STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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September 29, 2017

MR. BRETT COWMAN
HALCO PROPERTIES LLC
P.O. BOX 512
AUBURN, WA 98071

**Re: Opinion pursuant to WAC 173-340-515(5) on Proposed Remedial Action for the following Hazardous Waste Site:**

- **Site Name:** Cowman Campbell Paints
- **Site Address:** 5221 Ballard Avenue NW, Seattle, WA
- **Facility/Site No.:** 30774595
- **VCP Project No.:** NW3030
- **Cleanup Site ID No.:** 8651

Dear Mr. Cowman:

Thank you for submitting documents regarding your proposed remedial action for the **Cowman Campbell Paints** facility (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This letter constitutes an advisory opinion regarding a review of submitted documents/reports pursuant to requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following releases at the Site:

- Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) into the Soil;
- Total Petroleum Hydrocarbons in the Gasoline Range (TPH-G) and Benzene into the Soil and Ground Water;
- Petroleum Hydrocarbons and Volatile Organic Compounds (VOCs) into the Soil Vapor.

Ecology is providing this advisory opinion under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). The opinion is advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your proposed remedial actions:

1. Terra Associates, Inc., 2015. *Groundwater Summary, 5221 Ballard Avenue NW, Seattle, Washington, VCP NW2496.* October 21.

2. Terra Associates, Inc., 2015. *Environmental Services, Supplemental Site Sampling and Discussion, 5221 Ballard Avenue NW, Seattle, Washington, VCP NW2496.* October 21.

3. Terra Associates, Inc., 2013. *Environmental Services Remedial Investigation/Feasibility Study/Remedial Action Summary, 5221 Ballard Avenue NW, Seattle, Washington.* July 24.

4. Terra Associates, Inc., 2012. *Current Groundwater Assessment, Shilshole Avenue NW Parcels, Seattle, Washington.* October 24.

5. Terra Associates, Inc., 2012. *Technical Memo – Interim Action Project Progress, 5221 Ballard Avenue NW, Seattle, Washington.* September 6.

6. Terra Associates, Inc., 2011. *Technical Memo - November Groundwater Sampling, 5221 Ballard Avenue NW, Seattle, Washington.* December 1.

7. Terra Associates, Inc., 2011. *Technical Memo-Fall 2011 Quarterly Sampling, 5221 Ballard Avenue NW, Seattle, Washington.* October 12.

8. Terra Associates, Inc., 2011. *Underground Injection Control Well Registration Form for Voluntary Cleanup Sites and Groundwater Technical Memo - 5221 Ballard Avenue NW, Seattle, Washington.* September 2.

9. Terra Associates, Inc., 2011. *Phase II Environmental Site Assessment, 5221 Ballard Avenue NW, Seattle, Washington, Project No. T-6552.* July 29.

10. Nowicki & Associates, 1998. *UST Closure In Place - Site Assessment Report, C&C Paints - Ecology Site ID 004806, 5121 (5221) Ballard Avenue NW, Seattle, Washington.* February 10.

11. Bison Environmental Northwest, Inc. 1992. *Underground Storage Tank Closure In Place Site Assessment Report Cowman - Campbell Paint Company, 5221 Ballard Avenue NW, Seattle, Washington, 98107.* November.

12. November 19, 1992. Notice of Confirmed Release at 5221 Ballard Avenue NW from Mr. Ken Beaulaurier with Bison Environmental to Department of Ecology - NWRO.

13. April 19, 1991. Letter from Mr. Charles E. Kitchin, P.E. of Pacific Testing Laboratory to Mr. E. Arthur Cowman, Cowman Campbell Paints.

14. April 17, 1991. Letter from Ms. Susan Kunimatsu of Ballard Avenue Landmark District Board to Mr. Robert Campbell, Cowman Campbell Paints.

The reports listed above will be kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. Appointments can be made by calling the NWRO resource contact at (425) 649-7235 or sending an email to: nwro_public_request@ecy.wa.gov.

The Site is defined by the extent of contamination caused by the following releases:

- Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) into the Soil;
- Total Petroleum Hydrocarbons in the Gasoline Range (TPH-G) and Benzene into the Soil and Ground Water;
- Volatile organic compounds (VOCs) into the Soil Vapor.

The Site is located at 5221 Ballard Avenue NW in Seattle, Washington on King County tax parcel number 2767702565 (Property) which is one of four parcels containing Cowman Campbell Paints. On one of the three additional parcels, 2767702620, a separate release occurred that is associated with six former USTs that contained solvents. This opinion letter does not pertain to the separate release on parcel number 2767702620.

The Site is more particularly described in Enclosure A to this letter, which includes detailed Site diagrams. The description of the Site is based solely on the information contained in the documents listed above.

Based on a review of supporting documentation listed above, pursuant to **requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the releases at the Site, Ecology has determined:**

- Site ground water following the gradient reversal due to dewatering nearby needs additional characterization. The new monitoring wells were placed along a line making it difficult to verify the direction of the lowered hydraulic gradient using triangulation.

- A soil vapor extraction system operating on the Site from 2012 to 2014 recovered approximately 180 gallons of paint thinner from the subsurface. It is expected that additional hydrocarbon mass was degraded in place through enhanced biodegradation.

- Sub slab soil gas contains elevated concentrations of aliphatics which were not detected in indoor air samples collected in 2015. Due to the potential for vapor intrusion into the new residential spaces, Ecology requests additional indoor samples be collected to confirm these results. Please provide a detailed cross-section(s) that shows the locations of detected concentrations in soil near the USTs and the locations of soil vapor probes advanced thus far.

- This Site is complex with several releases of multiple chemicals. Ecology suggests using current guidance to present Site characterization data in a Remedial Investigation (RI) report format that consolidates all pertinent Site historical information, collected soil and ground water data, and completed soil cleanup data. See the following Ecology web page for RI report format and content requirements: http://www.ecy.wa.gov/programs/tcp/policies/checklists.

**GROUNDWATER SUMMARY REPORT (October 21, 2016)**

- Ecology's previous opinion letter dated April 10, 2014 requested a Rose diagram plotted with available ground water elevation data. This information was not provided in subsequent submittals. Since more sampling and monitoring has been done since 2014, Ecology now requests two Rose diagrams demonstrating all of the hydraulic gradient data before and after operation of the Hotel Ballard permanent dewatering system that was initiated in 2012.

- All figures that show ground water elevation contours such as Figures 5 and 6 of the Groundwater Summary report dated 10/21/15 need to show the ground water elevations used in the contouring plotted beside the well locations.

- In the Groundwater Summary report and other reports, please plot ground water elevation data on all figures showing ground water elevation contours. The placement and siting of

the new monitoring wells is somewhat linear. Ecology recommends that the proposed new wells be more spatially distributed so that ground water elevations can be triangulated to confirm the flow direction.

- Please include ground water elevation data from all wells including MW-6 in the ground water elevation contour diagrams. If the ground water elevation at MW-6 is consistently anomalous, the reason needs to be determined rather than eliminating the data point.

- In Table 1 of the Groundwater Summary report dated 10/21/15, the measuring point elevations of wells MW-107 and MW-201 through MW-205 are shown with "+/-" symbols following the elevation. There is no note below the table to account for this notation. Please provide an explanation in the figure. The measuring point elevations for ground water need to be surveyed by a Washington state-licensed land surveyor to the nearest 0.01 foot.

- The installation of five new monitoring wells (MW-201 through MW-205) related to the Site is not described in either of the two reports that are both dated October 21, 2015. Only monitoring well (MW-205) is mentioned in a sentence on page 2 in Section 3.3. Although boring logs are provided, the monitoring well installations need to be summarized in the text and a table provided showing the construction specifications including the date of installation. The Groundwater Summary report dated 10/21/15 recommends that two new wells be installed which are shown on Figure 9 (not Figure 8 as shown).

- Please provide a table of all Site monitoring wells that includes construction details and specifications, date of installation, date of decommissioning, if applicable and identification of the replacement well, if applicable.

- Ecology recommends installation of at least one additional monitoring well on the Property that would replace MW-101 and MW-102 and also be downgradient (and north of) the USTs that are closed in place in addition to MW-205.

- The Groundwater Summary report should include figures that show previous and current contaminant concentrations in ground water on the Site.

- In the Groundwater Summary report, please provide actual table and figure titles in the Table of Contents (TOC). Tables 5 and 6 are mislabeled in the TOC; Table 7 needs to be added to the TOC.

- Please explain why the samples from only one monitoring well, MW-205, were analyzed for polycyclic aromatic hydrocarbons (PAHs)? Ecology recommends at least two ground

water sampling rounds in which all monitoring wells are analyzed for PAHs, preferably 6 months apart and representative of dry and wet seasons.

**ENVIRONMENTAL SUMMARY REPORT (October 21, 2016)**

- The known soil contamination extends from a depth of 10 to 14 feet bgs in the vicinity of the USTs. Contamination characteristics from the ground surface to a depth of 10 feet bgs are undefined. One soil sample has been analyzed near the surface (B-104 at 2.5 feet bgs) and was collected approximately 15 feet to the northwest on the opposite side of the concrete retaining wall, instead of near the UST fill ports and along UST piping where a shallow release, if present, would likely be detected. Further characterization of soil to the north of the center UST, and to the east, south, southeast, and west of the UST cluster, including characterization of soil near any UST associated piping, is necessary to determine the lateral and vertical extent of contamination.

- Analytical data tables are large, difficult to read and compare the results for different locations. Please consider using a larger-sized (i.e. 11" x 17") page in landscape orientation and a smaller font so that more data can be tabulated on a single page. For example, Table 3 could all be on a single page and much more accessible to the reader.

- This report proposed using MTCA Method B air cleanup levels for a commercial exposure scenario. Land uses other than residential and industrial cannot be used as a basis for a reasonable maximum exposure scenario for the purpose of establishing a cleanup level (see WAC 173-340-708). The proposed MTCA Method B air cleanup levels modified for a commercial exposure scenario are not appropriate cleanup standards for this Site. Also, the Property is currently being redeveloped to include residential dwelling units on the top floor, so residential exposure has to be assumed. Ecology recommends sampling the indoor air in the residential apartment, following construction. Indoor air cleanup levels should be used for comparison.

- In Table 5.1.2 of the Supplemental Site Sampling and Discussion report, please use milligrams per kilogram as the units. Also, the actual value of the calculated cleanup level in Table 5.1.1 for TPH-G needs to be included.

- In Table 5.2.2 of the same report, please use micrograms per liter as the units.

- In Figures 5 and 6 of the Supplemental Site Sampling and Discussion report, please add concentrations used to draw the boundary of "Approximate limit of release impacts to soil from 5221".

- Please provide figures displaying the sub-slab vapor samples results shown in Tables 3A and 3B of the Supplemental Site Sampling and Discussion report.

- Section 4.2 of the Supplemental Site Sampling and Discussion report should be revised to state that total lead was detected in ground water samples. The report needs to provide a table of analytical data from soil sample locations analyzed for lead and if available, other metals.

- Tetrachloroethene (PCE) was detected at a concentration of 4,400 micrograms per cubic meter ($\mu g/m^3$) in a sub slab vapor sample from VP-1 in 2015. This concentration exceeds the Method B sub slab air cleanup value of 96.2 $\mu g/m^3$. What is the source of the PCE in sub slab vapor?

- Analysis of volatile organic compounds should be included for at least one or two ground water sampling rounds to determine the potential presence of PCE and related degradation compounds in ground water.

- The vapor pathway needs to be introduced and discussed prior to Section 5.3 of the Supplemental Site Sampling and Discussion report. An earlier section should be added that discusses the characterization, nature and extent of soil vapor on the Site. Due to the depths of soil contamination potentially remaining in place, vapors could enter the building via basement walls rather than the basement floor.

- The proposed Method B soil cleanup levels are based on direct contact. As Site ground water has been impacted, soil cleanup levels based on the leaching pathway are required.

- A Method B ground water cleanup level for TPH of 226 micrograms per liter ($\mu g/L$) was calculated by Ecology using the MTCA TPH spreadsheet with Site data.

- The vapor pathway needs to be introduced and discussed prior to Section 5.3 of the Supplemental Site Sampling and Discussion report. An earlier section should be added that discusses the characterization, nature and extent of soil vapor on the Site.

- The ground water cleanup levels for BTEX appear to be based on the Method B equations only without consideration of ARARs. Please research potential ARARs that may apply to this Site as that could affect the Site cleanup levels.

- The soil vapor screening levels and indoor air cleanup levels listed in Table 3A do not match the values in the current version of Ecology's CLARC. There are more exceedences when the current values are used.

- In Appendix E, the Method B spreadsheet for soil sample 'B-301 at 10' is not valid. Data from another location cannot be used in the calculation. The value for this location in Table 5.1.1 needs to be removed and the median rather than the average calculated for the remaining 5 cleanup values.

- Please refer to Ecology's Implementation Memo #14 regarding assessing potential petroleum vapor intrusion available at the following link: https://fortress.wa.gov/ecy/publications/SummaryPages/1609046.html to evaluate whether Site buildings are outside the lateral exclusion zone or if the contamination is deeper than the vertical separation distance. If either of these conditions is true, vapor intrusion does not need to be assessed for the current buildings. An environmental covenant may still be needed to protect potential future buildings.

- Please provide a revised version of the report in hard copy and electronic format.

- If contaminated soil above cleanup levels remains and is not migrating off the Site, an environmental covenant may be needed for Site closure. This would require a Feasibility Study and an acceptable disproportionate cost analysis. Some continued ground water monitoring would be required as well.

**This opinion does not represent a determination by Ecology that a proposed remedial action will be sufficient to characterize and address the specified contamination at the Site or that no further remedial action will be required at the Site upon completion of the proposed remedial action.** To obtain either of these opinions, you must submit appropriate documentation to Ecology and request such an opinion under the VCP. **This letter also does not provide an opinion regarding the sufficiency of any other remedial action proposed for or conducted at the Site.**

Please note that this opinion is based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then this opinion will automatically be rendered null and void.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of the Site progresses, you may request additional consultative services under the VCP, including assistance in identifying applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions regarding this opinion, please contact me at (425) 649-7064 or heather.vick@ecy.wa.gov.

Sincerely,

Heather Vick

Heather Vick, LHg
NWRO Toxics Cleanup Program

Enclosure: (1) A – Site Description and Diagrams

cc: Charles Lie, Terra Associates, Inc.
Sonia Fernandez, VCP Coordinator, Ecology

# Enclosure A

# Description and Diagrams of the Site

# Site Description

*This section provides Ecology's understanding and interpretation of Site conditions, and is the basis for the opinions expressed in the body of the letter.*

**Site:** The Site is defined as contamination associated with constituents of paint solvents released to soil and ground water from three underground storage tanks (USTs) and now present at 5221 Ballard Avenue NW, 5227 Ballard Avenue NW and 5242 Ballard Avenue NW in Seattle, Washington (Property). The contamination consists of carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil and total petroleum hydrocarbons in the gasoline range (TPH-G) and benzene in soil and ground water. The contamination also consist of volatile organic compounds in soil gas.

The Property, which corresponds to King County tax parcel numbers 27677025565, 276770256 and 2767702630, is 0.51 acre in size. The Property was formerly the location of a portion of the Cowman Campbell Paints complex which was also located on two adjacent parcels of land located west and south of the Property including parcel numbers 2767702620 and 2767702640. This information is summarized in the table below:

| Parcel Number | Address | Former Use | Current Use | Part of the Site? |
|---|---|---|---|---|
| 2767702565 | 5221 Ballard Avenue NW | Cowman Campbell Paints | Ascent Cycles; office space on 2nd floor; apartments on 3rd floor | Yes |
| 2767702556 | 5227 Ballard Avenue NW | Unknown | Rudy's Barbershop; office space on 2nd floor | Yes |
| 2767702630 | 5242 Shilshole Avenue NW | Cowman Campbell Paints | Warehousing | Yes |
| 2767702640 | 5256 Shilshole Avenue NW | Cowman Campbell Paints | Unknown | No |
| 2767702620 | 5232 Shilshole Avenue NW | Cowman Campbell Paints | Unknown | No |

There is a separate release associated with one of the additional parcels (2767702620) involving six former USTs that contained solvents. The USTs on parcel number 2767702620 consisted of three 1,000-gallon USTs and three 2,000-gallon USTs that were removed in 1992. This opinion letter does not pertain to that separate release on parcel number 2767702620.

**Area Description:** The Property is situated in the Ballard neighborhood in north Seattle. The Property is bordered by Ballard Avenue NW on the northeast, commercial properties to the northwest and southeast, and warehouse and light industrial properties to the south and southwest.

**Property History and Current Use:** The Property was formerly part of a paint manufacturing facility (Cowman Campbell Paints) from about 1947 to approximately 2000. The Property is the location of three underground storage tanks (UST) which were installed in the early 1960s and closed in place in 1992 and 1998. The USTs contained different types of paint thinners which are detailed in the table below:

| UST Volume | Substance Stored | Date Installed | Date Closed |
|---|---|---|---|
| 6,000 gallons | Petroleum solvent (Chevron 350B) | 1962 | 1992 |
| 8,000 gallons | Petroleum solvent (Chevron 410B (140)) | 1962 | 1992 |
| 7,000 gallons | Alkyd resin | 1964 | 1998 |

The paint mixing occurred in an off-Property building that fronts on Shilshole Avenue to the southwest; no paint mixing was conducted on the Property. The USTs are located in a small parking lot between two registered historical buildings and were closed in place because removing them would potentially undermine the foundations of the historical buildings. The Property is currently the location of vacant.

**Sources of Contamination:** Sources of contamination relate to spills and leaks associated with the Property's former UST systems described above. In 1992, analytical results from a soil sample collected during closure of the two USTs containing petroleum solvents indicated TPH concentrations above the MTCA Method A cleanup level.

**Physiographic Setting:** The Site and surrounding area are situated on lowlands on the north side of the dredged Lake Washington ship canal. The ship canal extends west from the Site for about 1.5 miles before entering Puget Sound. Water levels are maintained in the Lake Washington ship canal by the Chittenden Locks, an engineered system that regulates surface water flow between Lake Washington and Puget Sound. Ground surface elevations are about 30 to 50 feet above mean sea level (msl) in the vicinity of the Property. Surface water elevations on Salmon Bay directly south of the Property are about 20 feet above msl.

The Property is situated at an elevation of about 36 feet above msl with a concrete retaining wall bordering the west side. On the west side of the retaining wall, the ground surface elevation drops to an elevation of about 28 feet. The Property building includes a basement with the same floor elevation observed on the west side of the retaining wall, about 28 feet. The Property slopes south-southwest toward Salmon Bay.

**Surface/Storm Water System:** The closest surface water body, Salmon Bay in the Lake Washington Ship Canal, is located approximately 900 feet southwest of the Site. Surface water runoff in the area is collected in municipal storm drains and eventually reaches Puget Sound. At the Property, surface water runoff moves via sheet flow south toward Shilshole Avenue Northwest and Salmon Bay.

**Ecological Setting:** The Site and the surrounding area provide limited terrestrial ecological habitat because it is has been mostly developed with buildings and areas paved with concrete and asphalt.

**Geology:** Conditions at the Site have been explored to a maximum depth of about 44 feet below ground surface (bgs). The geology consists of fill materials from approximately 0 to 2 feet below the ground surface (bgs) and from approximately 0 to 10 feet bgs in the areas near the USTs. Weathered glacial till occurs from about 10 to 14 feet bgs increasing in density with depth. Unweathered glacial till occurs below depths of approximately 14 feet bgs. Based on geotechnical borings drilled across Ballard Avenue, the till underlying the Property is approximately 10 to 15 feet thick, below which are interpreted as being Advance outwash deposits.

**Ground Water:** The uppermost ground water beneath the Site occurs as a perched, water-bearing zone within the lower part of the fill and the weathered till. The water table originally varied from depths of 3 to 10 feet bgs, and was shallowest on the west side of the concrete retaining wall at a depth of about and deepest in the vicinity of the UST system. Static water level data from the Site monitoring wells in June 2011 indicated that the ground water flow in the perched zone at the Property was to the west-southwest.

Monitoring wells MW-1 through MW-10 were installed in 1996 to depths of 7 to 15 feet bgs. Monitoring wells MW-101 through MW-107 were installed in 2011 to depths of 15 to 20 feet bgs. Monitoring wells MW-201 through MW-205 were installed in 2014 to depths of 20 to 44 feet bgs.

In 2012, construction dewatering was initiated at a property across Ballard Avenue and northeast of the Site which lowered the ground water levels 20 to 25 feet bgs at the Property. This lowering has resulted in a hydraulic gradient reversal such that ground water now moves across the Site to the northeast. This localized flow direction was confirmed in new monitoring wells installed in 2014. It is not expected that ground water beneath the Site will return to prior conditions. The dewatering system discharges to the municipal storm water drainage system and then to Salmon Bay.

**Release and Extent of Contamination - Soil:** The maximum TPH-G concentration detected in soil was 7,300 mg/kg. A note in the laboratory reports indicated that the chromatograms for

TPH-G detections were similar to mineral spirits which is a constituent of oil-based paint. Benzene was not detected above laboratory detection limits. However, the laboratory detection limit for benzene was above the MTCA Method A cleanup level in the sample that detected TPH-G at 3,900 mg/kg.

Two soil samples collected in the boring drilled for MW-102 at 8 and 10 feet bgs were analyzed for cPAHs. Detected cPAH concentrations were adjusted using toxicity equivalency factors. The maximum total cPAH concentration detected in soil was 0.261 mg/kg which was corrected to 0.08228 using toxicity equivalency factors which is below the Method A cleanup level of 0.1 mg/kg.

**Extent of Contamination – Ground Water:** Four monitoring wells were originally installed at the Site in locations near and down to cross-gradient of potentially impacted soil. Analytical results from collected ground water samples indicated TPH-G at concentrations above the MTCA Method A cleanup level. Benzene, toluene, ethylbenzene, and xylenes (BTEX) were not detected above Method A cleanup levels in ground water. However, analysis for cPAHs in ground water was not been conducted. The extent of the contaminant plume has not been defined.

In 2012, a permanent dewatering sump was put into operation beneath Hotel Ballard, constructed northeast of the Site at 5216 Ballard Avenue NW (King County parcel number 2767702970). The dewatering system discharges to the municipal storm water drainage system and then to Salmon Bay. Ground water levels on the Site have been lowered from approximately 10 feet bgs to an estimated 25 feet bgs, below the screened intervals of the existing Site monitoring wells. In addition, the ground water flow direction at the Site has been observed to be reversed to now flow approximately east-northeast toward the Hotel Ballard's dewatering system.

As a result of the Hotel Ballard's permanent dewatering system, ground water levels at the Site declined such that most of the existing monitoring wells no longer intercepted the water-bearing zone they were intended to screen. As a result, monitoring wells MW-1 through MW-5 and MW-10 were decommissioned in September 2014. MW-1 was replaced by MW-204; MW-2 was replaced by MW-203. MW-205 is at the downgradient end of the Site but the gradient is poorly defined due to new monitoring wells that are located in a line rather than a triangle.

**Extent of Contamination – Air:** A soil vapor extraction system was operated from 2013 to 2015 on the Site. Sub-slab vapor samples were collected from 2013 to 2015 and analyzed for aliphatic and aromatic hydrocarbons and volatile organic compounds. The samples contained aliphatic hydrocarbons at concentrations ranging from 35,000 to 320,000 micrograms per cubic meter ($\mu g/m^3$) exceeding the Method B sub-slab cleanup value. The vapor samples also contained benzene and tetrachloroethene at concentrations exceeding Method B sub-slab screening levels.

In May 2015, two indoor air samples were collected in each basement of the buildings at 5221 Ballard Avenue NW and 5227 Ballard Avenue NW. The samples were analyzed for petroleum hydrocarbons only. The results were all below Method B indoor air cleanup levels.

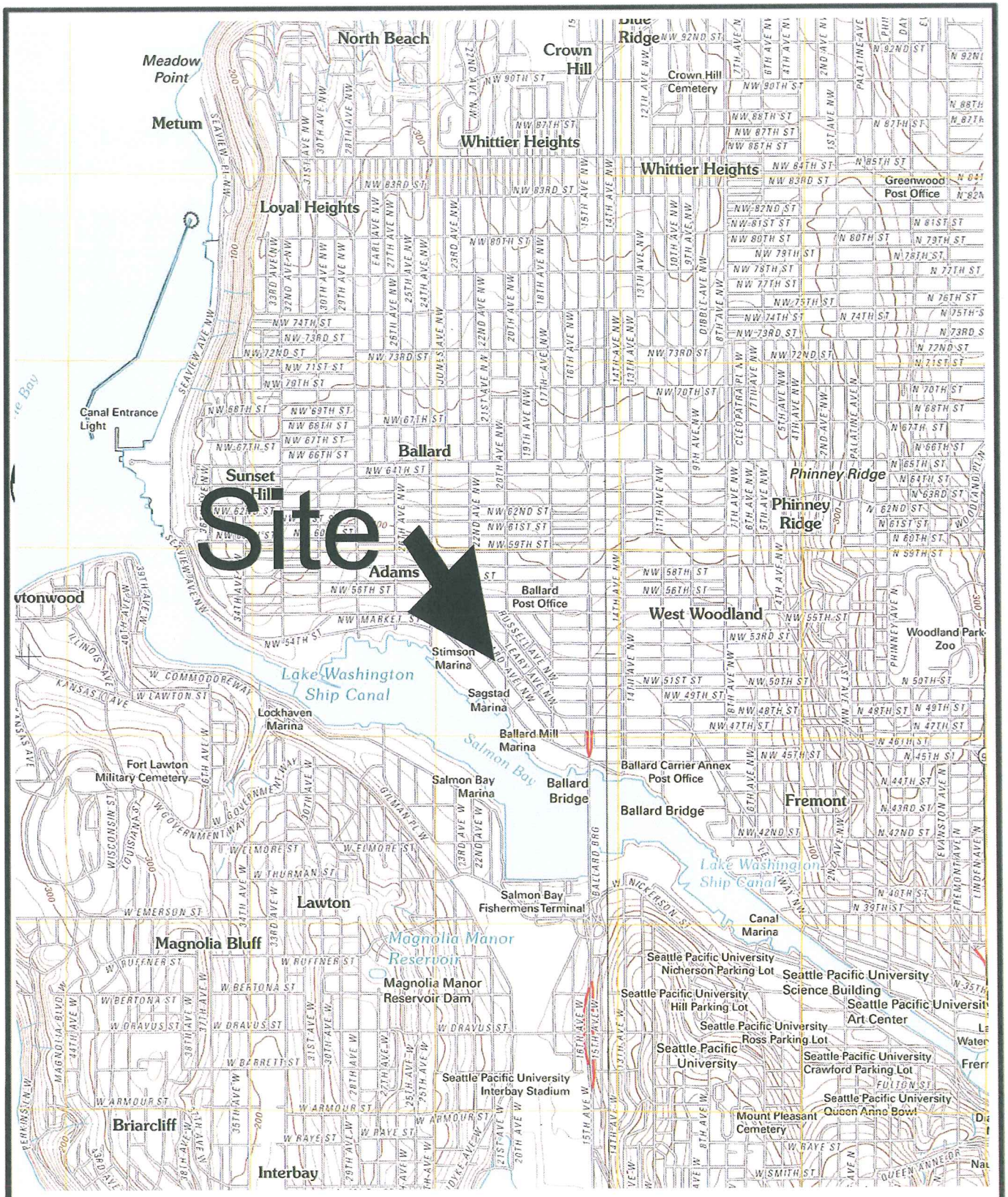
Additional indoor vapor performance samples will be collected to verify the initial results.

**Site Remediation:** In October 2011, approximately 880 pounds of TersOx™, a calcium hydroxide, were injected using six injection points, two in each UST cavity, with a GeoProbe drill rig. The four Site monitoring wells (MW-101 through MW-104) were sampled in May and September 2011 prior to the injections. MW-101 contained TPH-G and BTEX at concentrations below Method A. MW-103 still contained TPH-G and TPH-D at concentrations exceeding Method A.

To address the vapor pathway, an interim remedial action consisting of a vacuum extraction system (VES) was put into operation on the Site in May 2012. The VES system consists of a trench that provides an individual pipe to each of the three monitoring wells on the Site. The initial operation of the VES focused on the area near monitoring well MW-101 but in June 2012, the system drew from two additional monitoring wells, MW-102 and MW-103. Two new VES wells using former monitoring wells MW-105 and MW-106 were put into operation in February 2013. The system currently operated 12 hours per day (due to noise ordinance requirements) and the exhaust is sampled on a monthly basis. As of July 2013, approximately 180 gallons of TPH-G had been removed from the subsurface by the VES.

The VES recovery dropped below the method quantitation limit in December 2014 for wells MW-104/105. The vacuum unit was removed from the Site in February 2015.

# Site Diagrams




Reference: Seattle North and Shilshole Bay USGS Quadrangles

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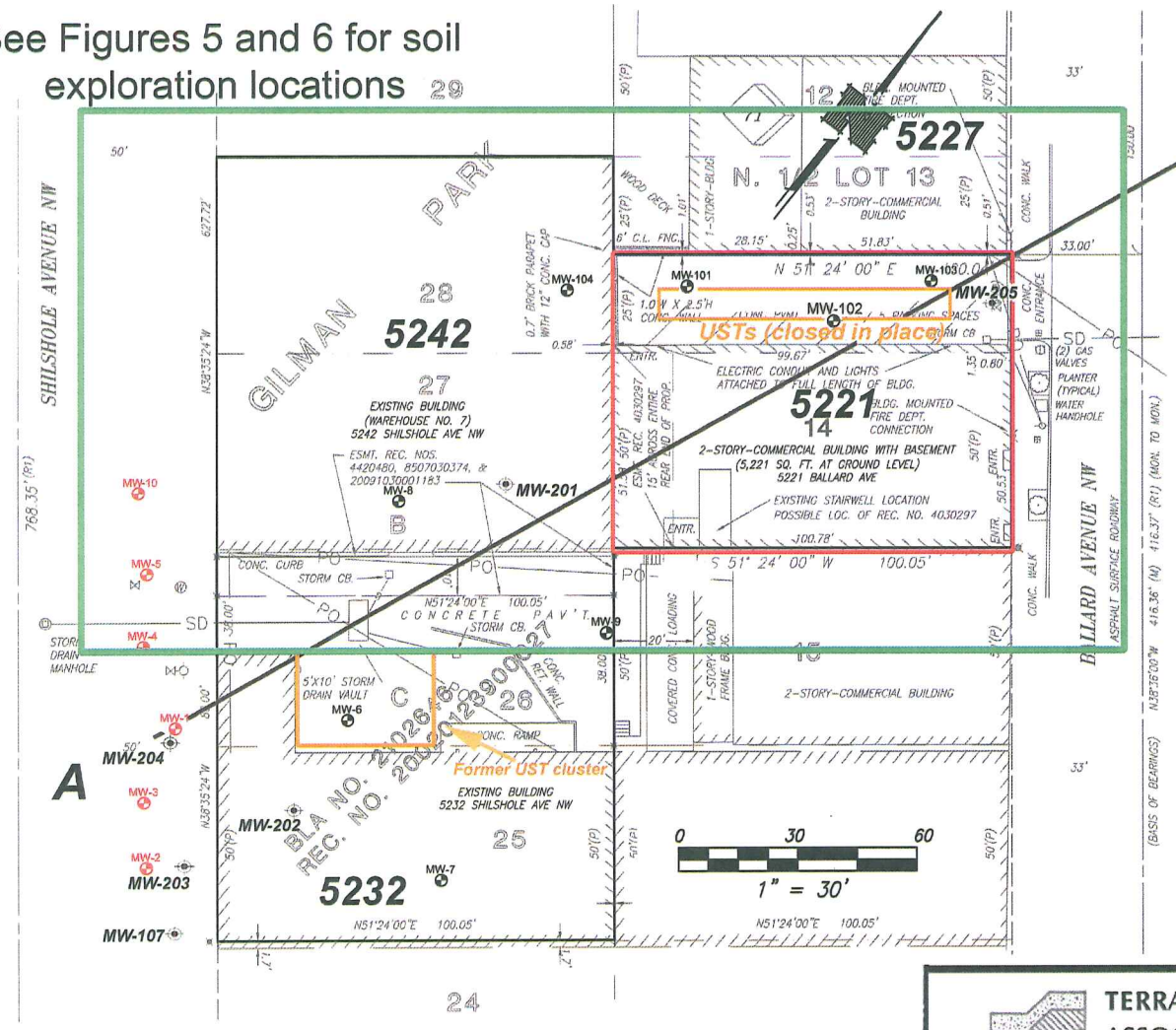
Geotechnical Consultants

Topographic Vicinity Map
5221 Ballard Ave NW
Seattle, Washington

| Proj. No T-6552 | Date Oct 2015 | Figure 2 |
|---|---|---|

See Figures 5 and 6 for soil exploration locations




## Legend

**Site of Building Built in 2011/2012 With Basement De-watering (borings shown are geotech borings by others)**

B-1, B-2, B-3, B-4

Boring Location

MW prefix indicates that the boring was completed as a monitoring well. Monitoring wells shown in red have been abandoned.

***5221*** Street Address

Reference: Survey by Jim Hart and Associates

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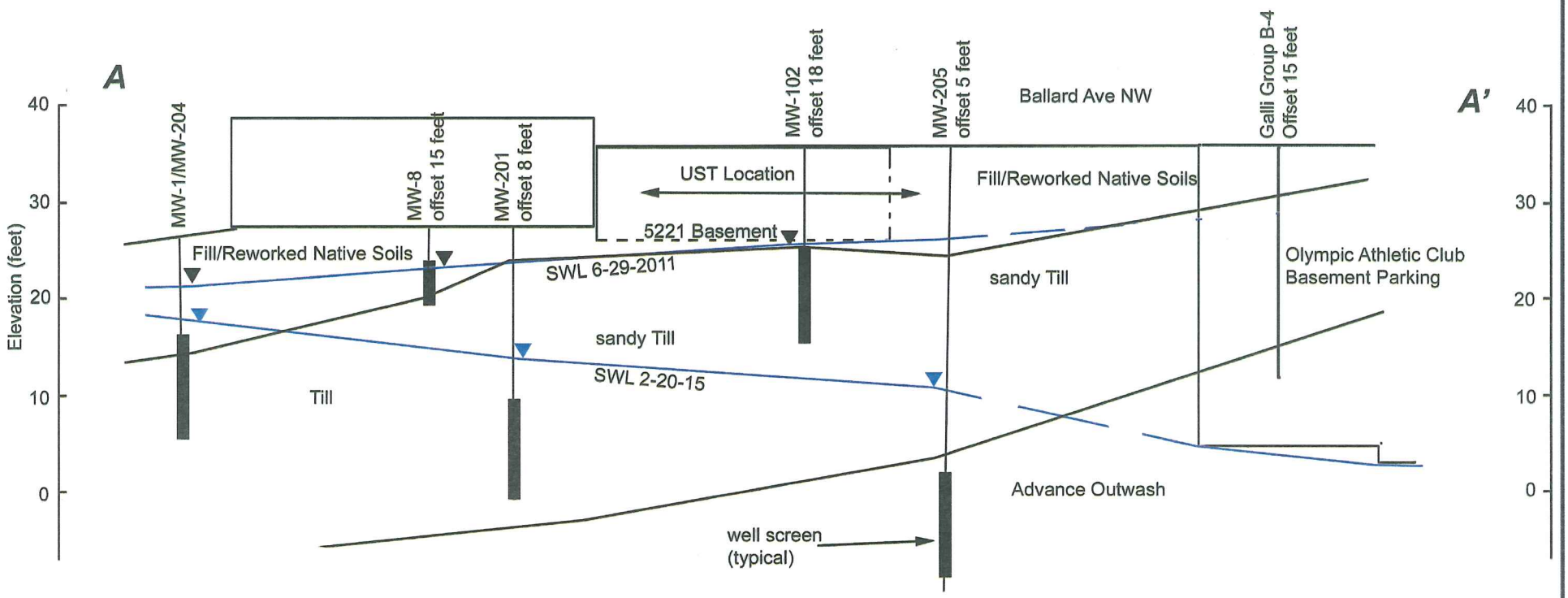
Geotechnical Consultants

Monitoring Well Location Plan
5221 Ballard Ave NW
Seattle, Washington

| Proj. No. T-6552 | Date Oct 2015 | Figure 3 |
|---|---|---|




Scale 1"=30' Horizontal, 1'=10' Vertical

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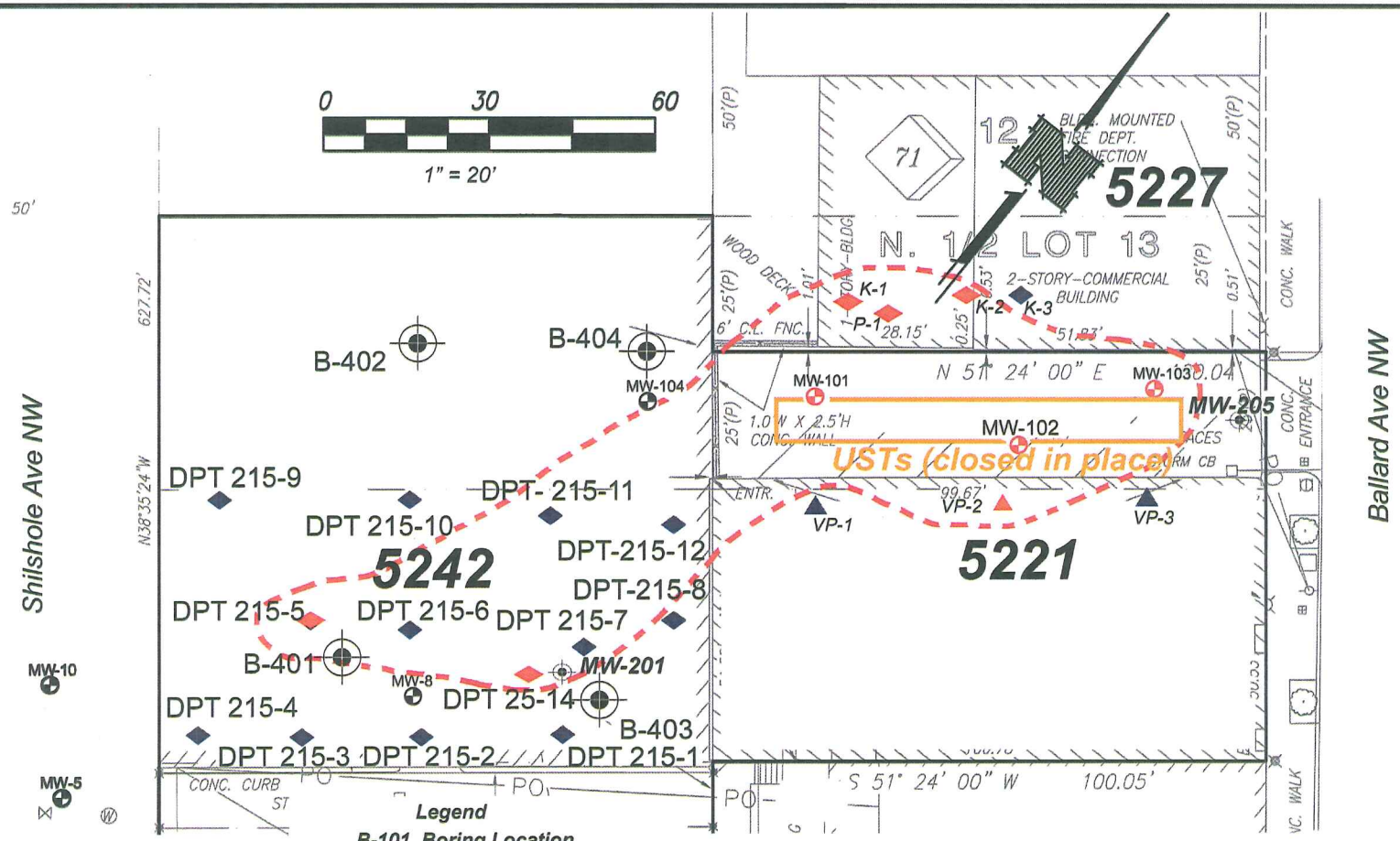
Geotechnical Consultants

Generalized Geologic Section
5221 Ballard Ave NW
Seattle, Washington

| Proj. No. T-6552 | Date Oct 2015 | Figure 4 |
|---|---|---|

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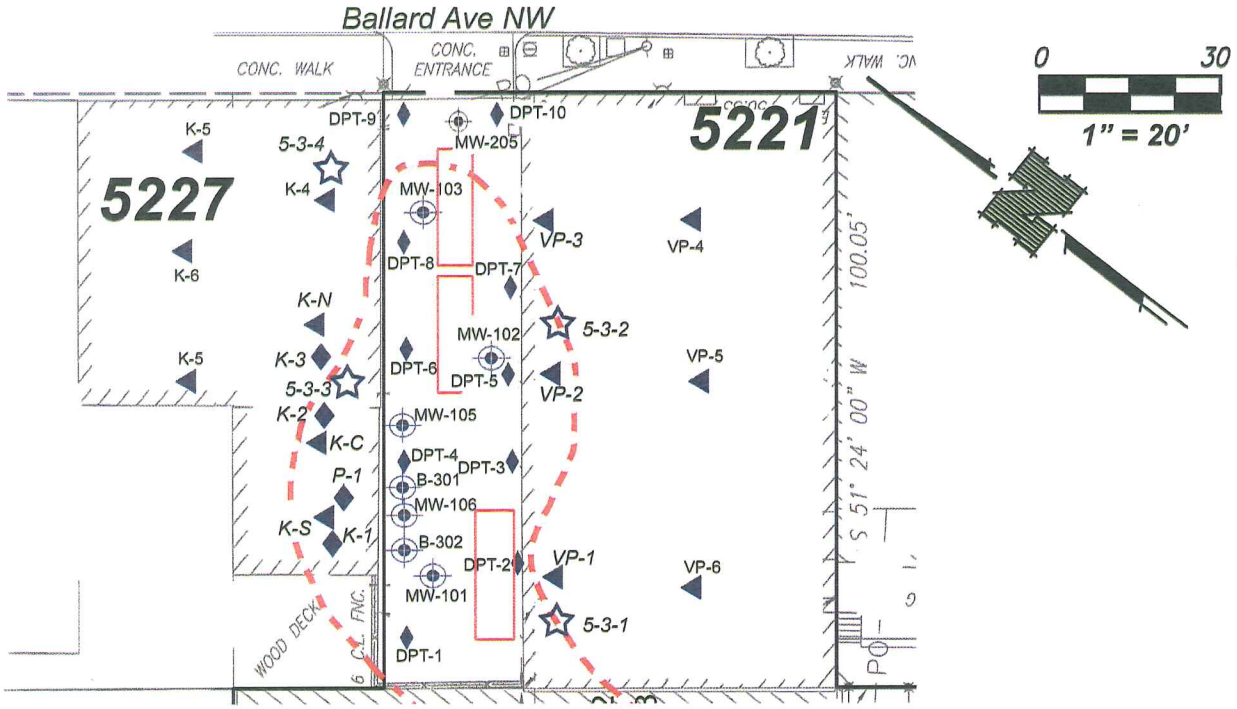
Geotechnical Consultants

Soil Exploration Overview
5221 Ballard Ave NW
Seattle, Washington

| Proj. No. T-6552 | Date Oct 2015 | Figure 5 |
|---|---|---|



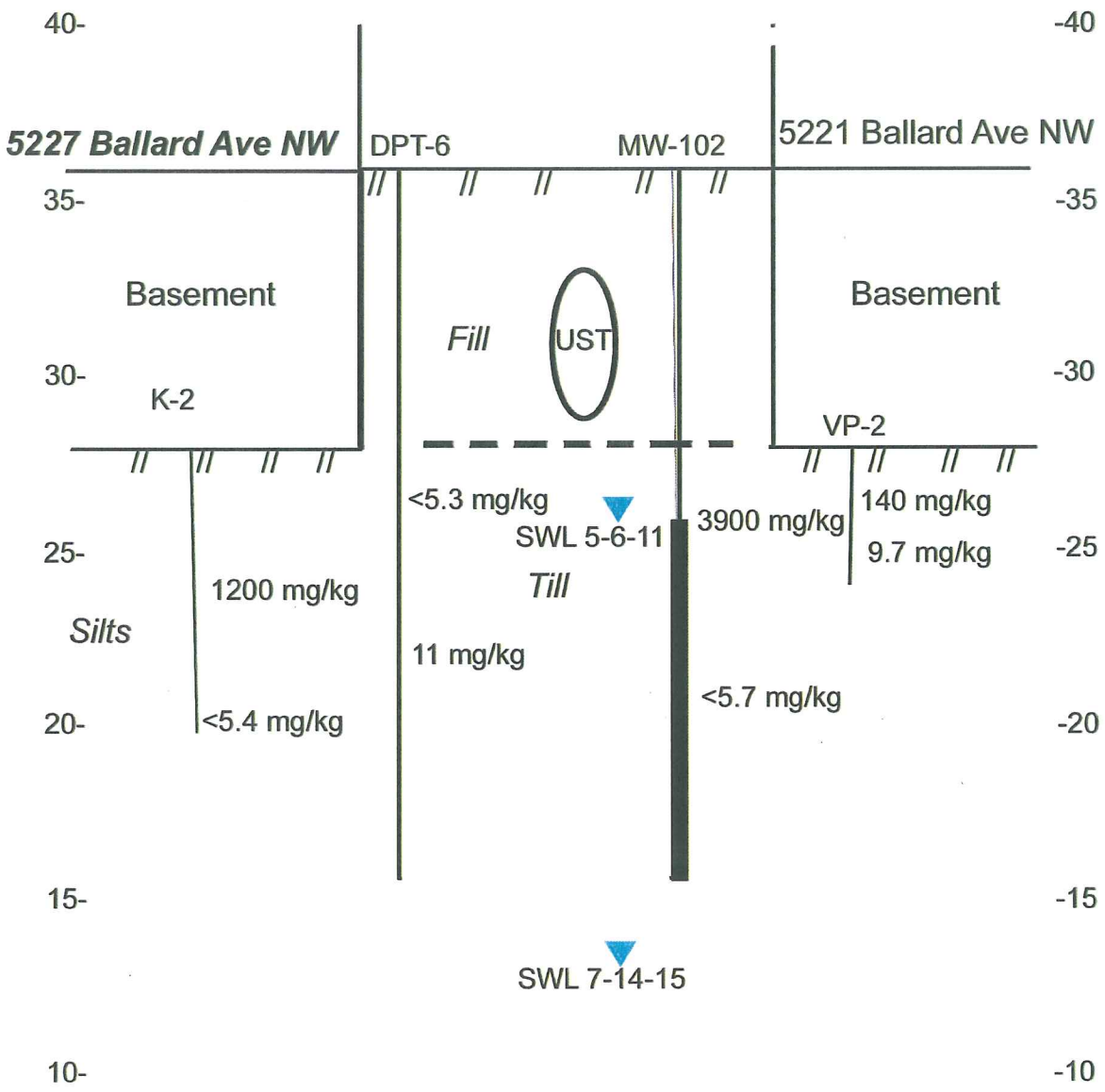

**Legend**

- **B-101 Boring Location**
  **MW-101 Monitoring Well Location**
- **DPT Location**
- **Sub Slab Vapor Sample Location**
- **Indoor Air Sample taken at Breathing Zone**
- **Approximate Limit of Release Impacts to Soil from 5221**

TERRA ASSOCIATES
Geotechnical Consultants

Soil Exploration 5221 Ballard Ave NW
5221 Ballard Ave NW
Seattle, Washington

| Proj. No. T-6552 | Date Oct 2015 | Figure 6 |
|---|---|---|




*Horizontal Scale 1"=10 feet*
*Vertical Scale 1" = 5'*
*Cross Section View is looking north*

TERRA ASSOCIATES
Geotechnical Consultants

Generalized Cross Section through UST
5221 Ballard Ave NW
Seattle, Washington

| Proj. No T-6552 | Date Oct 2015 | Figure 7 |
|---|---|---|