STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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March 16, 2015

Mr. Cody Johnson
Shannon & Wilson, Inc.
400 North 34th Street, Suite 100
Seattle, WA 98103-8600

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

- **Name:** FMH Materials Handling Solutions
- **Address:** 1313 S 96th Street, Seattle, WA 98108
- **Facility/Site No.:** 3533187
- **VCP No.:** NW2933
- **Cleanup Site ID No.:** 7542

Dear Mr. Johnson:

Thank you for submitting documents regarding your proposed remedial action for the **FMH Materials Handling Solutions** 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 release(s) at the Site:

- Total gasoline-range petroleum hydrocarbons (TPHg), total diesel-range petroleum hydrocarbons (TPHd), total oil-range petroleum hydrocarbons (TPHo), arsenic, barium, cadmium, chromium, lead, carcinogenic polynuclear aromatic hydrocarbons (cPAHs), cis-1,2-dichloroethene (cis-1,2-DCE), 1,2-dichloroethane (1,2-DCA) and trichloroethene (TCE) in Soil;

- TPHg, TPHd, TPHo, arsenic, chromium, lead, polychlorinated biphenyls (PCBs), and volatile organic compounds (VOCs) including cis-1,2-DCE, trans-1,2-dichloroethene (trans-1,2-DCE), 1,1-dichloroethene (1,1-DCE), 1,1-dichloroethane (1,1-DCA), vinyl chloride, 1,2-DCA, TCE, toluene, xylenes, and naphthalene in Ground Water.

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. Clayton Environmental Consultants, *Phase I Environmental Site Assessment of the Clarklift of Washington/Alaska Site, 1313 South 96th Street, Seattle, WA,* April 10, 1992.

2. Clayton Group Services (Clayton), *Phase I Environmental Site Assessment, FMH Materials Handling Solutions, 1313 South 96th Street, Seattle, WA,* March 13, 2003.

3. Clayton, *Limited Phase II Subsurface Investigation at the Former Clarklift Facility, 1313 South 96th Street, Seattle, WA,* July 25, 2003.

4. Clayton, *Limited Phase II Subsurface Investigation at the Former Clarklift Facility, 1313 South 96th Street, Seattle, WA,* July 29, 2003.

5. Clayton, *Limited Phase II Subsurface Investigation at the Former Clarklift Facility, 1313 South 96th Street, Seattle, WA,* October 22, 2003.

6. Clayton, *Underground Storage Tank Closure Report, FMH Materials Handling Solutions, 1313 South 96th Street, Seattle, WA,* February 9, 2005.

7. Shannon & Wilson, Inc. (SWI), *Phase I Environmental Site Assessment 1313 South 96th Street, Seattle, WA,* January 11, 2012.

8. SWI, *Remedial Investigation/Interim Remedial Action Report, Beckwith & Kuffel Site, Seattle, WA* October 21, 2014.

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:

- TPHg, TPHd, TPHo, arsenic, barium, cadmium, chromium, lead, cPAHs, cis-1,2-DCE, 1,2-DCA and TCE in Soil;

- TPHg, TPHd, TPHo, arsenic, chromium, lead, PCBs, and VOCs including cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, 1,1-DCA, vinyl chloride, 1,2-DCA, TCE, toluene, xylenes, and naphthalene in Ground Water.

The Site is more particularly described in Enclosure A to this letter, which includes a detailed Site diagram. 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 following release(s) at the Site, Ecology has determined:**

- To determine a path forward for the Site, a Remedial Investigation (RI) report that summarizes all previous investigations and shows the nature and extent of contamination in all media must be provided. In addition to what has already been provided, the revised RI should provide:

    - Discussion of current and historical Site uses including those that could have resulted in releases such as the use and locations of all current and former underground storage tanks (USTs), piping, dispensers, floor drains, service areas, pits and waste accumulation areas. Former uses of the Site and fill history prior to development of the current facility at the Site also need to be discussed. Current and former UST configurations and all floor drains, drain piping, and all subsurface utilities should be shown on figures. A concerted effort should be made to find plan drawings of the Site with improvements as they were constructed (as-builts).

    - Plan-view graphics and multiple cross-sections need to show the relationship of the Site contamination to current and former Site features, parcel boundaries, Site geology, and subsurface utilities and structures.

    - A complete description and interpretation of geologic and hydrogeologic conditions for and in the vicinity of the Site is needed, including discussion of water-bearing zones and continuity of aquitards across the Site. The distribution of contamination in different geologic units should be discussed.

- An evaluation of whether the vertical extent of contamination in ground water has been adequately assessed based on the known geology of the Site is needed, as is an understanding of the Site-specific ground water setting. A discussion of subsurface utilities at the Site that could provide a preferential pathway for contaminant movement should also be included.

- The blown-up area shown on Figure 9 should also be shown on a Site-wide figure for clarity. All soil samples collected during the remedial action should be shown on Figure 9, with clear indication of those samples that were subsequently removed.

- All boring logs and analytical reports generated for the Site need to be included with the RI evaluation and appended to the RI.

- Summary tables of all analytical data collected to date at the Site in all media need to be provided. The laboratory detection limit should be indicated for all samples that are not detected; i.e. use the "< reporting limit" nomenclature instead of "ND" on all tables. Sample dates and depths should be provided for all soil samples in separate columns. Analytical results of cPAHs should be presented on separate tables with detection limits shown.

An annotated outline of an RI Report is presented in **Enclosure B** to provide an understanding of Ecology's expectations for conducting and documenting the RI.

- Additional information regarding storm water collection and treatment at the Site is needed. This should include plans for storm water collection and treatment, information regarding storm water permit status, and a summary of any storm water permit violations. In addition, storm water and solids leaving the oil-water separators at the Site should be sampled, as should solids in the Hamm Creek culvert as it enters and leaves the Site.

- Analytical results in the 2003 investigation reports for soil borings B1 through B22 indicate that the analytical results were presented as being TPHd. However, the laboratory analytical reports present the data as being in carbon range C_{10}-C_{36}. Because this carbon range spans the TPHd and TPHo ranges, it is unclear whether the contamination is TPHd or TPHo or a mixture. Additional sampling in this area should report data separately in both ranges.

- A ground penetrating radar (GPR) survey should be conducted at the Site to determine whether any additional USTs or other structures are present in the subsurface that could be potential sources of contamination.

- MTCA Method A cleanup levels may not be appropriate for this Site. The Site is noted to be adjacent to Hamm Creek. Though Hamm Creek is currently piped, former uses of

the Property may have contributed to known TPH and cPAH contamination in Hamm Creek. A thorough evaluation of Applicable or Relevant and Appropriate Requirements (ARARs) and potential exposure pathways and receptors and potential cleanup levels needs to be performed for the Site.

- According to the 2003 Phase I ESA, an unknown quantity of soil was removed from the tank excavation when the southeastern USTs were removed. Documentation of disposition of the impacted soil and results of related stockpile soil sampling were not provided to Ecology. MTCA requires that "any waste contaminated by a hazardous substance generated during cleanup activities and requiring off-Site treatment, storage or disposal, shall be transported to a facility permitted or approved to handle these wastes" WAC 173-340-400(9). Without disposal or treatment documentation for the impacted soil removed from the Property, the status of the Site characterization will be considered incomplete.

- According to the 2014 RI, the UST removed in 2004 was used to collect fluids from various waste generating activities in the building. Additional information, including an as-built plan of the drain lines, needs to be provided, and the drains and piping investigated for potential additional releases. Further characterization related to the former UST, drains and drain line piping should be conducted as if the tank were used to store waste oil.

- The 2014 RI Report indicates that a No Further Action (NFA) determination should be requested on a portion of the Site. Ecology does not provide NFA determinations for portions of Sites, unless a parcel within a Site is demonstrated to be in compliance.

- The 2014 RI Report recommends that the Property owner file a deed restriction for the Site then request that Ecology grant a conditional NFA to the northern portion of the Site. However, an Environmental Covenant (EC) upon which an NFA determination relies must be filed through Ecology, using Ecology's EC template. There are significant requirements to obtain an EC for a Site. Among other requirements, an EC would require:

    - Full characterization of the soils that would remain at the Site at concentrations greater than Site cleanup levels.

    - Ground water be monitored and remain in compliance with Site cleanup levels.

    - A Feasibility Study is conducted including a disproportionate cost analysis (DCA) showing that the cost of remediation is disproportionate to the benefit of such remediation.

- Ecology concurrence that the EC is an appropriate institutional control for the Site.

- Ongoing monitoring and 5-year periodic reviews would be required as part of an EC.

- Characterization of identified soil impacts at the Site is not complete, as described below:

  - The concentration of TPHo was greater in the soil sample collected at 8 feet below ground surface (bgs) in boring B-1 in 2004/2005, which is located more distant from the UST than sample NSW. This may be indicative of another source of TPH contamination located between the former UST and the north Property line. This area requires additional investigation. Only a very limited number of soil samples collected near the waste oil tanks have been analyzed for cPAHs, which are common waste oil contaminants.

  - Extent of cement kiln dust (CKD) fill should be shown on all figures, and the extent needs to be determined in soil, especially near the storm water pipe north of the Site. Additional testing for pH, arsenic and lead is necessary throughout the Site to determine if CKD was used as a soil amendment to stabilize wet soils at the Site during development.

  - The nature and extent of TPH west of the building, north of the former waste UST, and under the storm water pipe has to be determined.

  - The extent of remaining chlorinated solvent contamination in soil is not clear and does not appear to be defined. Some of the samples shown on Table 5 are not represented on Figure 9. Please show all sample locations with clear indications of samples locations/depths that were subsequently removed on Table 5 and Figure 9.

  - Soil sampling has not been conducted at the locations of the former drains, drain piping, and service areas within the building. As noted previously, these potential sources of soil contamination at the Site need to be investigated.

  - Base samples beneath the former USTs at the southern portion of the Site have not been collected. Soil sampling should be conducted in the native material beneath the former UST excavations at the south end of the Site to determine if the former USTs are the source of the TPHg and TPHd detected in ground water in GP-6.

- The lateral and vertical extent of ground water contamination has not been characterized at the Site:

- Ground water flow direction at the Site has been assumed to be to the northeast based on the Site's relative location to the Lower Duwamish Waterway and to the northwest. However, the actual ground water gradient has not been determined at the Site. No ground water elevations or contour maps are available in Ecology files. Monitoring wells MW-1, MW-2 and MW-3 haven't been included in recent (2013 and 2014) ground water sampling rounds. Until the ground water flow direction is confirmed, no monitoring wells should be omitted from monitoring and sampling. The ground water flow direction at the Site must be measured to establish where additional sampling is necessary to define the extent of ground water contamination at each release location. Until the ground water flow direction is established for the Site, none of the impacted areas at the Site can be considered adequately characterized.

- Additional data regarding the potential presence and impacts to deeper water-bearing zones is needed. Additional monitoring wells are needed to determine the lithology, continuity of shallow and deep water-bearing zones, the continuity of the aquitard between the water-bearing zones, and vertical extent of contamination at the various source areas at the Site.

- The lateral and vertical extent of impacted ground water due to TPH releases from the waste UST in the northwest portion of the Site needs to be determined. Impacted ground water was identified in borings B9, B10, B13 and B17 through B21 in 2003. The extent of impacted ground water in this area has not been determined. Additional monitoring wells are needed in this area.

- The lateral and vertical extent of impacted ground water related to the chlorinated solvent and TPH (as evidenced by a ground water sample at GP-6) releases in the southeast portion of the Site need to be determined. MW-4 through MW-9 have not been analyzed for TPH, and need to be during future sampling events. The location of any additional wells should be based on the existing ground water data and the ground water flow direction that is to be determined for the Site.

- The lateral and vertical extent of impacted ground water due to CKD in the northern portion of the Site needs to be determined. In addition to other analytes, all ground water samples collected at the Site should be analyzed for pH, lead and arsenic in case CKD was used throughout the Site as a soil amendment.

- Monitoring wells are not present at or immediately adjacent to locations where previous contaminated ground water samples were collected at the Site. Additional monitoring wells are needed to characterize ground water impacts near the current and former sources of contamination at the Site. Once an adequate and representative monitoring well network is present for each of the releases at

the Site, a minimum of four consecutive quarters of ground water samples with concentrations less than Site cleanup levels is necessary to demonstrate compliance. Ground water samples collected at the Site must be analyzed for all of the COCs for the Site, including total PCBs near the former waste oil tanks. It is not appropriate to filter PCB ground water samples.

- Soil and ground water samples collected to characterize petroleum hydrocarbon releases should be analyzed according to Table 830-1 of the MTCA regulation and Table 7.2, page 95, in the ***Guidance for the Remediation of Petroleum Contaminated Sites***, Ecology Publication No. 10-09-057, September 2011. The additional parameters listed on Table 830-1 of the MTCA regulation should be analyzed in the samples with the greatest TPH concentrations. This is particularly of concern in areas where waste oil or other petroleum wastes may have been generated, conveyed or stored, including service areas with drains.

- A Terrestrial Ecological Evaluation (TEE) is required per WAC 173-340-7490 to determine if cleanup levels that are protective of terrestrial species are applicable to the Site. The first step is to determine if the Site is excluded from having to conduct a TEE. A TEE exclusion form can be found at https://fortress.wa.gov/ecy/publications/publications/ecy090300.pdf. If the Site does not qualify for an exclusion, then the process outlined in WAC 173-340-7490 must be followed to determine protective cleanup levels for the Site.

- Electronic submittal of all sampling data into Ecology's electronic Environmental Information Management (EIM) database is a requirement in order to receive a final Ecology opinion for this Site. Jenna Durkee (email jedu461@ecy.wa.gov, or via telephone at 509-454-7865) is Ecology's contact and resource on entering data into EIM.

- Before further work is completed, Ecology encourages the development of a work plan to insure that sufficient data for the soil and ground water is collected to avoid unnecessary expenditure of time and money.

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) 649-7257 or at masa461@ecy.wa.gov.

Sincerely,

Maureen Sanchez
Site Manager
Toxics Cleanup Program

Enclosures: A: Description and Diagrams of the Site
B: Remedial Investigation Outline

cc: Louis Kuffel, Beckwith & Kuffel, 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 by TPHg, TPHd, TPHo, arsenic, barium, cadmium, chromium, lead, cPAHs, cis-1,2-DCE, 1,2-DCA and TCE in soil and TPHg, TPHd, TPHo, arsenic, chromium, lead, PCBs, and VOCs including cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, 1,1-DCA, vinyl chloride, 1,2-DCA, TCE, toluene, xylenes, and naphthalene in ground water. The Site is located on King County tax parcel 5624200351 that covers 2.3 acres at 1313 South 96th Street in Seattle, WA (Property).

Area and Property Description: The Property is located south of South 96th Street and east of Des Moines Memorial Drive South in Seattle, WA, see **Figure 1.** The Property is located within an area comprised primarily of commercial and industrial properties, including an asphalt plant to the west, an office and construction storage yard to the north across South 96th Street, a strip mall with Red Apple Market to the east, and a Wooldridge Boats repair facility.

Site History and Current Use: The only identified use of the Property prior to development of the current building at the Site in 1977 was as an access road to the south-adjacent Property. The Property was noted to be a marsh on historic topographic maps and aerial photographs with noticeable depressions at the north end of the Property until approximately 1973. At that time, cement kiln dust (CKD) was brought to the Site to fill in low areas at the northern portion of the Property. It is not known if CKD was also used as a soil amendment for wet soils at the time of development. The Property was used as a forklift service and maintenance facility until approximately 2010. Four former underground storage tanks (USTs) have been removed from the Property, including one 4,000-gallon waste oil tank that was used to collect wastes from the former drain system in the building. This UST was removed in 2004. The piping from the former drain system is believed to still be in place, and has not been investigated. In 1990, one 5,000-gallon gasoline UST and one 1,000-gallon diesel UST were removed from a single excavation, and one 2,500-gallon waste oil UST was removed from a separate excavation. Both of these excavations were located in the southeast corner of the Property, as was a former steam cleaning wash pad used for cleaning forklifts. The former pad is believed to be the source of the TPH and chlorinated solvents into the subsurface, as soil impacted with TPH and TCE was identified near the wash pad in 2012. Approximately 390 tons of impacted soil were removed from this area in 2013. However, soil remains in the vicinity of the former steam clean area at concentrations greater than MTCA Method A cleanup levels. In addition, 3DME (a Regenesis compound) was introduced in liquid form to the 2013 excavation area to support additional reductive dechlorination in ground water. The Property is currently used by Beckwith & Kuffel as a pump distribution facility.

Sources of Contamination: The known sources of contamination at the Site are the former USTs, steam clean area (for the chlorinated solvents), and CKD fill at the Property. Potential additional source areas include current and former waste generation, storage, and collection areas in and immediately adjacent to the building. In addition, the building formerly used a floor drain

and piping system that was used to collect wastes prior to abandonment of the floor drains in the early 1990s. The UST used to collect the floor drain wastes was removed in 2004.

Physiographic Setting: The Site is situated at an elevation of approximately 25 feet above mean sea level. The land surface in the Site vicinity is relatively flat. The northern end of the Property was formerly a wetland area adjacent to Hamm Creek that was filled in during development of the Property.

Surface/Storm Water System: Storm water from the Property is reportedly collected and routed through two on-Property oil-water separators prior to discharging to Hamm Creek, which is piped immediately north of the Property. Additional information regarding the storm water management system at the Site has been requested.

Ecological Setting: The Property is located in a developed area within the City of Seattle, and is generally surrounded by roadways and commercial properties. However, an undeveloped area is present within 500-feet of the Property to the south which may attract wildlife.

Geology: Surficial deposits in the vicinity of the Site are mapped as Quaternary alluvial deposits. Soils observed at the Site typically include fill to approximately four to five feet below ground surface (bgs) consisting of silty clay with gravel. A different fill type was encountered at the locations of the former USTs, consisting of sand with silt. At the north end of the Site, the silty clay fill is underlain by approximately three to five feet of fine, light gray ash material interpreted as CKD. A two to five foot layer of peat was encountered beneath the CKD on the north portion of the Site, and beneath the silty clay at the southern portion of the Site. At MW-4 in the southeastern portion of the Site, poorly-graded sand and silt are present at approximate 5-foot intervals to the total depth explored of 40 feet bgs.

Ground Water: The depth to ground water in monitoring wells installed in 2012 varies between approximately three to six feet bgs, though only a limited number of ground water monitoring events have occurred in the Site monitoring wells. Shallow ground water flow has been assumed to be to the northeast, but ground water contour maps have not been generated for the Site. MW-4 is screened in a wet interval between 30 to 38 feet bgs, and is the only well advanced into a deeper water-bearing zone. The ground water flow direction in this deeper zone is therefore unknown. Additional monitoring is necessary to determine the Site-specific flow trend for the Site in both water bearing zones.

Release and Extent of Contamination: Soils at the southern portion of the Site contain residual concentrations of TCE at concentrations greater than MTCA Method A soil cleanup levels. In addition, TPHd was detected in ground water at GP-6 in the southeastern area, indicating that a soil source for TPH contamination may also remain near the former waste oil tank in this area. Based on the distribution of contaminants in soil and ground water, an additional source of TPH may be present in soil at the northwestern portion of the Site. This area is north of the former waste oil UST and at the northern property boundary near the storm drain line in South 96th Street. High levels of arsenic and lead are also present in the CKD fill area at the northern portion of the Site, but the horizontal and vertical extent of these metals in soil is not

fully defined. Additional data is needed to determine the source of the COCs identified in ground water at the Site. Potential sources related to the former drain system also need to be investigated.

Ground water containing elevated concentrations of TPHd and TCE and its daughter products are present at the southeastern portion of the Site. TCE was used on the Site as a degreaser on forklift parts. A deep monitoring well (MW-4) was sampled once and did not contain detectable concentrations of TCE or its daughter products. Ground water containing TPHd and TPHo at concentrations greater than MTCA Method A cleanup levels is present at the northern portion of the Site. The extent of this contamination and whether additional sources exist in soil has not been determined. Additional ground water data is necessary to determine the ground water flow direction at the Site and the nature and extent of ground water impacts at the Site.

The sampling locations at the Site with select sample results are shown on **Figures 2 through 5,** which is included in the Site Diagrams.

Site Diagrams

0 150 300

Approximate Scale in Feet

LEGEND

Approximate Parcel Boundary

NOTE

Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth ™ Mapping Service.

Beckwith & Kuffel Site
Remedial Investigation and Interim Remedial Action Report
King County, Washington

SITE AND SURROUNDING PROPERTIES

October 2014 21-1-12357-003

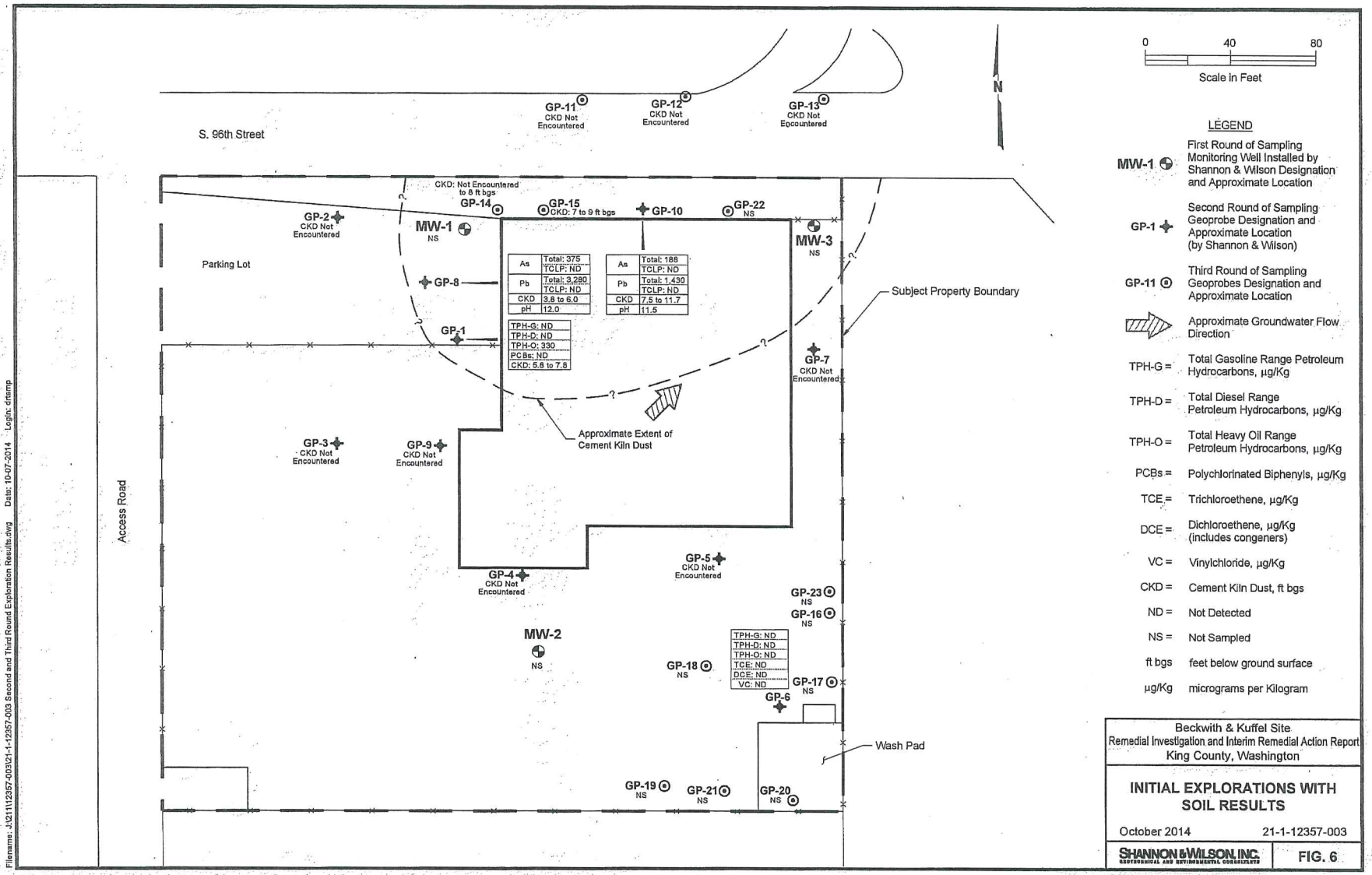
SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

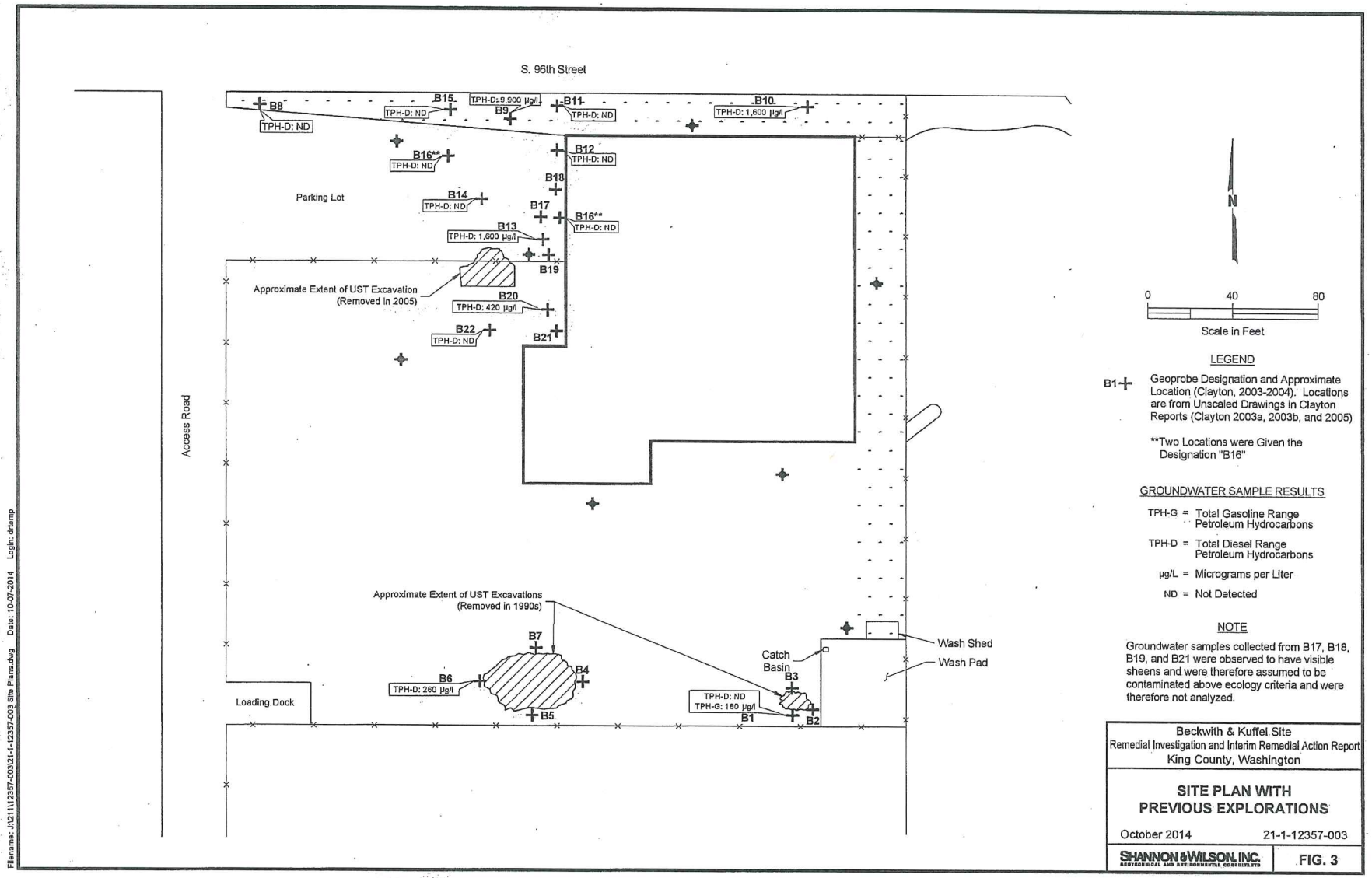
Filename: J:\21\12357-003\21-1-12357-003 Fig 2.dwg Date: 10-07-2014 Login: drtemp

Enclosure A, Figure 1

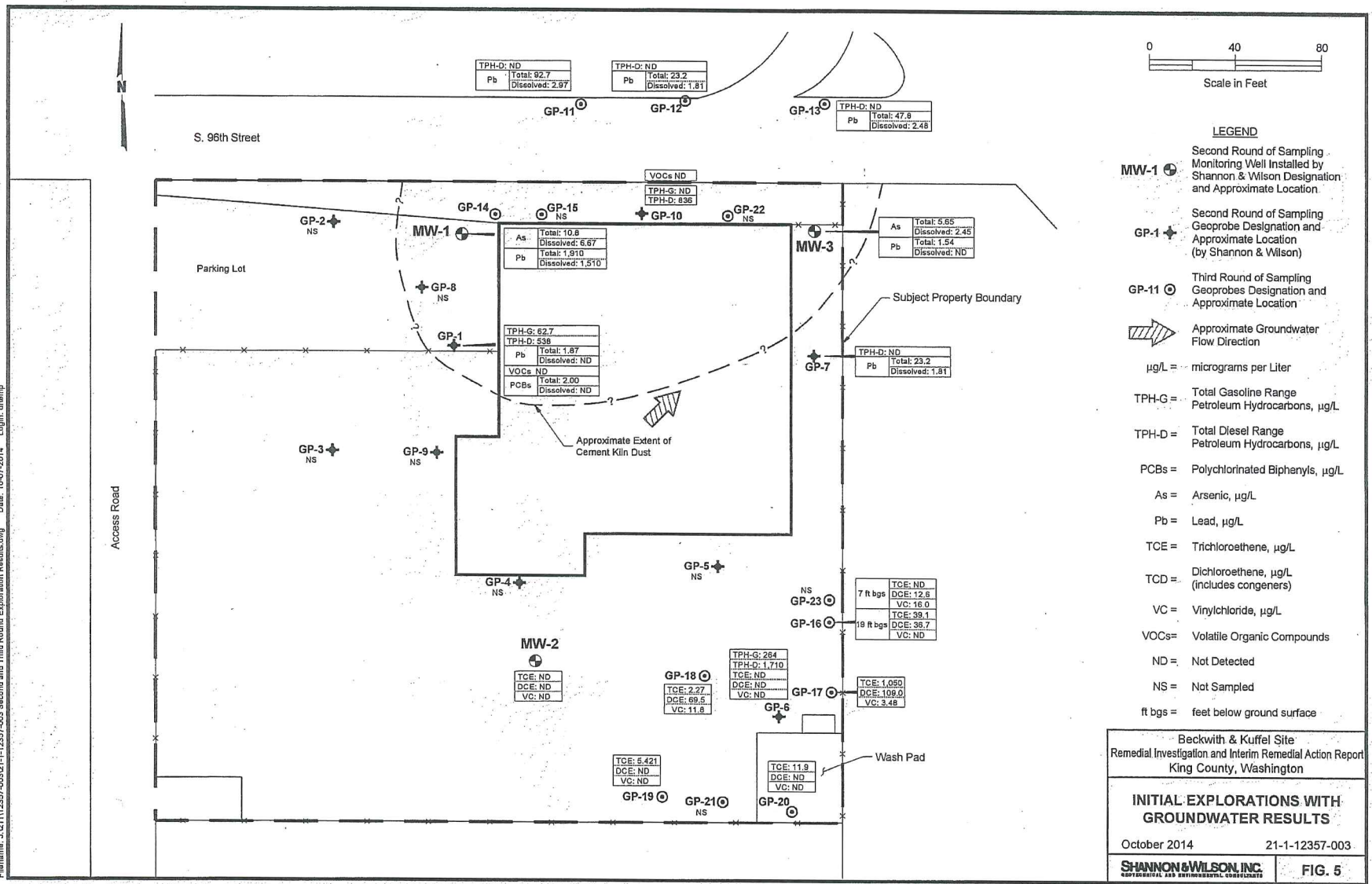
Enclosure A, Figure 2



Enclosure A, Figure 3



Enclosure A, Figure 4



LEGEND

MW-1	Second Round of Sampling Monitoring Well Installed by Shannon & Wilson Designation and Approximate Location
GP-1	Second Round of Sampling Geoprobe Designation and Approximate Location (by Shannon & Wilson)
GP-11	Third Round of Sampling Geoprobes Designation and Approximate Location
	Approximate Groundwater Flow Direction
µg/L =	micrograms per Liter
TPH-G =	Total Gasoline Range Petroleum Hydrocarbons, µg/L
TPH-D =	Total Diesel Range Petroleum Hydrocarbons, µg/L
PCBs =	Polychlorinated Biphenyls, µg/L
As =	Arsenic, µg/L
Pb =	Lead, µg/L
TCE =	Trichloroethene, µg/L
TCD =	Dichloroethene, µg/L (includes congeners)
VC =	Vinylchloride, µg/L
VOCs=	Volatile Organic Compounds
ND =	Not Detected
NS =	Not Sampled
ft bgs =	feet below ground surface

Beckwith & Kuffel Site
Remedial Investigation and Interim Remedial Action Report
King County, Washington

INITIAL EXPLORATIONS WITH GROUNDWATER RESULTS

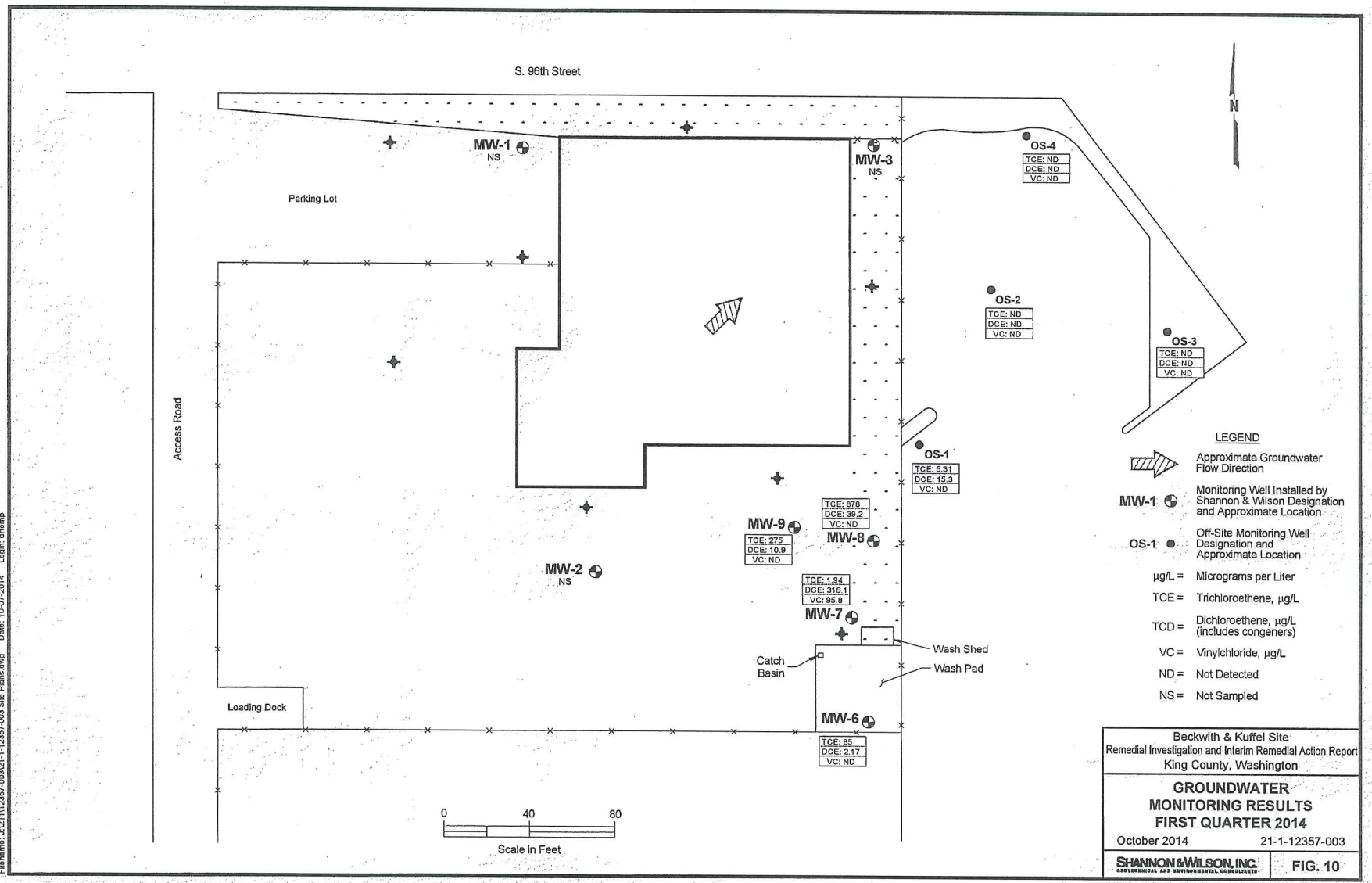
October 2014 21-1-12357-003

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 5

Filename: J:\21\12357-003\21-1-12357-003 Second and Third Round Exploration Results.dwg Date: 10-07-2014 Login: drtemp

Enclosure A, Figure 5



Enclosure B

Remedial Investigation Outline

DEPARTMENT OF ECOLOGY
NORTHWEST REGIONAL OFFICE
REMEDIAL INVESTIGATION OUTLINE
MTCA VCP SITES

The following annotated outline is a suggested schematic for elements to be included in a Remedial Investigation report. It is not intended to replace MTCA's specific requirements as presented in 173-340-350(7) WAC.

The main purpose of the outline is to facilitate the preparation of a document that is clear, comprehensive, and to the point. A secondary, but important, purpose is to make document preparation and review more efficient.

INTRODUCTION *(Concise, bulleted if possible)*

- **Site name, VCP number, Name, address, and phone number of project consultant, Current owner/operator**
- **Purpose of document** *(very brief restatement of what an RI is for, reference the WAC)*

SITE IDENTIFICATION AND LOCATION *(Focus on defining the site in the context of its location)*

- **Site discovery and regulatory status** *(describe how the site was identified and where it is in the MTCA process)*
- **Site and property location/definition** *(define actual MTCA site location relative to property or study area)*
- **Neighborhood setting**

Figure – Vicinity Map *(preferably with topography)*
Figure – Property/Site Map *(preferably with topography)*

Appendix – Legal description of property, present owner and operator, chronological listing of past owners and operators

ENVIRONMENTAL INVESTIGATION/INTERIM ACTION SUMMARY *(Concise summary presentation of the investigations that have been done at the site, along with prior remedial actions. Focused mostly on figures and tables. Details of and methods used in former investigations and remediation in appendices)*

- **Constituents of Concern** *(brief discussion about which specific compounds were chosen for analysis and why)*
- **Soil**
- **Surface water**
- **Ground water**

- **Sediment**
- **Air/soil vapor**
- **Natural resources/wildlife**
- **Cultural history/archeology**
- **Interim actions** *(brief intro to prior remediation activities)*

Figure – Soil investigation data points *(show potential source areas)*
Figure – Surface water/groundwater investigation data points *(show potential source areas)*
Figure – Air investigation data points *(show potential source areas)*
Figure – Prior remediation activities

Table – Exploration Summary
Table – Analytical Schedule per media *(include analytical methods and reporting limits, as possible)*

Appendix – Previous Investigations *(detailed discussion goes here)*
Appendix - Exploration and sampling methodology *(may combine with Previous Investigations)*
Appendix – Boring / Well logs
Appendix - Prior Interim Actions

PROPERTY DEVELOPMENT AND HISTORY *(This section focuses on the built environment, both current and historical, and presents the sources of contamination and release mechanisms.)*

- **Past site uses and facilities**
- **Current site use and facilities**
- **Proposed or potential future site uses**
- **Zoning** *(if appropriate)*
- **Transportation/roads**
- **Utilities, water supply**
- **Potential sources of site contamination**
- **Potential sources of contamination from neighboring properties** *(discuss nearby sources if known)*

Figure – Historical site features *(may be combined with Figure 2)*
Figure – Potential contaminant sources
Figure – Utilities *(may be combined with Figure 2)*

Table – Potential Contaminants

NATURAL CONDITIONS

- **Physiographic setting/topography**
- **Geology** *(focus on interpretation)*
    - Regional Setting *(brief)*
    - Property Geologic Conditions *(synthesis, not a copy of boring logs, provide cross sections)*
    - Physical Properties *(unlikely to need this section, but in some cases may be useful to present data on soil adsorptive capacity, organic content, strength, etc.)*

Figure – Plan view of geologic unit distribution *(if helpful)* Figure - Cross section A-A' *(show borings, wells, screened intervals, water levels)* Figure – Cross section B-B' *(if necessary)*

- **Surface Water** *(brief description of the surface water system)*
    - Property drainage
    - Area surface water/floodplain issues
    - Regulatory classifications, if any *(e.g. surface water classification)*

Figure – Surface water Conditions *(only if information not already in a prior figure)*

- **Ground Water** *(focus on interpretation, show on cross sections)*
    - Occurrence *(aquifers, water levels, confinement, geometry, continuity, physical properties)*
    - Movement *(directions, gradient if important, seasonal fluctuations, tidal influence)*
    - Discharge
    - Recharge *(if significant for site)*
    - Regulatory classifications, if any *(e.g. sole source aquifer)*

Figure – Cross section with ground water information *(if not already included above)* Figure – Water table/potentiometric surface maps *(for various seasons or tidal conditions, show surface water)* Appendix – Ground water elevation data *(a table)*

- **Natural Resources and Ecological Receptors** *(preparatory to a Terrestrial Ecological Evaluation)*
    - Greenbelts and other natural habitat
    - Wildlife
    - Other Information required to conduct evaluations under WAC 173-340 -7491, -7492, or if necessary -7493

Figure – showing natural areas, as appropriate

CONTAMINANT OCCURRENCE AND MOVEMENT *(Very little text, mostly figures and tables, main point is to provide easy-to-understand figures showing the depth and breadth of contamination.)*

- **Waste Material** *(sludges, fluids, stockpiles)*
- **Soil**
- **Surface Water**
- **Ground Water**
- **Sediment**
- **Air/Soil Vapor**

Figures – Cross sections showing soil contamination with depth Figures – Plan views showing soil contamination across site *(relative to releases if known)* Figures – Cross section showing ground water contamination with depth *(if appropriate)* Figures – Plan views showing ground water contamination in each aquifer *(relative to soil contamination and P-head map)* Figures – XY plots of specific contaminants with time *(as appropriate)* Figures – Others as appropriate to show the distribution of surface water, ground water, or air data Tables – All of the analytical data against final cleanup levels *(exceedances highlighted, no need to develop screening levels)* Tables – Summary of exceedances *(if helpful)* Appendix – QA report Appendix – Analytical lab reports

CONCEPTUAL MODEL *(Putting the whole story together, graphic illustrations are best.)*

- **Contaminant release/fate and transport/potential or actual receptors**
- **Data gaps** (*is anything missing)*

CLEANUP STANDARDS *(Developing appropriate cleanup standards based on receptors and pathways.)*

- **Soil**
    - Reasonable maximum exposure
    - Cleanup levels protective of direct contact, ground water, inhalation, terrestrial species, surface water, sediment
    - Points of compliance
    - Regulatory classifications *(classification of soil as dangerous or solid waste)*

- **Ground Water**
    - Highest beneficial use/reasonable maximum exposure
    - Cleanup levels protective of potable use, inhalation, surface water, sediment
    - Points of compliance

- **Other Media as appropriate**
    - Cleanup levels protective of ....
    - Points of compliance

Table – Cleanup Levels *(all potentially applicable values with final selected cleanup level noted)*

AREAS REQUIRING CLEANUP *(The final story detailing where the contamination exceeds an applicable cleanup standard, brief text, mostly tables, figures.)*

- **Constitutuents of Concern** *(a brief summary of compounds that exceed cleanup levels or "indicator hazardous substances" under MTCA. For most service station sites, the COCs should be the same)*
- **Soil – vertical and lateral**
- **Ground water – vertical and lateral**
- **Sediment**
- **Surface Water**
- **Soil Vapor/air**

Figures – Plan view and vertical sections of areas requiring cleanup

REFERENCES