SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER MONITORING

Texaco Strickland Site

Prepared for: Strickland Real Estate Holdings, LLC and Chevron Environmental Management Company

Project No. 180357 • August 11, 2023 FINAL

Aspect CONSULTING

earth + water

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1 Introduction

This Sampling and Analysis Plan (SAP) describes post-Interim Action (IA) groundwater monitoring at the Texaco Strickland Cleanup Site (Site) located at 6808 196th Street SW in Lynnwood, Washington (Property). The Site, as defined by Washington State's Model Toxics Control Act (MTCA), is defined as any area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located (Washington Administrative Code [WAC] 173-340-200). Aspect Consulting, LLC (Aspect) has prepared this SAP on behalf of two potentially liable parties (PLPs), Strickland Real Estate Holdings, LLC (SREH) and Chevron Environmental Management Company (CEMC), to satisfy requirements of the Agreed Order No. 14315 (AO) with the Washington State Department of Ecology (Ecology).

The IA was approved by Ecology in the Final Interim Action Work Plan (IAWP; Aspect, 2021), and IA completion was reported in the Final Interim Action Report (Aspect, 2023a). The IA involved installation of shoring walls at the Property boundaries and permanent removal of 14,437 tons of contaminated soil from the Site. The completed IA achieved the IAWP objectives. The residual soils within the excavation sidewalls and bottom comply with the IA remediation levels within the Property boundary at the direct contact point of compliance. Low concentrations of benzene exceed IA soil remediation levels in seven sidewall soil samples at the western Property boundary at depths greater than 15 feet below ground surface (bgs), the direct contact point of compliance for soil. These residual benzene soil exceedances will be demonstrated as protective of groundwater empirically via the post-IA groundwater confirmation monitoring outlined in this SAP.

The SAP groundwater monitoring results will be reported to Ecology in the quarterly AO Progress Reports. The results will also serve as basis of evaluating post-IA Site groundwater conditions, establishing cleanup requirements, and evaluating cleanup alternatives in AO-required Feasibility Study (FS) Report. The FS Report will incorporate well construction details and the results of all four quarters of post-IA groundwater monitoring defined in the SAP. It is anticipated that the four quarters of groundwater monitoring will be conducted in August 2023, November 2023, February 2024, and May 2024; draft groundwater monitoring results will be reported in the quarterly progress report following the sampling event.

This SAP defines groundwater monitoring well installation and development, and four quarters of groundwater monitoring activities. The SAP also defines the methods for groundwater monitoring and will ensure that field sample collection, handling, and laboratory analysis will generate data to meet data quality objectives for completing the confirmation monitoring in accordance with WAC 173-340-820.

This SAP comprises two components: a Field Sampling Plan (FSP; Section 2) that defines field sampling protocols, and a Quality Assurance Project Plan (QAPP; Section 3) defining analytical protocols. It is the responsibility of Aspect personnel and the subcontracted analytical laboratory personnel performing the activities to adhere to the requirements of the FSP and QAPP.

2 Field Sampling Plan

2.1 Objectives

The goals of the groundwater performance monitoring are to:

1. Assess Site groundwater quality following completion of the IA.
2. Evaluate groundwater protectiveness of residual benzene exceedances at the western Property boundary that are deeper than 15 ft. bgs and protective of direct contact.

Six new monitoring wells (MW-18R, MW-25R, and MW-29 through MW-32 will be installed to supplement existing wells for post-IA groundwater monitoring (Figure 1). Monitoring wells MW-18R and MW-25R will be located just west of the Property and will replace wells MW-18 and MW-25, respectively. Monitoring well MW-29 will be located on the upgradient (north) end of the Property. Monitoring wells MW-30 and MW-31 will be located on the southwest and downgradient corner of the Property. Monitoring well MW-32 will be located near the southern Property boundary. The two existing wells in 196th Street SW (MW-16 and MW-17), the three existing wells on the adjacent properties (MW-19, MW-26, and MW-27), and six new monitoring wells will establish a post-IA monitoring well network of 11 total monitoring wells (Figure 1).

The groundwater monitoring analytes are listed in Table 1. The analytes identified via the remedial investigation[1] as Site contaminants of concern (COCs) for groundwater are: gasoline-, diesel-, and oil-range total petroleum hydrocarbons (TPHg, TPHd, and TPHo, respectively); benzene, toluene, ethylbenzene, and total xylenes (BTEX); and naphthalene. The groundwater monitoring results will be screened against MTCA Method A cleanup levels. The COCs, Method A cleanup levels, method detection limits, and laboratory reporting limits are included in Table 2.

2.2 Monitoring Well Installation

Six soil borings will be completed as monitoring wells screened within the fill unit, using the procedures described below.

2.2.1 Drilling

Aspect will subcontract a Washington State-licensed resource protection well driller to advance the borings at the locations shown on Figure 1. Hollow stem auger drilling technology will be used as it can attain the required depth needed at the Site. The borings will be advanced to an expected depth of 20 feet bgs. Monitoring wells MW-18R and MW-25R will be screened in the Vashon till, and monitoring wells MW-29, -30, -31, and -32 will be screened in the backfilled area of the IA excavation. Wells installed in backfill will be screened in backfill with bottom of screen set at total depth of remedial excavation in that location.

[1] The Agency Review Draft Remedial Investigation Report is in progress and is anticipated to be transmitted to Ecology in advance of finalizing and implementing this SAP.

2.2.2 Well Construction

Each boring will be constructed as a permanent monitoring well in accordance with WAC 173-160. Monitoring wells will be installed as 2-inch-diameter threaded Schedule 40 PVC screens constructed of a 0.010-inch (10-slot) screen with a planned length of 15 feet and an artificial filter pack of 20/40 silica sand. An annular seal of hydrated bentonite chips will be placed above the filter pack.

A concrete surface seal will be set at grade for each new monitoring well. A lockable, Thermos-type cap will be installed at the top of the PVC well casing. The finished monitoring wells will be protected with a steel flush-mount monument embedded in each boring and monitoring well. After the wells are installed, Aspect will complete As-Built Well Completion Diagrams in the field.

2.2.3 Monitoring Well Development

Following installation, each monitoring well will be developed to remove fine-grained material from inside the well casing and filter pack and to improve hydraulic communication between the well screen and the surrounding water-bearing formation. Wells will be developed using a 12-volt submersible pump. Each well will be developed until visual turbidity is reduced to minimal levels, or until a maximum of 10 casing volumes of water has been removed. Field parameters will be recorded on a Well Development Record form. Groundwater produced during well development will be collected and stored at the Site in sealed and labeled 55-gallon drums pending profiling and disposal. Monitoring well development forms are included in Attachment A.

2.3 Groundwater Sampling

A minimum of 7 days following completion of well development, the six new monitoring wells and the five existing monitoring wells (MW-16, MW-17, MW-19, MW-26, MW-27) will be sampled for laboratory analysis for the analytes outlined in Table 1. Groundwater sampling will be conducted in accordance with these procedures:

- Field staff will use clean, non-talc disposable gloves to handle the sampling apparatus, and samples.
- The locking well cap will be removed and depth to water will be measured from the surveyed location to the nearest 0.01 foot using an electronic water level measuring device. The water level indicator will be decontaminated between wells.
- Each monitoring well will be purged at a low-flow rate of less than 0.5 liters per minute 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 the well screen.
- During purging, field parameters (temperature, pH, specific electrical conductance, dissolved oxygen, and oxidation-reduction potential [ORP]) will be monitored using an AquaTroll water quality meter and flow-through cell, or equivalent. These field parameters will be recorded at 5-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). No more than three well casing volumes will be purged prior to groundwater sample collection. Turbidity measurements will also be recorded before collecting the sample using a Hach 2100Q turbidimeter, or equivalent.

- Once stabilization has been reached, groundwater samples will be collected using the same low-flow rate.
- If the monitoring well is completely dewatered during purging, samples will be collected after the well has recovered to 80 percent of its starting depth to water.
- Following sampling, the well cap and monument cap will be secured.

Groundwater samples will be submitted for chemical analysis to Friedman & Bruya, Inc., an Ecology-accredited analytical laboratory. Table 2 lists groundwater cleanup levels and the laboratory's method detection limit and reporting limit (practical quantitation limit for purposes of this monitoring program) for each analyte.

2.4 Investigation-Derived Waste and Decontamination

All non-disposable sampling equipment (e.g., water level indicator) will be decontaminated before collection of each sample. The decontamination sequence consists of a scrub with a non-phosphate (Alconox) solution, followed by a tap water (potable) rinse, and finished with thorough spraying with deionized or distilled water.

All investigation-derived waste (IDW) will be placed in labeled 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
- Date IDW was generated
- 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. Documentation for off-Site disposal of IDW will be maintained in the project file.

2.5 Exploration Surveying

The horizontal coordinates and elevations of completed monitoring wells will be surveyed by a licensed surveyor relative to a common horizontal (1983 North American Datum) 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 (typically the north side) from which depth-to-water measurements are collected.

2.6 Sampling Documentation Procedures

2.6.1 Field Documentation

While conducting field work, the Aspect field representative will document pertinent observations and events on field forms specific to each activity and/or in a field notebook and photograph specific sampling efforts. Field notes will include a description of each field activity, sample descriptions, and associated details such as the date, time, and field conditions.

2.6.2 Sample Labeling Nomenclature

Sample labels will clearly indicate the sample location identification, collection date and time, sampler's initials, analysis to be performed, and any pertinent comments. For example, a sample collected from MW-13 would be named “MW-13-MMDDYY.”

2.6.3 Sampling Handling Custody

Each sample collected for chemical analysis will be collected in a laboratory-provided sample container and stored in a cooler. Ice or Blue Ice will be placed in each cooler to meet sample preservation requirements. Once the samples and completed chain-of-custody form (described below) are in the cooler, it will be taped shut prior to transport to the laboratory.

After collection, samples will be maintained in the consultant’s custody until formally relinquished 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
- 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 chain-of-custody form provided by the laboratory will be prepared for all samples collected; it will be signed by the field representative and any and all others who subsequently take custody of the samples. Couriers or other professional shipping representatives are not required to sign the chain-of-custody; however, if a courier is used, shipping receipts will be collected and maintained as a part of custody documentation in project files. The analytical laboratory’s data report will include a copy of the final chain-of-custody.

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 chain-of-custody matches the samples received. The laboratory will notify the consultant project manager of any issues noted with the sample shipment or custody as soon as possible.

3 Quality Assurance Project Plan

The purpose of the QAPP is to define, in specific terms, the quality assurance (QA) and quality control (QC) objectives, organization, and functional activities associated with the sampling and analysis of soil samples collected during the additional characterization.

Friedman & Bruya, Inc. of Seattle, Washington, is the Ecology-accredited analytical laboratory that will conduct the analyses of groundwater samples collected during monitoring.

3.1 Purpose of the QAPP

As stated in Ecology's *Guidelines for Preparation of Quality Assurance Project Plans for Environmental Studies* (Ecology, 2004), specific goals of this QAPP are as follows:

- Focus the 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 quality assurance and quality control (QA/QC) activities for the investigation.
- Ensure that the Data Quality Objectives (DQOs) are achieved.
- 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, sample collection procedures that are presented in the FSP (Section 2 of this SAP).

3.2 Project Organization and Responsibilities

The project consultant team involved with data generation includes representatives from Aspect and Friedman & Bruya, Inc. Key individuals and their roles on this project are follows:

Project Manager—Breeyn Greer, Aspect. The project manager is responsible for 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 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 provides regular, up-to-date progress reports and other requested information to the project team and Ecology.

Field Manager—Daniel Babcock, Aspect. 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—Hanna Winter, Aspect. 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 Aspect.

Laboratory Project Manager—Friedman & Bruya, Inc. (F&B). Aspect will contract F&B for the analysis described in the RI (Aspect, 2023b). The laboratory project manager is responsible for ensuring that all laboratory analytical work for soil, water, and gas media complies with project requirements, and acts 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.

3.3 Analytical Methods and Reporting Limits

Laboratory analytical methods for soil and groundwater analyses to be performed during this confirmation monitoring are presented in the table below.

Chemical Group and Analyte	Analytical Method
Gasoline-Range Petroleum Hydrocarbons	NWTPH-Gx
Diesel- and Heavy Oil-Range Hydrocarbons	NWTPH-Dx
Benzene, Toluene, Ethylbenzene, Xylenes, and Naphthalene	EPA 8260D

3.3.1 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 F&B laboratory are summarized in Tables 1 and 2 for groundwater, respectively.

3.4 Data Quality Objectives

Data quality indicators (DQIs)—including precision, accuracy, representativeness, comparability, and completeness (PARCC parameters)—and data RLs are dictated by the data quality objectives, project requirements, and intended uses of the data. An assessment of data quality is based upon quantitative (precision, accuracy, and completeness) and qualitative (representativeness and comparability) indicators. Definitions of these parameters and the applicable QC procedures are presented below.

3.4.1 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 measurements will be carried out at a minimum frequency of 1 per 20 samples or one per laboratory analysis group. Laboratory precision will be evaluated against laboratory quantitative relative percent difference (RPD) performance criteria provided with the lab's analytical data report.

3.4.2 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 surrogates and establishing the recovery. Surrogate recoveries will be determined for each sample analyzed. Laboratory accuracy will be evaluated against the lab's quantitative surrogate recovery performance criteria as provided with the lab's analytical data report.

3.4.3 Representativeness

Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The sampling plan design, sampling techniques, and sample handling protocols (e.g., homogenizing, storage, and preservation) have been developed to ensure representative samples.

3.4.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard techniques for both sample collection and laboratory analysis should make data collected comparable across monitoring events for this project as well as preexisting analytical data that may exist.

3.4.5 Completeness

Completeness is defined as the percentage of measurements made that are judged to be valid measurements. Results will be considered valid if all the precision, accuracy, and representativeness objectives are met and if RLs are sufficient for the intended uses of the data. The target completeness goal for this project is 95 percent.

Laboratory internal QC checks, preventive maintenance, and corrective action, as described in other sections of this document, will be implemented to help meet the QA objectives established for these analyses.

3.4.6 Sensitivity

Sensitivity depicts the level of ability an analytical system (i.e., sample preparation and instrumental analysis) has in 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.

3.5 Quality Control Procedures

Field and laboratory QC procedures are outlined below.

3.5.1 Field Quality Control

The use of standardized field sampling protocols is defined in Section 2.6. No additional field QC procedures are planned for this project.

3.5.2 Laboratory Quality Control

The laboratory's QA officers are responsible for ensuring that the laboratory implements all routine internal QC and QA procedures. At a minimum, the laboratory QC procedures used for this project will consist of the following:

- Instrument calibration and standards as defined in the laboratory standard operating procedures (SOPs)
- Laboratory blank measurements at a minimum frequency of 5 percent or 1 per 20 samples
- Accuracy and precision measurements as defined above, at a minimum frequency of 5 percent or 1 per 20 samples per matrix.

3.6 Corrective Actions

If routine QC audits by the laboratory detect 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
- Accepting but qualifying data to indicate the level of uncertainty

If unacceptable conditions occur, the laboratory will contact the consultant project manager to discuss the issues and determine the appropriate corrective action. All 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.

3.7 Data Quality Review and Reporting

All data will undergo two levels of QA/QC evaluation: one at the laboratory and one by a validator independent of the laboratory. Initial data QC evaluation and reporting at the laboratory will be carried out as described in the appropriate analytical protocols. QC data resulting from methods and procedures described in this document will also be reported.

3.7.1 Minium Data Reporting Requirements

The following sections describe the minimum data reporting requirements necessary to allow proper QA/QC reporting.

Sample Receipt. Cooler receipt forms will be filled out for all sample shipments to document problems in sample packaging, chain-of-custody, and sample preservation.

Reporting. For each analytical method run, analytes for each sample will be reported as a detected concentration or as less than the specific RL. The laboratory will report dilution factors for each sample as well as date of extraction (if applicable), date of analysis, extraction method, additional sample preparation methods performed if any, and confirmation results where required.

Internal Quality Control Reporting. The following laboratory QC samples will be analyzed at the rates specified in the applicable method:

- *Laboratory Method Blanks.* Analytes will be reported for each laboratory blank. Nonblank sample results will be designated as corresponding to a particular laboratory blank in terms of analytical batch processing.
- *Surrogate Spike Samples.* Surrogate spike recoveries will be reported for each sample analyzed. The report shall also specify the control limits for surrogate spike results as well as the spiking concentration. Spike recoveries outside of specified control limits (as defined in the laboratory SOP) will result in the sample being rerun.
- *Laboratory Duplicate Pairs*. Relative percent differences will be reported for duplicate pairs relative to analyte/matrix-specific control limits defined in the laboratory SOP.

3.7.2 Data Quality Review

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

Aspect will prepare an independent Stage 2A data quality review for all analytical data generated for this project. The data quality review will be performed in accordance with U.S. Environmental Protection Agency (EPA) *National Functional Guidelines for Inorganic Data Review* (EPA, 2017a), *National Functional Guidelines for Organic Data*

Review (EPA, 2017b), and laboratory-defined QC limits, with regard to the following, as appropriate to the particular analysis:

- Sample documentation/custody
- Holding times
- Method blanks (representativeness)
- Reporting limits
- Surrogate percent recoveries (accuracy)
- Laboratory duplicate pair RPDs (precision)
- Comparability
- Completeness

Data qualifiers will be assigned based on the 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 nondetect 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.

3.8 Preventative Maintenance Procedures and Schedules

Preventative maintenance in the laboratory will be the responsibility of the laboratory personnel and analysts. 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.

3.9 Performance and Systems Audits

The consultant project manager has responsibility for performance of the laboratory QA program. This 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.

4 References

Aspect Consulting, LLC (Aspect), 2021, Interim Action Work Plan, Texaco Strickland Site, August 6, 2021.

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U.S. Environmental Protection Agency (EPA), 2017a, Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, January 2017, OLEM 9355.0-135, EPA-540-R-2017-001.

U.S. Environmental Protection Agency (EPA), 2017b, Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, January 2017, OLEM 9355.0-135, EPA-540-R-2017-001.

Washington State Department of Ecology (Ecology), 2004, Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, July 2004, Publication No. 04-03-030.

TABLES

Table 1. Groundwater Analyical Methods

Project No. 180357, Texaco Strickland Site, Lynnwood, Washington

Sample Matrix	Analytical Parameter	Analytical Method	Sample Container	No. Containers	Preservation Requirements	Holding Time
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	Method NWTPH-Dx	500-mL amber glass bottle	1	4°C ±2°C	7 days for extraction, 40 days for analysis
	BTEXN	Method 8260	40-mL VOA vials	3	4°C ±2°C, 1 with HCl pH < 2, 2 without HCl	14 days for analysis

Notes:

HCl = hydrochloric acid

TPH = total petroleum hydrocarbons

VOA = volatile organic analysis

BTEXN = benzene, toluene, ethylbenzene, xylenes, napthalene

Table 2. Groundwater Laboratory Limits and Cleanup Levels

Project No. 180357, Texaco Strickland Site, Lynnwood, Washington

Analyte Name	Unit	Groundwater Cleanup Levels	Laboratory Method Detection Limit (MDL)[(A)]	Laboratory Method Reporting Limit (MRL)
Volatile Organic Compounds (VOCs) by SW8260C (µg/L)				
Benzene	ug/L	5	0.00096	0.35
Toluene	ug/L	1,000	0.00066	1
Ethylbenzene	ug/L	700	0.00056	1
Xylenes	ug/L	1,000	0.00055	1
Naphthalene	ug/L	160	0.0028	1
Gasoline-Range Hydrocarbons by NWTPH-Gx (µg/L)				
Gasoline-Range Hydrocarbons	ug/L	800	27	100
Diesel- and Motor Oil-Range Hydrocarbons by NWTPH-Dx (µg/L)				
Diesel-Range Hydrocarbons	ug/L	500	8.9	50
Oil-Range Hydrocarbons	ug/L	500	52	250

Notes:

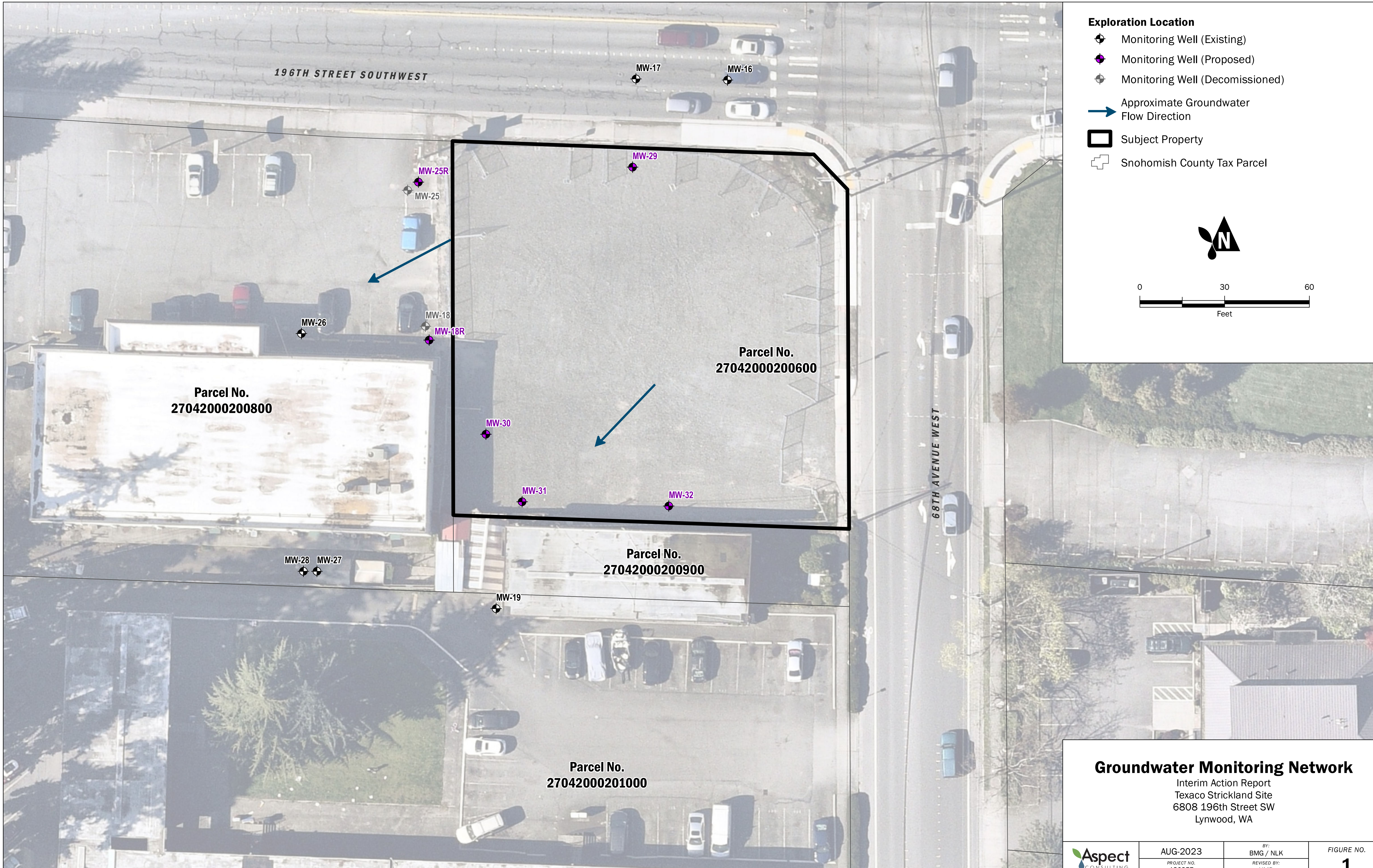
(A) = Based on current laboratory control criteria. Some values may vary slightly between instruments and can be subject to change as the laboratory updates the charted values periodically.

MDL = method detection limit

MRL = method reporting limit

µg/L = microgram per liter

FIGURES



Groundwater Monitoring Network

Interim Action Report
Texaco Strickland Site
6808 196th Street SW
Lynwood, WA

Aspect CONSULTING	AUG-2023	BY: BMG / NLK	FIGURE NO.
	PROJECT NO. 180357	REVISED BY: HMD	1

Basemap Layer Credits || Nearmap Verticle Imagery

GIS Path: T:\projects_8\AlohaCafe\Delivered\Interim Action Report\06 Groundwater Monitoring Network.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 8/4/2023 || User: nkochie || Print Date: 8/4/2023

ATTACHMENT A

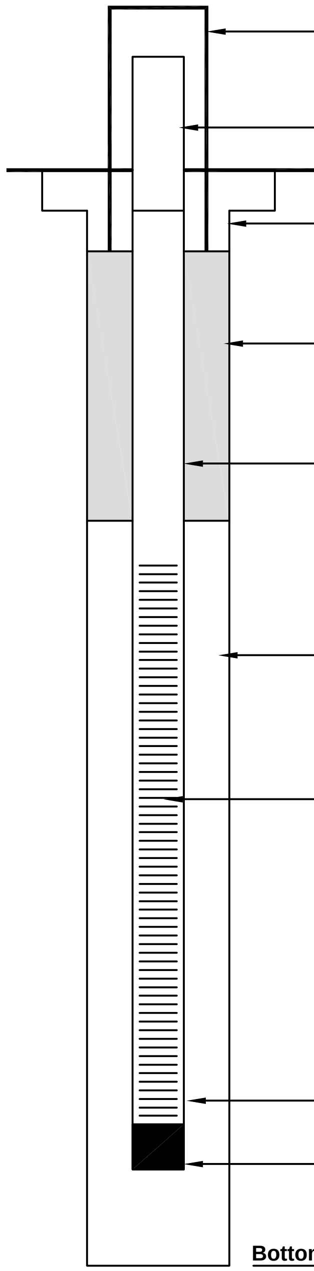
Aspect Field Forms

As-Built Well Completion Diagram

Project Number:	Boring/Monitoring Well Number: Sheet: of:
Project:	Location:
Elevation:	Drilling Contractor:
Drilling Method and Equipment Used:	Logged By:
Water Levels:	Completion Start: Finish:

Ecology Well ID ________________

Soil Type/ Depth	**Completion Depths**



Monument Type/Height ________________

Well Cap Type ________________

Surface Seal Material ________________

Seal Material ________________
(list NSF/ANSI certification)

Well Casing ID ________________

Type of Casing ________________

Type of Connection ________________

Filter Pack/Size ________________

Filter Pack Interval ________________

Well Screen ID ________________

Type of Screen ________________

Slot Size ________________

Screen Interval ________________

Centralizers ________________

Diameter of Borehole ________________

Sump ________________

Bottom of Boring ________________

Aspect consulting earth+water www.aspectconsulting.com *a limited liability company*	Materials Used:	Screen:
	Sand:	Bentonite:
	Blank:	Monument:
	Concrete:	Other:

Q:_ACAD Standards\Standard Details\Well Diagram.dwg

Field Staff:

DAILY REPORT

Date: **Project Name:** **Project Number:** **Weather:** **Arrival on site:** **Departure from site:**	Equipment used: Calibration:

Aspect CONSULTING

Sample number ______________________________

GROUNDWATER SAMPLING RECORD | **WELL NUMBER: _______** | **Page:____ of ____**

Project Name: ______________________________
Date: ______________________
Sampled by: ______________________________
Measuring Point of Well: NTOC
Screened Interval (ft. TOC) ______________________________
Filter Pack Interval (ft. TOC) ______________________________

Project Number: ______________________________
Starting Water Level (ft TOC): ______________
Casing Stickup (ft): ______________
Total Depth (ft TOC): ______________
Casing Diameter (inches): ______________

Casing Volume ___________ (ft Water) x ___________ (Lpfv)(gpf) = ___________ (L)(gal)
Casing volumes: 3/4"= 0.02 gpf 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf
3/4"= 0.09 Lpf 2" = 0.62 Lpf 4" = 2.46 Lpf 6" = 5.56 Lpf
Sample Intake Depth (ft TOC): ___________

PURGING MEASUREMENTS

Criteria (for 3 consecutive readings):		Typical 0.1-0.5 Lpm	Stable	na	± 3%	± 10%	± 0.1	± 10 mV	± 10%	
Time	Cumul. Volume (gal or L)	Purge Rate (gpm or Lpm)	Water Level (ft)	Temp. (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mv)	Turbidity (NTU)	Comments

Total Gallons Purged: ______________________________
Total Casing Volumes Removed: ______________

Ending Water Level (ft TOC): ______________________________
Ending Total Depth (ft TOC): ______________

SAMPLE INVENTORY

Time	Volume	Bottle Type	Quantity	Filtration	Preservation	Appearance		Remarks
						Color	Turbidity & Sediment	

METHODS

Parameters measured with (instrument model & serial number): ______________________________
Purging Equipment: ______________________________ Decon Equipment: Alconox + water
Disposal of Discharged Water: ______________________________
Observations/Comments: ______________________________

Aspect consulting earth+water

BORING LOG

SHEET ______OF _______

LOCATION OF BORING	PROJECT NO.	BORING NO.
	PROJECT NAME	

SKETCH OF LOCATION	
	DRILLING METHOD:
	LOGGED BY:
	DRILLER:
	SAMPLING METHOD:
	HAMMER WEIGHT/SAMPLER DIAMETER

OBSERVATION WELL INSTALL YES ______ NO ______					START	FINISH
WATER LEVEL					TIME	TIME
TIME						
DATE					DATE	DATE
CASING DEPTH						

DATUM	GRADE ELEV.

SURFACE CONDITION

DESCRIPTION: Density, moisture, color, minor,
MAJOR CONSTITUENT.
NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc. DRILL ACTION

FIELDSCREENING								
H_2S (ppm)	PID (ppm)	LFG ($CH_4/CO_2/O_2$) (%)	SAMPLE NO. / SAMPLE TYPE	SAMPLE DEPTH	INCHES DRIVEN / INCHES RECV'D	DEPTH IN FEET	PENETRATION RESISTANCE	USCS SUMMARY
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

WELL DEVELOPMENT RECORD

WELL NUMBER:

Project Name: ____________________
Date: ____________________
Developed by: ____________________
Measuring Point of Well: ____________________
Screened Interval (ft. BGS): ____________________
Filter Pack Interval (ft. BGS):

Project Number: ____________________
Starting Water Level (ft TOC): ____________________
Casing Stickup (ft BGS): ____________________
Total Depth (ft TOC): ____________________
Casing Diameter (inches):

Casing Volume: ft Water x gpf =
Casing volumes: 2" = 0.16 gpf 4" = 0.65 gpf 6" = 1.47 gpf

DEVELOPMENT MEASUREMENTS

Elapsed Time (min)	Cumul. Vol. (gallons)	Purge Rate (gpm)	Temp. (C or F)	pH	Specific Conductance (µmhos/cm)	Turbidity (NTU)	Imhoff Cone (ml/L)	Comments

Total Discharge (gallons): ____________________
Total Casing Volumes Removed (gallons): ____________________

Ending Water Level (ft TOC): ____________________
Ending Total Depth (ft TOC): ____________________

METHODS

Cleaning Equipment: ____________________
Development Equipment: ____________________
Disposal of Discharged Water: ____________________
Observations/Comments: ____________________