

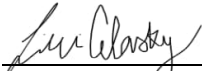
Groundwater Monitoring Work Plan

Former Chevron Station 209335
1201 – 1225 North 45th Street
Seattle, Washington 98103
FSID: 70996824
CSID: 6537

Project number: 60744002

May 15, 2025

Quality information

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Acronyms and Abbreviations

AO	Agreed Order
Arcadis	Arcadis U.S., Inc.
bgs	below ground surface
CEMC	Chevron Environmental Management Company
COC	contaminant of concern
CSM	conceptual site model
CUL	cleanup level
Draft FS Report	<i>Draft for Agency Review – Feasibility Study Report</i>
Ecology	Washington State Department of Ecology
Ecology Guidance	<i>Guidance on Remediation of Petroleum-Contaminated Groundwater by Natural Attenuation</i>
HRG	Housing Resources Group (now Bellwether Housing)
MNA	monitored natural attenuation
MTCA	Model Toxics Control Act
No.	Number
PLP	Potentially Liable Person
property	Former Chevron Station 209335 located at 1201 – 1255 North 45th Street in Seattle, Washington (King County Tax parcel no. 782120-0255-00 and 782120-0275-06)
ROW	right-of-way
SAIC	SAIC Energy, Environment, and Infrastructure, LLC
site	extent of contamination caused by the release of hazardous substances at Former Chevron Station 209335
Standard Oil	Standard Oil Company of California
Stone Way	Stone Way Apartments LLC
USEPA	United States Environmental Protection Agency
UST	underground storage tank
Work Plan	<i>Groundwater Monitoring Work Plan</i>

1. Introduction

On behalf of Chevron Environmental Management Company (CEMC), AECOM has prepared this *Groundwater Monitoring Work Plan* (Work Plan) for Former Chevron Station 209335, located at 1201 – 1225 North 45th Street, Seattle, Washington (property; Figure 1). Model Toxics Control Act (MTCA) Washington Administration Code (WAC) 173-340-200 defines a site as an area where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, placed, or otherwise come to be located. The site is defined in Agreed Order (AO) Number (No.) DE 19432 (Washington State Department of Ecology [Ecology] 2021) as the extent of contamination caused by the release of hazardous substances at Former Chevron Station 209335. Former Chevron Station 209335 was located on the eastern half of current tax parcel no. 782120-0255-00 (historical parcel information is discussed in Section 1.1). This tax parcel, as well as the adjoining parcel to the west (tax parcel no. 782120-0275-06), are currently owned by Stone Way Apartments LLC (Stone Way). Tax parcel nos. 782120-0255-00 and 782120-0275-06 are collectively referred to in this Work Plan as the property. Potentially Liable Persons (PLPs) for the site are identified in the AO as CEMC and Stone Way. The property is currently occupied by Stone Way Apartments, a four-story apartment building with one level of below-grade parking, and ground-level retail space (King County 2025). A site location map is presented on Figure 1, and a site plan is included as Figure 2. Site regulatory identifiers include Cleanup Site Identification No. 6537 and Facility Site Identification No. 70996824 (Arcadis U.S., Inc. [Arcadis] 2024).

On July 29, 2024, Arcadis submitted the *Draft for Agency Review – Feasibility Study Report* (Draft FS Report) for the site to Ecology which identified and evaluated remedial action alternatives for site cleanup (Arcadis 2024). Based on the property and surrounding conditions and use, and potential receptors and exposure pathways for the contaminants of concern (COCs) remaining in soil and groundwater, monitored natural attenuation (MNA), coupled with institutional controls, was the recommended remedial alternative for site cleanup. Via email correspondence on September 16, 2024, Ecology provided comments on the Draft FS Report. Since Ecology comments were provided, AECOM took over as CEMC's environmental consultant for the site. Ecology requested that geochemical parameters be collected to assess current attenuation processes prior to considering MNA as a viable remedial alternative for site cleanup.

The purpose of this Work Plan is to present a monitoring plan consistent with the requirements of Ecology's *Guidance on Remediation of Petroleum-Contaminated Groundwater by Natural Attenuation* (Ecology Guidance; Ecology 2005) to assess the viability of long-term MNA as a remedial alternative for the site. This plan aims to meet the following objectives:

- Show that natural attenuation processes are occurring at the site by collecting and analyzing data to confirm these natural attenuation processes are reducing contaminant concentrations.
- Demonstrate that these natural attenuation processes will continue to occur at rates sufficient to achieve cleanup objectives within a reasonable timeframe.
- Ensure that the natural attenuation processes will be adequately protective of human health and the environment during the cleanup period. This evaluation includes demonstrating that there are no unacceptable risks to human health or the environment from the contaminants during the attenuation process.

1.1 Site Background

The eastern half of current tax parcel no. 782120-0255-00 (historical parcel no. 0245 [Environmental Associates, Inc 1999]) was first developed as a gasoline service station in 1935 (Arcadis 2024). The 1935 station was purchased by Standard Oil Company of California (Standard Oil) in 1954 and reconfigured in 1956. The 1935 and 1956 stations were configured with the pump islands and the former station office in the northeastern corner and a service garage in the southern half of the property. A hydraulic hoist was also present (presumed located in the garage in the southern half of historical parcel no. 0245). The service station and garage were demolished in 1969. Seattle Housing Authority purchased historical parcel no. 0245 from Standard Oil in 1978 (Environmental Associates, Inc 1999; SAIC Energy, Environment, and Infrastructure, LLC [SAIC] 2010a Arcadis 2024).

According to a Phase I Environmental Site Assessment conducted in 1999, the western half of current tax parcel no. 782120-0255-00 (historical parcel no. 0255 [Environmental Associates, Inc 1999]) was occupied by a 1940-vintage building known as the Wallingford Medical Building. The Wallingford Medical Building heating system consisted of a boiler system fueled by heating oil stored in a 294-gallon underground storage tank (UST) reportedly located south of the building (Environmental Associates, Inc 1999; Arcadis 2024). No historical gas

station activities were conducted on historical parcel no. 0255. The parcel was owned throughout the years by private owners, corporations, or partnerships not associated with the owner of historical parcel no. 0245 (Environmental Associates, Inc 1999; Arcadis 2024).

In 2005, Seattle Housing Authority sold historical parcel nos. 0245 and 0255 (together forming current tax parcel no. 782120-0255-00) to Housing Resources Group (HRG, now Bellwether Housing) who immediately conveyed them to Stone Way (Arcadis 2024).

In 2005, the entire property was excavated to 13 feet below ground surface (bgs) to accommodate an underground parking garage that Stone Way constructed on the property beneath a four-story, mixed-use apartment building with ground-floor retail (SAIC 2010a; Arcadis 2024).

An estimated 11 USTs were present on current tax parcel no. 782120-0255-00, 10 being associated with the historical service station activities. None of the USTs remained in place after the property-wide excavation implemented in 2005 for the underground parking garage (Arcadis 2024). According to the documentation available, the original station included two 1,000-gallon fuel USTs; one 550-gallon UST; and one hydraulic hoist. In 1956, during station redevelopment, one 3,000-gallon UST, one 2,000-gallon UST, and one 550-gallon UST were reportedly installed. Four 500-gallon steel USTs were encountered during the 2005 excavation in the northeastern corner of the property and removed. An additional heating-oil UST, not associated with the service station, was also located at 3 feet bgs, 5 feet south of the Wallingford Medical Building according to the site reconnaissance conducted on former parcel no. 0255 by Environmental Associates, Inc in 1999 (Environmental Associates, Inc 1999; Arcadis 2024). The 2005 property-wide excavation to 13 feet bgs for the underground parking garage was implemented from lot line to lot line and therefore, included the presumed location of the heating-oil UST. While no documentation was available, it is assumed this heating-oil UST has been removed from the property (Arcadis 2024).

Regarding the history of surrounding properties, according to historical Sanborn maps, tax parcel no. 782120-0275-06 (the western parcel of the property) had been developed into multiple buildings by 1950 and had been further developed with shops and an office building by 1968, including a large building selling audio-visual supplies. In 2005, HRG purchased the western and eastern parcels of the property and immediately conveyed the property to Stone Way. In 2006, Stone Way built the existing development at the property (Arcadis 2024).

The south-adjoining property (4453 Stone Way North) was redeveloped from 2020 to 2021 with a four-story, mixed-use apartment building with underground parking. During redevelopment, two 500-gallon, unregistered, empty, abandoned, gasoline USTs were discovered. The USTs were removed, along with approximately 26.77 tons of petroleum-contaminated soil. Confirmation soil samples collected from the base and sidewalls of the UST excavations did not contain gasoline-, diesel-, or heavy oil-range petroleum hydrocarbons (ZipperGeo 2022; Arcadis 2024). Ecology issued a No Further Action determination dated February 2, 2023, indicating that the UST removal and cleanup were in compliance with applicable MTCA cleanup levels (CULs) (Arcadis 2024).

The 1999 Environmental Associates, Inc. Phase I Environmental Site Assessment identified the following notable uses on surrounding/adjoining properties:

- Big Wheel Auto Parts was located on the southern adjoining parcel (4453 Stone Way North). Historical records indicated a Shell gasoline station was located on the southern portion of this parcel in at least 1936 but was no longer present by 1956.
- A former auto repair shop was located 250 feet to the north of the site (1220 North 45th Street) from at least 1919 through 1954.
- A gasoline service station (Unocal) was located to the northeast, diagonally across the intersection of North 45th Street and Stone Way North (4500 Stone Way North), in at least 1960 but was no longer present by 1974.

A more extensive summary of site investigations and cleanup actions was presented in the Draft FS Report (Arcadis 2024).

1.2 Site Geology

Regional soils are composed of dense, heterogeneous glacial till with varying amounts of sand, silt, and gravel on the Seattle Drift Plain (Environmental Associates, Inc 1999; SAIC 2013; Arcadis 2024). Soil borings at the site have shown the predominant material to be a dense to very dense, well-graded, fine- to medium-grained sand with some silt and rounded gravel to a depth of approximately 20 feet bgs. Very dense, brown to light brown,

poorly graded, fine-to medium-grained sand underlies that layer to the maximum depth explored (45.5 feet bgs) (SAIC 2013, Arcadis 2024).

The topography at the site is generally flat, with a minor downhill slope to the west. The surrounding area slopes to the south toward Lake Union (Figure 1).

1.3 Site Hydrogeology

Groundwater monitoring began during the fourth quarter of 2000 with MW-1 through MW-5 until the wells were decommissioned in March 2005 during the redevelopment of the property (Arcadis 2024). Wells MW-6 through MW-8 were installed in November 2005, and monitoring resumed in the first quarter of 2006. Wells MW-9 and MW-10 were installed in the right-of-way (ROW) in December 2006. Monitoring of MW-6 through MW-10 continued quarterly until the fourth quarter of 2019. Monitoring wells MW-11 through MW-14 were installed in October 2022. Quarterly groundwater monitoring resumed in December 2022 (Arcadis 2024). The following provides summary information related to hydrogeology at the site:

- Monitoring network: MW-1 through MW-5 (2000 to 2005 [decommissioned]), MW-6 through MW-10 (2006 to present), and MW-11 through MW-14 (2022 to present). Wells MW-6 through MW-8 are on the property. MW-9 through MW-14 are located in the adjoining ROWs (Arcadis 2025);
- Observed depth to water in MW-1 through MW-5: 27 to 40 feet bgs (SAIC 2010b 2013);
- Observed depth to water in MW-6 through MW-10: 26 to 39 feet bgs (Arcadis 2024);
- Groundwater elevation: Approximately 170 to 181 feet (relative to North American Vertical Datum of 1988; Arcadis 2024);
- Groundwater flow direction: South/southeast with the topography, with some possible variation to the southwest (Farallon Consulting, LLC 2003; SAIC 2013; Arcadis 2024; rose diagram on Figure 3); and
- Hydraulic gradients: Range from approximately 0.007 to 0.04 feet per foot (Farallon Consulting, LLC 2003; SAIC 2010b; Arcadis 2024).

The approximate monitoring well locations are shown on Figure 2. Historical groundwater gauging and sampling results are summarized in Table 1, and gauging results from the fourth quarter 2024 are depicted on Figure 3 (Arcadis 2025). The approximate extent of COCs in relation to the MTCA Method A cleanup levels for the fourth quarter 2024 is depicted on Figure 4 (Arcadis 2025).

2. Proposed Site Remedy

MNA is defined as the reliance on natural attenuation processes (in the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a timeframe that is reasonable compared to that offered by other, more active methods. The natural attenuation processes include a variety of physical, chemical, or biological processes that, under favorable conditions, act to reduce the mass, toxicity, mobility, volume, or concentration of COCs in groundwater. These in-situ processes include diffusion, dilution, sorption, biodegradation, volatilization, and chemical and/or biological stabilization, transformation, or destruction of COCs.

Natural attenuation processes are typically occurring at all sites with contamination. However, these natural attenuation processes occur in varying degrees of effectiveness depending on the types and concentrations of contaminants present and the physical, chemical, and biological characteristics of the soil and groundwater.

2.1 MNA Assessment

Natural attenuation is the reduction in concentrations of COCs in groundwater over time due to naturally-occurring physical, chemical, and biological processes. Natural attenuation processes include both destructive (e.g., biodegradation and abiotic degradation) and non-destructive (e.g., dispersion, dilution, adsorption, and volatilization) processes. Destructive processes are generally preferred in support of natural attenuation because they transform potentially harmful COCs into innocuous end products. However, non-destructive processes may also play an important role in decreasing COC concentrations to levels that are acceptable.

The United States Environmental Protection Agency's (USEPA's) tiered lines of evidence approach (USEPA 1999) will be applied to evaluate the viability of MNA as a remedy at the site. The tiers of evidence for this approach include:

1. Historical groundwater data that demonstrate a clear and significant trend of decreasing contaminant mass and/or concentration over time at appropriate monitoring points;
2. Hydrogeologic and geochemical data that can be used to demonstrate indirectly the types of natural attenuation processes active at a site, and the rate at which such processes will reduce contaminant concentrations to required levels; and
3. Data from field studies that directly demonstrate the occurrence of particular natural attenuation processes at a site and their ability to degrade COCs.

The first tier of evidence is the most critical, as it indicates whether attenuation processes, acting together, result in the meaningful reduction of COCs in groundwater under site conditions. This line of evidence is established based on statistical analysis of concentration trends. The second tier of evidence is developed based on assessment of the groundwater geochemical conditions; these are assessed to ascertain which attenuation processes the environment is conducive to, and whether expected degradation products of specific reactions are observed. Rates at which attenuation processes are expected to reduce contaminant concentrations to required levels are assessed based on statistical trend analysis, as applicable. The third tier of evidence is not required in all cases, particularly when effective natural attenuation is firmly demonstrated based on the first two lines of evidence. If there is an initial lack of sufficient evidence under the first two tiers that MNA is proceeding as expected, then additional data may be collected to fulfill the third line of evidence.

The Ecology Guidance was also used to develop this preliminary MNA evaluation and will guide implementation and assessment. This guidance stipulates evaluation of the following five factors:

1. Demonstration that, prior to relying solely on natural attenuation to achieve cleanup standards, the groundwater plume is stable or shrinking;
2. Demonstration that destructive mechanisms of natural attenuation (i.e., chemical or biological degradation) are occurring and are substantial contributors to contaminant reductions observed at the site;
3. Demonstration that the estimated restoration timeframe by natural attenuation is reasonable;
4. Demonstration that natural attenuation is protective of human health and the environment during the restoration time frame; and
5. Demonstration that source control is achieved to the maximum extent practicable.

This preliminary MNA evaluation is aimed at demonstrating the stability of COCs in groundwater and understanding the contributing attenuation mechanisms at the site. The results from geochemical parameter sampling provide a line of evidence that natural attenuation is supported by destructive biodegradation. Source control is achieved based on removal of the primary sources (USTs and other service station infrastructure) and absence of any significant remaining secondary source material.

3. Monitoring Plan

The following section details the proposed monitoring plan to evaluate the processes of natural attenuation in site groundwater. A Sampling and Analysis Plan is included as Table 2.

3.1 Baseline Groundwater Monitoring

Baseline groundwater monitoring will be conducted in the first year. The entire remaining site monitoring well network (MW-6 through MW-14) will continue to be gauged and sampled quarterly with laboratory analysis/field measurement for site COCs and primary geochemical parameters. Secondary geochemical parameters (defined in Table 2) will also be analyzed during this period to evaluate natural attenuation processes at all remaining site monitoring wells.

3.2 Groundwater Performance Monitoring

Following four quarters of baseline groundwater monitoring, provided that the plume is determined to be shrinking or stable during the first year and quarterly monitoring indicates semi-annual monitoring will provide sufficient data, performance monitoring will then be conducted on a semi-annual basis for 2 years. Following 2 years of semi-annual performance monitoring, and provided that the plume is determined to be shrinking or stable during the first 3 years and semi-annual monitoring indicates annual monitoring will provide sufficient data, the frequency of monitoring may be reduced to an annual basis for subsequent years.

During the performance monitoring phase, the entire site monitoring well network will be gauged and sampled. Laboratory analysis/field measurement for site COCs, primary geochemical parameters, and secondary geochemical parameters will continue for the entire site monitoring well network.

Following the first year of baseline groundwater monitoring and 4 years of performance monitoring, if it is concluded that the monitoring well network may be reduced and still provide sufficient data to demonstrate MNA is occurring at the site, a request to reduce the number of sampled monitoring wells may be submitted to Ecology.

3.3 Groundwater Sampling Methodology

Each well will be gauged and sampled using low-flow methodology with a peristaltic pump. Primary geochemical parameters including pH, temperature, conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential will be measured during the purging process with a YSI multiparameter water-quality meter (or equivalent) and flow-through cell. Prior to collecting samples, field parameters will be allowed to stabilize in accordance with the USEPA 2017 Low Stress Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells (USEPA 2017). Further details regarding the field procedures and stabilization criteria are included in the monitoring well sampling standard operating procedures attached as Appendix A.

3.4 Investigation-Derived Waste

Purge water generated during groundwater monitoring activities will be transported off-site for proper disposal.

4. Contingency Plan

Ecology Guidance recommends the development of a site-specific contingency plan that describes monitoring results that would trigger additional action. Triggers for the site would include:

- Evidence of increased contaminant concentrations within the plume;
- Evidence of plume expansion or plume migration to a sentinel well;
- Evidence of new or renewed releases of contaminants;
- Evidence that biodegradation is not occurring; or
- Evidence that contaminant concentrations are not decreasing at a sufficiently rapid rate to achieve cleanup standards within the acceptable restoration time frame.

This contingency plan includes tiered contingent actions dependent on the trigger condition.

If evidence of statistically increasing concentration trends is observed within the plume, evidence of plume expansion or migration to a sentinel well is observed, and/or evidence of a new or renewed release of contaminants is discovered, the following contingency actions may be implemented:

- Modify the performance monitoring plan to provide for more frequent sampling or additional parameters to enhance the ability to evaluate the progress of natural attenuation and any potential threats posed to receptors;
- If data gaps are identified following modifications of the performance monitoring plan, conduct additional site investigation to re-evaluate the conceptual site model (CSM); and

- Based on the results of additional site investigation and updated CSM, the selected site remedy may be re-evaluated at that time if warranted.

If, following 1 year of baseline monitoring and 4 years of performance monitoring, evidence suggests that biodegradation is not occurring and/or contaminant concentrations are not decreasing at a sufficiently rapid rate to achieve cleanup standards within an acceptable restoration time frame, the following contingency actions may be implemented:

- Modify the performance monitoring plan to provide for more frequent sampling or additional parameters to enhance the ability to evaluate the progress of natural attenuation and any potential threats posed to receptors; and
- Following modifications of the performance monitoring plan, if evidence remains that biodegradation is not occurring and/or contaminant concentrations are not decreasing (i.e., MNA does not appear to be occurring) or MNA is not occurring at a sufficient rate to meet a reasonable timeframe, the selected site remedy may be re-evaluated at that time.

5. Data Evaluation and Reporting

Results of the groundwater monitoring and sampling events will be evaluated to demonstrate that natural attenuation is occurring at the site and presented in quarterly reports submitted to Ecology. Following four quarters of baseline monitoring, an MNA analysis will be included in a revised Draft FS Report and submitted to Ecology for approval. The MNA analysis will include documentation of a stable or decreasing plume using COC concentration iso-contour figures, time-series plots of COC concentrations and measured depth to water, a linear regression analysis for site COCs at select monitoring wells, and discussion of water quality and observed trends.

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Tables

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCOA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-1	10/11/00	97.95	--	34.5	--	63.45	--	--	--	--	--	--	--	--	--	--	
MW-1	12/16/00	97.95	--	35.91	0	62.04	74.4	<250	<750*	<0.500	<0.500	<0.500	<1.00	<5.00	<1.00	--	
MW-1	03/26/01	97.95	--	36.54	0	61.41	<50.0	<250	<750*	<0.500	<0.500	<0.500	<1.00	<1.00	--	--	
MW-1	06/25/01	97.95	--	36.78	0	61.17	<50.0	<281	<842*	<0.500	<0.500	<0.500	<1.00	--	--	--	
MW-1	09/24/01	97.95	--	37.14	0	60.81	<50.0	<250	<500	<0.500	<0.500	<0.500	<1.00	--	--	--	
MW-1	12/13/01	97.95	--	37.25	0	60.7	<80.0	<250	<500	<0.500	<0.500	<0.500	<1.00	--	--	--	
MW-1	03/08/02	97.95	--	36.79	0	61.16	<50.0	<250	<750*	<0.50	<0.50	<0.50	<1.5	--	--	--	No Purge
MW-1	05/29/02	97.95	--	36.44	0	61.51	--	--	--	--	--	--	--	--	--	--	Sampled Semiannually
MW-1	09/16/02	97.95	--	36.71	0	61.24	<50.0	<250	<250	<0.50	<0.50	<0.50	<1.5	--	--	--	No Purge
MW-1	12/05/02	97.95	--	37.09	0	60.86	--	--	--	--	--	--	--	--	--	--	Sampled Semiannually
MW-1	03/04/03	97.95	--	37.26	0	60.69	100	<250	<250	<0.50	<0.50	<0.50	<3.0	--	--	--	No Purge
MW-1	06/03/03	97.95	--	37.09	0	60.86	--	--	--	--	--	--	--	--	--	--	Sampled Semiannually
MW-1	10/27/03	97.95	--	37.42	0	60.53	--	--	--	--	--	--	--	--	--	--	Not Sampled due to insufficient water
MW-1	03/31/04	97.95	--	37.12	0	60.83	<50	<800*	<1000*	<0.5	<0.5	<0.5	<1.5	--	--	--	No Purge
MW-1	06/28/04	97.95	--	37.14	0	60.81	--	--	--	--	--	--	--	--	--	--	Sampled Semiannually
MW-1	09/29/04	97.95	--	37.5	0	60.45	--	--	--	--	--	--	--	--	--	--	Not Sampled due to insufficient water
MW-1	01/04/05	97.95	--	37.61	0	60.34	--	--	--	--	--	--	--	--	--	--	
MW-1							Abandoned										
MW-2	10/11/00	98.7	--	34.5	--	64.2	--	--	--	--	--	--	--	--	--	--	
MW-2	12/16/00	98.7	--	36.46	0	62.24	28,100	1,000	<750*	283	2,560	693	4020	<5.00	1.94	--	
MW-2	03/26/01	98.7	--	37.12	0	61.58	17000	1,180	<750*	143	1450	378	2180	<1.00/<1.00	--	--	
MW-2	06/25/01	98.7	--	37.37	0	61.33	11700	418	<750*	92.3	547	181	1010	--	--	--	
MW-2	09/24/01	98.7	--	37.72	0	60.98	22100	4840	<557*	120	1380	658	4100	--	--	--	
MW-2	12/13/01	98.7	--	37.89	0	60.81	84000	5540	<500	185	3960	1590	9950	--	--	--	
MW-2	03/08/02	98.7	37.24	38	0.76	61.31	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	05/29/02	98.7	36.81	37.54	0.73	61.74	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	09/16/02	98.7	37.19	37.61	0.42	61.43	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	10/15/02	98.7	37.24	37.68	0.44	61.37	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	11/22/02	98.7	37.12	37.63	0.51	61.48	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	12/05/02	98.7	37.51	38.1	0.59	61.07	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	01/28/03	98.7	36.77	37.33	0.56	61.82	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	02/13/03	98.7	37.44	38.02	0.58	61.14	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	03/04/03	98.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	04/21/03	98.7	37.21	37.78	0.57	61.38	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	05/08/03	98.7	37.43	37.94	0.51	61.17	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	06/03/03	98.7	37.37	37.91	0.54	61.22	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	07/06/03	98.7	36.96	37.51	0.55	61.63	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	08/18/03	98.7	37.49	38.02	0.53	61.1	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	10/27/03	98.7	37.54	39.98	2.44	60.67	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	11/17/03	98.7	37.1	37.58	0.48	61.5	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	12/31/03	98.7	36.18	38.19	2.01	62.12	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	02/09/04	98.7	37	37.49	0.49	61.6	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	03/04/04	98.7	35.85	37.06	1.21	62.61	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	03/31/04	98.7	37.32	39.05	1.73	61.03	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	06/28/04	98.7	37.32	39.05	1.73	61.03	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	08/30/04	98.7	37.61	38.99	1.38	60.81	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	09/07/04	98.7	37.61	39.19	1.58	60.77	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	09/11/04	98.7	37.65	39.1	1.45	60.76	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	09/14/04	98.7	37.65	39.25	1.6	60.73	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	09/21/04	98.7	37.61	39.3	1.69	60.75	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	09/28/04	98.7	37.7	39.3	1.69	60.75	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	09/29/04	98.7	37.71	39.39	1.68	60.65	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	10/05/04	98.7		37.72	1.55	60.67	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-2	10/06/04	98.7	37.86	39.27	1.16	60.36	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCOA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-4	10/11/00	98.52	--	35	--	63.52	--	--	--	--	--	--	--	--	--	--	
MW-4	12/16/00	98.52	--	36.35	0	62.17	58200	<250	<750*	326	5520	1430	8520	<5.00	12	--	
MW-4	03/26/01	98.52	--	37	0	61.52	27200	266	<750*	178	2160	785	4160	<1.00/<1.00	--	--	
MW-4	06/25/01	98.52	--	37.25	0	61.27	12300	<250	<750*	69	654	416	1910	--	--	--	
MW-4	09/24/01	98.52	--	37.6	0	60.92	4130	<250	<500	30.1	154	197	684	--	--	--	
MW-4	12/13/01	98.52	--	37.72	0	60.8	5490	<250	<500	30.3	175	177	679	--	--	--	
MW-4	03/08/02	98.52	--	38.36	0	60.16	9000	<250	<750*	<50*	150	170	710	--	--	--	No Purge
MW-4	05/29/02	98.52	--	36.86	0	61.66	6700	<250	<750*	22	150	190	780	--	--	--	No Purge
MW-4	09/16/02	98.52	--	37.16	0	61.36	7500	<250	<250	46	230	240	630	--	--	--	No Purge
MW-4	12/05/02	98.52	--	37.53	0	60.99	14000	<250	<250	73	400	540	1500	--	--	--	No Purge
MW-4	03/04/03	98.52	36.68	36.71	0.03	61.83	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-4	06/03/03	98.52	36.59	36.63	0.04	61.92	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-4	07/06/03	98.52	36.9	36.93	0.03	61.61	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-4	08/18/03	98.52	36.76	36.8	0.04	61.75	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-4	10/27/03	98.52	--	37.96	0	60.56	2200	<400	<500	16	55	76	170	--	--	--	No Purge
MW-4	11/17/03	98.52	36.34	36.37	0.03	62.17	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-4	12/31/03	98.52	--	36.88	0	61.64	--	--	--	--	--	--	--	--	--	--	
MW-4	02/09/04	98.52	36.14	36.17	0.03	62.37	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-4	03/04/04	98.52	--	36.74	0	61.78	--	--	--	--	--	--	--	--	--	--	
MW-4	03/31/04	98.52	--	37.59	0	60.93	3900	<250	<250	14	96	110	340	--	--	--	No Purge
MW-4	06/28/04	98.52	--	37.54	0	60.98	1600	<250	<250	8.5	15	59	110	--	--	--	No Purge
MW-4	09/11/04	98.52	37.78	37.81	0.03	60.73	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-4	09/29/04	98.52	--	37.86	0	60.66	1500	<250	<250	18	40	76	170	--	--	--	No Purge
MW-4	11/22/04	98.52	--	36.81	0	61.71	--	--	--	--	--	--	--	--	--	--	
MW-4	01/04/05	98.52	--	38.11	0	60.41	1600	1600	<250	10	13	60	110	--	--	--	No Purge
MW-4	01/14/05	98.52	--	37.58	0	60.94	--	--	--	--	--	--	--	--	--	--	
MW-4							Abandoned										
MW-5	10/11/00	99.42	--	34.5	--	64.92	--	--	--	--	--	--	--	--	--	--	
MW-5	12/16/00	99.42	--	37.18	0	62.24	146000	5080	<750*	<500*	15100	4160	24100	<5.00	20	--	
MW-5	03/26/01	99.42	--	37.91	0	61.51	149000	77900	<750*	256	10600	4000	24200	<1.00/<1.00	--	--	
MW-5	06/25/01	99.42	--	38.14	0	61.28	127000	109000	<18100*	210	9580	3730	21500	--	--	--	
MW-5	09/24/01	99.42	38.4	38.44	0.04	61.01	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	12/13/01	99.42	38.55	38.59	0.04	60.86	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	03/08/02	99.42	37.96	38.46	0.5	61.36	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	05/29/02	99.42	37.6	38.05	0.45	61.73	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	08/07/02	99.42	37.73	38.12	0.39	61.61	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	09/16/02	99.42	38	38.39	0.39	61.34	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	10/15/02	99.42	38.09	38.47	0.38	61.25	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	11/22/02	99.42	37.84	38.26	0.42	61.5	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	12/05/02	99.42	38.42	38.78	0.36	60.93	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	01/28/03	99.42	37.88	38.24	0.36	61.47	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	02/13/03	99.42	38.33	38.68	0.35	61.02	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	03/04/03	99.42	37.54	37.89	0.35	61.81	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	04/21/03	99.42	37.96	38.29	0.33	61.39	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	05/08/03	99.42	38.5	38.82	0.32	60.86	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	06/03/03	99.42	37.42	37.76	0.34	61.93	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	07/06/03	99.42	37.77	38.11	0.34	61.58	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	08/18/03	99.42	38.54	38.86	0.32	60.82	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	10/27/03	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Obstructed
MW-5	11/17/03	99.42	37.87	38.17	0.3	61.49	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-5	12/31/03	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	02/09/04	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	03/04/04	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-5	03/31/04	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	06/28/04	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	09/11/04	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	09/29/04	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	11/22/04	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	01/04/05	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	01/14/05	99.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Well Obstructed at 35.92 ft bgs
MW-5	Abandoned																
MW-6	02/09/06	197.18	--	36.74	0	160.44	1500	680	98	<0.5	0.7	1.2	37	--	--	--	
MW-6	05/03/07	197.18	--	36.74	0	160.44	380	1000	130	29	1	4	30	--	--	--	
MW-6	06/16/09	197.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Inaccessible
MW-6	07/01/09	197.18	--	27.46	0	169.72	<50	270	<70	<0.5	<0.5	<0.5	<1.5	--	22.9	--	No Purge
MW-6	12/11/09	197.18	--	27.55	0	169.63	<50	35	<69	<0.5	<0.5	<0.5	<1.5	--	0.76	--	No Purge
MW-6	06/09/10	197.18	--	26.84	0	170.34	5900	360	<340	<0.5	<0.5	<0.5	350	--	13.2	--	No Purge
MW-6	11/19/10	197.18	--	26.97	0	170.21	750	240	81	<0.5	<0.5	<0.5	11	--	3.7	--	No Purge
MW-6	06/21/11	197.18	--	25.77	0	171.41	2400	270	88	<0.5	<0.5	0.6	9.2	--	3.2	--	No Purge
MW-6	09/22/11	197.18	--	25.9	0	171.28	660	<29	<69	<0.5	<0.5	<0.5	4.1	--	3.3	--	No Purge
MW-6	12/09/11	197.18	--	27.34	0	169.84	64	<29	<69	140	0.5	<0.5	<1.5	--	0.44	--	No Purge
MW-6	03/30/12	197.18	--	26.8	0	170.38	90	<30	<69	<0.5	<0.5	<0.5	<1.5	--	2.5	--	No Purge
MW-6	06/20/12	197.18	--	26.56	0	170.62	<50	<30	<70	<0.5	<0.5	<0.5	<1.5	--	<0.034	--	No Purge
MW-6	10/05/12	197.18	--	27.08	0	170.1	<50	<32	<74	<0.5	<0.5	<0.5	<1.5	--	1.2	--	No Purge
MW-6	12/27/12	197.18	--	27.13	0	170.05	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	2	--	No Purge
MW-6	03/18/13	197.18	--	26.63	0	170.55	120	<30	<71	<0.5	<0.5	<0.5	<1.5	--	--	--	
MW-6	03/22/13	197.18	--	26.71	0	170.47	100	<31	<72	<0.5	<0.5	<0.5	<1.5	--	--	--	
MW-6	03/28/13	197.18	--	26.61	0	170.57	79	<29	<67	<0.5	<0.5	<0.5	<1.5	--	3.7	--	No Purge
MW-6	06/27/13	197.18	--	26.42	0	170.76	120	<29	<68	<0.5	<0.5	<0.5	<1.5	--	1.3	--	No Purge
MW-6	10/17/13	197.18	--	26.64	0	170.54	<50	<29	<68	<0.5	<0.5	<0.5	<1.5	--	0.33	--	No Purge
MW-6	03/20/14	197.18	--	26.68	0	170.5	<50	<30	<70	<0.5	<0.5	<0.5	<1.5	--	4	--	No Purge
MW-6	06/25/14	197.18	--	26.85	0	170.33	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	2.1	--	No Purge
MW-6	09/24/14	197.18	--	27.19	0	169.99	<50	<28	<66	<0.2	<0.2	<0.2	<0.2	--	0.48	--	No Purge
MW-6	12/11/14	197.18	--	27.16	0	170.02	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	1.5	--	No Purge
MW-6	03/11/15	197.18	--	26.66	0	170.52	<50	<30	<71	<0.5	0.5	<0.5	<1.5	--	6.3	--	No Purge
MW-6	10/21/15	197.18	--	27.47	0	169.71	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	10.9	--	No Purge
MW-6	04/20/16	197.18	--	26.66	0	170.52	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	6.4	--	No Purge
MW-6	10/17/16	197.18	--	26.98	0	170.2	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	14.8	--	No Purge
MW-6	05/17/17	197.18	--	25.99	0	171.19	<50	<29/<29¹	<68/<68¹	<0.5	<0.5	<0.5	<1.5	--	30.5	--	No Purge
MW-6	10/19/17	197.18	--	26.03	0	171.15	<50	<29/32¹	<68/<68¹	<0.5	<0.5	<0.5	<1.5	--	33	--	No Purge
MW-6	05/17/18	197.18	--	25.71	0	171.47	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	8.5	--	No Purge
MW-6	05/02/19	197.18	--	25.93	0	171.47	<19	53 J	<68	<0.5	<0.5	<0.5	<1.5	--	32.2	--	No Purge
MW-6	11/04/19	197.18	--	26.91	0	171.47	<19	83 J	<67	<0.2	<0.2	<0.4	<1	--	18	--	No Purge
MW-6	12/02/22	197.18	--	27.03	0	170.15	<100	<200	<250	<0.0400	0.205	0.133	0.405	<0.0118	--	<6.00	
MW-6	03/17/23	206.82	--	26.55	0	180.27	<100 UB	<200	<250	<0.0400	0.108 J	<0.100	<0.260	<0.0400	--	<6.00	
MW-6	06/23/23	206.82	--	25.91	0	180.91	<100 [<100]	<200 [<400]	<250 [<500]	0.0320 J [0.0250 J]	0.110 J [0.124 J]	0.422 [0.390]	0.8778 [0.0857]	<0.0400 [<0.0400]	--	<6.00 [<6.00]	
MW-6	09/29/23	206.82	--	27.22	0	179.6	<100	97.6 J	<250	<0.0400	0.0620 J	0.0580 J	0.33	<0.0400	--	<6.00	
MW-6	12/04/23	206.82	--	25.98	0	180.84	<100 [<100]	<200 [<200]	<250 [<250]	<1.00 [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	0.203 J [0.299 J]	<1.00 [<1.00]	--[-]	4.12 J [8.29]	
MW-6	02/28/24	206.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Unable to access
MW-6	05/30/24	206.82	--	26.39	0	180.43	<100 [<100]	<200 [<200]	94.4 J [91.5 J]	<1.00 [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	<3.00 [<3.00]	<1.00 [<1.00]	-- [-]	<6.00 [<6.00]	
MW-6	08/07/24	206.82	--	26.83	0	179.99	<100	<200	<250	<0.0400	<0.200	<0.100	<0.260	<0.0400	--	<6.00	
MW-6	11/05/24	206.82	--	27.39	0	179.43	<100 [<100]	<200 [87.6 J]	<250 [97.6 J]	<0.0400 [<0.0400]	<0.200[<0.200]	<0.100 [<0.100]	<0.260 [<0.260]	<0.0400 [<0.0400]	-- [-]	4.61 J [4.13 J]	
MW-7	8/6/2002	197.18	--	--	0.5	--	--	--	--	--	--	--	--	--	--	--	
MW-7	02/09/06	197.42	37.87	38.17	0.3	159.49	--	--	--	--	--	--	--	--	--	--	
MW-7	06/12/06	197.42	27.27	27.68	0.41	170.07	--	--	--	--	--	--	--	--	--	--	
MW-7	02/13/06	197.42	27.22	27.74	0.52	170.1	--	--	--	--	--	--	--	--	--	--	

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCOA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-7	02/14/06	197.42	27.24	26.59	0.35	171.11	--	--	--	--	--	--	--	--	--	--	
MW-7	02/17/06	197.42	27.3	17.39	0.09	180.1	--	--	--	--	--	--	--	--	--	--	
MW-7	02/22/06	197.42	27.22	27.53	0.31	170.14	--	--	--	--	--	--	--	--	--	--	
MW-7	02/24/06	197.42	--	--	0.2	--	--	--	--	--	--	--	--	--	--	--	
MW-7	02/27/06	197.42	--	--	0.3	--	--	--	--	--	--	--	--	--	--	--	
MW-7	02/28/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/01/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/02/06	197.42	27.21	27.22	0.01	170.21	--	--	--	--	--	--	--	--	--	--	
MW-7	03/03/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/06/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/06/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/08/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/13/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/15/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/16/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/17/06	197.42	27.02	27.13	0.11	170.38	--	--	--	--	--	--	--	--	--	--	
MW-7	03/22/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/24/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/27/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/29/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	03/31/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	04/03/06	197.42	26.99	27.03	0.04	170.42	--	--	--	--	--	--	--	--	--	--	
MW-7	04/05/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	04/07/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	04/10/06	197.42	26.92	26.97	0.05	170.49	--	--	--	--	--	--	--	--	--	--	
MW-7	04/12/06	197.42	26.93	26.94	0.01	170.49	--	--	--	--	--	--	--	--	--	--	
MW-7	04/18/06	197.42	--	--	0.3	--	--	--	--	--	--	--	--	--	--	--	
MW-7	04/19/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	04/24/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	05/01/06	197.42	26.9	26.98	0.08	170.5	--	--	--	--	--	--	--	--	--	--	
MW-7	05/03/06	197.42	26.55	27.8	0	169.62	--	--	--	--	--	--	--	--	--	--	
MW-7	05/19/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	05/26/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	06/01/06	197.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
MW-7	06/08/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	06/12/06	197.42	26.9	26.91	0.01	170.52	--	--	--	--	--	--	--	--	--	--	
MW-7	06/16/09	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	Inaccessible
MW-7	06/22/06	197.42	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--	
MW-7	06/29/06	197.42	26.86	26.89	0.03	--	--	--	--	--	--	--	--	--	--	--	
MW-7	07/01/09	197.42	27.39	--3	--3	--3	--	--	--	--	--	--	--	--	--	--	Skimmer in Well / LNAPL Present
MW-7	07/05/06	197.42	26.97	26.97	0	170.45	--	--	--	--	--	--	--	--	--	--	
MW-7	07/14/06	197.42	--	--	0	--	--	--	--	--	--	--	--	--	--	--	
MW-7	08/03/06	197.42	--	--	0	--	--	--	--	--	--	--	--	--	--	--	
MW-7	08/15/06	197.42	27	27.13	0.13	170.39	--	--	--	--	--	--	--	--	--	--	
MW-7	08/31/06	197.42	--	--	0	--	--	--	--	--	--	--	--	--	--	--	
MW-7	12/11/09	197.42	27.5	--3	--3	--3	--	--	--	--	--	--	--	--	--	--	Skimmer in Well / LNAPL Present
MW-7	06/09/10	197.42	27.03	28.2	1.17	170.16	--	--	--	--	--	--	--	--	--	--	Skimmer in Well / LNAPL Present
MW-7	10/10/10	197.42	27.57	28.13	0.56	169.74	--	--	--	--	--	--	--	--	--	--	
MW-7	11/19/10	197.42	27.08	28.34	1.26	170.09	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	06/21/11	197.42	--	26.12	0	171.3	150000	11000	<1800*	45	4800	2600	18000	--	310	--	
MW-7	09/22/11	197.42	--	26.25	0	171.17	100000	2000	<340	29	4300	1900	17000	--	94.4	--	
MW-7	12/09/11	197.42	27.45	27.8	0.35	169.9	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	03/30/12	197.42	27.15	27.35	0.2	170.23	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	06/20/12	197.42	26.9	27.05	0.15	170.49	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	10/05/12	197.42	27.38	27.76	0.38	169.96	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCOA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-7	12/27/12	197.42	27.46	27.65	0.19	169.92	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	03/18/13	197.42	27.01	27.18	0.17	170.38	--	--	--	--	--	--	--	--	--	--	Pre-surfactant injection sample
MW-7	03/22/13	197.42	--	27.03	0	170.39	99000	5200	<69	12	1600	1700	17000	--	--	--	Post-surfactant extraction sample
MW-7	03/28/13	197.42	26.91	27	0.09	170.49	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	06/27/13	197.42	26.77	26.79	0.02	170.65	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	10/17/13	197.42	27.03	27.05	0.02	170.39	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	03/20/14	197.42	26.99	27.11	0.12	170.41	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	06/25/14	197.42	27.26	27.28	0.02	170.16	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	09/24/14	197.42	27.56	27.61	0.05	169.85	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	12/11/14	197.42	--	27.5	0	169.92	96000	55000	<6900*	<13*	600	660	14000	--	168	--	No Purge
MW-7	03/11/15	197.42	--	26.96	0	170.46	65000	200000	<17000*	<5.0	470	570	6700	--	0.0717	--	No Purge
MW-7	10/21/15	197.42	27.77	28.17	0.4	169.57	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	04/20/16	197.42	26.91	27.31	0.4	170.43	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	10/17/16	197.42	27.25	27.57	0.32	170.11	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	05/17/17	197.42	--	26.38	0	171.04	480000	29000/41000 ^d	<660*/<1300 ^d	<50*	360	1400	18000	--	1020	--	No Purge
MW-7	10/19/17	197.42	--	26.62	0	170.8	63000	24000/29000 ^d	<1300*/<6700 ^d	4.1	190	900	8100	--	203	--	No Purge
MW-7	05/17/18	197.42	--	26.1	0	171.32	140000	12000	<670*	<10	390	1200	8700	--	78.8	--	No Purge
MW-7	05/02/19	197.42	--	26.32	0	171.1	95000	5900	160 J	<10	200	1200	6700	--	144	--	No Purge
MW-7	11/04/19	197.42	27.43	27.45	0.02	169.99	--	--	--	--	--	--	--	--	--	--	Not Sampled due to the presence of LNAPL
MW-7	12/02/22	197.42	--	27.3	0	170.12	33400 J	7380 J	<2500* UJ	<4.00	<20.0	732	2590	<4.00	--	26.6	
MW-7	03/17/23	207.05	--	26.83	0	180.22	20400	8130 D J	842 J	<4.00	<20.0	876	1280	<4.00	--	14	
MW-7	06/23/23	207.05	--	27.02	0	180.03	34600	9380	1060	2.00 J	<20.0	812	1840	<4.00	--	7.99	
MW-7	09/29/23	207.05	--	27.94	0	179.11	34500	9890	860	<4.00	<20.0	663	1060	<4.00	--	6.76	
MW-7	12/04/23	207.05	--	27.21	0	179.84	28800	7570	<1250*	<100*	<100	735	1090	<100*	--	13.1	
MW-7	02/28/24	207.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Unable to access
MW-7	05/30/24	207.05	--	27.31	0	179.74	12900	5090	705	<100*	<100	573	240 J	<100*	--	5.03 J	
MW-7	08/07/24	207.05	--	27.15	0	179.9	10800	3480	268	<4.00	<20.0	440	177	<4.00	--	21.6 [3.23 J]	
MW-7	11/05/24	207.05	--	27.74	0	179.31	13500 B [12200]	4580 [4720]	728 [779]	<4.00 [0.531]	<20.0 [0.772]	570 [563]	277 [372]	<4.00 [<0.0400]	-- [-]	17.3 [12.6]	
MW-8	02/09/06	197.35	--	36.74	0	160.61	440	280	<96	<0.5	1.1	3.3	28	--	--	--	
MW-8	05/03/07	197.35	--	36.74	0	160.61	2600	940	<200	<0.5	<0.5	<0.5	<0.5	--	--	--	
MW-8	06/16/09	197.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Inaccessible
MW-8	07/01/09	197.35	--	27.84	0	169.51	430	390	<700	<0.5	<0.5	<0.5	2.2	--	3.5	--	No Purge
MW-8	12/11/09	197.35	--	27.91	0	169.44	<50	<69	<69	<0.5	<0.5	<0.5	<1.5	--	7.3	--	No Purge
MW-8	06/09/10	197.35	--	27.21	0	170.14	350	280	180	<0.5	<0.5	<0.5	<1.5	--	16.5	--	No Purge
MW-8	11/19/10	197.35	--	27.34	0	170.01	94	320	120	<0.5	<0.5	<0.5	<1.5	--	3.4	--	No Purge
MW-8	06/21/11	197.35	--	26.18	0	171.17	54	94	150	<0.5	<0.5	1	<1.5	--	3.6	--	No Purge
MW-8	09/22/11	197.35	--	26.3	0	171.05	140	<29	<68	<0.5	<0.5	2.9	1.7	--	1.8	--	No Purge
MW-8	12/09/11	197.35	--	27.7	0	169.65	320	70	<69	<2.0	<2.0	<0.5	3	--	0.3	--	No Purge
MW-8	03/30/12	197.35	--	27.2	0	170.15	2000	<30	<70	3	3.9	45	120	--	2.9	--	No Purge
MW-8	06/20/12	197.35	--	27	0	170.35	170	<30	<70	0.7	0.7	1.3	2.2	--	1.8	--	No Purge
MW-8	10/05/12	197.35	--	27.49	0	169.86	490	<31	<71	1	1.7	19	32	--	1.3	--	No Purge
MW-8	12/27/12	197.35	--	27.49	0	169.86	280	<29	<68	0.6	0.7	4.7	6.8	--	1.1	--	No Purge
MW-8	03/18/13	197.35	--	27.06	0	170.29	320	<30	<70	<0.5	<0.5	29	22	--	--	--	Pre-surfactant injection sample
MW-8	03/22/13	197.35	--	27.13	0	170.22	360	<29	<68	<0.5	<0.5	29	22	--	--	--	Post-surfactant extraction sample
MW-8	03/28/13	197.35	--	27.09	0	170.26	80	<29	<67	<0.5	<0.5	<0.5	<1.5	--	1.9	--	No Purge
MW-8	06/27/13	197.35	--	26.86	0	170.49	<50	<30	<69	<0.5	<0.5	<0.5	<1.5	--	2	--	No Purge
MW-8	10/17/13	197.35	--	27.05	0	170.3	<50	<29	<68	<0.5	<0.5	<0.5	<1.5	--	0.36	--	No Purge
MW-8	03/20/14	197.35	--	27.01	0	170.34	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	1.4	--	No Purge
MW-8	06/25/14	197.35	--	27.31	0	170.04	<50	<30	<69	<0.5	<0.5	<0.5	<1.5	--	0.24	--	No Purge
MW-8	09/24/14	197.35	--	27.63	0	169.72	93	<29	<67	<0.2	<0.2	2.9	1	--	0.13	--	No Purge
MW-8	12/11/14	197.35	--	27.46	0	169.89	59	<30	<70	<0.5	0.5	0.6	<1.5	--	0.12	--	No Purge
MW-8	03/11/15	197.35	--	27.18	0	170.17	<50	<29	<68	<0.5	<0.5	<0.5	<1.5	--	0.32	--	No Purge
MW-8	10/21/15	197.35	--	27.89	0	169.46	110	<28	<66	<0.5	<0.5	1.1	3.9	--	0.63	--	No Purge
MW-8	04/20/16	197.35	--	27.87	0	169.48	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	0.46	--	No Purge

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Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation ¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-8	10/17/16	197.35	--	27.42	0	169.93	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	0.16	--	No Purge
MW-8	05/17/17	197.35	--	26.46	0	170.89	<50	<28/<46 ⁴	<66/<66 ⁴	<0.5	<0.5	<0.5	<1.5	--	0.56	--	No Purge
MW-8	10/19/17	197.35	--	26.49	0	170.86	<50	<28/<28 ⁴	<67/<67 ⁴	<0.5	<0.5	<0.5	<1.5	--	0.31	--	No Purge
MW-8	05/17/18	197.35	--	26.17	0	171.18	<50	55	<67	<0.5	<0.5	<0.5	<1.5	--	<0.11	--	No Purge
MW-8	05/02/19	197.35	--	26.4	0	170.95	<19	38 J	<68	<0.5	<0.5	<0.5	<1.5	--	1.4 J	--	No Purge
MW-8	11/04/19	197.35	--	27.37	0	169.98	<19	33 J	<67	<0.2	<0.2	<0.4	<1	--	0.74	--	No Purge
MW-8	12/02/22	197.35	--	22.46	0	174.89	<100	<200	<250	<0.0400	0.157 J	0.0900 J	<0.260	<0.0400	--	3.20 J	
MW-8	03/17/23	206.99	--	26.9	0	180.09	<100 [<100 UB]	84.5 J [69.7 J]	<250 [<250]	<0.0400 [<0.0400]	0.058 J [0.166 J]	<0.100 [0.0500 J]	<0.260 [<0.260]	<0.0400 [<0.0400]	--	<6.00 [<6.00]	
MW-8	06/23/23	206.99	--	26.03	0	180.96	65.3 J	<200	<250	0.0370 J	0.141 J	2.04	4.74	<0.0400	--	<6.00	
MW-8	09/29/23	206.99	--	27.86	0	179.13	<100	72.2 J	<250	0.0300 J	0.113 J	0.0320 J	<0.260	<0.0400	--	<6.00	
MW-8	12/04/23	206.99	--	26.28	0	180.71	<100	<200	<250	<1.00	<1.00	<1.00	0.185 J	<1.00	--	8.31	
MW-8	02/28/24	206.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Unable to access
MW-8	05/30/24	206.99	--	25.85	0	181.14	63.5 J	<200	145 J	<1.00	<1.00	1.9	0.957 J	<1.00	--	<6.00	
MW-8	08/07/24	206.99	--	27.28	0	179.71	<100 [<100]	<200 [<200]	<250 [130 J]	<0.0400 [<1.00]	<0.200 [<1.00]	<0.100 [<1.00]	<0.260 [<3.00]	<0.0400 [--]	-- [-]	<6.00	
MW-8	11/05/24	206.99	--	27.8	0	179.19	<100	75.1 J	121 J	<0.0400	<0.200	<0.100	<0.260	<0.0400	--	3.99 J	
MW-9	05/03/07	208.11	--	36.74	0	171.37	<50	<400	<500	<0.5	<0.5	4	18	--	--	--	
MW-9	06/16/09	208.11	--	38.72	0	169.39	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	19.3	--	No Purge
MW-9	07/01/09	208.11	--	38.03	0	170.08	--	<31	<71	--	--	--	--	--	--	--	No Purge
MW-9	12/11/09	208.11	--	38.86	0	169.25	<50	76	<69	<0.5	<0.5	<0.5	<1.5	--	14.5	--	No Purge
MW-9	06/09/10	208.11	--	38.17	0	169.94	<50	42	110	<0.5	<0.5	<0.5	<1.5	--	21.2	--	No Purge
MW-9	11/19/10	208.11	--	38.23	0	169.88	<50	<29	130	<0.5	<0.5	<0.5	<1.5	--	18.7	--	No Purge
MW-9	06/21/11	208.11	--	37.15	0	170.96	<50	<30	<70	<0.5	<0.5	<0.5	<1.5	--	4.7	--	No Purge
MW-9	09/22/11	208.11	--	37.25	0	170.86	<50	<300	<700	<0.5	<0.5	<0.5	<1.5	--	12.4	--	No Purge
MW-9	12/09/11	208.11	--	38.66	0	169.45	<50	<29	<68	<0.5	<0.5	<0.5	<1.5	--	2.8	--	No Purge
MW-9	03/30/12	208.11	--	29.6	0	178.51	<50	<29	<68	<0.5	<0.5	<0.5	<1.5	--	114	--	No Purge
MW-9	06/20/12	208.11	--	38	0	170.11	<50	<30	<70	<0.5	<0.5	<0.5	<1.5	--	3.8	--	No Purge
MW-9	10/05/12	208.11	--	38.44	0	169.67	<50	<30	<70	<0.5	<0.5	<0.5	<1.5	--	10.6	--	No Purge
MW-9	12/27/12	208.11	--	38.5	0	169.61	<50	<31	<73	<0.5	<0.5	<0.5	<1.5	--	5.3	--	No Purge
MW-9	03/28/13	208.11	--	29.73	0	178.38	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	<0.073	--	No Purge
MW-9	06/27/13	208.11	--	37.81	0	170.3	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	5.4	--	No Purge
MW-9	10/17/13	208.11	--	37.77	0	170.34	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	0.34	--	No Purge
MW-9	03/20/14	208.11	--	29.58	0	178.53	<50	<29	<68	<0.5	<0.5	<0.5	<1.5	--	4.1	--	No Purge
MW-9	06/25/14	208.11	--	34.92	0	173.19	<50	<30	<69	<0.5	<0.5	<0.5	<1.5	--	2.5	--	No Purge
MW-9	09/24/14	208.11	--	38.56	0	169.55	<50	<29	<67	<0.2	<0.2	<0.2	<0.2	--	0.15	--	No Purge
MW-9	12/11/14	208.11	--	38.53	0	169.58	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	<0.082	--	No Purge
MW-9	03/11/15	208.11	--	29.63	0	178.48	<50	<28	<66	<0.5	0.5	<0.5	<1.5	--	0.02	--	No Purge
MW-9	10/21/15	208.11	--	38.81	0	169.3	<50	<28	<66	<0.5	0.5	<0.5	<1.5	--	12.4	--	No Purge
MW-9	04/20/16	208.11	--	38.02	0	170.09	<50	<29	<67	<0.5	0.5	<0.5	<1.5	--	0.0049	--	No Purge
MW-9	10/17/16	208.11	--	38.32	0	169.79	<50	<28	<66	<0.5	0.5	<0.5	<1.5	--	3.2	--	No Purge
MW-9	05/17/17	208.11	--	37.41	0	170.7	<50	<28/<44 ⁴	<66/<66 ⁴	<0.5	0.5	<0.5	<1.5	--	1.6	--	No Purge
MW-9	10/19/17	208.11	--	37.43	0	170.68	<50	<29/<39 ⁴	<67/<67 ⁴	<0.5	0.5	<0.5	<1.5	--	3.2	--	No Purge
MW-9	05/17/18	208.11	--	37.18	0	170.93	<50	<28	<66	<0.5	0.5	<0.5	<1.5	--	0.9	--	No Purge
MW-9	05/02/19	208.11	--	37.36	0	170.75	<19	52 J	<67	<0.5	0.5	<0.5	<1.5	--	13.3	--	No Purge
MW-9	11/04/19	208.11	--	38.38	0	169.73	<19	150	<67	<0.2	<0.2	<0.4	<1	--	18.2	--	
MW-9	12/02/22	208.11	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-9	03/17/23	217.75	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-9	06/23/23	217.75	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-9	09/29/23	217.75	--	38.12	0	179.63	38.3 J	126 J	<250	<1.00	<1.00	0.227 J	0.456 J	--	--	<6.00	
MW-9	12/04/23	217.75	--	38.32	0	179.43	<100	118 J	<250	<1.00	<1.00	<1.00	<3.00	<1.00	--	5.00 J	
MW-9	02/28/24	217.75	--	38.16	0	179.59	--	--	--	--	--	--	--	--	--	--	Insufficient Water
MW-9	05/30/24	217.75	--	38.18	0	179.57	--	--	--	--	--	--	--	--	--	--	Insufficient water to purge or sample
MW-9	08/07/24	217.75	--	38.15	0	179.6	--	--	--	--	--	--	--	--	--	--	Insufficient water to sample
MW-9	11/05/24	217.75	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	Well Dry

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCa) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-10	05/03/07	207.29	--	36.74	0	170.55	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	--	
MW-10	06/16/09	207.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Inaccessible
MW-10	07/01/09	207.29	--	38.72	0	168.57	<50	<30	<69	<0.5	<0.5	<0.5	<1.5	--	10.9	--	No Purge
MW-10	12/11/09	207.29	--	35.91	0	171.38	<50	49	<69	<0.5	<0.5	<0.5	<1.5	--	13.4	--	No Purge
MW-10	06/09/10	207.29	--	37.48	0	169.81	<50	50	88	<0.5	<0.5	<0.5	<1.5	--	7.2	--	No Purge
MW-10	11/19/10	207.29	--	37.53	0	169.76	<50	<29	74	<0.5	<0.5	<0.5	<1.5	--	18.8	--	No Purge
MW-10	06/21/11	207.29	--	36.46	0	170.83	<50	<31	180	<0.5	<0.5	<0.5	<1.5	--	5.7	--	No Purge
MW-10	09/22/11	207.29	--	36.6	0	170.69	<50	<300	<700	<0.5	<0.5	<0.5	<1.5	--	6.6	--	No Purge
MW-10	12/09/11	207.29	--	35.71	0	171.58	<50	<29	<69	<0.5	<0.5	<0.5	<1.5	--	2.1	--	No Purge
MW-10	03/30/12	207.29	--	29.8	0	177.49	<50	<30	<69	<0.5	<0.5	<0.5	<1.5	--	110	--	No Purge
MW-10	06/20/12	207.29	--	37.35	0	169.94	<50	<31	<71	<0.5	<0.5	<0.5	<1.5	--	0.23	--	No Purge
MW-10	10/05/12	207.29	--	37.79	0	169.5	<50	45	<70	<0.5	<0.5	<0.5	<1.5	--	3.7	--	No Purge
MW-10	12/27/12	207.29	--	37.84	0	169.45	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	2.2	--	No Purge
MW-10	03/28/13	207.29	--	27.36	0	179.93	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	<0.073	--	No Purge
MW-10	06/27/13	207.29	--	37.16	0	170.13	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	1.8	--	No Purge
MW-10	10/17/13	207.29	--	37.78	0	169.51	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	0.34	--	No Purge
MW-10	03/20/14	207.29	--	29.77	0	177.52	<50	<30	<69	<0.5	<0.5	<0.5	<1.5	--	<0.085	--	No Purge
MW-10	06/25/14	207.29	--	35.03	0	172.26	<50	<30	<71	<0.5	<0.5	<0.5	<1.5	--	2.5	--	No Purge
MW-10	09/24/14	207.29	--	37.88	0	169.41	<50	<30	<70	<0.2	<0.2	<0.2	<0.2	--	0.00095	--	No Purge
MW-10	12/11/14	207.29	--	37.88	0	169.41	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	<0.082	--	No Purge
MW-10	03/11/15	207.29	--	29.71	0	177.58	<50	<29	<69	<0.5	<0.5	<0.5	<1.5	--	0.0002	--	No Purge
MW-10	10/21/15	207.29	--	38.14	0	169.15	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	20.1	--	No Purge
MW-10	04/20/16	207.29	--	37.39	0	169.9	<50	<29	<67	<0.5	<0.5	<0.5	<1.5	--	0.0113	--	No Purge
MW-10	10/17/16	207.29	--	37.69	0	169.6	<50	<28	<66	<0.5	<0.5	<0.5	<1.5	--	12	--	No Purge
MW-10	05/17/17	207.29	--	36.78	0	170.51	<50	<28/<28 ^d	<66/<66 ^d	<0.5	<0.5	<0.5	<1.5	--	3.6	--	No Purge
MW-10	10/19/17	207.29	--	36.8	0	170.49	<50	<29/<29 ^d	<67/<67 ^d	<0.5	<0.5	<0.5	<1.5	--	7.6	--	No Purge
MW-10	05/17/18	207.29	--	36.52	0	170.77	<50	<29	<68	<0.5	<0.5	<0.5	<1.5	--	2.2	--	No Purge
MW-10	05/02/19	207.29	--	36.72	0	170.57	<19	160	<70	<0.5	<0.5	<0.5	<1.5	--	2.0 J	--	No Purge
MW-10	11/04/19	207.29	--	37.7	0	169.59	<19	86 J	<66	<0.2	<0.2	<0.4	<1	--	1.3	--	
MW-10	12/02/22	207.29	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-10	03/17/23	216.95	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-10	06/23/23	216.95	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-10	09/29/23	216.95	--	38.94	0	178.01	--	--	--	--	--	--	--	--	--	--	Well Dry
MW-10	12/04/23	216.95	--	43.82	0	173.13	--	--	--	--	--	--	--	--	--	--	Insufficient Water
MW-10	02/28/24	216.95	--	38.21	0	178.74	--	--	--	--	--	--	--	--	--	--	Insufficient Water
MW-10	05/30/24	216.95	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-10	08/07/24	216.95	--	Dry	0	Dry	--	--	--	--	--	--	--	--	--	--	
MW-10	11/05/24	216.95	--	38.09	0	178.86	--	--	--	--	--	--	--	--	--	--	Insufficient water for sampling
MW-11	12/02/22	218.07	--	38.31	0	179.76	35.9 J	115 J	<250	0.482 J	0.281 J	<1.00	2.32 J	--	--	3.79 J	
MW-11	03/17/23	218.07	--	38.21	0	179.86	<100 UB	386	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-11	06/23/23	218.07	--	36.09	0	181.98	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-11	09/29/23	218.07	--	37.19	0	180.88	<100 [35.3 B J]	636 [<200]	526 [<250]	<1.00 [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	0.186 J [0.192 J]	--	--	<6.00 [<6.00]	
MW-11	12/04/23	218.07	--	36.23	0	181.84	257	<200	<250	<1.00	<1.00	<1.00	<3.00	<1.00	--	6.27	
MW-11	02/28/24	218.07	--	37.04	0	181.03	38.5 B J [<100]	<200 [<200]	<250 [<250]	<1.00 [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	<3.00 [<3.00]	<1.00 [<1.00]	-- [-]	<6.00 [<6.00]	
MW-11	05/30/24	218.07	--	38.07	0	180	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	--	--	3.02 J	
MW-11	08/07/24	218.07	--	38.2	0	179.87	33.5 B J [<100]	<200 [<200]	<250 [179 J]	0.495 J [0.605 J]	1.05 [1.60]	<1.00 [<1.00]	0.203 J [0.578 J]	-- [-]	-- [-]	3.90 J [3.31 J]	
MW-11	11/05/24	218.07	--	38.6	0	179.47	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	--	--	4.09 J	
MW-12	12/02/22	218.37	--	38.5	0	179.87	<100	86.4 J	<250	0.153 J	<1.00	<1.00	0.820 J	--	--	<6.00	
MW-12	03/17/23	218.37	--	38.38	0	179.99	<100 UB [<100 UB]	127 J [113 J]	<250 [<250]	<1.00 [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	<3.00 [<3.00]	-- [-]	-- [-]	<6.00 [<6.00]	
MW-12	06/23/23	218.37	--	37.68	0	180.69	<100 [<100]	<200 [<200]	<250 [<250]	<1.00 [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	<3.00 [<3.00]	-- [-]	-- [-]	<6.00 [<6.00]	
MW-12	09/29/23	218.37	--	38.82	0	179.55	<100	133 J	164 J	<1.00	<1.00	<1.00	0.197 J	--	--	<6.00	
MW-12	12/04/23	218.37	--	37.81	0	180.56	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	<1.00	--	6.33	
MW-12	02/28/24	218.37	--	37.89	0	180.48	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	<1.00	--	<6.00	

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCOA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
MW-12	05/30/24	218.37	--	38.67	0	179.7	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	--	--	4.58 J	
MW-12	08/07/24	218.37	--	38.7	0	179.67	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-12	11/05/24	218.37	--	39.1	0	179.27	<100	<600*	<750*	<1.00	<1.00	<1.00	<3.00	--	--	3.33 J	
MW-13	12/02/22	217.59	--	38.1	0	179.49	<100	<200	<250	0.124 J	<1.00	<1.00	0.623 J	--	--	4.10 J	
MW-13	03/17/23	217.59	--	37.96	0	179.63	<100 UB	109 J	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-13	06/23/23	217.59	--	37.94	0	179.65	<100	<400	<500	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-13	09/29/23	217.59	--	38.31	0	179.28	<100 [37.3 B J]	<200 [156 J]	<250 [<250]	<1.00 [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	<3.00 [0.241 J]	--	--	<6.00 [<6.00]	
MW-13	12/04/23	217.59	--	38.07	0	179.52	<100	91.6 J	<250	<1.00	<1.00	<1.00	<3.00	<1.00	--	6.99	
MW-13	02/28/24	217.59	--	38.11	0	179.48	<100	<400	<500	<1.00	<1.00	<1.00	<3.00	<1.00	--	<6.00	
MW-13	05/30/24	217.59	--	37.8	0	179.79	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-13	08/07/24	217.59	--	37.99	0	179.6	<100	<200	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-13	11/05/24	217.59	--	38.47	0	179.12	<100	136 J	<500	<1.00	<1.00	<1.00	<3.00	--	--	4.30 J	
MW-14	12/02/22	217.07	--	37.84	0	179.23	<100	283	<250	0.115 J	<1.00	<1.00	0.508 J	--	--	3.99 J	
MW-14	03/17/23	217.07	--	37.59	0	179.48	<100 UB	258	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-14	06/23/23	217.07	--	36.87	0	180.2	<100	305	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-14	09/29/23	217.07	--	38.23	0	178.84	39.0 B J	153 J	<250	<1.00	<1.00	<1.00	0.176 J	--	--	3.99 J	
MW-14	12/04/23	217.07	--	36.94	0	180.13	45.3 J [<100 J]	149 J [<200 J]	<250 [<250]	0.152 J [<1.00]	<1.00 [<1.00]	<1.00 [<1.00]	0.256 J [0.180 J]	<1.00 [<1.00]	--[-]	6.37 [8.10]	
MW-14	02/28/24	217.07	--	37.06	0	180.01	<100 [32.7 B J]	272 J3 [<200]	258 [<250]	<1.00 [<1.00]	<1.00 [1.30]	<1.00 [0.319 J]	<3.00 [1.49 J]	<1.00 [<1.00]	-- [-]	3.57 J [<6.00]	
MW-14	05/30/24	217.07	--	37.02	0	180.05	<100	172 J	<250	<1.00	<1.00	<1.00	<3.00	--	--	<6.00	
MW-14	08/07/24	217.07	--	37.56	0	179.51	32.9 B J	217	105 J	<1.00	<1.00	<1.00	<3.00	--	--	3.86 J	
MW-14	11/05/24	217.07	--	38.03	0	179.04	32.0 B J	591	215 J	0.268 J	<1.00	<1.00	<3.00	--	--	4.75 J	
FB-1	10/24/16	--	--	--	--	--	< 100	< 290	< 460	< 0.20	< 1.0	< 0.20	< 0.60	--	--	--	
FB-2	10/24/16	--	--	--	--	--	< 100	< 280	< 440	< 0.20	< 1.0	< 0.20	< 0.60	--	--	--	
QA	12/16/00	--	--	--	--	--	ND	--	--	ND	ND	ND	ND	ND	--	--	
QA	03/26/01	--	--	--	--	--	ND	--	--	ND	ND	ND	ND	ND	--	--	
QA	06/25/01	--	--	--	--	--	<50.0	--	--	<0.500	<0.500	<0.500	<1.00	--	--	--	
QA	09/24/01	--	--	--	--	--	<50.0	--	--	<0.500	<0.500	<0.500	<1.00	--	--	--	
QA	12/13/01	--	--	--	--	--	<80.0	--	--	<0.500	<0.500	<0.500	<1.00	--	--	--	
QA	03/08/02	--	--	--	--	--	<50	--	--	<0.50	<0.50	<0.50	<1.5	--	--	--	
QA	05/29/02	--	--	--	--	--	<50	--	--	<0.50	<0.50	<0.50	<1.5	--	--	--	
QA	09/16/02	--	--	--	--	--	<50	--	--	<0.50	<0.50	<0.50	<1.5	--	--	--	
QA	12/05/02	--	--	--	--	--	<50	--	--	<0.50	<0.50	<0.50	<1.5	--	--	--	
QA	03/04/03	--	--	--	--	--	<50	--	--	<0.50	<0.50	<0.50	<1.5	--	--	--	
QA	10/27/03	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	03/31/04	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	06/28/04	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	09/29/04	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	01/04/05	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	06/16/09	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	07/01/09	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	12/11/09	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	06/09/10	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	11/19/10	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	06/21/11	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	09/22/11	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	12/09/11	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	03/30/12	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	06/20/12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	QA Vials Not Received by the Laboratory
QA	10/05/12	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	12/27/12	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	

Table 1- Summary of Groundwater Gauging and Select Analytical Results
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Well	Date	Top of Casing (ft)	Depth to LNAPL (ft btoc)	Static Depth to Water (ft bTOC)	LNAPL Thickness (ft)	Groundwater Elevation ¹ (ft NAVD88)	GRO (µg/L)	DRO (µg/L)	HO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	Total Lead (µg/L)	Dissolved Lead (µg/L)	Comments/Remarks
Model Toxics Control Act (MTCA) Method A Cleanup Levels (CULs) in µg/L							800/1000	500	500	5	1000	700	1000	20	15	15	
QA	03/28/13	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	06/27/13	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	10/17/13	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	03/20/14	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	06/25/14	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	09/24/14	--	--	--	--	--	<50	--	--	<0.2	<0.2	<0.2	<0.2	--	--	--	
QA	12/11/14	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	03/11/15	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	10/23/15	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	04/20/16	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	10/17/16	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	05/17/17	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	10/19/17	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	
QA	05/17/18	--	--	--	--	--	<50	--	--	<0.5	<0.5	<0.5	<1.5	--	--	--	

Notes:
1 When LNAPL is present, GWE has been corrected using the following formula: GWE = [(TOC - DTW) + (LNAPL x 0.80)].
2 The Cleanup level of 800 µg/L is used when benzene is present, when benzene is not present the cleanup klevel of 1,000 µg/L is used
3 Interface probe could not detect LNAPL/Groundwater Interface, unable to gauge hydrocarbon thickness and calculate corrected GWE.
4 Analyzed with silica-gel cleanup.
1) **BOLD** values are greater than their respective MTCA Method A cleanup level
2) Prior to 2022 data was reported by Method Detection Limit (MDL) and **BOLD** values were non-detect below the laboratory method detection limit (MDL), but the MDL is higher than the MTCA Method A cleanup level
3) **BOLD*** are non detects values, but the Reported Detection Limit (RDL) is greater than the MTCA Method A Cleanup Level
Ecology Model Toxics Control Act (MTCA) Method A Cleanup Levels for Groundwater, WAC Chapter 173-340-900, Table 720-1
All results in micrograms per liter (µg/L).

Abbreviations:
-- = Not applicable, not available, or not analyzed
[] = Duplicate sample result
µg/L = Micrograms per Liter
btoc = below top of casing
BTEX = benzene, toluene, ethylbenzene and total xylenes - collectively analyzed by USEPA (United States Environmental Protection Act) Method 8260B; before March 27, 2006, analyzed by USEPA 8021B.
DRO = TPH - diesel range organics (C10-C28) by Method NWTPH-Dx + Extended
DTP = Depth to product in feet below TOC
DTW = Depth to water in feet below TOC
GRO = TPH- gasoline range organics (C4-C12), analyzed by Method NWTPH-Gx
HO = TPH - heavy oil range organics (C16-C36) by Method NWTPH-Dx + Extended
MTBE = Methyl tertiary butyl ether, analyzed by USEPA Method 8260B; before March 27, 2006, analyzed by USEPA 8021B unless otherwise noted.
MTCA = Model Toxics Control Act Cleanup Regulations [WAC 173-340-720(2)(a)(1), as amended February 2001]
LNAPL = Light Non-Aqueous Phase Liquid
No Purge = Non purge sample, collected with a bailer
TOC = Top of Casing. MW-6 through MW-9 TOC elevations are in feet above North American Vertical Datum of 1988 (NAVD 88). MW-1 through MW-5 TOC elevations are reference to an arbitrary benchmark of 100 feet. MW-6 through MW-14 TOC Elevations were re-surveyed in August 2023.
Total lead analyzed by USEPA Method 6000/7000 series
Dissolved Lead lead analyzed by Method 6010D

Laboratory Qualifiers
<n = Below laboratory detection limit of n µg/L
J = The compound was not detected above the reported sample quantitation limit. However, thereported limit is approximate and may or may not represent the actual limit of quantitation.
J3 = The associated batch QC was outside the established quality control range for precision
D = Concentration is based on a diluted sample analysis.
B = Compound considered non-detect at the listed value due to associated blank contamination.

Table 2- Sampling and Analysis Plan
Former Chevron Station 209335 - Seattle, WA
1201 - 1225 North 45th Street, Seattle, WA



Analytes/Field Data	Example Method	Baseline ^a	Wells	Performance Monitoring ^b	Wells
Primary Geochemical Parameters					
Depth to water	Electronic interface probe	X	MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14	X	MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14
pH	YSI or similar	X		X	
ORP/redox (pre/post-purge)	YSI or similar	X		X	
Dissolved oxygen (pre/post-purge)	YSI or similar	X		X	
Conductivity	YSI or similar	X		X	
Turbidity	YSI or similar	X		X	
Temperature	YSI or similar	X		X	
COCs					
TPH-GRO	NWTPH-Gx	X	MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14	X	MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14
TPH-DRO and TPH-HRO	NWTPH-Dx	X		X	
VOCs	USEPA Method 8260B	X		X	
EDB	USEPA Method 8011	X		X	
cPAHs	USEPA Method 8270 SIM	X			
Lead	USEPA Method 6000 series	X		X	
Secondary Geochemical Parameters					
Sulfate	USEPA Method 9056A	X	MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14	X	MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14
Sulfide	SM Method 4500S2 D	X		X	
Nitrate	USEPA Method 9056A	X		X	
Nitrite	USEPA Method 9056A	X		X	
Total Kjeldahl Nitrogen	USEPA Method 351.2	X		X	
Dissolved Iron	USEPA Method 6010D	X		X	
Dissolved Manganese	USEPA Method 6010D	X		X	
Total Manganese	USEPA Method 6010D	X		X	
Total Iron	USEPA Method 6010D	X		X	
Methane	USEPA Method RSK175	X		X	
Alkalinity	USEPA Method 2320B	X		X	
Total Organic Carbon	USEPA Method 9060A	X		X	

Notes:

^a Baseline monitoring will be performed on a quarterly basis for 1 year.

^b Performance monitoring will be performed semi-annually for the second and third years and annually for subsequent years.

Acronyms and Abbreviations:

COC = constituent of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

EDB = ethylene dibromide

ORP = oxidation-reduction potential

SM = Standard Method

TPH-DRO = total petroleum hydrocarbons as diesel-range organics

TPH-GRO = total petroleum hydrocarbons as gasoline-range organics

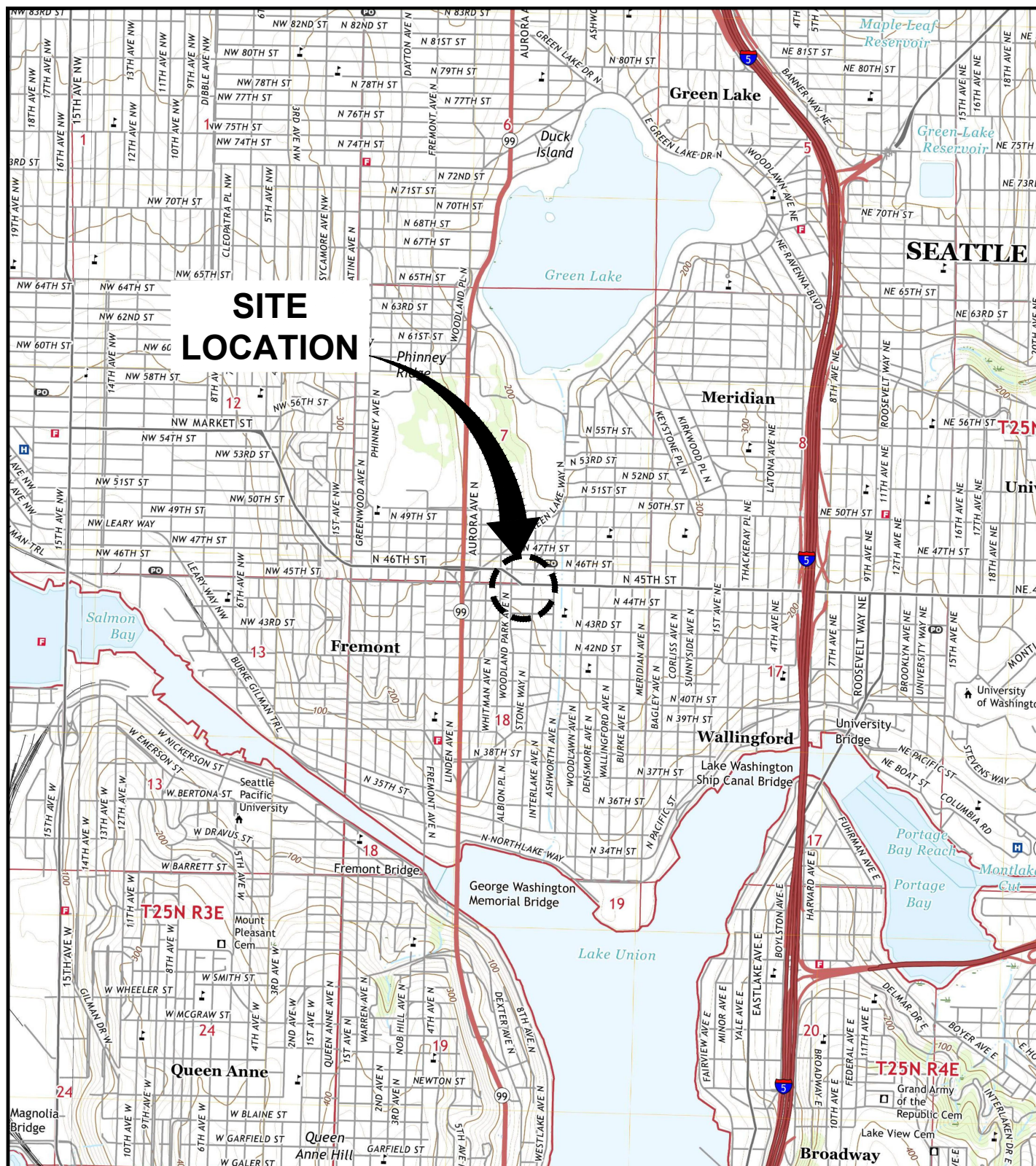
TPH-HRO = total petroleum hydrocarbons as heavy oil-range organics

USEPA = United States Environmental Protection Agency

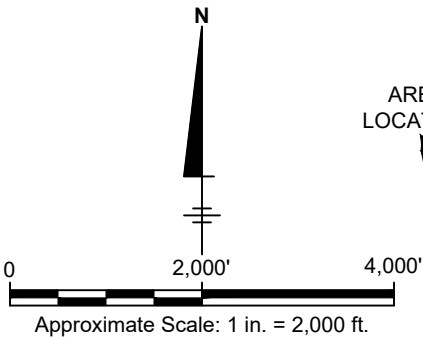
VOCs = volatile organic compounds

YSI = Yellow Springs Instruments

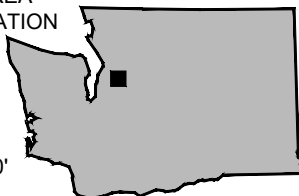
Figures



MAP SOURCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., SEATTLE NORTH AND SHISHOLE BAY, WASHINGTON, 2020.



AREA
LOCATION



WASHINGTON

FORMER CHEVRON STATION 209335
1201 - 1225 NORTH 45TH STREET
SEATTLE, WASHINGTON.

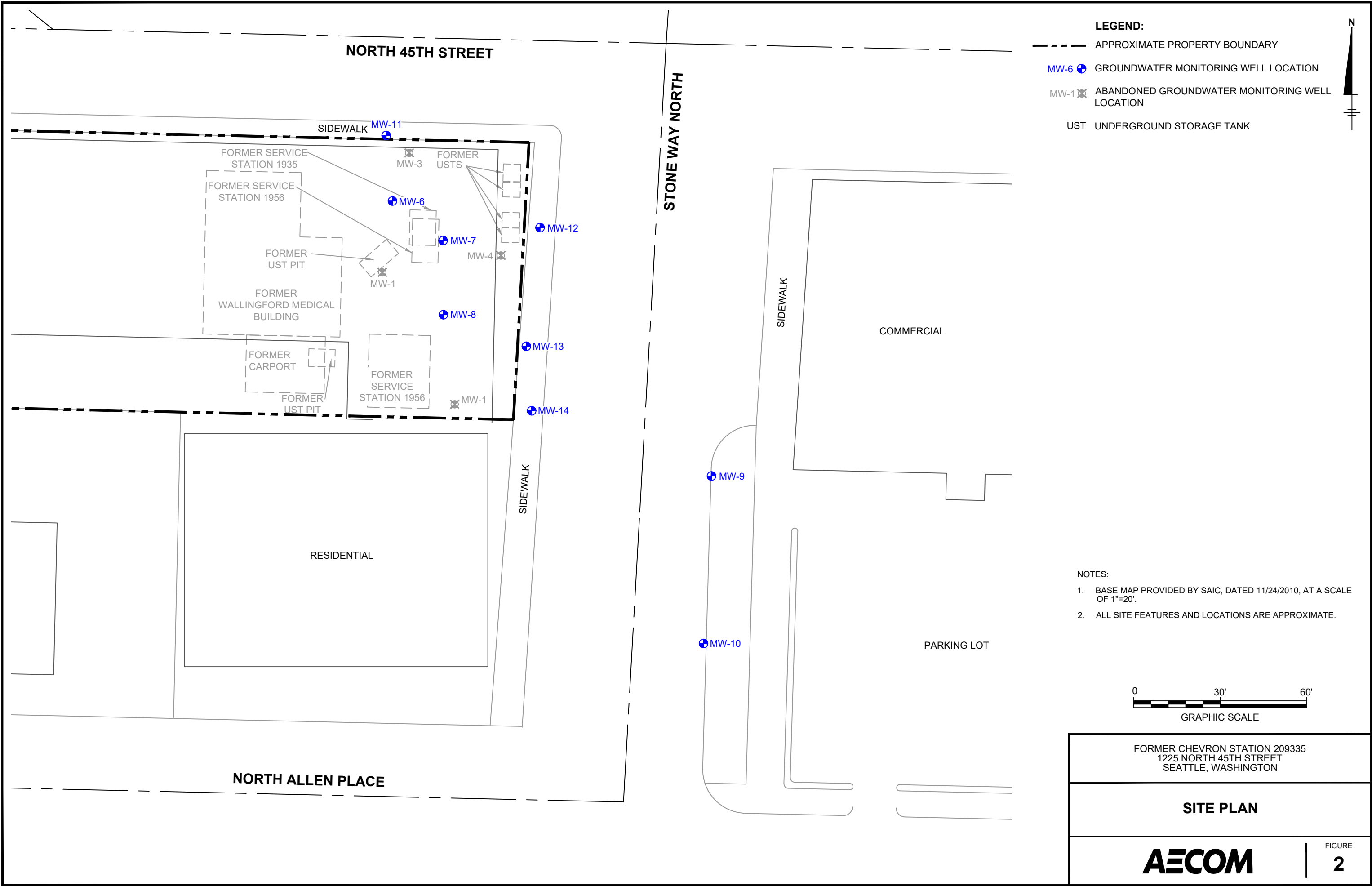
SITE LOCATION MAP

AECOM

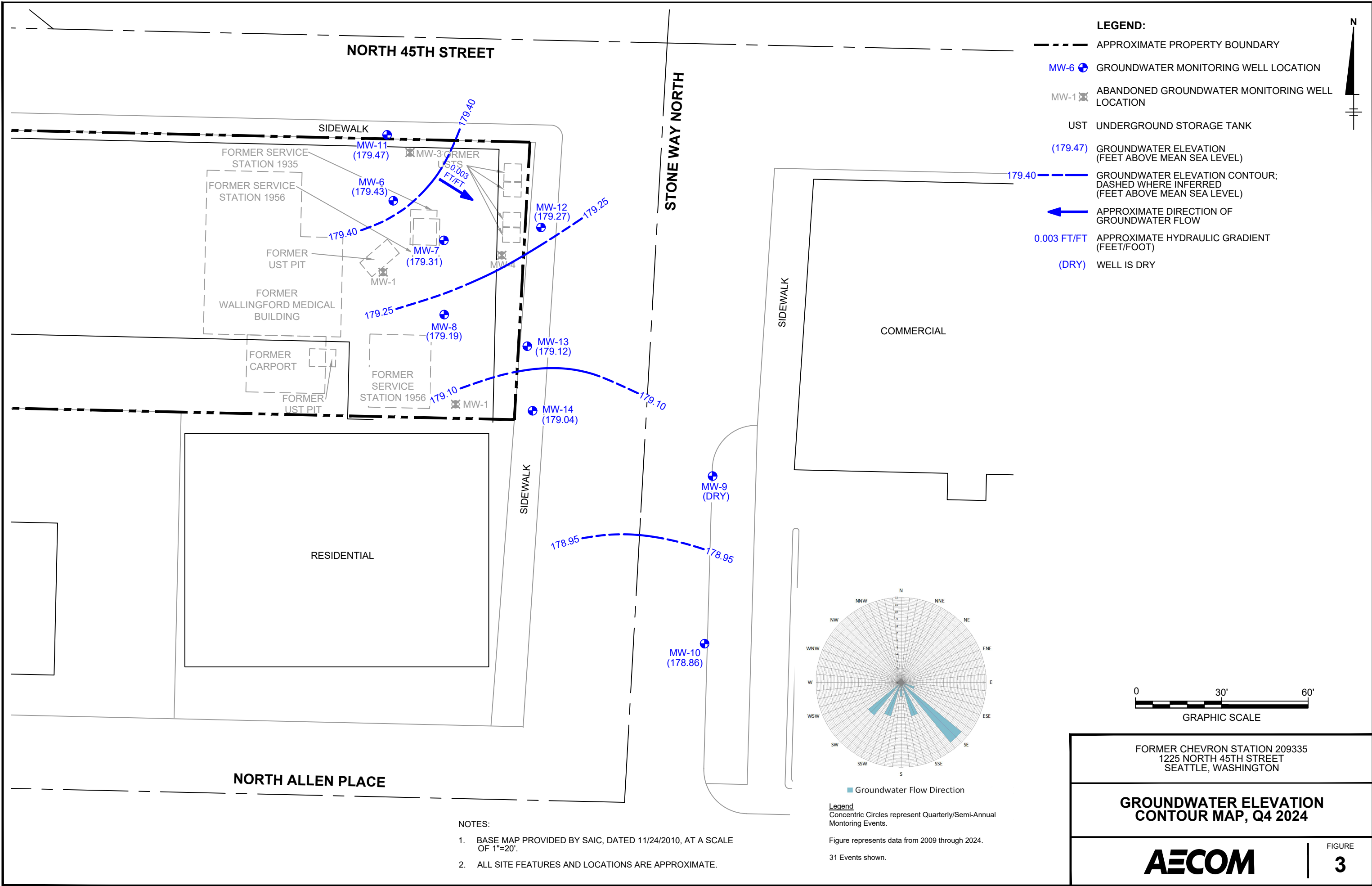
FIGURE

1

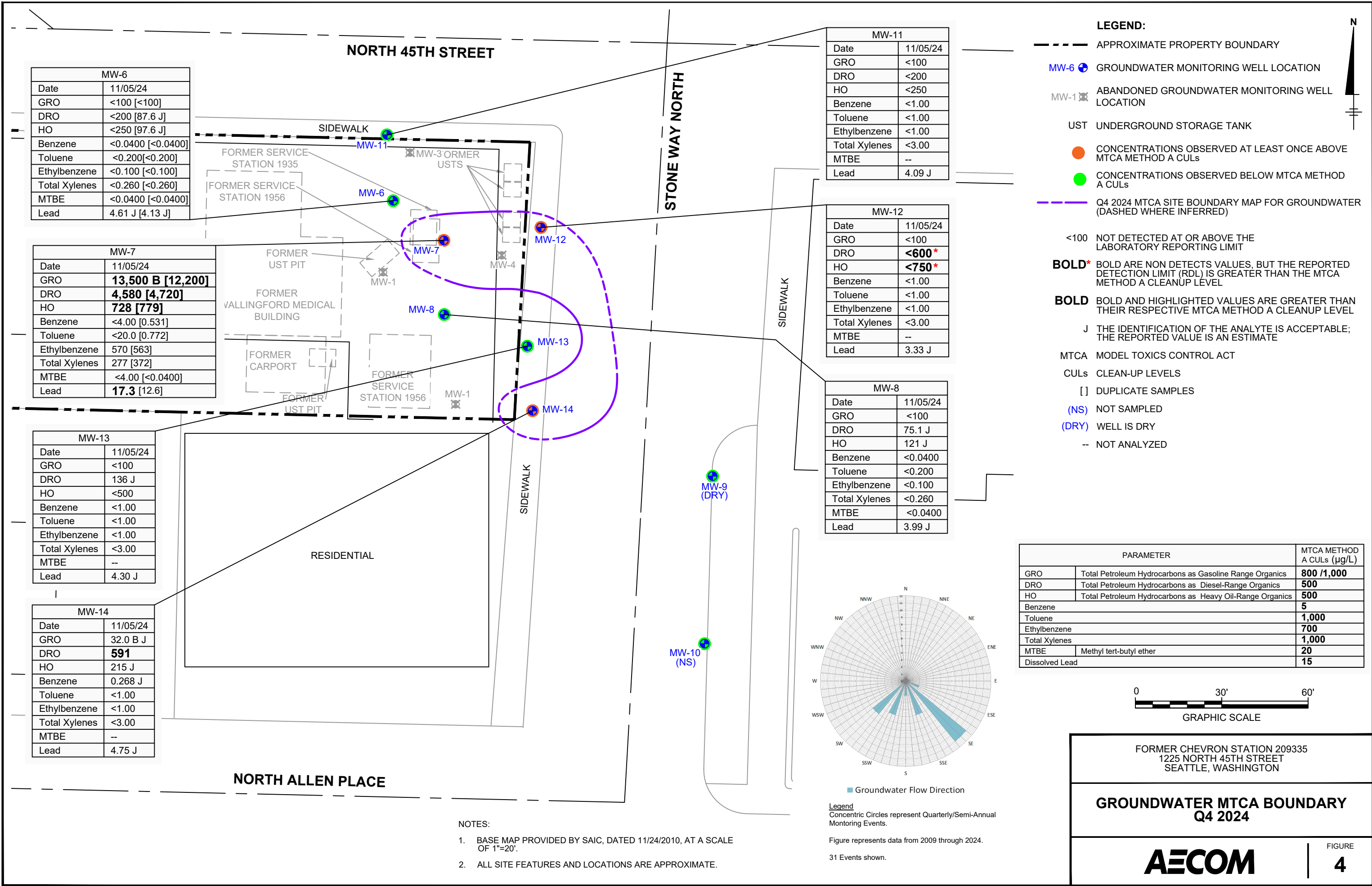
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Appendix A Monitoring Well Sampling Procedures

Monitoring Well Sampling

Procedure 3-14

1.0 Purpose and Scope

- 1.1 This standard operating procedure (SOP) describes the actions to be used during monitoring well sampling activities and establishes the method for sampling groundwater monitoring wells for water-borne contaminants and general groundwater chemistry. The objective is to obtain groundwater samples that are representative of aquifer conditions with as little alteration to water chemistry as possible.
- 1.2 As guidance for specific activities, this procedure does not obviate the need for professional judgment. Deviations from this procedure while planning or executing planned activities must be approved in accordance with Program requirements for technical planning and review.

2.0 Safety

- 2.1 Depending upon the site-specific contaminants, various protective programs must be implemented prior to sampling the first well. All **Field Sampling Personnel** responsible for sampling activities must review the project-specific Health and Health Plan (HASP) paying particular attention to the control measures planned for the well sampling tasks. Conduct preliminary area monitoring of sampling wells to determine the potential hazard to **Field Sampling Personnel**. If significant contamination is observed, minimize contact with potential contaminants in both the vapor phase and liquid matrix using appropriate personal protective equipment (PPE).
- 2.2 Observe standard health and safety practices according to the project-specific HASP. Suggested minimum protection during well sampling activities includes inner disposable vinyl gloves, outer chemical-protective nitrile gloves, and rubberized steel-toed boots. Half-face respirators and cartridges and Tyvek® suits may be necessary depending on evaluation for PFAS and on the contaminant concentrations. Refer to the project-specific HASP for the required PPE.
- 2.3 The following safety precautions should be observed to minimize physical hazards associated with monitoring well sampling:
 - To avoid lifting injuries associated with pump and bailers retrieval, use the large muscles of the legs, not the back.
 - Stay clear of all moving equipment, and avoid wearing loose fitting clothing.
 - When using tools for cutting purposes, cut away from yourself. The use of appropriate, task-specific cutting tools is recommended.
 - To avoid slip/trip/fall conditions as a result of pump discharge, use textured boots/boot cover bottoms.
 - To avoid heat/cold stress as a result of exposure to extreme temperatures and PPE, drink electrolyte replacement fluids (1 to 2 cups per hour is recommended) and, in cases of extreme cold, wear fitted insulating clothing.
 - Be aware of restricted mobility due to PPE.

3.0 Terms and Definitions

None.

4.0 Interferences

4.1 Potential interferences could result from cross-contamination between samples or sample locations. Minimization of the cross-contamination will occur through the following:

- The use of clean sampling tools at each location as necessary; and
- Avoidance of material that is not representative of the media to be sampled.

5.0 Training and Qualifications

5.1 Qualifications and Training

The individual executing these procedures must have read, and be familiar with, the requirements of this SOP.

5.2 Responsibilities

5.2.1 The **Field Team Coordinator** is responsible for ensuring that monitoring well sampling activities comply with this procedure. The **Field Team Coordinator** is responsible for ensuring that **Field Personnel** involved in monitoring well sampling shall have the appropriate education, experience, and training to perform their assigned tasks.

5.2.2 The **Project Manager** is responsible for ensuring overall compliance with this procedure.

5.2.3 All **Field Personnel** are responsible for the implementation of this procedure.

6.0 Equipment and Supplies

6.1 If sampling for PFAS, the sampler must take additional care to ensure no cross-contamination occurs from sampling equipment. Reference the Field Sampling Plan (FSP) for best practices regarding sampling equipment when necessary.

6.2 Purging and Sampling Equipment

- Pump (peristaltic, portable bladder, submersible)
- Polyethylene bladders (for portable bladder pumps)
- Bladder pump controller (for portable bladder pumps)
- Air compressor (for portable bladder pumps)
- Nitrogen cylinders (for portable bladder pumps)
- 12-volt power source
- Polyethylene inlet and discharge tubing
- Silicone tubing appropriate for peristaltic pump head
- High density polyethylene (HDPE) bailer appropriately sized for well
- Disposable bailer string (polypropylene)
- Individual or multi-parameter water quality meter(s) with flow-through cell to measure temperature, pH, specific conductance, dissolved oxygen (DO), oxidation reduction potential (ORP), and/or turbidity
- Turbidity meter
- Water level meter
- Oil/water interface probe

6.3 General Equipment

- Sample kit (i.e., bottles, labels, preservatives, custody records and tape, cooler, wet ice)
- Sample chain-of-custody (COC) forms
- Sample Collection Records
- Sample packaging and shipping supplies
- Fine-tipped Sharpie® marker
- Deionized water supply
- Polyethylene water dispenser bottles
- HDPE flow measurement cup or bucket
- 5-gallon buckets
- Instrument calibration solutions
- Stopwatch or watch
- Disposable, powderless Nitrile gloves
- Cotton towels
- Trash bags
- Zipper-lock (e.g., Ziploc brand) bags
- Equipment decontamination supplies (e.g., Alconox®, Liquinox®, NOT Decon 90™)
- Health and safety supplies (as required by the HASP)
- Well keys or combinations
- Monitoring well location map(s)
- Field project logbook/ballpoint pen

7.0 Calibration or Standardization

- 7.1 Field instruments will be calibrated daily according to the requirements of the FSP and/or manufacturer's specifications for each piece of equipment. Equipment will be checked daily with the calibration solutions at the end of use of the equipment. Calibration records shall be recorded in the field logbook or appropriate field form.
- 7.2 If readings are suspected to be inaccurate, the equipment shall be checked with the calibration solutions and/or re-calibrated.

8.0 Procedure

8.1 Preparation

8.1.1 Site Background Information

Establish a thorough understanding of the purposes of the sampling event prior to field activities. Conduct a review of all available data obtained from the site and pertinent to the water sampling. Review well history data including, but not limited to, well locations, sampling history, purging rates, turbidity problems, previously used purging methods, well installation methods, well completion records, well development methods, previous analytical results, presence of an immiscible phase, historical water levels, and general hydrogeologic conditions.

Previous groundwater development and sampling logs give a good indication of well purging rates and the types of problems that might be encountered during sampling, such as excessive turbidity and low well yield. They may also indicate where dedicated pumps are placed in the water column. To help minimize the potential for cross-contamination, well purging and sampling and water level measurement collection shall proceed from the least contaminated to the most contaminated well, as indicated by previous analytical results. This order may be changed in the field if conditions warrant it, particularly if dedicated sampling equipment is used. A review of prior sampling procedures and results may also identify which purging and sampling techniques are appropriate for the parameters to be tested under a given set of field conditions.

8.2 Groundwater Sampling Procedures

Groundwater sampling procedures at a site shall include:

- 1) An evaluation of the well security and condition prior to sampling
- 2) Decontamination of equipment
- 3) Measurement of well depth to groundwater
- 4) Assessment of the presence or absence of an immiscible phase
- 5) Assessment of purge parameter stabilization
- 6) Purging of static water within the well and well bore and
- 7) Obtaining a groundwater sample.

Each step is discussed in sequence below. Depending upon specific field conditions, additional steps may be necessary. As a rule, at least 24 hours should separate well development and well sampling events.

8.2.1 Well Security and Condition

At each monitoring well location, observe the conditions of the well and surrounding area. If required by the FSP, the following information may be noted on a Groundwater Sample Collection Record (Attachment 1) or in the field logbook:

- Condition of the well's identification marker
- Condition of the well lock and associated locking cap
- Integrity of the well—well pad condition, protective outer casing, obstructions or kinks in the well casing, presence of water in the annular space, and the top of the interior casing; and
- Condition of the general area surrounding the well.

8.2.2 Decontamination of Equipment

Prior to sampling the first monitoring well and after each monitoring well sample is collected, all non-dedicated sampling equipment will be decontaminated following the procedure described in the FSP.

8.2.3 Measurement of Static Water Level Elevation

Before purging the well, measure static water levels in each well on site. If the well cap is not vented, remove the cap several minutes before measurement to allow water levels to equilibrate to atmospheric pressure.

Measure the depth to standing water and the total depth of the well to the nearest 0.01 foot to provide baseline hydrologic data, to calculate the volume of water in the well, and to provide information on the integrity of the well (e.g., identification of siltation problems). If not already present, mark an easily identified reference point for water level measurements that will become

the measuring point for all water level measurements. This location and elevation must be surveyed.

The presence of light, non-aqueous phase liquids (LNAPLs) and/or dense, non-aqueous phase liquids (DNAPLs) in a well requires measurement of the elevation of the top and the bottom of the product, generally using an interface probe. Water levels in such wells must then be corrected for density effects to accurately determine the elevation of the water table.

At each location, measure water levels several times in quick succession to ensure that the well has equilibrated to atmospheric conditions prior to recording the measurement.

8.2.4 Detection of Immiscible Phase Layers

- Complete the following steps for detecting the presence of LNAPL and DNAPL before the well is purged for conventional sampling. These procedures may not be required for all wells. Consult the FSP prior to field deployment to determine if assessing the presence of LNAPL and/or DNAPL is necessary.
- Sample the headspace in the wellhead immediately after the well is opened for organic vapors using either a photoionization detector (PID) or an organic vapor analyzer and record the measurements.
- Lower an interface probe into the well to determine the existence of any immiscible layer(s), LNAPL and/or DNAPL, and record the measurements.
- Confirm the presence or absence of an immiscible phase by slowly lowering a clear bailer to the appropriate depth, then visually observing the results after sample recovery.
- In rare instances, such as when very viscous product is present, it may be necessary to utilize hydrocarbon- and water-sensitive pastes for measurement of LNAPL thickness. This is accomplished by smearing adjacent, thin layers of both hydrocarbon- and water-sensitive pastes along a steel measuring tape and inserting the tape into the well. An engineering tape showing tenths and hundredths of feet is required. Record depth to water, as shown by the mark on the water-sensitive paste, and depth to product, as shown by the mark on the product-sensitive paste. In wells where the approximate depth to water and product thickness are not known, it is best to apply both pastes to the tape over a fairly long interval (5 feet or more). Under these conditions, measurements are obtained by trial and error and may require several insertions and retrievals of the tape before the paste-covered interval of the tape encounters product and water. In wells where approximate depths of air-product and product-water interfaces are known, pastes may be applied over shorter intervals. Water depth measurements should not be used in preparation of water table contour maps until they are corrected for depression by the product.
- If the well contains an immiscible phase, it may be desirable to sample this phase separately. Section 8.2.6 presents immiscible phase sampling procedures. It may not be meaningful to conduct water sample analysis of water obtained from a well containing LNAPLs or DNAPLs (consult the **Project Manager**).

8.2.5 Purging Equipment and Use

8.2.5.1 General Requirements

The water present in a well prior to sampling may not be representative of in situ groundwater quality and shall be removed prior to sampling. Handle all groundwater removed during sampling in accordance with the investigation-derived waste handling procedures in the FSP. Purging shall be accomplished by methods as indicated in the FSP or by those required by state requirements.

The purge rate should be low enough that substantial drawdown in the well does not occur during purging. In addition, a low purge rate will reduce the possibility of stripping volatile organic compounds (VOCs) from the water and will reduce the likelihood of increasing the turbidity of the sample due to mobilizing colloids in the subsurface that are immobile under natural flow conditions.

The field sampler shall ensure that purging does not cause formation water to cascade down the sides of the well screen. Wells should not be purged to dryness if recharge causes the formation water to cascade down the sides of the screen, as this will cause an accelerated loss of volatiles. This problem should be anticipated based on the results of either the well development task or historical sampling events. In general, place the intake of the purge pump in the middle of the saturated screened interval within the well to allow purging, and at the same time minimize disturbance/overdevelopment of the screened interval in the well. Water shall be purged from the well at a rate that does not cause recharge water to be excessively agitated unless an extremely slow recharging well is encountered where complete evacuation is unavoidable. During the well purging procedure, collect water level and/or product level measurements to assess the hydraulic effects of purging and increase or decrease purge rate as needed. If the well is purged dry, allow the well to recover sufficiently to provide enough water for the specified analytical parameters, and then sample it.

The groundwater pump will be connected in-line to a water quality meter. Every five minutes during purging, record the temperature, pH, specific conductivity, DO, ORP, and turbidity on the groundwater sample form. Purging shall be considered complete once three consecutive parameters have stabilized to the parameter-specific requirements detailed on the groundwater sample form (Attachment 1). Once these stability metrics have been met, sample the well.

8.2.5.2 Purging Equipment and Methods

Submersible Pump

A stainless-steel submersible pump may be utilized for purging both shallow and deep wells prior to sampling the groundwater for semivolatile and non-volatile constituents but *is* generally not preferred for VOCs unless there are no other options (e.g., well over 200 feet deep). For wells over 200 feet deep, the submersible pump is one of the few technologies available to feasibly accomplish purging under any yield conditions. For shallow wells with low yields, submersible pumps are generally inappropriate due to overpumpage of the wells (<1 gallon per minute), which causes increased aeration of the water within the well.

Steam clean or otherwise decontaminate the pump and discharge tubing prior to placing the pump in the well. The submersible pump shall be equipped with an anti-backflow check valve to limit the amount of water that will flow back down the drop pipe into the well. Place the pump in the middle of the saturated screened interval within the well and maintain it in that position during purging.

Bladder Pump

A stainless-steel bladder pump can be utilized for purging and sampling wells up to 200 feet in depth for volatile, semivolatile, and non-volatile constituents. Use of the bladder pump is most effective in low to moderate yield wells and *is* often the preferred method for low-flow sampling. When sampling for VOCs and/or semi-volatile organic compounds (SVOCs) and PFAS, polyethylene bladders and PFAS-free O-rings and pump accessories should be used.

Either compressed dry nitrogen or compressed dry air, depending upon availability, can operate the bladder pump. The driving gas utilized must be dry to avoid damage to the bladder pump control box. Decontaminate the bladder pump prior to use.

Centrifugal, Peristaltic, or Diaphragm Pump

A centrifugal, peristaltic, or diaphragm pump may be utilized to purge a well if the water level is relatively shallow. New or dedicated HDPE tubing is inserted into the midpoint of the saturated screened interval of the well. Water should be purged at a rate that satisfies low-flow requirements (i.e., does not cause drawdown). Centrifugal, peristaltic, and diaphragm pumps are generally discouraged for VOC sampling; however, follow methods allowed per the project-specific FSP or state requirements.

Air Lift Pump

Airlift pumps are not appropriate for purging or sampling.

Bailer

Avoid using a bailer to purge a well because it can result in overdevelopment of the well and create excessive purge rates. If a bailer must be used, the bailer should either be dedicated or disposable. An HDPE bailer with polypropylene string mounted on a reel is recommended for lowering the bailer in and out of the well.

Lower the bailer below the water level of the well with as little disturbance of the water as possible to minimize aeration of the water in the well. One way to gauge the depth of water on the reel is to mark the depth to water on the bailer wire with a stainless-steel clip. In this manner, less time is spent trying to identify the water level in the well.

8.2.6 Monitoring Well Sampling Methodologies

8.2.6.1 Sampling Light, Non-Aqueous Phase Liquids (LNAPL)

Collect LNAPL, if present, prior to any purging activities. The sampling device shall generally consist of a dedicated or disposable bailer equipped with a bottom-discharging device. Lower the bailer slowly until contact is made with the surface of the LNAPL and to a depth less than that of the immiscible fluid/water interface depth as determined by measurement with the interface probe. Allow the bailer to fill with LNAPL and retrieve it.

When sampling LNAPLs, never drop bailers into a well and always remove them from the well in a manner that causes as little agitation of the sample as possible. For example, the bailer should not be removed in a jerky fashion or be allowed to continually bang against the well casing as it is raised. Teflon bailers should always be used when sampling LNAPL. The cable used to raise and lower the bailer shall be composed of an inert material (e.g., stainless steel) or coated with an inert material (e.g., Teflon).

8.2.6.2 Sampling Dense, Non-Aqueous Phase Liquids (DNAPL)

Collect DNAPL prior to any purging activities. The best method for collecting DNAPL is to use a double-check valve, stainless steel bailer, or a Kemmerer (discrete interval) sampler. The sample shall be collected by slow, controlled lowering of the bailer to the bottom of the well, activation of the closing device, and retrieval.

8.2.6.3 Groundwater Sampling Methodology

The well shall be sampled when groundwater within it is representative of aquifer conditions, per the methods described in Section 8.2.5. Prior to sampling, the flow-through

cell shall be removed and the samples collected directly from the purge tubing. Flow rates shall not be adjusted once aquifer conditions are met. Additionally, a period of no more than 2 hours shall elapse between purging and sampling to prevent groundwater interaction with the casing and atmosphere. This may not be possible with a slowly recharging well. Measure and record the water level prior to sampling in order to monitor drawdown when using low-flow techniques and gauge well volumes removed and recharged when using non-low-flow techniques.

Only use lab-provided, analyte-specific sample containers. When sampling for VOCs, sample containers are to be filled such that a positive meniscus forms on the top of the container with no overflow. No headspace may be present, which can be confirmed by tightly sealing the container and flipping it over. If a visible air bubble is present, add a small amount of the groundwater to the cap of the container and pour it gently onto the meniscus.

All samples are to be quickly placed into a cooler with ice. If samples are to be kept over several days, ice must be replenished as it melts, typically once a day.

Sampling equipment (e.g., especially bailers) shall never be dropped into the well, as this could cause aeration of the water upon impact. Additionally, the sampling methodology utilized shall allow for the collection of a groundwater sample in as undisturbed a condition as possible, minimizing the potential for volatilization or aeration. This includes minimizing agitation and aeration during transfer to sample containers, minimizing exposure to sunlight, and immediately placing the sample on ice once collected.

Sampling equipment shall be constructed of inert material. Equipment with neoprene fittings, polyvinyl chloride (PVC) bailers, Tygon® tubing, silicon rubber bladders, neoprene impellers, polyethylene, and Viton® are not acceptable when sampling for organics and PFAS. If bailers are used, an inert cable/chain (e.g., polypropylene string or stainless-steel wire or cable) shall be used to raise and lower the bailer. Dedicated equipment is highly recommended for all sampling programs.

Submersible Pump

The submersible pump must be specifically designed for groundwater sampling (i.e., pump composed of stainless steel and HDPE, sample discharge lines composed of HDPE) and must have a controller mechanism allowing the required low-flow rate. Adjust the pump rate so that flow is continuous and does not pulsate to avoid aeration and agitation within the sample discharge lines. Run the pump for several minutes at the low-flow rate used for sampling to ensure that the groundwater in the lines was obtained at the low-flow rate.

Bladder Pump

A gas-operated stainless steel bladder pump with adjustable flow control and equipped with a polyethylene bladder and HDPE tubing can be effectively utilized to collect a groundwater sample and is considered to be the best overall device for sampling inorganic and organic constituents. If only inorganics are being sampled, polyvinyl bladders and tubing may be used. Operate positive gas displacement bladder pumps in a continuous manner so that they minimize discharge pulsation that can aerate samples in the return tube or upon discharge.

When using a compressor, take several precautions. If the compressor is being powered by a gasoline generator, position the generator downwind of the well. Ground fault circuit interrupters (GFCIs) should always be used when using electric powered equipment. Do

not connect the compression hose from the compressor to the pump controller until after the engine has been started.

When all precautions are completed and the compressor has been started, connect the compression hose to the pump controller. Slowly adjust the control knobs to discharge water in the shortest amount of time while maintaining a near constant flow. This does not mean that the compressor must be set to discharge the water as hard as possible. The optimal setting is one that produces the largest volume of purge water per minute (not per purge cycle) while maintaining a near constant flow rate.

Prior to sampling, adjust the flow rate (purge rate) to yield 100 to 300 milliliters (mL) per minute. Avoid settings that produce pulsating streams of water instead of a steady stream if possible. Operate the pump at this low-flow rate for several minutes to ensure that drawdown is not occurring. At no time shall the sample flow rate exceed the flow rate used while purging.

For those samples requiring filtration, it is recommended to use an in-line high-capacity filter after all non-filtered samples have been collected.

Peristaltic Pump

A peristaltic pump is a type of positive displacement pump that moves water via the process of peristalsis. The pump uses a flexible hose fitted inside a circular pump casing. A rotor with cams compresses the flexible tube as the rotor turns, which forces the water to be pumped to move through the tube. In peristaltic pumps, no moving parts of the pump are in contact with the water being pumped. Displacement is determined by tube size, so delivery rate can only be changed during operation by varying pump speed. Peristaltic pumps are simple and quite inexpensive for the flow rates they provide.

There are several methods available for transferring the sample into the laboratory containers. The selected method may vary based on state requirements and should be documented in the FSP. Samples typically can be collected directly from the discharge end of the HDPE tubing, after it has been disconnected from the flow through cell. For volatile analyses, the sampler should make sure that the pump is set such that a smooth laminar flow is achieved. In all cases, the project team should consult their local regulatory requirements and document the selected sample collection procedure in the project-specific Quality Assurance Project Plan (QAPP).

Bailer

A single- or double-check valve HDPE or stainless steel bailer equipped with a bottom discharging device can be utilized to collect groundwater samples. Bailers have a number of disadvantages, however, including a tendency to alter the chemistry of groundwater samples due to degassing, volatilization, and aeration; the possibility of creating high groundwater entrance velocities; differences in operator techniques resulting in variable samples; and difficulty in determining where in the water column the sample was collected. Therefore, use bailers for groundwater sampling only when other types of sampling devices cannot be utilized for technical, regulatory, or logistical reasons.

Dedicated or disposable bailers should always be used in order to eliminate the need for decontamination and to limit the potential of cross-contamination. Each time the bailer is lowered to the water table, lower it in such a way as to minimize disturbance and aeration of the water column within the well.

8.2.7 Sample Handling and Preservation

Many of the chemical constituents and physiochemical parameters to be measured or evaluated during groundwater monitoring programs are chemically unstable and require preservation. The U.S. Environmental Protection Agency (EPA) document entitled *Test Methods for Evaluating Solid Waste – Physical/Chemical Methods (SW-846)* (EPA 1997) includes a discussion of appropriate sample preservation procedures. In addition, SW-846 provides guidance on the types of sample containers to use for each constituent or common set of parameters. In general, check with specific laboratory or state requirements prior to obtaining field samples. In many cases, the laboratory will supply the necessary sample bottles and required preservatives. In some cases, **Field Sampling Personnel** may add preservatives in the field.

Improper sample handling may alter the analytical results of the sample. Therefore, transfer samples in the field from the sampling equipment directly into the container that has been prepared specifically for that analysis or set of compatible parameters as described in the project-specific FSP. It is not an acceptable practice for samples to be composited in a common container in the field and then split in the laboratory or poured first into a wide-mouth container and then transferred into smaller containers.

Collect groundwater samples and place them in their proper containers in the order of decreasing volatility and increasing stability. A preferred collection order for some common groundwater parameters is:

1. VOCs and total organic halogens (TOX)
2. Dissolved gases, total organic carbon (TOC), total fuel hydrocarbons
3. Semivolatile organics, pesticides
4. Total metals, general minerals (unfiltered)
5. Dissolved metals, general minerals (filtered)
6. Phenols
7. Cyanide
8. Sulfate and chloride
9. Nitrate and ammonia
10. Radionuclides

When sampling for VOCs, collect water samples in vials or containers specifically designed to prevent loss of VOCs from the sample. The analytical laboratory performing the analysis shall provide these vials. Collect groundwater from the sampling device in vials by allowing the groundwater to slowly flow along the sides of the vial. Sampling equipment shall not touch the interior of the vial. Fill the vial above the top of the vial to form a positive meniscus with no overflow. No headspace shall be present in the sample container once the container has been capped. This can be checked by inverting the bottle once the sample is collected and tapping the side of the vial to dislodge air bubbles. Sometimes it is not possible to collect a sample without air bubbles, particularly water that has high concentrations of dissolved gases. In these cases, the **Field Sampling Personnel** shall document the occurrence in the field logbook and/or sampling worksheet at the time the sample was collected. Likewise, the analytical laboratory shall note in the laboratory analysis reports any headspace in the sample container(s) at the time of receipt by the laboratory.

8.2.7.1 Special Handling Considerations

In general, samples for organic analyses should not be filtered. However, high turbidity samples for polychlorinated biphenyl (PCB) analysis may require filtering. Consult the project-specific QAPP for details on filtering requirements. Samples shall not be transferred from one container to another because this could cause aeration or a loss of organic material onto the walls of the container. TOX and TOC samples should be handled in the same manner as VOC samples.

When collecting total and dissolved metals samples, the samples should be collected sequentially. The total metals sample is collected from the pump unfiltered. The dissolved metals sample is collected after filtering with a 0.45-micron membrane in-line filter. Allow at least 500 mL of effluent to flow through the filter prior to sampling to ensure that the filter is thoroughly wetted and seated in the filter capsule. If required by the project-specific QAPP, include a filter blank for each lot of filters used and always record the lot number of the filters.

Because there is some evidence that PFOS may sorb onto glass fiber filters, it is preferred not to filter samples for PFAS analysis in the field or laboratory. Field filtration is generally prohibited unless specifically requested by a client. If filtering is required by client's and regulatory agency's request, it is recommended that the following be considered and discussed with the client and regulatory agency:

- Evaluate if filtered results are meaningful, and, therefore, if filtering in the field or laboratory is required;
- Consider use of low-flow sampling in the field to reduce the need for sample filtering;
- Consider use of a centrifuge in the laboratory to reduce the need for sample filtering; and
- If filtering is required, determine the nature of the filters used and do not use glass fiber filters.

8.2.7.2 Field Sampling Preservation

Preserve samples immediately upon collection. Ideally, sampling containers will be pre-preserved with a known concentration and volume of preservative. Certain matrices that have alkaline pH (greater than 7) may require more preservative than is typically required. An early assessment of preservation techniques, such as the use of pH strips after initial preservation, may therefore be appropriate. Guidance for the preservation of environmental samples can be found in the U.S. EPA *Handbook for Sampling and Sample Preservation of Water and Wastewater* (EPA 1982). Additional guidance can be found in other U.S. EPA documents (EPA 1992, 1996).

8.2.7.3 Field Sampling Log

A groundwater sampling log provided as Attachment 1 shall document the following:

- Identification of well
- Well depth
- Static water level depth and measurement technique
- Presence of immiscible layers and detection method
- Well yield
- Purge volume and pumping rate

- Time that the well was purged
- Sample identification numbers
- Well evacuation procedure/equipment
- Sample withdrawal procedure/equipment
- Date and time of collection
- Types of sample containers used
- Preservative(s) used
- Parameters requested for analysis
- Field analysis data
- Field observations on sampling event
- Name of sampler
- Weather conditions

9.0 Quality Control and Assurance

- 9.1 **Field Personnel** will follow specific quality assurance (QA) guidelines as outlined in the project-specific FSP. The goal of the QA program should be to ensure precision, accuracy, representativeness, completeness, and comparability in the project sampling program.
- 9.2 Quality control (QC) requirements for sample collection are dependent on project-specific sampling objectives. The project-specific FSP will provide requirements for sample preservation and holding times, container types, and sample packaging and shipment, as well as requirements for the collection of various QC samples such as trip blanks, field blanks, equipment rinse blanks, and field duplicate samples.

10.0 Data and Records Management

- 10.1 Records will be maintained in accordance with SOP 3-03, *Recordkeeping, Sample Labelling, and Chain-of-Custody*. Various forms are required to ensure that adequate documentation is made of the sample collection activities. These forms may include:
- Sample Collection Records;
 - Non-water repellent field logbook;
 - COC forms; and
 - Shipping labels.
- 10.2 Sample collection records (Attachment 1) will provide descriptive information for the purging process and the samples collected at each monitoring well.
- 10.3 The field logbook is kept as a general log of activities and should not be used in place of the sample collection record.
- 10.4 COC forms are transmitted with the samples to the laboratory for sample tracking purposes.

11.0 Attachments or References

Attachment 1 – Groundwater Sampling Collection Record

ASTM Standard D5088. 2008. *Standard Practice for Decontamination of Field Equipment Used at Waste Sites*. ASTM International, West Conshohocken, PA. 2008. DOI: 10.1520/D5088-02R08. www.astm.org.

EPA (Environmental Protection Agency, United States). 1982. *Handbook for Sampling and Sample Preservation of Water and Wastewater*. EPA-600/4-82-029. Cincinnati: EPA Office of Research and Development, Environmental Monitoring and Support Laboratory.

EPA. 1992. *RCRA Groundwater Monitoring Draft Technical Guidance*. EPA/530/R-93/001. Office of Solid Waste. November.

EPA. 1996. *Ground Water Issue: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA/540/S-95/504. Office of Solid Waste and Emergency Response. April.

EPA. 1997. *Test Methods for Evaluating Solid Waste, Physical/Chemical Method (SW-846)*. 3rd ed., Final Update IIIA. Office of Solid Waste. Online updates at: <http://www.epa.gov/epaoswer/hazwaste/test/new-meth.htm>.

SOP 3-03, *Recordkeeping, Sample Labelling, and Chain-of-Custody*.

Author	Reviewer	Revisions (Technical or Editorial)
Mark Kromis Program Chemist	Chris Barr Program Quality Manager	Rev 0 – Initial Issue (May 2012)
Ken O'Donnell, PG Geologist	Claire Mitchell, PE, PMP Senior Engineer	Rev 1 – PFAS sampling update (July 2019)
Rose Kelley, Environmental Scientist	Richard Purdy, Project Scientist	Rev 2 – Update & Review (June 2022)
Alex McLean, Geologist	Jennifer Ray, Environmental Engineering	Rev 3 – Update & Review (February 2025)

Attachment 1

Groundwater Sample Collection Record

Well ID: _____

Groundwater Sample Collection Record

Client: _____	Date: _____	Time: Start _____ am/pm
Project No: _____		Finish _____ am/pm
Site Location: _____		
Weather Conds: _____	Collector(s): _____	

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length _____ c. Length of Water Column _____ (a-b) Casing Diameter/Material _____

b. Water Table Depth _____ d. Calculated Well Volume (see back) _____

2. WELL PURGEABLE DATA

a. Purge Method: _____

b. Acceptance Criteria defined (see SAP or Work Plan)

- Minimum Required Purge Volume (@ _____ well volumes) _____
- Maximum Allowable Turbidity _____ NTUs
- Stabilization of parameters _____ %

c. Field Testing Equipment used: Make _____ Model _____ Serial Number _____

Time (min)	Volume Removed (gal)	Temp. (°C)	pH s.u.	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (m)	Color/Odor/etc.

d. Acceptance criteria pass/fail

	Yes	No	N/A	(continued on back)
Has required volume been removed	☐	☐	☐	
Has required turbidity been reached	☐	☐	☐	
Have parameters stabilized	☐	☐	☐	

If no or N/A - Explain below.

3. SAMPLE COLLECTION: Method: _____

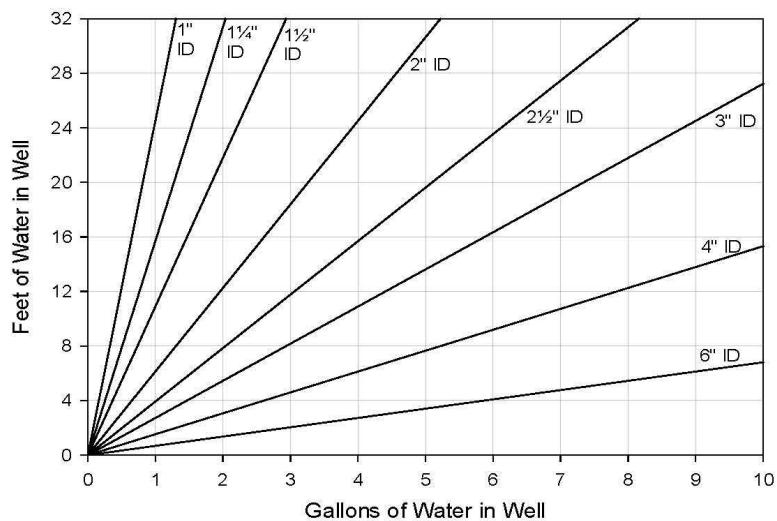
Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
-----------	----------------	-------------------	--------------	---------------	------

Comments _____

Signature _____ Date _____

Purge Volume Computation

Well ID:



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
¼	0.0025	0.0097
⅜	0.0057	0.0217
½	0.0102	0.0386
¾	0.0229	0.0869
1	0.0408	0.1544
1¼	0.0637	0.2413
1½	0.0918	0.3475
2	0.1632	0.6178
2½	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

[illegible]

Signature _____ Date _____

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