PREPARED FOR

UNITED STATES POSTAL SERVICE (USPS)

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Director, Environmental Services

SURVEY AND DESIGN FOR UST REMOVAL AND PRELIMINARY SOIL AND GROUNDWATER STUDY
USPS Terminal Station
Seattle, Washington

E-4414-330

December 17, 1990

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Geotechnical Engineers, Geologists & Environmental Scientists

December 17, 1990 E-4414-330

United States Postal Service
Kent Facilities Services Office
P.O. Box 5000
Seattle, Washington 98108

Attention: Mr. Martin Hansen
Project Manager

Subject: **Survey and Design for UST Removal and Preliminary Soil and Groundwater Study USPS Terminal Station Seattle, Washington**

Dear Mr. Hansen:

The Environmental Services Division of Earth Consultants, Inc. (ECI) is pleased to submit the attached report entitled "Survey and Design for UST Removal and Preliminary Soil and Groundwater Study, USPS Terminal Station, Seattle, Washington." This report presents our interpretations and summary of the field exploration, laboratory analyses, data evaluation, preliminary conclusions on contamination, recommendations and quantity estimates for UST removal.

As requested, we have also submitted one copy of this report to Mr. Joe Hickey at the Washington Department of Ecology (Ecology) in Redmond. Appendix D - Line Item Cost Estimates for Tank Removal was omitted from the report submitted to Ecology.

We appreciate the opportunity to provide environmental consulting services for you. If you have any questions or if we may be of further service, please contact us.

Respectfully submitted,

EARTH CONSULTANTS, INC.

Pamela J. Morrill
Project Environmental Scientist

Larry McGaughey, Ph.D., P.E.
Director, Environmental Services

PJM/SPH/ljs/sar
[E4414330.R01]

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SURVEY AND DESIGN FOR UST REMOVAL AND PRELIMINARY SOIL AND GROUNDWATER STUDY USPS TERMINAL STATION SEATTLE, WASHINGTON

E-4414-330

EXECUTIVE SUMMARY

During this study, ECI performed a survey and design for the prospective removal of two underground storage tanks (USTs) at the subject site. A preliminary soil and groundwater study was also performed to identify if soil or groundwater contamination exists. Three boreholes were drilled adjacent to the two USTs on the subject site (see Plate 2). One of the boreholes was completed as a monitor well. Groundwater sampled from the installed well was analyzed for volatile organic compounds (VOCs) and total recoverable petroleum hydrocarbons (TRPH). Soil samples collected from depths of approximately 8 and 13 feet below ground surface (BGS) from each borehole were also analyzed for TRPH.

Analysis of the soil samples indicated that petroleum hydrocarbon concentrations range from 150 to 920 parts per million (ppm) at approximately 8 feet BGS and from less than 5 to 48 ppm at approximately 13 feet BGS. The petroleum hydrocarbon was tentatively identified as diesel and possibly a heavier petroleum hydrocarbon. Total recoverable petroleum hydrocarbons were detected in the groundwater at a concentration of 1.3 ppm. Except for 10 parts per billion of an unidentified compound, none of the volatile organic priority pollutants analyzed were detected in the groundwater. Based on the analytical results of this study, it appears that there has been a release from either or both of the USTs that has resulted in concentrations which exceed current Washington Department of Ecology cleanup standards for soil and groundwater. ECI recommends removal of the USTs and the excavation of as much of the impacted soil as possible.

Since the concentration of TRPH found in the groundwater was only slightly above the proposed regulation limit, removing the source of contamination should substantially remediate the site. After evaluation of laboratory results from tank and soil excavation work, the installation and periodic monitoring of up to three monitor wells may be appropriate.

PURPOSE AND SCOPE OF WORK

The purpose of this study was to assess the potential for soil and/or groundwater contamination from two abandoned underground storage tanks located on the subject site to evaluate site conditions, and estimate costs with respect to tank closure by excavation. The scope of work for this study was limited to the following tasks:

- Drilling and sampling three test boreholes, with one of the boreholes being completed as a monitor well.
- Development and sampling of the groundwater monitor well installed on the site.

- Laboratory analysis of one groundwater sample for TRPH, and volatile organic compounds. Six soil samples were analyzed for TRPH.

- Visual survey and measurements of the site to estimate line-item quantities for tank closure by excavation and to identify site-specific difficulties which may be encountered during UST closure.

- Preparation of this report which summarizes our field work, results of laboratory analyses, and preliminary conclusions regarding UST release; recommendations for action; scope of work; and quantity estimates for UST removal.

SITE LOCATION AND DESCRIPTION

The subject site is located southwest of the intersection of South Lander Street and 3rd Avenue South in Seattle, Washington (see Plate 1). Located on the site is a slab-on-grade, two-storied warehouse/office building that covers approximately 72,300 square feet of the 2.9-acre property. The site is currently used by the USPS for warehouse space, a Credit Union, and customer services.

Asphalt-paved parking and storage areas lie adjacent to the eastern and southern sides of the building. The property is bound by the railroad right-of-way to the west, South Lander Street to the north, a warehouse building occupied by Rabanco Recycling to the south, and a paved parking lot for Rabanco Recycling to the west.

The USTs which were the subject of this investigation are located east of the building, near its southeast corner (see Plate 2).

SITE SURVEY

On November 9, 1990, Ms. Pamela Morrill of ECI conducted a visual survey of the subject USPS facility. The purpose of this survey was to (a) locate the existing UST at the facility, (b) document conditions pertinent to UST removal, and (c) stake out appropriate borehole locations for the field exploration performed during this study. Maintenance Supervisor Harry Caul assisted in the site survey and providing historical information.

During this site survey, the fill pipes of two USTs were located, rather than one as originally reported. Based on a site plan provided by Mr. Caul, a smaller tank lies south of the larger, 5,000-gallon tank. The 5,000-gallon tank was originally reported to have been used to store diesel. However, the presence of the smaller tank indicates that, at one time, the larger tank used to contain "Bunker C" oil and that the smaller tank was a "nurse" tank that contained diesel fuel to help start up the system. The estimated size of the smaller tank is approximately 500 gallons. The tanks are of single-wall steel construction and are estimated to be 29 to 36 years old.

The facility was converted to natural gas heating in 1982/1983, when the building was remodeled for occupancy by the USPS. At that time, the tanks were abandoned in-place by filling them with sand. Information as to whether or not the tanks were emptied and cleaned prior to in-place closure was not available.

SUBSURFACE STUDY

Drill Methods

Environmental Drilling, Inc. was contracted to drill three boreholes and install one groundwater monitor well. The drilling was conducted under the supervision of ECI personnel. The boreholes were drilled using a truck-mounted drill rig fitted with 8-inch hollow stem augers.

During drilling, the ECI environmental soil scientist examined the soil sample materials and the drill cuttings brought to the surface and recorded these field observations on a field log. Information recorded on the field logs included a description of the soil color, texture, moisture, stiffness, and other significant observations. These are included in Appendix A as Plates A2 through A4.

Clean augers were used at each borehole location and steam-cleaned at the end of the day to minimize the possibility of cross-contamination between boreholes. Each borehole not completed as a monitor well was abandoned by backfilling with a Portland Cement/bentonite grout mixture. A tremie pipe was used to grout the boreholes from bottom to top.

Soil Sampling

Soil samples were collected by advancing the hole with the auger string to the desired depth and lowering a Dames and Moore split-barrel sampler fitted with clean brass liners through the center of the hollow-stem augers. The inner rod/sampler assembly was driven 18 inches at each designated sampling interval using a 140 pound hammer while keeping a record of the number of blows required for each six inches driven (ASTM D-1586). Upon retrieval from the sampler, one soil filled liner was selected for analysis or archiving. The ends of the selected liner were covered with aluminum foil, sealed with plastic caps and tape, labelled and placed on ice for preservation purposes. Sample labels included the date, time, sample identification, depth, and sampler's initials. Samples were delivered to the laboratory on the following day.

After each sampling interval, the sampler was subjected to a thorough cleaning before reassembly to help prevent cross-contamination of samples. All components of the sampler were washed and scrubbed by brush in a solution of Alconox soap and water. This was followed by a triple-rinse with distilled or deionized water.

Monitor Well Installation

The monitor well (MW-1) was constructed using 2-inch diameter, Schedule 40, flush-threaded, solid and 0.01-inch slotted PVC well casing. The screened interval was from 5 to 15 feet BGS, the top of which was approximately 1.5 feet higher than the groundwater surface. After installation of the well casing, the borehole annulus was backfilled with washed, kiln-dried sand to a point approximately two feet above the top of the well screen. The remainder of the borehole annulus was then sealed by placing bentonite chips on top of the sand and brought to within one foot of the surface. The PVC casing was capped and a locking cover was placed over the casing, flush with the ground surface, then grouted in-place with concrete. As-built dimensions and other pertinent information on the installed well are included on Plate A5.

Monitor Well Development

The installed monitor well was developed by bailing on November 27, 1990. The purpose of this was to stabilize the filter material and remove turbid water caused by drilling operations. At this time, approximately 40 gallons, or 29 well volumes, were removed from the well for the purpose of development. Purging was discontinued when continued bailing provided no further improvement in turbidity, although the groundwater was still relatively turbid due to fine black silt. Purged water was stored in a 55-gallon drum on-site for appropriate disposal pending analysis.

Groundwater Sampling

The well was sampled on November 28, 1990. Prior to sampling, the well was purged of the stagnant water within the well casing and filter pack until specific conductivity and pH readings had stabilized and a minimum of three well volumes had been removed. The purpose of this was to assure that the sample obtained from the well was representative of ambient groundwater conditions. The well was purged and sampled using a clean, stainless steel bailer. The groundwater sample was transferred directly into clean laboratory grade glassware with minimal agitation to prevent the loss of volatiles. The sample was sealed, labeled, and kept cool with ice. Label information included the date, time, well identification, sample number, and sampler's initials. The sample was delivered, the same day as collection, to the contract laboratory.

Laboratory Analyses

The soil and groundwater samples were delivered under chain of custody to North Creek Analytical Laboratory in Bothell, Washington. The groundwater sample was analyzed for volatile organic compounds utilizing EPA method 8021 (a gas chromatography/photoionization technique) and for TRPH by method 418.1 (an infrared spectroscopy technique). Two soil samples from each borehole were analyzed for TRPH by method 418.1. Additionally, the type of the petroleum hydrocarbon detected was tentatively identified in one of the soil samples by a Hydrocarbon Identification analysis. The laboratory results for water analysis are reported as milligrams per liter (mg/L), which is approximately equivalent to parts per million by weight (ppm); or as micrograms per liter (ug/L), which is approximately equivalent to parts per billion (ppb). Soil analytical results are reported as

milligrams per kilogram (mg/kg), which is equivalent to ppm by weight. The laboratory's reporting of the analytical results and detection limits are included in Appendix B.

RESULTS OF SUBSURFACE STUDY

The borehole and monitor well locations are shown in Plate 2. Borings B-1 and B-2 were drilled to approximately 13.5 to 16 feet BGS. The monitor well, MW-1, was drilled to 16 feet BGS and installed at a depth of approximately 15 feet BGS. The well was installed within 10 feet of both of the USTs, and downgradient or cross-gradient of the USTs with respect to the anticipated direction of groundwater flow.

Subsurface Sediments

Conditions encountered during drilling indicate that the site surface is underlain by black sand, silty sand, clayey silt, and sandy silt between 0 and 16 feet below the ground surface. Fill debris, including glass and clay shards, rubber, a spoon, and pieces of wood were found in the boreholes. More detailed descriptions of the conditions encountered during this study are provided in the boring logs, shown on Plates A2 through A4.

The Abandoned Landfill Study in the City of Seattle (Seattle-King County Department of Public Health, Date Unknown) states that "the major industrial section south of Jackson Street and west of Beacon Hill was originally a huge tideflat area filled and converted to industrial usage today." The array of materials brought to the surface during drilling operations seems to confirm this statement.

Groundwater

During drilling, groundwater appeared to have been first encountered at approximately 12 feet (BGS), but stabilized at 6.5 feet BGS. ECI conducted a groundwater study for the USPS within one block of the site in September, 1990. The results of that investigation indicated the local gradient to be variable, with the direction of flow ranging from southerly to easterly. The site specific groundwater gradient may be influenced by a variety of factors, including but not limited to the local depositional characteristics, nearby areas of recharge (i.e., sewer lines), or areas of discharge (i.e., dewatering). Based on the analytical results, as discussed in the following section, the highest concentrations of TRPH were detected in soil samples from the southern borehole. This may indicate the gradient to be toward the south.

Analytical Results

Copies of the analytical reports are presented in Appendix B and summarized in Table 1 (found on page 9). Analysis of the soil samples indicated that petroleum hydrocarbon concentrations ranged from 150 to 920 ppm at approximately 8 feet BGS and from less than 5 to 48 ppm at approximately 13 feet BGS. The HCID performed on sample number B1-13G indicated the petroleum type to be

diesel. Based on discussions with the laboratory director, Mr. Scot Cocanour, the results indicated that a heavier petroleum hydrocarbon fraction (possibly Bunker C) may be present. The concentration of TRPH in groundwater was 1.3 ppm. The July 27, 1990 proposed Compliance Cleanup levels for total petroleum hydrocarbons in soil and groundwater, as specified in The Model Toxics Control Act Cleanup Regulation and Proposed Amendments (173-340 WAC, July 27, 1990), is 200 ppm and <1 ppm, respectively.

None of the compounds in the groundwater sample analyzed by EPA method 8021 were present above the stated limits of detection. However, an unidentified volatile hydrocarbon was present at approximately 10 parts per billion. Based on the array of materials brought to the surface during drilling and information from the Seattle-King County Department of Public Health, the area was used as a landfill at one time, so the presence of this unidentified compound is not surprising. Based on the concentration detected, it does not appear to be of particular concern.

UST REMOVAL

Potential Difficulties and Recommendations

Based on our site reconnaissance, potential site specific difficulties which may be encountered during UST removal were identified and are included as Table 2. Our recommendations in dealing with the potential difficulties are also provided. Additional information with respect to the disposal of contaminated soil, the UST and associated piping is included in Appendix C.

Regulatory Concerns

The Seattle Fire Department requires issuance of a permit for all fuel storage tank removals. The cost of the one day permit is $60, and the requirements of the permit include pumping and rinsing the tank, inerting it with CO_2, and removing and relocating the tank the same day as the permit is issued. A representative of the fire department will be on site to confirm tank inertion prior to removal. The cost for the fire department representative is included in the permit fee. No hot work is allowed on the tank. The Fire Department does not typically charge for emergency responses.

The Washington Department of Ecology (Ecology) does not require notification for the removal of heating oil USTs, but does require notification if contamination is encountered. Mr. Martin Hansen, Project Manager of the USPS UST removal program, verbally notified Mr. Joe Hickey at Ecology's Redmond office of the contamination encountered at the site during this investigation, and a copy of this report has been sent to them.

Estimated Line Item Quantities for UST Closure

The estimated line item quantities and costs for closure of the UST are included in Appendix D. The line item quantities include removal of some contaminated soil, based on the current study. However, since this investigation did not and was not intended to address the full lateral and vertical

extent of contamination, the actual quantity of excavated soil may be greater than that estimated. Disposal costs for the estimated amount of excavated soil are based upon disposal in a Class I landfill.

CONCLUSIONS AND RECOMMENDATIONS

It appears that the USTs were closed in accordance with applicable regulations at the time of closure. However, based on the analytical results of this study, it appears that there has been release from either or both of the USTs that has resulted in concentrations of petroleum hydrocarbons which exceed current proposed Ecology cleanup standards for soil and groundwater. ECI recommends removal of the USTs and excavation of as much of the impacted soil as possible. The concentration of TRPH found in the groundwater was only slightly above the proposed regulatory limit, so removing the source of contamination should substantially remediate the site. After evaluation of laboratory results from tank removal work, the installation and periodic monitoring of up to three monitor wells may be appropriate. It is recommended that installation of any additional wells be delayed until completing UST and affected soil removal.

Arrangements have been made to have the purged groundwater removed from the site for recycling by Coastal Tank Cleaning. A receipt of disposal will be forwarded to the USPS. The drummed soil cuttings will remain on the site for appropriate disposal during the UST excavation.

STANDARD LIMITATIONS

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with the terms and conditions set forth in our proposal dated October 8, 1990. All conclusions and recommendations are professional opinions based on our interpretation of information currently available to us. No warranty, expressed or implied, is made.

Conditions between borings may vary. A potential always remains for the presence of unknown, unidentified, unexpected, or unforeseen subsurface contamination, or other adverse conditions. Further evidence against such potential site contamination or adverse conditions would require additional subsurface exploration, sampling, testing, and interpretation.

If new information is discovered or developed in future work (which may include excavations, borings, or other studies), ECI should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

This report is for the exclusive use of the United States Postal Service and their representatives. After completion of this project, any subsequent consultations or other professional services made

by ECI to third parties (parties other than you or your representatives) will ordinarily require your prior written agreement to ECI. Any such ECI service to third parties ordinarily is new work (a) requiring formal agreement with the new client, and (b) done on a time-and-materials basis and in accordance with ECI's prevailing Standard Fee Schedule and General Conditions.

CLOSURE

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding our scope, methods, findings, conclusions, or recommendations, please contact us.

Table 1

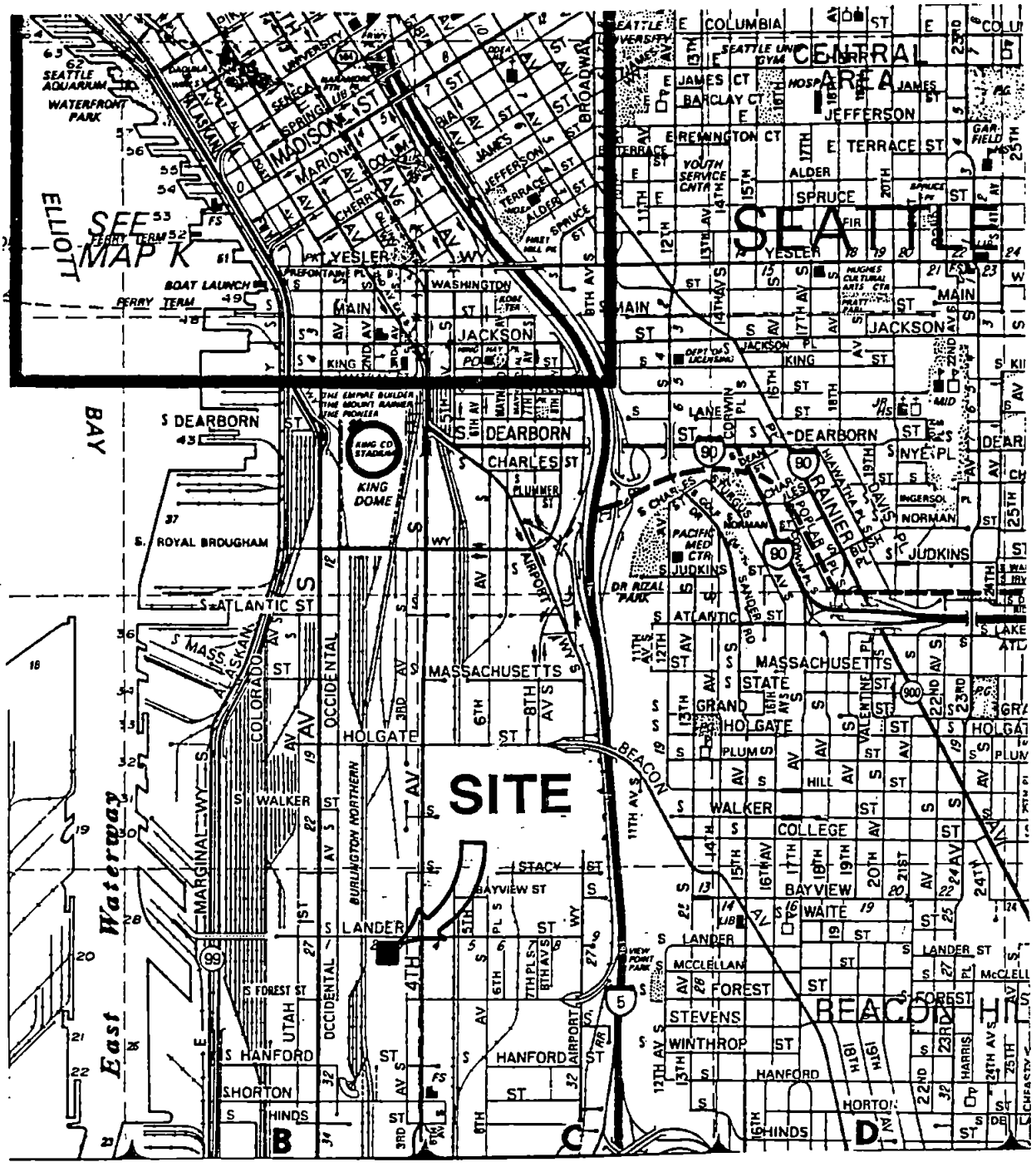
Total Recoverable Petroleum Hydrocarbons in Soil and Groundwater

Sample Description	Petroleum Oil (ppm)
Soil	
B-1-7.5'	920
B-1-13G	460
B-2-8.5'	480
B-2-13.0'	<5.0
MW-1-8'	150
MW-1-12.5'	11
Groundwater	
MW-1	1.3

Table 2

SITE SPECIFIC DIFFICULTIES FOR UST CLOSURE
E-4414-330

Item 1:	The nurse tank lies adjacent to a natural gas line.
Recommendation:	Since samples from the borehole (B-1) on the opposite side of the gas line had the highest concentrations of petroleum hydrocarbons, we recommend removing the gas line for the duration of the work. An alternate, temporary line would be required to continue natural gas service during UST removal.
Item 2:	The area was marked for underground utilities and did not indicate that other utilities were present in the area. However, a trench-like patched area noted 2-1/2 feet to the north of the 5,000-gallon tank indicates that there may be another underground utility of concern.
Recommendation:	Attempt to identify what is under this patched area from site plans and USPS personnel. If the nature of this patch is still uncertain prior to excavation, the area should be hand dug or probed to find out what, if anything, lies within this area before proceeding with the tank excavation.
Item 3:	The tank removal will interfere with maintenance operations.
Recommendation:	The area should be well marked and cordoned off. Work with postal officials on a suitable work plan and schedule for both parties.
Item 4:	It is not known how well the tanks were filled with sand, if they were cleaned prior to being filled, or if the remaining product was even pumped from the tanks.
Recommendation:	Care should be taken when opening the tanks to remove the sand so that product or contaminated sand is not released, thereby creating additional contamination problems.



Reference :
King County / Map 20
By Thomas Brothers Maps
Dated 1990

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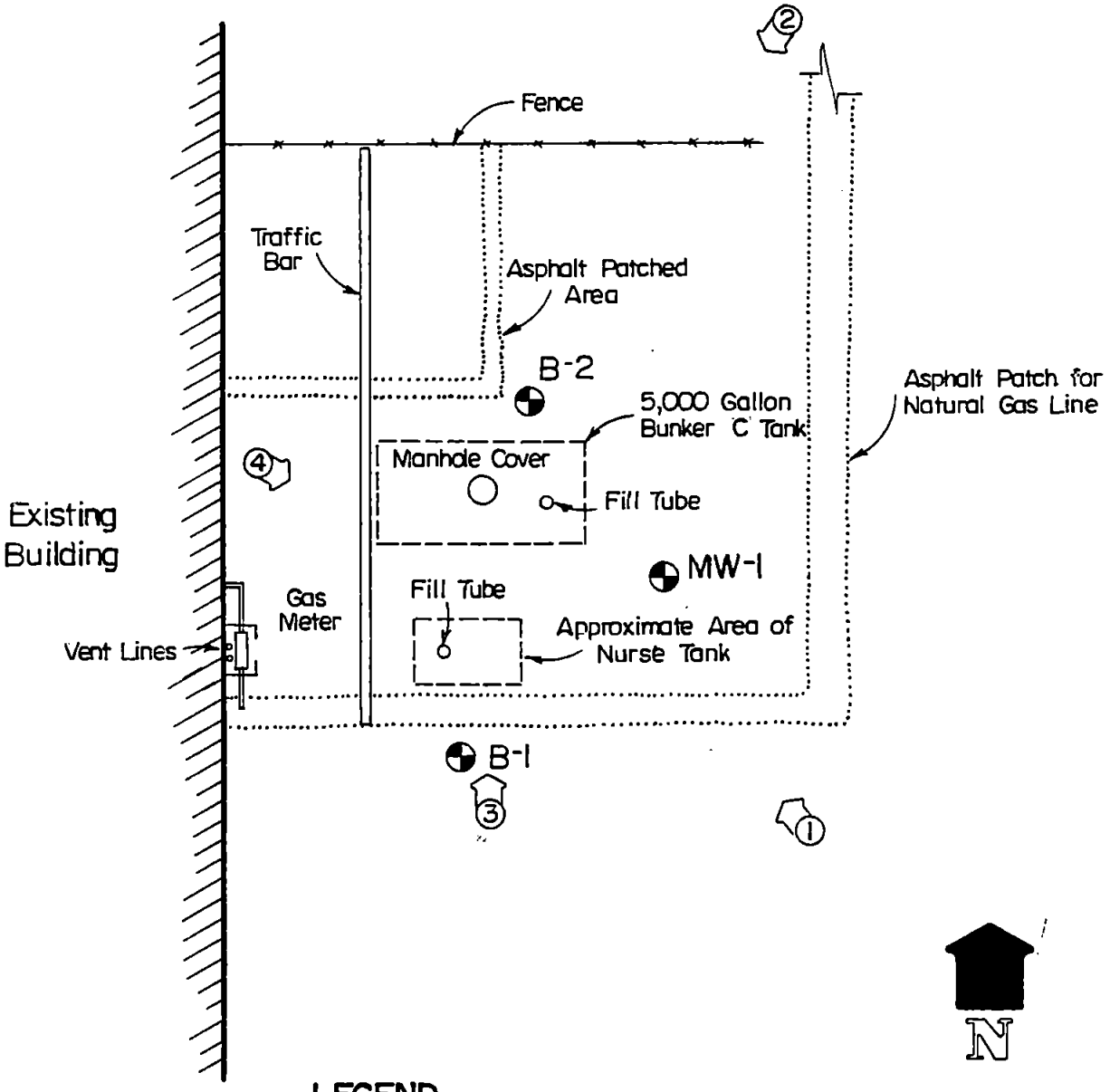
Vicinity Map
USPS Terminal Station
Seattle, Washington

Proj. No. 4414-330	Drwn. GLS	Date Dec. '90	Checked PM	Date 12/3/90	Plate 1



LEGEND

- B-1 — Approximate Location of ECI Boring, Proj. No. E-4414-330, Nov. 1990
- MW-1 — Approximate Location of ECI Monitoring Well, Proj. No. E-4414-330, Nov. 1990
- (1) — Photo Number and Direction of View

Approximate Scale
0 5 10 20ft.

Reference:
Site Sketch
By Earth Consultants Inc.
Undated

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Boring Location Plan
USPS Terminal Station
Seattle, Washington

Proj. No. 4414-330	Drwn. GLS	Date Dec. '90	Checked PM	Date 12/3/90	Plate 2

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTION
Coarse Grained Soils	Gravel And Gravelly Soils	Clean Gravels (little or no fines)		GW gw	Well-Graded Gravels, Gravel-Sand Mixtures, Little Or No Fines
				GP gp	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little Or No Fines
	More Than 50% Coarse Fraction Retained On No. 4 Sieve	Gravels With Fines (appreciable amount of fines)		GM gm	Silty Gravels, Gravel-Sand-Silt Mixtures
				GC gc	Clayey Gravels, Gravel-Sand-Clay Mixtures
More Than 50% Material Larger Than No. 200 Sieve Size	Sand And Sandy Soils	Clean Sand (little or no fines)		SW sw	Well-Graded Sands, Gravelly Sands, Little Or No Fines
				SP sp	Poorly-Graded Sands, Gravelly Sands, Little Or No Fines
	More Than 50% Coarse Fraction Passing No. 4 Sieve	Sands With Fines (appreciable amount of fines)		SM sm	Silty Sands, Sand-Silt Mixtures
				SC sc	Clayey Sands, Sand-Clay Mixtures
Fine Grained Soils	Silts And Clays	Liquid Limit Less Than 50		ML ml	Inorganic Silts & Very Fine Sands, Rock Flour, Silty-Clayey Fine Sands; Clayey Silts w/ Slight Plasticity
				CL cl	Inorganic Clays Of Low To Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean
				OL ol	Organic Silts And Organic Silty Clays Of Low Plasticity
More Than 50% Material Smaller Than No. 200 Sieve Size	Silts And Clays	Liquid Limit Greater Than 50		MH mh	Inorganic Silts, Micaceous Or Diatomaceous Fine Sand Or Silty Soils
				CH ch	Inorganic Clays Of High Plasticity, Fat Clays.
				OH oh	Organic Clays Of Medium To High Plasticity, Organic Silts
Highly Organic Soils				PT pt	Peat, Humus, Swamp Soils With High Organic Contents

Topsoil		Humus And Duff Layer
Fill		Highly Variable Constituents

The Discussion In The Text Of This Report Is Necessary For A Proper Understanding Of The Nature Of The Material Presented In The Attached Logs

Notes :

Dual symbols are used to indicate borderline soil classification. Upper case letter symbols designate sample classifications based upon laboratory testing; lower case letter symbols designate classifications not verified by laboratory testing.

- I 2" O.D. SPLIT SPOON SAMPLER
- II 2.4" I.D. RING SAMPLER OR SHELBY TUBE SAMPLER
- P SAMPLER PUSHED
- ✳ SAMPLE NOT RECOVERED
- ▽ WATER LEVEL (DATE)
- ▮ WATER OBSERVATION WELL

- C TORVANE READING, tsf
- qu PENETROMETER READING, tsf
- W MOISTURE, percent of dry weight
- pcf DRY DENSITY, pounds per cubic ft.
- LL LIQUID LIMIT, percent
- PI PLASTIC INDEX

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LEGEND

Proj. No. 4414-330 | Date Dec'90 | Plate A1

Environmental Boring Log

Project Name:				Sheet	of
USPS Terminal Station				1	1
Job No.: E-4414-330	**Logged by:** PJM	**Start Date:** 11-26-90	**Completion Date:** 11-26-90	**Boring No:** B-1	
Drilling Contractor: Environmental Drilling		**Drilling Method:** Hollow Stem Auger		**Sampling Method:** Split Spoon	
Ground Surface Elevation:		**Hole Completion:** ☐ Monitoring Well ☐ Piezometer ☒ Abandoned, sealed with bentonite			

Microtip Reading (ppm)	Sample ID	Blow Count	Litho-graphy	Depth in Feet	USCS Symbol	Surface Conditions:
				1		Asphalt and baserock
				2	sp	SAND, black, loose, fine
	B-1 3.5'	5 6 7		3		
				4		
				5	ml	Sandy SILT, black, wet, soft, fine sands
				6		
		6		7	sm	Silty SAND with gravels, dark gray/black, loose, moist, fill debris consisting of rubber fire hose and miscellaneous rubber, product odor, poor sample recovery
	B-1 7.5'	12 10		8		
				9		
				10		
				11		
				12 ▽		
		3 10		13	sp-ml	SAND, black with silt and sandy silt lenses, organic debris, very loose, saturated, product odor, poor sample recovery, sample B1 - B6 collected from bottom of auger.
	B-1 13.5'	8		14		
				15		
				16		Boring terminated at 15 feet.
				17		
				18		
				19		

Notes/Location

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Proj. No. E-4414-330	Date Dec'90	Plate A2

Environmental Boring Log

Project Name: USPS Terminal Station				Sheet 1 of 1
Job No.: E-4414-330	Logged by: PJM	Start Date: 11-26-90	Completion Date: 11-26-90	Boring No: **B-2**
Drilling Contractor: Environmental Drilling		Drilling Method: 8" Hollow Stem Auger		Sampling Method: Split Spoon
Ground Surface Elevation:		Hole Completion: ☐ Monitoring Well ☐ Piezometer ☒ Abandoned, sealed with bentonite		

Microtip Reading (ppm)	Sample ID	Blow Count	Litho-graphy	Depth in Feet	USCS Symbol	Surface Conditions:
				0		Asphalt and baserock
				1	sp	SAND, black, loose, damp, fine, poorly graded, silt lenses, slight product odor
				2		
		34		3		
	B-2 3.5'	17				
		11		4		
				5		
				6	ml	Sandy SILT, black, wet, soft, fine sands
				7	sm	Silty SAND, black, silt lenses, little gravel, moist, wood debris
		3				
		6		8		
	B-2 8'	7				
				9		
				10		
				11		
				12	ml ▽	Clayey SILT, very dark gray with stringers of grayish brown, trace sands, slightly plastic, soft, very moist, clay shards
	B-2 13'	4				
		3		13		
		2		14		Boring terminated at 13.5 feet.
				15		
				16		
				17		
				18		
				19		

Notes/Location

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Proj. No. E-4414-330	Date Dec'90	Plate A3

Environmental Boring Log

Project Name:				Sheet of
USPS Terminal Station				1 1
Job No.: E-4414-330	**Logged by:** PJM	**Start Date:** 11-26-90	**Completion Date:** 11-26-90	**Boring No:** MW-1
Drilling Contractor: Environmental Drilling		**Drilling Method:** 8" Hollow Stem		**Sampling Method:** Split Spoon
Ground Surface Elevation:		**Hole Completion:** [X] Monitoring Well [ ] Piezometer [ ] Abandoned, sealed with bentonite		

Microtip Reading (ppm)	Sample ID	Blow Count	Litho-graphy	Depth in Feet	USCS Symbol	Surface Conditions:
				1		Asphalt and baserock
				2	sp	SAND, black, damp, loose, fine, poorly graded
		5		3		
		6				
	MW-1 3.5'	7		4		
				5	ml	Sandy SILT, black, wet, soft, fine sands
				6		
				7	sm	Silty SAND, dark gray/black, well graded, fine to medium grained, glass shards, plastic, wood debris, moist, medium dense, product odor (heavy)
		4				
		4		8		
	MW-1 8'	3		9		
				10		
				11		
				12	ml ▽	Clayey SILT, very dark gray with stringers of grayish brown, soft, product odor, trace sands, wood debris
		1				
	MW-1 12.5'	1		13		
		1				
				14		
				15		
		1				
		1		16		
		1				
				17		Boring terminated at 16.5 feet.
				18		
				19		

Notes/Location

Earth Consultants Inc.
Geotechnical Engineers, Geologists & Environmental Scientists

Proj. No. E-4414-330 **Date** Dec'90 **Plate** A4

Monitoring Well Completion Form

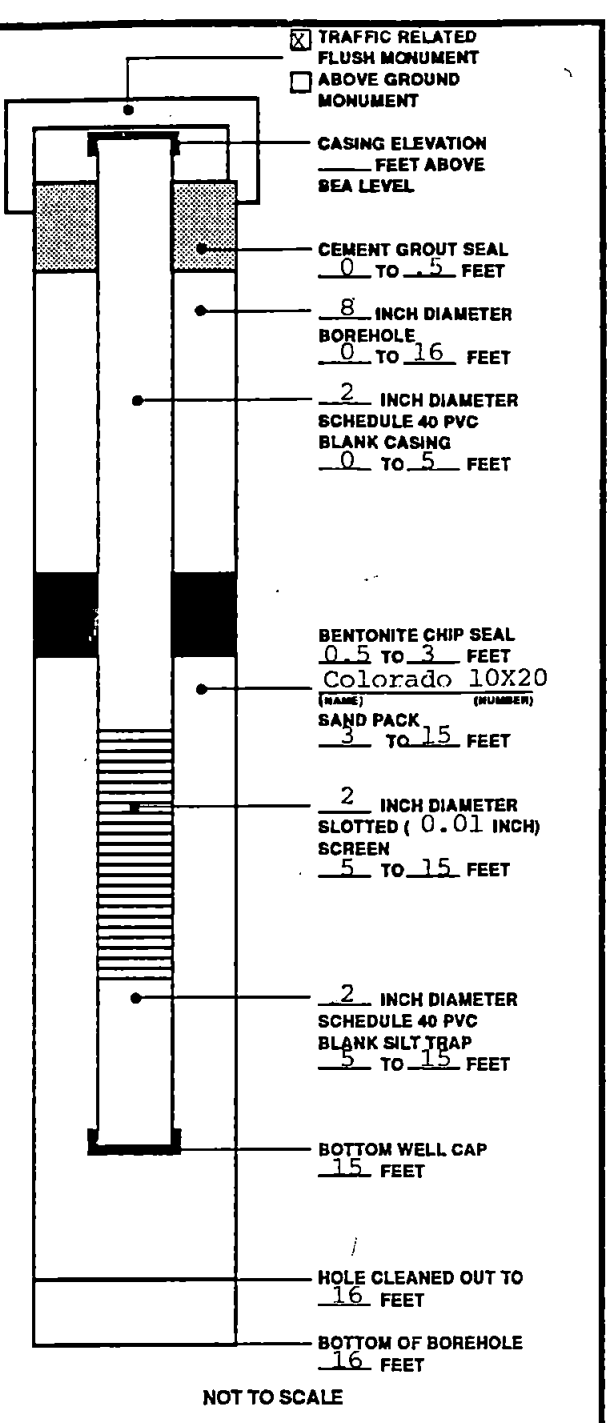
PROJECT NAME:	USPS Terminal Station		
PROJECT NUMBER:	E-4414-330	PROJECT MANAGER:	P. Morrill
LOGGED BY:	PJM	REVIEWED BY:	
WELL I.D.:	MW-1	DATE:	11-26-90
DRILLING COMPANY:	Environmental Drilling		
METHOD OF DECONTAMINATION PRIOR TO DRILLING:	Steam Cleaning		

DEVELOPMENT

METHOD OF DEVELOPMENT:	Bailing		
DEVELOPMENT DATE:	11-27-90		
YIELD (GAL)	40	TIME: FROM	6:00 AM TO 8:00 AM
DESCRIPTION OF TURBIDITY AT END OF DEVELOPMENT:	☐ CLEAR	☒ SLIGHTLY CLOUDY	
	☐ MOD. TURBID	☐ VERY MUDDY	
ODOR OF WATER:	Product odor		
WATER DISCHARGED TO:	☐ GROUND SURFACE	☐ TANK TRUCK	
	☐ SANITARY SEWERS	☐ STORAGE TANK	
	☒ DRUMS	☐ OTHER	
DEPTH TO WATER AT START OF DEVELOPMENT:	6.5	DEPTH TO WATER AT AFTER DEVELOPMENT:	7.0

MATERIALS USED

4.5	SACKS OF Colorado 10X20 SAND
1	SACKS OF Portland CEMENT
_____	SACKS OF GROUT USED:
_____	SACKS OF POWDERED BENTONITE:
_____	BUCKETS OF BENTONITE CHIPS:
5	FEET OF 2 INCH PVC BLANK CASING
10	FEET OF 2 INCH PVC SLOTTED SCREEN 1.01 INCH SLOT SIZE
_____	FEET OF _____ INCH STEEL CONDUCTOR CASING
_____	YARD^3 CEMENT-SAND (REDI-MIX) ORDERED:
_____	YARD^3 CEMENT-SAND (REDI-MIX) USED:
CONCRETE PUMPER USED?	☐ YES ☐ NO
NAME:	



NOT TO SCALE

ADDITIONAL INFORMATION

Earth Consultants Inc.
Geotechnical Engineers, Geologists & Environmental Scientists

MONITORING WELL COMPLETION FORM
USPS TERMINAL STATION
SEATTLE, WASHINGTON

Proj. No.	E-4414-330	Drwn.	GLS	Date	Dec'90	Checked	PJM	Date	12-5-90	Plate	A5

Date: 11-28-90 Sampler T.S. Clawson

Weather Conditions: Partly cloudy

Groundwater Sampling Field Notes

Well I.D.	Initial water level and bottom of casing (feet)	Casing diameter (inches)	Casing volume (gallons)	Time	Gallons purged	pH	Specific conductivity (umhos/cm)	Temperature (°C)	Sample method*	Analysis	No. and type of containers	Preservative	Comments (turbidity, odor, microtip reading, etc.)
MW-1	W.L. 6.5 T.D. 14.5	2	1.44	1115	5	6.65	2470	17.1	B	8021 418.1	3-40 ml vials 1-1 ltr br	None HCl	Turbid Turbid

Casing volume constants
- 2" well 0.16 gallons/lineal foot
- 4" well 0.65 gallons/lineal foot

*B - Teflon or Stainless Steel Bailer
P - Bladder Pump

Earth Consultants Inc.
Geotechnical Engineers, Geologists & Environmental Scientists

GROUNDWATER SAMPLING FIELD NOTES
USPS TERMINAL STATION
SEATTLE, WASHINGTON

Proj. No. 4414-330 | Date Dec'90 | Plate A6

E-4414-330

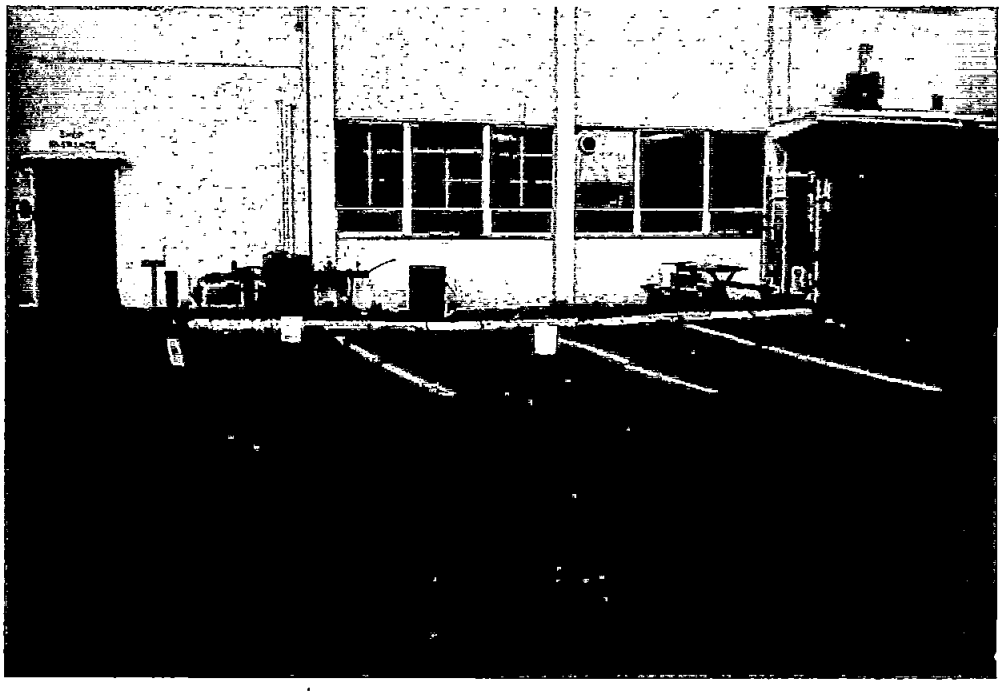


Photo 1 View of tank area showing bore hole and monitoring well locations. Tank fill tubes are marked by the white buckets. The orange cones mark the locations of B-1, MW-1 and B-2 from left to right. Note the location of the gas meter and vent lines behind it. The underground natural gas line is marked in yellow.

Photo 2 View of the tank area facing southwest.

Photos Dated 11/27/90

Photo 3 View showing the manhole cover and fill tube for the 5,000 gallon UST. The orange cone marks the location of borehole B-2.

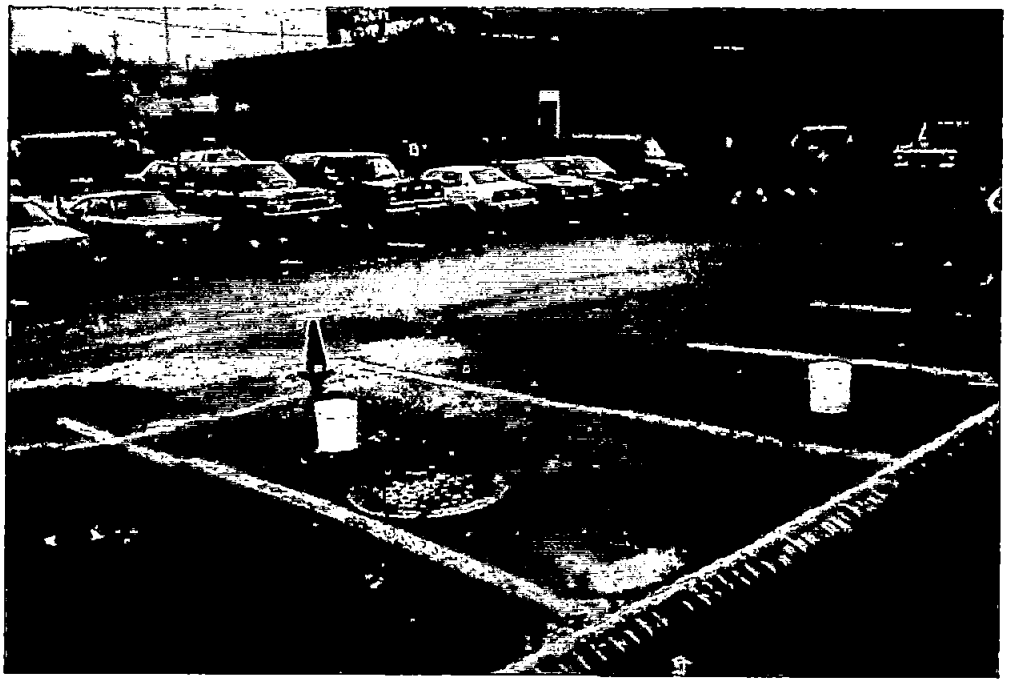


Photo 4 View of the tank area facing southeast.

Photos Dated 11/27/90

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011
Phone (206) 481-9200 • FAX (206) 485-2992

Earth Consultants Inc.	Client Project ID:	USPS - Terminal Station	Sampled:	Nov 26, 1990
1805 136th Place N.E., Suite 101	Matrix Descript:	Soil	Received:	Nov 27, 1990
Bellevue, WA 98005	Analysis Method:	EPA 418.1 (I.R. with clean-up)	Extracted:	Dec 3, 1990
Attention: Pamela Morrill	First Sample #:	011-0425	Analyzed:	Dec 3, 1990
			Reported:	Dec 3, 1990

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample Number	Sample Description	Petroleum Oil mg/kg (ppm)
011-0425	B-1-7.5	920
011-0426	B-1-13G	460
011-0427	B-2-8.5	48
011-0428	B-2-13.0	N.D.
011-0429	MW-1-8	150
011-0430	MW-1-12.5	11

Detection Limits:	**5.0**

Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL

Scot Cocanour
Laboratory Director

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Earth Consultants Inc.	Client Project ID:	USPS - Terminal Station	Sampled:	Nov 26, 1990
1805 136th Place N.E., Suite 101	Matrix Descript:	Soil	Received:	Nov 27, 1990
Bellevue, WA 98005	Analysis Method:	Oregon HCID		
Attention: Pamela Morrill	First Sample #:	011-0426	Analyzed:	Dec 4, 1990
			Reported:	Dec 4, 1990

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Sample Number	Sample Description	Hydrocarbon Species
011-0426	B1-13G	Diesel

Detection Limits:	N/A

Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL

Scot Cocanour
Laboratory Director

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Earth Consultants Inc.	Client Project ID:	USPS, E4414-330	Sampled:	Nov 28, 1990
1805 136th Place N.E., Suite 101	Sample Descript:	Water, MW-1	Received:	Nov 28, 1990
Bellevue, WA 98005	Analysis Method:	EPA 8021	Analyzed:	Dec 4, 1990
Attention: Pamela Morrill	Lab Number:	011-0471	Reported:	Dec 7, 1990

VOLATILE ORGANIC COMPOUNDS (EPA 8021)

Analyte	Detection Limit µg/L	Sample Results µg/L
Benzene	2.0	N.D.
Bromobenzene	2.0	N.D.
Bromochloromethane	2.0	N.D.
Bromodichloromethane	2.0	N.D.
Bromoform	2.0	N.D.
Bromomethane	2.0	N.D.
n-Butylbenzene	2.0	N.D.
sec-Butylbenzene	2.0	N.D.
tert-Butylbenzene	2.0	N.D.
Carbon tetrachloride	2.0	N.D.
Chlorobenzene	2.0	N.D.
Chloroethane	2.0	N.D.
Chloroform	2.0	N.D.
Chloromethane	2.0	N.D.
2-Chlorotoluene	2.0	N.D.
4-Chlorotoluene	2.0	N.D.
Dibromochloromethane	2.0	N.D.
1,2-Dibromo-3-chloropropane	2.0	N.D.
1,2-Dibromoethane	2.0	N.D.
Dibromomethane	2.0	N.D.
1,2-Dichlorobenzene	2.0	N.D.
1,3-Dichlorobenzene	2.0	N.D.
1,4-Dichlorobenzene	2.0	N.D.
Dichlorodifluoromethane	2.0	N.D.
1,1-Dichloroethane	2.0	N.D.
1,2-Dichloroethane	2.0	N.D.
1,1-Dichloroethene	2.0	N.D.
cis-1,2-Dichloroethene	2.0	N.D.
trans-1,2-Dichloroethene	2.0	N.D.
1,2-Dichloropropane	2.0	N.D.
1,3-Dichloropropane	2.0	N.D.
2,2-Dichloropropane	2.0	N.D.
1,1-Dichloropropene	2.0	N.D.
Ethyl Benzene	2.0	N.D.
Hexachlorobutadiene	2.0	N.D.
Isopropylbenzene	2.0	N.D.
p-Isopropyltoluene	2.0	N.D.
Methyl ethyl ketone	40	N.D.
Methylene chloride	2.0	N.D.

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Bellevue, WA 98005	Analysis Method:	EPA 8021	Analyzed:	Dec 4, 1990
Attention: Pamela Morrill	Lab Number:	011-0471	Reported:	Dec 7, 1990

VOLATILE ORGANIC COMPOUNDS (EPA 8021)

Analyte	Detection Limit µg/L	Sample Results µg/L
Naphthalene	2.0	N.D.
n-Propylbenzene	2.0	N.D.
Sytrene	2.0	N.D.
1,1,1,2-Tetrachloroethane	2.0	N.D.
1,1,2,2-Tetrachloroethane	2.0	N.D.
Tetrachloroethene	2.0	N.D.
Toluene	2.0	N.D.
1,2,3-Trichlorobenzene	2.0	N.D.
1,2,4-Trichlorobenzene	2.0	N.D.
1,1,1-Trichloroethane	2.0	N.D.
1,1,2-Trichloroethane	2.0	N.D.
Trichloroethene	2.0	N.D.
Trichlorofluoromethane	2.0	N.D.
1,2,3-Trichloropropane	2.0	N.D.
1,2,4-Trimethylbenzene	2.0	N.D.
1,3,5-Trimethylbenzene	2.0	N.D.
Vinyl chloride	2.0	N.D.
o-Xylene	2.0	N.D.
m,p-Xylene	2.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

NORTH CREEK ANALYTICAL

Scot Cocanour
Laboratory Director

Please Note:
This sample contains unidentified volatile hydrocarbons at approximately 10 µg/L.

Earth Consultants Inc.

CHAIN OF CUSTODY RECORD

SHEET 1 OF 1

ECI contact, Pam Morrill

PROJECT	SAMPLERS: *(Signature)*
[illegible] E 4414-[illegible]	[signature]

LAB NUMBER	DATE	TIME	WATER	SEDIMENT	TISSUE	AIR	OIL	OTHER	NO. OF CONTAINERS	REMARKS
MW-1	11/6/90	1115	X						4	
	Run 1L for HC hydrocarbons per 418.1 TPH									
	three 40ml vials for 8010 volatile organics									
	? 5 day turn around!									

RELINQUISHED BY: *(Signature)*	RECEIVED BY: *(Signature)*	DATE/TIME

RELINQUISHED BY: *(Signature)*	RECEIVED BY: *(Signature)*	DATE/TIME

RELINQUISHED BY: *(Signature)*	RECEIVED BY: *(Signature)*	DATE/TIME

RELINQUISHED BY: *(Signature)*	RECEIVED BY MOBILE LAB FOR FIELD ANALYSIS: *(Signature)*	DATE/TIME
[signature]		

DISPATCHED BY: *(Signature)*	DATE/TIME	RECEIVED FOR LABORATORY BY: *(Signature)*	DATE/TIME
		[illegible]	[illegible]

METHOD OF SHIPMENT:

Distribution: Original - Accompany Shipment
One Copy - Survey Coordinator Field Files

CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 · Bothell, WA 98011
Phone (206) 481-9200 · FAX (206) 485-2992

CHAIN OF CUSTODY REPORT

CLIENT: Earth Consultants
ADDRESS: 1805 136th Place NE
Bellevue 98005
PHONE: 643-3780
PROJECT NAME/SITE: USPS - Terminal Station
SAMPLER: Pam Morrill
DATE: 11/26

REPORT TO: Pam Morrill
BILLING TO: Earth Consultants

TURNAROUND TIME: 1-2 DAY [ ] 3-5 DAY [X] 10 DAY [ ]

PO#/BILLING REFERENCE:

SAMPLE ID#/ STATION	SAMPLE DESCRIPTION	NUMBER OF CONT.	TYPE CONT.	SAMPLING TIME/DATE	ANALYSIS REQUESTED 418.1	REMARKS	SAMPLE NUMBER
B-1-7.5	soil	1	Brass	11/26/90	X	HCID on one sample, prefer lower depth	
B-1-13.5	Soil-grab	1	Brass	"	X		
B-2-8.5'	Soil	1	"	"	X		
B-2-13.5'	Soil	1	"	"	X		
MW-1-8'	Soil	1	"	"	X		
MW-1-12.5	Soil	1	"	"	X		

RELINQUISHED BY: DATE: TIME:
RELINQUISHED BY: Pam Morrill DATE: 11/26/90 TIME: 4:52
RELINQUISHED BY: DATE: TIME:

RECEIVED BY:
RECEIVED BY: Jon P. Clerk
RECEIVED IN LAB BY:

TRAVEL TIME:
ON SITE TIME:
OTHER:

WERE SAMPLES:	YES	NO
PRESERVED ?		
IN GOOD CONDITION?		

APPENDIX C
GENERAL DISPOSAL OPTIONS

E-4414-330

Disposal of Excavated Contaminated Soil

Whenever possible, the Washington Department of Ecology prefers to see soil contaminated with petroleum hydrocarbons remediated by (a) landfarming and/or aeration or (b) in-place treatment technologies (i.e., in-situ biodegradation or soil venting).

Landfarming/Aeration

1) Fife Sand and Gravel
3120 Freeman Road East
Puyallup, Washington 98371

Restrictions: Fife Sand and Gravel only accepts petroleum contaminated materials that are safe to transport. The soil is landfarmed/aerated until State-acceptable levels are met. It is then sold commercially, used as cover for the Tacoma landfill, or returned to the property owner if requested.

Cost: $40/yard

Transportation: State rates for truck rental.

Contact: Mr. Mike Kelly at (206) 922-7710

Landfills

1) Cedar Hills Landfill
16645 228th Avenue Southeast
Maple Valley, Washington 98038

Restrictions: The landfill does not accept dangerous wastes (i.e. contaminated with solvents, high levels of benzene, or has a low flashpoint). Soil contaminated with more than 3% diesel (oil, etc) typically is not accepted, although exceptions have been made. There is no limit on total volume, but there may be a limit as to the amount accepted per day. A completed "King County Waste Clearance Form, Part A" must be submitted to the King County Health Department to obtain acceptance of the contaminated soil at the landfill.

Cost: Cost is approximately $80 per ton.

Transportation: The landfill does not provide transportation.

Contact: Mr. Steve Burke
172 - 20th Avenue
Seattle, Washington 98122
(206) 296-4633

2) Chem Securities
Star Route, Box 9
Cedar Springs Road
Arlington, OR 98712

Restrictions: The landfill imposes no restrictions on concentrations of TPH accepted. They request copies of analytical test results. From this, a profile sheet will be filled out and approved (approximately 2 weeks). Once the profile sheet is approved, they will make up a contract.

Costs: Bulk dump truck - $134/ton, plus a $20/ton State of Oregon tax.

One time approval fee - $400.00/shipping location/waste stream, $200.00 of which is refundable.

Transportation: Available by Chem Securities - $3.60/loaded mile (20 yard truck).

Contact: Mr. Allen Pettai @ (503) 454-2643.

Tank Disposal

Prior to tank disposal the following information should be checked by the contractor to verify that new restrictions have not been implemented.

1) Seattle Iron and Metals
2955 - 11th Avenue SW
Seattle, Washington
(206) 682-0040

Restrictions: Each tank must be certified washed and cleaned and a hole cut out of at least one end.

2) General Metals of Tacoma
1902 Marine View Drive
Tacoma, Washington
(206) 572-4000 or 1-800-562-9876

Restrictions: The tank must be cut open and certified clean.

DISTRIBUTION

E-4414-320

2 Copies	United States Postal Service Kent Facilities Services Office P.O. Box 5000 Seattle, Washington 98108 Attention: Mr. Martin Hansen
1 Copy	Washington Department of Ecology 4350 150th Avenue Northeast Redmond, Washington 98005 Attention: Mr. Joe Hickey

PJM/LMM/ljs/sar
[E4414330.R01]