



A.D.A.M.S

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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

January 24, 2011

Ms. Lauren Carroll
Pacific Crest Environmental
1531 Bendigo Blvd.
North Bend, Washington 98045

Re: Opinion on Proposed Cleanup of the following Site:

- **Site Name:** Streibels Deli Mart
- **Site Address:** 26605 State Road 104 NE, Kingston, WA
- **Facility/Site No.:** 681 981 52
- **VCP Project No.:** NW 2232

Dear Ms. Carroll:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your proposed independent cleanup of the Streibels facility (Site). Specifically, a remedial investigation and feasibility study (RI/FS) document was prepared and submitted for the Site. The RI/FS document concluded with the identification of a preferred cleanup alternative. An opinion was requested on the adequacy of the RI/FS and the proposed cleanup action. This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Note: The property at 26605 State Road 104 NE is referred to in this letter as the Property or the Streibel's property, whereas the contaminated area is referred to as the Site.

FURTHER NOTE: The potential exists for contaminated soil vapor to have migrated in the unsaturated zone beneath residential homes north of the Property. Ecology considers this to be a significant potential, and recommends further investigation and, if necessary, mitigation measures as soon as possible. We are specifically recommending a soil vapor evaluation be initiated immediately at the north edge of the Property, rather than waiting for final approval of an overall approach to site cleanup.

Issue Presented and Opinion

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

YES. Ecology has determined that, upon completion of your proposed cleanup, further remedial action will likely be necessary to clean up contamination at the Site.



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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 total petroleum hydrocarbons (GRO); and benzene, ethylbenzene, toluene, and xylenes (BETX) into the Soil, Ground Water, and Air.
- Diesel-range total petroleum hydrocarbons (DRO) into the Soil
- Methyl tert-butyl ether (MTBE) into the Ground Water.

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

Please note that 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. August 20, 2010, *Remedial Investigation-Feasibility Study Report, Streibel's Texaco, 26605 State Road 104 NE, Kingston, Washington*, by Pacific Crest Environmental, LLC
2. March 27, 2008, *Re: Phase II Environmental Site Assessment Letter Report, Retail Fueling Station, 26605 State Route 104, Kingston, Washington*, by Environmental Partners Inc.

Note that additional documents have been prepared for this Site, but were not reviewed for this letter.

Those documents are kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. You can make an appointment by calling the NWRO resource contact, Sally Perkins, at 426 649-9190.

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, **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 not sufficient to establish cleanup standards and select a cleanup action. The Site is described above and in **Enclosure A.**

The following specific characterization issues need to be addressed:

Air

- High concentrations of GRO and associated BETX compounds are present in soil vapor at the Site. The potential exists for the soil vapor to have migrated in the unsaturated zone beneath residential homes north of the Property. Ecology considers this to be a significant potential, and recommends further investigation and, if necessary, mitigation measures as soon as possible.

✓ Habitat

- Habitat conditions on and around the Site have not been described. This needs to be done to provide the basis for evaluating the need for soil cleanup levels protective of terrestrial species.

Surface Water

- Surface water drainage on and near the Site has not been described. This needs to be done to provide the basis for evaluating whether surface water could be impacted by releases at the Site.

Geology

- Ecology requests that the next document prepared for this Site, presumably a revised RI/FS, include a copy of all boring and monitoring well logs.

Soil Contamination

- The potential for near-surface soil contamination beneath the existing pump island has not been evaluated. Only one shallow sample has been obtained in this area (sample from 5 feet at GP-1). Although Ecology does not typically compel explorations for the purpose of determining whether a separate release exists near a known release, we are requesting such in this case because the pump island is too close to the known release area and could affect remediation efforts.

- The lateral extent of soil contamination and free product (LNPL) has been largely determined from land surface to a depth of about 35 feet, the interval where contaminant migration appears to have been predominantly downward. The lateral extent below this depth, where vertical migration may have changed to sideways spread on perched water-bearing zones and finer-grained sediment layers, has not been fully characterized. Specifically, the available information suggests the deeper lateral extent is bounded on the east and west, but not on the south or north. This data gap is particularly critical on the south where the land surface itself drops about 40 feet, bringing it close to the elevation where free product is first encountered beneath the Property.
- The vertical extent of soil contamination has not been determined. The deepest soil samples obtained to date have been at a depth of 40 to 45 feet. Highly contaminated ground water is present below this depth at about 60 feet below ground surface (bgs), suggesting the possibility soil contamination extends deeper than 45 feet. It has been asserted that a "thick clay aquitard" begins near 60 feet bgs. If so, then the base of the soil contamination is likely near 60 feet bgs. However, the only boring extending into the aquitard is MW-18, and the aquitard here is noted as consisting of interlayered silt beds and sand beds on the order of 5 to 15 feet thick. Ecology believes it very likely that the base of the soil contamination is, in fact, at around 60 feet bgs, but requires sampling data to confirm this hypothesis.

Ground Water

- Ecology generally concurs with the identification of the two primary water-bearing zones, shallow and deep, and also agrees they are likely both perched. Ecology also agrees with the general interpretation of flow in both zones, although there are issues with these interpretations as described below. However, some discussion of seasonal affects on ground elevations and flow, if any, needs to be provided. It would also be very helpful if a cross section was provided with the next report showing actual water bearing zones as they were encountered in the borings. These water bearing zones could be shown in blue so that their occurrence and distribution would be more clear.
- The interpretation that the shallow and deep water bearing zones are perched implies that the regional water table, or at least the top of the saturated zone, has not been reached, and that there is a potential for contamination to have migrated below the deepest explorations completed to date at the Site. If the aquitard mentioned previously is of sufficient thickness, continuity, and permeability, it may provide a floor for the contamination. If not, the vertical extent of ground water contamination has not been established. Further investigation is therefore required to determine which of these is true; several deeper borings will likely be necessary for this determination. Ecology recommends that at least one of the

borings go all the way through the aquitard into the next deepest water bearing zone and completed as a monitoring well.

- The lateral extent of ground water contamination is more problematic than the vertical extent, and has not been determined. Unlike unconfined aquifers, flow in a perched water-bearing zone is often governed by the slope and shape of the underlying deposit on which the ground water is perched, and the presence of windows which allow vertical flow. Although these features have not been defined beneath the Site, a cluster of shallow zone wells south of the pump island do suggest flow to the southwest through a trough extending from MW-1 to MW-2. A similar cluster of wells is not available in the main contaminant source area (former pump island and tank nest), so shallow zone flow in this area is completely unknown.

In the area of defined shallow zone flow, free product is present. There are no downgradient wells to the southwest, so it is not known whether free product or ground water contamination in the shallow zone extends off Property in this direction. If we assume the product is simply dropping vertically downward to the underlying deep water bearing zone, the lateral extent of contamination is still uncertain (although MW-8 does appear to provide a southwest boundary). Ground water flow in the deeper zone appears to be off-Property to the southeast, where no monitoring wells exist. However the interpretation of southeast flow in the deeper zone is also uncertain – the available data include four wells with very similar water surface elevations (i.e., all are on the same contour) and only one well with a different, higher, elevation.

In summary, further characterization of shallow zone flow is needed near the main source area and downgradient of MW-2, and further characterization of deep zone flow is needed southeast and west of the main source area.

- The use of ground water for water supply in the area has not been described, nor have wells in the area been identified. This needs to be done as part of the basis for establishing whether ground water beneath the Property is nonpotable.
- MTCA requires that GRO-contaminated ground water be tested for fuel additives and blending compounds (MTBE, EDB, and EDC – Table 830-1). If detected, contaminated soil must also be analyzed for these compounds. It is not clear whether ground water at this Site was analyzed for EDB and EDC. MTBE was detected in ground water, but not analyzed in soil.

2. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site do not meet the substantive requirements of MTCA, as follows.

a. Soil

Contaminated soil at this Site is a threat to human health via leaching to ground water, volatilization into air, and direct contact/ingestion. It has been asserted that the direct contact pathway is not present at this Site because the contamination is below 15 feet. This is not correct. Soil samples collected at a couple of locations near 10 feet bgs had GRO in the range of 5,000 to 11,000 mg/kg. Soil cleanup levels therefore need to be protective of all these pathways.

A discussion is also needed in the next document describing whether cleanup levels are necessary for protection of terrestrial species. The terrestrial ecological evaluation (TEE) form provided by Ecology is fine for an appendix, but the actual discussion and analysis needs to be in the body of the report.

The proposed soil cleanup levels listed on Page 4-5 of the August 20, 2010 RI/FS report are for protection of non potable ground water only. Ecology does not accept these cleanup levels unless it can be demonstrated that they are also protective of air, direct contact, and, potentially, terrestrial wildlife and potable water. Note that the Method B calculation of a benzene soil concentration protective of air in Appendix G appears to have a mathematic error (we calculate .08 mg/kg, not .279 mg/kg). Calculations for the other compounds might also be in error.

The point of compliance for soil is throughout the Site.

b. Ground Water

It has been asserted that ground water at the Site is not potable, based on the yield criterion in MTCA, and that a cleanup level for ground water is needed solely to protect air. Ecology agrees that a cleanup level protective of air is needed. Ecology also agrees that impacted ground water at the Site is likely not potable and is not likely to reach potable water; however, this has not been proven. Further proof in the form of pumping test data, or other quantitative analysis, is required to show sustainable yields of less than .5 gallons per minute. Further aquitard/ground water quality/ground water use characterization is also required, as outlined previously in this letter.

The ground water cleanup levels listed on Page 4-4 of the August 20, 2010 RI/FS report are not accepted. First, they do not match the screening levels in Table B-1 of Ecology's Draft October 2009 "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action", and no support has been provided in the text of the RI/FS for changing the screening level equation values (Note: We think there may be an arithmetic error in the screening level listed for benzene in the guidance document and are checking with the authors). Second, they can't be accepted until and unless ground water can be established as nonpotable.

The point of compliance also remains to be determined.

c. Air

Soil vapor at the Site emanating from contaminated soil and ground water does have the potential to pose an indoor air risk. An air cleanup level is therefore needed to protect air at the Property. Ecology accepts the air cleanup levels listed on Page 4-3 of the August 20, 2010 RI/FS report, but not the soil vapor screening levels; support for changing the Method B parameters used to calculate the soil vapor screening levels was not provided. Note that the screening levels should be considered "remediation levels" under MTCA, and could be used to help evaluate or test the effectiveness of a cleanup action.

The point of compliance for air is ambient air throughout the site.

3. Selection of cleanup action.

Ecology has determined the cleanup action you proposed for the Site does not meet the substantive requirements of MTCA. However, we recommend you implement the proposed remedial action immediately as an "interim action" under MTCA. Doing so will immediately reduce the risk of soil vapor intrusion, and will begin what is likely to be a lengthy cleanup process.

The selected cleanup action includes soil vapor extraction (SVE) along with light non-aqueous phase liquid (LNAPL) removal. Extracted air would be treated prior to discharge to the atmosphere, and air sparging might be implemented, if believed necessary. Essentially this cleanup approach relies on removing the source of ongoing contamination (the LNAPL) while simultaneously using vaporization to reduce soil and ground water contamination. Ground water monitoring is proposed to track affects of the SVE on ground water.

Ecology believes the proposed cleanup action is an appropriate approach for this Site, but cannot accept it at this time because of remaining questions about the site characterization and selection of cleanup levels, as described previously. Addressing these questions might require some changes in the cleanup approach.

In the meantime, Ecology has the following comments on the proposed cleanup action:

- Monitoring vapor intrusion will be a necessary component of any approved cleanup action that does not immediately clean up the Site. The currently proposed cleanup action, for example, might include soil vapor air pressure monitoring to show that soil vapor pressures are being maintained at less than atmospheric pressure beneath buildings.

- Although SVE effluent monitoring is not explicitly mentioned as being part of the proposed cleanup action, it obviously would be.

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 your Property under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may resubmit your proposal for our review. Please do not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

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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 at 425 649-7170.

Sincerely,



Mark Adams
NWRO Toxics Cleanup Program

ma/kh

Enclosures (1): A – Description of the Site

cc: Clark Davis, Davis Law Office PLLC

Enclosure A

Description and Diagram of the Site

Site Description

Site: The Site comprises petroleum hydrocarbon releases, primarily gasoline, at the property located at 26605 State Road 104 NE near Kingston in Kitsap County (the Property). An operating convenience store, with retail fuel sales, currently occupies the Property. The Property and the Site are shown on the attached Site Map.

Area Description: The Property is situated at the junction of State Road 104 and State Route 307 in a largely rural area of north Kitsap County. These roads constitute the major transportation routes for the area, and their junction is shown on maps as Streibels Corner. Although most of the surrounding area is rural, there are both residential and commercial areas of development close by. Immediately across State Route 104 to the south is an industrial park situated in an old gravel pit. Another industrial park is located across the road to the west. Adjoining the Property to the north is a large residential development. Remaining areas near the Property are occupied by low density rural properties or are undeveloped.

Property History and Current Use: The Property was originally a field. It was then developed in 1941 as a gas station, with an associated residence and farm outbuildings. The residence and farm buildings were demolished in 1965, a new convenience store constructed, and retail gas sales continued. The convenience store was later rebuilt in about 2003. In all, retail gas operations have been underway at the Property for almost 70 years.

Former fuel storage facilities included those from 1941, of which nothing is known, and five underground storage tanks (USTs) installed in 1965. Fuels stored in these tanks included gasoline and heating oil. New USTs were installed in 2003 and contain, or have contained, diesel and gasoline.

Sources of Contamination: Potential contamination sources consist of leaks and spills associated with former and current USTs, pump islands, and supply piping. The type of contamination expected would mostly be gasoline, diesel, heating oil, and various fuel additives, although non-chlorinated solvents (e.g., mineral spirits) and chlorinated solvents (e.g., trichloroethylene) could also potentially be present associated with automotive repair. Other less likely contaminants include PCBs in waste oil, and heavy metals such as cadmium and lead from battery fluids.

Physiographic Setting: The Site and surrounding area is at the north end of the Kitsap Peninsula, and bordered by Puget Sound on the east, Hood Canal on the west, and Admiralty Inlet on the north. The Property itself sits within a topographic saddle at about Elevation 195 feet above mean sea level. The land surface drops off gently to the northwest from the Property towards an arm of Admiralty Inlet (Gamble Bay), and steeply off to the south into what appears to be a glacially sculpted fluvial channel. The base of the channel is at about Elevation 60 to 80 feet. The land surface east of the Property rises to the east.

Surface/Storm Water System: Surface water conditions have not been described.

Ecological Setting: Ecological conditions have not been described.

Geology: Shallow geologic conditions at the Site have been explored to a depth of about 90 feet at the Site, but not been specifically identified in terms of genetic origin. However, grain size descriptions have been provided (e.g., sand, silty sand), and a cross section has been developed showing the distribution of grain sizes. Ecology's interpretation is:

- 30 to 40+ feet of glacial fluvial sands are present across the entire Site below a depth of about 20 feet. These are likely the deposits that were mined in the nearby gravel pit.
- The origin of the 20 feet of sediment above the fluvial sand is not clear. This shallow deposit is described as sandy silt with a trace of gravel. It is hard to tell whether this is a glacial till, a silty outwash, or even a lacustrine deposit.
- The origin of the deposit below the fluvial sand is more clear. These deeper sediments consist of finer grained silt and silty fine sand beds, suggesting lacustrine deposition. The depth and continuity of these deeper sediments has not been confirmed.

Ground Water: Ground water to the depth explored beneath the Site appears to occur as a series of perched water-bearing zones. These can be grouped into two primary depth intervals, a 40 - 50 feet shallow zone and a 60 - 70 foot deep zone. However, ground water also occurs perched at shallower depths, particularly in the upper silty sand deposits.

Ground water flow in the shallow zone is at least partly to the southwest. Ground water flow in the deep zone may be to the south. However, the data supporting flow directions are sparse, and may not accurately represent actual conditions. Vertical flow may also be occurring in some areas.

Water Supply: One well is located at the Property and is reportedly completed to a depth of 275 feet. The screened interval is not known to Ecology. Other water supply wells likely exist in the area given it's rural nature.

Release and Extent of Contamination - Soil: Petroleum hydrocarbons releases did occur at the Property from the sources listed above. Gasoline-range hydrocarbons (GR), along with associated benzene, ethylbenzene, toluene, and xylenes (BETX) and MTBE, are the major contaminants. Diesel-range hydrocarbons (DRO) have also been detected at Site, but in very limited quantities and locations. An age dating study performed on free-product and ground water recovered from the Site indicated that one release of leaded gasoline occurred in the mid-1970s, and that a second release had occurred later. Notwithstanding the results of this study, Ecology believes it likely that various other releases occurred over the history of the Property.

The bulk of the soil contamination appears to be present from a depth of 10 feet downward, suggesting release from the base of tanks. Migration of the released product appears to have initially been mostly downward, with little lateral spread, first through the silty sand and then into and through the fluvial sands. As the release migrated further downward it accumulated on a lense of lower permeability sediment about 40 feet below ground surface (bgs), coincident with the shallow perched zone. The lateral spread of soil contamination was narrow, as described above, near the surface, and may only be 50 by 50 feet in plan dimension. The lateral spread was much wider at 30 to 35 feet bgs, and currently has a footprint of at least 150 by 50 feet. The lateral spread below 35 feet may be even wider, but there is insufficient sample data at this depth to know.

Extent of Contamination – Ground Water: Ground water in the shallow and deep perched water-bearing zones beneath the Property is contaminated. Whether contamination extends even deeper has not been determined.

In the shallow zone, all of the wells contain free-product (mostly gasoline) in an area approximately 75 feet by 100 feet. There are no wells downgradient of this area to the southwest, so the lateral boundary of the free-product (and contaminated ground water) is not known. The lateral extent is also not known with assurance in the area near the main source area (the tank nest). There are a number of dry wells in this area, and otherwise sparse coverage.

In the deep zone, ground water is contaminated beneath the area where the shallow zone contains free product (two wells). Outside this area, only benzene is detected at low levels (two wells) or no contaminants are detectable (one well). Flow in this deep zone is not well known, as described previously, but appears to be to the southeast. If this is true, contaminated ground water likely extends off-Property in that direction.

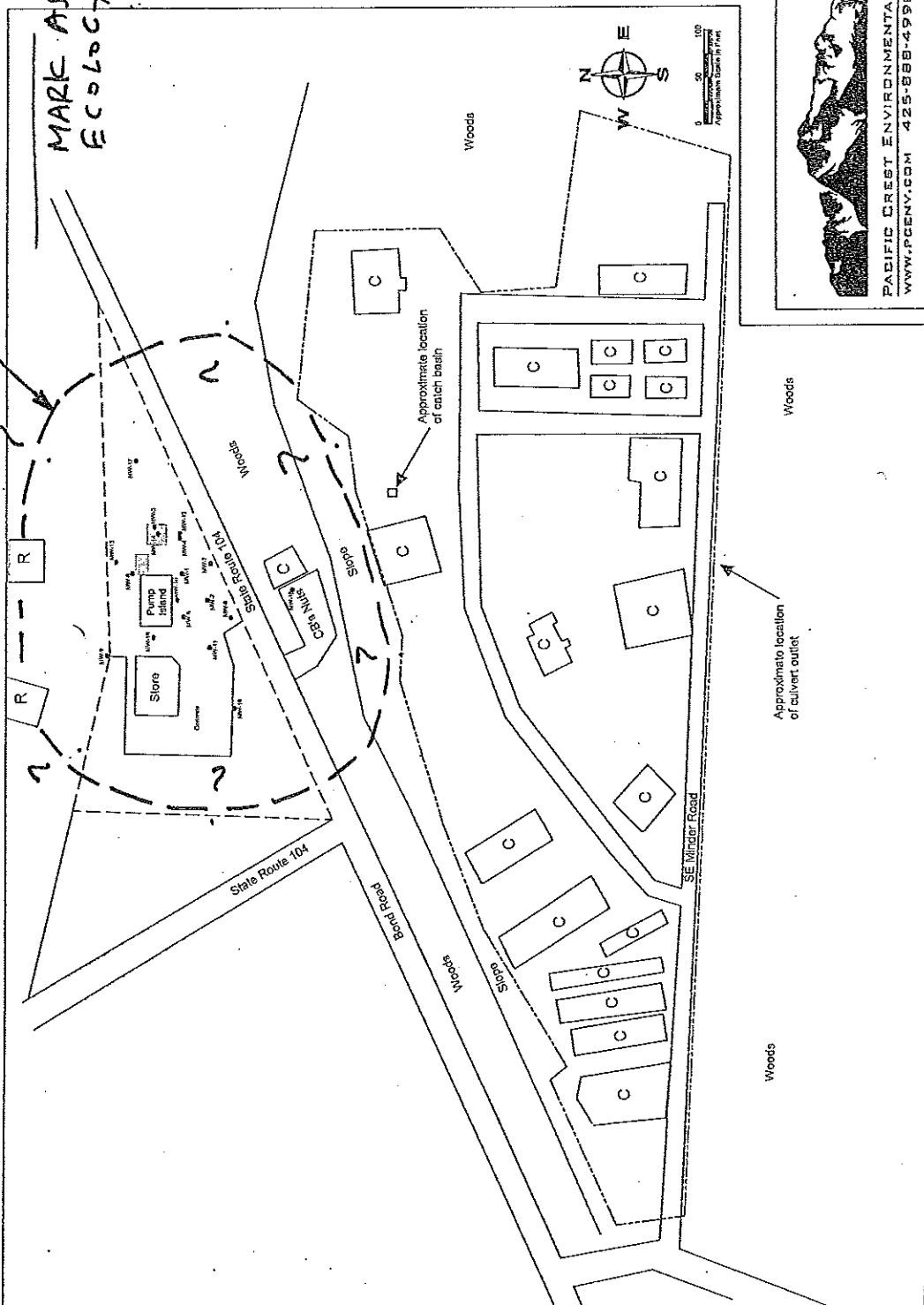
Extent of Contamination – Air

Gasoline vapors and associated specific volatile constituents (BETX) are present in the unsaturated zone beneath the Site. Soil vapor testing completed in 2009 indicated up to 173,000,000 micrograms per cubic meters of GRO and up to 4,600,000 micrograms per cubic meter of benzene. These values are significantly above current air cleanup levels under MTCA.

Subsurface soil vapor is migrating laterally within the unsaturated zone, and is venting at land surface. The lateral extent of contaminated soil vapor is not known, but could extend well beyond the boundary of soil and ground water contamination, potentially posing a risk to nearby homes. The closest residence is about 100 feet north of the main area of soil contamination. The vertical extent of soil vapor contamination likely goes no deeper than the lower perched zone, or about 60 feet bgs.

APPROXIMATE EXTENT OF
MICA SITE

MARK ADAMS
ECOLOGY



SITE MAP

Legend

- Streibel's Texaco Property Boundary
- Extent of former sand quarry/ current light industrial park
- ⊕ Monitoring Well completed at less than 16 feet bgs (MM-11)
- ⊕ Monitoring Well completed at greater than 16 feet bgs (MM-6)
- Structure (C - Commercial)
- ▭ Approximate location of former underground storage tanks

PACIFIC CREST ENVIRONMENTAL
 WWW.PCENVY.COM 425-888-4990

Figure 3
 Surrounding Properties

Streibel's Texaco
 26605 State Route 104
 Kingston, Washington

Drawn By: MWB Checked By: Date: 7-10-2009 Project Number: 198-001