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SoundEarth Strategies, Inc.
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FEASIBILITY STUDY AND DISPROPORTIONATE COST ANALYSIS



Property:
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

Prepared for:
Nordic Properties, Inc.
P.O. Box 84
Port Orchard, Washington

Report Date:
April 17, 2012

Feasibility Study and Disproportionate Cost Analysis

Prepared for:

Nordic Properties, Inc.
P.O. Box 84
Port Orchard, Washington 98366

Former Port Orchard Bulk Plant and Cardlock
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Port Orchard, Washington 98366

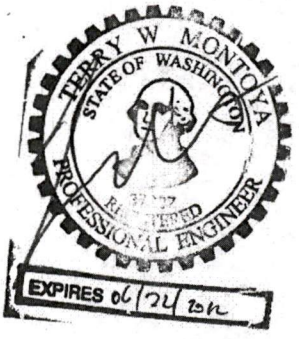
Project No.: 0644-001

Prepared by:

Jennifer Cyr
Technical Writer

Reviewed by:

Terry Montoya, P.E.
Senior Project Engineer



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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter, equivalent to parts per billion
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tanks
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
COCs	chemical of concern
DRPH	diesel-range petroleum hydrocarbons
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
Farallon	Farallon Consulting, LLC
FS/DCA	Feasibility Study/Disproportionate Cost Analysis
GRPH	gasoline-range petroleum hydrocarbons
mg/kg	milligram per kilogram
MTCA	Washington State Model Toxics Control Act
NFA	No Further Action
NWTPH	Northwest Total Petroleum Hydrocarbon
O&M	operation and maintenance
PCS	petroleum-contaminated soil
PVC	polyvinyl chloride
the Property	134 Bay Street West, Port Orchard, Washington
RAO	remedial action objective
RCW	Revised Code of Washington
RI/FS	remedial investigation/feasibility study

ACRONYMS AND ABBREVIATIONS (CONTINUED)

ROW	right-of-way
SES	Sound Environmental Strategies Corporation
the Site	defined by the full lateral and vertical extent of contamination that resulted from the historical operation of a bulk fuel storage facility on the Property
SoundEarth	SoundEarth Strategies, Inc.
UST	underground storage tank
VCP	Voluntary Cleanup Program
WAC	Washington Administrative Code

1.0 INTRODUCTION

SoundEarth Strategies, Inc. (SoundEarth, formerly known as Sound Environmental Strategies Corporation [SES]) has prepared this Feasibility Study/Disproportionate Cost Analysis (FS/DCA) for the Former Port Orchard Bulk Plant and Cardlock property located at 134 Bay Street West, Port Orchard, Washington (the Property), as shown on Figure 1, on behalf of Nordic Properties, Inc. The FS/DCA was prepared for submittal to the Washington State Department of Ecology (Ecology) under Ecology's Voluntary Cleanup Program (VCP No. NW1306), and was developed to select a cleanup action based on the remedy selection criteria and requirements as defined by the Washington State Model Toxics Control Act Regulation (MTCA) in the Washington Administrative Code (WAC), Chapters 173-340-350(8) through 173-340-390.

SoundEarth and others conducted subsurface investigations and interim remedial actions at the Property that confirmed releases of the chemicals of concern (COCs) in exceedance of the preliminary MTCA cleanup levels, including gasoline-range petroleum hydrocarbons (GRPH), diesel-range petroleum hydrocarbons (DRPH), and benzene, toluene, ethylbenzene and total xylenes (BTEX). Previous environmental investigations conducted by SoundEarth and others are summarized in the cleanup action work plan prepared by Farallon Consulting L.L.C. (Farallon), dated September 22, 2004 (Farallon 2004); the cleanup action status report prepared by Farallon, dated February 22, 2006 (Farallon 2006); and the closure report prepared by SoundEarth, dated October 4, 2010 (SES 2010).

According to Ecology's *Guidelines for Property Cleanups Under the Voluntary Cleanup Program,* dated July 2008 (Ecology 2008), a site is defined by the nature and extent of contamination associated with one or more releases of hazardous substances prior to any cleanup of that contamination. As established in Chapter 173-340 WAC, the "Site" is defined by the full lateral and vertical extent of contamination that has resulted from the historical operation of a bulk fuel storage facility on the Property. Based on the information gathered to date, the Site is located within tax parcel 4623-000-005-0004 and extends to the west side of Caseco Lane (formerly Wilkins Drive) located adjacent to the west of tax parcel 4623-000-005-0004.

1.1 DOCUMENT PURPOSE AND ORGANIZATION

The purpose of the FS/DCA is to develop and evaluate remedial alternatives for the Site and to select the most appropriate alternative based on the evaluation criteria listed below. According to MTCA, a cleanup alternative must satisfy all of the following threshold criteria as specified in WAC 173-340-360(2):

- Protect human health and the environment.
- Comply with cleanup standards.
- Comply with applicable state and federal laws.
- Provide for compliance monitoring.

While these criteria represent the minimum standards for an acceptable cleanup action, WAC 173-340-360(2b) also recommends that the cleanup action alternative:

- Use permanent solutions to the maximum extent practicable.

- Provide for a reasonable restoration time frame.
- Consider public concerns on the proposed cleanup action alternative.

This FS/DCA is organized into the following sections:

- **Section 2.0, Background.** This section provides a description of the Property features and location; a summary of land use; a description of the Property's environmental setting, including the local meteorology, geology, and hydrology; and a summary of the remedial investigations performed at the Site.
- **Section 3.0, Conceptual Site Model.** This section provides a summary of the conceptual site model which includes a discussion of the confirmed and suspected source areas, the chemicals and media of concern, the fate and transport characteristics of the release of hazardous substances, and potential exposure pathways and receptors.
- **Section 4.0, Remedial Alternatives Assessment.** This section develops and evaluates cleanup alternatives and discusses cleanup regulations and levels, the screening of remedial components, the development and evaluation of cleanup alternatives, and the recommended cleanup alternative.
- **Section 5.0, References.** This section lists references used to prepare this document.
- **Section 6.0, Limitations.** This section discusses document limitations.

2.0 BACKGROUND

Sections 2.1 through 2.7 provide a description of the Property, a summary of the land use history, a description of the environmental setting, and a discussion of the cleanup action conducted at the Property.

2.1 PROPERTY LOCATION AND DESCRIPTION

The Property is located within Kitsap County, Washington, in Township 24 North, Range 1 East, Section 26 and includes four tax parcels (4623-000-008-0001, 4623-000-005-0004, 4623-000-004-0500, and 262401-3-029-2008) (Figure 2). Portions of tax parcels 4623-000-004-0500 and 4623-000-005-0004 extend north of the State Route 166 right-of-way (ROW) and are not illustrated on Figure 2. The Property is currently vacant and covered with gravel.

The Property is located within a predominantly commercial area on the western edge of Port Orchard. The Property is bordered to the north by the State Route 166 ROW, and beyond tideland and Sinclair Inlet; to the south by wooded hillsides; to the west by Caseco Lane (formerly Wilkins Drive), and beyond a commercial parcel; and to the east by wooded land.

2.2 LAND USE HISTORY

The Wilkins Distributing Bulk Plant and Cardlock historically operated on the Property by Wilkins Distributing Company/Nordic Properties from the 1940s through 1992, and by Gull Industries, Inc. as the Port Orchard Bulk Plant and Cardlock from December 15, 1993 to November 15, 2003 (Farallon 2006). The former bulk fuel storage facility on the Property used aboveground storage tanks (ASTs) and underground storage tanks (USTs) for the storage and distribution of gasoline and diesel fuel (Figure 3).

Eight ASTs, ranging in volume from 20,000 to 47,000 gallons, were installed between 1965 and 1989 on the western portion of the Property and removed in early 2004 (Farallon 2006). Nine USTs were located at the north end of the Property and a single UST was located on the west-central portion of the Property. The 10 USTs, ranging in volume from 300 to 30,000 gallons, were removed in 2004.

2.3 FUTURE LAND USE

The future land use has not been fully determined but most likely will remain commercial due to its location.

2.4 ENVIRONMENTAL SETTING

This section summarizes the meteorology and groundwater use for the Property vicinity.

2.4.1 Meteorology

The climate of the Port Orchard area is mild during summer when temperatures tend to be in the 60s and cold during winter when temperatures tend to be in the 40s. The warmest month of the year is August, which has an average maximum daily temperature of 75.8 degrees Fahrenheit. The coldest month of the year is January, which has an average minimum daily temperature of 34.7 degrees Fahrenheit.

The average annual precipitation reported for the Port Orchard area is 53.96 inches and generally occurs as rain. The wettest month of the year is December, during which the area receives an average precipitation total of 9.07 inches. The driest month of the year is July, during which the area receives an average precipitation total of 0.96 inches (IDcide 2011).

2.4.2 Groundwater Use

The majority of the City of Port Orchard obtains its drinking water supply through a network of six active groundwater wells, six storage reservoirs, and 47 miles of water pipe (City of Port Orchard 2011). Based on a review of Ecology's Water Well Logs (Ecology 2011), there is one municipal supply well and three domestic supply wells within an 0.5-mile radius of the Site. These wells include the following:

- A municipal supply well is located in the vicinity of the intersection of Cline Avenue and Dekalb Street, approximately 0.5 miles northeast of the Site. This well was reportedly installed in 1946 to a depth of 792 feet (Ecology 2011). The screened interval was not noted on the reviewed boring log.
- There are three domestic supply wells located west/southwest of the Site, within approximately 0.2 miles. The domestic supply well nearest to the Site, located west of the adjacent western parcel, is reportedly 199 feet deep and screened from 194.5 to 199.5 feet below ground surface (bgs; Ecology 2011). The two other domestic supply wells are 59 and 108 feet deep, screened from 54 to 59 feet bgs and 108 to 188 feet bgs, respectively (Ecology 2011).

The municipal supply well and three domestic supply wells are located crossgradient to upgradient relative to the historic north-northwest groundwater flow direction at the Site. In addition, due to the depths of the screened intervals in the municipal and domestic supply wells,

the limited soil contamination present beneath the Site at approximately four to six feet bgs is not expected to impact groundwater quality in the municipal or domestic supply wells.

2.5 GEOLOGY AND HYDROGEOLOGY

The Property is located on Sinclair Inlet within the Puget Sound Lowland, a north-south trending structural and topographical depression bordered on the west by the Olympic Mountains and Vancouver Island, and on the east by the Cascade Mountains. The Puget Sound Lowland is filled with glacial and nonglacial sediments.

Soil types encountered on the Property during subsurface investigations include interlayered sand, silty sand, sandy silt, and silt. Woody debris, shell fragments, and peat have also been encountered in soil borings advanced on the Property (Farallon 2006).

Groundwater has been encountered at the Property between 0 and 12 feet bgs. Groundwater measured in monitoring wells located on the southern portion of the Property has historically been higher than on the northern portion of the Property. Artesian groundwater flow was consistently encountered in monitoring wells MW-1, MW-2, and MW-5 and may be attributable to low-permeability soil at the ground surface that acts as a confining layer for groundwater located within the underlying sand (Farallon 2006). The groundwater flow direction historically observed has been toward the north to northwest.

2.6 CLEANUP ACTIONS

A summary of the cleanup action activities conducted at the Site are provided below.

2.6.1 September 2004 to January 2006

A cleanup action was conducted by Farallon at the Site between September 2004 and January 2006 which included the removal of 10 USTs; removal and disposal of 5,493 tons of soil containing concentrations of the COCs exceeding the MTCA Method A cleanup levels from two separate excavation areas (Excavation #1 and Excavation #2); pumping approximately 53,000 gallons of groundwater and treating by air sparging before discharging to the sanitary sewer; and groundwater monitoring to evaluate the effect of source removal on groundwater quality. Analytical results for Excavation #1 indicated six confirmation soil samples (E1-101304-01, E1-101304-02, E1-101304-04, E1-101304-11, E1-102104-04, and E1-111104-01) contained concentrations of DRPH, GRPH, and/or one or more BTEX constituent in exceedance of the MTCA Method A cleanup levels (Table 1). Analytical results for Excavation #2 indicated two confirmation soil samples (E2-102504-04 and E2-102504-06) contained concentrations of DRPH, GRPH, and/or benzene in exceedance of the MTCA Method A cleanup levels (Table 1). The location of these soil samples include portions of the northern, southern, and western borders of Excavation #1, with the northern extent being within the State Route 166 ROW and the western extent being within Caseco Lane (formerly Wilkins Drive), and on the northern border of Excavation #2. These areas were not further excavated due to the presence of subsurface utilities and/or the Property boundary. As of January of 2008, the City of Port Orchard exchanged the land identified as the utility easement on Figure 2, for the Nordic Properties Inc. land formerly identified as Wilkins Drive (Figure 2). Nordic Properties Inc. has indemnified the City of Port Orchard against all potential environmental liabilities associated with the former Wilkins Drive.

2.6.2 September 2007 to December 2009

A cleanup action was conducted at the Site between September 2007 and December 2009 and included the following activities:

- Conducting two separate chemical injections events of sodium persulfate and hydrogen peroxide into 13 push-probe borings (P1 through P13) and three injection wells (IW-17 through IW19). Each batch of the injectant solution was composed of 100 gallons of water, 55 gallons of 5 percent hydrogen peroxide, and 55 pounds of sodium persulfate, and was injected by directly pouring the solution into each probe/well.
- Excavating the remainder of a historic gasoline pipe, which was a remnant piece between Excavations #1 and #2 and thought to be a major source of gasoline contamination in the old ROW. An approximate 4-foot-wide by 6-foot-deep trench was excavated along the path of the pipe, which was located approximately 3 to 4 feet bgs. A soil sample analyzed from directly beneath the pipe contained concentrations of DRPH, GRPH, benzene, ethylbenzene, and total xylenes in exceedance of the applicable cleanup levels.
- Collecting additional confirmation soil samples from three direct-push borings. The borings were advanced in the vicinity of 2004 confirmation samples, which contained concentrations of GRPH and benzene in exceedance of the MTCA Method A cleanup levels. A single confirmation soil sample was collected from each boring from a depth of 4 to 5 or 9 to 10 feet bgs and analyzed for GRPH and BTEX. Analytical results indicated concentrations of the COCs were below applicable cleanup levels with the exception of GRPH and benzene in a sample collected from between 4 to 5 feet bgs (New-MW16-South) from the boring advanced adjacent to the southern wall of Excavation #1 (Table 1).
- Conducting nine groundwater monitoring events at monitoring well MW-16 in September and December 2007; March, June, and December 2008; and March, June, September, and December 2009. Analytical results for groundwater samples collected from monitoring well MW-16 for the nine quarterly monitoring events indicated concentrations GRPH and BTEX were below the MTCA Method A cleanup levels for the nine monitoring events, with the exception of benzene, which exceeded the cleanup level between September 2007 and June 2008 (Table 2). The groundwater flow direction at the Property has historically been towards the north-northwest (Farallon 2006).

2.7 2011 SUBSURFACE INVESTIGATION

SoundEarth conducted a subsurface investigation at the Site, which consisted of installing two monitoring wells at downgradient locations relative to monitoring well MW-16 for the purpose of assessing groundwater quality at these locations. Monitoring wells MW-17 and MW-18 were advanced approximately 30 and 53 feet northwest, respectively, of monitoring well MW-16 (Figure 3).

Monitoring wells MW-17 and MW-18 were constructed of 2-inch-diameter blank polyvinyl chloride (PVC) casing, flush-threaded to 15 feet of 0.010-inch slotted well screen. The bottom and top of each of the wells were fitted with a threaded PVC bottom cap and a locking compression-fit well cap. The

annulus of the monitoring wells was filled with #2/12 silica sand to approximately 1 foot above the top of the screened interval. A bentonite seal having a minimum thickness of 1 foot was installed above the sand pack. The wells were completed at the surface with a flush-mounted, traffic-rated well box set in concrete. Boring logs are provided in Appendix A.

The monitoring wells were developed with the use of a submersible pump. Monitoring well development consisted of surging the monitoring wells using a surge block and purging groundwater from the monitoring wells until a minimum of five submerged well volumes were removed. The monitoring well top-of-casing elevations were surveyed relative to an arbitrary benchmark with an assumed elevation of 100.00 feet.

Depth-to-groundwater measurements were collected from monitoring wells MW-15 through MW-18 and groundwater samples were collected from wells MW-17 and MW-18 on July 5, 2011. Monitoring wells MW-15 through MW-18 were opened and water levels were permitted to equilibrate with atmospheric pressure for a minimum of 15 minutes before obtaining depth-to-groundwater measurements. Groundwater levels were measured to an accuracy of 0.01 foot relative to the top of each well casing using an electric water-level meter.

Purging and sampling of each monitoring well was performed using a peristaltic pump and dedicated polyethylene tubing at purge rates, ranging from approximately 80 to 110 milliliters per minute. The tubing intake was placed 2 to 3 feet below the water table. During purging, water quality was monitored using a Horiba U-22 water-quality system equipped with a flow-through cell. The water quality parameters monitored and recorded included temperature, pH, specific conductance, dissolved oxygen, turbidity, and oxidation-reduction potential.

Following purging, groundwater samples were collected from the pump outlet tubing located upstream of the flow-through cell and placed directly into clean, laboratory-prepared sample containers. Each container was labeled with unique sample identification, placed on ice in a cooler, and sent to TestAmerica of Tacoma, Washington, under standard chain-of-custody protocols for laboratory analysis. The groundwater samples were submitted for analysis of GPRH by Northwest Total Petroleum Hydrocarbons (NWTPH) Method NWTPH-Gx and BTEX by U.S. Environmental Protection Agency (EPA) Method 8021B.

2.7.1 Groundwater Monitoring Results

Groundwater measured in monitoring wells MW-15 through MW-18 on July 5, 2011, ranged from 6 feet (MW-17) to 8.84 feet (MW-18) below the top of the monitoring well casings (Table 2). The groundwater elevation contours measured on July 5, 2011 are shown on Figure 4. The contours indicate a general groundwater flow direction to the north toward Sinclair Inlet, which is consistent with previous groundwater monitoring events. Analytical results for the groundwater samples collected from wells MW-17 and MW-18 indicate concentrations of GRPH and BTEX are below the laboratory reporting limit or the applicable MTCA Method A cleanup level in both samples (Figure 4, Table 2). This shows that the groundwater plume did not "break away" from the source as surmised by Ecology in 2011. The downgradient wells have not had exceedances since the bulk excavation. A copy of the analytical report is provided in Appendix B.

3.0 CONCEPTUAL SITE MODEL

This section provides a conceptual understanding of the Site based on the results of the subsurface investigations and cleanup actions performed at the Site. Included is a discussion of the confirmed and suspected source areas, affected media, contaminant transport, and exposure assessment. The estimated extent of petroleum contaminated soil remaining in place at the Site is illustrated on Figure 5.

3.1 CONFIRMED AND SUSPECTED SOURCE AREAS

The suspected source of the COCs is associated with the historical operation of a bulk fuel storage facility on the Property, which included eight ASTs and ten USTs.

3.2 CHEMICALS OF CONCERN

The COCs for the Site include the chemical compounds that were detected in soil and groundwater at concentrations exceeding the applicable MTCA cleanup levels. The COCs for the soil at the Site include DRPH, GRPH, and BTEX. The COCs for groundwater at the Site include GRPH and BTEX.

3.3 AFFECTED MEDIA

Soil and groundwater are the media of concern at the Site. Vapor is not considered a medium of concern due to no structures being present on the Site.

3.4 CONTAMINANT FATE AND TRANSPORT

Provided below is a summary of the contaminant fate and transport model for the Site.

3.4.1 Transport Mechanisms Affecting Distribution of Petroleum Hydrocarbons in the Subsurface

The lateral distribution of petroleum hydrocarbons in soil is likely a result of transport via direct contact from historical surface releases and transport over time via movement of dissolved-phase petroleum hydrocarbons in groundwater and adsorptive capacity of the soil matrix.

Dissolved-phase petroleum hydrocarbons in groundwater will migrate with the horizontal and vertical groundwater gradients. The lateral groundwater flow direction is to the north (Figure 4). Concentrations of petroleum hydrocarbons in groundwater are typically highest in the source areas and decrease along the groundwater flow path as a result of dilution with unaffected groundwater. Groundwater has been encountered between 0 and approximately 12 feet below top of casing at the Property, with artesian groundwater flow observed in several of the monitoring wells. The shallow groundwater flow reduces the vertical migration of dissolved concentrations of petroleum hydrocarbons in groundwater with depth.

3.4.2 Environmental Fate in the Subsurface

The most significant fate process for petroleum hydrocarbons is biodegradation (i.e., natural attenuation). Degradation products of gasoline constituents are generally less toxic than their parent species. Petroleum hydrocarbons that are the most mobile (having the least viscosity and most solubility in water) are also the most easily biodegraded (e.g., aromatics). Because gasoline constituents contain thousands of carbon compounds, there is a vast array of biochemical transformations that occur in the soil and groundwater media. For example, hydroxylation can

alter hydrocarbon compounds to ketone or alcohol products that are less toxic or more biologically available; aromatic reduction can convert aromatic groups to naphthenes; ring cleavage can destroy aromatic functional group species; and reduction can alter olefin functionality. The alteration and destruction of gasoline constituents occur by microbial enzyme catalytic reactions on the contaminant substrate or by direct digestion of contaminants as an electron donor or acceptor. Any number of reactions can occur within the subsurface by microorganisms that change the chemical distribution and concentrations of the contaminants.

The time frame over which these reactions occur vary depending on any number of limiting factors, primarily the availability of oxygen. For example, BTEX constituents are rapidly degraded under aerobic conditions but tend to persist for several years or decades under the anoxic conditions typical of most subsurface environments.

The two compounds that are primarily the focus of environmental fate and transport for DRPH are benzene and naphthalene, which are normally present in low enough concentrations to mitigate the risk of impacts to human health and the environment. This nominal risk is diminished as biodegradation of the DRPH compounds continues. The degradation rate is dependent upon several factors, including the mass and volume of the product, nutrient input and associated limiting factors, and temperature.

3.5 EXPOSURE PATHWAYS

This subsection discusses the confirmed and potential human health and environmental exposure pathways at the Site, with the goal of identifying those pathways requiring remediation to reduce or eliminate unacceptable risks to human health or the environment.

3.5.1 Soil to Groundwater Pathway

Analytical results of groundwater samples collected from monitoring wells at the Site indicate that contamination of groundwater via soil leaching is incomplete. Groundwater sample results from MW-17 and MW-18 further shows that the plume has not "broken away" from the source area.

3.5.2 Soil–Direct Contact Pathway

Direct contact with soil and groundwater exhibiting concentrations of petroleum hydrocarbons in excess of the cleanup levels is limited to human receptors that come into close contact with the media via direct exposure, including dermal contact or ingestion of excavated soil or groundwater. The standard point of compliance for soil contamination beneath a site is 15 feet bgs, which represents a reasonable estimate of the depth that could be accessed during normal site redevelopment activities (WAC 173-340-740[6][d]). Institutional controls limiting direct contact will be implemented to make the direct contact pathway incomplete.

3.5.3 Groundwater to Drinking Water Pathway

Shallow groundwater in the vicinity of the Site is not developed as a significant water resource. The municipal supply well and three domestic supply wells range in depth from 59 to 792 feet deep and are located crossgradient relative to the Site. Based on this information and the fact that all of the wells on the site are below MTCA Method A cleanup levels, the groundwater to drinking water pathway is considered incomplete.

3.6 POTENTIAL RECEPTORS

The section includes a discussion of the confirmed and potential receptors, which include human population, food crops, recreation areas, parks, sensitive environments, irrigated areas, and aquatic resources currently or potentially affected by groundwater, air, or surface water containing the release of hazardous substances at the Site.

According to the Ecology website, a City of Port Orchard supply well is located approximately 0.5 miles northeast of the Site. The well is approximately 792 feet deep with no screened interval noted on the well log. There are three domestic supply wells located west/southwest of the Site, within approximately 0.2 miles. The wells range in depth from 59 to 199 feet depth, with the most shallow well screened from 54 to 59 feet bgs (Ecology 2011). Based on the well depths, screened intervals, crossgradient to upgradient location of the wells relative to the Site, and concentrations of the COCs in groundwater below the applicable MTCA Method A cleanup levels, the potential for adverse impacts to drinking water from contaminants on the Site is low.

Sinclair Inlet is located adjacent to and north of the Property; however, the potential for adverse impacts from contaminants on the Property is extremely low based on concentrations of the COCs in groundwater below the applicable MTCA Method A cleanup levels.

4.0 REMEDIAL ALTERNATIVES ASSESSMENT

The purpose of this FS is to recommend a cleanup action that meets the requirements of MTCA found in WAC 173-340-350(8). The FS often includes an extensive development, screening, and evaluation of numerous remedial alternatives. Because Site-specific conditions preclude the implementation of many potential remedial components, a more focused evaluation was performed only on those components and alternatives that were considered both implementable and effective in achieving the remediation objectives.

The FS is used to screen cleanup alternatives and eliminate those that are not technically possible, those with costs that are disproportionate under WAC 173-340-360(3)(e), or those that will substantially affect the future planned business operations at the Site. Based on the screening, the FS presented below evaluates the most advantageous remedial components to recommend a final cleanup action for the Site in conformance with WAC 173-340-360 through WAC 173-340-390.

4.1 CLEANUP STANDARDS

The selected cleanup alternative must comply with MTCA cleanup regulations specified in WAC 173-340 and with applicable state and federal laws. The cleanup standards selected for the Site are discussed in detail below.

4.1.1 Applicable or Relevant and Appropriate Requirements

Under WAC 173-340-350 and 173-340-710, applicable requirements include regulatory cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that specifically address a contaminant, remedial action, location, or other circumstances at a site.

MTCA defines relevant and appropriate requirements as:

> "... those cleanup action standards, standards of control, and other human health and environmental requirements, criteria or limitations established under state and federal law that, while not legally applicable to the hazardous substance, cleanup action, location, or other circumstances at a site, the department determines address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site. The criteria specified in WAC 173-340-710(3) shall be used to determine if a requirement is relevant and appropriate."

The criteria used to make this determination are presented in WAC 173-340-710(4)(a)-(i).

Remedial actions conducted under MTCA must comply with the substantive requirements of the applicable or relevant and appropriate requirements (ARARs) but are exempt from their procedural requirements (WAC 173-340-710[9]). Specifically, this exemption applies to state and local permitting requirements under the Washington State Water Pollution Control Act, Solid Waste Management Act, Hazardous Waste Management Act, Clean Air Act, State Fisheries Code, and Shoreline Management Act.

4.1.1.1 Screening of ARARs

ARARs were screened in order to assess their applicability to the Site. Only those that were deemed appropriate and applicable were retained as remedial action objectives (RAOs). The following list identifies the ARARs that may be applicable to the Site:

- State Environmental Policy Act (Chapter 43.21C of the Revised Code of Washington [RCW 43.21C]).
- Washington State Shoreline Management Act (RCW 90.58; WAC 173-18, 173-22, and 173-27).
- The Clean Water Act (33 United States Code [USC] 1251 et seq.).
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC 9601 et seq.; 40 CFR 300).
- The Fish and Wildlife Coordination Act.
- Endangered Species Act (16 USC 1531 et seq.; 50 CFR 17, 225, and 402).
- Native American Graves Protection and Repatriation Act (25 USC 3001 through 3013; 43 CFR 10) and Washington's Indian Graves and Records Law (RCW 27.44).
- Archaeological Resources Protection Act (16 USC 470 aa et seq.; 43 CFR 7.).
- Washington Dangerous Waste Regulations (WAC 173-303).
- Solid Waste Management Act (RCW 70.95; WAC 173-304 and 173-351).
- Water Quality Standards for Surface Waters of the State of Washington (RCW 90.48 and 90.54; WAC 173-201A).
- Department of Transportation Hazardous Materials Regulations (49 CFR Parts 100 through 185).
- Washington State Water Well Construction Act (RCW 18.104; WAC 173-160).

- City of Port Orchard and Kitsap County regulations, codes, and standards.

4.1.2 Cleanup Levels

The cleanup levels proposed for the Site are the MTCA Method A cleanup levels for unrestricted land use, which are summarized in the following table.

CLEANUP LEVELS PROPOSED FOR SITE REMEDIATION ACTIVITIES

Cleanup Level	Remedial Action Objective
GROUNDWATER ▪ 800 µg/L–GRPH ▪ 5 µg/L–benzene ▪ 1,000 µg/L–toluene ▪ 700 µg/L–ethylbenzene ▪ 1,000 µg/L–total xylenes	Reduce concentrations of COCs in groundwater to achieve the respective MTCA Method A cleanup levels.
SOIL ▪ 30 mg/kg–GRPH ▪ 0.03 mg/kg–benzene ▪ 7 mg/kg–toluene ▪ 6 mg/kg–ethylbenzene ▪ 9 mg/kg–total xylenes ▪ 2,000 mg/kg–DRPH	Reduce concentrations of COCs in soil to achieve the respective MTCA Method A cleanup levels.

NOTES:
µg/L = micrograms per liter
mg/kg = milligrams per kilogram

4.1.3 Remedial Action Objectives

RAOs are general administrative goals for a cleanup action that address the overall MTCA cleanup process. The purpose of establishing RAOs for a site is to provide remedial alternatives that protect human health and the environment (WAC 173-340-350). In addition, RAOs are designated in order to:

- Implement administrative principles for cleanup (WAC 173-340-130).
- Meet the requirements, procedures, and expectations for conducting an FS and developing cleanup action alternatives as discussed in WAC 173-340-350 through 173-340-370.
- Develop cleanup levels (WAC 173-340-700 through 173-340-760) and remedial alternatives that are protective of human health and the environment.

In particular, RAOs must include the following threshold requirements from WAC 173-340:

- Protect human health and the environment.
- Comply with cleanup levels.
- Comply with applicable state and federal laws.
- Provide for compliance monitoring.

The RAOs for the Site are to mitigate risks to human health and the environment and to obtain a No Further Action (NFA) determination from Ecology for the Site.

4.2 IDENTIFICATION AND EVALUATION OF TECHNOLOGIES

Remedial components were evaluated with respect to the degree to which they comply with the cleanup requirements set forth in MTCA. According to MTCA, a cleanup alternative must satisfy all of the minimum threshold requirements for RAOs, as outlined in Section 4.1.3 above. WAC 173 340-360 (2b) also requires the cleanup action alternative to:

- Use permanent solutions to the maximum extent practicable.
- Provide for a reasonable restoration time frame.
- Consider public concerns on the proposed cleanup action alternative.

Using the above criteria (excluding the consideration of public concerns), several remedial technologies were evaluated to produce a short list for further evaluation. Included in screening the technologies were site specific conditions that would limit the use of technologies, such as the active cast iron, bell and socket, and a high pressure water line running through the impacted area. The City of Port Orchard has instructed the Property owner that he may not expose this line during remediation. Table 3 presents the results of the screening matrix. The components of the technologies that passed the screening process include the following:

- Environmental Covenant
- Containment Cap
- Excavation without Shoring

4.3 ALTERNATIVE EVALUATION PROCESS

This section presents the evaluation of potentially feasible cleanup alternatives with respect to the RAOs established for the Site. Remedial components were identified per the requirements set forth in MTCA under WAC 173-340-350(8)(b) and the focused screening of potential remedial components using the requirements and procedures for selecting cleanup actions as set forth in MTCA under WAC 173-340-360(2)(a)(b). The criteria used by SoundEarth to evaluate and compare applicable cleanup alternatives when conducting the disproportionate cost analysis were derived from WAC 173-340-360(3)(f) and include the following:

- **Protectiveness.** The overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, the time required to reduce risk at the facility and attain cleanup standards, the on-Property risks resulting from implementing the alternative, and improvement of overall environmental quality of the Site.
- **Permanence.** The degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and the sources of releases, the degree of irreversibility of the waste treatment process, and the characteristics and quantity of treatment residuals generated during the treatment process.

- **Cost.** The cost to implement the alternative, including the cost of construction, and the net present value of long-term costs. Long-term costs that were considered include those associated with monitoring, reporting, and maintaining institutional controls.
- **Effectiveness over the long term.** The degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time over which hazardous substances are expected to remain on the Site, and the magnitude of residual risk associated with the contaminated soil and/or groundwater components. The following types of cleanup action components, presented in descending order, may be used as a guide when assessing the relative degree of long-term effectiveness of the chosen alternative:
  - Reuse or recycling.
  - Destruction or detoxification.
  - Immobilization or solidification.
  - On-Property or off-Property disposal in an engineered, lined, and monitored facility.
  - On-Property isolation or containment with attendant engineering controls
  - Institutional controls and monitoring.
- **Management of short-term risks.** The risk to human health and the environment associated with the alternative during its construction and implementation, and the effectiveness of measures that will be taken to manage such risks.
- **Technical and administrative implementability.** The ability to implement the alternative includes consideration of the technical feasibility of the alternative, administrative and regulatory requirements; permitting, scheduling, size, complexity, monitoring requirements; access for construction operations and monitoring; and integration with the future development plans for the Property.
- **Consideration of Public Concerns.** The consideration of community concerns regarding the alternative and, if there are concerns, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, federal and state agencies, or any other organization that may have an interest in or knowledge of the Site.

4.4 FOCUSED EVALUATION OF TREATMENT ALTERNATIVES

The focused evaluation of potential technically feasible cleanup alternatives considered all practicable remedial components confirmed to be effective at treating petroleum hydrocarbons in the affected media of concern. SoundEarth also considered whether Site-specific constraints would preclude the application of a remedial component due to the creation of a greater risk to human health and the environment, or that such constraints could result in the remedial technology being technically or administratively infeasible to implement. A detailed description of the three alternatives that were retained for additional consideration is provided below.

4.4.1 Cleanup Alternative 1, Environmental Covenant

Cleanup Alternative 1 involves documenting the environmental conditions, showing the location of the impacted soil, and attaching them to the chain of title associated with the land.

The final element of Cleanup Alternative 1 includes notifying the City of Port Orchard to the possible impacted soils that could be encountered during any utility maintenance required.

The environmental covenant is considered protective of human health and the environment by preventing direct contact exposure with contaminated soil.

No groundwater monitoring will be completed because the Site is already compliant with MTCA cleanup requirements.

Key assumptions for this cleanup action include the following:

- City of Port Orchard acknowledges the receipt of the utility work issue.
- The environmental covenant can be attached to the title of the Property.

The present worth cost to complete Cleanup Alternative 1, assuming a 0.9 percent annual rate of return and a life cycle of 11 years, is approximately $11,866 (Table 4).

4.4.2 Cleanup Alternative 2, Containment Cap

Cleanup Alternative 2 involves the installation of a containment cap over the site along with an environmental covenant.

Implementation of the Containment Cap alternative involves placement of 2- to 4-inches of asphalt over the Site to limit direct contact issues associated with the impacted soil. The containment cap is one step higher in protectiveness than the environmental covenant because the exposed person will now have to excavate through asphalt instead of hard packed gravel.

Key assumptions for this cleanup action include the following:

- City of Port Orchard acknowledges the receipt of the utility work issue.
- The environmental covenant can be attached to the title of the property.
- The Site will be reviewed every 5 years to determine if there are any significant changes to the physical setting of the Property.

The present worth cost estimate to complete Cleanup Alternative 2, assuming a 0.9 percent real discount rate and a life cycle of 20 years, is approximately $158,340 (Table 5).

4.4.3 Cleanup Alternative 3, Bulk Excavation without Shoring and Off-Site Disposal

Cleanup Alternative 3 involves the bulk excavation and off-site disposal of soil containing concentrations of COCs exceeding the specified cleanup levels. Clean structural fill would be imported and compacted to restore the Site to its original grade. The high pressure water line would require a second line to be installed and connected before the start of remediation. Other utilities, such a phone, stormwater and sewer would be removed and replaced during excavation. Figure 6 provides a conceptual illustration of how this alternative would be implemented. The City of Port Orchard will not allow for the water line to be exposed and supported during exaction; therefore, the cost associated with pre-replacement has been used in the remediation estimate. The is also a $100,000 contingency cost associated with the estimate to address the City of Port Orchard's concern that design points for diverting the water line may move. The high pressure water line is an old cast iron bell and socket design. The city is

concerned that when the line is initially exposed, it may fail. In that event the water would cause considerable damage to the area, hence the contingency cost.

Limits of the soil excavation would extend along the rights-of-way running through the middle of the site for approximately 40 feet. The vertical walls would extend to a width of about 15 feet to a depth of about 10 feet for a total of 222 bank cubic yards to be removed.

During excavation activities, compliance soil sampling would be performed to ensure the soil meets all applicable cleanup levels.

Key assumptions for this component of the alternative include the following:

- The City of Port Orchard would issue a required grading permit. During SoundEarth's initial inquiry about exposing the water line, the city have indicated that they would not grant access for the removal action.
- Excavation did not cause a release to the groundwater and the groundwater continues to below MTCA Method A Cleanup Levels.
- Monitoring wells installed on the Property would be decommissioned after one monitoring event.

The present worth cost estimate to complete Cleanup Alternative 3, assuming a 0.9 percent real discount rate and a life cycle of 2 year is approximately $799,971 (Table 6).

4.5 COMPARISON OF ALTERNATIVES

A summary of the evaluation of the cleanup alternatives using the MTCA evaluation criteria (WAC 173-340-360[3][f]) is presented below:

- **Protectiveness.** All cleanup alternatives provide a measure of protectiveness for human health and the environment. Cleanup Alternative 3 is the most protective of human health and the environment, because of the permanent removal and off-Site disposal of petroleum contaminated soil (PCS) beneath the Site. Implementation of Cleanup Alternatives 1 and 2 are protective of human health and environment; however, the protectiveness is slightly less due to future improper handling of the soil. All alternatives score high due lack of mobility of the contamination.
    - Alt 1 – 7, Alt 2 – 8, Alt 3 – 10 points
- **Permanence.** Cleanup Alternatives 1 and 2 score lower for this criterion compared to Cleanup Alternative 3 due to the uncertainties related to the effectiveness of environmental covenant always being followed. Cleanup Alternative 3 scores higher because it involves permanent removal and off-Site disposal of PCS. All alternatives again score high due to the lack of mobility of the contamination.
    - Alt 1 – 7, Alt 2 – 8, Alt 3 – 10 points
- **Effectiveness over the long term.** The long-term effectiveness for Cleanup Alternatives 1 and 2 is less than Cleanup Alternative 3 because of the uncertainty with respect to effectiveness and the time required to achieve the specified cleanup levels. Cleanup Alternative 2 does not scores higher than Cleanup Alternative 1 because the long-term risk balance out because of the eventual development of the Site, which will involve capping with asphalt for parking or capping

with concrete for building flooring. All alternatives again score high due to the minimal risk and the lack of mobility of the contamination.

  - Alt 1 – 8, Alt 2 – 8, Alt 3 – 10 points

- **Management of short-term risks.** The short-term risks are significantly higher for Cleanup Alternatives 2 and 3 than for Cleanup Alternative 1 because of the use of heavy equipment. Alternative 1 involves excavation, transportation, and material handling hazards. Cleanup Alternative 2 also presents a short-term risk associated with the use of hot asphalt and heavy equipment.

  - Alt 1 – 10, Alt 2 – 5, Alt 3 – 3 points

- **Technical and administrative implementability.** Cleanup Alternatives 1 and 2 will be significantly easier to administer and implement than Cleanup Alternative 3. Cleanup Alternative 3 is currently not allowed by the City of Port Orchard and would require intervention from Ecology to implement. Cleanup Alternatives 1 and 2 have a similar numerical rating for this criterion; however, Alternative 2 received a slight deduction due to the unknown nature of stormwater associated with the large impervious structure it would require.

  - Alt 1 – 10, Alt 2 – 9, Alt 3 – 1 points

When equal weighting factors are used for each of the evaluation criteria, the three cleanup alternatives achieve similar ranking scores; however, the ranking score for Cleanup Alternative 1 (8.4) is significantly higher than that of Cleanup Alternatives 2 and 3 (7.6 and 6.6, respectively).

4.6 DISPROPORTIONATE COST ANALYSIS

Costs are considered disproportionate to benefits if the incremental costs of one alternative versus a less expensive alternative exceed the incremental degree of benefit achieved by the more expensive alternative. Following is a description of the factors that were used to estimate the cost of the three alternatives discussed above.

4.6.1 Cleanup Action Alternative Cost Estimating

- **Capital costs.** These costs include expenditures for equipment, labor, and material necessary to install a remedial action. Indirect costs may be incurred for engineering, financial, or other services not directly involved with installation of remedial alternatives but necessary for completion of this activity.
- **Operation and maintenance costs.** These are post-construction costs necessary to provide effective implementation of the alternative. Such costs may include, but are not limited to, operating labor; maintenance materials and labor; disposal of residues; and administrative, insurance, and licensing costs.
- **Monitoring costs.** These costs are incurred from monitoring activities associated with remedial activities. Cost items may include sampling labor, laboratory, analyses, and report preparation.
- **Present worth analysis.** Present worth analysis provides a method of evaluating and comparing costs that occur over different time periods by discounting all future expenditures to the present year. The present worth cost or value represents the amount of money which, if invested in year 0 and disbursed as needed, would be

sufficient to cover all costs associated with a remedial alternative. The assumptions necessary to derive a present worth cost are inflation rate, discount rate, and period of performance. A discount rate, which is similar to an interest rate, is used to account for the time value of money. EPA policy on the use of discount rates for remedial investigation/feasibility (RI/FS) cost analyses is stated in the preamble to the National Oil and Hazardous Substances Pollution Contingency Plan published at the Federal Register (55 FR 8722) and in Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-20 titled *Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis* (EPA 1993). Based on the National Oil and Hazardous Substances Pollution Contingency Plan and this directive, a discount rate of 7 percent is recommended in developing present value cost estimates for remedial action alternatives during the FS. This specified rate of 7 percent represents a "real" discount rate in that it approximates the marginal pretax rate of return on an average investment in the private sector in recent years and has been adjusted to eliminate the effect of expected inflation. For this FS, a more conservative real discount rate was selected based on the December 2009 revisions to Appendix C of the OMB Circular A-94. The real discount rates used to estimate the present worth of annual operating costs are based on the estimated restoration time frame (life cycle) for each alternative and are extrapolated from the referenced OMB Circular, which is published annually.

- Because it is assumed that all capital costs are incurred in year 0, the present worth analysis is performed only on annual operation and maintenance (O&M) and groundwater monitoring costs. The total present worth for a given alternative is equal to the sum of the capital costs and the present worth of annual O&M and monitoring costs over the anticipated life cycle of the alternative.
- Using these criteria, and relying upon the assumptions outlined in Section 5.4, the present worth costs of Cleanup Alternatives 1 through 3 are:
  - Cleanup Alternative 1 - $11,866 (Table 4)
  - Cleanup Alternative 2 - $158,340 (Table 5)
  - Cleanup Alternative 3 - $799,971 (Table 6)
- As indicated above, the cost of Cleanup Alternatives 1 and 2 are significantly less than that of Cleanup Alternative 3. Chart 1 plots the relative cost and ranking scores and Chart 2 plots the cost–to-benefit ratios for the three alternatives in order to illustrate the relative cost and benefits afforded by each alternative. The charts clearly demonstrate that Cleanup Alternative 1 ranks the highest using the evaluation criteria. In addition Cleanup Alternative 1 also represents the least expensive alternative.

4.7 RECOMMENDED CLEANUP ALTERNATIVE

After performing the comparative analysis and ranking of alternatives in accordance with the MTCA evaluation criteria, Cleanup Alternative 1 is the recommended alternative. Cleanup Alternative 1 meets the threshold requirements for cleanup actions set forth in WAC 173-340-360(3) and WAC 173-340-370. Cleanup Alternative 1 is protective of human health and the environment. Because the cost associated

with Cleanup Alternative 1 are 1 to 2 orders of magnitude less than the other alternatives, and Cleanup Alternative 1 is protective of human health and the environment, both Cleanup Alternatives 2 and 3 are disproportionate in cost vs. risk reduction compared to Cleanup Alternative 1.

Upon verbal concurrence from Ecology for Cleanup Alternative 1, SoundEarth will submit a request for No Further Action with documentation of the implemented environmental covenant and City of Port Orchard notification.

5.0 REFERENCES

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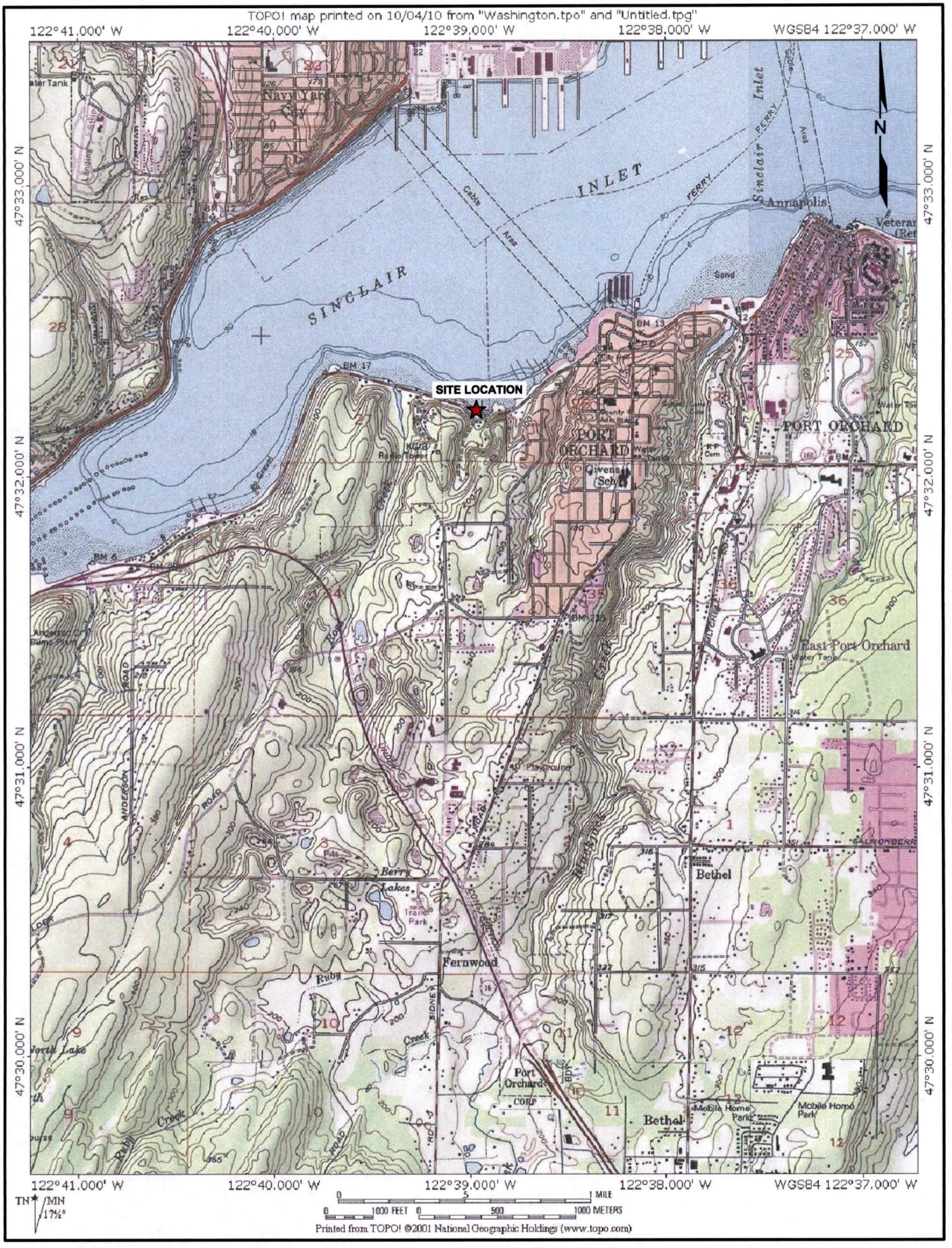
6.0 LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

FIGURES



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 10/24/2011
DRAWN BY: BLR
CHECKED BY: TWM
CAD FILE: 0644-001-01_VIC

PROJECT NAME: FORMER PORT ORCHARD BULK PLANT AND CARDLOCK
PROJECT NUMBER: 0644-001-01
STREET ADDRESS: 134 BAY STREET WEST
CITY, STATE: PORT ORCHARD, WASHINGTON

FIGURE 1
PROPERTY LOCATION MAP

4/20/2012

P:\0644 NORDIC PROPERTIES\0644-001-01 PORT ORCHARD SITE CLOSURE\FIGURES\FS\0644-001-01 VIC.DWG

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4/10/2012

P:\0644 NORDIC PROPERTIES\0644-001-01 PORT ORCHARD SITE CLOSURE\FIGURES\FS\0644_2011FS_SP.DWG

LEGEND

- MW-16 — MONITORING WELL
- MW-7 — DECOMMISSIONED MONITORING WELL
- PROPERTY BOUNDARY
- PARCEL BOUNDARY

NOTES:
MAP BASED ON SURVEY COMPLETED BY CSI SURVEYING APRIL 7, 2004

PARCEL BOUNDARIES BASED ON KITSAP COUNTY GEOGRAPHIC INFORMATION SYSTEM PARCEL SEARCH

N

~ SINCLAIR INLET ~

WASHINGTON DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY

TAX PARCEL
4623-000-004-0500

UTILITY EASEMENT

WILKINS PLACE SOUTHWEST

FOREST

TAX PARCEL
4623-000-008-0001

MW-5

MW-11

MW-1

MW-4

DOCK - 100' +/-

MW-14

TAX PARCEL
4623-000-005-0004

FOREST

MW-3

MW-15

CASECO LANE (FORMERLY WILKINS DRIVE)

MW-16

MW-13

STATE ROUTE NO. 166

MW-18

MW-17

178 FEET SOUTH

COMMERCIAL PROPERTY

MW-7

TAX PARCEL
262401-3-029-2008

SOUTHWEST WILKINS DRIVE

CASECO LANE

DITCH

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DATE:	10/18/11
DRAWN BY:	BLR
CHECKED BY:	JAC
CAD FILE:	0644_2011_FS_SP

PROJECT NAME:	FORMER PORT ORCHARD BULK PLANT AND CARDLOCK
PROJECT NUMBER:	0644-001-01
STREET ADDRESS:	134 BAY STREET WEST
CITY, STATE:	PORT ORCHARD, WASHINGTON

REGION:

0 10 20 40 80

APPROXIMATE SCALE IN FEET

FIGURE 2
TAX PARCEL LOCATIONS

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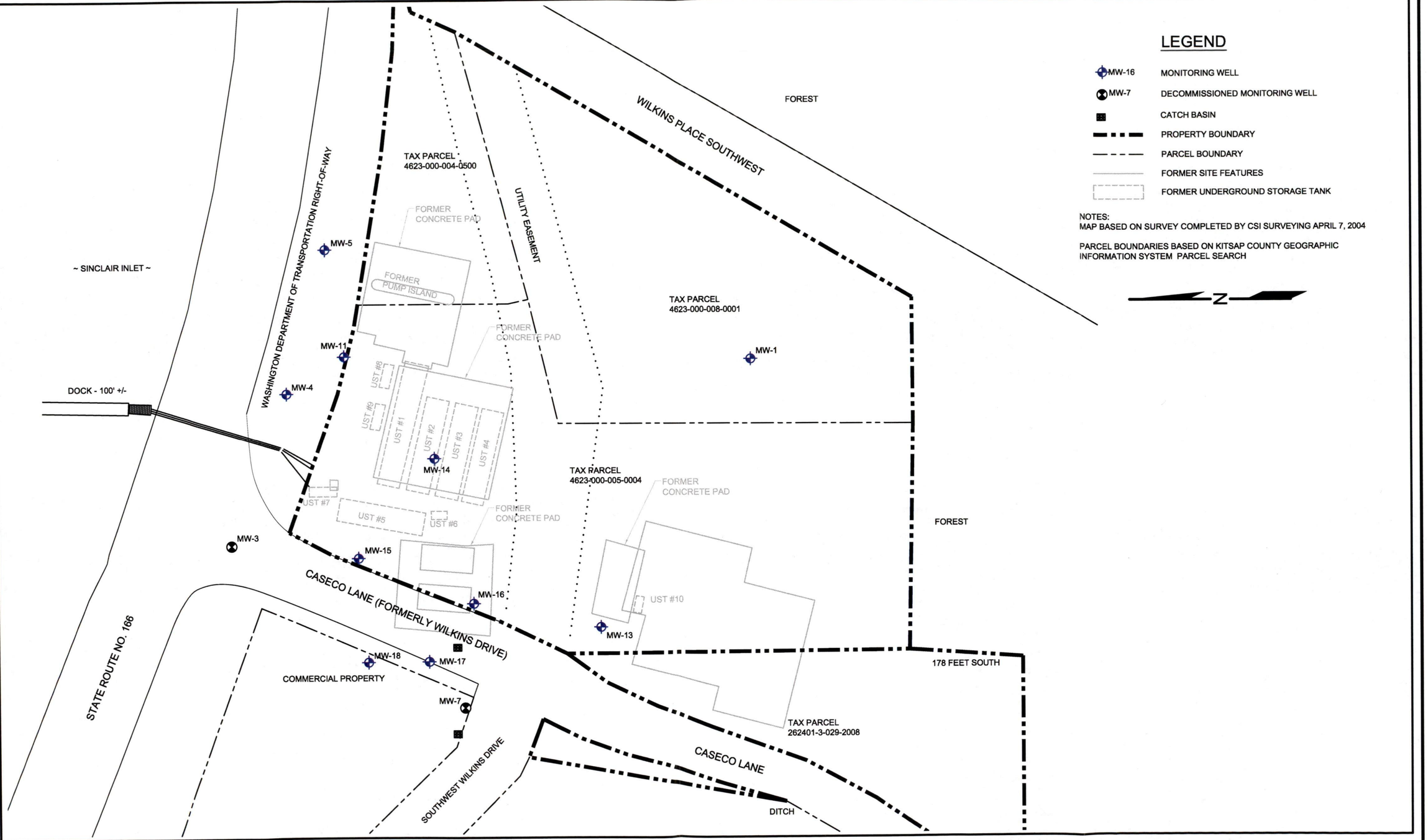

SoundEarth Strategies WWW.SOUNDEARTHINC.COM	DATE: 10/18/11 DRAWN BY: BLR CHECKED BY: JAC CAD FILE: 0644_2011FS_PP	PROJECT NAME: FORMER PORT ORCHARD BULK PLANT AND CARDLOCK PROJECT NUMBER: 0644-001-01 STREET ADDRESS: 134 BAY STREET WEST CITY, STATE: PORT ORCHARD, WASHINGTON	REGION:	0 10 20 40 80 APPROXIMATE SCALE IN FEET

FIGURE 3
PROPERTY PLAN

4/10/2012

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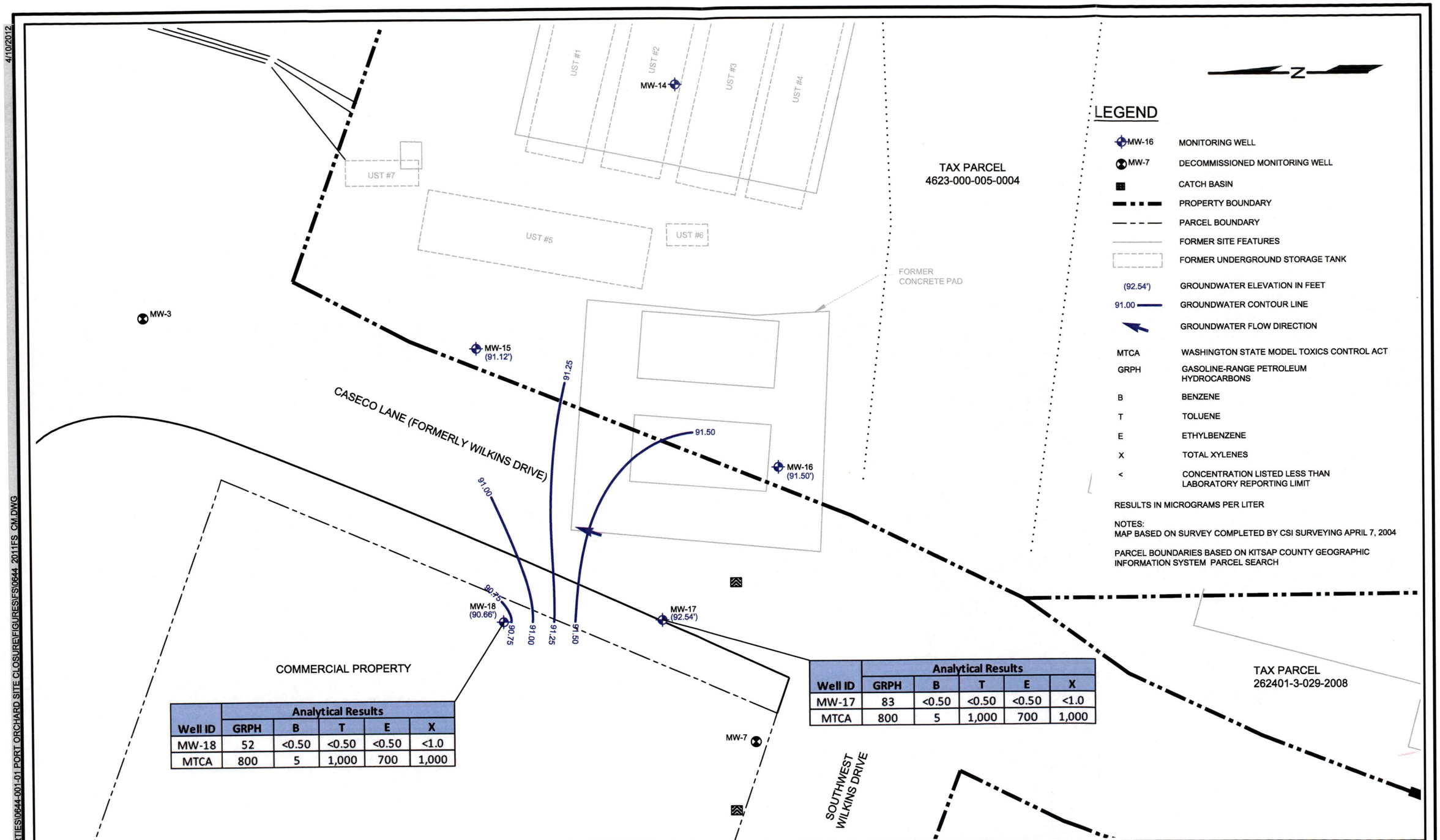

Well ID	Analytical Results				
	GRPH	B	T	E	X
MW-18	52	<0.50	<0.50	<0.50	<1.0
MTCA	800	5	1,000	700	1,000

Well ID	Analytical Results				
	GRPH	B	T	E	X
MW-17	83	<0.50	<0.50	<0.50	<1.0
MTCA	800	5	1,000	700	1,000

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DATE: 10/18/11
DRAWN BY: BLR
CHECKED BY: JAC
CAD FILE: 0644_2011FS_CM

PROJECT NAME: FORMER PORT ORCHARD BULK PLANT AND CARDLOCK
PROJECT NUMBER: 0644-001-01
STREET ADDRESS: 134 BAY STREET WEST
CITY, STATE: PORT ORCHARD, WASHINGTON

REGION:

0 15 30
APPROXIMATE SCALE IN FEET

FIGURE 4
GROUNDWATER CONTOUR MAP AND ANALYTICAL RESULTS
(JULY 5, 2011)

4/10/2012
P:\0644 NORDIC PROPERTIES\0644-001-01 PORT ORCHARD SITE CLOSURE\FIGURES\FS\0644_2011FS_CM.DWG
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4/10/2012

N

DOCK - 100' +/-

FUEL BARGE TRANSFER LINES

STATE ROUTE NO. 166

EXCAVATION #1

MW-11

MW-4

MW-14

P13
P12
P11
P10
E1-111104-01

MW-3

MW-15

MW-16

MW-7

IW-19

IW-18

IW-17

E1-101304-01

E1-101304-02
NEW-MW16-SOUTH

E1-101304-04

E1-101304-11

E1-102104-04

NEW-WILKINS RD-NORTH

NEW-WILKINS RD-SOUTH

P1
P2
P3
P4
P5
P6
P7
P8
P9

E2-102504-06

E2-102504-04

MW-13

OWS

TAX PARCEL
4623-000-008-0001

TAX PARCEL
4623-000-005-0004

TAX PARCEL
262401-3-029-2008

WILKINS DRIVE

CASECO LANE

Sample ID	Sample Date	Depth (feet)	Analytical Results		
			DRPH	GRPH	Benzene
E1-101304-01	10/13/04	4	<20	<10	0.25

Sample ID	Sample Date	Depth (feet)	Analytical Results		
			DRPH	GRPH	Benzene
E1-101304-02	10/13/04	4	140	<10	0.28

Sample ID	Sample Date	Depth (feet)	Analytical Results		
			DRPH	GRPH	Benzene
New-MW16-South	09/18/08	4-5	—	99.3	1.66

Sample ID	Sample Date	Depth (feet)	Analytical Results		
			DRPH	GRPH	Benzene
E1-101304-04	10/13/04	4	5,010	680	14.9

Sample ID	Sample Date	Depth (feet)	Analytical Results		
			DRPH	GRPH	Benzene
E2-102504-06	10/25/04	3	700	66	0.35

Sample ID	Sample Date	Depth (feet)	Analytical Results		
			DRPH	GRPH	Benzene
E2-102504-04	10/25/04	4	4,550	<10	0.17

LEGEND

- EXISTING STORM DRAIN LINE AND DIRECTION OF FLOW
- EXISTING SEWER LINE
- EXISTING WATER LINE
- EXISTING OVERHEAD POWER LINE
- AREA OF EXCAVATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- MW-16 MONITORING WELL
- MW-7 DECOMMISSIONED MONITORING WELL
- IW-19 INJECTION WELL
- P13 PUSH-PROBE BORING
- E2-102504-04 SOIL SAMPLE LOCATION
- CITY OF PORT ORCHARD WILKINS DRIVE EASEMENT
- WASHINGTON STATE DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY FOR STATE ROUTE 166
- APPROXIMATE EXTENT OF PETROLEUM CONTAMINANTS IN SOIL

ALL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

DEPTH IN FEET BELOW GROUND SURFACE

DRPH = TOTAL PETROLEUM HYDROCARBONS (TPH) AS DIESEL-RANGE ORGANICS

GRPH = TPH AS GASOLINE-RANGE ORGANICS

RED INDICATES CONCENTRATIONS EXCEED THE MTCA METHOD A CLEANUP LEVELS

< = INDICATES COMPOUND NOT DETECTED ABOVE STATED LABORATORY REPORTING LIMIT (OR METHOD LIMIT)

-- NOT ANALYZED

MTCA METHOD A = WASHINGTON STATE MODEL TOXICS CONTROL ACT

NOTES: MAP BASED ON FIGURE BY FARALLON CONSULTING LLC

PARCEL BOUNDARIES BASED ON KITSAP COUNTY GEOGRAPHIC INFORMATION SYSTEM PARCEL SEARCH

	Analytical Results		
	DRPH	GRPH	Benzene
MTCA Method A	2,000	30/100	0.03

SoundEarth Strategies
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DATE: 10/24/11
DRAWN BY: BLR
CHECKED BY: JAC
CAD FILE: 0644_2011FS_SD

PROJECT NAME: FORMER PORT ORCHARD BULK PLANT AND CARDLOCK
PROJECT NUMBER: 0644-001-01
STREET ADDRESS: 134 BAY STREET WEST
CITY, STATE: PORT ORCHARD, WASHINGTON

REGION:

0 5 10 20 40
APPROXIMATE SCALE IN FEET

FIGURE 5
PROPERTY PLAN SHOWING ESTIMATED EXTENT OF PETROLEUM-CONTAMINATED SOIL

P:\0644 NORDIC PROPERTIES\0644-001-01 PORT ORCHARD SITE CLOSURE\FIGURES\FS\0644_2009CR_SD.DWG

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4/10/2012

N

DOCK - 100' +/-

FUEL BARGE TRANSFER LINES

STATE ROUTE NO. 166

EXCAVATION #1

MW-11

MW-4

MW-14

P13
P12
P11
P10
E1-111104-01

MW-3

MW-15

WILKINS DRIVE

MW-16

P1
P2
P3
P4
P5
P6
P7
P8
P9

E1-102104-04
NEW-WILKINS RD-NORTH
NEW-WILKINS RD-SOUTH
E1-101304-11

MW-7

TAX PARCEL
4623-000-008-0001

TAX PARCEL
4623-000-005-0004

TAX PARCEL
262401-3-029-2008

OWS

IW-19

PROTECTED ENVIRONMENTAL COVENANT AREA

EXCAVATION #2

IW-18
E1-101304-01

E1-101304-02
NEW-MW16-SOUTH
IW-17

E1-101304-04

E2-102504-06

E2-102504-04

MW-13

CASECO LANE

LEGEND

- EXISTING STORM DRAIN LINE AND DIRECTION OF FLOW
- EXISTING SEWER LINE
- EXISTING WATER LINE
- EXISTING OVERHEAD POWER LINE
- AREA OF EXCAVATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- MW-16 MONITORING WELL
- MW-7 DECOMMISSIONED MONITORING WELL
- IW-19 INJECTION WELL
- P13 PUSH-PROBE BORING
- E2-102504-04 SOIL SAMPLE LOCATION
- CITY OF PORT ORCHARD WILKINS DRIVE EASEMENT
- WASHINGTON STATE DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY FOR STATE ROUTE 166
- APPROXIMATE EXTENT OF PETROLEUM CONTAMINANTS IN SOIL

SoundEarth Strategies
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DATE: 10/24/11
DRAWN BY: BLR
CHECKED BY: JAC
CAD FILE: 0644_2011FS_SD

PROJECT NAME: FORMER PORT ORCHARD BULK PLANT AND CARDLOCK
PROJECT NUMBER: 0644-001-01
STREET ADDRESS: 134 BAY STREET WEST
CITY, STATE: PORT ORCHARD, WASHINGTON

REGION:

0 5 10 20 40
APPROXIMATE SCALE IN FEET

FIGURE 6
CLEANUP ALTERNATIVE 1
ENVIRONMENTAL COVENANT

P:\0644 NORDIC PROPERTIES\0644-001-01 PORT ORCHARD SITE CLOSURE\FIGURES\FS\0644_2009CR_FIG 6.DWG

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4/10/2012

P:\0644 NORDIC PROPERTIES\0644-001-01 PORT ORCHARD SITE CLOSURE\FIGURES\FS\0644_2011FS_FIG 7.DWG

LEGEND

- MW-16 — MONITORING WELL
- MW-7 — DECOMMISSIONED MONITORING WELL
- CATCH BASIN
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- FORMER SITE FEATURES
- FORMER UNDERGROUND STORAGE TANK
- EXISTING ASPHALT
- NEW ASPHALT CAP

NOTES:
MAP BASED ON SURVEY COMPLETED BY CSI SURVEYING APRIL 7, 2004

PARCEL BOUNDARIES BASED ON KITSAP COUNTY GEOGRAPHIC INFORMATION SYSTEM PARCEL SEARCH

N

~ SINCLAIR INLET ~

DOCK - 100' +/-

WASHINGTON DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY

STATE ROUTE NO. 166

TAX PARCEL
4623-000-004-0500

UTILITY EASEMENT

WILKINS PLACE SOUTHWEST

FOREST

FORMER CONCRETE PAD

FORMER PUMP ISLAND

FORMER CONCRETE PAD

FORMER CONCRETE PAD

MW-5

MW-11

MW-4

MW-14

MW-3

MW-15

MW-16

MW-18

MW-17

MW-7

UST #1

UST #2

UST #3

UST #4

UST #5

UST #6

UST #7

UST #8

UST #9

UST #10

TAX PARCEL
4623-000-008-0001

MW-1

TAX PARCEL
4623-000-005-0004

FOREST

MW-13

178 FEET SOUTH

CASECO LANE (FORMERLY WILKINS DRIVE)

COMMERCIAL PROPERTY

TAX PARCEL
262401-3-029-2008

SOUTHWEST WILKINS DRIVE

CASECO LANE

DITCH

DATE:	10/18/11
DRAWN BY:	BLR
CHECKED BY:	JAC
CAD FILE:	0644_2011FS_PP

SoundEarth Strategies
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PROJECT NAME:	FORMER PORT ORCHARD BULK PLANT AND CARDLOCK
PROJECT NUMBER:	0644-001-01
STREET ADDRESS:	134 BAY STREET WEST
CITY, STATE:	PORT ORCHARD, WASHINGTON

REGION:

0 10 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 7
CLEANUP ALTERNATIVE 2
CONTAINMENT CAP

WWW.SOUNDEARTHINC.COM

4/20/2012

N

EXCAVATION #1

MW-11

MW-4

DOCK - 100' +/-

FUEL BARGE TRANSFER LINES

STATE ROUTE NO. 166

P13
P12
P11
P10
E1-111104-01

MW-14

TAX PARCEL
4623-000-008-0001

OWS

TAX PARCEL
4623-000-005-0004

IW-19

BULK EXCAVATION LIMITS

EXCAVATION #2

MW-3

MW-15

E1-101304-01

IW-18

E1-101304-02
NEW-MW16-SOUTH

IW-17

E2-102504-06

P1
P2
P3
MW-16

E1-101304-04

E2-102504-04

MW-13

P4
P5
E1-101304-11

P9
P8
P7
E1-102104-04
NEW-WILKINS RD-NORTH

P6
NEW-WILKINS RD-SOUTH

WILKINS DRIVE

MW-7

TAX PARCEL
262401-3-029-2008

CASECO LANE

LEGEND

- EXISTING STORM DRAIN LINE AND DIRECTION OF FLOW
- EXISTING SEWER LINE
- EXISTING WATER LINE
- EXISTING OVERHEAD POWER LINE
- AREA OF EXCAVATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- MW-16 MONITORING WELL
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SoundEarth Strategies
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DATE: 10/24/11
DRAWN BY: BLR
CHECKED BY: JAC
CAD FILE: 0644_2011FS_SD

PROJECT NAME: FORMER PORT ORCHARD BULK PLANT AND CARDLOCK
PROJECT NUMBER: 0644-001-01
STREET ADDRESS: 134 BAY STREET WEST
CITY, STATE: PORT ORCHARD, WASHINGTON

REGION:

0 5 10 20 40
APPROXIMATE SCALE IN FEET

FIGURE 8
CLEANUP ALTERNATIVE 3
BULK EXCAVATION WITH OFF-SITE DISPOSAL

P:\0644 NORDIC PROPERTIES\0644-001-01 PORT ORCHARD SITE CLOSURE\FIGURES\0644_2009CR_FIG 8.DWG

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TABLES

SoundEarth Strategies

Table 1
Summary of Soil Analytical Results
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

Sample ID	Date	Sample Type	Depth (feet)[1]	Analytical Results (mg/kg)						
				DRPH[2]	ORPH[2]	GRPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Xylenes[4]
Excavation 1										
E1-101104-01	10/11/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-02	10/11/04	BTM	6	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-03	10/11/04	BTM	7-8	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-04	10/11/04	SD-E	7	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-05	10/11/04	BTM	12-13	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-05 Dup	10/11/04	LD	12-13	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-06	10/11/04	BTM	12-13	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-07	10/11/04	SD-E	8-9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-08	10/11/04	SD-NE	7-8	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101104-09	10/11/04	BTM	9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-01	10/12/04	SD-S	8-9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-02	10/12/04	SD-S	8-9	1,010	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-03	10/12/04	SD-N	9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-04	10/12/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-04 Dup	10/12/04	LD	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-05	10/12/04	SD-S	8-9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-06	10/12/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-07	10/12/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-08	10/12/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101204-09	10/12/04	SD-N	9	<20	—	<10	**0.036**	0.07	<0.05	0.30
E1-101204-09 Dup	10/12/04	LD	12	--	—	<10	**0.042**	<0.05	<0.05	0.31
E1-101204-11	10/12/04	FD	12	<20	—	12	**0.060**	0.10	0.06	0.50
E1-101204-10	10/12/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101304-01	10/13/04	SD-S	4	<20	—	<10	**0.25**	<0.05	0.07	0.14
E1-101304-02	10/13/04	SD-S	4	140	—	<10	**0.28**	<0.05	0.16	<0.05
E1-101304-03	10/13/04	FD	4	260	—	**46**	**1.24**	<0.05	1.39	0.83
E1-101304-04	10/13/04	SD-S	4	**5,010**	—	**680**	**14.9**	6.20	**15.7**	**16.3**
E1-101304-05	10/13/04	BTM	6	<20	—	<10	**0.084**	<0.05	<0.05	<0.05
E1-101304-06	10/13/04	BTM	8-9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101304-06 Dup	10/13/04	BTM	8-9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101304-07	10/13/04	PCS	5	560	—	21	**0.70**	<0.05	0.69	1.02
E1-101304-08	10/13/04	BTM	6	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101304-09	10/13/04	SD-S	5	<20	—	<10	**0.14**	<0.05	<0.05	<0.05
E1-101304-10	10/13/04	FD	5	22	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101304-11	10/13/04	SD-S	4	<20	—	**47**	**0.88**	0.22	0.98	2.35
MTCA Method A Cleanup Levels for Soil[5]				**2,000**	**2,000**	**30/100[a]**	**0.03**	**7**	**6**	**9**

SoundEarth Strategies

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134 Bay Street West
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Sample ID	Date	Sample Type	Depth (feet)[1]	Analytical Results (mg/kg)						
				DRPH[2]	ORPH[2]	GRPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Xylenes[4]
Excavation 1										
E1-101304-12	10/13/04	PERF	6	990	—	**145**	**2.91**	6.44	**31.1**	**48.5**
E1-101404-01	10/14/04	BTM	8	<20	—	<10	**0.32**	0.09	0.07	0.35
E1-101404-01 Dup	10/14/04	LD	8	<20	—	<10	**0.29**	0.07	0.07	0.25
E1-101404-02	10/14/04	BTM	8	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101404-03	10/14/04	BTM	8-9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101404-04	10/14/04	BTM	8	<20	—	<10	**0.031**	<0.05	<0.05	<0.05
E1-101404-05	10/14/04	SD-E	8	<10	<25	1.39	<0.0164	0.0514	0.0103	0.0403
E1-101404-06	10/14/04	SD-S	8-9	17.5	<25	0.921	<0.0160	0.0161	0.000637	0.0249
E1-101404-07	10/14/04	BTM	12-13	<10	<25	1.59	<0.0190	0.0193	0.0109	0.038
E1-101404-08	10/14/04	BTM	9	<10	<25	5.18	<0.0161	0.012	<0.00536	0.15
E1-101404-09	10/14/04	BTM	9-10	<20	—	<10	**0.23**	<0.05	<0.05	0.07
E1-101404-10	10/14/04	SD-NE	8-9	<20	—	<10	**0.061**	<0.05	<0.05	0.12
E1-101404-11	10/14/04	SD-NE	9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101404-12	10/14/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-01	10/15/04	SD-N	9	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-02	10/15/04	BTM	12	<20	—	<10	0.026	<0.05	<0.05	<0.05
E1-101504-02 Dup	10/15/04	LD	12	<20	—	<10	0.027	<0.05	<0.05	<0.05
E1-101504-03	10/15/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-04	10/15/04	BTM	12-13	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-05	10/15/04	BTM	11-12	<20	—	<10	**0.13**	<0.05	<0.05	0.05
E1-101504-06	10/15/04	SD-N	9-10	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-07	10/15/04	SD-N	9	<20	—	**1,150**	**0.44**	4.44	**48.8**	**194**
E1-101504-08	10/15/04	BKFL-OB	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-09	10/15/04	FD	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-10	10/15/04	BKFL-OB	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-11	10/15/04	BKFL-IMP	N/A	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-12	10/15/04	BKFL-IMP	N/A	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101504-12 Dup	10/15/04	LD	N/A	<20	—	—	—	—	—	—
E1-101504-13	10/15/04	SD-N	5	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101804-01	10/18/04	BTM	11	<20	—	<10	**0.042**	<0.05	<0.05	<0.05
E1-101804-01 Dup	10/18/04	LD	11	<20	—	<10	**0.033**	<0.05	<0.05	<0.05
E1-101804-02	10/18/04	BTM	12-13	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101804-03	10/18/04	SD-W	8	180	—	**38**	**0.55**	0.08	0.35	0.45
E1-101804-04	10/18/04	BTM	12-13	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101804-05	10/18/04	SD-W	10	**2,900**	—	<10	**0.31**	<0.05	<0.05	0.06
E1-101904-01	10/19/04	BTM	11-12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101904-01 Dup	10/19/04	LD	11-12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101904-02	10/19/04	SD-W	9-10	<20	—	<10	0.028	0.06	<0.05	0.11
MTCA Method A Cleanup Levels for Soil[5]				**2,000**	**2,000**	**30/100[a]**	**0.03**	**7**	**6**	**9**

SoundEarth Strategies

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				DRPH[2]	ORPH[2]	GRPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Xylenes[4]
Excavation 1										
E1-101904-03	10/19/04	BTM	12	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101904-04	10/19/04	SD-W	9	<20	—	<10	**0.18**	<0.05	<0.05	0.13
E1-101904-05	10/19/04	BTM	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-101904-06	10/19/04	FD	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102004-01	10/20/04	TP	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102004-01 Dup	10/20/04	LD	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102004-02	10/20/04	TP	3-4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102004-03	10/20/04	TP	6	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102004-04	10/20/04	BTM	12	<20	—	<10	0.021	<0.05	<0.05	<0.05
E1-102004-06	10/20/04	BTM	12	<20	—	<10	0.022	<0.05	<0.05	<0.05
E1-102104-01	10/21/04	SDW	9-10	<20	—	18	<0.02	<0.05	0.11	0.89
E1-102104-02	10/21/04	SD-W	9-10	<20	—	20	0.024	0.05	0.08	0.39
E1-102104-03	10/21/04	SD-W	9-10	420	—	**350**	**2.77**	**12.9**	**13.9**	**55.1**
E1-102104-04	10/21/04	SD-W	9-10	21.7	77.1	22.6	**0.14**	0.11	0.158	0.654
E1-102104-05	10/21/04	BTM	13-14	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102104-06	10/21/04	SD-N	11	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102104-07	10/21/04	FD	11	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102104-08	10/21/04	SD-N	8-9	<20	870	28	**1.22**	0.07	<0.05	0.13
E1-102104-10	10/21/04	SD-N	8	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102104-10 Dup	10/21/04	LD	8	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102204-01	10/22/04	SD-NW	8	<20	—	22	0.021	<0.05	0.10	0.32
E1-102204-02	10/22/04	SD-SW	8	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E1-102604-01	10/26/04	BTM	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E1-102604-02	10/26/04	TP	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E1-111004-01	11/10/04	SD-S	5-6	—	—	1.9	<0.0138	0.021	0.01	0.045
E1-111004-02	11/10/04	SD-S	3-4	—	—	1.7	<0.0147	0.016	0.008	0.029
E1-111104-01	11/11/04	SD-N	9	—	—	1.8	**0.035**	0.036	0.032	0.099
E1-111104-02	11/11/04	BTM	13	—	—	1.2	<0.0160	0.012	0.007	<0.195
E1-111104-03	11/11/04	SD-N	11-12	—	—	28.4	<0.0166	0.112	0.153	0.453
E1-111204-01	11/11/04	SN-N	5-6	—	—	1.8	<0.0177	0.020	0.012	0.045
Excavation 2										
E2-102004-01	10/20/04	TP	5-6	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E2-102004-02	10/20/04	TP	8	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E2-102004-03	10/20/04	TP	2-3	**3,600**	—	<10	<0.02	0.09	<0.05	0.53
E2-102004-04	10/20/04	FD	2-3	**2,900**	—	<10	<0.02	0.22	<0.05	1.14
E2-102004-05	10/20/04	TP	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E2-102004-06	10/20/04	TP	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E2-102004-06 Dup	10/20/04	LD	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
MTCA Method A Cleanup Levels for Soil[5]				**2,000**	**2,000**	**30/100[a]**	**0.03**	**7**	**6**	**9**

SoundEarth Strategies

Table 1
Summary of Soil Analytical Results
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

Sample ID	Date	Sample Type	Depth (feet)[1]	Analytical Results (mg/kg)						
				DRPH[2]	ORPH[2]	GRPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Xylenes[4]
Excavation 2										
E2-102004-07	10/20/04	TP	3	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E2-102004-08	10/20/04	TP	4	<20	—	<10	<0.02	<0.05	<0.05	<0.05
E2-102004-09	10/20/04	TP	4	<20	—	<10	<0.02	<0.05	<0.05	0.05
E2-102004-10	10/20/04	TP	3	430	—	<10	<0.02	<0.05	<0.05	<0.05
E2-102204-01	10/22/04	BTM	5-6	<20	<40	<10	0.024	<0.05	<0.05	<0.05
E2-102204-02	10/22/04	SD-W	4-5	**6,230**	<40	<10	**0.27**	<0.05	<0.05	<0.05
E2-102204-03	10/22/04	PCS	3	**3,420**	<40	<10	**0.041**	0.042	<0.05	0.62
E2-102204-04	10/22/04	PCS	4	**2,850**	<40	<10	**0.30**	0.11	<0.05	0.22
E2-102204-04 Dup	10/22/04	LD	4	**2,560**	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102204-05	10/22/04	SD-E	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102204-06	10/22/04	BTM	5	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102204-07	10/22/04	SD-W	4	**4,480**	<40	<10	**0.45**	<0.05	<0.05	0.98
E2-102204-08	10/22/04	BTM	5-6	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102204-09	10/22/04	BTM	5-6	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102204-10	10/22/04	SD-W	4	850	<40	<10	0.026	<0.05	<0.05	0.31
E2-102204-11	10/22/04	BTM	5	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102204-11 Dup	10/22/04	LD	5	<20	<40	—	—	—	—	—
E2-102504-01	10/25/04	SD-W	5	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102504-01`Dup	10/25/04	LD	5	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102504-02	10/25/04	FD	5	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102504-03	10/25/04	SD-S	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102504-04	10/25/04	SD-N	4	**4,550**	<40	<10	**0.17**	0.25	<0.05	0.08
E2-102504-05	10/25/04	SD-N	3	680	<40	<10	<0.02	<0.05	0.09	0.23
E2-102504-06	10/25/04	SD-N	3	700	<40	**66**	**0.35**	<0.05	1.07	0.89
E2-102504-07	10/25/04	SD-W	5	420	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102504-08	10/25/04	BTM	5-6	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102504-09	10/25/04	SD-S	4-5	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102504-010	10/25/04	SD-E	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102604-01	10/26/04	SD-N	3	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102604-01 Dup	10/26/04	LD	3	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102604-02	10/26/04	SD-E	3-4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102604-03	10/26/04	BTM	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102604-04	10/26/04	FD	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102604-05	10/26/04	SD-N	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102604-06	10/26/04	SD-N	4	<20	<40	<10	<0.02	<0.05	<0.05	<0.05
E2-102704-01	10/27/04	BTM	5	10.2	30.4	1.37	<0.0169	0.0242	0.00948	0.0349
E2-102704-04	10/27/04	SD-E	4	<10.0	<25.0	1.59	<0.016	0.022	0.00961	0.0345
E2-102704-05	10/27/04	SD-N	4	30.2	45.7	10.8	0.0226	0.0372	0.0597	0.192
MTCA Method A Cleanup Levels for Soil[5]				**2,000**	**2,000**	**30/100[a]**	**0.03**	**7**	**6**	**9**

SoundEarth Strategies

Table 1
Summary of Soil Analytical Results
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

Sample ID	Date	Sample Type	Depth (feet)[1]	Analytical Results (mg/kg)						
				DRPH[2]	ORPH[2]	GRPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Xylenes[4]
Soil Borings										
New-Wilkins-Road-North	09/18/08	Boring	9-10	—	—	<4.86	<0.0292	<0.0486	<0.0486	<0.0973
New-Wilkins-Road-South	09/18/08	Boring	4-5	—	—	90.7	<0.0495	<0.0824	<0.0824	<0.165
New-MW16-South	09/18/08	Boring	4-5	—	—	**99.3**	**1.66**	0.161	0.641	0.694
MTCA Method A Cleanup Levels for Soil[5]				**2,000**	**2,000**	**30/100[a]**	**0.03**	**7**	**6**	**9**

NOTES:

Red denotes concentration exceeds MTCA Method A cleanup levels for groundwater.

Samples analyzed by TestAmerica Laboratories, Inc. of Bothell, Washington. Data collected prior to 09/18/08 provided by previous consultants.

[1]Depth collected in feet below ground surface.

[2]Analyzed by Method NWTPH-Dx.

[3]Analyzed by Method NWTPH-Gx.

[4]Analyzed by EPA Method 8021B.

[5]MTCA Method A Cleanup Levels, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.

[a]The cleanup level for GRPH is 30 mg/kg when benzene is present and 100 mg/kg when benzene is not present.

— = not analyzed

< = not detected at a concentration exceeding the laboratory reporting limit

BKFL-IMP = Sample of imported backfill soil

BKFL-OB = Sample of overburden soil used as excavation backfill

BTM = Excavation bottom confirmation sample

DRPH = diesel-range petroleum hydrocarbons

EPA = U.S. Environmental Protection Agency

FD = Field duplicate sample

GRPH = gasoline-range petroleum hydrocarbons

LD = Laboratory selected sample duplicate analysis of preceeding sample

mg/kg - milligrams per kilogram

MTCA = Washington State Model Toxics Control Act Cleanup Regulation

N/A = not applicable

NWTPH = Northwest total Petroleum hydrocarbon

ORPH = oil-range petroleum hydrocarbons

PCS = petrolum contaminated soil

PERF = performance sample

SD-X = Excavation sidewall confirmation sample with ordinal sidewall designation (N,S,E,W)

TP = Test pit excavation sample

SoundEarth Strategies

Table 2
Summary of Groundwater Analytical Results
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

Well ID	Sample Identification	Sample Date	Depth to Groundwater[1] (feet)	Groundwater Elevation[2] (feet)	Analytical Results (micrograms per Liter)					
					DRPH[3]	GRPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]
MW-1	MW1-011305	01/13/05	Artesian	103.34+	<250	<50	<0.5	<0.5	<0.5	<1.0
TOC: 103.34	—	03/25/05		103.34+	—	—	—	—	—	—
	—	06/23/05		103.34+	—	—	—	—	—	—
MW-3	MW3-011305	01/13/05	11.65	89.35	<250	<50	<0.5	<0.5	<0.5	<1.0
TOC: 101	MW3-032505	03/25/05	11.90	89.10	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW3-062305	06/23/05	11.74	89.26	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW3-092805	09/28/05	12.32	88.68	<250	<100	<1.0	<1.0	<1.0	<3.0
	Decommissioned on 12/12/2005.									
MW-4	MW4-011305	01/13/05	8.90	92.48	<250	<50	0.635	0.726	0.641	1.89
TOC: 101.38	MW4-032505	03/25/05	8.92	92.46	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW4-062305	06/23/05	9.34	92.04	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW4-092805	09/28/05	9.29	92.09	<250	<100	<1.0	<1.0	<1.0	<3.0
MW-5	MW5-011305	01/13/05	Artesian	100.43+	<250	<50	<0.5	<0.5	<0.5	<1
TOC: 100.43	—	03/25/05		100.43+	—	—	—	—	—	—
	—	06/23/05		100.43+	—	—	—	—	—	—
MW-7	MW7-011305	01/13/05	5.80	93.70	<250	<50	<0.5	<0.5	<0.5	<1.0
TOC: 99.5	—	03/25/05	Paved Over							
MW-11	MW11-011305	01/13/05	7.32	94.38	<250	<50	<0.5	<0.5	<0.5	<1.0
TOC: 101.7	—	03/25/05	7.38	94.32	—	—	—	—	—	—
	—	06/23/05	7.30	94.40	—	—	—	—	—	—
MW-13	MW13-011305	01/13/05	1.49	98.61	296	<50	0.868	<0.5	<0.5	<1.0
TOC: 100.1	MW13-032505	03/25/05	1.83	98.27	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW13-062305	06/23/05	2.00	98.10	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW13-092805	09/28/05	2.07	98.03	<250	<100	<1.0	<1.0	<1.0	<3.0
MW-14	MW14-011305	01/13/05	Artesian	100.84+	<250	<50	<0.5	<0.5	<0.5	<1.0
TOC: 100.84	MW14-032505	03/25/05		100.84+	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW14-062305	06/23/05		100.84+	<250	<50	<0.5	<0.5	<0.5	<1.0
	MW14-092805	09/28/05	0.30	100.54	<250	<100	<1.0	<1.0	<1.0	<3.0
MW-15	MW15-011305	01/13/05	9.33	90.64	<250	<50	<0.5	<0.5	<0.5	<1.0
TOC: 99.97	MW15-032505	03/25/05	9.10	90.87	<250	<50	<0.5	1.18	<0.5	1.77
	MW15-062305	06/23/05	9.09	90.88	<250	<50	<0.5	<0.5	<0.5	<1
	MW15-092805	09/28/05	9.21	90.76	<250	<100	<1.0	<1.0	<1.0	<3.0
TOC: 99.85	N/A	07/05/11	8.73	91.12	—	—	—	—	—	—
MW-16	MW16-011305	01/13/05	7.64	91.70	<250	<50	0.621	<0.5	<0.5	<1.0
TOC: 99.34	MW16-032505	03/25/05	7.51	91.83	<250	59.3	**21.2**	<0.5	<0.5	<1.0
	MW16-062305	06/23/05	7.53	91.81	<250	175	**61.6**	<0.5	0.546	<1
	MW16-092805	09/28/05	7.60	91.74	<250	<100	**10**	<1.0	<1.0	<3.0
	MW16-091407	09/14/07	7.55	91.79	—	133	**57.1**	<0.500	<0.500	<1.00
	MW16-20071220	12/20/07	7.49	91.85	—	<50	**59.3**	<0.500	<0.500	<1.00
	MW16-20080318	03/18/08	—	—	—	251	**89.7**	0.633	<0.500	<1.00
	MW16-20080623	06/23/08	7.25	92.09	—	124	**46.3**	<0.500	<0.500	<1.00
	MW16-20081230	12/30/08	7.17	92.17	—	<50	1.14	<0.500	<0.500	<1.00
	MW16-20090309	03/09/09	7.49	91.85	—	<50	2.13	<0.500	<0.500	<1.00
	MW16-20090608	06/08/09	7.69	91.65	—	<50	0.846	<0.500	<0.500	<1.00
	MW16-20090917	09/17/09	7.86	91.48	—	<50	<1.0	<1.0	<1.0	<3.0
	MW16-20091214	12/14/09	7.88	91.46	—	<50	<1.0	<1.0	<1.0	<3.0
	N/A	07/05/11	7.84	91.50	—	—	—	—	—	—
MW-17 TOC: 98.89	MW17-20110705	07/05/11	6.35	92.54	—	83	<0.50	<0.50	<0.50	<1.0
MW-18 TOC: 99.50	MW18-20110705	07/05/11	8.84	90.66	—	52	<0.50	<0.50	<0.50	<1.0
MTCA Method A Cleanup Levels for Groundwater[6]					**500**	**800**	**5**	**1,000**	**700**	**1,000**

NOTES:

Red denotes concentrations exceeding MTCA Method A Cleanup Levels for Groundwater.

Samples analyzed by TestAmerica Laboratories, Inc. of Bothell, Washington or Friedman & Bruya, Inc. of Seattle, Washington.
Data collected prior to 09/19/05 provided by previous consultants.

[1]Measured in feet below a fixed spot on the well casing rim.

[2]Elevations relative to a temporary benchmark with an assumed elevation of 100.00 feet.

[3]Analyzed by Method NWTPH-Dx.

[4]Analyzed by Method NWTPH-Gx.

[5]Analyzed by EPA Method 8021B.

[6]MTCA Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.

— = not analyzed/not measured
< = not detected at a concentration exceeding the laboratory reporting limit
Artesian = Groundwater level observed above top of well casing
DRPH = diesel-range petroeum hydrocarbons
EPA = U.S. Environmental Protection Agency
GRPH = gasoline-range petroleum hydrocarbons
MTCA = Model Toxics Control Act
N/A = not applicable
NWTPH = Northwest Total Petroleum Hydrocarbons
TOC = top of casing elevation (feet)

SoundEarth Strategies

Table 3
Remedial Component Screening Matrix
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

Component Group	Component Options	Retained for Inclusion in Cleanup Action Alternatives?	Rationale for Inclusion or Exclusion
Passive Remediation			
	Monitored Natural Attenuation	No	Groundwater is shown to be below MTCA Method A cleanup levels; therefore, monitoring is not needed.
	Containment Cap	Yes	Retained as a component of all cleanup alternatives. Not retained for use as a sole administrative or engineering control.
	Environmental Covenant	Yes	Not retained for inclusion with cleanup action alternatives as a containment cap is not required for the on-Property impacts and is no enforceable at off-Property locations.
In Situ Physical Treatment			
	SVE	No	Soil contamiantion left inplace includes diesel, which is not impacted by SVE.
	Air Sparging	No	Not retained due to site conditions. Groundwater is below cleanup levels and the soil would need wells installed through the high pressure water pipe. In addition,the extra oxygen could attack the cast iron pipe, shortening the life of the pipe.
	Surfactant Washing	No	Not retained as this technology is mediated in the saturated zone and is not effective in treating unsaturated zone soil contamination.
	Co solvent Washing	No	
	Pump and Treat	No	Groundwater is shown to be below MTCA Method A cleanup levels; therefore, pumping clean water would not further the remediation o the soil.
	DPE	No	Groundwater is shown to below MTCA Method A cleanup levels; therefore, pumping clean water would not further the remediatior process.
In Situ Thermal			
	Resistive Thermal with SVE	No	Although these in situ thermal technologies generally satisfy all of the MTCA threshold and modifying evaluation criteria, none are retained because they are impossible to implement with utilities located in the impacted area.
	Conductive Thermal with SVE	No	
	Radio Frequency/Electromagnetic Thermal with SVE	No	
	Steam Injection with SVE and Groundwater Extraction	No	
	Hot Air Injection with SVE	No	
	Hot Water Injection with SVE and Groundwater Extraction	No	
Source Removal			
	Excavation without Shoring	Yes	This technology has been retained as it is the only technology that could be successful, even though the City of Port Orchard prohibits the action.
	Excavation with Shoring	No	Shoring not required for excavation.
	Secant Pile Wall - Impuervious Wall	No	
	Sheet Pile Wall - Impervious Wall	No	
	Soldier Pile Wall - Non-Impervious Wall	No	

SoundEarth Strategies

Table 3
Remedial Component Screening Matrix
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

Component Group	Component Options	Retained for Inclusion in Cleanup Action Alternatives?	Rationale for Inclusion or Exclusion
Ex Situ Source Treatment			
	Surfactant Washing	No	Not retained because these components are not cost competitive with other technologies at this scale and would result in another waste stream requiring disposal.
	Co solvent Washing	No	
	Chemical Oxidation	No	
	Thermal Desorption	Yes	Retained - This technology is cost-competitive and provides more permanence than other component technologies in this category.
	Landfill Disposal	Yes	Retained - This technology is retained.
In Situ Chemical Oxidation			
	Heated Sodium Persulfate	No	Will not be successful in vadose zone remediation / unproven.
	Hydrogen Peroxide	No	
	Permanganate	No	
	RegenOx™ (Catalyzed Sodium Percarbonate)	No	
	Fenton's Reagent	No	
Containment/Immobilization			
	Bituminization	No	None of these technologies are better than current site conditions, as groundwater meets MTCA Method A cleanup levles.
	Emulsified Asphalt	No	
	Modified Sulfur Cement	No	
	Polyethylene Extrusion	No	
	Pozzolan/Portland Cement	No	
	Vitrification/Molten Glass	No	
	Slurry Wall Containment	No	
	Sheet Pile Wall Containment	No	
	Pump and Treat for Hydraulic Containment	No	
Phytoremediation			
	Hydraulic Control	No	Not retained because groundwater is not above MTCA Method A cleanup levels.
	Phyto-Degradation	No	
	Phyto-Volatilization	No	
	Phyto-Accumulation	No	
	Phyto-Stabilization	No	
	Enhanced Rhizosphere Biodegradation	No	
In Situ Bioremediation			
	Aerobic Bioremediation	No	Not retained because the limiting compound required for aerobic bioremediation is oxygen and the oxygen may attack the utilities in the impacted area.
	Anaerobic Bioremediation	No	Not effective in treating COCs.

NOTES:

COC = Chemical of Concern

DPE = Dual-Phase Extraction

MTCA = Washington State Model Toxics Control Act

SVE = Soil Vapor Extraction

SoundEarth Strategies

Table 4
Feasibility Level Cost Estimate
Cleanup Alternative 1, Environmental Convenant
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

CAPITAL COST ITEM	QTY	UNIT	UNIT PRICE	COST	TOTALS
Covenant Paper Work					
Letter and meeting with City of Port Orchard	1	per permit	$4,000	$4,000	
Title fee (covenant)	1	per permit	$500	$500	
Subtotal				*$4,500*	
TOTAL CAPITAL COST					**$6,367**

O&M COST ITEM	ANNUAL COST[1]	Present Worth Cost of Annual O&M Real Discount Rate = 0.9%	
		n = 20 years	
5 year site review	$1,500	$5,500	
TOTAL PRESENT WORTH O&M COST			**$5,500**
TOTAL PRESENT WORTH COST OF ALTERNATIVE 3			**$11,866**

NOTES:

[1]Annual cost is 2011 year cost.

n = number of years of operation and maintenance

O&M = operation and maintenance

QTY = quantity

SoundEarth Strategies

Table 5
Feasibility Level Cost Estimate
Cleanup Alternative 2, Containment Cap
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

CAPITAL COST ITEM	QTY	UNIT	UNIT PRICE	COST	TOTALS
Covenant Paper Work					
Letter and meeting with City of Port Orchard	1	per estimate	$4,000	$4,000	
Title Fee (covenant)	1	per estimate	$500	$500	
Permit	1	per permit	$2,500	$2,500	
Subtotal				*$7,000*	
Cap Installation					
Geotechnical oversight	1	ls	$2,500	$2,500	
Gravel preparation	26,000	sf	$0.5	$13,000	
Well abandonment within proposed excavation	36,000	sf	$2	$72,000	
Signage rental	4	day	$50	$200	
Flaggers	2	day	$415	$830	
Subtotal	0			*$88,530*	
Labor and Other Direct Costs					
Professional labor	1	ls	$12,000	$12,000	
Other direct costs (reprographics, courier services)	1	ls	$500	$500	
Subtotal	0			*$12,500*	
CONSTRUCTION SUBTOTAL	0				$108,030
Mobilization, Contingencies, and Demobilization					
Mobilization (3% of construction subtotal)				$3,241	
Bid (10% of construction subtotal)				$10,803	
Scope (15% of construction subtotal)				$16,205	
Cleanup and demobilization (3% of construction subtotal)				$3,241	
Subtotal				*$33,489*	
CONSTRUCTION TOTAL					$141,519
Indirect Capital Costs					
Engineering construction services (8% of construction total)				$11,322	
Subtotal				*$11,322*	
TOTAL CAPITAL COST					**$152,841**

O&M COST ITEM	ANNUAL COST[1]	Present Worth Cost of Annual O&M Real Discount Rate = 0.9%	
		n = 20 years	
5 year site review	$1,500	$5,500	
TOTAL PRESENT WORTH O&M COST			**$5,500**
TOTAL PRESENT WORTH COST OF ALTERNATIVE 3			**$158,340**

NOTES:

[1]Annual cost is 2011 year cost.

ls = lump sum
n = number of years of operation and maintenance
O&M = operation and maintenance
QTY = quantity
sf = square feet

SoundEarth Strategies

Table 6
Feasibility Level Cost Estimate
Cleanup Alternative 3
Bulk Excavation with Off-Site Disposal
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

CAPITAL COST ITEM	QTY	UNIT	UNIT PRICE	COST	TOTALS
Permitting (excludes labor)					
Traffic control and truck route haul plans	1	per permit	$2,000	$2,000	
Right-of-way permit fees	1	per permit	$2,000	$2,000	
Utilities permit	1	per permit	$5,000	$5,000	
Shoring and grading permit fees	1	per permit	$5,000	$5,000	
Subtotal				*$14,000*	
Geotechnical/Structural Engineering Support Services					
Geotechnical and Structural Design (new water line)	1	ls	$10,000	$10,000	
Subtotal				*$10,000*	
Excavation					
Geotechnical oversight	1	ls	$20,000	$20,000	
Pre installation of new water line	600	lf	$150	$90,000	
City of Port Orchard - contingency	1	ls	$100,000	$100,000	
City of Port Orchard connection fees	1	ls	$50,000	$50,000	
Well abandonment within proposed excavation	5	ea	$2,000	$10,000	
Excavation contractor					
Mobilization and site security	1	ls	$5,000	$5,000	
Temporary dewatering equipment/labor/disposal fees	1	ls	$25,000	$25,000	
Excavate, load and haul clean overburden	400	ton	$25	$10,000	
Excavate, load and haul PCS	400	ton	$55	$22,000	
Import clean fill	800	ton	$19	$15,200	
Traffic control					
Signage rental	5	day	$50	$250	
Flaggers	1	day	$415	$415	
Site restoration					
Replace sewer	1	ls	$45,000	$45,000	
Replace phone line	1	ls	$8,000	$8,000	
Site water line and sewer replace (1" water 4" sewer)	1	ls	$9,000	$9,000	
Well abandonment	17	ea	$1,500	$25,500	
Subtotal				*$435,365*	
Labor and Other Direct Costs					
Professional labor	1	ls	$78,500	$78,500	
Other direct costs (reprographics, courier services)	1	ls	$1,500	$1,500	
Equipment (health and safety equipment, soil sampling kits)	15	days	$450	$6,750	
Analytical costs	1	ls	$5,000	$5,000	
Subtotal				*$91,750*	
CONSTRUCTION SUBTOTAL					$551,115
Mobilization, Contingencies and Demobilization					
Mobilization (3% of construction subtotal)				$16,533	
Bid (10% of construction subtotal)				$55,112	
Scope (15% of construction subtotal)				$82,667	
Cleanup and demobilization (3% of construction subtotal)				$16,533	
Subtotal				*$170,846*	
CONSTRUCTION TOTAL					$721,961
Indirect Capital Costs					
Engineering construction services (8% of construction total)				$57,757	
Subtotal				*$57,757*	
TOTAL CAPITAL COST					**$779,718**

SoundEarth Strategies

Table 6
Feasibility Level Cost Estimate
Cleanup Alternative 3
Bulk Excavation with Off-Site Disposal
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington

O&M COST ITEM	ANNUAL COST[1]	Present Worth Cost of Annual O&M Real Discount Rate = 0.9%	
		n = 1 year	
Quarterly groundwater monitoring and reporting (1 year)	$20,253	$20,253	
TOTAL PRESENT WORTH O&M COST			**$20,253**
TOTAL PRESENT WORTH COST OF ALTERNATIVE 3			**$799,971**

NOTES:

[1]Annual cost is 2011 year cost.

ea = each

ls = lump sum

n = number of years of operation and maintenance

lf = linear feet

O&M = operation and maintenance

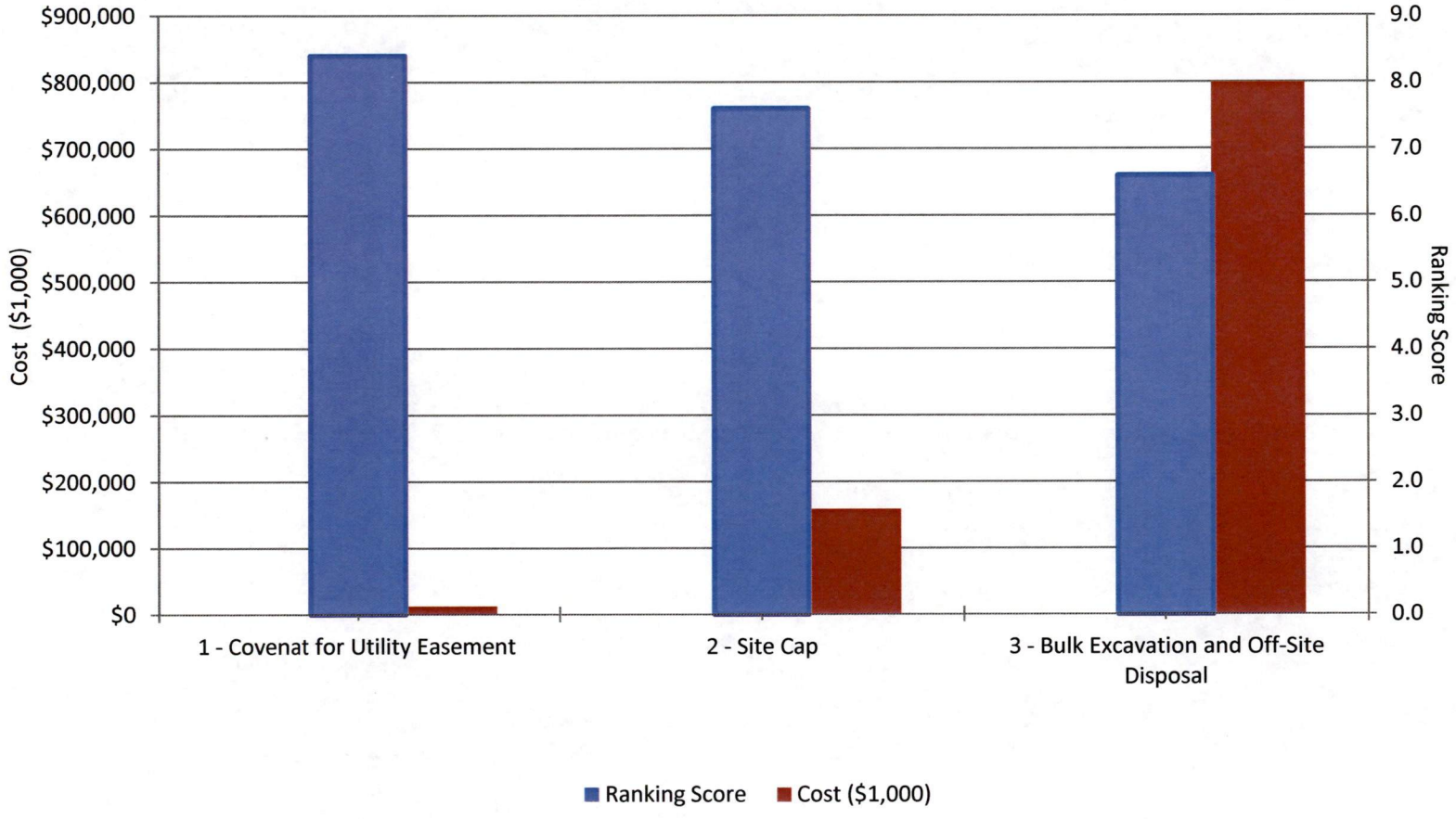
PCS = petroleum-contaminated soil

QTY = quantity

CHARTS

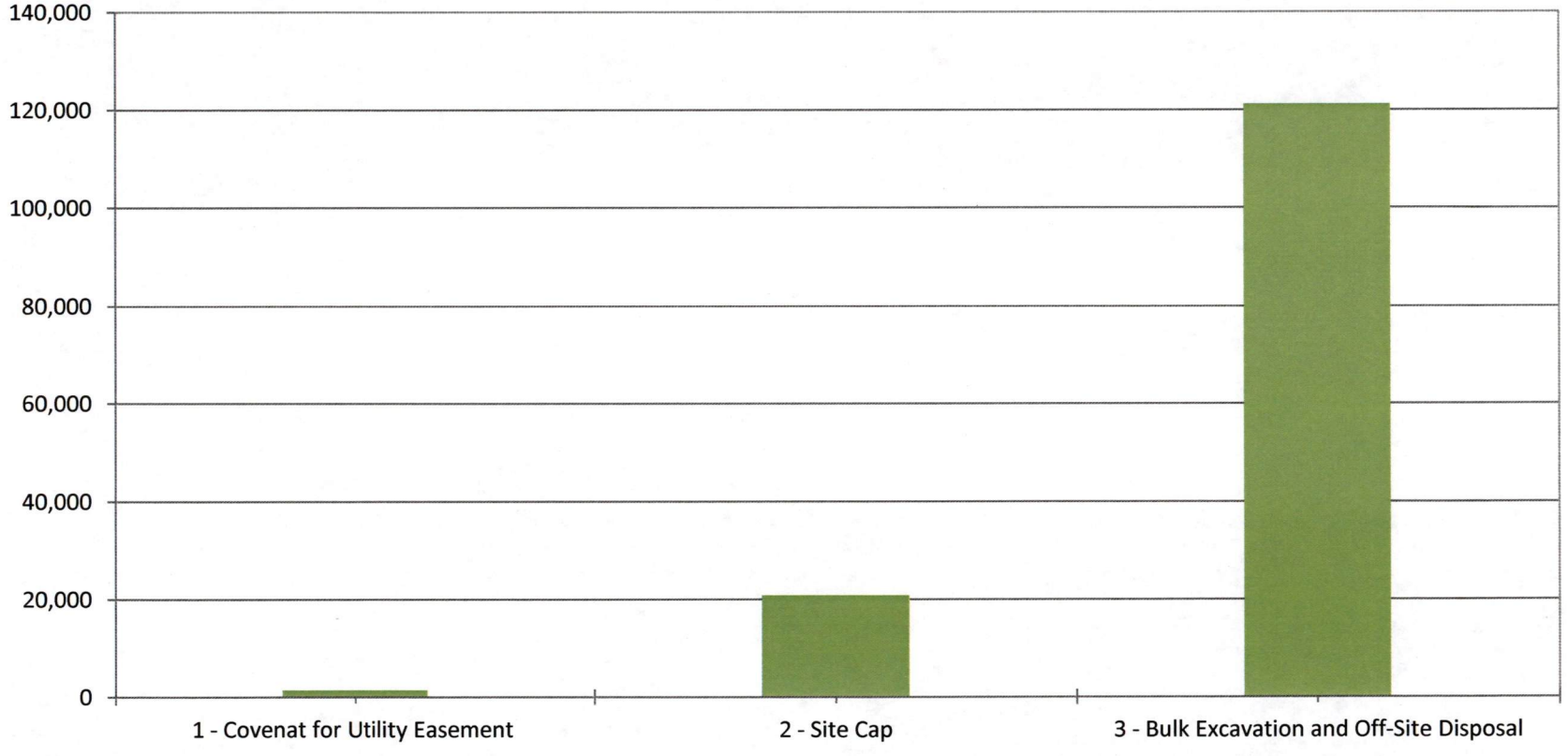
SoundEarth Strategies

Chart 1
Cost and Relative Ranking of Cleanup Alternatives
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington



SoundEarth Strategies

Chart 2
Cost-to-Benefit Ratio for Cleanup Alternatives
Former Port Orchard Bulk Plant and Cardlock
134 Bay Street West
Port Orchard, Washington



APPENDIX A
WELL BORING LOGS

SoundEarth Strategies

Project:	Former Port Orchard Bulk Plant
Project Number:	0644-001
Logged by:	EBF
Date Started:	06/28/11
Surface Conditions:	Asphalt
Well Location N/S:	20 feet N of MW-16
Well Location E/W:	21 feet W of MW-16
Reviewed by:	JAC
Date Completed:	06/28/11

BORING LOG | MW-17

Site Address: 134 Bay Street West
Port Orchard, WA

Water Depth At Time of Drilling: 15 feet bgs
Water Depth After Completion: 6.53 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
0								**3" asphalt.**	
5		9 10 10	100	2.8		SP		**Moist, medium dense, gravelly, fine to medium SAND, some silt, fine gravel, gray, no hydrocarbon odor (15-65-20) (FILL).**	
10		3 4 4	90	2.3		SP ML		**Same as above.** **Moist, medium stiff, fine sandy SILT with organic matter (wood debris), brown, faint hydrocarbon odor (70-30-0).**	
15									

Drilling Co./Driller:	Cascade/Scott		**Well/Auger Diamter:**	2	inches	**Notes/Comments:**
Drilling Equipment:	HSA		**Well Screened Interval:**	5 to 20	feet bgs	
Sampler Type:	Dames and Moore		**Screen Slot Size:**	0.010	inches	
Hammer Type/Weight:	300	lbs	**Filter Pack Used:**	2/12 Sand		
Total Boring Depth:	20.5	feet bgs	**Surface Seal:**	Cement		
Total Well Depth:	20	feet bgs	**Annular Seal:**	Bentonite		
State Well ID No.:	BHA 080		**Monument Type:**	Flushmount		

SoundEarth Strategies

Project:	Former Port Orchard Bulk Plant
Project Number:	0644-001
Logged by:	EBF
Date Started:	06/28/11
Surface Conditions:	Asphalt
Well Location N/S:	20 feet N of MW-16
Well Location E/W:	21 feet W of MW-16
Reviewed by:	JAC
Date Completed:	06/28/11

BORING LOG | MW-17

Site Address: 134 Bay Street West
Port Orchard, WA

Water Depth At Time of Drilling: 15 feet bgs
Water Depth After Completion: 6.53 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
15		4 5 5	100	2.1		ML		**Wet, stiff, fine to medium sandy SILT, organic matter (wood debris, charcoal), grey, no hydrocarbon odor (80-20-0).**	
		9 10 11	100	6.7		ML		**Moist, very stiff, SILT, some fine to coarse sand, grey, no hydrocarbon odor (85-15-0).**	
20						SM		**Moist, silty SAND, grey-brown, no hydrocarbon odor (30-70-0).**	
								Boring terminated at 20.5 feet below ground surface and completed as monitoring well MW-17 as shown in well construction detail.	
25									
30									

Drilling Co./Driller:	Cascade/Scott		**Well/Auger Diamter:**	2	inches	**Notes/Comments:**
Drilling Equipment:	HSA		**Well Screened Interval:**	5 to 20	feet bgs	
Sampler Type:	Dames and Moore		**Screen Slot Size:**	0.010	inches	
Hammer Type/Weight:	300	lbs	**Filter Pack Used:**	2/12 Sand		
Total Boring Depth:	20.5	feet bgs	**Surface Seal:**	Cement		
Total Well Depth:	20	feet bgs	**Annular Seal:**	Bentonite		
State Well ID No.:	BHA 080		**Monument Type:**	Flushmount		

SoundEarth Strategies

Project:	Former Port Orchard Bulk Plant
Project Number:	0644-001
Logged by:	EBF
Date Started:	06/28/11
Surface Conditions:	Asphat
Well Location N/S:	33 ft NE of MW-16
Well Location E/W:	39 ft NW of MW-16
Reviewed by:	JAC
Date Completed:	06/28/11

BORING LOG | MW-18

Site Address: 134 Bay Street West
Port Orchard, WA

Water Depth At Time of Drilling: 10 feet bgs
Water Depth After Completion: 8.81 feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppm)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
0								**1.5" asphalt**	
5		13 13 15	100	2.3		SP		**Moist, medium dense, fine to medium SAND, some silt, trace fine gravel, brown, no hydrocarbon odor (10-85-5) (FILL).**	
10		10 12 13	10	5.7		SP		**Wet, medium dense, gravelly, fine to coarse SAND, some silt, brown, faint hydrocarbon odor (10-60-30).**	
15		8 10 11	25	11.9		ML		**Moist, very stiff, fine to medium sandy SILT, trace fine gravel, wood debris, grey, possible hydrocarbon odor (70-25-5).**	
20		8 10 11	10	8.8		ML		**Moist, very stiff, fine to coarse sandy SILT, wood debris, gray, possible hydrocarbon odor (80-20-0).**	
								Boring terminated at 20.5 feet below ground surface and completed as monitoring well MW-18 as shown in well construction detail.	
25									

Drilling Co./Driller:	Cascade/Scott		**Well/Auger Diamter:**	2	inches	**Notes/Comments:**
Drilling Equipment:	HSA		**Well Screened Interval:**	5 to 20	feet bgs	
Sampler Type:	Dames and Moore		**Screen Slot Size:**	0.010	inches	
Hammer Type/Weight:	300	lbs	**Filter Pack Used:**	2/12 Sand		
Total Boring Depth:	20.5	feet bgs	**Surface Seal:**	Cement		
Total Well Depth:	20	feet bgs	**Annular Seal:**	Bentonite		
State Well ID No.:	BHA 081		**Monument Type:**	Flushmount		

APPENDIX B

LABORATORY ANALYTICAL REPORT

TestAmerica Laboratories, Inc. #580-27214-1

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-27214-1
Client Project/Site: Frmr Port Orchard Bulk Plant & Cardlock
Revision: 1

For:
SoundEarth Strategies Inc
2811 Fairview Ave East
Suite 2000
Seattle, Washington 98102

Attn: Terry Montoya

Authorized for release by:
10/20/2011 04:08:24 PM
Melissa Armstrong
Project Manager I
melissa.armstrong@testamericainc.com

Designee for

Pam Johnson
Project Manager I
pamr.johnson@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

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Receipt Checklists 13

Case Narrative

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Job ID: 580-27214-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-27214-1

Comments
No additional comments.

Receipt
The following sample was received at the laboratory outside the required temperature criteria at 6.7C.

All samples were received in good condition.

GC/MS VOA - NWTPH-Gx
The instrument blank for analytical batch 580-90026 contained GRO analyte greater than the reporting limit (RL). The sample immediately following the CCB was ND for GRO analyte. The data have been qualified "^" and are reported.

No other analytical or quality issues were noted.

Definitions/Glossary

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Qualifiers

GC VOA

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Client Sample ID: MW17-20110705
Date Collected: 07/05/11 13:00
Date Received: 07/06/11 15:35

Lab Sample ID: 580-27214-1
Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.50		ug/L			07/11/11 23:53	1
Toluene	ND		0.50		ug/L			07/11/11 23:53	1
Ethylbenzene	ND		0.50		ug/L			07/11/11 23:53	1
m-Xylene & p-Xylene	ND		1.0		ug/L			07/11/11 23:53	1
o-Xylene	ND		1.0		ug/L			07/11/11 23:53	1
Xylenes, Total	ND		1.0		ug/L			07/11/11 23:53	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*109*		*50 - 150*		*07/11/11 23:53*	*1*
4-Bromofluorobenzene (Surr)	*93*		*80 - 130*		*07/11/11 23:53*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**0.083**	^	0.050		mg/L			07/11/11 23:53	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*93*		*50 - 150*		*07/11/11 23:53*	*1*
Trifluorotoluene (Surr)	*105*		*50 - 150*		*07/11/11 23:53*	*1*

Client Sample Results

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Client Sample ID: MW18-20110705
Date Collected: 07/05/11 13:44
Date Received: 07/06/11 15:35

Lab Sample ID: 580-27214-2
Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.50		ug/L			07/12/11 00:19	1
Toluene	ND		0.50		ug/L			07/12/11 00:19	1
Ethylbenzene	ND		0.50		ug/L			07/12/11 00:19	1
m-Xylene & p-Xylene	ND		1.0		ug/L			07/12/11 00:19	1
o-Xylene	ND		1.0		ug/L			07/12/11 00:19	1
Xylenes, Total	ND		1.0		ug/L			07/12/11 00:19	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*110*		*50 - 150*		*07/12/11 00:19*	*1*
4-Bromofluorobenzene (Surr)	*93*		*80 - 130*		*07/12/11 00:19*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	**0.052**	^	0.050		mg/L			07/12/11 00:19	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*94*		*50 - 150*		*07/12/11 00:19*	*1*
Trifluorotoluene (Surr)	*107*		*50 - 150*		*07/12/11 00:19*	*1*

QC Sample Results

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Method: 8021B - Volatile Organic Compounds (GC)

Lab Sample ID: MB 580-90028/4
Matrix: Water
Analysis Batch: 90028

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.50		ug/L			07/11/11 11:10	1
Toluene	ND		0.50		ug/L			07/11/11 11:10	1
Ethylbenzene	ND		0.50		ug/L			07/11/11 11:10	1
m-Xylene & p-Xylene	ND		1.0		ug/L			07/11/11 11:10	1
o-Xylene	ND		1.0		ug/L			07/11/11 11:10	1
Xylenes, Total	ND		1.0		ug/L			07/11/11 11:10	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*109*		*50 - 150*		*07/11/11 11:10*	*1*
4-Bromofluorobenzene (Surr)	*94*		*80 - 130*		*07/11/11 11:10*	*1*

Lab Sample ID: LCS 580-90028/5
Matrix: Water
Analysis Batch: 90028

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Benzene	25.0	23.7		ug/L		95	80 - 125
Toluene	25.0	24.8		ug/L		99	80 - 120
Ethylbenzene	25.0	24.8		ug/L		99	80 - 125
m-Xylene & p-Xylene	50.0	49.4		ug/L		99	75 - 120
o-Xylene	25.0	24.6		ug/L		98	75 - 120

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
a,a,a-Trifluorotoluene	*104*		*50 - 150*
4-Bromofluorobenzene (Surr)	*92*		*80 - 130*

Lab Sample ID: LCSD 580-90028/6
Matrix: Water
Analysis Batch: 90028

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Benzene	25.0	23.1		ug/L		92	80 - 125	3	20
Toluene	25.0	24.1		ug/L		96	80 - 120	3	20
Ethylbenzene	25.0	24.1		ug/L		96	80 - 125	3	20
m-Xylene & p-Xylene	50.0	47.9		ug/L		96	75 - 120	3	20
o-Xylene	25.0	24.0		ug/L		96	75 - 120	2	20

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
a,a,a-Trifluorotoluene	*97*		*50 - 150*
4-Bromofluorobenzene (Surr)	*92*		*80 - 130*

QC Sample Results

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-90026/5
Matrix: Water
Analysis Batch: 90026

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.050		mg/L			07/11/11 11:10	1

Surrogate	*MB % Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*95*		*50 - 150*		*07/11/11 11:10*	*1*
Trifluorotoluene (Surr)	*106*		*50 - 150*		*07/11/11 11:10*	*1*

Lab Sample ID: LCS 580-90026/6
Matrix: Water
Analysis Batch: 90026

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Gasoline			1.00	0.846		mg/L		85	79 - 110		

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*95*		*50 - 150*
Trifluorotoluene (Surr)	*99*		*50 - 150*

Lab Sample ID: LCSD 580-90026/7
Matrix: Water
Analysis Batch: 90026

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Gasoline			1.00	0.879		mg/L		88	79 - 110	4	20

Surrogate	*LCSD % Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*96*		*50 - 150*
Trifluorotoluene (Surr)	*101*		*50 - 150*

Lab Chronicle

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Client Sample ID: MW17-20110705

Lab Sample ID: 580-27214-1

Date Collected: 07/05/11 13:00

Matrix: Water

Date Received: 07/06/11 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total/NA	Analysis	NWTPH-Gx		1	90026	07/11/11 23:53	JMB	TAL SEA
Total/NA	Analysis	8021B		1	90028	07/11/11 23:53	JMB	TAL SEA

Client Sample ID: MW18-20110705

Lab Sample ID: 580-27214-2

Date Collected: 07/05/11 13:44

Matrix: Water

Date Received: 07/06/11 15:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total/NA	Analysis	NWTPH-Gx		1	90026	07/12/11 00:19	JMB	TAL SEA
Total/NA	Analysis	8021B		1	90028	07/12/11 00:19	JMB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Seattle	Alaska	Alaska UST	10	UST-022
TestAmerica Seattle	Alaska	TA-Port Heiden Mobile Lab	10	UST-093
TestAmerica Seattle	California	NELAC	9	1115CA
TestAmerica Seattle	Florida	NELAC	4	E871074
TestAmerica Seattle	L-A-B	DoD ELAP		L2236
TestAmerica Seattle	L-A-B	ISO/IEC 17025		L2236
TestAmerica Seattle	Louisiana	NELAC	6	05016
TestAmerica Seattle	Montana	MT DEQ UST	8	N/A
TestAmerica Seattle	Oregon	NELAC	10	WA100007
TestAmerica Seattle	USDA	USDA		P330-11-00222
TestAmerica Seattle	Washington	State Program	10	C553

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

Sample Summary

Client: SoundEarth Strategies Inc
Project/Site: Frmr Port Orchard Bulk Plant & Cardlock

TestAmerica Job ID: 580-27214-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-27214-1	MW17-20110705	Water	07/05/11 13:00	07/06/11 15:35
580-27214-2	MW18-20110705	Water	07/05/11 13:44	07/06/11 15:35

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

11720 North Creek Pkwy N Suite 400, Bothell, WA 98011-8244 425-420-9200 FAX 420-9210
11922 E. First Ave, Spokane, WA 99206-5302 509-924-9200 FAX 924-9290
9405 SW Nimbus Ave,Beaverton, OR 97008-7145 503-906-9200 FAX 906-9210
2000 W International Airport Rd Ste A10, Anchorage, AK 99502-1119 907-563-9200 FAX 563-9210

CHAIN OF CUSTODY REPORT

Work Order #: 27214

CLIENT: Sound Earth Strategies

REPORT TO: Terry Montoya
ADDRESS: 2811 Fairview Ave East
Seattle, WA 98102
PHONE: 206-306-1900 FAX: 206-306-1907

INVOICE TO:
Nordic Properties Inc
PO Box 64
Port Orchard, WA 983366

P.O. NUMBER:

PROJECT NAME:

PROJECT NUMBER:

SAMPLED BY:

TURNAROUND REQUEST
in Business Days *
Organic & Inorganic Analyses: 10 STD. | 7 | 5 | 4 | 3 | 2 | 1 | <1
Petroleum Hydrocarbon Analyses: 5 STD. | 4 | 3 | 2 | 1 | <1
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges.

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	PRESERVATIVE	REQUESTED ANALYSES: 6x by NWTPH-Gx	REQUESTED ANALYSES: 8260 by 8021	MATRIX (W, S, O)	# OF CONT.	LOCATION/ COMMENTS	TA WO ID
1	MW17-20110705	7/5/11 @ 1300		X	X	W	6		
2	MW18-20110705	7/5/11 @ 1344		X	X	W	6		
3									
4									
5									
6									
7									
8									
9									
10									

~~Cooler~~/~~TB~~ Dig/IR/cor 6.7° unc 6.9°
Cooler Dsc Sm Blue/Wh.2@ Lab 1535
Wet/Packs Packing Bubble Bag

RELEASED BY: Elizabeth Forbes	FIRM: SoundEarth	DATE: 7/6/11 TIME:	RECEIVED BY: Francisco Luna, Jr.	FIRM: TA-5#14 DATE: 7/6/11 TIME: 1458
RELEASED BY:	FIRM:	DATE: TIME:	RECEIVED BY:	FIRM: DATE: TIME:

ADDITIONAL REMARKS:

TEMP:

PAGE OF

TAL-1000(0408)

Login Sample Receipt Checklist

Client: SoundEarth Strategies Inc

Job Number: 580-27214-1

Login Number: 27214

List Source: TestAmerica Seattle

List Number: 1

Creator: Luna, Francisco

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	Fresh Ice
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	