PRELIMINARY DRAFT
REMEDIAL INVESTIGATION WORK PLAN
4700 Brooklyn Avenue NE, Seattle, WA

Prepared for: FH Brooklyn LLC & Chevron

Project No. 160092 • November 4, 2016 Preliminary Draft

Aspect CONSULTING

earth + water

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1 Introduction

1.1 Purpose and Objectives

FH Brooklyn, LLC (FH Brooklyn) and Chevron Environmental Management Company (Chevron) are signatories to an Agreed Order (No. DE 13815, effective XXXX, 2016) with the Washington State Department of Ecology (Ecology). The Agreed Order requires FH Brooklyn and Chevron to complete a Remedial Investigation (RI) and Feasibility Study (FS) along with associated reporting requirements, and to draft a cleanup action plan (DCAP) for the site generally located at 4700 Brooklyn Avenue NE in Seattle, Washington (Site). The Site location is depicted on Figure 1.

Service station operations beginning in the 1910s and ending on November 1, 2016, have resulted in the release of contaminants of potential concern (COPCs); namely, petroleum and petroleum-related products to the subsurface, impacting soil and ground water. Chevron previously conducted independent investigation and cleanup activities beginning in 1990, including ground water monitoring, limited soil removal (during station rebuilds), and operation of an air sparge/soil vapor extraction (AS/SVE) system. Data obtained more recently, however, has demonstrated that COPCs remain in the soil and ground water at the Site in excess of Method A Cleanup Levels under Washington's Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This document presents the Work Plan for the RI (RIWP) required by the Agreed Order. The RI work under the Agreed Order is intended to provide additional data and analysis to define the nature and extent of contamination at the Site, and to assess the potential risks to human health and the environment posed by the Site. The RI will facilitate the evaluation of remedial alternatives in the FS and ultimate selection of a cleanup remedy. The RI performed under this RIWP will be in accordance with MTCA and its implementing regulations, Chapter 173-340 Washington Administrative Code (WAC), and specifically 173-340-350 WAC.

1.2 RI Work Plan Organization

This RIWP includes 9 sections and 3 appendices. The main text is organized as follows:

- Section 1—The **Introduction** presents information regarding the objectives and approaches for the ABP cleanup and RIWP.
- Section 2—The **Site Background** section provides information about the facility location and history.
- Section 3—The **Environmental Setting** section summarizes environmental information relevant to the RI including land use, climate, and hydrogeology, based on available information.

- Section 4—A **Summary of Previous Environmental Investigations and Cleanup Actions** describes the purpose and scope of Site investigations and cleanup actions.
- Section 5—The **Preliminary Conceptual Site Model** integrates available information to understand how hazardous substances move through the Site and come into contact with human and ecological receptors.
- Section 6—The **Planned Interim Action** is summarized here.
- Section 7—The **Remedial Investigation Tasks** section identified Site data gaps and the proposed data collection to address the data gaps.
- Section 8—A brief summary of the proposed **Schedule and Reporting** is provided in this section.
- Section 9—A list of **References** is provided at the end of the report.

2 Site Background

2.1 Site Location and Description

The Site is located at 4700 Brooklyn Avenue Northeast in the University District neighborhood in Seattle, Washington, as shown on Figure 1. The Site consists of King County Tax Parcel No. 8816400985 totaling approximately 0.38 acre of land (Figure 2). The Property and surrounding neighborhood is zoned for commercial/mixed use (Neighborhood Commercial 3). The Site is relatively flat with a maximum elevation change of less than 2 feet across the Site. The Site is bordered by Northeast 47th Street to the south, Brooklyn Avenue Northeast to the west, a concrete paved alley to the east and a paved parking lot to the north.

The Site is occupied by a recently closed Chevron gasoline service station and convenience store, operated under permit from the Ecology Underground Storage Tank (UST) program as UST ID 5046, WASU Chevron. The current fuel system was installed in 1991. The USTs associated with this system consist of two double-walled 12,000-gallon gasoline USTs and one double-wall 12,000-gallon diesel UST situated on the southwestern portion of the Site. Four dispenser islands are situated on the west-central portion of the Site. The UST system also contains spill buckets and leak detection and product lining is double-walled. The USTs were upgraded to comply with regulatory requirements in 1998.

Dates will be inserted when information available concerning closing date of Service Station, when Temporary Closure and 30 Closure Notices were submitted to Ecology UST Unit in accordance with Ecology's Underground Storage Tank regulations 173-360-200 WAC and 173-360-385 WAC.

2.2 Site History and Land Use

The Property has operated as a retail gas station since at least 1919, and has experienced four rebuilds over that period, with different UST, dispenser island, and service area locations. The following Property history is based on review of Property King County Tax Assessor Records and previous environmental consulting reports. Figure 2 illustrates the footprint of the multiple service stations since 1919.

- **1919—First Generation:** Gasoline station located at southwestern corner of Property. The station included three 283-gallon gasoline USTs (RGI, 2015).
- **1936—Second Generation:** A second generation gasoline service station was constructed on the southwestern portion of the Property. A smaller structure is visible in the tax assessor photograph of the Property, located on the eastern side of the Property, possibly an auto repair building. At this time, the tax parcel consisted of only the southern half of the present Property and service station activities were focused in this area. In the 1936 Property photograph from the assessor files, these northern parcels appear residential.
- **1951:** Tax parcel was increased to its current square footage by adding Lots 18 and 19 to the north.
- **1950s – 1969—Third Generation:** A third generation gasoline service station was present on the southern portion of the Property (RGI, 2015).
- **1969—Fourth Generation:** The third generation service station was replaced by the fourth generation service station. At the time of construction, the station consisted of two 10,000-gallon USTs, one 5,000-gallon UST, one 1,000-gallon UST, two pump islands, and three hoists.
- **1987:** Based on Ecology UST records, one 550-gallon "fuel oil" UST and one 1,000-gallon waste-oil UST were removed. The location of these USTs is not provided in the records.
- **1990 – Present:** Based on Ecology UST records, two 12,000-gallon and one 5,000-gallon gasoline USTs were removed from the northwestern portion of the Site. The building was converted into a convenience store. Three USTs (two double-walled 12,000-gallon gasoline USTs and one double-wall 12,000-gallon diesel UST) were installed at the southwestern corner of the Property. Refer to Section 4 for a discussion of the remedial actions and environmental investigations that were completed from 1989 to present.

The Property owner (FH Brooklyn, LLC) plans to redevelop the Property with a six-story apartment building with commercial space and one level of below-grade parking.

3 Environmental Setting

3.1 Topography and Surface Water Features

The Site is relatively flat and located at an elevation of approximately 215 feet. Area topography slopes to the southwest towards Portage Bay and the Ship Canal, located 3,700 feet southwest of the southern Property boundary.

3.2 Vegetation

Vegetation in the area is generally sparse. The area is typical of urban, developed land, with vegetation limited to landscaped planting areas, street-side trees, and plantings on the dispersed residential properties.

3.3 Climate

The climate is characterized by mild temperatures and a rainy season, with considerable cloudiness during the winter months. Average winter daytime temperatures are in the 40s (degrees Fahrenheit) and nighttime readings in the 30s. During the summer, daytime temperatures are usually in the 70s, with nighttime lows in the 50s.

The middle of the dry season occurs in July or early August, with July being the driest month of the year. The rainy season extends from October to March, with December normally the wettest month. However, precipitation is rather evenly distributed throughout the winter and early spring months. More than 75 percent of the yearly precipitation falls during the rainy season. At the King County Airport (located approximately 8 miles south), average annual precipitation is 37 inches is reported.

3.4 Hydrogeologic Conditions

3.4.1 Geology

Puget Sound surface geology is dominated by repeated advanced and recessions of glacial ice which started around 750,000 years ago. Shallow soils at the Site consist of deposits from last period of glaciation, Vashon stade of the Fraser Glaciation Age. Soils at the Site are mapped as Vashon ice-contact deposits (Qvi), which consist of irregularly shaped bodies of glacial outwash-like deposits with lenses of lodgment till (Booth et. al, 2009). On-site, these deposits consist fine to medium sand with silt and occasional gravel, grading from loose to dense with depth. Underlying the fine to medium sand unit, stiff to hard gray silt has been logged at a depth of 25 to 30 feet below ground surface. Boring R-1, the deepest boring completed on the Site, was completed 4.5 feet into the hard silt, total depth 34 feet. This silt unit may be the Vashon Lawton clay (Qvlc) or older Pre-Fraser lacustrine unit (Qpnl). Fill is present overlying the ice-contact deposit in several areas across the Site up to maximum depth of 15 feet below ground surface. The location of a north-south Site cross section is illustrated on Figure 3 and the cross section is on Figure 4. Logs of the Site monitoring wells are included in Appendix A.

3.4.2 Ground Water

Based on Site monitoring wells, depth to ground water typically ranges in depth from 15 to 19 feet. Periodically, ground water depths have been up to 21 to 26 feet at the end of summer and early fall in select wells for some years. Variability in water levels may be due to the backfill in former and current UST pits and/or perched conditions caused by the silt unit at depth.

Previous ground water contour maps of the Site resemble a c-shape open to the east to southeast (Figure 5). Based on these figures, ground water flow is inferred to be predominantly to the southeast, with a more easterly direction of flow in the southern portion and southerly in the northern portion. A southeasterly direction of ground water flow is consistent with data collected from another gasoline release site located on the Property southwest of the Site (76 Station at 4557 Brooklyn Ave NE). Horizontal hydraulic gradients at the Site range from 0.01 and 0.02 feet per foot (ft/ft).

A review of ground water data from the Sound Transit Northgate Link geotechnical data report (2009) indicated aquifers beneath the silt unit have an upward vertical hydraulic gradient. Ground water flow directions in these deeper aquifers have horizontal hydraulic gradients to the southwest.

4 Summary of Previous Environmental Investigations and Cleanup Actions

This section provides summary of environmental investigations and cleanup actions that have been completed at the Site. The purpose and scope of each investigation are summarized below; the exploration locations are depicted on Figure 3. Previous investigation reports are available through Ecology and will be included in the RI Report. Boring and well construction logs from previous investigations are provided in Appendix A. Analytical results are discussed in Section 5.2.

4.1 UST Replacement and Soil Cleanup Action (1990)

GeoEngineers (1990) provided oversight for replacement of the service station USTs in 1989–1990, and subsequently completed soil and ground water investigations. Work included the following:

- Removal of 4 USTs north of the current fueling islands (two 12,000-gallon steel gasoline USTs, one 500-gallon steel gasoline UST, one 1,000-gallon steel UST (unknown fuel type)) and installation of 3 USTs south of the current fueling islands (two double-walled 12,000-gallon gasoline USTs and one double-wall 12,000-gallon diesel UST);
- Removal of approximately 900 cubic yards of soil for off-site disposal at Coal Creek and Cedar Hills Landfills. Remaining soils from the excavation were reused as

backfill. The excavation footprint is illustrated on Figure 3 and in cross section on Figure 4;

- Collection of 26 confirmation soil samples from excavation side walls and base and 6 stockpile samples. Soil samples were submitted for laboratory analysis of gasoline- and diesel-range total petroleum hydrocarbons (TPH) and BTEX;
- Installation of fourteen 2-inch diameter ground water monitoring wells (MW-1 through MW-14) and one 8-inch recovery well (R-1);
- Collection of soil samples from borings MW-1 through MW-14;
- Collection of one ground water sample from each of the fourteen monitoring wells;
- Submittal of 28 soil samples and 14 ground water samples from borings MW-1 through MW-14 for laboratory analysis of gasoline- and diesel-range TPH, BTEX, and dissolved lead; and
- Recovery of light non-aqueous phase liquid (LNAPL) from wells MW-4 and MW-12 with bailer. Volume of LNAPL removed was not reported.

4.2 Soil Vapor Extraction Remediation System (1990)

Following the Subsurface Hydrocarbon Study in 1989-1990, GeoEngineers oversaw the installation of a soil vapor extraction system. Site monitoring wells MW-1 through MW-14 and R-1, with the exception of wells MW-2 and MW-5, were plumbed and converted to vapor extraction wells (GeoEngineers, 1990). The system was modified in 1990 to add air sparging when MW-4 and MW-12 were converted to air sparge wells.

4.3 Additional Monitoring Well Installation (2001)

Delta Environmental Consultants (Delta, 2001) completed an additional site investigation to further characterize Site conditions in 2001. Work included the following:

- Installation of two 2-inch ground water monitoring wells along the east Property boundary (MW-15 and MW-16);
- Submittal of samples from one soil boring from a depth of 15 feet, depth just above saturated soils, from each boring for laboratory analysis of gasoline-, diesel-, and oil-range TPH, BTEX, and total lead;
- Collection of ground water samples from wells MW-15 and MW-16;
- Submittal of ground water samples for laboratory analysis of gasoline- and diesel-range TPH and BTEX.

4.4 Baseline Environmental Assessment (2015)

RGI (2015) completed an environmental site assessment to further characterize known contamination. Work included the following:

- Advancement of nine direct-push borings (P-1 through P-9) to a depth ranging from 5 to 22 feet;

- Submittal of 8 soil samples for laboratory analysis of gasoline- and diesel-range TPH and BTEX. Submittal of 2 soil samples for analysis of lead and 1 soil sample for analysis of chlorinated volatile organic compounds (CVOCs).

4.5 Ground Water Monitoring (1990-2014)

Site monitoring wells have been sampled from installation up until 2014. Ground water samples were submitted for laboratory analysis of gasoline-, diesel-, and oil-range TPH and BTEX. Starting in 2001, samples were submitted periodically for analysis of methyl tertiary-butyl ether (MTBE). If free product was present in the well at the time of monitoring, a ground water sample was typically not collected.

In 2016, RGI sampled wells MW-3, MW-6, MW-9, and MW-13 to determine whether or not an off-Property, upgradient dry cleaners had impacted Site ground water (RGI, 2016). Ground water samples were submitted for analysis of CVOCs including tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-DCE) and vinyl chloride.

5 Preliminary Conceptual Site Model

5.1 Chemicals of Potential Concern

Existing ground water and soil data have been compared to MTCA Method A cleanup levels for unrestricted land use and Method B cleanup levels for cis-DCE for which no Method A value is available (Table 1). The following COPCs have been identified based on previous investigation data:

- Gasoline-, diesel-, and oil-range TPH in soil and ground water;
- BTEX in soil and ground water;
- Dissolved lead, cis-DCE, vinyl chloride, and MTBE in ground water.

5.2 Nature and Extent of Contamination

The Property has operated as a retail gas station since as early as 1919. Service station operations have resulted in the release of product to the subsurface, impacting soil and ground water.

Environmental investigations at the Site revealed LNAPL on the ground water surface in two areas: the former UST pit decommissioned in 1989 at the north end of the Property (MW-12), and the southwestern portion of the Site (MW-9 through MW-13). The 2014 ground water sampling event indicate LNAPL was measured up to 0.3 feet thick at the north end of the Site (MW-12) and between 2.72 and 0.28 feet thick at the southwestern portion of the Site (MW-9, MW-10, MW-11, and MW-13; see Figure 7b).

Soil analytical data collected between 2001 and 2015 are illustrated on Figure 6. Two soil sample concentrations for benzene are slightly above MTCA Method A cleanup levels

(0.03 milligrams per kilogram [mg/kg]), measured at 0.032 in boring P-4 at 10 feet below ground surface (bgs) and 0.063 mg/kg in boring P-6 at 13 feet bgs. Borings P-4 and P-6 are located north and south, respectively, of the current UST pit. Lead in soil has been tested in three soil samples with concentrations ranging between 1.89 and 2.28 mg/kg, well below Puget Sound background of 24 mg/kg (Ecology, 1994) and the Method A cleanup level of 250 mg/kg.

Ground water analytical data collected in April 2001 and June 2014 are illustrated on Figures 7a and 7b, respectively. During the June 2014 event, monitoring wells completed just outside the 1989 soil removal (MW-3 and MW-4) area had gasoline and benzene concentrations above MTCA Method A cleanup levels or contained measureable LNAPL and were therefore not sampled (MW-9 through MW-13). Ground water data from well MW-16, located downgradient of the southern LNAPL occurrences, exceeds MTCA Method A cleanup levels for gasoline and benzene.

In addition to impacts from the on-Property petroleum release, cis-DCE and vinyl chloride were detected in ground water samples collected in wells located at the southwest corner of the Site at concentrations above MTCA cleanup levels (16 micrograms per liter [µg/L] for cis-DCE and 0.2 µg/L for vinyl chloride). Cis-DCE and vinyl chloride concentrations at well MW-13 were 24 µg/L and 0.67 µg/L, respectively. The concentration of cis-DCE at well MW-9 was 22 µg/L. Based on inferred direction of ground water flow to the east-southeast, these contaminants are suspected to be from an off-Property source – a former drycleaners located at the northwest corner of Brooklyn Avenue and Northeast 47th Street. The dry cleaner (or associated address) is not listed in Ecology's Toxics Cleanup Program web reporting database.

5.3 Potential Receptors

5.3.1 Human Receptors

Until November 1, 2016, Property use consists of a service station with convenience store. Customers are present on-Site for short periods of time. Site workers spend the majority of their time inside the convenience store; however, people working on the pump islands, and/or USTs may also be present occasionally for short periods of time.

The Property owner (FH Brooklyn, LLC) plans to redevelop the Property with a six-story apartment building with commercial space and one level of below-grade parking. Potential future receptors include construction workers, apartment and commercial tenants, and tenant visitors.

5.3.2 Ecological Receptors

Until a terrestrial ecological evaluation (TEE) is completed for this Site, terrestrial ecological receptors have not been identified. During the RI, a TEE will be performed for the Site in accordance with WAC 173-340-7492 to identify potential terrestrial ecological receptors and exposure pathways.

5.4 Potential Exposures Pathways

An exposure pathway describes the mechanisms by which human or ecological exposure to site contaminants can occur.

5.4.1 Currently Known and Potential Future Exposures to Human Receptors

Soil

As previously discussed, the area is typical of urban, developed land, with vegetation limited to landscaped planting areas and street-side trees. The Property, adjoining sidewalks, alley, and streets are paved. Current and future potentially complete exposure pathways for soil are workers contacting contaminated soils (skin contact or incidental ingestion) and/or inhaling contaminated soil particles or vapors during future remedial action activities, if no worker protection controls are in place.

Contaminants in soil can leach to ground water, acting as a secondary source. Therefore, the soil-to-ground water pathway must also be considered in areas where there is a potentially complete ground water exposure pathway.

Ground Water

No drinking water wells are present on the Property, and drinking water is supplied by the City of Seattle. However, ground water underlying the Site must be considered as potable and a potential source of drinking water. At this time, based on existing data, accidental contact or consumption of ground water during investigation, remediation and/or construction work is a potentially complete pathway for human receptors at the Site.

Vapor Inhalation

Individuals inhaling indoor air contaminated—via vapor intrusion—by the volatilization of contaminants in soil is another potential exposure pathway.

5.4.2 Currently Known and Potential Future Exposures to Ecological Receptors

As previously discussed, a TEE will be performed as part of the RI for the Site.

6 Planned Interim Action

An interim action is planned prior to Property redevelopment. The horizontal extent of excavation is planned to be the entire parcel to the depth required for redevelopment (development depth) and underground parking, estimated as 12 feet below grade. This excavation will be completed as an interim removal action and will be extended beyond the development depth with the objective of removing all soil exceeding MTCA Method A cleanup levels and disposing of soils off-Property. This interim action will be designed

to address all on-Property contamination and is intended to comprise the remedial action for the on-Property portion of the Site.

Prior to the Interim Action, the station will be closed and the USTs, associated piping, and dispenser islands will be removed in accordance with Ecology's UST regulations per 173-360-200 WAC and 173-360-385 WAC.

7 Remedial Investigation Tasks

This section of the RI Work Plan describes the RI scope of work and the rationale for those activities. The RI will address the identified data gaps for the Site (Section 7.1) with an emphasis on collecting sufficient data to characterize Site conditions, facilitate planned interim action activities during redevelopment, and evaluate possible cleanup alternatives in the FS. Procedures for sampling and analysis and quality assurance/quality control are described in the Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) in Appendix B of this Work Plan. A Health and Safety Plan (HASP) that pertains to the tasks to be conducted on-Property is provided in Appendix C. A HASP for off-Property investigation work will be provided at a later date.

7.1 Data Gaps

7.1.1 On-Property

Additional on-Property investigation is necessary to satisfy Ecology requirements for an on-Property interim action, guide on-Property excavation, and select the on-Property remedial action. The following data gaps have been identified based on previous environmental investigations and the CSM:

- Identification and Testing of Additional COPCs. The following COPCs required by 173-340-900 WAC, Table 830-1, have not been previously evaluated at the Site, and have been incorporated into the tables describing proposed cleanup levels (Table 1), the soil exploration plan (Table 2), and the SAP/QAPP (Appendix B):
  - Gasoline additives Ethylene dibromide (EDB) and Ethylene Dichloride (EDC); and
  - Naphthalenes.
  - Potential waste-oil contaminants:
    - Carcinogenic polycyclic aromatic hydrocarbons (cPAHs);
    - Polychlorinated biphenyls (PCBs); and
    - Cadmium, chromium, nickel, and zinc (per Table 7.2 of Ecology 2016a).
- Vertical and horizontal extent of soil contamination. Additional soil investigation data is needed to better define an approximate footprint and volume of soils for the interim action.

- Horizontal extent of the hard silt layer. Previous soil borings (MW-1, MW-16, R-1, SB-1) have encountered a hard silt layer at a depth of approximately 30 feet. A continuous hard silt layer would provide a confining unit for vertical transport of contamination. During the RI, additional borings will be completed to record the horizontal continuity of this hard silt layer and identify the silt unit as either Vashon Lawton clay (Qvlc) or older Pre-Fraser lacustrine unit (Qpnl). Soil boring data will be reviewed relative to nearby Sound Transit Northgate Link geotechnical borings and discussed in the RI Report.
- Soil chemistry data for waste characterization. Sufficient soil chemistry data is necessary for waste characterization and disposal acceptance for interim action planning.
- On-Property ground water characterization. Ground water sampling was last conducted in 2014. During the RI, an additional round of ground water sampling will be conducted to record current LNAPL thickness, depth to water, and dissolved COPC concentrations.
- Ground water flow direction. During the RI, Site monitoring wells will be resurveyed to confirm ground water flow conditions. Wells will be surveyed to 1988 North American Vertical Datum, whereas previously it was an arbitrary site datum.
- Assessment of soil vapor intrusion (VI). The VI exposure pathway will be evaluated per the draft Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State (2016b). Data collected during the on-Property investigation and remedial action will be used to assess the soil VI pathway and develop additional RI activities to be conducted after the Interim Action.

7.1.2 Off-Property

Off-Property data gaps will be identified based on results of the on-Property investigation outlined in Section 7.2.1 and the interim action soil removal.

7.2 Data Collection and Field Sampling Plan

This section of the Work Plan defines the field sampling program proposed to address the data gaps identified in Section 7.1. This work will be conducted in accordance with the Sampling and Analysis Plan/Quality Assurance Project Plan (Appendix B), attached to this Work Plan.

7.2.1 On-Property Investigation

7.2.1.1 Proposed Soil Sampling

Nine soil borings will be advanced to delineate the vertical extent of soil exceeding MTCA Method A cleanup levels and to develop waste characterization information for the purpose of soil disposal. Drilling will be performed using sonic drilling methods which allows dual-casing to prevent drag-down of shallow contamination. Table 2 provides a summary of the proposed soil sampling intervals and analytical sampling.

The sampling and analysis plan for these borings includes the following:

- Borings will be completed to an approximate depth of 30 to 35 feet to assess depth of hard silt layer in previous Site borings.
- Five soil borings (AB-1 and -5) will be extended up to 5 feet into the silt layer to assess the thickness of this stratigraphic unit. The other four borings will be completed approximately 1 foot into the hard silt as confirmation. If free product is encountered in borings AB-1 through AB-5, they will not be extended beyond 1 foot into the silt, to prevent contamination of any deeper units.
- Depth to water and LNAPL thickness, if present, will be measured in all wells. If LNAPL is measured in MW-8 or MW-7, an additional boring will be completed due north of AB-5 and due east of MW-10 to assess the eastern extent of LNAPL.
- The entire length of each recovered core will be examined for the field indications of LNAPL and the presence of contaminants, in accordance with procedures specified in the SAP. Discrete soil samples will be collected every 5 feet, on average, from each boring. Since sonic drilling can produce high soil temperatures resulting in loss of volatiles, soil samples will be collected from the center of the soil core.
- Samples will be submitted for analysis of gasoline-, diesel-, and oil-range TPH and BTEX, based on field screening, as described in detail in the SAP.
- Up to five soil samples will be analyzed for MTBE, EDB, EDC, naphthalene, and total lead as a follow-on analysis. Samples will be selected from borings AB-5, AB-6, and AB-8, where gasoline-range TPH is elevated in laboratory analysis, to provide proper horizontal and vertical characterization.
- Up to five soil samples will be analyzed for PCBs, cPAHs, cadmium, chromium, nickel, and zinc as a follow-on analysis if oil-range TPH is detected in laboratory analysis. If oil-range TPH is detected in more than five samples, sample selection will be made to provide proper horizontal and vertical characterization.
- Select soil samples from the saturated zone from borings AB-3 and AB-4 will be submitted for analysis of CVOCs by EPA Method 8260B. Samples from other borings may be submitted for analysis if necessary to delineate extent of CVOCs in soil.

7.2.1.2 Proposed Ground Water Monitoring

The purpose of the ground water sampling is to document current ground water COPC conditions prior to abandonment of all existing monitoring wells, which is necessary to complete the planned interim action described in Section 6. A ground water monitoring event is proposed in November 2016. While there are 16 wells located on-Site, well MW-1 has been deemed inaccessible during prior activities due to an obstruction in the casing. The sampling and analysis plan for the ground water sampling event is provided in Table 3 and includes:

- Measure depth to water and/or free product in all accessible wells. Historically, wells MW-9 through MW-13 have had measureable free product.

- Ground water samples will be collected from all wells not containing free product, with the exception of wells MW-9 and MW-13.
- Samples will be submitted for analysis of gasoline-, diesel-, and oil-range TPH, BTEX, MTBE, and dissolved lead. If measurable free product is present in a well, a sample will not be collected for these analytes.
- Ground water samples from well MW-9, MW-11 and MW-13 will be submitted for analysis of CVOCs. If measurable free product is present, a sample will still be collected from the ground water beneath the LNAPL.

7.2.2 Off-Property Investigation

Off-Property investigation will be designed to fill the data gaps identified in Section 7.1.2 at a later date, and is required to define the Site boundaries.

7.2.3 Data Evaluation

The results of the sampling and analysis conducted during the RI will be used to evaluate contaminant fate and transport, to update the preliminary CSM presented in Section 5, and inform the design and implementation of the interim action. The updated CSM will include an update to the assessment of exposure pathways and potential receptors based on the results of the data collected during the RI event.

8 Schedule and Reporting

The schedule for the RI activities and deliverables is provided in Exhibit C of the Agreed Order No. 13815. The On-Property investigation activities described in Section 7.2.1 are schedule to be completed in November 2016. The results of the activities will be reported in a RI Data Report to be submitted by January 2017. This RI Data Report will serve as the primary basis as the Interim Action Work Plan to be submitted to Ecology in January 2017 with the goal of beginning Interim Action implementation by the end of March 2017.

An Agency Draft RI Work Plan will be submitted to Ecology in accordance with Exhibit C of the Agreed Order and will include the planned off-Property activities.

9 References

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TABLES

Table 1 - Proposed Cleanup Levels

Project No. 160092, 4700 Brooklyn Avenue
Seattle, WA

Analyte	MTCA Method A Unrestricted Land Uses	
	Soil	Groundwater
	in mg/kg	in µg/L
Total Petroleum Hydrocarbons		
Gasoline-Range Organics	30/100 [a]	800/1,000 [a]
Diesel-Range Organics	2,000	500
Heavy Oil-Range Organics	2,000	500
Volatile Organic Compounds		
Benzene	0.03	5
Cis-1,2-Dichloroethene[b]	160	16
Ethylbenzene	6	700
Ethylene Dibromide	0.005	0.01
Ethylene Dichloride	480 [c]	5
MTBE	0.1	20
Toluene	7	1,000
Vinyl Chloride	0.67 [c]	0.2
Xylenes	9	1,000
Carcinogenic Polycyclic Aromatic Hydrocarbons		
benzo[a]pyrene	0.1 [d]	0.1 [d]
benzo[a]anthracene	d	d
benzo[b]fluoranthene	d	d
benzo[k]fluoranthene	d	d
chrysene	d	d
dibenz[a,h]anthracene	d	d
indeno[1,2,3-cd]pyrene	d	d
Metals		
Cadmium	2	5
Chromium	19/2000 [e]	50
Lead	250	15
Nickel	1,600 [c]	320 [c]
Zinc	24,000 [c]	4,800 [c]
Polychlorinated Biphenyls		
PCB Mixtures	1	0.1

Notes:

Soil cleanup levels are primarily based on the protection of groundwater for drinking water with these exceptions: diesel and oil are based on preventing accumulation of free product; cis-1,2 DCE, vinyl chloride and lead are based on protection of human direct contact.

Groundwater cleanup levels are based on protection of groudnwater for drinking water.

a Benzene present/no detectable benzene

b No Method A soil or groundwater cleanup level. The value listed is Method B - noncancer.

c Method A does not have a soil cleanup level for vinyl chloride. The value listed is Method B - Soil Direct Contact.

d As per MTCA Method A, if other carcinogenic PAHs are detected, we will use this value as the total concentration that all carcinogenic PAHs must meet using the toxicity equivalency methodology in WAC 173-340-708(8).

e Method A soil cleanup levels for Chromium IV/Chromium III

Table 2 - Soil Exploration Plan

Project No. 160092, 4700 Brooklyn Avenue
Seattle, WA

	Sampling Interval(s)		Chemical Analysis						
Exploration Name	Approximate Depth in Feet	TPH and BTEX Soil Sampling Depth Intervals in Feet[1]	Gas-Range TPH (NWTPH-G)	Diesel-Range TPH (NWTPH-Dx)	BTEX (8021B)	Chlorinated VOCs (EPA 8260)	MTBE, EDB, EDC, naphthalene [2] (8260)	Total Lead[2] (6020)	cPAHs (8270), PCBs (8082), and Cadmium, Chromium, Nickel, Zinc (6020) [3]
On-Property Soil Borings									
AB-1	35	4-5; 9-10; 14-15; 19-20; 24-25; 29-30; 34-35	X	X	X				(3)
AB-2			X	X	X				
AB-3			X	X	X	X			
AB-4			X	X	X	X			
AB-5			X	X	X	X	X	X	
AB-6	30	4-5; 9-10; 14-15; 19-20; 24-25; 29-30	X	X	X		X	X	
AB-7			X	X	X				
AB-8			X	X	X		X	X	
AB-9			X	X	X				

Notes:

TPH = total petroleum hydrocarbons
VOCs = volatile organic compounds
MTBE = methyl tertiary-butyl ether
EDC = Ethyl Dichloride or 1,2-dichloroethane
EDB = Ethyl Dibromide
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
PCBs = Polychlornated biphenols

[1] Approximately one discrete sample within each interval will be selected for analysis based on field observations including sheen, odor, and PID readings.
If evidence of contamination is encountered in the lowest interval, the boring will be advanced lower and another sample collected.

[2] Up to five total samples will be submitted for analysis of EDB, EDC, MTBE and total lead. Not every sample interval will be analyzed.

[3] Up to five total samples with oil-range TPH detections will be submitted for follow-on analysis of cPAHs, PCBs, cadmium, chromium, nickel, and zinc.

Table 3 - Ground Water Monitoring Plan

Project No. 160092, 4700 Brooklyn Avenue
Seattle, WA

Exploration Name	Screen Interval Depth in Feet	Field Parameters	Water Level	Product Thickness (1)	Gas-Range TPH (NWTPH-Gx)	Diesel-Range TPH (NWTPH-Dx)	Chlorinated VOCs (8260)	MTBE (8260)	Dissolved Lead (6020)
On-property Monitoring Wells									
MW-1	1.5 to 27.3	X	X		X	X		X	X
MW-2	5 to 24.5	X	X		X	X		X	X
MW-3	5 to 25	X	X		X	X		X	X
MW-4	5 to 21.8	X	X		X	X		X	X
MW-5	5 to 21.6	X	X		X	X		X	X
MW-6	5 to 23	X	X		X	X		X	X
MW-7	5 to 20.5	X	X		X	X		X	X
MW-8	5 to 23	X	X		X	X		X	X
MW-9	5 to 21.4	*(X)*	X	X	*(X)*	*(X)*	X	*(X)*	*(X)*
MW-10	5 to 22.5	*(X)*	X	X	*(X)*	*(X)*		*(X)*	*(X)*
MW-11	5 to 22.5	*(X)*	X	X	*(X)*	*(X)*	*X*	*(X)*	*(X)*
MW-12	5 to 21.5	*(X)*	X	X	*(X)*	*(X)*		*(X)*	*(X)*
MW-13	5 to 22.8	*(X)*	X	X	*(X)*	*(X)*	X	*(X)*	*(X)*
MW-14	5 to 23.5	X	X		X	X		X	X
MW-15	10 to 25	X	X		X	X		X	X
MW-16	10 to 25	X	X		X	X		X	X

Notes:

TPH = total petroleum hydrocarbons

VOCs = volatile organic compounds

MTBE = methyl tertiary-butyl ether

(1) - Wells listed to have free product, based on data from 2014.

Field Parameters include: temperature, pH, conductivity, dissolved oxygen, ORP.

(X) If the well has no measureable product, a groundwater sample will be collected and field parameters will be recorded. A groundwater sample will be collected from beneath the product in wells MW-9 and MW-13 and submitted for analysis of chlorinated VOCs only.

FIGURES

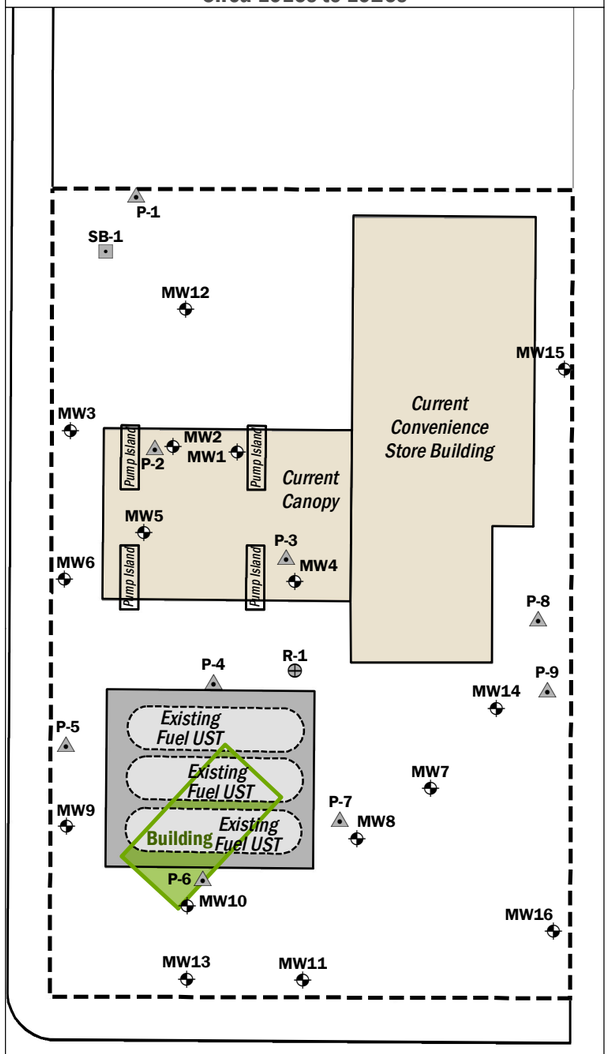
Vicinity Map

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

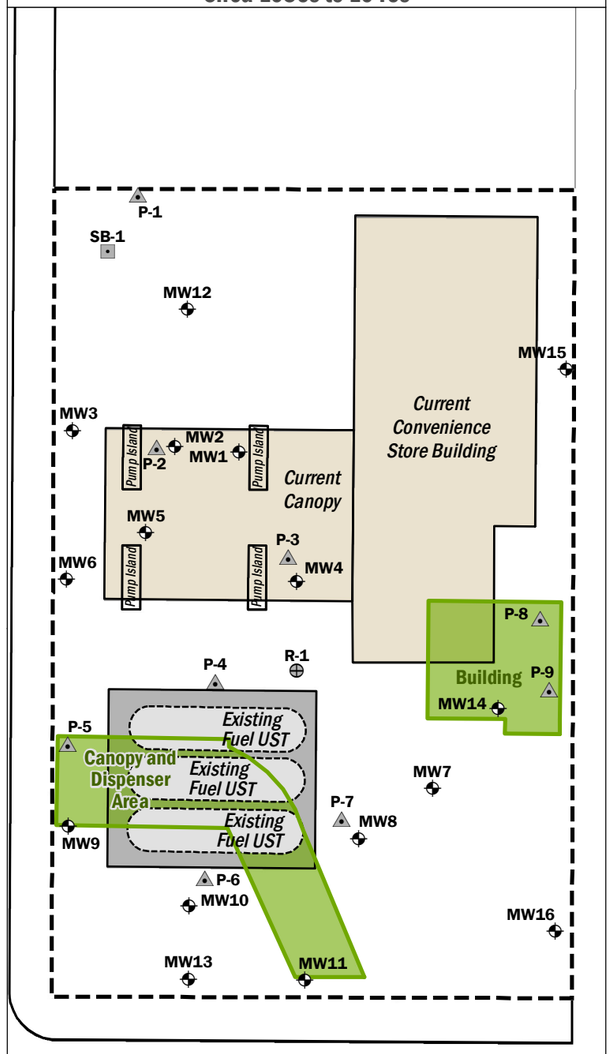
Aspect CONSULTING	NOV-2016	BY: DLC / RAP	FIGURE NO. 1
	PROJECT NO. 160092	REVISED BY: SCC	

GIS Path: T:\projects_8\4700 Brooklyn 160092\Delivered\Remedial Investigation Work Plan\01-Vicinity Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 11/2/2016 || User: ecrumbaker || Print Date: 11/2/2016

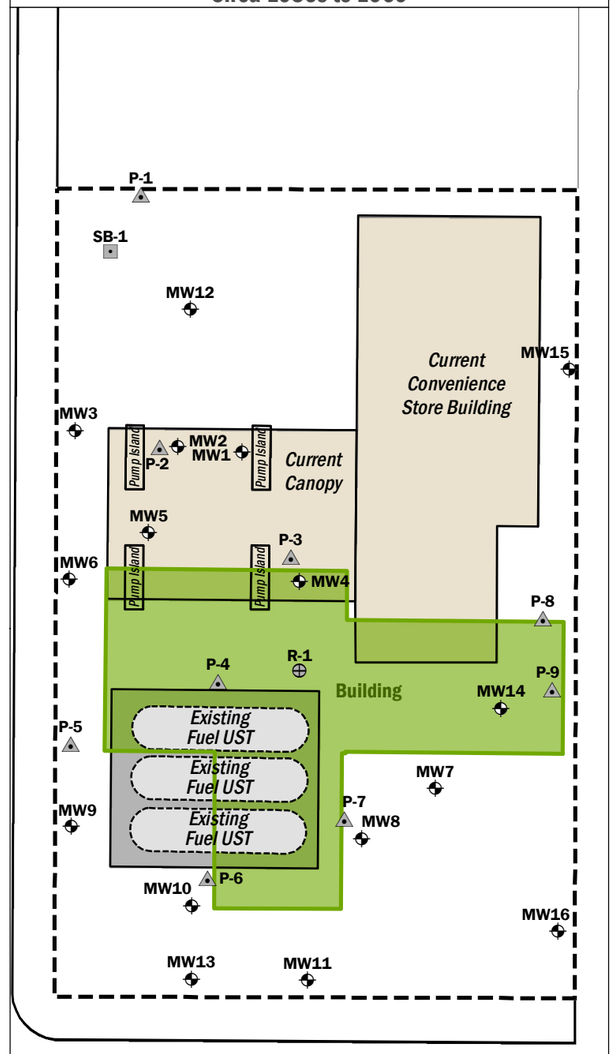
First Generation Gas Station
Circa 1910s to 1920s



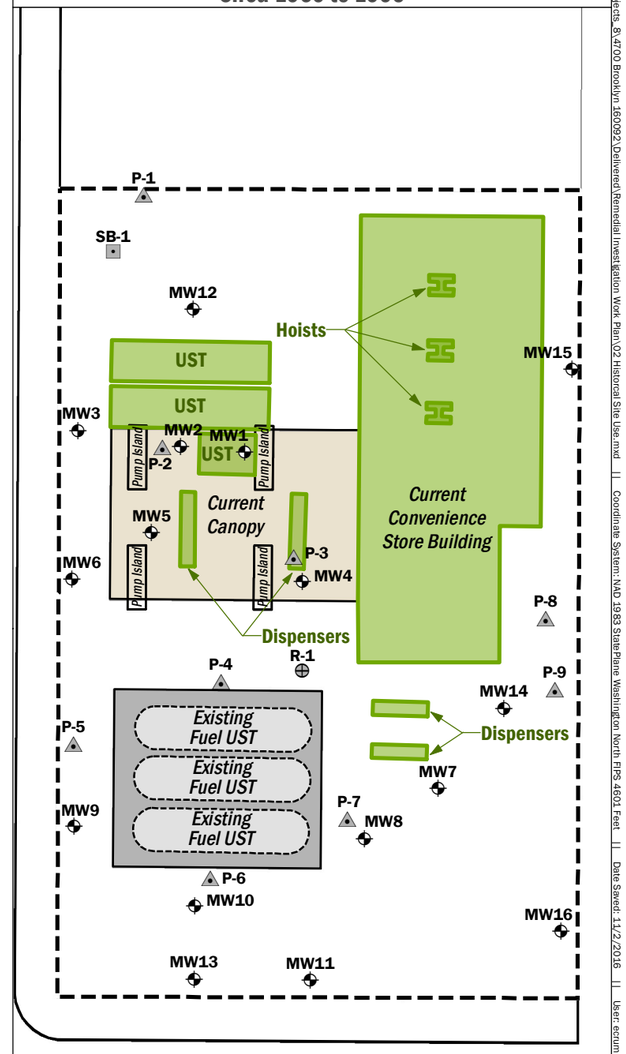
Second Generation Gas Station
Circa 1930s to 1940s



Third Generation Gas Station
Circa 1950s to 1969



Fourth Generation Gas Station
Circa 1969 to 1990



Explorations

- Monitoring Well
- Product Recovery Well
- Soil Boring
- Test Probe

- Historic Features
- Current USTs
- Building
- Property Boundary
- Tax Parcel

N

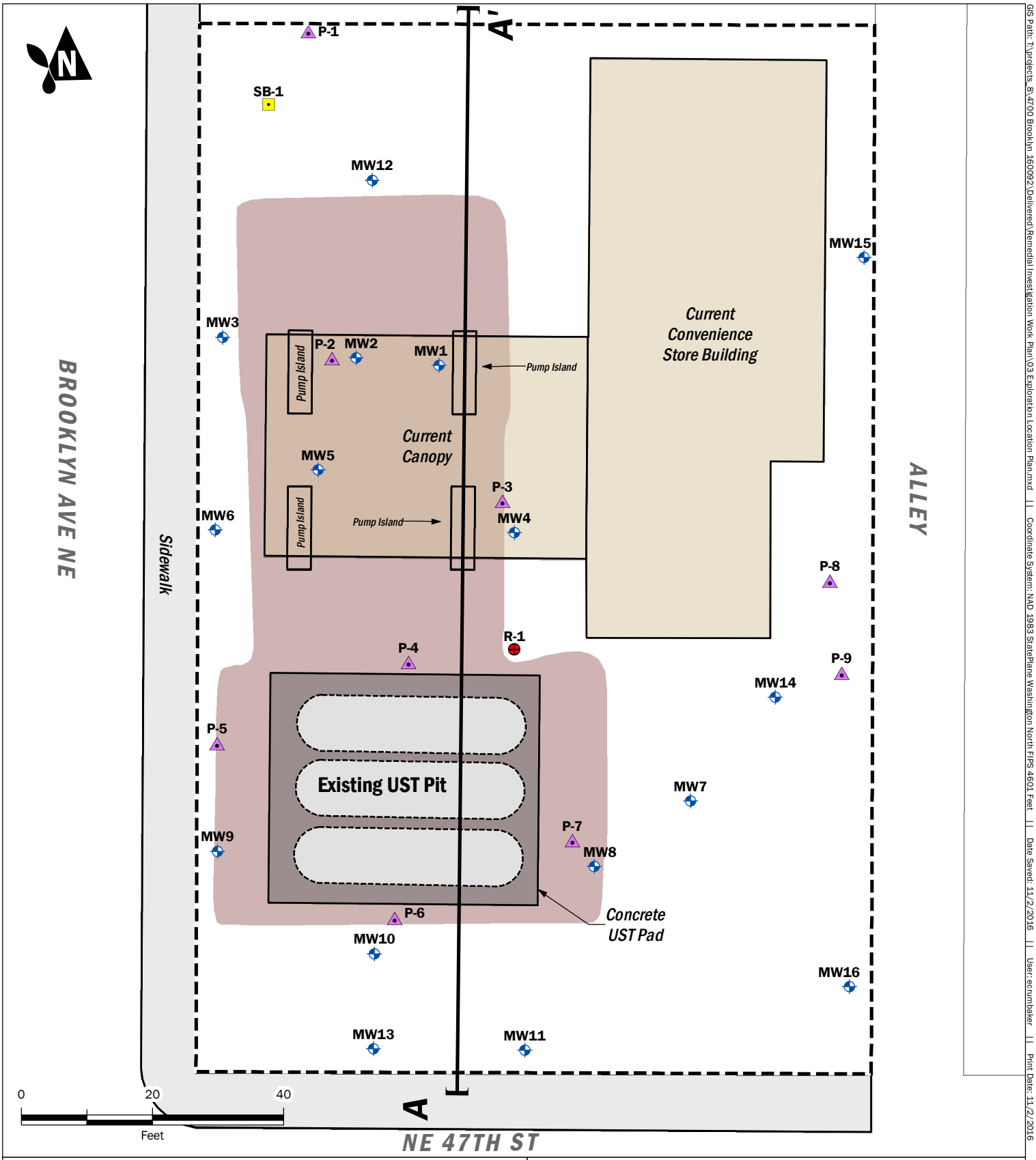
0 30 60

Feet

Historical Site Use

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

Aspect CONSULTING	NOV-2016	BY: DLC / EAC	FIGURE NO. 2
	PROJECT NO. 160092	REVISED BY: SCC	

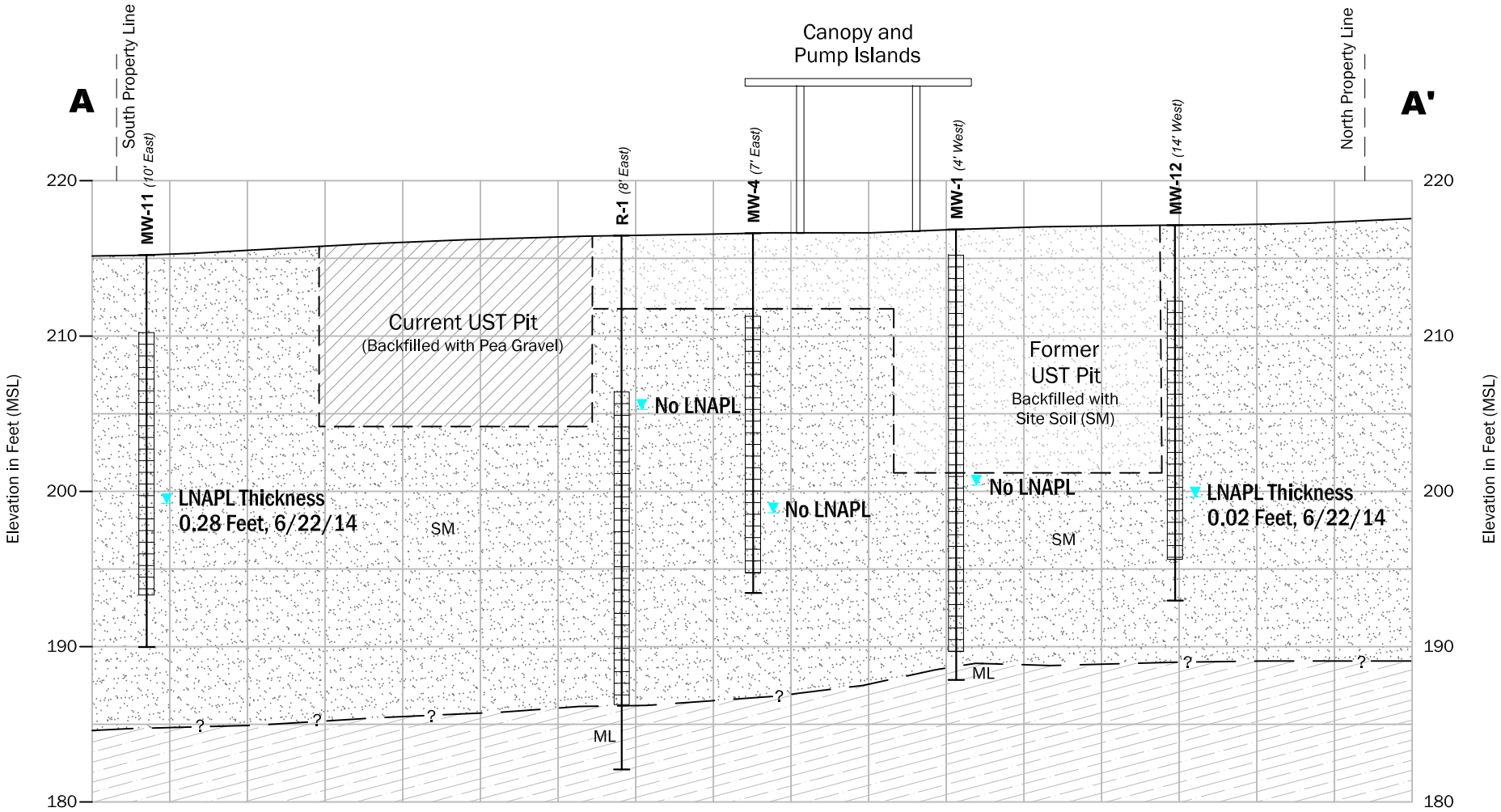


Monitoring Well
Product Recovery Well
Soil Boring
Test Probe
Cross Section
UST
1989 Soil Excavation Boundary
Building
Property Boundary
Tax Parcel

Site Layout

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

Aspect CONSULTING	NOV-2016	BY: DLC / RAP	FIGURE NO. 3
	PROJECT NO. 160092	REVISED BY: EAC/SCC	



Gray fine to medium sand with silt and occasional gravel. Grades from loose to dense with depth (SM).

Medium stiff to hard gray silt (ML).

▼ Depth to Water

Note: Depth to water & LNAPL measurements from June 2014 with the exception of R-1 & MW-1. These wells were inaccessible therefore water levels are from time of drilling (boring logs in Appendix A).

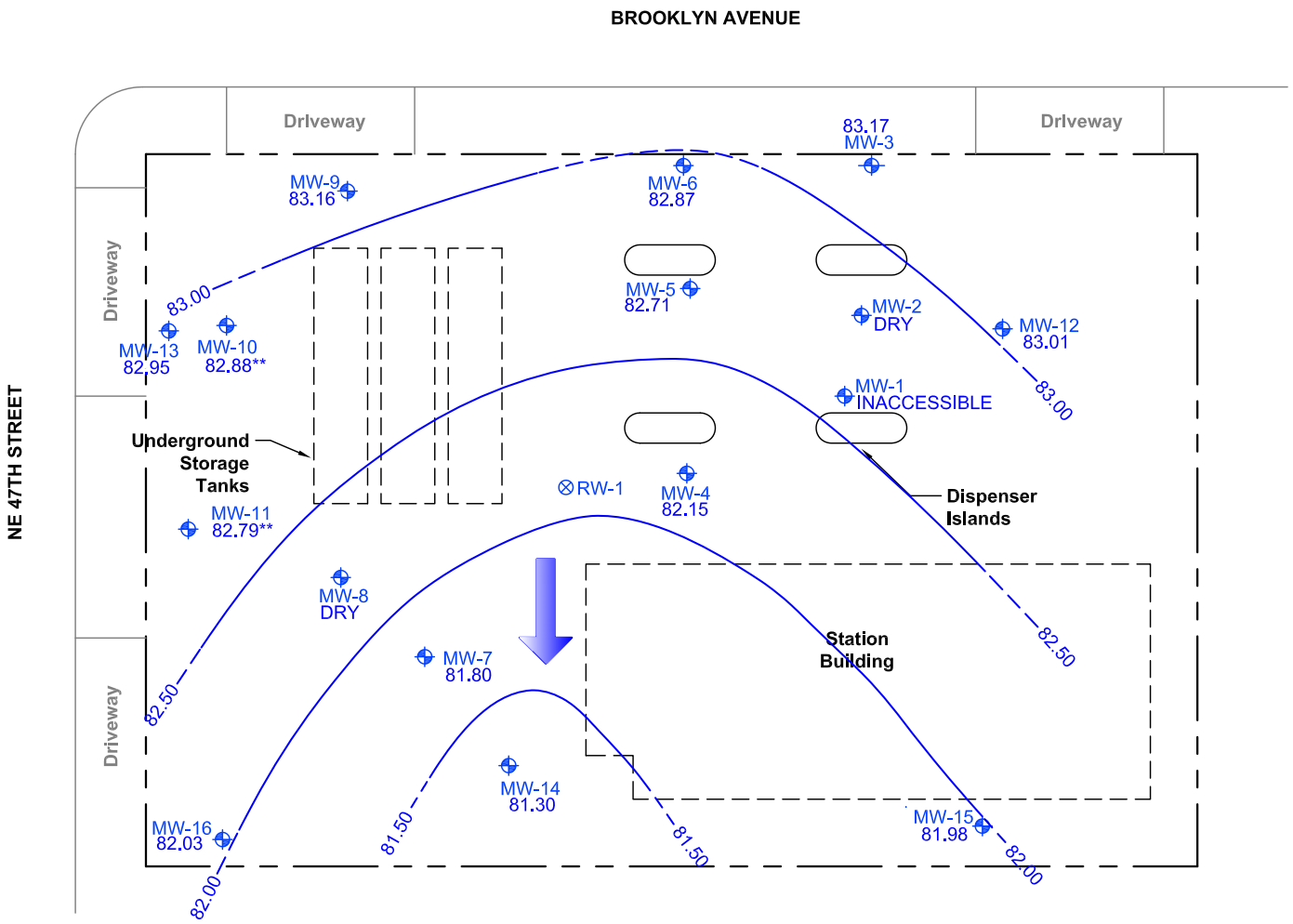
Horizontal Scale: 1" = 20'
Vertical Scale: 1" = 10'
Vertical Exaggeration 2x

0 20 40 Feet

Cross Section A-A'

Remedial Investigation Work Plan
4700 Brooklyn Avenue NE
Seattle, Washington

Aspect Consulting	Nov-2016	BY: DLC/SCC	FIGURE NO. 4
	PROJECT NO. 160092	REV BY: ASC/SCC	



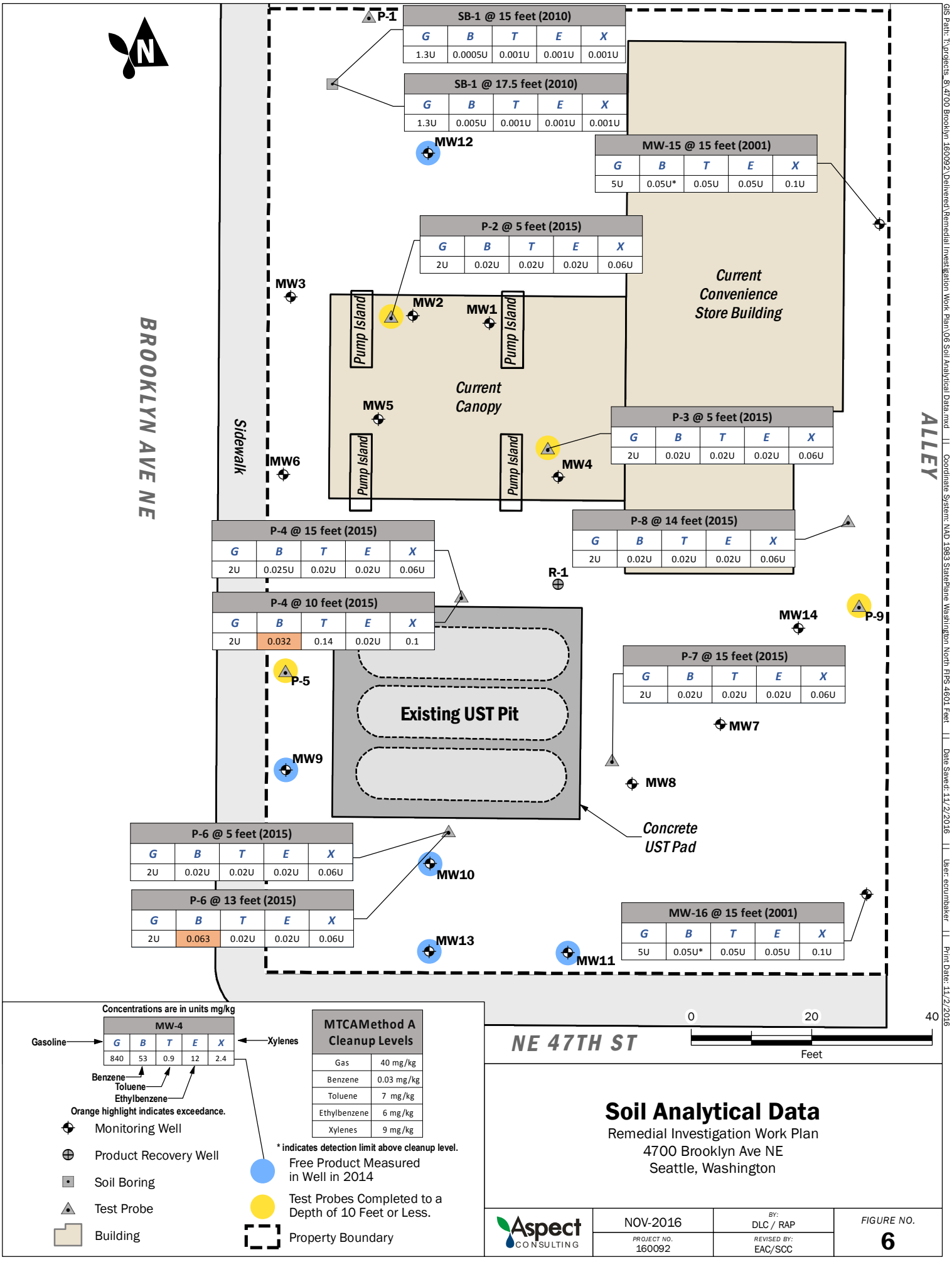
LEGEND

MW-6 ⊕	Groundwater Monitoring Well
RW-1 ⊗	Recovery Well
82.15	Groundwater Elevation in Feet
82.79**	Groundwater Elevation Corrected for the Presence of Separate Phase Hydrocarbons (SPH)
82.00 ——	Groundwater Elevation Contour at a 0.5 Foot Interval (Dashed Where Inferred)
⟵	Approximate Groundwater Flow Direction at a Gradient of 0.02 to 0.03 Ft./Ft.

Ground Water Contour Map
March 2013

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

Aspect CONSULTING	NOV-2016	BY: DLC / EAC	FIGURE NO. 5
	PROJECT NO. 160092	REVISED BY: ---	

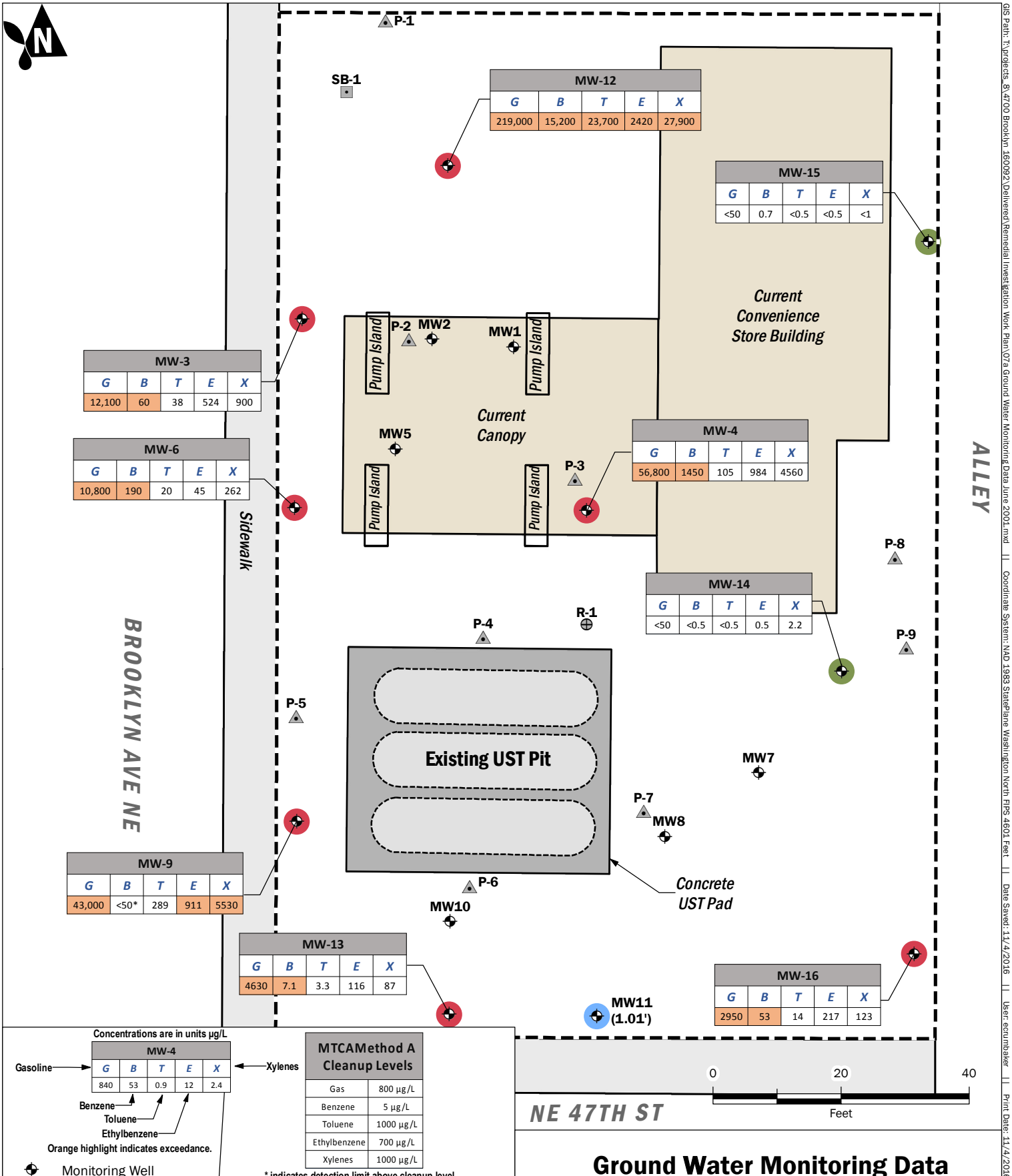


Soil Analytical Data

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

Aspect CONSULTING	NOV-2016	BY: DLC / RAP	FIGURE NO. 6
	PROJECT NO. 160092	REVISED BY: EAC/SCC	

GIS Path: T:\projects_8\4700 Brooklyn 160092\Delivered\Remedial Investigation Work Plan\06 Soil Analytical Data.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 11/2/2016 || User: ecrumbaker || Print Date: 11/2/2016



Concentrations are in units µg/L

MW-4

G	B	T	E	X
840	53	0.9	12	2.4

Gasoline — Xylenes — Benzene — Toluene — Ethylbenzene

Orange highlight indicates exceedance.

MTCAMethod A Cleanup Levels	
Gas	800 µg/L
Benzene	5 µg/L
Toluene	1000 µg/L
Ethylbenzene	700 µg/L
Xylenes	1000 µg/L

* indicates detection limit above cleanup level.

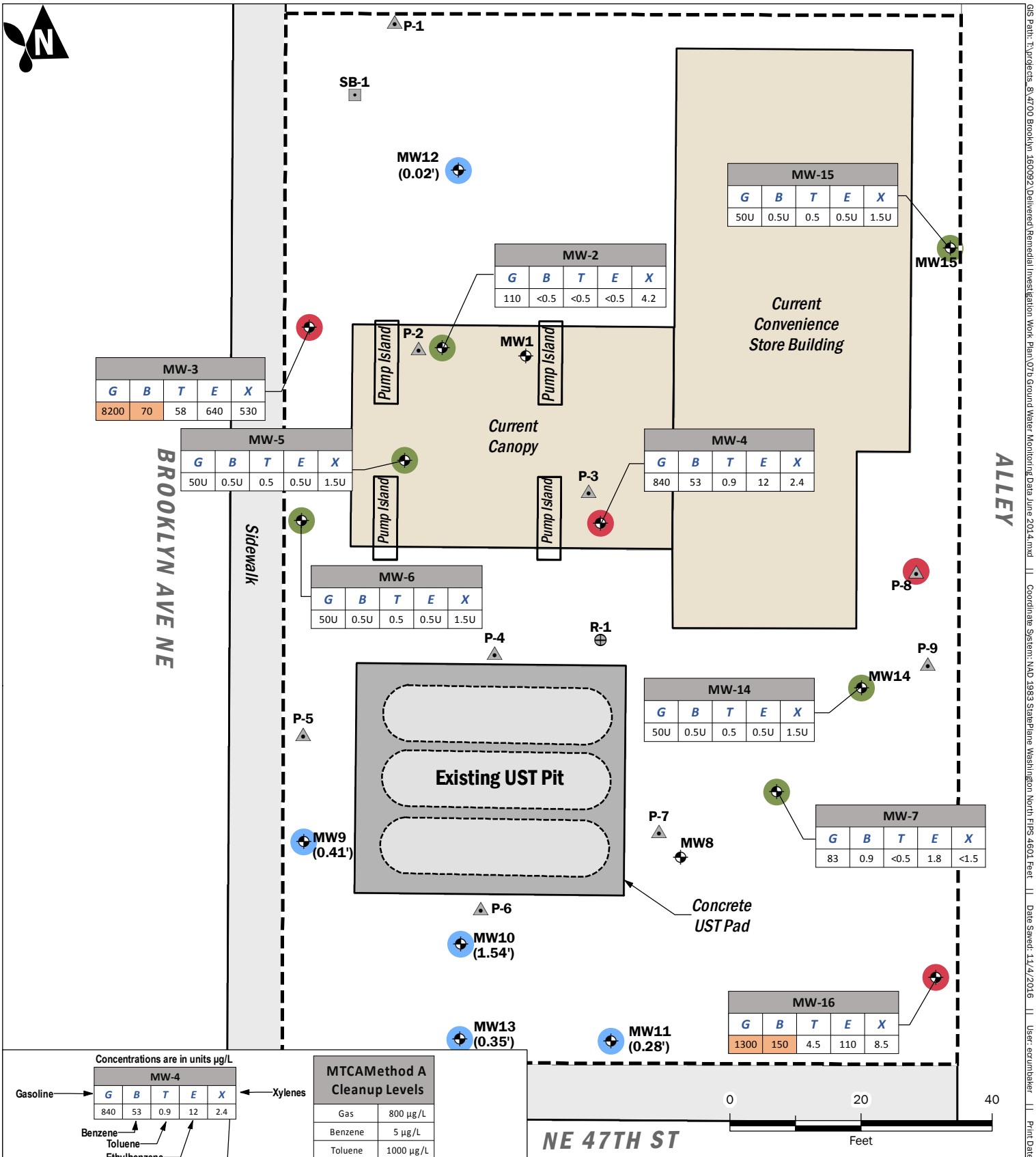
- Monitoring Well
- Product Recovery Well
- Soil Boring
- Test Probe
- Building
- Free Product Measured in Well in 2001
- Data Above at Least One MTCA Method A Cleanup Level for at Least One Constituent
- Data Below MTCA Method A Cleanup Levels for All Constituents or Non-Detect
- Property Boundary

Notes:
-Wells MW-1, MW-2, MW-5, MW-7, MW-8, and MW-10 were not sampled.

Ground Water Monitoring Data
April 2001

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

Aspect CONSULTING	NOV-2016	BY: DLC / RAP	FIGURE NO. 7a
	PROJECT NO. 160092	REVISED BY: EAC/SCC	



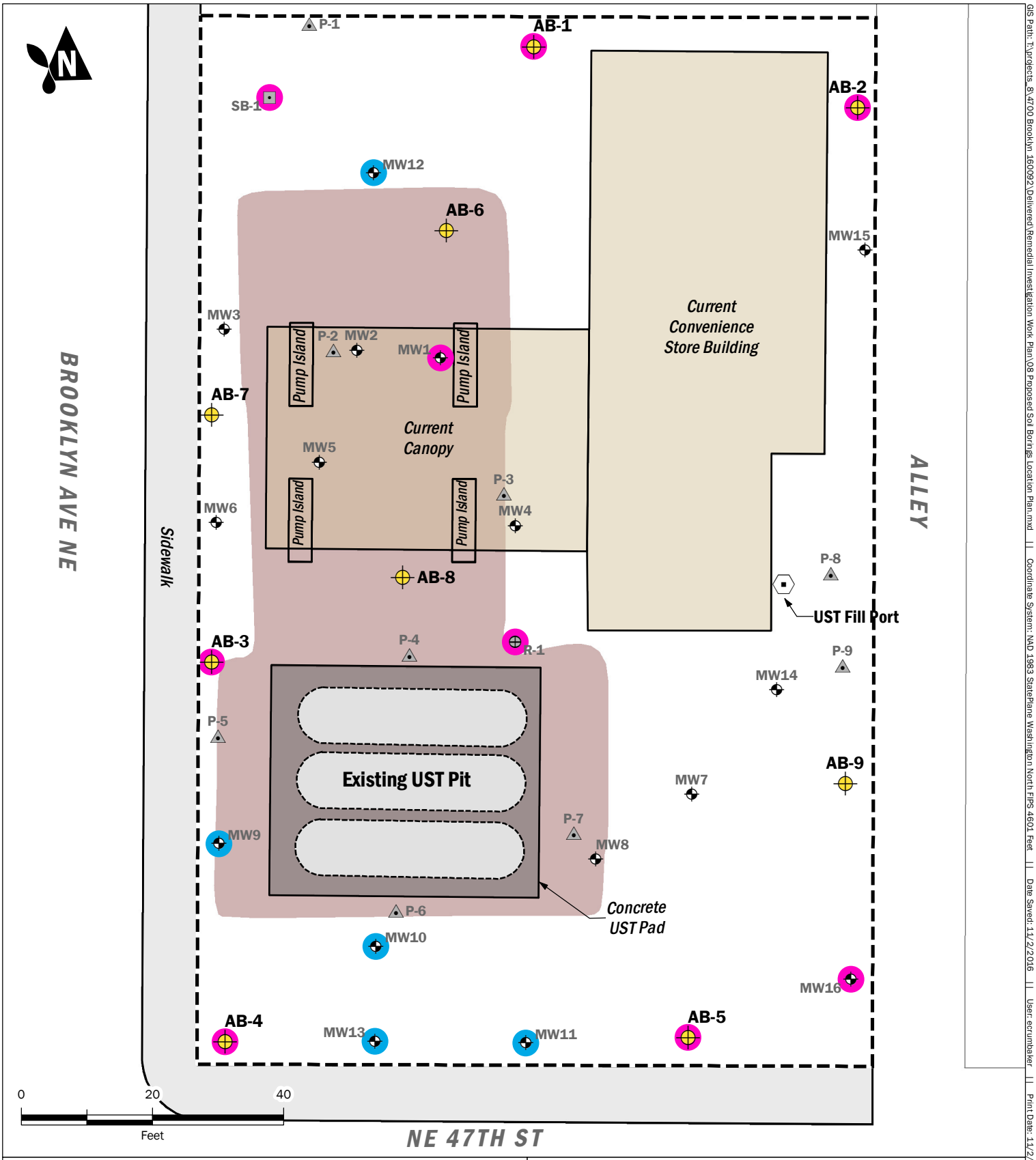
Notes:
-Wells MW-1 and MW-8 inaccessible at time of sampling event.

Ground Wwater Monitoring Data June 2014

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

Aspect CONSULTING	NOV-2016	BY: DLC / RAP	FIGURE NO. 7b
	PROJECT NO. 160092	REVISED BY: EAC/SCC	

GIS Path: T:\projects_8\4700 Brooklyn 160092\Delivered\Remedial Investigation Work Plan\07b Ground Water Monitoring Data June 2014.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 11/4/2016 || User: ecrumbaker || Print Date: 11/4/2016



- Proposed Boring
- Monitoring Well
- Product Recovery Well
- Soil Boring
- Test Probe
- Free Product Measured in Well in 2014
- Existing and Proposed Borings That Extend into Hard Silt
- Property Boundary
- 1989 Soil Excavation Boundary

Proposed Soil Borings Location Plan

Remedial Investigation Work Plan
4700 Brooklyn Ave NE
Seattle, Washington

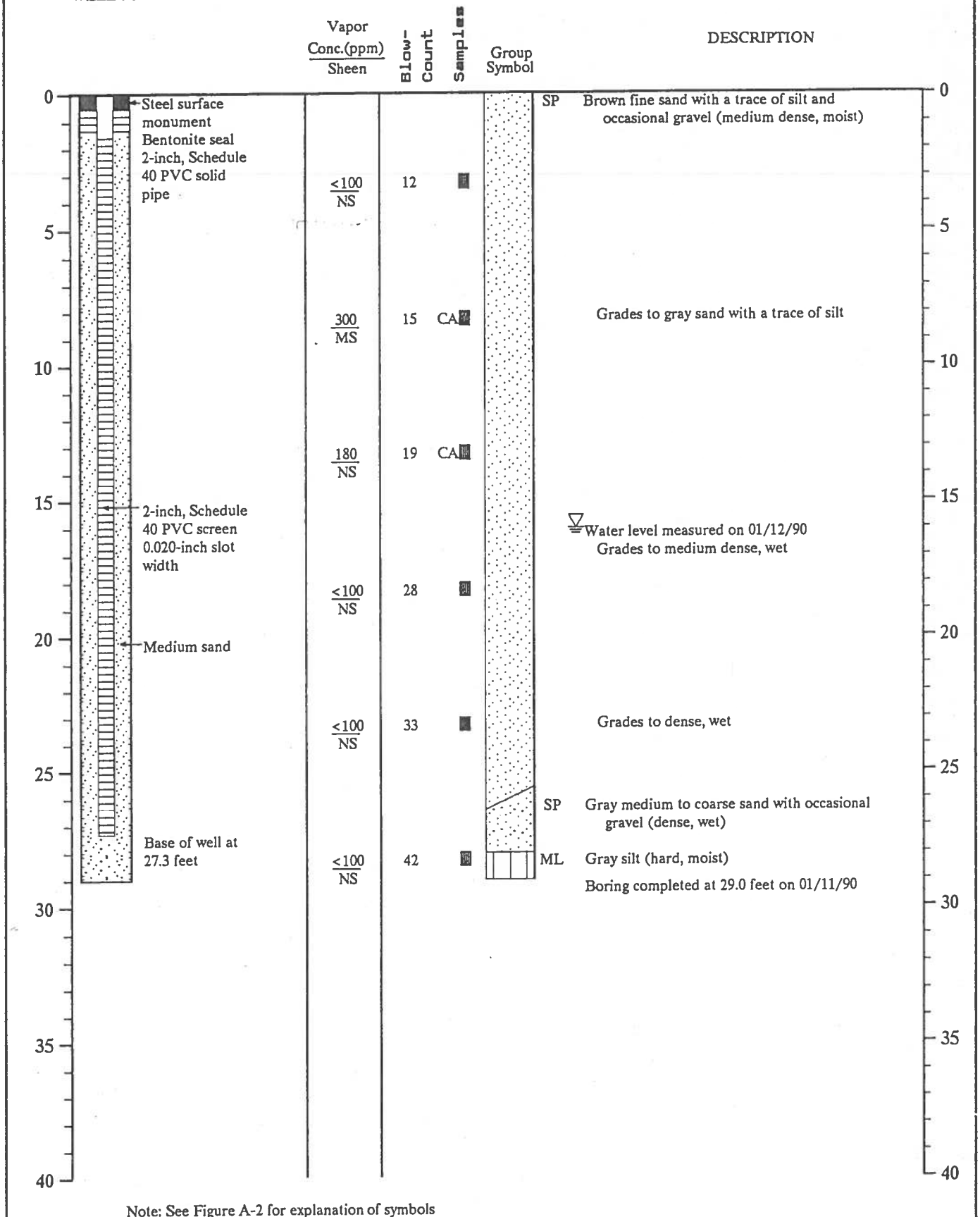
Aspect Consulting	NOV-2016	BY: DLC / RAP	FIGURE NO. 8
	PROJECT NO. 160092	REVISED BY: EAC/SCC	

GIS Path: T:\projects_8\4700 Brooklyn 160092\Delivered\Remedial Investigation Work Plan\08 Proposed Soil Borings Location Plan.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 11/2/2016 || User: ecrumbaker || Print Date: 11/2/2016

APPENDIX A

Boring Logs

MONITOR WELL NO. MW-1



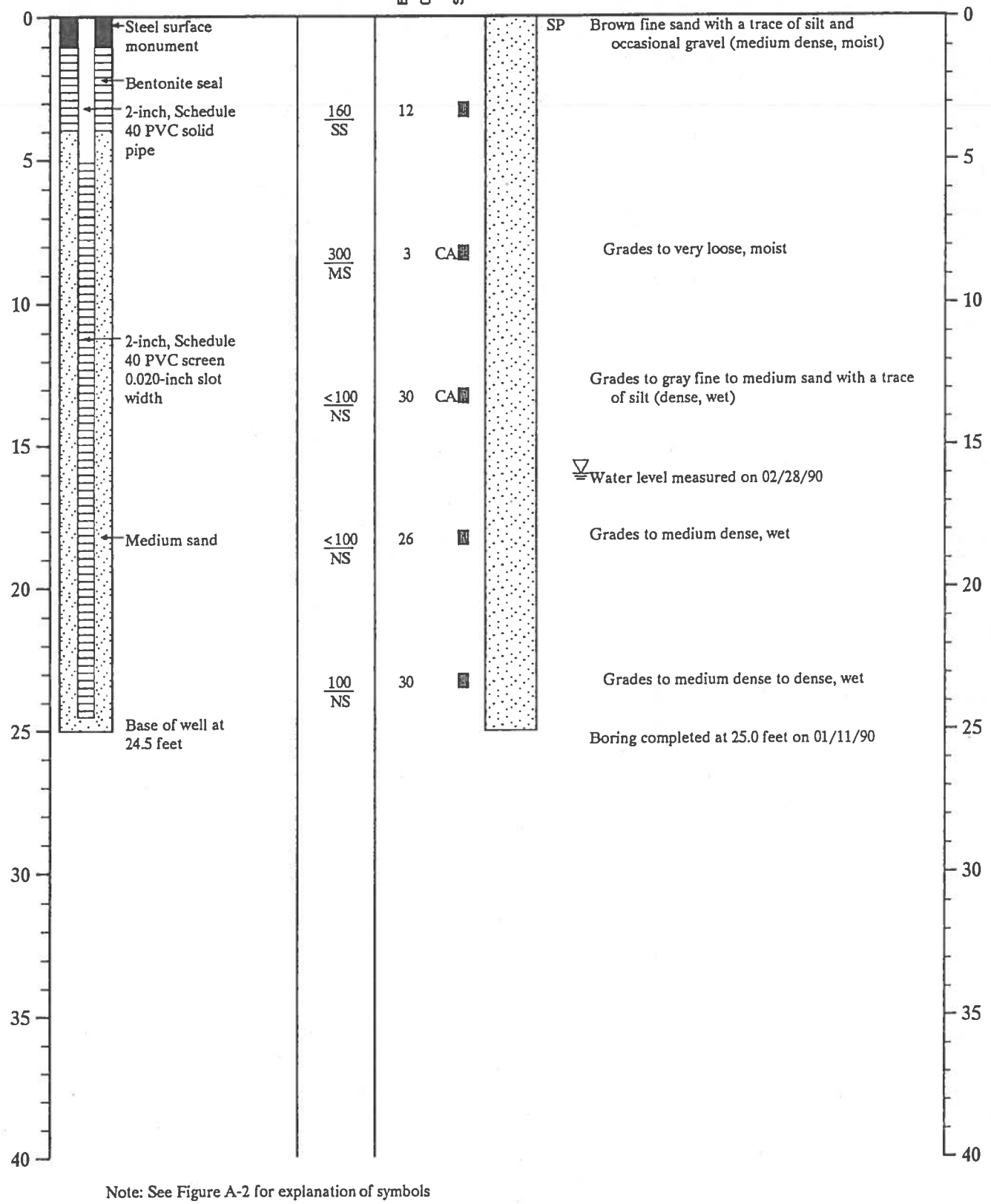
Note: See Figure A-2 for explanation of symbols

GeoEngineers

Log of Monitor Well

Figure A-3

MONITOR WELL NO. MW-2



Note: See Figure A-2 for explanation of symbols

Geo Engineers

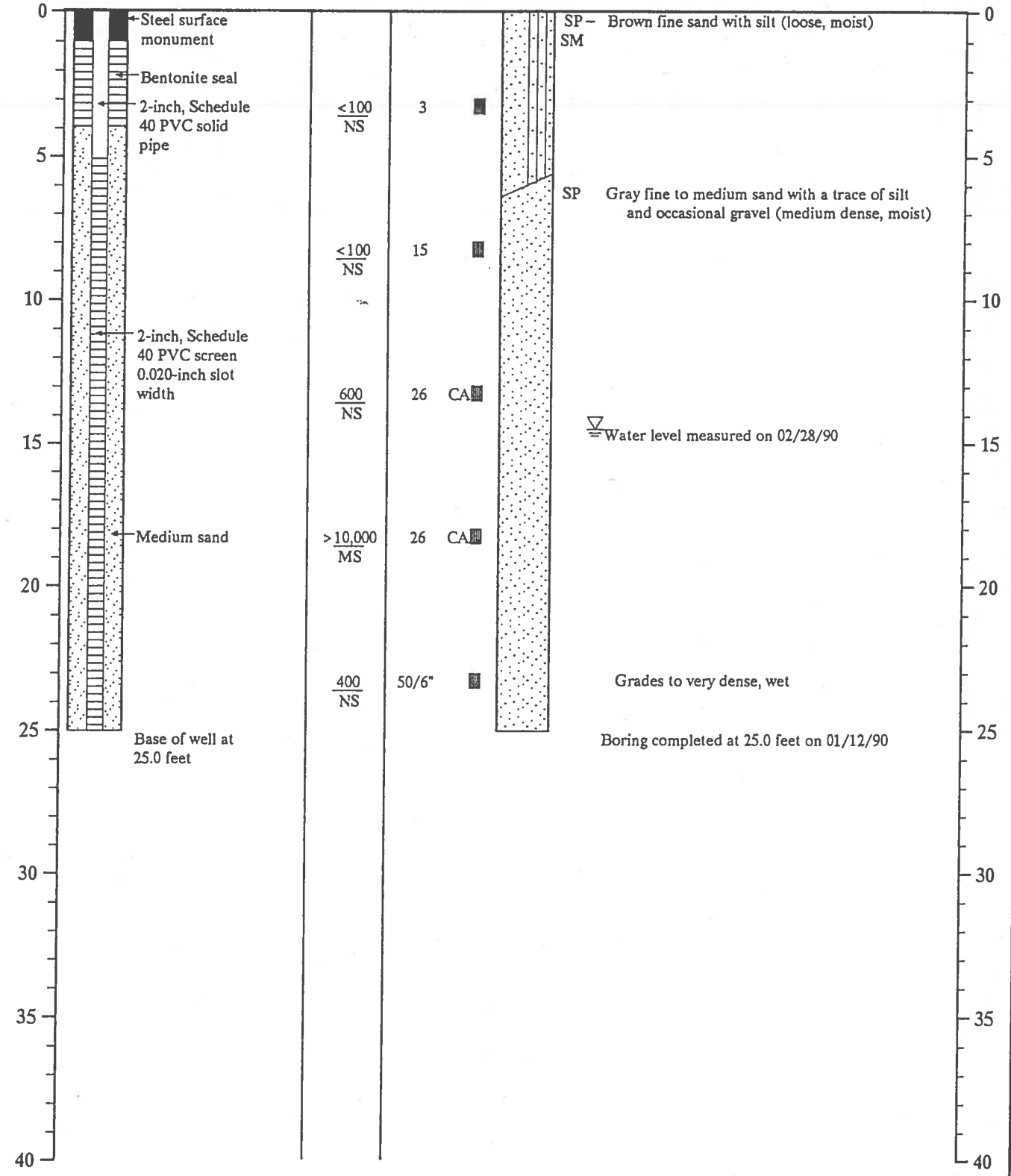
Log of Monitor Well

Figure A-4

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-3



Note: See Figure A-2 for explanation of symbols

Geo Engineers

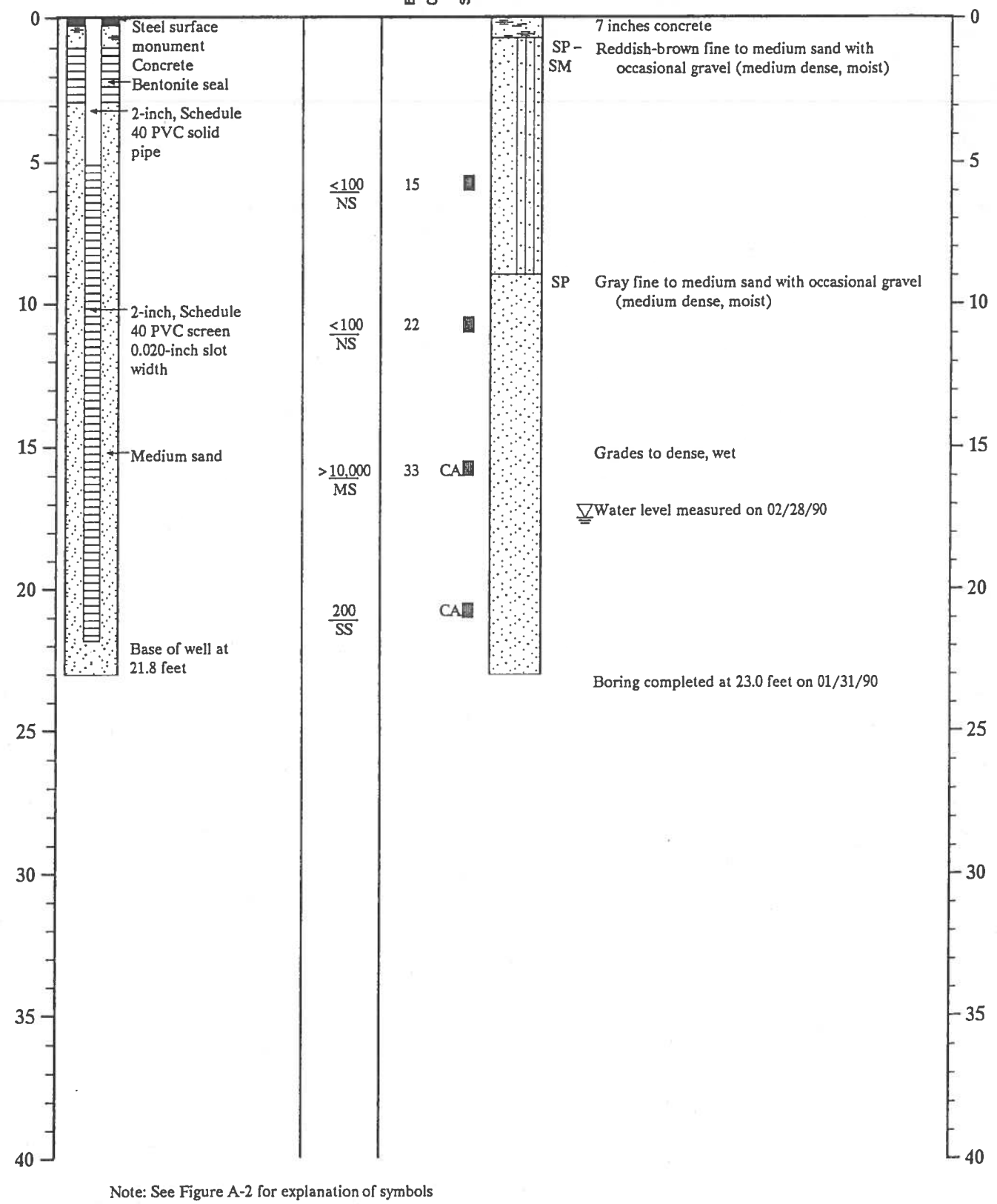
Log of Monitor Well

Figure A-5

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-4



Note: See Figure A-2 for explanation of symbols

Geo Engineers

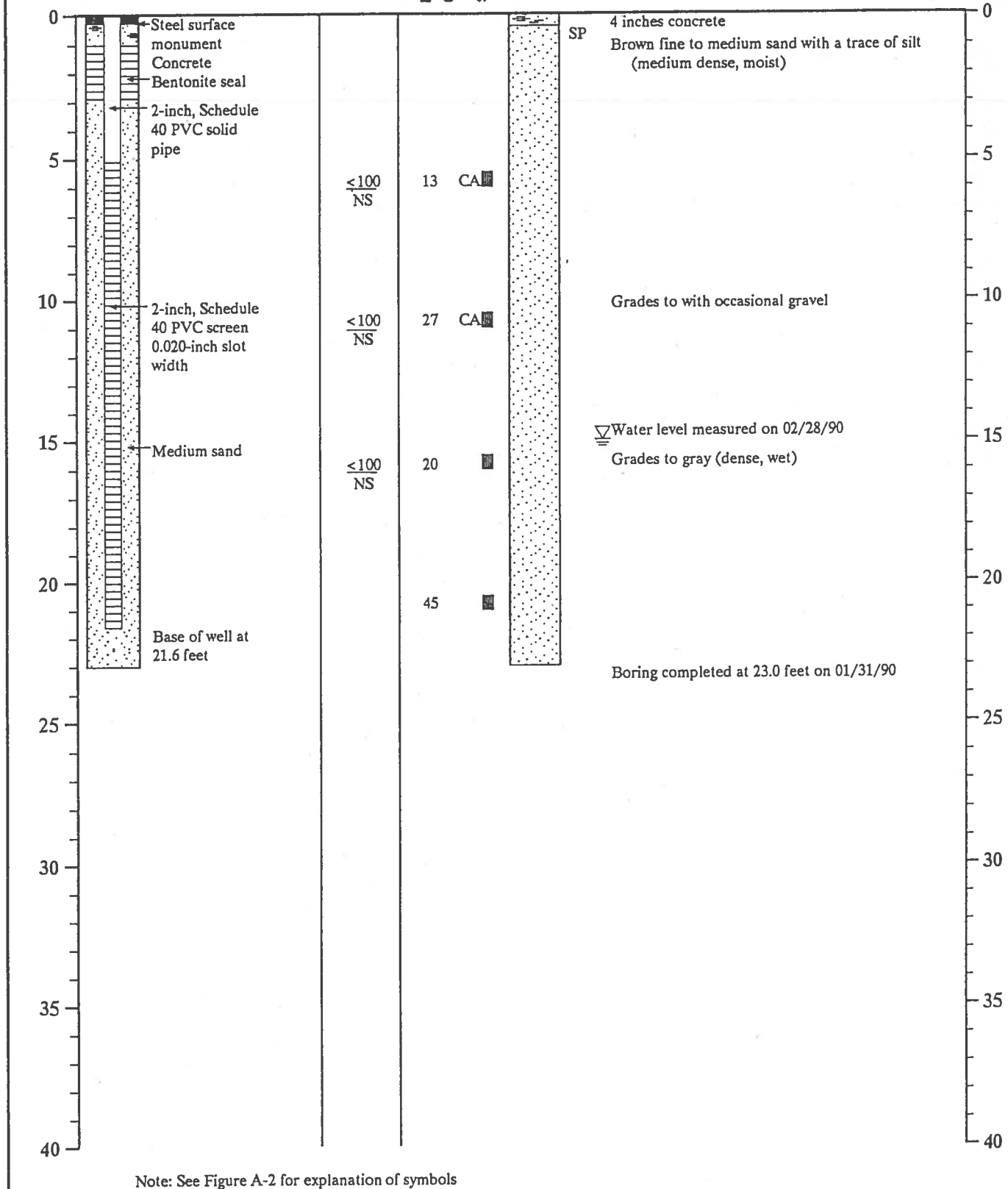
Log of Monitor Well

Figure A-6

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-5



Note: See Figure A-2 for explanation of symbols

Geo Engineers

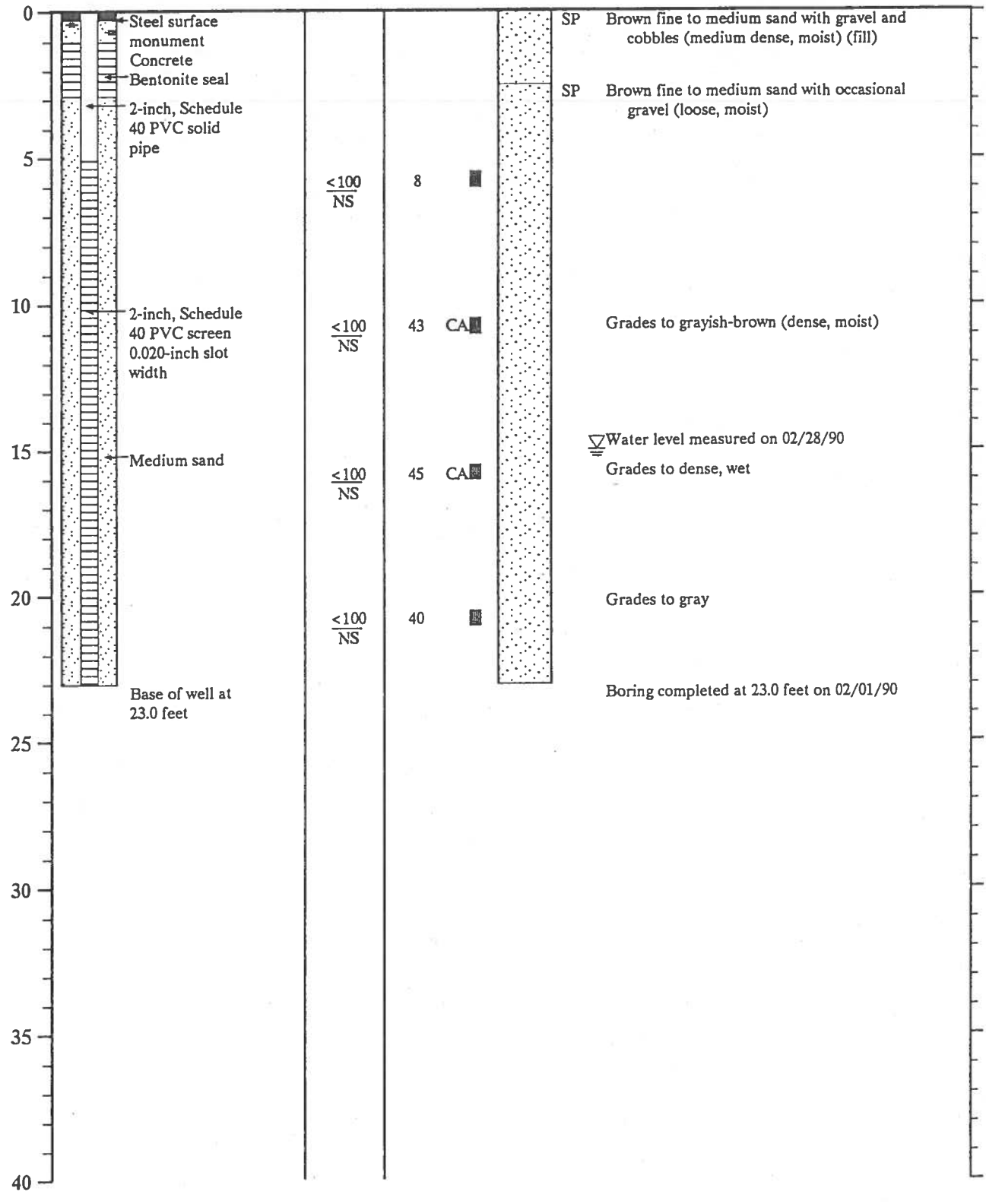
Log of Monitor Well

Figure A-7

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-6



Note: See Figure A-2 for explanation of symbols

Geo Engineers

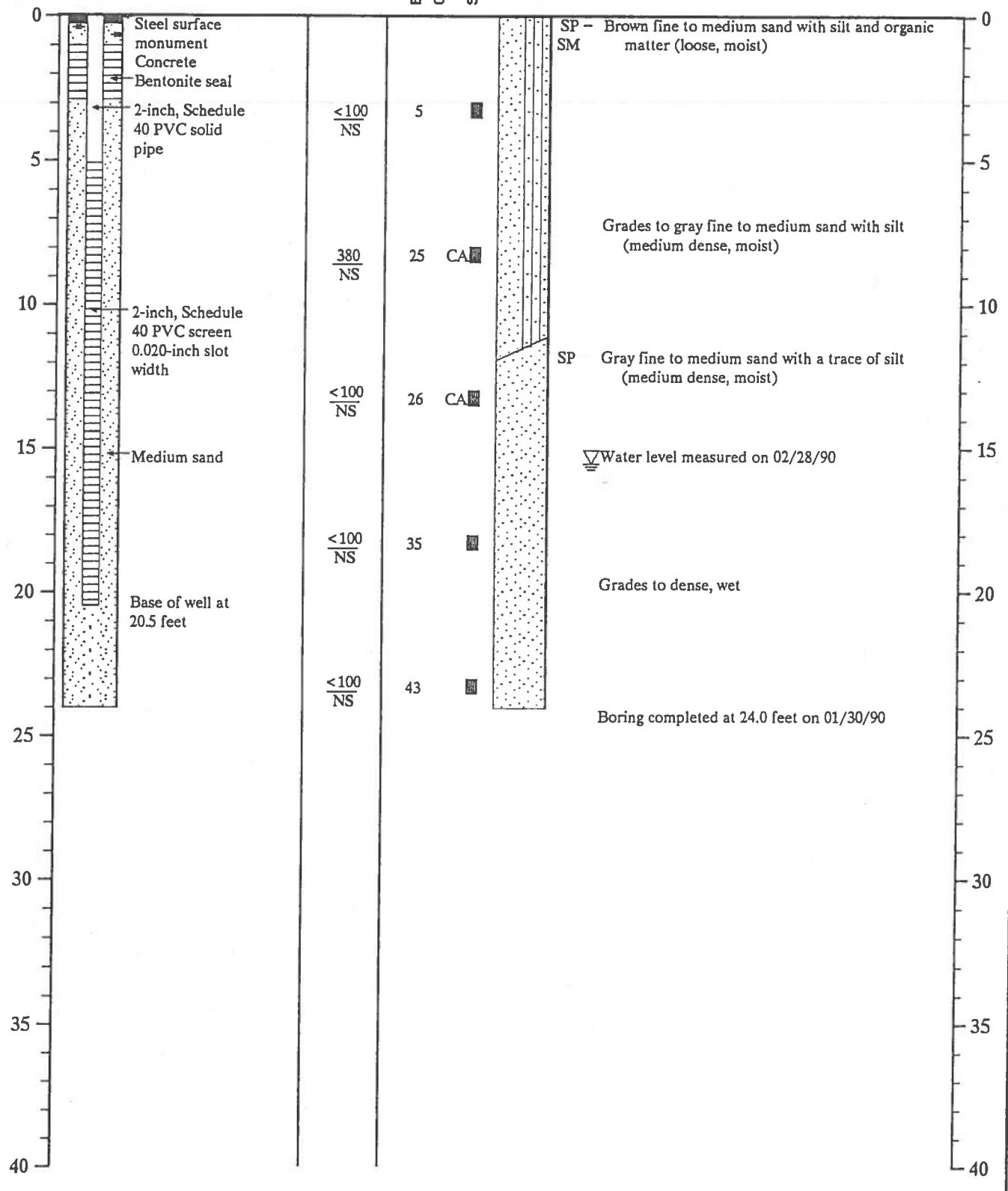
Log of Monitor Well

Figure A-8

:LRM:CLH:IRA 6/15/90

0372-068-B04

MONITOR WELL NO. MW-7



Note: See Figure A-2 for explanation of symbols

Geo Engineers

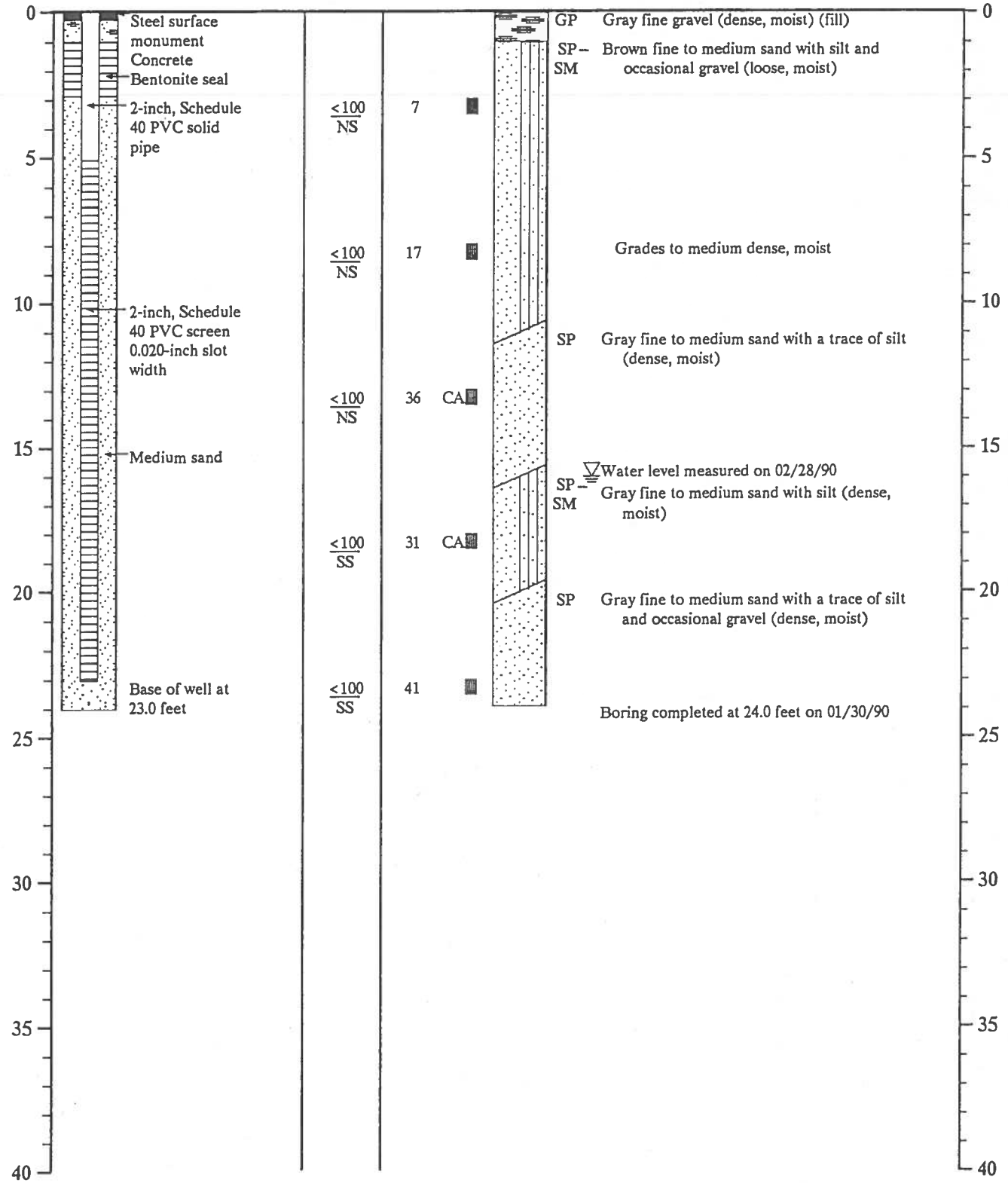
Log of Monitor Well

Figure A-9

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-8



Note: See Figure A-2 for explanation of symbols

Geo Engineers

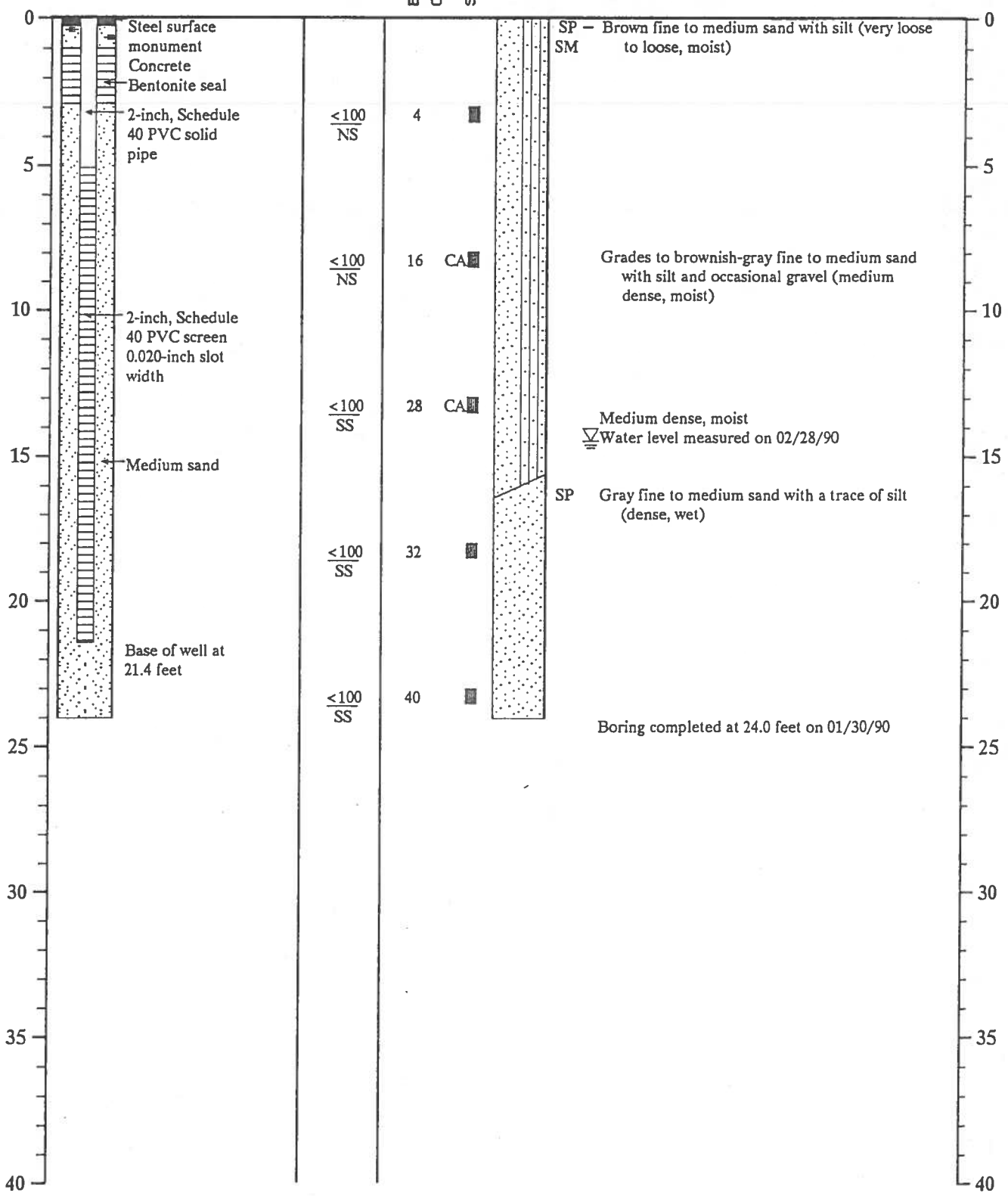
Log of Monitor Well

Figure A-10

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-9



Note: See Figure A-2 for explanation of symbols

Geo Engineers

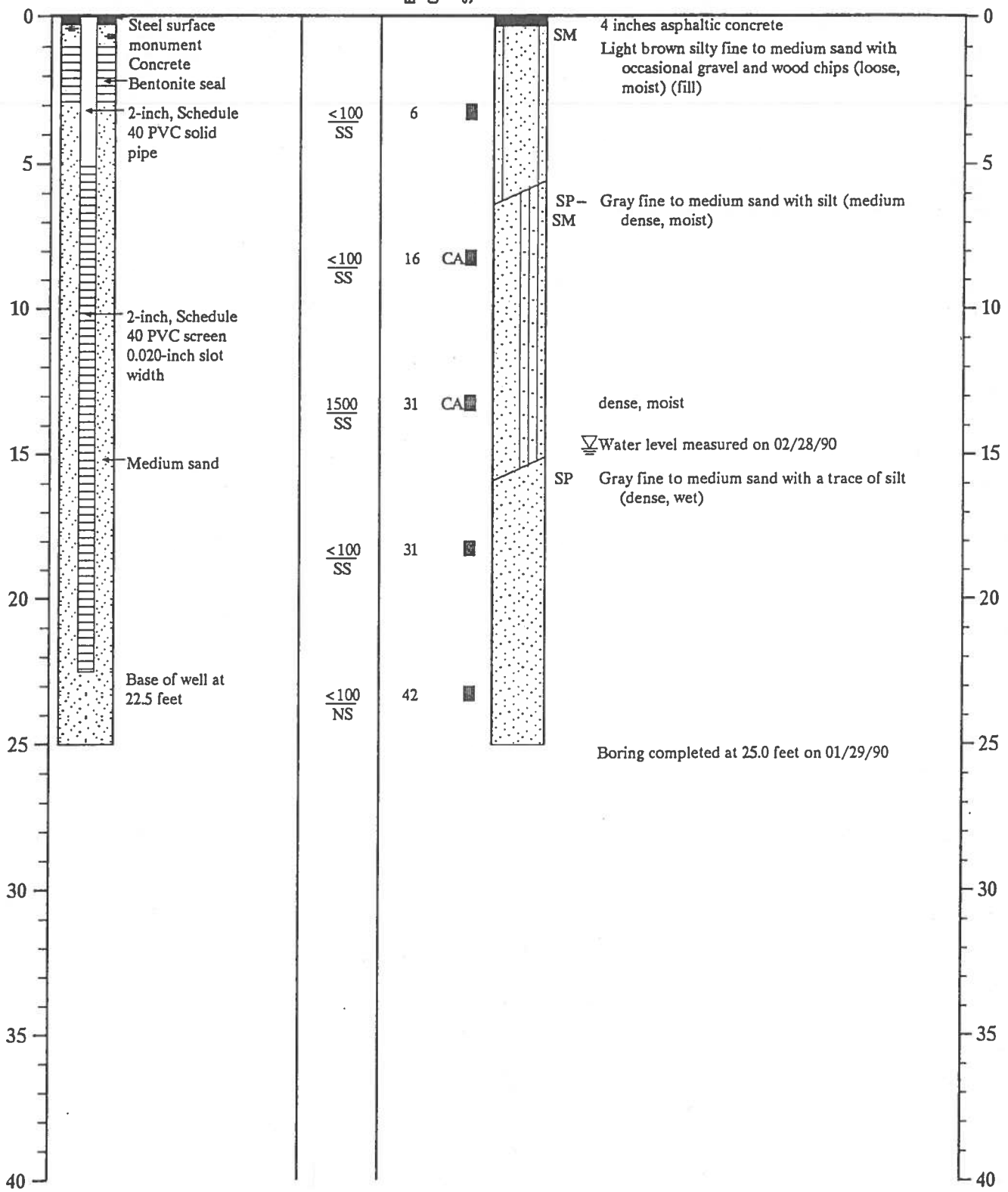
Log of Monitor Well

Figure A-11

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-10



Note: See Figure A-2 for explanation of symbols

GeoEngineers

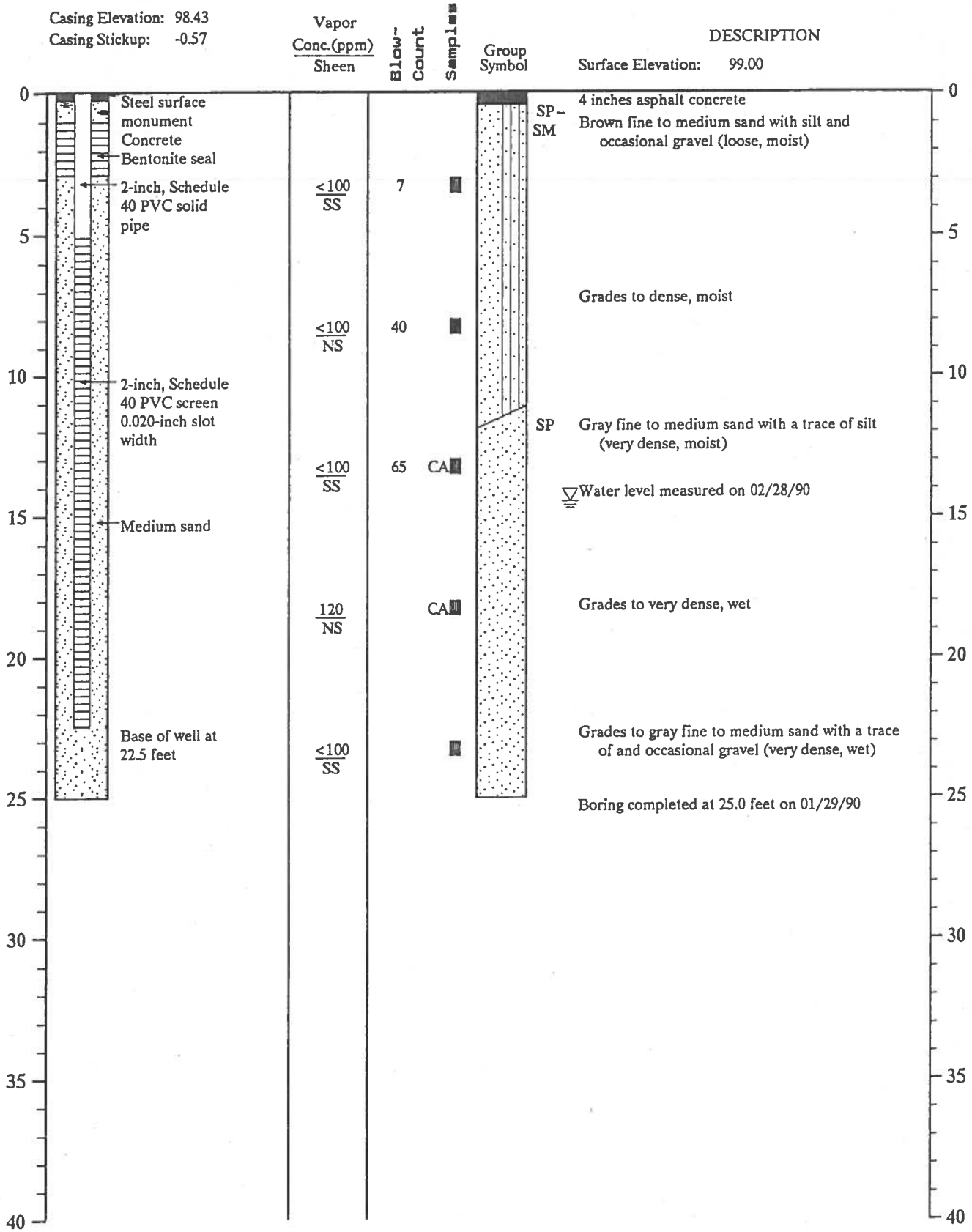
Log of Monitor Well

Figure A-12

:LRM:CLH:IRA 6/15/90

0372-068-B04

MONITOR WELL NO. MW-11



Note: See Figure A-2 for explanation of symbols

Geo Engineers

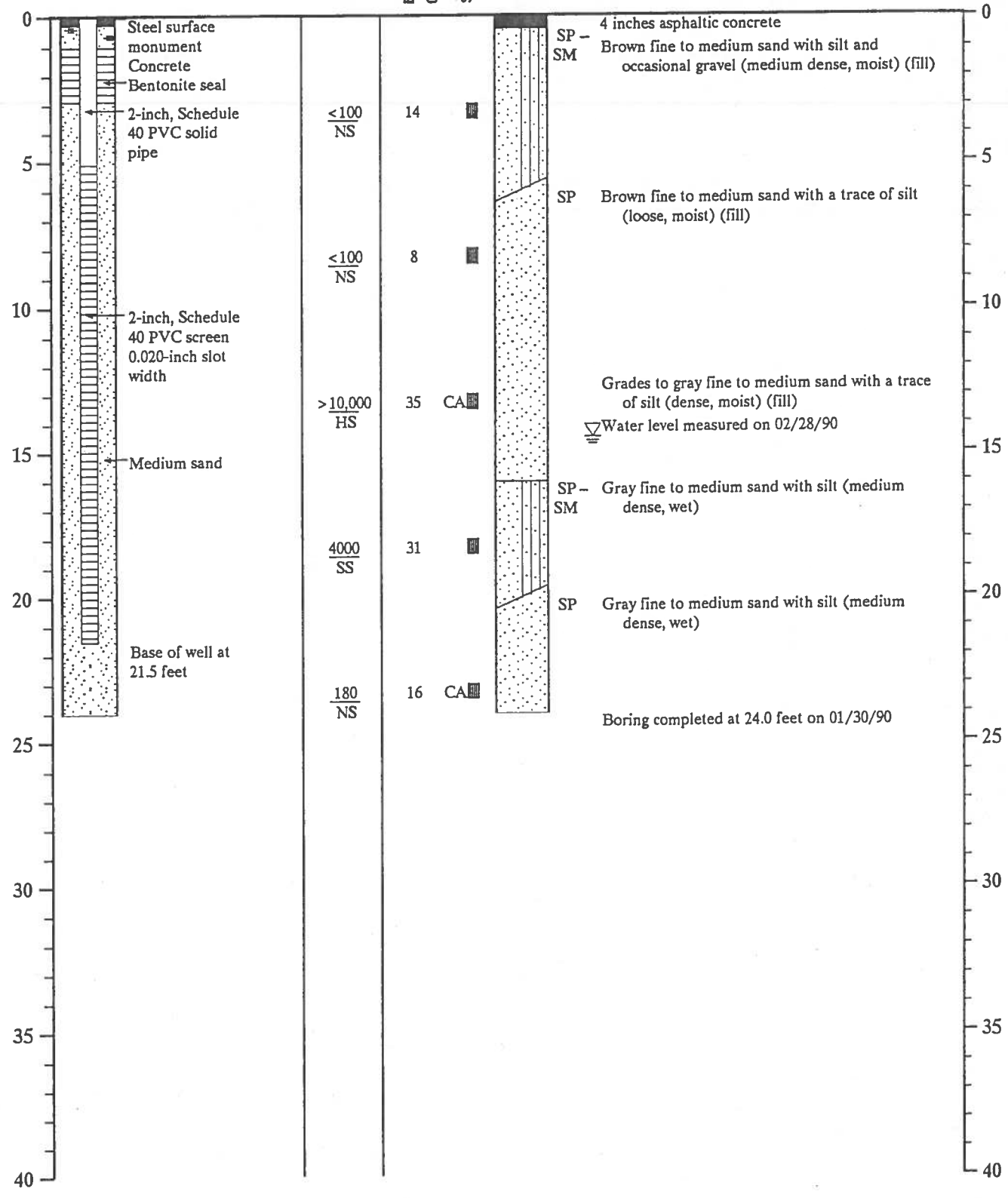
Log of Monitor Well

Figure A-13

:LRM:CLH:IRA 6/15/90

0372-068-B04

MONITOR WELL NO. MW-12



Note: See Figure A-2 for explanation of symbols

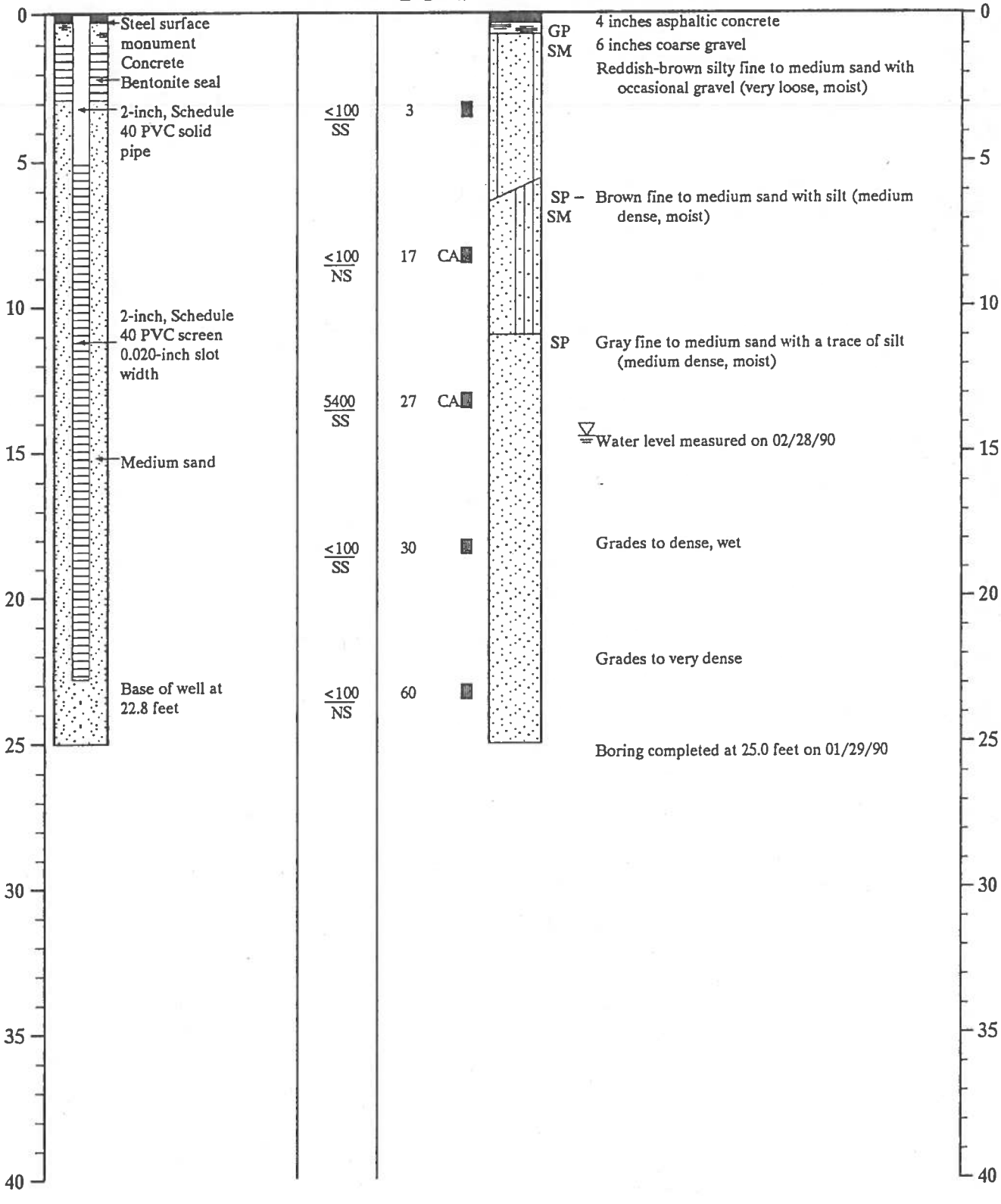
Geo Engineers

Log of Monitor Well

Figure A-14

0372-068-B04 :LRM:CLH:IRA 6/13/90

MONITOR WELL NO. MW-13



Note: See Figure A-2 for explanation of symbols

Geo Engineers

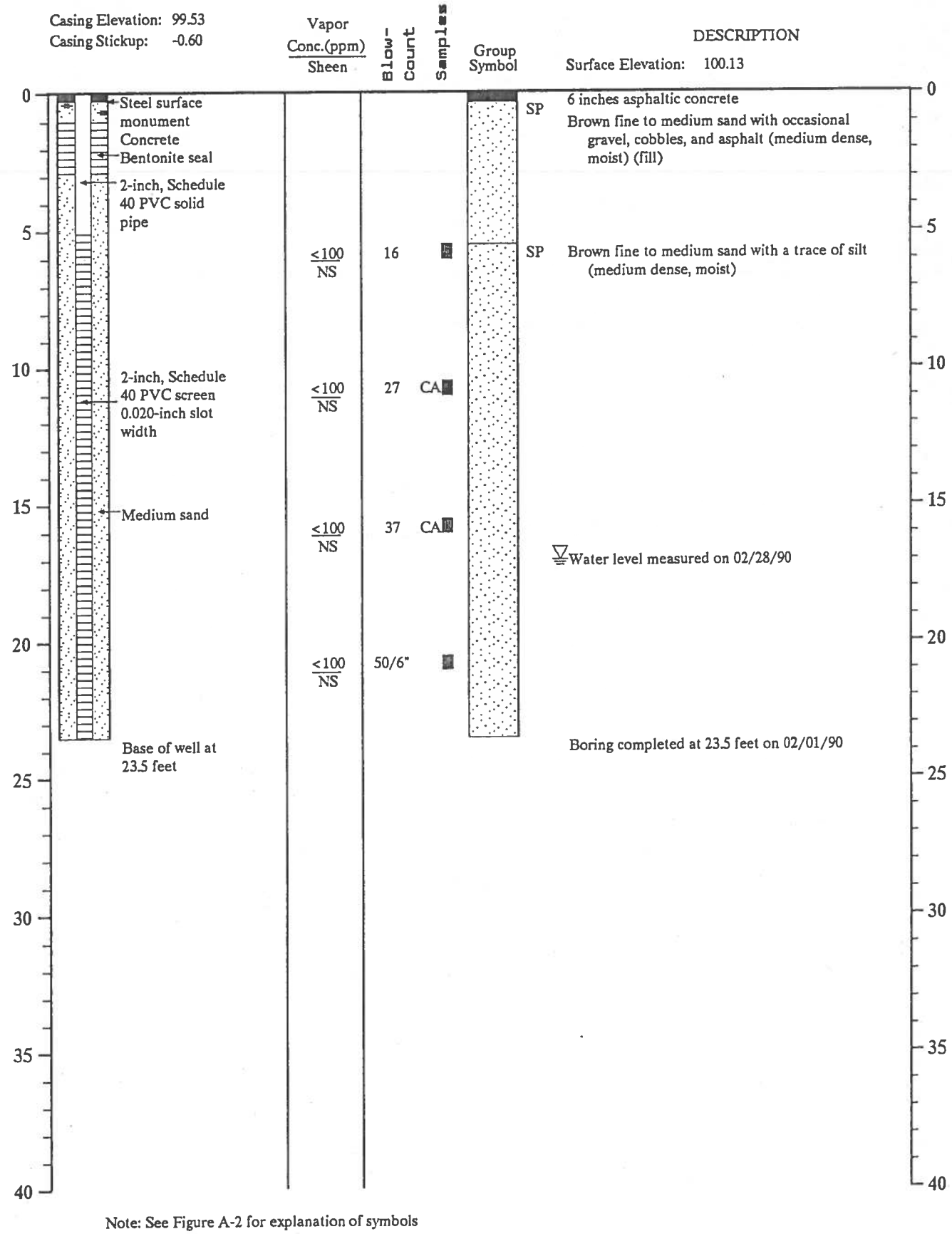
Log of Monitor Well

Figure A-15

:LRM:CLH:IRA 6/13/90

0372-068-B04

MONITOR WELL NO. MW-14



Note: See Figure A-2 for explanation of symbols

Geo Engineers

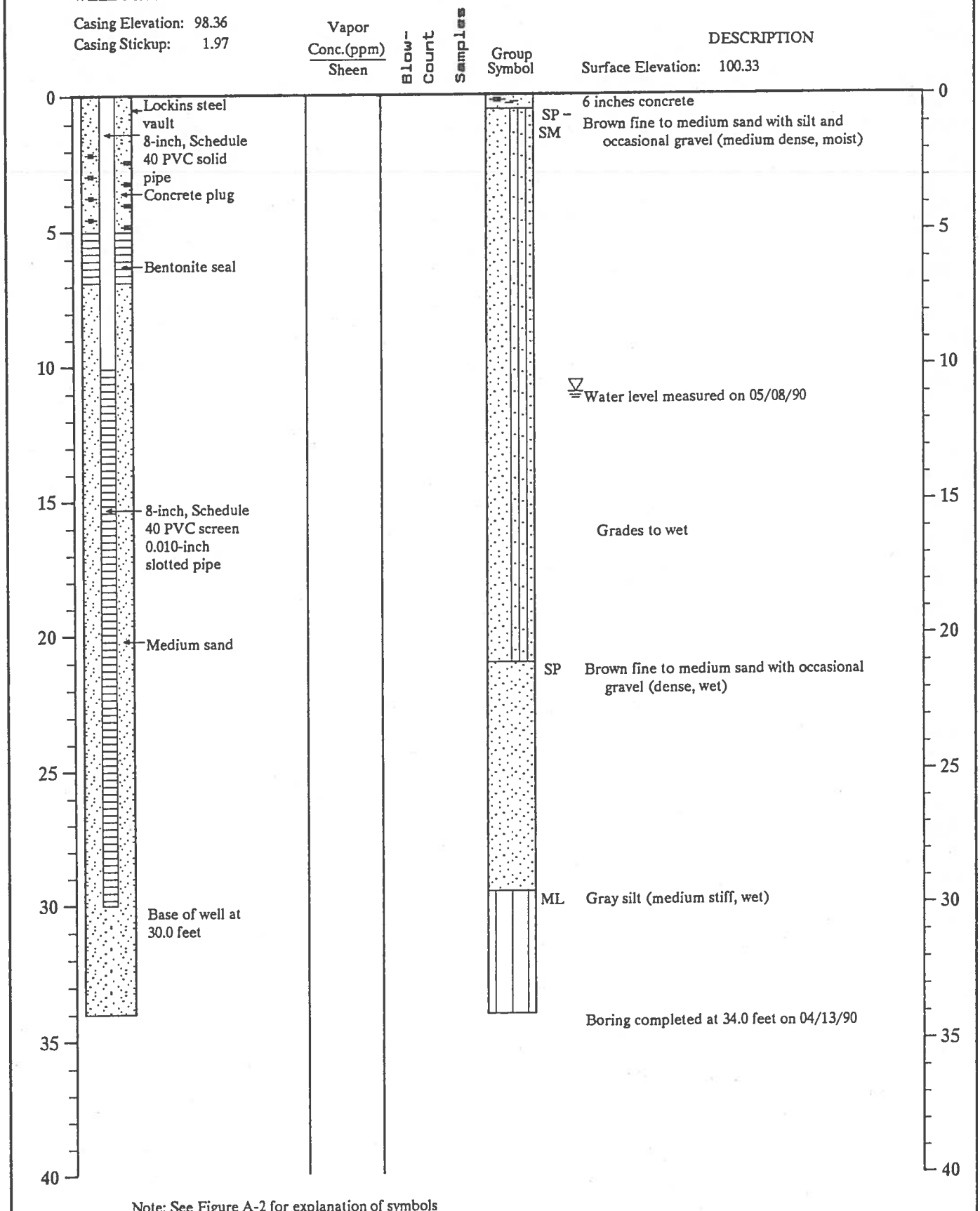
Log of Monitor Well

Figure A-16

:LRM:CLH:IRA 6/13/90

0372-068-B04

RECOVERY WELL NO. RW-1



Note: See Figure A-2 for explanation of symbols

Geo Engineers

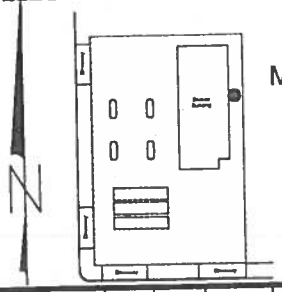
Log of Recovery Well

Figure A-17

:LRM:CLH:IRA 6/15/90

0372-068-B04

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: MW-15

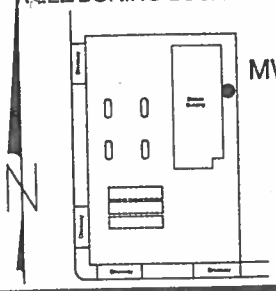
DATE:3/8/2001	DRILLING METHOD: Hollow Stem Auger
PROJECT: CW 90129	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 90129	BORING DIAMETER: 8"
LOCATION: 4700 Brooklyn Avenue	BORING DEPTH: 25.5'
CITY: Seattle	WELL CASING: 2" SCH 40 PVC
STATE: WA.	WELL SCREEN: 10-25' (0.020")
DRILLER: Cascade	SAND PACK: 8-25.5' (#2/12)

CASING ELEVATION	99.09
DATE:	3/8/2001
TIME:	

DESCRIPTION/LOGGED BY: Shawn Madison

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete / Bentonite / Sand			DP	0	27 38 39	5–6			SM		SILTY SAND: brown; 10% fines; fine to medium sand; very dense; no odor
			DP	0	24 26 29	10–11			SM		SILTY SAND: grayish brown; 20% fines; fine to medium sand; dense; no odor
		▼	DP	0	50/6	15–16			SM		SILTY SAND: gray; 10% fines; fine to medium sand; very dense; no odor
	▽		WT	0	80/6 50/4	20–21			SM		SILTY SAND: gray; 10% fines; fine to medium sand; very dense; no odor

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: MW-15

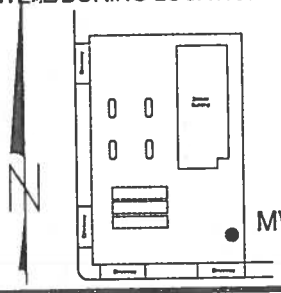
DATE:3/8/2001	DRILLING METHOD: Hollow Stem Auger
PROJECT: CW 90129	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 90129	BORING DIAMETER: 8"
LOCATION: 4700 Brooklyn Avenue	BORING DEPTH: 25.5'
CITY: Seattle	WELL CASING: 2" SCH 40 PVC
STATE: WA.	WELL SCREEN: 10-25' (0.020")
DRILLER: Cascade	SAND PACK: 8-25.5' (#2/12)

CASING ELEVATION	99.09
DATE:	3/8/2001
TIME:	

DESCRIPTION/LOGGED BY: Shawn Madison

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	
Sand			WT	0	50/6	23			GM		SILTY GRAVEL: gray; 25% silt; 10% fine to medium sand; gravel; very dense; no odor
						24					
						25					
						26					
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

WELL/BORING LOCATION MAP



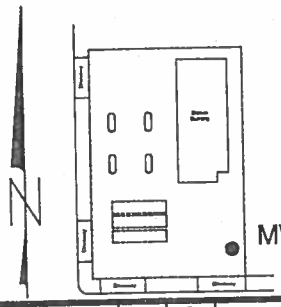
Delta Environmental Consultants, Inc.	WELL/BORING: MW-16
DATE:3/8/2001	DRILLING METHOD: Hollow Stem Auger
PROJECT: CW 90129	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 90129	BORING DIAMETER: 8"
LOCATION: 4700 Brooklyn Avenue	BORING DEPTH: 25.5'
CITY: Seattle	WELL CASING: 2" SCH 40 PVC
STATE: WA.	WELL SCREEN: 10-25' (0.020")
DRILLER: Cascade	SAND PACK: 8-25.5' (#2/12)

CASING ELEVATION	97.67
DATE:	3/8/2001
TIME:	

DESCRIPTION/LOGGED BY: Shawn Madison

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION
Concrete / Bentonite / Sand				0	8 8 10	5–6			SM		SILTY SAND: light brown; 10% fines; fine to medium sand; medium dense; no odor
				0	27 31 40	10–11			SM		SILTY SAND: gray; 20% fines; fine to medium sand; very dense; no odor
		▼		0	23 30	15–16			SM		SILTY SAND: gray; 20% fines; fine sand; very dense; no odor
				0	36 30	20–21			SM		SILTY SAND: gray; 20% fines; fine sand; very dense; no odor

WELL/BORING LOCATION MAP



Delta Environmental Consultants, Inc.

WELL/BORING: MW-16

DATE: 3/8/2001	DRILLING METHOD: Hollow Stem Auger
PROJECT: CW 90129	SAMPLING METHOD: DM Split Spoon
CLIENT: Chevron 90129	BORING DIAMETER: 8"
LOCATION: 4700 Brooklyn Avenue	BORING DEPTH: 25.5'
CITY: Seattle	WELL CASING: 2" SCH 40 PVC
STATE: WA.	WELL SCREEN: 10-25' (0.020")
DRILLER: Cascade	SAND PACK: 8-25.5' (#2/12)

CASING ELEVATION	97.67
DATE:	3/8/2001
TIME:	

DESCRIPTION/LOGGED BY:

WELL/BORING COMPLETION	FIRST ▽	STABILIZED ▼	MOISTURE	PID (ppm)	DENSITY BLOWS / 6"	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	USCS SYMBOL	GRAPHIC	DESCRIPTION/LOGGED BY:
Sand						23					
						24			SM		
			DP	0	50/6	25			ML		INORGANIC SILT: gray; fines; 20% very fine to fine sand; low placticity; very dense; no odor
						26					
						27					
						28					
						29					
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					
						41					
						42					
						43					
						44					

Project Name: **Chevron Station No. 9-0129**
Project Number: **2015-006A**
Client: **Fields Holdings, LLC**

RILEYGROUP

Test Probe No.: **P1**

Sheet 1 of 2

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **22 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **17.5 feet bgs**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Asphalt	
						Light brown, medium SAND, dry, no odor, no sheen	
0.3	P1-5				5	Light brown, medium, silty SAND, dry, no odor, no sheen	
0.2	P1-9				10	With ~0.5" diameter, angular gravel	
0.4	P1-15				15	Becomes wet	
	P1-W			▽			
0.1	P1-18				20		

Project Name: **Chevron Station No. 9-0129**

Project Number: **2015-006A**

Client: **Fields Holdings, LLC**

RILEYGROUP

Test Probe No.: **P1**

Sheet 2 of 2

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
0.2	P1-22				20	Light gray, medium, silty SAND, wet, no odor, no sheen	
						Test probe terminated at 22 feet bgs	
					25		
					30		
					35		
					40		
					45		
					50		
					55		

The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Chevron Station No. 9-0129**
Project Number: **2015-006A**
Client: **Fields Holdings, LLC**

RILEYGROUP

Test Probe No.: **P2**

Sheet 1 of 1

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Concrete**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **10 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION
					0	Concrete
						Light brown, fine to coarse, silty SAND, dry, no odor, no sheen
1.7						
0.4	P2-5				5	Vacuum, excavated to 5 feet bgs
0.1	P2-10				10	Test probe terminated at 10 feet bgs
					15	
					20	

The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Chevron Station No. 9-0129**
Project Number: **2015-006A**
Client: **Fields Holdings, LLC**

RILEYGROUP

Test Probe No.: **P3**

Sheet 1 of 1

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Concrete**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **10 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Concrete	
						Pea GRAVEL	
						Product lines and air sparge/vapor extraction lines observed	
						Light brown, medium to fine, silty SAND, dry, no odor, no sheen	
1.7	P3-5				5	Vacuum, excavated to 5 feet bgs	
1.0	P3-10				10	Test probe terminated at 10 feet bgs	
					15		
					20		

Project Name: **Chevron Station No. 9-0129**
Project Number: **2015-006A**
Client: **Fields Holdings, LLC**

RILEYGROUP

Test Probe No.: **P4**

Sheet 1 of 1

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Concrete**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **19 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **17.5 feet bgs**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION
					0	Concrete
						Light brown, medium to fine, silty SAND, dry, no odor, no sheen
1.4						
3.4	P4-5				5	Vacuum, excavated to 5 feet bgs Becomes slightly moist, slight odor
90.1	P4-10				10	No odor, elevated PID reading
						Light gray, medium to fine, silty SAND, no odor, no sheen
8.3	P4-15				15	Light gray, medium to fine SAND, no odor, no sheen
	P4-19			▽		
						Test probe terminated at 19 feet bgs
					20	

Graphic Log

Project Name: **Chevron Station No. 9-0129**
Project Number: **2015-006A**
Client: **Fields Holdings, LLC**

RILEYGROUP

Test Probe No.: **P5**

Sheet 1 of 1

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **5 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Asphalt	
0.7						Gray, pea GRAVEL, dry, no odor, no sheen	
1.1	P5-5					Light brown, medium, silty SAND, dry, no odor, no sheen	
					5	Test probe terminated at 5 feet bgs	
					10		
					15		
					20		

The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Chevron Station No. 9-0129**
Project Number: **2015-006A**
Client: **Fields Holdings, LLC**

RILEYGROUP

Test Probe No.: P6

Sheet 1 of 1

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **18.5 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **16.5 feet bgs**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION
					0	Asphalt
						Gray, pea GRAVEL, subangular, dry, no odor, no sheen
41.0	P6-5				5	Gray, fine to medium, silty SAND, dry, slight sheen, no odor
1.2	P6-9				10	
2.0	P6-13					
3.9	P6-14					Becomes wet, strong odor, sheen
				▽	15	
1,156						Test probe terminated at 18.5 feet bgs
					20	

Graphic Log

The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Chevron Station No. 9-0129**	Test Probe No.: **P7**
Project Number: **2015-006A**	**Sheet 1 of 1**
Client: **Fields Holdings, LLC**	RILEYGROUP

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **17 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION
					0	Asphalt
						Gray, pea GRAVEL, dry, no odor, no sheen
4.5	P7-5				5	Light brown, medium to fine, silty SAND, dry, no odor, no sheen Becomes moist
8.4	P7-10				10	Becomes dry
3.2	P7-15				15	Becomes gray
3.0	P7-17					Test probe terminated at 17 feet bgs
					20	

Graphic Log

Project Name: **Chevron Station No. 9-0129**	Test Probe No.: **P8**
Project Number: **2015-006A**	**Sheet 1 of 1**
Client: **Fields Holdings, LLC**	RILEYGROUP

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **19 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **17.5 feet bgs**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Asphalt	
						Light brown, medium to fine, silty SAND with ~0.5" diameter subangular gravel, dry, no odor, no sheen	
1.7	P8-5				5		
						Becomes moist	
2.0	P8-10				10	Becomes dry	
2.1	P8-14				15		
2.5	P8-17						
	P8-W			▽		Becomes wet	
						Gray, medium to fine, silty SAND, wet, odor, sheen	
						Test probe terminated at 19 feet bgs	
					20		

The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Chevron Station No. 9-0129** Project Number: **2015-006A** Client: **Fields Holdings, LLC**	RILEYGROUP Test Probe No.: **P9** **Sheet 1 of 1**

Date(s) Drilled: **02/24/15**	Logged By: **SL**	Surface Conditions: **Asphalt**
Drilling Method(s): **Direct Push**	Drill Bit Size/Type: **2.25" Diameter**	Total Depth of Borehole: **10 feet bgs**
Drill Rig Type: **Track-Mounted**	Drilling Contractor: **The Riley Group, Inc.**	Approximate Surface Elevation: **n/a**
Groundwater Level: **Not Encountered**	Sampling Method(s): **Continuous**	Hammer Data : **n/a**
Borehole Backfill: **Bentonite**	Location: **4700 Brooklyn Avenue Northeast, Seattle, Washington 98105**	

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Asphalt	
						Light brown, medium to fine, silty SAND, dry, no odor, no sheen	
2.1	P9-5				5	Becomes slightly moist	
0.3	P9-10				10	Test probe terminated at 10 feet bgs	
					15		
					20		

Project Name: **Chevron Station No. 9-0129**

Project Number: **2015-006A**

Client: **Fields Holdings, LLC**

RILEYGROUP

Boring Log Key

Sheet 1 of 1

PID Reading, ppm	Sample ID	Sample Type	% Recovery	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1. PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
2. Sample ID: Sample identification number.
3. Sample Type: Type of soil sample collected at the depth interval shown.
4. % Recovery: % Recoverysquare foot.
5. GW Depth: Groundwater depth in feet below the ground surface.
6. Depth (feet): Depth in feet below the ground surface.
7. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8. Graphic Log: Graphic depiction of the subsurface material encountered.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS


Asphaltic Concrete (AC)


Portland Cement Concrete


Poorly graded GRAVEL (GP)


Silty SAND (SM)


Poorly graded SAND (SP)

TYPICAL SAMPLER GRAPHIC SYMBOLS


Auger sampler


Bulk Sample


3-inch-OD California w/ brass rings


CME Sampler


Continuous


Grab Sample


2.5-inch-OD Modified California w/ brass liners


Pitcher Sample


2-inch-OD unlined split spoon (SPT)


Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)

Water level (after waiting)

Minor change in material properties within a stratum

Inferred/gradational contact between strata

Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

SAIC
From Science to Solutions
18912 North Creek Parkway, Suite 101
Bothell, WA 98011

Boring: SB-1

Project: Chevron Service Station No. 9-0129
Client: Chevron
Location: 4700 Brooklyn Ave NE, Seattle, WA

Logged By: G. Cisneros
Date Started: 10/2/2010
Date Completed: 10/2/2010

Driller: Cascade
Drill Method: AK/HSA
Total Boring Depth: 25 ft

MOISTURE CONTENT	ORGANIC VAPOR (ppm)	BLOWS/6"	SAMP. INTERVAL	ANALYTICAL SAMPLE	Analyical Results (mg/mk)	U.S.C.S. SYMBOL	GRAPHIC LOG	DEPTH (ft)	LITHOLOGY/DESCRIPTION
								0	Asphalt
Moist	0.3					SW		1	(SW) Brown, loose, fine to medium SAND with 20% fine to medium gravel & <5% silt. No odor; No sheen. (Fill)
								2	Bricks
Moist	0.3					SW		3	(SW) Brown, loose, fine to medium SAND with 20% fine to medium gravel & <5% silt. No odor; No sheen. (Fill)
								4	(GP) Same as above, less gravel, No odor; No sheen.
Moist	0.0					GP		5	
								6	
								7	
								8	(GP) Light brown, loose, fine to medium SAND with <20% fine to medium gravel, <5% silt. No odor; No sheen.
						GP		9	
Moist	0.0	21 31 50				SP		10	(SP) Brown, dense, medium SAND with 10% fine gravel. No odor; No sheen.
								11	
Moist	0.0	32 50						12	
						SP		13	(SP) Brown, dense, medium to coarse SAND w/10% fine gravel. No odor; No sheen.
								14	
Wet	1.9	50		SB-1-15	G = N.D. D = N.D. HO = N.D. B = N.D.			15	
						SP		16	(SP) Orange brown, dense, medium SAND. No odor; No sheen; 10.0ppm.
								17	
Saturated	0.0	50		SB-1-17.5	G = N.D. D = N.D. HO = N.D. B = N.D.			18	(SP) Light brown to gray, dense, medium to coarse SAND with 5% gravel. No odor; No sheen.
						SP		19	
Saturated		50						20	(SP) Gray, dense, medium to coarse SAND wtih 10% fine to medium gravel.
						SP		21	
								22	
Saturated	1.3	25 50						23	(SP) Gray, dense, medium to coarse SAND with 5% fine to medium gravel. No odor; No sheen.
						SP		24	
								25	Bottom of borehole at 25.0 feet.
								26	

APPENDIX B

Sampling and Analysis Plan/ Quality Assurance Project Plan

Appendix B Contents

List of Tables

B1 Introduction

This Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) has been prepared for the 4700 Brooklyn Ave NE Site (Site) as Appendix B to the Remedial Investigation Work Plan (RIWP). The purpose of this SAP is to ensure that field sample collection, handling, and laboratory analysis will generate data to meet project-specific data quality objectives (DQOs) in accordance with the Model Toxics Control Act (MTCA) requirements (WAC 173-340-350). This SAP/QAPP is comprised of two major components: a Field Sampling Plan (FSP) defining field protocols and a Quality Assurance Project Plan (QAPP) defining analytical protocols.

Environmental investigation activities to be performed under this SAP/QAPP are on behalf of two parties, FH Brooklyn LLC (FH Brooklyn) and Chevron Environmental Management (Chevron) according to the Agreed Order 13815. The parties have an agreement of responsibility for the different environmental investigations to be performed and therefore each investigation will have a lead party. FH Brooklyn is the lead party for on-property activities and Aspect Consulting LLC (Aspect) will perform activities on behalf of FH Brooklyn. Chevron is the lead party for off-property activities and Leidos will perform activities on behalf of Chevron. Given this joint party agreement, this SAP/QAPP contains counterpart elements that apply to the on-property work performed by Aspect, and the off-property work performed by Leidos. It is the responsibility of the Aspect and Leidos personnel and subcontracted analytical laboratory personnel performing the sampling and analysis activities to adhere to the requirements of this SAP/QAPP.

The Field Sampling Plan (Section B2) and Quality Assurance Project Plan (Section B3) are presented below.

B2 Field Sampling Plan

B2.1 Soil Borings and Soil Sampling

Soil samples collected during the on-property investigation will be obtained using sonic drilling methods, which allow dual-casing to prevent drag-down of shallow contamination. The specific soil sample locations, depths, and chemical analyses are provided in Section 8 of the RIWP, with Table 2 tabulating the specific chemical analyses to be collected. The following subsections detail the procedures for soil sample collection, handling, identification, and sample quality assurance/quality control (QA/QC).

The responsible lead party will subcontract with a Washington-licensed resource protection well driller to complete soil borings in accordance with requirements of Chapter 173-160 WAC.

Each boring will be advanced to collect samples at depth intervals specified in the RIWP or as determined by field screening. The sonic drilling method provides continuous cores of soil.

B2.1.1 Soil Sample Collection and Handling Procedures

A geologist from Aspect and/or Leidos will oversee the drilling activities and prepare a geologic log for each of the explorations completed, including an examination of the full length of each soil core recovered by the sonic drilling rig. The field representative will visually classify the soils in accordance with American Society of Testing and Materials (ASTM) Method D2488 and record soil descriptions, field screening results, and other relevant details (e.g., staining, debris, odors, etc.) on the boring log form. If samples are collected for chemical analysis, the sample ID and depth will also be recorded on the log. We anticipate encountering a silt unit at the base of the borings. The geologist will use hydrogen peroxide to determine if disseminated organics are present in the silt layer to distinguish between the Lawton Clay (no organics-no reaction with peroxide) or Pre-Fraser lacustrine deposits (organics present – reaction with peroxide).

Headspace Vapor

Each sample will be field screened to obtain a relative estimate of its volatile organic carbon (VOC) concentration. This field screening will be performed by measuring the concentration of VOCs in the headspace above the sample in a closed container using a field flame-ionization detector (FID) or photoionization detector (PID). The field screening will be performed by placing the soil into a sealed plastic bag (e.g., Ziploc), disaggregating the soil by hand, allowing the sample to equilibrate for at least five minutes, and then opening the bag slightly, inserting the instrument probe, and measuring the VOC concentration in the headspace. If the ambient temperature is below 65ºF, the sample will be warmed (e.g., in a heated vehicle) before the headspace measurement is made.

The PID will be calibrated daily in the field using the manufacturer's calibration standard (100 ppm isobutylene gas). A calibration test, referred to as a "bump test," will be performed as necessary in the field using the calibration gas to check that the PID remains properly calibrated throughout the day.

Sheen Testing

Sheen testing will be conducted by placing soil in a pan of water and observing the water surface for signs of sheen. Sheens are classified as follows:

- **Slight Sheen:** Light, colorless, dull sheen. The spread is irregular and dissipates rapidly.
- **Moderate Sheen:** Light to heavy sheen, may show color/iridescence. The spread is irregular to flowing. Few remaining areas of no sheen are evident on the water surface.
- **Heavy Sheen:** Heavy sheen with color/iridescence. The spread is rapid and the entire water surface may be covered with sheen.

Sample Collection for Laboratory Analysis

All soil samples to be submitted for gasoline-range total petroleum hydrocarbons (TPH-Gx) and VOC analyses will be collected in accordance with U.S. Environmental Protection Agency (EPA) Method 5035A. Since sonic drilling can produce high soil temperatures resulting in loss of volatiles, soil samples will be collected from the center of the soil core. The soil aliquot for these analyses will be collected from the undisturbed soil sample core using a laboratory-supplied modified disposable plastic syringe as required by the EPA Method 5035A, and placed in preweighed laboratory-supplied vials.

For all other analyses, the soil samples will be removed from the sampler using a stainless-steel spoon and placed in a stainless-steel bowl for homogenization with the stainless-steel spoon. Gravel-sized material greater than approximately 0.5 inch will be removed from the sample during mixing. A representative aliquot of the homogenized soil will be placed into certified-clean jars supplied by the analytical laboratory.

The initial laboratory submittal will have samples selected for TPH-Gx, TPH-Dx, and BTEX. Samples will be selected based on field screening and to provide proper horizontal and vertical characterization. Select soil samples from the saturated zone from borings AB-3 and AB-4 will be submitted for analysis of chlorinated volatile compounds (CVOCs). Samples from other borings may be submitted for analysis if necessary to delineate extent of CVOCs in soil.

Based on TPH results, select samples may be submitted for follow-on analysis. Up to five soil samples will be analyzed for MTBE, EDB, EDC, naphthalene and total lead. Samples will be selected from borings AB-5, AB-6, and AB-8, where gasoline-range TPH is detected in laboratory analysis and to provide proper horizontal and vertical characterization. Up to five soil samples will be analyzed for PCBs, cPAHs, cadmium, chromium, nickel, and zinc as a follow-on analysis if oil-range TPH is detected in laboratory analysis. If oil-range TPH is detected in more than five samples, sample selection will be made to provide proper horizontal and vertical characterization.

QC soil samples (e.g., field duplicates and trip blanks) will be collected at the respective frequencies prescribed in Section B3.5 of the QAPP.

Each soil boring will be decommissioned with hydrated granular bentonite in accordance with requirements of Chapter 173-160 WAC.

B.2.1.2 Soil Sample Identification

Each soil sample collected for chemical analysis will be assigned a unique sample identification number including the boring number and the depth from which the sample was collected. For example, the soil sample collected from boring B-10 at a depth of 4 to 5 feet below ground surface (bgs) would be identified as B-10-4-5.

B2.2 Ground Water Sampling

Ground water samples will be collected and handled in accordance with the procedures described below:

- The locking well cap will be removed and the depth-to-ground water will be measured from the surveyed location to the nearest 0.01 foot using an electronic

water level measuring device. The depth to the bottom of the monitoring well will also be measured to evaluate siltation of the monitoring well. The water level indicator will be decontaminated between wells.

- The presence of light non-aqueous phase liquid (LNAPL) will be evaluated in all wells screened in the 15-foot zone within the area of LNAPL indicators depicted in Figure 6 of the RIWP. LNAPL presence and thickness will be evaluated using an electronic oil/water interface probe. The oil/water interface probe will be decontaminated between wells.
- Each monitoring well will be purged at a low-flow rate less than 0.5 liter per minute (Puls and Barcelona, 1996; Ecology, 2012) using a peristaltic pump and dedicated tubing (polyethylene tubing with a short length of silicon tubing through the pump head). The tubing intake will be placed just below the center of the saturated section of well screen. During purging, field parameters (temperature, pH, specific electrical conductance, dissolved oxygen, and oxidation-reduction potential [ORP]) will be monitored using a YSI meter and flow-through cell, or equivalent. These field parameters will be recorded at 2- to 4-minute intervals throughout well purging until they stabilize. Stabilization is defined as three successive readings where the parameter values vary by less than 10 percent (or 0.5 milligrams per liter [mg/L] dissolved oxygen if the readings are below 1 mg/L). However, no more than three well casing volumes will be purged prior to ground water sample collection. Three turbidity measurements will also be made before collecting the sample (Hach 2100Q turbidimeter).
- Samples with a field-measured specific electrical conductance greater than 1,000 microSiemans per centimeter (µS/cm) or turbidity greater than 25 nephelometric turbidity units (NTU) will be denoted as such on the chain-of-custody (COC) form, so that the laboratory can employ appropriate sample preparation techniques to avoid analytical interferences for specific analyses.
- If the monitoring well is completely dewatered during purging, samples will be collected when sufficient recharge has occurred to allow filling of all sample containers.
- Once purging is complete, the ground water samples will be collected using the same low-flow rate directly into laboratory-supplied sample containers. Samples for dissolved metals analyses will be filtered using an in-line 0.45 micrometer (µm) filter; at least 0.5 liter of water will be purged through the filter prior to sample collection.
- In wells that have measurable LNAPL, but that require sample collection for CVOC analysis, an additional sampling procedure will be implemented to advance the 1/4-inch peristaltic tubing past the LNAPL. One end of a length of 3/8-inch tubing will be covered with Teflon plumbers tape and the tubing will be placed into the well to a level below the measured LNAPL layer. The 1/4-inch peristaltic tubing will be inserted into the 3/8-inch tubing and pushed through the Teflon tape at the end of the 3/8-inch tubing. Purging and sample collection will then proceed as described above.
- QC ground water samples (e.g., field duplicates and trip blanks) will be collected at the respective frequencies prescribed in Section B3.5.

- Following sampling, the wells cap and monument cap will be secured. Each well's dedicated tubing will be retained in a labeled Ziploc bag for subsequent sampling events. Any damaged or defective well caps or monuments will be noted and scheduled for replacement, if necessary.

B2.2.1 Ground water Sample Identification

Each ground water sample will be assigned a unique sample identification number that includes the well number and the 8-digit date on which the sample was collected. For example, a ground water sample collected from monitoring well MW-10 on December 10, 2016, would be identified as MW-10-121016.B2.6

B.2.3 Sample Custody and Field Documentation

B2.3.1 Sample Custody

Upon collection, samples will be placed upright in a cooler. Ice or blue ice will be placed in each cooler to meet sample preservation requirements. Inert cushioning material will be placed in the remaining space of the cooler as needed to limit movement of the sample containers. If the sample coolers are being shipped, not hand carried, to the laboratory, the COC form will be placed in a waterproof bag taped to the inside lid of the cooler for shipment.

After collection, samples will be maintained in the consultant's custody until formally transferred to the analytical laboratory. For purposes of this work, custody of the samples will be defined as follows:

- In plain view of the field representatives;
- Inside a cooler that is in plain view of the field representative; or
- Inside any locked space such as a cooler, locker, car, or truck to which the field representative has the only immediately available key(s).

A COC record provided by the laboratory will be initiated at the time of sampling for all samples collected. The record will be signed by the field representative and others who subsequently take custody of the sample. Couriers or other professional shipping representatives are not required to sign the COC form; however, shipping receipts will be collected and maintained as a part of custody documentation in project files. A copy of the COC form with appropriate signatures will be kept by consultants's project manager.

Upon sample receipt, the laboratory will fill out a cooler receipt form to document sample delivery conditions. A designated sample custodian will accept custody of the shipped samples and will verify that the COC form matches the samples received. The laboratory will notify the project manager, as soon as possible, of any issues noted with the sample shipment or custody.

B2.3.2 Field Documentation

While conducting field work, the field representative will document pertinent observations and events, specific to each activity, on field forms (e.g., boring log form, as-built well completion form, well development form, ground water sampling form, etc.)

and/or in a field notebook, and, when warranted, provide photographic documentation of specific sampling efforts. Field notes will include a description of the field activity, sample descriptions, and associated details such as the date, time, and field conditions.

B2.4 Ground Water Level Monitoring

Depth-to-ground water measurements will be conducted in monitoring wells using an electric well sounder, graduated to 0.01 foot. Where there is potential for light or dense non-aqueous phase liquid (NAPL), an oil-water interface probe will be used to measure water levels and evaluate the presence of separate-phase product—either floating or at the bottom of the well.

B2.5 Exploration Surveying

Horizontal coordinates for each soil sampling location will be recorded using a hand-held global positioning system (GPS) instrument with real-time differential correction. The horizontal coordinates and elevations of monitoring wells included in the assessment will be surveyed by a licensed surveyor relative to a common horizontal and vertical datum (1988 North American Vertical Datum (NAVD 88)). Monitoring well top-of-casing elevations will be surveyed to the nearest 0.01 foot, and horizontal coordinates to the nearest 0.1 foot, or better. Each well will be surveyed at the marked spot on the top of the PVC well casing from which depth-to-water measurements are collected.

B2.6 Decontamination and Investigative-Derived Waste Management

All non-disposable sampling equipment (stainless steel spoons and bowls) will be decontaminated before collection of each sample. The decontamination sequence consists of a scrub with a non-phosphate (Alconox or Liquinox) solution, followed by tap water (potable) rinse, and finished with thorough spraying with deionized or distilled water. A solvent rinse – methanol or hexane – may be used to remove petroleum product from sampling equipment prior to the decontamination procedure described above.

Investigation-derived waste (IDW) water generated during equipment decontamination and sampling will be containerized in labeled drums. The containerized IDW water will be disposed of appropriately at a permitted off-site disposal facility.

Soil cuttings from borings and disposable personal protective equipment (PPE) will be placed in labeled Department of Transportation (DOT)-approved drums pending the analytical results to determine appropriate disposal. Each drum will be labeled with the following information:

- Non Classified IDW
- Content of the drum (soil, water, PPE) and its source (i.e., the exploration[s] from which the contents came);
- Date IDW was generated; and
- Name and telephone number of the contact person.

The drums of IDW will be temporarily consolidated on-site, profiled (in accordance with applicable waste regulations) based on available analytical data, and disposed of appropriately at a permitted off-site disposal facility. Containers of IDW will be on site less than 90 days from date of generation.

Documentation for off-site disposal of IDW will be maintained in the project file.

B3 Quality Assurance Project Plan

This QAPP identifies QC procedures and criteria required to ensure that data collected are of known quality and acceptable to achieve project objectives. Specific protocols and criteria are also set forth in this QAPP for data quality evaluation, upon the completion of data collection, to determine the level of completeness and usability of the data. It is the responsibility of the project personnel performing or overseeing the sampling and analysis activities to adhere to the requirements of the FSP and this QAPP.

B3.1 Purpose of the QAPP

As stated in the Washington State Department of Ecology's (Ecology) Guidelines for Preparation of Quality Assurance Project Plans for Environmental Studies (Ecology Publication No. 04-03-030, July 2004), specific goals of this QAPP are as follows:

- Focus project manager and project team to factors affecting data quality during the planning stage of the project;
- Facilitate communication among field, laboratory, and management staff as the project progresses;
- Document the planning, implementation, and assessment procedures for QA/QC activities for the investigation;
- Ensure that the DQOs are achieved; and
- Provide a record of the project to facilitate final report preparation.

The DQOs for the project include both qualitative and quantitative objectives, which define the appropriate type of data, and specify the tolerable levels of potential decision errors that will be used as a basis for establishing the quality and quantity of data needed to support the environmental assessment. To ensure that the DQOs are achieved, this QAPP details aspects of data collection including analytical methods, QA/QC procedures, and data quality reviews. This QAPP describes both quantitative and qualitative measures of data to ensure that the DQOs are achieved. DQOs dictate data collection rationale, sampling and analysis designs that are presented in the main body of the RIWP, and sample collection procedures that are presented in the FSP (Section B2 of this Appendix).

B3.2 Project Organization and Responsibilities

The project consultant team involved with data generation includes representatives from the lead party, either Aspect or Leidos, depending on party responsible for the investigation component. Key individuals and their roles on this project are as follows:

Project Manager—Aspect; Leidos. The project manager is responsible for the successful completion of all aspects of this project, including day-to-day management, production of reports, liaison with party and regulatory agencies, and coordination with the project team members. The project manager is also responsible for resolution of non-conformance issues, is the lead author on project plans and reports, and will provide regular, up-to-date progress reports and other requested information to project team and Ecology.

Field Manager—Aspect; Leidos. The field manager is responsible for overseeing the field sampling program outlined in this plan, including collecting representative samples and ensuring that they are handled properly prior to transfer of custody to the project laboratory. The field manager will manage procurement of necessary field supplies, assure that monitoring equipment is operational and calibrated in accordance with the specifications provided herein, and act as the Site Health and Safety Officer.

Data Quality Manager—Aspect; Leidos. The data quality manager is responsible for developing data quality objectives, selecting analytical methods, coordinating with the analytical laboratory, overseeing laboratory performance, and approving QA/QC procedures. The data quality manager is also responsible for overseeing QA validation of the analytical data reports received from the project laboratory. Data will be validated in-house by the lead party for the data collection, either Aspect or Leidos. The validator works independently, with no interference from those who collect and use the Site data.

Laboratory Project Manager – Friedman and Bruya, Inc. (FBI); Eurofins Lancaster Laboratories. Aspect will contract FBI laboratory for the on-property investigation described in this work plan. Chevron will contract Eurofins Lancaster Laboratories for investigation activities for which their responsible. The laboratory project manager is responsible for ensuring that all laboratory analytical work for soil and water media complies with project requirements, and acting as a liaison with the project manager, field manager, and data quality manager to fulfill project needs on the analytical laboratory work. This responsibility also applies to analysis the laboratory project manager subcontracts to another laboratory.

B3.3 Analytical Methods and Reporting Limits

Laboratory analytical methods for soil and ground water analyses to be performed during this environmental characterization are as follow:

Chemical Group and Analyte	Analytical Method
Gasoline Range Organics	NWTPH-Gx
Diesel & Residual Range Organics	NWTPH-Dx
Benzene, Toluene, Ethylbenzene, Xylenes	EPA 8260C or 8021B
Chlorinated Volatile Organic Compounds	EPA 8260C
Petroleum Fractionation (EPH/VPH)	NWEPH and NWVPH
Total/Dissolved Lead, cadmium, chromium, nickel, and zinc	EPA 6000 series
Methyl tert-butyl ether (MTBE) Ethylene dibromide (EDB) and Ethylene Dichloride (EDC), Naphthalene	EPA 8260C
Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)	EPA 8270
Polychlorinated biphenyls (PCBs)	EPA 8082

Tables 2 and 3 of the RIWP, respectively, list the laboratory analytical methods for soil and ground water analyses to be performed. Table B-1 lists samples containers, preservation, and analytical holding times for each analysis.

B3.3.1 Method Detection Limit and Method Reporting Limit

The method detection limit (MDL) is the minimum concentration of a compound that can be measured and reported with a 99-percent confidence that the analyte concentration is greater than zero. MDLs are established by the laboratory using prepared samples, not samples of environmental media.

The method reporting limit (RL) is defined as the lowest concentration at which a chemical can be accurately and reproducibly quantified, within specified limits of precision and accuracy, for a given environmental sample. The RL can vary from sample to sample depending on sample size, sample dilution, matrix interferences, moisture content, and other sample-specific conditions. As a minimum requirement for organic analyses, the RL should be equivalent to or greater than the concentration of the lowest calibration standard in the initial calibration curve. The expected MDLs and RLs from FBI laboratory are summarized in Tables B-3 and B-4 for water and soil samples collected by Aspect, respectively The expected MDLs and RLs from Eurofins Lancaster Laboratory are summarized in Tables B-5 and B-6 for water and soil samples collected by Leidos, respectively.

B3.4 Data Quality Objectives

DQOs, including the Measurement Quality Indicators (MQIs)—precision, accuracy, representativeness, comparability, completeness, and sensitivity (namely PARCCS parameters) —and sample-specific RLs are dictated by the data quality objectives, project requirements, and intended uses of the data. For this project, the analytical data must be of sufficient technical quality to determine whether contaminants are present and, if present, whether their concentrations are greater than or less than applicable screening criteria based on protection of human health and the environment.

The quality of data generated will be assessed against the MQIs set forth in this QAPP. Specific QC parameters associated with each of the MQIs are summarized in Table B-2.

Specific MQI goals and evaluation criteria (i.e., MDLs, RLs, percent recovery (%R) for accuracy measurements, relative percent difference (RPD) for precision measurements, are defined in Tables B-3 through B-6. Definitions of these parameters and the applicable QC procedures are presented below.

B3.4.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared with their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples and laboratory control samples/laboratory control sample duplicate (LCS/LCSD) when there is sufficient sample volume. A laboratory duplicate sample or just an LCS/LCSD may be used in place of an MS/MSD if there is insufficient volume.

Analytical precision is quantitatively expressed as the relative percent difference (RPD) between the LCS/LCSD, MS/MSD, or laboratory duplicate pairs and is calculated with the following formula:

$$RPD\ (\%) = 100 \times \frac{|S - D|}{(S + D)/2}$$

where:
S = analyte concentration in sample
D = analyte concentration in duplicate sample

Analytical precision measurements will be carried out at a minimum frequency of 1 per 20 samples for each matrix sampled, or one per laboratory analysis group. Laboratory precision will be evaluated against laboratory quantitative RPD performance criteria as defined in Tables B-3 through B-6 for specific analytical methods and sample matrices. If the control criteria are not met, the laboratory will supply a justification of why the limits were exceeded and implement the appropriate corrective actions. The RPD will be evaluated during data review and validation. The data reviewer will note deviations from the specified limits and will comment on the effect of the deviations on reported data.

B3.4.2 Accuracy

Accuracy measures the closeness of the measured value to the true value. The accuracy of chemical test results is assessed by "spiking" samples with known standards (surrogates, blank spikes, or matrix spikes) and establishing the average recovery. Accuracy is quantified as the %R. The closer the %R is to 100 percent, the more accurate the data.

Surrogate recovery will be calculated as follows:

$$\text{Recovery (\%)} = \frac{MC}{SC} \times 100$$

where:

SC = spiked concentration
MC = measured concentration

MS percent recovery will be calculated as follows:

$$\text{Recovery (\%)} = \frac{MC - USC}{SC} \times 100$$

where:

SC = spiked concentration
MC = measured concentration
USC = unspiked sample concentration

Accuracy measurements on MS samples will be carried out at a minimum frequency of 1 in 20 samples per matrix analyzed. Blank spikes will also be analyzed at a minimum frequency of 1 in 20 samples (not including QC samples) per matrix analyzed. Surrogate recoveries for organic compounds will be determined for each sample analyzed for respective compounds. Laboratory accuracy will be evaluated against the performance criteria defined in Tables B-3 through B-6. If the control criteria are not met, the laboratory will supply a justification of why the limits were exceeded and implement the appropriate corrective actions. Percent recoveries will be evaluated during data review and validation, and the data reviewer will comment on the effect of the deviations on the reported data.

B3.4.3 Representativeness

Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The FSP sampling techniques and sample handling protocols (e.g., homogenizing, storage, preservation, and use of duplicates and blanks) have been developed to ensure representative samples. Only representative data will be deemed usable. Sampling locations are described in Section 7 of the RIWP. The field sampling procedures are described in the FSP (Section B2) of this SAP.

The representativeness of a data point is determined by assessing the integrity of the sample upon receipt at the laboratory (e.g., consistency of sample ID and collection date/time between container labels versus COC forms, breakage/leakage, cooler temperature, preservation, headspace for VOA containers, etc.); compliance of method required sample preparation and analysis holding times; the conditions of blanks (trip blank, rinsate blank, field blank, method/preparation blank, and calibration blank)

associated with the sample; and the overall consistency of the results within a field duplicate pair.

B3.4.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. This goal will be achieved through the use of standard techniques to collect samples, USEPA-approved standard methods to analyze samples, and consistent units to report analytical results. Data comparability also depends on data quality. Data of unknown quality cannot be compared.

B3.4.5 Completeness

Completeness is defined as the percentage of measurements made that are judged to be valid. Results will be considered valid if the precision, accuracy, and representativeness objectives are met and if RLs are sufficient for the intended uses of the data. Completeness is calculated as follows:

$$Completeness\ (\%) = \frac{V}{P} \times 100$$

where:

V = number of valid measurements
P = number of measurements taken

Valid and invalid data (i.e., data qualified with the R flag [rejected]) will be identified during data validation. The target completeness goal for this project is 95 percent.

B3.4.6 Sensitivity

Sensitivity depicts the level of ability an analytical system (i.e., sample preparation and instrumental analysis) of detecting a target component in a given sample matrix with a defined level of confidence. Factors affecting the sensitivity of an analytical system include: analytical system background (e.g., laboratory artifact or method blank contamination), sample matrix (e.g., mass spectrometry ion ratio change, co-elution of peaks, or baseline elevation), and instrument instability.

B3.5 Quality Control Procedures

Field and laboratory QC procedures are outlined below.

B3.5.1 Field Quality Control

Beyond use of standard sampling protocols defined in the FSP, field QC procedures include maintaining the field instrumentation used. Field instruments (e.g., PID for evaluating presence of VOCs in soil samples, and the YSI meter for measuring field parameters during ground water sampling) are maintained and calibrated regularly prior to use, in accordance with manufacturer recommendations.

In addition, field QC samples will be collected and submitted for analyses to monitor the precision and accuracy associated with field procedures. Field QC samples to be collected and analyzed for this RI include field duplicates, trip blanks, and equipment rinsate blanks. The definition and sampling requirements for field QC samples are presented below.

Blind Field Duplicates

Blind field duplicate samples are used to check for sampling and analysis reproducibility; however, the field duplicate sample results include variability introduced during both field sampling and laboratory preparation and analysis, and EPA data validation guidance provides no specific evaluation criteria for field duplicate samples. Advisory evaluation criteria are set forth at 35 percent for RPD (if both results are greater than five times the RL) and two times the RLs for concentration difference (if either of the result is less than five times the RL) between the original and field duplicate results.

Field Duplicates will be submitted "blind" to the laboratory as discrete samples (i.e., given unique sample identifiers to keep the duplicate identity unknown to the laboratory), but will be clearly identified in the field log. **Field duplicate samples will be collected at a frequency of 5 percent (1 per 20) of the field samples for each matrix and analytical method, but not less than one duplicate per sampling event per matrix.**

If a given soil sample depth interval lacks sufficient volume (recovery) to supply material for a planned analysis and its field duplicate analysis, the field duplicate aliquot will be collected for that analysis from another depth interval in that same location if practical.

Trip Blank

Trip blank samples will be used to monitor possible VOC cross-contamination occurring during sample transport. Trip blank samples are prepared and supplied by the laboratory using organic-free, reagent-grade water into a VOC vial prior to the collection of field samples. The trip blank sample vials are placed with and accompany the VOC and TPH-Gx samples through the entire transporting process. **One trip blank will be collected for each soil sampling round and each ground water sampling round where VOC or TPH-Gx analyses are conducted.**

In case a target compound is present in a trip blank, results for all samples shipped with this trip blank will be evaluated and data qualified accordingly if determined that the results are affected.

Equipment Rinsate Blank

Equipment rinsate blanks are collected to determine the potential of cross-contamination introduced by nondedicated equipment (e.g., bladder pump and YSI meter) that is used at multiple sample locations. Deionized water (obtained from the laboratory) is rinsed through the decontaminated sampling equipment and collected into adequate sample containers for analysis. The equipment rinsate blank is then handled in a manner identical to the primary samples collected with that piece of equipment. The blank is then processed, analyzed, and reported as a regular field sample. **The rinsate blank collection frequency will be 1 per 20 samples for each matrix and analytical method,**

but not less than one equipment rinsate per sampling event per matrix. When dedicated equipment is used, equipment rinsate blanks will not be collected.

B3.5.2 Laboratory Quality Control

The laboratories' analytical procedures must meet requirements specified in the respective analytical methods or approved laboratory standard operating procedures (SOPs), e.g., instrument performance check, initial calibration, calibration check, blanks, surrogate spikes, internal standards, and/or labeled compound spikes. Specific laboratory QC analyses required for this project will consist of the following at a minimum:

- Instrument tuning, instrument initial calibration, and calibration verification analyses as required in the analytical methods and the laboratory standard operating procedures (SOPs);
- Laboratory and/or instrument method blank measurements at a minimum frequency of 5percent (1 per 20 samples) or in accordance with method requirements, whichever is more frequent; and
- Accuracy and precision measurements as defined in Table B-2, at a minimum frequency of 5 percent (1 per 20 samples) or in accordance with method requirements, whichever is more frequent. In cases where a pair of MS/MSD or MS/laboratory duplicate analyses are not performed on a project sample, a set of LCS/LCSD analyses will be performed to provide sufficient measures for analytical precision and accuracy evaluation.

The laboratory's QA officers are responsible for ensuring that the laboratory implements the internal QC and QA procedures detailed in the laboratory's Quality Assurance Manual.

B3.6 Corrective Actions

If routine QC audits by the laboratory result in detection of unacceptable conditions or data, actions specified in the laboratory SOPs will be taken. Specific corrective actions are outlined in each SOP used and can include the following:

- Identifying the source of the violation;
- Reanalyzing samples if holding time criteria permit;
- Resampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and/or
- Accepting but qualifying data to indicate the level of uncertainty.

If unacceptable conditions occur, the laboratory will contact the project manager to discuss the issues and determine the appropriate corrective action. Corrective actions taken by the laboratory during analysis of samples for this project will be documented by the laboratory in the case narrative associated with the affected samples.

In addition, the project data quality manager will review the laboratory data generated for this investigation to ensure that project DQOs are met. If the review indicates that non-conformances in the data have resulted from field sampling or documentation procedures

or laboratory analytical or documentation procedures, the impact of those non-conformances on the overall project data usability will be assessed. Appropriate actions, including re-sampling and/or re-analysis of samples may be recommended to the project manager to achieve project objectives.

B3.7 Data Reduction, Quality Review, and Reporting

All data will undergo a QA/QC evaluation at the laboratory which will then be reviewed by the responsible data quality manager. Initial data reduction, evaluation, and reporting at the laboratory will be carried out in full compliance with the method requirement and laboratory SOPs. The laboratory internal review will include verification (for correctness and completeness) of electronic data deliverable (EDD) accompanied with each laboratory report. The responsible database manager will verify the completeness and correctness of all laboratory deliverables (i.e., laboratory report and EDDs) before releasing the deliverables for data validation.

B3.7.1 Minimum Data Reporting Requirements

The following sections specify general and specific requirements for analytical data reporting to provide sufficient deliverables for project documentation and data quality assessment.

General Requirements

The following requirements apply to laboratory reports for all types of analyses:

- A laboratory report will include a cover page signed by the laboratory director, the laboratory QA officer, or his/her designee to certify the eligibility of the reported contents and the conformance with applicable analytical methodology.
- Definitions of abbreviations, data flags and data qualifiers used in the report.
- Cross reference of field sample names and laboratory sample identity for all samples in the SDG.
- Completed COC document signed and dated by parties of acquiring and receiving.
- Completed sample receipt document with record of cooler temperature and sample conditions upon receipt at the laboratory. Anomalies such as inadequate sample preservation, inconsistent bottle counts, and sample container breakage, and communication record and corrective actions in response to the anomalies will be documented and incorporated in the sample receipt document. The document will be initialed and dated by personnel that complete the document.
- Case narrative that addresses any anomalies or QC outliers in relation to sample receiving, sample preparation, and sample analysis on samples in the sample delivery group (SDG). The narrative will be presented separately for each analytical method and each sample matrix.
- All pages in the report are to be paginated. Any insertion of pages after the laboratory report is issued will be paginated with starting page number suffixed

with letters (e.g., pages inserted between pages 134 and 135 should be paginated as 134A, 134B, etc.)

- Any resubmitted or revised report pages will be submitted to project manager with a cover page stating the reason(s) and scope of resubmission or revision, and signed by laboratory director, QA officer, or the designee.

Specific Requirements

The following presents specific requirements for laboratory reports:

- Sample results: All soil sample results will be reported on a dry-weight basis. The report pages for sample results (namely Form 1s) will, at minimum, include sample results, RLs, unit, proper data flags, preparation, and analysis, dilution factor, and percent moisture (for solid samples).
- Method blank results.
- LCS and LCSD (if matrix spike duplicate analysis is not performed) results with laboratory acceptance criteria for %R and RPD.
- Surrogate spike results with laboratory acceptance criteria for %R.
- MS and MSD results with laboratory acceptance criteria for %R and RPD. In cases where MS/MSD analyses were not performed on a project sample, LCS/LCSD analyses should be performed and reported instead.

B3.8 Data Quality Verification and Validation

Reported analytical results will be qualified by the laboratory to identify QC concerns in accordance with the specifications of the analytical methods. Additional laboratory data qualifiers may be defined and reported by the laboratory to more completely explain QC concerns regarding a particular sample result. All data qualifiers will be defined in the laboratory's narrative reports associated with each case.

Data validation will be performed on all data consistent with United States Environmental Protection Agency Stage 2B requirements. In cases where a systematic QC problem is suspected, such as unusual detections of an analyte or consistent outlying results of a QC parameter, a more detailed review will be performed on laboratory records pertinent to the concerned analysis to further evaluate the extend of the QC issue and the final data quality and usability. The actual level of validation for each data point will be entered in the electrical database submitted to the Ecology Environmental Information Management system (EIMs). Data validation will be conducted following the guidance below:

- EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, January 2010, USEPA 540/R-10/011
- EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, Office of Superfund Remediation and Technical

Innovation, U.S. Environmental Protection Agency, June 2008, USEPA-540-R-08-01.

The data validation will examine and verify the following parameters against the method requirements and laboratory control limits specified in Tables B-3 through B-6:

- Sample management and holding times;
- Instrument performance check, calibration, and calibration verification;
- Laboratory and field blank results;
- Detection and reporting limits;
- Laboratory replicate results;
- MS/MSD results;
- LCS and/or standard reference material results;
- Field duplicate results;
- Surrogate spike recovery (organic analyses only);
- Internal standard recovery (internal calibration methods only);
- Inter-element interference check (ICP analyses only);
- Serial dilution (metals only);
- Labeled compound recovery (isotope dilution methods only); and
- Ion ratios for detected compounds (high resolution GC/MS methods only).

Data qualifiers will be assigned based on outcome of the data validation. Data qualifiers are limited to and defined as follows:

- U—The analyte was analyzed for but was determined to be non-detect above the reported sample quantitation limit, or the quantitation limit was raised to the concentration found in the sample due to blank contamination.
- J—The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ—The analyte was not detected above the reported quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R—The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified.
- DNR—Do not report from this analysis; the result for this analyte is to be reported from an alternative analysis.

In cases of multiple analyses (such as an undiluted and a diluted analysis) performed on one sample, the optimal result will be determined and only the determined result will be reported for the sample.

The scope and findings of the data validation will be documented and discussed in the Data Validation Report(s). The Data Validation Report(s) will be appended to the RI report.

B3.9 Preventative Maintenance Procedures and Schedules

Preventative maintenance in the laboratory will be the responsibility of the laboratory personnel and analysts and ensured by the laboratory project manager. This maintenance includes routine care and cleaning of instruments and inspection and monitoring of carrier gases, solvents, and glassware used in analyses. Details of the maintenance procedures are addressed in the respective laboratory SOPs.

Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to change as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the method-specific QC criteria.

Maintenance and calibration of instruments used in the field for sampling (e.g., PID for evaluating presence of VOCs in soil samples, and the YSI meter for measuring field parameters during ground water sampling) will be conducted regularly in accordance with manufacturer recommendations prior to use.

B3.10 Performance and System Audits

The project manager has responsibility for reviewing the performance of the laboratory QA program; this review will be achieved through regular contact with the analytical laboratory's project manager. To ensure comparable data, all samples of a given matrix to be analyzed by each specified analytical method will be processed consistently by the same analytical laboratory.

B3.11 Data and Records Management

Records will be maintained documenting all activities and data related to field sampling and chemical analyses.

B3.11.1 Field Documentation

Raw data received from the analytical laboratory will be reviewed, entered into a computerized database, and verified for consistency and correctness. The database will be updated based on data review and independent validation if necessary.

The following field data will be included in the database:

- Sample location coordinates
- Sample type (i.e., ground water or soil)
- Soil or ground water sampling depth interval

Information regarding whether concentrations represent total phase (unfiltered samples) or dissolved phase (filtered samples) will be compiled and stored in the database. Data

will be submitted to Ecology's Environmental Information Management (EIM) database once data have been reviewed and validated.

B3.11.2 Analytical Data Management

Raw data received from the analytical laboratory will be reviewed, entered into a computerized database, and verified for consistency and correctness. The database will be updated based on data review and independent validation if necessary.

The following field data will be included in the database:

- Sample location coordinates
- Sample type (i.e., ground water or soil)
- Soil or ground water sampling depth interval

Information regarding whether concentrations represent total phase (unfiltered samples) or dissolved phase (filtered samples) will be compiled and stored in the database. Data will be submitted to Ecology's Environmental Information Management (EIM) database once data have been reviewed and validated.

B4 References for Appendix B

Puls, R.W. and M.J. Barcelona, 1996, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, EPA Ground Water Issue, EPA/540/S-95/504.

U.S. Environmental Protection Agency (EPA), 2008, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, June 2008, USEPA-540-R-08-01.

U.S. Environmental Protection Agency (EPA), 2009, Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, January 13 2009. EPA 540-R-08-005.

U.S. Environmental Protection Agency (EPA), 2010, Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, January 2010, USEPA 540/R-10/011.

Washington State Department of Ecology (Ecology), 2004, Collecting and Preparing Soil Samples for VOC Analysis, Implementation Memorandum Number 5, June 17, 2004.

Washington State Department of Ecology (Ecology), 2012, Guidance For Groundwater Monitoring at Landfills and Other Facilities Regulated Under Chapters 173-304, 173-306, 173-350, and 173-351 WAC, Publication No. 12-07-072.

Table B-1 - Analytical Methods, Sample Containers, Preservation, and Holding Times

Project No. 160092, 4700 Brooklyn Avenue
Seattle, Washington

Sample Matrix	Analytical Parameter	Analytical Method	Sample Container	No. Containers	Preservation Requirements	Holding Time
Soil	Gasoline Range TPH	NWTPH-Gx	Method 5035A, 40-mL vials	4	4°C ±2°C, Freeze within 48 hours to <-7°C	14 days
	Diesel and Motor Oil Range TPH	NWTPH-Dx/SW846 Method 3630 (Silica Gel Cleanup)	4 ounce jar	1	4°C ±2°C	14 days for extraction; 40 days for analysis
	BTEX	Method 8021 B	Method 5035A, 40-mL vials	4	4°C ±2°C, Freeze within 48 hours to <-7°C	14 days
	EPH/VPH	NWEPH/NWVPH	4 Ounce Jar/Method 5035A, 40-mL vials	5	4°C ±2°C, Freeze within 48 hours to <-7°C	14 days
	MTBE, EDC, EDB, Naphthalene	Method 8260	Method 5035A, 40-mL vials	4	4°C ±2°C, Freeze within 48 hours to <-7°C	14 days
	Polychlorinated Biphenyls (PCBs)	Method 8082	4-ounce jar	1	4°C ±2°C	6 months
	Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)	Method 8270	4-ounce jar	1	4°C ±2°C	6 months
	Cadmium, Chromium, Lead, Nickel, Zinc	Method 6020	4-ounce jar	1	4°C ±2°C	6 months
Water	Gasoline Range TPH	Method NWTPH-Gx	40-mL VOA vials	3	4°C ±2°C, HCl pH < 2	14 days
	Diesel and Motor Oil Range TPH	NWTPH-Dx/SW846 Method 3630 (Silica Gel Cleanup)	500-mL amber glass bottle	1	4°C ±2°C	7 days for extraction, 40 days for analysis
	VOCs (including MTBE)	Method 8260	40-mL VOA vials	3	4°C ±2°C, 1 with HCl pH < 2, 2 without HCl	14 days for analysis
	EPH/VPH	NWEPH/NWVPH	1000-mL amber/40-mL VOA vials	4	4°C ±2°C, HCl pH < 2	7 days for extraction, 40 days for analysis/14 days for anlaysis
	Lead	Method 6020	500-mL HDPE bottle	1	4°C ±2°C, $HN0_3$ pH < 2 (after field filtration)	28 days

Notes:
HCL = hydrochloric acid
TPH = total petroleum hydrocarbons
VOA = volatile organic analysis
BTEX = benzene, toluene, ethylbenzene, xylenes
MTBE = methyl tert-butyl ether

Table B-2 - QC Parameters Associated with PARCCS

Project No. 160092, 4700 Brooklyn Ave
Seattle, Washington

Data Quality Indicators	QC Parameters
Precision	RPD values of:
	(1) LCS/LCS Duplicate
	(2) MS/MSD
	(3) Field Duplicates
Accuracy/Bias	Percent Recovery (%R) or Percent Difference (%D) values of:
	(1) Initial Calibration and Calibration Verification
	(2) LCS
	(3) MS
	(4) Surrogate Spikes
	Results of:
	(1) Instrument and Calibration Blank
	(2) Method (Preparation) Blank
	(3) Trip Blank
	(4) Equipment Rinsate Blank (if appropriate)
Representativeness	Results of All Blanks
	Sample Integrity (Chain-of-Custody and Sample Receipt Forms)
	Holding Times
Comparability	Sample-specific Reporting Limits
	Sample Collection Methods
	Laboratory Analytical Methods
Completeness	Data Qualifiers
	Laboratory Deliverables
	Requested/Reported Valid Results
Sensitivity	MDLs and MRLs

Notes:

LCS = laboratory control sample

MDL = method detection limit

MRL = method reporting limit

MS/MSD = matrix spike/matrix spike duplicate

QC = Quality Control

PARCCS = Precision, Accuracy, Representativeness, Comparability, Completeness, Sensistivity

Table B-3 - Measurement Quality Objectives for Water Samples

Friedman and Bruya, Inc

Project No. 160092, 4700 Brooklyn Avenue

Seattle, Washington

Analyte Name	MDL[(A)]	MRL	LCS/LCS %R[(A)]	RPD (%)	Surrogate %R[(A)]
Volatile Organic Compounds (VOCs) by SW8260C (µg/L)					
1,1,1,2-Tetrachloroethane	0.040	0.2	80 – 128	≤40	n/a
1,1,1-Trichloroethane	0.041	0.2	79 – 124	≤40	n/a
1,1,2,2-Tetrachloroethane	0.060	0.2	80 – 120	≤40	n/a
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.043	0.2	76 – 124	≤40	n/a
1,1,2-Trichloroethane	0.129	0.2	80 – 120	≤40	n/a
1,1-Dichloroethane	0.053	0.2	80 – 120	≤40	n/a
1,1-Dichloroethene	0.054	0.2	74 – 120	≤40	n/a
1,1-Dichloropropene	0.034	0.2	80 – 120	≤40	n/a
1,2,3-Trichlorobenzene	0.110	0.5	80 -125	≤40	n/a
1,2,3-Trichloropropane	0.131	0.5	80 – 120	≤40	n/a
1,2,4-Trichlorobenzene	0.107	0.5	77 – 127	≤40	n/a
1,2,4-Trimethylbenzene	0.024	0.2	80 – 122	≤40	n/a
1,2-Dibromo 3-Chloropropane	0.366	0.5	79 – 129	≤40	n/a
1,2-Dibromoethane (Ethylene Dibromide)	0.075	0.2	80 – 120	≤40	n/a
1,2-Dichlorobenzene	0.036	0.2	80 – 120	≤40	n/a
1,2-Dichloroethane	0.072	0.2	80 – 121	≤40	n/a
1,2-Dichloropropane	0.035	0.2	80 – 120	≤40	n/a
1,3,5-Trimethyl Benzene	0.015	0.2	80 – 120	≤40	n/a
1,3-Dichlorobenzene	0.036	0.2	80 – 120	≤40	n/a
1,3-Dichloropropane	0.062	0.2	80 – 120	≤40	n/a
1,4-Dichlorobenzene	0.040	0.2	80 – 120	≤40	n/a
2,2-Dichloropropane	0.052	0.2	72 – 133	≤40	n/a
2-Butanone	0.814	5.0	73 – 123	≤40	n/a
2-Chloro Toluene	0.024	0.2	80 – 120	≤40	n/a
2-Chloroethylvinyl Ether	0.250	1.0	62 – 130	≤40	n/a
2-Hexanone	0.902	5.0	80 – 129	≤40	n/a
4-Chloro Toluene	0.016	0.2	80 – 120	≤40	n/a
4-Isopropyl Toluene	0.026	0.2	80 – 124	≤40	n/a
4-Methyl-2-Pentanone	0.974	5.0	80 – 125	≤40	n/a
Acetone	2.057	5.0	64 – 125	≤40	n/a
Acrolein	2.476	5.0	60 – 124	≤40	n/a
Acrylonitrile	0.604	1.0	76 – 123	≤40	n/a
Benzene	0.027	0.2	80 – 120	≤40	n/a
Bromobenzene	0.060	0.2	80 – 120	≤40	n/a
Bromochloromethane	0.061	0.2	80 – 120	≤40	n/a

Table B-3 - Measurement Quality Objectives for Water Samples

Friedman and Bruya, Inc

Project No. 160092, 4700 Brooklyn Avenue

Seattle, Washington

Analyte Name	MDL[(A)]	MRL	LCS/LCS %R[(A)]	RPD (%)	Surrogate %R[(A)]
Volatile Organic Compounds (VOCs) by SW8260C (µg/L)					
Bromodichloromethane	0.051	0.2	80 – 122	≤40	n/a
Bromoethane	0.041	0.2	77 – 122	≤40	n/a
Bromoform	0.062	0.2	62 – 149	≤40	n/a
Bromomethane	0.252	1.0	68 – 130	≤40	n/a
Carbon Disulfide	0.037	0.2	77 – 124	≤40	n/a
Carbon Tetrachloride	0.044	0.2	71 – 139	≤40	n/a
Chlorobenzene	0.023	0.2	80 – 120	≤40	n/a
Chloroethane	0.086	0.2	68 – 133	≤40	n/a
Chloroform	0.027	0.2	80 – 120	≤40	n/a
Chloromethane	0.095	0.5	77 – 122	≤40	n/a
cis 1,3-dichloropropene	0.061	0.2	80 – 127	≤40	n/a
cis-1,2-Dichloroethene	0.043	0.2	78 – 120	≤40	n/a
Dibromochloromethane	0.048	0.2	80 – 120	≤40	n/a
Dibromomethane	0.145	0.2	80 – 120	≤40	n/a
Dichlorodifluoromethane	0.052	0.2	68 – 133	≤40	n/a
Ethyl Benzene	0.037	0.2	80 – 120	≤40	n/a
Hexachloro-1,3-Butadiene	0.073	0.5	80 – 135	≤40	n/a
Iodomethane (Methyl Iodide)	0.227	1.0	76 – 123	≤40	n/a
iso-propyl Benzene	0.021	0.2	80 – 120	≤40	n/a
Methylene Chloride	0.485	1.0	71 – 125	≤40	n/a
Methyl-tert-butyl ether	0.073	0.5	79 – 121	≤40	n/a
Naphthalene	0.118	0.5	80 – 128	≤40	n/a
n-Butyl Benzene	0.025	0.2	80 – 125	≤40	n/a
n-Propyl Benzene	0.023	0.2	80 – 120	≤40	n/a
sec-Butyl Benzene	0.024	0.2	80 – 121	≤40	n/a
Styrene	0.045	0.2	80 – 121	≤40	n/a
tert-Butyl Benzene	0.026	0.2	80 – 121	≤40	n/a
Tetrachloroethene	0.047	0.2	80 – 120	≤40	n/a
Toluene	0.040	0.2	80 – 120	≤40	n/a
trans 1,3-Dichloropropene	0.081	0.2	79 – 132	≤40	n/a
trans-1,2-Dichloroethene	0.048	0.2	75 – 120	≤40	n/a
trans-1,4-Dichloro 2-Butene	0.324	1.0	47 – 147	≤40	n/a
Trichloroethene	0.049	0.2	80 – 120	≤40	n/a
Trichlorofluoromethane	0.037	0.2	74 – 135	≤40	n/a
Vinyl Acetate	0.069	0.2	74 – 120	≤40	n/a
Vinyl Chloride	0.069	0.2	74 – 120	≤40	n/a
m,p-xylene	0.052	0.4	80 – 120	≤40	n/a
o-Xylene	0.035	0.2	80 – 120	≤40	n/a

Table B-3 - Measurement Quality Objectives for Water Samples

Friedman and Bruya, Inc
Project No. 160092, 4700 Brooklyn Avenue
Seattle, Washington

Analyte Name	MDL[(A)]	MRL	LCS/LCS %R[(A)]	RPD (%)	Surrogate %R[(A)]
Volatile Organic Compounds (VOCs) by SW8260C (µg/L)					
1,2-Dichloroethane-d4	n/a	n/a	80 – 130	≤40	80 – 120
1,2-Dichlorobenzene-d4	n/a	n/a	80 – 120	≤40	80 – 120
Toluene-d8	n/a	n/a	80 – 120	≤40	80 – 120
4-Bromofluorobenzene	n/a	n/a	80 – 120	≤40	80 – 120
Gasoline Range Hydrocarbons by NWTPH-Gx (µg/L)					
Gasoline Range Hydrocarbons	0.057	0.25	80 – 120	≤40	n/a
Bromobenzene	n/a	n/a	77 – 120	≤40	n/a
Diesel and Motor Oil Range Hydrocarbons by NWTPH-Dx with Silica Gel Cleanup (µg/L)					
Diesel Range Hydrocarbons	39	100	61-104	≤40	n/a
Oil Range Hydrocarbons	10	200	60 – 130	≤40	n/a
o-Terphenyl	n/a	n/a	50 – 150	≤40	n/a
Metals					
Lead	0.046	0.1	80 – 120	≤20	n/a

Notes:

[(A)] = Based on current laboratory control criteria. Some values may vary slightly between instruments and can be subject to change as the laboratory updates the charted values periodically.

%R = percent recovery

LCS/LCSD = laboratory control samples and laboratory control sample duplicate

MDL = method detection limit

MRL = method reporting limit

n/a = not applicable

RPD = relative percent difference

µg/L = microgram per liter

(--) = No PSL identified

Table B-4 - Measurement Quality Objectives for Soil Samples

Friedman and Bruya, Inc.

Project No. 160092, 4700 Brooklyn Ave

Seattle, Washington

Analyte Name	MDL[(A)]	MRL	LCS/LCS %R[(A)]	RPD (%)	Surrogate %R[(A)]
Volatile Organic Compounds (VOCs) by SW8260C (mg/kg)					
1,1,1,2-Tetrachloroethane	0.000233	0.001	80 – 120	≤40	n/a
1,1,1-Trichloroethane	0.000226	0.001	78 – 133	≤40	n/a
1,1,2,2-Tetrachloroethane	0.000253	0.001	71 – 120	≤40	n/a
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.000287	0.002	72 – 142	≤40	n/a
1,1,2-Trichloroethane	0.000286	0.001	77 – 120	≤40	n/a
1,1-Dichloroethane	0.000203	0.001	65 – 139	≤40	n/a
1,1-Dichloroethene	0.000336	0.001	73 – 138	≤40	n/a
1,1-Dichloropropene	0.000312	0.001	80 – 123	≤40	n/a
1,2,3-Trichlorobenzene	0.000305	0.005	76 – 122	≤40	n/a
1,2,3-Trichloropropane	0.000517	0.002	75 – 120	≤40	n/a
1,2,4-Trichlorobenzene	0.000332	0.005	75 – 130	≤40	n/a
1,2,4-Trimethylbenzene	0.00023	0.001	77 – 125	≤40	n/a
1,2-Dibromo-3-Chloropropane	0.000586	0.005	61 – 128	≤40	n/a
1,2-Dibromoethane (Ethylene Dibromide	0.000176	0.001	79 – 120	≤40	n/a
1,2-Dichlorobenzene	0.000293	0.001	77 – 120	≤40	n/a
1,2-Dichloroethane	0.000191	0.001	77 – 120	≤40	n/a
1,2-Dichloropropane	0.000162	0.001	74 – 120	≤40	n/a
1,3,5-Trimethylbenzene	0.000254	0.001	77 – 126	≤40	n/a
1,3-Dichlorobenzene	0.000227	0.001	76 – 120	≤40	n/a
1,3-Dichloropropane	0.000209	0.001	77 – 120	≤40	n/a
1,4-Dichlorobenzene	0.000232	0.001	75 – 120	≤40	n/a
2,2-Dichloropropane	0.000292	0.001	77 – 137	≤40	n/a
2-Butanone	0.000513	0.005	64 – 120	≤40	n/a
2-Chloroethyl Vinyl Ether	0.000276	0.005	20 – 157	≤40	n/a
2-Chlorotoluene	0.0003	0.001	76 – 120	≤40	n/a
2-Hexanone	0.000439	0.005	62 – 128	≤40	n/a
4-Chlorotoluene	0.000277	0.001	75 – 121	≤40	n/a
4-Isopropyl Toluene	0.000236	0.001	78 – 131	≤40	n/a
4-Methyl-2-Pentanone	0.00042	0.005	70 – 124	≤40	n/a
Acetone	0.000482	0.005	48 – 132	≤40	n/a
Acrolein	0.003809	0.05	60 – 130	≤40	n/a
Acrylonitrile	0.001026	0.005	59 – 124	≤40	n/a
Benzene	0.000296	0.001	80 – 120	≤40	n/a
Bromobenzene	0.000153	0.001	75 – 120	≤40	n/a
Bromochloromethane	0.000323	0.001	69 – 133	≤40	n/a
Bromodichloromethane	0.000254	0.001	80 – 122	≤40	n/a
Bromoethane	0.00044	0.002	74 – 132	≤40	n/a
Bromoform	0.000297	0.001	63 – 120	≤40	n/a
Bromomethane	0.000187	0.001	40 – 172	≤40	n/a
Carbon Disulfide	0.000559	0.001	72 – 146	≤40	n/a

Table B-4 - Measurement Quality Objectives for Soil Samples

Friedman and Bruya, Inc.

Project No. 160092, 4700 Brooklyn Ave

Seattle, Washington

Analyte Name	MDL[(A)]	MRL	LCS/LCS %R[(A)]	RPD (%)	Surrogate %R[(A)]
Carbon Tetrachloride	0.000213	0.001	76 – 136	≤40	n/a
Chlorobenzene	0.000219	0.001	80 – 120	≤40	n/a
Chloroethane	0.000462	0.001	53 – 154	≤40	n/a
Chloroform	0.000234	0.001	75 – 126	≤40	n/a
Chloromethane	0.000263	0.001	65 – 129	≤40	n/a
cis-1,2-Dichloroethene	0.00024	0.001	75 – 124	≤40	n/a
cis-1,3-Dichloropropene	0.000226	0.001	80 – 124	≤40	n/a
Dibromochloromethane	0.000266	0.001	77 – 123	≤40	n/a
Dibromomethane	0.000147	0.001	80 – 120	≤40	n/a
Dichlorodifluoromethane	0.000207	0.001	67 – 142	≤40	n/a
Ethyl Benzene	0.000202	0.001	80 – 120	≤40	n/a
Hexachloro-1,3-Butadiene	0.00041	0.005	72 – 135	≤40	n/a
Iodomethane (Methyl Iodide)	0.000215	0.001	34 – 181	≤40	n/a
Isopropyl Benzene	0.000233	0.001	77 – 127	≤40	n/a
Methylene Chloride	0.000635	0.002	61 – 128	≤40	n/a
Methyl-t-butyl ether (MTBE)	0.000231	0.001	68 – 124	≤40	n/a
Naphthalene	0.000429	0.005	71 – 122	≤40	n/a
n-Butylbenzene	0.000262	0.001	75 – 134	≤40	n/a
n-Propyl Benzene	0.000272	0.001	76 – 126	≤40	n/a
s-Butylbenzene	0.00024	0.001	77 – 127	≤40	n/a
Styrene	0.000138	0.001	80 – 122	≤40	n/a
t-Butylbenzene	0.000306	0.001	77 – 125	≤40	n/a
Tetrachloroethene	0.000257	0.001	76 – 131	≤40	n/a
Toluene	0.000151	0.001	78 – 120	≤40	n/a
Volatile Organic Compounds (VOCs) by SW8260C (mg/kg)					
trans-1,2-Dichloroethene	0.000266	0.001	73 – 131	≤40	n/a
trans-1,3-Dichloropropene	0.000216	0.001	80 – 126	≤40	n/a
trans-1,4-Dichloro-2-Butene	0.000437	0.005	62 – 127	≤40	n/a
Trichloroethene	0.000212	0.001	80 – 120	≤40	n/a
Trichlorofluoromethane	0.000266	0.001	57 – 161	≤40	n/a
Vinyl Acetate	0.000381	0.005	54 – 138	≤40	n/a
Vinyl Chloride	0.000235	0.001	74 – 134	≤40	n/a
m,p-Xylene	0.000392	0.001	80 – 123	≤40	n/a
o-Xylene	0.000224	0.001	80 – 120	≤40	n/a
1,2-Dichloroethane-d4	n/a	n/a	80 – 149	≤40	80 – 122
1,2-Dichlorobenzene-d4	n/a	n/a	80 – 120	≤40	80 – 120
Toluene-d8	n/a	n/a	77 – 120	≤40	80 – 120
4-Bromofluorobenzene	n/a	n/a	80 – 120	≤40	80 – 120

Table B-4 - Measurement Quality Objectives for Soil Samples

Friedman and Bruya, Inc.

Project No. 160092, 4700 Brooklyn Ave

Seattle, Washington

Analyte Name	MDL[(A)]	MRL	LCS/LCS %R[(A)]	RPD (%)	Surrogate %R[(A)]
Gasoline Range Hydrocarbons by NWTPH-Gx (mg/kg)					
Gasoline Range Hydrocarbons	0.057	0.25	80 – 120	≤40	n/a
Bromobenzene	n/a	n/a	49 – 143	≤40	n/a
Diesel and Motor Oil Range Hydrocarbons by NWTPH-Dx with Silica Gel Cleanup (mg/kg)					
Diesel Range Hydrocarbons	1.28	5	60 – 108	≤40	n/a
Oil Range Hydrocarbons	1.57	10	60 – 130	≤40	n/a
o-Terphenyl	n/a	n/a	50 – 150	≤40	n/a
Polychlorinated Biphenyls (PCBs; mg/kg)					
PCB Arochlors	0.0021	0.1	55-130	≤20	n/a
Carcinogenic Polycyclic Aromatic Hydrocarbons					
benzo[a]pyrene	0.000065	0.01	51-118	≤20	24-168
benzo[a]anthracene	0.000088	0.01	51-115	≤20	24-168
benzo[b]fluoranthene	0.000182	0.01	56-123	≤20	24-168
benzo[k]fluoranthene	0.000194	0.01	54-131	≤20	24-168
chrysene	0.000165	0.01	55-129	≤20	24-168
dibenz[a,h]anthracene	0.00025	0.01	50-141	≤20	24-168
indeno[1,2,3-cd]pyrene	0.000183	0.01	49-148	≤20	24-168
Metals					
Lead	n/a	0.1	80-120	≤20	75-125
Cadmium	0.0198	1	70-130	≤20	n/a
Copper	0.189	1	70-130	≤20	n/a
Nickel	0.0335	1	70-130	≤20	n/a
Zinc	0.089	1	70-130	≤20	n/a

Notes:

[(A)] = Based on current laboratory control criteria. Some values may vary slightly between instruments

%R = Percent recovery

LCS/LCSD = Laboratory control samples and laboratory control sample duplicate

MDL = Method detection limit

mg/kg = milligram per kilogram

MRL = Method reporting limit

n/a = not applicable

RPD = Relative percent difference

Table B-5 Measurement Quality Objectives for Water Samples

Eurofins Lancaster Laboratories

Project No. 160092, 4700 Brooklyn Avenue

Seattle, Washington

Analyte	Groundwater					
	Analytical Method	MDL	LOD	LOQ	LCS	RPD
		(ug/L)			(%)	
Petroleum Hydrocarbons (µg/L)						
Gasoline-Range Hydrocarbons	NWTPH-Gx	50	100	250	75-135	≤ 30
Diesel-Range Hydrocarbons	NWTPH-Dx	45	90	100	32-115	≤ 20
Heavy Oil-Range Hydrocarbons	NWTPH-Dx	100	250	250	--	--
Volatile Organic Compounds (VOCs) by SW8260C (µg/L)						
Benzene	USEPA 8260B	0.5	1	1	78-120	≤ 30
Ethylbenzene	USEPA 8260B	0.5	1	1	78-120	≤ 30
Toluene	USEPA 8260B	0.5	1	1	80-120	≤ 30
Total Xylenes	USEPA 8260B	0.5	1	1	80-120	≤ 30
Methyl tert-butyl ether	USEPA 8260B	0.5	1	1	75-120	≤ 30
Vinyl Chloride	USEPA 8260B	0.5	1	1	63-121	≤ 30
Cis-1,2-Dichloroethene	USEPA 8260B	0.5	1	1	80-120	≤ 30
1,2 Dichloroethane (EDC)	USEPA 8260B	0.5	1	1	66-128	≤ 30
1,2-Dibromoethane (EDB)	USEPA 8011	0.0	0.02	0.03	60-140	≤ 20
Metals						
Lead	USEPA 6010	6.2	15	15	80-120	≤ 20

Notes:

LCS = laboratory control sample (supplied by Eurofin Lancaster Labs)

LOD = limit of detection (supplied by Eurofin Lancaster Labs)

LOQ = limit of quantitation (supplied by Eurofin Lancaster Labs; equivalent to PQLs or RLs)

MDL = method detection limit (supplied by Eurofin Lancaster Labs)

RPD = relative percent difference (supplied by Eurofin Lancaster Labs)

µg/L = Micrograms per liter

-- Not applicable or available

Table B-6 - Measurement Quality Objectives for Soil Samples

Eurofins Lancaster Laboratories

Project No. 160092, 4700 Brooklyn Avenue

Seattle, Washington

Analyte	Soil					
	Analytical Method	MDL	LOD	LOQ	LCS	RPD
		(mg/kg)			(%)	
Petroleum Hydrocarbons (mg/kg)						
Gasoline Range Hydrocarbons	NWTPH-Gx	1.000	2.000	5.000	80-120	≤ 30
Diesel-Range Hydrocarbons	NWTPH-Dx	3	6	7	61-115	≤ 20
Heavy Oil-Range Hydrocarbons	NWTPH-Dx	10	20	30	--	--
Volatile Organic Compounds (mg/kg)						
Benzene	USEPA 8260B	0.0005	0.002	0.005	80-120	≤ 30
Ethylbenzene	USEPA 8260B	0.001	0.002	0.005	80-120	≤ 30
Toluene	USEPA 8260B	0.001	0.002	0.005	80-120	≤ 30
Total Xylenes	USEPA 8260B	0.001	0.002	0.005	80-120	≤ 30
Vinyl Chloride	USEPA 8260B	0.001	0.002	0.005	59-120	≤ 30
Cis-1,2-Dichloroethene	USEPA 8260B	0.001	0.002	0.005	8-120	≤ 30
1,2 Dichloroethane (EDC)	USEPA 8260B	0.001	0.002	0.005	70-133	≤ 30
1,2-Dibromoethane (EDB)	USEPA 8260B	0.001	0.002	0.005	80-120	≤ 30
Metals						
Lead	USEPA 6010	0.55	1.5	1.5	80-120	≤ 20

Notes:

LCS = laboratory control sample (supplied by Eurofin Lancaster Labs)

LOD = limit of detection (supplied by Eurofin Lancaster Labs)

LOQ = limit of quantitation (supplied by Eurofin Lancaster Labs; equivalent to PQLs or RLs)

MDL = method detection limit (supplied by Eurofin Lancaster Labs)

RPD = relative percent difference (supplied by Eurofin Lancaster Labs)

mg/kg = milligrams per kilogram

-- Not applicable or not available

APPENDIX C

Health and Safety Plan, Aspect Consulting, LLC

PROJECT-SPECIFIC HEALTH AND SAFETY PLAN

Property Name:	4700 Brooklyn Ave NE		
Project Number:	160092		
Prepared By:	Bob Hanford	Date:	10/1/2016
Reviewed By:	Dana Cannon	Date:	10/25/2016

1 INTRODUCTION

This project-specific health and safety plan (HASP) establishes procedures and practices to protect employees of Aspect Consulting, LLC (Aspect) from potential hazards posed by field activities at the subject site. In this HASP, measures are provided to minimize potential exposure, accidents, and physical injuries that may occur during daily activities and adverse conditions. Contingency arrangements are also provided for emergency situations.

2 EMERGENCY CONTACT INFORMATION

PROPERTY LOCATION	4700 Brooklyn Ave NE Seattle, WA 98105
NEAREST HOSPITAL	UW Medical Center – Emergency Room 2180 NE Pacific St Seattle, WA 98195 **Attached figure shows route to hospital.**
EMERGENCY RESPONDERS	Police, Ambulance, Fire ……**911**
OTHER CONTACTS	Bob Hanford (mobile) ……..……...(206) 276-9256 Aspect, Seattle Office ……..……(206) 328-7443 Client Contact ……..(310) 903-3141
IN EVENT OF EMERGENCY, CALL FOR HELP AS SOON AS POSSIBLE	Give the following information: ✓ **Where You Are:** address, cross streets, or landmarks ✓ **Phone Number:** you are calling from ✓ **What Happened:** type of accident, injury ✓ **How Many Persons:** need help ✓ **What is Being Done:** for the victims ✓ **You Hang Up Last:** let whomever you called hang up first

In case of serious injuries or other emergency, immediately call Bob Hanford, Aspect Corporate Safety Officer, at (206) 780-7729 or (206)-276-9256. If no response, call Doug Hillman at (206) 328-7443 or Tim Flynn at (206) 780-9370.

3 PERSONNEL ORGANIZATION AND CHAIN OF COMMAND

The Aspect Project Manager assigns the Site Safety Supervisor and other field personnel for this project, and has ultimate responsibility for developing this project-specific HASP and ensuring it is complied with during project execution. The Aspect Site Safety Supervisor has responsibility and

authority for Aspect employees' safety during site activities. Other Aspect personnel on-site have the responsibility to comply with this project-specific HASP in coordination with the Site Safety Supervisor.

Aspect Personnel			
Role	**Name**	**Office Phone**	**Mobile/Cell Phone**
Project Manager	Adam Griffin	206-780-7746	865-696-7658
Site Safety Supervisor	Bob Hanford	206-780-7729	206-276-9256

Aspect will inform its subcontractors working on-site of potential fire, explosion, health, safety or other hazards associated with planned site activities, and can make available to them this project-specific HASP. **However, all subcontractors are solely responsible for preparation of their own HASP, and for the safety of their employees.**

4 SITE CONTROL PLAN

4.1 Property Description

Property Name:	Chevron	
Property Location or Address:	4700 Brooklyn Ave NE, Seattle 98105	
Owner:	Eran Fields	
Current Property Use: **Past Use of Property (if different):**	Commercial, retail Service station	
Designated Hazardous Waste Site?	(yes or no) NO	If yes, specify federal, state, or other:
Industrial Site?	NO	
Topography:	flat	
Surround Land Use/Nearest Population:	Residential and commercial	
Drinking Water/Sanitary Facilities:	On-site	
Site Map:	In Work Plan	

4.2 Site Access Control

Describe controls to be used to prevent entry by unauthorized persons:

- The work area will be closed to the public.
- Traffic cones, barriers, and caution tape, as needed.

Describe how exclusion zones and contamination reduction zones will be designated:

- The area immediately adjacent the drill rig will be considered an exclusion zone.
- The subcontractor will mark the limits of the exclusion zone using cones, caution tape, etc.
- Aspect field personnel will remain vigilant about preventing unauthorized persons from approaching the exclusion zone.

4.3 Worker Hygiene Practices

Aspect personnel will use the following hygiene practices while working on-site:

- No person will eat, drink, chew gum or tobacco in potentially contaminated areas. Drinking of replacement fluids for heat stress control will be permitted only in areas that are free from contamination, except in emergency situations.
- Smoking is prohibited except in designated areas of the site.
- Long hair will be secured away from the face so that it does not interfere with any activities.
- All personnel leaving potentially contaminated areas will wash their hands and face prior to entering any eating areas.
- Personnel leaving potentially contaminated areas will shower (including washing hair) and change to clean clothing as soon as practical after leaving the property.

4.4 Emergency Communications

Aspect workers on-site will have a mobile (cell) phone on-site that will be used for communications should an emergency arise. Phone numbers for Aspect site personnel are listed in Section 3: Personnel Organization and Chain of Command.

4.5 Nearest Medical Assistance

FIRST CALL 911. The route from the site to the nearest hospital is shown in the attached figure.

5 SITE WORK PLAN

Proposed Work Activities On Site:	• Advance soil borings • Soil and groundwater sampling • Confirmation soil sampling during property redevelopment • Observe and monitor soil removal • UST Decommissioning • Well Abandonment
Objectives of Site Activities:	Site characterization and remediation
Proposed Work Dates:	*November 2016 through July 2017*
Will On-site Personnel Potentially be Exposed to Hazardous Substances?	If yes, describe: The property has been a service station for nearly 100 years. Three former USTs have a confirmed petroleum release • Petroleum hydrocarbons and aromatic volatile organic compounds (BTEX)
Do Personnel Conducting Site Activities have Training in Accordance with 296-843-200 WAC?	Yes

6 DECONTAMINATION

Goals	Procedures
To prevent the distribution of contaminants outside the exclusion zone or cross-contamination of samples, the following procedures will be used to decontaminate sample equipment.	• Decontamination process involving Alconox wash, tap water rinse, and deionized water rinse (with air dry).
To prevent the distribution of contaminants outside the exclusion zone, unnecessary vehicles will not be allowed inside the exclusion zone. For vehicles required in the exclusion zone (e.g., drill rig, excavator), the following decontamination procedures will be used to prevent contamination from leaving the exclusion zone:	• Contractor is responsible for cleaning all equipment prior to leaving the contamination reduction zone.
To minimize or prevent worker exposure to hazardous substances, all personnel working in the exclusion zone and contamination reduction zones will comply with the following decontamination procedures:	• Wash boots and rain gear that have come into contact with soil or groundwater with Alconox/tap water and air dry. • Dispose of disposable personal protective equipment (PPE such as gloves, Tyvek) into Department of Transportation (DOT) approved and appropriately labeled 55-gallon drums. • To prevent distribution of contaminants outside the exclusion zone, do not allow unnecessary vehicles inside the exclusion zone.
Excavated Soil	• Place soil from each location on visqueen with bermed edges, and cover with visqueen weighted to minimize chance for removal by wind; appropriate disposition of the cuttings will be based on soil quality data collected for each location.

7 HAZARD ANALYSIS

The potential hazards and corresponding control measures for planned site work activities are as follows:

Work Activity	Primary Potential Hazards	Control Measures
UST pulling and excavation	• Getting hit by equipment, especially from overhead.	• Stay back from equipment and stay alert. • Modified Level D PPE (with hard hat, traffic vest, steel-toe boots).
	• Excessive noise.	• Wear hearing protection.
	• Chemical exposure (skin contact, ingestion, inhalation).	• Modified Level D PPE. • Air monitoring.
Sampling	• Getting hit by excavator.	• Wear traffic vest. • Stay back from excavator and maintain eye contact with operator.
	• Falling into open excavation, engulfment.	• Do not enter excavation >4 feet deep unless properly shored or sloped. • Stay back from unstable slopes. • Sample from excavator bucket where needed.
	• Chemical exposure (skin contact, ingestion, inhalation).	• Modified Level D PPE. • Air monitoring.
All	• Getting hit by other trucks working on the property.	• Wear traffic vest. • Stay back from roads and stay alert.
	• Heat stress	• Take breaks, seek shade, and increase fluid intake.

Potentially Hazardous Chemicals Known or Suspected at the Property and Permissible Exposure Limits (air)					
Substance	**Medium**	**OHSA PEL**	**OSHA STEL**	**IDLH**	**Carcinogen or Other Hazard**
Gasoline-Range Petroleum	Soil, GW	10 ppmv	15 ppmv	250 ppmv	T
Diesel- and Oil-Range Petroleum	Soil, GW	1 ppmv	5 ppmv	500 ppmv	T
Benzene	Soil, GW	1 ppmv	5 ppmv	500 ppmv	C
Toluene	Soil, GW	200 ppmv	--	500 ppmv	T
Ethylbenzene	Soil, GW	100 ppmv	--	800 ppmv	T
Xylenes	Soil, GW	100 ppmv	150 ppmv	900 ppmv	T
Heavy Metals, lead	Soil, GW	Pb: 0.05 mg/m^3	Pb: --	Pb: 0.05 mg/m^3	

Notes:
-- = none established
C = carcinogen
cPAH = carcinogenic polycyclic aromatic hydrocarbon
GW = groundwater
IDLH = immediately dangerous to life or health
N/A = not applicable/not available
OHSA = Occupational Safety and Health Administration
T = toxic
PCB = polychlorinated biphenyl
PEL = permissible exposure level (8-hour time-weighted average)
STEL = short-term exposure level

Chemicals Known or Suspected On-site (check box)			
Chemical Class	**Known**	**Possible**	**Unlikely**
Corrosive (if expected, specify)			x
Ignitable (if expected, specify)		x	
Reactive			x
Volatile		x	
Radioactive			x
Explosive			x
Biological Agent			x
Particulate or Fibers			x
If known or likely, describe:			

8 PERSONAL PROTECTIVE EQUIPMENT

Based on the hazards identified above, the following personal protective equipment (PPE) will be required for the following field activities. This section specifies both an initial level of protection and a more protective (contingency) level or protection, in the event conditions should change. The contingency defines the PPE that will be available on-site.

Work Activity	Level of Protection	
	Initial	Contingency
Excavating	D	Mod. D or C
Soil boring	D	Mod. D or C
Sample handling	D	Mod. D or C
Groundwater sampling	D	Mod. D or C
Other activities (list):		

Each level of protection will incorporate the following equipment (specify type of protective clothing, boots, gloves, respiratory cartridges or other protection, safety glasses, hardhat, and hearing protection):

Level of Protection	Specific PPE
Level D	Work clothing, traffic vest, rubber (nitrile) gloves, steel toe and shank boots, safety glasses, hearing protection, and hardhat.
Modified D	Level D plus Tyvek coveralls or rain gear, and neoprene outer gloves.
Level C	Level D plus air-purifying respirator with combination organic vapor/HEPA dust cartridges.

NOTE: Project personnel are not permitted to deviate from the specified levels of protection without the prior approval of the Site Safety Supervisor. A traffic vest is not needed if work clothes are suitably visible (e.g., orange/yellow rain gear or white/yellow chemical protective clothing).

9 AIR MONITORING

Air monitoring will be conducted periodically to identify potentially hazardous environments and determine reference or background concentrations. Air monitoring can be used to define exclusion zones. Air monitoring can also be conducted to evaluate relative concentrations of volatile organic chemicals in samples. The contractor is responsible for conducting air monitoring for the UST decommissioning and will have a marine chemist on-site to monitor the inerting process.

The following equipment will be used to monitor air quality in the breathing zone during work activities:

Monitoring Instrument	Calibration Frequency	Parameters of Interest	Sampling Frequency
PID	Daily	Volatile organic compounds	• During collection of each soil sample during drilling. • During excavation if workers smell gasoline odor. • During routine monitoring of remediation equipment.
Detector tube (*specify chemical)*	As required	Benzene	• As needed based on PID monitoring

Use the following action levels to determine the appropriate level of personal protection to be used during field activities:

Monitoring Instrument	Reading in Breathing Zone	Action	Comments
PID	10 PID units above background for 5 minutes	Confirm with detector tube (*specify chemical*) or upgrade to Level C (air-purifying respirator with organic vapor cartridge).	Alternatively, use engineering controls (ventilation) or leave location and return at a later time.
Detector tube (*specify chemical)*	> PEL	Upgrade to Level C (air-purifying respirator with organic vapor cartridge).	Leave location pending further evaluation by Aspect Corporate Safety Officer.
PID	100 PID units above background for 5 minutes	Leave location pending further evaluation by Aspect Corporate Safety Officer.	

10 SAFETY EQUIPMENT

The following safety equipment will be on-site during the proposed field activities:

Other Required Items (check items required)	
First aid kit	x
Eyewash (e.g., bottled water)	
PID	x
Drinking water	x
Fire extinguisher	x
Brush fan	
Wind sox	
Other:	

11 SPILL CONTAINMENT

Will the proposed field work include the handling of bulk chemicals?	Yes	No x
If yes, describe spill containment provisions for the property:		

12 CONFINED SPACE ENTRY

Will the proposed field work include confined space entry?	Yes	No x
If yes, attach to this plan the confined space entry checklist and permit.		

13 ASPECT TRAINING AND MEDICAL MONITORING

Aspect employees who perform site work are responsible for understanding potential health and safety hazards of the site. All Aspect site workers will have health and safety training for hazardous waste operations, in accordance with 296-843-200 WAC. In addition, Aspect requires medical monitoring for all employees potentially exposed to chemical hazards in concentrations in excess of the permissible exposure limit (PEL) for more than 30 days per year, as required under 296-843-210 WAC. Employees who use respirators for their work will have a respirator medical evaluation as required under Chapter 296-842-WAC.

14 DISCLAIMER

Aspect Consulting, LLC does not guarantee the health or safety of any person entering this property. Because of the potentially hazardous nature of this property and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury and illness at this property. The health and safety guidelines in this plan were prepared specifically for this site and should not be used on any other property without prior evaluation by trained health and safety personnel.

FIELD SAFETY PLAN CONSENT AGREEMENT

Aspect Consulting Employees

I have reviewed the project-specific health and safety plan, dated *October 25,2016* for the planned activities at the 4700 Brooklyn Ave. project fieldwork. I understand the purpose of the plan and I consent to adhere to its procedures and guidelines while conducting activities on site that are described in the plan.

Employee Printed Name	Signature	Date

Site Visitors

I have been briefed on the contents of the project-specific health and safety plan. I am responsible for my own health and safety.

Visitor Printed Name and Organization/Company	Signature	Date

FIELD SAFETY MEETING MINUTES

Site Name _____Project No. _____

Meeting Location _____

Meeting Date _____ Time _____ Conducted by_____

Pre-field Work Orientation_____ Weekly Safety Meeting_____ Other_____

Subject Discussed _____

_____

_____

_____

Site Safety Supervisor Comments _____

_____

_____

_____

Participants

Printed Name (and company if subcontractor)	Signature

Route to Hospital

Directions from 4700 Brooklyn to UW Emergency Room

A 4700 Brooklyn

B 2180 NE Pacific St Seattle, WA 98195

Drive 1 mi, 8 minutes

A 4700 Brooklyn Ave NE, Seattle, WA 98105, USA

Head south on **Brooklyn Ave NE** toward **NE 47th St**

135 ft

Turn **left** at the 1st cross street onto **NE 47th St**

551 ft

Turn **right** onto **15th Ave NE**

0.703 mi

Turn **left** onto **NE Pacific St**

0.276 mi

Continue straight to stay on **NE Pacific St**Destination will be on the right

459 ft

B 2180 NE Pacific St, Seattle, WA 98195, USA