STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

May 26, 2010

Ms. Renee West
Verbeek Wrecking
18416 Bothell Everett Hwy
Bothell, WA 98012

Re: Opinion on Proposed Cleanup of the following Site:

- Name: Verbeek Wrecking
- Property Address: 18416 Bothell Everett Hwy, Bothell, WA 98012
- Facility/Site No.: 51544175
- VCP Project No.: NW1982

Dear Ms. West:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your proposed independent cleanup of the Verbeek Wrecking facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Upon completion of the proposed cleanup, will further remedial action likely be necessary to clean up contamination at the Site?

NO. Ecology has determined that, upon completion of your proposed cleanup, no further remedial action will likely be necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following releases:

- Gasoline-range petroleum hydrocarbons (TPH-G), diesel-range petroleum hydrocarbons (TPH-D), motor oil-range petroleum hydrocarbons (TPH-O) in Soil;

- Hydrocarbon and coal-tar related volatile aromatics - benzene, toluene, ethylbenzene, xylenes (BTEX) in Soil
- Polycyclic aromatic hydrocarbons (PAHs), including carcinogenic PAHs (cPAHs), in Soil;
- Arsenic, Cadmium in Soil;
- TPH-G, TPH-D, BETX, various methyl and butyl benzenes, methyl ethyl ketone, and PAHs in Ground Water.

Note that the contaminants at this site comprise two groupings; one is composed of those associated with automobile wrecking yards, and the other associated with gas manufacturing wastes derived from Gas Works Park. The term "coal tar" is used throughout this letter as a general reference to the gas manufacturing wastes, although other kinds of tar may also be present. The acronym "GWP fill" is also used to denote fill containing the Gas Works Park waste.

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. January 15, 2010, *Interim Remedial Action Plan, Site B Portion of Verbeek Wrecking Yard, Bothell, Washington,* prepared by Dalton, Olmsted & Fuglevand, Inc.

2. December 24, 2009, *Ecology Review Draft, Cleanup Action Plan, Verbeek Wrecking Property, 18416 Bothell-Everett Highway, Bothell, Washington,* prepared by Landau Associates

3. July 21, 2009, *Re: Opinion pursuant to WAC 173-340-515(5) on June 15, 2009, Remedial Investigation Work Plan for the following Hazardous Waste Site: Verbeek Wrecking,* letter from Department of Ecology to Ms. Renee West, Verbeek Wrecking

4. June 15, 2009, *Remedial Investigation Work Plan, Verbeek Wrecking Site, Bothell, Washington*, prepared by Landau Associates.

5. May 20, 2009, *Interim Action Cleanup Report, Verbeek WreckingProperty, 18416 Bothell-Everett Highway, Bothell, Washington*, prepared by Landau Associates.

6. January 29, 2009, *Re: Further Action Determination under WAC 173-340-515(5) on Proposed Remedial Action for the following Hazardous Waste Site: Name: Verbeek Wrecking,* letter from Department of Ecology to Ms. Renee West, Verbeek Wrecking

7. August 22, 2007, *Initial Investigation Field Report,* prepared by Geoffrey Crofoot, Snohomish Health District for Ecology

8. April 13, 2007, letter from Steve Britsch, Snohomish County Surface Water Management, to Steve White, Cascade Auto Wrecking, regarding results of a 3/28/07 inspection.

9. 2007, various emails, correspondence, and field records in Ecology files regarding surface water and process water disposal practices at the Verbeek property.

The Ecology January 29, 2009 opinion letter requested clarification of a "Remediation Report" previously prepared for the Site by GreenCo and CMSI, and required preparation of a Remedial Investigation/Feasibility Study (RI/FS) to complete site characterization and to select a cleanup action. Landau Associates' May 20 report responded to the request for clarification, and their June 15 document was the requested RI work plan. Ecology's comments on the work plan were provided in the July 21 opinion letter. The January 2010 Dalton, Olmsted & Fuglevand and December 2009 Landau reports, combined, provide an RI, FS, and Cleanup Action Plan for the Site. This letter provides an opinion on the proposed cleanup action.

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, Sally Perkins, at (425) 649-7190.

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

Ecology has concluded that, upon completion of your proposed cleanup, **no further remedial action** will likely be necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards and select a cleanup action. The Site is described above and in **Enclosure A.**

2. Establishment of cleanup standards.

a. Soil

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

Cleanup Levels

The Site is located in an area of mixed commercial and residential use. It is also located near terrestrial habitat. As such, human health cleanup levels protective of unrestricted use are necessary, as well as ecological cleanup levels protective of terrestrial wildlife. The soil cleanup levels also need to be protective of leaching to ground water. For any given contaminant, the more stringent of the three cleanup levels (human and ecological health, and ground water protection) generally applies to this Site.

For protection of human health, either Method A or Method B cleanup levels can be used, although Method B is more appropriate and was chosen given the complexity of the Site.

For protection of terrestrial wildlife, cleanup levels were developed using the simplified terrestrial ecological evaluation process (WAC 173-340-7492). Specifically the cleanup levels provided in Table 749-2 were used.

For protection of ground water, cleanup levels were calculated using Ecology's three-phase model.

The table included in **Enclosure B** summarizes the accepted soil cleanup levels for this Site.

Note that soil vapor cleanup levels protective of air quality were not considered necessary because the ground surface is bare, and there are no buildings or structures in the main area of potential soil vapor impact – the former fuel dispenser area (see Site Description, Enclosure A)

Point of Compliance

The point of compliance for protection of human health (direct contact) and terrestrial wildlife is soil throughout the Site to a depth of 15 feet below ground surface. The top of the ground surface is defined as that which will exist immediately after the proposed cleanup action takes place. Ordinarily this

clarification would not be necessary, but contaminated fill is to be excavated and disposed of off-Property in a portion of the Site, and new fill might not be brought back in to raise the grade.

The point of compliance for contaminants that are leaching to, and have been detected in, ground water is soil throughout the Site.

b. Ground Water

Cleanup Levels

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

The highest beneficial use for ground water in the uppermost aquifer beneath the Site is as a source of drinking water. Cleanup levels protective of this use can be based on Method A, Method B, or applicable state and federal laws (e.g., Federal MCLs). The most stringent of these was generally chosen as the selected cleanup level for a given compound or metal.

The table included in **Enclosure B** summarizes the accepted ground water cleanup levels for this Site.

Point of Compliance

The point of compliance for ground water is throughout the Site, from the uppermost level of the saturated zone (the water table) to the lowest most depth which could potentially be affected.

3. Selection of cleanup action.

Ecology has determined the cleanup action you proposed for the Site meets the substantive requirements of MTCA.

The areas of the Site that exceed cleanup levels and the associated cleanup action proposed are as follows:

- Petroleum- contaminated soil and ground water beneath the former fuel dispensers in the eastern part of the Property (maximum 820 mg/kg TPH-G, 14,000 mg/kg TPH-D, and15,000 mg/kg TPH-O in soil; maximum 800 ug/L TPH-D in ground wate) (See Figure 17 in Enclosure A).

Contaminated soils will be excavated and disposed of off-Property. One new monitoring well is proposed in the center of the excavation area. Ecology requires two wells be installed just west of the western edge of the excavation, so that water quality downgradient of the contaminated area can be checked. Ground water conditions will be monitored for two quarters to confirm diesel concentrations are declining. If they are not, a revised ground water cleanup plan will be developed. The current plan proposes monitored natural attenuation. Ecology does not accept this as the only alternative, and would require other alternatives be evaluated should further work be needed.

- Diesel-range petroleum contamination (2,400 mg/kg TPH-D) below a former fuel oil tank north of the shop building (See Figure 17 in Enclosure A).

  There is currently no plan for cleanup of this area. An investigation is underway to determine cleanup requirements in this area.

- Lead-contaminated gravel stripped from the surface of the wrecking yard and stockpiled in the southwest corner of the Property (See Figure 14 in Enclosure A).

  These piles will be removed and disposed of off-Property.

- Coal tar-contaminated soil imported from Gas Works Park and placed as fill in the southeastern portion of the Property. Part of the fill is in-place and has not been excavated, and part has been excavated and stockpiled on the western portion of the Property (See Figure 14 in Enclosure A).

  The in-place fill will be excavated and disposed of off-Property as will the stockpiled GWP fill.

- PAH-contaminated soils at the surface across part of the area where the Gas Works Park fill was placed (See Figure 14 in Enclosure A).

  These soils will also be excavated and disposed of off-Property.

- A small area of PAH-contaminated surface soil near the western edge of the Property around sampling point A-B2 (See Figure 14 in Enclosure A).

  These soils will also be excavated and disposed of off-Property.

- Storm drains, sanitary system, and oil-water separators.

The cleanup action must include an investigation of the potential for contamination in the storm drain, sanitary, and waste processing systems, and at the storm drain outfall. The plan of investigation should be submitted for Ecology review and approval. If contamination is present at concentrations above cleanup levels, it will need to be cleaned up.

Limitations of the Opinion

1. Opinion does not settle liability with the state.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you proposed will be substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. Opinion is limited to proposed cleanup.

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Site upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the VCP.

4. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

Contact Information

Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). As you conduct your cleanup, please do not hesitate to request additional services. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at 425 649-7107 or e-mail at mada461@ecy.wa.gov.

Sincerely,

Mark Adams
NWRO Toxics Cleanup Program

ma/ kp

Enclosures (2): A - Site Description
B - Site Soil and Ground Water Cleanup Levels

cc: Larry Beard, Landau Associates
Matt Dalton, Dalton, Olmstead & Fuglevan
Steve Parkinson, Groff Murphy

Enclosure A

Description and Diagrams of the Site

Enclosure A
Site Description
Verbeek Wrecking

The approximately thirteen-acre Verbeek property (the Property) is located at 18332 Bothell-Everett Highway (SR 527), in an unincorporated part of Snohomish County. The Property occupies the southwest corner of the intersection between the highway and 183rd St. SE.

Verbeek Wrecking operated at the Property between 1956 and 2008. During this 53-year period, a variety of automobile wrecking and salvage activities took place, including vehicle storage, vehicle refueling, body and engine disassembly, parts storage and sales, and automobile crushing and shearing. Several underground storage tanks (USTs) were also used at the Property to temporarily hold waste fluids and to store fuel for vehicles and equipment. The USTs were all in the eastern part of the Property and included the following:

- One 8,000 gallon waste oil tank - located near and partially beneath the former shop building. This tank remains in place, but is not currently being used and reportedly contains no oil.

- Two diesel storage tanks – 5,000 and 6,000 gallons – located near a fuel dispenser. These tanks were removed in 1995.

- One 800-gallon lube oil tank, and 500-gallon and 550-gallon fuel oil tanks – located north of the former shop building. All of these tanks were also removed in 1995.

Soil and ground water that became contaminated due to the wrecking yard operations and to releases from the USTs comprise the main portion of the Verbeek site (the Site).

A second source of contamination, consisting of imported coal-tar contaminated fill, exists at the Property and is also part of the Site. The fill was brought it from the City of Seattle's Gas Works Park in the 1970s, and placed in the southeast corner of the Property. Coal tar wastes of various chemical compositions are typically found at manufactured gas plants, and are rich in polycyclic aromatic hydrocarbons (PAHs). For convenience, this coal-tar contaminated fill is termed "GWP fill".

The boundaries of the Site, as currently known, are within the Property lines, as shown on the attached figure. However, there is some potential for the GWP fill to extend off-Property to the south.

The area around the Property is semi-rural, with low-density commercial and retail business extending north and south along both sides of the highway, and residential properties or undeveloped land to the east and west. Immediately south of the Property is a Golds Gym facility and a storage area for Lease Crutcher Lewis Contractors; to the north are some homes and a dental office. An apparent former farmstead is located a few hundred feet northwest of the Property, and beyond that a large regional park, the North Creek County Park. The park and farmstead contain mostly open grass and wetland areas, with lesser areas of forest. Other forested areas are located immediately west of the Property.

The Property itself contains an existing home/office and a former shop building. A number of other buildings have historically been present at the Property including a steam cleaner/parts shed, a parts shed/office and shop, a third parts shed, and a processing building associated with automobile crushing and shearing. These have all been removed, as have all vehicles, vehicle parts, internal fencing and other structures.

The area around the Site consists of somewhat hummocky terrain near Elevation 250 feet, and is located between the North Creek valley on the west and the Silver Creek drainage on the east. North Creek is about 2,000 feet from the Site, and Silver Creek about 1,000 feet. Silver Creek is a tributary of North Creek, and both flow south.

The Property itself sits across a small north-south trending depression, with a total relief of approximately 22 feet. The highest area adjoins the highway at the east edge of the Property; the lowest is within the depression. Natural runoff from the Property originally flowed south in a gully present along the axis of the depression. The gully was filled in and storm drains now capture the runoff and maintain discharge to the south.

Geologic conditions at the Site consist of fill overlying glacial outwash to the maximum depth explored, 35 feet below ground surface (bgs). The fill was placed in the depression in the southwestern corner of the Property to raise the grade, and may be up to 20 feet thick. It is not clear whether the outwash is a recessional deposit associated with the latest Fraser glaciation, or an earlier advance outwash. Regardless, it contains both clean and dirty (silty) outwash, some with an almost till-like character but with greater permeability. There is some indication that glacial till or a hard silt may actually underlie the outwash, but the data is inconclusive.

Shallow ground water occurs under generally unconfined conditions within the outwash. The depth to the water table is 6 to 8 feet bgs beneath lower areas of the Property and 14 to 20 feet beneath higher areas. Ground water flow directions are westward towards the North Creek drainage.

An interim cleanup action took place at the Site from July to October 2008. The interim action consisted of :

- Surface gravel removal and stockpiling
- Widespread shallow soil excavation throughout the wrecking yard guided primarily by visual signs of contamination. The depth of excavation is not well documented, but is reported to have been 4 to 9 feet.
- Deeper soil excavations to a depth of 12 feet at a couple of locations in the western portion of the wrecking yard.
- Excavated soil stockpiling and subsequent treatment via tilling and incorporation of some unidentified reagent.
- Confirmatory sampling to show the excavated soils had reached cleanup levels, and placement of the treated soils back into the excavation. It is worth noting that the mixing process that occurred as part of excavation and treatment makes it nearly impossible to discern whether cleanup levels were achieved through biodegradation, dilution, or both.
- Soil excavation in the GWP fill area. The depth of excavation in this area reached approximately 8 feet.
- GWP fill stockpiling for future disposal or treatment.

The contaminant nature and distribution was not well documented prior to the interim action, but did suggest the soil contamination attributable to wrecking yard operations was broadly distributed across the property and relatively shallow in depth (most concentrated at the surface and extending downward less than 10 feet). At the close of this interim action, several stockpiles of surface gravel remained, along with a large stockpile of GWP fill. A small area of treated soil also remained. These are still present at the Property.

Because the original extent of soil and ground water contamination had not been fully documented, and because clear documentation on what exactly occurred during the interim action was also lacking, additional investigations were undertaken in 2009 to prepare a final cleanup action plan. These investigations showed the following:

Nature and Extent of Contamination Associated with GWP Fill

- GWP fill soil contains elevated concentrations of carcinogen and noncarcinogenic PAHs, diesel- and oil-range hydrocarbons (TPHd, TPHo, respectively), and benzene, ethylbenzne, toluene, and xylenes (BETX). Several metals (arsenic, barium, chromium, and lead) were also detected at a few locations at concentrations slightly over the applicable cleanup level. However, statistical treatment of the metals data in accordance with MTCA showed no exceedance of the cleanup levels. Many more compounds are actually present in coal-tar, but the TPH, PAHs and BETX provide a reasonable surrogate for the totality of contamination.

- The GWP-contaminated soils are typically present within a 1 to 3-foot thick layer over an area measuring approximately 200' by 300' in the southeast corner of the Property, except where it was removed in 2008. The contaminated layer dips from near land surface to over 10 feet below land surface.

- An area of near-surface PAH soil contamination soil also exists across a portion of the GWP fill area. The origin of this contamination is not known, but it has been speculated that impacted soils were spread around while the GWP fill was being excavated during the 2008 interim action,

- No ground water contamination was detected associated with the GWP fill soils.

Nature and Extent of Contamination Associated with Wrecking Yard Operations

- Crushed rock surfacing across the wrecking yard, as currently stockpiled, is contaminated with TPHd, TPHo, cPAHs, and lead. Of these, only lead exeeds the cleanup level. Other volatile organics and PAH compounds are likely present, but were not analyzed for in gravel samples.

- Surface soils across the wrecking yard surface soils were originally contaminated with TPHd, TPHo, gasoline-range hydrocarbons (TPHg), BETX, and several petroleum-related volatiles (trimethylbenzenes, isopropylbenzenes, butylbenzenes). PAHs were also detected at one location near the stockpile of excavated GWP fill, but may be associated with stray dirt from the stockpile, since PAHs were not detected in other areas of the wrecking yard (except near the GWP fill area as noted above).

- The interim action stripped and reportedly treated the contaminated soils, such that soils across the wrecking yard area now meet cleanup levels (except for the PAH single exceedance).

- Some low-level ground water impacts were detected in grab samples obtained from push borings in areas of the Property potentially impacted by surface-soil contamination. Specifically, benzene and xylenes were detected at two locations along with toluene at one. However, ground water data collected from properly installed monitoring wells in the same areas and elsewhere at the Property showed no detectable hydrocarbons.

- The Verbeek operation was visited on several occasions in 2007 by Ecology, King County, and Snohomish County staff in response to complaints about contaminated surface water and process waste water being discharged to the storm drain system, and about gasoline odors in the side sewer. These complaints were confirmed. An initial investigation was subsequently undertaken by the Toxics Cleanup Program, and an Early Notice Letter issued on January 23, 2008. No further investigations have taken place regarding the storm drain and sanitary sewer system, and it is possible both still contain contaminated sediment or oils. The point of discharge into surface water, presumably Silver Creek, has also not been checked, and the disposition of at least two below-ground oil-water separators and a "bus dump" has not been documented.

Nature and Extent of Contamination Associated with USTs

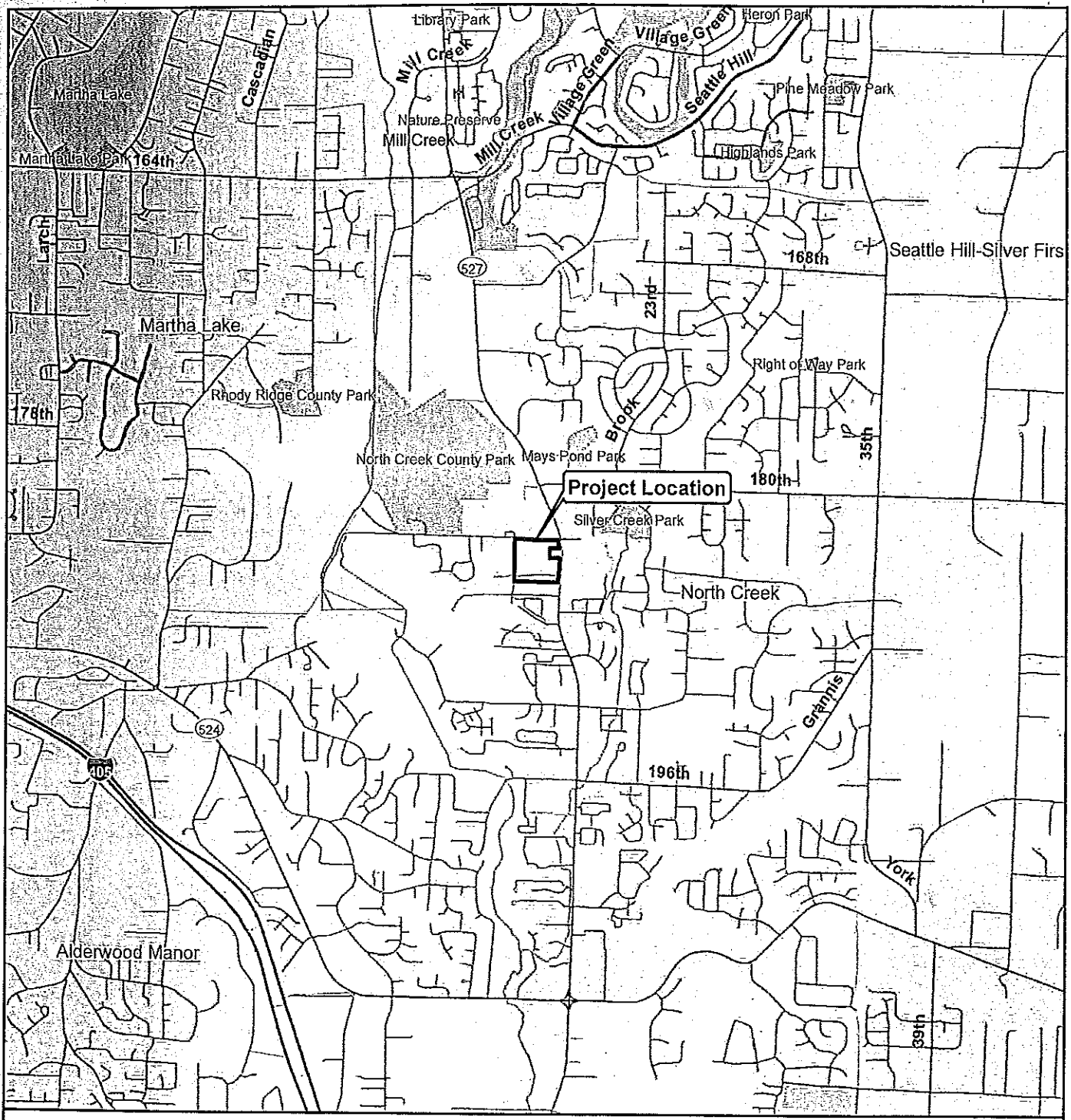
- TPHg, TPHd, and TPHo hydrocarbons have contaminated soils near the former fuel dispenser and associated 5,000- gallon and 6,000-gallon USTs. BETX and PAH compounds are also detected in this area. The area of fuel contamination overlaps a portion of the area impacted by GWP fill, which may explain why the PAH and oil-range petroleum hydrocarbons are present.

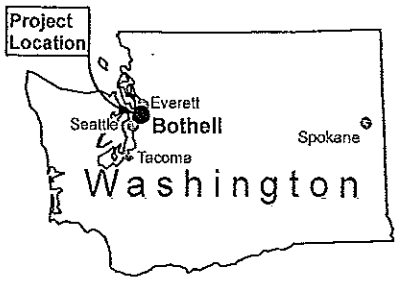
- The fuel contamination near the former fuel dispenser extends in soil 10 to 16 feet to the water table, over an area measuring approximately 50 x 70 feet.

- Relatively low concentrations of total TPHd hydrocarbons, benzene, xylenes, and PAHs below cleanup levels were detected in ground water beneath the former fuel dispenser. The extent of the impacted ground water has not been determined, but likely is within the Property boundaries given the concentrations detected.

- Total diesel-range hydrocarbons were also detected at 2,400 ppm in soil at an unknown depth beneath one of the former fuel oil tanks north of the former shop (these tanks were removed in 1995). The extent of this contamination is not known.

- No ground water contamination has been detected below the former fuel oil tanks.





N

0 0.5 1

Miles

Data Source: ESRI 2008

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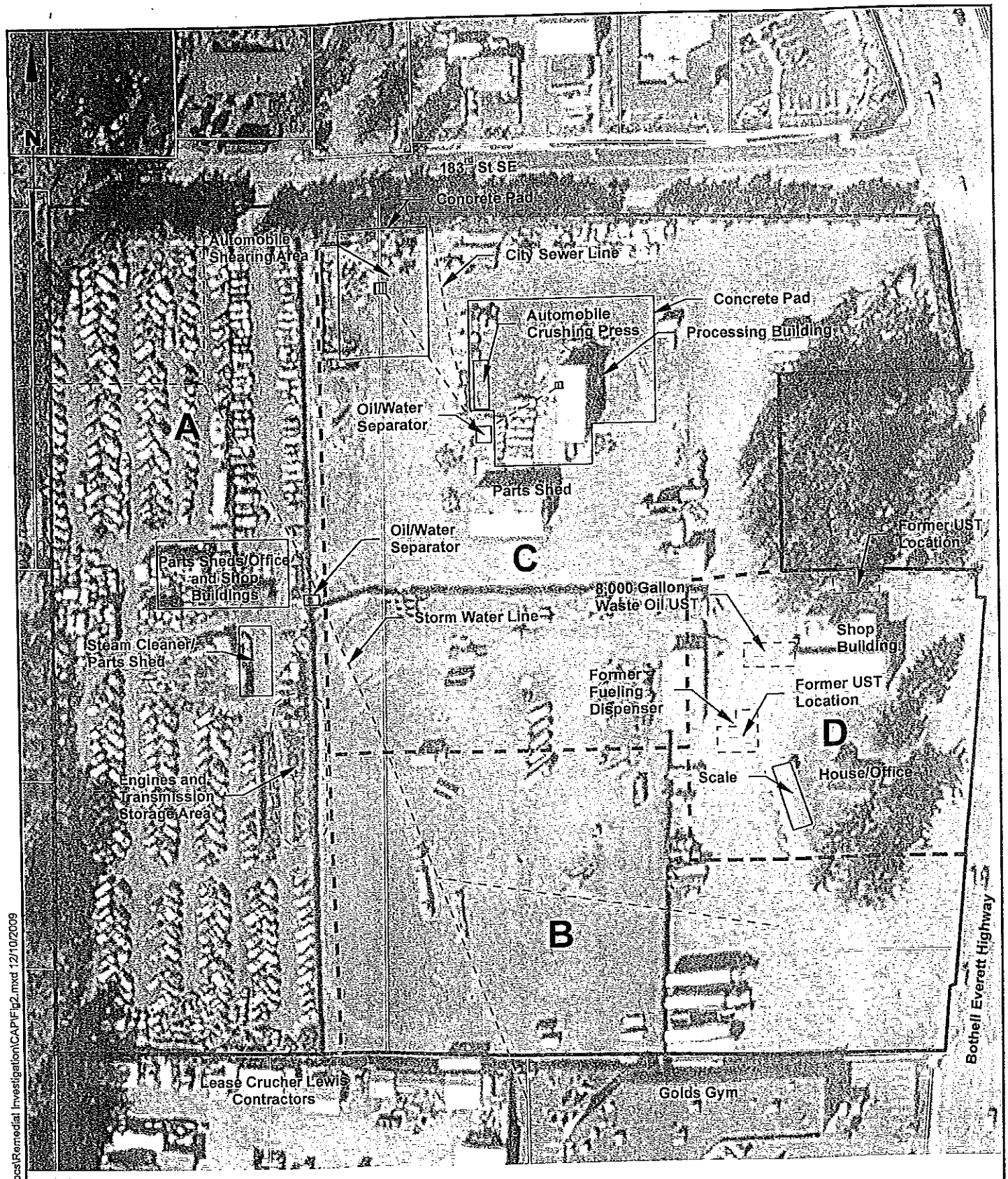
LANDAU ASSOCIATES

Verbeek Wrecking CAP Bothell/Snohomish County Washington	**Vicinity Map**	Figure **1**



Data Source: Snohomish County; ESRI

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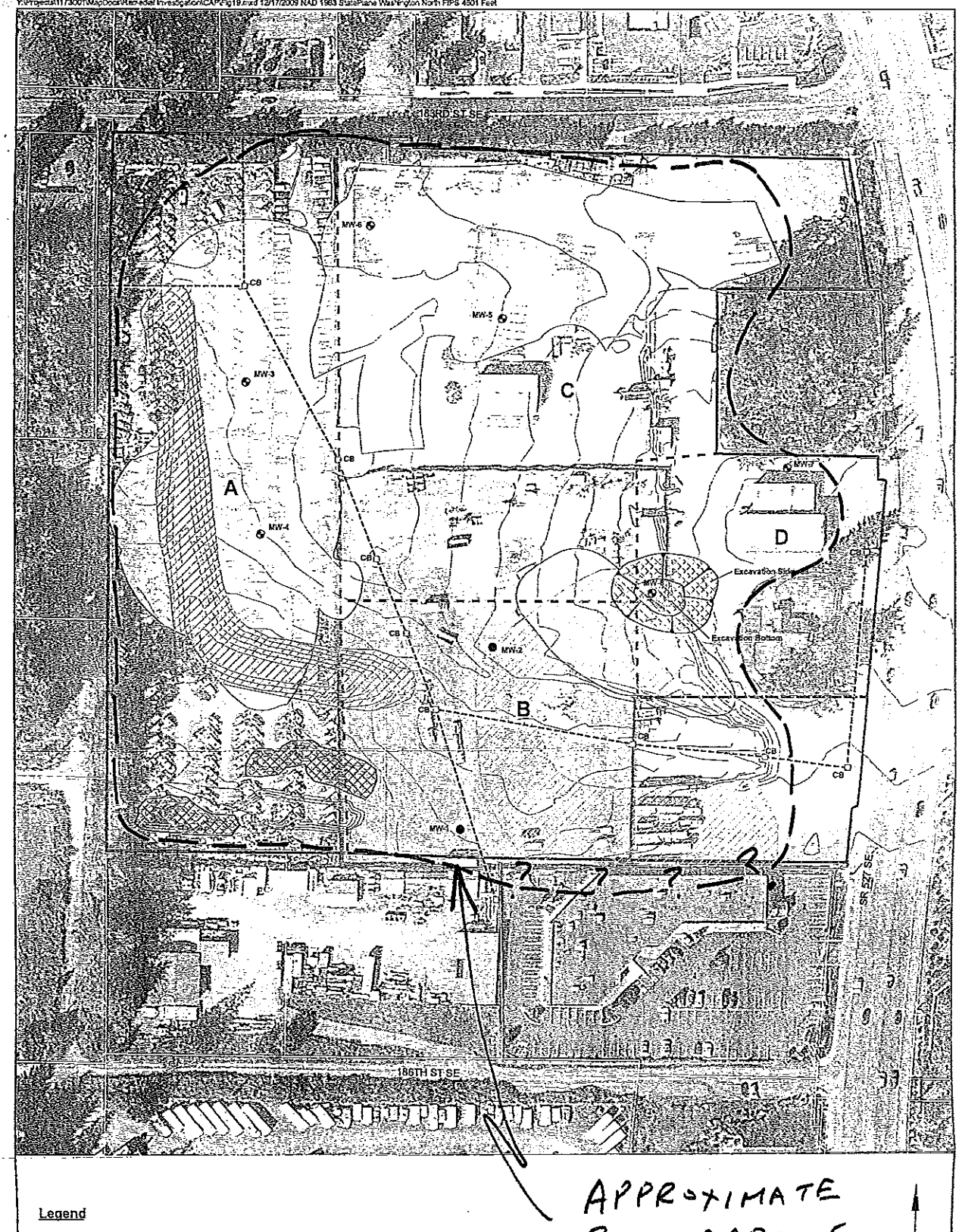
Verbeek Wrecking CAP Bothell/Snohomish County Washington	Historic ~~Site~~ Plan PROPERTY	Figure 2



Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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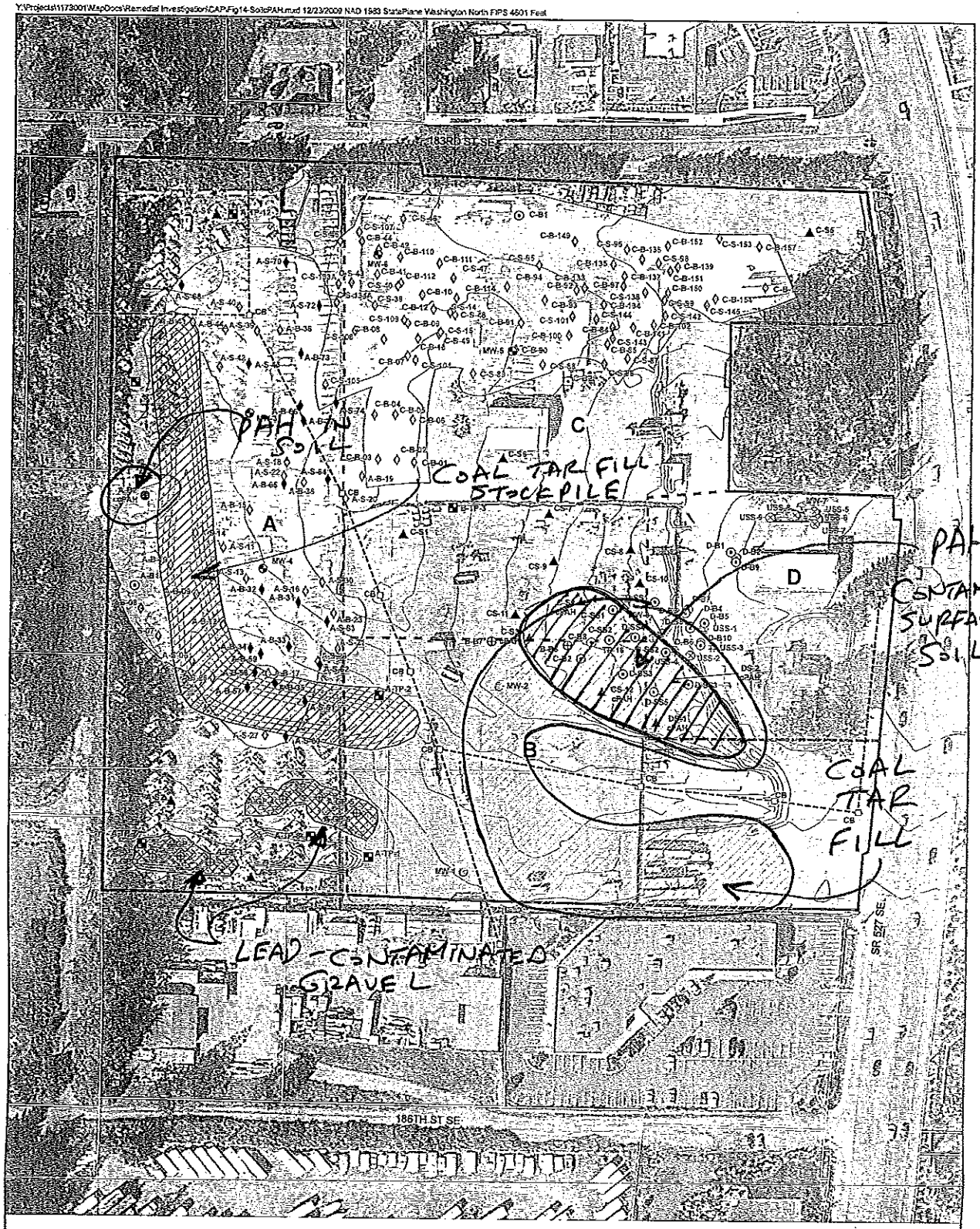
Verbeek Wrecking CAP Bothell/Snohomish County Washington	Cleanup Action Areas	Figure 19

M. Adams Ecology

CLEANUP ACTION AREAS



Legend

- RI Boring Location
- RI Monitoring Well Location
- RI Surface Soil Sample Location
- RI Gravel Stockpile Sample
- Existing Monitoring Well - Green Co. 2008
- 2008 Test Pit Location - Geotech Consultants
- 1995 Excavation Sidewall Confirmation Soil Sample - Geotech Consultants
- 1995 Excavation Bottom Confirmation Soil Sample - Geotech Consultants
- 2008 Boring Location - Geotech Consultants
- Green Co. 2008 Excavation Sample
- Soil Sample Exceeds Cleanup Screening Level - Constituent that exceeds is noted below sample name.
- Sample Location Not Analyzed for cPAHs
- Storm Drains and Sanitary Sewer Lines
- Elevation Contour
- Gravel Stockpile
- Soil Stockpile
- Soil cleanup action area (approximate limits)
- cPAH Affected Area
- Approximate Extent of Remaining GWP Fill

N

0 100 200

Scale in Feet

Data Source: Snohomish County; ESRI; Western Engineers Inc.

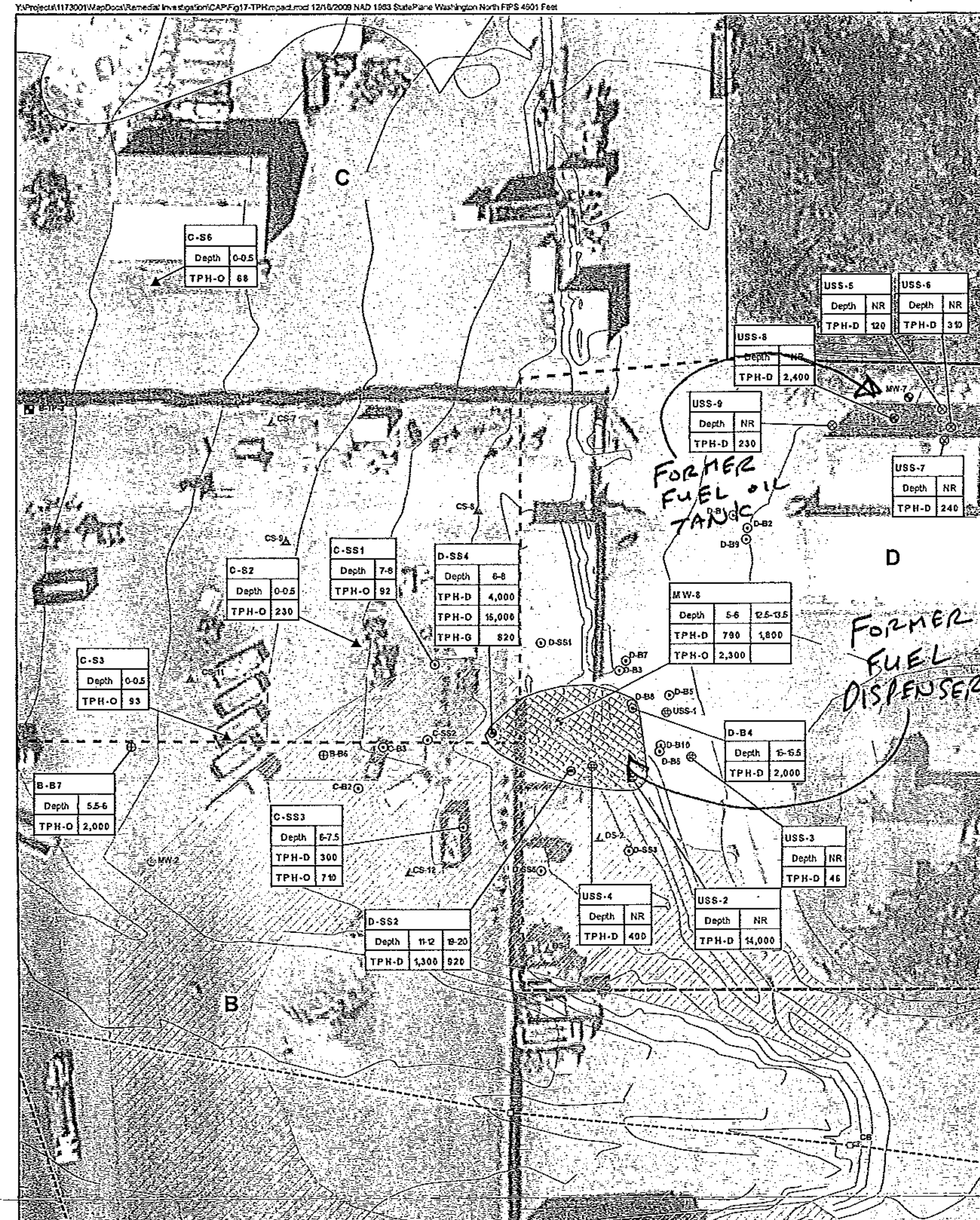
LANDAU ASSOCIATES

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Verbeek Wrecking CAP Bothell/Snohomish County Washington	Current Soil Conditions - cPAHs	Figure 14

Y:\Projects\1173001\MapDocs\Remedial Investigation\CAP\Fig17-TPHimpact.mxd 12/18/2009 NAD 1983 StatePlane Washington North FIPS 4601 Feet



CLEANUP ACTION AREAS

M. ADAMS, ECOLOGY

Legend

- ⊙ RI Boring Location
- RI Monitoring Well Location
- ▲ RI Surface Soil Sample Location
- ● Existing Monitoring Well - Green Co. 2008
- 2008 Test Pit Location - Geotech Consultants
- ⊕ 1995 Excavation Sidewall Confirmation Soil Sample - Geotech Consultants
- ⊗ 1995 Excavation Bottom Confirmation Soil Sample - Geotech Consultants
- ⊕ 2008 Boring Location - Geotech Consultants
- Soil Sample Exceeds Cleanup Screening Level - Constituent that exceeds is noted below sample name.
- Sample Location Not Analyzed for TPH
- Storm Drains and Sanitary Sewer Lines
- Elevation Contour
- Petroleum Hydrocarbon Affected Area
- Approximate Extent of Remaining GWP Fill

Sample ID	
Depth	Interval (ft)
Analyte	Result (mg/kg)

NR = Not Reported

N

0 40 80

Scale in Feet

Notes

1. The Cleanup Level for TPH-D is 460 mg/kg above 15 ft BGS and 2,000 mg/kg below 15 ft BGS. The Cleanup Level for TPH-O is 2,000 mg/kg. The Cleanup Level for TPH-G is 30 mg/kg.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
3. Data boxes only provided for locations where TPH detected.

Data Source: Snohomish County; ESRI; Western Engineers Inc.

LANDAU ASSOCIATES

Verbeek Wrecking CAP
Bothell/Snohomish County
Washington

TPH Impacted Area
TPH Detection Summary

Figure 17

Enclosure B

Site Soil and Ground Water Cleanup Levels

TABLE 5
PRELIMINARY SOIL CLEANUP LEVELS
VERBEEK WRECKING
BOTHELL, WASHINGTON

Constituent	Protective of Direct Human Contact		Protective of Groundwater as Drinking Water	Protective of Terrestrial Ecological Receptors	Adjustments		
	MTCA Method B Unrestricted Land Use Carcinogen	MTCA Method B Unrestricted Land Use Non-Carcinogen	MTCA Method B (a)	Primary Contaminant Soil Concentrations Protective of Terrestrial Ecological Receptors Unrestricted Land Use	PQL (b)	Soil Background (c)	Preliminary Cleanup Level
METALS (mg/kg)							
Arsenic	0.67	24	20 (d)	95	5	7	20
Barium	--	16,000	1700 (k)	1,250	50	--	16,000/1,250 (e)
Cadmium	--	80	0.69 (k)	25	1	1.0	25
Chromium III	--	120,000	3,600,000	42	5	42	120,000/42 (e)
Lead	--	250 (f)	-- (g)	220	5	24	250/220 (e)
Mercury	--	24	2.1 (k)	0.7	0.05	0.07	24 / 0.7 (e)
TOTAL PETROLEUM HYDROCARBONS (mg/kg)							
Diesel-Range	--	2,000 (h)	2,000 (h)	460	20	--	2,000/460 (e,h)
Gasoline-Range	--	100/30 (h, i)	100/30 (h, i)	200	5.0	--	100/30 (h,i)
Oil-Range	--	2,000 (h)	2,000 (h)	--	50	--	2,000 (h)
BTEX (mg/kg)							
Benzene	18	320	0.03	--	0.02	--	0.03
Ethylbenzene	--	8,000	6.0	--	0.05	--	6.0
Toluene	--	6,400	4.7	--	0.05	--	4.7
Xylenes (total)	--	16,000	15	--	0.05	--	15
m,p-Xylene	--	160,000	84	--	0.05	--	84
o-Xylene	--	160,000	92	--	0.05	--	92
Ethylene Glycol	--	160,000	-- (g)	--	--	--	160,000
VOLATILES (mg/kg)							
1,2,4-Trimethylbenzene	--	4,000	-- (g)	--	0.05	--	4,000
1,3,5-Trimethylbenzene	--	4,000	-- (g)	--	0.05	--	4,000
Isopropylbenzene	--	--	--	--	0.05	--	--
Isopropyltoluene	--	--	--	--	0.05	--	--
n-Butylbenzene	--	--	--	--	0.05	--	--
n-Propylbenzene	--	--	--	--	0.05	--	--
tert-Butylbenzene	--	--	--	--	0.05	--	--
p-Isopropyltoluene	--	--	--	--	0.05	--	--
sec-Butylbenzene	--	--	--	--	0.05	--	--

TABLE 5
PRELIMINARY SOIL CLEANUP LEVELS
VERBEEK WRECKING
BOTHELL, WASHINGTON

Constituent	Protective of Direct Human Contact		Protective of Groundwater as Drinking Water	Protective of Terrestrial Ecological Receptors	Adjustments		Preliminary Cleanup Level
	MTCA Method B Unrestricted Land Use Carcinogen	MTCA Method B Unrestricted Land Use Non-Carcinogen	MTCA Method B (a)	Primary Contaminant Soil Concentrations Protective of Terrestrial Ecological Receptors Unrestricted Land Use	PQL (b)	Soil Background (c)	
SVOCs (mg/kg)							
Naphthalene	--	1,600	4.5	--		--	4.5
1-Methylnaphthalene	--	--	-- (g)	--	0.10	--	--
2-Methylnaphthalene	--	320	-- (g)	--	0.10	--	320
1,2-Methylnaphthalenes	--	--	--	--	--	--	--
Acenaphthylene	--	--	--	--	0.10		--
Acenaphthene	--	4,800	98	20	0.10	--	98 / 20 (e)
Anthracene	--	24,000	2,300 (k)	--	0.10	--	24,000
Carbazole	50	--	0.31 (k)	--	0.10	--	50
Dibenzofuran	--	160	--	--	0.10	--	160
Fluorene	--	3,200	101 (k)	30	0.10	--	3,200 / 30 (e)
Phenanthrene	--	--	--	--	0.10	--	--
Fluoranthene	--	3,200	630	--	0.10	--	630
Pyrene	--	2,400	650	--	0.10	--	650
Benzo(g,h,i)perylene	--	--	--	--	0.10	--	--
Benzo(a)pyrene	see total cPAHs	--	see total cPAHs	12	0.10	--	see total cPAHs
Benzo(a)anthracene	see total cPAHs	--	see total cPAHs	--	0.10	--	see total cPAHs
Benzo(b)fluoranthene	see total cPAHs	--	see total cPAHs	--	0.10	--	see total cPAHs
Benzo(k)fluoranthene	see total cPAHs	--	see total cPAHs	--	0.10	--	see total cPAHs
Chrysene	see total cPAHs	--	see total cPAHs	--	0.10	--	see total cPAHs
Dibenzo(a,h)anthracene	see total cPAHs	--	see total cPAHs	--	0.10	--	see total cPAHs
Indeno(1,2,3-cd)pyrene	see total cPAHs	--	see total cPAHs	--	0.10	--	see total cPAHs
Total cPAH - benzo(a)pyrene TEQ (l)	0.14	--	2.3 (k)		--	--	0.14

Shaded cell indicates basis for screening levels.

-- Indicates no criterion available.

(a) Calculated using fixed parameter 3-phase partitioning model, WAC 173-340-747(4) and preliminary groundwater cleanup levels shown in Table 2 of this report.

(b) Practical quantitation limit based on analytical reporting limits.

(c) From Ecology's Natural Background Soil Metals Concentrations in Puget Sound (1994). Used 90th percentile for Puget Sound.

(d) The MTCA Method A soil cleanup level for unrestricted site use was used for arsenic because it was established based on adjustments for background. From Responsiveness Summary for the Amendments to the MTCA Cleanup Regulation Chapter 173-340 WAC 1991.

(e) Soil concentrations protective of terrestrial ecological receptors apply to soil above a depth of 15 feet below ground surface.

(f) No MTCA Method B criteria available. MTCA Method A criteria based on preventing unacceptable blood lead levels is presented.

(g) Value cannot be calculated because Koc value is not available for this constituent.

(h) MTCA Method A soil cleanup levels for unrestricted land use.

(l) MTCA Method A cleanup level is 30 mg/kg when benzene is present and 100 mg/kg when benzene is not present.

(j) A toxicity equivalency quotient (TEQ) will be completed for each sample containing carcinogenic PAHs above reporting limits and the sum of the TEQs will be compared to the benzo(a)pyrene cleanup level in accordance with 173-340-708(8)(e).

(k) Critera based on protection of groundwater not applicable based on empirical demonstration that groundwater not affected

TABLE 6
PRELIMINARY GROUNDWATER CLEANUP LEVELS
VERBEEK WRECKING
BOTHELL, WASHINGTON

	Federal and State Criteria Protective of Drinking Water						MTCA Method B Unadjusted Site Screening Levels		MTCA Method B Adjusted Preliminary Cleanup Levels
Constituent	Federal MCL	State MCL	MTCA Method A	MTCA Method B (Formula Value) Carcinogen	MTCA Method B - Non Carcinogen	Concentration Associated with 10^{-6} Risk (if carcinogen)	Protective of Drinking Water	PQL (a)	Protective of Drinking Water
TOTAL METALS (µg/L)									
Arsenic	10	10	5.0	0.058	4.8	0.58	0.58	0.20	5.0 (b)
Barium	2,000	2,000	--	--	3,200	--	2,000	0.50	2,000
Cadmium	5.0	5.0	5.0		8.0	--	5.0	0.20	5.0
Chromium (total)	100	100	50	--	--	--	100	0.50	100
Chromium (III)	--	100	--	--	24,000	--	100	--	100
Chromium (VI)	--	100	--	--	48	--	48	--	48
Lead	15	15	15	--	--	--	15	1.0	15
TOTAL PETROLEUM HYDROCARBONS (µg/L)									
Diesel-Range	--	--	500	--	--	--			500
Gasoline-Range	--	--	1,000/800 (c)	--	--	--			1,000/800 (c)
Oil-Range	--	--	500	--	--	--			500
BTEX (µg/L)									
Benzene	5.0	5.0		0.8	32	8.0	5	1.0	5
Ethylbenzene	700	700		--	800	--	700	1.0	700
Toluene	1,000	1,000		--	640	--	640	1.0	640
Xylenes (total)	10,000	10,000		--	1,600	--	1,600	1.0	1,800
VOLATILES (µg/L)									
Acetone	--	--	--	--	800	--	800	10.0	800
2- Butanone (MEK)	--	--	--	--	4,800	--	4,800	10.0	4,800
1,2,4-Trimethylbenzene	--	--	--	--	400	--	400	1.0	400
1,3,5-Trimethylbenzene	--	--	--	--	400	--	400	1.0	400
Isopropylbenzene	--	--	--	--	--	--	--	1.0	--
n-Propylbenzene	--	--	--	--	--	--	--	1.0	--
Methyl-t-butyl ether	--	--	--	24	6,800	--	24	1.0	24
tert-Butylbenzene	--	--	--	--	--	--			

TABLE 6
PRELIMINARY GROUNDWATER CLEANUP LEVELS
VERBEEK WRECKING
BOTHELL, WASHINGTON

Constituent	Federal and State Criteria Protective of Drinking Water						MTCA Method B Unadjusted Site Screening Levels		MTCA Method B Adjusted Preliminary Cleanup Levels
	Federal MCL	State MCL	MTCA Method A	MTCA Method B (Formula Value) Carcinogen	MTCA Method B - Non Carcinogen	Concentration Associated with 10^{-6} Risk (if carcinogen)	Protective of Drinking Water	PQL (a)	Protective of Drinking Water
PAHs (µg/L)									
Naphthalene	--	--	160 (d)	--	160	--	160 (d)	0.38	160 (d)
2-Methylnaphthalene	--	--	160 (d)	--	32 (e)	--	32 (e)	0.32	32 (e)
1-Methylnaphthalene	--	--	160 (d)	--	--	--	160 (d)	0.41	160 (d)
Acenaphthene	--	--	--	--	960	--	960	0.42	960
Fluorene	--	--	--	--	640	--	640	0.39	640
Phenanthrene	--	--	--	--	--	--	--	--	--
Anthracene	--	--	--	--	4,800	--	4,800	0.35	4,800
Fluoranthene	--	--	--	--	640	--	640	0.26	640
Pyrene	--	--	--	--	480	--	480	0.35	480
Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--
cPAHs (µg/L)									
Benzo(a)pyrene	0.20	0.20	see total cPAHs	0.012	--	0.12	0.12	0.014	0.12
Benzo(a)anthracene	--	--	see total cPAHs	see total cPAHs	--	--	see total cPAHs	0.020	see total cPAHs
Benzo(b)fluoranthene	--	--	see total cPAHs	see total cPAHs	--	--	see total cPAHs	0.017	see total cPAHs
Benzo(k)fluoranthene	--	--	see total cPAHs	see total cPAHs	--	--	see total cPAHs	0.036	see total cPAHs
Chrysene	--	--	see total cPAHs	see total cPAHs	--	--	see total cPAHs	0.019	see total cPAHs
Dibenzo(a,h)anthracene	--	--	see total cPAHs	see total cPAHs	--	--	see total cPAHs	0.014	see total cPAHs
Indeno(1,2,3-cd)pyrene	--	--	see total cPAHs	see total cPAHs	--	--	see total cPAHs	0.017	see total cPAHs
Total cPAHs - TEQ	--	--	0.10	0.012	--	0.12 (f)	0.12	--	0.12 (f)

Shaded cell indicates basis for screening levels.

-- Indicates no cleanup level criteria available.

(a) Practical quantitation limit based on reporting limit from previous investigation except for metals. Metals PQL is based on Analytical Resources, Inc. laboratory reporting limit for analytical method 6020.

(b) Ecology's potable groundwater Method A Cleanup Screening Level for arsenic is based on background concentrations of this metal in groundwater (WAC 173-340-900; Table 720-1. As such, the proposed Cleanup Screening Level for arsenic of 5 ug/L is based on the MTCA Method A level for potable groundwater.

(c) Preliminary cleanup level of gasoline-range petroleum hydrocarbons is 800 ug/L if benzene is present, or is 1,000 ug/L if no detectable benzene is present in groundwater.

(d) Cleanup level is a total value for naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

(e) The concentration of 2-methylnapthalene cannot exceed 32 ug/L. The total concentration of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene cannot exceed 160 ug/L.

(f) A toxicity equivalency quotient (TEQ) will be completed for each sample containing carcinogenic PAHs above reporting limits and compared to the benzo(a)pyrene cleanup level protective of drinking water in accordance with 173-340-708(8)(d).