L+C Deli
FS 1035

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

In the Matter of Remedial Action by:

Vancouver Oil Co., Inc.
1503 Northeast 136th Street
Post Office Box 528
Vancouver, Washington 98666

The 205 Group
5512 Northeast 109 Court, Suite G
Vancouver, Washington 98662

ENFORCEMENT ORDER

No. DE 92TC-S112

TO: Mr. Bruce Holmstrom
Vancouver Oil Co., Inc.
1503 Northeast 136th Street
Post Office Box 528
Vancouver, Washington 98666

I.

Jurisdiction

This Agreed Order ("Order") is issued pursuant to the authority of RCW 70.105D.050(1).

II.

Findings of Fact

Ecology makes the following Findings of Fact, without admission of such facts by Vancouver Oil Co., Inc.

1. Vancouver Oil Co., Inc. is the operator of the facility formerly known as the L&C Deli, a gasoline station and mini-mart, located at 13908 Northeast 20th Avenue, Vancouver, Washington.

2. The source of gasoline found in a sewer line was traced to this site during a spill response by the Department of Ecology on September 18, 1987.

3. In early November 1987, Ecology contracted Crowley Environmental Services to perform initial abatement measures. A total of seven test pits were excavated in an effort to determine the extent of contamination. Floating free petroleum product was found on the ground water surface in two of the test pits. No obvious signs of contamination were observed in the remaining five test pits.

4. In mid-November 1987, a product recovery system was installed. By the time recovery measures ceased one year later, a total of 524 gallons of gasoline had been recovered.

5. In August 1990, Vancouver Oil co., Inc. was issued Order No. DE 90-S135 by Ecology. The Order required a remedial investigation/ feasibility study (RI/FS) to be conducted at the site. The purpose of this order was to facilitate the remediation of the remaining contamination present in the soil and ground water.

6. In October 1990, a total of seven borings were drilled on-site, four of which were finished as monitoring wells. The results of this first phase of investigation are described in a report submitted to Ecology in November 1990. Since the results of this study were inconclusive, that is, the full extent of soil and ground water contamination was not determined, additional investigation was deemed necessary.

7. In February 1991, 11 additional soil borings were drilled on-site and off-site near utility trenches. Three of the borings were finished as monitoring wells. The final results of both investigations are described in a draft remedial investigation submitted to Ecology in March 1991. A draft feasibility study was submitted to Ecology in April 1991.

8. In August 1991, final versions of the remedial investigation and feasibility study were received by Ecology.

9. In October 1991, a Cleanup Action Plan (CAP) was prepared by Ecology.

III.

Ecology Determinations

1. Vancouver Oil Co., Inc. is an "owner or operator" as defined in RCW 70.105D.020(6) of a "facility" as defined in RCW 70.105D.020(3).

2. The facility is known formerly as the L&C Deli, a gasoline station and mini-mart, and is located at 13908 Northeast 20th Avenue, in Vancouver, Washington.

3. The substances found at the facility as described above are "hazardous substances" as defined at RCW 70.105D.020(5).

4. Based on the presence of these hazardous substances at the facility and all factors known to the Department, there has been a release of hazardous substances from the facility, as defined at RCW 70.105D.020(10).

5. By letter dated August 7, 1990, Ecology notified Vancouver Oil Co., Inc. of its status as a "potentially liable person" under RCW 70.105D.040 after notice and opportunity for comment.

6. Pursuant to RCW 70.105D.030(1) and 70.105D.050, the Department may require potentially liable persons to investigate or conduct other remedial actions with respect to the release or threatened release of hazardous substances, whenever it believes such action to be in the public interest.

7. Based on the foregoing facts, Ecology believes the remedial action required by this Order is in the public interest.

IV.

Work to be Performed

Based on the foregoing Facts and Determinations, it is hereby ordered that Vancouver Oil Co., Inc. implement the Preferred Alternative as described in the attached final Cleanup Action Plan (Exhibit A). The remedial actions shall be conducted in accordance with Chapter 173-340-400 WAC unless otherwise specifically provided for herein. Vancouver Oil Co., Inc. shall carry out the provisions of the cleanup action within the due dates specified, including, but not limited to, the following deliverables:

1. Engineering design report
2. Construction plans and specifications
3. Operation and maintenance plan
4. Compliance monitoring plan
5. Sampling and analysis plan.
6. Health and safety plan

The above deliverables, including a proposed schedule for the implementation of the remedial action, may be combined into one draft document containing all applicable and appropriate elements addressed in Chapter 173-340-400 WAC. These draft documents shall be due to Ecology within six (6) weeks after the effective date of this Order. Final versions of the deliverables shall be submitted within five (5) weeks after reciept of Ecology's comments on the draft document. The remedial action shall be implemented in accordance with the schedule in the approved remedial design documents.

V.

Terms and Conditions of Order

1. Definitions

Unless otherwise specified, the definitions set forth in Chapter 70.105D RCW and Chapter 173-340 WAC shall control the meanings of the terms used in this Order.

2. Public Notices.

RCW 70.105D.030(2)(a) requires that, at a minimum, this Order be subject to concurrent public notice. Ecology shall be responsible for providing such public notice and reserves the right to modify or withdraw any provisions of this Order should public comment disclose facts or considerations which indicate to Ecology that the Order is inadequate or improper in any respect.

3. Remedial Action Costs.

Vancouver Oil Co., Inc. shall pay to Ecology costs incurred by Ecology pursuant to this Order. These costs shall include work performed by Ecology or its contractors for investigations, remedial actions, and Order preparation, oversight and administration. Ecology costs shall include costs of direct activities; e.g., employee salary, laboratory costs, travel costs, contractor fees, and employee benefit packages; and agency indirect costs of direct activities. Vancouver Oil Co., Inc. shall pay the required amount within 90 days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and

the amount of time spent by involved staff members on the project. A general description of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Failure to pay Ecology's costs within 90 days of receipt of an itemized statement of costs may result in interest charges.

4. Designated Project Coordinators.

The project coordinator for Ecology is:

Tammy Hall
Department of Ecology
Southwest Regional Office
Post Office Box 47775
Olympia, Washington 98504-7775

The project coordinator for Vancouver Oil Co., Inc. is:

Bruce Holmstrom
1530 Northeast 136th Street
Post Office Box 528
Vancouver, Washington 98666

The project coordinator(s) shall be responsible for overseeing the implementation of this Order. To the maximum extent possible, communications between Ecology and Vancouver Oil Co., Inc. and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order, shall be directed through the project coordinator(s). Should Ecology or the Vancouver Oil Co., Inc. change project coordinator(s), written notification shall be provided to Ecology or Vancouver Oil Co., Inc. at least ten (10) calendar days prior to the change.

5. Performance.

All work performed pursuant to this Order shall be under the direction and supervision, as necessary, of a professional engineer or hydrogeologist, or similar expert, with appropriate training, experience and expertise in hazardous waste site investigation and cleanup. Vancouver Oil Co., Inc. shall notify Ecology as to the identity of such engineer(s) or hydrogeologist(s), and of any contractors and subcontractors to be used in carrying out the terms of this Order, in advance of their involvement at the Site.

Except where necessary to abate an emergency situation, Vancouver Oil Co., Inc. shall not perform any remedial actions at the L&C Deli outside that required by this Order unless Ecology concurs, in writing, with such additional remedial actions.

6. Access.

Ecology or any Ecology authorized representative shall have the authority to enter and freely move about the Site at all reasonable times for the purposes of, inter alia: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Order; reviewing the progress in carrying out the terms of this Order; conducting such tests or collecting samples as Ecology or the project coordinator may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Order; and verifying the data submitted to Ecology by Vancouver Oil Co., Inc. Ecology shall provide reasonable notice before entering property unless an emergency prevents notice. Ecology shall allow split or replicate samples to be taken by Vancouver Oil Co., Inc. during an inspection unless doing so interferes with Ecology's sampling. Vancouver Oil Co., Inc. shall allow split or replicate samples to be taken by Ecology and shall provide seven (7) days notice before any sampling activity.

7. Public Participation

Vancouver Oil Co., Inc. shall prepare and/or update a public participation plan for the site. Ecology shall maintain the responsibility for public participation at the site. Vancouver Oil Co., Inc. shall help coordinate and implement public participation for the site.

8. Retention of Records.

Vancouver Oil Co., Inc. shall preserve in a readily retrievable fashion, during the pendency of this Order and for ten (10) years from the date of completion of the work performed pursuant to this Order, all records, reports, documents, and underlying data in its possession relevant to this Order. Should any portion of the work performed hereunder be undertaken through

contractors or agents of Vancouver Oil Co., Inc. then Vancouver Oil Co., Inc. agrees to include in their contract with such contractors or agents a record retention requirement meeting the terms of this paragraph.

9. Dispute Resolution.

Vancouver Oil Co., Inc. may request Ecology to resolve factual or technical disputes which may arise during the implementation of this Order. Such request shall be in writing and directed to the signatory to this Order. Ecology resolution of the dispute shall be binding and final. Vancouver Oil Co., Inc. is not relieved of any requirement of this Order during the pendency of the dispute and remains responsible for timely compliance with the terms of the Order unless otherwise provided by Ecology in writing.

10. Reservation of Rights

Ecology reserves all rights to issue additional orders or take any action authorized by law in the event or upon the discovery of a release or threatened release of hazardous substances not addressed by this Order, upon discovery of any factors not known at the time of issuance of this Order, in order to abate an emergency, or under any other circumstances deemed appropriate by Ecology.

In the event Ecology determines that conditions at the Site are creating or have the potential to create a danger to the health or welfare of the people on the Site or in the surrounding areas or to the environment, Ecology may Order the Vancouver Oil Co., Inc. to stop further implementation of this Order for such period of time as needed to abate the danger.

11. Transference of Property

No voluntary or involuntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Site shall be consummated by Vancouver Oil Co., Inc. without provision for continued implementation of all requirements of this Order and implementation of any remedial actions found to be necessary as a result of this Order.

Prior to transfer of any legal or equitable interest Vancouver Oil Co., Inc. may have in the site or any portions thereof, Vancouver Oil Co., Inc.

shall serve a copy of this Order upon any prospective purchaser, lessee, transferee, assignee, or other successor in such interest. At least thirty (30) days prior to finalization of any transfer, Vancouver Oil Co., Inc. shall notify Ecology of the contemplated transfer.

12. Compliance with Other Applicable Laws.

All actions carried out by Vancouver Oil Co., Inc. pursuant to this Order shall be done in accordance with all applicable federal, state, and local requirements.

VI.

Satisfaction of this Order

The provisions of this Order shall be deemed satisfied upon Vancouver Oil Co., Inc.'s receipt of written notification from Ecology that Vancouver Oil Co., Inc. has completed the remedial activity required by this Order, as amended by any modifications, and that all other provisions of this Enforcement Order have been complied with.

VII.

Enforcement

1. Pursuant to RCW 70.105D.050, this Order may be enforced as follows:

   A. The Attorney General may bring an action to enforce this Order in a state or federal court.

   B. The Attorney General may seek, by filing an action, if necessary, to recover amounts spent by Ecology for investigative and remedial actions and orders related to the Site.

   C. In the event Vancouver Oil Co., Inc. refuses, without sufficient cause, to comply with any term of this Order, Vancouver Oil Co., Inc. will be liable for:

      (1) up to three times the amount of any costs incurred by the state of Washington as a result of its refusal to comply; and

      (2) civil penalties of up to $25,000 per day for each day it refuses to comply.

D. This Order is not appealable to the Washington Pollution Control Hearings Board. This Order may be reviewed only as provided under Section 6 of Chapter 70.105D RCW.

Effective date of this Order: March 2, 1992

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By Meegan Cunniffe

EXHIBIT A

CLEANUP ACTION PLAN
L&C DELI
VANCOUVER, WASHINGTON

INTRODUCTION

A cleanup action plan (CAP) has been provided to describe the alternatives for remediation at the L&C Deli Site (hereafter referred to as "the site") located near Vancouver, Washington. This CAP has been prepared to satisfy the requirements of the Model Toxics Control Act (MTCA)(Ch 70.105D RCW). The purposes of this CAP are to: (1) briefly describe the alternatives presented in the Remedial Investigation and Feasibility Study (RI/FS); and (2) identify the preferred alternative. Additional information is also presented to provide sufficient background for the site, which includes a site description, and nature and extent of contaminants.

The alternatives and information described in this plan are evaluated in detail in the RI/FS for the site which was conducted pursuant to Order No. DE 90-S135. The draft Cleanup Action Plan was issued for public comment from October 1 to November 1, 1991. Since no comments were received, a responsiveness summary has not been included with this document.

SITE BACKGROUND

The site is located at the northwest corner of the intersection of NE 20th Avenue and NE 139th Street at 13908 NE 20th Avenue in an unincorporated area of Clark County near Vancouver, Washington. The location of the site is shown on Figure 1. The L&C Deli formerly occupied leased building space in a two-story commercial office building named the I-205 Center, owned by the 205 Group, Inc., of Vancouver. The L&C Deli consisted of a convenience store with retail gasoline sales which utilized three 12,000 gallon underground storage tanks (USTs). The Vancouver Oil Company, Inc., supplied the gasoline stored in the tanks at the time of the petroleum release. The operator of the L&C Deli was Choong Il Kang.

In September 1987, gasoline product and vapors were discovered in a sanitary sewer line near the L&C Deli. Analysis of a gasoline sample revealed leaded gasoline product. Although tank and line integrity testing was performed and all leaded UST lines were determined sound, in late October 1987, gasoline vapors were reported to be entering a household through the sanitary sewer line approximately 800 feet east of the site. Ecology contracted Crowley Environmental Services (CES) of Seattle, Washington, in early November 1987 to perform initial abatement measures. To identify the source of the leak and extent of contamination, a total of seven test pits were excavated, two of which had visible free-product floating on the ground water surface. In November 1987, a product recovery system was installed by CES for Ecology and by the time product recovery measures had ceased one year later, a total of 524 gallons of gasoline had been recovered.

Order No. DE 90-S135 and Order No. DE 90-S138, requiring an RI/FS, were issued in August 1990 to Vancouver Oil Company and the 205 Group, respectively. In October 1990, a total of seven borings were drilled. The results of this phase of investigation were presented to the Department of Ecology in a draft RI study dated November 13, 1990. Although the investigation confirmed the presence of contamination, additional work was necessary to determine the extent of soil contamination. In February 1991, an additional eleven soil borings were drilled. The results of this second investigation phase were summarized in a report dated March 14, 1991. This report was followed by a Draft Feasibility Study dated April 12, 1991. Final versions of both the Remedial Investigation and the Feasibility Study were received by Ecology August 21, 1991.

MTCA CLEANUP STANDARDS

Soil Cleanup Standards

Cleanup levels for soil which apply to this site are given in WAC 173-340-740(2) and are summarized below. The MTCA Method A Soil Cleanup Standards will be achieved at the points of compliance. The points of compliance for soil cleanup standards shall be throughout the site. The site shall be defined as the one-acre parcel of property owned by the 205 group on which the L&C Deli was located and off-site areas surrounding this property that have been impacted by the gasoline release.

Total Petroleum Hydrocarbons (gasoline)	100.0 mg/kg
Benzene	0.5 mg/kg
Toluene	40.0 mg/kg
Ethylbenzene	20.0 mg/kg
Xylenes	20.0 mg/kg

Ground Water Cleanup Standards

Cleanup levels for ground water which apply to this site are given in WAC 173-340-720(2) and are summarized below. The MTCA Method A Ground Water Cleanup Standards will be achieved at the points of compliance. The points of compliance for ground water cleanup standards shall be the edge of the property line of the one-acre parcel owned by the 205 Group.

Total Petroleum Hydrocarbons (gasoline)	1.0 mg/L
Benzene	0.005 mg/L
Toluene	0.040 mg/L
Ethylbenzene	0.030 mg/L
Xylenes	0.020 mg/L

SITE CONDITIONS

Subsurface Soils

The soils that exist on site can be divided into three units:

1) Backfill. This unit is composed of sand and is found near the underground storage tanks and utility trenches.

2) Silt/Clay Unit. This unit is composed predominately of clayey silts, silty clays, and organic clays, and is present from near the surface to a maximum depth of 12 feet below the surface (165 feet above mean sea level). This unit exhibits low permeability and appears to act locally as a semi-confining layer and is absent in the tank area.

3) Silty Sand Aquifer. This water-bearing unit directly underlies the Silt/Clay Unit and is composed of silty sand. This unit is present from a depth of 12 feet to a depth of at least 21.5 feet (155 feet above mean sea level), which was the maximum depth investigated at the site.

Ground Water

The Silt/Clay Unit contains ground water and also appears to act locally as a semi-confining layer to the underlying Silty Sand Aquifer. At the time of the investigation, ground water flow between the two units appeared to be one of net upward migration. The water table within the Silt/Clay Unit ranges from 5 to 6 feet below ground surface (172 to 171 feet above mean sea level). The potentiometric surface for the Silty Sand Aquifer which underlies the Silt/Clay Unit occurs between 2 to 5 feet below ground surface (175 to 172 feet above mean sea level). Ground water flow for both units appears to be converging towards the southeast corner of the property from the north, south, and west. Evidence of this ground water discharge zone is apparent across NE 20th Avenue. Seasonal fluctuations on the order of one to two feet were observed in each of the two units during the two phases of the investigation.

NATURE AND EXTENT OF CONTAMINATION

Free Phase Petroleum Product

Although free phase gasoline product (free product) floating on the ground water was initially present when the release was discovered in 1987, it is no longer suspected to be present at the site. An extraction well, presumably screened across both units, was installed after the discovery of the release and apparently was able to recover the free gasoline product. Neither free product nor gasoline sheens were observed during either of the two phases of investigation.

Soil Contamination - Backfill

The main conduit for contaminant migration during the release was apparently the utility trenches. The material present as backfill in the utility trenches consists of highly permeable sand and, as a result of its highly permeable nature, has retained little residual contamination. Analytical results of the trench backfill show all contaminant levels below detection limits.

Soil Contamination - Silt/Clay Unit

Soil contamination at the site appears to be confined to the Silt/Clay Unit. During the course of the remedial investigation, soil contamination was not detected in the underlying Silty Sand Aquifer. The lateral and vertical extent of the soil contamination in the Silt/Clay Unit was identified during the investigation as being present in two zones:

1) A shallow zone of contamination is present from approximately 3 to 7.5 feet below ground surface (174 to 169.5 feet above mean sea level). This zone lies predominately above the water table and near the soil-water interface and is localized around the pump island. Total petroleum hydrocarbons (TPH) concentrations in this zone were reported to be as high as 670 mg/kg TPH as gasoline, and concentrations for benzene, toluene, ethylbenzene, and xylene (BTEX) were detected up to 1.9, 22.0, 9.8, and 55 mg/kg, respectively.

2) A deeper zone of contamination is present from approximately 7.5 to 9.5 feet below ground surface (169.5 to 167.5 feet above mean sea level). This zone occurs at the soil-water interface and below the water table and is primarily the result of two factors--the migration of gasoline product down utility trenches after the

initial release and the redistribution of gasoline product when the water table was depressed during the free product recovery phase. Concentrations of contaminants in this zone ranged from 7.5 to 270 mg/kg TPH as gasoline and were as high as 0.5, 5.2, 3.8, and 22.0 mg/kg for BTEX, respectively.

Figure 2 illustrates the lateral distribution of both contamination zones in the Silt/Clay Unit described above which exceed MTCA cleanup levels for TPH as gasoline (100 mg/kg).

Ground Water Contamination - Silt/Clay Unit

During the investigation, the water table in the Silt/Clay Unit was approximately 5.5 feet below the surface (171.5 feet above mean sea level). A monitor well installed in this unit detected concentrations as high as 46 mg/L TPH and 7.600, 5.400, 0.240, and 14.000 mg/L for BTEX, respectively, for two sampling events.

A water well survey performed during the investigation revealed that the Silt/Clay Unit is not currently being used as a source of drinking water near the site. Although the estimated sustainable yields of this unit are extremely low (less than 0.5 gallons per minute), the primary concern in this case is potential contaminant migration to other beneficial aquifers.

Ground Water Contamination - Silty Sand Aquifer

Although the presence of contaminants in ground water have been detected in this unit, levels of TPH and BTEX have not exceeded MTCA cleanup standards. The most recent sampling event revealed a concentration of 1.0 mg/L TPH in one well, which is at the cleanup level. Concentrations for benzene, toluene, and xylene were detected at 0.004, 0.001, and 0.007 mg/L, respectively.

One well, located approximately one-half mile south of the site, utilizes what could be equivalent to the Silty Sand Aquifer as a source of water. However, because of its distance from the site and ground water flow patterns in the area, it is not considered to be at risk from off-site contaminant migration. The well most likely to be a risk from off-site contaminant migration, located approximately 1,000 feet east of the site, is no longer in use. Currently, the area surrounding the site is supplied water by Clark County PUD.

POTENTIAL CLEANUP OPTIONS

Soil

A wide range of cleanup technologies were considered in the selection of a cleanup option for the site. Based on site conditions, that is, the presence of a low permeability clay layer and the fact that contaminated soils lie below the saturated zone, all in-situ methods of soil cleanup were ruled out from consideration because of their limited effectiveness. Therefore, the primary cleanup option available to remediate the soils at the site is limited to excavation and removal of the contaminated soils and surface treatment. Upon removal, the contaminated soil can be remediated using several different methods. Landfill disposal (without treatment) was ruled out from consideration because it ranks low in the MTCA hierarchy of cleanup technologies and other practicable treatment technologies exist.

Four methods of soil treatment could be conducted at this site: land farming, surface vapor extraction, surface biodegradation, and thermal treatment. Land farming was ruled out from further consideration because it involves the mass

transfer of volatiles from the contaminated soil to the air and is not allowed by Southwest Air Pollution Control Authority (SWAPCA). Surface vapor extraction and surface biodegradation involve construction of a treatment cell which is both underlain and covered by plastic sheeting. Surface vapor extraction is achieved by installing a network of perforated piping within the soil in the treatment cell and connecting the piping to a vacuum. The hydrocarbon vapors are volatilized and treated in an activated carbon system. Surface biodegradation involves the enhancement of naturally occurring organisms in the contaminated soil by adding fertilizers and tilling the contaminated soil to supply the organisms with oxygen. Thermal treatment consists of destroying the contamination in the soils by incineration in a mobile rotary kiln. In this case, air emissions are strictly controlled.

A final option not discussed above relies on in-situ passive biodegradation to destroy the contaminants and takes advantage of the fact that hydrocarbons naturally degrade through time by physical, chemical, and microbial processes. Engineering options such as covering the site with an asphalt cap can also prevent direct contact with the contaminants in the subsurface. This option is especially of interest to this site due to the fact that soil contamination exists under utility trenches, which can prove difficult and expensive to excavate. Because this method involves no active treatment or removal of the contaminated media, certain institutional controls and long-term monitoring are required by MTCA (WAC 173-340-360(8)(b)). Unlike other in-situ methods, passive remediation is generally not considered a permanent solution over the short term because of the long restoration time frame and low rank in the MTCA hierarchy of cleanup technology.

Ground Water

The only soil unit which appears to be affected by ground water contamination is the Silt/Clay Unit. Although it is not currently being used as a source of drinking water, the possibility of potential migration from this unit to other beneficial aquifers is a concern. Based on the fact that the Silt/Clay Unit contains ground water which exceeds cleanup levels, ground water treatment is necessary under MTCA.

The typical cleanup technology used to remediate contaminated ground water is through "pump and treat" methods. The standard pump and treat method involves the installation of a series of wells used to extract contaminated ground water. For contaminants usually present at leaking underground storage tank (LUST) sites, water is treated by air stripping or carbon adsorption, then reinjected to the ground through wells or an infiltration gallery, or discharged to surface water. In order to be efficient, this method requires that a sustainable flow of ground water can be pumped from the aquifer. In the case of this site, the affected unit is composed of silt and clay and has low permeability. As a result, sustainable ground water yields are not possible and therefore a standard pump and treat system will not work for this site, although a somewhat "modified" system will work. This "modified" system will be described later.

CLEANUP ACTION ALTERNATIVES

Based on previous discussion of technologies which are suited for site conditions, following are four cleanup alternatives which have been considered:

1) Removal of all contaminated soils; surface vapor extraction treatment of excavated soils; modified pump and treat of ground water in Silt/Clay Unit.

2) Removal of all contaminated soils, thermal treatment of excavated soils; modified pump and treat of ground water in Silt/Clay Unit.

3) Removal of all contaminated soils, surface bioremediation treatment of excavated soils; modified pump and treat of ground water in Silt/Clay Unit.

4) Partial removal of contaminated soils; surface bioremediation treatment of excavated soils; passive in-situ degradation of remaining soil contamination, modified pump and treat of ground water in Silt/Clay Unit.

General Procedures

Soil Excavation

Alternatives 1 through 3 involve the excavation and removal of all the contaminated soils that exceed soil cleanup standards. It is estimated that this would involve the removal of approximately 800 cubic yards of contaminated soil and approximately 1,100 cubic yards of clean overburden soils. These three alternatives would also involve extensive excavation around sanitary sewer, storm sewer, and natural gas utility lines and significant restoration costs. The estimated lateral extent of the excavation is shown on Figure 5. The actual size of the excavation would be determined by field screening methods (visual, olfactory, and headspace) and documented by confirmational soil sampling when the excavation is complete. The depth of the excavation will be approximately 10 feet. The excavation would be backfilled with clean imported fill following ground water treatment.

Soil Treatment

Alternatives 1, 3, and 4 involve the construction of a soil treatment cell. The cell would be composed of a floor of 30-mil plastic sheeting to prevent leachate from infiltrating to the underlying soils. A berm to prevent water run-off and run-on would be constructed around the soil treatment cell by tucking the plastic sheeting floor over and under a series of hay bales placed around the cell. Approximately six inches of clean fill would be placed on the floor of the treatment cell to allow tilling of the contaminated soils without puncturing the underlying plastic sheeting. The contaminated soils would then be loaded on top of the clean soil to a depth of two feet and covered by additional plastic sheeting to prevent hydrocarbon emissions to the air (required under SWAPCA) and keep precipitation from saturating the soil.

After the soils have been placed on the treatment cell, baseline soil concentrations would be established by collecting and compositing soil samples. For the first month of the treatment, soils would be tilled on a weekly basis, and thereafter tilling would take place biweekly. During the tilling operation, the soil would be uncovered briefly then recovered when the process has been completed. Fertilizer and water could be added to the soils to keep them at optimal moisture and nutrient content. The soil pile would be sampled and composited each month to monitor the effectiveness of the treatment. Once the soils have reached MTCA cleanup standards, they could be used as fill material for future development at the site with some restrictions. Criteria regarding end use of treated petroleum contaminated soils is described in "Guidance for Remediation of Releases from Underground

Storage Tanks"[1]. The ultimate goal for the treatment would be to achieve levels below laboratory detection limits for each of the contaminants.

Ground Water Treatment

Although the typical method of remediating ground water could not work in this case because of site conditions, a "modified" system could work. This "modified" system would consist of utilizing the large pit that would be excavated to remove contaminated soils. With a much larger capture zone than a well, the pit would act as a sump and allow ground water in the contaminated soil to drain into the pit. The water would be pumped out and temporarily stored in a storage tank. It is expected that approximately 100,000 gallons of contaminated water would be removed during this process. As the storage tank fills with water, its contents would be sampled and analyzed to determine proper disposal methods. Disposal options include permitted discharge to the sanitary sewer for treatment at the sewage treatment plant or transport to a water treatment and recycling facility. The excavation, if left open for a period of time and allowed to recharge, would capture ground water beyond the confines of the excavation. This system would be temporary, as once the excavation is backfilled it could no longer be used.

Alternative 1 — **Removal of all Contaminated Soils, Vapor Extraction Treatment of Contaminated Soils, Modified Pump and Treat of Ground Water**

Description

This alternative involves the excavation of all contaminated soils that are above MTCA cleanup standards as described above. A series of perforated pipes would be placed on the floor of the treatment cell prior to the placement of the contaminated soils. The piping would be manifolded into a blower system to place a vacuum on the soils and extract the volatilizing hydrocarbons. The extracted air would be run through a carbon adsorption treatment system prior to discharge to the atmosphere. The soils would be occasionally tilled above the level of the piping, if necessary. The effectiveness of the soil treatment would be monitored using the procedures described above. The restoration time frame would be approximately four months.

A modified pump and treat system as previously discussed would be utilized to treat contaminated ground water.

Cost

A cost estimate for Alternative 1 is as follows:

Soil Excavation and Removal	$58,000
Soil Treatment	$22,000
Ground Water Remediation	$12,000
TOTAL	**$92,000**

Alternative 2 — **Excavation of all Contaminated Soils, Thermal Treatment of Removed Soils, Modified Pump and Treat of Ground Water**

[1] "Guidance for Remediation of Releases From Underground Storage Tanks", Washington State Department of Ecology, Toxics Cleanup Program, July 1991.

Description

This alternative would involve the excavation and removal of all contaminated soils on-site that exceed cleanup standards, as described above. Unlike all other alternatives, this option would not require the construction of a soil treatment cell. Upon removal from the excavation, the soils would be placed in a portable rotary kiln unit which heats the soil to approximately 600 degrees Fahrenheit such that the hydrocarbons would be volatilized. Treated soils exiting the soil thermal unit would be sampled every 10 cubic yards and composited over 50 cubic yards to determine if the treatment goals had been met. If the remediated soils show no detectable levels of contaminants (TPH and BTEX), then the soils would be placed back into the excavation as backfill material. If the soils continue to show detectable levels of contaminants, they would be recycled through the thermal unit until the levels fall below detection. The hydrocarbon vapors from the thermal unit would be sent to an afterburner for destruction to control air emissions. Particulate matter emissions would also be controlled by means of a baghouse. This alternative would require permitting through SWAPCA prior to operation. The restoration time frame for Alternative 2 would be less than two weeks.

A modified pump and treat system, as discussed previously, would be utilized to treat contaminated ground water.

Cost

A cost estimate for Alternative 2 is as follows:

Soil Excavation and Removal	$58,000
Soil Treatment	$44,000
Ground Water Remediation	$12,000
TOTAL	**$114,000**

Alternative 3 **Excavation of all Contaminated Soils, Bioremediation of Removed Soils, Modified Pump and Treat of Ground Water**

Description

Alternative 3, like Alternatives 1 and 2, would involve the excavation and removal of all contaminated soils which exceed cleanup standards. Excavated soils would be placed in a pre-constructed treatment cell and monitored until cleanup goals are met using procedures discussed under the Soil Treatment section on page 4.

A modified pump and treat system, as previously discussed, would be utilized to treat contaminated ground water.

Cost

A cost estimate for Alternative 3 is as follows:

Soil Excavation and Removal	$58,000
Soil Treatment	$18,000
Ground Water Remediation	$12,000
TOTAL	**$88,000**

Alternative 4 **Excavation of Part of Contaminated Soils, Bioremediation of Excavated Soils, Modified Pump and Treat Ground of Water, Passive Degradation of Remaining Soils**

Description

This alternative would consist of removing approximately 660 cubic yards of contaminated soil and leaving in place the remaining 150 cubic yards of contaminated soil, or approximately 20 percent of total amount of contaminated material. However, since this 150 cubic yards of contaminated soil contains lower concentrations of contaminants, it represents approximately 10 percent of the total amount of contamination present. By leaving this contaminated soil in place, difficulties associated with excavating around underground utilities would be avoided. The depth of the excavation would be approximately 10 feet. The estimated lateral extent of the proposed excavation and the location of the soil to be left in place are illustrated on Figure 6. Figure 7, a cross section through the proposed excavation, illustrates the approximate location of these contaminated soils that would be left in place and location of the utility lines for sanitary sewer, storm sewer, and natural gas. The actual depth and lateral extent of the excavation to the north, south, and west would be determined by field screening methods (visual, olfactory, and headspace methods). The lateral extent of the excavation to the east would be determined in the field and would be based on proximity to the utility lines and the potential for undermining them. Confirmational samples would be collected when the excavation is complete. Approximately 840 cubic yards of clean overburden soils are expected to be generated during this process. Following excavation, the contaminated soils would be placed in a pre-constructed soil treatment cell and monitored, as described in the Soil Treatment section on page 4, until cleanup goals are met. The clean soils would be separated during the excavation process and set aside to avoid mixing with contaminated soils.

It is expected that leaving the contaminated soil in place under utility lines would have little impact on human health and the environment. An asphalt cap already exists on site which would prevent direct contact with the contaminated soil. It is also anticipated that any effects the contamination would have on ground water quality would be minimal. The contamination that would be left in place is confined to the Silt/Clay Unit. Because this unit has relatively low permeability, the contaminants would be more likely to naturally degrade rather than dissolve in ground water and migrate off-site. Compliance monitoring of ground water quality in both the Silt/Clay Unit and the Silty Sand Aquifer would identify any problems that may arise, after which a strategy would be developed and conducted before impacts result. The concentrations of contaminants in ground water and soil in the Silt/Clay Unit are expected to decrease over time.

A modified pump and treat system, as previously discussed, would be implemented to treat contaminated ground water.

The restoration time frame for the ground water and the excavated soil is approximately 4 to 8 months. For natural degradation of the contaminated soil left in place, restoration time is expected to take approximately 5 to 10 years.

Cost

A cost estimate for Alternative 4 is summarized below. This estimate does not include drilling of confirmatory soil borings after five years.

Soil Excavation and Removal	$31,000
Soil Treatment	$16,000
Ground Water Remediation	$12,000
TOTAL	**$59,000**

ANALYSIS OF CLEANUP ACTION ALTERNATIVES

Following is an evaluation of the four cleanup action alternatives using MTCA criteria:

1. **Protection of Human Health and the Environment**

   Alternatives 1, 2, and 3 would involve the removal of all contaminated soil and treatment of the contaminated soil on-site which would eliminate any potential for human or environmental exposure. Removing all affected material would also eliminate any source of additional possible impacts to ground water in the area resulting from leaving the contaminated soil in place.

   Alternative 4, which is the preferred alternative, proposes to leave a certain amount of contaminated soil in place beneath utility trenches. Although this could result in some potential for future impacts to human health and the environment, it could be controlled by institutional and engineering controls to address human contact, and compliance monitoring to address potential for ground water contamination. An asphalt cap is present which prevents direct contact with the contaminated soil. The information gathered during the RI shows that contamination adsorbed by the Silt/Clay Unit is more likely to remain in this unit and naturally biodegrade than migrate off-site. For this reason, Alternative 4 is believed to be only slightly less protective of human health and the environment as Alternatives 1, 2, and 3.

2. **Compliance with Cleanup Standards**

   Alternatives 1, 2, and 3 would fully comply with the appropriate Method A Soil Cleanup Standards within a 4 to 8 month restoration time frame. Alternative 4, the preferred alternative, would comply with the appropriate Method A Soil Cleanup Standards within an 8 month restoration time frame for 90 percent of the total contamination present at the site. The remainder of the contamination is expected to comply within a 10 year restoration time frame.

   All alternatives would comply with the appropriate Method A Ground Water Cleanup Standards.

3. **Compliance with Applicable or Relevant and Appropriate Requirements**

   All alternatives would comply with the applicable or relevant and appropriate state and federal requirements (ARARs). These would include, but not be limited to, permitting and compliance with SWAPCA for air emissions and with the Hazel Dell Sewer District for discharge of wastewater.

4. **Restoration Time Frame**

The restoration time frames for Alternatives 1, 2, and 3 would be essentially immediate, since all contaminated soils would be removed from the subsurface. For Alternative 4, the preferred alternative, restoration time frame would also be immediate for 90 percent of the contamination present. For the remaining 10 percent that lies beneath off-site utility trenches, the restoration time frame is estimated to be approximately 5 to 10 years to allow natural degradation to occur. Since the exact rate of degradation could not be determined given current data, performance monitoring would be undertaken to monitor the rate of in-situ degradation.

For all four alternatives, the restoration time frame for ground water remediation is essentially immediate for all practicable purposes.

5. **Short Term Effectiveness**

Alternatives 1, 2, and 3 are anticipated to be equally and fully protective in the short term since each would consist of complete removal of all contaminated soils and remediation of the ground water in the Silt/Clay Unit. The effectiveness for Alternative 4 would be somewhat less for the short term since 10 percent of the contamination would be left in place.

6. **Long Term Effectiveness**

All methods are anticipated to be equally effective in the long term (5 to 10 years). The effectiveness of Alternative 4, the preferred alternative, would be documented through compliance monitoring.

7. **Reduction of Toxicity, Mobility, and Volume**

All proposed alternatives involve utilizing a treatment technology that ultimately destroys or detoxifies the contaminants in all contaminated soils, the only difference being in the restoration time frames. Alternative 4, the preferred alternative, would leave approximately 10 percent of the total amount of contamination in place to degrade by natural processes, but at a slower rate than enhanced biodegradation. This would allow for the eventual destruction of the contaminants.

The modified pump and treat method of remediating ground water would involve a separation of the contaminant from the ground water through carbon adsorption filtering or treatment of the contaminant at the sewage treatment plant.

7. **Implementability**

Although all alternatives are executable, alternative 4 is much easier and safer to implement because difficulties involved with excavating around underground utilities can be avoided.

8. **Cleanup Cost**

Although the cost for the cleanup action cannot be considered when determining the cleanup standard, it may be considered when choosing a cleanup option (WAC 173-340-700(7)(f). The estimated cost for Alternatives 1, 2, and 3 are $92,000, $114,000, and $88,000,

respectively. The cost estimate for Alternative 4, the prererred alternative, is $59,000.

9. **Community Concerns**

Community comments were solicited during a 30-day public review period.

PROPOSED ALTERNATIVE

The proposed alternative for the remedial action for the site is described below. This proposed alternative is the same as Alternative 4, as detailed below:

- Removal of approximately 660 cubic yards of contaminated soil would be performed, leaving in place 150 cubic yards of contaminated soil, or approximately 20 percent of the total amount of contaminated soil on a volumetric basis. However, since this 150 cubic yards contains lower concentrations of contaminants, it represents only 10 percent of the total mass of contamination present. The contaminated soil to be left in place lies primarily below off-site sanitary sewer, storm sewer, and natural gas lines.

- Modified pump and treat of contaminated ground water would consist of removing the accumulated ground water in the excavation pit generated during the soil removal process. It is anticipated that approximately 100,000 gallons of contaminated water would be removed during this process. The water pumped from the pit would be temporarily stored in a tank and analyzed to determine a proper disposal method. If the stored water meets the appropriate discharge limits, it would be released to the sanitary sewer for treatment at the sewage treatment plant under a permit from the Hazel Dell Sewer District. If discharge limits cannot be met, a temporary carbon adsorption unit would be constructed to treat the water prior to discharge. To monitor the effects of the modified pump and treat system, two additional monitoring wells would be installed down-gradient of the excavation pit; one well would be completed in the Silt/Clay Unit and the second well would be completed in the Silty Sand Aquifer and subsequently be used for compliance monitoring. This entire process is expected to take approximately two weeks. When completed, it is expected that ground water cleanup standards would be achieved.

- Surface bioremediation would be performed on 660 cubic yards of contaminated soil. Following excavation, contaminated soils would be placed in a soil treatment cell. Soil samples would be collected and composited each month until cleanup goals are met. Once soils have achieved the appropriate cleanup standard, they can be used as fill for anticipated development at the site, with some restrictions. If the remediation goal of undetectable contamination is achieved, the soil can be used as fill without restriction.

- In-situ bioremediation would be monitored on the remaining 150 cubic yards of contaminated soil by drilling confirmatory soil borings after five years. The existing asphalt cap present over the contaminated zone would be maintained to prevent direct contact. Since the contaminated zone to be left in place is located on property owned by Clark County, they would be notified so the contamination can be recorded on the property deed. Institutional controls would consist of notifying the affected utilities of the contamination, so if repairs or maintenance is

required in the area, workers can take the proper precautions to minimize exposure.

- A periodic review in accordance with WAC 173-340-420 would be conducted after five years' time in areas where soils were left in place to naturally biodegrade by drilling confirmatory soil borings. If, after five years, the soils have not met cleanup levels, the effectiveness of the cleanup action would be re-evaluated. The department shall publish a notice of the periodic review to provide an opportunity for public comment.

- Compliance monitoring would be accomplished by installing seven monitor wells completed in the Silt/Clay Unit and the Silty Sand Aquifer to monitor possible migration from the contaminated zone to aquifers currently being used as drinking water supply. Monitoring would take place quarterly for the first year after soil removal occurs, biannually for two years proceeding, and annually thereafter until confirmatory soil sampling shows that the contaminated soils left in place have attained the cleanup standard.

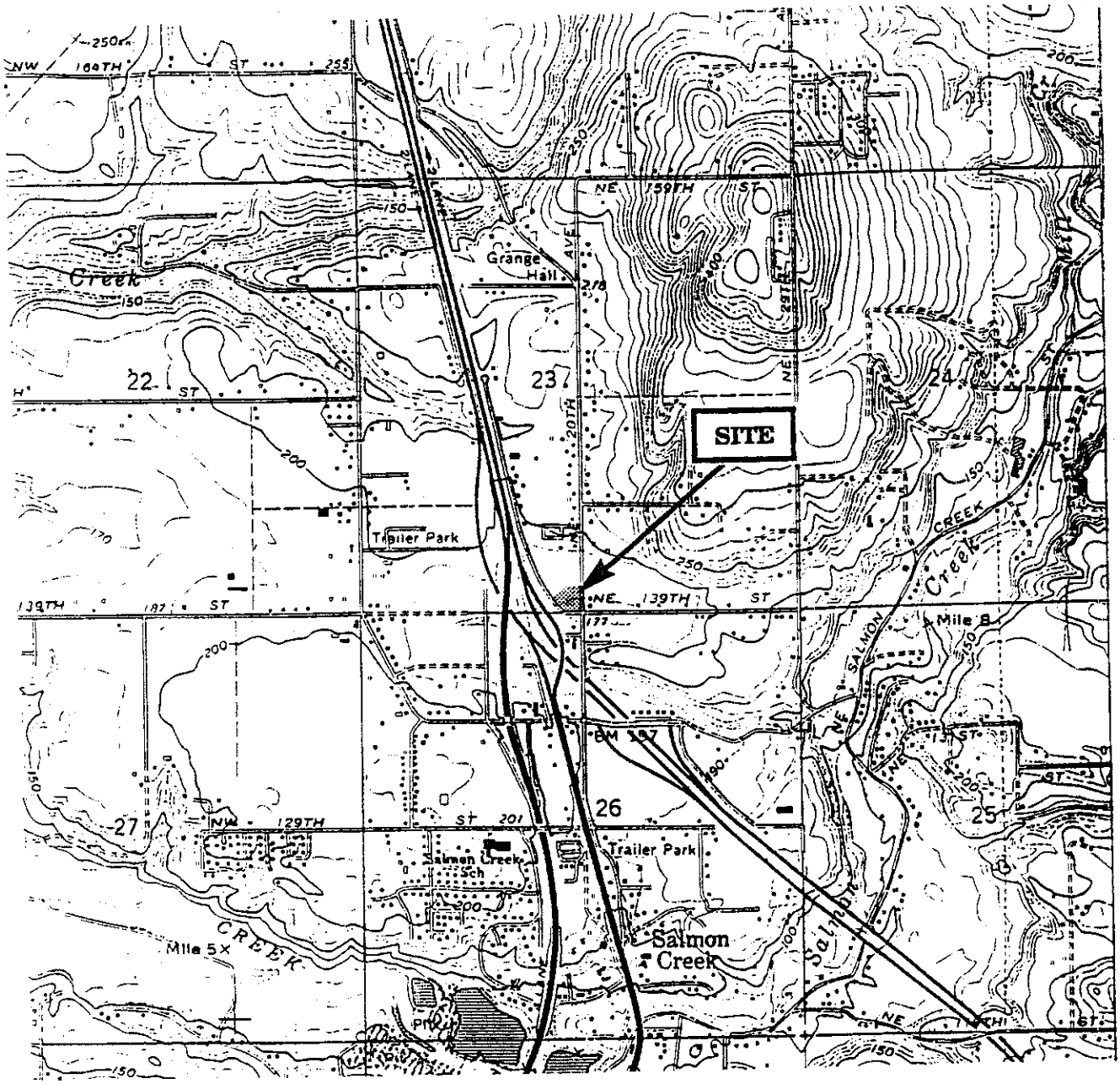
JUSTIFICATION FOR CHOOSING PREFERRED ALTERNATIVE

The cleanup action, as proposed is designed to accomplish the following requirements:

1. Protect human health and the environment.
2. Comply with cleanup standards per WAC 173-340-700 through 760.
3. Comply with applicable state and federal laws per WAC 173-430-710.
4. Provide compliance monitoring per WAC 173-340-410.
5. Use permanent solutions to the maximum extent practicable per WAC 173-340-360(4), (5), (7), and (8).
6. Provide a reasonable time frame per WAC 173-340-360(6).
7. A comment period from October 1 to November 1, 1991 solicited public comment on the draft cleanup action plan (WAC 173-340-360(10 through (13)).

The preferred alternative would consist of removing approximately 660 cubic yards of contaminated soil from the site, while leaving in place approximately 150 cubic yards of contaminated soil lying below off-site sanitary sewer, storm sewer, and natural gas lines. By leaving the contaminated soil in place, difficulties associated with excavating around underground utilities would be avoided. This would represent approximately 10 percent of the total contaminant mass.

The preferred alternative, like the other alternatives evaluated, is protective of human health and the environment and remediates contaminated ground water present at the site. The primary difference between the preferred alternative and all other alternatives evaluated is the short term effectiveness for 10 percent of the contaminants, although long term effectiveness is still achieved through a longer restoration time frame. Compliance monitoring would be conducted to reduce potential risks of leaving the contaminated soil in place.



Source: Vancouver, Washington-Oregon U.S.G.S. 7.5 Minute Quadrangles, 1978

PROJECT NO. 1351 March 1991	**HAHN & ASSOCIATES** **INCORPORATED** ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 503/796-0717	**LOCATION MAP** Remedial Investigation L & C Deli Site 13908 NE 20th Avenue Vancouver, Washington	FIGURE 1

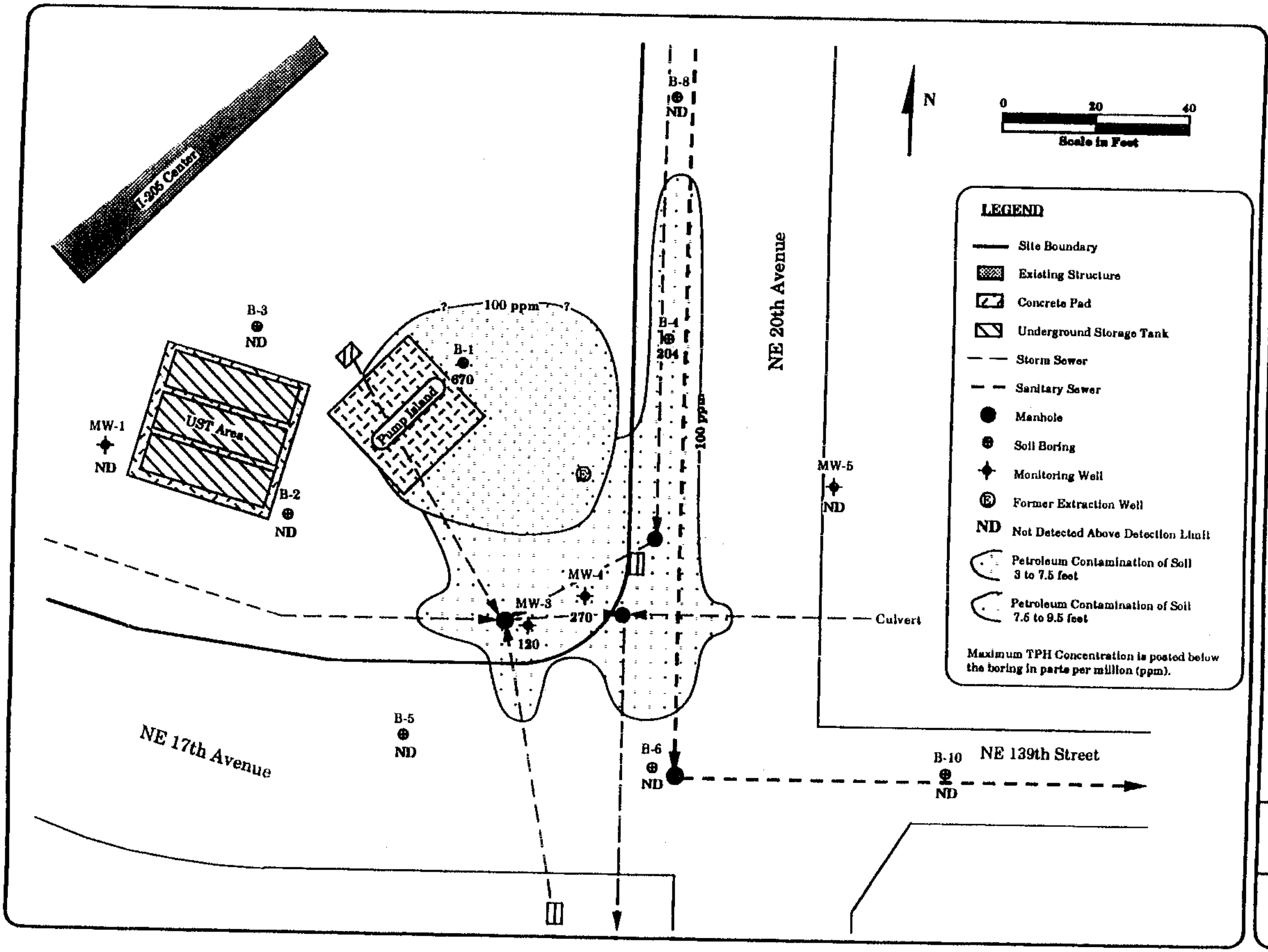


Figure 2

Petroleum Contaminated Soil Extent (>100 ppm)

Feasibility Study
L & C Deli Site
13908 NE 20th Avenue
Vancouver, Washington

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ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
503/796-0717

April 1991

HAI Project #1351

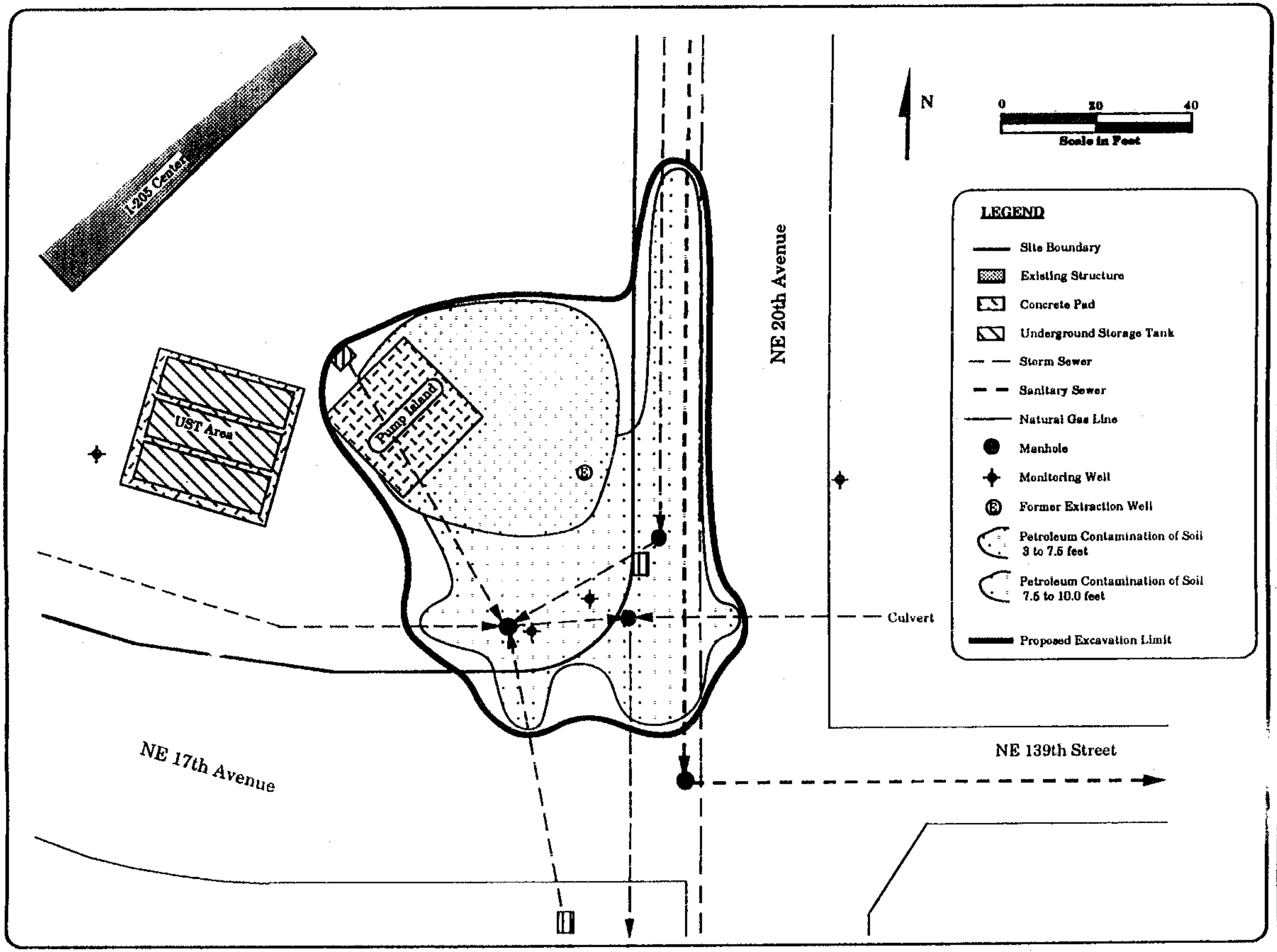

Figure 5

Proposed Excavation Extent Map
Alternatives 1, 2, 3

Feasibility Study
L & C Deli Site
13908 NE 20th Avenue
Vancouver, Washington

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INCORPORATED
ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
503/796-0717

August 1991

Project #1351

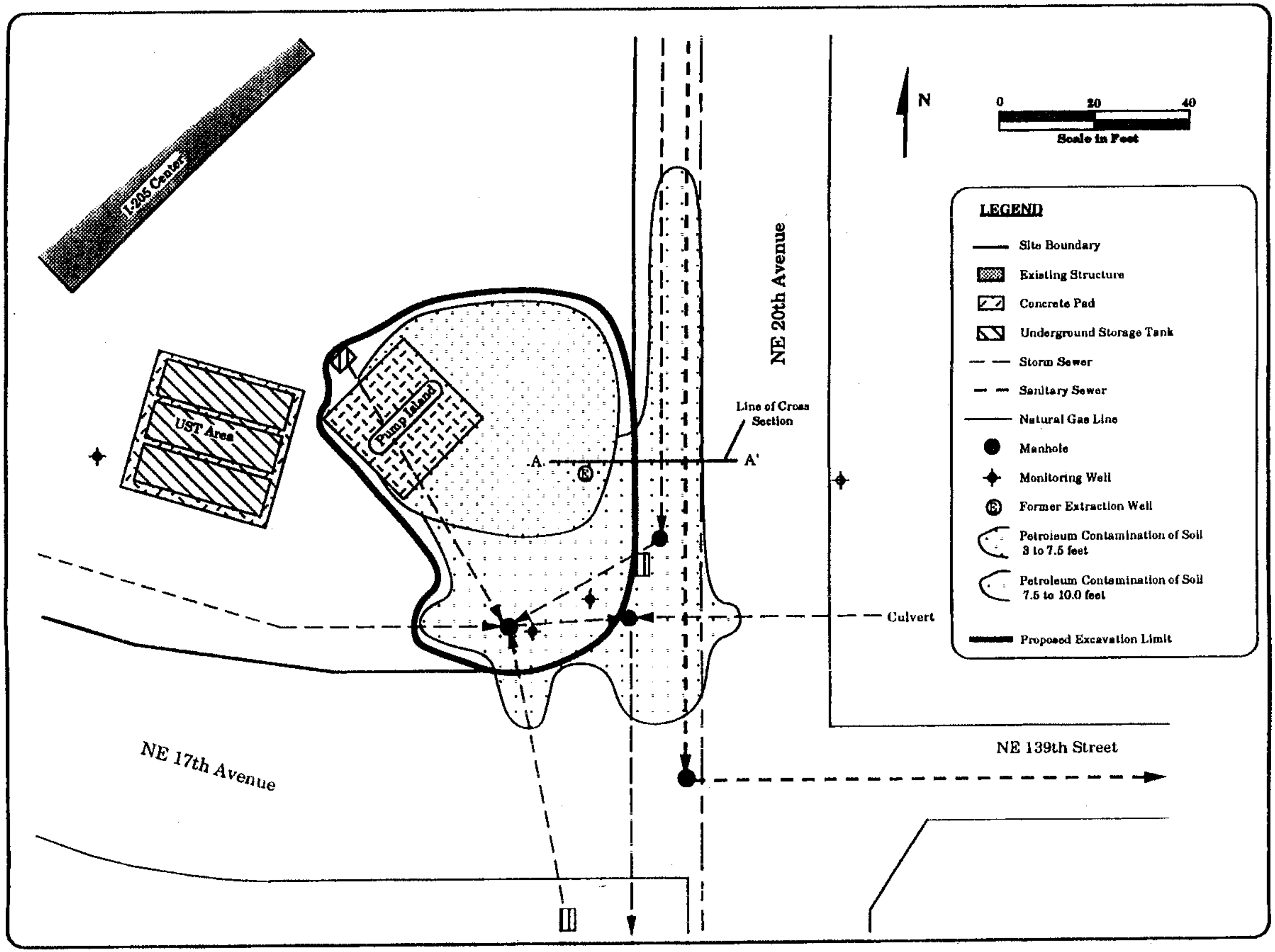

Figure 6

Proposed Excavation Extent Map
Alternative 4 (Preferred)

Feasibility Study
L & C Deli Site
13908 NE 20th Avenue
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August 1991

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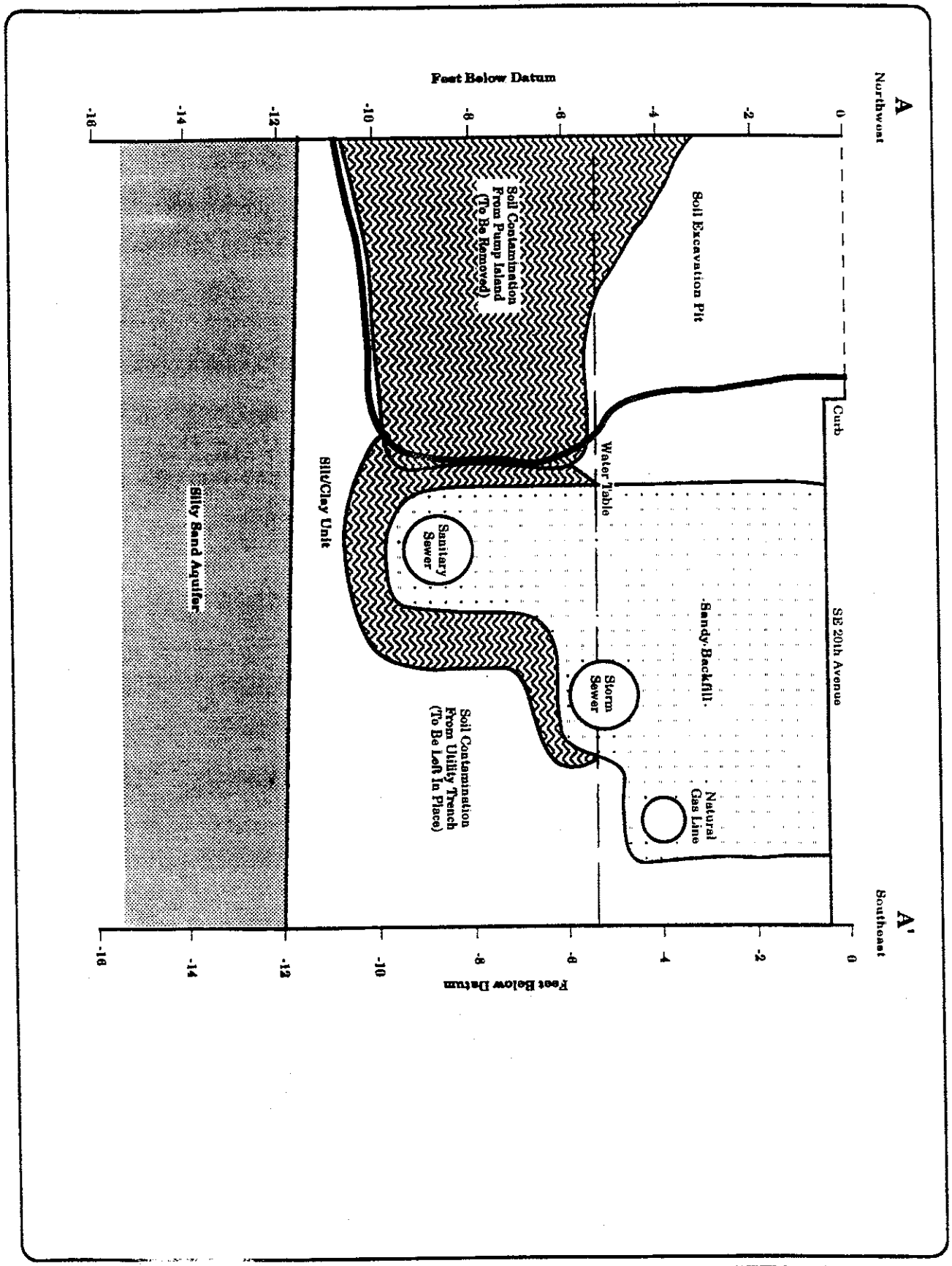

Project #1951	August 1991	**HAHN & ASSOCIATES** INCORPORATED ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 503/796-0717	**Excavation Cross Section** **A - A'** Remedial Investigation L & C Deli Site 13908 NE 20th Avenue Vancouver, Washington	**Figure 7**