GeoEngineers

# Memorandum

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| **To:** | Priscilla Tomlinson |
| **From:** | Garrett Leque, LG; Terry McPhetridge, LG, LHG |
| **Date:** | March 9, 2023 |
| **File:** | 25806-001-00 |
| **Subject:** | Precision Engineering Phase 2 Work Plan Addendum |

This memorandum presents the Phase 2 Work Plan Addendum for field investigation activities proposed at the former Precision Engineering site in Seattle, Washington. This is an addendum to the document "Remedial Investigation Work Plan, Precision Engineering Site," dated March 31, 2022 (2022 Work Plan). Refer to the Work Plan for additional information for the site.

The Phase 2 proposed investigation activities are based on the Phase 1 investigation results and discussions with Ecology regarding the Phase 1 results and remaining data gaps at the site. Proposed investigation locations are shown in Figure 1 that include the following.

- Four direct-push boring locations (SB34 through SB37).
- Five new monitoring wells (MW19 through MW23).
- Four additional hand auger locations (HA26 through HA29).
- Four surface water (ditch) sampling locations (SW1 through SW4).

The Phase 2 activities also include up to two rounds of groundwater and surface water sampling prior to initiating development of the Remedial Investigation report. Activities are summarized in attachments provided in this document as follows. Table 1 provides the background for the Phase 2 investigation locations and activities based on discussions between GeoEngineers and Ecology. Attachment A discusses methylene chloride as it relates to a common laboratory contaminant versus sourced on the site. Tables 9-1 Addendum and Table 9-2 Addendum are copies of Tables 9-1 and 9-2 from the 2022 Work Plan, and the proposed Phase 2 activities are identified in yellow-highlighted cells. Table 9-3 is a new table that summarizes the surface water sampling activities.

We trust this meets your needs at this time. Please contact Garrett Leque at 253.312.7958 if you have any questions.

Attachments:

Table 1. Draft Summary of Phase 2 Proposed Activities

Table 9-1 Addendum. Draft Soil Sampling Scope of Work – Phase 2

Table 9-2 Addendum. Draft Groundwater Scope of Work – Phase 2 Two Rounds of Groundwater Sampling

Table 9-3 Addendum. Draft Surface Water Scope of Work – Phase 2 Two Surface Water Sampling Events

Figure 1. Proposed Phase 2 Investigation Locations

Attachment A. Methylene Chloride Summary

# Table 1

## Draft Summary of Phase 2 Proposed Activities

### Precision Engineering, Inc.

### Seattle, Washington

| ID | Topic | Discussion | Proposed Phase 2 Investigation Locations | Ecology Response | Final Agreement - Phase 2 Investigation |
|---|---|---|---|---|---|
| 1 | Depth of contamination in former tank area. | The depth of contamination in the former tank area is reasonably well defined based on the soil and groundwater sampling results collected in the area. Soil in the following borings and depths do not contain the site COCs at concentrations above PCULs: GP16 at 1' bgs and 5' bgs; MW15 at 29' bgs and 36' bgs; GP19 at 1' bgs and 7' bgs; GP2 at 10' bgs; and GP22 at 10' bgs. Borings GP18, GP32, and SBB33 do not contain "clean" "bottom" samples, and all encountered refusal using direct-push methods to depths up to 7' bgs. Sonic drilling may be able to penetrate deeper into and through the till unit - however, there is the potential to drag down contamination into the subsurface and into the deeper aquifer. Thus far the deeper aquifer does not appear impacted by contamination based on COCs that are either not detected or detected below PCULs in deeper monitoring wells MW7, MW15, and MW16. Recommend continued monitoring of the shallow and deep aquifers downgradient of the former tank area. | No additional exploration locations based on this topic | Agreed. | Agreed. |
| 2 | Sporadic detections of methylene chloride | Continue analyzing for methylene chloride in Phase 2 samples. However, note that methylene chloride is a potential candidate for dropping as a site contaminant of concern as discussed in Attachment A | No additional exploration locations based on this topic | Agreed no new exploration locations specifically for methylene chloride. Although the soil data are suspect, the recent detects in shallow groundwater are not. Furthermore, it was detected in air in the shop in 2015, suggesting that it has been used on site. | Noted. See Attachment A of this Work Plan Addendum |
| 3 | Trichloroethylene in MW14 | It was noted there is no TCE soil sample specifically collected in the deep aquifer in MW-14. However, the Work Plan specified analyzing at least one vadose and one saturated soil sample per boring. MW-14 was sampled beyond the Work Plan scope, with a total of four soil samples analyzed for TCE. The deepest two samples at 34' and 44' bgs did not contain detectable TCE. Sitewide to date, TCE has been analyzed in 57 vadose samples and 93 saturated samples, at depths ranging from the ground surface to 50 feet bgs. Furthermore, TCE has not been detected in soil or groundwater in downgradient deep wells MW16 nor MW17. TCE coverage is considered sufficient. TCE will continue to be analyzed in samples collected during Phase 2. | No additional exploration locations based on this topic | Agreed. | Agreed. |
| 4 | Additional sampling in southeast portion of property | It was noted that there are some chemical exceedances in the ~~southwest~~ southeast portion of the property. Propose one additional monitoring well (MW19) southeast of MW18. Propose collection of surface water sample(s) at four sampling stations in the ditch (SWS1 through SWS4). Sample all wells and surface water station at least two times prior to RI. | MW19<br>SWS-1 through SWS-4 | Agreed on SWS1 to SWS4. Note the discussion in column B should say "southeast" rather than "southwest."<br>The proposed location for MW19 is pretty close to existing MW18. Further east would be preferable if possible with the tree. | Agreed. The typo has been corrected to indicate southeast. MW19 has been placed south of MW18 per our discussion on February 16, 2023. |
| 5 | Petroleum hydrocarbons detected in selected groundwater monitoring wells | Propose NWTPH-Dx with and without silica gel cleanup (SGC) on groundwater analyses due to known organics (peat) in the subsurface. | No additional exploration locations based on this topic | Agreed. | Agreed. New and existing wells will be sampled for petroleum. |
| 6 | PAHs | Continue sampling for PAHs in Phase 2 activities. PAHs have been detected at very low levels in soil. The maximum cPAH TEQ in site soil is 0.09 mg/kg, which is well within the range of typical background cPAH TEQ concentrations in Seattle of 0.001 mg/kg to 0.23 mg/kg (Ecology Pub 11-09-049, 2011). In general, petroleum hydrocarbons can be a suspected source of PAHs, however there does not appear to be such an association at this site. 16 out of 17 samples with PAH exceedances do not have corresponding TPH exceedances. (The single sample where TPH and PAHs exceedances are collocated is shallow soil in the ditch at HA-2. This is not surprising since the ditch receives runoff from the highway 99 on ramp; sheen is frequently observed entering the ditch in street runoff). Review of field screening results on boring logs at locations of PAH detections consistently indicate "no sheen". PAHs do not exceed in groundwater at the site (only 1 exceedance out of 66 samples, and the cPAH TEQ concentration was less than 2 times the PCUL). | No additional exploration locations based on this topic | Agreed. | Agreed. |

| ID | Topic | Discussion | Proposed Phase 2 Investigation Locations | Ecology Response | Final Agreement - Phase 2 Investigation |
|---|---|---|---|---|---|
| 7 | Hexavalent Chromium in SB17 | The single hexavalent chromium detection in SB17 does not appear to be related to the facility. There are three soil samples analyzed in SB17 at depths of 26', 40', and 43.5'. Only the 43.5' sample contained detectable hexavalent chromium. The concentration was reported as 1.78 mg/kg, only slightly above the reporting limit of 0.445 mg/kg. The boring log indicates the sample was collected from glacial till that is described as very hard and dense and dry, with no odor or sheen. None of the surrounding borings contain hexavalent chromium exceedances, including samples north and south of SB17 on either side of the ditch, and including samples located between the former chromium plating tank source area in Warehouse 1 and boring SB17. Transport in groundwater is unlikely since there have been no hexavalent chromium exceedances in groundwater at the eastern property boundary (i.e. no exceedances at any shallow or deep wells at MW11, MW17, MW6, MW16, MW2, MW17, MW10, MW9, or MW8), and the soil sample in SB17 was noted as dry. | No additional exploration locations based on this topic | Disagreed. We have clear evidence of off-Property transport of multiple contaminants in both shallow and deep groundwater. One or more shallow wells on the east side of the Property (11, 6, 2, 10, 8, and 18) have exceedances for Cr VI, Cu, Pb, Hg, Ni, DRO+ORO, vinyl chloride, 1,4-dioxane, and methylene chloride. One or more deep wells on the east side of the property (17, 16, 7, and 9) have exceedances for Cu, Hg, Ni, and 1,4-dioxane. MW18 on the south property line has exceedances for Cr VI, Cu, Pb, Hg, Ni, DRO+ORO, and vinyl chloride. A brief sampling scope is discussed on line 12 below ("Groundwater data gaps"). | See line 12 below ("Groundwater data gaps"). |
| 8 | 1,4-Dioxane | Continue sampling for 1,4-Dioxane in Phase 2 activities. In general, 1,4-dioxane is most commonly associated as a stabilizer additive in 1,1,1-TCA. 1,1,1-TCA is not known to have been used at the site, and is generally not present in soil or groundwater at the site. 1,1,1-TCA is not detected in more than 70 soil samples. 1,1,1-TCA is not detected in any groundwater sampling events with the exception of one detection in MW5 at an estimated concentration of 0.19 ug/L, which is 1,000 times below the PCUL. | No additional exploration locations based on this topic | Agreed that additional exploration locations aren't needed. However, dioxane was used in cutting oils for metal fabrication and may have been used as a stabilizer for TCE, in smaller amounts than in 111-TCA. See ITRC's guidance document and https://pubmed.ncbi.nlm.nih.gov/22492728/ and chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://14d-1.itrcweb.org/wp-content/uploads/2020/03/14DX-History-of-Use-and-Potential-Sources-1.pdf. | Ok. |
| 9 | LDW Pathway analysis | As previously demonstrated by multiple investigations and groundwater modeling, it is unlikely for this site to contribute contaminants to the LDW. Phase 2 will continue to investigate potential pathways by sampling stormwater in the ditch, and with installation of a monitoring well in the southeast portion of the site as discussed above. Additionally, six four direct push borings (SB-34 through SB-3937) are proposed in the ditch (as access allows). | SB-34 through SB-~~39~~37 | Agreed on SB-34 through -39. Note that only five locations are shown on the map. The surface water samples and the new wells discussed on line 12 ("Groundwater data gaps") will also evaluate potential transport to the LDW. | Agreed. We meant to propose 5 direct-push borings as shown on map. Furthermore, it is apparent that MW-19 can take the place of the easternmost direct push boring after discussing the location of MW-19 with Ecology on February 16, 2023. Therefore, we are proposing 4 direct-push borings, SB-34 through SB-37, as shown on Figure 1. |
| 10 | PFAS | Sample for PFAS in downgradient monitoring wells and MW5. There is no known use of PFAS at the site, no soil exceedances during Phase I, and only slight exceedances of PFAS and PFOS in only one well (MW5) in 2022. | No additional exploration locations based on this topic | Agreed no additional wells specifically for PFAS. Analyze all shallow and deep wells on the east Property line for PFAS. Archive samples from the new wells discussed on line 12 ("Groundwater data gaps") for potential PFAS analyses pending the results of the Property line wells. | Agreed. |
| 11 | Soil data gaps | Additional soil investigation locations needed in ditch including south and southeast portions of site (as discussed above). Propose direct push SB34-SB3937 in ditch as discussed above. Propose 4 hand auger borings (HA26-HA29) south of historical hand augers where chromium exceeds (i.e. HA-1, HA-2 area). | MW19<br>SB34 through SB37<br>HA26 through HA~~31~~29 | Space HA26 through HA29 more evenly across the area and add an additional HA location at each end of the line. Analyze HA samples and SB34-SB39 for metals, HCID/TPH-Dx, PAHs, and the full list of VOCs including 1,4-dioxane. Select three sample locations for PFAS analyses. Depending on the apparent size of the source in this area, it might be necessary to add an additional shallow well in the ditch south of the Property. | Agreed regarding hand auger spacing. Four hand augers are now located along the southern portion of the site following our discussion on February 16, 2023. MW-19 can take the place of the easternmost hand auger. Regarding new wells, please note that groundwater flow direction is consistently to the east and the site currently has many wells installed to the east (and south) (i.e. MW-1, MW-4, MW-8, MW-10, and MW-18). |
| 12 | Groundwater data gaps | Additional monitoring well (MW19) needed in southeast portion of site (as discussed above).<br>Two additional sampling events prior to RI: Continue sampling for COCs in monitoring wells; use NWTPH-Dx with and without SGC (as discussed above) | MW19<br>Two additional rounds of sampling from all wells | We need four shallow wells in the ditch east of the limo property wrapping around to the south. The northernmost well should be around SB15. The southwesternmost well should be proposed MW19. We also need a new deep well in the vicinity of SB17. Soil and groundwater samples from all the new wells need to be analyzed for metals, HCID/TPH-Dx, PAHs, and the full list of VOCs including 1,4-dioxane. Archive groundwater samples for analyses of PFAS pending the results of PFAS analyses in the wells on the east Property line. | Agreed. Wells MW-19 through MW-23 are shown in the ditch centerline on Figure 1. However the wells will be placed either east or west of the centerline (i.e. along Seattle Limousine fenceline or along road shoulder) depending on field conditions, access, safety etc. |
| 13 | Chemicals | Perform SGC on TPH samples<br>Continue sampling for chemicals of concern and/or chemicals of potential concern including but not limited to methylene chloride, 1,4-dioxane, PFAS<br>See Tables 9-1 Addendum, 9-2 Addendum, and 9-3 for specific analyses | No additional exploration locations based on this topic | Discussed above. | Agreed. |

# Table 9-2 Addendum

## Draft Groundwater Scope of Work - Phase 2 Two Rounds of Groundwater Sampling

Precision Engineering, Inc.

Seattle, Washington

| Well ID | Field Parameters | | Water Sample Analyses - See Notes | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Field pH, DO, ORP | Field Ferrous Iron | Metals, total | Metals, Dissolved (Field Filtered) | HCID with Follow-up if Detection | PAHs - SIM | Full SVOCs | SVOCs - other | Full VOCs+ | Phase 2 (s)VOCs | PCBs | PFAS | Geochemical Parameters |
| MW1 | x | | x | x | x | x | | | x | x | | | |
| MW2 | x | | x | x | x | x | | | x | x | | x | |
| MW3 | x | x | x | x | x | x | | | x | x | | x | x |
| MW4 | x | | x | x | x | x | | | x | x | | | |
| MW5 | x | x | x | x | x | x | | | x | x | | x | x |
| MW6 | x | | x | x | x | x | | | x | x | | x | |
| MW7 | x | | x | x | x | x | | | x | x | | x | |
| MW8 | x | | x | x | x | x | | | x | x | | x | |
| MW9 | x | x | x | x | x | x | | | x | x | | x | x |
| MW10 | x | x | x | x | x | x | | | x | x | | x | x |
| MW11 | x | x | x | x | x | x | | | x | x | | x | x |
| MW12 | x | | x | x | x | x | | | x | x | | | |
| MW13 | x | x | x | x | x | x | | | x | x | | | x |
| MW14 | x | x | x | x | x | x | | | x | x | | | x |
| MW15 | x | | x | x | x | x | | | x | x | | | |
| MW16 | x | | x | x | x | x | | | x | x | | x | |
| MW17 | x | x | x | x | x | x | | | x | x | | x | x |
| MW18 | x | | x | x | x | x | | | x | x | | x | |
| MW19 | x | x | x | x | x | x | | | | x | | archive | x |
| MW20 | x | | x | x | x | x | | | | x | | archive | |
| MW21 | x | | x | x | x | x | | | | x | | archive | |
| MW22 | x | x | x | x | x | x | | | | x | | archive | x |
| MW23 | x | x | x | x | x | x | | | | x | | archive | x |
| Hyd Cyl Vault | x | X | x | x | x | x | | | x | x | | | |

**Notes:**

Yellow-highlighted cells indicate proposed Phase 2 fieldwork. Non-yellow cells indicate Phase 1 fieldwork that was completed in 2022.

Phase 2 (s)VOCs: TCE and breakdown products; methylene chloride; 1,4-dioxane (1,4-dioxane analyzed as an SVOC).

Metals = Arsenic, cadmium, chromium [hexavalent and total], copper, lead, mercury, nickel, selenium, thallium and zinc

HCID w/Follow up = Hydrocarbon Identification with follow up for gasoline-range organics, diesel-range organics with and without SGC, and VPH/EPH if TPH is detected in samples with SGC.

PAHs - SIM = Polycyclic aromatic hydrocarbons - selected ion mode

SVOCs - Other = 1,2,4-trichlorobenzene; 1,2-, 1,3-, and 1,4-dichlorobenzene; and hexachlorobutadiene

Geochemical parameters = Total organic carbon, nitrate, sulfate, and dissolved manganese

Hyd Cyl Vault = A grab sample from the Hydraulic Cylinder Test Vault

X = Analyze

archive = collect for potential analysis

PFAS = Perfluoroalkyl substances

PCBs = PCB congeners

Full VOCs+ = Full suite VOCs and 1,4-Dioxane

Full SVOCs = Full suite SVOCs

# Table 9-3

## Draft Surface Water Scope of Work - Phase 2 Two Surface Water Sampling Events

### Precision Engineering, Inc.

### Seattle, Washington

| Location ID | Water Sample Analyses - See Notes | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Metals, total | Metals, Dissolved (Field Filtered) | HCID with Follow-up if Detection | PAHs - SIM | Full SVOCs | SVOCs - other | Full VOCs+ | Phase 2 (s)VOCs | PCBs | PFAS | Geochemical Parameters |
| SW-1 | x | x | x | x | | | | x | | | |
| SW-2 | x | x | x | x | | | | x | | | |
| SW-3 | x | x | x | x | | | | x | | | |
| SW-4 | x | x | x | x | | | | x | | | |

Notes:

Yellow-highlighted cells indicate proposed Phase 2 fieldwork.

Phase 2 (s)VOCs: TCE and breakdown products; methylene chloride; 1,4-dioxane (1,4-dioxane analyzed as an SVOC).

Metals = Arsenic, cadmium, chromium [hexavalent and total], copper, lead, mercury, nickel, selenium, thallium and zinc

HCID w/Follow up = Hydrocarbon Identification with follow up for gasoline-range organics, diesel-range organics with and without SGC, and VPH/EPH if TPH is detected in samples with SGC.

PAHs- SIM = Polycyclic aromatic hydrocarbons - selected ion mode

SVOCs - Other = 1,2,4-trichlorobenzene; 1,2-, 1,3-, and 1,4-dichlorobenzene; and hexachlorobutadiene

Geochemical parameters = Total organic carbon, nitrate, sulfate, and dissolved manganese

Hyd Cyl Vault = A grab sample from the Hydraulic Cylinder Test Vault

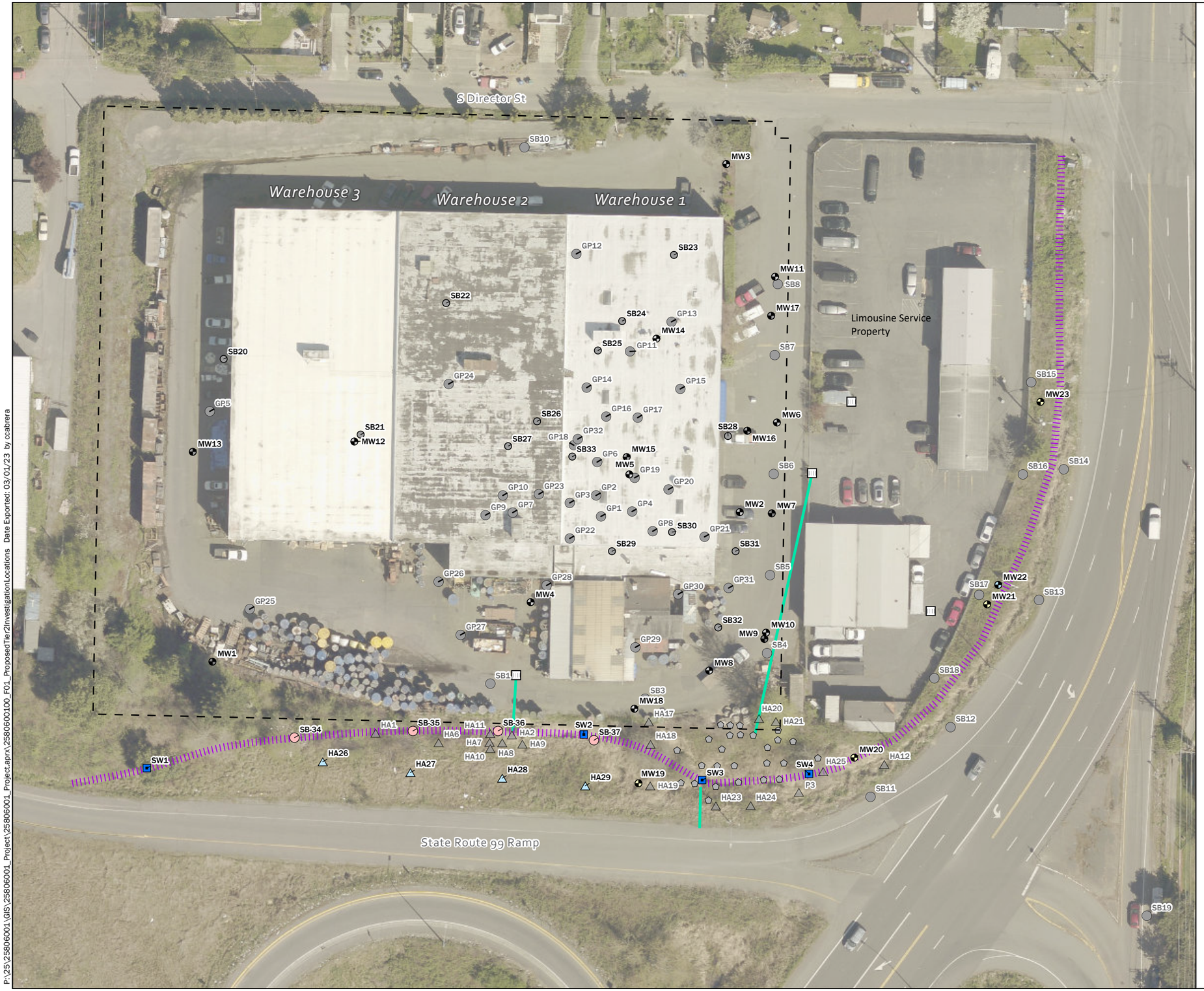
PFAS = Perfluoroalkyl substances

PCBs = PCB congeners

Full VOCs+ = Full suite VOCs and 1,4-Dioxane

Full SVOCs = Full suite SVOCs

X = Analyze




**Legend**

- Soil Boring (2005, 2014, 2015, 2022)
- Hand Auger
- Shallow Monitoring Well
- Deep Monitoring Well
- Surface Soil
- Property Parcel
- Catch Basin
- Drainage Ditch
- Stormwater Piping

Proposed Phase 2 Investigation Locations

- Proposed Phase 2 Direct Push Soil Boring
- Proposed Phase 2 Shallow Monitoring Well
- Proposed Phase 2 Deep Monitoring Well
- Proposed Phase 2 Hand Auger
- Proposed Phase 2 Surface Water Sampling Location

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: 2021 image from King County GIS.
Site features from Figure 2-4 Previous Sample Locations, July 9, 2021, Maul Foster Alongi.
Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

50 0 50

Feet

**Proposed Phase 2 Investigation Locations**

Precision Engineering, Inc.
Seattle, Washington

GeoEngineers

**Figure 1**

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# ATTACHMENT A
## Methylene Chloride Summary

## ATTACHMENT A
## METHYLENE CHLORIDE SUMMARY

The following is a summary of information on methylene chloride with respect to the Precision Engineering site in Seattle, Washington:

- Methylene chloride has been analyzed in 65 soil samples including vadose and saturated soil inside and outside the building from 2005 to 2022.
- **There have been zero preliminary cleanup level (PCUL) exceedances in vadose soil including at locations GP1 through GP11 located within and near the location of the former plating tanks**. GP1 through GP11 generally contain the highest concentrations of other site contaminants of concern.
- There are sporadic very slight PCUL exceedances of methylene chloride in saturated soil but only in samples collected during the Kennedy Jenks 2015 investigation. The saturated soil preliminary cleanup level for methylene chloride is 0.0015 milligrams per kilogram (mg/kg).
  - The slight soil exceedances are all at locations outside the building and appear to be associated with batches of samples collected on some days but not others during the Kennedy Jenks 2015 investigation, indicating a possible connection to laboratory interference.
  - There was blank contamination in selected soil samples collected and analyzed during the Kennedy Jenks 2015 investigation.
  - The exceedances were very close to the reporting limits. The laboratory reporting limits for methylene chloride in the Kennedy Jenks soil samples ranged from 0.002 mg/kg to 0.004 mg/kg, and the detected concentrations ranged from approximately 0.0024 mg/kg to 0.004 mg/kg in most cases. Only two samples had detections above 0.004 mg/kg, including SB7 at 19 feet below the ground surface (bgs) with a concentration 0.0094 mg/kg, and SB11 at 10 feet bgs with a concentration of 0.0083 mg/kg. SB7 and SB11 are located outside the building and do not appear to be spatially related: SB7 is located in the driveway between Precision and Seattle Limousine sites and is surrounded by other locations with low or no detections of methylene chloride, and SB11 is located on the shoulder of the Hwy 99 onramp and also surrounded by other locations with low or no detections.
  - Methylene chloride is not detected in soil in multiple borings between known source areas (former plating tanks location) and locations SB7 and SB11.
- Methylene chloride was only detected in two of the 18 monitoring wells in 2022. Methylene chloride was detected in wells MW-6 and MW-10. Importantly, methylene chloride has never been detected in MW-5. MW-5 is the well that consistently contains high concentrations of all known site contaminants of concern including chromium, hexavalent chromium, and trichloroethylene. Methylene chloride would likely be detected in well MW-5 if it was released at the site.
- In 2015, methylene chloride was detected in indoor air but not in soil gas. Although this would argue against vapor intrusion as the source to indoor air, it does suggest that methylene chloride may have been used inside the shop at that time.
- Methylene chloride is not a common groundwater contaminant in the Lower Duwamish Valley. Groundwater will continue to be monitored for methylene chloride.