FARALLON CONSULTING

TECHNICAL MEMORANDUM

TO: Joseph Hunt – Washington State Department of Ecology

cc: Linda Anderson – Estate of Irwin Jessen
Mark Myers – Williams Kastner
Silje Roalsvik – Resolute Management, Inc.

FROM: Jeffrey Kaspar, L.G., L.H.G., Principal Geologist

DATE: April 9, 2025

RE: **WORK PLAN FOR REGIONAL AQUIFER ASSESSMENT AND VAPOR INTRUSION PATHWAY EVALUATION**
FORMER GRACE'S PLAZA CLEANERS SITE
717 WEST MAIN STREET
BATTLE GROUND, WASHINGTON
VOLUNTARY CLEANUP PROGRAM IDENTIFICATION NO. SW0597
FARALLON PN: 1201-001

Farallon Consulting, L.L.C. (Farallon) has prepared this Technical Memorandum in response to the request made by the Washington State Department of Ecology (Ecology) to present the Work Plan for regional aquifer assessment and vapor intrusion pathway evaluation at the former Grace's Plaza Cleaners Site at 717 West Main Street in Battle Ground, Washington (herein referred to as the Site). This Technical Memorandum provides a brief background for the Site and discusses the proposed locations for installation of three monitoring wells to be screened in the regional aquifer; proposed soil and groundwater sampling locations; and analysis, frequency, and evaluation of the vapor intrusion pathway for the Site. A Site vicinity map is provided on Figure 1 and a Site plan with the proposed monitoring well and soil gas sampling locations is presented on Figure 2. All cleanup work is being conducted as an independent remedial action under Ecology Voluntary Cleanup Program Identification No. SW0597. A formal opinion is being requested from Ecology regarding its concurrence on the proposed monitoring well locations, sampling locations, analysis, and frequency for completion of the remedial investigation.

BACKGROUND

Confirmation groundwater monitoring was conducted at the Site since 2016 as the final cleanup action element required by Ecology to determine when the Site qualified for an unrestricted No Further Action (NFA) determination. An objective of the groundwater monitoring was to confirm that prior cleanup activities of release(s) of the dry cleaning solvent tetrachloroethene (PCE) at the Site would result in cleanup of deep groundwater within the regional aquifer used by the City of Battleground as a source of potable drinking water. The prior cleanup activities completed at the Site included:

- Excavation and off-Site transport and disposal of the PCE-contaminated soil from the former dry cleaning location, which was the source of contamination to groundwater at the Site;
- Operation of soil vapor extraction (SVE) at the former dry cleaning location to remove residual PCE in soil that could not be accessed by excavation; and
- Implementation of in-situ chemical oxidation at one location near the back door of the former dry cleaning location where a minor release of PCE in soil was identified.

Confirmation soil sampling results supported that soil quality was compliant with the requirements under the Washington State Model Toxics Control Act Cleanup Regulation (MTCA) and no further action was necessary for soil cleanup.

Groundwater in the first-encountered groundwater-bearing zone ranged from a depth of approximately 72.5 to 88.5 feet below the ground surface (bgs), and is underlain by approximately 13 feet of dry cemented sand and gravel. Other groundwater-bearing zones were encountered at depths from approximately 102 to 139 feet bgs mixed with thinner layers of dry soil.

Monitoring wells MW-1D, MW-2D, MW-3D, and MW-5D are screened in the first-encountered groundwater-bearing zone and were sampled from 2005 to 2016. Concentrations of the constituents of concern (COCs), which include PCE, trichloroethene (TCE), dichloroethene isomers, and vinyl chloride, have never exceeded the MTCA cleanup levels.

Groundwater within the regional aquifer, which is used for the City of Battle Ground's two municipal water supply wells, was evaluated as a component of the remedial investigation work. The two municipal water supply wells are located approximately 700 feet down-gradient of the Site (northeast) and extract groundwater from screened intervals that are at

approximately 93 to 144 feet bgs. The municipal water supply wells have had detections of PCE and TCE, but the concentrations have been less than the MTCA cleanup levels for at least 25 years and the source(s) have never been investigated by the City of Battle Ground or Ecology. The City of Battle Ground has not evaluated the capture zones of the wells; therefore, the extent of the area that groundwater is extracted from is unknown. Vinyl chloride has also been consistently less than the laboratory reporting limits (non-detect) at the municipal water supply wells.

Multiport well MPW-2 was installed in 2005, with concurrence from Ecology on the well location and screened intervals, which were in turn based on observations of groundwater-bearing zones during drilling activities. The location of MPW-2 is directly down-gradient of the former dry cleaner tenant space and within the flow path that COCs would travel if they were to reach the municipal water supply wells. Multiport well MPW-2 is constructed of continuous multichannel tubing that is 10 millimeters in diameter and screened in three separate intervals at the following depths:

- Zone 1: 103 to 106 feet bgs;
- Zone 3: 131 to 134 feet bgs; and
- Zone 5: 137 to 139 feet bgs.

Continued groundwater sampling at multiport well MPW-2 was required by Ecology due to fluctuating COC concentrations in Zones 3 and 5, which at times exceeded the MTCA cleanup levels. All COCs except vinyl chloride have been less than the MTCA cleanup levels since October 2018. The highest concentration of vinyl chloride ever detected was 2.34 micrograms per liter (µg/L). The average concentration of vinyl chloride in Zones 3 and 5, when it was detected above the laboratory reporting limit of 0.200 µg/L, is 0.85 µg/L based on data collected between 2005 and 2022.

Farallon prepared the Cleanup Action Summary Report (CASR)[1] to provide Ecology with a summary of the work conducted to clean up COCs at the Site. The CASR presented the details of soil excavation, in-situ chemical oxidant injection, confirmation soil sampling, and performance groundwater sampling. The cleanup action work presented in the CASR was in addition to the initial cleanup action activities conducted in 2008, which included a

[1] Farallon. 2016. *Cleanup Action Summary Report, 717 West Main Street, Battle Ground, Washington.* July 29.

combination of soil excavation and installation and operation of the SVE system, as described in the Cleanup Action Plan.[2]

Following review of the CASR, Ecology required groundwater sampling at deep monitoring wells MW-1D through MW-3D and MW-5D to confirm that COC concentrations were still less than MTCA cleanup levels for groundwater. On April 4, 2017, performance groundwater monitoring was conducted at deep monitoring wells MW-1D through MW-3D and MW-5D, and at multiport well MPW-2. The results at MW-1D through MW-3D and MW-5D indicated that COC concentrations were all non-detect at the laboratory reporting limit of 0.005 µg/L. Ecology concurred that sufficient sampling had been conducted at these well locations to demonstrate that all COC concentrations were consistently less than MTCA cleanup levels. However, Ecology requested that monitoring wells MW-1D through MW-3D, located outside the building footprint, remain in-place until an NFA determination was issued. Ecology allowed monitoring well MW-5D, located inside the building and directly down-gradient of the former PCE source area associated with the former dry cleaning machine area, to be decommissioned to facilitate remodeling for a new tenant. Ecology also allowed further sampling of Zone 1 (the shallowest zone, screened at depths of 103 to 106 feet bgs) at multiport well MPW-2 to be discontinued, based on the groundwater analytical data collected from 2005 through 2020 that indicated consistent compliance with MTCA cleanup levels.

PCE biodegradation in groundwater under anaerobic conditions results in production of TCE, dichloroethene isomers, and vinyl chloride, which is then degraded to nontoxic by-products including chloride and ethene. The time frame for the residual mass of COCs in the regional aquifer at the Site to fully biodegrade to concentrations that are consistently less than the MTCA cleanup levels is unknown at this time due to the fluctuations in vinyl chloride concentrations occurring. However, there is sufficient information to conclude biodegradation of PCE is occurring in the regional aquifer based on the anaerobic geochemistry documented during the historical groundwater monitoring, the presence of the entire suite of PCE degradation compounds, and the presence of dehalococcoides populations (dehalococcoides are the consortium of microbes that biodegrade the COCs present).

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[2] Farallon. 2008. *Cleanup Action Plan, Former Grace's Plaza Cleaners, 717 West Main Street, Battle Ground, Washington.* March 25 (Cleanup Action Plan).

Based on the residual concentrations of COCs present in groundwater at the Site, the distance to the municipal water supply wells, and historical sampling data for the City of Battle Ground water-supply wells, COCs in groundwater at the Site cannot result in concentrations of COCs requiring further action under MTCA or other applicable or relevant and appropriate requirements. The only COC exceeding a MTCA Method A cleanup level at the Site is vinyl chloride based on historical groundwater sampling results. The average vinyl chloride concentration at the Site has been 0.85 µg/L. Dispersion, dilution, and continued degradation along the flow path would likely reduce vinyl chloride originating from the Site to a concentration less than the maximum contaminant level value allowed in drinking water of 0.2 µg/L. Similarly, vinyl chloride is also highly unlikely to be detected at the MTCA Method A cleanup level of 0.2 µg/L. The historical sampling results at the municipal water supply wells have substantiated this conclusion since vinyl chloride has never been detected.

Ecology issued an Opinion Letter dated February 13, 2024[3] requesting further action at the Site. In Ecology's opinion, the lateral extent of the COCs identified in groundwater in the groundwater-bearing zones ranging from approximately 131 to 139 feet bgs at the Site must be better defined to meet the MTCA requirements that pertain to a remedial investigation (Chapter 173-340-350). Prior Ecology project managers had waived this requirement based on the Site COCs in groundwater representing a low risk to the municipal water supply wells and improbability of direct contact with affected groundwater at depths greater than 100 feet bgs by third parties that own/operate the easements/streets and property separating the Site and the municipal water supply wells. Ecology also requested other actions that will be addressed herein, including sampling deep monitoring wells MW-1D through MW-3D; collecting additional groundwater data to support that biodegradation is occurring; and conducting additional vapor intrusion assessment work.

GROUNDWATER WELLS

To comply with Ecology's request for additional characterization of the extent of COCs in the regional aquifer, three new monitoring wells will be installed. The monitoring wells that will be installed will be designated as monitoring wells MW-RA1, MW-RA2, and MW-RA3 to indicate they are screened within the regional aquifer. Each monitoring well will be screened from approximately 129 to 139 feet bgs based on the documented presence of COCs that

[3] Ecology. 2024. Letter Regarding Further Action on the Proposed Cleanup at a Site: Grace's Cleaners (Battle Ground Plaza), 717 West Main Street, Battle Ground, WA 98604. From Joseph Hunt. To Jeff Kaspar, Farallon. February 13.

indicate the groundwater-bearing zones that the multiport well is screened to are connected versus separated by an aquitard. The screened interval may be modified based on observed conditions at the time of drilling. The monitoring wells will be installed in accordance with Chapter 173-160-400 of the Washington Administrative Code, *Minimum Standards for Construction and Maintenance of Resource Protection Wells and Geotechnical Soil Borings*. Each well will be constructed with 2-inch-diameter Schedule 80 polyvinyl chloride piping/well screen (0.010-inch slot size). The estimated locations of the monitoring wells are depicted on Figure 2.

The rationale for each of the monitoring well location follows:

- Monitoring well MW-RA1 – Will be used as a replacement for multiport well MPW-2, which will be decommissioned immediately following installation of the new monitoring wells. This location is appropriate since it is directly down-gradient of the documented sources of PCE releases identified at the Site. The location is also appropriate since multiport well MPW-2 has had COCs present within the same depth interval that is proposed for monitoring well MW-RA1.
- Monitoring well MW-RA2 – Will be located down-gradient of the Site in the eastern right-of-way for Southwest 7th Avenue. This monitoring well will be used to evaluate the lateral distribution of COCs. The location was selected due to the presence of multiple utilities on the western right-of-way (Figure 2). Placing the well on the Site itself is believed to be too close to MW-RA1. Placing the monitoring well in the eastern right-of-way will also provide better information regarding the lateral distribution of COCs and the potential risk to the municipal water supply wells.
- Monitoring well MW-RA3 – Will also be located on the east side of Southwest 7th Avenue in the eastern right-of-way. This location is down-gradient of the Site and in the flow path with the municipal water supply wells. This location will provide information on the lateral distribution of COCs and potential risk to the municipal water supply wells.

The three monitoring wells above will also provide information regarding the direction of groundwater flow in the regional aquifer.

Based on prior drilling experiences, a full-size truck-mounted sonic drill rig will be necessary to achieve the desired drilling depths. Right-of-way/street use permits will be needed to accommodate the drill rig and support truck/materials. Prior to drilling, Farallon will retain

both public and private utility locating services to clear each boring location of subsurface utilities. Each monitoring well location will also be cleared for the presence of utilities to 5 feet bgs using air knifing methods prior to drilling.

Soil cores from the sonic drilling will be collected for the purpose of evaluating soil lithology. Soil will be screened for the presence of volatile organic compounds using a photoionization detector. If potential indications of COCs are detected, a soil sample will be collected and retained for laboratory analysis. Soil samples also will be collected at various depth intervals to profile waste soil generated for disposal purposes. The soil samples will be collected at depth intervals representative of each drum of waste soil generated rather than from a composite of the drummed waste. This sampling approach will also provide data regarding whether soil is compliant with the MTCA cleanup levels. The soil samples retained for laboratory analysis will be analyzed for halogenated volatile organic compounds (HVOCs) by U.S. Environmental Protection Agency Method 8260D on a standard 7-day turnaround time.

Farallon's observations will be recorded on daily field report forms and boring/well logs. The information recorded on the field boring/well logs will include the soil types encountered, visual and olfactory evidence of contaminant presence, and volatile organic vapor screening measurements using a photoionization detector.

Following installation, the licensed well driller will develop each monitoring well using standard surging and purging techniques. The majority of the fine-grained sediment in the well and surrounding filter pack will be removed until the purge water appears clear. Each monitoring well will be allowed to stabilize several days prior to sampling.

The locations and elevations of the monitoring wells will be surveyed by a professional surveyor licensed in the state of Washington. The monitoring wells will be surveyed and referenced to Washington State Plane North coordinate system and the North American Vertical Datum of 1988, as required by Ecology.

Multiport well MPW-2 will be decommissioned by the licensed well driller by overdrilling the well. Overdrilling is necessary due to the nature of the well construction that prohibits bentonite or bentonite grout to be introduced into the narrow multiport channels. Multiport well MPW-2 will be decommissioned immediately following installation of monitoring wells MW-RA1, MW-RA2, and MW-RA3.

Soil cuttings, decontamination water, purge water, and other wastewater generated during monitoring well installation and groundwater sampling activities conducted will be temporarily stored in a secure location at the Site in labeled steel drums. The analytical results for the soil and groundwater samples will be used to develop a waste profile to identify appropriate waste disposal options.

GROUNDWATER SAMPLING

Groundwater sampling will be conducted at monitoring wells MW-RA1, MW-RA2, and MW-RA3 for up to four quarters (four sampling events) using standard low-flow sampling techniques. If any of the newly installed monitoring wells have no detections of COCs for the initial two sampling events and no detections of COCs in the soil samples collected during drilling, that will be considered sufficient evidence to demonstrate that no further sampling at that location is necessary. Any monitoring well with a detection of COCs will continue to be sampled for a full four quarters. All three monitoring wells will be gauged for depth to water and evaluation of groundwater elevation data regardless of whether the well is being sampled for COCs. The direction of groundwater flow is not anticipated to deviate significantly and is expected to be similar to the overlying groundwater-bearing zone, especially with the municipal water supply wells pumping of groundwater. The COC concentrations are not affected by seasonal variations based on the historical analytical data from multiport well MWP-2. Therefore, four consecutive monitoring events are not required to evaluate seasonal influences on groundwater flow or COC concentrations.

Ecology has also requested that the existing deep monitoring wells screened in the first-encountered groundwater-bearing zone, which includes MW-1D, MW-2D, and MW-3D, be sampled again to confirm COCs have remained below the MTCA cleanup levels. These monitoring wells will be sampled during the first quarterly sampling event for the newly installed monitoring wells. If COC concentrations are less than the MTCA cleanup levels, then sampling at these locations will be discontinued.

Prior to sampling, the depth to groundwater will be measured in each monitoring well using an electronic water-level indicator. Before the monitoring wells are purged, the intake of the dedicated polyethylene tubing will be placed at the approximate center of the screened interval in each monitoring well. Groundwater will be purged from each well using a bladder pump at a flow rate of approximately 100 to 300 milliliters per minute. During the purging of groundwater prior to sampling at each monitoring well, field measurements for pH,

temperature, specific conductivity, dissolved oxygen, and oxidation-reduction potential will be recorded using a water-quality analyzer equipped with a flow-through cell. Groundwater samples will be collected after the pH, temperature, and specific conductivity parameters stabilize. The samples will be collected by pumping groundwater directly from each well through the dedicated polyethylene tubing into laboratory-prepared containers. All samples will be submitted for laboratory analysis for HVOCs by U.S. Environmental Protection Agency Method 8260D on a standard 7-day turnaround time.

VAPOR INTRUSION EVALUATION

Ecology has requested that the vapor intrusion pathway be evaluated one final time to confirm that prior indoor air sampling results in 2013 still indicate there is not a vapor intrusion risk. Ecology's concern is that residual soil contamination may persist following the three cleanup excavation events, SVE operations, and chemical oxidation treatment. Ecology has recommended collecting both subslab soil gas samples and indoor air samples.

The proposed vapor intrusion evaluation will be a multistep process. Two subslab soil gas samples will be collected proximate to the former source areas where the highest concentrations of COCs have been detected. These locations are depicted on Figure 2. The locations proposed are next to the tenant spaces most likely to be affected but on the outside of the building since the interior tenant spaces and hallways were remodeled and the current owner's preference is not to penetrate the flooring. If Ecology does not concur with the subslab soil gas locations, then the suggested alternative is to eliminate soil gas sampling and collect indoor air samples as described herein.

SUBSLAB SOIL GAS SAMPLING

Subslab soil gas samples will be collected using Vapor Pins (Attachment A). The Vapor Pin sampling device allows for multiple sampling events and is recommended in case the data collected is inconclusive. The Vapor Pins will be installed at the time the new monitoring wells are installed. The proposed sampling event will occur at the time of the first quarterly groundwater sampling event of the newly installed monitoring wells. The Vapor Pins will penetrate the concrete slab proximate to the former dry cleaner tenant space and the asphalt surface near the back door of the former dry cleaner tenant space.

Public and private utility location services to clear the proposed soil gas sampling locations will be conducted as a component of the monitoring well drilling program. The Vapor Pins are installed by coring through the concrete slab/asphalt using a handheld rotohammer drill

to install a 0.25-inch-diameter core in the slab. The Vapor Pin and associated cover are then installed and sealed at the borehole interface via a silicone sleeve.

Prior to sampling at each soil gas sampling location, the sampling train will be leak-tested using laboratory-grade helium gas as a tracer with a shroud, and a real-time helium gas monitor, to ensure that there are no leaks that can introduce ambient air into the sample. A Farallon scientist will collect the soil gas samples directly into laboratory-provided 1-Liter Summa canisters using Farallon's standard soil gas sampling procedures, which are attached (Attachment A). The sampling duration is typically over a period of approximately 10 minutes. After completion of the sampling, the Vapor Pin will be covered with the flush-mounted cap for future accessibility, if necessary. The Vapor Pins can be removed when no longer required and the shallow boreholes backfilled with concrete/asphalt.

The subslab soil gas samples will be submitted to a qualified laboratory for analysis by Modified U.S. Environmental Protection Agency Method TO-15 for PCE and related degradation compounds TCE, dichloroethene isomers, and vinyl chloride. The laboratory analytical results will be provided within the standard 10-day turnaround time and then validated for use by Farallon.

The soil gas analytical results will be compared to MTCA Method B vapor intrusion screening levels for commercial building use. If the results are less than the screening levels, no indoor air sampling will be conducted. Indoor and outdoor ambient air sampling will be performed if any of the COCs exceed the commercial building use screening levels for soil gas.

AIR SAMPLING

If air sampling is conducted, a building inspection of the former dry cleaner tenant space will occur at least 48 hours prior to sampling. The purpose of the building inspection is to evaluate the potential presence and use of chemical products that could contain COCs that could bias the air sampling results. The building survey will also evaluate other potential conditions and tenant operations that may require discontinuation until the sampling is completed.

Farallon will collaborate with the current owner and tenant to ensure that chemical products identified during the building inspection be removed and any practices identified that could bias the results be discontinued (such as cleaning, painting, product deliveries, etc.). Farallon will notify the Site owner, who will be responsible for notifying the tenant of the

proposed sampling event. Tenants must not disturb the samplers, which will remain in the space for an 8-hour time frame. Farallon may create a flyer for the tenants to inform them of the sampling and restrictions if necessary. The sampling will be conducted during normal work hours rather than evenings due to the potential to bias results high when the spaces are closed with limited HVAC operations or air exchanges that are not representative of a typical commercial worker shift. Air sampling will be conducted following Farallon's Standard Operating Procedures (Attachment B).

Farallon will collect air samples from the following locations:

- Two samples from the former dry cleaner tenant space; and
- One outdoor ambient air sample.

The proposed air sample locations will be determined based on the current layout of the former dry cleaner tenant space, with the preferred locations being proximate to the former source areas in soil. The outdoor ambient air sample will be placed on the upwind side of the building, which will be determined the day of sampling. The indoor air samples will be collected at the typical breathing space height of 4 to 5 feet above the ground surface. The outdoor ambient air sample will be collected from a height of 4 to 6 feet above the ground surface. All samples will be collected using a 6-Liter Summa canister equipped with a flow controller calibrated for an 8-hour duration. Farallon staff will be at the Site periodically checking the integrity of the Summa canisters throughout the sampling event and will observe and record weather and other Site conditions/operations that will facilitate interpretation of the results.

The air samples will be analyzed for the following by Modified U.S. Environmental Protection Agency Method TO-15 Selected Ion Monitoring (low-level) for PCE and related degradation compounds TCE, dichloroethene isomers, and vinyl chloride. The laboratory analytical results will be provided within the standard 10-day turnaround time and then validated for use by Farallon.

The air analytical results will be compared to MTCA Method B vapor intrusion screening levels commercial building use and the standard MTCA Method B cleanup levels. Concentrations of HVOCs identified in outdoor ambient air will be subtracted from the indoor air results to account for air exchanges between outdoor and indoor air that bias the indoor air sample results.

CLOSING

Periodic progress reports will be provided to Ecology via email. Progress reports will include a summary of the work conducted, tables summarizing the analytical data collected, and summary figures with analytical data and other information regarding Site work conducted. Formal opinions from Ecology will not be requested; however, informal technical assistance regarding the work conducted and guidance on the path forward to an unrestricted NFA determination will be appreciated. All data collected will be submitted to Ecology's Environmental Information Management database as required under MTCA and as work progresses.

A Cleanup Action Status Report for a formal opinion regarding an NFA determination, or proposed path forward to achieve the NFA determination, will be provided to Ecology following completion of the work described herein. The Cleanup Action Status Report will include details required by Ecology under MTCA to evaluate the work conducted. With the exception of multiport well MPW-2, the monitoring wells and Vapor Pins will not be decommissioned until an NFA determination is received.

At this time, a formal opinion by Ecology regarding the scope of work proposed herein is requested. The Request for Opinion Form is included in Attachment C.

Attachments: Figure 1, *Site Vicinity Map*
Figure 2, *Site Plan Showing Proposed Monitoring Well and Soil Gas Sampling Locations*
Attachment A, Soil Gas Standard Operating Procedure
Attachment B, Air Sampling Standard Operating Procedure
Attachment C, Request for Opinion Form

JK/BJ:cm

LIMITATIONS

The conclusions contained in this report/assessment are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted hydrogeologic and engineering standards and practices applicable to this location. The conclusions contained herein are subject to the following inherent limitations:

- Accuracy of Information. Farallon reviewed certain information used in this report/assessment from sources that were believed to be reliable. Farallon's conclusions, opinions, and recommendations are based in part on such information. Farallon's services did not include verification of its accuracy. Should the information upon which Farallon relied prove to be inaccurate, Farallon may revise its conclusions, opinions, and/or recommendations.
- Reconnaissance and/or Characterization. Farallon performed a reconnaissance and/or characterization of the Site that is the subject of this report/assessment to document current conditions. Farallon focused on areas deemed more likely to exhibit hazardous materials conditions. Contamination may exist in other areas of the Site that were not investigated or were inaccessible. Site activities beyond Farallon's control could change at any time after the completion of this report/assessment.

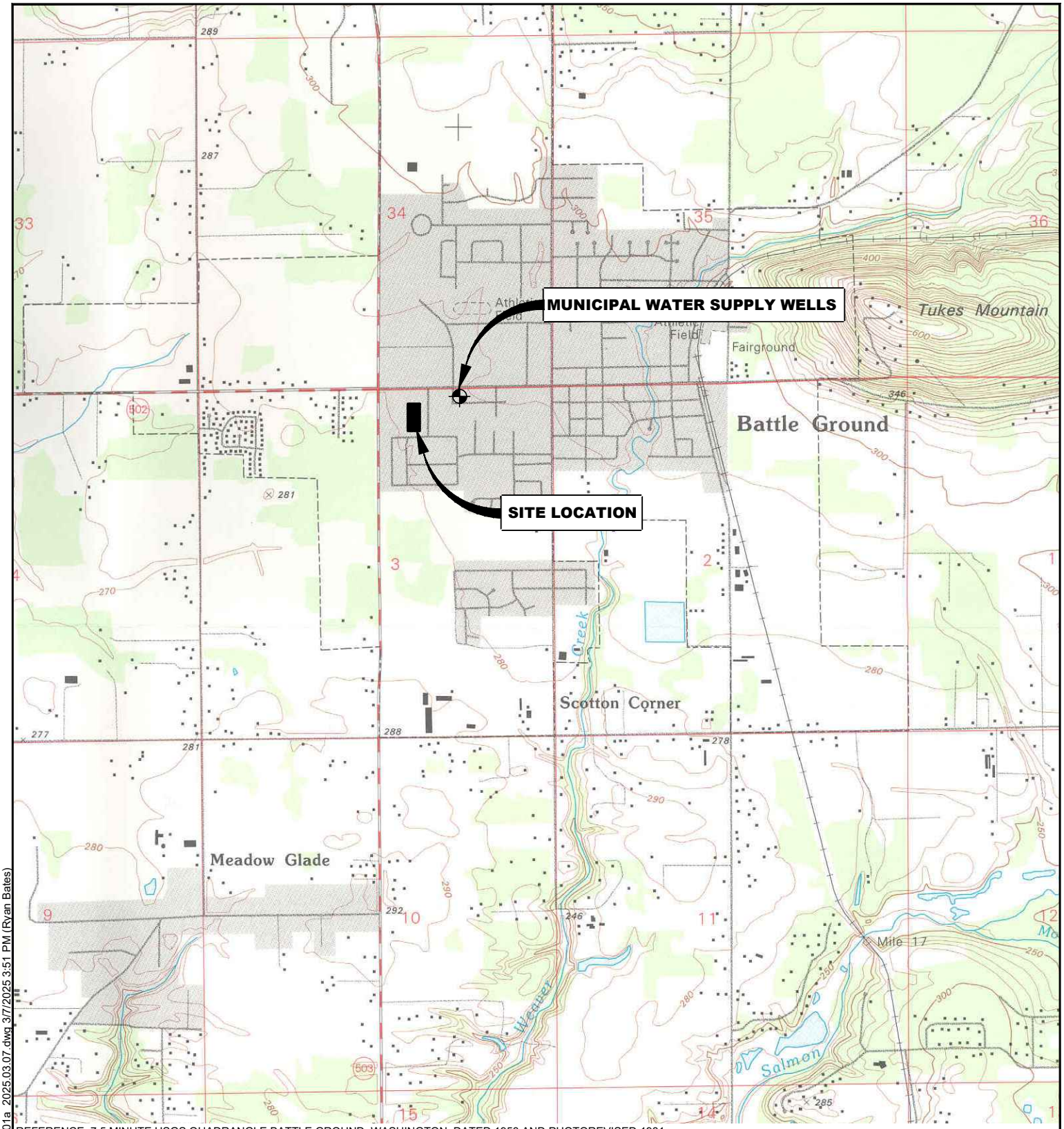
Farallon does not guarantee that the Site is free of hazardous or potentially hazardous substances or conditions, or that latent or undiscovered conditions will not become evident in the future. Farallon's observations, findings, and opinions are as of the date of the report.

This report/assessment has been prepared in accordance with the contract for services between Farallon and the Estate of Irwin Jessen. No other warranties, representations, or certifications are made.

FIGURES

WORK PLAN FOR REGIONAL AQUIFER ASSESSMENT
AND VAPOR INTRUSION PATHWAY EVALUATION
Former Grace's Plaza Cleaners Site
717 West Main Street
Battle Ground, Washington

Farallon PN: 1201-001



REFERENCE: 7.5 MINUTE USGS QUADRANGLE BATTLE GROUND, WASHINGTON. DATED 1953 AND PHOTOREVISED 1981

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Oregon
Portland | Baker City

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Drawn By: RB Checked By: JK

FIGURE 1

SITE VICINITY MAP
FORMER GRACE'S PLAZA CLEANERS SITE
717 WEST MAIN STREET
BATTLE GROUND, WASHINGTON

FARALLON PN: 1201-001

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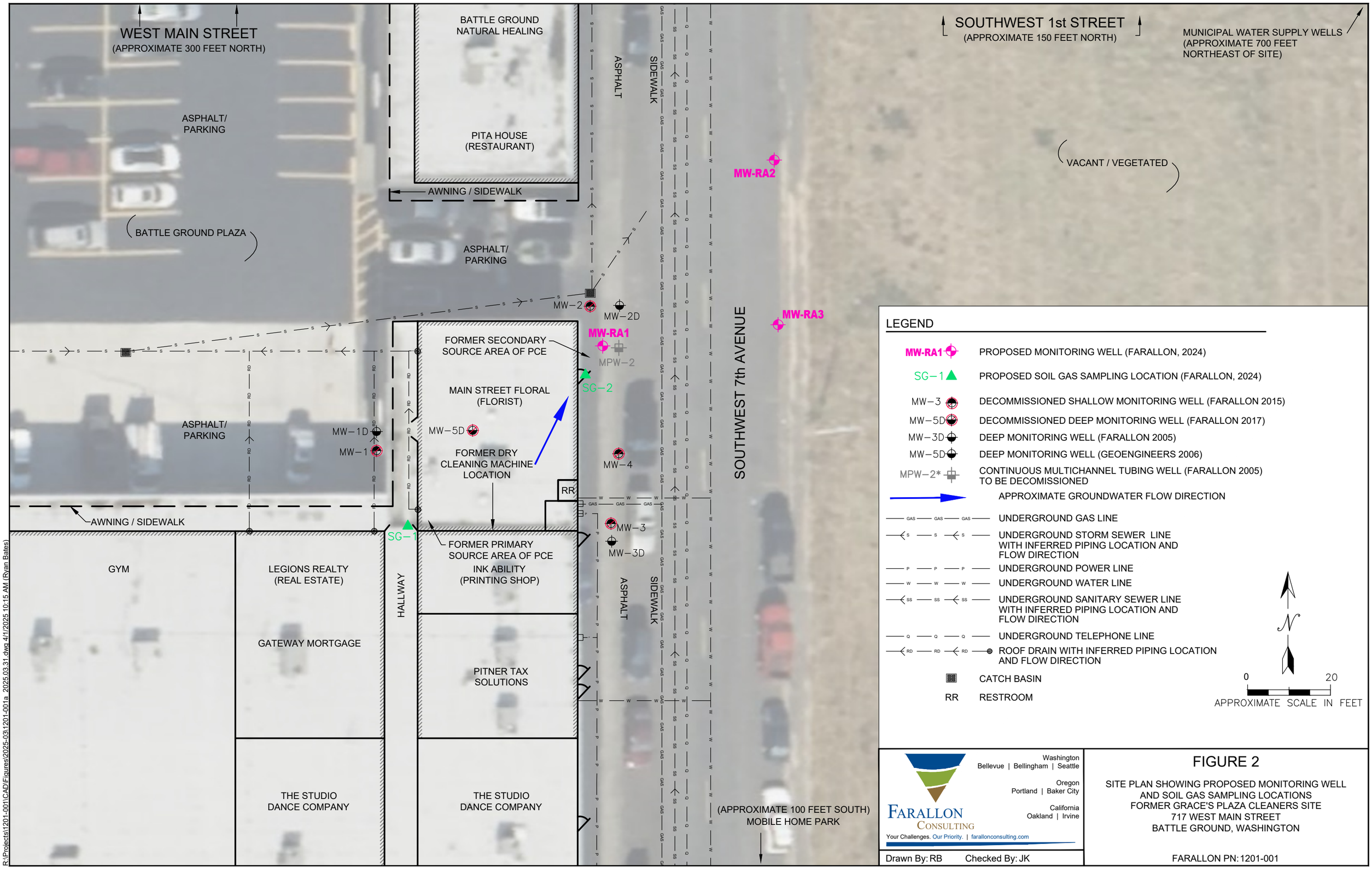

LEGEND

- MW-RA1 — PROPOSED MONITORING WELL (FARALLON, 2024)
- SG-1 — PROPOSED SOIL GAS SAMPLING LOCATION (FARALLON, 2024)
- MW-3 — DECOMMISSIONED SHALLOW MONITORING WELL (FARALLON 2015)
- MW-5D — DECOMMISSIONED DEEP MONITORING WELL (FARALLON 2017)
- MW-3D — DEEP MONITORING WELL (FARALLON 2005)
- MW-5D — DEEP MONITORING WELL (GEOENGINEERS 2006)
- MPW-2* — CONTINUOUS MULTICHANNEL TUBING WELL (FARALLON 2005) TO BE DECOMISSIONED
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- GAS GAS GAS — UNDERGROUND GAS LINE
- S S S — UNDERGROUND STORM SEWER LINE WITH INFERRED PIPING LOCATION AND FLOW DIRECTION
- P P P — UNDERGROUND POWER LINE
- W W W — UNDERGROUND WATER LINE
- SS SS SS — UNDERGROUND SANITARY SEWER LINE WITH INFERRED PIPING LOCATION AND FLOW DIRECTION
- Q Q Q — UNDERGROUND TELEPHONE LINE
- RD RD RD — ROOF DRAIN WITH INFERRED PIPING LOCATION AND FLOW DIRECTION
- CATCH BASIN
- RR — RESTROOM

N

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APPROXIMATE SCALE IN FEET

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Drawn By: RB Checked By: JK

FIGURE 2

SITE PLAN SHOWING PROPOSED MONITORING WELL AND SOIL GAS SAMPLING LOCATIONS
FORMER GRACE'S PLAZA CLEANERS SITE
717 WEST MAIN STREET
BATTLE GROUND, WASHINGTON

FARALLON PN: 1201-001

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ATTACHMENT A
SOIL GAS STANDARD OPERATING PROCEDURES

WORK PLAN FOR REGIONAL AQUIFER ASSESSMENT
AND VAPOR INTRUSION PATHWAY EVALUATION
Former Grace's Plaza Cleaners Site
717 West Main Street
Battle Ground, Washington

Farallon PN: 1201-001

STANDARD OPERATING PROCEDURE (SOP) AIR-02

SUBSLAB SOIL GAS SAMPLING WITH LEAK TESTING

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the information needed to collect consistent and representative subslab soil gas samples, and to accurately document the data-collection process.

Soil gas sampling should not be performed during a significant rainfall event (i.e., more than 0.5 inch of rainfall during a 24-hour period). If feasible, sampling should be conducted only after 5 days without a significant rainfall event. Infiltration of rainwater adjacent to a building slab may have a temporary effect on soil gas conditions, and may yield biased, non-representative sampling results. The step-by-step guidelines provided in this SOP are to be followed by the field crew collecting subslab soil gas samples.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment and supplies are necessary to properly conduct subslab soil gas sampling:

- A Farallon custom acrylic shroud or laboratory-provided shroud with 0.25-inch access ports and a foam mat floor seal. The shroud will enclose the 1-liter Summa canister used to collect the sample while allowing leak testing to be performed using analytical-grade helium gas.
- An analytical-grade MGD 2002 dielectric helium detector (or equivalent helium detection device).
- New 0.25-inch-outside-diameter Teflon tubing and Swagelok 0.25-inch-outside-diameter compression fittings for dedicated sampling at each sampling location.
- A hand-held rotary hammer drill to penetrate the concrete floor slab with a borehole of 1-inch-diameter or less. Alternatively, the concrete slab boring or coring can be completed by a subcontractor.
- Plumber's putty or a suitable volatile organic compound (VOC)-free substance to seal the core annulus and sample tubing.
- A sufficient number of 1-liter Summa canisters supplied by the analytical laboratory, as specified by the project sampling plan. Each canister will be equipped with a dedicated manifold that includes appropriate filters, pressure gauges, valves, and flow controllers set for a sample collection rate of 200 milliliters per minute or less (depending on the desired sampling-time interval), and/or accessories to collect samples required by the project-specific sampling plan.
- Equipment required to collect samples using 1-liter Summa canisters, including appropriate wrenches and other tools and/or fittings.

- A lung box, Tedlar bags, and a low-volume sampling pump or syringe for evaluating leaks in the sampling train using helium tracer gas, before sampling is initiated.
- Laboratory-provided shipping containers for the Summa canisters.
- Patch material to restore the area of the drilled hole to its original condition.
- Field notes to record sampling procedures and data.
- Helium Gas

DECONTAMINATION

Use dedicated soil gas sampling supplies and equipment at each location. No decontamination of equipment in the field is required.

PROCEDURES

Implement the following procedures to collect soil gas samples representative of conditions beneath the building slab.

Leak-Detection Testing for Manifolds

Several days before sampling commences, test for leaks in the laboratory-supplied manifolds and/or flow controllers to allow time to obtain new canisters, manifolds, and/or flow controllers in the event the equipment fails the testing. Follow the instructions below for the leak-detection testing:

- Verify that the number engraved on each Summa canister matches the number listed on the certified-clean tag attached to the canister to ensure that the canister was properly decontaminated. Ensure that documentation of the laboratory certification for the canister(s) is included on a tag attached to the canister and in the paperwork that accompanied the canister shipment from the laboratory.
- Confirm that the Summa canister valves are closed (i.e., the knob is tightened clockwise).
- Attach the manifold—including the filter, flow controller, and pressure gauge—to the canister.
- Confirm that a brass cap is secured at the inlet of the manifold/flow controller, creating an air-tight sampling train.
- Quickly open and close the sample canister valve, and observe the gauge reading. If the initial gauge reading is less than the minimum canister pressure necessary to collect a sample that will meet the required practical quantitation limit/method detection limit,

discontinue leak testing, and obtain additional canisters. Repeat the testing for all new canisters.

- If the initial vacuum pressure is greater than the minimum canister pressure necessary to collect a sample that will meet the required practical quantitation limit and/or method detection limit, continue to monitor the gauge to check for leaks in the manifold and connections to the Summa canister. Observe the gauge for 5 minutes. If the needle on the gauge drops indicating a loss of pressure, the sampling train is not air-tight. In this event, refit and/or tighten the connections until the needle holds steady. If leakage is still indicated, use an alternate manifold/flow controller to confirm that the initial manifold/flow controller requires replacement. Obtain replacement equipment and repeat the testing.

Preparation for Sampling

Perform the following steps to prepare and stage the sampling equipment prior to performing real time leak-detection testing and sample collection at each sampling location:

- Ensure that access agreements are in place, and the building owner and/or operator is aware that sampling will be performed.
- Clear the sampling locations for utilities. Building slabs may contain conduits for electrical wires, structural cables, and/or other utilities that could be encountered when the slab is cored for sampling. Retain a private utility location service for each sampling location at sites where utility locations have not been documented.
- Use a rotary hammer or a concrete corer to drill an approximately 1-inch-diameter borehole or less (a 0.375-inch borehole typically is adequate) through the concrete floor slab of the building. Where indoor ambient air sampling also will be conducted, drill the core near the ambient indoor air sampling location, if possible, to allow direct evaluation of attenuation factors for migration of subslab soil gas to indoor air.
- Place new dedicated Teflon tubing down the borehole to a depth just below the base of the concrete slab, or to the desired depth specified by the project sampling plan. If the flow controllers for the Summa canister do not include appropriate filters to mitigate extraction of particulate matter into the canister, place a dedicated filter on the end of the Teflon tubing before placing it through the slab. Record the length of the tubing used before sealing the borehole. The tubing length will be used to calculate the purge volume of the ambient air in the sample tubing to be removed before sampling.
- Apply plumber's putty or a similar VOC-free substance inside the borehole to seal the annulus around the tubing, and around the tubing and borehole at the interface with the building slab surface to mitigate potential introduction of ambient air into the sample. Try not to disturb the sample tubing at the surface seal, to minimize potential ambient air leakage during the sampling period to maintain the integrity of the sample.

- Cut a hole near one end of the foam mat to allow the tubing to be fed through, and place the mat over the tubing.
- Place the sample canister assembly on the mat. Use either a T-fitting or a laboratory-supplied manifold to connect the tubing and the fittings so there is a feed from the subslab sample collection tubing into the sampling canister, and also to the fitting exiting the shroud for leak detection.
- Configure the helium supply, the helium detector, and the sampling shroud for monitoring.

Leak-Detection Protocols

Make provisions to eliminate or minimize leakage of ambient air into the subslab soil gas sample. Helium concentrations measured in the sample must not exceed 5 percent of the helium concentration in the shroud (e.g., 1 percent helium in the sample at a 20 percent shroud concentration). Introduction of ambient air into the soil gas sample may dilute sample results, or may bias the soil gas sample high if ambient air contains concentrations of the target hazardous substance(s). Use of a tracer gas enables detection of ambient air incursion from above the slab if the soil gas probe and/or the sampling canister assembly is not completely sealed. Farallon uses analytical-grade helium as the tracer gas. Collect a preliminary soil gas sample in a Tedlar bag, and screen using the helium detector before opening the 1-liter Summa canister. If helium is detected during real-time Tedlar bag sample-collection indicating potential ambient air leakage, modify and/or adjust sampling equipment prior to soil gas sampling.

Shut-in Testing, Purging, and Real-Time Leak Detection

Use the following protocols to test for leaks during sample collection. Follow the instructions below for shut-in testing, purging, and real-time leak detection:

- Remove the brass cap from the manifold/flow controller inlet and connect the tubing from the sample port using a laboratory-supplied manifold with a T-fitting. Connect the other outlet from the manifold via Teflon tubing to the helium sampling port on the side of the sampling shroud. Record the length of each piece of tubing used during sample train assembly. The tubing lengths will be used to estimate purge volumes of ambient air to be removed prior to sampling.
- Connect the tubing from the helium sampling port to the inlet for the lung box. Connect a Tedlar bag to the helium sampling port connection inside the lung box. Connect the low-volume purge pump inlet or syringe to the other port for the lung box. Open the valve on the Tedlar bag for sampling, and seal the lung box.
- Ensure that the sampling shroud base has a seal that will retain the helium and minimize introduction of ambient indoor air.
- Perform additional shut-in testing on the fully assembled sampling train once it is set up in the field by evacuating the sampling train to a minimum measured vacuum of approximately 100 inches of water using the purge pump or syringe. Observe the

vacuum gauge connected to the system with a T-fitting for at least 1 minute. If any loss of vacuum is observed, adjust the fittings until the vacuum in the sample train does not noticeably dissipate. After a successful shut-in test, do not alter the sampling train. Calibrate the vacuum gauge so it is sensitive enough to indicate a water-pressure change of 0.5 inch.

- Attach the tubing from the flow controller for the helium canister to the port on the sampling shroud, and begin filling the shroud with helium, maintaining a minimum concentration of at least 20 percent as measured with the helium detector. **DO NOT OPEN THE SAMPLE CANISTER.**
- Purge an estimated three volumes of air from the tubing/borehole. Use the following equation to calculate the volume of air to be removed:

  Volume (in cubic inches) = $3.1417\ Xr^2$

  Where:

  X = the length of tubing (inches)

  r = the inner radius (inches) of all tubing lengths being used
- Use the same equation to estimate the volume of the cored boring in the concrete slab, where "X" is the depth of the boring, and "r" is the radius of the boring.
- Add the two volumes and the estimated volume of air in the manifold to determine one "internal" volume of air to be purged. Multiply this volume by three for three purge volumes; the result will be in cubic inches. Divide by the flow rate (200 milliliters per minute = 12.2 cubic inches per minute) to determine how many minutes (or convert to seconds by multiplying by 60) to purge the tubing. Record the calculations in the field notes.
- Use the low-flow purge pump or syringe to evacuate the lung box, drawing the calculated purge volumes into the Tedlar bag. The calculated purge volume should produce a sample volume sufficient to evaluate whether helium is present in the sample using the helium detector. If an additional sample is required, record the additional volume of soil gas removed.
- Once the calculated purge volume has been reached, close the valve on the shroud, and turn off the pump. Open the lung box, and close the valve on the Tedlar bag. Remove the Tedlar bag and use the helium detector to measure the helium concentration in the Tedlar bag. If the helium concentration in the Tedlar bag exceeds 5 percent of the helium concentration in the shroud (i.e., 1 percent helium in the Tedlar bag at a 20 percent shroud concentration), sufficient leakage is occurring to compromise soil gas analytical results.
- Check all fittings/seals and repeat the shut-in test and the leak test until helium concentrations are less than 5 percent of the concentration measured in the shroud.

Sampling Methodology

Initiate sampling procedures immediately upon confirmation that leakage of ambient air has been eliminated, or reduced to an acceptable level (i.e., less than 5 percent helium in the sample). Follow the instructions below for soil gas sample collection:

- Open the sample canister valve and record the pressure on the gauge as "initial pressure" in the field notes and on the sample tag attached to the canister. Ensure that the sample shroud is undisturbed and protects the sample canister throughout the sampling period. The sampling period will be based on the flow controller setting established by the laboratory. Maintain a flow rate of between 100 and 200 milliliters per minute.
- Check the canister to confirm that it is filling at the rate specified for the flow controller. Because the accuracy of the flow regulators can vary slightly causing a canister to fill faster or more slowly than expected, check the canister pressure before the end of the sampling period. The volume of air sampled is a linear function of the canister vacuum. Therefore, halfway through the sampling period, the canister should be half-filled, and the gauge should read approximately 17 inches of mercury. Ensure that the final pressure at the end of the sampling period is 5 inches of mercury to ensure that ambient air does not inadvertently enter the canister during shipping.
- Upon completion of sampling, record the time and the exact pressure of the canister on the sample tag attached to the canister, on the Chain of Custody form, and in the field notes. Record any condition (e.g., site activities, weather, holes and/or cracks in the concrete slab) that could affect results.
- Close the sample canister valve, disconnect it from the manifold, and replace and tighten the brass caps on the canister inlet.
- Remove the tubing and putty from the borehole. Use clean sand or pea gravel to fill a portion of the borehole annulus, and concrete for surface completion. Repair the area of the borehole to match the original condition of the surface to the extent practicable.

Post-Sampling Procedures

Ensure that all sample containers are labeled with the following information: sample identification; date and time the sample was collected; initial and ending canister pressure; site name; and company name. Record this information and the time sample collection was completed in the field notes, and transfer pertinent information to the Chain of Custody form. Pack each Summa canister in its original shipping container, seal the container with a custody seal, and return it to the laboratory for analysis as soon as possible.

ANALYSIS

Subslab soil gas samples typically are analyzed using U.S. Environmental Protection Agency Method TO-15. Check the project-specific sampling plan for potential analytical variations. The hold time for analysis for most VOCs using U.S. Environmental Protection Agency Method TO-15 is 30 days. Check the project-specific sampling plan for any project-specific hold times.

DOCUMENTATION

Provide written documentation of field activities and environmental and building conditions, and other forms of sampling documentation such as photos and video recordings. Include the written documentation on standard Farallon forms, which include the following:

- Field Report form;
- Soil Gas/Indoor and Outdoor Air Sampling Parameters form; and
- Soil Gas Sampling form.

If notes are electronically recorded, label the documents and transfer them to the applicable project folder.

BIBLIOGRAPHY

California Environmental Protection Agency, Department of Toxic Substances Control, Los Angeles Regional Water Quality Control Board, San Francisco Regional Water Quality Control Board. 2015. *Advisory – Active Soil Gas Investigations.* Department of Toxic Substances Control. July.

Commonwealth of Massachusetts Executive Office of Environmental Affairs, Department of Environmental Protection. 2002. *Indoor Air Sampling and Evaluation Guide.* WSC Policy #02-430. April.

Cox-Colvin & Associates, Inc. 2016. *Standard Operating Procedure Installation and Extraction of the Vapor Pin*. Updated September 9.

New York State Department of Health. 2006. *Guidance for Evaluating Soil Vapor Intrusion in the State of New York.* Center for Environmental Health, Bureau of Environmental Exposure Investigation. October.

U.S. Environmental Protection Agency. 1999. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method To-14A, Determination Of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography*. Center for Environmental Research Information, Office of Research and Development. January.

———. 2002. *Evaluating the Vapor Intrusion into Indoor Air.* EPA530-F-02-052. November.

———. 2004. *Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations.* U.S. Office of Research and Development, National Risk Management Research Laboratory, Groundwater and Ecosystem Restoration Division. Ada, Oklahoma. February 12.

Washington State Department of Ecology. 2009. *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action.* Review Draft. October.

Standard Operating Procedure

Installation and Extraction
Vapor Pin® Sampling Device

Scope & Purpose

Scope

This standard operating procedure describes the installation and extraction of the Vapor Pin® Sampling Device for use in sub-slab soil-gas sampling.

Purpose

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the Vapor Pin® Sampling Device.

Equipment Needed

- Vapor Pin® Sampling Device
- Vapor Pin® Sleeves
- Vapor Pin® Cap
- Installation/Extraction Tool
- Rotary Hammer Drill
  - ⅝-Inch (16mm) diameter hammer bit
  - 1½-Inch (38mm) diameter hammer bit for flush mount applications
- ¾-Inch (19mm) diameter bottle brush
- Wet/Dry Vacuum with HEPA filter (optional)
- Dead Blow Hammer
- VOC-free hole patching material (hydraulic cement) and a putty knife or trowel
  - This is for repairing the hole following the extraction of the Vapor Pin® Sampling Device

Installation Procedure

1. Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.
2. Set up wet/dry vacuum to collect drill cuttings.
3. For a temporary installation, drill a ⅝-inch (16mm) diameter hole through the slab and approximately 1-inch (25mm) into the underlying soil to form a void. The hole must be ⅝-inch (16mm) in diameter to ensure a seal.
   - If a flush mount installation is required, drill a 1½-inch (38mm) diameter hole at least 1¾-inches (45mm) into the slab. We highly recommend using the Stainless Steel Drilling Guide and to reference the Standard Operating Procedure Drilling Guide & Secure Cover.
4. Remove the drill bit, brush the hole with the bottle brush and remove the loose cuttings with the vacuum.
5. Assemble the Vapor Pin® Sampling Device and Vapor Pin® Sleeve (Figure 1).
6. Place the lower end of the Vapor Pin® Sampling Device assembly into the drilled hole. Place the small hole located in the handle of the Installation/Extraction Tool, over the Vapor Pin® to protect the barb fitting and tap the Vapor Pin® into place using a dead blow hammer (Figure 2). Make sure the Installation/Extraction Tool is aligned parallel to the Vapor Pin® to avoid damaging the barb.
   - During installation, the Vapor Pin® Sleeve may form a slight bulge between the slab and the Vapor Pin® Sampling Device shoulder.
7. Place the Vapor Pin® Cap on the Vapor Pin® to prevent vapor loss prior to sampling (Figure 3).
8. For flush mount installations, cover the Vapor Pin® with a flush mount cover, using either the plastic cover or the optional Stainless Steel Secure Cover (Figure 4).
9. Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.

Figure 1.

Figure 2.

Figure 3.

Figure 4.

Sampling

1. Remove the Vapor Pin® Cap and connect your sample tubing to the barb fitting of the Vapor Pin® Sampling Device.
2. Create a connection by using a short piece of Tygon™ tubing to join the Vapor Pin® Sampling Device with the Nylaflow tubing (Figure 5). Put the Nylaflow tubing as close to the Vapor Pin® Sampling Device as possible to minimize contact between soil gas and Tygon™ tubing. You do not **have** to use Nyflaflow tubing, any stiff tubing will suffice.
3. Prior to sampling, conduct a leak test in accordance with applicable guidance. If a leak test is not specified, refer to the SOP Leak Testing the Vapor Pin® Sampling Device, via Mechanical Means (Figure 6). For flush-mount installations, distilled water can be poured directly into the 1½ inch (38mm) hole.

Figure 5.

Figure 6.

Figure 7.

Extraction Procedure & Reuse Notes

1. Remove the protective cap, and thread the Installation/Extraction Tool onto the Vapor Pin® Sampling Device (Figure 7). Turn the tool clockwise continuously, don't stop turning, the Vapor Pin® Sampling Device will feed into the bottom of the Installation/Extraction Tool and will extract from the hole like a wine cork, **DO NOT PULL!**
2. Fill the void with hydraulic cement and smooth with a trowel or putty knife.
3. Prior to reuse, remove the silicon Vapor Pin® Sleeve and Vapor Pin® Cap and discard. Decontaminate the Vapor Pin® Sampling Device in a Alconox® solution, then heat in an oven to a temperature of 265° F (130°C). For Stainless – ½ hour, Brass 8 minutes.

ATTACHMENT B
AIR SAMPLING STANDARD OPERATING PROCEDURES

WORK PLAN FOR REGIONAL AQUIFER ASSESSMENT
AND VAPOR INTRUSION PATHWAY EVALUATION
Former Grace's Plaza Cleaners Site
717 West Main Street
Battle Ground, Washington

Farallon PN: 1201-001

STANDARD OPERATING PROCEDURE (SOP) AIR-01

INDOOR AND OUTDOOR AMBIENT AIR SAMPLING

PURPOSE AND APPLICATION

The purpose of this SOP is to provide personnel with the specific information needed to collect consistent and representative indoor and outdoor ambient air data, and accurately document the data collection process.

The step-by-step guidelines provided in this SOP are to be followed by the field crew collecting indoor and outdoor ambient air samples

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment and supplies are necessary to properly conduct indoor and outdoor ambient air sampling:

- A sufficient number of 6-liter Summa canisters, appropriate filters, and flow controllers to collect the indoor and outdoor ambient air samples;
- Appropriate wrenches, pressure gauges, and a field tool kit;
- A photoionization detector (PID) or similar instrument and the proper calibration gases to monitor indoor ambient air during the initial building inspection prior to indoor air sampling; and
- The shipping packages for the Summa canisters.

DECONTAMINATION

Dedicated soil gas sampling supplies and equipment are to be used at each location. No decontamination of equipment in the field is required.

PROCEDURES

This section presents the procedures to be implemented for the building inspection and the indoor and outdoor ambient air sampling. Procedures include preparation for sampling, sampling methodology, post-sampling procedures, and analysis.

Preparation for Sampling

Prior to collecting indoor air samples inside a building, building inspection is necessary to identify potential sources of contamination. The purpose of the building inspection is to assess building construction characteristics; heating, ventilating, and air conditioning (HVAC) systems; and sources of possible chemical contaminants that may influence the results of indoor air sampling at each sampling location. Document the presence of any chemical products used and will evaluate whether these products contain the target compounds for the indoor air sampling.

Farallon will complete the Indoor Air Building Survey and Sampling Form prior to initiating sampling.

The building owner/operators will be notified in advance of the sampling, and necessary access agreements and tenant notifications will be executed. It is important that tenants, custodial personnel, and others present in the sampling area be made aware of the sensitivity of the sampling and that the sampling devices must not be tampered with during the sampling process. If necessary, a Farallon representative will remain on the Site for the duration of the sampling to ensure the security and integrity of the samples. At a minimum, Farallon will periodically visit each sampling location for the duration of the sampling to observe and document sampling conditions such as changes in weather, building/tenant space use, HVAC system operation, and other activities that could affect sampling results.

Farallon will identify potential sources of volatile organic compounds (VOCs) in the building by visual observation and using a PID or similar air monitoring device to screen for the presence of VOCs in the building. If possible, Farallon will properly seal any chemicals present, or remove them from the building prior to the sampling event. If source materials are removed from the building, sampling will be delayed for a minimum of 24 hours and the spaces to be sampled will be ventilated to exchange the air present when the source materials were in the building with fresh air using either the HVAC system or other means of ventilation such as opening doors and/or windows.

During the building inspection process Farallon will also document potential outdoor sources of contamination and weather conditions that could influence indoor ambient air concentrations.

Sampling Methodology

Time-integrated indoor and outdoor ambient air samples will be collected using 6-liter Summa canisters, prepared under negative pressure and laboratory-certified to be clean for the compounds of interest for the site. The Summa canisters will be equipped with dedicated flow regulators for collection of a sample over an 8-hour period. The instructions below are to be followed for the indoor and outdoor ambient air sampling:

- Several days before sampling, check the Summa canisters for leaks to ensure that each canister is under sufficient vacuum pressure to obtain a representative sample. Ensure that documentation of the laboratory certification for the canisters is included on a tag attached to the canister and in the paperwork accompanying the canister shipment from the laboratory.
- Confirm that the sampling canister valves are closed (the knob is tightened clockwise).
- Attach the manifold to the canister, including the filter, flow controller, and pressure gauge.
- Confirm that a brass cap is secured at the inlet of the manifold/flow controller, creating an air-tight sampling train.

- Quickly open and close the sample canister valve and observe the gauge reading. If the initial gauge reading is less than the laboratory-recommended value, discontinue the leak testing for that canister. Repeat the testing for each canister.
- If the initial vacuum pressure is within acceptable limits, continue to monitor the gauge to check for leaks in the manifold and at the connections to the Summa canister. Observe the gauge for 5 minutes. If the needle on the gauge drops, indicating a loss of pressure, the sampling train is not air-tight. In this situation, refit and/or tighten the connections until the needle holds steady. If leakage is still indicated, use an alternate manifold/flow controller to confirm that the initial manifold/flow controller requires replacement. Obtain replacement equipment and repeat the testing.
- Ensure that the owner and/or operator and other parties present in the sampling space are aware that testing is being performed and that the sampling devices must not be disturbed. Document the conditions in the sampling space, including work activities, potential chemical use, persons wearing dry-cleaned clothing, carpet cleaning, painting, and any change noted from the time the building was inspected before the sampling event.
- Note the HVAC operational settings, including but not limited to whether the HVAC system is operational, heating or cooling mode, temperature, and any nonstandard HVAC ventilation or heating methods (e.g., use of a fan or space heater, an open window or door).
- Verify that the selected sampling locations remain valid under current conditions (e.g., a change in weather conditions may necessitate altering the ambient outdoor air sampling location, a recent spill or use of a cleaning product may eliminate a room initially selected for sampling). Contact the Project Manager immediately to discuss any condition potentially necessitating a change in sampling location.
- Verify that the number engraved on each Summa canister matches the number listed on the certified-clean tag attached to the canister to ensure that the canister was properly decontaminated.
- Set up the Summa canisters in the selected sampling locations approximately 3 to 4 feet above the floor to collect indoor ambient air samples.
- Outdoor ambient air samples typically are collected near a building undergoing indoor air sampling. For outdoor ambient air samples, select collection points for outdoor ambient air samples such that the intake point for the sampler is a minimum of 6 feet above the ground surface and upwind of the building undergoing indoor air sampling.
- Verify that the Summa canister valve is tightly closed, and remove the threaded cap at the top of the canister.
- Attach the flow regulator/pressure gauge to the top of the canister and use a wrench to gently tighten it.
- Open the valve and record the pressure on the gauge as "initial pressure" in the field notes and on the sample tag attached to the canister.
- Complete the sample tag attached to the canister and record the following sample information in the Field Report form:
    - Sample identification

  - Sample start date
  - Sample start time
  - Location of sample: distance from walls and floor shown on the site plan
  - Initial pressure of the canister
  - Canister number
- Once sampling has begun and the canisters have been verified to be operating correctly, leave the canisters to fill.
- Return after approximately 6 to 7 hours to confirm that the canisters are operating properly. Depending on site activities, it may be necessary to be on the site during the entire sampling period, or to return periodically to document site conditions during sampling. Consult the Project Manager to determine the specific monitoring frequency required for the sampling location. Check the canister pressure before the end of the anticipated 8-hour sampling period, as the accuracy of the flow regulators can vary slightly, causing a canister to fill more quickly or slowly than anticipated. **The final pressure at the end of sampling should be approximately 5 to 6 inches of mercury.**
- If the pressure is above 6 inches of mercury, leave the canister to fill for the full 8-hour sampling period. If the pressure is below 5 inches of mercury, close the canister and contact the Project Manager immediately. The Project Manager will confer with the laboratory to establish whether sampling must be repeated using a new canister, or sufficient vacuum is present to obtain valid laboratory data.
- Upon completion of sampling, record the time and the exact pressure of the canister on the sample tag for that canister, on the Chain of Custody form, and in the field notes. Record any other condition that could affect sampling results (e.g., site activities, HVAC use, weather).
- Close the sample canister valve, disconnect it from the manifold, and replace and tighten the brass cap on the canister inlet.

Post-Sampling Procedures

Ensure that each of the sample containers is labeled with the following information:

- Sample identification;
- Date and time of sample collection;
- Starting and ending canister pressure;
- Site name; and
- Farallon.

Record this information and the ending time of sample collection in the field notes, and transfer pertinent information to the Chain of Custody form. Pack each of the Summa canisters in its original shipping container, seal it with a custody seal, and return it to the laboratory as soon as possible for analysis. The hold time for the analysis to be performed as described herein is 30 days.

Analysis

The indoor air samples should be analyzed using U.S. Environmental Protection Agency Method TO-15, with low-level analysis using Selective Ion Mode to obtain method detection and reporting limits that are sufficiently low to meet or exceed the target cleanup levels for the project. The air samples collected in the Summa canisters have a 30-day hold time.

DOCUMENTATION

Document field activities and environmental and building conditions on standard Farallon forms and in the field notes, and provide other sampling documentation such as photos or video recordings. Documentation provided electronically will be recorded, labeled, and transferred to the corresponding project folder.

REFERENCES

Air Toxics LTD. No Date. *Guide to Air Sampling and Analysis, Canisters and Tedlar Bags.* Fourth Edition. Folsom, California. www.airtoxics.com.

Massachusetts Department of Environmental Protection. 2002. *Indoor Air Sampling and Evaluation Guide.* Boston, Massachusetts. April.

U.S. Environmental Protection Agency. 1999a. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition.* Method TO-14A. EPA/625/R-96/010b. January

———. 1999b. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition.* Method TO-15. EPA/625/R-96/010b. January.

ATTACHMENT C
REQUEST FOR OPINION FORM

WORK PLAN FOR REGIONAL AQUIFER ASSESSMENT
AND VAPOR INTRUSION PATHWAY EVALUATION
Former Grace's Plaza Cleaners Site
717 West Main Street
Battle Ground, Washington

Farallon PN: 1201-001

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

REQUEST FOR OPINION FORM

Use this form to request a written opinion on your planned or completed independent remedial action under the Voluntary Cleanup Program (VCP). Attach to this form the plans or reports documenting the remedial action. Please submit only one form for each request.

Step 1: IDENTIFY HAZARDOUS WASTE SITE

Please identify below the hazardous waste site for which you are requesting a written opinion under the VCP. This information may be found on the VCP Agreement.

Facility/Site Name: Graces Cleaners	
Facility/Site Address: 717 West Main, Battle Ground, Washington 98604	
Facility/Site No: 86416754	VCP Project No.: SW0597

Step 2: REQUEST WRITTEN OPINION ON PLAN OR REPORT

What type of independent remedial action plan or report are you submitting to Ecology for review under the VCP? Please check all that apply.

- ☐ Remedial investigation plan
- ☐ Remedial investigation report
- ☐ Feasibility study report
- ☐ Property cleanup* plan (* cleanup of one or more parcels located within the Site)
- ☐ Property cleanup* report
- ☐ Site cleanup plan
- ☐ Site cleanup report
- ☒ Other – please specify: WORK PLAN FOR REGIONAL AQUIFER ASSESSMENT AND VAPOR INTRUSION PATHWAY EVALUATION

Do you want Ecology to provide you with a written opinion on the planned or completed independent remedial action?

☒ Yes ☐ No

Please note that Ecology's opinion will be limited to:

- Whether the work proposed is acceptable to Ecology (General approach)
- Whether Ecology concurs with the proposed monitoring well locations
- Whether Ecology concurs with the vapor intrusion assessment approach
- Whether Ecology concurs with the groundwater sampling approach.

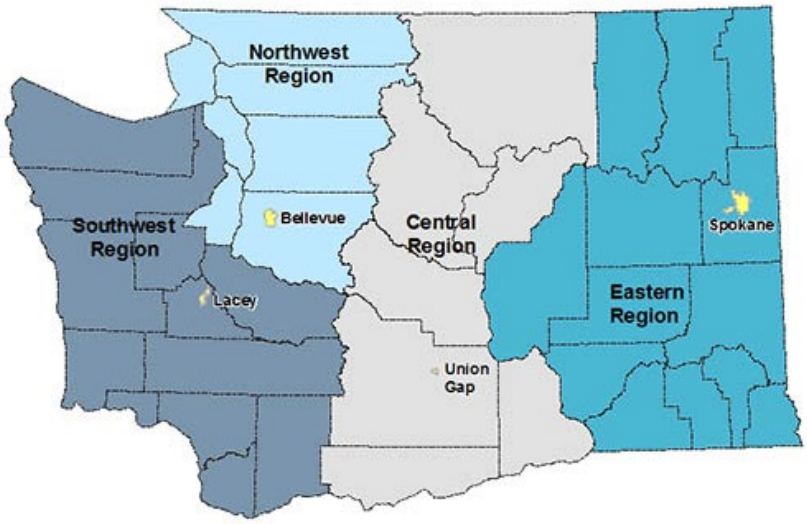
Step 3: REPRESENTATIONS AND SIGNATURE

The undersigned representative of the Customer hereby certifies that he or she is fully authorized to request services from Ecology under the Agreement for this VCP Project.

Name: Jeffrey Kaspar for Linda Anderson	Title: Consultant for Former Owner	
Signature: Jeffrey Kaspar	Date: 04/09/2025	
Organization: Farallon Consulting LLC for the Estate of Irwin Jessen		
Mailing address: 13555 SE 36th Street, Suite 320		
City: Bellevue	State: WA	Zip code: 98006
Phone: (425) 417-7238	Fax:	E-mail: jkaspar@farallonconsulting.com

Step 4: SUBMITTAL

Please mail your completed form and the independent remedial action plan or report that you are requesting Ecology review to the site manager Ecology assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.



Northwest Region: Attn: VCP Coordinator 3190 160th Ave. SE Bellevue, WA 98008-5452	**Central Region:** Attn: VCP Coordinator 1250 West Alder St. Union Gap, WA 98903-0009
Southwest Region: Attn: VCP Coordinator P.O. Box 47775 Olympia, WA 98504-7775	**Eastern Region:** Attn: VCP Coordinator N. 4601 Monroe Spokane WA 99205-1295

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