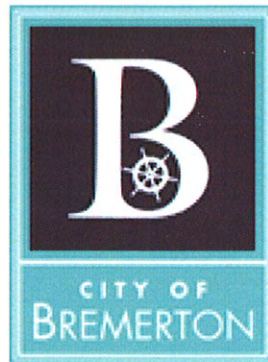


Work Plan for Remedial Investigation/Feasibility Study, Interim Action, and Shoreline Restoration Former Chevron Property Bremerton, Washington

City of Bremerton



September 2007

Parametrix

Work Plan for Remedial Investigation/Feasibility Study, Interim Action, and Shoreline Restoration Former Chevron Property Bremerton, Washington

Prepared for

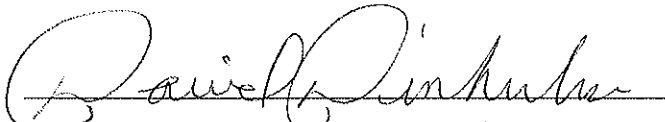
City of Bremerton
2037 Olympus Drive
Bremerton, WA 98310

Prepared by

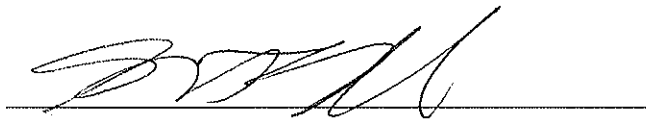
Parametrix
4660 Kitsap Way, Suite A
Bremerton, WA 98312-2357
360-377-0014
www.parametrix.com

CERTIFICATION

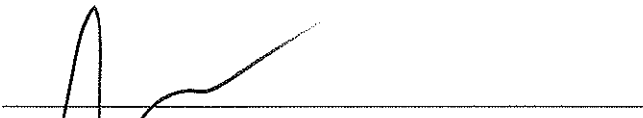
The technical material and data contained in this document were prepared under the supervision and direction of the undersigned.



Prepared by David Dinkuhn, Parametrix



Checked by Scott Elkind, Parametrix



Approved by Bill Webb, Parametrix

DISTRIBUTION LIST

<u>Name</u>	<u>Title</u>	<u>Organization</u>
Tom Knuckey, P.E.	Project Manager	City of Bremerton
Panjini Balaraju, P.E.	Project Manager	Ecology
Bill Webb	Project Manager	Parametrix
David Dinkuhn	Task Manager	Parametrix
Lily Isenhardt	Field Sampler	Parametrix
Stuart Currie	Data QA Manager	Parametrix

TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND INFORMATION	1-1
1.1 SITE DESCRIPTION AND HISTORY	1-1
1.2 SHORELINE RESTORATION AND FUTURE SITE USES	1-2
1.3 EXISTING ENVIRONMENTAL DATA	1-3
1.3.1 Initial Assessments	1-3
1.3.2 Soil Vapor Extraction	1-3
1.3.3 Post-SVE Assessment	1-4
1.3.4 Historical Groundwater Monitoring	1-4
1.3.5 Current Assessments	1-4
2. PROJECT ORGANIZATION AND MANAGEMENT	2-1
2.1 PROJECT ORGANIZATION	2-1
2.2 DATA QUALITY OBJECTIVES	2-2
2.3 DATA QUALITY INDICATORS	2-3
2.4 SPECIAL TRAINING AND CERTIFICATION	2-3
2.5 SAMPLING DOCUMENTATION AND RECORDS	2-4
2.5.1 Field Notebook and Field Data Sheets	2-4
2.5.2 Photographs	2-5
2.6 REPORTING	2-5
3. RI/FS ACTIVITIES AND INTERIM ACTION	3-1
3.1 REMEDIAL INVESTIGATION	3-1
3.1.1 GROUNDWATER SAMPLING	3-1
3.1.2 SURFACE SOIL SAMPLING	3-2
3.1.3 SUBSURFACE SOIL SAMPLING	3-7
3.2 FEASIBILITY STUDY	3-8
3.3 INTERIM ACTION	3-8
3.3.1 Source Reduction	3-8
3.3.2 Residual Soil and Groundwater Remediation	3-10
3.4 TERRESTRIAL ECOLOGICAL EVALUATION	3-10
4. FIELD AND LABORATORY METHODS	4-1
4.1 SAMPLING METHODS AND PROCEDURES	4-1
4.1.1 General Sampling Procedures	4-1
4.1.2 Field Screening	4-1
4.1.3 Surface Soil Grab Sampling	4-1
4.1.4 Push-Probe Sampling (Soil)	4-1
4.1.5 Soil Sampling using a Hollow-Stem Auger Rig	4-2
4.1.6 Monitoring Well Installation, Development, and Sampling	4-2

TABLE OF CONTENTS (CONTINUED)

4.1.7 Decontamination Procedures.....	4-3
4.1.8 Investigation-Derived Waste.....	4-3
4.2 SAMPLE HANDLING AND CUSTODY	4-4
4.2.1 Sample Identification and Labeling.....	4-4
4.2.2 Sample Storage, Packaging and Transportation.....	4-4
4.2.3 Sample Custody.....	4-4
4.3 ANALYTICAL METHODS	4-5
4.4 QUALITY ASSURANCE/QUALITY CONTROL	4-5
4.4.1 Field Methods.....	4-5
4.4.2 Laboratory QA/QC Methods.....	4-6
4.4.3 Summary of Sample Media, Numbers, and Analyses.....	4-6
4.4.4 Sample Containers, Preservation, and Holding Times.....	4-8
4.5 FIELD INSTRUMENT/EQUIPMENT CALIBRATION, INSPECTION, AND MAINTENANCE.....	4-9
4.6 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES.....	4-9
4.7 DATA MANAGEMENT.....	4-9
4.7.1 Field Data	4-9
4.7.2 Laboratory Data.....	4-9
5. DATA VERIFICATION AND VALIDATION	5-1
5.1 DATA REVIEW, VERIFICATION AND VALIDATION.....	5-1
5.2 VERIFICATION AND VALIDATION METHODS.....	5-1
5.3 RECONCILIATION AND USER REQUIREMENTS	5-2
6. SCHEDULE.....	6-1
7. REFERENCES.....	7-1

LIST OF FIGURES

1-1 Project Vicinity.....	1-9
1-2 CIRCA 2005 Aerial Photography	1-11
1-3 1963 Aerial Photograph.....	1-13
1-4 Historical Sample Locations.....	1-15
1-5 Completed Park Concept.....	1-17
1-6 Historical Soil Results	1-19
1-7 Historical Groundwater Results	1-21
1-8 Location of Sediment Sample C-6	1-23

TABLE OF CONTENTS (CONTINUED)

1-9	Section A	1-25
3-1	Wells To Be Sampled.....	3-13
3-2	Soil Sampling Locations.....	3-15
3-3	Preliminary Interim Action Plan	3-17

LIST OF TABLES

2-1	Project Roles and Responsibilities	2-1
2-2	Design Characterization Sampling DQOs	2-2
2-3	General Description of DQIs.....	2-3
2-4	Sampling and Sample Handling Records	2-4
3-1	Soil and Groundwater MTCA Method A Cleanup Levels and Surface Water ARARS.....	3-3
4-1	Purging Stabilization Criteria	4-3
4-2	Sample Numbering Protocol	4-4
4-3	Guidelines for Minimum QA/QC Samples for Field Sampling	4-5
4-4	Summary of Sample Types, Analyses, and Number	4-7
4-5	Sample Containers, Preservation, and Holding Times	4-8

APPENDICES

A	Public Participation Plan
B	SEPA Environmental Checklist
C	Test Pit and Boring Logs
D	Letter – Ryan Inc. 2002 Report Excerpt
E	Parametrix 2006 Technical Memorandum
F	Field Forms
G	Standard Operating Procedures
H	Project Schedule

KEY TERMS

µg/L	Micrograms per liter
ARARs	Applicable or Relevant and Appropriate Requirements
ASTs	above-ground fuel storage tanks
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
cm/s	centimeters per second
COCs	contaminants of concern
COD	chemical oxygen demand
cPAHs	Carcinogenic PAHs
CSLs	Screening Cleanup Levels
DQIs	data quality indicators
DQOs	Data Quality Objectives
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management
EPH	extractable petroleum hydrocarbons
FID	flame ionization detector
FS	feasibility study
gpm	gallon per minute
HAZWOPER	Hazardous Waste Operation
I.D.	internal diameter
IDW	Investigation derived waste
mg/kg	Milligrams per kilogram
mg/L	milligrams per liter
MHHW	mean higher high water
MTBE	methyl tertiary-butyl ether
MTCA	Model Toxics Control Act
NTUs	nephelometric turbidity units
O.D.	outside diameter
ORP	Oxidation-reduction potential
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PDF	portable document format
PID	photoionization detector

KEY TERMS (CONTINUED)

PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RI/FS	remedial investigation/feasibility study
RPD	relative percent difference
SEPA	State Environmental Policy Act
SOPs	standard operating procedures
SPT	split-spoon
SQSs	sediment quality standards
SVE	soil vapor extraction
TM	technical memorandum
TOC	total organic carbon
TPH	total petroleum hydrocarbons
USCS	Unified Soil Classification System
UV	ultra-violet
VOCs	volatile organic compounds
VPH	volatile petroleum hydrocarbons

1. INTRODUCTION AND BACKGROUND INFORMATION

This document presents a work plan for conducting a remedial investigation/feasibility study (RI/FS), interim action, and shoreline restoration at the Former Chevron Property located at 1310 Highland Avenue in Bremerton, Washington (Figure 1-1). The site, which formerly contained a bulk fuel distribution facility, was purchased by the City of Bremerton in 2005 for development as an addition to the adjacent Evergreen Park.

The RI/FS is to be performed to aid in the development of cleanup actions for addressing residual petroleum contamination at the site. Residual petroleum contamination exists in soil and groundwater as a result of past fuel releases. Cleanup actions developed during the RI/FS to treat residual contamination will be implemented at the site as an interim action. Following the interim action, shoreline restoration will be implemented to restore the intertidal environment as habitat for important species such as forage fish and salmon.

This work plan was developed in cooperation with the Washington State Department of Ecology (Ecology) under an Agreed Order. Work is to be done in an expedited manner under the Governor's Puget Sound Initiative. The initiative focuses on cleaning up contamination as well as restoring Puget Sound. Ecology recognizes that site cleanups can be designed and implemented in a manner that improves habitat values and provides for shoreline restoration in conjunction with remedial actions. While planning the cleanup, and making cleanup decisions, Ecology and the City will evaluate opportunities to perform remedial actions in a fashion that coincidentally enhances habitat. Elements of the remedial action will be evaluated for restoration opportunities in consultation with Ecology as plans for cleanup are developed.

Conceptual cleanup actions have been developed based on existing environmental data and are presented here as a proposed interim action. Stakeholder approval will be obtained prior to the implementation of the interim action selected based on the RI/FS. Shoreline restoration actions are described briefly. Detailed restoration plans will be developed as part of the design package for construction of the Evergreen Park addition.

This RI/FS work plan includes two companion documents required under an Agreed Order. A public participation plan is included in Appendix A. A State Environmental Policy Act (SEPA) environmental checklist is included in Appendix B.

1.1 SITE DESCRIPTION AND HISTORY

The Former Chevron Property is a 1.4 acre waterfront property located on the Port Washington Narrows (Figure 1-1). The site formerly contained a bulk fuel distribution facility, which operated from prior to 1946 until circa 1988. Existing and former site features are shown on Figures 1-2 through 1-4. In 1946, the northern boundary of the site was defined by the wooden bulkhead shown in Figure 1-4. Based on aerial photographs, the facility was expanded northward to its present boundaries between 1946 and 1963 (Hart Crowser 1989a).

Products handled at the former bulk fuel distribution facility consisted primarily of diesel and gasoline (Hart Crowser 1989a). The site is divided into two operations areas known as the "upper yard" and "lower yard" (Figure 1-4). The lower yard was the former location of fuel loading and offloading operations. Fuel was offloaded from barges at a fueling pier in the Port Washington Narrows and pumped through above-ground piping to twelve ASTs located in the upper yard. Fuel was loaded from the ASTs to tanker trucks at four loading

racks in the lower yard through above-ground piping. An exception is piping south of the former garage (shown in Figure 1-4), which extended underground beneath the driveway to supply fuel to the southwestern loading rack. All above-ground structures were removed by the end of 1988. It is not known whether the underground piping in the vicinity of the former garage was removed.

Soils in the upper yard consist of glacial till underlain by interbedded dense silts and silty sands (outwash). This soil unit was consolidated during the most recent glaciation and, as a result, is typically very dense and relatively impermeable. The lower yard is underlain by silty sand fill, which was used to extend the lower yard into Port Washington Narrows. The fill is underlain by silty sand outwash at a depth of approximately 20 feet below ground surface (bgs). The results of slug testing performed by Hart Crowser (1989b) indicate that the hydraulic conductivity of the fill soils is 5×10^{-5} centimeters per second (cm/s).

Groundwater occurs at depths of approximately 8 to 10 feet bgs in the lower yard and 15 to 17 feet bgs in the upper yard. Previous site explorations investigated the possible presence of separate upper and lower water bearing units in the upper yard. However, study results indicate that the potential lower water bearing unit did not likely consist of a distinct, second water bearing zone (PEG 1994).

1.2 SHORELINE RESTORATION AND FUTURE SITE USES

After the interim action has been successfully implemented, the shoreline will be restored. Restoration will be designed to return the majority of the site's shoreline to a natural beach profile. All bulkheads and existing fill soils along the site's southern shoreline will be removed. The new beach will be sloped to match existing natural beaches in the area and will be surfaced with sands and gravels appropriate for forage fish spawning (beach nourishment). The sands and gravels will be sized to be both conducive for spawning and to resist erosive tidal forces. To the north of this new beach, a pocket beach will be constructed which will also be surfaced with beach nourishment.

The interim action will address contaminated soil at the site, including soil near the shoreline. However, it is estimated that up to 2,500 cubic yards of residual potentially-contaminated soil may be removed from the shoreline as fill soils are excavated to create the new beaches. Following excavation, the new beach surfaces will be formed by placing beach nourishment to grade.

In addition to the bulkhead removal and beach construction, all existing creosote piling, the derelict pier, and concrete rubble along the shoreline will be removed. A native riparian buffer consisting of native trees, shrubs, and grasses will be planted at the transition zones between the constructed beaches and the uplands. The purpose of the buffer is to provide shading, leaf litter, and stabilization against slope erosion. Upland portions of the site will be landscaped with grass, trees, and paths. A representation of the completed park concept is provided in Figure 1-5.

Under the current schedule, the interim action will be implemented in 2008 and shoreline restoration will occur during the open fish window (approximately July through October) in 2009/2010 (see Section 6 for a proposed schedule). Shoreline restoration will occur not earlier than one year following the interim action in order to allow the enhanced bioremediation step (see Section 3 for a description) time to reduce subsurface contamination. The goal of the bioremediation is to reduce contamination to below cleanup

levels. This will reduce the level of effort required to manage any residual contaminated soils as they are excavated for beach construction.

1.3 EXISTING ENVIRONMENTAL DATA

1.3.1 Initial Assessments

Environmental work at the site began in 1988 following demolition of the bulk fuel facility (GeoEngineers 1988). Initial site work consisted of the installation and sampling of nine monitoring wells (MW-4 through MW-12) and seven test pits (TP-1 through TP-7). Soil and groundwater samples were analyzed for contaminants of concern (COCs) consisting of total petroleum hydrocarbons (TPH), gasoline, diesel, and benzene, toluene, ethylbenzene, and xylenes (BTEX). Based on the discovery of gasoline and diesel contamination in soils and groundwater, an additional nine test pits (TP-8 through TP-16) were excavated and soil samples from each pit were collected and analyzed (Hart Crowser 1989b). Test pits were located throughout the site, including at former tank, piping, and loading rack locations (Figure 1-4). Monitoring wells were located across the site to provide an assessment of site-wide groundwater conditions. Test pit and monitoring well logs are provided in Appendix C.

During these explorations, soil samples were collected from the monitoring well borings and test pits at regular intervals for field screening using visual/olfactory methods and a flame ionization detector (FID). Samples were generally selected from locations indicating the potential for hydrocarbon contamination based on the field screening. The greatest soil impacts were found in the lower yard, with gasoline concentrations as high as 25,000 milligrams per kilogram (mg/kg) and diesel concentrations as high as 17,000 mg/kg. Reported concentrations were generally lower in upper yard soils, with gasoline concentrations of up to 250 mg/kg and diesel concentrations of up to 1,400 mg/kg. Historical soil sampling results are shown on Figure 1-6.

As shown in Figure 1-6, highly-impacted soils were generally confined to the area behind the buried wooden bulkhead where the fuel loading racks were located. Impacted soils generally occur in a “smear zone” located above the groundwater table. Historical groundwater depth measurements at the site suggest that the smear zone is approximately 3 to 5 feet thick. Near-surface contaminated soils were discovered in only one location, Test Pit TP-9, beginning at a depth of 2 feet bgs and extending to the groundwater table.

Historical groundwater sample results are shown on Figure 1-7. As shown, groundwater contamination has been detected in the majority of the monitoring wells, with TPH concentrations as high as 1,742 milligrams per liter (mg/L). In addition, floating free product was measured in some of the wells at thickness of up to 4 feet. The locations of wells where free product has been measured historically are shown on Figure 1-7.

1.3.2 Soil Vapor Extraction

Chevron installed a soil vapor extraction (SVE) system at the site in 1990 to address floating product and soil contamination. The system consisted of a series of eleven shallow extraction wells connected via a piping manifold to a blower and thermal oxidizer. An additional three monitoring wells (MW-13 through MW-15) were installed to increase the available monitoring network. The SVE system was operated from 1990 until 1994 when it was shut down due to diminishing returns. It was estimated that a total of approximately 195,000 pounds of hydrocarbons were removed during system operation (Emcon 1995).

1.3.3 Post-SVE Assessment

An additional nine monitoring wells (MW-16 through MW-24) were installed at the site in 1993 to expand the available monitoring network (PEG 1994). Soil samples were collected from the borings at regular intervals and field screened using visual/olfactory methods and a photoionization detector (PID). Thirteen soil samples selected from the borings were analyzed for gasoline, diesel, heavy oil, BTEX, lead, and polycyclic aromatic hydrocarbons (PAHs). Gasoline and diesel concentrations exceeding Model Toxics Control Act (MTCA) Method A criteria were detected in only four of the nine wells (MW-19 through MW-22). Benzene exceeded MTCA A criteria in two of these wells. Heavy oil and lead concentrations (where detected) did not exceed MTCA A criteria in any sample. No carcinogenic PAHs were detected. Non-carcinogenic PAHs at concentrations exceeding MTCA A criteria were only detected in one sample which also contained a high concentration of diesel.

Groundwater samples were collected from all site wells (including new and existing wells) with the exception of those that were dry or that contained floating product (floating product was measured in four of the wells ranging from 0.01 to 0.39 feet thick). Twelve groundwater samples were collected and analyzed for the same constituents as the soil samples. Wells located in the lower yard generally showed the highest impacts, with gasoline concentrations exceeding MTCA A criteria in four wells. Diesel concentrations did not exceed MTCA A criteria. The upper yard wells did not contain gasoline or diesel at concentrations exceeding MTCA A criteria. An exception is MW-23, which slightly exceeded the gasoline criteria. BTEX compounds exceeded MTCA A criteria in five wells. Total lead exceeded the MTCA A criteria in six wells. Carcinogenic PAHs (cPAHs) concentrations exceeded MTCA A criteria in three wells (MW-13, MW-14, and MW-22).

1.3.4 Historical Groundwater Monitoring

Periodic groundwater monitoring was conducted at the site quarterly from 1994 to 1997 and semi-annually from 1998 to 2003. All site wells were included in the monitoring program during at least one sampling event. Groundwater samples were analyzed for gasoline, diesel, BTEX, heavy oil, and total lead. The second-to-last groundwater monitoring report (GRI 2002) is excerpted in Appendix D. Table 1-1 of this report provides a summary of all monitoring data for all wells. As shown, floating product thicknesses decreased with time, particularly through the period of SVE system operation. Gasoline, diesel, and BTEX concentrations have also generally decreased over time. An exception is in wells MW-16 and MW-18, where gasoline and diesel concentrations have fluctuated with no discernable pattern. Lead, where sampled, has declined below the MTCA A criteria. Exceptions are MW-4 and MW-9. The detected concentrations of gasoline and diesel from the latest sampling event in each well are included on Figure 1-7.

1.3.5 Current Assessments

1.3.5.1 Sediment

The following discussion presents the results of a sediment characterization study conducted at the site by the City. The discussion also presents the City's position regarding the adequacy of the study for the purpose of characterizing impacts to the sediments. The City acknowledges that Ecology is currently conducting a sediment investigation at the site and will develop an independent opinion regarding sediment impacts and the possible need for sediment remediation.

Sediment Testing

Prior to purchasing the property in 2005, the City conducted sediment sampling on the beach adjacent to the site (Parametrix 2006). The scope of the sampling was developed in coordination with Ecology NW Region staff. The purpose of the sampling was to provide an assessment of site sediments to support both the decision to purchase the property and a future aquatic land lease from the Washington Department of Natural Resources (for the future Bremerton Boardwalk project). Sampling was conducted according to the requirements of the Washington State Sediment Management Standards (173-204 WAC) to determine compliance with applicable marine sediment quality standards (SQSs).

Sediment sample locations are shown on Figure 1-4. Sediment samples were collected from 12 locations within intertidal and subtidal areas. Surface sediment grab samples were collected at all 12 locations from the top 10 centimeters. Intertidal samples were collected during low tide events using hand scoops. Subtidal samples were collected from a boat using a Van Veen sampler. At five of the intertidal sample locations, subsurface grab samples were collected from a depth of 2 feet using a shovel and hand scoops. These samples are indicated on Figure 1-4 by the presence of an “S” in the sample number.

The majority of the shoreline at the site has been armored with concrete rubble. Intertidal samples were collected near the toe of the concrete rubble from sediments exposed during low tide. The sediment substrate consisted of sand-, gravel-, and cobble-sized particles. A photograph showing the location of sediment sample C-6 is provided in Figure 1-8. Fifteen sediment samples (14 field samples and one duplicate) were analyzed for the marine SQSs chemical criteria list, diesel, and motor oil. An exception is the intertidal samples, which were not analyzed for polychlorinated biphenyls (PCBs) since this contaminant has not been identified as a potential COC at the site. Subtidal samples were analyzed for PCBs for the purposes of the future aquatic lease. Sediment sample results were compared to SQSs, which were exceeded for PAHs in one intertidal surface sediment sample (C-8).

To further assess the presence of PAHs at the site, three additional surface sediment samples were collected (C-11, C-12, and C-13) and analyzed for PAHs. The SQSs for PAHs were not exceeded on any of the three samples.

In accordance with the Sediment Management Standards, an additional sediment sample was collected from the location of sample C-8 for the purpose of a bioassay test to “confirm” whether or not the sediment complied with the applicable SQSs biological criteria. The results of the bioassay test demonstrated that there was no statistically significant difference between the test sediment and reference sediment and that the sediment passed both the SQSs and less stringent sediment Cleanup Screening Levels (CSLs) evaluation criteria. CSLs are used as cleanup levels for sediment cleanups while SQSs are a regulatory and management goal for the quality of sediment throughout the state.

Although the bioassay test was performed according to 173-204-WAC, the test did not include exposure of the test specimens to ultra-violet (UV) radiation as is recommended in Sub-appendix D to the Ecology guidance document for preparing sediment sampling plans (Ecology 2003). UV radiation exposure is recommended for sediments in intertidal and shallow subtidal areas that contain PAHs. Certain PAHs are photo-reactive and may exhibit higher toxicity when exposed to UV light. Although UV exposure was not

performed, it is observed that the bioassay test results met the SQSs criteria, which are more stringent than the CSLs. To fail both the SQSs and CSLs criteria would require a large increase in effects due to UV radiation. A technical memo reporting the sediment sampling results is excerpted in Appendix E (Parametrix 2006).

Conceptual Model and Adequacy of Sediment Testing

A cross section of the site (Section A) is depicted on Figure 1-9. The location and depths of sediment samples C-6 (surface) and C-6-S (2 feet bgs) are shown on the section. The conceptual location of sediments that would potentially be most impacted (or “smeared”) by floating product is also shown. According to the conceptual model, sample C-6 was collected from the location most likely impacted by historical floating product (if present), which is the near-surface sediments. Thus, the near-surface sediments are representative of worst-case conditions at the site. This observation would not be valid if the exposed intertidal beach sediments consisted of recent deposits (deposited following the removal of the majority of floating hydrocarbons from the site by the soil vapor extraction (SVE) system. However, the absence of fines and the presence of large gravel and cobbles in the beach sediments indicate that the beach is being eroded rather than gaining sediments by deposition.

The above discussion supports the selection of near-surface sediment samples as appropriate for the site. The purpose for sampling sediments at greater depths would be to delineate the potential vertical extent of contamination to aid in evaluating cleanup options. Since surface sediments are in compliance with SQSs, no sediment cleanup is anticipated for the site.

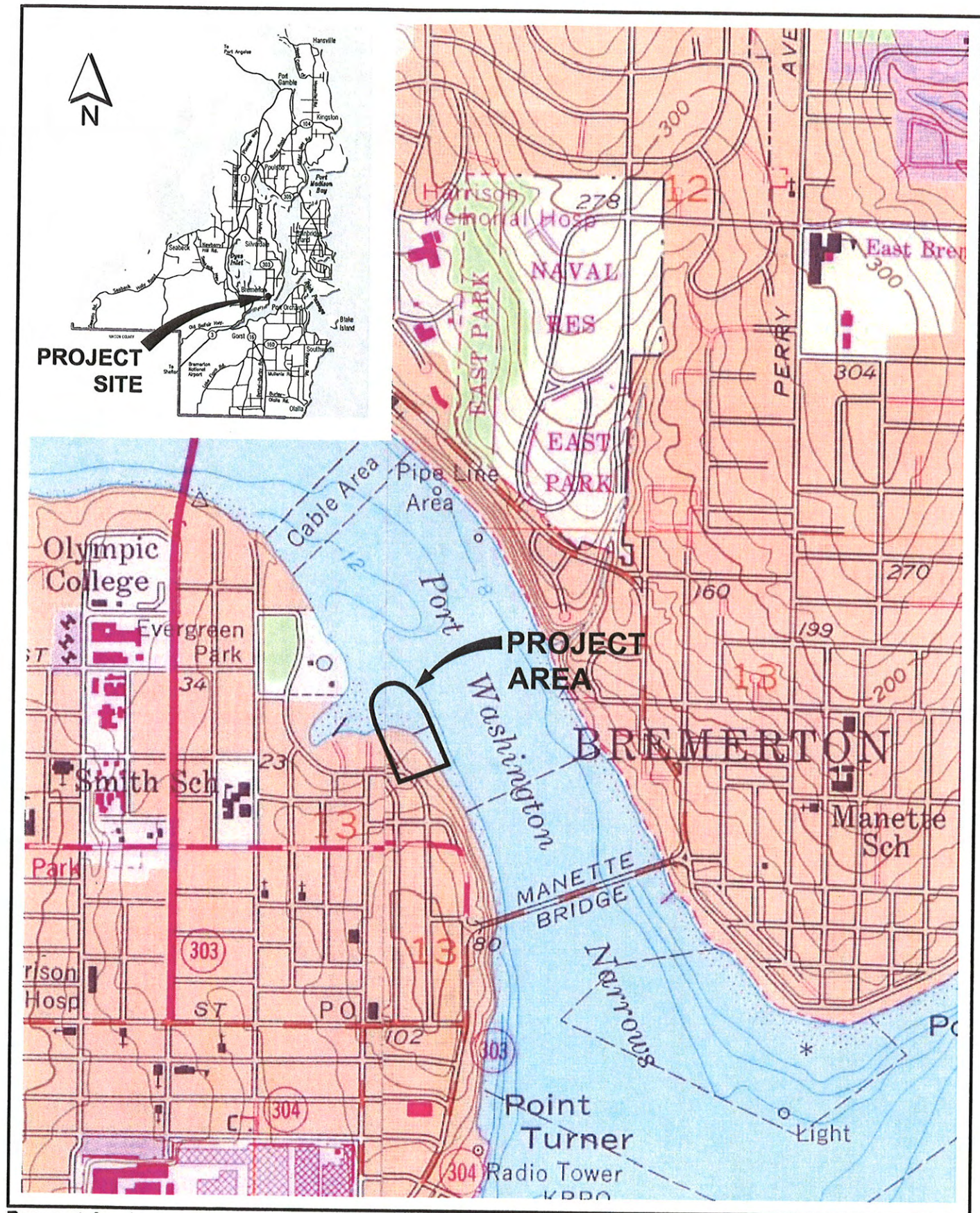
Evaluation of Concern

The 18 sediment samples collected constitute a “station cluster” (WAC 173-204-510 [2]) in that they are “spatially and chemically similar.” According to the Sediment Cleanup Standards (WAC 173-204-510 to 590), station clusters “of potential concern” are identified by grouping three stations with the “highest concentration of each chemical contaminant identified in WAC 1873-204-520, cleanup screening levels criteria.” The three stations are then evaluated by comparing the average concentrations for the three stations to the CSLs. If the average contaminant concentrations exceed the CSLs, the station cluster is defined as “of potential concern”. Sediment results are compared to CSLs in Table 2 of the technical memorandum excerpt in Appendix E. As shown in the table, none of the sediment sample chemical results exceeds the CSLs, which categorizes the station cluster as being of “low concern”.

In addition to the chemical evaluation, the three stations within the cluster with the highest level of biological effects, determined by the biological testing requirements, are to be identified (if available). If the biological effects at each of the three stations exceed the CSLs biological criteria, the station cluster is defined as “of potential concern”. However, since only a single bioassay test was required to “confirm” the sediments from station C-8, only one set of biological test data is available, and an evaluation of biological effects for three stations within the cluster cannot be made. Note that the results of the single biological test did not exceed the SQSs biological effects criteria, supporting the “of low concern” designation.

1.3.5.2 Monitoring Well Survey

A survey of all existing groundwater monitoring wells at the site was conducted on October 24, 2006. Sixteen existing wells were located, as indicated on Figure 1-4. Depths to groundwater and thickness of floating product (if present) were measured in each well using an electronic oil/water interface probe. Floating product was measured in only two of the wells (MW-16 and MW-18) located in the upper yard. The thickness of product measured was 0.03 feet (approximately 3/8 inch) in each of the two wells. The horizontal location and top of casing vertical elevation for each well were measured by survey on November 16, 2006. Groundwater elevations presented on Figure 1-7 are based on the survey. General groundwater flow directions indicated on the figure are based on the measured elevations.



Parametrix DATE: Jan 22, 2007 FILE: BR1896063P04T1301F-04

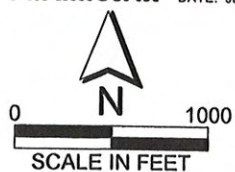


**Figure 1-1
Former Chevron Property
Project Vicinity**



Parametrix DATE: Jan 22, 2007 FILE: BR1896063P04T1301F-05

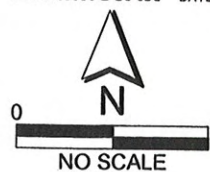
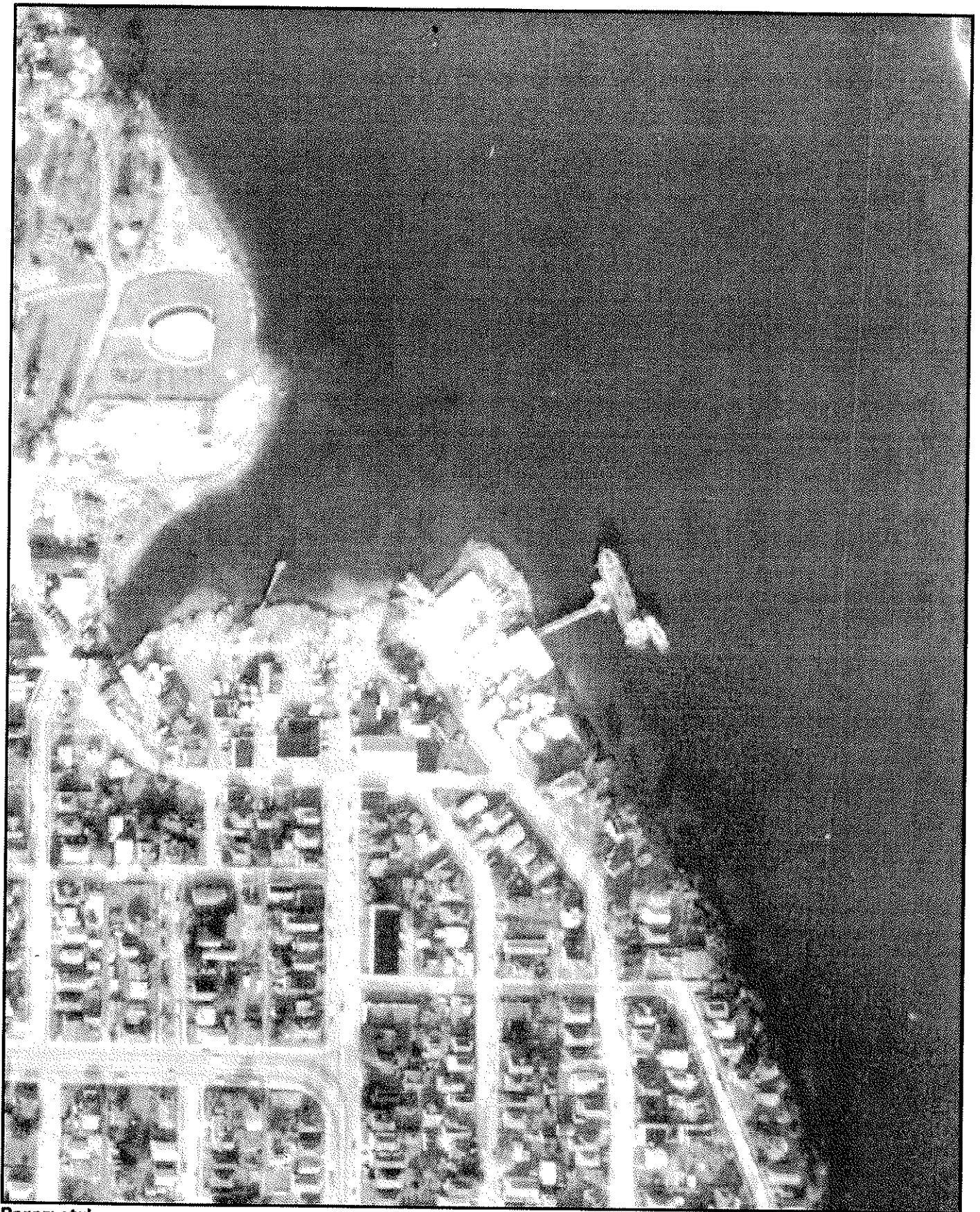


Figure 1-2
Former Chevron Property
CIRCA 2005 Aerial Photograph



Parametrix DATE: Jan 22, 2007 FILE: BR1696063P04T1301F-05

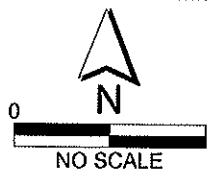
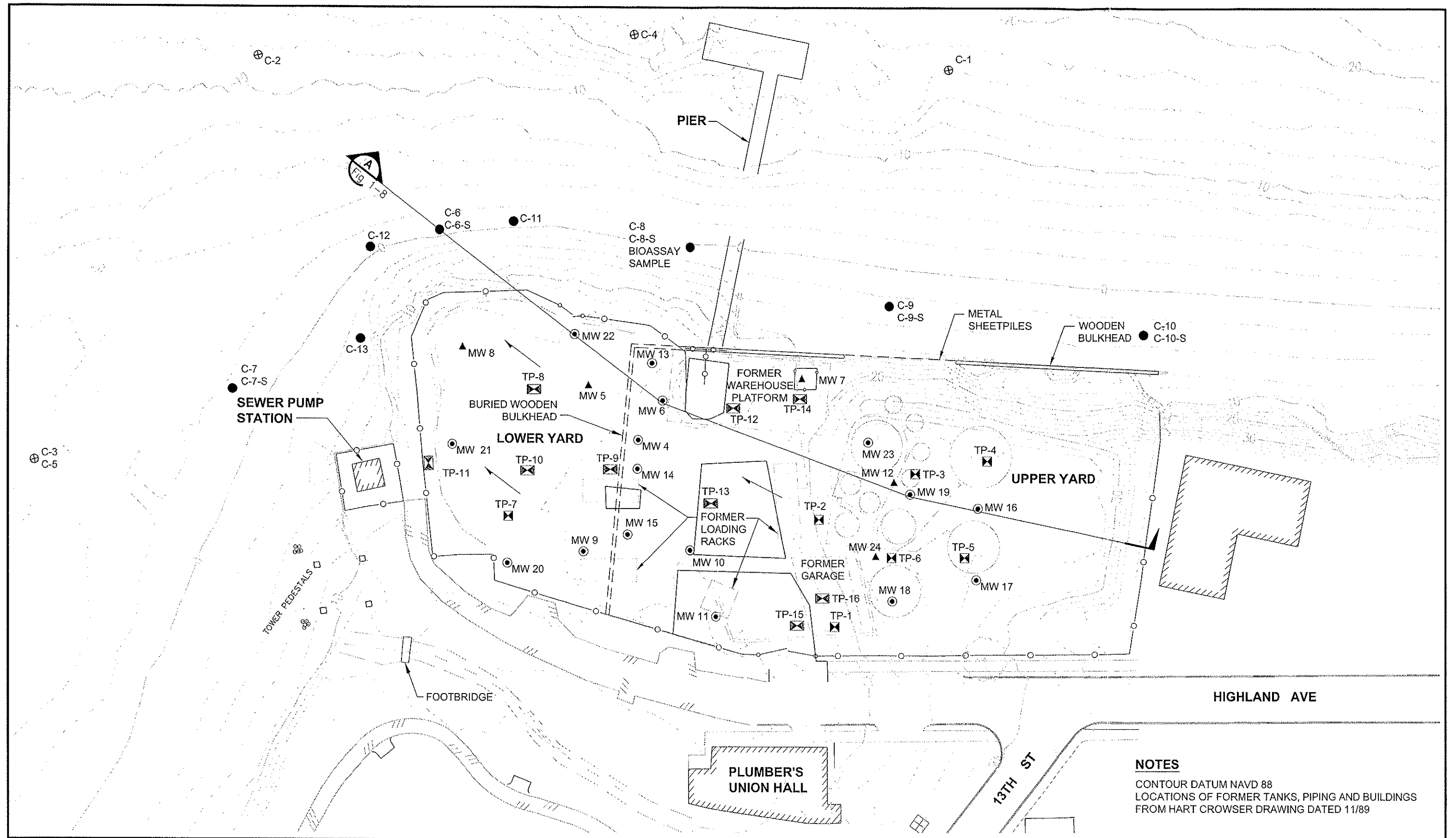


Figure 1-3
Former Chevron Property
1963 Aerial Photograph



Parametrix DATE: Jan 26, 2007 FILE: BR1895063P04T1301F-02



LEGEND

- INTERTIDAL SEDIMENT SAMPLE
- ⊕ SUBTIDAL SEDIMENT SAMPLE
- ⊙ EXISTING MONITORING WELL

- ⊠ TEST PIT, GEO ENGINEERS 1988
- ⊡ TEST PIT, HART CROWSER 1989
- ▲ DESTROYED MONITORING WELL
- EXISTING CONCRETE PAD

- ▨ EXISTING BUILDING
- CHAIN LINK FENCE
- - - DRAINAGE DITCH
- FORMER PIPING/BUILDING/LOADING RACK

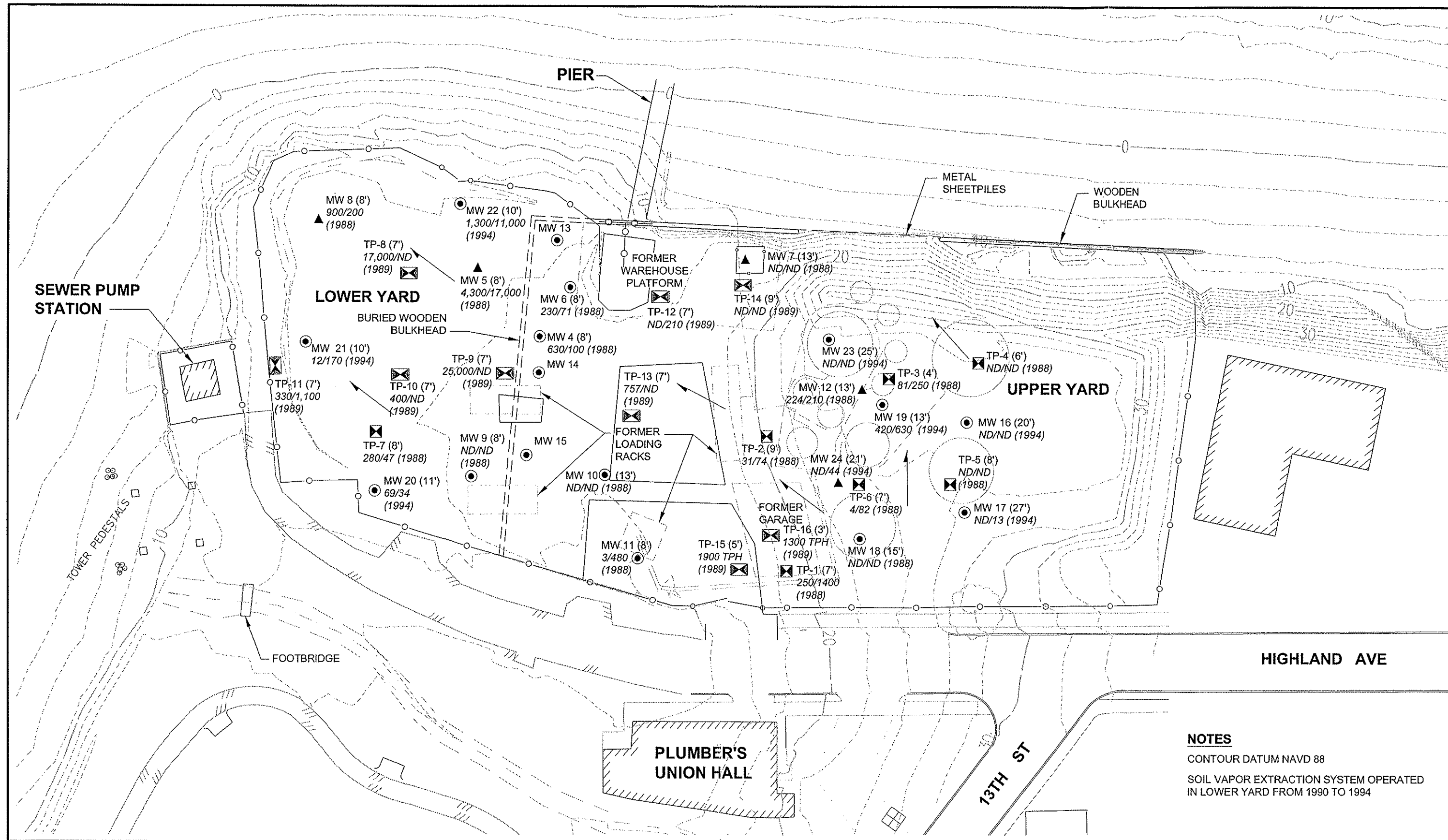
- C-6 SURFACE SEDIMENT SAMPLE
- C-6-S SEDIMENT SAMPLE COLLECTED AT 2 FT DEPTH
- FORMER ABOVEGROUND STORAGE TANK
- GENERAL GROUNDWATER FLOW DIRECTION

Figure 1-4
Former Chevron Property
Historical Sample Locations



Parametrix DATE: Jun 28, 2007 FILE: BR1896063P04T1301F-05

Figure 1-5
Former Chevron Property
Completed Park Concept



NOTES

CONTOUR DATUM NAVD 88

SOIL VAPOR EXTRACTION SYSTEM OPERATED IN LOWER YARD FROM 1990 TO 1994

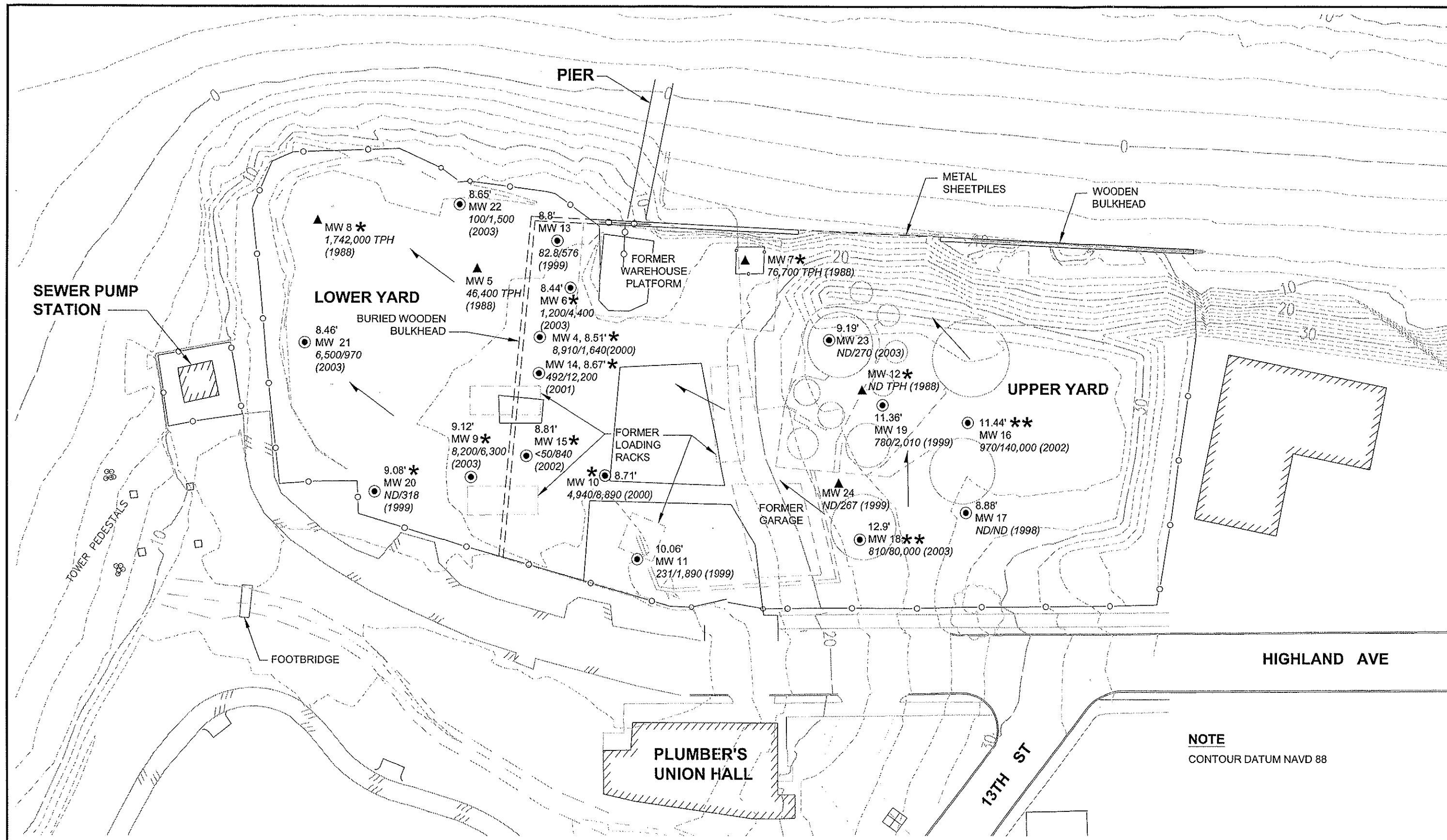
Parametrix DATE: Jun 21, 2007 FILE: 8R1856063P04T1301F-03



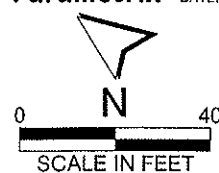
900/200 (1988)	SOIL RESULTS FOR GASOLINE/DIESEL IN MG/KG (YEAR SAMPLED)	▲ DESTROYED MONITORING WELL	EXISTING CONCRETE PAD
TPH	TOTAL PETROLEUM HYDROCARBONS	○ FORMER ABOVEGROUND STORAGE TANK	→ GENERAL GROUNDWATER FLOW DIRECTION
(8')	DEPTH OF SAMPLE		

EXISTING BUILDING	TEST PIT, GEO ENGINEERS 1988
CHAIN LINK FENCE	TEST PIT, HART CROWSER 1989
DRAINAGE DITCH	EXISTING MONITORING WELL
FORMER PIPING/BUILDING/LOADING RACK	

Figure 1-6
Former Chevron Property
Historical Soil Results



Parametrix DATE: Jun 21, 2007 FILE: BR1898063P04T1301F-03



LEGEND

- EXISTING BUILDING
- CHAIN LINK FENCE
- DRAINAGE DITCH
- GENERAL GROUNDWATER FLOW DIRECTION

- **** CURRENT FLOATING PRODUCT IN WELL
- *** HISTORICAL FLOATING PRODUCT IN WELL
- EXISTING MONITORING WELL
- DESTROYED MONITORING WELL

ND NOT DETECTED

TPH TOTAL PETROLEUM HYDROCARBONS

6,500/970 (2003) MOST RECENT GROUNDWATER SAMPLE RESULTS FOR GASOLINE/DIESEL IN ug/L (YEAR SAMPLED)

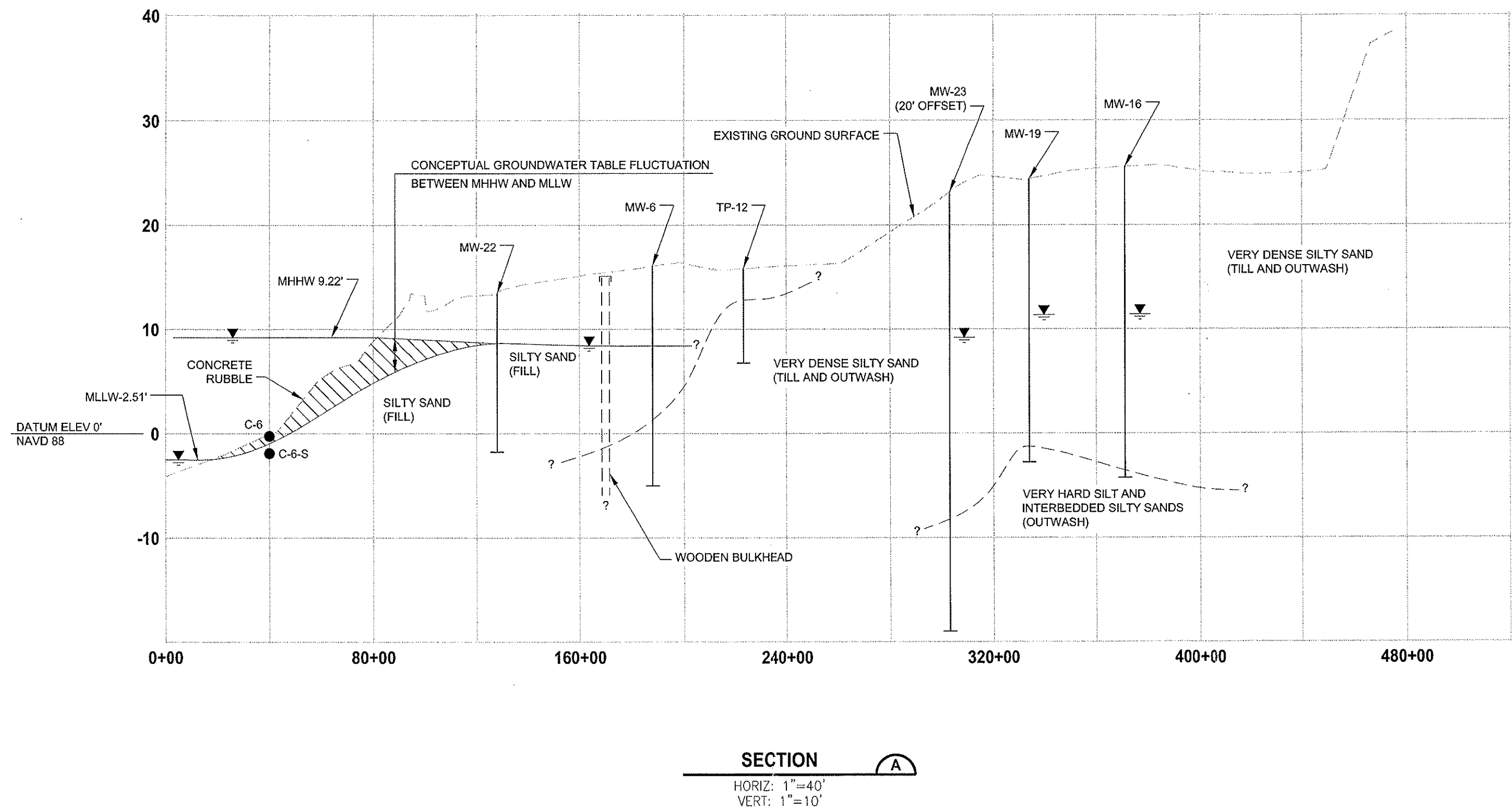
10.06' GROUNDWATER ELEVATION MEASURED IN WELL OCTOBER 2006

Figure 1-7
Former Chevron Property
Historical Groundwater Results



Parametrix DATE: Jun 21, 2007 FILE: BR1896063P04T1301F-05

Figure 1-8
Former Chevron Property
Location of Sediment Sample C-6



Parametrix DATE: Jun 21, 2007 FILE: BR1895063P04T1301F-06

NOTES:

MEAN HIGHER HIGH WATER (MHHW) AND MEAN LOWER LOW WATER (MLLW) ELEVATIONS OBTAINED FROM NOAA RECORDS FOR TIDAL STATION BREMERTON, WA, ID NO. 9445958

**Figure 1-9
Former Chevron Property
Section A**

2. PROJECT ORGANIZATION AND MANAGEMENT

2.1 PROJECT ORGANIZATION

Specific project roles and responsibilities for oversight and sampling are described in Table 2-1.

Table 2-1. Project Roles and Responsibilities

Personnel	Responsibilities
Bill Webb Parametrix Project Manager (360) 850-5303 bwebb@parametrix.com	Oversees technical team performance to ensure successful accomplishment of the project objectives.
David Dinkuhn Parametrix Task Manager (360) 850 -5319 ddinkuhn@parametrix.com	Reports directly to the Project Manager. Scopes and coordinates field effort; oversees day to day project activities; coordinates site access with property owners; insures all field sampling and handling procedures are followed and documented, and that field QA objectives are met. Reports to the Project Manager any deviations from the work plan.
Lily Isenhardt Parametrix Field Sampler/Field Health and Safety Officer (360) 850-5333 lisenhardt@parametrix.com	Reports directly to the Task Manager. Ensures all project health and safety requirements are followed; conducts field sampling activities; coordinates sample deliveries to lab; reports to the Task Manager any deviations from the work plan.
Stuart Currie Parametrix Project Chemist/Data QA Manager (425) 458-6273 scurrie@parametrix.com	Reports directly to Task Manager and works directly with laboratory QA manager. Reviews laboratory data; ensures chemical data quality; performs QA evaluations of data.
Katie Downie Laboratory QA Manager Severn Trent Laboratories (253) 922-2310	Works with Data QA Manager and Project Manager to ensure that all laboratory QA objectives are met and data package QA/QC deliverables from the laboratory are correctly documented and reported.

The Field Sampler will be responsible for the initial coordination of sampling and analysis activities with the selected analytical laboratory. The Project Chemist may review laboratory procedures to establish that protocols for chemical analysis, quality assurance/quality control (QA/QC), and reporting are acceptable. He will also act as the primary point of contact with the laboratory for any analysis or QA/QC issues arising during project completion.

The Field Sampler will be responsible for coordinating daily sampling and analysis activities with the project laboratory and for notifying the laboratory of sample delivery, assuring samples are packaged properly for transportation, and delivering samples to the laboratory.

The Data QA Manager will assess data quality by conducting data review/verification, and validation, as needed.

2.2 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) were developed according to EPA's DQOs Process (EPA 2000). The DQO process is a seven-step planning approach to develop sampling designs for data collection activities that support decision-making. It provides a systematic procedure for defining the criteria that a data collection design should satisfy. The DQOs for the project are shown in Table 2-2.

Table 2-2. Design Characterization Sampling DQOs

DQO	Description
State the Problem	What is the nature and extent of soil and groundwater contamination at the site, both initially and following the interim action?
Identify the Decisions	Is the collected chemical data adequate to identify and delineate the extent of the contamination for the purposes of designing the interim action and developing an appropriate final action?
Identify the Inputs to the Decisions	Analytical results (what are the detected concentrations? are they above cleanup levels? was QA/QC criteria met?). Actual sample locations (correct location and depth?).
Define the Study Boundaries	The site property boundary and off-site migration areas (where warranted).
Develop a Decision Rule	Results will be compared to the cleanup levels established for the site. Determination of whether the collected data is adequate will be generally be based on overall investigation results and professional judgment.
If/Then Statement	If the extent of contamination cannot be adequately evaluated, then additional sampling may be required.
Specify Tolerable Limits on Decision Errors	The extent of contamination will be determined based on the sampling results and established cleanup levels. Tolerable limits of uncertainty regarding the sampling results will be developed by stakeholders based on professional judgment.
Optimize the Design	Sampling strategies may be adjusted in the field based on visual observations made during characterization activities. This may include collection of additional samples, moving planned sampling locations, and adding analyses to better characterize the site. Second phase sampling events may be employed if, based on first phase sampling results, contaminant delineation is insufficient for the purposes of the interim action or for selecting an appropriate final action.

2.3 DATA QUALITY INDICATORS

Data quality and usability are evaluated in terms of performance criteria. Performance and acceptance criteria are expressed in terms of data quality indicators (DQIs). The principal indicators of data quality are precision, accuracy, bias, sensitivity, completeness, comparability, and representativeness. Table 2-3 provides a description of project DQIs.

Table 2-3. General Description of DQIs

DQI	Description
Precision:	A measure of agreement among repeated measurements of the same property under identical conditions. Usually assessed as a relative percent difference (RPD) between duplicate measurements. RPD guidelines for laboratory duplicate analyses are contained in the standard operating procedures (SOPs) for each analytical method and will be obtained from the laboratory for validation purposes.
Accuracy:	A measure of the overall agreement of a measurement to a known value. Analytical accuracy is assessed as percent recovery from matrix spike or reference material measurements. Percent recovery guidelines are contained in laboratory SOPs for each analytical method.
Bias:	The systematic or persistent distortion of a measurement process that causes error in one direction. Usually assessed with reference material or matrix spike measurements. Bias as reported by the laboratory will be used to assess data validity.
Sensitivity:	The capability of a method or instrument to meet prescribed reporting limits. Assessed by comparison with risk-based reporting limits, method reporting limits, instrument reporting limits, or laboratory quantitation limits, as appropriate. In general, reporting limits for the analytical methods used will be at or below cleanup levels.
Completeness:	A measurement of the amount of valid data needed to be obtained for a task. Assessed by comparing the amount of valid results to the total results set. Project requirements for completeness are 90%.
Comparability:	A qualitative term that expresses the measure of confidence that one data set can be compared to another. Assessed by comparing sample collection and handling methods, sample preparation and analytical procedures, holding times, reporting units, and other QA protocols. To ensure comparability of data collected for the site, standard collection and measurement techniques will be used.
Representativeness:	A qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variation at a sample point, or environmental condition. To ensure representativeness, the sampling design will incorporate sufficient samples so that contamination is detected, if present. Additionally, all sampling procedures detailed in this QAPP will be followed.

2.4 SPECIAL TRAINING AND CERTIFICATION

All personnel conducting sampling activities on the project site must be 40-hour Hazardous Waste Operation (HAZWOPER) trained per 29CFR 1910.120 and be current with their annual 8-hour refresher course.

All personnel working at the project site will be briefed on potential site hazards, health and safety procedures, and sampling procedures. Following completion of this training, all personnel will be required to sign an acknowledgement form verifying that they have completed the task-specific training.

2.5 SAMPLING DOCUMENTATION AND RECORDS

The sampling records provided in Table 2-4 will be maintained for the project.

Table 2-4. Sampling and Sample Handling Records

Record	Use	Responsibility/Requirements
Field Notebook	Record significant events and observations.	Maintained by field sampler/geologist; must be bound; all entries must be factual, detailed, objective; entries must be signed and dated.
Sampling Field Data Sheet	Provide a record of each sample collected (Appendix F).	Completed, dated, and signed by sampler; maintained in project file.
Sample Label	Accompanies sample; contains specific sample identification information.	Completed and attached to sample container by sampler.
Chain-of-Custody Form	Documents chain-of-custody for sample handling (Appendix F).	Documented by sample number. Original accompanies sample.
Chain-of-Custody Seal	Seals sample shipment container (e.g., cooler) to prevent tampering or sample transference.	Completed, signed, and applied by sampler at time samples are transported.
Sampling and Analysis Request	Provides a record of each sample number, date of collection/transport, sample matrix, analytical parameters for which samples are to be analyzed.	Completed by sampler at time of sampling/transport; copies distributed to laboratory project file.

2.5.1 Field Notebook and Field Data Sheets

A bound field notebook and/or field data sheets will be maintained to provide daily records of significant events and observations that occur during field investigations. All entries are to be made in waterproof ink, signed, and dated. Pages of the field notebook are not to be removed, destroyed, or thrown away. Corrections will be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside. The correction will be initialed and dated. Most corrected errors will require a footnote explaining the correction.

If an error made on a document is assigned to one person, that individual may make corrections simply by crossing out the error and entering the correct information. The erroneous information should not be obliterated. Any error discovered on a document should be corrected by the person who made the entry.

All field logs and forms will be retained in the project files.

2.5.2 Photographs

All photographs taken of field activities will be documented with the following information noted in the field notebook:

- Date, time, and location of photograph taken
- Description of photograph taken
- Reasons photograph was taken
- Viewing direction

Digital photographs will be reviewed in the field to assess quality and need to re-shoot the photograph. For non-digital photographs, the photographer will review the photographs or slides when they return from developing, and compare them to the log, to assure that the log and the photographs match.

2.6 REPORTING

Parametrix will provide a report at the completion of the RI/FS and interims action implementation. In addition, two technical memoranda will be provided at intermediate stages to report investigation and feasibility study results and to aid in the decision making process. The first technical memorandum will summarize the results of the RI sampling and will present a proposed pilot test plan for verifying the selected in-situ treatment technology (see Section 3). The second technical memorandum will describe the results of the pilot study and propose a production-scale treatment plan. The memoranda will contain tables and figures as appropriate to present the data and proposed plans.

At the completion of the RI/FS and interim action implementation, Parametrix will prepare a draft and final RI/FS report containing:

- A summary of field activities completed.
- Figures showing sampling locations.
- A description and discussion of the nature and extent of contamination found. Figures diagramming contamination extent will be included.
- A description of the soil excavations, pilot test, and full scale treatment performed, including diagrams and confirmation test results.
- The results of the confirmation groundwater sampling including an assessment of groundwater contaminant levels trends.
- Recommendations for a final cleanup action.
- A summary of laboratory analytical results and a comparison to cleanup levels.
- A terrestrial ecological evaluation.
- All boring logs and sampling forms.
- Laboratory data sheets and the results of data review/validation.
- An electronic laboratory data submittal consistent with the requirements of Ecology's Environmental Information Management (EIM) System.

The draft and final deliverables will be submitted to all parties on the distribution list as two hard copies and one electronic copy (portable document format [PDF]).

3. RI/FS ACTIVITIES AND INTERIM ACTION

3.1 REMEDIAL INVESTIGATION

3.1.1 GROUNDWATER SAMPLING

3.1.1.1 Approach

In order to determine current groundwater conditions, eight existing and two newly-installed wells will be sampled. The data collected will be used to refine the design of the interim action proposed in this plan. Wells to be sampled during the RI are shown on Figure 3-1. Wells were selected at the downgradient boundary and at interior site locations designed to provide a concentration gradient across the lower yard. In the upper yard, wells with historical elevated concentrations were selected. However, wells MW-16 and MW-18 were not selected because they currently contain 0.03 feet of floating product and it is assumed that groundwater in these wells is impacted similar to the last sampling events in 2002 and 2003. Upgradient well MW-17 has historically been clean and was not selected.

A new well (MW-25) will be installed to replace MW-7, which was found to contain floating product up to 0.95 feet-thick. MW-7 was apparently destroyed in 1989. Note that MW-7 was located directly over the historical piping location. Well MW-25 will be configured the same as MW-7 and will be installed to a depth of 20 feet with a 15-foot long screen. A second new well (MW-26) will be installed to replace MW-8 near the shoreline. Well MW-26 will be configured the same as MW-7 and will be installed to a depth of 20 feet with a 15-foot long screen.

Soils from the monitoring well borings will be collected at the surface and at 2.5-foot intervals for field screening using a PID and visual/olfactory observations. The soil sample with the highest potential to contain contamination from each boring (based on field screening) will be submitted for laboratory analysis. In the absence of indications of contamination, the soil sample from the vadose zone-groundwater surface interface will be submitted for analysis. Soil sample analysis is discussed in Section 3.1.3 below.

3.1.1.2 Sample Analysis and Cleanup Levels

All groundwater samples will be analyzed for gasoline, BTEX, diesel, heavy oil, lead scavengers (1,2-dibromomethane [EDB] and 1,2-dichloroethane [EDC]), and the antiknock agent/oxygenate methyl tertiary-butyl ether (MTBE) to establish a baseline of existing groundwater conditions. Groundwater samples from the five wells located at the downgradient boundary of the site (MW-20, MW-21, MW-22, MW-25, and MW-26) and two interior wells (MW-4 and MW-19) will also be analyzed for cPAHs and lead. If the turbidity of the collected samples is greater than 10 nephelometric turbidity units (NTUs), dissolved lead samples will also be collected.

To provide a baseline for assessing whether natural attenuation is occurring at the site, all groundwater samples will be analyzed for nitrate, sulfate, and alkalinity. The additional geochemical indicators dissolved oxygen and redox potential will be measured in the field during well sampling. All groundwater samples will also be analyzed for chemical oxygen demand (COD) for remedial design purposes, and salinity to assess tidal influences.

To account for tidal influence and possible dilution of the fresh water in the wells, contaminant concentrations will be corrected using chloride concentrations detected in the wells and from a marine surface water sample collected from the shoreline during the same sampling event as the groundwater samples. Two groundwater samples will be analyzed for total dissolved solids to determine whether the groundwater is potable under MTCA.

Groundwater results for individual constituents will be compared to Applicable or Relevant and Appropriate Requirements (ARARs) that are protective of surface water. Specific ARARs consist of the Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A) and the National Toxics Rule (40 CFR 131). Surface water ARARs obtained from the Ecology online searchable database are provided in Table 3-1 (page 3-3). Note that the human health ARARs in the appendix are for ingestion of aquatic organisms only. TPH groundwater cleanup levels will consist of MTCA Method A groundwater cleanup levels.

3.1.2 SURFACE SOIL SAMPLING

3.1.2.1 Approach

Historically, surface soil at the site has been investigated at the test pit and monitoring well locations through field screening techniques. During these explorations, both surface and subsurface soils were observed for the presence of contamination; samples were generally selected from depths where contamination was most likely to exist. No surface samples were selected and analyzed during the historical investigations, indicating that contaminated soils generally occurred at depth.

During the RI, surface soils will be investigated to further assess potential surface soil impacts at the site. Surface soils will be collected from a depth of 0 to 6 inches at locations where potential surface spills may have occurred such as former ASTs, fuel loading racks, and the former warehouse platform. Approximately 25 samples will be collected and field screened using a PID, sheen test, and visual/olfactory methods.

3.1.2.2 Sample Analysis and Cleanup Levels

Samples containing apparent contamination based on the field screening will be submitted for laboratory analysis for gasoline, BTEX, diesel, heavy oil, and lead. A maximum of ten surface soil samples with the highest apparent contaminant levels will be analyzed. To meet the requirements of Table 830-1 of the MTCA regulation, the two samples showing the highest overall potential contaminant levels will also be analyzed for fuel additives (EDB, EDC, and MTBE) and cPAHs. If no apparent contamination is observed, a minimum of four samples will be selected and submitted for analysis. Surface soil sample results will be compared to MTCA A cleanup levels.

Table 3-1. Soil and Groundwater MTCA Method A Cleanup Levels and Surface Water ARARS

Analyte	Ground Water, Method A, Table Value (µg/L)	Soil, Method A, Unrestricted Land Use, Table Value (mg/kg)	Surface Water ARAR – Aquatic Life – Marine/Acute – Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Acute – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic –Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Human Health – Marine – National Toxics Rule, 40 CFR 131 (µg/L)
acetone	–	–	–	–	–	–	–
acrylonitrile	–	–	–	–	–	–	6.6e-01
allyl chloride	–	–	–	–	–	–	–
benzene	5e+00	3e–02	–	–	–	–	7.1e+01
benzo[a]anthracene	–	–	–	–	–	–	3.1e-02
benzo[a]pyrene	1e–01	1e–01	–	–	–	–	3.1e-02
benzo[b]fluoranthene	–	–	–	–	–	–	3.1e-02
benzo[k]fluoranthene	–	–	–	–	–	–	3.1e-02
bromodichloromethane	–	–	–	–	–	–	2.2e+01
bromoform	–	–	–	–	–	–	3.6e+02
bromomethane	–	–	–	–	–	–	4e+03
carbon disulfide	–	–	–	–	–	–	–
carbon tetrachloride	–	–	–	–	–	–	4.4e+00
chlorobenzene	–	–	–	–	–	–	2.1e+04
chlorobutane;1-	–	–	–	–	–	–	–
chloroform	–	–	–	–	–	–	4.7e+02
chloromethane	–	–	–	–	–	–	–
chlorotoluene;o-	–	–	–	–	–	–	–

(Table Continues)

Table 3-1. Soil and Groundwater MTCA Method A Cleanup Levels and Surface Water ARARS (Continued)

Analyte	Ground Water, Method A, Table Value (µg/L)	Soil, Method A, Unrestricted Land Use, Table Value (mg/kg)	Surface Water ARAR – Aquatic Life – Marine/Acute – Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Acute – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic –Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Human Health – Marine – National Toxics Rule, 40 CFR 131 (µg/L)
chrysene	–	–	–	–	–	–	3.1e-02
cPAHs*	1e-01	1e-01	–	–	–	–	–
cumene	–	–	–	–	–	–	–
dibenzo[a,h]anthracene	–	–	–	–	–	–	3.1e-02
dibromo-3- chloropropane;1,2-	–	–	–	–	–	–	–
dibromochloromethane	–	–	–	–	–	–	3.4e+01
dichlorobenzene;1,2-	–	–	–	–	–	–	1.7e+04
dichlorobenzene;1,3-	–	–	–	–	–	–	2.6e+03
dichlorobenzene;1,4-	–	–	–	–	–	–	2.6e+03
dichlorodifluoromethane	–	–	–	–	–	–	–
dichloroethane;1,1-	–	–	–	–	–	–	–
dichloroethane;1,2-	5e+00	–	–	–	–	–	9.9e+01
dichloropropane;1,2-	–	–	–	–	–	–	–
ethyl chloride	–	–	–	–	–	–	–
ethyl ether	–	–	–	–	–	–	–
ethyl methacrylate	–	–	–	–	–	–	–
ethylbenzene	7e+02	6e+00	–	–	–	–	2.9e+04

(Table Continues)

Table 3-1. Soil and Groundwater MTCA Method A Cleanup Levels and Surface Water ARARS (Continued)

Analyte	Ground Water, Method A, Table Value (µg/L)	Soil, Method A, Unrestricted Land Use, Table Value (mg/kg)	Surface Water ARAR – Aquatic Life – Marine/Acute – Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Acute – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic –Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Human Health – Marine – National Toxics Rule, 40 CFR 131 (µg/L)
ethylene dibromide (EDB)	1e–02	5e–03	–	–	–	–	–
hexachlorobutadiene	–	–	–	–	–	–	5e+01
hexachloroethane	–	–	–	–	–	–	8.9e+00
indeno[1,2,3-cd]pyrene	–	–	–	–	–	–	3.1e–02
lead	1.5e+01	2.5e+02	2.1e+02	2.1e+02	8.1e+00	8.1e+00	–
methyl acrylate	–	–	–	–	–	–	–
methyl methacrylate	–	–	–	–	–	–	–
methyl tert–butyl ether	2e+01	1e–01	–	–	–	–	–
methylene bromide	–	–	–	–	–	–	–
methylene chloride	5e+00	2e–02	–	–	–	–	1.6e+03
naphthalene	1.6e+02	5e+00	–	–	–	–	–
nitropropane;2-	–	–	–	–	–	–	–
styrene	–	–	–	–	–	–	–
tetrachloroethane;1,1,1,2-	–	–	–	–	–	–	–
tetrachloroethane;1,1,2,2-	–	–	–	–	–	–	1.1e+01
tetrachloroethylene	5e+00	5e–02	–	–	–	–	8.9e+00
toluene	1e+03	7e+00	–	–	–	–	2e+05
tph, diesel range organics	5e+02	2e+03	–	–	–	–	–

(Table Continues)

Table 3-1. Soil and Groundwater MTCA Method A Cleanup Levels and Surface Water ARARS (Continued)

Analyte	Ground Water, Method A, Table Value (µg/L)	Soil, Method A, Unrestricted Land Use, Table Value (mg/kg)	Surface Water ARAR – Aquatic Life – Marine/Acute – Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Acute – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic –Ch. 173–201A WAC (µg/L)	Surface Water ARAR – Aquatic Life – Marine/Chronic – National Toxics Rule, 40 CFR 131 (µg/L)	Surface Water ARAR – Human Health – Marine – National Toxics Rule, 40 CFR 131 (µg/L)
tph, heavy oils	5e+02	2e+03	–	–	–	–	–
tph: gasoline range organics, benzene present	8e+02	3e+01	–	–	–	–	–
tph: gasoline range organics, no detectable benzene	1e+03	1e+02	–	–	–	–	–
tribromobenzene;1,2,4-	–	–	–	–	–	–	–
trichloroethane;1,1,1-	2e+02	2e+00	–	–	–	–	–
trichloroethane;1,1,2-	–	–	–	–	–	–	4.2e+01
trichloroethylene	5e+00	3e–02	–	–	–	–	8.1e+01
trichloropropane;1,2,3-	–	–	–	–	–	–	–
vinyl chloride	2e–01	–	–	–	–	–	5.3e+02
xylene;m–	–	–	–	–	–	–	–
xylene;o–	–	–	–	–	–	–	–

Notes:

ARARs: Applicable or Relevant and Appropriate Requirements.

(mg/kg): Milligrams per kilogram.

tph: Total petroleum hydrocarbons.

(µg/L): Micrograms per liter.

–: Not available.

*: Total carcinogenic PAHs using toxicity equivalency method.

3.1.3 SUBSURFACE SOIL SAMPLING

3.1.3.1 Approach

Subsurface soil samples will be collected to characterize existing soil conditions and to aid in remedial design. Proposed sampling locations are shown on Figure 3-2. Note that subsurface soil samples include samples to be collected from new wells MW-25 and MW-26 as discussed in Section 3.1.1.1. Up to 21 subsurface soil samples will be collected for analysis. Sample clusters are proposed at existing wells MW-16 and MW-18 to investigate the extent of contaminated soil at these wells, which currently contain floating product. Another cluster of sample locations is proposed at historical test pit TP-9, where contaminated soil was found between 2 feet bgs and the groundwater table. A fourth cluster is proposed around new well MW-25 as optional samples to investigate the potential extent of soil contamination (if found) at the former location of MW-7. Note that destroyed well MW-7 contained floating product when last measured in 1989.

Subsurface soil samples in the upper yard (at MW-16 and MW-18, and MW-25) will be collected from borings installed using an auger drill rig. An auger rig will be used due to the presence of till and outwash soils, which cannot be penetrated using a push-probe rig. Soils from the borings will be collected at the surface and at 2.5-foot intervals to the depth of the borings. All samples will be field screened using a PID, sheen test, and visual/olfactory methods. Note that the field screening includes the sample collected from the surface at the boring locations. The borings will be extended to 3 feet below the groundwater table as measured in the adjacent wells. It is anticipated the borings will be extended to 15 to 20 feet bgs. The soil sample with the highest potential to contain contamination from each boring (based on field screening) will be submitted for laboratory analysis. In the absence of indications of contamination, the soil sample from the groundwater table will be submitted for analysis.

Subsurface samples in the lower yard will be collected using a push-probe rig. Soil will be sampled continuously from the ground surface to 2 feet below the groundwater table as measured in the adjacent existing monitoring wells. It is anticipated that the probes will be extended to approximately 12 feet bgs. The entire sampled soil column, including soil from the ground surface at the probe locations, will be field screened using a PID, sheen test, and visual/olfactory methods. The sample with the highest potential to contain contamination (based on the field screening) will be submitted for laboratory analysis.

3.1.3.2 Sample Analysis and Cleanup Levels

All subsurface soil samples submitted to the laboratory will be analyzed for gasoline, BTEX, diesel, heavy oil, and lead. The four samples showing the highest overall potential contaminant levels will be analyzed for cPAHs and total organic carbon (TOC). The six samples showing the highest overall contaminant levels will be analyzed for extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH). Results for these analyses will provide a baseline for remedial design purposes. The samples will not be analyzed for fuel additives (EDB, EDC, and MTBE) since it is assumed that these compounds (if present) will be treated during the interim action implemented to address the petroleum contamination. Following the interim action, selected soil samples will be analyzed for these compounds to confirm that remedial goals were met. An exception is the fuel additives; if these compounds are not detected in the groundwater samples collected during the RI, they will not be analyzed for in the confirmation samples (in accordance with MTCA Table 830-1). Subsurface soil sample results will be compared to MTCA A cleanup levels.

3.2 FEASIBILITY STUDY

The purpose of a feasibility study (FS) is to develop and evaluate cleanup action alternatives. A FS should include the evaluation of a reasonable number of cleanup action alternatives that protect human health and the environment. An initial alternatives analysis was performed for the site by the City prior to purchase of the property (Parametrix 2005). Alternatives involving soil capping, installation of a cutoff wall, and complete removal by excavation were evaluated. Two alternatives, soil capping and installation of a cutoff wall, were identified as appropriate for the site and preferred. Since that time, further analysis has been conducted to meet current cleanup goals for the site, which are as follows:

- Meet the requirements of MTCA for the protection of human health and the environment.
- Use permanent solutions where possible. MTCA rules state that cleanup action shall use permanent solutions “to the maximum extent practicable” and provide for a “reasonable restoration time frame.”

The cleanup action proposed here as an interim action has been selected to meet the stated goals. They were developed based on historical data and, as such, are conceptual. Proposed cleanup actions will be further evaluated based on the information derived during the RI and a pilot study (see Section 3.3.1.2 below).

3.3 INTERIM ACTION

The proposed interim action described here are intended to meet MTCA requirements for a cleanup action. Once the interim action is completed, compliance monitoring will be conducted to confirm that interim action goals are met. The interim action will consist of:

- Source reduction using a combination of in-situ chemical oxidation and excavation and,
- In-situ enhanced bioremediation of dissolved and adsorbed hydrocarbons in the contaminated plume using oxygen releasing compounds.

3.3.1 Source Reduction

The major historical source at the site, the floating product layer in the lower yard, was removed by the SVE system. Secondary sources that are still present consist of residual hydrocarbons in smear zone soils, contaminated soil in the vadose zone (such as at test pit TP-9), and contaminated soil/product associated with the thin layer of floating product (<3/8-inch) in the vicinity of wells MW-16 and MW-18. The proposed methods for source reduction at the site are a combination of in-situ chemical oxidation and soil excavation. In-situ chemical oxidation has been demonstrated to be effective at reducing petroleum contamination at sites similar to the subject property. If the technology is shown to be ineffective during the pilot test proposed here, alternative treatments will be proposed and evaluated. Such alternative treatments may consist of a more aggressive application of oxygen leasing compounds to treat the smear zone or alternative soil treatment solutions such as Greenmarket Solutions Land Reclaimer™. This technology uses a proprietary process that weakens the bonds holding petroleum to soils and making them more bioavailable. Indigenous bacteria can also be added to the process.

3.3.1.1 Soil Excavation

Source soils near MW-16 and MW-18, where floating product was observed in November 2006, will be excavated and removed. Excavation will be conducted during the dry summer season and will target the removal of petroleum saturated soils and free product. Excavations will generally extend to the groundwater table. In addition to the excavations at MW-16 and MW-18, if other concentrated, near-surface zones of contaminated soil are discovered during the RI, their removal by excavation will be implemented.

Excavations will be observed full time by an archaeologist to screen for the presence of cultural resources. Cultural resources are not anticipated in the upper yard but are potentially present in the lower yard. If cultural resources are observed, excavation will be halted in the area. At this time, alternative remedial measures will be evaluated. One potential alternative would be to treat the area with chemical oxidant as described in Section 3.3.1.2 below. Any other potential alternatives will be evaluated at a later date as appropriate.

The excavation plan will be refined following the RI. At that time, a technical memorandum will be submitted that will summarize the results of the RI and present proposed excavation locations and a confirmation sampling scheme.

3.3.1.2 In-Situ Chemical Oxidation

Soils at locations in the lower yard where floating product has historically been observed are assumed to contain high concentrations of petroleum in the vadose zone. These soils will be treated using in-situ chemical oxidation. This treatment involves introducing a chemical oxidant in slurry form into the zone of impacted media. The slurry is typically injected using push-probe or drilling equipment with injections spaced on 7 to 10-foot centers. The oxidant destroys the hydrocarbons on contact, producing primarily carbon dioxide and water as by products. Two to three injection events spaced at one-month intervals are typically recommended. An alternative method is to mechanically mix the soil in place while injecting the oxidant slurry. Commercially-available chemical oxidants include RegenOxTM, Fenton's Reagent, and permanganate. Selection of the preferred chemical oxidant will be based on an analysis of cost and effectiveness that will be performed following the RI. At this time, a technical memorandum will be submitted that will present the preferred oxidant and a pilot study and confirmation sampling plan to prove the effectiveness of the oxidant. This technical memorandum will be combined with the excavation plan technical memorandum. A preliminary pilot test plan is described below.

Pilot Test Plan

To demonstrate the effectiveness of the selected chemical oxidation treatment, a pilot-scale test will be performed prior to production-scale treatment. The pilot scale location selected will be representative of the highest soil concentrations at the site. Nine injection locations on 10-foot centers will be treated with oxidant. The test injections will be centered around a soil sampling location with known concentrations to provide "before" soil concentrations. Two injection events spaced one month apart will occur. One month following the second event, four confirmation push-probes will be installed centered around the original sample location to provide an "after" measurement of soil concentrations. The four push-probes will each be spaced 5 feet horizontally from the original sample location. Two soil samples will be collected from each probe for a total of eight samples. Sample elevations will be selected so that three samples are collected from an elevation 1 foot above the original sample elevation, three samples will be collected from 1 foot below and two samples will

be collected from the same elevation. The confirmation samples will be analyzed for the same constituents as the “before” sample. A third injection event may be implemented based on the results of the confirmation sampling.

If proved effective, the chemical oxidation treatment will be applied at all source locations. Injection volumes, spacing, and treatment depths will be selected based on the results of the RI sampling and the pilot test. A production-scale treatment plan will be provided for approval in a technical memorandum following the pilot test.

An approximate outline of the source treatment area is shown on Figure 3-3. The number of injection events will be determined based on the pilot test. Confirmation sampling will be conducted at least one month following the final injection event. Confirmation sample locations will be collected at the same locations as the subsurface samples that were collected during the RI. This will provide “before” soil concentrations for comparison to the confirmation samples. All confirmation samples will be analyzed for gasoline, BTEX, diesel, heavy oil and cPAHs. The samples will also be analyzed for fuel additives (EDB, EDC, and MTBE) if these compounds are detected in the groundwater samples collected during the RI sampling.

3.3.2 Residual Soil and Groundwater Remediation

Residual soil and groundwater contamination will be treated using in-situ enhanced bioremediation following the source reduction interim action. The specific in-situ enhanced bioremediation technology selected for the site involves injecting an oxygen releasing compound in slurry form into the aquifer. Oxygen is provided to enhance the activity of naturally-occurring aerobic bacteria, which feed on or “respire” the hydrocarbons. Oxygen is typically the limiting factor for bioremediation at contaminated sites. Similar to the chemical oxidant injections, the slurry is injected into the zone of impacted media using push-probe or drilling equipment with injections spaced on approximately 10-foot centers. The effective treatment period is on the order of one year. Selection of design criteria such as the preferred oxygen-releasing compound, compound volumes, injection spacings, and treatment depths will be based on a cost evaluation and the results of the RI.

Confirmation sampling will consist of groundwater monitoring conducted in selected wells. The initial evaluation monitoring period will consist of three sampling events conducted at 6-, 9-, and 12-months following the injection event. A future long-term monitoring program will be developed based on the initial monitoring period results.

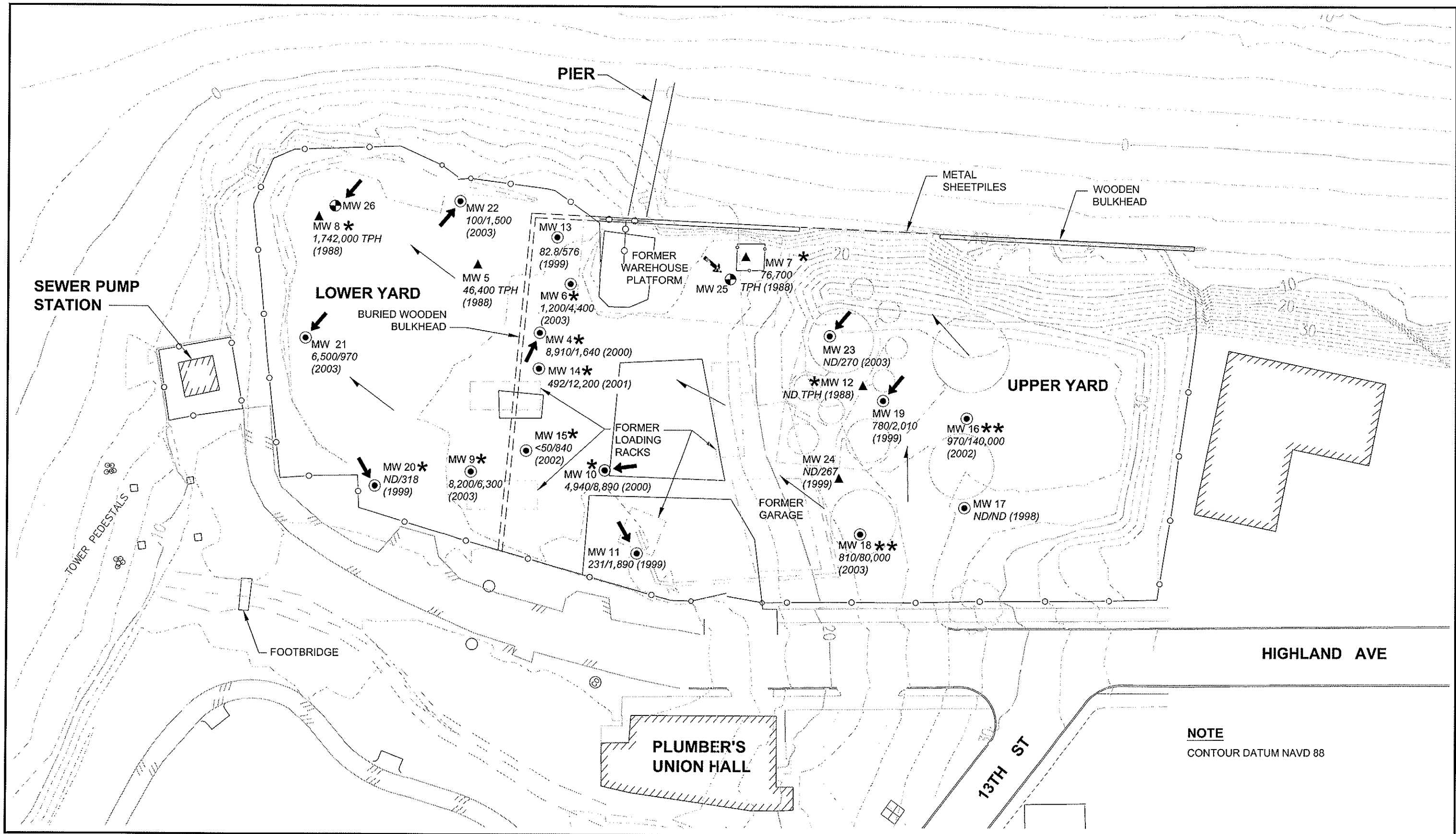
A proposed treatment plan and confirmation groundwater monitoring plan will be presented in a technical memorandum following the RI and pilot test. The technical memorandum will be combined with the production-scale in-situ chemical oxidation plan technical memorandum.

3.4 TERRESTRIAL ECOLOGICAL EVALUATION

At the completion of the RI, a terrestrial ecological evaluation will be performed to evaluate threats to terrestrial plants and animals at the site and to identify cleanup action alternatives and cleanup levels protective of terrestrial receptors (if appropriate). Terrestrial receptors identified in the SEPA environmental checklist developed for the site include hawks, herons, bald eagles, songbirds, waterfowl, otter, raccoons and other small mammals. No endangered or threatened terrestrial species were identified with the exception of the bald eagle (threatened).

The majority of contaminated soil at the site is expected to be located at depth (5 feet to 10 feet bgs) in the smear zone near the groundwater table. Source soil in the vadose zone above the groundwater table will be targeted for removal during the remedial actions.

Actual appropriate approaches will be evaluated based on the RI results. The approaches and cleanup levels (if appropriate) will be proposed in the excavation plan developed following the RI and prior to the excavation activities.



Parametrix DATE: Apr 12, 2007 FILE: BR1896053P04T1301F-03



LEGEND

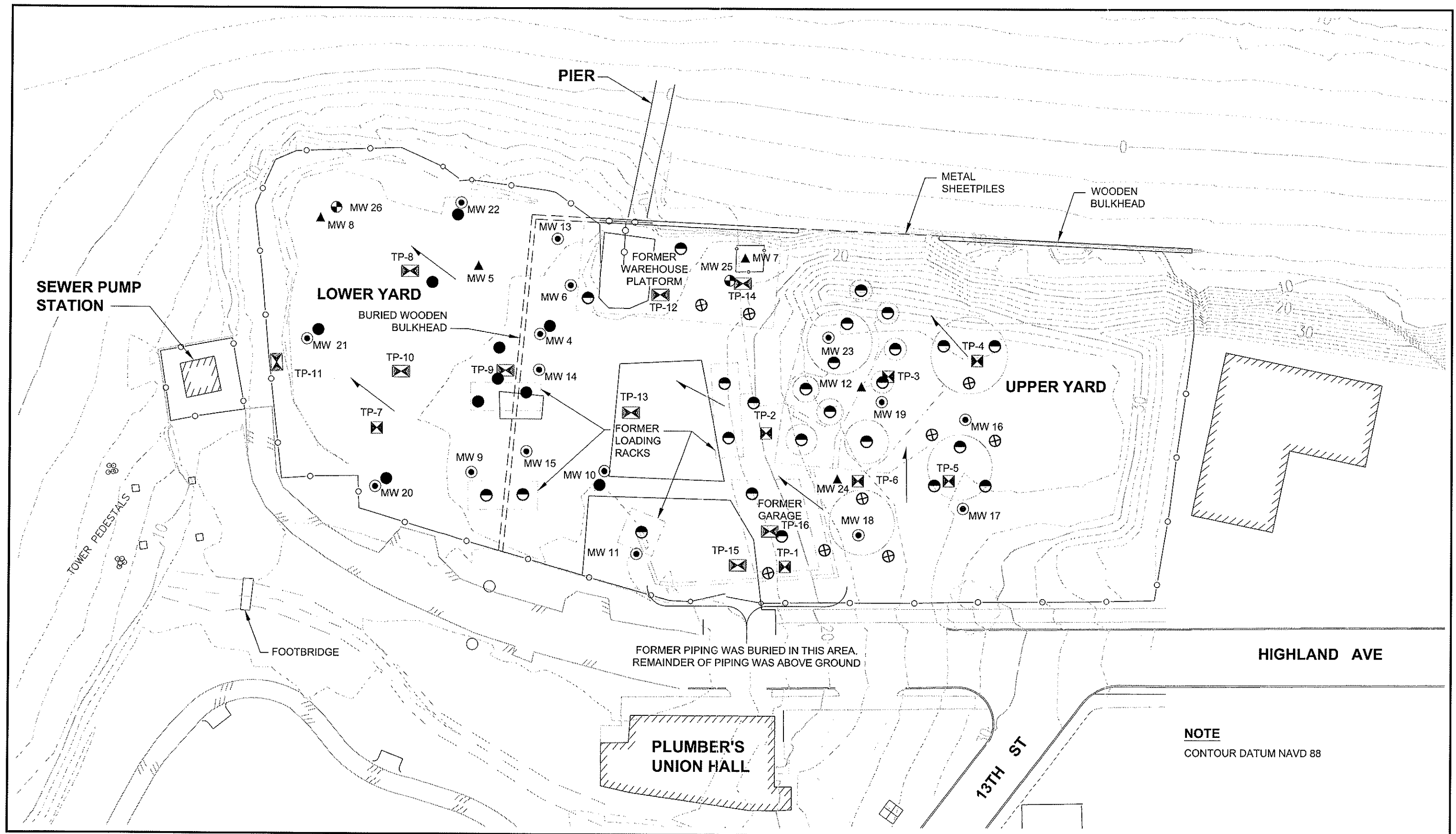
- EXISTING BUILDING
- CHAIN LINK FENCE
- DRAINAGE DITCH
- GENERAL GROUNDWATER FLOW DIRECTION

- NEW MONITORING WELL
- DESTROYED MONITORING WELL
- EXISTING MONITORING WELL

- WELL TO BE SAMPLED
- CURRENT FLOATING PRODUCT IN WELL
- HISTORICAL FLOATING PRODUCT IN WELL

6,500/970 (2003) MOST RECENT GROUNDWATER SAMPLE RESULTS FOR GASOLINE/DIESEL IN ug/L (YEAR SAMPLED)

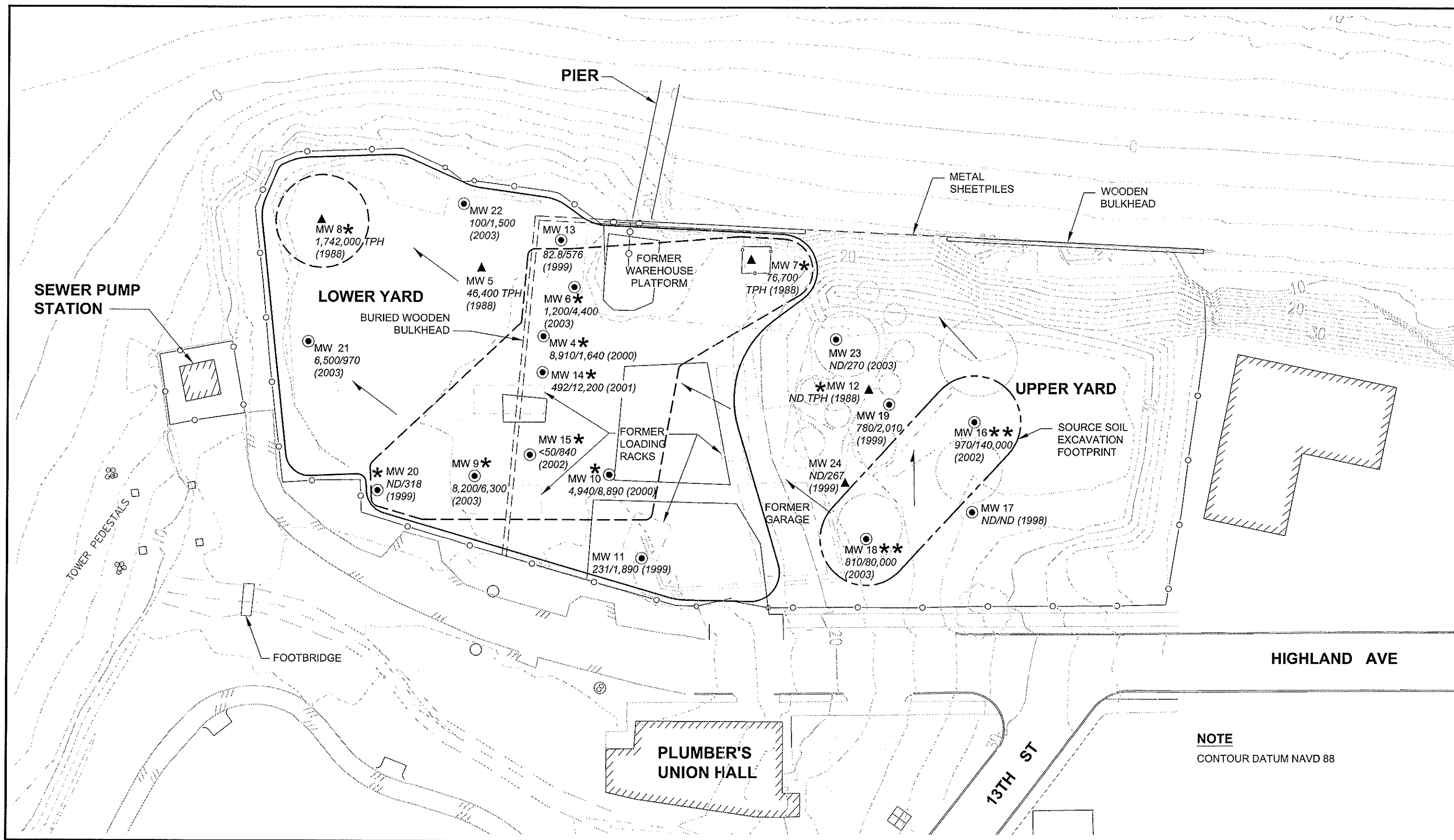
Figure 3-1
Former Chevron Property
Wells To Be Sampled



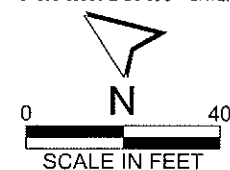
Parametrix DATE: Apr 12, 2007 FILE: BR1896063P04T1301F-03



Figure 3-2
Former Chevron Property
Soil Sampling Locations



Parametrix DATE: Apr 17, 2007 FILE: BR1896083P04T1301F-03



LEGEND

EXISTING BUILDING
CHAIN LINK FENCE
DRAINAGE DITCH

AREA TO BE TREATED USING IN-SITU CHEMICAL OXIDATION

** CURRENT FLOATING PRODUCT IN WELL
* HISTORICAL FLOATING PRODUCT IN WELL
● EXISTING MONITORING WELL

6,500/970 (2003) MOST RECENT GROUNDWATER SAMPLE RESULTS FOR GASOLINE/DIESEL ug/L (YEAR SAMPLED)

▲ DESTROYED MONITORING WELL

ND NOT DETECTED

TPH TOTAL PETROLEUM HYDROCARBONS

AREA TO BE TREATED USING IN-SITU ENHANCED BIOREMEDIATION

SOIL EXCAVATION AREA

NOTE

CONTOUR DATUM NAVD 88

**Figure 3-3
Former Chevron Property
Preliminary Interim Actions Plan**

4. FIELD AND LABORATORY METHODS

Descriptions of the specific sampling and laboratory methods for the project are presented in this section. The methods described are intended to supplement the standard operating procedures (SOPs) provided in Appendix G. Sampling field forms are provided in Appendix F.

4.1 SAMPLING METHODS AND PROCEDURES

4.1.1 General Sampling Procedures

All soil samples will be placed into the appropriate sample containers using dedicated, disposable polyethylene scoops. All sample containers will be provided by the analytical laboratory. Bowls used during sample collection will be dedicated, disposable, and constructed of polyethylene. Samples for BTEX, EDB, EDC, MTBE, and gasoline analyses were collected according to EPA Method 5035A as described in the soil sampling SOP in Appendix G. These samples will not be homogenized in the field. Samples for non-volatiles analysis will be thoroughly homogenized before being placed in sample containers. Soil samples will be logged by a qualified scientist using the Unified Soil Classification System (USCS). Following sampling collection, the location of all samples will be tied to existing site features and sketched in the field logbook. Sample locations and new monitoring wells will be located by survey in state plane coordinates.

4.1.2 Field Screening

During sample collection, soil samples will be field screened using a PID and visual/olfactory methods. A portion of each sample will be placed in a re-sealable plastic bag for headspace screening using the PID. The headspace sample will be allowed to heat in the sun for approximately 10 minutes and will then be shaken vigorously. A headspace vapor measurement will be then be collected and recorded on the field sampling form. During sampling, observations will also be made for signs of contamination such as odors, staining, or a sheen on saturated samples from below the water table. Such observations will also be recorded on the field sampling form. Field screening information will be used to aid in the selection of samples for laboratory analysis.

4.1.3 Surface Soil Grab Sampling

At locations where only surface soil samples are to be collected, samples will be collected from between 0 and 6 inches bgs using dedicated, disposable equipment.

4.1.4 Push-Probe Sampling (Soil)

A Geoprobe® or equivalent push-probe rig will be used to collect surface and subsurface soil samples. For soil sampling, the stainless steel core sampler will be fitted with a new disposable acetate sleeve for each sample run. Soil samples will generally be collected continuously from the ground surface to the depth of the borings. Probes will be extended to the groundwater table at a minimum.

Once the sampling depth is reached for each sample run, the coring device will be retracted and the acetate sleeve will be cut length-wise and opened to allow for observation of the soil core. The soil core will be logged and selected sections will be placed into the appropriate sample containers.

4.1.5 Soil Sampling using a Hollow-Stem Auger Rig

When difficult drilling conditions preclude the use of a push probe rig, subsurface soil sampling may be conducted using a hollow-stem auger rig. Soil samples will be collected from the auger borings using a decontaminated 2.5-inch internal diameter (I.D.) split-spoon (SPT) sampler. Soil samples will generally be collected at 2.5 feet intervals to the planned depth of the borings. The borings will be extended to the groundwater table at a minimum.

Once the sampling depth is reached for each sample, the SPT sampler will be driven 1 foot into the undisturbed soil at the base of the boring. The sampler will then be retrieved and opened for sample logging and field screening. Selected soil samples will be placed into the appropriate sample containers.

4.1.6 Monitoring Well Installation, Development, and Sampling

The two planned monitoring wells will be installed by a licensed driller according to applicable Ecology regulations (Chapter 173-160 WAC). The monitoring wells will be constructed using 2-inch I.D. polyvinyl chloride (PVC) casings fitted with 15-foot screens (with 0.01-inch or 0.02-inch slots) installed to depths of 20-feet bgs each (to match the former wells being replaced). Completed well monuments will be flush-mounted; a 2-foot square concrete pad will be constructed around the monument as a surface seal.

Completed monitoring wells will be allowed to set for at least 24 hours before development to allow grout or bentonite chip seals to set. Development will be achieved by over-pumping at a flow rate of up to 1 gallon per minute (gpm) using an 5/8-inch outside diameter (O.D.) inertial lift pump fitted with a surge block. New polyethylene tubing shall be used for developing each well. Water quality parameters (specific conductance, pH, temperature, and turbidity) will be measured during development. Development will be continued until the parameters stabilize as determined by the lack of appreciable change in measurement over several 3-minute monitoring periods or if a turbidity reading of 10 NTUs or less is attained. The 10 NTU criteria is based on EPA sampling guidelines (EPA 2002).

Groundwater sampling will be conducted no earlier than 24 hours following development to allow undisturbed water to enter the well column. Groundwater samples for volatile organic compounds (VOCs) or gasoline analysis will be collected using a decontaminated, positive-displacement down-hole pump. Non-volatiles samples may be collected using a peristaltic pump. New, disposable polyethylene tubing will be used at each sample location. For samples collected near the groundwater table, the sample pump will be lowered to 2-feet below the water surface. For deeper samples, the pump will be lowered to the mid-point of the well screen.

Groundwater will be purged and sampled from the wells using low flow techniques. The measured purging and sampling flow rate shall be 0.5 liters per minute or less. Water quality parameters will be measured during sampling; purging shall be considered complete when the criteria shown in Table 4-1 are met over at least three 3-minute monitoring periods.

Table 4-1. Purging Stabilization Criteria

Parameter	Stabilization Criteria
pH	+/- 0.1 unit
Specific conductance	+/- 3%
Oxidation-reduction potential (ORP)	+/- 10 millivolts
Turbidity	+/- 10% (when greater than 10 NTUs)
Dissolved Oxygen	+/- 0.3 milligrams per liter

If a turbidity of 10 NTUs or less is not attained during purging, both filtered and non-filtered metals samples will be collected. Filtered samples will be collected using a 0.45 micron filter placed in line with the sample tubing.

4.1.7 Decontamination Procedures

Decontamination of all non-disposable tools and equipment (such as split-spoon soil samplers) will be conducted prior to each sampling event and between each sampling location. The following steps will be taken during decontamination of sampling equipment used during field investigations:

- Scrub with non-phosphate detergent (i.e., Alconox or similar)
- Rinse with tap water
- Rinse thoroughly with deionized water
- Allow to air dry and place in a new plastic bag for storage

For decontamination of larger tools and equipment, such as push-probe rods, a high-pressure, hot water washer or similar device will be used. Loose soil materials will be removed from equipment using a “dry” decontamination technique consisting of the removal of loose soil using a shovel or brush.

4.1.8 Investigation-Derived Waste

Investigation derived waste (IDW) from sampling activities will be containerized onsite in 55-gallon drums. Composite samples will be collected for waste characterization. Disposal options for the IDW will be based on the analytical results. Disposal shall be managed by Parametrix using a licensed waste disposal contractor.

All drums will be labeled indicating date filled, content, location, company, and a unique identification number. All drums and containers will be tracked on a waste-tracking log.

All disposable sampling materials and personal protective equipment, such as disposable coveralls, gloves, and paper towels used in sample processing will be placed inside polyethylene bags or other appropriate containers. Disposable materials will be placed in a refuse container and disposed of as solid waste.

4.2 SAMPLE HANDLING AND CUSTODY

4.2.1 Sample Identification and Labeling

Prior to the field investigation, each sample location will be assigned a unique code. Each sample collected at that location will be pre-assigned an identification code using the sampling site followed by other specific information describing the sample. The sample numbering protocol is shown in Table 4-2.

Table 4-2. Sample Numbering Protocol

Site	CHEV = Chevron Property
Matrix	SO = Soil GW = Groundwater WT = Rinsate/trip blank water
Sampling Station	SS01 = Surface Soil Station 01 SB01 = Soil Boring No. 1 PP01 = Push Probe No. 1 MW25 = Monitoring Well No. 25 (for continuity with past work, monitoring well numbering will begin with 25)
Sample Type/Sample Depth	0000 = Field sample collected at a depth of 0.0 feet 1010 = Field duplicate collected at a depth of 1.0 feet 2000 = Trip blank 4050 = Rinsate Blank collected following the collection of a sample at a depth of 5.0 feet.

Example:

CHEV-SO-MW25-0150 = Soil sample collected from the soil boring installed for MW-25 at a depth of 15.0 feet.

4.2.2 Sample Storage, Packaging and Transportation

Samples will be placed in a cooler following collection and chilled to approximately 4°C. Following completion of each days sampling, all samples will be transported and/or shipped to the analytical laboratory, as appropriate. Samples which are routinely delivered to the laboratory on the same day as collection may not have sufficient time to chill to 4°C.

4.2.3 Sample Custody

The chain-of-custody procedures used for this project will provide an accurate written or computerized record that can be used to trace the possession of each sample from the time each is collected until the completion of all required analyses. A sample is in custody if it is in any of the following places:

- In someone's physical possession
- In someone's view
- In a secured container
- In a designated secure area

The following information will be provided on the chain-of-custody form:

- Sample identification numbers
- Matrix type for each sample
- Analytical methods to be performed for each sample
- Number of containers for each sample
- Sampling date and time for each sample
- Names of all sampling personnel
- Signature and dates indicating the transfer of sample custody

All samples will be maintained in custody until formally transferred to the laboratory under a written chain-of-custody. Samples will be kept in sight of the sampling crew or in a secure, locked vehicle at all times. Samples that leave the custody of field personnel will be sealed by placing a signed and dated Custody Seal across the seam of the shipping container.

4.3 ANALYTICAL METHODS

All samples will be submitted to a commercial analytical laboratory certified by Ecology to perform the required analyses. The selected laboratory for the project is Severn Trent Laboratory of Fife, Washington. Analytical methods are listed in Table 4-5. Laboratory reporting limits will be verified prior to analyses to ensure that, at a minimum, reporting limits for each analyte are equal to or lower than MTCA Method A cleanup levels for soil and groundwater. Matrix interferences may make it impossible to achieve the desired reporting limits and associated QC criteria. In such instances, the laboratory shall report the reason for noncompliance with QC criteria or elevated detection limits.

4.4 QUALITY ASSURANCE/QUALITY CONTROL

QA/QC checks consist of measurements performed in the field and laboratory.

4.4.1 Field Methods

Guidelines for minimum samples for field QA/QC sampling are summarized in Table 4-3.

Table 4-3. Guidelines for Minimum QA/QC Samples for Field Sampling

Field			
Media	Field Duplicate	Trip Blank	Equipment Blank
Soil and Groundwater	1 per 20 samples per analysis	1 per cooler containing water VOCs samples	1 per 20 samples (per non-disposable equipment type)

4.4.1.1 Field Duplicates

A minimum of one blind field duplicate will be analyzed per 20 samples. Field duplicates will be collected following field samples. Soil duplicates samples for non-volatiles analysis will be homogenized and split. Duplicate samples will be coded so the laboratory cannot discern which samples are field duplicates.

4.4.1.2 Trip Blanks

A trip blank shall accompany each cooler containing groundwater samples for VOCs analysis. The trip blank shall be obtained from the laboratory or will be made by filling the appropriate sample containers with certified analyte-free deionized water. Trip blanks will be analyzed for VOCs with the field samples.

4.4.1.3 Equipment Blanks

One equipment blank will be collected per 20 samples when non-disposable equipment is used for sampling. Equipment blanks will be collected by capturing deionized water rinsed over (or through) sampling equipment after decontamination. Equipment blanks will be analyzed for the same constituents as the field samples.

4.4.2 Laboratory QA/QC Methods

Specific procedures and frequencies for laboratory QA procedures and QC analyses are detailed in the laboratory's QA Plan and SOPs for each method. QC analyses will be performed by the laboratory according to their Ecology-approved SOPs.

4.4.3 Summary of Sample Media, Numbers, and Analyses

Total numbers of samples to be collected are summarized by medium in Table 4-4.

Table 4-4. Summary of Sample Types, Analyses, and Number

Sample Medium	Analysis	No. Field Samples	No. Duplicate Samples	No. Equipment Blanks	No. Trip Blanks	Total No.
Groundwater	Gas	10	1	1	-	12
	Diesel/Heavy Oil	10	1	1	-	12
	VOCs (incl. BTEX, EDB, EDC, MTBE)	10	1	1	1	13
	Lead (total)	7	1	1	-	12
	Lead* (dis.)	7	1	-	-	11
	cPAHs	7	1	1	-	7
	Alkalinity	10	-	-	-	10
	Nitrate	10	-	-	-	10
	Sulfate	10	-	-	-	10
	COD	10	-	-	-	10
	Chloride	10	-	-	-	10
	TDS	2	-	-	-	2
Surface Water	Chloride	1	-	-	-	1
Surface Soil	Gas/BTEX	10	1	-	-	11
	Diesel/Heavy Oil	10	1	-	-	11
	Lead (total)	10	1	-	-	11
	VOCs (EDB, EDC, MTBE)	2	1	-	-	3
	cPAHs	2	1	-	-	3
Subsurface Soil	Gas/BTEX	21	1	1**	-	23
	Diesel/Heavy Oil	21	1	1**	-	23
	Lead (total)	21	1	1**	-	23
	cPAHs	4	-	1**	-	5
	TOC	4	-	-	-	4
	EPH	6	-	-	-	6
	VPH	6	-	-	-	6

Notes:
BTEX: Benzene, toluene, ethylbenzene, and xylenes.
cPAHs: Carcinogenic polycyclic aromatic hydrocarbons.
COD: Chemical oxygen demand.
EDB: 1,2-Dibromoethane.
EDC: 1,2-Dichloroethane.
EPH: Extractable Petroleum Hydrocarbons.
MTBE: Methyl tertiary-butyl ether.

TDS: Total Dissolved Solids.

TOC: Total organic carbon.

VPH: Volatile Petroleum Hydrocarbons.

* If sample turbidity is greater than 10 nephelometric turbidity units (NTUs), a dissolved sample will also be collected using a 0.45 micron filter.

** Equipment blanks will be collected from decontaminated split spoon samplers only.

4.4.4 Sample Containers, Preservation, and Holding Times

Analytical methods, sample containers, preservation, and holding times are summarized in Table 4-5.

Table 4-5. Sample Containers, Preservation, and Holding Times

Analysis	Method	Matrix	Container	Preservation	Holding Time
Gasoline (w/BTEX optional)	NWTPH-Gx	Soil – 10g	En Core sampler	Cool 4°C	14 days
		Groundwater	2 – 40 mL vials	HCl pH < 2, cool 4°C	14 days
Diesel and Heavy Oil	NWTPH-Dx	Soil	8 oz cwm	Cool 4°C	14 days
		Groundwater	1 liter amber	HCl pH < 2, cool 4°C	7 days ext, 40 days
VOCs (includes BTEX, EDB, EDC, and MTBE)	8260B	Soil – 10g	En Core sampler	Cool 4°C	48 hrs preservation 14 days
		Groundwater	2 – 40 mL vials	HCl pH < 2, Cool 4°C	14 days
cPAHs	8270C (SIM for soil)	Soil	8 oz cwm	Cool 4°C	14 days ext, 40 days
		Groundwater	1 liter amber	Cool 4°C	7 days ext, 40 days
EPH	NWTPH-EPH	Soil	4 oz cwm	Cool 4°C	6 months
VPH	NWTPH-VPH	Soil	En Core sampler	Cool 4°C	48 hrs preservation 14 days
Lead and Iron	6010	Soil	4 oz cwm	Cool 4°C	6 months
		Groundwater	500 mL HDPE	HNO ₃ < pH 2, Cool 4°C	6 months
COD	410.1	Groundwater	250 mL HDPE	H ₂ SO ₄ < pH 2, Cool 4°C	28 days
Alkalinity	310.1	Groundwater	250 mL HDPE	Cool 4°C	14 days
Sulfate	300.0	Groundwater	125 mL HDPE	Cool 4°C	28 days
Nitrate	300.0	Groundwater	125 mL HDPE	Cool 4°C	48 hours
Chloride	300.0	Groundwater	125 mL HDPE	Cool 4°C	28 days
TDS	160.1	Groundwater	1 L HDPE	Cool 4°C	7 days
TOC	9060	Soil	4 oz cwm	Cool 4°C	28 days

Notes:
cPAHs: Carcinogenic polycyclic aromatic hydrocarbons.
COD: Chemical Oxygen Demand.
cwm: Clear, wide-mouth jar.
EDB: 1,2-Dibromoethane.
EDC: 1,2-Dichloroethane.
EPH: Extractable Petroleum Hydrocarbons.
HCl: Hydrochloric acid.
HDPE: High-density polyethylene.

HNO₃: Nitric acid.
H₂SO₄: Sulfuric acid.
mL: Milliliter.
MTBE: Methyl tertiary-butyl ether.
NWTPH: Northwest total petroleum hydrocarbons.
oz: Ounce.
TDS: Total Dissolved Solids.
VOCs: Volatile organic compounds.
VPH: Volatile Petroleum hydrocarbons.

4.5 FIELD INSTRUMENT/EQUIPMENT CALIBRATION, INSPECTION, AND MAINTENANCE

The types of field instruments and equipment that are anticipated to be used during sampling include, but are not limited to:

- PIDs

Equipment maintenance will be performed according to manufacturers' specifications by the equipment supplier. Field personnel will be responsible for inspection and calibration of field equipment. An equipment users manual will be provided to all field personnel working with the equipment. All equipment will be inspected and calibrated prior to use. The results of calibration, as well as any problems encountered and corrective actions, will be documented in the activity field notebook.

4.6 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Field supplies such as sample containers and trip/rinsate blank water shall be obtained from reputable suppliers and shall be certified analyte free. Records of certification shall be kept by the laboratory (for laboratory-supplied supplies) or by Parametrix in the project file. Sampling spoons and bowls shall be food-grade and shall be purchased new.

4.7 DATA MANAGEMENT

The objectives of data management are to assure that large volumes of information and data are technically complete, accessible, and efficiently handled.

4.7.1 Field Data

The original hard (paper) copies of all field notes and laboratory reports will be stored in the project file. Photocopies of these documents should be prepared for working copies as needed.

Field data should be recorded in bound notebooks or individual sampling sheets. The field team members should review the field data for completeness prior to placing it in the files.

4.7.2 Laboratory Data

The laboratory data reports will be archived in the project files. The electronic data will be incorporated into Excel spreadsheets and archived on electronic media and placed in the project file. An electronic laboratory data submittal consistent with the requirements of Ecology's EIM will be submitted with the RI/FS report and archived in the project file.

5. DATA VERIFICATION AND VALIDATION

Techniques for data verification and validation will be in accordance with the Guidance on Environmental Data Validation and Verification (EPA 2001).

5.1 DATA REVIEW, VERIFICATION AND VALIDATION

Analytical data will be reviewed by the Laboratory QA Officer to assure that the method-specific QC objectives have been met. These reviews will identify the occurrence of deficiencies in time to take corrective action. If the required QC objectives are not met after the corrective action is performed, the Task Manager will be notified by the laboratory before data submittal. The Task Manager and Data QA Manager will determine if additional corrective action should be taken, such as re-analysis, if applicable. All data packages provided by the laboratory will provide a summary of QC results adequate to enable reviewers to determine the quality of the data.

The Data QA Manager is responsible for conducting checks for internal consistency, transmittal errors, and for adherence to the field and laboratory QC elements. The Data QA Manager will review the data package submitted by the laboratory to ensure that documentation has been provided, appropriate QC checks have been performed, that appropriate corrective actions have been taken, and that the data is valid and useable. The Data QA Manager will also determine the potential effects of any deviations or corrective actions on the suitability of the data.

5.2 VERIFICATION AND VALIDATION METHODS

The Data QA Manager will review the following:

- Chain-of-custody documentation
- Holding times
- Equipment/trip blank results
- Field Duplicate results
- Method blank results
- Compliance with project DQIs

A limited review (minimum 20 percent) of the following laboratory QC data results will be conducted:

- Laboratory MS/MSD and/or matrix duplicate results
- Laboratory surrogate recoveries
- Laboratory check samples

If, based on this limited review the QC data results indicate potential data quality problems, further evaluations will be conducted.

5.3 RECONCILIATION AND USER REQUIREMENTS

The Data QA Manager will prepare a technical memorandum for each data package describing the results of the data review and describing any qualifiers that were added to the data. The technical memorandum will include recommendations on whether additional actions such as re-sampling are necessary. The technical memorandum will be submitted with the technical report.

6. SCHEDULE

A project schedule is presented graphically in Appendix H.

Upon notice to proceed, the remedial investigation would be initiated within approximately six weeks. This includes the public comment period for the SEPA checklist prepared for the Agreed Order. Field work would be accomplished within two weeks. A draft pilot test design and technical memorandum (TM) would be provided within six weeks following completion of field work. Once the pilot test TM is approved, the pilot test will be implemented; assuming all three treatment events are implemented, the pilot test will require approximately four months to complete. A full scale design TM will be provided within 4 weeks of the completion of the pilot test. Duration for the RI/FS and pilot test tasks is expected to be on the order of eight months. It is anticipated the task will begin in September 2007 and be completed by May 2008.

Implementation of the in-situ treatment interim action may require five months (assuming three chemical oxidation treatment events). Confirmation soil and groundwater sampling will be completed within 1 year following completion of treatment. A draft RI/FS report will be provided within four weeks of completion of confirmation sampling. Assuming a two week review period, a final RI/FS report will be provided within four weeks of the draft submittal. Draft and final cleanup action plans will be submitted within the 4 week period following submittal of the final RI/FS report. Total duration for the interim action implementation, RI/FS reporting, and cleanup action planning tasks is anticipated to be nineteen months, with completion in late-2009.

Shoreline restoration will occur during the open fish windows (approximately July through January) in 2009/2010. Note that confirmation sampling can be conducted concurrent with shoreline restoration.

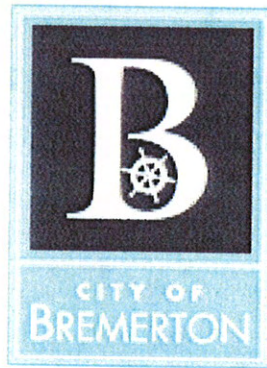
7. REFERENCES

- Ecology (Washington State Department of Ecology). 2003. Sediment Sampling and Analysis Plan Appendix, Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards (Chapter 173-204 WAC). Publication No. 03-09-043. Revised April.
- Emcon (Emcon Northwest, Inc.) 1995. Re: Fourth Quarter Vapor Extraction System Monitoring, Former Chevron Bulk Fuel Facility 61001351, 1310 Highland Avenue, Bremerton, Washington. Prepared for Chevron U.S.A. January.
- EPA (U.S. Environmental Protection Agency). 2002. Groundwater Sampling Guidelines for Superfund and RCRA Project Managers. Groundwater Forum Issue Paper. EPA 542-S-01-001.
- EPA. 2001. *Guidance on Environmental Data Validation and Verification*. EPA QA/G-8.
- EPA. 2000. *Data Quality Objectives Process*, EPA QA/G-4, Final, August.
- GeoEngineers. 1988. Report of Geotechnical Services, Subsurface Contamination Study, Chevron Bulk Fuel Terminal, Bremerton, Washington. Prepared for Chevron U.S.A. November.
- GRI (Gettler-Ryan, Inc.). 2002. Event of September 30, 2002, Groundwater Monitoring and Sampling Report, Former Chevron Bulk Terminal #1001351, 1310 Highland Avenue, Bremerton, Washington. Prepared for Chevron Products Company, San Ramon, California. November.
- Hart Crowser. 1989a. Summary of Work Accomplished to Date and Pending, Former Chevron Bremerton Bulk Plant, Bremerton, Washington. Prepared for Chevron U.S.A., Inc., Seattle, Washington. November.
- Hart Crowser. 1989b. Phase I-Remediation Services, Bremerton Bulk Plant, Bremerton, Washington. Prepared for Chevron U.S.A., Inc., May.
- Parametrix (Parametrix, Inc.). 2006. Technical Memorandum, Chevron Property Sediment Characterization Study. Prepared for the City of Bremerton. February 15.
- Parametrix. 2005. Chevron Property Environmental Conditions Assessment. Prepared for the City of Bremerton. June.
- PEG (Pacific Environmental Group, Inc.). 1994. Supplemental Environmental Site Assessment, Decommissioned Chevron Bulk Terminal No. 61001351, 1301 Highland Avenue, Bremerton Washington. Prepared for Chevron U.S.A. March.

APPENDIX A
Public Participation Plan

**Public Participation Plan
Remedial Investigation/Feasibility
Study and Interim Actions
Former Chevron Property
Bremerton, Washington**

City of Bremerton



August 2007

Parametrix

**Public Participation Plan
Remedial Investigation/Feasibility
Study and Interim Actions
Former Chevron Property
Bremerton, Washington**

Prepared for

City of Bremerton

3027 Olympus Drive
Bremerton, Washington 98310

Prepared by

Parametrix

4660 Kitsap Way, Suite A
Bremerton, WA 98312-2357
360-377-0014
www.parametrix.com

CITATION

Parametrix. 2007. Draft Public Participation Plan
Remedial Investigation/Feasibility Study and
Interim Actions
Former Chevron Property
Bremerton, Washington. Prepared by Parametrix,
Bremerton, Washington. August 2007.

TABLE OF CONTENTS

1. PROJECT OVERVIEW	1-1
1.1 WHAT WILL BE ACCOMPLISHED?	1-1
1.2 WHAT GOT US TO THIS POINT?	1-1
1.3 WHAT'S HAPPENING NOW?.....	1-2
1.3.1 Cleanup Design and Schedule	1-2
1.3.2 Communication	1-2
2. INTRODUCTION	2-1
2.1 MISSION STATEMENT	2-1
2.2 GOALS.....	2-1
2.3 APPROACH.....	2-1
2.4 PUBLIC PARTICIPATION TIMELINE.....	2-1
2.4.1 Public Meetings	2-1
2.4.2 Boardwalk Advisory Committee.....	2-2
2.4.3 Exhibitions.....	2-2
2.4.4 Bremerton Boardwalk Website www.bremertonboardwalk.net	2-2
2.5 COMMUNITY PROFILE.....	2-2
2.5.1 The City of Bremerton.....	2-2
2.5.2 Kitsap County Community Interviews and Contacts	2-3
2.5.3 Key Community Concerns	2-3
2.6 STAKEHOLDERS.....	2-3
3. COMMUNICATION AND PUBLIC INPUT	3-1
3.1 OVERVIEW.....	3-1
3.2 BOARDWALK ADVISORY COMMITTEE (BAC).....	3-1
3.3 PUBLIC MEETINGS.....	3-1
3.4 WEB SITE.....	3-2
3.5 FACT SHEETS/FLYERS	3-2
3.6 CONTACT LIST	3-2
3.7 PRESS RELEASES.....	3-2
3.8 INFORMATION BOOTH	3-2
3.9 PROJECT SIGNS.....	3-3
3.10 INFORMATION REPOSITORY.....	3-3
4. GLOSSARY OF RELATED TERMS	4-1

APPENDIX

A ADDRESSES OF RESIDENTS WITHIN ¼ MILE OF THE PROJECT SITE

ACRONYMS

BAC	Boardwalk Advisory Committee
Ecology	Washington State Department of Ecology
MTCA	Model Toxics Control Act
RI/FS	Remedial Investigation/Feasibility Study
BKAT	Kitsap Access Television

1. PROJECT OVERVIEW

The City of Bremerton is conducting a Remedial Investigation/Feasibility Study (RI/FS) and Interim Actions at the property known as the Former Chevron Property, which is located at 1310 Highland Avenue in Bremerton, Washington. The RI/FS is being performed under an Agreed Order with the Washington State Department of Ecology (Ecology). This plan is intended to satisfy the requirements for a Public Participation Plan under the Model Toxics Control Act (MTCA). Prior to the implementation of the RI/FS, this plan will be made available during a 30-day public comment period. If, during the public comment period, ten or more persons request a public meeting, a meeting will be scheduled. If there are substantial changes to the proposed RI/FS and Interim Actions during the public comment period, an additional 30-day public comment period will be held.

The RI/FS is being performed to address petroleum contamination at the property resulting from the property's former use by a commercial bulk fuel distributor. The RI/FS will involve studying the site to develop a cleanup approach and then performing cleanup through "interim actions." Finally, the success of the cleanup will be verified through long-term monitoring of the site's groundwater. The long term monitoring will be performed under a cleanup action plan to be developed in the future.

At the successful completion of the interim actions, the property will be developed into an addition to Evergreen Rotary Park. The property will also be developed concurrently as the terminus of the to-be-constructed Bremerton Boardwalk. Public outreach for the RI/FS is being coordinated with the Bremerton Boardwalk project.

1.1 WHAT WILL BE ACCOMPLISHED?

The Former Chevron Property will be investigated and cleaned up so that it may be redeveloped as an expansion of the Evergreen Rotary Park.

1.2 WHAT GOT US TO THIS POINT?

The Former Chevron Property was developed in 1946 and expanded until 1963. It operated as a bulk fuel terminal until it was decommissioned in 1988. All buildings and major facilities were then removed with the exception of the fuel pier and some of the concrete slabs and asphalt paving. Environmental investigations performed in 1988 discovered that significant petroleum releases had occurred and that the site's soil and groundwater was contaminated. Remedial actions completed to date include active product removal and operation of a soil vapor extraction system at the site. These remedial activities have removed fuels floating on the ground water surface and have reduced the overall soil contamination. However, subsequent groundwater and soil sampling events have revealed that the site still contains petroleum concentrations that exceed MTCA Method A cleanup levels. The site is listed on Ecology's Hazardous Sites List as Facility No. 2618.

The City has developed an RI/FS work plan and is currently coordinating with Ecology to cleanup the site under an Agreed Order (pursuant to WAC 173-340-530). Ecology regulations require actions at a facility where there has been a release or threatened release of hazardous substances. The Agreed Order establishes an agreement to conduct an RI/FS, which will be used to develop a final cleanup action plan for the site. The City has also agreed to conduct appropriate interim actions to address site contamination.

1.3 WHAT'S HAPPENING NOW?

1.3.1 Cleanup Design and Schedule

The cleanup project is currently in the design stage and cleanup approaches are in negotiation with Ecology. Current plans include cleanup of the majority of the contaminated soils on site using chemical treatments injected into contaminated areas underground. These treatments will break down petroleum and also stimulate bacteria in the ground. Bacteria will remove any remaining petroleum by using it as a food source. Some concentrated areas of contaminated soil will be excavated and removed as well.

The cleanup design will be refined based on the results of the RI/FS, which will be completed by April 2008. Interim actions are scheduled for completion by September 2008. The long term-monitoring to confirm the effectiveness of the cleanup is scheduled for completion by fall 2009.

1.3.2 Communication

Information on the cleanup project is currently provided on the Bremerton Boardwalk website at www.bremertonboardwalk.net. The website provides a forum for public comment.

Project information will also be included with a Bremerton Boardwalk exhibit at the upcoming Armed Forces Day celebration in May 2007 and the Blackberry Festival in September 2007. City representatives will be available for public questions and comments.

2. INTRODUCTION

2.1 MISSION STATEMENT

Cleanup of the Former Chevron Property will protect human health and the environment and will allow for the successful redevelopment of a former brownfields property into a park.

2.2 GOALS

The goals of this Public Participation Plan include:

- Keep the public informed of the project in a timely manner.
- Offer convenient mechanisms for the public to provide input and receive project information as the project progresses.
- Identify issues or concerns of interested parties and ensure they are addressed as appropriate.

2.3 APPROACH

The City will continue to solicit public participation and provide project communications through public meetings, press releases, exhibits, meetings with the Boardwalk Advisory Committee (BAC), which includes five citizen representatives, and information repositories. As the project progresses, the approach may be modified to best serve the public, support the project team and meet public participation goals. These elements are described in detail in Section 3.

2.4 PUBLIC PARTICIPATION TIMELINE

The following activities will provide opportunity for public involvement in the project.

2.4.1 Public Meetings

To date, the following public meetings have been held for the RI/FS and Bremerton Boardwalk projects:

- Public Meeting in October 2005
- Design Charette in October 2006
- Parks Commission presentation in January 2007
- City Council presentations in April and December 2006
- Presentation to the Suquamish Tribal Council in December 2006
- City Council District 5 meeting in January 2007
- Bremerton Arts Commission meeting in February 2007

- Parks Commission meeting March 2007. Park alternative review performed and preferred park alternative selected for further development.
- Future public meetings may occur in 2007. Meeting dates are to be announced.

2.4.2 Boardwalk Advisory Committee

- A BAC meeting, including citizen representatives, will be held summer 2007. Meeting date is to be announced.
- Follow-on BAC meeting dates to be announced.

2.4.3 Exhibitions

- Booth at the Armed Forces Day celebration in May 2007.
- Booth at the Blackberry Festival in September 2007.

2.4.4 Bremerton Boardwalk Website www.bremertonboardwalk.net

- The current Bremerton Boardwalk website provides project information and solicits input and comment on the cleanup project. The website will be maintained throughout the project.

2.5 COMMUNITY PROFILE

2.5.1 The City of Bremerton

Bremerton is nationally renowned as one of America's most livable cities and one of the top five places to raise a family. Bremerton offers affordable, quality living in a spectacular water and mountain setting. Located in Kitsap County in Washington State, the City of Bremerton lies east of the Olympic Mountains directly across Puget Sound from Seattle.

The town was spurred in 1891 when William Bremer, a German immigrant and shrewd businessman, encouraged the U.S. Navy to buy 190 acres of his land for a shipyard. Over a century later, Bremerton's Puget Sound Naval Shipyard continues to service U.S. Navy ships and its yard employs 8,000 civilians and as many active duty military work aboard ships or for the yard's attendant commands.

Bremerton's downtown core is undergoing a comprehensive revitalization. A sense of optimism resonates among its residents and small business owners. The ferry terminal and Bremerton Transportation Center at the foot of downtown lead visitors into a growing arts community of galleries, theaters and shops. Restaurants, museums and cafes contribute to the eclectic ambiance. And there's much more to come. City officials and business leaders are bringing a new era to Bremerton with plans for mixed-use waterfront development and a new government center adjacent to the ferry terminal.

Bremerton's 36,000 people live in East and West Bremerton, divided by the waters of Port Washington Narrows and connected by the Manette and Warren Avenue bridges. Many distinct neighborhoods comprise the city, such as Manette, with its Bohemian appeal in East Bremerton; Charleston, a quaint section of the city filled with bungalows, and Rocky Point with its rows of charming waterfront homes hugging the shoreline.

2.5.2 Kitsap County Community Interviews and Contacts

Kitsap County has not been involved with this project to date.

2.5.3 Key Community Concerns

2.5.3.1 A Blighted and Contaminated Property

The Former Chevron Property is a former industrial property containing petroleum contamination, a derelict pier, creosote-covered pilings and broken concrete. This property is a blight nestled between the existing Evergreen Park and adjacent neighborhood. Site cleanup and redevelopment will enhance the neighborhood and the experience of visitors to the park.

2.5.3.2 The Eroding Shoreline

The existing shoreline is eroding and, if allowed to continue, will deposit contaminated material into the Port Washington Narrows. Previous stabilization efforts at the site which are failing have included installation of large concrete debris and wood and steel bulkheads. These types of interim measures are not environmentally friendly, are unsightly, and are a detriment to the near shore habitat. Proposed stabilization solutions are being designed which will enhance the environmental processes, increase and improve habitat for fish, and provide additional recreational opportunities at this site.

2.6 STAKEHOLDERS

The following stakeholders have been identified for the project:

- Mayor, City Council and all other Residents of Bremerton
- Property Owners along Washington Avenue, and adjacent to the Former Chevron Property.
- City of Bremerton Public Works and Utilities
- City of Bremerton Parks and Recreation
- City of Bremerton Department of Community Development
- Suquamish Tribe
- Washington State Department of Ecology
- Washington State Department of Fish and Wildlife
- Army Corps of Engineers
- Washington State Department of Natural Resources
- National Marine Fisheries Service
- United States Fish and Wildlife Service

3. COMMUNICATION AND PUBLIC INPUT

3.1 OVERVIEW

The following methods of communication will be used at various times throughout the project. These methods will be used to provide accurate information to the public and stakeholders in a timely manner. Input from the public will be solicited during BAC meetings, public exhibits, and the Bremerton Boardwalk website.

3.2 BOARDWALK ADVISORY COMMITTEE (BAC)

The Boardwalk Advisory Committee (BAC) is informed and updated on the cleanup project and makes recommendations as appropriate on major decisions affecting the cleanup. As shown below, the BAC includes five citizen representatives. Input from these representatives is solicited on the cleanup project during committee meetings.

The Boardwalk Advisory Committee consists of the following participants:

- Phil Williams – Chair
- Wendy Priest, City Council Representative
- Ken Atterbery/Steve Slaton - Port of Bremerton Representative
- Alison O’Sullivan - Suquamish Tribe Representative
- Stephan Kalinowski - Regulatory Agency Representatives (WDFW)
- Linda Streissguth - Planning Commission
- Tom Wolfe - Police Representative
- Gary Tussberg - Kitsap County Consolidated Housing Authority Representative
- Geoff Hosea, Citizen at Large - Design
- Mark Goldberg – Citizen at Large – Property Owners
- Amy Burnett – Citizen, Citizen at Large – Arts
- Brad Rucker – Citizen, Citizen at Large
- Stephanie Vail—Citizen at large
- Cindi Wiedenhof – ADA Representative

3.3 PUBLIC MEETINGS

As discussed in section 2.4.1, several public meetings have been held to date. Future public meetings may be held to collect comments on the project and to share information. The meetings will be structured to allow interaction between project staff and the public. Future meetings may be held associated with project milestones or as needed to communicate project information.

Notification of these meetings will be made by the most cost efficient methods that reach the greatest number of interested people. Notification of meetings will use a combination of a contact list (mail), a Boardwalk project web site, flyers posted at various public places in Bremerton, and press releases.

Notification will be made a minimum of one week prior to the meeting and will include location, time, and topics for discussion.

3.4 WEB SITE

www.bremertonboardwalk.net

The project web site will be maintained throughout project duration. The web site includes project information, contact information for questions or comments and notification of upcoming public and BAC meetings. Web content is updated as needed to communicate project information.

3.5 FACT SHEETS/FLYERS

If future public meetings are held, printed flyers will be developed to advertise each meeting, including time, place and issues discussed. Printed fact sheets will be developed to provide information on a particular topic or issue.

Printed versions of flyers and fact sheets will be distributed on a limited basis to downtown businesses and public locations such as libraries, Norm Dicks Government Center, the existing boardwalk, the Bremerton transit station and Ferry Terminal, Public Works Building, Parks Building, Parks and Recreation Centers.

3.6 CONTACT LIST

A mainstay for meeting notification will be a contact list of residents living within ¼ mile of the project site. The contact list will be maintained by Parametrix staff. A copy of the list is included in Appendix A.

3.7 PRESS RELEASES

A press release will be issued in advance of each public meeting to the Kitsap Sun and the Kitsap Newspaper Group announcing the meeting time and place, special topic(s) to be discussed at the meeting and, for those who can not attend the meeting, alternative ways to participate in the design process.

3.8 INFORMATION BOOTH

A stand-alone display booth is used at selected community events and other public gatherings. The booth contains information explaining the overall project and timeline, upcoming meetings or events, and how to participate in the process. When not in use, the information booth is displayed at the Bremerton Government Center (since October 2006).

3.9 PROJECT SIGNS

“There’s a park in you future”, or other signs to that effect will be displayed at the site to signal the beginning of the project. The sign will also advertise the project website for further information and upcoming meetings and include a phone number or other method to contact project staff.

3.10 INFORMATION REPOSITORY

A complete library of all project documents will be maintained by Parametrix. Hard copies of significant project documents will be available to the public for viewing at the following locations;

City of Bremerton Public Works and Utilities Offices (360) 473-5318
3027 Olympus Drive, Bremerton WA 98310

Washington Department of Ecology - Headquarters Office
Carol Dorn contact by appointment only 360-407-7224
300 Desmond Drive, Lacey, WA 98503

PDF versions of significant project documents will be available at the City offices on CD-Rom upon request.

4. GLOSSARY OF RELATED TERMS

Cleanup: The implementation of a cleanup action or interim action.

Cleanup Action: Any remedial action except interim actions, taken at a site to eliminate, render less toxic, stabilize, contain, immobilize, isolate, treat, destroy, or remove a hazardous substance that complies with cleanup levels; utilizes permanent solutions to the maximum extent practicable; and includes adequate monitoring to ensure the effectiveness of the cleanup action.

Cleanup Action Plan: A document that selects the cleanup action and specifies cleanup standards and other requirements for a particular site. The cleanup action plan, which follows the remedial investigation/feasibility study report, is subject to a public comment period. After completion of a comment period on the cleanup action plan, Ecology finalizes the cleanup action plan.

Cleanup Process: The process for identifying, investigating, and cleaning up hazardous waste sites.

Contaminant: Any hazardous substance that does not occur naturally or occurs at greater than natural background levels.

Feasibility Study: Provides identification and analysis of site cleanup alternatives and is usually completed within a year. The entire Remedial Investigation/Feasibility Study process takes about two years and is followed by the cleanup action plan. Remedial action evaluating sufficient site information to enable the selection of a cleanup action plan.

Groundwater: Water found beneath the earth's surface that fills pores between materials such as sand, soil, or gravel. In aquifers, ground water occurs in sufficient quantities that it can be used for drinking water, irrigation, and other purposes.

Hazardous Site List: A list of ranked sites that require further remedial action. These sites are published in the Site Register.

Interim Action: Any remedial action that partially addresses the cleanup of a site. It is an action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance at a facility; an action that corrects a problem that may become substantially worse or cost substantially more to address if the action is delayed; an action needed to provide for completion of a site hazard assessment, state remedial investigation/feasibility study, or design of a cleanup action.

Model Toxics Control Act: Refers to RCW 70.105D. Voters approved it in November 1988. The implementing regulation is WAC 173-340 and was amended in 2001.

Monitoring Wells: Special wells drilled at specific locations on or off a hazardous waste site where ground water can be sampled at selected depths and studied to determine the direction of ground water flow and the types and amounts of contaminants present.

Public Notice: At a minimum, adequate notice mailed to all persons who have made a timely request of Ecology and to persons residing in the potentially affected vicinity of the proposed action; mailed to appropriate news media; published in the local (city or county) newspaper of largest circulation; and the opportunity for interested persons to comment.

Public Participation Plan: A plan prepared under the authority of WAC 173-340-600 to encourage coordinated and effective public involvement tailored to the public's needs at a particular site.

Release: Any intentional or unintentional entry of any hazardous substance into the environment, including, but not limited to, the abandonment or disposal of containers of hazardous substances.

Remedial Action: Any action to identify, eliminate, or minimize any threat posed by hazardous substances to human health or the environment, including any investigative and monitoring activities of any release or threatened release of a hazardous substance, and any health assessments or health effects studies conducted in order to determine the risk or potential risk to human health.

Remedial Investigation: Any remedial action that provides information on the extent and magnitude of contamination at a site. This usually takes 12 to 18 months and is followed by the feasibility study. The purpose of the Remedial Investigation/Feasibility Study is to collect and develop sufficient site information to enable the selection of a cleanup action

APPENDIX A

ADDRESSES OF RESIDENTS WITHIN ¼ MILE OF THE PROJECT SITE

**FORMER CHEVRON PROPERTY, 1310 HIGHLAND AVENUE
RESIDENT ADDRESSES WITHIN 1/4 MILE**

	Street Address	City	State	Zip Code
Dear Resident	110 11TH ST	BREMERTON	WA	98310
Dear Resident	1102 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1102 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1103 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1104 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1106 PARK AVE	BREMERTON	WA	98310
Dear Resident	1106 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1107 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1107 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1107 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1108 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1108 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1108 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1108 PARK AVE	BREMERTON	WA	98310
Dear Resident	1109 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1109 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1109 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1109 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1110 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1110 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1111 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1111 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1112 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1112 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1113 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1113 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1113 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1113 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1114 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1114 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1116 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1116 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1116 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1117 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1117 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1118 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1119 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1119 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1119 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1120 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1120 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1121 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1121 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1121 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1122 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1123 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1124 MCKENZIE AVE	BREMERTON	WA	98310

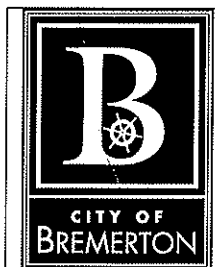
Dear Resident	1125 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1126 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1127 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1127 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1129 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1129 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	1131 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1134 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	114 11TH ST	BREMERTON	WA	98310
Dear Resident	1202 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1202 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1203 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1204 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1204 PARK AVE	BREMERTON	WA	98310
Dear Resident	1205 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1206 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1206 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1206 PARK AVE	BREMERTON	WA	98310
Dear Resident	1208 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	1209 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1209 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1210 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1210 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1210 PARK AVE	BREMERTON	WA	98310
Dear Resident	1211 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1214 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1214 PARK AVE	BREMERTON	WA	98310
Dear Resident	1215 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1217 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1217 SHELDON BLVD	BREMERTON	WA	98310
Dear Resident	1218 PARK AVE	BREMERTON	WA	98310
Dear Resident	1218 PARK AVE	BREMERTON	WA	98310
Dear Resident	1221 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1223 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	1301 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	1302 PARK AVE	BREMERTON	WA	98310
Dear Resident	1303 PARK AVE	BREMERTON	WA	98310
Dear Resident	1306 PARK AVE	BREMERTON	WA	98310
Dear Resident	1307 PARK AVE	BREMERTON	WA	98310
Dear Resident	1309 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	1310 PARK AVE	BREMERTON	WA	98310
Dear Resident	1311 PARK AVE	BREMERTON	WA	98310
Dear Resident	1312 PARK AVE	BREMERTON	WA	98310
Dear Resident	13161 PARK AVE	BREMERTON	WA	98310
Dear Resident	1319 PARK AVE	BREMERTON	WA	98310
Dear Resident	1323 PARK AVE	BREMERTON	WA	98310
Dear Resident	1325 PARK AVE	BREMERTON	WA	98310
Dear Resident	1329 PARK AVE	BREMERTON	WA	98310
Dear Resident	1332 SHELDON BLVD	BREMERTON	WA	98310
Dear Resident	1335 PARK AVE	BREMERTON	WA	98310
Dear Resident	1403 PARK AVE	BREMERTON	WA	98310
Dear Resident	1407 PARK AVE	BREMERTON	WA	98310

Dear Resident	914 PLEASANT ST	BREMERTON	WA	98310
Dear Resident	915 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	915 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	915 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	916 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	916 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	916 PLEASANT ST	BREMERTON	WA	98310
Dear Resident	917 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	918 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	919 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	919 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	919 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	920 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	920 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	920 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	920 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	920 PLEASANT ST	BREMERTON	WA	98310
Dear Resident	921 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	922 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	922 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	922 MCKENZIE AVE	BREMERTON	WA	98310
Dear Resident	922 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	923 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	923 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	923 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	924 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	924 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	925 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	925 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	926 COGEAN AVE	BREMERTON	WA	98310
Dear Resident	926 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	926 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	926 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	927 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	927 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	928 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	928 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	929 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	929 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	930 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	930 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	931 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	932 PACIFIC AVE	BREMERTON	WA	98310
Dear Resident	933 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	933 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	934 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	934 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	935 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	935 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	936 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	937 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	938 PLEASANT AVE	BREMERTON	WA	98310

Dear Resident	939 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	940 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	941 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	941 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	944 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	946 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	949 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	951 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	951 PLEASANT AVE	BREMERTON	WA	98310
Dear Resident	952 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	955 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	956 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	956 WASHINGTON AVE	BREMERTON	WA	98310
Dear Resident	958 HIGHLAND AVE	BREMERTON	WA	98310
Dear Resident	959 WASHINGTON AVE	BREMERTON	WA	98310

APPENDIX B

SEPA Environmental Checklist



City of Bremerton
Department of Community Development
345 - 6th Street, Suite 600
Bremerton, WA 98337-1873
Phone: (360) 473-5275
Fax: (360) 473-5278

WAC 197-11-960 Environmental checklist.

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

A. BACKGROUND

1. Name of proposed project, if applicable:

Remedial Investigations and Interim Actions at the Former Chevron Property

2. Name of applicant:

City of Bremerton

3. Address and phone number of applicant and contact person:

APPLICANT

Tom Knuckey, P.E.
Managing Engineer
City of Bremerton, Public Works and Utilities
3027 Olympus Drive
Bremerton, Washington 98310
(360) 473-2376

CONTACT PERSON

Bill Webb, Parametrix, Inc.
4660 Kitsap Way, Suite A
Bremerton, WA 98312
(360)-850-5303

4. Date checklist prepared:

April 17, 2007

5. Agency requesting checklist:

Washington State Department of Ecology.

6. Proposed timing or schedule (including phasing, if applicable):

The proposed remedial work is scheduled to commence following receipt of all necessary permits, projected to be as early as by May 21, 2007. Initial sampling and remedial work will be conducted at commencement of work, and long term monitoring sampling will follow at 6-, 9-, and 12-months following completion of remedial work. All work will be completed within 2 years, projected to be by August of 2009.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

The Former Chevron Property was purchased by the City of Bremerton in 2005 for development as an addition to Evergreen Park. Following clean-up of the site, the area will be developed as a park, with planted grass, trees, and beachfront access.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

- Chevron Property Sediment Characterization Study, Parametrix, 2005
- NEPA assessment for SR 303 Manette Bridge Bremerton Vicinity – Bridge Replacement is underway by the Washington State Department of Transportation.
- Work Plan for Remedial Investigation/Feasibility Study (RI/FS) and Interim Actions, Former Chevron Property, Bremerton, Washington, Parametrix 2007 (attached).

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

None known.

10. List any government approvals or permits that will be needed for your proposal, if known.

Grading permit, City of Bremerton
Shoreline Permit, City of Bremerton

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Remedial investigation activities are to be performed to aid in the development of a cleanup strategy for addressing residual petroleum contamination within an approximate area of 160 feet by 400 feet at the Former Chevron Property site. Residual petroleum contamination exists in soil and groundwater as a result of past fuel releases. Conceptual cleanup strategies have been developed based on existing environmental data and are proposed as interim actions (described below in this response). Before the proposed interim actions are implemented, they will be refined based on data provided by the remedial investigation (described below in this response).

PROPOSED REMEDIAL INVESTIGATIONS

Groundwater Sampling

In order to determine current groundwater conditions, eight existing and two newly-installed wells will be sampled. The data collected will be used to refine the design of the interim actions proposed in this plan. Wells to be sampled for the remedial investigation are shown on Figure 3-1 of the *Work Plan for RI/FS and Interim Actions, Former Chevron Property, Bremerton, Washington* (attached). A new well (MW-25) will be installed to replace MW-7, which was found to contain floating product up to 0.95 feet-thick. Well MW-25 will be installed to an approximate depth of 20 feet with a 15-foot screen. MW-7 was apparently destroyed in 1989. A second new well (MW-26) will be installed to replace MW-8 near the shoreline. Well MW-26 will be installed to an approximate depth of 20 feet with a 15-foot screen. A description of well installation methods is provided at the end of this response.

Surface Soil Sampling

During the remedial investigation, surface soils will be investigated to further assess potential surface soil impacts at the site. Surface soils will be collected from a depth of 0 to 6 inches at locations where potential surface spills may have occurred such as former ASTs, fuel loading racks, and the former warehouse platform. Approximately 25 samples will be collected.

- b. What kind and amount of vegetation will be removed or altered?
No vegetation will be removed from the site; and no vegetation will be altered at the site with the exception of the grass cover at the excavation area.
- c. List threatened or endangered species known to be on or near the site.
No threatened or endangered plant species are known to be on or near the site.
- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
All disturbed areas will be revegetated during construction of the new park expansion.

5. Animals

- a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:
birds: hawk, heron, eagle, songbirds, waterfowl
mammals: deer, otter, raccoon, other small mammals
fish: salmon, trout, shellfish
- b. List any threatened or endangered species known to be on or near the site.
Eight federally listed species and one species proposed for listing are known to occur, or could potentially occur, on or near the site:
- Chinook salmon (*Oncorhynchus tshawytscha*) Puget Sound ESU (Threatened)
 - Bull trout (*Salvelinus confluentus*) Coastal/Puget Sound DPS (Threatened)
 - Chum salmon (*O. keta*) Hood Canal Summer-run ESU (Threatened)
 - Steelhead trout (*Oncorhynchus mykiss*) Puget Sound ESU (*Proposed Threatened*)
 - Bald eagle (*Haliaeetus leucocephalus*) (Threatened)
 - Marbled murrelet (*Brachyramphus marmoratus*) (Threatened)
 - Killer whale (*Orcinus orca*) Southern Resident DPS (Endangered)
 - Steller sea lion (*Eumetopias jubatus*) (Threatened)
 - Humpback whale (*Megaptera novaeangliae*) (Endangered)
 - Leatherback sea turtle (*Dermochelys coriacea*) (Endangered)
- c. Is the site part of a migration route? If so, explain.
The site is part of the larger Pacific Flyway and various waterfowl and other birds migrate through the general region.
- d. Proposed measures to preserve or enhance wildlife, if any:
No measures are proposed for preserving or enhancing wildlife at the site, as no negative impacts to wildlife are expected to result from the sampling and remedial actions.

6. Energy and natural resources

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.
The completed project will not require any energy.
- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
This project will not affect the potential use of solar energy by adjacent properties.
- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:
No energy conservation features are proposed.

7. Environmental health

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.
Risk of environmental health hazards is limited to potential exposure of the remedial team members to the contaminated soil.
- 1) Describe special emergency services that might be required.
No special emergency services will be required.

Subsurface Soil Sampling

Subsurface soil samples will be collected to characterize existing soil conditions and to aid in remedial design. Proposed sampling locations are shown on Figure 3-2 of the attached RI/FS Work Plan. Up to 21 subsurface soil samples will be collected for analysis. Sample clusters are proposed at existing wells MW-16 and MW-18 to investigate the extent of contaminated soil at these wells, which currently contain floating product. Another cluster of sample locations is proposed at historical test pit TP-9, where contaminated soil was found between 2 feet below ground surface (bgs) and the groundwater table. A fourth cluster is proposed around new well MW-25 as optional samples to investigate the potential extent of soil contamination (if found) at the former location of MW-7.

Subsurface soil samples in the upper yard (at MW-16 and MW-18, and MW-25) will be collected from borings installed using an auger drill rig. An auger rig will be used due to the presence of till and outwash soils, which cannot be penetrated using a push-probe rig. Soils from the borings will be collected at the surface and at 2.5-foot intervals to the depth of the borings. The borings will be extended to 3 feet below the groundwater table as measured in the adjacent wells.

Subsurface samples in the lower yard will be collected using a push-probe rig. Soil will be sampled continuously from the ground surface to 2 feet below the groundwater table as measured in the adjacent existing monitoring wells. It is anticipated that the probes will be extended to approximately 12 feet bgs.

PROPOSED INTERIM ACTIONS

The interim actions described here are based on existing data. They will be refined using the information gathered during the remedial investigation activities. The primary goal of the interim actions is to meet the requirements of the Model Toxics Control Act (MTCA) for the protection of human health and the environment. MTCA rules state that cleanup action shall use permanent solutions "to the maximum extent practicable" and provide for a "reasonable restoration time frame." The interim actions are intended to meet MTCA requirements for a cleanup action. Once the interim actions are completed, compliance monitoring will be conducted to confirm that interim action goals are met. Interim actions consist of 1) source reduction and 2) in-situ enhanced bioremediation of dissolved and adsorbed hydrocarbons in the contaminated plume at the site.

Source Reduction

The major historical source at the site, the floating product layer in the lower yard, was removed by the soil vapor extraction (SVE) system that was operated on the site between 1990 and 1994. Secondary sources that are still present consist of residual hydrocarbons in smear zone soils, contaminated soil in the vadose zone (such as at test pit TP-9), and contaminated soil/product associated with the thin layer of floating product (<3/8-inch) in the vicinity of wells MW-16 and MW-18.

The proposed method for remediating the source soils and floating product will be in-situ chemical oxidation. An exception is contaminated soils near MW-16 and MW-18, which will be excavated and removed. It is anticipated removal by excavation will be limited to approximately 800 cubic yards. All excavated soil will be disposed of off-site at an approved disposal site.

In-situ chemical oxidation involves introducing a chemical oxidant in slurry form into the zone of impacted media. The slurry is typically injected using push-probe or drilling equipment with injections spaced on 7- to 10-foot centers. The oxidant destroys the hydrocarbons on contact, producing primarily carbon dioxide and water as by products. Two to three injection events spaced at one-month intervals are typically recommended. Commercially-available chemical oxidants include RegenOx™, Fenton's Reagent, and permanganate. Selection of the preferred chemical oxidant will be based on an analysis of cost and effectiveness that will be performed following the remedial investigation activities.

To demonstrate the effectiveness of the selected chemical oxidation treatment, a pilot-scale test will be performed prior to production-scale treatment. The pilot scale location selected will be representative of the highest soil concentrations at the site. Location selection will be made following the remedial investigation activities. Injection locations will be treated with oxidant, centered around a soil sampling location with known concentrations to provide "before" soil concentrations. Two injection events spaced one month apart will occur. One month following the second event, soil samples will be collected at the location of the original sample to provide an "after" measurement of soil concentrations. A third injection event may be implemented based on the results of the confirmation sampling.

Chemical oxidation treatment will be applied at source locations. Injection volumes, spacing, and treatment depths will be selected based on the results of the remedial investigation sampling and the pilot test. An approximate outline of the source treatment area is shown on Figure 3-3 of the attached RI/FS Work Plan.

The number of injection events will be determined based on the pilot test. Confirmation sampling will be conducted at least one month following the final injection event. Confirmation sample locations will be collected at the same locations as the subsurface samples that were collected during the remedial investigation activities. This will provide "before" soil concentrations for comparison to the confirmation samples.

Residual Soil and Groundwater Remediation

Residual soil and groundwater contamination will be treated using in-situ enhanced bioremediation following the source reduction interim action. The specific in-situ enhanced bioremediation technology selected for the site involves injecting an oxygen releasing compound in slurry form into the aquifer. Oxygen is provided to enhance the activity of naturally-occurring aerobic bacteria, which feed on or "respirate" the hydrocarbons. Oxygen is typically the limiting factor for bioremediation at contaminated sites. Similar to the chemical oxidant injections, the slurry is injected into the zone of impacted media using push-probe or drilling equipment with injections spaced on approximately 10-foot centers. The effective treatment period is on the order of one year. Selection of design criteria such as the preferred oxygen-releasing compound, compound volumes, injection spacings, and treatment depths will be based on a cost evaluation and the results of the remedial investigation activities.

Confirmation sampling will consist of groundwater monitoring conducted in selected wells. The initial evaluation monitoring period will consist of three sampling events conducted at 6-, 9-, and 12-months following the injection event. A future long-term monitoring program will be developed based on the initial monitoring period results.

MONITORING WELL INSTALLATION

Monitoring wells will be installed by a licensed driller according to applicable Ecology regulations. Monitoring wells will be constructed using 2-inch I.D. polyvinyl chloride (PVC) casings fitted with 15-foot screens (with 0.01-inch or 0.02-inch slots). Completed well monuments will be flush-mounted; a 2-foot square concrete pad will be constructed around the monument as a surface seal. All soil removed for purposes of constructing the new wells will be disposed of off-site at an approved disposal site.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The Former Chevron Property is located on the Port Washington Narrows, at 1310 Highland Avenue in Bremerton, Washington. The site, which formerly contained a bulk fuel distribution facility, was purchased by the City of Bremerton in 2005 for development as an addition to the adjacent Evergreen Park. The project vicinity is shown in Figure 1-1 of the attached RI/FS Work Plan.

B. ENVIRONMENTAL ELEMENTS

1. Earth

- a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other.
Topography at the site is shown on the Figures included with the attached RI/FS Work Plan.
- b. What is the steepest slope on the site (approximate percent slope)?
67% at the shoreline bluff.
- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.
According to the Soil Survey of Kitsap County, the project site contains three soil types: Alderwood very gravelly, sandy loam, 15 to 30 percent slopes; Dystric Xerorthents, 45-70% slopes; and Urban Land Alderwood Complex 0 to 8 percent slopes.
- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.
There are no surface indications or history of unstable soils in this area.
- e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.
It is anticipated removal by excavation will be limited to approximately 800 cubic yards in the vicinity of wells MW-16 and MW-18. The excavated material will be disposed of off-site at an approved disposal site. The excavated areas will be backfilled with clean excavated soils and clean material from an approved vendor.
- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
No erosion is expected to occur as a result of the sampling or remedial work.
- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?
N/A
- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:
N/A

2. Air

- a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.
Dust from excavation activities will be controlled with water spray, so emissions are not anticipated.

Diesel and gasoline exhaust emissions would be produced by the push-probe or hollow-stem auger rig that will be used for collecting the soil samples, by the drilling rig used for installation the additional monitoring wells, and by excavating equipment. The amount of exhaust produced is expected to be inconsequential.
- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.
No off-site sources of emissions or odor will affect this proposal.
- c. Proposed measures to reduce or control emissions or other impacts to air, if any:
No measures are proposed outside of controlling dust with water spray.

3. Water

- a. Surface:
 - 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.
The project borders the Port Washington Narrows, which flows into Sinclair Inlet and the Puget Sound.
 - 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.
All of the soil sample locations will be within 200 feet of the Port Washington Narrows.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.
No fill or dredge material will be placed in or removed from surface water or wetlands.
- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.
No
- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.
The proposal does not lie within a 100-year floodplain.
- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.
No waste materials will be discharged to surface waters.

b. Ground:

- 1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.
No ground water will be withdrawn, and no water will be discharged to ground water.
- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.
No waste materials will be discharged from any source as a result of this proposal.

c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.
The only source of runoff at the project site is rainwater. The proposed project will not result in any changes to existing conditions with regard to flow of rainwater.
- 2) Could waste materials enter ground or surface waters? If so, generally describe.
No. The approximately 800 cubic yards of soil that potentially could be removed through excavation in the vicinity of wells MW-16 and MW-18 will be stockpiled for approximately 2 weeks for testing. The stockpiles will be placed on and covered by plastic sheeting to prevent erosion. After testing, soils will be either removed to an off-site, approved location, or backfilled into the excavation (if clean). Therefore, the project will not change existing conditions with regard to rainwater runoff, and concern of contamination entering the Port Washington Narrows. The proposed remedial work will improve groundwater and soil quality.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Stockpiled soils will be covered with plastic sheeting. Best management practices (BMPs) will be employed to prevent erosion and sediment runoff from leaving the excavation area and entering surface waters.

4. Plants

a. Check or circle types of vegetation found on the site:

- ☒ deciduous tree: alder, maple, aspen, other
- ☒ evergreen tree: fir, cedar, pine, other
- ☒ shrubs
- ☒ grass
- ☐ pasture
- ☐ crop or grain
- ☐ wet soil plants: cattail, buttercup, Chinook, skunk cabbage, other
- ☐ water plants: water lily, eelgrass, milfoil, other
- ☐ other types of vegetation

2) Proposed measures to reduce or control environmental health hazards, if any:

All personnel conducting sampling activities on the project site must be 40-hour Hazardous Waste Operation (HAZWOPER) trained per 29 CFR 1910.120 and be current with their annual 8-hour refresher course. All personnel working at the project site will be briefed on potential site hazards, health and safety procedures, and sampling procedures. Following completion of this training, all personnel will be required to sign an acknowledgement form verifying that they have completed the task-specific training.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Noise in the area is mainly produced by road and boat traffic. Noise in the area will not affect this project.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Noise will be produced by engines running the probing and drilling rigs. Noise can be expected between 7:00 a.m. and 7:00 p.m. Monday through Saturday.

3) Proposed measures to reduce or control noise impacts, if any:

No measures are proposed.

8. Land and shoreline use

a. What is the current use of the site and adjacent properties?

The site, which formerly contained a bulk fuel distribution facility, was purchased by the City of Bremerton in 2005 for development as an addition to the adjacent Evergreen Park, following completion of the proposed remediation work. Port Washington Narrows is used for recreation by boats. Residences and some scattered commercial land uses are located adjacent to the Narrows.

b. Has the site been used for agriculture? If so, describe.

The site has not been used for agriculture.

c. Describe any structures on the site.

All structures have been removed from the site with the exception of a derelict pier. A sewer pump station, and the Plumber's Union Hall are located near the site. The Project actions will not affect any structures.

d. Will any structures be demolished? If so, what?

This project will not result in demolition of any structures.

e. What is the current zoning classification of the site?

The site is currently zoned R-10 Low Density Residential.

f. What is the current comprehensive plan designation of the site?

The Comprehensive Plan Land Use designation of the site is Downtown Regional Center. The Comprehensive Plan Parks and Recreation designation of the site is Urban Trail and Park.

g. If applicable, what is the current shoreline master program designation of the site?

The Shoreline Master Plan designation of the site is Urban Conservancy.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

No.

i. Approximately how many people would reside or work in the completed project?

No people would reside or work at the completed project.

j. Approximately how many people would the completed project displace?

No people would be displaced by the completed project.

k. Proposed measures to avoid or reduce displacement impacts, if any:

N/A

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The proposal will not result in any change to existing or projected land uses.

9. Housing

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.
This project will not create any housing units.
- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
This project will not eliminate any housing units.
- c. Proposed measures to reduce or control housing impacts, if any:
This project will not impact housing in the area, therefore no measures are proposed.

10. Aesthetics

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
No structures will be built as part of this proposal.
- b. What views in the immediate vicinity would be altered or obstructed?
This proposal will not alter any views.
- c. Proposed measures to reduce or control aesthetic impacts, if any:
No measures are proposed, as no views will be affected.

11. Light and glare

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
Work lights will not be needed for the sampling or remedial work, as work will not occur after 7:00 p.m.
- b. Could light or glare from the finished project be a safety hazard or interfere with views?
The project will not result in any significant amount of light or glare.
- c. What existing off-site sources of light or glare may affect your proposal?
No off-site sources of light or glare will affect this proposal.
- d. Proposed measures to reduce or control light and glare impacts, if any:
No measures are proposed to reduce or control light and glare.

12. Recreation

- a. What designated and informal recreational opportunities are in the immediate vicinity?
The project area is bounded by recreation opportunities located at Evergreen Rotary Park. Port Washington Narrows is also used for recreation including boating and fishing.
- b. Would the proposed project displace any existing recreational uses? If so, describe.
The project will not displace any recreational use of the area.
- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
No measures are proposed.

13. Historic and cultural preservation

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.
According to the Washington State Department of Archaeology and Historic Preservation, there are no historic or cultural places or objects listed on or proposed for national, state, or local preservation registers on or immediately adjacent to the site.
- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.
There are no visible landmarks or evidence of historic, archaeological or scientific significance. However, the waters and shorelines of Puget Sound were extensively used by Native Indians and Port Washington Narrows is the usual and accustomed fishing place for tribal members such as the Suquamish. Thus, there is some cultural importance to this area, and there is potential for undocumented cultural/archaeological resources.
- c. Proposed measures to reduce or control impacts, if any:
The sampling and remedial action team will monitor the soil to be excavated for the purpose of constructing the two new wells and from the upper yard at MW 16 and MW 18. In the unlikely event of an inadvertent discovery of archaeological materials, work will be stopped immediately and the Washington Department of Archaeology and Historic Preservation (WDAHP) will be contacted. Work will not commence until WDAHP consults with the Suquamish Tribe.

14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system.
Show on site plans, if any.
The site is accessed by Highland Avenue, just north of 13th Street.
- b. Is the site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?
The Bremerton Transportation Center, which serves as a Kitsap Transit bus transfer center, as well as the Washington State Ferries terminal, is located just to the south of the project site. Five Kitsap Transit bus routes serve the site. On weekdays only, the #22 and #15 run from approximately 4:30 a.m. until 7:00 a.m., and in the afternoons from approximately 4:00 p.m. until 9:00 p.m. Daily service is available on the #11 Crosstown route from 4:45 a.m. until 9:30 p.m., and weekends 9:15 a.m. until 6:45 p.m. The #21 and #25 also run daily from approximately 6:00 a.m. until 9:00 p.m., and weekends from approximately 9:00 a.m. until 6:00 p.m.
- c. How many parking spaces would the completed project have? How many would the project eliminate?
This project will not create or eliminate any parking spaces.
- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).
This project will not require any road improvements or new roads.
- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.
The project is not located in the vicinity of rail or air transportation. The Washington State Ferries terminal is located south of the project site.
- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.
No vehicular trips will be generated by the completed project.
- g. Proposed measures to reduce or control transportation impacts, if any:
The project will have no long-term impacts on transportation. Truck traffic necessary for hauling away the approximately 800 cubic yards of material possibly excavated from the vicinity of wells MW-16 and MW-18 is not expected to be significant. Therefore, no measures to reduce or control transportation impacts are proposed.

15. Public services

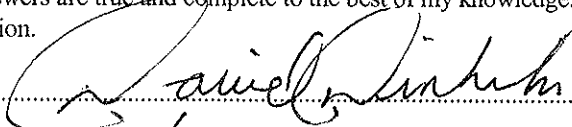
- a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.
No additional public services will be required as a result of this proposal.
- b. Proposed measures to reduce or control direct impacts on public services, if any.
This project will not impact public services, therefore no measures are proposed.

16. Utilities

- a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.
All utilities that were present at the site have been capped, and are no longer in use.
- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.
This project will not require construction of any utilities.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Date Submitted: 

APPENDIX C

Test Pit and Boring Logs

LOG OF TEST PIT

DEPTH BELOW GROUND SURFACE (FEET)	GROUP SOIL CLASSIFICATION SYMBOL	DESCRIPTION
<u>TEST PIT 1</u>		
0 - 2.5	SM	BROWN SILTY FINE SAND WITH OCCASIONAL FINE TO MEDIUM GRAVEL, WOOD FRAGMENTS, METAL, AND BLOCKS OF CONCRETE (LOOSE, MOIST) (FILL)
2.5 - 5.5	SM	BROWN TO GRAY SILTY FINE SAND WITH FINE GRAVEL (DENSE TO VERY DENSE, MOIST)
5.5 - 9.5	SM	SLIGHT PETROLEUM ODOR DETECTED AT 3.0 FEET GRAY SILTY FINE SAND WITH FINE GRAVEL (VERY DENSE, MOIST) (TILL) SLIGHT PETROLEUM ODOR DETECTED; BECOMES MODERATE PETROLEUM ODOR AT 7.0 FEET OCCASIONAL COBBLES AT 8.0 FEET SLIGHT PETROLEUM ODOR DETECTED AT 9.0 FEET SAMPLE OBTAINED AT 7.0 FEET TEST PIT COMPLETED AT 9.5 FEET ON 9/28/88
<u>TEST PIT 2</u>		
0 - 1.5	SM	BROWN SILTY FINE SAND WITH OCCASIONAL FINE TO MEDIUM GRAVEL, CONCRETE, WIRE AND WOOD FRAGMENTS (MEDIUM DENSE, MOIST) (FILL)
1.5 - 3.0	SM	BROWN TO GRAY SILTY FINE SAND WITH FINE GRAVEL (DENSE, MOIST) (WEATHERED TILL)
3.0 - 9.0	SM	MODERATE ORGANIC ODOR AT 2.0 FEET BLUE-GRAY SILTY FINE SAND WITH FINE GRAVEL AND OCCASIONAL COBBLES (VERY DENSE, MOIST) (FILL) MODERATE PETROLEUM ODOR DETECTED AT 4.0 FEET SAMPLES OBTAINED AT 2.5 AND 9.0 FEET TEST PIT COMPLETED AT 9.0 FEET ON 9/28/88
<u>TEST PIT 3</u>		
0 - 1.2	SM	BROWN SILTY FINE SAND WITH OCCASIONAL FINE TO MEDIUM GRAVEL, WOOD AND METAL FRAGMENTS (MEDIUM DENSE, MOIST) (FILL)
1.2 - 2.0	SM	SLIGHT PETROLEUM ODOR DETECTED BROWN TO GRAY SILTY FINE SAND WITH FINE GRAVEL (DENSE, MOIST) (WEATHERED TILL)
2.0 - 8.5	SM	SLIGHT TO MODERATE PETROLEUM ODOR DETECTED AT 1.5 FEET BLUE-GRAY SILTY FINE SAND WITH FINE GRAVEL AND OCCASIONAL COBBLES (VERY DENSE, MOIST) (TILL) MODERATE TO STRONG PETROLEUM ODOR DETECTED AT 4.0 FEET SAMPLE OBTAINED AT 4.0 FEET TEST PIT COMPLETED AT 8.5 FEET ON 9/28/88

THE DEPTHS ON THE TEST PIT LOGS, ALTHOUGH SHOWN TO 0.1 FEET, ARE BASED ON AN AVERAGE OF MEASUREMENTS ACROSS THE TEST PIT AND SHOULD BE CONSIDERED ACCURATE TO 0.5 FEET.

LOG OF TEST PIT

DEPTH BELOW GROUND SURFACE (FEET)	GROUP SOIL CLASSIFICATION SYMBOL	DESCRIPTION
<u>TEST PIT 4</u>		
0 - 1.2	SP	GRAY TO BROWN FINE TO MEDIUM SAND WITH FINE GRAVEL AND A TRACE OF SILT (LOOSE, MOIST) (FILL)
1.2 - 7.0	SM	GRAY SILTY FINE SAND WITH FINE GRAVEL AND OCCASIONAL COBBLES (VERY DENSE, MOIST) (FILL) NO PETROLEUM ODOR DETECTED SAMPLE OBTAINED AT 6.0 FEET TEST PIT COMPLETED AT 7.0 FEET ON 9/28/88
<u>TEST PIT 5</u>		
0 - 1.5	SM	BROWNISH-GRAY SILTY FINE SAND WITH OCCASIONAL FINE TO MEDIUM GRAVEL AND WOOD FRAGMENTS (MEDIUM DENSE, MOIST) (FILL)
1.5 - 8.0	SM	GRAY SILTY FINE SAND WITH FINE GRAVEL AND OCCASIONAL COBBLES (VERY DENSE, MOIST) (TILL) NO PETROLEUM ODOR DETECTED SAMPLE OBTAINED AT 8.0 FEET TEST PIT COMPLETED AT 8.0 FEET ON 9/28/88
<u>TEST PIT 6</u>		
0 - 0.5	SM	BROWN TO GRAY SILTY FINE SAND WITH OCCASIONAL FINE GRAVEL, ROOTS AND CONCRETE (MEDIUM DENSE, MOIST) (FILL)
0.5 - 8.0	SM	SLIGHT PETROLEUM ODOR DETECTED AT 0.5 FEET GRAY TO BLUE-GRAY SILTY FINE SAND WITH FINE GRAVEL AND OCCASIONAL COBBLES (VERY DENSE, MOIST) MODERATE PETROLEUM ODOR DETECTED AT 7.0 FEET SAMPLE OBTAINED AT 7.5 FEET TEST PIT COMPLETED AT 8.0 FEET ON 9/28/88
<u>TEST PIT 7</u>		
0 - 0.2		ASPHALT CONCRETE
0.2 - 2.5	SM	BROWN SILTY FINE TO MEDIUM SAND WITH FINE GRAVEL (LOOSE, MOIST) (FILL)
2.5 - 9.0	SP-SM	GRAY FINE TO MEDIUM SAND WITH SILT AND OCCASIONAL FINE TO MEDIUM GRAVEL (MEDIUM DENSE, MOIST) (FILL) MODERATE PETROLEUM ODOR DETECTED AT 3.0 FEET; STRONG PETROLEUM ODOR DETECTED AT 8.5 FEET SAMPLE OBTAINED AT 8.0 FEET SOIL BECOMES WET AT 9.0 FEET TEST PIT COMPLETED AT 9.0 FEET ON 9/28/88

Test Pit Log TP-8

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1	CA	150	0	(Medium dense), moist to wet, mottled dark brown-gray, silty, gravelly, fine to medium SAND. (FILL)
S-2		172	2	(Loose), moist to wet, mottled gray-red brown, slightly silty to silty, fine SAND. (FILL)
S-3		150	4	Small zone on pit wall from a depth of 3 to 8 feet consists of (loose), wet, dark brown, silty, gravelly, fine SAND with trace of cobbles - seepage from this zone had petroleum sheen.
S-4	CA	100	7	
S-5		145	8	(Loose), wet, dark brown to black, silty, gravelly, fine SAND - petroleum sheen observed.
			9	Bottom of Test Pit at 9 Feet.
			10	Completed 3/30/89.
			11	
			12	
			13	
			14	
			15	

Test Pit Log TP-9

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1		90	0	ASPHALT over CRUSHED ROCK.
S-2	CA	110	2	(Medium dense), moist to wet, layered gray and light brown, silty, fine SAND with layers of slightly silty, fine SAND with trace gravel.
S-3		180	4	(Medium dense), moist to wet, gravelly, fine to medium SAND. (FILL)
S-4	CA	160	6	(Medium dense to loose), gray, slightly silty, fine to medium SAND. (FILL)
			8	Petroleum sheen observed on water surface.
			9	Bottom of Test Pit at 8-1/2 Feet.
			10	Completed 3/30/89.
			11	Note: A wooden wall was encountered at a depth of 3 feet to at least a depth of 8-1/2 feet. The wall trended east-west and consisted of pilings with wooden and extended slats probably a bulkhead. A concrete pipe was running along the south side of the bulkhead.
			12	
			13	
			14	
			15	

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum times are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

Test Pit Log TP-10

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1		40	0	3 inches ASPHALT PAVEMENT over (dense), moist, red-brown, silty, fine SAND with trace gravel.
			1	(Dense), moist, red-brown, slightly silty, very gravelly SAND.
S-2	CA	200	2	(Dense), moist, gray, silty, gravelly, fine SAND.
			3	(Medium dense), moist, light brown, slightly gravelly to gravelly, medium to fine SAND.
S-3		180	4	
			5	Becomes loose.
S-4	CA	200	6	
			7	
			8	
			9	Rapid caving cannot keep test pit open.
				Bottom of Test Pit at 9-1/2 Feet.
				Completed 3/30/89.

Test Pit Log TP-11

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1		0*	0	(Medium dense), moist, dark brown, silty, gravelly, fine SAND.
			1	(Medium dense), moist, red brown, slightly silty to silty, gravelly, fine SAND.
S-2	CA	15*	2	
			3	(Medium dense), moist, gray, slightly silty, gravelly, fine to medium SAND grading to coarse SAND with depth.
S-3		110	4	
			5	(Loose), moist to wet, gray, gravelly SAND.
S-4	CA	140	6	
			7	
S-5		160	8	Becomes wet.
			9	
				Bottom of Test Pit at 9 Feet.
				Completed 3/30/89.
				*Problem with H-Nu lost volatiles from samples during repair time.

Test Pit Log TP-12

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1		1	0	3 inch CONCRETE SLAB over (medium dense), moist, light brown, silty, gravelly, medium to fine SAND. (FILL?)
			1	
S-2	CA	1	2	West end test pit - (dense), moist, light brown, gravelly, silty, fine to medium SAND. (WEATHERED TILL or FILL)
			3	East end test pit - (very dense), wet, gray, gravelly, silty, fine to medium SAND. (TILL)
S-3		30	4	Contact between two soil types slopes west to east with till underlying weathered till or fill.
			5	
S-4	CA	115	6	
			7	
			8	
			9	(Very dense), wet, gray, silty, gravelly SAND (some seepage).
				Bottom of Test Pit at 9-1/5 Feet.
				Completed 3/30/89.

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

Test Pit Log TP-13

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1		1	0	6 inch CONCRETE SLAB over 4 inches of CRUSHED ROCK over (medium dense), moist to wet, red brown to light brown, slightly gravelly to gravelly, silty, medium to fine SAND. (FILL)
S-2		25	1	
S-3		60	2	
S-4		135	3	
			4	Dark brown to black soil zone (old asphalt?).
			5	
			6	(Dense), wet, gray, gravelly, silty, medium to fine SAND. (TILL)
			7	
			8	Bottom of Test Pit at 8-1/2 Feet. Completed 3/30/89. Note: Test pit against concrete wall, wall trends east-west and is in the north side of the test pit. The concrete wall was encountered at the surface and is present to a depth of at least 8 feet.
			9	
			10	
			11	
			12	
			13	
			14	
			15	

Test Pit Log TP-14

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1			0	(Medium dense), moist, light brown, silty, gravelly, medium to fine SAND. (WEATHERED TILL)
			1	
S-2	CA	1	2	(Dense), moist, light brown, silty, gravelly, medium to fine SAND.
S-3		1	3	
			4	
S-4		3	5	(Very dense), moist to wet, gray, silty, gravelly, medium to fine SAND.
			6	
S-5	CA	3	7	(Very dense), wet, gray, silty, gravelly to very gravelly SAND grading to gravelly SAND.
			8	
			9	Bottom of Test Pit at 11 Feet. Completed 3/30/89. Note: Petroleum sheen observed on water surface.
			10	
			11	
			12	
			13	
			14	
			15	

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

Test Pit Log TP-15

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1		37	0	9 inches CONCRETE over 8 inches CRUSHED ROCK over (medium dense), wet, gray brown, silty, sandy GRAVEL. (FILL)
S-2	CA	80	1	(Medium dense), wet, gray, very silty SAND.
			2	(Hard), damp to moist, gray, slightly gravelly CLAY.
S-3		94	3	(Dense to very dense), moist, gray, silty, gravelly, medium to fine SAND with occasional large gravels.
			4	Grades to (medium dense), wet, gray, slightly silty, gravelly SAND.
S-4	CA	25	5	(Dense), wet, brown, silty, fine to medium SAND with occasional gravel.
			6	
			7	
			8	
			9	
			10	Bottom of Test Pit at 3/31/89.
			11	Completed 3/31/89.
			12	Note: Did not observe visual evidence of petroleum product.
			13	
			14	
			15	

Test Pit Log TP-16

Sample	Chem Analysis	H-Nu	Depth in Feet	SOIL DESCRIPTIONS
				Ground Surface Elevation in Feet 0.0
S-1		27	0	(Medium dense), wet, brown, slightly silty, sandy GRAVEL.
			1	(Dense), moist to wet, gray, gravelly, silty, medium to fine SAND.
			2	(TILL)
S-2	CA	220	3	(Very dense), moist, gray, slightly silty to silty, gravelly, medium to fine SAND. (TILL)
			4	Grades moist to wet.
S-3		185	5	
			6	
S-4	CA	11	7	
			8	
			9	
			10	Bottom of Test Pit at 9 Feet.
			11	Completed 3/31/89.
			12	Note: Slow groundwater seepage at 5-foot-depth.
			13	
			14	
			15	

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

HARTCROWSER

J-2385-01

3/89

Figure A-6

MONITOR WELL NO. MW-4

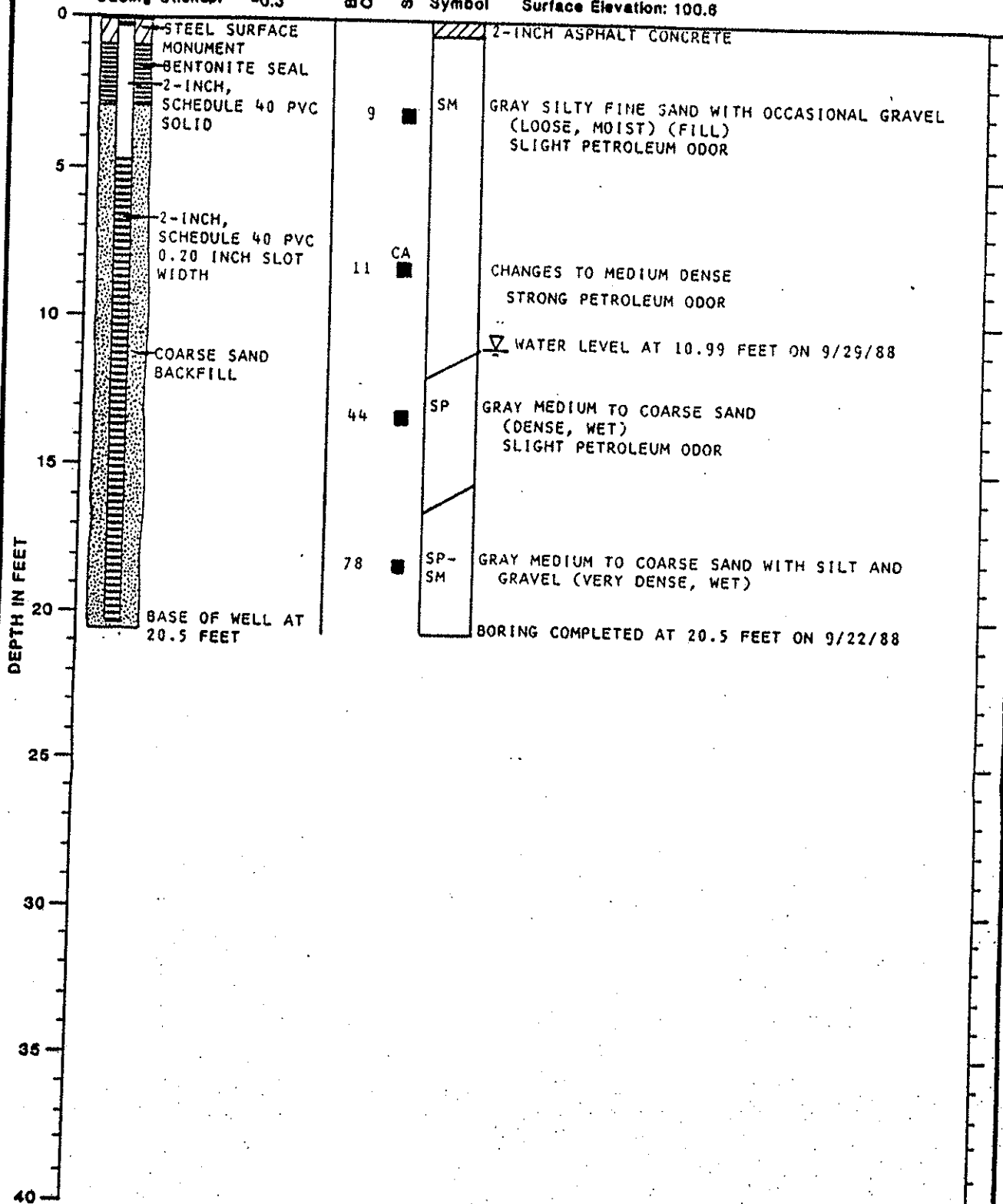
WELL SCHEMATIC

Casing Elevation: 100.34
Casing Stickup: -0.3

Blow-
Count
Samples
Group
Symbol

DESCRIPTION

Surface Elevation: 100.6



Note: See Figure A-2 for Explanation of Symbols

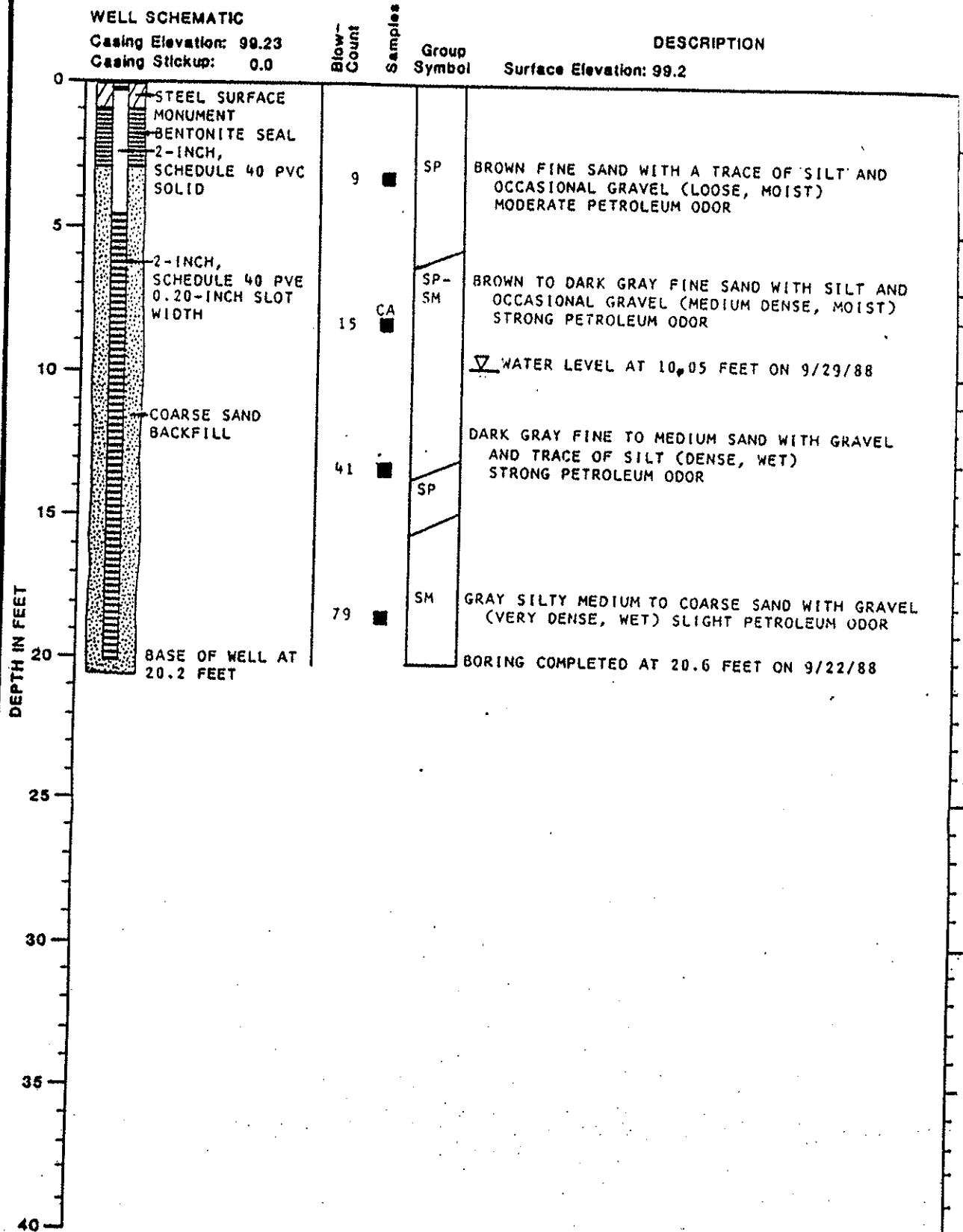
Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-6

0372-34-4 KRF:OWA:GD 10/12/88

MONITOR WELL NO. MW-5



Note: See Figure A-2 for Explanation of Symbols

Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-7

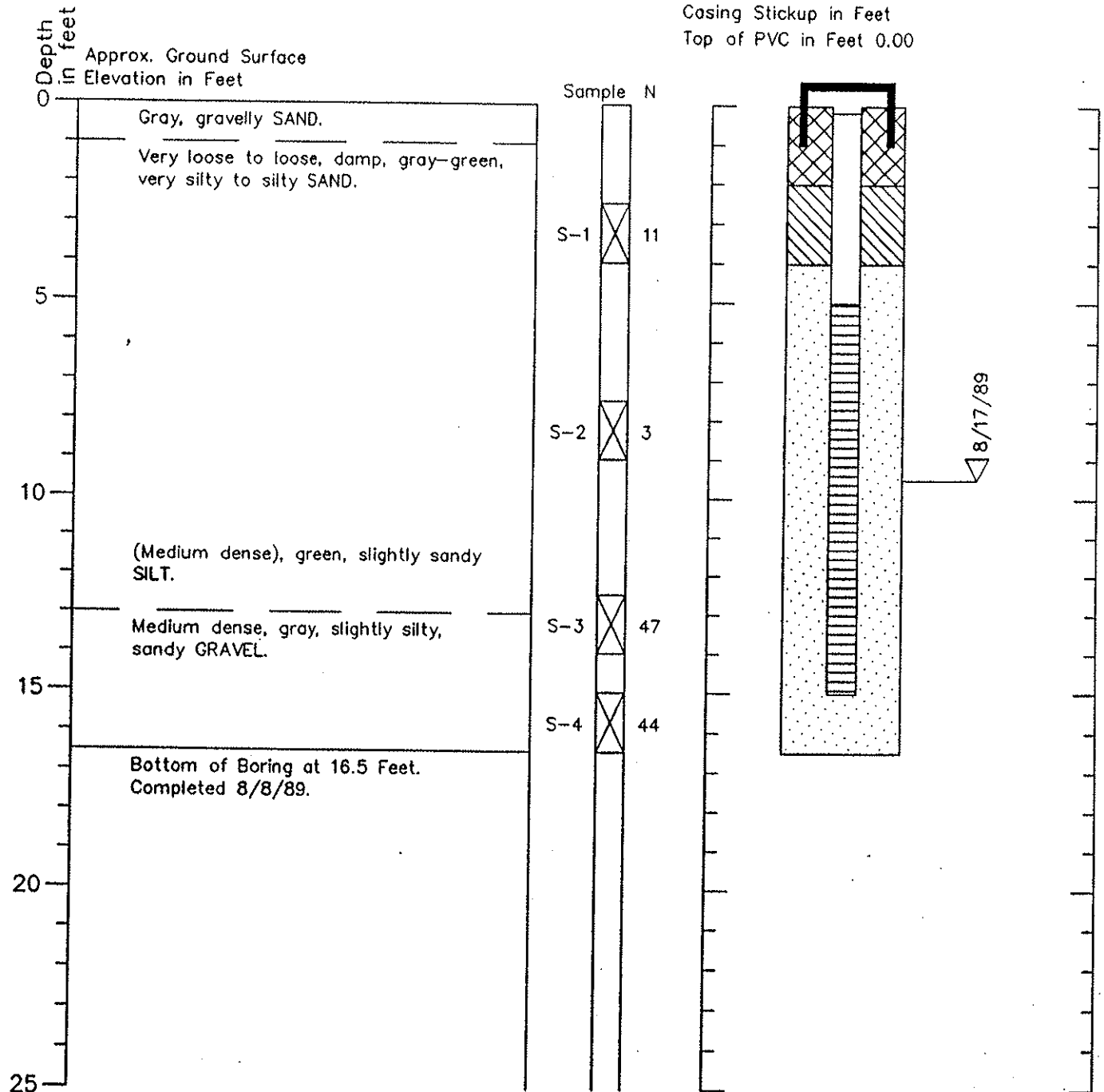
0372-34-4 KRF:DMA:GO 10/12/88

Boring Log and Construction Data for Monitoring Well MW-5A

Geologic Log

Monitoring Well Design

Casing Stickup in Feet
Top of PVC in Feet 0.00



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



HARTCROWSER

J-2365-01

8/89

Figure A-2

MONITOR WELL NO. MW-6

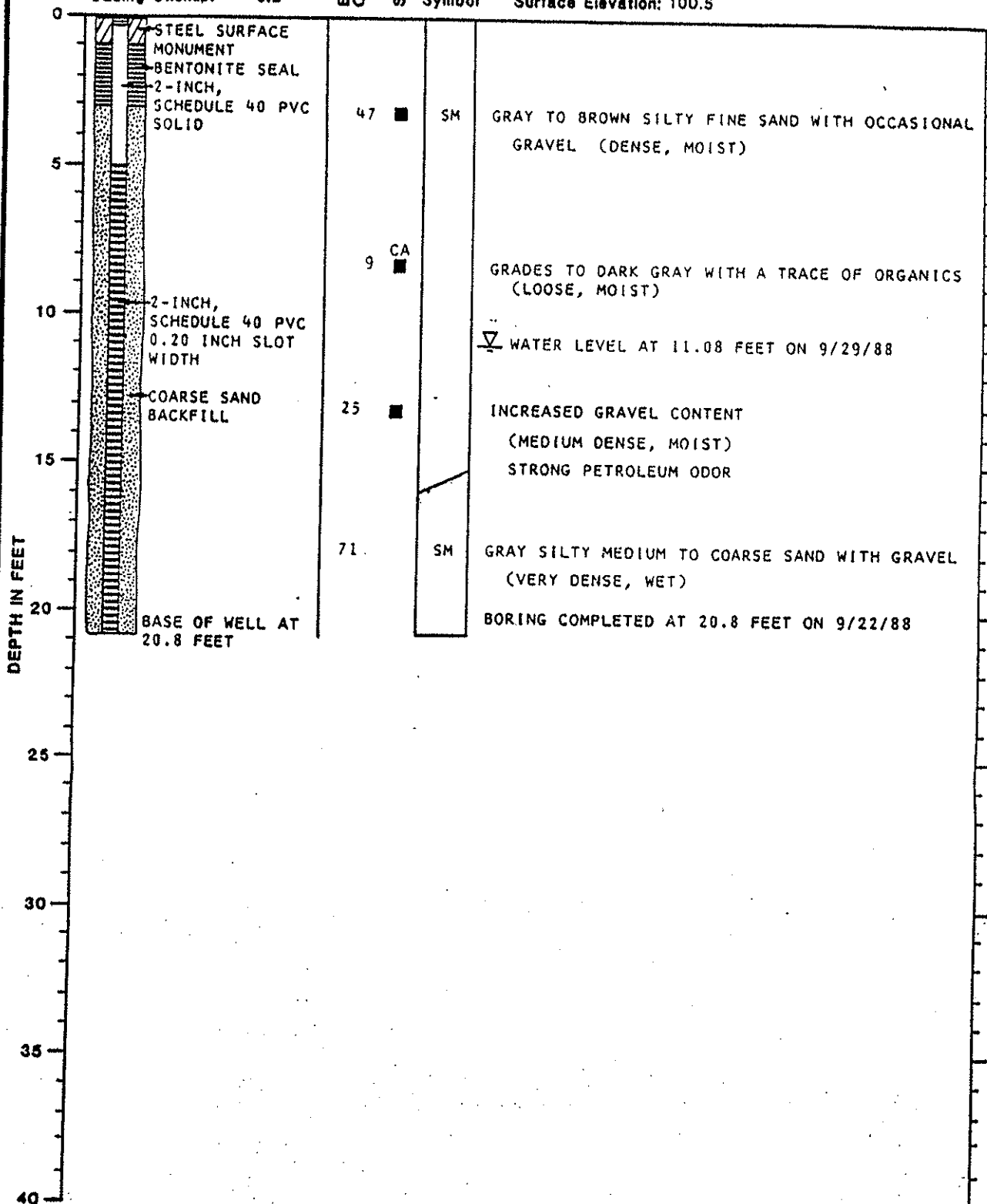
WELL SCHEMATIC

Casing Elevation: 100.29
Casing Stickup: -0.2

Blow-
Count
Samples
Group
Symbol

DESCRIPTION

Surface Elevation: 100.5



Note: See Figure A-2 for Explanation of Symbols

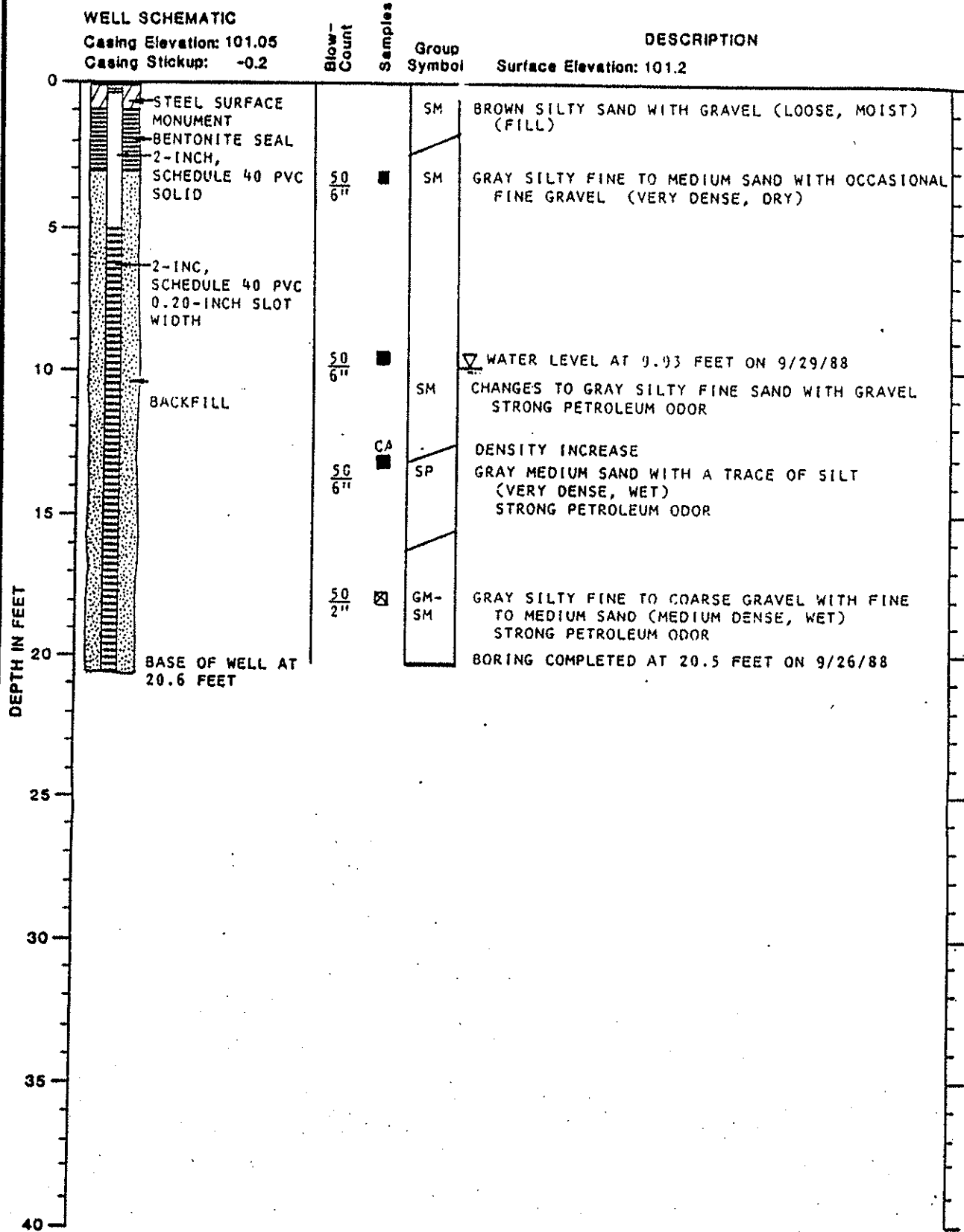
Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-8

0372-34-4 KRF;DWA;GD 10/12/88

MONITOR WELL NO. MW-7



Note: See Figure A-2 for Explanation of Symbols

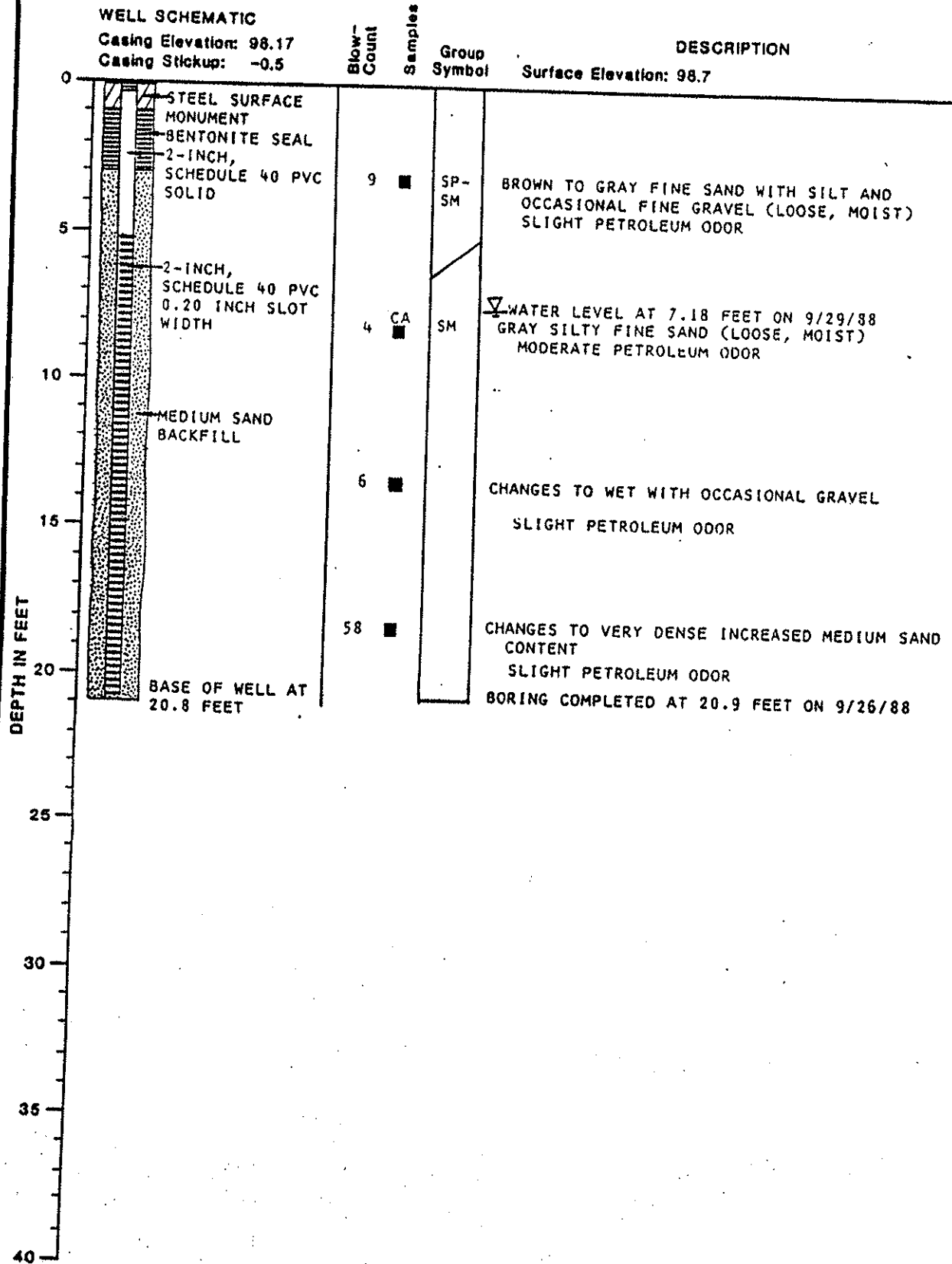
0372-34-4 KRF:DMA:GD 10/12/88

Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-9

MONITOR WELL NO. MW-8



Note: See Figure A-2 for Explanation of Symbols

Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-10

0372-34-4 KRF:DWA:GD 10/12/88

MONITOR WELL NO. MW-9

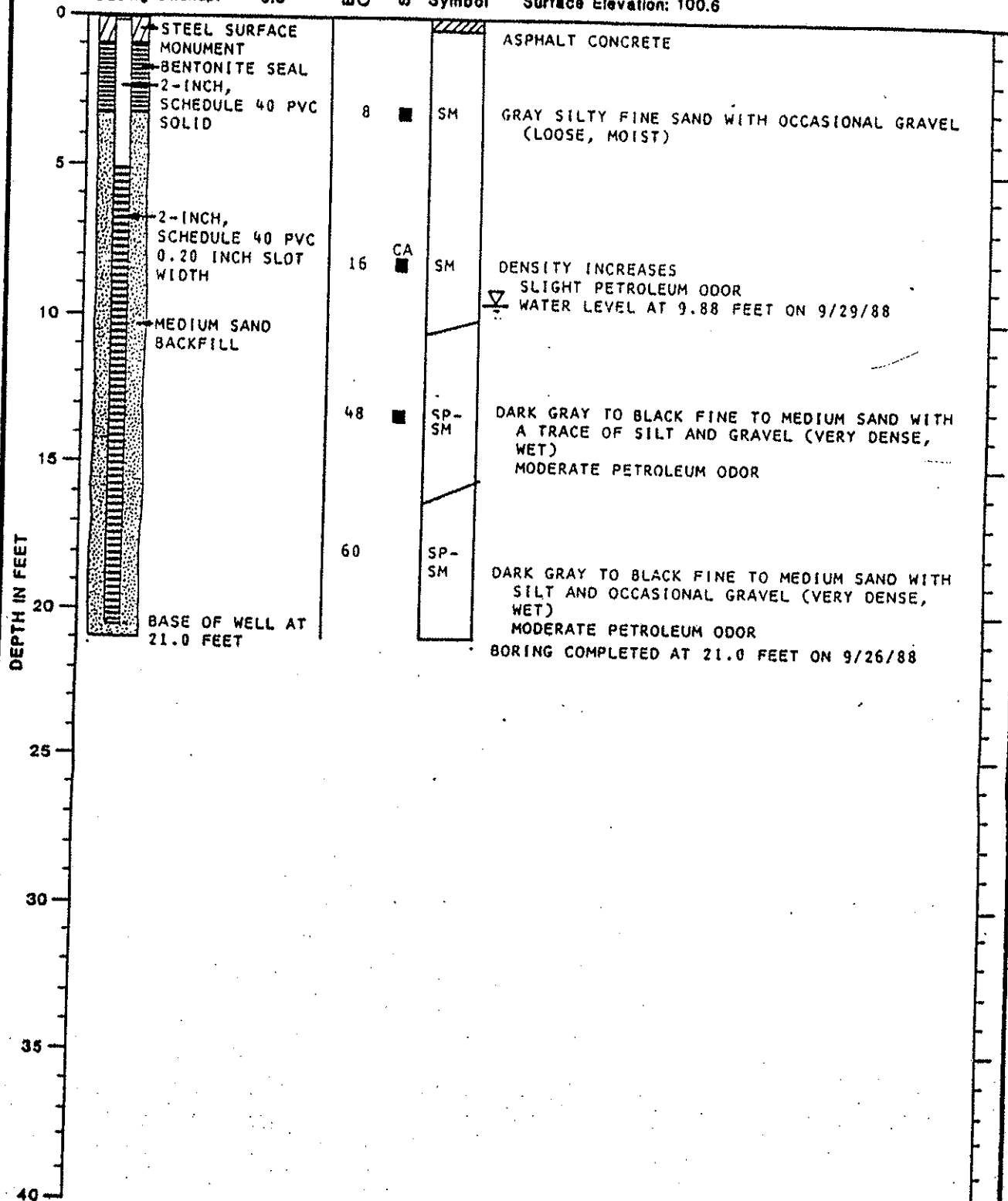
WELL SCHEMATIC

Casing Elevation: 100.34
Casing Stickup: -0.3

Blow-
Count
Samples
Group
Symbol

DESCRIPTION

Surface Elevation: 100.6



Note: See Figure A-2 for Explanation of Symbols

Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-11

0372-34-4 KRF:DWA:GD 10/12/88

MONITOR WELL NO. MW-10

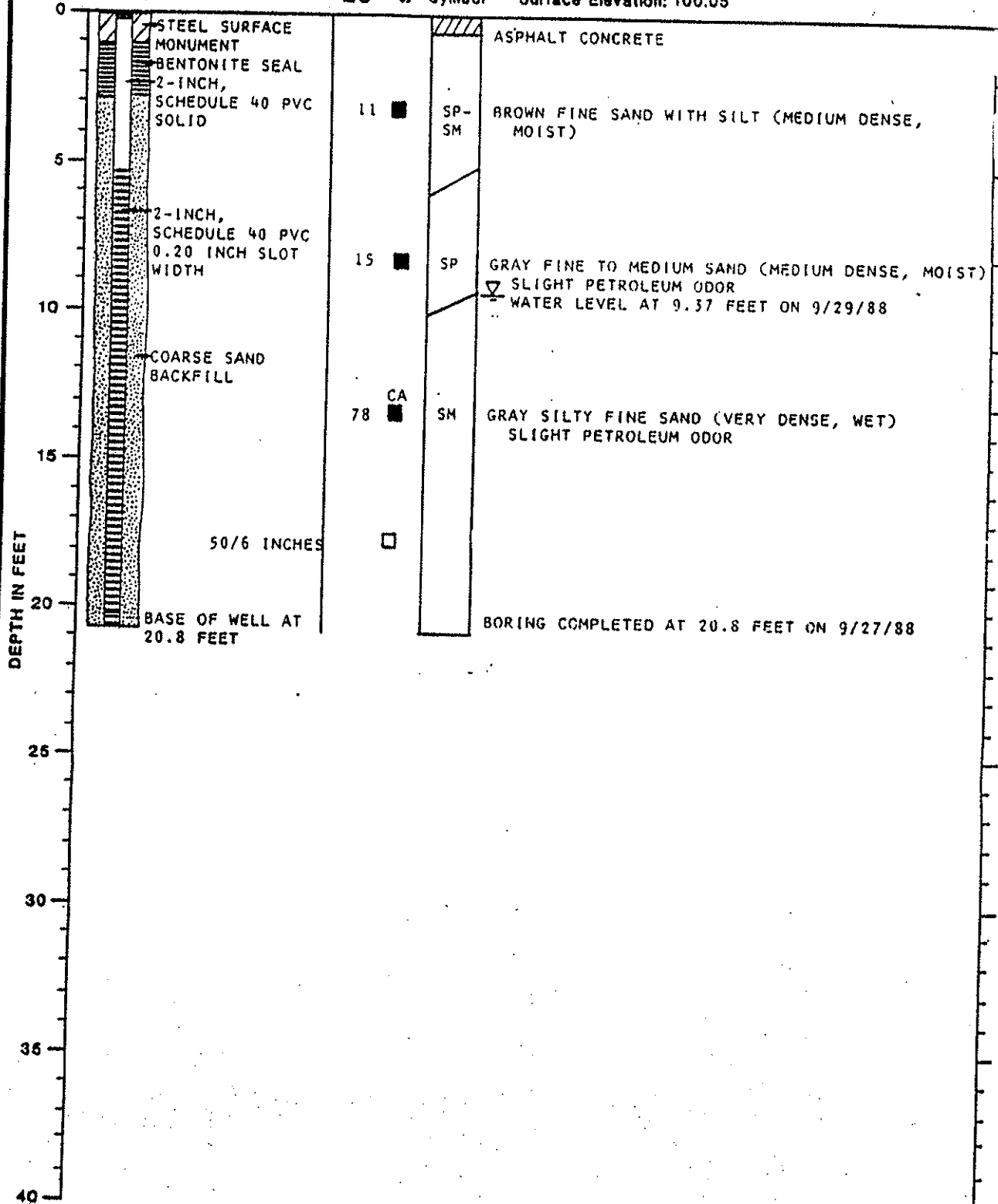
WELL SCHEMATIC

Casing Elevation: 99.94
Casing Stickup: -0.8

Blow-
Count
Samples
Group
Symbol

DESCRIPTION

Surface Elevation: 100.05



Note: See Figure A-2 for Explanation of Symbols

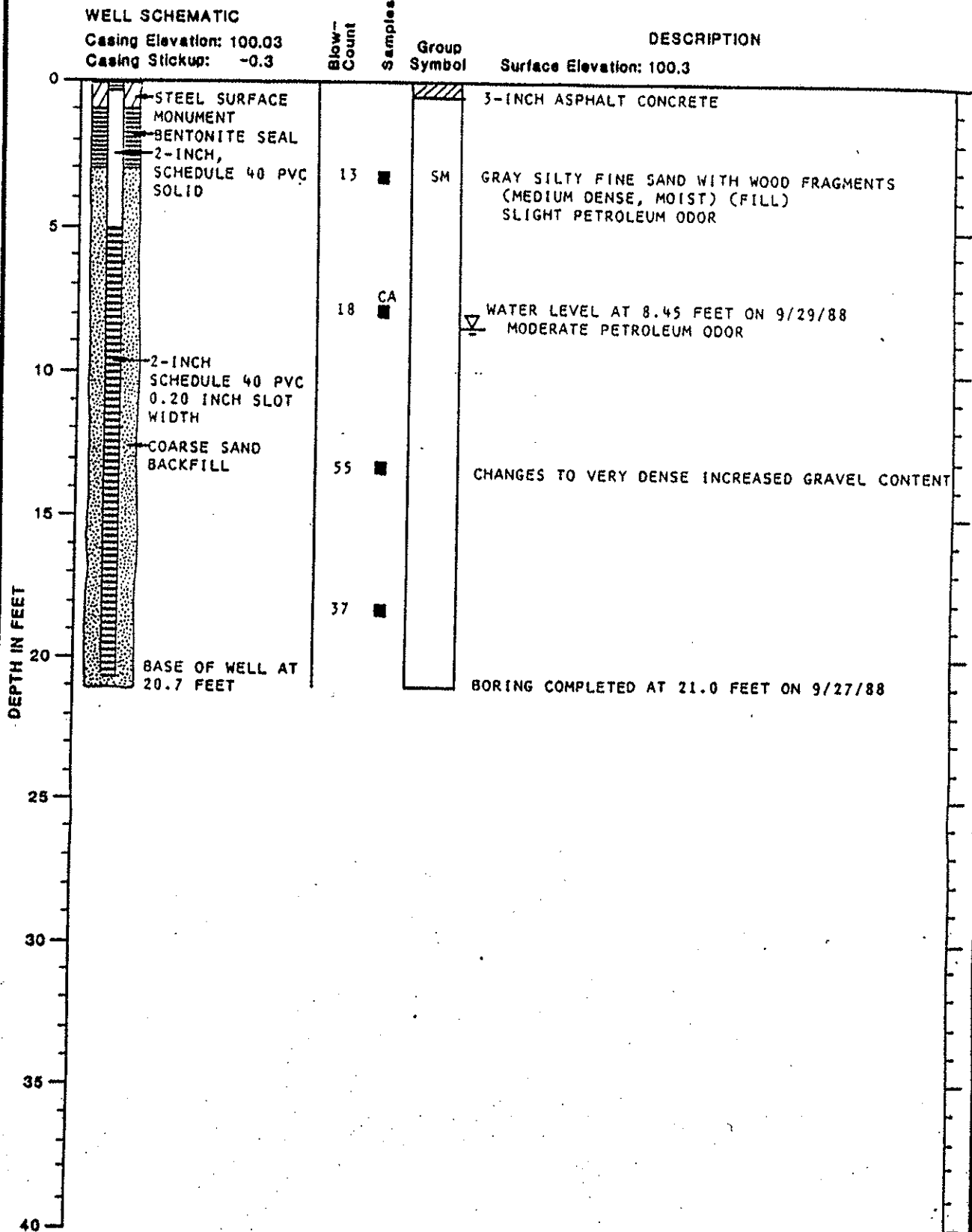
Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-12

0372-34-4 KRF:OWA:GD 10/12/88

MONITOR WELL NO. MW-11



Note: See Figure A-2 for Explanation of Symbols

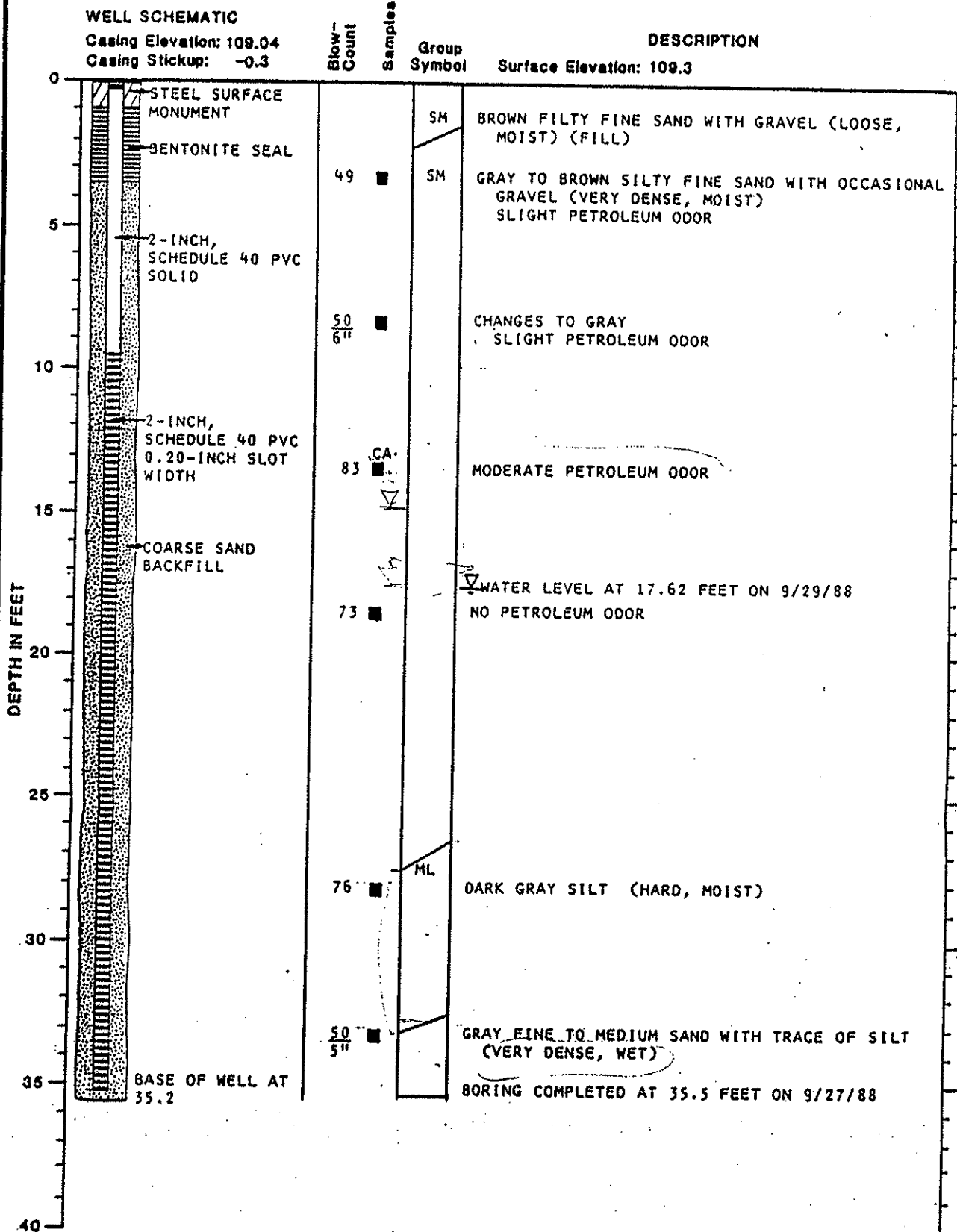
Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-13

0372-34-4 KRF:DWA:GD 10/12/88

MONITOR WELL NO. MW-12



Note: See Figure A-2 for Explanation of Symbols

Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-14

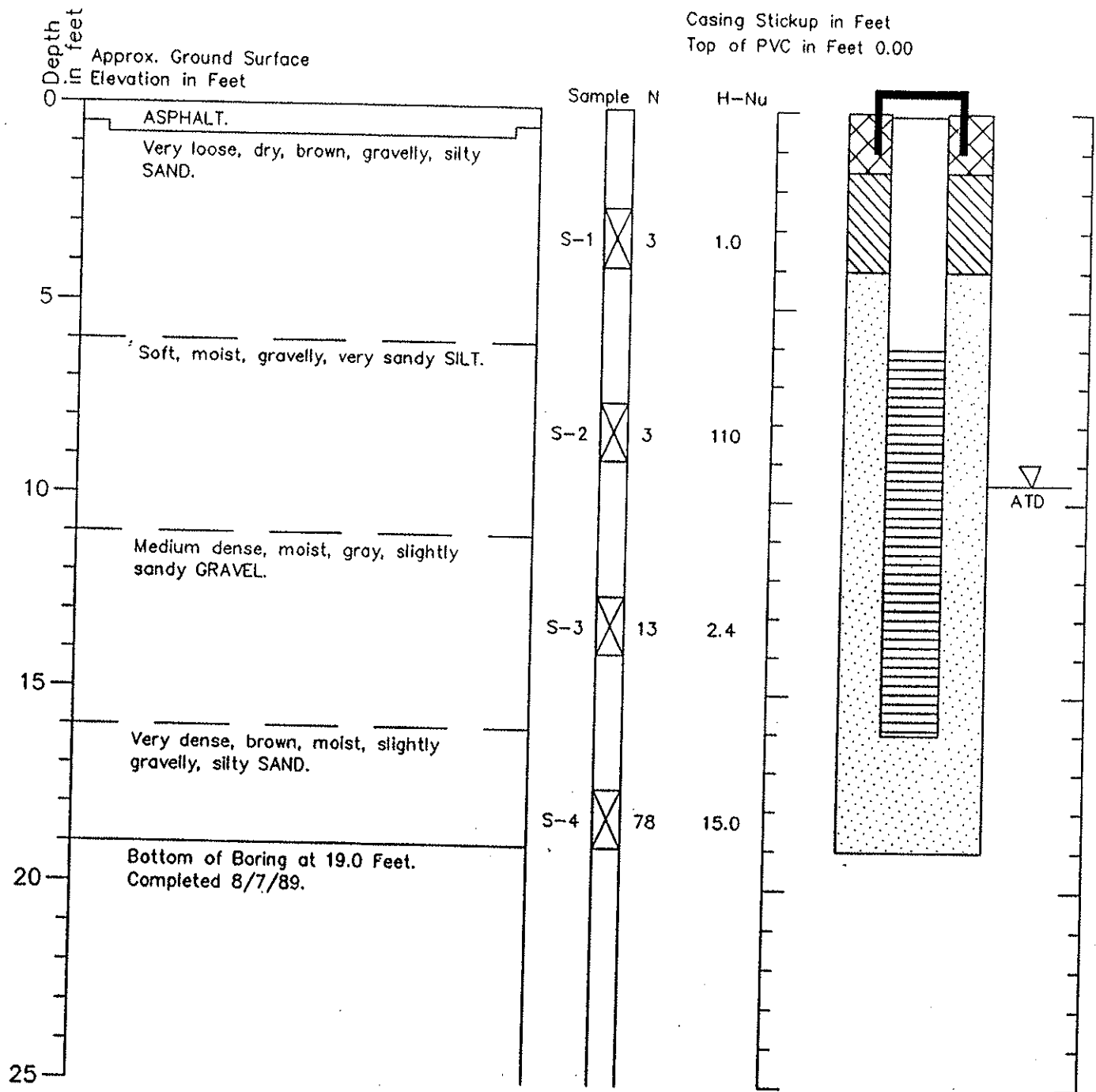
0372-34-4 KRF:DWA:GD 10/12/88

Boring Log and Construction Data for Monitoring Well MW-13

Geologic Log

Monitoring Well Design

Casing Stickup in Feet
Top of PVC in Feet 0.00



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



HARTCROWSER

J-2365-01

8/89

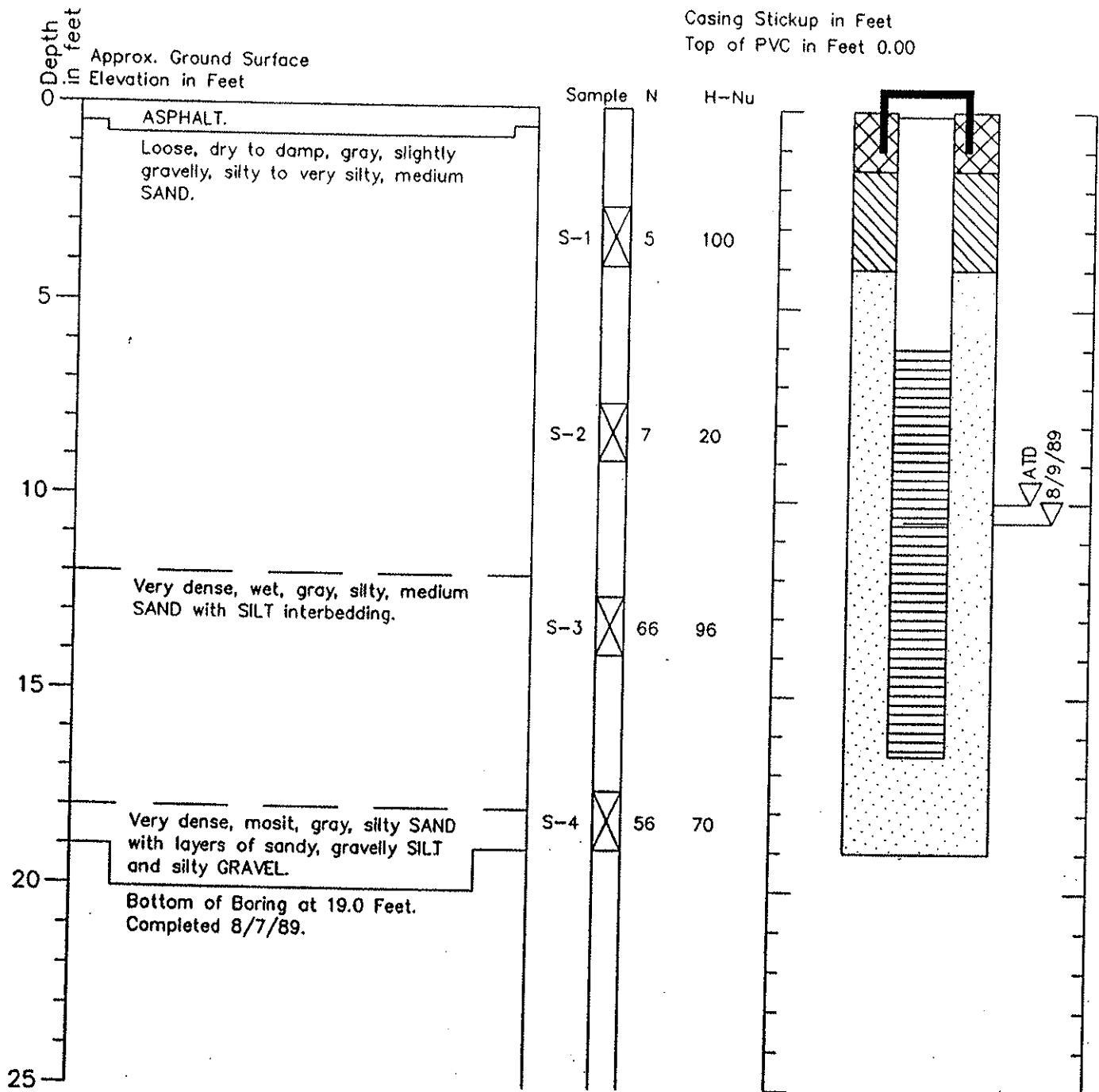
Figure A-3

Boring Log and Construction Data for Monitoring Well MW-14

Geologic Log

Monitoring Well Design

Casing Stickup in Feet
Top of PVC in Feet 0.00



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



HARTCROWSER

J-2365-01

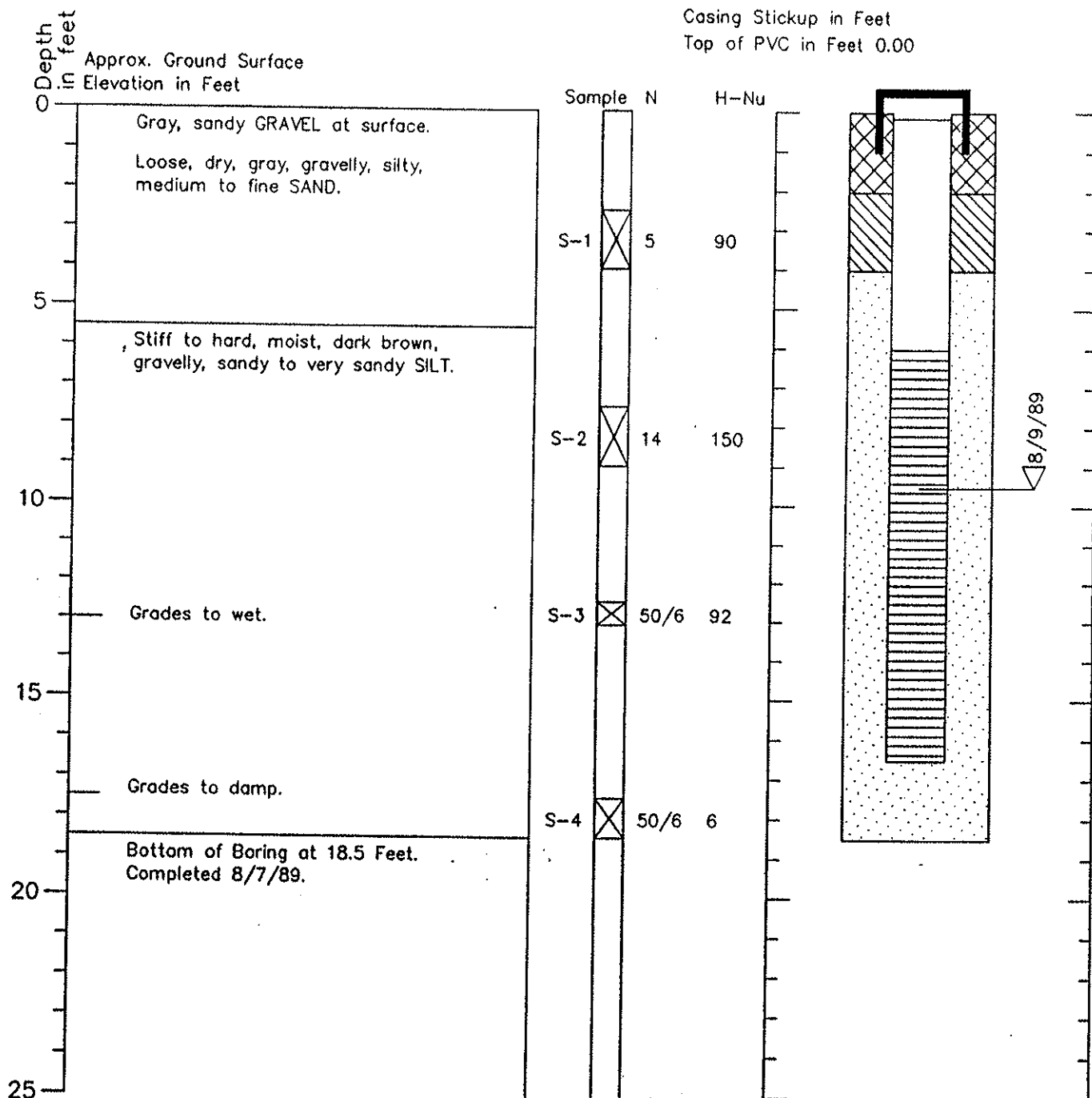
8/89

Figure A-4

Boring Log and Construction Data for Monitoring Well MW-15

Geologic Log

Monitoring Well Design



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



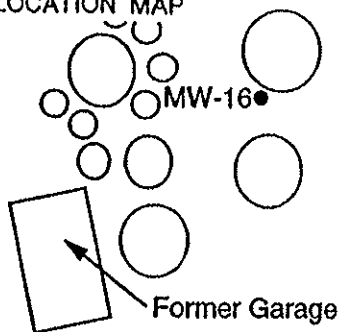
HARTCROWSER

J-2365-01

8/89

Figure A-5

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

WELL NO. MW-16

PAGE 1 OF 1

PROJECT NO. 520-41.01

LOGGED BY: LB

DRILLER: HAYES

DRILLING METHOD: HSA

SAMPLING METHOD: SS

CASING TYPE: Sch 40 PVC

SLOT SIZE: 0.010"

GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON

DATE DRILLED: 8-23-93

LOCATION: Bremerton

HOLE DIAMETER: 7"

HOLE DEPTH: 29.5'

WELL DIAMETER: 2"

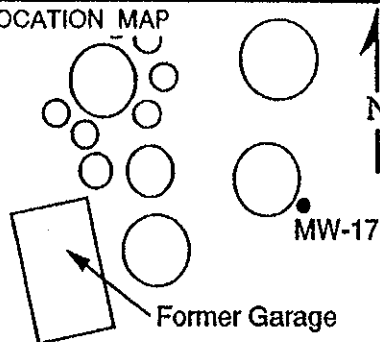
WELL DEPTH: 28.5'

CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
CEMENT				2			SM	SILTY SAND: gravelly; surface cover (fill).
	Dp	0	67	4				SILTY SAND: gray; 20-30% fines; very fine to fine sand; 20-30% fine to medium sand; trace gravel; very dense; no hydrocarbon odor.
	Dp	0	62	8				@ 10': slight hydrocarbon odor; minimal sample recovery.
	Dp	8	89	14				@ 15': moderate hydrocarbon odor; minimal sample recovery.
	Mst	1	96	18				@ 16-18': a very soft layer was noted by the driller; subsequent cuttings revealed a very silty medium grained sand.
	Mst	2	73	20				@ 20': as above.
	Wet	2	97	24				@ 25': decreasing hydrocarbon odor.
	Wet	0	64	26				@ 26.5': as above.
				28			ML	SILT: very dark gray; low plasticity; very hard; no hydrocarbon odor.
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				

BOTTOM OF BORING AT 29.5'

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

WELL NO. MW-17

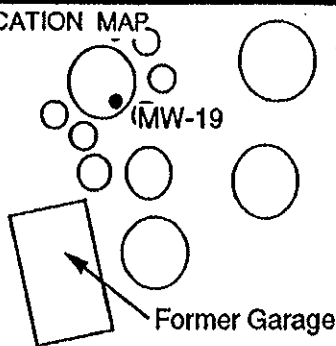
PAGE 1 OF 2

PROJECT NO. 520-41.01
 LOGGED BY: LB
 DRILLER: HAYES
 DRILLING METHOD: HSA
 SAMPLING METHOD: SS
 CASING TYPE: Sch 40 PVC
 SLOT SIZE: 0.010"
 GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON
 DATE DRILLED: 8-24 and 26-93
 LOCATION: Bremerton
 HOLE DIAMETER: 12" to 34/7" to 46
 HOLE DEPTH: 46.5'
 WELL DIAMETER: 2"
 WELL DEPTH: 44'
 CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
CEMENT				2			SM	SILTY SAND: gravelly; hydrocarbon odor and staining noted at 1.5; surface cover (fill).
	Dp	4	72	4				SILTY SAND: gray; 30-40% fines; very fine to fine sand; 10-20% medium sand; very dense; slight hydrocarbon odor.
	Dp	2	65	8				@ 10': trace coarse sand; trace gravel.
	Mst	0	39	14				@ 15.5': dense.
	Mst	0	40	16				@ 17': as above.
			85	18				@ 18.5': no sample recovery
				20				
				22				
				24				SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
	Mst	0	73	26			ML	SILTY SAND: dark gray; 20-30% silt; very fine to fine sand; trace medium sand; dense; no hydrocarbon odor.
	Wet	0	44	* 26			SM	SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
	Mst	1	39	28			ML	SILTY SAND: dark gray; 20-30 % silt; very fine to fine sand; very dense; no hydrocarbon odor.
	Wet	1	53	* 30			SM	SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
	Mst	0	84	32			ML	@ 32.5': dark gray; low plasticity; 20-30% very fine sand; very hard; no hydrocarbon odor.
	Mst	0	84	34				@ 34': dark gray; low plasticity; very hard; no hydrocarbon odor.
	Mst	0	73	36				@ 35.5': dark gray; low plasticity; 20-30% very fine to fine sand; very hard; no hydrocarbon odor; minimal sample recovery.
				38				@ 40': dark grayish brown; high plasticity; 10-20% fine gravel and coarse sand; very hard; no hydrocarbon odor.
	Mst	0	75	40				
				42				
				44				

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

WELL NO. MW-19

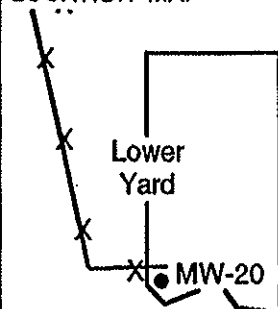
PAGE 1 OF 1

PROJECT NO. 520-41.01
 LOGGED BY: LB
 DRILLER: HAYES
 DRILLING METHOD: HSA
 SAMPLING METHOD: SS
 CASING TYPE: Sch 40 PVC
 SLOT SIZE: 0.010"
 GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON
 DATE DRILLED: 8-25-93
 LOCATION: Bremerton
 HOLE DIAMETER: 7"
 HOLE DEPTH: 26.5'
 WELL DIAMETER: 2"
 WELL DEPTH: 24'
 CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
CEMENT				2			SM	SILTY SAND: gravelly; surface cover (fill).
				4				
	Mst	28	60	6				@5': gray; 30-40% fines; trace to 10% very fine sand; fine to medium sand; trace coarse sand; very dense; hydrocarbon odor and staining.
				8				
				10				
	Mst	517	81	12	*			@13.5': decreasing fines; increasing coarse sand; very dense; strong hydrocarbon staining and odor (resembles diesel).
				14				@16.5': increasing fines.
	Wet	24	97	16				
				18				
	Wet	45	77	20				@20.5': increasing fines; minimal sample recovery.
				22				
				24				
	Mst	3	49	26			ML	SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
				28				
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				
								BOTTOM OF BORING AT 26.5'

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

WELL NO. MW-20

PAGE 1 OF 1

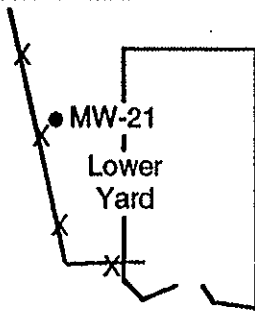
PROJECT NO. 520-41.01
 LOGGED BY: LB
 DRILLER: HAYES
 DRILLING METHOD: HSA
 SAMPLING METHOD: SS
 CASING TYPE: Sch 40 PVC
 SLOT SIZE: 0.010"
 GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON
 DATE DRILLED: 8-25-93
 LOCATION: Bremerton
 HOLE DIAMETER: 7"
 HOLE DEPTH: 15.5'
 WELL DIAMETER: 2"
 WELL DEPTH: 15'
 CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
	Dp	43	15	2			SM	SILTY SAND: 3" surface cover; 2" asphalt; gravelly (fill); hydrocarbon odor.
				4				@4.5': gravelly; gray; 10-20% fines; 10-20% very fine to fine sand; medium sand; trace coarse sand and gravel; medium density; hydrocarbon odor and staining.
				6				@8.5': no recovery - move down.
				8				
				10				
	Wet	109	9	12				@11.5': very dark grayish brown; 30-40% fines; very fine to fine sand; trace to 10% medium to coarse sand; loose; strong hydrocarbon odor; (resembles diesel).
	Wet	3	6	14				@15.5': 20-30% medium to coarse sand; hydrocarbon odor.
				16				
				18				
				20				
				22				
				24				
				26				
				28				
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				

BOTTOM OF BORING AT 15.5'

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

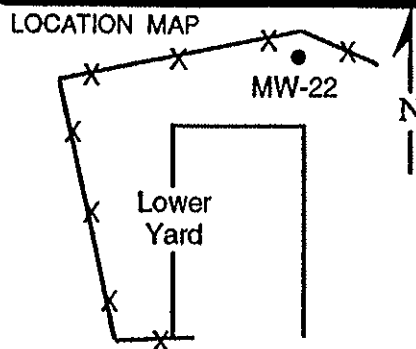
WELL NO. MW-21

PAGE 1 OF 1

PROJECT NO. 520-41.01
 LOGGED BY: LB
 DRILLER: HAYES
 DRILLING METHOD: HSA
 SAMPLING METHOD: SS
 CASING TYPE: Sch 40 PVC
 SLOT SIZE: 0.010"
 GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON
 DATE DRILLED: 8-26-93
 LOCATION: Bremerton
 HOLE DIAMETER: 7"
 HOLE DEPTH: 15'
 WELL DIAMETER: 2"
 WELL DEPTH: 15'
 CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
	Dp	15	19	2			SM	SILTY SAND: gravelly; hydrocarbon odor; surface cover (fill).
				4				@4.5': gravelly (fill); olive gray; trace to 10% fines; med. sand; 10-20% gravel; medium density; hydrocarbon odor; minimal sample recovery.
	Wet	280	7	8				
				10				@10': 10-20% very fine to fine sand; no gravel; loose; strong hydrocarbon odor (resembles diesel).
	Wet	30	6	14				@15': very loose; minimal sample recovery.
				16				BOTTOM OF BORING AT 15'
				18				
				20				
				22				
				24				
				26				
				28				
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				



PACIFIC ENVIRONMENTAL GROUP, INC.

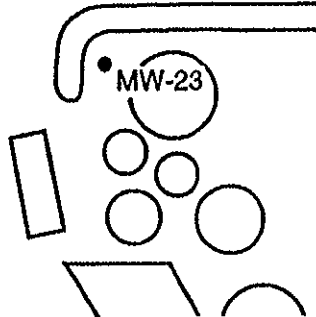
WELL NO. MW-22
PAGE 1 OF 1

PROJECT NO. 520-41.01
LOGGED BY: LB
DRILLER: HAYES
DRILLING METHOD: HSA
SAMPLING METHOD: SS
CASING TYPE: Sch 40 PVC
SLOT SIZE: 0.010"
GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON
DATE DRILLED: 8-26-93
LOCATION: Bremerton
HOLE DIAMETER: 7"
HOLE DEPTH: 15'
WELL DIAMETER: 2"
WELL DEPTH: 15'
CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
	Mst	0	14	2			SM	SILTY SAND: gravelly; surface cover (fill).
	Wet	468	9	4				@4.5': gravelly (fill); very dark grayish brown; 20-30% fines; 10-20% very fine to medium sand; coarse sand; 20-30% gravel; medium density; no hydrocarbon odor; minimal sample recovery.
	Wet	116	36	10				@10': black; trace to 10% fines; fine to medium sand; loose; strong hydrocarbon odor (resembles diesel).
				14				@15': olive gray; 10-20% fines; 10-20% very fine to fine sand; medium to coarse sand; dense; strong hydrocarbon odor.
				16				BOTTOM OF BORING AT 15'
				18				
				20				
				22				
				24				
				26				
				28				
				30				
				32				
				34				
				36				
				38				
				40				
				42				
				44				

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

WELL NO. MW-23

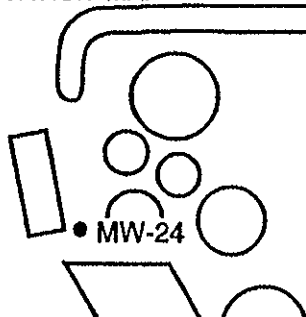
PAGE 1 OF 1

PROJECT NO. 520-41.01
 LOGGED BY: LB
 DRILLER: HAYES
 DRILLING METHOD: HSA
 SAMPLING METHOD: SS
 CASING TYPE: Sch 40 PVC
 SLOT SIZE: 0.010"
 GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON
 DATE DRILLED: 9-13-93 & 9-14-93
 LOCATION: Bremerton
 HOLE DIAMETER: 11.5" to 34"; 7.5" to 41"
 HOLE DEPTH: 42.5'
 WELL DIAMETER: 2"
 WELL DEPTH: 41'
 CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
CEMENT				2				SM	SILTY SAND: (fill) surface cover.
				4					
	Dp	0	110	6					@4.5': light brown; 20-30% fines; very fine to fine sand; trace to 5% medium to coarse sand; very dense; no hydrocarbon odor.
				8					
	Mst	0	94	10					@10.5': gray; increasing medium sand; trace gravel; slight hydrocarbon odor.
				12					
	Wet	0	110	14					@15.5': as above.
				16					
	Wet	0	67	18					
				20					@20.5': as above.
				22					
	Wet	20	84	24	*				@25.5': increasing hydrocarbon odor.
				26					
				28					
				30				ML	SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
	Dp	5	54	32				SM	SILTY SAND: dark gray; trace 10% fines; fine to medium sand; dense; slight hydrocarbon odor.
	Wet	0	33	34				ML	SILT: as above.
	Dp	0	39	36	*			SM	SILTY SAND: increasing fines; as above.
	Wet	0		38				ML	SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
	Dp	5	117	40				SM	SILTY SAND: as above; minimal sample recovery.
	Wet	0		42	*			ML	@41.5': gravelly; gray; 20-30% fines; 10-20% fine to medium sand; coarse sand; 30% gravel; very dense; hydrocarbon odor.
	Mst	0	81	44					SILT: low plasticity; very hard; no hydrocarbon odor.
									BOTTOM OF BORING AT 42.5'

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

WELL NO. MW-24

PAGE 1 OF 1

PROJECT NO. 520-41.01

LOGGED BY: LB

DRILLER: HAYES

DRILLING METHOD: HSA

SAMPLING METHOD: SS

CASING TYPE: Sch 40 PVC

SLOT SIZE: 0.010"

GRAVEL PACK: 10 x 20 SAND

CLIENT: CHEVRON

DATE DRILLED: 9-13-93 & 9-14-93

LOCATION: Bremerton

HOLE DIAMETER: 11.5" to 28"; 7.5" to 35'

HOLE DEPTH: 35'

WELL DIAMETER: 2"

WELL DEPTH: 35'

CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	PID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
CEMENT 10" CONDUCTOR CASING SAND BENTONITE	Mst	2	54	2			SM	SILTY SAND: (fill) surface cover; gravelly; hydrocarbon odor noted at 2.5'.
	Mst	0	66	4				
				6				@5': light olive gray; 20-30% fines; fine sand; 10% med. to coarse sand; trace gravel; very dense; hydrocarbon odor.
				8				
				10				@11.5': light brown; no hydrocarbon odor.
				12				
				14				
				16				@16.5': as above.
				18				
				20			ML	SILT: dark gray; low plasticity; hard; no hydrocarbon odor.
	Dp	2	49	22			SM	SILTY SAND: dark gray; 30-40% fines; very fine to fine sand; hydrocarbon odor.
	Dp	0	87	24			ML	SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
				26			SM	SILTY SAND: dark gray; 20-30% fines; 10-20% very fine to fine sand; medium sand; no hydrocarbon odor.
				28			ML	SILT: dark gray; low plasticity; very hard; no hydrocarbon odor.
				30				@28': as above.
				32			SM	SILTY SAND: dark gray; trace to 10% fines; 10-20% medium sand; coarse sand; very dense; no hydrocarbon odor.
				34				
				36				
				38				
				40				
				42				
				44				

BOTTOM OF BORING AT 35'

APPENDIX D

Letter – Ryan Inc. 2002 Report Excerpt



GETTLER-RYAN Inc.

TRANSMITTAL

November 14, 2002

G-R #386607

TO: Mr. Matt Miller
Delta Environmental Consultants, Inc.
1200-112th Avenue N.E., Suite C-146,
Bellevue, Washington 98004-3769

FACILITY NUMBER 100-1351
GENERAL CORR. ☐
SERVICE REQS./PROPOSALS ☐
PERMITS/BONDS ☐
DRAWINGS/PHOTOS/NOTES ☐
SPILL & LEAK REPORTS ☐
LEGAL/EASEMENTS/LIC. ☐
REPORTS ☒

FROM: Deanna L. Harding
Project Coordinator
Gettler-Ryan Inc.
6747 Sierra Court, Suite J
Dublin, California 94568

RE: Former Chevron Bulk Terminal
#1001351
1310 Highland Avenue
Bremerton, Washington

WE HAVE ENCLOSED THE FOLLOWING:

COPIES	DATED	DESCRIPTION
1	November 4, 2002	Groundwater Monitoring and Sampling Report Event of September 30, 2002

COMMENTS:

This report is being sent for your review. Please provide any comments/changes and propose any groundwater monitoring modifications for the next event prior to *November 29, 2002*, at which time the final report will be distributed to the following:

cc: Mr. Gerald O'Regan, Chevron Products Company, P.O. Box 6004, San Ramon, CA 94583
Mr. John Wietfeld, WDOE, Northwest Region, 3190 160th Avenue, SE, Bellevue, WA 98008-5452

☐ Current Site Check List included.

Enclosure

trans/100-1351-gor



GETTLER-RYAN INC.



November 4, 2002
Job #386607

Mr. Gerald O'Regan
Chevron Products Company
P.O. Box 6004
San Ramon, CA 94583

RE: Event of September 30, 2002
Groundwater Monitoring & Sampling Report
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

Dear Mr. Hunter:

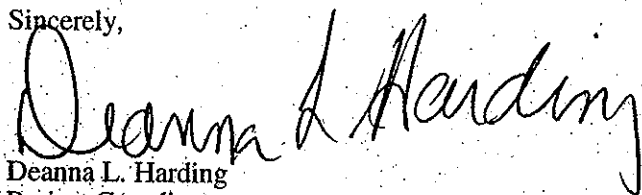
This report documents the groundwater monitoring and sampling event performed by Gettler-Ryan Inc. (G-R) at the referenced site. All field work was conducted in accordance with G-R Standard Operating Procedure - Groundwater Sampling (attached).

Static groundwater levels were measured and the wells were checked for the presence of separate-phase hydrocarbons. Separate-phase hydrocarbons were present in two wells (MW-14 and MW-15). Static water level data and groundwater elevations are presented in Table 1. A Vicinity Map is included as Figure 1 and a Potentiometric Map is included as Figure 2.

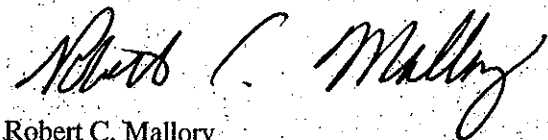
Groundwater samples were collected from the monitoring wells and submitted to a state certified laboratory for analyses. The field data sheets for this event are attached. Analytical results are presented in the table(s) listed below. Purge water was treated by filtration through granular activated carbon and was subsequently discharged. A Concentration Map is included as Figure 3. The chain of custody document and laboratory analytical reports are attached.

Please call if you have any questions or comments regarding this report.

Sincerely,

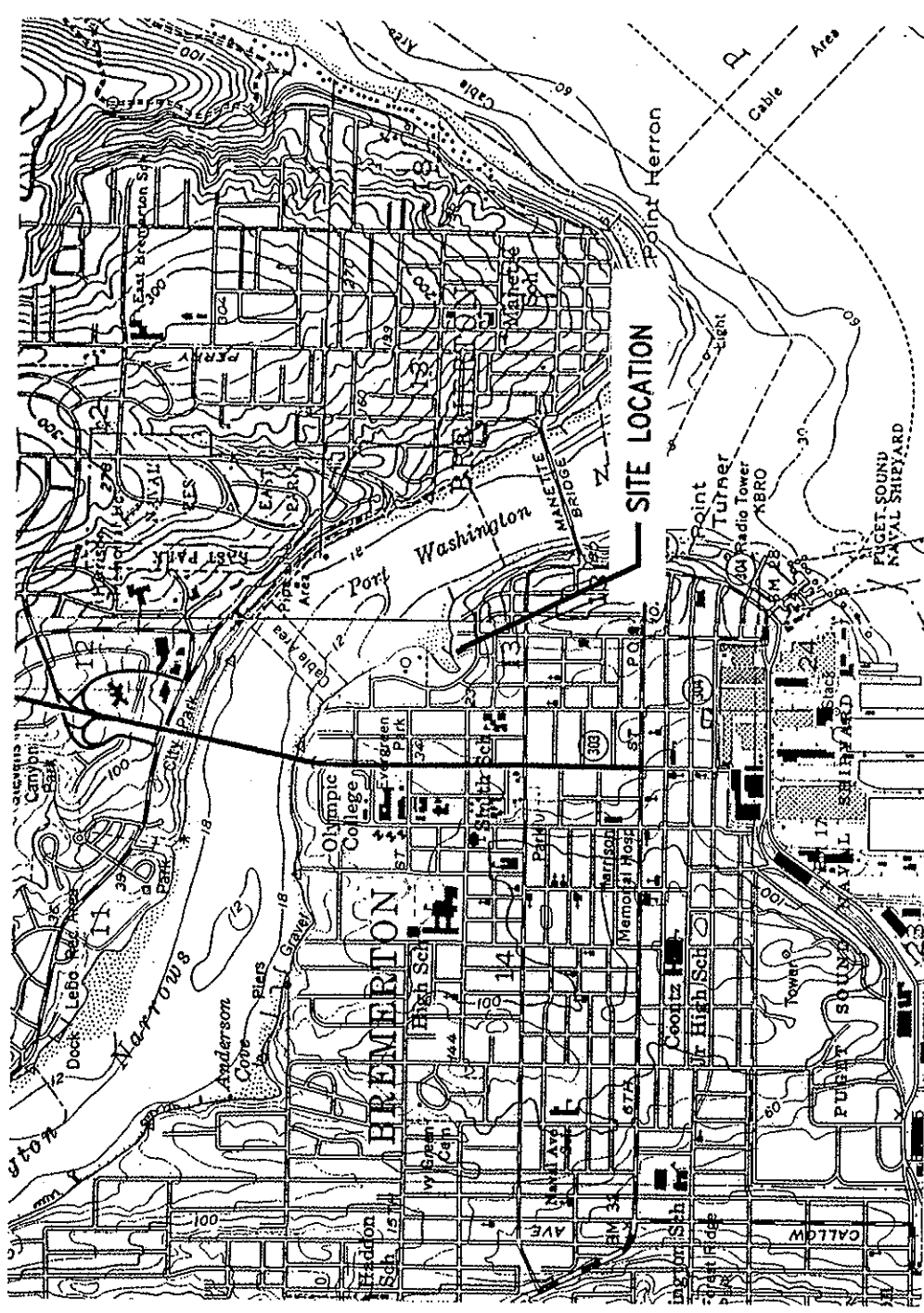


Deanna L. Harding
Project Coordinator



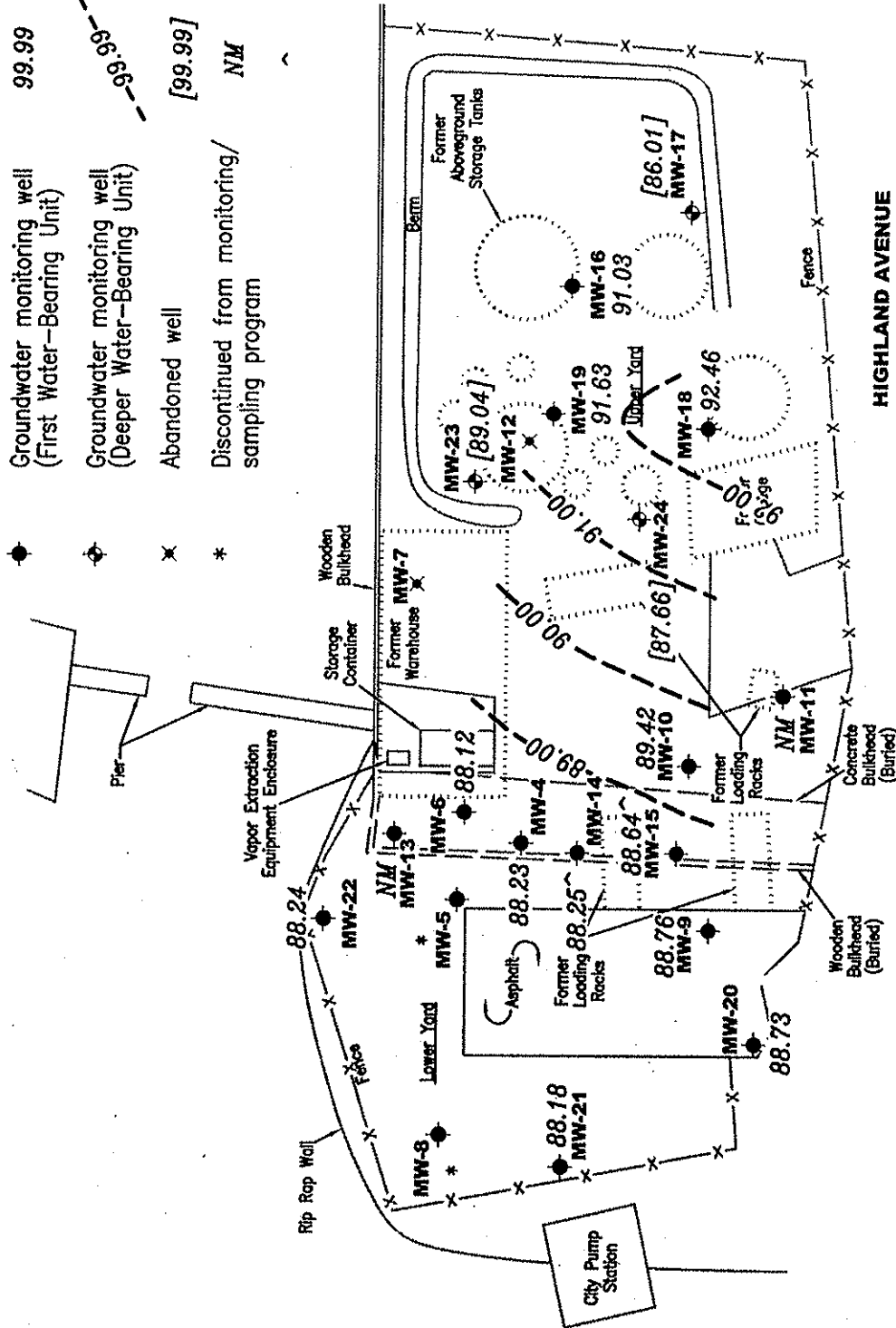
Robert C. Mallory
Registered Geologist

Figure 1: Vicinity Map
Figure 2: Potentiometric Map
Figure 3: Concentration Map
Table 1: Groundwater Monitoring Data and Analytical Results
Attachments: Standard Operating Procedure - Groundwater Sampling
Field Data Sheets
Chain of Custody Document and Laboratory Analytical Reports



EXPLANATION

- Groundwater monitoring well (First Water-Bearing Unit) 99.99 Groundwater elevation in feet referenced to arbitrary datum
- Groundwater monitoring well (Deeper Water-Bearing Unit) -99.99 Groundwater elevation contour, dashed where inferred
- × Abandoned well [99.99] Not used in contouring
- * Discontinued from monitoring/sampling program NM Not Monitored
- ~ Groundwater elevation corrected for the presence of separate-phase hydrocarbons



Source: Figure modified from drawing provided by Pacific Environmental Group, Inc.

GETTLER - RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568 (925) 551-7555

POTENTIOMETRIC MAP
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

PROJECT NUMBER 386607

REVIEWED BY

DATE September 30, 2002

REVISED DATE

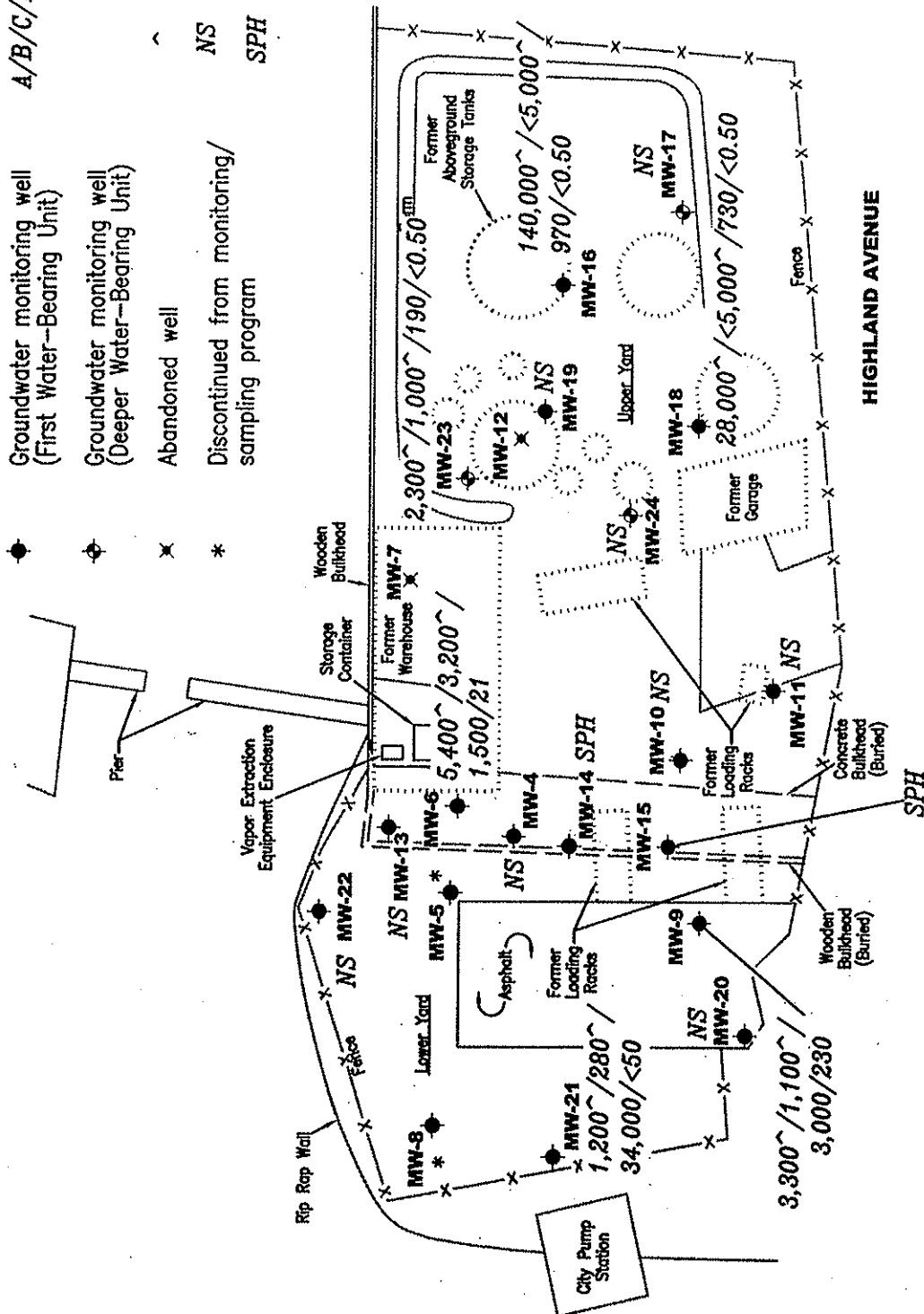
FILE NAME: P:\ENVIRO\CHEVRON\1001351\002-100-1351.DWG | Layout Tab: Pot3

FIGURE

2

EXPLANATION

Groundwater monitoring well (First Water-Bearing Unit)	A/B/C/D	Total Petroleum Hydrocarbons (TPH) as Diesel/TPH as Oil/ TPH as Gasoline/Benzene concentrations in ppb
Groundwater monitoring well (Deeper Water-Bearing Unit)		w/silica gel cleanup
Abandoned well	NS	Not Sampled
Discontinued from monitoring/ sampling program	SPH	Separate Phase Hydrocarbons



Source: Figure modified from drawing provided by Pacific Environmental Group, Inc.

GETTLER - RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

CONCENTRATION MAP
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

PROJECT NUMBER 386607
REVIEWED BY
DATE September 30, 2002
REVISED DATE

FILE NAME: P:\ENVIRO\CHEVRON\1001351\002-100-1351.DWG | Layout Tab: Con3

FIGURE

3

Table 1

Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-4 100.34	09/10/88	10.99	90.43**	1.35	--	--	--	ND	ND	3,600	23,000	--
	03/09-10/89	12.76	90.74**	3.95	--	--	--	--	--	--	--	--
	04/04/89	12.56	91.00**	4.02	--	--	--	--	--	--	--	--
	08/07/89	11.74	89.86**	1.57	--	--	--	--	--	--	--	--
	09/21/89	11.71	89.77**	1.42	--	--	--	--	--	--	--	--
	05/21/93	9.29	91.07**	0.02	--	--	--	--	--	--	--	--
	09/20/93	10.36	89.98	--	--	--	--	--	--	--	--	--
	12/23/93	10.68	89.68**	0.02	--	--	--	--	--	--	--	--
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	8.33	92.01	--	190,000	31,000	5,400	13	ND ¹⁰	8.1	79	18
98.46	09/28/94	--	--	--	130,000	ND ¹⁰	--	--	--	--	--	--
	12/09/94	7.98	90.48	--	--	--	580,000	3,200	630	1,900	4,800	45
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	9.10	89.36	--	2,400,000	270,000	96,000	1,000	110	470	1,300	--
	09/11/95	10.30	88.16	--	--	--	--	--	--	--	--	--
	12/06/95	6.22	92.24	--	6,000	ND ¹⁰	32,000	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	03/14/96	8.38	90.08	--	--	--	--	--	--	--	--	--
	06/05/96	9.33	89.13	--	--	--	--	--	--	--	--	--
	09/04/96	DRY	--	--	--	--	--	--	--	--	--	--
	12/23/96	9.10	89.36	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	9.90	88.56	--	76,100	ND ¹⁰	12,700	973	30	99.5	217	--
	12/29/97	7.12	91.34	--	--	--	--	--	--	--	--	--
	03/18/98	6.98	91.48	--	--	--	--	--	--	--	--	--
	06/23/98	9.63	88.83	Sheen	--	--	--	--	--	--	--	--
	03/24/99	6.47	91.99	0.00	68,500	6,390	746	36.8	ND ¹⁰	12	35.8	--
98.46	08/31/99 ¹²	10.23	88.23	Sheen	--	--	--	--	ND ¹⁰	--	--	--
	03/17-18/00	7.05	91.41	Sheen	1,640	ND	8,910	170	ND ¹⁰	222	504	--
	10/06/00	10.34	88.12	0.00	--	--	--	--	--	--	--	--

Table 1

Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-4 (cont)	04/01/01	7.96	90.50	0.00	--	--	--	--	--	--	--	--
	09/27/01	10.81	87.65	0.00	--	--	--	--	--	--	--	--
	03/28/02	8.48	89.98	0.00	--	--	--	--	--	--	--	--
	09/30/02	10.23	88.23	0.00	--	--	--	--	--	--	--	--
MW-5 99.23	09/10/88	10.05	89.18	--	--	--	--	1,900	360	290	1,900	--
	03/9-10/89	8.56	90.67	--	--	--	--	5,400	11,000	1,400	7,000	--
	04/04/89	8.22	91.01	--	--	--	--	--	--	--	--	--
	08/07/89	--	--	--	--	--	--	--	--	--	--	--
	09/21/89	--	--	--	--	--	--	--	--	--	--	--
	05/21/93	--	--	--	--	--	--	--	--	--	--	--
	09/20/93	--	--	--	--	--	--	--	--	--	--	--
	12/23/93	--	--	--	--	--	--	--	--	--	--	--
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	--	--	--	--	--	--	--	--	--	--	--
	09/28/94	--	--	--	--	--	--	--	--	--	--	--
	12/09/94	5.78	90.18	--	--	--	--	--	--	--	--	--
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	--	--	--	--	--	--	--	--	--	--	--
	09/11/95	--	--	--	--	--	--	--	--	--	--	--
	12/06/95	--	--	--	--	--	--	--	--	--	--	--
	03/14/96	5.37	90.59	--	--	--	--	--	--	--	--	--
	06/05/96	--	--	--	--	--	--	--	--	--	--	--
	09/04/96	--	--	--	--	--	--	--	--	--	--	--
	12/23/96	--	--	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	--	--	--	--	--	--	--	--	--	--	--
	12/29/97	--	--	--	--	--	--	--	--	--	--	--
	03/18/98	--	--	--	--	--	--	--	--	--	--	--
	06/23/98	--	--	--	--	--	--	--	--	--	--	--

Table 1
Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

[illegible]

Table 1
Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-6 (cont)	03/18/98	7.53	90.87	--	--	--	--	--	--	--	--	--
	06/23/98	9.65	88.75	--	2,500	ND	11,000	39.2	12.8	235	1,270	--
	03/24/99	7.00	91.40	0.00	2,200	2,030	216	3.95	2.94	3.79	13.4	--
	08/31/99	10.28	88.12	0.00	9,490	5,890	4,040	25.8	ND ¹⁰	62.7	131	--
	03/17-18/00	7.85	90.55	Sheen	2,850	1,750	1,960	21.6	ND ¹⁰	22.9	84.4	--
	10/06/00	11.08	87.32	0.00	4,600 ¹⁴	ND ¹⁰	6,020	13.5	24.7	39.1	118	--
	04/01/01	8.69	89.71	0.00	5,970	3,720	4,530	56.6	6.84	128	281	--
	09/27/01	10.84	87.56	0.00	7,410	5,090	4,110	25.7	5.01	35.0	55.6	--
	03/28/02	8.50	89.90	0.00	3,300 ²⁰	3,300 ²⁰	1,400	23	<5.0	20	32	--
	09/30/02	10.28	88.12	0.00	5,400 ²⁰	3,200 ²⁰	1,500	21	1.8	12	7.9	--
MW-7 101.25	09/10/88 ³	9.93	91.32	--	--	--	--	ND	ND	62	21	--
	03/09-10/89	8.36	93.31**	0.53	--	--	--	--	--	--	--	--
	04/04/89	7.64	93.86**	0.31	--	--	--	--	--	--	--	--
	08/07/89	10.98	91.03**	0.95	--	--	--	--	--	--	--	--
	09/21/89	UNABLE TO LOCATE		--	--	--	--	--	--	--	--	--
	05/21/93	UNABLE TO LOCATE		--	--	--	--	--	--	--	--	--
	09/20/93	UNABLE TO LOCATE		--	--	--	--	--	--	--	--	--
	12/23/93	UNABLE TO LOCATE - PRESUMED DESTROYED		--	--	--	--	--	--	--	--	--
	03/24/99	UNABLE TO LOCATE		--	--	--	--	--	--	--	--	--
	08/31/99	UNABLE TO LOCATE		--	--	--	--	--	--	--	--	--
	03/17-18/00	UNABLE TO LOCATE		--	--	--	--	--	--	--	--	--
	ABANDONED											
MW-8 98.17	09/10/88 ⁴	7.18	91.01**	0.02	--	--	--	3,900	19,000	2,900	18,000	--
	03/09-10/89	8.28	90.48**	0.74	--	--	--	--	--	--	--	--
	04/04/89	13.33	85.40**	0.70	--	--	--	--	--	--	--	--
	08/07/89	8.39	90.07**	0.36	--	--	--	--	--	--	--	--

Table 1

Groundwater Monitoring Data and Analytical Results

Former Chevron Bulk Terminal #1001351

1310 Highland Avenue

Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-8 (cont)	09/21/89	--	--	--	--	--	--	--	--	--	--	--
	05/21/93	--	--	--	--	--	--	--	--	--	--	--
95.18	09/20/93	--	--	--	--	--	--	--	--	--	--	--
	12/23/93	--	--	--	--	--	--	--	--	--	--	--
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	--	--	--	--	--	--	--	--	--	--	--
	09/28/94	--	--	--	--	--	--	--	--	--	--	--
	12/09/94	--	--	--	--	--	--	--	--	--	--	--
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	--	--	--	--	--	--	--	--	--	--	--
	09/11/95	--	--	--	--	--	--	--	--	--	--	--
	12/06/95	--	--	--	--	--	--	--	--	--	--	--
	03/14/96	9	--	--	--	--	--	--	--	--	--	--
	06/05/96	9	--	--	--	--	--	--	--	--	--	--
	09/04/96	9	--	--	--	--	--	--	--	--	--	--
MW-9 100.34	12/23/96	9	--	--	--	--	--	--	--	--	--	--
	04/15/97	9	--	--	--	--	--	--	--	--	--	--
	09/15/97	9	--	--	--	--	--	--	--	--	--	--
	12/29/97	9	--	--	--	--	--	--	--	--	--	--
	03/18/98	9	--	--	--	--	--	--	--	--	--	--
	06/23/98	9	--	--	--	--	--	--	--	--	--	--
	03/24/99	9	--	--	--	--	--	--	--	--	--	--
	08/31/99	9	--	--	--	--	--	--	--	--	--	--
	03/17-18/00	9	--	--	--	--	--	--	--	--	--	--
	10/06/00	9	--	--	--	--	--	--	--	--	--	--
	04/01/01	9	--	--	--	--	--	--	--	--	--	--
	NOT MONITORED/SAMPLED											
	09/10/88 ^s	9.88	90.46	--	--	--	--	6,100	11,000	1,400	9,800	--
	03/09-10/89	8.34	93.13**	1.41	--	--	--	--	--	--	--	--

Table 1

Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-9 (cont)	04/04/89	8.74	92.80**	1.50	--	--	--	--	--	--	--	--
	08/07/89	12.58	90.03**	2.84	--	--	--	--	--	--	--	--
98.50	09/21/89	--	--	--	--	--	--	--	--	--	--	--
	05/21/93	--	--	--	--	--	--	--	--	--	--	--
	09/20/93	10.15	88.36**	0.01	--	--	--	--	--	--	--	--
	12/23/93	7.99	90.51	--	17,000	5,000	4,300	370	510	110	980	120
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	8.43	90.07	--	19,000	5,000	4,200	1,000	1,000	110	750	13
	09/28/94	--	--	--	--	--	--	--	--	--	--	--
	12/09/94	7.81	90.69	--	8,900	3,100	2,000	140	73	65	180	67
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	9.46	89.04	--	13,000	6,000	4,600	230	84	170	390	--
	09/11/95	10.15	88.35	--	--	--	--	--	--	--	--	--
	12/07/95	6.20	92.30	--	8,500	1,500	2,700	390	110	94	360	--
	03/14/96	7.39	91.11	--	--	--	--	--	--	--	--	--
	06/05/96	8.40	90.10	--	12,100	ND	7,960	1,140	1,500	124	812	--
	09/04/96	10.15	88.35	--	--	--	--	--	--	--	--	--
	12/23/96	6.75	91.75	--	--	--	--	--	--	--	--	--
	04/15/97	7.40	91.10	--	4,210	1,050	3,370	449	547	111	652	--
	09/15/97	9.95	88.55	--	5,470	1,490	7,700	943	23.6	545	515	--
	12/29/97	6.72	91.78	--	4,620	1,220	306	14.9	4.47	10.2	69.7	--
	03/18/98	6.90	91.60	--	2,290	ND	10,900	541	252	293	2,190	--
	06/23/98	9.63	88.87	--	4,290	796	12,600	980	108	513	2,790	--
	03/24/99	6.15	92.35	0.00	5,910	2,020	8,850	627	97.7	246	1,310	--
	08/31/99	9.92	88.58	0.00	3,560	939	2,160	333	ND ¹⁰	62.3	73.5	--
	03/17-18/00	6.69	91.81	Sheen	3,860	ND ¹⁰	16,600	819	186	741	3,760	--
	10/06/00	11.45	87.05	0.00	3,600	752 ¹⁴	3,990	437	21.1	75.6	90.1	--
	04/01/01	7.70	90.80	0.00	11,900	3,310	13,300	621	96.3	666	2,790	--
	09/27/01	9.63	88.87	0.00	13,400	4,510	4,860	419	19.6	82.3	70.2	--
	03/28/02	7.50	91.00	0.00	4,800 ²⁰	1,800 ²⁰	8,500	480	38	610	1,600	--
	09/30/02	9.74	88.76	0.00	3,300 ²⁰	1,100 ²⁰	3,000	230	9.5	47	28	--

Table 1
Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-10 99.94	09/10/88 ⁶	9.37	90.57	--	--	--	--	ND	ND	350	110	--
	03/09-10/89	6.54	93.40	--	--	--	--	150	6.8	ND	2.8	--
	04/04/89	6.51	93.43	--	--	--	--	--	--	--	--	--
	08/07/89	9.39	90.55	--	--	--	--	--	--	--	--	--
	09/21/89	--	--	--	--	--	--	--	--	--	--	--
98.45	05/20/93	7.64	92.30	--	180,000	--	1,900	64	1.9	3.9	3.6	--
	09/20/93	9.97	88.57**	0.11	--	--	--	--	--	--	--	--
	12/23/93	7.31	91.14	--	350,000	ND	4,800	23	6.2	26	130	5.4
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	7.98	90.47	--	220,000	38,000	3,600	71	ND	7.1	8.2	8.5
	09/28/94	--	--	--	--	--	--	--	--	--	--	--
	12/09/94	7.86	90.59	--	60,000	ND	6,700	ND	4.9	11	21	8.0
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	9.41	89.04	--	11,000	940	4,300	2.6	5.9	1.8	8.8	--
	09/11/95	10.12	88.33	--	--	--	--	--	--	--	--	--
	12/06/95	6.43	92.10**	0.10	780,000	26,000	4,100,000	100	960	1,200	2,300	--
	03/14/96	7.52	90.93	--	--	--	--	--	--	--	--	--
	06/05/96	8.80	89.65	--	9,890	27,600	1,610,000	ND ¹⁰	ND ¹⁰	ND ¹⁰	1,170	--
	09/04/96	10.20	88.25	--	--	--	--	--	--	--	--	--
	12/23/96	7.13	91.32	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	9.83	88.65**	0.04	--	--	--	--	--	--	--	--
	12/29/97	--	--	0.06	--	--	--	--	--	--	--	--
	03/18/98	--	--	0.04	--	--	--	--	--	--	--	--
	06/23/98	9.22	89.33**	0.12	--	--	--	--	--	--	--	--
	03/24/99	6.11	92.34	Sheen	104,000	ND ¹⁰	21,300	2.50	3.14	20.0	43.5	--
	08/31/99 ¹²	8.43	90.02	0.00	--	--	--	--	--	--	--	--
	03/17-18/00	6.47	91.98	Sheen	8,890	1,180	4,940	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	10/06/00	10.52	87.93	0.00	--	--	--	--	--	--	--	--
	04/01/01	7.16	91.29	0.00	--	--	--	--	--	--	--	--

Table 1
Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DIW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-10 (cont)	09/27/01	10.19	88.26	0.00	--	--	--	--	--	--	--	--
	03/28/02	6.78	91.67	0.00	--	--	--	--	--	--	--	--
	09/30/02	9.03	89.42	0.00	--	--	--	--	--	--	--	--
MW-11 100.03	09/10/88 ⁷	8.45	91.58	--	ND	--	--	ND	ND	ND	ND	--
	03/09-10/89	6.03	94.00	--	--	--	--	ND ¹⁰	0.6	0.8	5.2	--
	04/04/89	6.47	93.56	--	--	--	--	--	--	--	--	--
	08/07/89	8.65	91.38	--	--	--	--	--	--	--	--	--
	09/21/89	--	--	--	--	--	--	--	--	--	--	--
	05/20/93	7.11	92.92	--	73,000	--	320	ND	0.7	0.7	1.0	--
	09/20/93	8.62	89.49	--	20,000	4,000	600	ND	0.7	ND	2.7	ND
	12/23/93	6.69	91.42	--	25,000	6,900	250	ND	ND	ND	1.1	ND
	03/25/94	5.84	94.19	--	13,000	2,900	120	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰
	05/04/94	7.35	92.68	--	16,000	4,300	350	ND	ND	ND	ND	ND
	09/28/94	9.51	90.52	--	7,900	2,200	730	ND	0.9	0.9	1.3	ND
	12/09/94	6.41	93.62	--	15,000	3,500	460	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰
	03/15/95	3.97	96.06	--	11,000	3,000	140	0.72	0.73	ND	ND	--
	06/22/95	8.22	91.81	--	11,000	5,000	240	ND	ND	ND	ND	--
	09/11/95	8.67	91.36	--	13,000	5,500	3,600	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
100.03	12/06/95	4.99	95.04	--	7,300	1,800	160	ND	ND	ND	ND	--
	03/14/96	6.17	93.86	--	17,000	5,500	2,300	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	06/05/96	7.23	92.80	--	--	--	--	--	--	--	--	--
	09/04/96	8.45	91.58	--	--	--	--	--	--	--	--	--
	12/23/96	5.48	94.55	--	--	--	--	--	--	--	--	--
	04/15/97	6.55	93.48	--	--	--	--	--	--	--	--	--
	09/15/97	8.23	91.80	--	2,170	1,010	679	ND	ND	ND	ND	--
	12/29/97	5.83	94.20	--	--	--	--	--	--	--	--	--
	03/18/98	5.95	94.08	--	--	--	--	--	--	--	--	--
	06/23/98	8.00	92.03	Sheen	--	--	--	--	--	--	--	--
	03/24/99	5.16	94.87	Sheen	1,890	837	231	ND	ND	ND	2.20	--

Table 1
Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-11 (cont)	08/31/99	--	--	--	--	--	--	--	--	--	--	--
	03/17-18/00	5.34	94.69	0.00	--	--	--	--	--	--	--	--
	10/06/00	--	--	--	--	--	--	--	--	--	--	--
	04/01/01	6.28	93.75	0.00	--	--	--	--	--	--	--	--
	09/27/01	9.04	90.99	0.00	--	--	--	--	--	--	--	--
	03/28/02	6.41	93.62	0.00	--	--	--	--	--	--	--	--
	09/30/02	MONITORED ANNUALLY										
MW-13 97.11	09/10/88	--	--	--	--	--	--	--	--	--	--	--
	03/09-10/89	--	--	--	--	--	--	--	--	--	--	--
	04/04/89	--	--	--	--	--	--	--	--	--	--	--
	08/07/89	--	--	--	--	--	--	--	--	--	--	--
	09/21/89	9.80	87.31	--	--	--	--	--	--	--	--	--
	05/20/93	7.55	89.56	--	11,000	--	9,000	84	22	250	440	--
	09/20/93	8.13	88.98	--	22,000	8,200	2,800	33	6.4	58	95	100
	12/23/93	7.65	89.46	--	6,700	1,700	1,800	140	27	34	49	ND
	03/25/94	6.81	90.30	--	11,000	4,600	4,600	22	7.0	180	280	ND
	05/04/94	8.19	88.92	--	20,000	7,500	5,000	15	1.6	67	120	3.1
	09/28/94	9.71	87.40	--	72,000	28,000	17,000	48	13	250	570	20
	12/09/94	7.55	89.56	--	5,800	2,800	360	0.9	ND	6.1	7.8	7.9
	03/15/95	5.40	91.71	--	3,800	1,400	5,800	2.6	0.97	39	76	--
	06/22/95	8.69	88.42	--	3,800	3,300	3,400	13	5.2	240	160	--
	09/11/95	8.89	88.22	--	9,200	8,700	7,500	10	2.8	120	35	--
	12/06/95	6.00	91.11	--	390	470	ND	ND	ND	ND	ND	--
	03/14/96	7.50	89.61	--	2,000	2,200	110	1.2	ND	1.2	14	--
	06/05/96	8.30	88.81	--	58,900	24,500	6,990	13.9	5.44	374	160	--
	09/04/96	8.90	88.21	--	6,630	3,380	9,160	11.3	11.8	266	61.6	--
	12/23/96	6.72*	90.39	--	1,730	1,850	ND	ND	ND	ND	ND	--
	04/15/97	7.75	89.36	--	742	ND	105	ND	ND	9.53	11.2	--
	09/15/97	8.42	88.69	--	1,060	ND ¹⁰	775	4.42	ND ¹⁰	45.4	ND ¹⁰	--

Table 1

Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-13 (cont)	12/29/97	6.60	90.51	--	791	ND	ND	ND	0.695	ND	ND	--
	03/18/98	7.40	89.71	--	--	--	--	--	--	--	--	--
	06/23/98	8.37	88.74	--	675	ND	1,080	7.70	2.54	209	24.5	--
	03/24/99	6.07	91.04	0.00	576	ND	82.8	1.92	ND	9.83	3.74	--
	08/31/99	--	--	--	--	--	--	--	--	--	--	--
	03/17-18/00	6.70	90.41	0.00	--	--	--	--	--	--	--	--
	10/06/00	--	--	--	--	--	--	--	--	--	--	--
	04/01/01	7.55	89.56	0.00	--	--	--	--	--	--	--	--
	09/27/01	9.67	87.44	0.00	--	--	--	--	--	--	--	--
	03/28/02	7.49	89.62	0.00	--	--	--	--	--	--	--	--
	09/30/02	MONITORED ANNUALLY										
MW-14 97.58	09/10/88	--	--	--	--	--	--	--	--	--	--	--
	03/09-10/89	--	--	--	--	--	--	--	--	--	--	--
	04/04/89	--	--	--	--	--	--	--	--	--	--	--
	08/07/89	--	--	--	--	--	--	--	--	--	--	--
	09/21/89	10.00	87.58	--	--	--	--	--	--	--	--	--
	05/20/93	7.34	90.24	--	34,000	--	2,600	75	180	58	250	--
	09/20/93	8.85	88.73	--	27,000	2,700	8,700	330	570	350	1,000	46
	12/23/93	7.26	90.32	--	13,000	4,100	280	2.1	0.8	1.5	9.8	12
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	--	--	--	--	--	--	--	--	--	--	--
	09/28/94	--	--	--	--	--	--	--	--	--	--	--
	12/09/94	--	--	--	--	--	--	--	--	--	--	--
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	--	--	--	--	--	--	--	--	--	--	--
	09/11/95	--	--	--	--	--	--	--	--	--	--	--
	12/06/95	--	--	--	--	--	--	--	--	--	--	--
	03/14/96	6.98	90.60	--	6,200	2,400	ND	1.1	ND	1.1	ND	--
	06/05/96	8.20	89.38	--	--	--	--	--	--	--	--	--

Table 1

Groundwater Monitoring Data and Analytical Results

Former Chevron Bulk Terminal #1001351

1310 Highland Avenue

Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-14 (cont)	09/04/96	10.16	87.42	--	--	--	--	--	--	--	--	--
	12/23/96	6.00	91.58	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	9.00	88.58	--	7,330	1,610	1,380	5.94	2.22	5.36	2.70	--
	12/29/97	6.25	91.33	--	--	--	--	--	--	--	--	--
	03/18/98	6.31	91.27	--	--	--	--	--	--	--	--	--
	06/23/98	9.00	88.58	Sheen	--	--	--	--	--	--	--	--
	03/24/99	5.58	92.00	0.00	1,250	ND	51.0	1.17	ND	ND	1.02	--
	08/31/99	9.38	88.20	0.00	68,500	ND ¹⁰	119	8.06	ND ¹⁰	2.69	ND ¹⁰	--
	03/17-18/00	5.94	91.64	Sheen	3,510	ND	237	6.97	7.56	5.70	15.5	--
	10/06/00	10.15	87.43	0.00	8,570	1,790 ¹⁵	494	9.85	3.54	23.5	32.9	--
	04/01/01	7.04	90.54	0.00	5,920	1,880	<50.0	1.43	<0.500	<0.500	<1.00	--
	09/27/01	9.93	87.65	0.00	12,200	<2,500	492	8.52	2.84	11.9	12.5	--
	03/28/02	6.80	90.80**	0.03	NOT SAMPLED DUE TO THE PRESENCE OF SPH							
	09/30/02	9.35	88.25**	0.03	NOT SAMPLED DUE TO THE PRESENCE OF SPH							

MW-15

97.46

09/10/88	--	--	--	--	--	--	--	--	--	--	--	--
03/09-10/89	--	--	--	--	--	--	--	--	--	--	--	--
04/04/89	--	--	--	--	--	--	--	--	--	--	--	--
08/07/89	--	--	--	--	--	--	--	--	--	--	--	--
09/21/89	9.90	87.56	--	--	--	--	--	--	--	--	--	--
05/20/93	6.91	90.55	--	--	--	--	4,600	63	31	420	280	--
09/20/93	9.22	88.24	--	--	7,000	ND	4,600	67	24	360	77	14
12/23/93	6.61	90.85	--	--	2,400	760	190	2.7	0.5	4.1	4.9	9.8
03/25/94	--	--	--	--	--	--	--	--	--	--	--	--
05/04/94	7.44	90.02	--	--	1,500	ND	450	3.5	ND	2.0	3.4	4.9
09/28/94	--	--	--	--	--	--	--	--	--	--	--	--
12/09/94	6.40	91.06	--	--	4,300	ND	350	2.2	ND	2.2	2.3	6.7
03/15/95	--	--	--	--	--	--	--	--	--	--	--	--
06/22/95	8.48	88.98	--	--	4,600	1,200	96	1.5	ND	1.6	1.9	--

Table 1
Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-15 (cont)	09/11/95	9.34	88.12	--	--	--	--	--	--	--	--	--
	12/06/95	5.15	92.31	--	640	ND	72	1.3	ND	ND	ND	--
	03/11/96	6.35	91.11	--	--	--	--	--	--	--	--	--
	06/05/96	7.50	89.96	--	4,160	ND	233	1.54	ND	0.769	ND	--
	09/04/96	9.25	88.21	--	--	--	--	--	--	--	--	--
	12/23/96	5.78	91.68	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	9.00	88.46	--	1,510	ND	266	1.24	ND	ND	ND	--
	12/29/97	7.79	89.67	--	--	--	--	--	--	--	--	--
	03/18/98	7.65	89.81	--	--	--	--	--	--	--	--	--
	06/23/98	8.58	88.88	--	582	ND	120	3.91	0.522	ND	1.11	--
	03/24/99	5.20	92.26	0.00	894	ND	ND	3.16	ND	ND	1.48	--
	08/31/99	9.12	88.34	0.00	2,640	823	143	ND ¹⁰	0.681	ND	1.27	--
	03/17-18/00	5.62	91.84	0.00	846	ND	269	1.22	ND ¹⁰	ND	ND ¹⁰	--
	10/06/00	9.78	87.68	0.00	2,000 ¹⁴	ND ¹⁰	358	ND	3.14	0.606	1.07	--
	04/01/01	6.39	91.07	0.00	445	<750	210	2.90	<0.500	<0.500	1.66	--
	09/27/01	9.35	88.11	0.00	2,930	730	653	5.96	1.73	<1.00	4.42	--
	03/28/02	6.51	90.95	0.00	840 ²⁰	<750 ²⁰	<50	<0.50	<0.50	<0.50	<1.5	--
	09/30/02	8.84	88.64**	0.03	NOT SAMPLED DUE TO THE PRESENCE OF SPH							
MW-16 108.03	09/20/93	16.23	91.80	--	6,200	1,400	670	ND	1.1	1.7	4.1	3.7
	12/23/93	12.26	95.77	--	8,400	1,100	1,300	6.9	1.8	2.2	7.0	ND
	03/25/94	9.23	99.10**	0.37	--	--	--	--	--	--	--	--
	05/04/94	12.92	95.44**	0.41	--	--	--	--	--	--	--	--
	09/28/94	17.29	90.92**	0.22	--	--	--	--	--	--	--	--
	12/09/94	12.49	95.54	--	39,000	ND ¹⁰	1,800	2.0	2.1	4.3	6.3	ND ¹⁰
	03/15/95	8.35	99.68	--	3,900	ND	1,500	2.2	ND	1.3	1.9	--
	06/22/95	14.20	93.83	--	--	--	--	--	--	--	--	--
	09/11/95	16.42	91.61	--	220,000	14,000	170,000	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	12/06/95	9.23	98.80	--	5,800	ND ¹⁰	210,000	ND ¹⁰	ND ¹⁰	ND ¹⁰	43	--

Table 1
Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-16 (cont)	03/14/96	9.11	98.92	--	110,000	3,800	590,000	ND ¹⁰	ND ¹⁰	100	240	--
	06/05/96	--	--	--	--	--	--	--	--	--	--	--
	09/04/96	15.90	92.13	--	--	--	--	--	--	--	--	--
	12/23/96	--	--	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	--	--	--	--	--	--	--	--	--	--	--
	12/29/97	--	--	--	--	--	--	--	--	--	--	--
	03/18/98	--	--	--	--	--	--	--	--	--	--	--
	06/23/98	14.90	93.13	Sheen	--	--	--	--	--	--	--	--
	08/31/99	16.10	91.93	Sheen	8,820	ND	2,830 ¹¹	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	03/17-18/00 ¹³	9.01	99.02	0.00	2,010	ND	1,870	ND ¹⁰	ND ¹⁰	ND	ND ¹⁰	--
	10/06/00	16.25	91.78	0.00	2,880 ¹⁶	ND	2,030	ND	2.44	4.11	6.40	--
	04/01/01 ¹⁹	12.37	95.66	0.00	168,000	<7,880	2,550	1.44	1.25	2.39	9.90	--
	09/27/01	16.86	91.17	0.00	32,700	<5,500	2,340	6.51	<10.0	<10.0	<15.0	--
	03/28/02	9.60	98.43	0.00	46,000 ²⁰	<10,000 ²⁰	1,800	<1.0	<1.0	<5.0	7.6	--
	09/30/02	17.00	91.03	0.00	140,000 ²⁰	<5,000 ²⁰	970	<0.50	<0.50	0.59	1.9	--
MW-17 108.97	09/20/93	19.38	89.59	--	280	ND	ND	ND	ND	ND	ND	16
	12/23/93	17.92	91.05	--	ND	ND	ND	ND	ND	ND	ND	ND
	03/25/94	21.12	87.85	--	ND	ND	ND	ND	ND	ND	ND	ND
	05/04/94	20.33	88.64	--	ND	ND	ND	ND	ND	ND	ND	ND
	09/28/94	22.96	86.01	--	ND	ND	ND	ND	ND	ND	ND	ND
	12/09/94	18.34	90.63	--	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/95	18.87	90.10	--	ND	ND	ND	ND	ND	ND	ND	--
	06/22/95	21.84	87.13	--	ND	910	ND	ND	ND	ND	ND	--
	09/11/95	21.90	87.07	--	ND	ND	ND	ND	ND	ND	ND	--
	12/06/95	20.00	88.97	--	ND	ND	ND	ND	ND	ND	ND	--
	03/14/96	18.73	90.24	--	ND	ND	ND	ND	ND	ND	ND	--
	06/05/96	--	--	--	--	--	--	--	--	--	--	--
	09/04/96	20.80	88.17	--	--	--	--	--	--	--	--	--

Table 1

Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-17 (cont)	12/23/96	--	--	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	--	--	--	--	--	--	--	--	--	--	--
	12/29/97	--	--	--	--	--	--	--	--	--	--	--
	03/18/98	--	--	--	--	--	--	--	--	--	--	--
	06/23/98	24.77	84.20	--	ND	ND	ND	ND	ND	ND	ND	--
	08/31/99	--	--	--	--	--	--	--	--	--	--	--
	03/17-18/00	18.53	90.44	0.00	--	--	--	--	--	--	--	--
	10/06/00	--	--	--	--	--	--	--	--	--	--	--
	04/01/01	19.49	89.48	0.00	--	--	--	--	--	--	--	--
MW-18 104.88	09/27/01	17.01	91.96	0.00	--	--	--	--	--	--	--	--
	03/28/02	19.25	89.72	0.00	--	--	--	--	--	--	--	--
	09/30/02	22.96	86.01	0.00	--	--	--	--	--	--	--	--
	09/20/93	11.67	93.21	--	3.0	ND	ND	ND	ND	ND	1.2	46
	12/23/93	8.38	96.50	--	8,300	1,700	1,300	6.3	1.3	4.3	3.8	ND
	03/25/94	5.91	98.97	--	4,600	ND	760	4.2	1.0	4.1	6.4	ND
	05/04/94	8.15	96.73	--	9,500	ND	1,100	ND	0.9	2.2	2.6	ND
	09/28/94	12.18	92.70	--	3,500	760	460	ND	1.1	1.2	1.4	ND
	12/09/94	10.15	94.73	--	31,000	ND	ND	ND	ND	ND	ND	ND
	03/15/95	5.02	99.86	--	2,800	1,100	1,300	3.0	1.3	2.3	2.9	--
MW-18 104.88	06/22/95	9.92	94.96	--	15,000	1,500	870	0.57	ND	0.56	2.0	--
	09/11/95	11.60	93.28	--	5,500	2,700	1,200	ND	0.58	ND	3.3	--
	12/06/95	7.00	97.88	--	3,400	ND	1,800	0.96	0.72	1.2	3.0	--
	03/14/96	6.55	98.33	Sheen	4,600	790	11,000	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	06/03/96	7.70	97.18	--	--	--	--	--	--	--	--	--
	09/04/96	10.85	94.03	--	--	--	--	--	--	--	--	--
	12/23/96	10.85	94.03	--	--	--	--	--	--	--	--	--
	04/15/97	7.48	97.40	--	--	--	--	--	--	--	--	--
	09/15/97	11.10	93.78	--	14,800	1,360	641	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--

Table 1

Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-18 (cont)	12/29/97	--	--	--	--	--	--	--	--	--	--	--
	03/18/98	--	--	--	--	--	--	--	--	--	--	--
	06/23/98	10.18	94.70	Sheen	--	--	--	--	--	--	--	--
	03/24/99	5.89	98.99	0.00	2,490	ND	647	0.943	ND	0.792	4.21	--
	08/31/99	19.59	85.29	0.00	ND	ND	ND	ND	ND	ND	ND	--
	03/17-18/00	6.54	98.34	Sheen	3,000	ND	999	ND ¹⁰	ND ¹⁰	ND	ND ¹⁰	--
	10/06/00	12.07	92.81	0.00	1,850 ¹⁷	539 ¹⁴	462	ND	0.601	0.727	1.42	--
	04/01/01	8.46	96.42	0.00	121,000	<30,800	1,390	0.791	<0.500	0.806	3.90	--
	09/27/01	12.29	92.59	0.00	5,610	856	494	1.06	<1.00	<1.00	3.08	--
	03/28/02	8.60	96.28	0.00	68,000 ²⁰	<10,000 ²⁰	1,300	<1.0	<1.0	<1.0	5.3	--
	09/30/02	12.42	92.46	0.00	28,000 ²⁰	<5,000 ²⁰	730	<0.50	<0.50	<0.50	<1.5	--
MW-19 107.39	09/20/93	15.73	91.66	--	4,900	1,200	400	4.1	1.0	1.3	3.1	ND
	12/23/93	10.31	97.08	--	6,700	1,700	1,600	25	3.8	9.7	10	ND
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	10.95	96.44	--	45,000	ND	3,500	41	3.7	19	9.8	4.9
	09/28/94	--	--	--	--	--	--	--	--	--	--	--
	12/09/94	8.69	98.70	--	16,000	ND ¹⁰	2,800	12	1.9	6.7	7.0	ND ¹⁰
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	13.53	93.86	--	12,000	1,400	3,800	17	2.6	8.7	8.7	--
	09/11/95	15.73	91.66	--	--	--	--	--	--	--	--	--
	12/06/95	6.00	101.39	--	3,300	820	1,900	8.2	1.1	3.6	3.3	--
	03/14/96	7.13	100.26	--	--	--	--	--	--	--	--	--
	06/05/96	11.15	96.24	--	4,350	ND	1,700	12.5	1.58	6.75	4.40	--
	09/04/96	15.45	91.94	--	--	--	--	--	--	--	--	--
	12/23/96	7.85	99.54	--	--	--	--	--	--	--	--	--
	04/15/97	--	--	--	--	--	--	--	--	--	--	--
	09/15/97	15.35	92.04	--	8,510	1,280	3,260	3.51	2.12	2.54	5.74	--
	12/29/97	8.23	99.16	--	--	--	--	--	--	--	--	--
	03/18/98	7.50	99.89	--	2,580	ND ¹⁰	1,250	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--

Table 1
Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-19 (cont)	06/23/98	13.90	93.49	Sheen	--	--	--	--	--	--	--	--
	03/24/99	6.49	100.90	0.00	2,010	ND	780	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	08/31/99	--	--	--	--	--	--	--	--	--	--	--
	03/17-18/00	6.41	100.98	0.00	--	--	--	--	--	--	--	--
	10/06/00	--	--	--	--	--	--	--	--	--	--	--
	04/01/01	8.80	98.59	0.00	--	--	--	--	--	--	--	--
	09/27/01	16.12	91.27	0.00	--	--	--	--	--	--	--	--
	03/28/02	8.05	99.34	0.00	--	--	--	--	--	--	--	--
	09/30/02	15.76	91.63	0.00	--	--	--	--	--	--	--	--
MW-20 97.25	09/20/93	8.86	88.47**	0.10	--	--	--	--	--	--	--	--
	12/23/93	7.91	89.34	--	590	760	ND	ND	ND	ND	ND	ND
	03/25/94	5.85	91.40	--	740	ND	ND	ND	ND	ND	ND	ND
	05/04/94	7.22	90.03	--	1,900	1,900	ND	ND	ND	ND	ND	ND
	09/28/94	9.29	87.96	--	780	910	ND	ND	1.5	ND	ND	ND
	12/09/94	6.63	90.62	--	490	ND	ND	ND	ND	ND	ND	ND
	03/15/95	4.32	92.93	--	580	ND	66	ND	ND	ND	ND	ND
	06/22/95	8.14	89.11	--	700	ND	ND	ND	ND	ND	ND	--
	09/11/95	8.87	88.38	--	1,300	1,900	84	ND	ND	ND	ND	--
	12/07/95	5.27	91.98	--	ND	ND	83	ND	ND	ND	ND	--
	03/14/96	6.32	90.93	--	440	ND	66	ND	ND	ND	ND	--
	06/05/96	7.30	89.95	--	636	ND	752	ND	ND	ND	ND	--
	09/04/96	8.85	88.40	--	557	763	76.2	ND	ND	ND	ND	--
	12/23/96	5.82	91.43	--	1,140	865	63.1	ND	ND	ND	ND	--
	04/15/97	6.40	90.85	--	385	ND	56.8	ND	ND	ND	ND	--
	09/15/97	8.55	88.70	--	412	ND	178	ND	ND	ND	ND	--
	12/29/97	5.82	91.43	--	614	ND	56.7	ND	ND	ND	ND	--
	03/18/98	5.80	91.45	--	ND	ND	ND	ND	ND	ND	ND	--
	06/23/98	8.12	89.13	--	269	ND	58.1	ND	ND	ND	ND	--
	03/24/99	5.28	91.97	0.00	318	ND	ND	0.581	ND	ND	ND	--

Table 1

Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-20 (cont)	08/31/99	--	--	--	--	--	--	--	--	--	--	--
	03/17-18/00	5.61	91.64	0.00	--	--	--	--	--	--	--	--
	10/06/00	--	--	--	--	--	--	--	--	--	--	--
	04/01/01	6.68	90.57	0.00	--	--	--	--	--	--	--	--
	09/27/01	7.93	89.32	0.00	--	--	--	--	--	--	--	--
	03/28/02	6.34	90.91	0.00	--	--	--	--	--	--	--	--
MW-21 97.27	09/30/02	8.52	88.73	0.00	--	--	--	--	--	--	--	--
	09/20/93	9.10	88.17	--	2,200	ND ¹⁰	45,000	470	8,300	890	6,500	49
	12/23/93	8.11	89.16	--	3,000	930	12,000	120	2,200	410	2,400	32
	03/25/94	7.92	89.35	--	2,800	ND ¹⁰	12,000	89	1,400	450	1,900	11
	05/04/94	8.72	88.55	--	4,900	940	20,000	150	4,200	480	3,800	14
	09/28/94	9.73	87.54	--	2,600	ND	52,000	170	4,500	1,600	6,800	12
	12/09/94	8.08	89.19	--	1,700	ND ¹⁰	40,000	120	2,100	910	3,800	13
	03/15/95	6.50	90.77	--	1,000	ND	19,000	71	1,400	670	2,800	--
	06/22/95	9.16	88.11	--	4,100	890	35,000	130	4,600	740	4,100	--
	09/11/95	9.25	88.02	--	3,600	11,000	40,000	92	3,100	1,200	5,800	--
	12/07/95	7.27	90.00	--	1,200	ND	960	2.3	50	30	150	--
	03/14/96	8.36	88.91	--	2,800	ND	25,000	110	1,200	1,600	4,000	--
	06/05/96	8.83	88.44	--	3,580	ND ¹⁰	47,400	ND ¹⁰	3,700	2,160	8,780	--
	09/04/96	9.25	88.02	--	3,460	815	42,500	71.6	2,570	1,780	7,780	--
	12/23/96	7.64	89.63	--	2,250	887	31,900	59.7	1,500	1,300	5,230	--
	04/15/97	8.40	88.87	--	404	ND	4,870	12.1	231	207	649	--
	09/15/97	9.10	88.17	--	1,800	ND ¹⁰	65,300	ND ¹⁰	2,130	2,160	10,200	--
	12/29/97	7.69	89.58	--	4,960	859	31,600	59	992	1,190	4,760	--
	03/18/98	8.00	89.27	--	275	ND	2,410	20.3	10.4	30.3	66.9	--
	06/23/98	9.10	88.17	--	756	ND	31,000	63.2	1,150	1,390	5,990	--
	03/24/99	7.16	90.11	0.00	774	ND	34,600	46.0	600	1,680	3,820	--
	08/31/99	9.29	87.98	0.00	547	ND	31,000	ND ¹⁰	748	1,260	4,920	--
	03/17-18/00	7.88	89.39	0.00	732	ND ¹⁰	24,200	47.5	503	1,530	4,500	--

Table 1

Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-21 (cont)	10/06/00	9.84	87.43	0.00	1,150 ¹⁸	ND	34,800	56.5	588	1,500	6,050	--
	04/01/01	8.41	88.86	0.00	2,870	<750	41,100	191	633	1,890	7,570	--
	09/27/01	9.49	87.78	0.00	6,560	4,170	36,100	91.4	494	1,890	7,430	--
	03/28/02	8.30	88.97	0.00	700 ²⁰	<750 ²⁰	5,200	5.3	130	360	970	--
	09/30/02	9.09	88.18	0.00	1,200 ²⁰	280 ²⁰	34,000	<50	360	1,500	6,200	--
MW-22 96.47	09/20/93	8.04	88.43	--	95,000	15,000	450	24	1.3	2.6	3.4	30
	12/23/93	7.38	89.09	--	14,000	ND	5,100	20	ND	ND	9.7	ND
	03/25/94	7.98	88.49	--	91,000	8,000	410	15	3.6	14	11	ND
	05/04/94	8.49	87.98	--	55,000	ND	2,500	3.0	ND	3.0	5.3	ND
	09/28/94	9.48	86.99	--	9,500	ND	280	0.5	1.3	1.2	1.3	ND
	12/09/94	8.11	88.36	--	43,000	ND ¹⁰	210	ND ¹⁰	0.7	ND ¹⁰	0.8	ND ¹⁰
	03/15/95	6.67	89.80	--	2,200	770	220	1.2	ND	11	2.0	--
	06/22/95	8.99	87.48	--	4,500	1,000	430	ND	1.4	ND	1.6	--
	09/11/95	8.59	87.88	--	9,300	4,600	570	1.1	1.8	ND	2.6	--
	12/07/95	7.12	89.35	--	3,100	ND	350	ND	ND	ND	ND	--
	03/14/96	7.25	89.22	--	4,700	780	670	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	06/05/96	8.40	88.07	--	8,850	998	535	0.559	ND	ND	ND	--
	09/04/96	8.35	88.12	--	15,600	2,440	1,450	ND	ND	ND	ND	--
	12/23/96	7.00	89.47	--	19,100	2,790	1,350	ND	ND	ND	ND	--
	04/15/97	7.95	88.52	--	2,040	ND	63.8	0.876	ND	ND	ND	--
	09/15/97	8.50	87.97	--	2,200	ND	774	5.02	ND	ND	ND	--
	12/29/97	7.00	89.47	--	2,180	ND	202	1.47	ND	ND	ND	--
	03/18/98	7.97	88.50	--	870	ND	84.7	ND	ND	ND	ND	--
	06/23/98	8.75	87.72	--	1,010	ND	133	2.59	ND	ND	1.20	--
	03/24/99	6.12	90.35	0.00	1,150	ND	187	6.33	3.20	4.77	8.66	--
	08/31/99	8.26	88.21	0.00	966	ND	57.2	1.53	ND	ND	ND ¹⁰	--
	03/17-18/00	7.49	88.98	0.00	797	ND	144	ND ¹⁰	ND	ND	ND ¹⁰	--
	10/06/00	9.50	86.97	0.00	1,110 ¹⁴	ND	216	0.619	1.09	0.611	2.36	--
	04/01/01	7.50	88.97	0.00	--	--	--	--	--	--	--	--

Table 1
Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-22 (cont)	09/27/01	8.96	87.51	0.00	--	--	--	--	--	--	--	--
	03/28/02	8.05	88.42	0.00	5,600 ²⁰	<1,100 ²⁰	250	1.3	<0.50	<0.50	1.8	--
	09/30/02	8.23	88.24	0.00	--	--	--	--	--	--	--	--
MW-23 108.07	09/20/93 ⁷	18.22	89.85	--	4,300	970	900	20	2.6	4.0	2.8	ND
	12/23/93	17.11	90.96	--	3,700	1,200	370	8.6	1.9	0.9	3.9	ND
	03/25/94	20.39	87.68	--	4,300	880	880	14	2.3	3.0	3.5	ND
	05/04/94	19.31	88.76	--	3,900	ND	1,000	12	1.9	2.1	1.3	ND
	09/28/94	21.54	86.53	--	2,500	ND	750	7.7	1.5	1.1	1.0	4.2
	12/09/94	17.25	90.82	--	3,400	ND	430	5.7	1.5	1.0	1.2	ND
	03/15/95	19.32	88.75	--	4,100	1,600	1,700	14	2.6	3.4	4.5	--
	06/22/95	20.77	87.30	--	5,100	2,100	850	7.8	1.4	1.1	2.4	--
	09/11/95	22.37	85.70	--	8,300	5,700	ND	0.57	ND	ND	ND	--
	12/06/95	18.95	89.12	--	2,100	ND	ND	ND	ND	ND	ND	--
	03/14/96	14.15	93.92	--	2,600	1,100	970	5.7	0.63	0.70	1.4	--
	06/05/96	20.45	87.62	--	--	--	--	--	--	--	--	--
	09/04/96	18.80	89.27	--	--	--	--	--	--	--	--	--
	12/23/96	17.81	90.26	--	5,660	2,500	378	2.23	0.626	ND	1.19	--
	04/15/97	18.55	89.52	--	2,910	914	1,260	9.22	1.50	1.61	3.15	--
	09/15/97	22.20	85.87	--	2,330	1,110	462	ND	ND	ND	ND	--
	12/29/97	19.15	88.92	--	2,710	890	155	0.728	ND	ND	ND	--
	03/18/98	21.60	86.47	--	2,570	ND ¹⁰	1,460	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	06/23/98	23.68	84.39	--	2,370	ND	784	2.02	0.774	ND	2.21	--
	03/24/99	15.65	92.42	0.00	2,150	ND	553	2.16	1.08	2.04	4.93	--
	08/31/99	18.88	89.19	0.00	1,220	ND	264	ND ¹⁰	ND	ND ¹⁰	ND ¹⁰	--
	03/17-18/00	16.90	91.17	0.00	2,070	ND	1,240	1.57	ND ¹⁰	ND ¹⁰	ND ¹⁰	--
	10/06/00	19.84	88.23	0.00	7,970 ¹⁴	2,560 ¹⁴	919	0.926	1.57	1.39	3.38	--
	04/01/01	20.40	87.67	0.00	1,400	<750	146	0.769	<0.500	<0.500	<1.00	--

Table 1
Groundwater Monitoring Data and Analytical Results
 Former Chevron Bulk Terminal #1001351
 1310 Highland Avenue
 Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-23 (cont)	09/27/01	17.76	90.31	0.00	5,050	1,040	1,030	10.2	1.74	4.22	13.1	--
	03/28/02	17.49	90.58	0.00	2,500 ²⁰	<750 ²⁰	1,100	<1.0	<1.0	1.7	<3.0	--
	09/30/02	19.03	89.04	0.00	2,300 ²⁰	1,000 ²⁰	190	<0.50	<0.50	<0.50	<1.5	--
MW-24 100.65	09/20/93 ⁷	10.53	90.12	--	340	ND	ND	0.6	ND	ND	ND	5.0
	12/23/93	9.61	91.04	--	ND	ND	ND	ND	ND	ND	ND	ND
	03/25/94	--	--	--	--	--	--	--	--	--	--	--
	05/04/94	11.32	89.33	--	ND	ND	ND	ND	ND	ND	ND	ND
	09/28/94	--	--	--	--	--	--	--	--	--	--	--
	12/09/94	9.99	90.66	--	310	ND	ND	ND	ND	ND	ND	ND
	03/15/95	--	--	--	--	--	--	--	--	--	--	--
	06/22/95	12.96	87.69	--	2,000	ND	ND	ND	ND	ND	ND	--
	09/11/95	--	--	--	--	--	--	--	--	--	--	--
	12/06/95	10.68	89.97	--	ND	ND	ND	ND	ND	ND	ND	--
	03/14/96	10.25	90.40	--	ND	ND	ND	ND	ND	ND	ND	--
	06/05/96	12.20	88.45	--	--	--	--	--	--	--	--	--
	09/04/96	11.75	88.90	--	--	--	--	--	--	--	--	--
	12/23/96	10.60	90.05	--	--	--	--	--	--	--	--	--
	04/15/97	10.60	90.05	--	--	--	--	--	--	--	--	--
	09/15/97	14.34	86.31	--	504	ND	94.7	ND	ND	ND	ND	--
	12/29/97	9.95	90.70	--	--	--	--	--	--	--	--	--
	03/18/98	12.65	88.00	--	--	--	--	--	--	--	--	--
	06/23/98	15.15	85.50	--	ND	ND	ND	ND	ND	ND	ND	--
	03/24/99	8.11	92.54	0.00	267	ND	ND	ND	ND	ND	ND	--
	08/31/99	--	--	--	--	--	--	--	--	--	--	--
	03/17-18/00	9.92	90.73	0.00	--	--	--	--	--	--	--	--
	10/06/00	--	--	--	--	--	--	--	--	--	--	--
	04/01/01	13.91	86.74	0.00	--	--	--	--	--	--	--	--

Table 1

Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	GWE (ft.)	SPHT (ft.)	TPH-D (ppb)	TPH-O (ppb)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	D. Lead (ppb)
MW-24 (cont)	09/27/01	11.67	88.98	0.00	--	--	--	--	--	--	--	--
	03/28/02	11.04	89.61	0.00	--	--	--	--	--	--	--	--
	09/30/02	12.99	87.66	0.00	--	--	--	--	--	--	--	--
Trip Blank												
TB-LB	06/23/98	--	--	--	--	--	ND	ND	ND	ND	ND	--
	03/24/99	--	--	--	--	--	ND	ND	ND	ND	ND	--
	08/31/99	--	--	--	--	--	ND	ND	ND	ND	ND	--
	03/17-18/00	--	--	--	--	--	113	ND ¹⁰	ND ¹⁰	ND ¹⁰	ND	--
	10/06/00	--	--	--	--	--	ND	ND	ND	ND	ND	--
	04/01/01	--	--	--	--	--	<50.0	<0.500	<0.500	<0.500	<1.00	--
	09/27/01	--	--	--	--	--	<100	<0.500	<1.00	<1.00	<1.50	--
	03/28/02	--	--	--	--	--	<50	<0.50	<0.50	<0.50	<1.5	--
QA	09/30/02	--	--	--	--	--	<50	<0.50	<0.50	<0.50	<1.5	--

Standard Laboratory Reporting Limits:										EPA 7421		
	TPH-D	TPH-O	TPH-G	B	T	E	X	D. Lead				
	250	250	50	0.50	0.50	0.50	1.5	--				
MTCA Method A Cleanup Levels:												
	1,000	1,000	1,000	5.0	40	30	20	5.0				
Current Method:										NWTPH-G and EPA 8021B		
	NWTPH-D + Extended									EPA 7421		

Table 1

Groundwater Monitoring Data and Analytical Results
Former Chevron Bulk Terminal #1001351
1310 Highland Avenue
Bremerton, Washington

EXPLANATIONS:

Groundwater monitoring data and laboratory analytical results prior to March 24, 1999, were compiled from reports prepared by Pacific Environmental Group, Inc.

TOC = Top of Casing
(ft.) = Feet
DTW = Depth to Water
GWE = Groundwater Elevation
SPHT = Separate Phase Hydrocarbon Thickness
TPH-D = Total Petroleum Hydrocarbons as Diesel
TPH-O = Total Petroleum Hydrocarbons as Oil

TPH-G = Total Petroleum Hydrocarbons as Gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
(ppb) = Parts per billion
ND = Not Detected

-- = Not Measured/Not Analyzed
D. Lead = Dissolved Lead - Analysis by EPA Method 7421
QA = Quality Assurance
MTCA = Model Toxics Control Act Cleanup Regulations
[WAC 173-340-720(2)(a)(1), as amended 12/93]

* TOC in feet relative to an arbitrary datum.

** GWE has been corrected due to the presence of SPH; correction factor: $[(TOC-DTW) + (SPHT \times 0.80)]$.

1 Total Petroleum Hydrocarbons (TPH) Modified EPA Method 8015 was detected at 46,400 ppb.

2 TPH Modified EPA Method 8015 was detected at 36,700 ppb.

3 TPH Modified EPA Method 8015 was detected at 76,700 ppb.

4 TPH Modified EPA Method 8015 was detected at 1,742,000 ppb.

5 TPH Modified EPA Method 8015 was detected at 38,900 ppb.

6 TPH Modified EPA Method 8015 was detected at 150,000 ppb.

7 TPH Modified EPA Method 8015 was ND.

8 Well obstructed at approximately 5.2 feet.

9 Well obstructed at approximately 4.5 feet.

10 Detection limit raised. Refer to analytical reports.

11 Laboratory report indicates sample appears to contain extractable diesel range organics.

12 Absorbent sock installed in well.

13 Replaced absorbent sock.

14 Laboratory report indicates detected hydrocarbons have non-petroleum peaks or elution pattern that suggests the presence of biogenic interference.

15 Laboratory report indicates detected hydrocarbons in the heavy/oil range appear to be due to overlap of diesel range hydrocarbons.

16 Laboratory report indicates detected hydrocarbons appear to be due to biogenic interference as well as weathered diesel; cleanup recommended.

17 Laboratory report indicates hydrocarbon pattern and range have non-petroleum peaks or elution pattern that suggests the presence of biogenic interference, however, there is some heavily weathered diesel.

18 Laboratory report indicates detected hydrocarbons are mainly due to overlap from the gasoline range; however, there is some weathered diesel detected.

19 Absorbent sock present.

20 TPH-D and TPH-O with silica gel cleanup.

APPENDIX E

Parametrix 2006 Technical Memorandum

TECHNICAL MEMORANDUM

Date: February 15, 2006
To: Phil Williams, City of Bremerton Public Works
From: Bill Webb, Parametrix
Subject: Chevron Property Sediment Characterization Study
cc: Phil Struck, Parametrix
Project Number: 255-1896-063 (03/01)
Project Name: Pt Narrows Beach Sewer Replacement

INTRODUCTION

The purpose of this Technical Memorandum is to describe the results of the sediment characterization study conducted in the Port Washington Narrows and Smith Cove located in Bremerton, Washington (Figure 1). This study was conducted in support of a potential aquatic land lease from the state Department of Natural Resources (DNR) and potential acquisition of the Chevron property. Each area will be considered separately for purposes of this report. The first area is called the "sewer line corridor", and the second area is called the "Chevron property". Data from both areas will be used to make decisions regarding future projects planned by the City of Bremerton.

This investigation consisted of collecting a total of 25 sediment samples which were submitted for physical, chemical and bioassay analysis and comparison to applicable Sediment Quality Standards (SQS) described in Washington State Sediment Management Standards (SMS).

On November 21, 2005, a total of 8 (including duplicate) surface sediment grab samples were collected via boat from the area including Smith Cove extending south to the USS Turner Joy (stations S-1, S-2, S-6, and C-1 through C-5 – see Figure 2 attached). Samples were collected from the top 10 cm of sediment. On November 29, 2005, a total of 13 additional sediment samples were collected in the intertidal zone during an extreme low tide on and in the vicinity of the Chevron property and along the sewer corridor (samples S-3, S-4, S-5, and C-6 through C-10). Five sediment samples were collected from the surface to a depth of 10 cm, and 5 subsurface samples were collected from approximately 2 feet below ground surface (bgs) at the same locations as the surface sediment samples and three surface sediment samples were collected along the sewer corridor. On December 14, 2005 a surface sediment sample was collected for bioassay analysis from station C-1⁸. At the request of the Department of Ecology (Ecology), three additional surface sediment samples were collected on January 06, 2006.

Sample locations are shown in Figures 2, 3, and 4 (attached). All sampling was conducted in accordance with the Ecology guidelines and the Sampling and Analysis Plan (SAP) for the site (Parametrix 2005).

FIELD OBSERVATIONS

Substrate in the sampling area generally consisted of sand, gravel and cobble ranging in size from silt and sand to cobbles greater than 1-ft in diameter. Due to the large percentage of cobbles at several stations, samples were difficult to obtain and required multiple grabs that were composited and homogenized.

Debris on the beach offshore of the former Chevron property included metal pipes, bricks, concrete, and rip-rap. A petroleum and sulfur odor was noted along an approximately 50-100 ft segment of shoreline on the northeast side of the site near the fueling pier. An unidentified staining was observed approximately two inches below ground surface. This staining was located in the vicinity of sample stations C-6 and C-8.

SAMPLING AND ANALYSIS

Sediment samples were analyzed for of the following contaminants in accordance with the SAP:

- Petroleum hydrocarbons using NWTPH-Dx
- Metals using EPA Method 6010/7470
- Semi-volatile organic compounds (SVOCs) and poly-aromatic hydrocarbons (PAHs) using EPA Method 8270
- Sediment Management Standards (SMS) parameters (including metals and semi-volatile organics), as specified in WAC 173-204-320.

Table 1 lists all sample numbers and analytical parameters for each sampling location. Analytical results were compared to the Marine Sediment Quality Standards (SQS) – WAC 173-204-320, (See Table 2 - attached) to assess sediment quality. For organic chemicals whose numerical criteria are TOC-normalized, tables include both dry-weight and TOC-normalized concentration values. Analytical results are shown in spreadsheet form in attached Table 2.

Table 1. Sample Location and Analytes

Site	Sample ID	Analytes
Sewer Line Corridor	S-1 through S-6	All SMS Parameters
	C-1 through C-4	All SMS Parameters, TPH-Dx
Chevron Property	C-5 through C-10	Metals, SVOCs, PAHS, TPH-Dx, TOC
	C-5-S through C-10-S	Metals, SVOCs, PAHS, TPH-Dx, TOC
	C-11 through C-13	PAHS, TOC
	C-8	Bioassay

RESULTS

Sewer Line Corridor

Six samples were collected in this area (S-1 through S-6) and analyzed for SMS parameters. No Sediment Quality Standard (SQS) was exceeded in any sample (See Table 2). Sediment along the proposed sewer line corridor generally contained trace concentrations of metals, semi-volatile organic compounds (SVOCs), poly aromatic hydrocarbons (PAHs), and petroleum compounds.

Chevron Property

A total of five sediment samples were collected offshore of the Chevron property, and 13 samples were collected within the intertidal area for chemical analysis. One sample was collected from station C-8 for

bioassay analysis. Offshore samples (C-1 through C-5) were collected in both the Port Washington Narrows and Smith Cove at estimated elevations that ranged from -2 ft to -12.8 ft. MLLW. No chemicals detected in off-shore samples exceeded SQS.

In the intertidal area, sample location C-8 exceeded SQS for fluoranthene, chrysene, benzo(a)fluoranthenes, and Total HPAHs. No other samples exceeded applicable SQS levels. Table 2 (attached) shows results in comparison to SQS.

Sediment chemistry laboratory analysis results are provided in the Data Attachment.

BIOASSAY TESTING

Based on chemistry sample results, no further action was necessary or warranted at any location except the surface sample from station C-8. Washington Administrative Code (WAC) 173-204-310 allows a confirmatory marine biological test (bioassay) to be performed (WAC 173-204-315) when one applicable chemical or human health criterion in WAC 173-204-320 through 173-204-340 is exceeded. Pursuant to this, an additional sample was collected from station C-8 and delivered on December 13, 2005 to Weston Environmental Laboratory in Port Gamble for bioassay analysis.

Bioassays were conducted pursuant to SMS requirements and consisted of the 48-hr larval Bay mussel (*Mytilus galloprovincialis*), the 10-day amphipod (*Eohaustoris estuaries*), and the 20-day juvenile polychaete worms (*Neanthes arenaceodentata*). Results were compared to both SQS and Cleanup Screening Levels. For all tests, there was no statistically significant difference between the test sediment from station C-8, and reference sediment. The confirmatory marine sediment bioassay tests demonstrate that sediment at the site pass SMS criteria. The complete bioassay report is provided in the Data Attachment.

CONCLUSIONS

Based on sampling results, sediments within both the sewer line corridor and adjacent to the former Chevron site meet applicable SMS requirements and no further sampling or cleanup action is necessary or warranted.

FIGURES

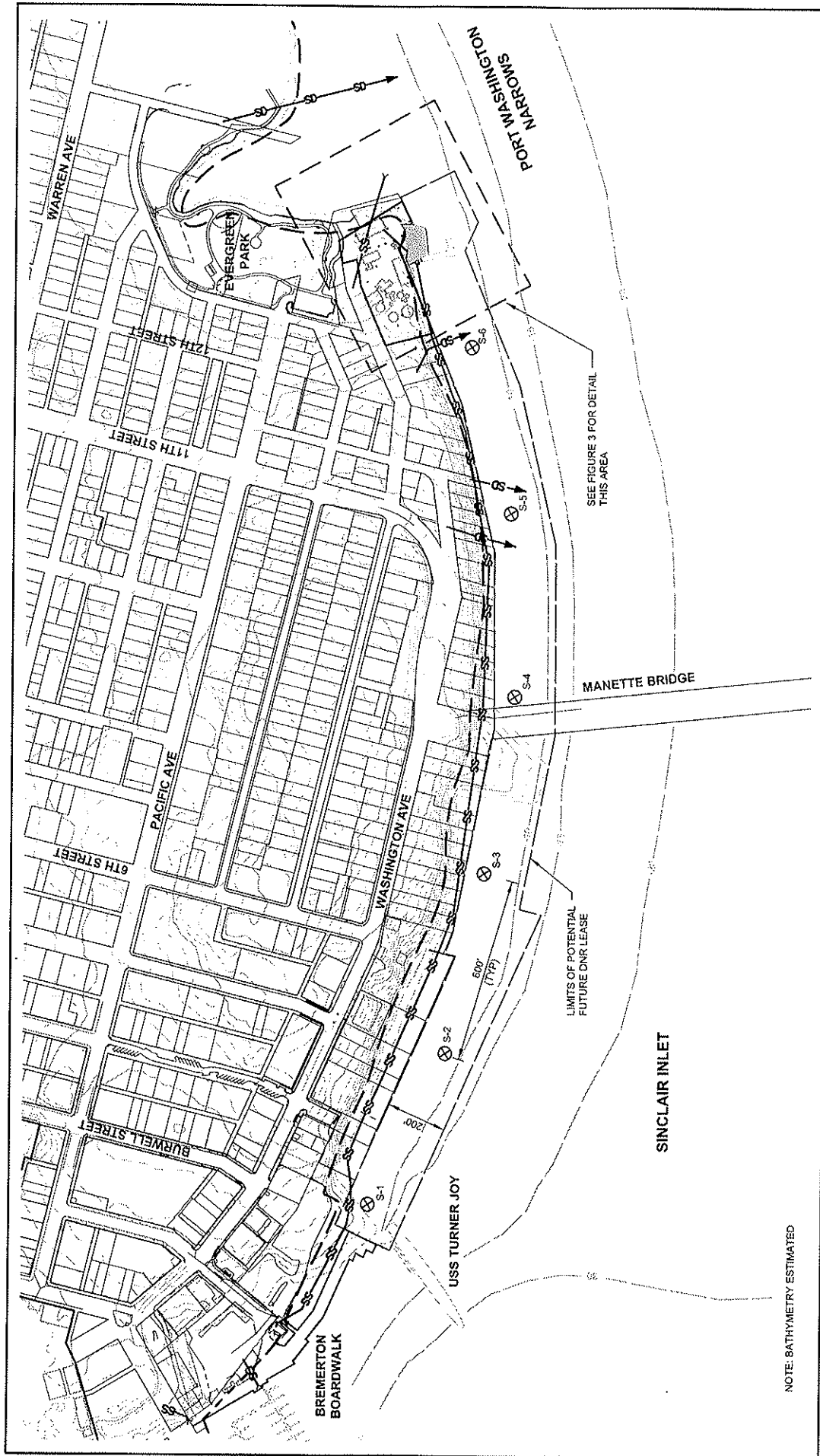
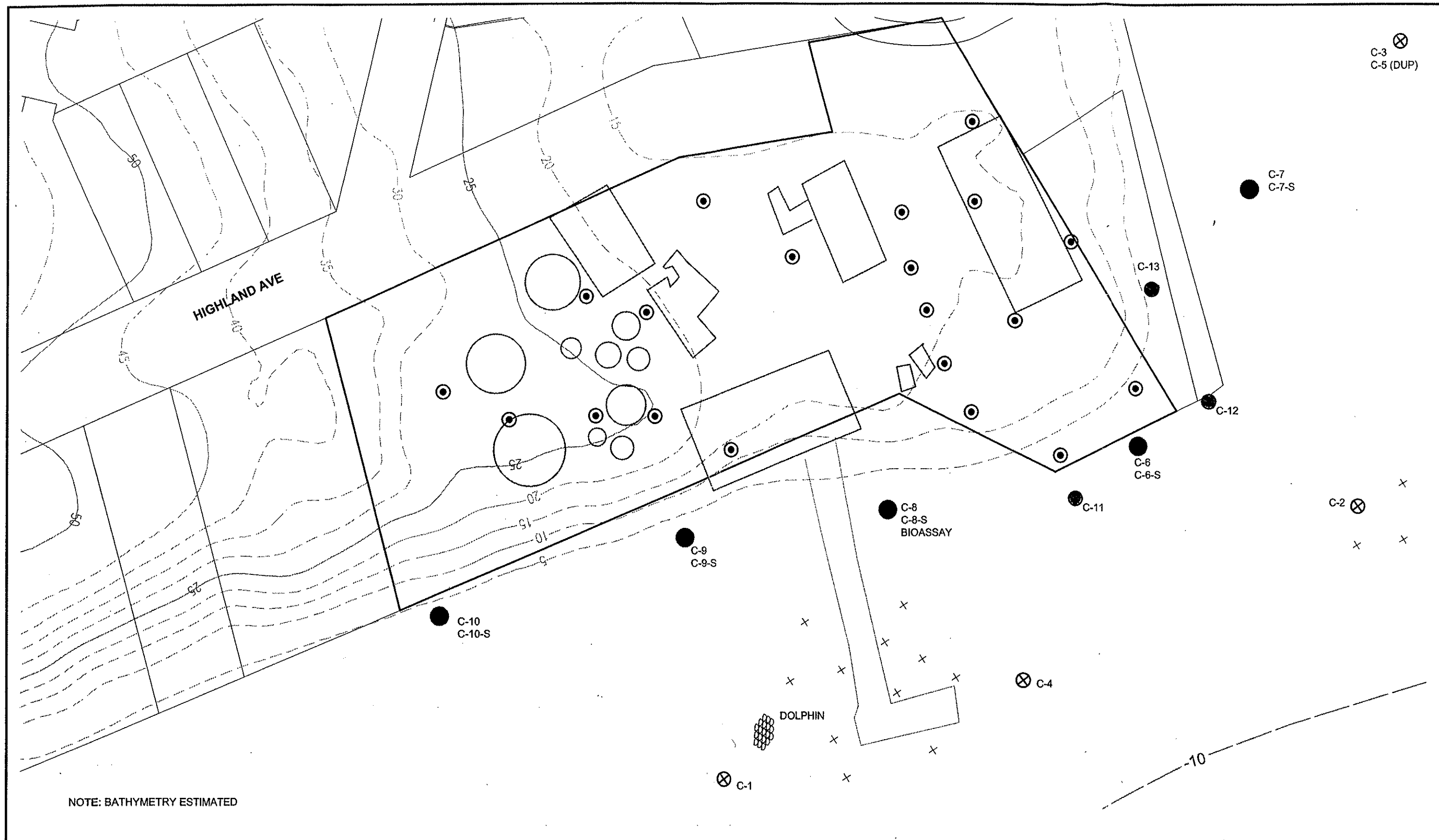


Figure 2
 Pt Narrows Beach
 Sewer Line Corridor
 Sediment Sample Locations

- ⊗ Sediment Grab Sample Location
- Approx Shoreline
- SS Sanitary Sewer
- SO Storm Drain Outfall
- Future DNR Lease Area





Parametrix DATE: Feb 16, 2006 FILE: BR1896063P02T01F-02



- ⊗ Surface Sediment Grab Sample Location (Dec. 2005)
 - Intertidal Surface Grab and Subsurface (2-ft BGS) Sample (Dec. 2005)
 - ⊙ Monitoring Well
 - × Failed Sampling Location Due to Large Cobble Substrate (Dec. 2005)
 - Chevron Property
- JAN 2006*
BLD

Figure 3
Former Chevron Site,
Sample Locations



Parametrix DATE: Oct 19, 2006 FILE: BR1896063P02T01F-03

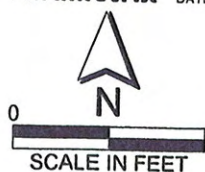


Figure 4
Pt Narrows Beach
Former Chevron Site
Sediment Sampling Locations

TABLE

Table 2. Summary of sediment sampling results, ormer Chevron Property and sewer line corridor, City of Bremerton, Washington. Samples collected December 2005 and January 2006.

ANALYTE	SQS	SIZM/SCSL	UNITS	C-1	C-2	C-3	C-4	C-5	S-1	S-2	S-6	S-3	S-4	S-5	C-6	C-7	C-8	C-9	C-10	C-6-S	C-7-S	C-8-S	C-9-S	C-10-S	C-11	C-12	C-13
Total Solids			%	77	74.9	63.2	74.1	62.7	78.5	80.6	76.6	80.9	81	84.6											82.6	71.9	73.5
Preserved Total Solids			%	76.7	72.3	59.2	73.8	64.9	77.1	77.1	73.7	81.7	81.3	85.2													
Total Volatile Solids			%	1.23	2.15	2.86	1.59	3.13	1.6	1.75	1.26	1.81	1.42	1.38													
N-Ammonia			mg/kg	6.97	13	9.92	6.51	10.5	7.28	4.95	4.28	6.03	1.47	0.66													
Sulfide			mg/kg	0.91 UJ	6.5 J	580 J	17 J	500 J	11 J	4.9 J	1.3 UJ	29	1.5 U	1.5 U													
Total Organic Carbon			%	0.593	0.81	1.65	0.468	2.24	0.461	0.409	0.426	0.421	0.28	0.269	0.380	0.526	0.528	0.492	0.503	0.269	1.140	0.305	0.205	0.167	0.392	0.631	1.040
Antimony			mg/kg dw	6 UJ	6 UJ	7 UJ	7 UJ	8 UJ	6 UJ	6 UJ	6 UJ	10 UJ	6 UJ	6 UJ	6 UJ	6 UJ	10 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ		
Arsenic	57	93	mg/kg dw	6 U	6 U	7 U	7 U	8 U	6 U	6 U	6 U	10 U	6 U	6 U	6 U	6 U	10 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U		
Cadmium	5.1	6.7	mg/kg dw	0.3 U	0.3	0.5	0.3	0.5	0.3	0.2 U	0.2 U	0.6 U	0.3	0.2 U	0.3 U	0.2 U	0.6 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		
Chromium	260	270	mg/kg dw	18.6	14.1	20.8	18.8	21.9	17.5	13.3	16.3	11 J	22.2 J	33.8 J	16.5 J	20 J	15 J	20.1 J	23.3 J	19.8 J	24.8 J	19.2 J	16.6 J	18.8 J			
Copper	390	390	mg/kg dw	15.4	15	19.6	18.7	19.8	16.3	8.6	15.1	9.9 J	29.1 J	32.7 J	15.3 J	11.6 J	15.8 J	19 J	20.8 J	17.2 J	10.7 J	19.5 J	14.8 J	16.1 J			
Lead	450	530	mg/kg dw	15	13	27	16	21	14	12	24	16	82	34	26	14	18	18	23	31	13	28	23	147			
Mercury	0.41	0.59	mg/kg dw	0.06 U	0.06 U	0.09	0.06 U	0.09	0.05 U	0.06	0.05 U	0.06 U	0.04	0.04 U	0.07 U	0.05 U	0.21	0.05 U	0.05 U	0.04 U	0.21	0.06	0.05 U	0.05 U			
Nickel			mg/kg dw	18	17	20	20	22	20	13	16	13	24	26	18	25	16	24	22	21	22	17	22				
Silver	6.1	6.1	mg/kg dw	0.4 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	0.3 U	0.4 U	0.8 U	0.4 U	0.4	0.4 U	0.4 U	0.9 U	0.3 U	0.4 U	0.3 U	0.4 U	0.4 U	0.3 U				
Zinc	410	960	mg/kg dw	45.7	40.1	49.8	47.4	48.3	36	27.1	46.4	38	65.1	120	57.6	51.2	44	49.5	63.1	72.4	37.2	60	45.7	111			
Naphthalene	99	170	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	3.91 J	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	5.17	7.06 U	1.75 U	4.26 J	9.27 U	11.38 U	4.85 U	3.01 U	1.92 U
Acenaphthylene	66	66	mg/kg oc	3.37 U	1.85 J	2.06	2.99 J	1.83	4.34 U	4.65 J	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	7.01	4.07 U	3.78 U	7.06 U	1.23 J	3.93 J	9.27 U	11.38 U	4.85 U	3.01 U	1.92 U
Acenaphthene	16	57	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U	4.85 U	3.01 U	1.92 U
Fluorene	23	79	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.94	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U	4.85 U	3.01 U	1.92 U
Phenanthrene	100	480	mg/kg oc	3.37 U	7.41	7.27	4.49	8.93	3.47 J	15.65	4.46 U	6.89	3.93 J	7.46 U	3.42 J	3.61 J	16.85	11.38	7.36	7.06 U	2.28	5.90 J	5.85 J	9.58 J	4.85 U	4.28	1.92
Anthracene	220	1200	mg/kg oc	3.37 U	2.35 J	3.39	4.27 U	5.80	4.34 U	2.93 J	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	6.44	4.07 U	3.78 U	7.06 U	2.46	7.21	4.68 J	11.38 U	4.85 U	3.01 U	1.92 U
Total LPAHs	370	780	mg/kg oc	3.37 U	11.60	12.73	7.48	17.50	3.47	27.14	4.46 U	6.89	3.93	7.46 U	3.42	3.61	30.30	11.38	12.52	3.05 U	5.96	21.31	10.54	9.58	4.85 U	4.28	1.92
2-Methylnaphthalene	38	64	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	5.90 J	9.27 U	11.38 U	4.85 U	3.01 U	1.92 U
Fluoranthene	160	1200	mg/kg oc	2.87 J	13.58	29.70	14.96	25.45	8.68	24.45	3.99 J	14.01	5.71 J	7.46 U	28.95	7.03	587.12	9.15	9.15	7.06 J	13.16	52.46	21.46	59.88	5.10	14.74	6.15
Pyrene	1000	1400	mg/kg oc	2.87 J	11.23	23.03	12.39	21.43	5.64	19.80	2.58 J	9.98	4.29 J	7.46 U	13.16	5.13	208.33	7.32	4.77	9.67	11.40	42.62	15.61	31.14	4.85 U	12.52	5.77
Benzo(a)anthracene	110	270	mg/kg oc	3.37 U	5.43	10.91	10.68	8.93	2.82 J	9.05	4.46 U	5.70	6.79 U	7.46 U	5.00 J	2.66 J	54.92	3.86 J	2.78 J	4.46 J	5.44	19.67	8.78 J	7.78 J	4.85 U	6.66	2.69
Chrysene	110	460	mg/kg oc	2.53 J	8.64	15.76	12.39	12.05	3.69 J	11.00	3.05 J	6.89	3.57 J	7.46 U	7.89 J	3.80	136.36	4.07	3.18 J	7.06 U	6.58	21.64	11.71	16.77	6.38	8.08	3.75
Benzo(b)fluoranthene			mg/kg oc	3.37 U	7.41	13.94	15.60	10.71	5.21	19.07	2.35 J	5.23	6.79 U	7.46 U	6.84	3.80	130.68	3.86 J	3.78	5.20 J	6.40	23.61	15.61	14.97	4.85 U	9.19	3.56
Benzo(k)fluoranthene			mg/kg oc	3.37 U	6.42	12.73	12.39	12.50	3.04 J	12.96	3.52 J	5.94	6.79 U	7.46 U	5.26	2.09 J	125.00	4.07	2.39 J	3.72 J	4.74	14.43	12.68	7.19 J	4.85 U	6.34	2.69
Benzo(a)fluoranthene	230	450	mg/kg oc	3.37 U	13.83	26.67	27.99	23.21	8.24	32.03	5.87	11.16	6.79 U	7.46 U	12.11	5.89	255.68	7.93	6.16	8.92	11.14	38.03	26.29	22.16	4.85 U	15.53	6.25
Benzo(a)pyrene	99	210	mg/kg oc	3.37 U	6.30	12.12	15.17	10.71	3.47 J	14.91	4.46 U	5.94	6.79 U	7.46 U	3.95 J	3.23 J	54.92	4.88	2.98 J	5.95 J	6.58	23.28	9.27	7.19 J	4.85 U	7.61	3.17
Indeno(1,2,3-cd)pyrene	34	88	mg/kg oc	3.37 U	1.60 J	2.55	3.63	2.46	4.34 U	3.67 J	4.46 U	3.33 J	6.79 U	7.46 U	5.26 U	3.80 U	16.29	4.07 U	3.78 U	7.06 U	1.58 J	5.25 J	9.27 U	11.38 U	4.85 U	3.80	1.92 U
Dibenz(a,h)anthracene	12	33	mg/kg oc	3.37 U	2.47 U	0.91 J	4.27 U	0.71 J	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	4.36	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U	4.85 U	3.01 U	1.92 U
Benzo(g,h,i)perylene	31	78	mg/kg oc	3.37 U	1.73 J	2.61	3.85 J	2.46	4.34 U	3.18 J	4.46 U	4.04 J	6.79 U	7.46 U	5.26 U	3.80 U	13.26	4.07 U	3.78 U	7.06 U	1.67 J	6.56	9.27 U	11.38 U	4.85 U	4.28	2.02
Total HPAHs	960	5300	mg/kg oc	6.26	62.35	124.24	101.07	107.41	32.54	118.09	15.49	61.05	13.57	7.46 U	71.05	27.76	1331.25	37.20	29.03	36.06	57.54	209.51	95.12	144.91	11.48	73.22	29.81
1,2-Dichlorobenzene	2.3	2.3	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
1,4-Dichlorobenzene	3.1	9	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
1,2,4-Trichlorobenzene	0.81	1.8	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Hexachlorobenzene	0.38	2.3	mg/kg oc	0.17 U	0.12 U	0.06 U	0.21 U	0.05 U	0.22 U	0.23 U	0.23 U	0.23 U	0.35 U	0.36 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Dimethylphthalate	53	53	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Diethylphthalate	61	110	mg/kg oc	3.37 U	2.35 J	0.91 J	4.27 U	0.45 J	4.34 U	3.91 J	2.82 J	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Di-n-butylphthalate	220	1700	mg/kg oc	3.20 J	2.96	2.12	4.49	1.16	5.21	5.38	5.63	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Butylbenzylphthalate	4.9	64	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Bis(2-ethylhexyl)phthalate	47	78	mg/kg oc	3.37 UJ	3.46 UJ	4.61 J	4.27 UJ	3.39 J	6.07 UJ	8.56 J	4.46 UJ	3.33 J	4.64 J	7.46 U	3.42 J	3.42 J	3.79 U	4.07 U	10.34	9.29	1.40 J	13.11	7.80 J	9.58 J			
Di-n-octylphthalate	58	4500	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	35.79	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Dibenzofuran	15	58	mg/kg oc	3.37 U	2.47 U	1.15 U	4.27 U	0.89 U	4.34 U	4.89 U	4.46 U	4.51 U	6.79 U	7.46 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			
Hexachlorobutadiene	3.9	6.2	mg/kg oc	0.17 U	0.12 U	0.06 U	0.21 U	0.05 U	0.22 U	0.23 U	0.23 U	0.23 U	0.35 U	0.36 U	5.26 U	3.80 U	3.79 U	4.07 U	3.78 U	7.06 U	1.75 U	6.23 U	9.27 U	11.38 U			

TECHNICAL MEMORANDUM

Date: January 31, 2005
To: Project File
From: Stuart Currie
Subject: Quality Assurance/Quality Control Review of Laboratory Data for the November 2005 and January 2006 Bremerton Sediment Sampling
cc: Phil Struck
Lara Linde
Project Number: 255-1896-063 (02/02)
Project Name: Pt. Narrows Beach Sewer Replacement

This memorandum summarizes the results of an internal quality assurance/quality control (QA/QC) review of analytical results for sediment samples collected on November 21 and 29, 2005, and January 9, 2006. Twenty-four (24) surface grab sediment samples were collected and submitted to Analytical Resources, Inc. (ARI) in Tukwila, Washington for analysis for various Sediment Management Standards (SMS) parameters.

Final laboratory data (ARI Reports IU01, IU50, IV18, IV58, and IX82) were submitted to Parametrix via hardcopy Tier II data reports. All data were reviewed using laboratory quality criteria specified in the ARI (2006) Quality Assurance Plan (QAP)¹ and qualifiers were applied where judged appropriate. This review included evaluation of the following (where applicable):

- Preparation and analytical holding times;
- Laboratory method blanks;
- Laboratory control samples (LCS) and LCS duplicates (LCSD)²;
- Laboratory replicates;
- Matrix spike (MS) and MS duplicates (MSD); and
- Surrogate compound recoveries.

All samples were analyzed within the required holding times and the appropriate methods were used. Analytical accuracy and precision were determined to be generally acceptable based on this review. Specific instances of out of control laboratory QC results were identified and data qualifiers were assigned based on results that exceeded laboratory QC criteria. Table 1 summarizes all qualified data. No data were rejected and all data reported should be considered valid, representative of the samples collected, and acceptable for further use.

¹ ARI. 2006. Quality Assurance Plan. Revision 12-006. Prepared by Analytical Resources, Inc., Tukwila, WA. January 16, 2006.

² LCS/LCSD may also be referred to as Blank Spike/Blank Spike Duplicate.

TECHNICAL MEMORANDUM (CONTINUED)

Table 1. Qualified Bremerton Sediment Data

Sample ID	Analyte	Result	Unit	Qualifier	Reason
C-1	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-10	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-10-S	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-2	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-3	Antimony	7	mg/kg dw	UJ	MS recovery was <75%.
C-4	Antimony	7	mg/kg dw	UJ	MS recovery was <75%.
C-5	Antimony	8	mg/kg dw	UJ	MS recovery was <75%.
C-6	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-6-S	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-7	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-7-S	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-8	Antimony	10	mg/kg dw	UJ	MS recovery was <75%.
C-8-S	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-9	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-9-S	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
S-1	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
S-2	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
S-3	Antimony	10	mg/kg dw	UJ	MS recovery was <75%.
S-4	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
S-5	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
S-6	Antimony	6	mg/kg dw	UJ	MS recovery was <75%.
C-1	bis(2-Ethylhexyl)phthalate	20	ug/kg dw	UB	Analyte detected in MB @ >MRL; sample result was ≤MRL.
C-2	bis(2-Ethylhexyl)phthalate	28	ug/kg dw	UB	Analyte detected in MB @ >MRL; sample result was ≤MB conc.
C-3	bis(2-Ethylhexyl)phthalate	76	ug/kg dw	JB	Analyte detected in MB @ >MRL; sample result was ≤5X MB conc.
C-4	bis(2-Ethylhexyl)phthalate	20	ug/kg dw	UB	Analyte detected in MB @ >MRL; sample result was ≤MRL.
C-5	bis(2-Ethylhexyl)phthalate	76	ug/kg dw	JB	Analyte detected in MB @ >MRL; sample result was ≤5X MB conc.
S-1	bis(2-Ethylhexyl)phthalate	28	ug/kg dw	UB	Analyte detected in MB @ >MRL; sample result was ≤MB conc.
S-2	bis(2-Ethylhexyl)phthalate	35	ug/kg dw	JB	Analyte detected in MB @ >MRL; sample result was ≤5X MB conc.
S-6	bis(2-Ethylhexyl)phthalate	19	ug/kg dw	UB	Analyte detected in MB @ >MRL; sample result was ≤MRL.
C-10	Chromium	23.3	mg/kg dw	J	MS recovery was >125%.
C-10-S	Chromium	18.8	mg/kg dw	J	MS recovery was >125%.
C-6	Chromium	16.5	mg/kg dw	J	MS recovery was >125%.
C-6-S	Chromium	19.8	mg/kg dw	J	MS recovery was >125%.
C-7	Chromium	20	mg/kg dw	J	MS recovery was >125%.
C-7-S	Chromium	24.8	mg/kg dw	J	MS recovery was >125%.
C-8	Chromium	15	mg/kg dw	J	MS recovery was >125%.
C-8-S	Chromium	19.2	mg/kg dw	J	MS recovery was >125%.
C-9	Chromium	20.1	mg/kg dw	J	MS recovery was >125%.
C-9-S	Chromium	16.6	mg/kg dw	J	MS recovery was >125%.

TECHNICAL MEMORANDUM (CONTINUED)

Table 1. Qualified Bremerton Sediment Data

Sample ID	Analyte	Result	Unit	Qualifier	Reason
S-3	Chromium	11	mg/kg dw	J	MS recovery was >125%.
S-4	Chromium	22.2	mg/kg dw	J	MS recovery was >125%.
S-5	Chromium	33.8	mg/kg dw	J	MS recovery was >125%.
C-10	Copper	20.8	mg/kg dw	J	Duplicate RPD was >20%.
C-10-S	Copper	16.1	mg/kg dw	J	Duplicate RPD was >20%.
C-6	Copper	15.3	mg/kg dw	J	Duplicate RPD was >20%.
C-6-S	Copper	17.2	mg/kg dw	J	Duplicate RPD was >20%.
C-7	Copper	11.6	mg/kg dw	J	Duplicate RPD was >20%.
C-7-S	Copper	10.7	mg/kg dw	J	Duplicate RPD was >20%.
C-8	Copper	15.8	mg/kg dw	J	Duplicate RPD was >20%.
C-8-S	Copper	19.5	mg/kg dw	J	Duplicate RPD was >20%.
C-9	Copper	19.0	mg/kg dw	J	Duplicate RPD was >20%.
C-9-S	Copper	14.8	mg/kg dw	J	Duplicate RPD was >20%.
S-3	Copper	9.9	mg/kg dw	J	Duplicate RPD was >20%.
S-4	Copper	29.1	mg/kg dw	J	Duplicate RPD was >20%.
S-5	Copper	32.7	mg/kg dw	J	Duplicate RPD was >20%.
C-1	Sulfides	0.91	mg/kg	UJ	Duplicate RPD was >30%.
C-2	Sulfides	6.5	mg/kg	J	Duplicate RPD was >30%.
C-3	Sulfides	580	mg/kg	J	Duplicate RPD was >30%.
C-4	Sulfides	17	mg/kg	J	Duplicate RPD was >30%.
C-5	Sulfides	500	mg/kg	J	Duplicate RPD was >30%.
S-1	Sulfides	11	mg/kg	J	Duplicate RPD was >30%.
S-2	Sulfides	4.9	mg/kg	J	Duplicate RPD was >30%.
S-6	Sulfides	1.3	mg/kg	UJ	Duplicate RPD was >30%.

J Analyte was detected; the reported concentration should be considered an estimate
 JB Analyte was detected; the reported concentration should be considered an estimate based on blank contamination
 MB Method blank
 MRL Method reporting limit
 UB Analyte should be considered not detected at the reported concentration based on blank contamination
 UJ Analyte was not detected and the reporting limit should be considered an estimate

APPENDIX F

Field Forms

PARAMETRIX, INC.

BORING/WELL CONSTRUCTION LOG

Project Number

Boring/Well Number #

Project Name

Date Completed

Location

Total Depth of Boring

Coordinates

Initial Water Level

Drilling Method

Static Water Level

Sampling Method

Logged by

Ground Elevation

Top of Casing Elevation

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
					5					
					10					
					15					
					20					
					25					
					30					
					35					

FIELD PARAMETERS

SOIL SAMPLING

Sample #: _____

Project Number:	
Project Name:	
Project Address:	
Client Name:	
Sample Location:	
Date:	
Sampled By:	

Depth of Sample (feet):	
Date/Time Sampled:	
Air temperature:	
Weather Conditions:	
PID Measurements (ppm):	

Sample Number:	
Sampled By:	
Laboratory:	
Chain-of-Custody (yes/no):	
Date Sent to Lab:	
Shipment Method:	

Remarks/Notes:	

Signature: _____

APPENDIX G
Standard Operating Procedures

**APPENDIX G
STANDARD OPERATING PROCEDURES**

TABLE OF CONTENTS

STANDARD OPERATING PROCEDURE EXPLORATORY SOIL BORING LOG PREPARATION	G-1
STANDARD OPERATING PROCEDURE SOIL SAMPLING	G-3
STANDARD OPERATING PROCEDURE STATIC WATER LEVEL MEASUREMENT	G-7
STANDARD OPERATING PROCEDURE GROUNDWATER SAMPLING	G-9
STANDARD OPERATING PROCEDURE DECONTAMINATION	G-11

STANDARD OPERATING PROCEDURE

EXPLORATORY SOIL BORING LOG PREPARATION

OBJECTIVE

The objective of this standard operating procedure (SOP) is to describe a method for the preparation of an Exploratory Soil Boring Log. This log documents the subsurface information at the time of drilling. The level of detail required for soil classification will be based on project-specific considerations; however, the boring log procedures and required information described in the following sections will be the minimum. A blank boring log form is provided in Appendix B.

The exploratory borings will be installed by a subcontractor using a drill or push-probe rig. Soil sampling intervals will be based on project-specific considerations. Soil samples will be collected using a split-spoon (SPT) or push-probe sampler.

MATERIALS

- Exploratory soil boring log
- USCS visual-manual soil identification flow chart
- Hand lens (optional)
- Health and safety equipment

PROCEDURE

During drilling, the site geologist will log all pertinent information on a standard soil boring log form. Two general types of information will be collected:

1. Stratigraphic Information: A continuous log of subsurface materials encountered during drilling will be recorded. The site geologist will classify the soil in accordance with the Unified Soil Classification System (USCS), and note all significant stratigraphic contacts and geologic features. The site geologist will also note the color, plasticity, moisture content, density/compaction, and other project-specific information.
2. Hydrogeologic Information: A continuous log of soil moisture and/or saturated conditions will be recorded during drilling. The primary purpose is to obtain information that is only available during drilling regarding zones of saturation. In addition, a static water level will be collected at the beginning and end of each working day.

The exploratory soil boring log will include, at a minimum, the following items:

- Project name and number
- Boring or well number
- Boring location
- Date and time started/finished
- Name of drilling contractor
- Geologist's name
- Ground surface elevation (estimated)
- Drilling method and equipment

- Hole diameter
- Casing size
- Soil sampling method
- Depth of soil sample below grade
- Soil sample interval
- Soil sample type
- Percentage of soil sample recovered
- Geologic observations (soil description and classification)
- Graphic soil symbols
- Graphic representation of stratigraphic contacts
- Blow counts/advance rate
- Total depth of boring
- Headspace reading, if applicable
- Observations on groundwater: Degree of saturation, drill stem wet or dry, etc.
- Static water level, time of observation, total depth of boring and drive casing at time of observation.
- Well installation data (reported on separate Monitoring Well Field Installation Log)
- Borehole abandonment information, if applicable

NOTES

All drilling activities and other pertinent site information will be recorded in the field notebook. Field notes will include, at a minimum, the following:

- Project name and number
- Date
- Weather conditions
- Personnel on-site
- Any problems or corrective actions
- Any other information that will allow reconstruction of pertinent field activities without relying on personal memory

Soil samples will be retained for verification purposes until the boring log is finalized. If sampling for chemical analysis is required, sample collection and handling procedures will be determined prior to drilling activities. Drilling and logging activities will be performed under appropriate health and safety procedures.

STANDARD OPERATING PROCEDURE SOIL SAMPLING

OBJECTIVES

The objective of this document is to describe procedures to be followed during soil sample collection. A blank soil sampling field form is provided in Appendix B.

MATERIALS

- Field sampling forms
- QAPP
- Health and safety equipment
- Sampling tools (spoons, bowls, sample containers, paper towels, etc.)

PROCEDURES

Soil Probe Sampling

A soil probe rig such as a Geoprobe, Strata-probe, or equivalent will be used to collect subsurface soil samples. This technique uses direct-push technology to drive a 2-inch diameter steel core barrel to pre-selected depths for collection of soil samples.

Soil samples will be collected using 1-inch diameter probe rods with a probe-driven soil sampling device attached to the end that retrieves discrete soil cores approximately two inches in diameter and four feet in length. Different samplers will be available to match subsurface soil conditions. Soil samples will be logged by a qualified geologist using the Unified Soil Classification System (USCS).

Soil samples will be collected using a stainless steel sampler. The sampler remains sealed by a piston tip at the end of the sample tube while it is pushed or driven to the desired depth. A piston stop-pin at the opposite end of the sampler is removed by means of extension rods inserted into the probe rods, and the sampler is driven to depth. This enables the piston to retract into the sample tube while the sample is collected.

Samples will be collected in disposable acetate sleeves. After sample collection, the probe rods will be retracted from the hole and the sample will be extruded from the sampler while it remained inside the acetate sleeve. The sleeves and end caps preserve bedding characteristics and soil moisture can be cut into sections to produce samples from discrete intervals, or cut lengthwise to produce composite samples.

The soil sample will be placed directly into labeled sampling containers provided by the analytical laboratory. Soil samples will be collected using dedicated stainless steel or polyethylene spoons. Samples for volatile organic compounds (VOCs) or gasoline range organics (GRO) analyses will be placed directly into labeled sample containers. These samples will be field preserved according to the procedure for EPA Method 5035A provided below. Samples for non-volatile analyses will be thoroughly homogenized in a dedicated stainless steel, polyethylene, or aluminum bowl prior to being placed in the appropriate sample containers. Additional soil will be placed in a self-sealing bag for in-field headspace analysis.

Surface Soil Sampling

Soil samples will be collected from shallow depths (less than 2 feet) using decontaminated hand tools such as a post-hole digger or shovel to reach the desired sample depth. Once the sample depth is reached, soil sample collection will be conducted as in Soil Probe Sampling above.

Test Pit Sampling

Soil samples will be collected from the base and sidewalls of excavated test pits. Specific sampling depths will be selected by the field geologist based on field conditions. Soil samples will be collected from the centre of the backhoe bucket at a depth at least 6-inches. Soil sample collection will be conducted as in Soil Probe Sampling. Test pits will be logged in a manner similar to that described in the SOP for Soil Boring Log Preparation.

Soil Boring Sampling

Soil samples will be collected from the soil borings using a decontaminated 2.5-inch I.D. split-spoon (SPT) sampler. Soil samples will generally be collected at 2.5 feet intervals to the planned depth of the borings. Once the sampling depth is reached for each sample, the SPT sampler will be driven 1 foot into the undisturbed soil at the base of the boring. The sampler will then be retrieved and opened for sample logging and field screening. Selected soil samples will be placed into the appropriate sample containers using the same methods as in Soil Probe Sampling above.

Samples for Volatiles Analysis using EPA Method 5035A

All soil samples for VOCs or GRO analysis will be collected using EPA Method 5035A. This method may involve field preservation using pre-weighed 40-mL vials that contain a pre-measured quantity of preservative. An alternate method is to use a proprietary disposable sample coring device such as an EnCore™ sampler. When using a disposable coring sampler, the sample is collected into the disposable coring container using the proprietary sampling tool, capped tightly, and returned to the laboratory within 48 hours for preservation and analysis.

For the field preservation method, a prescribed mass of soil is collected using a hand-held coring device and is placed directly into the sample vial with as little disturbance as possible. Soil mass and preservative volume requirements are laboratory specific. Typically, 10 grams of soil are required and are placed into vials pre-preserved with 10-mL of methanol. The pre-preserved vials are weighed in the laboratory and the weights are recorded on the sample label. Specific field procedures are as follows:

1. Calibrate the field balance and reweigh the laboratory-supplied vials. The field balance should be sensitive to ± 0.1 grams. If the difference between the laboratory tare weight and the field weight is > 0.2 grams, do not use the vial.
2. Prepare a methanol blank by leaving a blank methanol vial open during collection of a soil sample to check for atmospheric VOCs. When sample collection is complete, cap the vial and ship it to the lab for analysis along with the other samples. Prepare at least one methanol blank per sample cooler.
3. Collect the soil sample using a pre-calibrated syringe. Several syringe types are currently commercially available. Collect the sample from undisturbed soil on a freshly-exposed surface. If the soil type is such that the syringe will not penetrate, use a dedicated stainless steel spoon to collect the sample. Extrude (or place) the sample gently into the vial. Reweigh the vial; the target soil weight is 5 ± 0.5 grams. The desired ratio of grams soil to mL methanol is 1:1 with a $\pm 25\%$ tolerance. In all cases, the soil sample must be completely immersed in methanol. Collect as many vials as required by the laboratory (typically one to two).
4. Record sample information on the sample label applied by the laboratory. Do not place an additional label on the vial as this will alter the tare weight and affect the analytical results.
5. For each sample, collect a full 40 mL-vial for moisture content analysis. Fill the vial so no headspace is present.

Sample Handling

Samples for chemical analysis will be stored at 4 (+/- 2) degrees C, and shipped or hand carried under chain-of-custody procedures to the analytical laboratory.

Headspace Measurements

During sampling operations, a field photoionization detector (PID) will be used to measure for the presence of VOCs vapors in the soil. For each sample, approximately 200 to 300 grams of soil will be collected and placed in a self-sealing bag. After approximately 10 minutes, during which the bag will be warmed in the sun and shaken, the intake tip of the PID will be inserted through the seal and the highest concentration of VOCs measured will be recorded on the field form. The PID will be calibrated to 100 ppm isobutylene at the beginning of the field day.

Decontamination

All drilling tools, non-disposable soil sampling equipment, and excavator buckets will be decontaminated prior to commencing sampling activities, between boring or test pit locations, and upon demobilization. Equipment will be cleaned using the method described in the Decontamination Standard Operating Procedure.

NOTES

All soil sampling activities and other pertinent site information will be recorded on filed sampling forms (Appendix B). Field notes will include, at a minimum, the following:

- Project name and number
- Date
- Weather conditions
- Personnel on-site
- Sample number, depth, and time, soil classification (USCS), analyses to be performed, and number and types of sample containers
- Any other information that will allow reconstruction of pertinent field activities without relying on personal memory

STANDARD OPERATING PROCEDURE STATIC WATER LEVEL MEASUREMENT

OBJECTIVE

The objective of this standard operating procedure is to describe a method for collecting a static water level measurement. Measurements will be made from groundwater monitoring wells accurate to the nearest 0.01-foot from a standard reference point on the well casing.

MATERIALS

The following materials are required for the collection of static water level measurements:

- Well keys
- Electronic water-level indicator
- Weighted steel tape
- Paper towels
- Deionized water
- Health and safety equipment

PROCEDURE

The following steps will be taken during the collection of a static water level measurements:

1. Unlock and open well. Verify well integrity.
2. Lower electronic water level indicator to the water surface.
3. When the sounder indicates that the indicator probe has contacted water, raise and lower the probe to verify exact point at which measurement should be taken.
4. Measure the depth to water, to the nearest 0.01-foot, from the reference point (notch or mark on well casing).
5. Record the measurement, to the nearest 0.01-foot, in the field notebook or on the Groundwater Sampling Data Sheet.
6. Measure total well depth to the nearest 0.1-foot using weighted steel tape.
7. Replace well cap and close and lock protective well casing.

DECONTAMINATION

The following steps will be taken during decontamination of down-hole measuring equipment:

1. While winding the equipment up from the well, thoroughly rinse with deionized water.
2. Remove excess water from the equipment with clean paper towels prior to rewinding equipment on the reel.

Notes: Measurements will be made under appropriate health and safety procedures.

STANDARD OPERATING PROCEDURE

GROUNDWATER SAMPLING

OBJECTIVE

The objective of this document is to describe methods for the collection of groundwater samples from monitoring wells. Groundwater sample collection procedures include equipment cleaning, water elevation measurements, well purging, and sampling. A groundwater sampling field form is provided in Appendix B.

MATERIALS

The following materials will be used for collection of groundwater samples:

- Sample containers
- Multi-parameters meter with flow-through cell
- Electronic water-level indicator
- Purging and sampling pump
- Filters for dissolved metals

Prior to the sampling event, all non-disposable equipment which will be placed in the well or come in contact with the groundwater sample will be decontaminated using the procedure described in the section titled "Decontamination Standard Operating Procedure."

PROCEDURES

1. Prior to purging a monitoring well, measure the depth to water using the method described in the "Static Water Level Measurement Standard Operating Procedure."
2. Purging and sampling will be performed using a pump. Typically, the same pump used for purging is used for sampling. Groundwater samples for volatiles analysis will be collected using a decontaminated, positive-displacement down-hole pump. Non-volatiles samples may be collected using a peristaltic pump. An alternative is to purge using a peristaltic pump and collect volatiles samples using a check-valve type inertial pump or a bailer. For purging, lower the pump or sample tubing to the desired depth in the well. Purge the well by pumping at a flow rate of ≤ 0.5 liters per minute. Pumping rates should be adjusted so that groundwater surface drawdown stabilizes with a maximum total drawdown of less than 0.3 feet. A stable groundwater surface elevation indicates that fresh groundwater is being obtained directly from the aquifer. Check drawdown with electronic water-level indicator periodically. Record all measurements. The volume of water to be purged shall be determined by stabilization of measured parameters. Stabilization shall be considered complete when the following stabilization criteria is met over three measurement intervals of at least 3 minutes duration:

Purging Stabilization Criteria	
Parameter	Stabilization Criteria
pH	+/- 0.1 unit
Specific conductance	+/- 3%

Oxidation-reduction potential (ORP)	+/- 10 millivolts
Turbidity	+/- 10% (when greater than 10 NTUs)
Dissolved Oxygen	+/- 0.3 milligrams per liter

3. After purging is complete, begin sample collection at the purging flow rate. Ensure that the pumping rate does not exceed 0.5 liters per minute to minimize turbulence and aeration of the sample. If a bailer is used for volatiles sampling, it will be lowered gently into the well to prevent off-gassing.
4. Fill sample containers for volatile samples so that no headspace exists. After capping, invert the container and tap to verify that no air bubbles are present. For parameters other than volatile organic compounds, fill the sample container to within 2- to 5-cm of the top, in a manner to minimize aeration. When sampling for dissolved metals, filter the sample using an in-line disposable 0.45 μ filter.
5. Label all sample containers at the time of sampling. Sample labels will include the following information:
 - Project name and number
 - Sample station
 - Sample number
 - Date and time of sample collection
 - Sampler's initials
 - Analyses requested
6. Store all samples at approximately 4°C for transport to the laboratory under chain-of-custody procedures. Samples that will be analyzed for volatile organic compounds will not be placed in direct contact with ice. Upon completion of sampling, the well will be locked and secured.

DECONTAMINATION

During field sampling, all equipment surfaces placed in well or in contact with groundwater samples will be cleaned before purging and sampling the next well. Plastic sheeting will be placed around the well-head to keep work area clean. The equipment will be cleaned using the method described in the "Decontamination Standard Operating Procedure."

STANDARD OPERATING PROCEDURE DECONTAMINATION

OBJECTIVE

The objective of this document is to describe decontamination procedures to be followed during the performance of field activities. Dedicated, disposable sampling equipment (such as spoons, bowls, and tubing) will not require decontamination

MATERIALS

The following materials are required for performance of equipment decontamination:

- Scrub brush
- Alconox or equivalent soap
- Deionized water
- Water tubs
- Health and safety equipment

PROCEDURES

The following steps will be taken during decontamination of equipment and materials, which may affect sample quality:

1. Scrub with non-phosphate detergent
2. Rinse with tap water
3. Rinse thoroughly with deionized water
4. Air dry

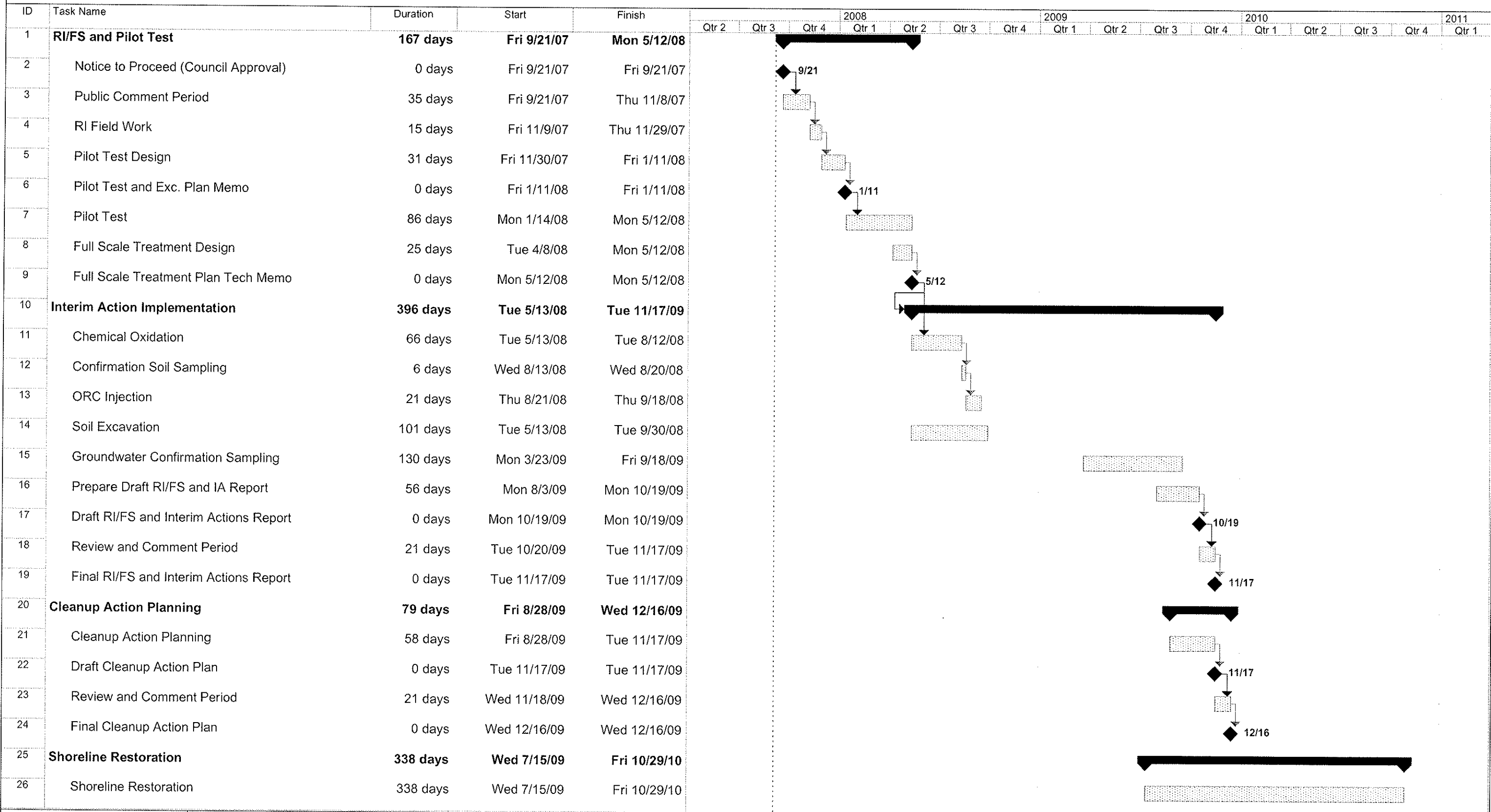
Down-hole sampling pumps will be decontaminated using the above procedures and clean tubs or buckets that allow the pump to be immersed in the decontamination fluid. The pump will be operated for approximately 1 minute in each decontamination solution.

Notes:

- Decontamination wastes will be disposed of according to project-specific considerations.
- Decontamination will be performed under Level D Health and Safety Procedures. Site-specific conditions may require additional health and safety precautions.

APPENDIX H
Project Schedule

FORMER CHEVRON PROPERTY RI/FS AND INTERIM ACTIONS SCHEDULE



Project: Chevron Property RIFS Scher
Date: Fri 9/7/07

Task
Split

Progress
 Milestone

Summary
Project Summary

External Tasks
 External Milestone

Deadline