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TECHNICAL MEMORANDUM

Date:	February 27, 2014
To:	Steve Teel - Department of Ecology
From:	David Dinkuhn, PE
Subject:	Draft Data Gap Sampling Report
cc:	Kip Summers, City of Olympia
Project Number:	233-1577-038 (03/01)
Project Name:	Solid Wood Incorporated Site - RI/FS and IA

SOLID WOOD INCORPORATED SITE – DRAFT RI/FS DATA GAP SAMPLING REPORT

This technical memorandum presents the results of data gap sampling conducted over several field efforts at the Solid Wood Incorporated Site in located in Olympia, Washington (Figure 1). Sampling was performed to fill data gaps as part of the site's ongoing Remedial Investigation/Feasibility Study (RI/FS). All work was conducted according to Addendum No. 5 Revision 1 (Parametrix 2012), Addendum No. 6 (Parametrix 2013a), and Addendum No. 8 (Parametrix 2013b) to the project's RI/FS work plan (Parametrix 2008).

BACKGROUND

In 2004, Parametrix performed a Phase I Environmental Site Assessment (ESA) for the site (Parametrix 2004a) which was followed by a Phase II ESA (Parametrix 2004b). An additional Phase II ESA was performed in 2007 along the former Burlington Northern Santa Fe (BNSF) rail spur located at the site (Parametrix 2007). The majority of surface and subsurface contamination associated with the findings in these reports has been investigated sufficiently for the purposes of the RI/FS or cleaned up during a 2009 Interim Action (Parametrix 2010). However, four site areas were identified by the Washington State Department of Ecology (Ecology) as data gaps requiring further investigation. These areas consist of:

Oil Stain

During the Phase I ESA site reconnaissance (Parametrix 2004), an oil stain was observed on the asphalt parking area adjacent to the east side of the former Solid Wood facility foundation (Figure 2). The stain, which was several feet in diameter, had not been investigated previously during the RI and was targeted for investigation as part of the data gap sampling.

Rail Spur Surface Soils

Surface soils in the vicinity of the former rail spur adjacent to the former Solid Wood Inc. facility were suspected of containing carcinogenic polycyclic aromatic hydrocarbons (cPAHs) associated with creosote-treated rail ties used in the construction of the spur. As an example, subsurface soil samples collected from three soil borings (SB-26, SB-29, and SB-30; Figure 2) located beside the rail spur contained cPAHs in excess of screening levels

selected for the RI (Parametrix 2008). Data gap sampling was conducted to investigate the horizontal extent of potential cPAHs contamination in surface soil adjacent to the rail spur.

Metals in Groundwater and Seeps

An Interim Action (IA) was performed at the site in the summer of 2009, during which several hot spot areas of soil contamination were excavated and removed. The excavated hot spots included soils at the former wood burner location, which contained metals and dioxins at concentrations above screening/remedial levels. Three monitoring wells (MW-08 through MW-10; Figure 3) were installed in the vicinity of the former wood burner for the purpose of monitoring down gradient groundwater for metals following the hot spot removal. The results of an initial four quarters of testing showed that copper and nickel concentrations in samples from all three wells consistently exceeded screening levels. Two nearby groundwater seeps (Seeps 4 and 5) and West Bay surface water sampling stations (SW01 through SW03) were also monitored for metals during the initial quarterly sampling events. The seeps were monitored because copper and nickel concentrations in excess of screening levels had been detected during previous RI sampling at these locations. The purpose of monitoring marine surface water was to evaluate the possibility that metals in marine water from West Bay were impacting the groundwater and seep samples. This would occur due to the mixing of marine water and fresh groundwater in the shallow groundwater aquifer adjacent to the shoreline. The results of the initial sampling showed that copper and nickel concentrations consistently exceeded screening levels in samples from all locations, including the surface water samples from West Bay. However, copper and nickel concentrations in marine water were consistently at or above concentrations in samples from the wells and seeps, indicating that the source of the copper and nickel is marine water. If the source of the copper and nickel was groundwater, the metals concentrations in adjacent marine water would be much lower than groundwater since groundwater entering West Bay mixes with and is diluted by the marine water. Data gap sampling, which consisted of two quarters of additional sampling at all locations, was conducted to provide additional data in order to confirm the initial sampling results.

Sediment Station SD-33 Delineation

Several sediment sampling events were conducted during the RI to delineate potential impacts from site activities and/or creosote treated piling. Limited locations of petroleum impacted sediments were identified including sediment station SD-33 (Figure 3). Data gap sampling was conducted to delineate the horizontal extent of petroleum hydrocarbon contamination at this sediment station.

DATA GAP SAMPLING ACTIVITIES AND RESULTS

Oil Stain

The oil stain was located in the field on September 27, 2012 using 2004 site reconnaissance photos and visual observations. On the same day, a single boring (SB-47) was advanced to four feet below ground surface (bgs) at the stain location using a truck-mounted direct push drilling rig. Two soil samples were collected from two different depths, 1-and 3.5-feet below ground surface (bgs) from the boring. The soil samples were submitted for laboratory analysis for contaminants of concern (COCs) associated with waste oil. A summary of analytical results is presented in Table 1, which shows that both soil samples collected from SB-47 exceeded the screening level of 2,000 milligrams per kilogram (mg/kg) for lube oil. No other constituents were detected above their corresponding screening levels. A log of the SB-47 is provided in Attachment 1, and laboratory reports and a data validation memorandum are provided in Attachment 2.

A follow-up test pit investigation was performed on January 15, 2013 to delineate the horizontal and vertical extent of the lube oil. A backhoe with a pavement breaker was used to excavate a 9-foot by 15.5-foot test pit down to 5 feet bgs at the SB-47 location (Figure 2). A strong petroleum odor was observed in sidewall soils between 0.5 to 3 feet bgs, with a mild petroleum odor between 3 to 5 feet bgs. At 5 feet bgs, soils at the bottom of the excavation

exhibited a clear change of type and color with no petroleum odor. Soil sample TPBT1 was collected from this depth at the bottom of the pit and analyzed for diesel and lube oil. Test results for TBTP1 (Table 1) indicate that diesel and lube oil are not present at concentrations above the screening level at the base of the test pit. Note that no samples were collected from the sidewalls of the pit due to the apparent presence of contamination. Soil excavated from the test pit was hauled offsite and disposed of at a permitted landfill, following which the test pit was backfilled with clean fill. A test pit log and analytical results for this follow-up investigation are included in Attachments 1 and 2.

A third sampling event was conducted on November 7, 2013 to delineate the horizontal extent of contamination around the test pit. Soil probes were installed in grid pattern around the test pit as shown on Figure 4. Soil samples were taken at depths corresponding to the location most likely to be contaminated based on field observations. If no apparent contamination was observed, samples were collected at the water table depth. Thirteen samples (SB-48 through SB-60) were collected and analyzed for diesel and lube oil. Lube oil was detected at concentrations exceeding the screening level samples from SB-48 and SB-59 (Table 2). Sampling results were used to delineate the approximate horizontal extent of soil contamination as shown on Figure 4. Contaminated soil within the footprint shown on Figure 4 is anticipated to occur within a 1- to 2- foot thick layer between the depths of 5 to 7 feet bgs. This zone likely reflects the zone of water table fluctuation at this location. Logs of the soil borings are presented in Attachment 1.

In addition to the soil samples, two groundwater samples (SB-52 and SB-53) were collected and analyzed for diesel and lube oil to assess down gradient impacts to groundwater. Groundwater samples were collected from the probes using a peristaltic pump; pumped groundwater was allowed to purge until relatively free of sediment before samples were collected. Diesel and lube oil were detected in the sample from SB-53 at concentrations below the screening levels (Table 3). This sample was re-analyzed using silica-gel cleanup to remove naturally-occurring organics which may have originated from organic soils (such as peat). Note that peat was observed in several borings, including SB-53. Diesel and lube oil were not detected in the re-analyzed sample.

Rail Spur Surface Soils

A total of fourteen soil samples were collected along the rail spur on September 27, 2012 (Figure 2). Of the fourteen samples, six were collected in surface soils from 0 to 6 inches bgs (SB-33, SB-37 through SB-40, and SB-46). The remaining eight locations (SB-34 through SB-36 and SB-41 through SB-45) were sampled using a probe rig to advance borings through asphalt and concrete pavement present at the sampling locations. Samples from these borings were collected immediately below surficial layers of either asphalt and concrete debris or coarse gravel fill without sufficient fines to sample. Sample depths ranged from 1- to 2- feet bgs. All samples were submitted for analysis for cPAHs. None of the samples exceeded the screening levels for cPAHs (Table 4). Sampling/boring logs for the samples are provided in Attachment 1.

Metals in Groundwater and Seeps

Two consecutive quarterly sampling events were conducted in July and October 2012. Groundwater samples were collected from monitoring wells MW-08 through MW-10, surface water stations SW-01 through SW-03, and groundwater seeps 4 and 5 (Figure 3).

Groundwater samples were collected on July 3 and October 25, 2012 using a peristaltic pump and low-flow purging/sampling techniques. Prior to sampling, the wells were purged until measured water quality parameters stabilized according to criteria established in the RI/FS Work Plan (Parametrix 2008). Upon stabilization, groundwater samples were collected into the appropriate laboratory-provided containers.

The surface water and seep samples were collected on the same dates as the groundwater samples during a low slack tide. A tide chart has been provided for reference for both sampling dates (Attachment 3). Surface water

samples were collected by submerging the appropriate sample containers into the surface water at near-shore locations where the surface water was approximately 1-foot deep. Care was taken to prevent loss of preservative.

Seep samples were collected from shallow depressions excavated in the beach sediment at each seep location. Turbid water created by the excavation activities was allowed to dissipate until the water in the depressions appeared visually clear. Seep samples were collected by submerging the appropriate sample containers below the surface of the water in the depressions. Care was taken not to introduce sediments into the samples and to avoid the loss of preservative from the containers.

Water quality parameter measurements were collected during purging of the monitoring wells and following sampling at the seep and surface water locations (Tables 5 and 6). Field data sheets from both sample collection dates are presented in Attachment 1. In addition to sample collection, the depth to groundwater was measured in each well for both sampling events to provide data used to develop inferred elevation contours as shown on Figures 5 and 6. The measurements were collected within a 1-hour period to give a representative snapshot of groundwater elevations. The figures also show inferred groundwater flow directions based on the elevation contours.

All samples were submitted for analysis of total and dissolved copper and nickel, chloride, dissolved organic carbon (DOC), salinity, and total dissolved solids (TDS).

Results for the monitoring well samples (Table 7) show that both total and dissolved copper and nickel concentrations exceeded screening levels in all three wells during both the July and October 2012 sampling events. Total and dissolved nickel also exceeded RLs in the seeps (Table 8). The concentrations detected are relatively consistent with those measured during the initial four quarterly monitoring events in 2010. To illustrate this, charts of copper and nickel concentrations versus time are provided on Figures 7 through 10.

Surface water samples were collected from West Bay to assess the possibility that copper and nickel concentrations detected in the wells and seeps reflected area background conditions in marine waters adjacent to the site. As shown in Table 8 and Figures 7 through 10, total and dissolved copper and nickel concentrations detected in the surface water samples were similar to or higher than concentrations detected in the wells and seeps. Note that samples SW01, SW02, and SW03 were collected at low slack tide from near-shore locations situated approximately 100 feet, 1,600 feet, and 400 feet respectively from the former wood burner location.

Marine surface water quality is relevant to the quality of the well and seep samples since the near-shore groundwater in the wells and seeps consists of a mixture of marine and freshwater. The ratio of mixture is illustrated by the concentrations of chloride measured in the seep and groundwater samples – 1,100 to 14,000 milligrams per liter (mg/L); typical seawater has a chloride concentration of on the order of 19,000 mg/L. Typical background chloride concentrations in groundwater are on the order of 100 mg/L (USGS 2011). The measured chloride concentrations suggest that well and seep samples consisted of 17 to 50 percent seawater in July and 7 to 74 percent seawater in October. Note that chloride in the West Bay surface samples ranged from 7,700 to 13,000 mg/L over that same timeframe, reflecting the effect of freshwater input from sources such as the Deschutes River.

Plots of total and dissolved copper versus chloride are provided on Figures 11 and 12. Linear regression trend lines were added to the data series to illustrate concentration trends. If marine water is the source of the copper, we would expect copper concentrations to increase with increasing amounts of marine water in the samples (as indicated by increasing chloride concentrations). As shown, a clear trend of increasing copper concentrations with increasing chloride may be observed from the plotted data. Conversely, if the copper source were groundwater, we would expect to see decreasing copper concentrations as chloride concentrations increase; instead, the data show an opposite trend.

Figures 13 and 14 show that, like copper, total and dissolved nickel concentrations generally increase with increasing chloride concentrations.

Sediment Station SD-33 Delineation

Additional delineation of the area downslope and cross slope from sediment station SD-33 was conducted on July 19, 2012. Sediment stations were established on an approximate 10- to 20-foot grid down and cross slope from SD-33 by physical measurement at low tide (Figure 3). One sample from the top 10 centimeters (cm) was collected at each of the eight locations, SD-34 through SD-41. Sediment was collected using disposable polyethylene scoops and bowls and thoroughly homogenized. Large debris, rocks, wood, and shells were removed from the sample prior to filling laboratory provided containers. A physical description of the sediment from each of the sample locations was documented on field data sheets included in Attachment 1.

All samples were submitted for analysis for diesel and lube oil. In accordance with the Data Gap SAP, only the three samples closest to SD-33 (SD-34 through SD-36) were analyzed initially. Following receipt of results, the remaining five samples were also analyzed since the initial three samples exceeded the 100 mg/kg screening level for petroleum. All eight locations exceeded the screening level. Results are summarized in Table 9.

CONCLUSIONS

The results of the data gap sampling reported here will be incorporated into the overall RI results and factored into the Feasibility Study to be developed for the site (as appropriate). The following conclusions pertain only to the sufficiency of the RI efforts conducted to date for each investigated area.

Oil Stain

The sampling efforts conducted have successfully delineated the extent of the lube oil impacts to soil and groundwater at this location. It is noted that the limits of contaminated soil were not fully delineated to the north of the oil stain in the vicinity of SB-59. However, the lube oil concentration detected in SB-59 is relatively low and it is anticipated that the contamination extends only a short distance to the north of the boring location. This limit could easily be verified by sampling during clean up excavation activities (if excavation is the selected cleanup action). Therefore, further investigation work at the oil stain location is not warranted.

Rail Spur Soils

The rail spur soil sampling results clearly establish that surface and near surface soils beyond the immediate vicinity of the rail spur are not impacted by cPAHs. Therefore, further investigation work to delineate the horizontal extent of cPAHs contamination is not warranted. If future cleanup actions include a soil cap over the rail spur, the results of the data gap sampling may be used to establish the horizontal cap limits.

Metals in Groundwater and Seeps

The data gap sampling conducted for groundwater, seeps, and marine water confirmed the results of the initial sampling. The copper and nickel concentrations in wells MW-08 through MW-10 and seeps 4 and 5 clearly reflect area background conditions in West Bay. It is therefore concluded that the monitoring completed to date in wells MW-08 through MW-10 and seeps 4 and 5 is sufficient for the purposes of the RI/FS and that further monitoring is not warranted.

Sediment Station SD-33 Delineation

Data gap sampling did not successfully delineate the extent of petroleum contamination above the 100 mg/kg screening level in the vicinity of station SD-33. Therefore, additional delineation sampling is warranted for the RI.

REFERENCES

Parametrix. 2004a. West Bay Phase I Environmental Site Assessment Port of Olympia Property. Prepared for City of Olympia Parks, Arts, and Recreation Department. June.

Parametrix. 2004b. West Bay Phase II Environmental Site Assessment. Prepared for City of Olympia Parks, Arts, and Recreation Department. June.

Parametrix. 2007. West Bay Rail Spur Phase II Environmental Site Assessment Report. Prepared for City of Olympia Parks, Arts, and Recreation Department. December.

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Parametrix 2010. Solid Wood Incorporated Site (West Bay Park) Interim Action Report Revision 1. Prepared for the City of Olympia Parks, Arts, and Recreation Department. September.

Parametrix. 2011a. Technical memorandum: Solid Wood Incorporated Site – Quarter 8 Groundwater Results, December 2010. Prepared for City of Olympia Parks, Arts, and Recreation Department. February 1.

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Parametrix. 2013a. Technical memorandum: Solid Wood Incorporated Site RI/FS and IA Work Plan Addendum No. 6 – Additional Oil Stain Investigation Sampling and Analysis Plan. Prepared for City of Olympia Parks, Arts, and Recreation Department. January 14.

Parametrix. 2013b. Technical memorandum: Solid Wood Incorporated Site RI/FS and IA Work Plan Addendum No. 8 – Oil Stain Soil Probe Investigation Sampling and Analysis Plan. Prepared for City of Olympia Parks, Arts, and Recreation Department. August 7.

USGS. 2011. ca.water.usgs.gov/archive/fact_sheets/b07/up.html

Figures

1 – Site Plan and Surface Water Sampling Locations

2 – Rail Spur Surface Soil and Oil Stain Sample Locations

3 – Surface Water, Seep, Groundwater, and Sediment Sample Locations

4 – Oil Stain Soil Probe Investigation Sampling Locations

5 – Potentiometric surface, July 2012

6 – Potentiometric surface, Oct 2012

7 – Dissolved Copper Results Chart

8 – Total Copper Results Chart

9 - Dissolved Nickel Results Chart

10 - Total Nickel Results Chart

11 – Dissolved Copper vs Chloride Chart

12 – Total Copper vs Chloride Chart

13 – Dissolved Nickel vs Chloride Chart

14 – Total Nickel vs Chloride Chart

Tables

1 – Oil Stain Soil Sample Results

2 – Oil Stain Soil Sample Results

3 – Oil Stain Groundwater Sample Results

4 – Rail Spur Sample Results

5 - Final Water Quality Parameters for July 2012

6 - Final Water Quality Parameters for October 2012

7 – Groundwater Results

8- Surface Water and Seep Results

9 – Sediment Sample Results

Attachments

1 – Boring and Field Logs

2 – Data Review Memoranda and Laboratory Reports

3 – Tide Charts

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LEGEND

- SURFACE WATER SAMPLE LOCATION

Figure 1
Solid Wood Incorporated Site
(West Bay Park)
Olympia, Washington
Site Plan and Surface Water Sampling Locations

SS-4
SS-5
SS-6
WBGP-04
SS-3
MW-01
MW-02
FORMER SOLID WOOD INC FACILITY
INTERIM ACTION CLEANUP AREA A SUMMER 2009
CONCRETE SLAB
OIL STAIN LOCATION
FORMER LOADING DOCK
TEST PIT
SB-47
TP BT1
5'
15.5'
SB-31
FORMER YARD DRAIN
WBGP-03
SB-33
SB-34
SS-1
WBTP-06
SB-35
CB-04
SB-36
SB-28
SB-37
SS-2
SB-32
EDGE OF EXISTING ASPHALT
36" RCP (GARFIELD CK)
RAIL SPUR PRESENT BENEATH ASPHALT
SB-38
SB-30
SB-40
SB-39
SB29
SB-41
SB-26
SB-04
SB-43
SB-42
SB-27
SB-44
SB-45
SB-25
MW-03
SB-46
MW-04
MHHW
14.6
MW-07
APPROXIMATE BOUNDARY OF NEW PARK INCLUDING REVEGATATED AREAS
MW-06

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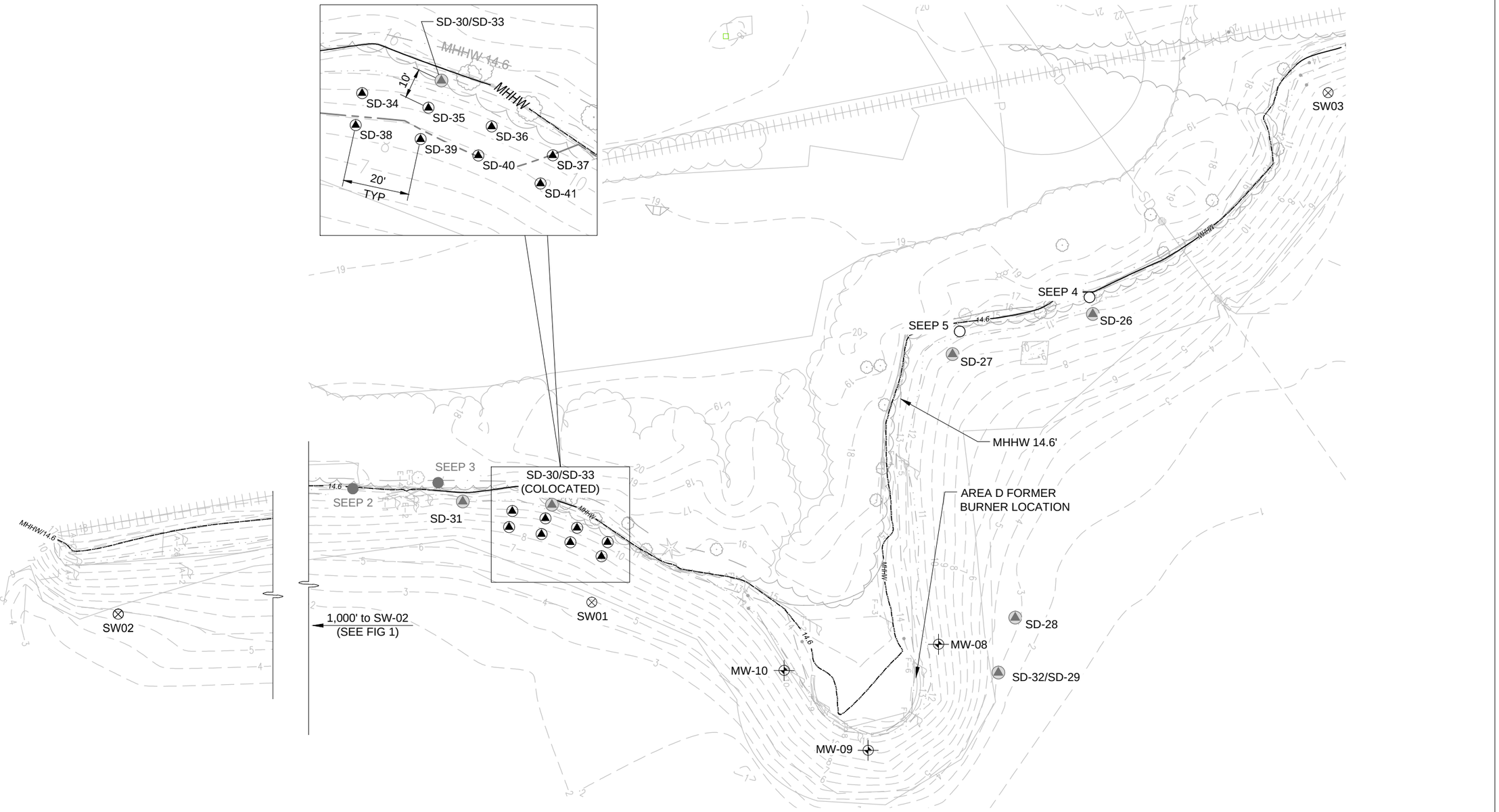
LEGEND

- WBGP — 2004 GEOPROPE SAMPLING LOCATIONS
- WBTP — 2004 TEST PIT SAMPLING LOCATION
- PMX PHASE II ESA/RIFS SAMPLING LOCATION
- MONITORING WELL
- PORT OF OLYMPIA TEST PIT LOCATION
- SOIL BORING LOCATION WHERE SOIL CONCENTRATIONS EXCEED SCREENING LEVELS FOR PAHs DURING PREVIOUS RI SAMPLING
- RAIL SPUR SOIL SAMPLE LOCATION
- OIL STAIN SOIL SAMPLE LOCATION
- SS — SURFACE SOIL SAMPLING LOCATION
- SB — SOIL BORING LOCATION
- FENCE

Figure 2
Rail Spur Surface Soil and Oil Stain Sample Locations
Solid Wood Incorporated Site
(West Bay Park)
Olympia, Washington



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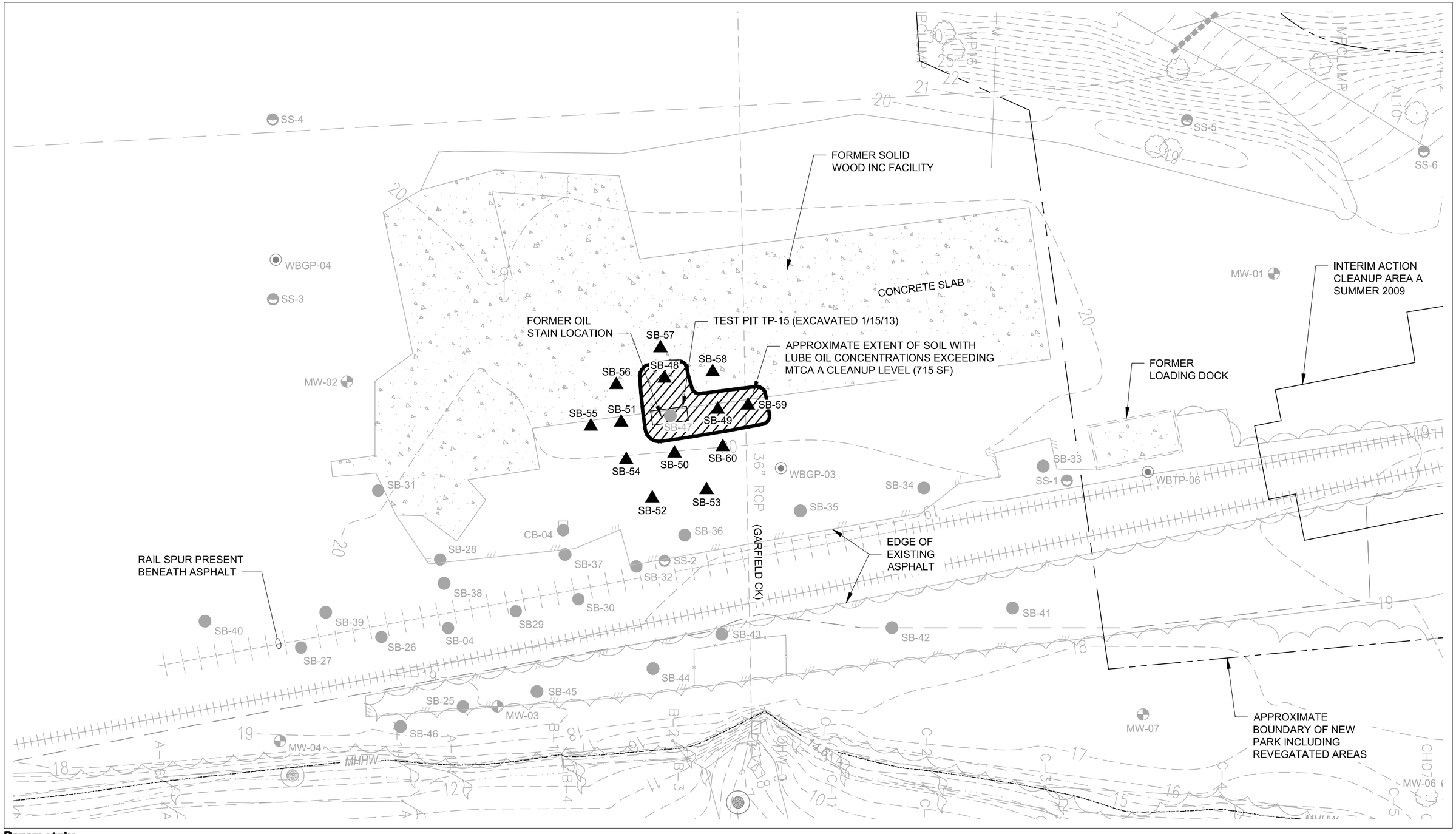
- SEEPS SAMPLED PREVIOUSLY DURING THE RI
- SEEP LOCATION SAMPLED
- SEDIMENT SAMPLED PREVIOUSLY DURING RI
- SURFACE WATER SAMPLE STATION
- MW-10 MONITORING WELL SAMPLED
- SEDIMENT SAMPLE LOCATION

NOTES

1. ELEVATION DATUM: MEAN LOWER LOW WATER (MLLW)
2. TOPOGRAPHY SHOWN BASED ON PRE-PARK CONSTRUCTION CONDITIONS.
3. MHHW = MEAN HIGHER HIGH WATER

Figure 3
Surface Water, Seep, Groundwater, and Sediment Sample Locations
Solid Wood Incorporated Site
(West Bay Park)
Olympia, Washington



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LEGEND

- WBGP — 2004 GEOPROPE SAMPLING LOCATIONS
- WBTP — 2004 TEST PIT SAMPLING LOCATION
- PMX PHASE II ESA/RIFS SAMPLING LOCATION
- EXTENT OF LUBE OIL CONTAMINATED SOIL
- PORT OF OLYMPIA TEST PIT LOCATION
- MONITORING WELL
- TEST PIT
- EDGE OF ASPHALT
- FENCE
- SS — SURFACE SOIL SAMPLING LOCATION
- SB — SOIL BORING LOCATION
- SB-48 — OIL STAIN SOIL PROBE LOCATION AND NUMBER

Figure 4
Oil Stain Soil Probe Investigation Sampling Locations
Solid Wood Incorporated Site
(West Bay Park)
Olympia, Washington

AREA A

AREA B

AREA C

AREA E
(ESTIMATED)

FORMER
LOADING DOCK

FORMER
RAIL SPUR

AREA D FORMER
BURNER LOCATION

20'

MW-01

MW-05

MW-06

MW-07

MW-08
8.29

MW-09
6.77

MW-10
9.43

SW01

SW02

SW03

SEEP 1

SEEP 2

SEEP 3

SEEP 4

SEEP 5

MHHW

MHHW-14.6

14.6

1,000' to SW-02
(SEE FIG 1)

LEGEND

- INTERIM ACTION AREAS FROM SUMMER 2009 CLEANUP ACTIVITIES
- EXISTING MONITORING WELL NOT SAMPLED
- SEEPS SAMPLED PREVIOUSLY DURING THE RI
- SEEPS SAMPLED 7/3/2012
- SURFACE WATER SAMPLE LOCATION
- 10 — INFERRED GROUND WATER SURFACE ELEVATION CONTOUR
- MW-10 9.43 — MONITORING WELL SAMPLED AND GROUNDWATER ELEVATION MEASURED 7/3/2012
- GROUNDWATER FLOW

NOTES

1. ELEVATION DATUM: MLLW
2. TOPOGRAPHY SHOWN BASED ON PRE-PARK CONSTRUCTION CONDITIONS.

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SCALE IN FEET

Figure 5
Potentiometric Surface July 2012
Solid Wood Incorporated Site
(West Bay Park)
Olympia, Washington

AREA A

AREA B

AREA C

AREA E
(ESTIMATED)

FORMER
LOADING DOCK

FORMER
RAIL SPUR

AREA D FORMER
BURNER LOCATION

20'

MW-01

MW-05

MW-06

MW-07

MW-08
8.32

MW-09
6.82

MW-10
8.83

SW01

SW02

SW03

SEEP 1

SEEP 2

SEEP 3

SEEP 4

SEEP 5

MHHW

MHHW-14.6

14.6

1,000' to SW-02
(SEE FIG 1)

LEGEND

- INTERIM ACTION AREAS FROM SUMMER 2009 CLEANUP ACTIVITIES
- EXISTING MONITORING WELL NOT SAMPLED
- SEEPS SAMPLED PREVIOUSLY DURING THE RI
- SEEPS SAMPLED 10/25/2012
- SURFACE WATER SAMPLE LOCATION
- 10 — INFERRED GROUND WATER SURFACE ELEVATION CONTOUR
- MW-10 8.83 — MONITORING WELL SAMPLED AND GROUNDWATER ELEVATION MEASURED 10/25/2012
- GROUNDWATER FLOW

NOTES

1. ELEVATION DATUM: MLLW
2. TOPOGRAPHY SHOWN BASED ON PRE-PARK CONSTRUCTION CONDITIONS.

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Figure 6
Potentiometric Surface October 2012
Solid Wood Incorporated Site
(West Bay Park)
Olympia, Washington

Figure 7. Dissolved Copper Results for Seeps 4 and 5, Surface Water Samples, MW-8, MW-9, and MW-10

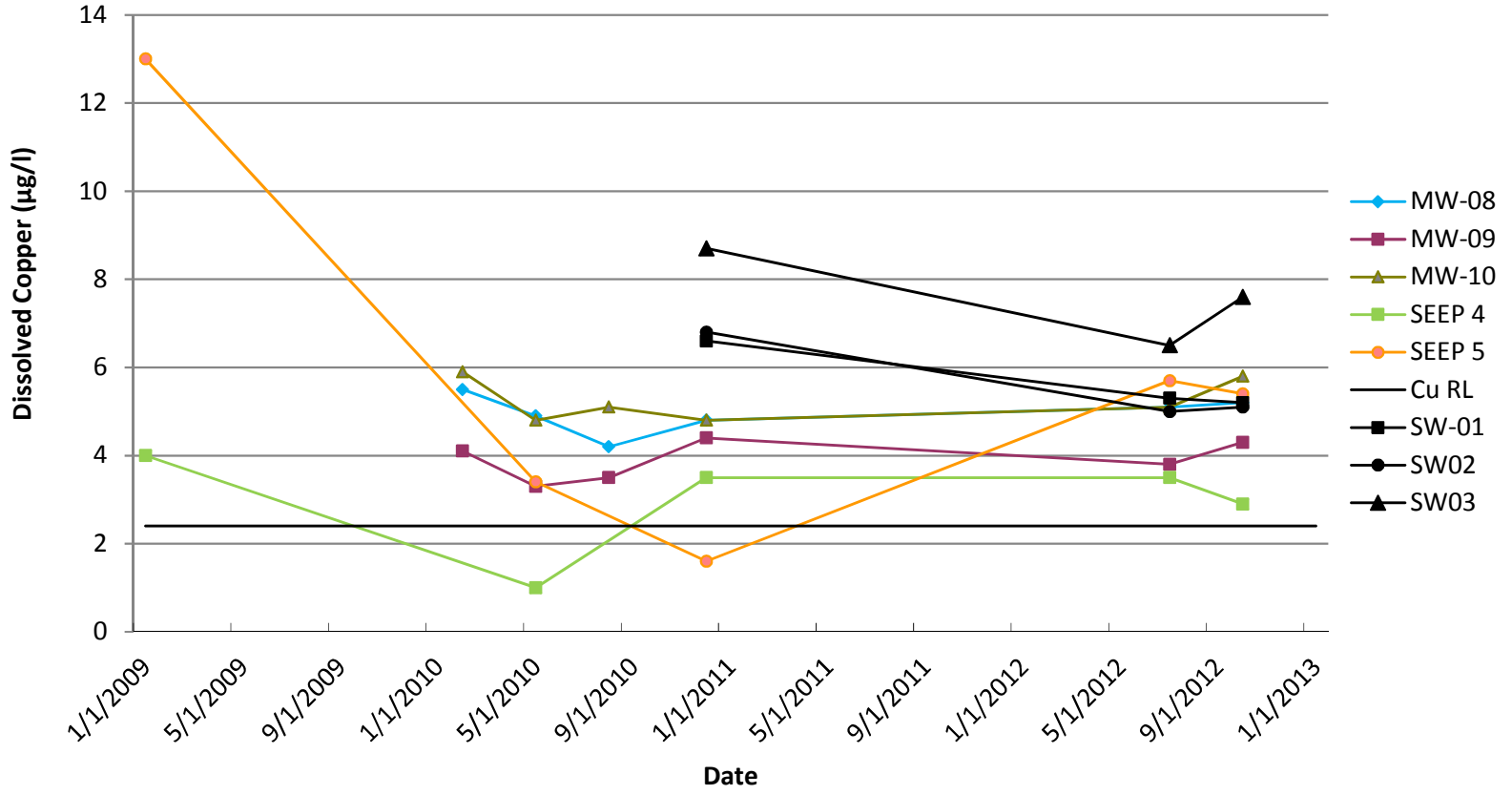
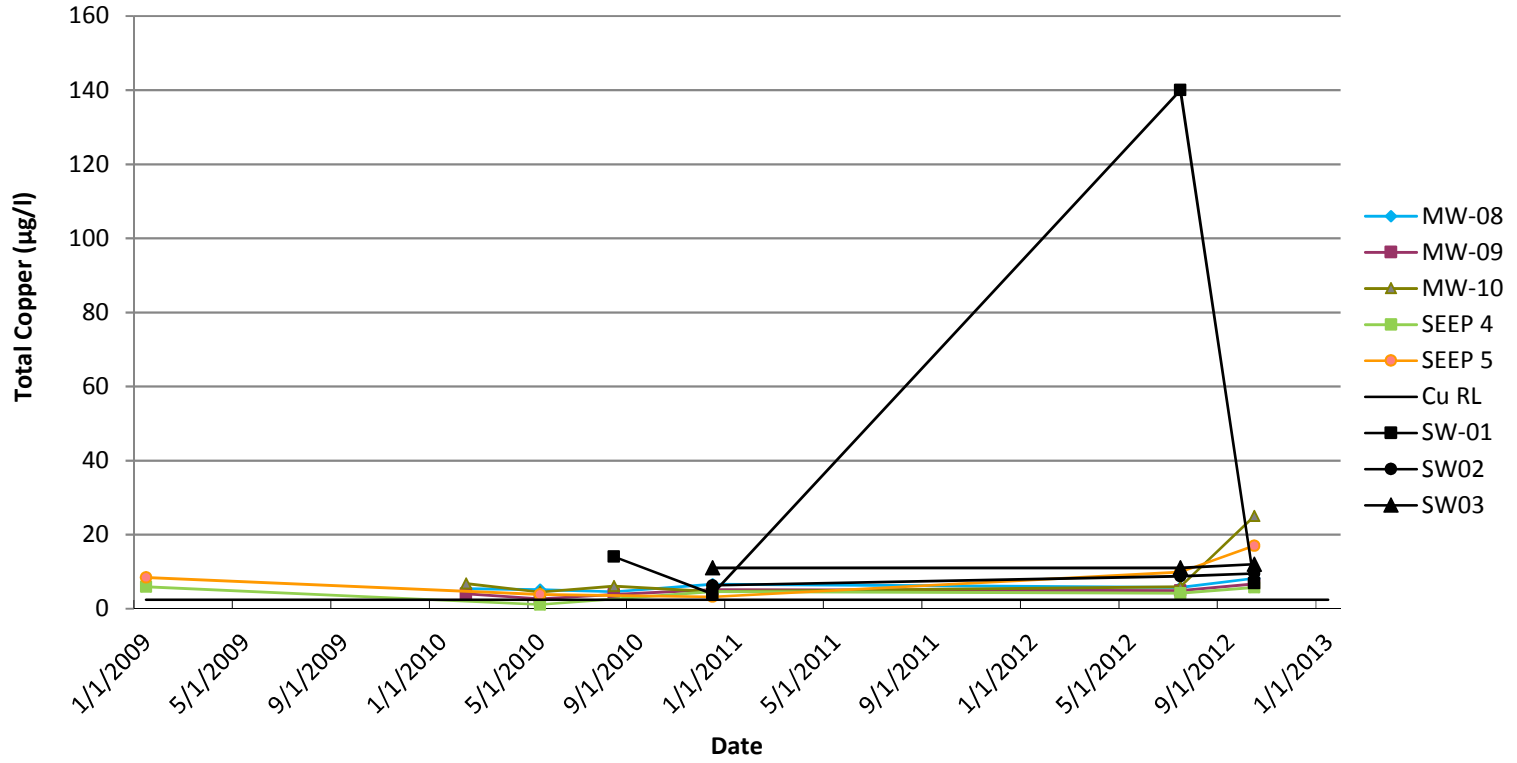


Figure 8. Total Copper Results for Seeps 4 and 5, Surface Water Samples, MW-8, MW-9, and MW-10



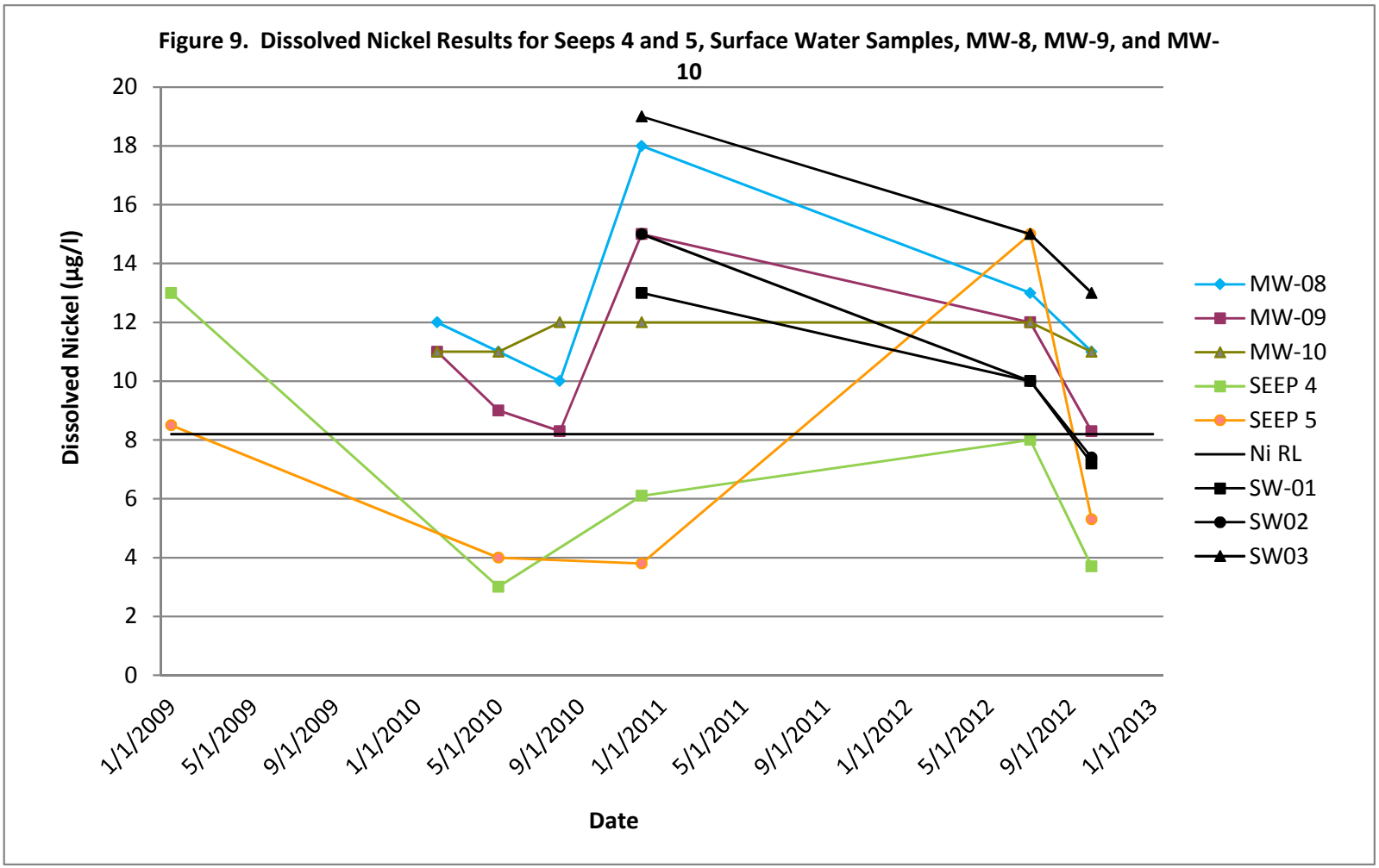


Figure 9. Dissolved Nickel Results for Seeps 4 and 5, Surface Water Samples, MW-8, MW-9, and MW-10
Dissolved Nickel (µg/l)
20
18
16
14
12
10
8
6
4
2
0
1/1/2009
5/1/2009
9/1/2009
1/1/2010
5/1/2010
9/1/2010
1/1/2011
5/1/2011
9/1/2011
1/1/2012
5/1/2012
9/1/2012
1/1/2013
Date
MW-08
MW-09
MW-10
SEEP 4
SEEP 5
Ni RL
SW-01
SW02
SW03

Figure 10. Total Nickel Results for Seeps 4 and 5, Surface Water Samples, MW-8, MW-9, and MW-10

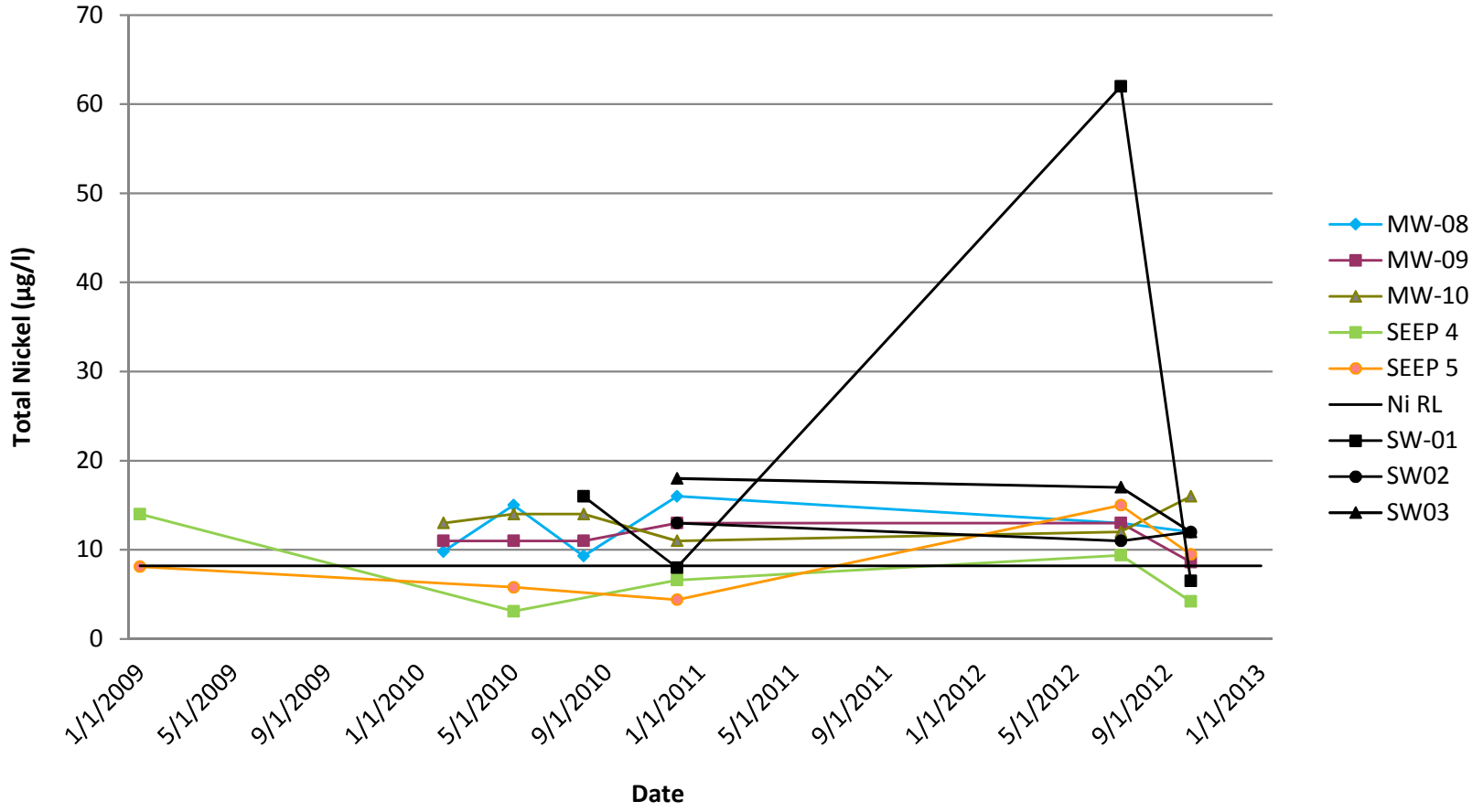


Figure 11. Dissolved Copper Versus Chloride

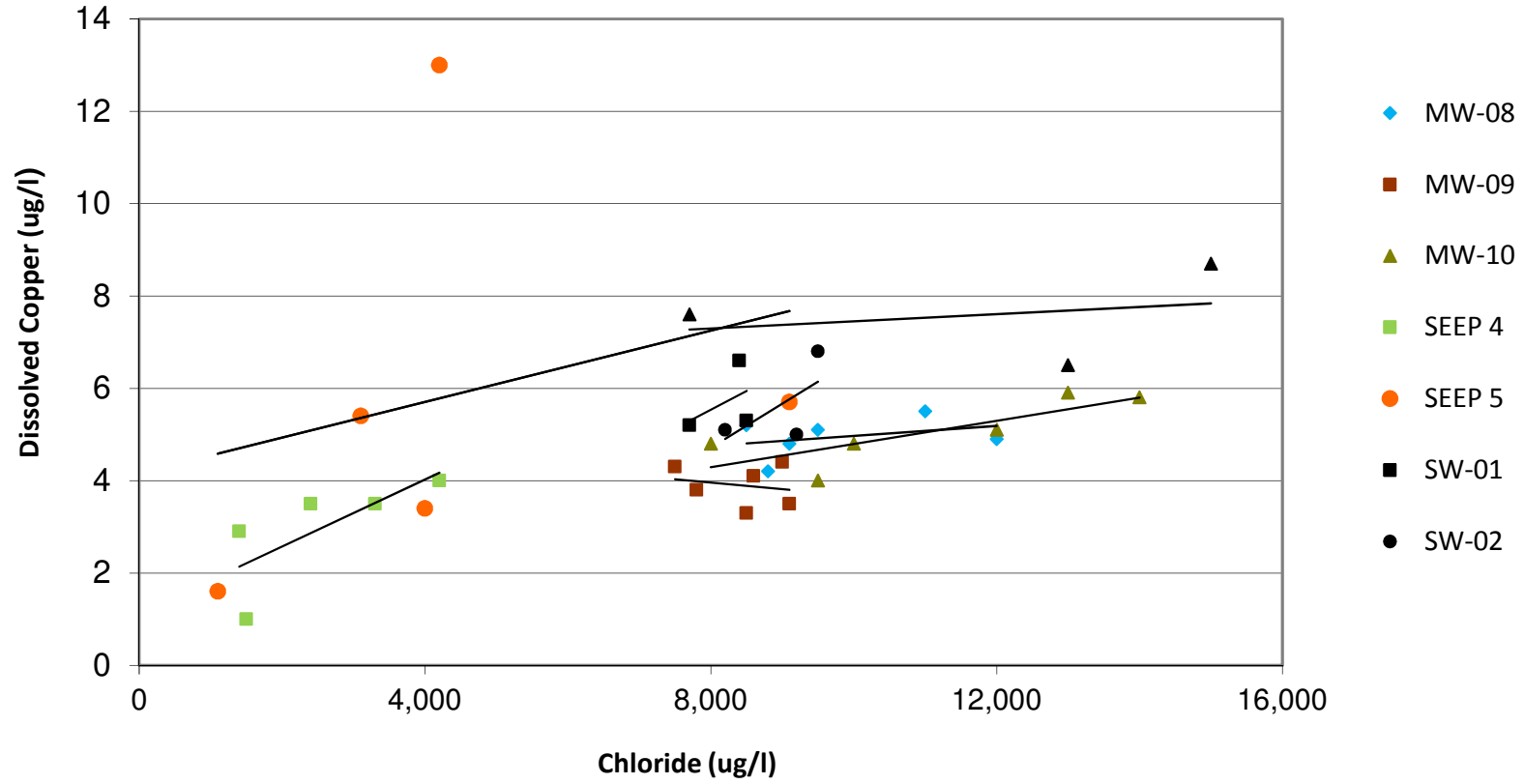


Figure 12. Total Copper Versus Chloride

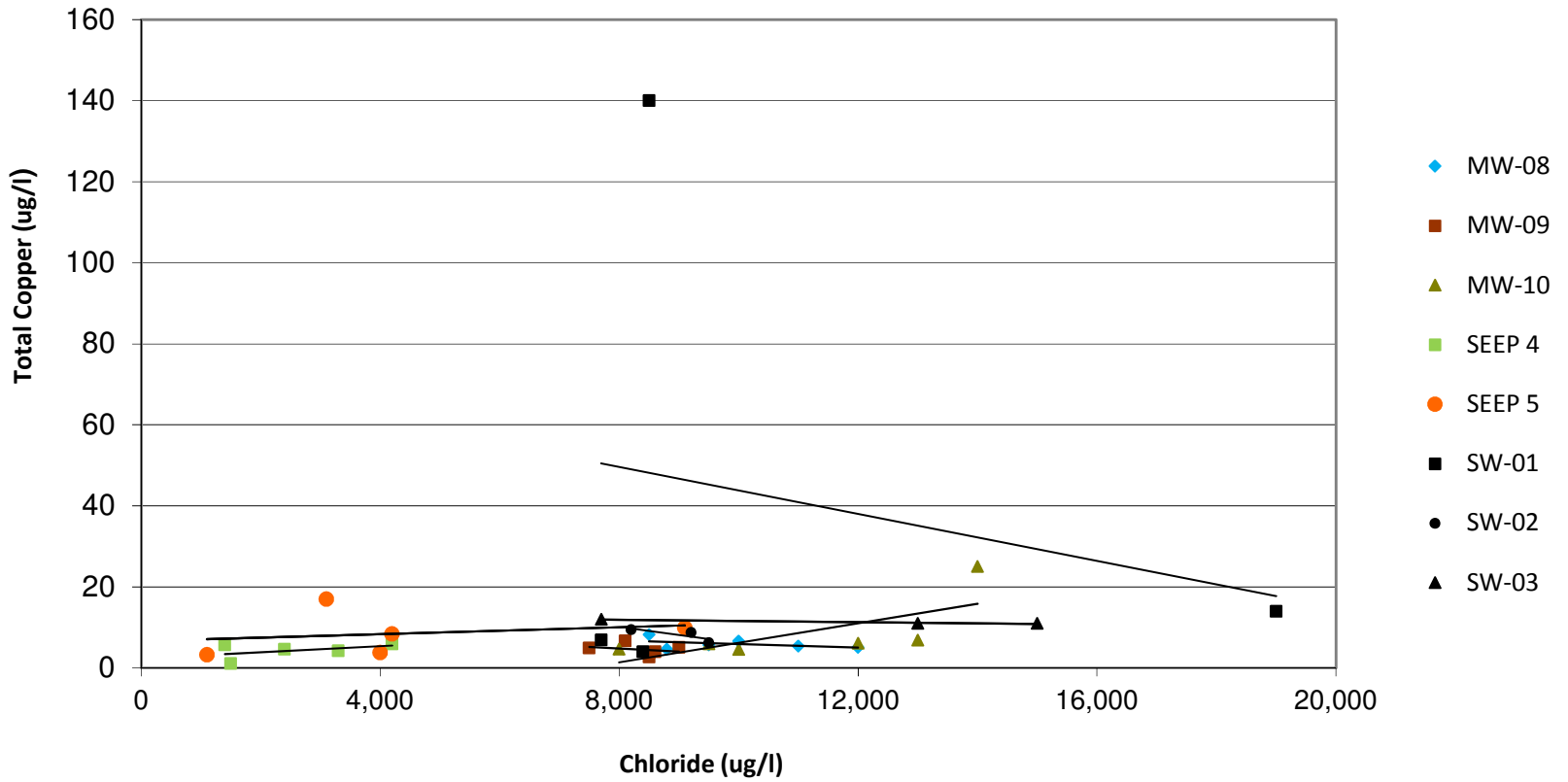


Figure 13. Dissolved Nickel Versus Chloride

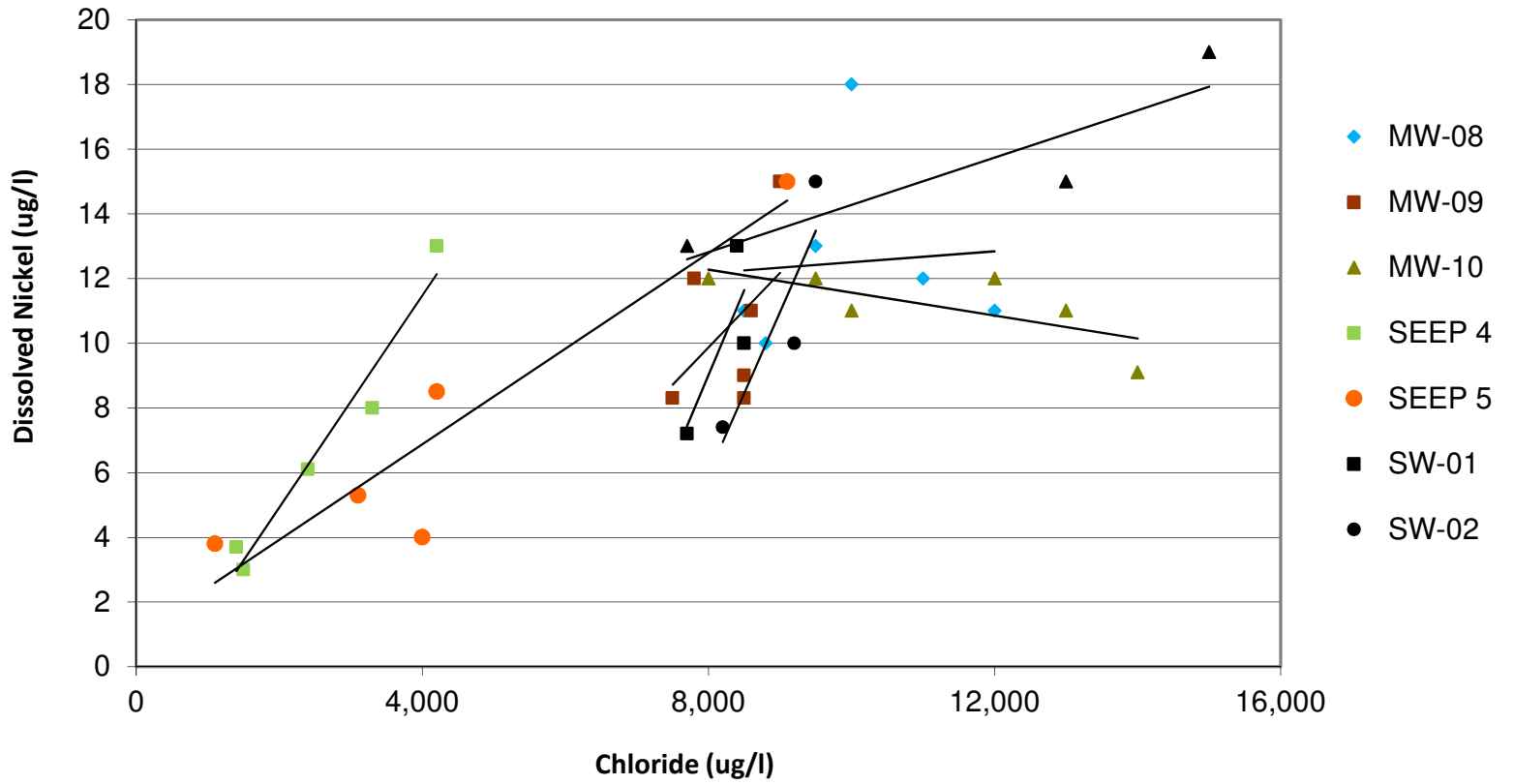


Figure 14. Total Nickel Versus Chloride

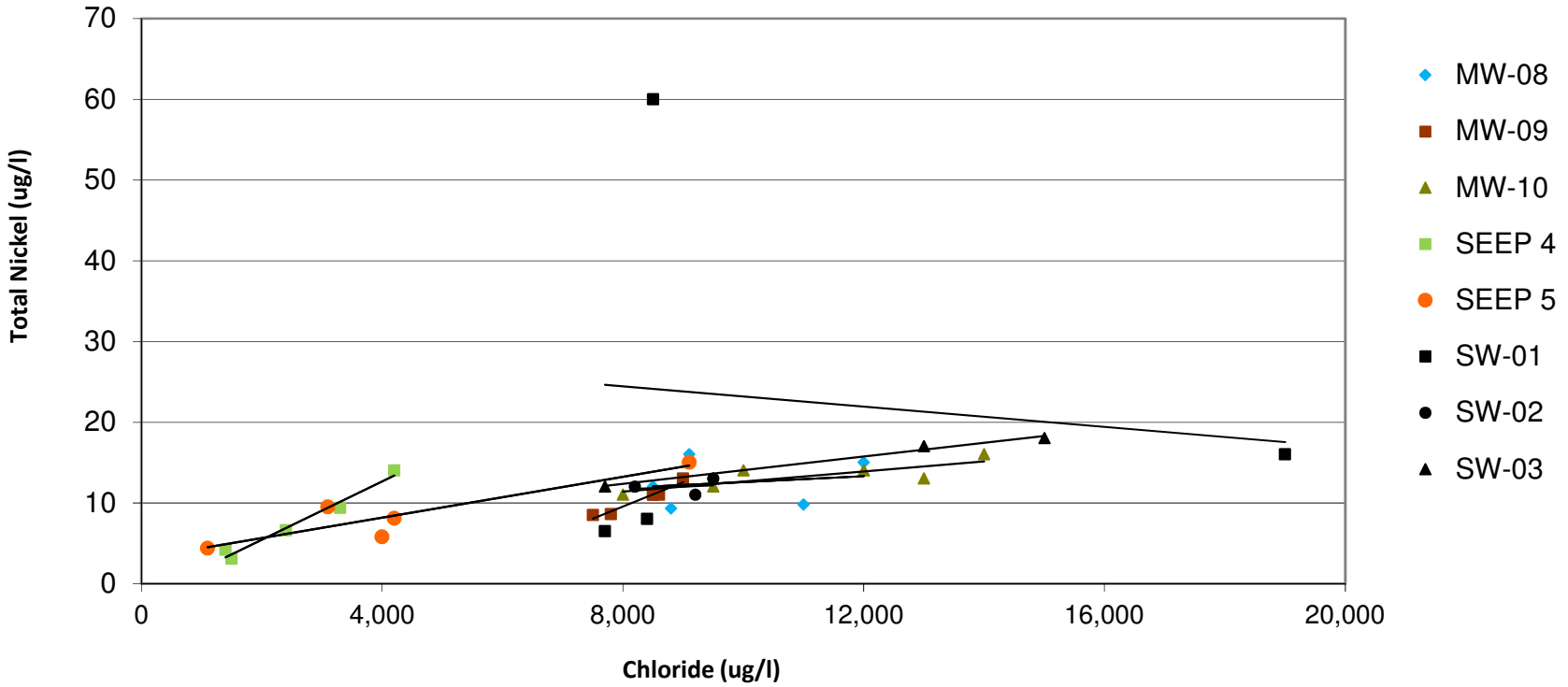


Table 1. Oil Stain Soil Sample Results

		Sample No.	SB47	SB47	SB47(dup)	TPBT1	TPBT1(dup)
		Sample Depth (ft):	1.0	3.5	3.5	5.0	5.0
		SL	9/27/12	9/27/12	9/27/12	1/15/13	1/15/13
TOTAL PETROLEUM HYDROCARBONS							
Diesel Range Organics	mg/kg	2000	360 U	1500 U	600 U	39 U	39 U
Lube Oil Range Organics	mg/kg	2000	11,000	17,000	16,000	200	200
Gasoline Range Organics	mg/kg	100	5.1 U	5.5 U	5.0 U	--	--
METALS							
Arsenic	mg/kg	20	11 U	11 U	11 U	--	--
Cadmium	mg/kg	2	0.53 U	0.55 U	0.54 U	--	--
Chromium	mg/kg	2000	20	25	34	--	--
Lead	mg/kg	250	6.0	5.5 U	5.4 U	--	--
Mercury	mg/kg	2	0.27 U	0.27 U	0.27 U	--	--
VOLATILE ORGANIC COMPOUNDS[1]							
Acetone	mg/kg	-	0.071	0.066	0.069	--	--
2-Butanone	mg/kg	-	0.012	0.013	0.015	--	--
o-Xylene	mg/kg	9	0.0017 U	0.0010	0.0011 U	--	--
Toluene	mg/kg	7	0.0084 U	0.038	0.038	--	--
POLYCHLORINATED BIPHENYLS							
All Aroclors - non-detect	mg/kg	-	U	U	U	--	--
CARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS							
Benzo(a)anthracene	mg/kg	-	0.036 U	0.036 U	0.036 U	--	--
Chrysene	mg/kg	-	0.036 U	0.036 U	0.036 U	--	--
Benzo(b)fluoranthene	mg/kg	-	0.036 U	0.036 U	0.036 U	--	--
Benzo(k)fluoranthene	mg/kg	-	0.036 U	0.036 U	0.036 U	--	--
Benzo(a)pyrene	mg/kg	0.1	0.036 U	0.036 U	0.036 U	--	--
Indeno(1,2,3-cd)pyrene	mg/kg	-	0.036 U	0.036 U	0.036 U	--	--
Dibenzo(a,h)anthracene	mg/kg	-	0.036 U	0.036 U	0.036 U	--	--
Total cPAHs as Benzo(a)pyrene[2]	mg/kg	0.1	0.0272 U	0.0272 U	0.0272 U	--	--

Notes:

- \- No comparative value established.
- -- Not analyzed.
- [1] Only detects listed.
- [2] Total of individual cPAHs multipled by benzo(a)pyrene toxcity equivalency factor - half the practical quantitation limit was used for non-detect values.
- cPAHs Carcinogenic polycyclic aromatic hydrocarbons.
- ft Feet.
- mg/kg Milligrams per kilogram.
- SL Screening level established in the RI/FS Work Plan.
- U Analyte not detected above given practical quantitation limit.
- Exceeds site specific screening level.

Table 2. Oil Stain Soil Sample Results

Sample No.			SB48	SB49	SB50	SB51	SB52	SB53	SB54	SB55	SB56	SB57	SB58	SB59	SB59 (dup)	SB60
Sample Depth (ft):			**7.0**	**6.0**	**6.0**	**7.0**	**7.0**	**7.0**	**6.5**	**7.0**	**1.0**	**8.0**	**7.0**	**6.0**	**6.0**	**7.0**
		SL	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**	**11/7/13**
TOTAL PETROLEUM HYDROCARBONS																
Diesel Range Organics	mg/kg	2000	680 U	48 U	36 U	27 U	41 U	59 U	65 U	60 U	42 U	42 U	60	150 U	30 U	35 U
Lube Oil Range Organics	mg/kg	2000	12,000	530	150	55 U	89	360	390	1,100	210	210	480	3,200	420	92

Notes:

ft Feet.

mg/kg Milligrams per kilogram.

SL Screening level established in the RI/FS Work Plan.

U Analyte not detected above given practical quantitation limit.

Exceeds site specific screening level.

Table 3. Oil Stain Groundwater Sample Results

		Sample No.	SB52	SB52 (dup)	SB53	SB53[1]
		SL	11/7/13	11/7/13	11/7/13	11/7/13
TOTAL PETROLEUM HYDROCARBONS						
Diesel Range Organics	mg/L	0.5	0.26 U	0.26 U	0.46	0.26 U
Lube Oil Range Organics	mg/L	0.5	0.41 U	0.41 U	0.48	0.41 U

Notes:

1 Silica gel cleanup performed.
ft Feet.
mg/L Milligrams per liter.
SL Screening level established in the RI/FS Work Plan.
U Analyte not detected above given practical quantitation limit.
Exceeds site specific screening level.

Table 4. Rail Spur Sample Results

PARAMETERS	Units	Sample No. / Sample Depth (ft): / Date Sampled:	SB33 0.5 9/27/12	SB34 1.5 9/27/12	SB35 1.5 9/27/12	SB36 1.5 9/27/12	SB37 0.5 9/27/12	SB38 0.5 9/27/12	SB39 0.5 9/27/12	SB40 0.5 9/27/12	SB40(dup) 0.5 9/27/12	SB41 1.0 9/27/12	SB42 2.0 9/27/12	SB43 1.5 9/27/12	SB44 1.0 9/27/12	SB45 1.5 9/27/12	SB46 0.5 9/27/12
		SL															
CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS																	
Benzo(a)anthracene	mg/kg	-	0.0070 U	0.0070 U	0.0070 U	0.10	0.0069 U	0.0072 U	0.0069 U	0.0072 U	0.0073 U	0.0093	0.0073 U	0.020	0.0070 U	0.0071 U	0.022
Chrysene	mg/kg	-	0.034	0.0070 U	0.0070 U	0.087	0.015	0.017	0.011	0.013	0.013	0.036	0.0073 U	0.039	0.0070 U	0.014	0.062
Benzo(b)fluoranthene	mg/kg	-	0.038	0.0070 U	0.0070 U	0.045	0.010	0.019	0.011	0.012	0.014	0.066	0.0073 U	0.026	0.0070 U	0.0071 U	0.083
Benzo(k)fluoranthene	mg/kg	-	0.0088	0.0070 U	0.0070 U	0.041 U	0.0069 U	0.0072 U	0.0069 U	0.0072 U	0.0073 U	0.015	0.0073 U	0.0070 U	0.0070 U	0.0071 U	0.018
Benzo(a)pyrene	mg/kg	0.1	0.0095	0.0070 U	0.0070 U	0.041 U	0.0073	0.0072 U	0.0069 U	0.0072 U	0.0073 U	0.023	0.0073 U	0.023	0.0070 U	0.0071 U	0.039
Indeno(1,2,3-cd)pyrene	mg/kg	-	0.013	0.0070 U	0.0070 U	0.041 U	0.0069 U	0.0072 U	0.0069 U	0.0072 U	0.0073 U	0.031	0.0073 U	0.015	0.0070 U	0.0071 U	0.020
Dibenzo(a,h)anthracene	mg/kg	-	0.0070 U	0.0070 U	0.0070 U	0.041 U	0.0069 U	0.0072 U	0.0069 U	0.0072 U	0.0073 U	0.012	0.0073 U	0.0070 U	0.0070 U	0.0071 U	0.0074
Total cPAHs as Benzo(a)pyrene[1]	mg/kg	0.1	0.0165	0.0053 U	0.0053 U	0.042	0.0223	0.0525	0.0495	0.0517	0.0066	0.0367	0.0055 U	0.0333	0.0053 U	0.0055	0.0547

Notes:

- \- No comparative value established.
- [1] Total of individual cPAHs multipled by benzo(a)pyrene toxcity equivalency factor - half the PQL was used for non-detect values.
- cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
- ft Feet.
- mg/kg Milligrams per kilogram.
- SL Screening level established in the RI/FS Work Plan.
- U Analyte not detected above given practical quantitation limit.
- Exceeds site specific screening level.

Table 5. Final Water Quality Parameters for July 2012

Location ID	Date/Time	pH (units)	Conductivity (S/m)	Dissolved Oxygen (mg/l)	Temperature (ºC)	Turbidity (NTU)	Redox (mV)
MW-08	7/3/12 @ 1228	7.00	7.15	0	14.65	120	-360
MW-09	7/3/12 @ 1128	7.06	6.28	0	13.66	19.6	-377
MW-10	7/3/12 @1023	6.59	7.25	0	14.69	24.0	-255
SW-01	7/3/12 @ 0925	6.84	6.88	6.70	15.06	>1000*	47
SW-02	7/3/12 @ 0905	6.63	6.91	7.64	14.18	206	-2
SW-03	7/3/12 @ 0850	6.06	9.58	5.92	14.20	203	-17
SEEP-4	7/3/12 @ 1330	7.59	3.31	0.95	13.60	>1000**	-138
SEEP-5	7/3/12 @ 1315	7.49	6.98	4.92	16.09	72.7	-52

Notes:

S/m = siemens per meter.

mg/l = milligrams per liter.

ºC = degrees Celsius.

NTU = nephelometric turbidity units.

mV = millivolts.

% = percent.

* = Outgoing tide caused significant turbidity.

** = Bivalves in excavated depression caused turbidity.

Table 6. Final Water Quality Parameters for October 2012

Location ID	Date/Time	pH (units)	Conductivity (mS/m)	Dissolved Oxygen (mg/l)	Temperature (ºC)	Turbidity (NTU)	Redox (mV)
MW-08	10/25/12 @ 1026	8.75	35.9	0	13.25	4.1	-325
MW-09	10/25/12 @ 0919	8.74	30.6	0	14.41	0.3	-337
MW-10	10/25/12 @ 0823	7.83	45.5	0	14.02	6.2	-244
SW-01	10/25/12 @ 1300	8.00	28.7	9.88	11.41	5.9	-1
SW-02	10/25/12 @ 1240	7.83	47.4	7.73	12.03	5.2	11
SW-03	10/25/12 @ 1220	7.89	48.4	7.85	11.54	13.4	-17
SEEP-4	10/25/12 @ 1130	8.01	51.5	0.98	13.12	460	-109
SEEP-5	10/25/12 @ 1200	8.20	13.8	3.46	12.37	245	-87

Notes:

mS/m = millisiemens per meter.

mg/l = milligrams per liter.

ºC = degrees Celsius.

NTU = nephelometric turbidity units.

mV = millivolts.

% = percent.

* = turbidity meter malfunction, water was clear.

Table 7. Groundwater Results

ANALYTE	Location ID		MW-08							MW-09									MW-10							
	Date Sampled		2/3/10	5/3/10	8/23/10	12/2/10	12/2/10[a]	7/3/12	10/25/12	2/3/10	2/3/10[a]	5/3/10	8/23/10	8/23/10[a]	12/2/10	7/3/12	10/25/12	10/25/12[a]	2/3/10	5/3/10	5/3/10[a]	8/23/10	12/2/10	7/3/12	7/3/12[a]	10/25/12
	Units	SL																								
TOTAL METALS																										
Antimony	µg/l	6[b]	6U	0.50U	0.50U	0.50U	0.50U	--	--	6U	6U	0.50U	0.50U	0.50U	0.50U	--	--	--	6U	0.50U	0.50U	1.3U	0.50U	--	--	--
Arsenic	µg/l	5	*6.5U*	1.8U	2.0U	1.0U	1.0U	--	--	5U	5U	0.50U	1.2U	2U	1.0U	--	--	--	*7.5U*	2.0U	2.5U	4.0U	1.2U	--	--	--
Beryllium	µg/l	4[b]	4U	0.50U	0.50U	0.50U	0.50U	--	--	4U	4U	0.50U	0.50U	0.50U	0.50U	--	--	--	4U	0.50U	0.50U	0.50U	0.50U	--	--	--
Cadmium	µg/l	5	5U	0.50U	0.50U	0.50U	0.50U	--	--	5U	5U	0.50U	0.50U	0.50U	0.50U	--	--	--	5U	0.50U	0.50U	0.50U	0.50U	--	--	--
Chromium	µg/l	50	50U	1.3	1.3	1.1	1.6	--	--	50U	50U	0.98	0.89	1.0	1.7	--	--	--	50U	1.4	1.4	1.3	1.4	--	--	--
Copper	µg/l	2.4[c]	5.4	5.1	4.6	4.8	6.6	5.7	8.2	4	3.4	2.7	3.6	3.8	5.1	4.9	6.7	5.7	6.8	4.5	4.5	6.1	4.6	5.9	6.0	25
Lead	µg/l	8.1[c]	8U	0.50U	0.50U	0.50U	0.50	--	--	8U	8U	0.50U	0.50U	0.50U	0.50U	--	--	--	8U	0.50U	0.50U	0.50U	0.50U	--	--	--
Mercury	µg/l	0.025[c]	*0.038U*	0.025U	0.025U	0.025U	0.025U	--	--	*0.038U*	*0.038U*	0.025	0.025U	0.025U	0.025U	--	--	--	*0.038U*	0.025U	0.025U	0.025U	0.025U	--	--	--
Nickel	µg/l	8.2[c]	9.8	15	9.3	16	14	13	12	11	11	11	9.8	11	13	13	8.6	8.5	13	14	13	14	11	12	13	16
Selenium	µg/l	50[b]	50U	8.0U	20U	10U	10U	--	--	50U	50U	1.6U	18U	15U	10U	--	--	--	50U	2.5U	4.5U	24U	10U	--	--	--
Silver	µg/l	1.9[c]	1.9U	0.50U	0.50U	0.50U	0.50U	--	--	1.9U	1.9U	0.50U	0.50U	0.50U	0.50U	--	--	--	1.9U	0.50U	0.50U	1.3U	0.50U	--	--	--
Thallium	µg/l	0.47[c]	0.45U	*0.50U*	*0.50U*	*0.50U*	*0.50U*	--	--	0.45U	0.45U	*0.50U*	*0.50U*	*0.50U*	*0.50U*	--	--	--	0.45U	*0.50U*	*0.50U*	*0.50U*	*0.50U*	--	--	--
Zinc	µg/l	81[c]	80U	18	18J	7.0	12	--	--	80U	80U	8.7	9.8J	4.7J	6.8	--	--	--	80U	12	11	11J	6.8	--	--	--
DISSOLVED METALS																										
Antimony	µg/l	6[b]	6U	0.50U	0.50U	0.50U	0.50U	--	--	6U	6U	0.50U	0.50U	0.50U	0.50U	--	--	--	6U	0.50U	0.50U	1.3U	0.50U	--	--	--
Arsenic	µg/l	5	*8U*	1.4U	1.2U	1.0U	1.0U	--	--	*6U*	5U	0.50U	1.2U	1.2U	1.0U	--	--	--	*7.5U*	0.50U	2.2U	3.5U	1.0U	--	--	--
Beryllium	µg/l	4[b]	4U	0.50U	0.50U	0.50U	0.50U	--	--	4U	4U	0.50U	0.50U	0.50U	0.50U	--	--	--	4U	0.50U	0.50U	0.50U	0.50U	--	--	--
Cadmium	µg/l	5	5U	0.50U	0.50U	0.50U	0.50U	--	--	5U	5U	0.50U	0.50U	0.50U	0.50U	--	--	--	5U	0.50U	0.50U	0.50U	0.50U	--	--	--
Chromium	µg/l	50	50U	0.66	1.1	1.2	1.1	--	--	50U	50U	0.50U	0.75	0.8	1.1	--	--	--	50U	0.76	0.66	1.4	1.5	--	--	--
Copper	µg/l	2.4[c]	5.5	4.9	4.2	4.8	4.4	5.1	5.2	4.1	3.4	3.3	3.5	3.4	4.4	3.8	4.3	4.4	5.9	4.8	4.5	5.1	4.8	5.1	4.0	5.8
Lead	µg/l	8.1[c]	8U	0.50U	0.50U	0.50U	0.50U	--	--	8U	8U	0.50U	0.50U	0.50U	0.50U	--	--	--	8U	0.50U	0.50U	0.50U	0.50U	--	--	--
Mercury	µg/l	0.025[c]	*0.038U*	0.025U	0.025U	0.025U	0.025U	--	--	*0.038U*	*0.038U*	0.025U	0.025U	0.025U	0.025U	--	--	--	*0.038U*	0.025U	0.025U	0.025U	0.025U	--	--	--
Nickel	µg/l	8.2[c]	12	11	10	18	18	13	11	11	8.9	9.0	7.8	8.3	15	12	8.3	8.6	11	11	10	12	12	12	9.1	11
Selenium	µg/l	50[b]	50U	6.0U	24U	10U	12U	--	--	50U	50U	2.0U	18U	16U	10U	--	--	--	50U	5.0U	4.0U	27U	10U	--	--	--
Silver	µg/l	1.9[c]	1.9U	0.50U	0.50U	0.50U	0.50	--	--	1.9U	1.9U	0.50U	0.50U	0.50U	0.50U	--	--	--	1.9U	0.50U	0.50U	1.3U	0.50U	--	--	--
Thallium	µg/l	0.47[c]	0.45U	*0.50U*	*0.50U*	*0.50U*	*0.50U*	--	--	0.45U	0.45U	*0.50U*	*0.50U*	*0.50U*	*0.50U*	--	--	--	0.45U	*0.50U*	*0.50U*	*0.50U*	*0.050U*	--	--	--
Zinc	µg/l	81[c]	80U	15	5.9	6.1	5.4	--	--	80U	80U	6.3	4.5	4.1	3.5	--	--	--	80U	8	11	4.8	4.3	--	--	--
GENERAL CHEMISTRY																										
Chloride	mg/l	-	11,000	12,000	8,800	9,100	10,000	9,500	8,500	8,600	8,400	8,500	9,100	8,500	9,000	7,800	7,500	8,100	13,000	10,000	9,600	12,000	8,000	9,500	9,000	14,000
DOC	mg/l	-	--	--	100J	83	92	5.1	5.7	--	--	--	72J	120J	100	3.7	4.0	3.9	--	--	--	38J	76	5.3	5.3	4.6
TDS	mg/l	-	--	--	--	--	--	17,000	17,000	--	--	--	--	--	--	14,000	13,000	13,000	--	--	--	--	--	17,000	17,000	23,000
Salinity	g/kg	-	--	--	--	--	--	13.90	15.84	--	--	--	--	--	--	11.79	12.14	11.91	--	--	--	--	--	14.04	14.04	19.07

Notes:

[a] = Duplicate sample.
[b] = State and federal groundater maximum contaminant level (MCL).
[c] = Surface water applicable or relevant and appropriate requirement (ARAR).
italics = PQL exceeds screening level.
J = Analyte was detected. The reported concentration should be considered an estimate.
mg/l = milligrams per liter.
DOC Dissolved Organic Carbon.
SL = Screening level.
µg/l = micrograms per liter.
U = Not detected at given practical quantitation limit (PQL).
-- = Not analyzed.
Exceeds site specific screening level.

Table 8. Surface Water and Seep Results

ANALYTE	Location ID	SW01				SW02			SW03			SEEP 4					SEEP 5				
	Date Sampled	8/23/10	12/2/10	7/3/12	10/25/12	12/2/10	7/3/12	10/25/12	12/2/10	7/3/12	10/25/12	1/14/09	5/3/10	12/2/10	7/3/12	10/25/12	1/14/09	5/3/10	12/2/10	7/3/12	10/25/12
	Units																				
	RL																				
TOTAL METALS																					
Antimony	µg/l	6[b]	1.3U	--	--	--	--	--	--	--	--	--	5.6U	0.50U	--	--	--	5.6U	0.50U	--	--	--
Arsenic	µg/l	5	*6U*	1.0U	--	--	1.0U	--	--	2.5U	--	--	3.3U	1.6	1.0U	--	--	3.3U	1.2	1.1	--	--
Beryllium	µg/l	4[b]	0.50U	--	--	--	--	--	--	--	--	--	4.0U	0.50U	--	--	--	4.0U	0.50U	--	--	--
Cadmium	µg/l	5	0.50U	--	--	--	--	--	--	--	--	--	4.4U	0.50U	--	--	--	4.4U	0.50U	--	--	--
Chromium	µg/l	50	3.2	--	--	--	--	--	--	--	--	--	11U	1.0	--	--	--	11U	1.4	--	--	--
Copper	µg/l	2.4[c]	14	4.0	140	6.9	6.3	8.8	9.5	11	11	12	5.9	1.1	4.6	4.2	5.7	8.4	3.8	3.2	9.9	17
Lead	µg/l	8.1[c]	1.1	--	--	--	--	--	--	--	--	--	1.1U	0.50U	--	--	--	1.1U	0.57	--	--	--
Mercury	µg/l	0.025[c]	0.025U	--	--	--	--	--	--	--	--	--	*0.125U*	0.025U	--	--	--	*0.125U*	0.025U	--	--	--
Nickel	µg/l	8.2[c]	16	8.0	60.0	6.5	13	11	12	18	17	12	14	3.1	6.6	9.4	4.2	8.1	5.8	4.4	15.0	9.5
Selenium	µg/l	50[b]	25U	--	--	--	--	--	--	--	--	--	28U	1.0U	--	--	--	28U	1.0U	--	--	--
Silver	µg/l	1.9[c]	1.3U	--	--	--	--	--	--	--	--	--	1.9U	0.50U	--	--	--	1.9U	0.50U	--	--	--
Thallium	µg/l	0.47[c]	*0.50U*	--	--	--	--	--	--	--	--	--	0.47U	0.50U	--	--	--	0.47U	0.50U	--	--	--
Zinc	µg/l	81[c]	6.3U	--	--	--	--	--	--	--	--	--	69U	5.0	--	--	--	69U	5.0	--	--	--
DISSOLVED METALS																						
Antimony	µg/l	6[b]	--	--	--	--	--	--	--	--	--	--	5.6U	0.50U	--	--	--	5.6U	0.50U	--	--	--
Arsenic	µg/l	5	--	1.0U	--	--	1.0U	--	--	3.0U	--	--	3.3U	1.7	1.0U	--	--	3.3U	1.3	1.5	--	--
Beryllium	µg/l	4[b]	--	--	--	--	--	--	--	--	--	--	4.0U	0.50U	--	--	--	4.0U	0.50U	--	--	--
Cadmium	µg/l	5	--	--	--	--	--	--	--	--	--	--	4.4U	0.50U	--	--	--	4.4U	0.50U	--	--	--
Chromium	µg/l	50	--	--	--	--	--	--	--	--	--	--	11U	0.75	--	--	--	11U	0.55	--	--	--
Copper	µg/l	2.4[c]	--	6.6	5.3	5.2	6.8	5.0	5.1	8.7	6.5	7.6	4.0	1.0	3.5	3.5	2.9	13	3.4	1.6	5.7	5.4
Lead	µg/l	8.1[c]	--	--	--	--	--	--	--	--	--	--	1.1U	0.50U	--	--	--	1.1U	0.50U	--	--	--
Mercury	µg/l	0.025[c]	--	--	--	--	--	--	--	--	--	--	*0.125U*	0.025U	--	--	--	*0.125U*	0.025U	--	--	--
Nickel	µg/l	8.2[c]	--	13	10	7.2	15	10	7.4	19	15	13	13	3.0	6.1	8.0	3.7	8.5	4.0	3.8	15	5.3
Selenium	µg/l	50[b]	--	--	--	--	--	--	--	--	--	--	28U	1.0U	--	--	--	28U	1.2U	--	--	--
Silver	µg/l	1.9[c]	--	--	--	--	--	--	--	--	--	--	1.9U	0.50U	--	--	--	1.9U	0.50U	--	--	--
Thallium	µg/l	0.47[c]	--	--	--	--	--	--	--	--	--	--	0.47U	0.50U	--	--	--	0.47U	0.50U	--	--	--
Zinc	µg/l	81[c]	--	--	--	--	--	--	--	--	--	--	69U	2.6	--	--	--	69U	3.5	--	--	--
GENERAL CHEMISTRY																						
Chloride	mg/l	-	19,000	8,400	8,500	7,700	9,500	9,200	8,200	15,000	13,000	7,700	4,200	1,500	2,400	3,300	1,400	4,200	4,000	1,100	9,100	3,100
DOC	mg/l	-	23J	14	2.4	2.1	13	2.3	2.0	17	2.5	1.7	--	--	65	3.9	3.4	--	--	31	4.7	6.1
TDS	mg/l	-	--	--	--	13,000	--	--	17,000	--	--	25,000	--	--	--	--	3,100	--	--	--	--	6,500
Salinity	g/kg	-	--	--	--	11.32	--	--	15.00	--	--	20.80	--	--	--	--	2.61	--	--	--	--	5.41

Notes:

[a] = Duplicate sample.

[b] = State and federal groundater maximum contaminant level (MCL).

[c] = Surface water applicable or relevant and appropriate requirement (ARAR).

italics = PQL exceeds screening level.

J= Analyte was detected. The reported concentration should be considered an estimate.

g/l = grams per liter.

DOC Dissolved Organic Carbon.

SL = Screening level.

µg/l = micrograms per liter.

U = Not detected at given practical quantitation limit (PQL).

-- = Not analyzed.

Exceeds site specific screening level.

Table 9. Sediment Sample Results

PARAMETERS	Units	Sediment Sample No. / Sample Depth (ft): / Date Sampled:	SL	SD34 0.5 7/19/12	SD35 0.5 7/19/12	SD35(dup) 0.5 7/19/12	SD36 0.5 7/19/12	SD37 0.5 7/19/12	SD38 0.5 7/19/12	SD39 0.5 7/19/12	SD40 0.5 7/19/12	SD41 0.5 7/19/12
TOTAL PETROLEUM HYDROCARBONS												
Diesel Range Organics	mg/kg		100[1]	180 U	45 U	38 U	51 U	64	35 U	42 U	66	61
Lube Oil Range Organics	mg/kg		100[1]	1500	310	120	520	380	140	190	380	320
Tot. Petroleum Hydrocarbons[2]	mg/kg		100[1]	1680 U	355	158	571	444	175	232	446	381

Notes:

- No comparative value established.

[1] Ecology screening concentration for sediments applicable to the sum of the diesel range organics and lube oil range organics results.

[2] Sum of diesel and lube oil results. Practical quantitation limit used for non detect analytes.

ft Feet.

mg/kg Milligrams per kilogram.

SL Screening level.

U Analyte not detected above given practical quantitation limit.

Exceeds site specific screening level.

Attachment 1

Boring and Field Logs

Location Olympia, WA Date 9/27/12

Project / Client West Bay

Activities: Collect surface soils along rail spur & subsurface samples @ oil stained area
Weather: ~50°F, foggy
Anther: L. Linde
Onsite: L. Linde

0800	Depart for site
0810	Call KP to get gate open
0815	Accident on I-5, traffic delay
0845	Call ESN
0850	Traffic breaks, continue to site
0915	Stop @ store to get ice
0925	Arrive @ site; KP (City) onsite & Anisa (ESN), gate open
0930	Walk locations, set up
0945	KP off site
1000	Start coring, set up for sampling
1030	Collect WB-SO-SB33-0005
1045	Collect WB-SO-SB37-0005
1100	Collect WB-SO-SB38-0005
1110	Collect WB-SO-SB39-0005
1120	Collect WB-SO-SB40-0005
1125	Collect WB-SO-SB40-1005, field dup

Location Olympia, WA Date 9/27/12

Project / Client West Bay

1135	Collect WB-SO-SB46-0005
1310	Collect WB-SO-SB35-0015
1320	Collect WB-SO-SB34-0015
1345	Collect WB-SO-SB36-0015
~~1405~~ 1355	Collect WB-SO-SB47-0010
1405	Collect WB-SO-SB47-0035
1410	Collect WB-SO-SB47-1035, field duplicate
1420	Collect WB-SO-SB45-0015
1435	Collect WB-SO-SB44-0010
1445	Collect WB-SO-SB43-0015
1455	Collect WB-SO-SB42-0020
~~1415~~ 1505	Collect WB-SO-SB41-0010
1515	Cleanup
1525	ESN offsite, stake locations and get GPS points

~~location~~	~~Northing~~ / ~~Easting~~
SB33	N47°03'04.3"
	W122°54'44.9"
SB34	N47°03'03.8"
	W122°54'44.5"
SB35	N47°03'03.4"
	W122°54'44.4"

Location Olympia, WA Date 9/27/12
Project / Client West Bay

SB36	N47°03'03.0"	W122°54'44.3"
~~SB47~~	N47°03'03.1"	W122°54'44.8"
SB37	N47°03'02.7"	W122°54'44.1"
SB38	N47°03'02.4"	W122°54'44.0"
SB39	N47°03'01.8"	W122°54'43.8"
SB40	N47°03'01.5"	W122°54'43.8"
SB46	N47°03'02.2"	W122°54'43.2"
SB45	N47°03'02.7"	W122°54'43.5"
SB44	N47°03'02.9"	W122°54'43.6"
SB43	N47°03'03.2"	W122°54'43.8"
SB42	N47°03'03.7"	W122°54'43.8"
SB41	N47°03'04.1"	W122°54'43.9"

Location Olympia, WA Date 9/27/12
Project / Client West Bay

1545 Don Farnden (ESN) onsite looking for Anisa
1555 Don (ESN) offsite
Late Entry 1150 Dave D. (PMX) onsite, walk through cored locations & surface station
Late Entry 1210 Attempt hand auger in SB35, too many large rocks to advance
Late Entry 1220 Stop Anisa on coring, discuss approach with drill rig instead
Late Entry 1230 Dave D. call Kip to discuss borings rather than core/hand auger
~~124~~ Late Entry 1245 Dave D. approves borings with drill rig via Kip, offsite
Late Entry 1255 Prep for borings
1600 Kip (City) onsite to check to see if we're done, just finishing staking/GPS
1610 Depart, Kip (City) lock gate
[signature] 9/27/12

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'04.3" W122°54'44.9"
DRILLING METHOD N/A
SAMPLING METHOD N/A
GROUND ELEVATION ~20ft

BORING/WELL NUMBER # SB33
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 0.5
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		6/6		X		ML		Silt, ML, dk brn, NP, dry, loose, ~25% sm-lg gravel rounded to angular, fill, no odor WB-SD-SB33-0005 @ 1030		dirt backfill
					5				5	
					10				10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'03.8" W122°54'44.5"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~20 ft

BORING/WELL NUMBER # SB34
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		36/48			0	Fill GP		Concrete & asphalt rubble/fill 0-1.5 ft Dk brn black asphaltic gravel, organic odor Gravel, GP, gray, NP, med-lg rounded moist, loose no odor WB-SO-SB36-0015 Sample collected @ 1.5 ft, shallowest depth at which matrix was able to be sampled immediately below asphalt/rubble.	0 5 10 15 20 25	dirt and bentonite backfill

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'03.4" W122°54'44.4"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~20 ft

BORING/WELL NUMBER #SB35
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▽ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/48			0	Fill		Concrete & Asphalt rubble/fill 0-1.5ft	0	dirt and bentonite backfill
						GW		Dk brn asphaltic gravel, asphalt/organic odor		
								Gravel, GW, gray, NP, sm-lg rounded w/some sand, moist, loose, no odor		
					5			NB-SD-SB35-0015 @ 1310	5	
								Sample collected @ 1.5ft, shallowest depth at which matrix was able to be sampled immediately below asphalt rubble		
					10				10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47° 03' 03.0" W122° 54' 44.3"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~20 ft

BORING/WELL NUMBER # SB36
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		32/48			0	Fill		Concrete & Asphalt rubble/fill 0-1.5ft	0	dirt and bentonite backfill
						GW		Dk brn asphaltic gravel w/ asphaltic odor		
						Fill		Dk brn, sand w/ gravel, mild petroleum odor, moist, loose, NP, twigs		
								Wood plng		
					5			Asphalt & gravel mixed with creosote treated wood	5	
								WB-SO-SB36-0015 @ 1345		
								Sample collected @ 1.5 ft, shallowest depth at which matrix was able to be sampled immediately below asphalt rubble.		
					10				10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'02.7" W122°54'44.1"
DRILLING METHOD N/A
SAMPLING METHOD N/A
GROUND ELEVATION ~20ft

BORING/WELL NUMBER # SB37
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 0.5ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		6/6		X		GM		RR ballast with silt, GM, dk brn, NP, fist-sized ballast w/smaller angular & rounded sm-lg gravel, dry, hard & compact; no odor, occassional bark & clam shell WB-SO-SB37-0005 @ 1045		dirt backfill

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'02.4" W122°54'44.0"
DRILLING METHOD N/A
SAMPLING METHOD N/A
GROUND ELEVATION ~20ft

BORING/WELL NUMBER # SB38
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 0.5 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		6/6		X		GM		RR ballast w/ silt, GM + cobble, dk brn, NP, cobble to small gravel rounded to angular, dry, hard & compact, no odor, bark & occassional clam shell WB-SD-SB38-0005 C1105		dirt backfill

5 10 15 20 25

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'01.8" W122°54'43.8"
DRILLING METHOD N/A
SAMPLING METHOD N/A
GROUND ELEVATION ~20 ft

BORING/WELL NUMBER # SB39
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 0.5ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▽ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		6/6		X		Gm		RR ballast w/ silt & gravel, Gm, dk brn, NP, cobble to sm gravel, angular to rounded, dry, hard & compact, no odor, bark common WB-SO-SB39-0005 @ 1110		dirt backfill

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'01.5" W122°54'43.8"
DRILLING METHOD N/A
SAMPLING METHOD N/A
GROUND ELEVATION ~20ft

BORING/WELL NUMBER # SB40
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 0.5 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Lindle
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		6/6		X		GM		RR Ballast w/ silt, GM, dk brn, NP, cobble to sm gravel, dry, hard, no odor, bark common WB-SD-SB40-0005 @ 1120 WB-SD-SB40-0005 @ 1125, field dup		dirt backfill

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'04.1" W122°54'43.9"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~20 ft

BORING/WELL NUMBER # SB41
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Lindle
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		44/48			0	Fill / GM		Asphalt rubble fill 0-1 ft Gravel, Gm, orange brn, SP, med-lg rounded to angular, loose, dry, no odor dk orange horizon with wood & bark gravel, Gm, gray, NP, med-lg sand, loose, no odor WB-50-SB41-0010 @ 1505 Sample collected @ 1 ft, shallowest depth at which matrix was able to be sampled immediately below asphalt rubble.	0 5 10 15 20 25	dirt and bentonite backfill

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47° 03' 03.7" W122° 54' 43.8"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~19 ft

BORING/WELL NUMBER # SB42
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		36/48				Asphalt		Asphalt 6-8 inches		
						GW		Gravel, GW, dk brn, NP, large, dry, loose, no odor, no fines		
						GM		Gravel, GM dk brn, NP, sm-med, dry, loose, no odor, fines present		
						PT		Peat with gravel		
						GW		Gravel, same as above		
					5				5	
								WB-SO-SB42-0020 @ 1455		
					10			Sample collected @ 2ft, shallowest depth at which matrix was able to be sampled immediately below asphalt nibble due to lack of fines in matrix (above 2ft matrix was too large to sample)	10	
					15				15	
					20				20	
					25				25	

dirt and bentonite backfill

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'032"W122°54'43.8"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~19 ft

BORING/WELL NUMBER # SB43
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		38/48			0	Fill		Concrete & ~~Asphalt~~ rubble/fill 0-1.5 ft	0	
						GW		Gravel, GW, brn, NP, med to lg rounded to angular, dry, loose, no odor		
					5	Fill		Asphalt & gravel mix, asphaltic odor, fill	5	dirt and bentonite backfill
								WB-SO-SB43-0015 @ 1445		
								Sample collected @ 1.5 ft, shallowest depth at which matrix was able to be sampled immediately below asphalt rubble.		
					10				10	
					15				15	
					20				20	
					25				25	

~~Continued Next Page~~

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'02.9" W122°54'43.6"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~16.5 ft

BORING/WELL NUMBER # SB44
DATE COMPLETED 9/27/10
TOTAL DEPTH OF BORING 4 ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/48			0	Fill		Asphalt & concrete rubble/fill 0-6 inches	0	dirt and bentonite backfill
						GW		Gravel, GW, brn, NP, large, rounded dry, loose, no odor or fines		
						GM		Gravel, GM, brn, NP, sm-med, dry loose, no odor, fines present		
					5			large gravel @ 4 ft	5	
								WB-SO-SB44-0010 @ 1435		
					10			Sample collected @ 1 ft, shallowest depth at which matrix was able to be sampled immediately below asphalt rubble due to lack of fines in matrix (above 1 ft matrix was too large to sample)	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'02.7" W122°54'43.5"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~19 FT

BORING/WELL NUMBER # SB45
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4 FT
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/48			0	Fill		Asphalt rubble 0-6 inches	0	
						GW		Gravel, GW, brn gray, NP, large, angular dry, loose, no odor or fines		
						GM		Gravel, GM, brn gray, NP, sm-med, angular, dry, loose, no odor, fines present		
						GW	GM	Gravel, GW, gray to dk gray black, sl. large, rounded, dry, loose, asphaltic odor	5	dirt and bentonite back fill
						GW		Gravel, GM, brn, NP, sm-med, dry, loose, slight asphaltic odor		
					10			Gravel, GW, same as asphaltic gravel above	10	
								WB-SO-SB45-0015		
					15			Sample collected @ 1.5 ft, shallowest depth at which matrix was able to be sampled immediately below asphalt rubble due to lack of fines in matrix (above 1.5 ft matrix was too large to sample).	15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'02.2" W122°54'43.2"
DRILLING METHOD N/A
SAMPLING METHOD N/A
GROUND ELEVATION ~19 ft

BORING/WELL NUMBER # SB46
DATE COMPLETED 9/07/12
TOTAL DEPTH OF BORING 0.5
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		6/6		X		ML		SiH, ML, light orange brn, NP, fine to med, dry, loose, extremely light weight, bark remnants, no odor WB-SO-SB46-0005 @1135		dirt backfill
					5				5	
					10				10	
					15				15	
					20				20	
					25				25	

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233-1577-037
PROJECT NAME West Bay Park
LOCATION Olympia, WA
COORDINATES N47°03'03.1" W122°54'44.8"
DRILLING METHOD Direct Push
SAMPLING METHOD Split Spoon
GROUND ELEVATION ~20ft

BORING/WELL NUMBER # SB47
DATE COMPLETED 9/27/12
TOTAL DEPTH OF BORING 4ft
INITIAL WATER LEVEL ▽ N/A
STATIC WATER LEVEL ▼ N/A
LOGGED BY L. Linde
TOP OF CASING ELEVATION N/A

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		44/48			0	GM		Asphalt rubble 0-6 inches Gravel, GM, brn gray, NP, dry, loose mild petroleum odor mild petroleum odor @3.5ft WB-SO-SB47-0010 @1355 WB-SO-SB47-0035 @1405 WB-SO-SB47-1035 @1410 Sample collected @ 1ft, shallowest depth at which matrix was able to be sampled immediately below asphalt rubble. Sample collected @ 3.5 ft, area of mild petroleum odor	0	dirt and bentonite backfill
					5				5	
					10				10	
					15				15	
					20				20	
					25				25	

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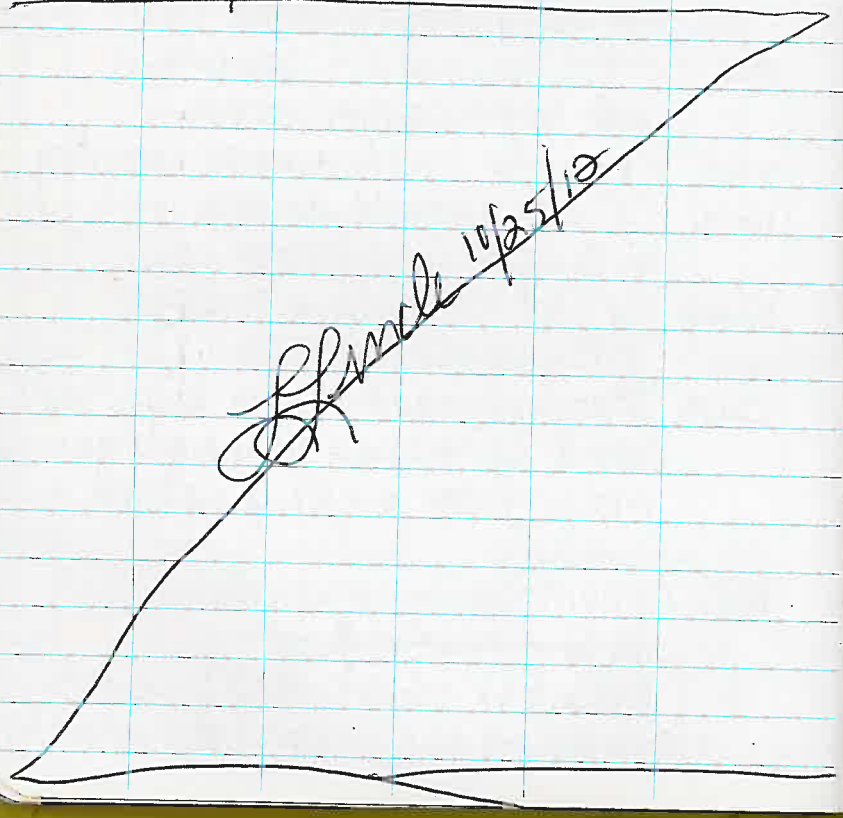
Location Olympia, WA Date 10/25/12

Project / Client West Bay

1330 Clean up & move equipment off beach, back to vehicle,
1345 Receive buckets from ~~divers~~
1400 Field filter surface water samples & finish making labels for ~~coolers, ice~~ samples, ice down cooler
1430 Depart site



Location Olympia, WA Date 1/15/13

Project / Client West Bay

Activities: Dig test pit
Weather: Foggy, cold ~35°F
Onsite: L. Rhodes, T. Langsith, Brent
Author: L. Lucke

0630 Depart for site
0700 Arrive @ site, Kip & Brent on site, Tom turning around
0715 Tom on site, unload pigmod unload backhoe
0745 Begin breaking asphalt/concrete with hydraulic breaker, Kip offsite
0830 Backfill arrives on site, take off breaker & put on bucket, begin peeling off asphalt, dump truck standby
0840 Collect bottom sample @ 5ft
0845 Collect duplicate of bottom sample @ 5ft
0900 Tape to Dave - locate bottom extent but have not defined any other limits horizontally
0905 Receive VM from Steve Teel, getting ready to depart for site, attempt

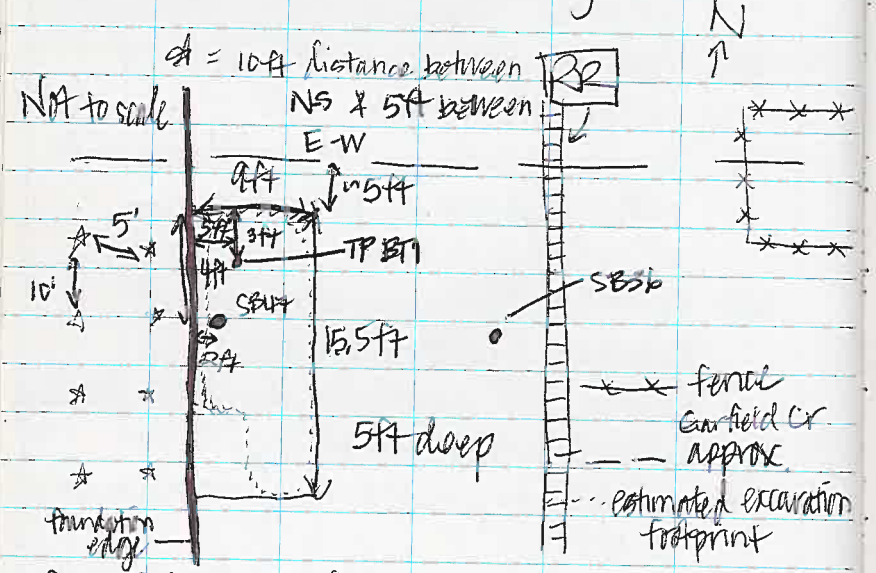
Location Olympia, WA Date 1/15/13

Project / Client West Bay

to call back but # disconnected, continue digging until truck is full

0915 Receive call from Kip, no more digging, but wants concrete broken in foundation

0920 Dump truck departs, mark locations for concrete breaking



0930 Steve Teel & Kip on site

0950 Kip off site

1000 Steve Teel off site, begin back-filling hole, plane about 2ft fill then asphalt pieces from surface

Location Olympia, WA Date 1/15/13

Project / Client West Bay

TP ES1 N 47°03'03.1"
W 122°54'44.7"

1035 Finish backfilling test-pit

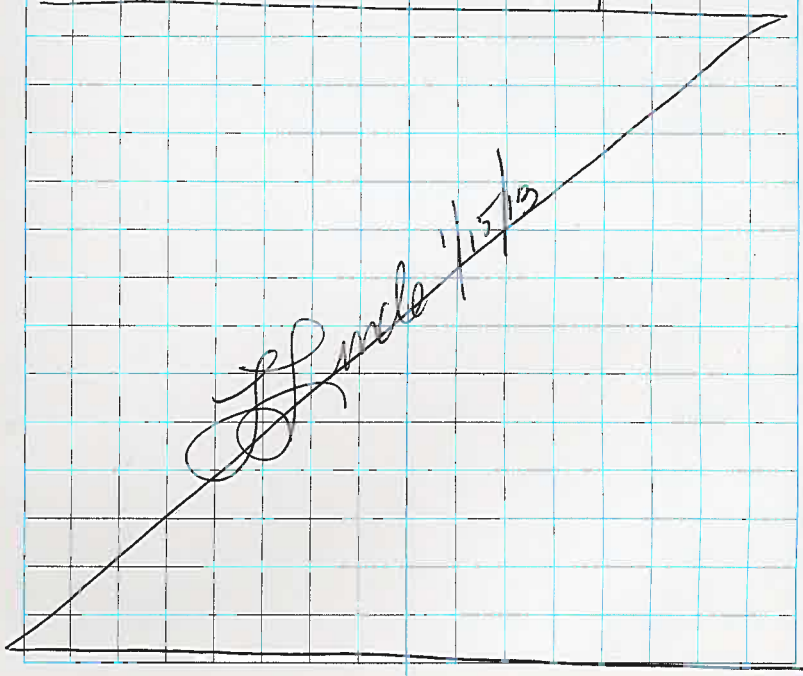
1040 Stake sample location & restake SB1ft location

1045 Pick up plywood

1107 Call Dave, will be leaving soon

1115 Finish picking up plywood, depart site for Bremerton

1200 Arrive in Bremerton, unpack



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Test Pit Log

PROJECT NUMBER: 033-1577-007
PROJECT NAME: West Bay RI/FS
LOCATION: Olympia, WA
EXCAVATION EQUIPMENT: Case 580 super L Backhoe w/ breaker

TEST PIT NUMBER: @ SB47
DATE COMPLETED: 1/15/13
TOTAL DEPTH OF TEST PIT: 5ft
WATER LEVEL: N/A
LOGGED BY: L. Linde

Depth (ft)	Soil Classification	Description	Remarks
	Fill gravel	Asphalt Fill gravel, gray, NP, sm-lg, angular @ surface, rounded w/ depth, moist, loose, strong petroleum odor 0.5ft - 5ft Scrap metal & sprayer bar @ 3ft	
5	SM	Cobbles (rounded) @ 3-5ft in sandy matrix, mild petroleum odor, some brick Bottom of hole @ 5ft @ clear soil type & color change SM, dk brn, SP, sm-med, moist, loose, woody odor but no petroleum odor, small roots, some silt Sample collected @ 5ft WB-SO-TPBT1-0050 @ 0840 also field duplicate WB-SO-TPBT1-0050 @ 0845 No water encountered	
10			
15			
20			

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 233 1577 638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-48
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 7'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		24/60			0	SP		CONCRETE SAND, SP, BROWN, NP, GRAVEL-SAND, MOIST, LOOSE, SUBROUNDED ROCK, ORGANIC ODOR	0	
								SAND, SP, GRAY, NP, GRAVEL-SAND, MOIST, ~~SUB~~ LOOSE, SUB ROUNDED ROCK		
		48/60			5	SM	▽	~~GRAY~~ SAND, SM, GRAY, NP ~~LOOSE~~ SMALL TO FINE, LOOSE, ORGANIC ODOR, (CRASHELL)	5	
								PETROLEUM ODOR AT 6'-7' SAMPLED AT 6' TO 7'		
					10				10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-49
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 6'
STATIC WATER LEVEL ▽
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		24/60			0	SP		ASPHALT SAND, SP, DARK BROWN, NP, GRAVEL TO SAND MOIST, LOOSE, SUBROUNDED ROCK, BROWN - SAME AS ABOVE GRAY - SAME AS ABOVE	0	
		50/60			5	SM	▽	DARK BROWN, SAND, SM, NP, SAND TO SILT, MEDIUM DENSE, GRAY, SAND, SM, NP, SAND TO SILT, MEDIUM DENSE. SAMPLED AT 6' ORGANIC ODOR	5	
					10				10	
					15				15	
					20				20	
					25				25	

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-50
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 6'
STATIC WATER LEVEL ▽
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/60			0	SP		ASPHALT SAND, SP, BROWN, NP, GRAVEL TO SAND, MOIST, LOOSE, SUBROUNDED ROCKS	0	
								SAND SP GRAY, NP, GRAVEL TO SAND, MOIST, LOOSE, SUBROUNDED ROCKS,		
		48/60			5	SM	▽	SAND, SM, DARK BROWN, NP, SAND TO SILT, MOIST, MEDIUM DENSE SAMPLED AT 6'	5	
					10			SAND, SM, GRAY, NP, SAND TO SILT, MOIST, MEDIUM DENSE ORGANIC MATTER (SEASHELL) ORGANIC ODOR	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-51
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 7'
STATIC WATER LEVEL ▽
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		36/60			0	SM		ASPHALT. SAND, SM, BROWN - GRAY, NP, GRAVEL TO SAND, MOIST, LOOSE, ORGANIC ODOR	0	
						PT		PEAT, PT, PARK BROWN, NP, ~~SILT TO SM~~ VERY FINE MOIST, ORGANIC ODOR, DENSE		
						SM		SAND, SM, GRAY, NP, SAND TO SILT, MOIST, MEDIUM DENSE, ORGANIC ODOR		
		36/60			5		1.4	SAMPLED AT 7'	5	
					10				10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-52
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 7'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (Inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/60			0	SP		CONCRETE SP, SAND, BROWN/GRAY, NP, GRAVEL-SAND, MOIST, LOOSE, ANGULAR ROCK, ~~ORGANIC~~ ORGANIC ODOR	0	
		48/60			5	SM SM	▽	SM, SAND, DARK BROWN, NP, SAND-SILT, MOIST, DENSE, AT PEAT SAND MIX, ORGANIC ODOR SM, SAND, GRAY, NP, SAND-SILT, MOIST, MEDIUM DENSE, SOME SEASHELL (LAYERS) ORGANIC ODOR.	5	
					10			SAMPLED at 7' COLLECTED A WATER SAMPLE	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-53
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 7'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		42/60				SP		ASPHALT / SP, SAND, BROWN, NP, GRAVEL-SAND, MOIST, LOOSE, SUBANGULAR ROCK, ORGANIC ODOR		
					5			SP, SAND, GRAY, NP, GRAVEL-SAND, MOIST, LOOSE, SUBANGULAR ROCK, ORGANIC ODOR	5	
						SM				
		48/60					▽	PSM, SAND, DARK BROWN, NP, SAND WITH PEAT, MOIST, MEDIUM DENSE, ORGANIC ODOR		
						Sm		SM, SAND, GRAY, NP, SAND-SILT, MOIST, MEDIUM DENSE, SEASHELL LAYERS		
					10			SAMPLED AT 7'	10	
								COLLECTED A WATER SAMPLE		
					15				15	
					20				20	
					25				25	

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BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-54
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 6.5'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/60			0	SP	S	ASPHALT SP, SAND, GRAY, NP, GRAVEL - SAND, MOIST, ORGANIC ODOR, LOOSE	0	
						SP		SP, SAND, BROWN, NP, GRAVEL-SAND, MOIST, ORGANIC ODOR, LOOSE.		
					5	SM		SM, SAND, DARK BROWN, NP, SAND-PEAT, MOIST, SAND-SILT, MEDIUM DENSE	5	
		48/60					▽	SM, SAND, GRAY, NP, SAND, WITH SEA SHELL LAYERS, MEDIUM DENSE, ORGANIC ODOR		
					10			SAMPLED AT 6.5'	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-55
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 7'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/60			0	SP		CONCRETE SP, SAND, GRAY, NP, GRAVEL-SAND, MOIST, LOOSE, ORGANIC, ODOR, SUBANGULAR ROCK, SOME BROWN SAND	0	
					5	Sm		Sm, SAND, GRAY, NP, SAND-SILT, MOIST, MEDIUM DENSE, ORGANIC ODOR, SEASHELL LAYERS	5	
		48/60			10		▽	SAMPLED AT 7'	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-56
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 1'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		36/60			0	SP		CONCRETE SP, SAND, BROWN, NP, GRAVEL - SAND, WET, LOOSE, SUBROUNDED ROCKS, ORGANIC ODOR	0	
					5	SM		SM, SAND GRAY, NP, SAND-SILT, MOIST, MEDIUM DENSE ~~VERY WET AT 7'~~ ORGANIC ODOR	5	
		48/60			10	SM		SM, SAND, DARK BROWN, NP SAND-PEAT MOIST MEDIUM DENSE, ORGANIC ODOR SM, SAND, GRAY, NP, SAND-SILT, MOIST, MEDIUM DENSE VERY WET AT 7'-8' ORGANIC ODOR SAMPLED AT 1'	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-57
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 8'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		36/60			0	SP		CONCRETE SP, SAND, BROWN-GRAY, NP, GRAVEL-SAND, MOIST, LOOSE, ORGANIC ODOR	0	
						SP		SP, SAND GRAY, NP, GRAVEL-SAND, MOIST, LOOSE, & ORGANIC ODOR, SUBANGULAR ROCK.		
					5				5	
		42/60				SM	▽	SM, SAND ~~GRAY~~ DARK BROWN, NP, SAND-SILT, MEDIUM DENSE, ORGANIC ODOR, AT A LITTLE PEAT		
						SM		SM, SAND, GRAY, NP, SAND-SILT, MEDIUM DENSE, ORGANIC ODOR		
					10			SAMPLED AT 8'	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-~~5~~8
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 7'
STATIC WATER LEVEL ▽
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		24/60			0	SP		ASPHALT/CONCRETE SP, SAND, BROWN, NP, GRAVEL - SAND, MOIST LOOSE.	0	
						~~SP~~ SM		~~SP~~, SAND, DARK BROWN, SAND-SILT A LITTLE PEAT SM, MOIST, MEDIUM DENSE		
					5	SM		SM, SAND, GRAY, SAND - SILT MOIST MEDIUM DENSE.	5	
		45/60				SM	▽	SM, SAND, DARK BROWN, NP, SAND-SILT, MOIST MEDIUM DENSE		
					10			ORGANIC ODOR SAMPLED AT 7'	10	
					15				15	
					20				20	
					25				25	

Continued Next Page

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-59
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 59@ 6'
STATIC WATER LEVEL ▼
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/60				SP		ASPHALT SP, SAND, BROWN, NP, SAND-GRAVEL, MOIST, LOOSE		
						SP		SP, SAND, GRAY, NP, SAND-GRAVEL, MOIST, LOOSE, SUBROUNDED/SUBANGULAR ROCKS.		
					5	SM	▽	SM, SAND, GRAY, NP, SAND-SILT, MOIST, ~~LOOSE~~ MEDIUM DENSE.	5	
		48/60				SM		SM, SAND, DARK BROWN, NP, SAND-SILT, MOIST, MEDIUM DENSE.		
						SM		SM, SAND, GRAY, NP, SAND-SILT, MOIST, MEDIUM DENSE.		
					10			SAMPLED AT 6'	10	
					15				15	
					20				20	
					25				25	

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Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 2331577638
PROJECT NAME SOLID WOOD INC SITE
LOCATION WEST BAY PARK
COORDINATES
DRILLING METHOD PUSH PROBE
SAMPLING METHOD PUSH PROBE
GROUND ELEVATION

BORING/WELL NUMBER # SB-60
DATE COMPLETED 11-6-13
TOTAL DEPTH OF BORING 10'
INITIAL WATER LEVEL ▽ 7'
STATIC WATER LEVEL ▽
LOGGED BY WALTER HARVEY
TOP OF CASING ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION SOIL: Group Name, Group Symbol, Color, Plasticity, Grain Size, Moisture Content, Density/Compaction, Miscellaneous	DEPTH (ft.)	WELL DIAGRAM
		48/60				SP		ASPHALT SP, SAND, GRAY, NP, GRAVEL - SAND, MOIST, LOOSE, SUBROUNDED ROCK		
						Sm		Sm, SAND, GRAY-BROWN, NP, SAND-SILT, MOIST, MEDIUM DENSE, A FEW SUBANGULAR ROCKS		
					5	Sm		Sm, SAND, GRAY, NP, SAND-SILT, MOIST, MEDIUM DENSE	5	
		48/60					▽			
					10			SAMPLED AT 7'	10	
					15				15	
					20				20	
					25				25	

Continued Next Page

Parametrix, Inc.

Well #: MW-08
Sample #:

Groundwater Sampling Field Data Sheet

WB-GW-MW08-D100

Project Number	233-1577-037	Date	7/3/12
Project Name	West Bay Park	Location	Burner PT - N
Project Address	900 West Bay Drive, Olympia	Sampled By	L. Linde
Client Name	OPARD	Purged By	"

Casing Diameter: 2" ____ 4" ____ 6" ____ Other X 3/4"

Depth to Water (feet)	2.65	Purge Vol. Meas.Method	Meas cup/watch
Depth of Well (feet)	13.05	Date Purged	7/3/12
Reference Point (surveyors notch/etc)	TOC	Purge Time (from/to)	1207 - 1228
Date/Time Sampled	7/3/12 1230	Flow Rate (ml/min)	300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) _____ Actual Purge Volume (gallons) _____

TIME (2400 hr)	WATER LEVEL* (ft)	pH (units) ± 0.1	COND (mS/m) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10% if > 10 NTU	ORP (mV) ± 10 mV	CUM. VOL. (gal)
1207	—	7.18	5.29	0.04	14.36	477	-376	
1210	—	7.11	6.12	0.00	14.49	226	-367	
1213	—	7.07	6.57	0.00	14.54	182	-363	
1216	—	7.04	6.78	0.00	14.64	159	-360	
1219	—	7.02	6.90	0.00	14.59	148	-361	
1222	—	7.01	7.03	0.00	14.59	137	-361	
1225	—	7.00	7.10	0.00	14.67	128	-360	
1228	—	7.00	7.15	0.00	14.65	120	-360	3gal

Sal(‰)
3.5
>45
>45
>45
>45
>45
>45
>45

Purge Equipment	Peristaltic	Sampling Equipment	Same
Laboratory	Onsite Environmental	Date Sent to Lab	7/3/12
Chain-of-Custody (yes/no)	Yes	Field QC Sample Number	N/A
Shipment Method	Courier	Split with (name(s)/organization)	N/A

Well Integrity: Good
Remarks: Water in monument, lock corroded, replaced j-plug
Signature: L. Linde
Page 1 of 1

* water level indicator would detect initial water level but would not stop buzzing, suspect sensitivity needs adjustment

Parametrix, Inc.

Well #: MW01
Sample #: NB GW-MW01-0100

Groundwater Sampling Field Data Sheet

Project Number	233-1577-037	Date	7/3/12
Project Name	West Bay Park	Location	Burner Pt - Mid
Project Address	900 West Bay Drive, Olympia	Sampled By	C. Linde
Client Name	OPARD	Purged By	"

Casing Diameter: 2" ____ 4" ____ 6" ____ Other X 3/4"

Depth to Water (feet)	3.50	Purge Vol. Meas.Method	Meas cup/watch
Depth of Well (feet)	13.58	Date Purged	7/3/12
Reference Point (surveyors notch/etc)	TOC	Purge Time (from/to)	1116-1128
Date/Time Sampled	7/3/12 1130	Flow Rate (ml/min)	300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) _____ Actual Purge Volume (gallons) _____

TIME (2400 hr)	WATER LEVEL* (ft)	pH (units) ± 0.1	COND (mS/m) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10% if > 10 NTU	ORP (mV) ± 10 mV	CUM. VOL. (gal)
1116	—	7.06	6.32	0.00	13.82	60.2	-346	
1119	—	7.06	6.26	0.00	13.77	44.8	-364	
1122	—	7.07	6.27	0.00	13.82	23.2	-372	
1125	—	7.05	6.29	0.00	13.74	21.7	-374	
1128	—	7.06	6.28	0.00	13.66	19.6	-377	2gal

Sat (%)
>4.00%
>4.00%
>4.00%
>4.00%
>4.00%

Purge Equipment: Peristaltic — Sampling Equipment: same

Laboratory	Onsite Environmental	Date Sent to Lab	7/3/12
Chain-of-Custody (yes/no)	Yes	Field QC Sample Number	N/A
Shipment Method	Courier	Split with (name(s)/organization)	N/A

Well Integrity: Good
Remarks: water in monument, lock corroded, replaced
Signature: C. Linde — Page ____ of ____ — plug

* water level indicator would detect initial water level but would not stop beeping, suspect sensitivity needs adjustment

Parametrix, Inc.

Well #: MW-10
Sample #:

Groundwater Sampling Field Data Sheet

WB-GW-MW10-0090

Project Number	233-1577-037	Date	9/3/12
Project Name	West Bay Park	Location	Burner PT-S.
Project Address	900 West Bay Drive, Olympia	Sampled By	L. Linde
Client Name	OPARD	Purged By	L. Linde

Casing Diameter: 2" ____ 4" ____ 6" ____ Other X 3/4"

Depth to Water (feet)	1.65	Purge Vol. Meas.Method	Meas. cup/watch
Depth of Well (feet)	9.20	Date Purged	9/3/12
Reference Point (surveyors notch/etc)	TOC	Purge Time (from/to)	1005-1023
Date/Time Sampled	9/3/12 1025	Flow Rate (ml/min)	300ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) _____ Actual Purge Volume (gallons) _____

TIME (2400 hr)	WATER LEVEL* (ft)	pH (units) ± 0.1	COND (mS/m) ±3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10% if > 10 NTU	ORP (mV) ± 10 mV	CUM. VOL. (gal)	Sal (ppt)
1005	—	6.58	6.72	0.03	14.79	216	-215		4.20
1008	—	6.56	6.97	0.00	14.68	179	-228		>4.20
1011	—	6.56	7.12	0.00	14.71	81.0	-233		>4.20
1014	—	6.58	7.17	0.00	14.75	32.2	-237		>4.20
1017	—	6.58	7.19	0.00	14.70	29.5	-245		>4.20
1020	—	6.59	7.24	0.00	14.70	27.6	-252		>4.20
1023	—	6.59	7.25	0.00	14.69	24.0	-255	3 gal	>4.20

Purge Equipment	Peristaltic	Sampling Equipment	same
Laboratory	Onsite Environmental	Date Sent to Lab	9/3/12
Chain-of-Custody (yes/no)	Yes	Field QC Sample Number	WB-GW-MW10-1090
Shipment Method	Courier	Split with (name(s)/organization)	N/A

Well Integrity: Good
Remarks: Lock corrected, water in monument replaced plug
Signature: L. Linde
Page ____ of ____

Field duplicate WB-GW-MW10-1090, @ 1030

* water level indicator would detect initial water level but would not stop beeping, suspect sensitivity needs adjustment

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Sampling Field Data Sheet

Station #: SW1

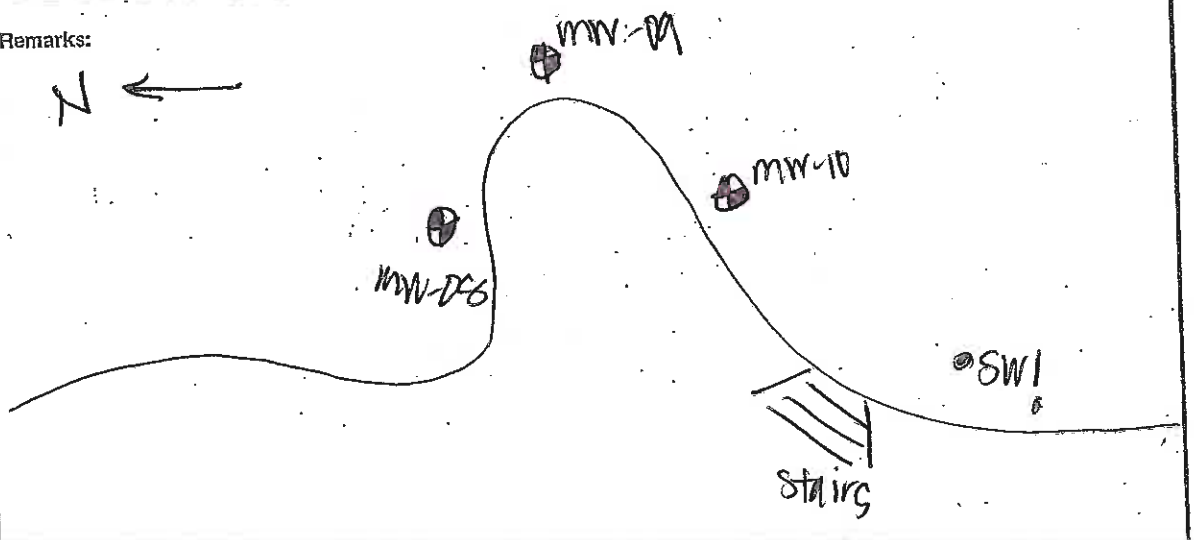
Project Number:	233-1577-037	Date:	7/3/12
Project Name:	West Bay Park	Client Name	OPARD
Project Address:	West Bay Dr Olympia, WA	Sampled By:	L. Linde

TIME (2400 hr)	pH (units) (± 0.1)	Ec (~~µmhos/cm 25°C~~ S/m) (± 3%)	TEMPERATURE °C	DO (mg/L)	COLOR (~~visual~~) ORP (mV)	TURBIDITY (~~visual~~) * (NTU)	Sal (%)
0925	6.84	6.88	15.16	6.70	47	7000	7.48

Sampling Equipment:

Laboratory:	Onsite	Date Sent to Lab:	7/3/12
Chain-of-Custody (yes/no):	Yes	Field QC Sample Number:	N/A
Shipment Method:	Courier	Split With (names[s]/organization):	N/A

Remarks:



Signature: L Linde

* outgoing tide caused significant turbidity.

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Sampling Field Data Sheet

Station #: SW2

Project Number:	233-1577-037	Date:	7/3/12
Project Name:	West Bay Park	Client Name	OPARD
Project Address:	West Bay Dr Olympia, WA	Sampled By:	L. Linde

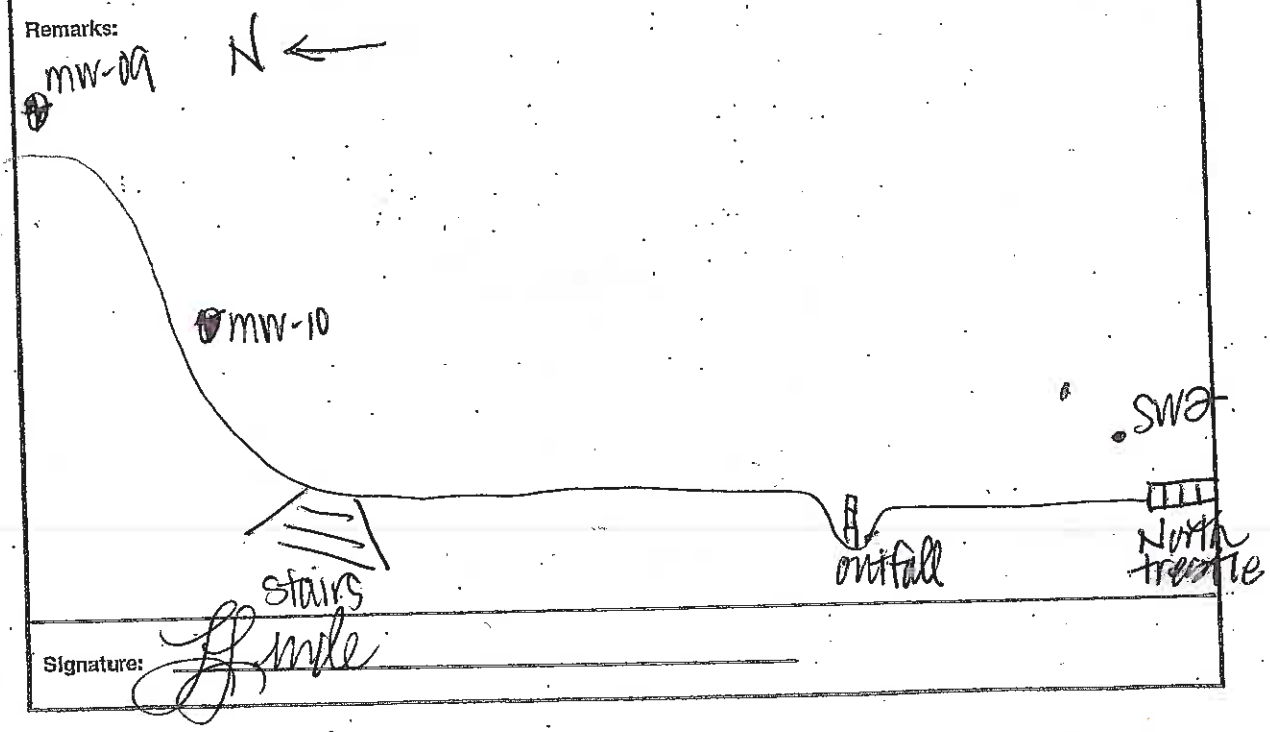
TIME (2400 hr)	pH (units) (± 0.1)	Ec (~~µmhos/cm~~ mS/m 25°C) (± 3%)	TEMPERATURE °C	DO (mg/L)	~~COLOR~~ ORP (visual) (mV)	TURBIDITY (~~visual~~) (NTU)
0905	6.63	6.91	14.18	7.64	-2	203

Sal (%) >4.0‰

Sampling Equipment:

Laboratory:	Onsite	Date Sent to Lab:	7/3/12
Chain-of-Custody (yes/no):	Yes	Field QC Sample Number:	N/A
Shipment Method:	Courier	Split With (names[s]/organization):	N/A

Remarks:



Signature: L. Linde

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Sampling Field Data Sheet

Station #: SW3

Project Number:	233-1577-037	Date:	7/3/12
Project Name:	West Bay Park	Client Name	OPARD
Project Address:	West Bay Dr Olympia, WA	Sampled By:	L. Linde

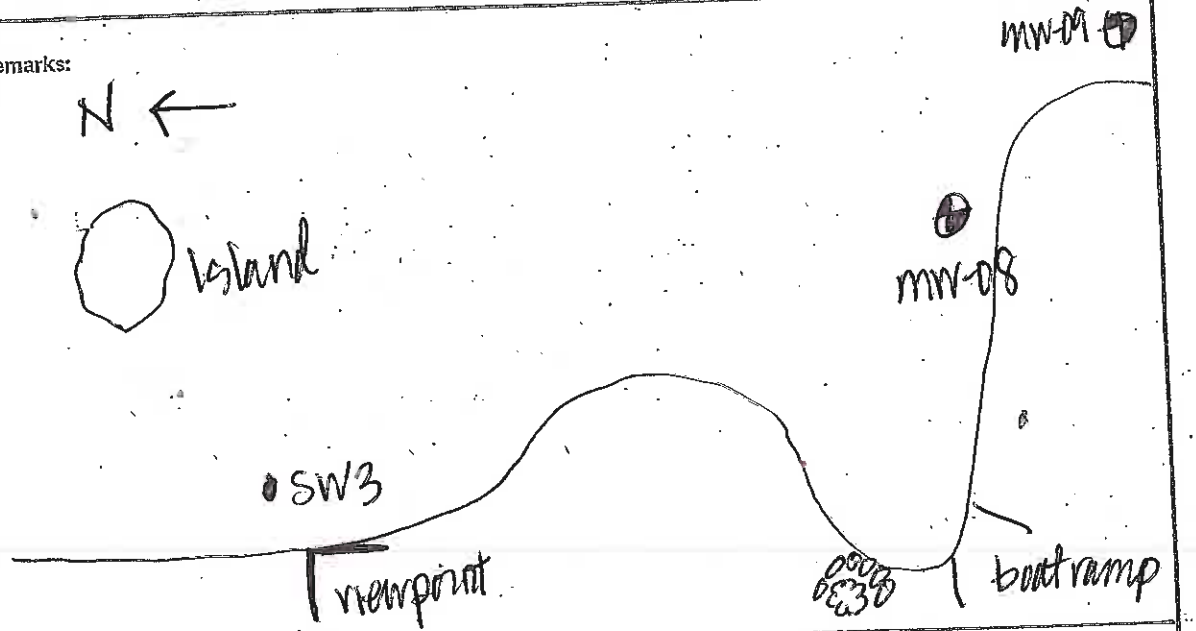
TIME (2400 hr)	pH (units) (± 0.1)	Ec ~~(µmhos/cm 25°C)~~ mS (± 3%)	TEMPERATURE °C	DO (mg/L)	ORP ~~COLOR (visual)~~ (mV)	TURBIDITY (NTU) (visual)
0850	6.06	9.58	14.26	5.92	-17	203

Sal (‰) 4.0

Sampling Equipment:

Laboratory:	Onsite	Date Sent to Lab:	7/3/12
Chain-of-Custody (yes/no):	Yes	Field QC Sample Number:	N/A
Shipment Method:	Courier	Split With (names[s]/organization):	N/A

Remarks:



Signature: L. Linde

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Sampling Field Data Sheet

Station #: Seep 4

Project Number:	233-1577-037	Date:	7/3/12
Project Name:	West Bay Park	Client Name	OPARD
Project Address:	West Bay Dr Olympia, WA	Sampled By:	L. Linde

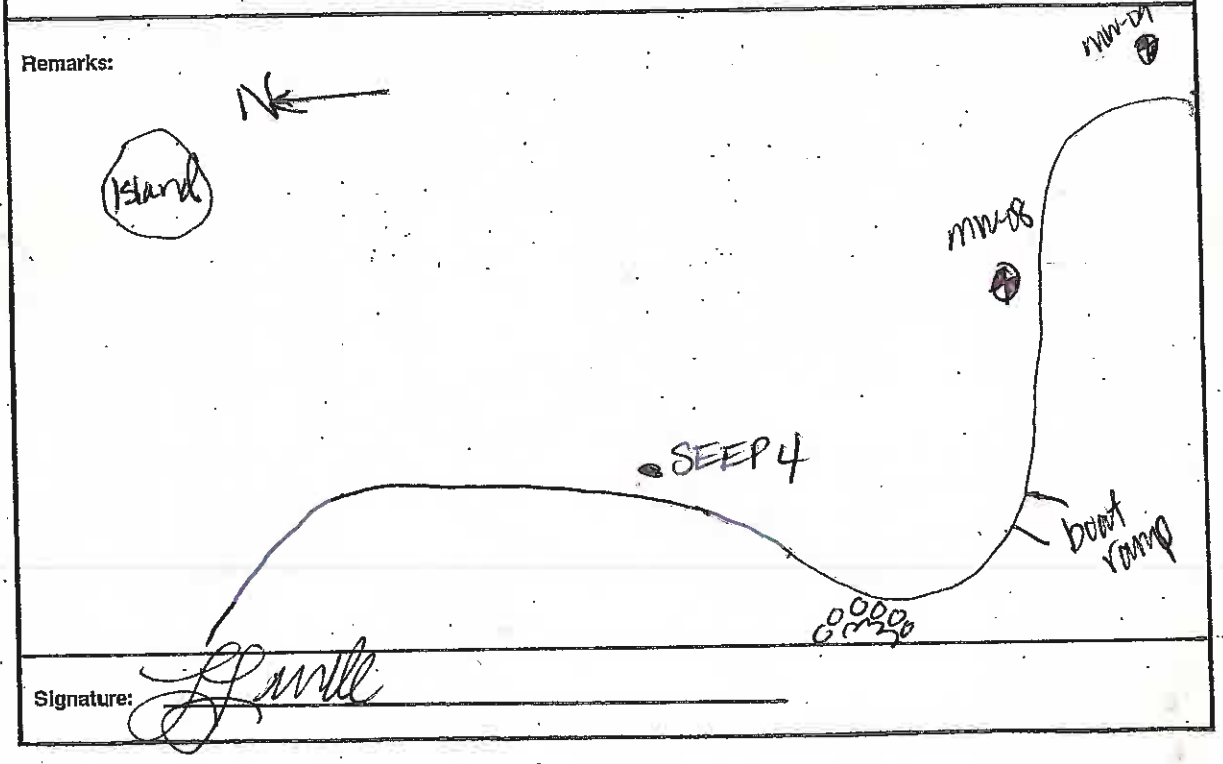
TIME (2400 hr)	pH (units) (± 0.1)	~~Ec (umhos/cm 25°C)~~ S/m (± 3%)	TEMPERATURE °C	DO (mg/L)	~~COLOR~~ ORP (visual)(mV)	TURBIDITY (visual)(NTU) *
1330	7.59	3.31	13.60	0.95	-138	>1000

Sal (ppt) 2.1

Sampling Equipment:

Laboratory:	Onsite	Date Sent to Lab:	7/3/12
Chain-of-Custody (yes/no):	Yes	Field QC Sample Number:	N/A
Shipment Method:	Courier	Split With (names[s]/organization):	N/A

Remarks:



Signature: L. Linde

* bivalves in excavated depression causing turbidity

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Sampling Field Data Sheet

Station #: ~~SP~~ 05

Project Number:	233-1577-037	Date:	7/3/12
Project Name:	West Bay Park	Client Name	OPARD
Project Address:	West Bay Dr Olympia, WA	Sampled By:	L. Linde

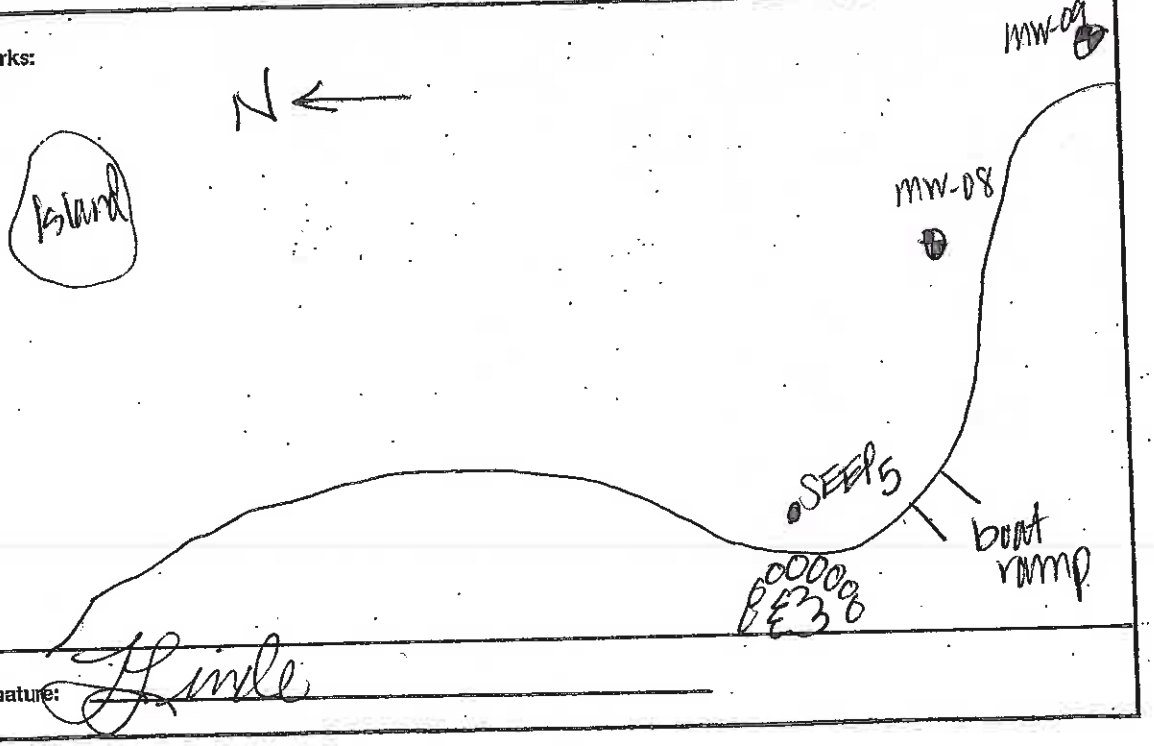
TIME (2400 hr)	pH (units) (± 0.1)	~~Ec (umhos/cm 25°C)~~ Cond S/m (± 3%)	TEMPERATURE °C	DO (mg/L)	~~COLOR~~ (visual) ORP (mV)	~~TURBIDITY~~ (visual) (NTU)
1315	7.09	6.98	16.09	4.92	-52	28.7

Sal (‰) >4.00

Sampling Equipment:

Laboratory:	Onsite	Date Sent to Lab:	7/3/12
Chain-of-Custody (yes/no):	Yes	Field QC Sample Number:	N/A
Shipment Method:	Courier	Split With (names[s]/organization):	N/A

Remarks:



Signature: L. Linde

Location Olympia, WA Date 7/3/12

Project / Client West Bay

Proj# change 233-1577-037

Activities: Collect sw, gw, & seeps
Weather: Partly cloudy, ~55°F
Onsite: L. Linde,
Author: L. Linde

0700 Depart for Olympia
0730 Stop @ Thriftway for supplies & ice.
0740 At site, gate locked & our key doesn't work. Call K?p - get vm. Call Parks dept - get vm that says call back @ 0800. Wait for 0800 or someone to open gate. Calibrate Horiba while waiting

pH	4.00
cond	0.450 S/m
turb	0 NTU
temp	15.64
DO	9.84 mg/L
ORP	278 mV

Location Olympia, WA Date 7/3/12

Project / Client West Bay

0800 Parks office still not open, continue to wait, leave vm @ Kid's desk phone to call back with contact to open gate

0810 Call Parks office again, ask front desk to send someone to open gate @ park, they will send someone right away, continue to wait

0820 Don with Parks Dept arrives to open gate, says we have the wrong gate key, he can get us one, come by Priest Pt. Park office when finished

0830 Unload gear & get supplies for surface water before tide goes out too far

0850 Collect surface water @ SW3
WB-SW-SW3-0000

0905 Collect surface water @ SW2
WB-SW-SW2-0000

0925 Collect surface water @ SW1
WB-SW-SW1-0000

See pg 78 for locations

Location Olympia, WA Date 7/3/12

Project / Client West Bay

0930 Set up for sampling wells, start @ MW-10

1005 Begin purging MW-10

1025 Collect sample @ MW-10
WB-GW-MW10-0090

1030 Collect field duplicate @ MW-10
WB-GW-MW10-1090

1045 Clean up, replace j-plug, set up @ MW-09

1116 Begin purging MW-09

1130 Collect sample @ MW-09
WB-GW-MW09-0100

1145 Clean up, replace j-plug, set up @ MW-08

1207 Begin purging MW-08

1230 Collect sample @ MW-08
WB-GW-MW08-0100

1245 Clean up, replace j-plug set up @ SEEP 5, excavate depression for SEEP 4 & 5

1315 Collect sample @ SEEP 5

1320 Receive call from KP, will bring truck to carry

Location Olympia, WA Date 7/3/12

Project / Client Webb Bay

purge water to staging location

1330 Collect sample & ~~STEP~~ 4, receive call from courier who was arrived on site, tell him running late & will be about 30 min until ready

1345 All gear back on upland, field filter surface waters for metals

1400 Courier departs, will return in awhile, Kip arrives, takes 2 buckets of purge water to staging location, finish processing samples & complete COC, load car

1435 Courier back, sign 1 cooler for delivery to Onsite in Redmond, Kip returns buckets

1440 Call office, let courier know to call Onsite if later than 1800 to deliver samples

1445 Depart site

Guide

Location Date

Project / Client

Parametrix, Inc.

Well #: MW-08
Sample #: WB-GW-MW08- 0090

Groundwater Sampling Field Data Sheet

Project Number	233-1577-037 (03/02)	Date	10/25/12
Project Name	West Bay Final RIFS	Location	Burner Point - north
Project Address	900 West Bay Drive	Sampled By	L. Linde
Client Name	OPARD	Purged By	L. Linde

Casing Diameter: 2" ____ 4" ____ 6" ____ Other x ____

Depth to Water (feet)	2.62	Purge Vol. Meas.Method	Meas cup/watch
Depth of Well (feet)	12.83	Date Purged	10/25/12
Reference Point (surveyors notch/etc)	TOC	Purge Time (from/to)	1008 - 1026
Date/Time Sampled	10/25/12 1030	Flow Rate (ml/min)	300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) _____ Actual Purge Volume (gallons) _____

TIME (2400 hr)	WATER LEVEL (ft) ± 0.3	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10% if > 10 NTU	ORP (mV) ± 10 mV	CUM. VOL. (gal)	Sal (%)
1008	2.87	8.69	25.7	2.90	13.12	194	-324		1.6
1012	2.80	8.75	30.4	0.00	13.27	18.1	-327		2.0
1015	2.83	8.74	33.3	0.00	13.23	10.5	-326		2.1
1019	2.85	8.74	34.5	0.00	13.24	7.9	-326		2.2
1022	2.86	8.74	35.4	0.00	13.24	5.1	-325		2.2
1026	2.86	8.75	35.9	0.00	13.25	4.1	-325	2 gal	2.3

Purge Equipment	Geopump Peristaltic	Sampling Equipment	same
Laboratory	Onsite Environmental	Date Sent to Lab	10/26/12
Chain-of-Custody (yes/no)	Yes	Field QC Sample Number	N/A
Shipment Method	Courier	Split with (name(s)/organization)	N/A

Well Integrity Good
Remarks Water in monument, missing 1 bolt
Signature Linde

Parametrix, Inc.

Well #: MW-09
Sample #: WB-GW-MW09- 0090

Groundwater Sampling Field Data Sheet

Project Number	233-1577-037 (03/02)	Date	10/25/12
Project Name	West Bay Final RIFS	Location	Burner Point - east
Project Address	900 West Bay Drive	Sampled By	L. Linde
Client Name	OPARD	Purged By	L. Linde

Casing Diameter: 2" ____ 4" ____ 6" ____ Other x ____

Depth to Water (feet)	3.45	Purge Vol. Meas.Method	Meas cup/watch
Depth of Well (feet)	13.30	Date Purged	10/25/12
Reference Point (surveyors notch/etc)	TOC	Purge Time (from/to)	0859 - 0919
Date/Time Sampled	10/25/12 0925	Flow Rate (ml/min)	350 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) _____ Actual Purge Volume (gallons) _____

TIME (2400 hr)	WATER LEVEL (ft) ± 0.3	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10% if > 10 NTU	ORP (mV) ± 10 mV	CUM. VOL. (gal)	Sml (%)
0859	3.52	8.44	30.3	0.66	14.07	3.7	-318		1.9
0902	3.40	8.51	30.2	0.00	14.36	1.8	-325		1.9
0907	3.44	8.60	30.5	0.00	14.45	2.1	-334		1.9
0910	4.00	8.65	30.6	0.00	14.47	2.2	-336		1.9
0914	3.92	8.71	30.6	0.00	14.40	0.7	-336		1.9
0919	4.00	8.74	30.6	0.00	14.41	0.3	-337	2.5 gal	1.9

Purge Equipment	Geopump Peristaltic	Sampling Equipment	same
Laboratory	Onsite Environmental	Date Sent to Lab	10/26/12
Chain-of-Custody (yes/no)	Yes	Field QC Sample Number	~~N/A~~ see below
Shipment Method	Courier	Split with (name(s)/organization)	N/A

Well Integrity Good
Remarks Water in monument, missing 1 bolt
Signature L. Linde
Page 1 of 1

Duplicate collected WB-GW-MW09-1090 @ 0935

Parametrix, Inc.

Well #: MW-10
Sample #: WB-GW-MW10- 0000

Groundwater Sampling Field Data Sheet

Project Number	233-1577-037 (03/02)	Date	10/25/12
Project Name	West Bay Final RIFS	Location	Burner Point - south
Project Address	900 West Bay Drive	Sampled By	L. Linde
Client Name	OPARD	Purged By	L. Linde

Casing Diameter: 2" ____ 4" ____ 6" ____ Other x

Depth to Water (feet)	2.25	Purge Vol. Meas.Method	Meas cup/watch
Depth of Well (feet)	9.02	Date Purged	10/25/12
Reference Point (surveyors notch/etc)	TOC	Purge Time (from/to)	0807-0823
Date/Time Sampled	10/25/12 0830	Flow Rate (ml/min)	300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) _____ Actual Purge Volume (gallons) _____

TIME (2400 hr)	WATER LEVEL (ft) ± 0.3	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10% if > 10 NTU	ORP (mV) ± 10 mV	CUM. VOL. (gal)	Sal (%)
0807	2.20	7.36	39.7	1.15	13.46	130.0	-242		2.5
0810	2.60	7.54	42.9	0.09	14.01	149.0	-251		2.8
0813	2.61	7.66	44.5	0.00	13.95	36.1	-243		2.9
0817	2.65	7.74	45.1	0.00	13.84	11.6	-242		2.9
0820	2.60	7.77	45.2	0.00	14.06	5.8	-241		2.9
0823	2.63	7.83	45.5	0.00	14.02	6.2	-244	2.5 gal	2.9

Purge Equipment	Geopump Peristaltic	Sampling Equipment	same
Laboratory	Onsite Environmental	Date Sent to Lab	10/26/12
Chain-of-Custody (yes/no)	Yes	Field QC Sample Number	N/A
Shipment Method	Courier	Split with (name(s)/organization)	N/A

Well Integrity Good
Remarks Water in monument
Signature Linde

Page 1 of 1

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Surface Water Sampling Field Data Sheet

Station #: SW1

Sample #: WB-SW-SW1-0000

Project Number:	233-1577-024 (03/02)	**Date:**	10/25/12
Project Name:	West Bay Park Final RIFS	**Location:**	South of Burner Point
Project Address:	900 West Bay Dr	**Sampled By:**	L. Linde
Client Name:	OPARD		

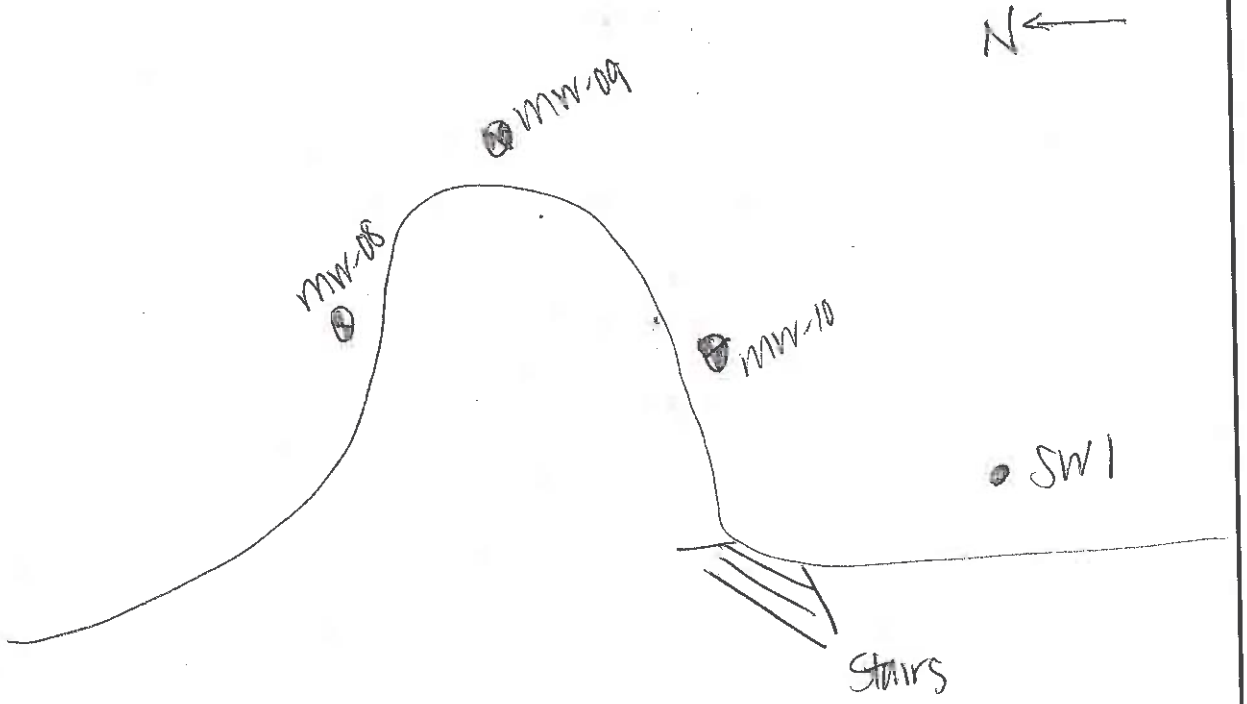
TIME (2400 hr)	pH (units) ±0.1	COND (mS/m) ±3%	DO (mg/L) ±10%	TEMP (°C)	TURB ±10% if > 10 NTU	ORP (mV) ±10 mV	Salinity (%)
1300	8.00	28.7	9.88	11.41	5.9	-1	1.7

Sampling Equipment: Grab

Laboratory:	Onsite Environmental	**Date Sent to Lab:**	10/26/12
Chain-of-Custody (yes/no):	Yes	**Field QC Sample Number:**	N/A
Shipment Method:	Courier	**Split With (names[s]/organization):**	N/A

Remarks:

WB-SW-SW1-0000 @ 1300



Signature: L Linde

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Surface Water Sampling Field Data Sheet

Station #: SW2

Sample #: WB-SW-SW2-0000

Project Number:	233-1577-024 (03/02)	**Date:**	10/25/12
Project Name:	West Bay Park Final RIFS	**Location:**	North side of North RR Trestle
Project Address:	900 West Bay Dr	**Sampled By:**	L. Linde
Client Name:	OPARD		

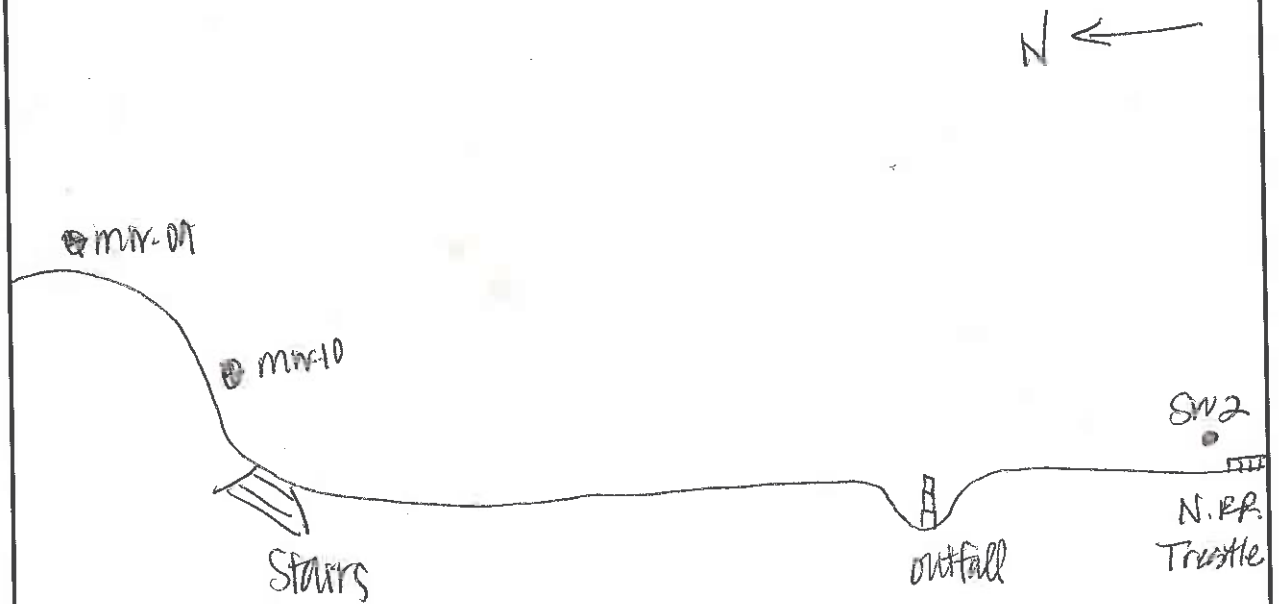
TIME (2400 hr)	pH (units) ±0.1	COND (mS/m) ±3%	DO (mg/L) ±10%	TEMP (°C)	TURB ±10% if > 10 NTU	ORP (mV) ±10 mV	Salinity (%)
____	7.63	47.4	7.73	12.03	5.2	11	3.1

Sampling Equipment: Grab

Laboratory:	Onsite Environmental	**Date Sent to Lab:**	10/26/12
Chain-of-Custody (yes/no):	Yes	**Field QC Sample Number:**	N/A
Shipment Method:	Courier	**Split With (names[s]/organization):**	N/A

Remarks:

WB-SW-SW2-0000 @ 1240



Signature: L Linde

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Surface Water Sampling Field Data Sheet

Station #: SW3

Sample #: WB-SW-SW3-0000

Project Number:	233-1577-024 (03/02)	**Date:**	10/25/12
Project Name:	West Bay Park Final RIFS	**Location:**	Northern Project Boundary
Project Address:	900 West Bay Dr	**Sampled By:**	L. Linde
Client Name:	OPARD		

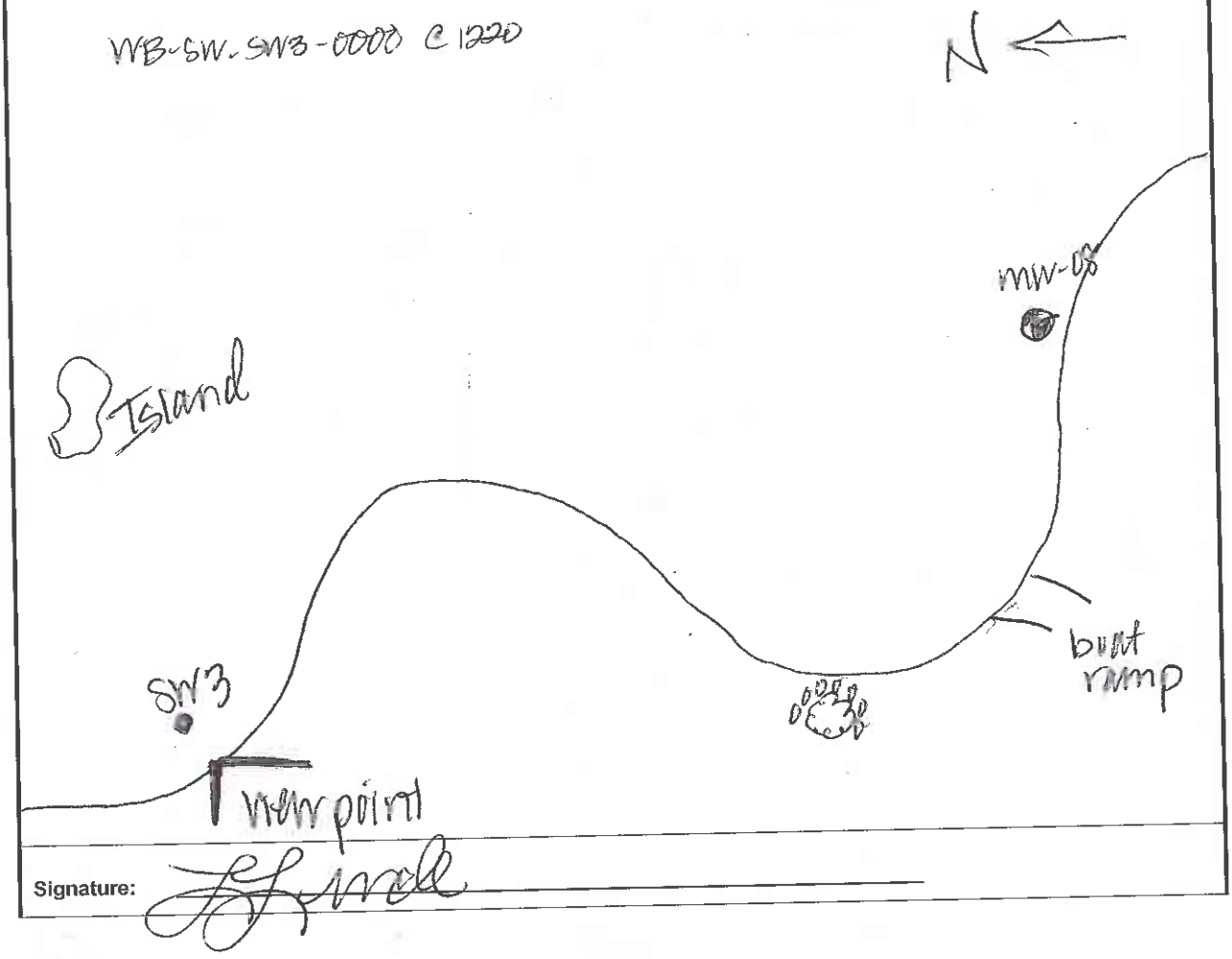
TIME (2400 hr)	pH (units) ±0.1	COND (mS/m) ±3%	DO (mg/L) ±10%	TEMP (°C)	TURB ±10% if > 10 NTU	ORP (mV) ±10 mV	Salinity (%)
____	7.89	46.4	7.85	11.54	13.4	-17	3.1

Sampling Equipment: Grab

Laboratory:	Onsite Environmental	**Date Sent to Lab:**	10/26/12
Chain-of-Custody (yes/no):	Yes	**Field QC Sample Number:**	N/A
Shipment Method:	Courier	**Split With (names[s]/organization):**	N/A

Remarks:

WB-SW-SW3-0000 @ 1220



Signature: L Linde

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Seep Sampling Field Data Sheet

Station #: SEEP 4

Sample #: WB-SEEP-SEEP4-000

Project Number:	233-1577-024 (03/02)	**Date:**	10/25/12
Project Name:	West Bay Park Final RIFS	**Location:**	Northeast of SEEP 5
Project Address:	900 West Bay Dr	**Sampled By:**	L. Linde
Client Name:	OPARD		

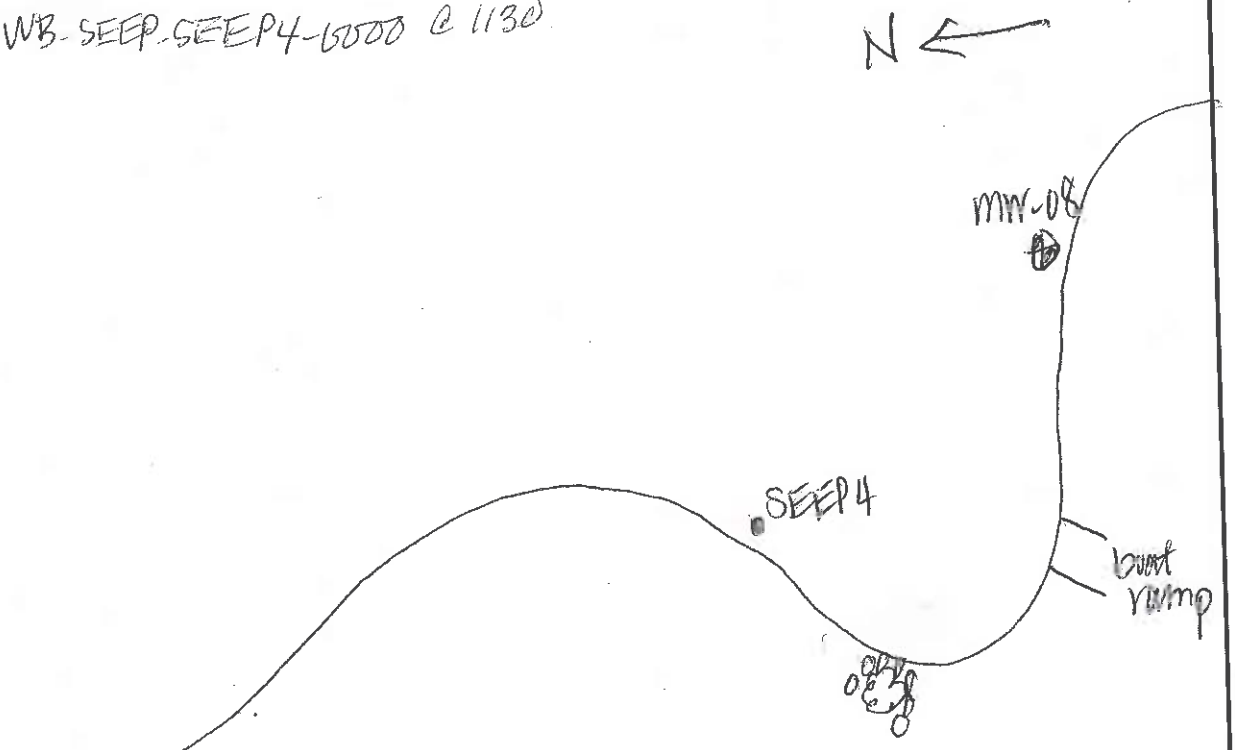
TIME (2400 hr)	pH (units) ±0.1	COND (mS/m) ±3%	DO (mg/L) ±10%	TEMP (°C)	TURB ±10% if > 10 NTU	ORP (mV) ±10 mV	Salinity (%)
1124	8.01	51.5	0.98	13.12	440	-109	0.3

Sampling Equipment: Grab

Laboratory:	Onsite Environmental	**Date Sent to Lab:**	10/26/12
Chain-of-Custody (yes/no):	Yes	**Field QC Sample Number:**	N/A
Shipment Method:	Courier	**Split With (names[s]/organization):**	N/A

Remarks:

WB-SEEP-SEEP4-0000 @ 1130



Signature: Lara Linde

PARAMETRIX

Form 02-EN-100/Rev. 10/02

Seep Sampling Field Data Sheet

Station #: SEEP5

Sample #: WB-SEEP-SEEP5-0000

Project Number:	233-1577-024 (03/02)	**Date:**	10/25/12
Project Name:	West Bay Park Final RIFS	**Location:**	Below tree, northeast of boat launch
Project Address:	900 West Bay Dr	**Sampled By:**	L. Linde
Client Name:	OPARD		

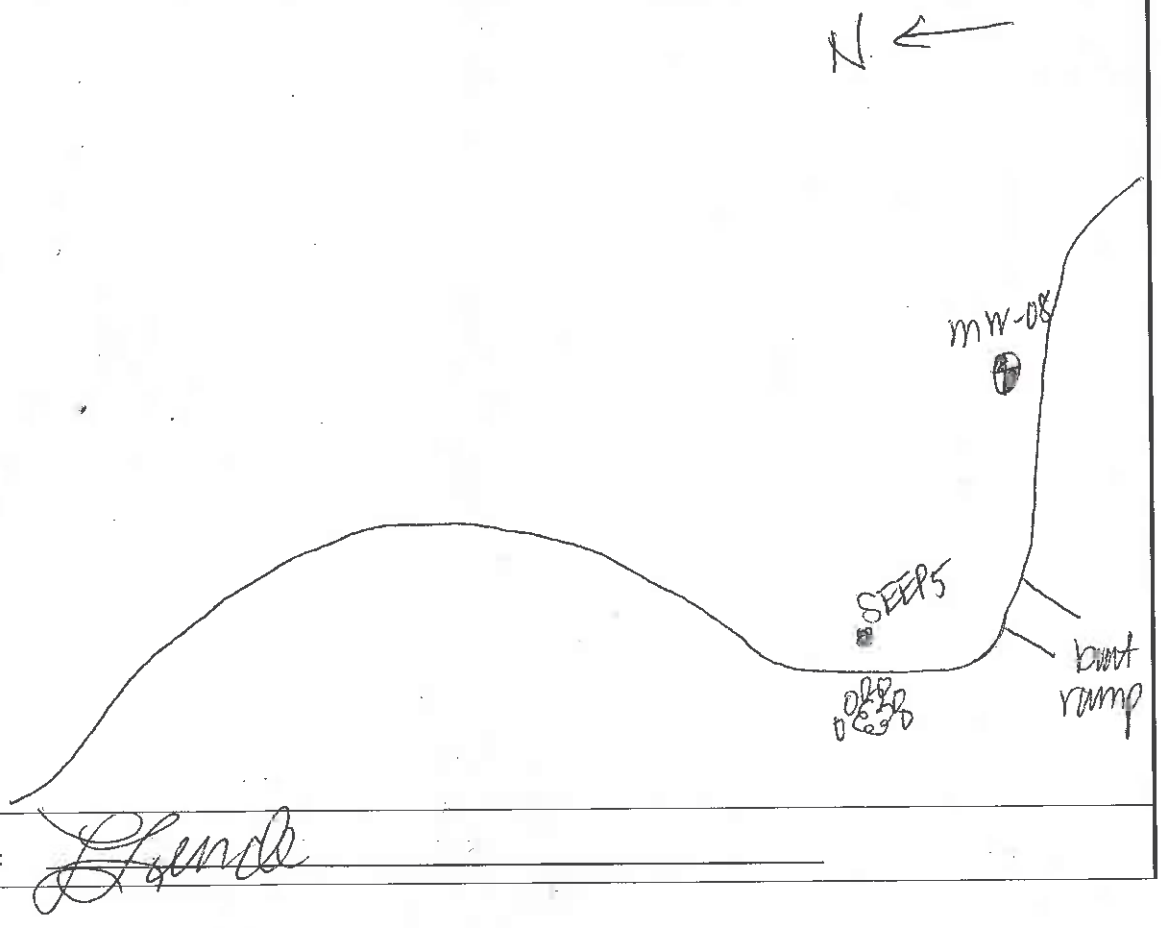
TIME (2400 hr)	pH (units) ±0.1	COND (mS/m) ±3%	DO (mg/L) ±10%	TEMP (°C)	TURB ±10% if > 10 NTU	ORP (mV) ±10 mV	Salinity (%)
1200	8.20	13.8	3.46	12.37	245.0	-87	0.8

Sampling Equipment: Grab w/ peristaltic

Laboratory:	Onsite Environmental	**Date Sent to Lab:**	10/26/12
Chain-of-Custody (yes/no):	Yes	**Field QC Sample Number:**	N/A
Shipment Method:	Courier	**Split With (names[s]/organization):**	N/A

Remarks:

WB-SEEP-SEEP5-0000 collected @ 1200



Signature: L Linde

94

Location Olympia, WA Date 10/25/12

Project / Client West Bay

Activities: Collect gw, sw, & seeps
Weather: Cloudy ~50°F
Onsite: L. Linde
Author: L. Linde

0625 Depart for site
0700 Arrive @ site, set up
0705 Kip Summers on site
0720 Kip offsite, calibrate Horiba
pH 4.08
cond 4.55 mS/cm
turb 0 NTU
DO 11.00 mg/L
temp 9.55 °C
ORP 185 mV
0745 Dig holes for seeps & let clear, pack gear to burner pt
0755 Setup @ MW-10
0807 Begin purging MW-10
0830 Finish purging, collect sample
WB-GW-MW10-0080
0835 Move locations, setup @ MW-09
0859 Begin purging MW-09
0925 Collect sample WB-GW-MW09-0090

Location Olympia, WA Date 10/25/12 95

Project / Client West Bay

0935 Collect field duplicate
WB-GW-MW09-1090
0940 Pack up & move to MW-08, setup
1008 Begin purging MW-08
1030 Finish purging, collect sample
WB-GW-MW08-0090
1035 Clean up, prep for seep sampling
1130 Collect sample @ SEEP4
WB-SEEP-SEEP4-0000
1200 Collect sample @ seep 5
WB-SEEP-SEEP5-0000
1205 Prep for surface water sampling
1220 Collect sample @ SW3
WB-SW-SW3-0000
1240 Collect sample @ SW2
WB-SW-SW2-0000
1245 Receive call from Kip, will send someone to get purge water from wells & return buckets
1300 Collect sample @ SW1
~~WB-SW-SW2-0~~
WB-SW-SW1-0000, see parks retrieve purge buckets

Location Olympia, WA Date 10/25/12

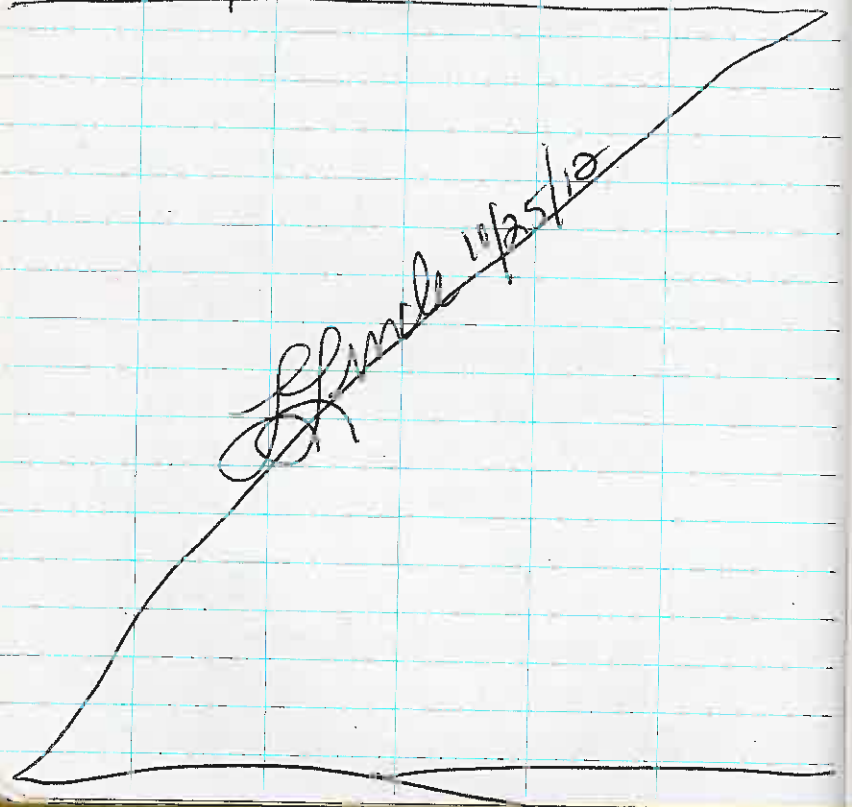
Project / Client West Bay

1330 Clean up & move equipment off beach, buried to vehicle.

1345 Receive buckets from divers

1400 Field filter surface water samples & finish making labels for ~~coolers, ice~~ samples, ice down cooler

1430 Depart site.



Location Date

Project / Client

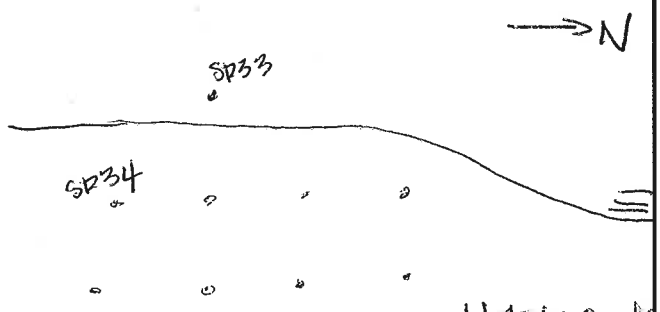
FIELD PARAMETERS
SEDIMENT SAMPLING

Sample #: SD34

Project Number:	233-1577-037
Project Name:	West Bay RI/FS
Project Address:	900 West Bay Dr
Client Name:	City of Olympia Parks
Sample Location:	See Sketch
Date:	7/19/12
Sampled By:	L. Linde / W. Harvey
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7/19/12 1010
Air temperature:	60°F
Weather Conditions:	Partly cloudy
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD34-0050
Sampled By:	L. Linde / W. Harvey
Laboratory:	Onsite
Chain-of-Custody (yes/no):	Yes
Date Sent to Lab:	7/20/12
Shipment Method:	Courier

Remarks/Notes:

Dark brown to black fg sediment w/ pebbles, occasional shell (clam & mussel) fragments, grass, & wood; intertidal, no odor



Not to scale
See fig 2 SAP
Locations follow
Contour of beach

Signature: Linde

FIELD PARAMETERS
SEDIMENT SAMPLING

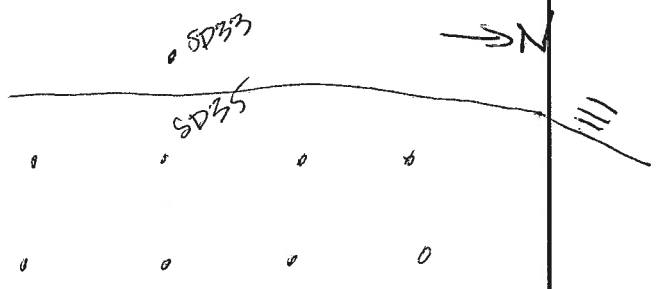
Sample #: SD35

Project Number:	233-1577-037
Project Name:	WEST BAY RI/FS
Project Address:	900 WEST BAY DRIVE
Client Name:	CITY OF OLYMPIA PARKS
Sample Location:	SEE SKETCH
Date:	7-19-12
Sampled By:	L. LINDE / W. HARVEY
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7-19-12 1040
Air temperature:	60°F
Weather Conditions:	PARTLY CLOUDY
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD35-1050
Sampled By:	L. LINDE / W HARVEY
Laboratory:	ONSITE
Chain-of-Custody (yes/no):	YES
Date Sent to Lab:	7-20-12
Shipment Method:	COURIER

Remarks/Notes:

Dark brn to black fg sediment w/ pebbles, ~5% shell frags (clam & mussel) grass, wood frags, worm, no odor, intertidal

Field duplicate collected WB-SD-SD35-1050 @ 1045



Not to scale
See Fig SAP locations follow contour of beach

Signature: L. Linde

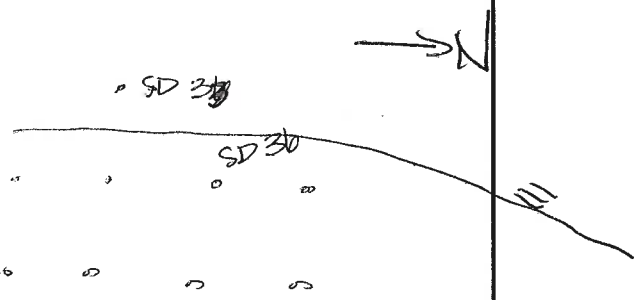
FIELD PARAMETERS
SEDIMENT SAMPLING

Sample #: SD36

Project Number:	233-1577-037
Project Name:	WEST BAY R1/FS
Project Address:	900 West Bay Dr
Client Name:	City of Olympia Parks
Sample Location:	See sketch
Date:	7/19/12
Sampled By:	L. Lindle / W. Harvey
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7/19/12 1100
Air temperature:	60°F
Weather Conditions:	Partly cloudy
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD36-0050
Sampled By:	L. Lindle / W. Harvey
Laboratory:	Onsite
Chain-of-Custody (yes/no):	Yes
Date Sent to Lab:	7/20/12
Shipment Method:	Courier

Remarks/Notes:

PK brn fg sediment, ~30% wood chips & saw dust, woody odor, grasses, no shell, intertidal



Not to scale
See fig 2-SAP locations follow contour of beach

Signature: L. Lindle

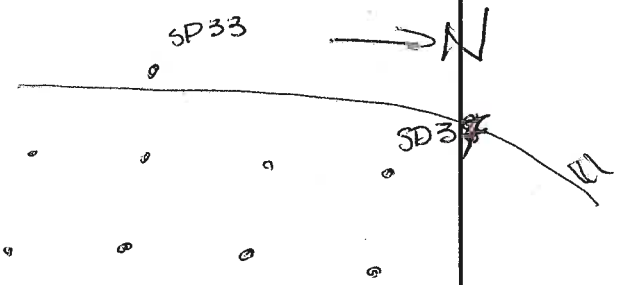
FIELD PARAMETERS
SEDIMENT SAMPLING

Sample #: SD38

Project Number:	233-1577-~~036~~ 037
Project Name:	West Bay RI/FS
Project Address:	900 West Bay Dr
Client Name:	City of Olympia Parks
Sample Location:	See sketch
Date:	7/19/12
Sampled By:	L. Linde / W. Harvey
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7/19/12 1135
Air temperature:	~60°F
Weather Conditions:	Partly Cloudy
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD38-0050
Sampled By:	L. Linde / W. Harvey
Laboratory:	Onsite
Chain-of-Custody (yes/no):	Yes
Date Sent to Lab:	7/20/12
Shipment Method:	Courier

Remarks/Notes:

Black-fg sediment, wood chunks, sawdust, pulp, ~5%, occassional shell frag (clams) ~5%, wood odor, intertidal



NA to scale
See Fig 2 - SAP locations follow contour of beach

Signature: L Linde

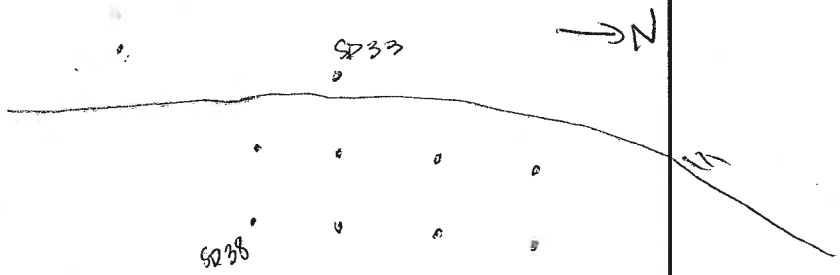
FIELD PARAMETERS
SEDIMENT SAMPLING

Sample #: ~~SD38~~

Project Number:	233-1577-037
Project Name:	West Bay RI/FS
Project Address:	900 West Bay Dr
Client Name:	City of Olympia Parks
Sample Location:	See sketch
Date:	7/19/12
Sampled By:	L. Linde / W. Harvey
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7/19/12 1310
Air temperature:	~60°F
Weather Conditions:	Partly Cloudy
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD38-0050
Sampled By:	L. Linde / W. Harvey
Laboratory:	Onsite
Chain-of-Custody (yes/no):	Yes
Date Sent to Lab:	7/20/12
Shipment Method:	Courier

Remarks/Notes:

Black & gray silt & fg sediment, occassional grass, pebbles, ~<5% wood, small shell frag @ surface, brine odor, intertidal



NA to scale
See Fig 2 SAP locations follow contour of beach

Signature: L. Linde

PARAMETRIX

Form 02-EN-98/Rev. 10/02

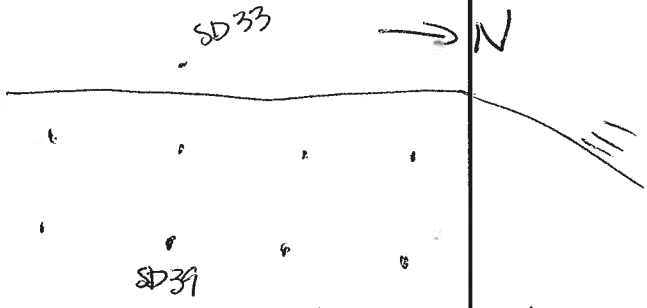
FIELD PARAMETERS
SEDIMENT SAMPLING

Sample #: SD39

Project Number:	233-1577-037
Project Name:	West Bay RI/FS
Project Address:	900 West Bay Dr
Client Name:	City of Olympia Parks
Sample Location:	See sketch
Date:	7/19/12
Sampled By:	L. Lindel W. Harvey
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7/19/12 1120
Air temperature:	~70°F
Weather Conditions:	Sunny w/ cloudys
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD39-0050
Sampled By:	L. Linde / W. Harvey
Laboratory:	Onsite
Chain-of-Custody (yes/no):	Yes
Date Sent to Lab:	7/20/12
Shipment Method:	Courier

Remarks/Notes:

Dk-bn & black fg silty sediment, shells common (clam & mussel), ~10% barnacles, ~10% wood frg, brine odor, intertidal



Not to scale
See Fig 2 SAP locations follow beach contour

Signature: L Lindel

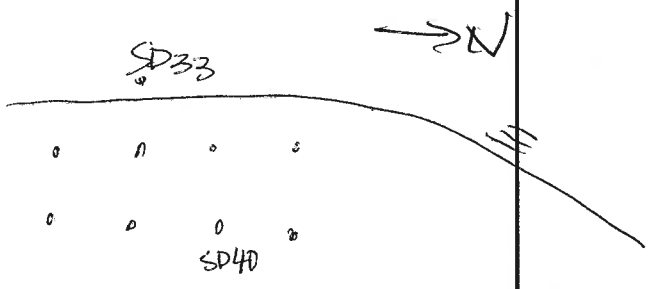
FIELD PARAMETERS
SEDIMENT SAMPLING

Sample #: SD40

Project Number:	233-1577-037
Project Name:	West Bay RI/FS
Project Address:	900 West Bay Dr
Client Name:	City of Olympia Parks
Sample Location:	See sketch
Date:	7/19/12
Sampled By:	L. Linde / W. Harvey
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7/19/12 1300
Air temperature:	~70°F
Weather Conditions:	Sunny
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD40-0050
Sampled By:	L. Linde / W. Harvey
Laboratory:	Onsite
Chain-of-Custody (yes/no):	Yes
Date Sent to Lab:	7/20/12
Shipment Method:	Courier

Remarks/Notes:

Black w/ rusty areas fg sediment, pebbles in <5% shell frags, <10% wood chunks mild petrogenic odor intertidal



NOT to scale
See Fig 2 SAP locations follow beach contour

Signature: L. Linde

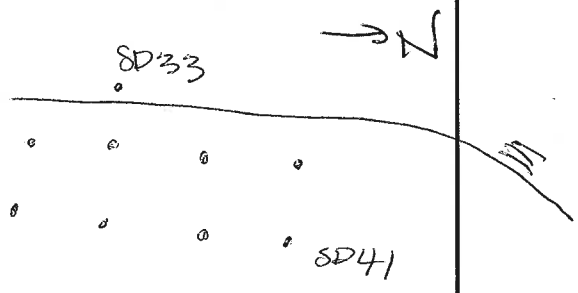
FIELD PARAMETERS
SEDIMENT SAMPLING

Sample #: SD41

Project Number:	233-1577-037
Project Name:	West Bay RI/FS
Project Address:	900 West Bay Dr
Client Name:	City of Olympia
Sample Location:	See sketch
Date:	7/19/12
Sampled By:	L. Linde / W. Harvey
Depth of Sample (feet):	0-4"
Date/Time Sampled:	7/19/12 1235
Air temperature:	~70°F
Weather Conditions:	Sunny ~70°F
PID Measurements (ppm):	N/A
Sample Number:	WB-SD-SD41-0050
Sampled By:	L. Linde / W. Harvey
Laboratory:	Onsite
Chain-of-Custody (yes/no):	Yes
Date Sent to Lab:	Onsite
Shipment Method:	Courier

Remarks/Notes:

Dk brn, black fg silt sediment, ~40% wood chunks, pulp & sawdust, shell frags ~5% (clam), mild petroleum odor occassional, intertidal



NAT to scale
See Fig 2 SAP
locations follow
contour of beach

Signature: L Linde

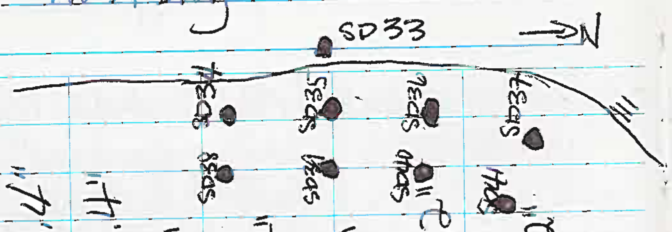
Location Olympia, WA Date 7/19/12

Project / Client West Bay

Activities: Collect sediment samples
Weather: Partly sunny
Onsite: L. Linde, W. Harris (PMX)
S. Teel (Ecology)
Author: L. Linde

0730 Meet @ park n ride
0800 Stop for ice & DI water
0820 Arrive onsite, setup
0830 Stake first row of sample locations & apply survey flagging for safety
0845 Stake second row of locations & flag in survey tape
0915 Finish cleaning rocks away from each location, start filling labels while waiting for Steve Teel
0935 Finish labels & sampling setup, start filling out field forms & not GPS coordinates - see next page

Location Olympia, WA Date 7/19/12
Project / Client West Bay



Station	Location	
SD34	N47°03'07.7"	W 122°54'42.5"
SD35	N47°03'07.9"	W 122°54'42.4"
SD36	N47°03'08.1"	W 122°54'42.4"
SD37	N47°03'08.3"	W122°54'42.3"
SD38	N47°03'07.7"	W 122°54'42.4"
SD39	N47°03'07.9"	W122°54'42.3"
SD40	N47°03'08.0"	W 122°54'42.2"
SD41	N47°03'08.2"	W122°54'42.2"

Late Entry 1100 collect Sample WB-SD-SD36-0050

Location Olympia, WA Date 7/19/12
Project / Client West Bay

0950 Steve Teel onsite
1000 Start collecting sediment at SD34
1010 Collect sample WB-SD-SD34-0050
1040 Collect sample WB-SD-SD35-0050
1045 Collect field duplicate WB-SD-SD35-1050
Steve Teel collect split SD35B
1120 Collect sample, Steve collect WB-SD-SD39-0050 split SD39B
1135 Collect sample WB-SD-SD37-0050
1145 Break for lunch, Kip & Steve offsite
1230 Start collecting @ SD41
1235 Collect sample WB-SD-SD41-0050
1300 Collect sample WB-SD-SD40-0050
1310 Collect sample WB-SD-SD38-0050
1320 Cleanup / start locations for surface soils
Late Entry ~1100 Kip Summers onsite

Location Olympia, WA Date 7/19/12

Project / Client West Bay

1330 Access gate - OPEN! key gate ~9.5' wide for truck clearance no clearance around either side of fence - to go around See City Parks employee ask if ground/grass is solid enough for P/u to drive on it, says he thinks so

1400 Grass & ground feels solid for vehicle traffic, attempt to locate MW03 or MW04 to scale off of for surface soil stations

1420 Locate MW04 in blackberries start marking eastern line of surface soil locations

1430 Third location south of fence is within fenced area around outfall for protection, relocate station from inside culvert/outfall fencing to immediately outside (w/EA) for safety

Location Olympia, WA Date 7/19/12

Project / Client West Bay

1445 Finish marking surface soil locations, attempt to locate oil stained area from Phase I ESA, no obvious staining in or around concrete slab

1455 Go back to vehicle to get photos from Phase I ESA to locate, mark locations based on photos but no obvious staining is observed

1515 Depart site

1615 Back @ park n ride, will meet @ office in morning to get cooler out to crusher

Received 7/19/12