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September 7, 1988

Ms. Lynn Cashion
State of Washington
Department of Ecology
Northwest Regional Office
4350 150th Avenue Northeast
Redmond, WA 98052-5301

Dear Lynn:

Enclosed you'll find a copy of the Sampling and Analysis Plan for the Tank Removal Operation at the USPS Terminal Annex in Seattle.

As we discussed I will give you a call as soon as the excavation reaches the underground tanks or groundwater, which may be on either Monday or Tuesday.

Sincerely,

Lisa C. Robbins

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SAMPLING AND ANALYSIS PLAN
UNDERGROUND FUEL TANK REPLACEMENT
TERMINAL ANNEX FUEL ISLAND
SEATTLE, WASHINGTON

September 1988

Project: KFSO - USPS

Prepared by: Resources Conservation Company (RCC)
3006 Northup Way
Bellevue, WA 98004

jrm/k/aa0

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I. INTRODUCTION

The current project consists of the soil and groundwater monitoring associated with the excavation and replacement of three underground fuel storage tanks at the U.S.P.S.Terminal Annex (Figure 1) in Seattle, Washington. The work, conducted by Crowley Environmental Services, will consist of: 1) removal and disposal of contaminated soil surrounding the tanks, 2) removal and disposal of the 3 tanks, 3) removal and disposal of groundwater required for dewatering the excavation, and 4) replacement with one double-walled underground storage tank. Uncontaminated soil and contaminated soil will be temporarily stored on-site for remediation of volatile contaminants prior to disposal at either Cedar Hills Landfill or the Chem-Security Landfill in Arlington, Oregon. Previous site work by others has included the installation of 9 groundwater monitoring wells, one product recovery well, and operation of a free-product recovery system. Recent sampling indicates that the free-product has been removed from the site. This Sampling and Analysis Plan outlines the monitoring and testing program to be conducted to document and assess the tank removal operation.

II. WELL WATER SAMPLING PROGRAM

The nine groundwater monitoring wells found on-site are shown in Figure 2. All nine wells will be sampled prior to excavation, and then immediately after site construction is complete. An ongoing monitoring program will then be initiated consisting of monthly sampling and analysis to be continued as directed by the Washington State Department of Ecology. The well water will be analyzed for benzene, toluene, ethylbenzene and xylene (BTX), oil and grease (Total Petroleum Hydrocarbon), and TOC. Measurement of the free product layer, if present, will be taken in each monitoring well. Appendix A provides a detailed breakdown of the sample volumes, analytical testing requirements and sample numbering.

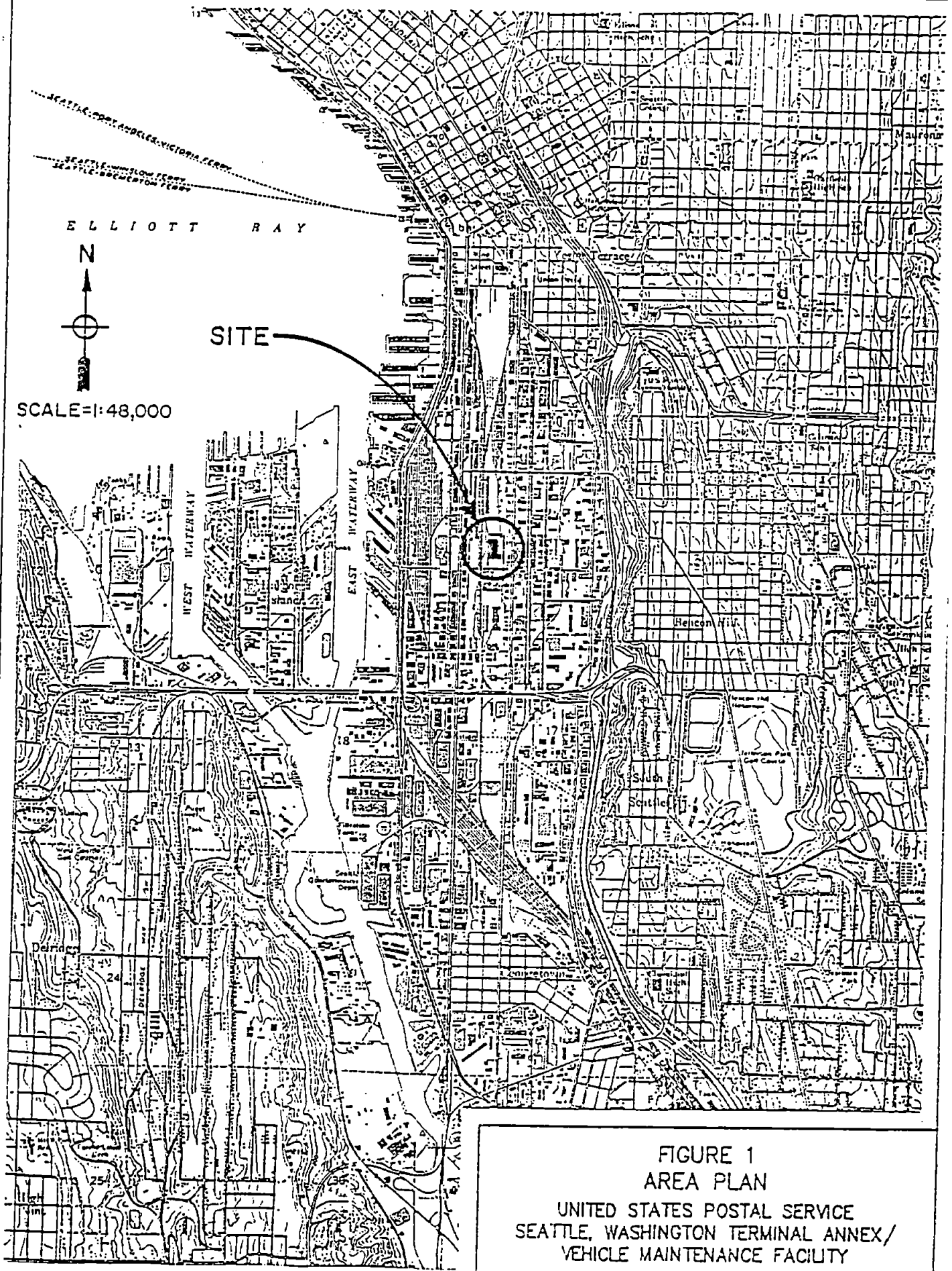

FIGURE 1
AREA PLAN
UNITED STATES POSTAL SERVICE
SEATTLE, WASHINGTON TERMINAL ANNEX/
VEHICLE MAINTENANCE FACILITY

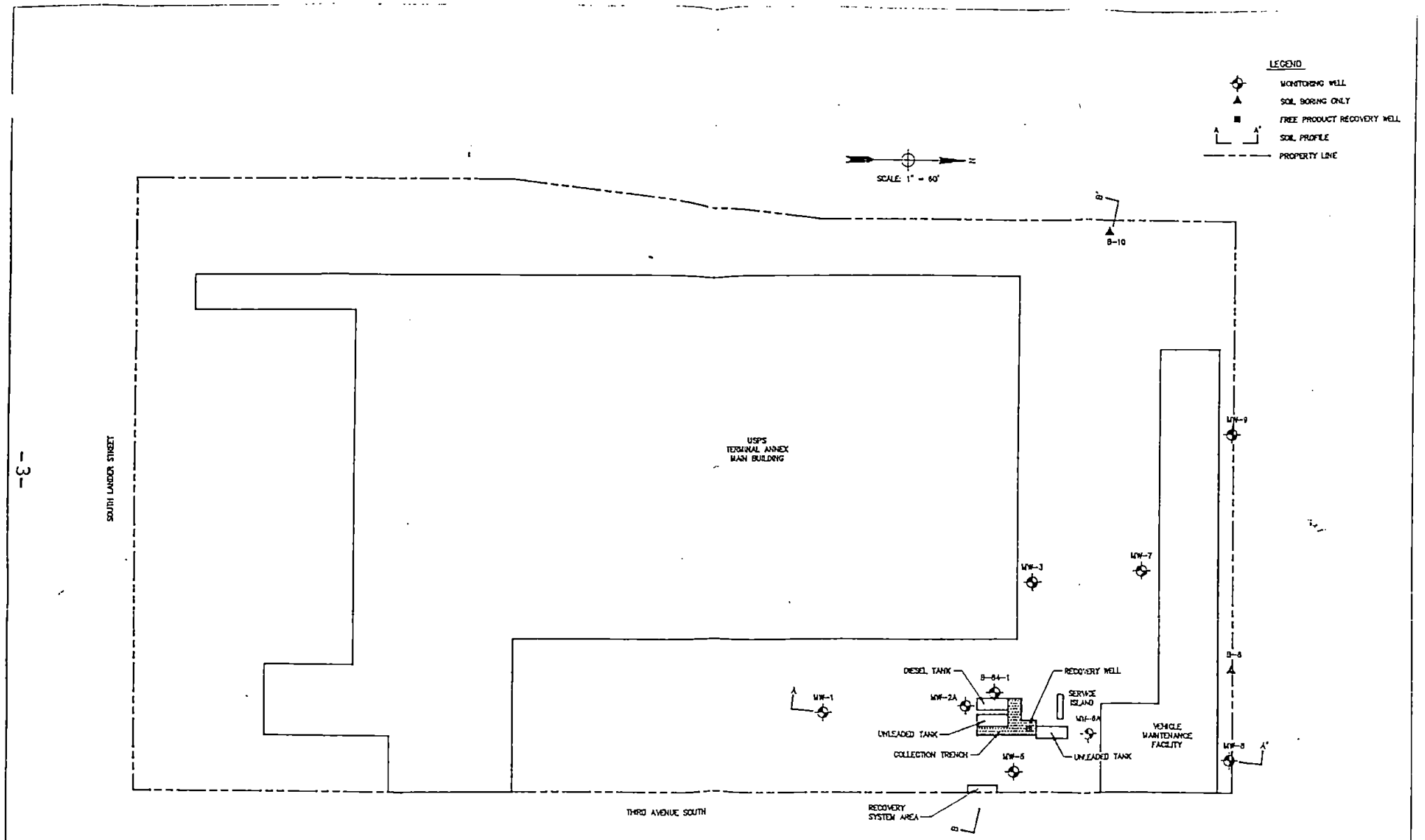

FIGURE 2
SITE PLAN

UNITED STATES POSTAL SERVICE
SEATTLE, WASHINGTON TERMINAL ANNEX/
VEHICLE MAINTENANCE FACILITY

Sampling Methodology

The static water level and thickness of any floating product will be measured in each well prior to purging the well. An electric sounder will be used to measure water level, after which a clear plastic bailer will be used to remove the water column for measurement of product thickness., The sounder and bailer will be cleaned with a detergent wash and distilled water rinse before each use.

The wells will be purged prior to sampling by removing 3 to 5 casing volumes with a centrifugal or hand-powered pump. The purge water will be stored in the 500 gallon tank located in the water treatment area for disposal in accordance with applicable regulations. On-site testing of groundwater will be performed during the purging operation for temperature, pH, and specific conductance. All collected data and procedures for field operations will be recorded in the field log book. Monitoring wells will be sampled in the order specified on the Sample Field Sheets in Appendix A.

A stainless steel or teflon bailer will be used to collect water samples after purging. The bailer will be cleaned after sample collection using laboratory detergent and followed by a distilled water rinse. New nylon rope will be attached to the bailer at each location. If floating product enters the well during sampling, it will be poured off from the bailer to the extent practicable prior to filling the sample containers.

Each sample container will be labelled with a sequential sample number (Appendix A), well number, date, time, preservative, sample collector, project name and analysis requested. A 1 liter glass bottle, with HCl preservative added, and two 40-ml glass VOA vials will be filled at each well location. The 40-ml vials will be completely filled with no remaining headspace. The well samples will be analyzed for TPH (Total Petroleum Hydrocarbon), TOC (Total Organic Carbon), and BTX (benzene, toluene and xylene) as described in Appendix A.

After collection, the water samples will be stored in a cooler with blue ice and delivered to the RCC laboratory within 24 hours. Sample Analysis Request Forms and Chain-of-Custody Forms (Figures 3 and 4) will be completed and accompany the samples to the laboratory. A two week turnaround time for sample results will be specified on the Sample Analysis Request Form for the TOC, TPH and BTX samples from each well.

QA/QC sampling will be as follows:

Each well sampling event will include the collection of 1 set of duplicate samples and 1 set of trip blank samples for each shipment of BTX samples. The field duplicate will be collected from well MW-3, consisting of a one liter glass jar, which has been prepared with HCl preservative, for analysis of TPH and TOC, and two 40 ml VOA vials for analysis of BTX. The VOA vials will be filled leaving no headspace. Also, two 40 ml VOA vial trip blanks which have been pre-prepared at the laboratory will be included with each cooler shipment of BTX samples. Sample jars will be labeled with the sequential sample number (see Appendix A), well number, date, time, preservative, sample collector, project name and analysis requested.

The identity of all samples will be carefully documented in the permanent field log book including the sample number and identity (e.g., field sample, duplicate or trip blank).

Sampling gloves will be worn during all sampling operations to prevent contamination of equipment. Sampling gloves will be changed and discarded after each well is sampled.

FIGURE 3

SAMPLING ANALYSIS REQUEST

PART I: Field Section

Collector _____ Date Sampled _____ Time _____ hours

Affiliation of Sampler _____

Address _____
number street city state zip

Telephone (___)_____ Company Contact _____

LABORATORY SAMPLE NUMBER	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION**

Analysis Requested _____

_____

_____

Special Handling and/or Storage _____

_____

PART II: LABORATORY SECTION**

Received by _____ Title _____ Date _____

Analysis Required _____

_____

* Indicate whether sample is soil, sludge, etc.
**Use back of page for additional information relative to sample location.

PRO.	PROJECT NAME					NO. OF CONTAINERS							REMARKS
SAMPLERS: (Signature)													
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION								

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

FIGURE 4 CHAIN-OF-CUSTODY FORM

III. ON-SITE MONITORING OF WORK PLAN TASKS 2 AND 3

After the product lines are flushed and the free liquid removed from the tanks, all piping systems and tanks will be monitored with the onsite combustible gas indicator (CGI). Readings will be recorded in the field log book. The Fire Department is responsible for the determination of the success of the free product removal operation.

All safety conditions wil be observed as specified in the site Health and Safety Plan.

All onsite operations will be monitored with both the Photoionization Detector (PID) and CGI to ensure that H&S requirements and Fire Department permit conditions are followed. All observations will be recorded in the permanent field log.

IV. ON-SITE MONITORING OF WORK PLAN TASKS 11, 12, 14 AND 15

Tasks 11, 12, 14 and 15 involve the gas freeing of tanks, tank and piping excavation, stock piling of soils and dewatering of the excavation area, respectively. On-site monitoring activities will include obtaining PID and CGI readings for all onsite activities. Results will be recorded in the permanent field log. Discrepancies between onsite conditions and the H&S plan requirements or the Fire Department Permit will be reported immediately to the on-site manager. PID readings will be taken of the site perimeter before, during and after excavation. All observations will be recorded in the field log. The instruments (CGI and PID) will be calibrated daily with the calibration procedures noted in the field log book (i.e., the calibration gas and concentration will be identified). All observations which may affect readings that are obtained (i.e, diesel fumes from on-site and offsite vehicles, heavy wind or rain, etc.) will be recorded in the field log. CGI and PID readings will be taken of the gas-free piping and tank systems. All values, times, and dates will be recorded in the field log book.

V. EXCAVATION TRENCH SOIL SAMPLING PROGRAM

Both composite and discrete samples will be taken of the excavation trench after the tanks have been removed and the soil is excavated down to a level to be determined by the Engineer (DEA Site Manager). The scope of services require that the excavation continue to a depth of 2 feet below the static groundwater elevation. Composite samples will be taken from all four walls of the excavation trench as close as possible to the level of the groundwater (which is assumed to be the area of the greatest contamination). Two discrete or grab samples will be obtained from areas of either visible contamination or at the discretion of the field personnel. These discrete samples which will be taken in a manner which will reduce the loss of volatiles will be analyzed for BTX.

The composite samples will be analyzed for TPH and BTX. See Appendix A for a detailed breakdown of sampling requirements. Briefly, samples that will be analyzed for TPH will be packaged in 8 oz jars. Samples that are taken for BTX analysis will be taken in two 40 ml VOA vials. The VOA vial samples will be taken in a manner which minimizes headspace.

Composites will be obtained by scooping soil from the various points at the designated sampling locations into a stainless steel mixing bowl. The sample will be mixed in the mixing bowl with a scoop or spoon. The 8 oz and 40 ml VOA vials will be filled directly from the bowl.

The discrete or grab samples for BTX analysis will be obtained by pushing the 40 ml VOA vial into the side of the trench excavation, using a clean stainless steel scoop or spoon to completely fill the vial leaving minimal headspace.

Equipment will be scrubbed with detergent and rinsed with water followed by deionized water before each sampling point. Gloves will be worn for sampling and changed between each sampling point.

A composite field duplicate will be obtained from the southern most wall of the trench. The field duplicate will include one 8 oz jar for TPH analysis and two 40 ml VOA vials for BTX analysis.

All samples will be labelled with sample number (see Appendix A), date and time of collection, analysis requested, sample collector and project name. The sampling locations of all samples by sample numbers and sample type (i.e., composite field sample, discrete field sample or field duplicate) will be carefully logged in the field log book.

The Sample Analysis Request Forms will be completed as required, specifying clearly that 24 hour analysis response is required. The Sample Analysis Request Form and Chain of Custody Form will be placed in a zip lock plastic bag and taped to the inside cover of the sample cooler. Samples will be packed in frozen blue ice and other packing material to prevent breakage. Drain holes will be taped and the cooler cover sealed with tape and custody seals. Coolers will be delivered to the RCC laboratory within 24 hours.

Analytical results will be reported to Lisa Robbins at RCC and "faxed" to Lynn Cashion (206-867-7098) of the Department of Ecology for determination of extent of contaminated soil excavation. If the soil does not meet the Department of Ecology's clean-up criteria, additional soil will be excavated and a new sampling-episode undertaken as delineated in this section. This sequence will proceed until the Department of Ecology makes a determination that the soil meets existing clean-up requirements.

VI. STOCK PILED SOILS SAMPLING PROGRAM

Excavated soils will be stockpiled on USPS property located one block east across Fourth Avenue South at Stacey Street. These soils will be monitored during the excavation activities to allow the separate stockpiling of "contaminated" and "clean" soils. An on-site PID will be used to monitor the soil as it is excavated and stockpiled.

Measurements will be taken while the soil is being loaded for transport to the stockpile location. If the PID reading is 50 ppm or below then the soil is considered "clean" for the purposes of the stockpiling operation and should be stockpiled in the "clean" stockpile location. If the PID reading is above 50 ppm then the soil is considered "contaminated" for the purposes of the stockpiling operation and should be stockpiled in the "contaminated" stockpile location. The "clean" and "contaminated" stockpiles should be sufficiently separated to prevent cross contamination (i.e., not less than 10 feet apart).

Representative samples of both the "clean" and "contaminated" stockpiles will be taken in order to determine the acceptable disposal options. Criteria for disposal at the Cedar Hills Landfill are as follows:

Flash Point $\geq$ 140^{o}F
Benzene $\leq$ 100 ppm
Other halogenated hydrocarbon $\leq$ 100 ppm
EP TOX lead $\leq$5 ppm
Petroleum Hydrocarbon $\leq$3%

Therefore analysis of the soil samples from the stockpiles will include flashpoint, BTX, halogenated hydrocarbons (WAC 173-303), EP TOX (lead), TPH (418.1) and TOC.

To verify that the "clean" stockpile is sufficiently clean for disposal in the Cedar Hills Landfill four composite and two discrete samples will be obtained from the stockpile. Composite samples shall be obtained from four locations within the stockpile including areas which visibly represent the character of the stockpile. Composites will be mixed in a stainless steel mixing bowl and samples bottles filled as indicated in Appendix A. The discrete samples will be taken from two additional areas within the stockpile. The sampler will attempt to obtain samples that are visibly contaminated and representative of the stockpile.

Samples will be taken for the analysis of BTX (two 40 ml VOA vials), Flashpoint (8-oz), TOX or Halogenated Hydrocarbons (8-oz) and EPTOX, TPH and TOC (all from one 8-oz). All sampling equipment will be scrubbed with detergent and rinsed with water followed by a deionized water rinse between sampling points. Gloves will be worn during sampling and discarded after each sampling point.

Field duplicates will be obtained for the composite samples taken from stockpile sampling area #2 which is an area to be determined by the sampler. Samples will include those for BTX (two 40 ml VOA vials), flashpoint (8-oz), TOX (8-oz) and, EPTOX, TPH and TOC (all from one 8-oz). A trip blank (two 40 ml VOA vials which have been prepared at the laboratory) will be provided with each shipment of BTX samples.

The stockpile of "contaminated" soil will be sampled using the same procedures as outlined for the "clean" stockpile. All sample data will be logged in the permanent field log book, particularly the sample number and location.

All sample jars will be labelled with the date and time of collection, sample number (see Appendix A), analysis requested, sample collector, project name, along with preservative used. The Sample Analysis Request Form will specify a 1 week analysis turnaround time for all samples. The Sample Analysis Request

Form and the Chain-of-Custody Form will be placed in a ziplock bag and taped to the inside cover of the sample cooler. Samples will be packed in frozen blue ice and other suitable packing material to prevent breakage. The cooler drain will be taped shut and the cooler cover sealed with tape and custody seals. The sample cooler will be delivered to the RCC laboratory within 24 hours of collection.

Sampling of the stockpiled soil will proceed weekly until soil is properly disposed of in accordance with all applicable regulations. Close coordination with the Department of Ecology will be a top priority.

VII. WATER & SOIL ANALYSIS

The following table provides the analytical test procedures which will be used:

Analyte	Water Method	Detection* Limit	Soil Method	Detection* Limit
BTEX	EPA 602	<6 PPB	EPA 8020	<60 PPB
TPH (DIESEL)	418.1	.5PPM	418.1	10 PPM
TPH (GASOLINE)	8015 (MOD) DHS RECOMMENDED	.5 PPM	8015 (MOD) DHS RECOMMENDED	10 PPM
TOC	EPA 415.2	.5 PPM	EPA 415.1	1,000 PPM
TOTAL HALOGENATED HYDROCARBONS	WAC 173-303	15 PPM	WAC 173-303	15 PPM
EP TOXICITY	SW846 1310	.5 PPM	SW846 1310	.5PPM
FLASH POINT	SW 846 1010		SW846 1010	

* Note: While every effort is made to achieve uniformity of detection limits for a sample set, or to meet the level of sensitivity indicated above, variations in sample types, sample size and interferences will occasionally result in varying ability to quantitate to a particular level.

APPENDIX A: SAMPLE FIELD SHEET

GROUNDWATER WELL MONITORING FIELD SHEET

SAMPLE NUMBER	WELL NUMBER	TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
SMW1-001	MW1	FS	(1) - 1 Liter Glass	TPH (418.1) and TOC	Bottle will be pre-preserved with HCl.
SMW1-001	MW1	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
SMW3-002	MW3	FS	(1) - 1 Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SMW3-002	MW3	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
SMW3-003	MW3	FD	(1) - 1 Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SMW3-003	MW3	FD	(2) VOA Vials Septum	BTX	No preservative No headspace
SMW6-004	MW6	FS	(1) - 1 Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SMW6-004	MW6	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
SMW7-005	MW7	FS	(1) - 1 Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SMW7-005	MW7	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
SMW8-006	MW8	FS	(1) 1 - Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SMW8-006	MW8	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
SMW9-007	MW9	FS	(1) 1 - Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SMW9-007	MW9	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
SMW5-008	MW5	FS	(1) 1 - Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SMW5-008	MW5	FS	(2) VOA Vials Septum	BTX	No preservative No headspace

Continued on the next page

APPENDIX A: SAMPLE FIELD SHEET

SAMPLE NUMBER	WELL NUMBER	TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
SMW2-009	MW2	FS	(1) - 1 Liter Glass	TPH (418.1) and TOC	Bottle will be pre-preserved with HCl.
SMW2-009	MW2	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
SB1-010	B1	FS	(1) - 1 Liter Glass	TPH (418.1) and TOC	Pre-preserved with HCl
SB1-010	B1	FS	(2) VOA Vials Septum	BTX	No preservative No headspace
TBS-011	Trip Blank	TB	(2) VOA Vials Septum	BTX	Pre-prepared No preservatives
TBS-012	Trip Blank	TB	(2) VOA Vials Septum	BTX	Pre-prepared No preservatives

Notes:

Pack 1 trip blank per sample cooler containing VOA vials for BTX analysis.

Specify analysis required and an analytical turnaround time of 2 weeks on the Analysis Request Form.

Include Analysis Request Form and Chain of Custody form in coolers. One per cooler.

Chill Coolers to 4^{o}C with blue ice. Pack coolers with inert packing material to prevent breakage.

APPENDIX A: SAMPLE FIELD SHEET

TRENCH SAMPLING FIELD SHEET

Trench Identity: North or South (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
SW-001* N or S	Composite of North wall of trench	(2) VOA Vials	BTX	No headspace
SW-001 N or S	Composite of North wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-002 N or S	Composite of East wall of trench	(2) VOA Vials	BTX	No headspace
SW-002 N or S	Composite of East wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-003 N or S	Composite of West wall of trench	(2) VOA Vials	BTX	No headspace
SW-003 N or S	Composite of West wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-004 N or S	Composite of South wall of trench	(2) VOA Vials	BTX	No headspace
SW-004 N or S	Composite of South wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-005 N or S	Field Duplicate of Composite Samples of South wall of trench	(2) VOA Vials	BTX	No headspace
SW-005 N or S	Field Duplicate of Composite Samples of South wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full

Continued on the next page.

APPENDIX A: SAMPLE FIELD SHEET

Trench Identity: North or South (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
SW-006** N or S	Discrete (Grab) sample of visibly contaminated area #1	(2) VOA Vials	BTX	No headspace
SW-007** N or S	Discrete (Grab) sample of visibly contaminated area #2	(2) VOA Vials	BTX	No headspace
SW-008 N or S	Trip blank for inclusion in the cooler containing the BTX samples	(2) VOA Vials	BTX	Pre-prepared at the laboratory

Notes:

*Sample numbers for samples taken from the North excavation trench will bear the suffix "N", while samples taken from the Southern excavation trench will be suffixed in "S". The appropriate suffix can be circled on the Field Sample Sheets for clarification.

**Take discrete samples of visibly contaminated areas if possible, otherwise arbitrarily choose the sampling areas. Sampling areas will be marked in the Field Log Book. Analysis will be BTX only.

Specify analytical requirements and an analytical turnaround time of 24 hours, if possible; 48 hours maximum if required to obtain the specified detection limits given on page 13, on the Analysis Request Form.

Include Analysis Request Form and Chain of Custody in sample cooler.

Chill coolers to 4^{o}C with blue ice. Pack cooler with inert packing material to prevent breakage.

APPENDIX A: SAMPLE FIELD SHEET

TRENCH SAMPLING FIELD SHEET

Trench Identity: North or South (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
SW-001* N or S	Composite of North wall of trench	(2) VOA Vials	BTX	No headspace
SW-001 N or S	Composite of North wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-002 N or S	Composite of East wall of trench	(2) VOA Vials	BTX	No headspace
SW-002 N or S	Composite of East wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-003 N or S	Composite of West wall of trench	(2) VOA Vials	BTX	No headspace
SW-003 N or S	Composite of West wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-004 N or S	Composite of South wall of trench	(2) VOA Vials	BTX	No headspace
SW-004 N or S	Composite of South wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full
SW-005 N or S	Field Duplicate of Composite Samples of South wall of trench	(2) VOA Vials	BTX	No headspace
SW-005 N or S	Field Duplicate of Composite Samples of South wall of trench	(1) 8 oz.	TPH (8015 Mod)	Full

Continued on the next page.

APPENDIX A: SAMPLE FIELD SHEET

Trench Identity: North or South (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
SW-006** N or S	Discrete (Grab) sample of visibly contaminated area #1	(2) VOA Vials	BTX	No headspace
SW-007** N or S	Discrete (Grab) sample of visibly contaminated area #2	(2) VOA Vials	BTX	No headspace
SW-008 N or S	Trip blank for inclusion in the cooler containing the BTX samples	(2) VOA Vials	BTX	Pre-prepared at the laboratory

Notes:

*Sample numbers for samples taken from the North excavation trench will bear the suffix "N", while samples taken from the Southern excavation trench will be suffixed in "S". The appropriate suffix can be circled on the Field Sample Sheets for clarification.

**Take discrete samples of visibly contaminated areas if possible, otherwise arbitrarily choose the sampling areas. Sampling areas will be marked in the Field Log Book. Analysis will be BTX only.

Specify analytical requirements and an analytical turnaround time of 24 hours, if possible; 48 hours maximum if required to obtain the specified detection limits given on page 13, on the Analysis Request Form.

Include Analysis Request Form and Chain of Custody in sample cooler.

Chill coolers to 4°C with blue ice. Pack cooler with inert packing material to prevent breakage.

APPENDIX A: SAMPLE FIELD SHEET

STOCKPILE SAMPLING FIELD SHEET

Stockpile Identity "Clean"/"Contaminated" (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
CSP-001* Cl or Co	Composite of Stockpile area #1	(2) VOA Vials	BTX	No headspace
CSP-001 Cl or Co	Composite of Stockpile area #1	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-001 Cl or Co	Composite of Stockpile area #1	(1) 8 oz.	TOX (Halogenated Hydrocarbons)	$\geq$ 1/2 Full
CSP-001 Cl or Co	Composite of Stockpile area #1	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full
CSP-002 Cl or Co	Composite of Stockpile area #2	(2) VOA Vials	BTX	No headspace
CSP-002 Cl or Co	Composite of Stockpile area #2	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-002 Cl or Co	Composite of Stockpile area #2	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-002 Cl or Co	Composite of Stockpile area #2	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(2) VOA Vials	BTX	No headspace
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full

Continued on the next page.

APPENDIX A: SAMPLE FIELD SHEET
Stockpile Identity "Clean"/"Contaminated" (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
CSP-004 Cl or Co	Composite of Stockpile area #3	(2) VOA Vials	BTX	No headspace
CSP-004 Cl or Co	Composite of Stockpile area #3	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-004 Cl or Co	Composite of Stockpile area #3	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-004 Cl or Co	Composite of Stockpile area #3	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full
CSP-005 Cl or Co	Composite of Stockpile area #4	(2) VOA Vials	BTX	No headspace
CSP-005 Cl or Co	Composite of Stockpile area #4	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-005 Cl or Co	Composite of Stockpile area #4	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-005 Cl or Co	Composite of Stockpile area #4	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOX	Full
CSP-006 Cl or Co	Discrete Sample of Stockpile at Area #5	(2) VOA Vials	BTX	No headspace
CSP-007 Cl or Co	Discrete Sample of Stockpile at Area #6	(2) VOA Vials	BTX	No headspace
CSP-008 Cl or Co	Trip Blank	(2) VOA Vials	BTX	Pre-prepared at laboratory

Note:

* For samples taken from the "clean" stockpile, sample numbers will suffix in "Cl". Thus circle "Cl" on the Sample Field Sheet. Samples taken from the "contaminated" stockpile will suffix with "Co" and the "Co" can be circled on the Sample Field Sheet. For example, sample number CSP-004Cl is the composite taken from the area #3 of the "clean" stockpile.

1) Mark locations of sampling areas in the Field Log Book. Be sure to indicate compass direction.
2) Include one trip blank (2 - VOA vials) in each cooler which contains samples which will be analyzed for BTX.
3) Indicate analysis required and an analytical turnaround time of 1 week or less on the Analysis Request Form.
4) Keep sample cooler(s) chilled to 4°C with blue ice. Pack coolers with inert packing matter to prevent sample bottle breakage.
5) Include Analysis Request Form and Chain of Custody Form in each sample cooler.

APPENDIX A: SAMPLE FIELD SHEET

STOCKPILE SAMPLING FIELD SHEET

Stockpile Identity "Clean"/"Contaminated" (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
CSP-001* Cl or Co	Composite of Stockpile area #1	(2) VOA Vials	BTX	No headspace
CSP-001 Cl or Co	Composite of Stockpile area #1	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-001 Cl or Co	Composite of Stockpile area #1	(1) 8 oz.	TOX (Halogenated Hydrocarbons)	$\geq$ 1/2 Full
CSP-001 Cl or Co	Composite of Stockpile area #1	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full
CSP-002 Cl or Co	Composite of Stockpile area #2	(2) VOA Vials	BTX	No headspace
CSP-002 Cl or Co	Composite of Stockpile area #2	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-002 Cl or Co	Composite of Stockpile area #2	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-002 Cl or Co	Composite of Stockpile area #2	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(2) VOA Vials	BTX	No headspace
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-003 Cl or Co	Field Duplicate of Composite Sample of Stockpile Area #2	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full

Continued on the next page.

APPENDIX A: SAMPLE FIELD SHEET
Stockpile Identity "Clean"/"Contaminated" (Circle One)

SAMPLE NUMBER	SAMPLE LOCATION/TYPE	SAMPLE CONTAINER	ANALYSIS	COMMENTS
CSP-004 Cl or Co	Composite of Stockpile area #3	(2) VOA Vials	BTX	No headspace
CSP-004 Cl or Co	Composite of Stockpile area #3	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-004 Cl or Co	Composite of Stockpile area #3	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-004 Cl or Co	Composite of Stockpile area #3	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOC	Full
CSP-005 Cl or Co	Composite of Stockpile area #4	(2) VOA Vials	BTX	No headspace
CSP-005 Cl or Co	Composite of Stockpile area #4	(1) 8 oz.	Flash Point	$\geq$ 1/2 Full
CSP-005 Cl or Co	Composite of Stockpile area #4	(1) 8 oz.	TOX	$\geq$ 1/2 Full
CSP-005 Cl or Co	Composite of Stockpile area #4	(1) 8 oz.	EP TOX (lead) TPH (418.1) TOX	Full
CSP-006 Cl or Co	Discrete Sample of Stockpile at Area #5	(2) VOA Vials	BTX	No headspace
CSP-007 Cl or Co	Discrete Sample of Stockpile at Area #6	(2) VOA Vials	BTX	No headspace
CSP-008 Cl or Co	Trip Blank	(2) VOA Vials	BTX	Pre-prepared at laboratory

Note:

* For samples taken from the "clean" stockpile, sample numbers will suffix in "Cl". Thus circle "Cl" on the Sample Field Sheet. Samples taken from the "contaminated" stockpile will suffix with "Co" and the "Co" can be circled on the Sample Field Sheet. For example, sample number CSP-004Cl is the composite taken from the area #3 of the "clean" stockpile.

1) Mark locations of sampling areas in the Field Log Book. Be sure to indicate compass direction.
2) Include one trip blank (2 - VOA vials) in each cooler which contains samples which will be analyzed for BTX.
3) Indicate analysis required and an analytical turnaround time of 1 week or less on the Analysis Request Form.
4) Keep sample cooler(s) chilled to 4^{o}C with blue ice. Pack coolers with inert packing matter to prevent sample bottle breakage.
5) Include Analysis Request Form and Chain of Custody Form in each sample cooler.

APPENDIX B

REA BEATTY RINIKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4350-150th Ave. N.E. • Redmond, Washington 98052-5301 • (206) 867-7000

SOIL SAMPLING FOR UNDERGROUND STORAGE TANKS (Petroleum Products)

Below is a list of testing parameters and clean-up levels for common petroleum contaminants. Different tests are used for each contaminant. These are quidelines used in the Seattle metropolitan area by the Northwest Region of the Department of Ecology (Ecology).

Excavate until no odor or visual signs of product are detected. Then take a representative sample of the excavation pit walls and bottom to determine if clean-up levels have been achieved. Take another representative sample(s) of the excavated material to characterize it for treatment or disposal. If clean-up levels in the pit walls and bottom have not been reached, remove additional material and resample. Excavated material which has concentrations higher than the clean-up levels must be treated or disposed off-site.

CONTAMINANT	PARAMETER	SOIL CLEAN-UP LEVELS (parts per million-ppm parts per billion-ppb)
Gasoline	Benzene	66 ppb
	Toluene	143 ppm
	Ethyl benzene	-
	Xylene	-
Diesel	Total Petroleum Hydrocarbons (TPH)	200 ppm

Waste oil tank issues are more complex and may involve testing for petroleum, metals, solvents and PCB contamination.

If there is a potential threat to groundwater (e.g. soil contamination and a shallow groundwater table), monitoring wells and groundwater sampling may be required.

These values are guidelines and may vary according to specific situations (e.g. drinking water well or other sensitive receptor impacts?). If you have additional questions, contact the Northwest Region of Ecology at 867-7000.

APPENDIX B

CHREA BEATTY RINIKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4350-150th Ave. N.E. • Redmond, Washington 98052-5301 • (206) 867-7000

RECOMMENDED ANALYTICAL METHODS for PETROLEUM UNDERGROUND TANK SITES

CONTAMINANT	INDICATOR	WATER (EPA Method)	SOIL (EPA Method)
Gasoline	Benzene Toluene Ethylbenzene Xylene (commonly called BTEX)	602	8020
	Total petroleum hydrocarbons (TPH)*	418.1	418.1
Diesel or #2 Fuel Oil	TPH	418.1	418.1

*TPH is recommended for old spills where benzene, toluene, ethyl benzene or xylene may not be an accurate indicator of gasoline contamination. Those constituents volatilize, are relatively soluble in water and may no longer be present at old spill sites.

Contact a qualified laboratory for detailed information. Each of the above methods requires specific sample containers and sample preservation methods.

3/28/88

APPENDIX C
SAMPLING SUMMARY PLAN

GROUND WATER MONITORING WELL SAMPLING

1 - 1 liter samples will be taken from each well and analyzed for TPH (418.1 only) and TOC. Two VOA Vials will also be taken from each well for BTX analysis. One field duplicate will be taken for each test for the nine wells. Trip blanks will be included in sample shipments of BTX samples. A two week analytical turnaround time is sufficient.

EXCAVATION TRENCH SAMPLING

Composite samples will be taken from each wall of the trench (4 samples) in areas as close as possible to the water line. Composites will be analyzed for BTX (2-VOA vials per sampling location) and TPH 8015 modified only (one 8 oz jar). One field duplicate of composites will be taken for each test. Two discrete (grab) samples will be taken for BTX analysis only. Sample locations for the discrete samples will be determined at the site. Areas of visible contamination will be targeted. Trip blanks will be included with each sample shipment of BTX samples. A sample analysis turnaround time of 24 hours will be requested.

STOCKPILED SOIL SAMPLING

Representative samples of both the "clean" and "contaminated" stockpiles will be taken in order to determine the acceptable disposal options.

Criteria for disposal at the Cedar Hills Landfill are as follows:

FP $\geq$ 140°F
Benzene $<$ 100 ppm
Other halogenated hydrocarbon $\leq$ 100 ppm
EP TOX lead $<$5 ppm
Petroleum Hydrocarbon $<$3%

Therefore analysis of the soil samples from the stockpiles will include flashpoint, BTX, halogenated hydrocarbons (WAC 173-303), EP TOX (lead) and TPH (418.1) as well as TOC.

A total of 4 sampling areas will be sampled from each stockpile. Samples will be composites. In addition, 2 discrete samples will be taken for BTX analysis only.

1 field duplicate will be included for each test and trip blanks will be sent with each shipment of BTX samples.

A sample analysis turnaround time of 1 week will be requested.

The following tests will be used:

Analyte	Water Method	Detection* Limit	Soil Method	Detection* Limit
BTEX	EPA 602	<6 ppb	EPA 8020	<60 ppb
TPH (DIESEL)	418.1	.5PPM	418.1	10 PPM
TPH (GASOLINE)	8015 (MOD) DHS RECOMMENDED	.5 PPM	8015 (MOD) DHS RECOMMENDED	10 PPM
TOC	EPA 415.2	.5 PPM	EPA 415.1	1,000 PPM
TOTAL HALOGENATED HYDROCARBONS	WAC 173-303	15 PPM	WAC 173-303	15 PPM
EP TOXICITY	SW8461310	.5 PPM	SW846 1310	.5PPM
FLASH POINT	SW 846 1010		SW846 1010	

*Note: While every effort is made to achieve uniformity of detection limits for a sample set, or to meet the level of sensitivity indicated above, variations in sample types, sample size and interferences will occasionally result in varying ability to quantitate to a particular level.