDs) | n/a (no Regional Bkg) | 0.76 | n/a (no Regional Bkg) |
| 7440-38-2 | Arsenic, Inorganic | n/a (all NDs) | n/a (no Regional Bkg) | 0.91 | n/a (no Regional Bkg) |
| CPAH-TEQ | Total Carcinogenic PAHS (BaP TEQs) | 57 | 15 | 3.8 | 1.0 |
| DIOXIN-TEQ | Total Dioxin/Furans (2,3,7,8-TCDD TEQs) | 3.0 | 0.63 | 1.2 | 0.25 |

| Cas No | Analyte | Natural Background (mg/kg) | Regional Background (mg/kg) |
|---|---|---|---|
| 7439-97-6 | Mercury (elemental) | 0.2 | n/a |
| 7440-38-2 | Arsenic, Inorganic | 11 | n/a |
| CPAH-TEQ | Total Carcinogenic PAHS (BaP TEQs) | 0.021 | 0.078 |
| DIOXIN-TEQ | Total Dioxin/Furans (2,3,7,8-TCDD TEQs) | 4E-06 | 1.9E-05 |

Maximums provided for Context Only. Focus is on Mean for Bioaccumulatives.

Mean of Non Detects (100% NDs) is less than Natural Background.

Mean (Detects + ½ DL for Non Detects) is less than Regional Background.

Table 3-6: SL Exceedances in Sediment

| Constituent | Number of Samples | Number of Detected Results | Frequency of Detection (%) | Maximum Detected Concentration (mg/kg) | Sediment Management Standards (WAC 173-204) SCO | Sediment Management Standards (WAC 173-204) CSL | Apparent Effects Threshold SCO | Apparent Effects Threshold CSL | Final SL[1] (mg/kg) | Does the Maximum Detected Concentration Exceed the SL? |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Petroleum Hydrocarbons (mg/kg dry weight)** | | | | | | | | | | |
| TPH-D | 68 | 14 | 21 | 94 | -- | -- | 100 | -- | 100 | No |
| TPH-HO | 68 | 42 | 62 | 1,500 | -- | -- | 100 | -- | 100 | Yes |
| **Metals (mg/kg dry weight)** | | | | | | | | | | |
| Cadmium | 9 | 2 | 22 | 1.1 | 5.1 | 6.7 | 5.1 | 6.7 | 5.1 | No |
| Chromium, Total | 10 | 10 | 100 | 28 | 260 | 270 | 260 | 270 | 260 | No |
| Copper | 9 | 9 | 100 | 39 | 390 | 390 | 390 | 390 | 390 | No |
| Lead | 10 | 4 | 40 | 15 | 450 | 530 | 450 | 530 | 450 | No |
| Zinc | 9 | 9 | 100 | 66 | 410 | 960 | 410 | 960 | 410 | No |
| **VOCs (mg/kg organic carbon)[4]** | | | | | | | | | | |
| 2-Methylnaphthalene | 32 | 3 | 9.4 | 0.034 | -- | -- | 0.67 | 0.67 | 0.67 | No |
| 2-Methylnaphthalene, OC-Normalized | 28 | 3 | 10.7 | 1.0 | 38 | 64 | -- | -- | 38 | No |
| Acenaphthene | 32 | 2 | 6.3 | 0.031 | -- | -- | 0.50 | 0.50 | 0.50 | No |
| Acenaphthene, OC-Normalized | 28 | 2 | 7.1 | 0.77 | 16 | 57 | -- | -- | 16 | No |
| Acenaphthylene | 32 | 8 | 25 | 0.15 | -- | -- | 1.3 | 1.3 | 1.3 | No |
| Acenaphthylene, OC-Normalized | 28 | 8 | 29 | 1.4 | 66 | 66 | -- | -- | 66 | No |
| Anthracene | 32 | 13 | 41 | 0.26 | -- | -- | 0.96 | 0.96 | 0.96 | No |
| Anthracene, OC-Normalized | 28 | 12 | 43 | 3.5 | 220 | 1,200 | -- | -- | 220 | No |
| Benz[a]anthracene | 32 | 24 | 75 | 0.92 | -- | -- | 1.3 | 1.6 | 1.3 | No |
| Benz[a]anthracene, OC-Normalized | 28 | 20 | 71 | 8.7 | 110 | 270 | -- | -- | 110 | No |
| Benzo(g,h,i)perylene | 33 | 22 | 67 | 0.49 | -- | -- | 0.67 | 0.72 | 0.67 | No |
| Benzo(g,h,i)perylene, OC-Normalized | 29 | 20 | 69 | 4.6 | 31 | 78 | -- | -- | 31 | No |
| Benzo[a]pyrene | 33 | 25 | 76 | 0.90 | -- | -- | 1.6 | 1.6 | 1.6 | No |
| Benzo[a]pyrene, OC-Normalized | 29 | 21 | 72 | 8.5 | 99 | 210 | -- | -- | 99 | No |
| Benzo[b]fluoranthene | 33 | 26 | 79 | 0.66 | -- | -- | -- | -- | No Value[2] | No |
| Benzo[b]fluoranthene, OC-Normalized | 29 | 22 | 76 | 6.2 | -- | -- | -- | -- | No Value[2] | No |
| Benzo[k]fluoranthene | 33 | 16 | 48 | 0.78 | -- | -- | -- | -- | No Value[2] | No |
| Benzo[k]fluoranthene, OC-Normalized | 29 | 15 | 52 | 7.4 | -- | -- | -- | -- | No Value[2] | No |
| Bis(2-ethylhexyl)phthalate | 14 | 2 | 14 | 0.13 | -- | -- | 1.3 | 3.1 | 1.3 | No |
| Bis(2-ethylhexyl)phthalate, OC-Normalized | 10 | 2 | 20 | 6.3 | 47 | 78 | -- | -- | 47 | No |
| Chrysene | 32 | 25 | 78 | 1.0 | -- | -- | 1.4 | 2.8 | 1.4 | No |
| Chrysene, OC-Normalized | 28 | 21 | 75 | 9.4 | 110 | 460 | -- | -- | 110 | No |
| Dibenz[a,h]anthracene | 33 | 6 | 18 | 0.14 | -- | -- | 0.23 | 0.23 | 0.23 | No |
| Dibenz[a,h]anthracene, OC-Normalized | 29 | 6 | 21 | 1.3 | 12 | 33 | -- | -- | 12 | No |
| Fluoranthene | 32 | 26 | 81 | 2.1 | -- | -- | 1.7 | 2.5 | 1.7 | Yes |
| Fluoranthene, OC-Normalized | 28 | 22 | 79 | 38 | 160 | 1,200 | -- | -- | 160 | No |
| Fluorene | 32 | 5 | 16 | 0.058 | -- | -- | 0.54 | 0.54 | 0.54 | No |
| Fluorene, OC-Normalized | 28 | 5 | 18 | 1.1 | 23 | 79 | -- | -- | 23 | No |
| Indeno[1,2,3-cd]pyrene | 33 | 19 | 58 | 0.46 | -- | -- | 0.60 | 0.69 | 0.60 | No |
| Indeno[1,2,3-cd]pyrene, OC-Normalized | 29 | 18 | 62 | 4.3 | 34 | 88 | -- | -- | 34 | No |
| Naphthalene | 32 | 7 | 22 | 0.096 | -- | -- | 2.1 | 2.1 | 2.1 | No |
| Naphthalene, OC-Normalized | 28 | 7 | 25 | 5.3 | 99 | 170 | -- | -- | 99 | No |
| Phenanthrene | 32 | 23 | 72 | 0.80 | -- | -- | 1.5 | 1.5 | 1.5 | No |
| Phenanthrene, OC-Normalized | 28 | 20 | 71 | 12 | 100 | 480 | -- | -- | 100 | No |
| Pyrene | 32 | 26 | 81 | 1.8 | -- | -- | 2.6 | 3.3 | 2.6 | No |
| Pyrene, OC-Normalized | 28 | 22 | 79 | 18 | 1,000 | 1,400 | -- | -- | 1,000 | No |
| Total Benzofluoranthenes | 33 | 26 | 79 | 1.4 | -- | -- | 3.2 | 3.6 | 3.2 | No |
| Total Benzofluoranthenes, OC-Normalized | 29 | 22 | 76 | 14 | 230 | 450 | -- | -- | 230 | No |
| Total Carcinogenic PAHS (BaP TEQs)[3] | 33 | 27 | 82 | 1.2 | -- | -- | -- | -- | No Value | No |
| Total Naphthalenes | 32 | 7 | 22 | 0.13 | -- | -- | -- | -- | No Value | No |
| **Phenols (mg/kg dry weight)** | | | | | | | | | | |
| Phenol | 13 | 1 | 7.7 | 0.15 | 0.42 | 1.2 | 0.42 | 1.2 | 0.42 | No |
| **Dioxins/Furans (ng/kg dry weight)** | | | | | | | | | | |
| Total Dioxins/Furans (2,3,7,8-TCDD TEQs)[3] | 15 | 15 | 100 | 12 | -- | -- | 11 | -- | 11 | Yes |

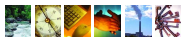
**Table Notes:**

AET: Apparent Effects Threshold
BaP: Benzo(a)pyrene
CSL: Cleanup Screening Level
OC: Organic Carbon
SCO: Sediment Cleanup Objective
TEQ: Toxic Equivalents

- Shaded cells indicate that the maximum detected constituent concentration exceeds the applicable SL.
- The final SL is the minimum of the SCO and CSL (as appropriate).
- Benzo[b]fluoranthene and benzo[k]fluoranthene were considered under Total Benzofluoranthenes.
- Total TCDD-TEQ and BaP TEQs calculated by multiplying the isomer concentrations by the toxicity equivalency factor (WAC 173-340-900 Table 708-1 and 708-2) and summing all isomers. Half the reporting limit was used for non-detected isomers.
- Constituents were organic carbon (OC) normalized by dividing the constituent concentration by the sample-specific total OC concentration.

# Sediment – Insufficient Sampling to Define Nature and Extent of Contamination (Ecology Comment #3 and G)

- Ecology's Comment: Insufficient sample to define nature and extent of sediment contamination: Sufficient sediment sampling has been done in the nearshore area surrounding West Bay Park to identify this sediment area as part of the site and understand nature and extent of contamination. However, this sampling is geographically limited to the nearshore, with a focus on West Bay Park. This limited sampling fails to identify (or verify) sediment quality impacts in the subtidal environment from chemical contamination and wood waste as well as other upland sources that were not identified in the conceptual release model.
- Response/Discussion:
  - Between October 2008 and November 2014, several sampling events were performed based on Ecology's comments and requests to further characterize the nature and extent of contamination in sediment
    - A series of Addendums to the Work Plan (Parametrix) were submitted to and approved by Ecology
    - Following Ecology's approval and prior to developing the RI/FS Report, numerous meetings and communications between Ecology and the City occurred to confirm that Ecology agreed with the characterization of sediment and to confirm that no further evaluation was warranted
  - In February 2015, PIONEER submitted a tech memo (Appendix F of the RI/FS) for the Supplemental Sediment Sampling
    - Findings/conclusions were that the characterization of sediment was considered complete and no further sediment characterization was recommended
    - June 23, 2015 Ecology sent an approval letter with no further comments



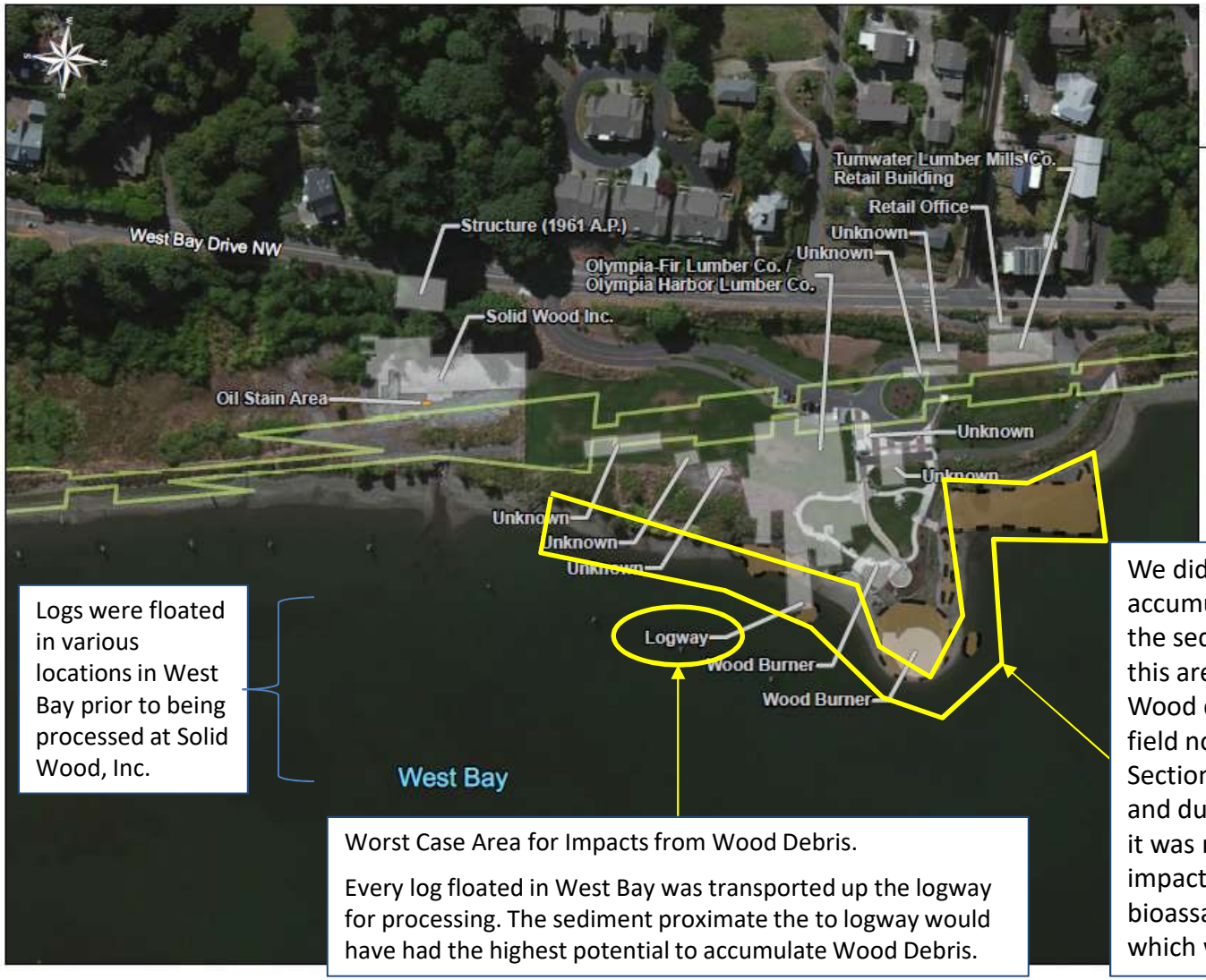
# Sediment – Insufficient Sampling to Define Nature and Extent of Contamination (Ecology Comment #3 and G) - Continued

- Response/Discussion:
  - There is no indication from the extensive sediment sampling that has been performed to-date that subtidal sediments are impacted by releases from the Site.
  - The majority of upland sources would impact near-shore sediments first and with the highest concentrations (e.g., direct spills/releases from the logway, upland spills/releases to soil and subsequent transport to surface water/sediment, storm drains).
    - No significant impacts to near shore sediments have been identified; therefore, a deeper/subtidal investigation is not warranted.
  - The only exceptions to above:
    - Wood Burner on the Point (Dioxins/Furans)
    - Direct release of wood/wood debris from logs floated in West Bay (Wood Debris)

# Sediment – Dioxins/Furans


- Worst case locations were sampled for Dioxins/Furans as highest deposition from combustion sources occurs closest to the combustion source and decreases with distance downwind.
- Only one of the 15 samples exceeded the MTCA Method B Soil Direct Contact Screening Level of 11 ng/kg, which is appropriate for the Beachcomber Scenario.
- The Maximum Detected concentration was 12 ng/kg and does not trigger remediation.

# Sediment – Wood Debris





Logs were floated in various locations in West Bay prior to being processed at Solid Wood, Inc.

Worst Case Area for Impacts from Wood Debris.

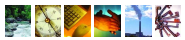
Every log floated in West Bay was transported up the logway for processing. The sediment proximate the to logway would have had the highest potential to accumulate Wood Debris.

We did not observe significant accumulations of Wood Debris in the sediment samples collected in this area.

Wood debris was recorded in the field notes in some samples (see Section 2.8.2.1 of the IA Report) and during sieving for bioassays but it was not extensive and did not impact sediment because all bioassays passed (except for SD30, which was discussed previously).

# 2008 IA Work Plan: Wood Debis

- All sediment samples shall be discrete and shall be collected from the top 10 centimeters of sediments using dedicated polyethylene bowls and spoons. Sample collection shall target the fine-grained portion of sediments. Any unrepresentative material (e.g., wood debris, shells, and rocks) will be removed at the discretion of the sampler. Detailed notes regarding the sample composition shall be recorded in the field notebook.



# 2008 IA Report: Wood Debris

**Table 2-1. Sediment Sample Description Summary**

**Station ID Description**

- SD-25 Gray-black, organic silty sand, scattered shells, hydrogen sulfide odor, occasional wood fragments, live mussels, barnacles, and clams in sample vicinity, intertidal zone.
- SD-26 Gray-black, slightly silty gravelly sand, shells and wood fragments, slight organic odor, live mussels, barnacles, and clams in sample vicinity, intertidal zone.
- SD-27 Gray-black, slightly silty gravelly sand, scattered shells and wood fragments, slight organic odor, live mussels, barnacles, and clams in sample vicinity, intertidal zone.
- SD-28 Gray-black, organic silty sand, shells and occasional wood fragments, slight organic odor, live mussels, barnacles, and clams in sample vicinity, intertidal zone.
- SD-29 Gray-black, silty gravelly sand, scattered shells and wood fragments, slight organic odor, live mussels, barnacles, and clams in sample vicinity, intertidal zone.
- SD-30 Gray-brown, slightly silty sandy gravel, slight to no odor, intertidal zone.
- SD-31 Gray, silty sandy gravel, no shells or wood fragments, no odor, live barnacles in sample vicinity, intertidal zone.

# 2014 Supplemental Sampling Work Plan: Wood Debris

## 2.2 Sampling Plan

At each sampling location, descriptions of the sediment will be recorded on the sampler's field note form (Attachment 1). Descriptions will include density, color, consistency, odor, organic matter, shell or wood debris, biological activity, presence of staining or sheens, and any other distinguishing characteristics or features.

# 2014 Supplemental Sampling: Wood Debris

| | |
|---|---|
| **Photo No. 1:** Sediment from SD-42 |  |
| **Date:** 2/5/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Sediment from the shallow sample at SD-42. Coarse sand texture with minimal amount of rocks. | |

| | |
|---|---|
| **Photo No. 2:** SD-42 Sample Location |  |
| **Date:** 2/5/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Deep sample at SD-42. | |

| | |
|---|---|
| **Photo No. 5:** SD-46 Sample Location |  |
| **Date:** 2/4/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** The shallow sample at SD-46. There was a small amount of pebbles and a high amount of organic matter. | |

| | |
|---|---|
| **Photo No. 3:** SD-44 Sample Location |  |
| **Date:** 2/5/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Sample location at SD-44. The sediment was extremely saturated and lighter in color with a high amount of large stones, shell, and clay. | |

| | |
|---|---|
| **Photo No. 4:** SD-45 Sample Location |  |
| **Date:** 2/4/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Sample location at SD-45. The sediment was extremely saturated and the sample hole filled with water. Large rocks were present throughout the sample. There was a high amount of biological activity including crabs and invertebrates. | |

| | |
|---|---|
| **Photo No. 6:** SD-47 Sample Location |  |
| **Date:** 2/4/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Sample location at SD-47. SD-47 had a high amount of biological activity, including barnacles and crabs. | |

# 2014 Supplemental Sampling: Wood Debris

| | |
|---|---|
| **Photo No. 7:** SD-48 Sample Location |  |
| **Date:** 2/3/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Sample location at SD-48. The sample was dark brown and contained a high amount of organic matter, including bark. | |

| | |
|---|---|
| **Photo No. 8:** SD-49 Sample Location |  |
| **Date:** 2/4/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** SD-49 had a high amount of large stones and a high amount of crabs and invertebrate activity. | |

| | |
|---|---|
| **Photo No. 11:** SD-52 Sample Location |  |
| **Date:** 2/3/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Slight sheen visible in the pooled water. Large rocks and bricks were present in the deep sample. | |

| | |
|---|---|
| **Photo No. 9:** Sediment from SD-49 |  |
| **Date:** 2/4/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** Sediment from SD-49 contained a high amount of large stones. | |

| | |
|---|---|
| **Photo No. 10:** SD-50 Sample Location |  |
| **Date:** 2/3/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** SD-50 had a slight sheen when water pooled in the sample hole. There was minimal rock and shell, and a high amount of organic material. | |

| | |
|---|---|
| **Photo No. 12:** SD-53 Sample Location |  |
| **Date:** 2/4/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** SD-53 sediment had a spongy texture and a large amount of small pebbles. | |

# 2014 Supplemental Sampling: Wood Debris

| | |
|---|---|
| **Photo No. 13:** SD-54 Sample Location |  |
| **Date:** 2/3/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** There was a sheen present on the pooled water. Large rocks and shells were present in the shallow sample. | |

| | |
|---|---|
| **Photo No. 14:** SD-55 Sample Location |  |
| **Date:** 2/3/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** SD-55 sediment was dark gray sand with a high amount of shell and wood particles, and large mussels. | |

| | |
|---|---|
| **Photo No. 1:** SD-58 Sample Location |  |
| **Date:** 11/1/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** SD-58 had a high amount of rocks and coarse grey sand. High amounts of biological activity (earthworms) were noted. | |

| | |
|---|---|
| **Photo No. 2:** SD-56 Sample Location |  |
| **Date:** 11/1/2014 | |
| **Direction Photo Taken:** NA | |
| **Description:** SD-56 had large rocks and a high amount of shells. High amounts of biological activity (earthworms, flatworms, clams, and barnacles) were noted. | |

# 2010 Bioassay

Figure 1. Sample SD29

Figure 2. Sample SD29 Material Recovered After Wet-Sieving


Figure 3. Sample SD30

Figure 4. Sample SD30 Material Recovered After Wet-Sieving

# 2010 Bioassay

Figure 1. Sample SD29

Figure 2. Sample SD29 Material Recovered After Wet-Sieving


Figure 3. Sample SD30

Figure 4. Sample SD30 Material Recovered After Wet-Sieving

# Thank You.