LUST INC # 4084
Northern State Multi-Service Center
Skagit Co / Sedro Woolley

SITE CHARACTERIZATION REPORT

FOR

UNDERGROUND STORAGE TANK REMOVAL SITES NO. 3 AND NO. 4
NORTHERN STATE MULTI-SERVICE CENTER
SEDRO WOOLLEY, WASHINGTON

Prepared For:

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PROJECT NO. 930210-1

April 8, 1993

Independent Action Report Update

Site Name: Northern State Multi-Service Center

Inc. #: 4084 Date of Report: 4-8-93

County: Skagit Date Report Rec'd: 4-20-94 HQ 7-27-94 NW

Reviewed by: J. Hickey

Comments (please include: free prod., tank info., media, contaminant migration, GW conc. trends, PCS treated/fate?):

Test pits were dug but that did little to characterize the extent of PCS contamination, especially in the vertical direction. Nothing was done to characterize or check for possible groundwater contamination, as was recommended by an earlier report by J.P. Hurley Co. This report recommends sampling excavation water, but at this late date, I think monitoring wells are more appropriate.

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SITE CHARACTERIZATION REPORT

FOR

UNDERGROUND STORAGE TANK REMOVAL SITES NO. 3 AND NO. 4
NORTHERN STATE MULTI-SERVICE CENTER
SEDRO WOOLLEY, WASHINGTON

1.0 INTRODUCTION

Lone Rock Resources has completed a site characterization of the area circumscribing the underground storage tank (UST) removal sites located adjacent to the southwest corner of Building No. 28 and between Building No. 28 and Building No. 29 at Washington's Northern State Multi-Service Center (NSMSC), located east-northeast of Sedro Woolley, Skagit County, Washington.

Recent UST regulatory compliance activities conducted at the site resulted in the removal of two, 2,000-gallon USTs formerly used to store regular and unleaded gasoline for use in NSMSC vehicles and equipment. Gasoline leakages and/or spills were previously reported to Washington Department of Ecology (Ecology) in late 1992. During the period of March 11 and March 12, 1993; Lone Rock Resources conducted a site characterization program to determine the vertical and horizontal migration of suspected gasoline contaminant plume(s) underlying the UST removal locations, Building No. 28 and Building No. 29, and the immediate periphery.

Lone Rock Resources directed a Washington-licensed environmental services company, Environmental Excavation, Inc. to excavate 7 test pits for site characterization purposes. A single test pit was excavated to the northeast, outside of the study area, and was used for a comprehensive evaluation of background geological and hydrogeological characteristics. The 6 remaining test pits were excavated at selected locations circumscribing the characterization study area. Lone Rock Resources sampled the soil from the test pit excavations and "field-screened" the soil to aid in the determination of the soil samples selected for subsequent chemical analysis. The analytical program for the chemical analysis of selected soil samples was conducted by Friedman and Bruya, Inc. of Seattle, Washington. Upon completion of the field test pit excavation and soil sampling/soil sample "field-screening" activities, all test pit excavations were backfilled with native materials and prepared for final site restoration work. NO shallow-depth, groundwater monitoring wells were installed during the field test pit excavation activities because groundwater was NOT intercepted.

This site characterization report describes the field activities and analytical programs conducted to evaluate the subsurface for potential migrating gasoline contaminant plume(s). In addition, this site characterization report

presents the findings of the field and analytical programs and forwards recommendations for the best technical and environmentally sound resolution for the site.

2.0 PERMITTING

No special use engineering permits were required to conduct the site characterization.

3.0 TEST PIT LOCATIONS

Lone Rock Resources selected 7 test pit excavation locations. A single test pit was located several hundred feet east-northeast of the site characterization study area for a comprehensive evaluation of the background geological and hydrogeological subsurface characteristics without incurring environmental compromise. The 6 remaining test pit excavation locations were sited at selected points circumscribing the site characterization study area. All test pit excavation locations were selected to aid in the best evaluation of the subsurface during the site characterization field activities (Figure 1).

4.0 SUBSURFACE UTILITIES LOCATING

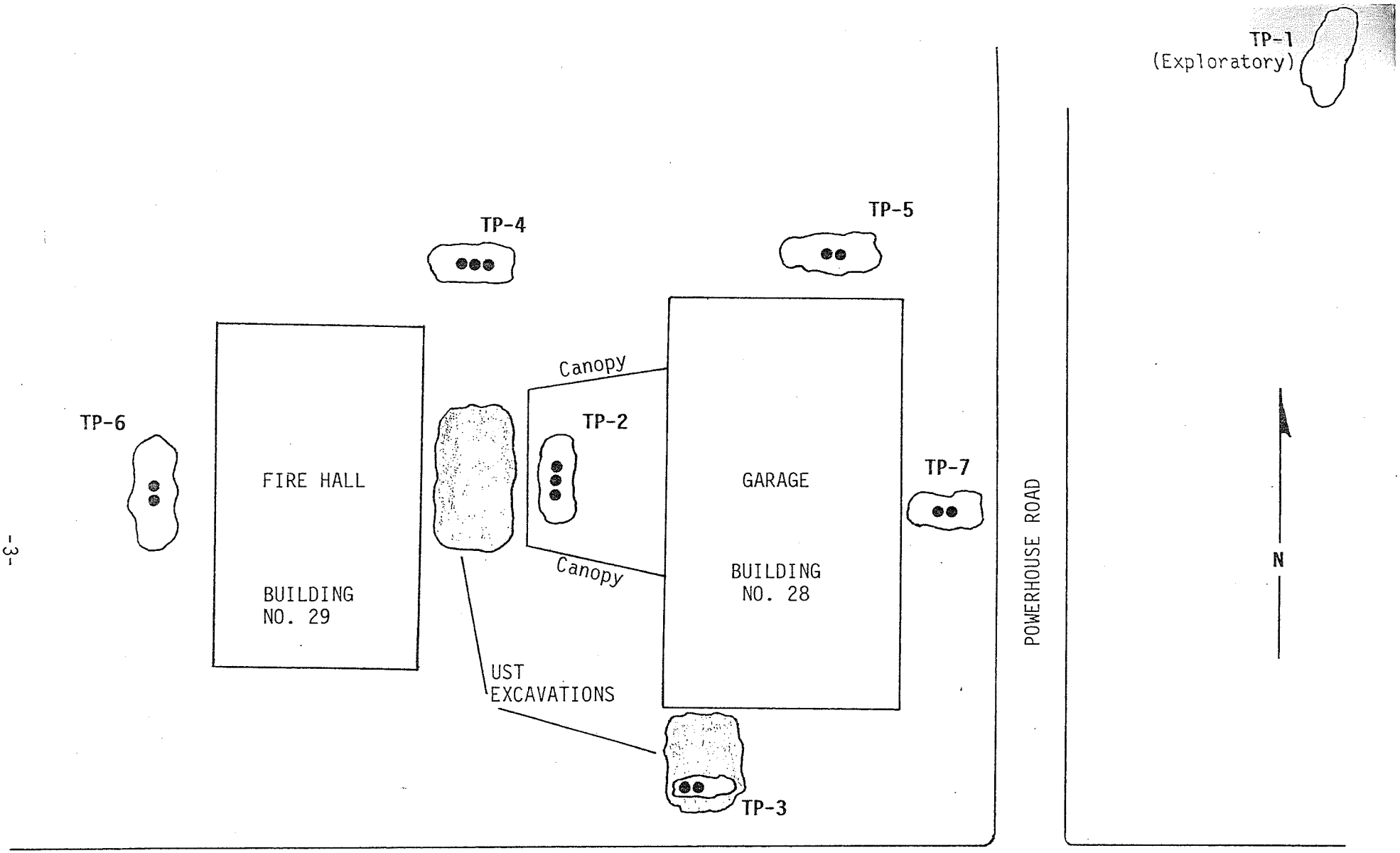
Lone Rock Resources conferred with Mr. Mel Walton of NSMSC regarding underground utilities and potential subsurface interferences. Although no accurate "as-built" drawings were located for the site, a site walk conducted on February 8, 1993 with Mr. Mel Walton aided in the selection of the test pit excavation locations. The location of subsurface utility placement at the NSMSC Facility has been proprietary to best meet NSMSC Facility needs, and does not reflect established engineering practices "off-Facility".

5.0 CONCRETE SAWCUTTING

4 test pit excavation locations were overlain with bar-reinforced concrete pavement, asphalt concrete pavement, or a layered combination of the two pavement types. At these test pit excavation locations, a Washington-licensed concrete sawcutting company, B & K Sawing and Sealing, Inc., sawcut "windows" in the pavement to enable access for subsurface soil investigations. The "windows" were approximately 6-feet wide and 15-feet long. The "window" size enabled maneuverablity with excavation equipment during the test pit excavation activities.

6.0 TEST PIT EXCAVATIONS, SOIL SAMPLE COLLECTION, AND SOIL SAMPLE SCREENING

Lone Rock Resources directed Environmental Excavation, Inc. for the excavation of 7 test pits. The test pit locations are identified on Figure 1 and have



(Not to Scale)

● Soil Sample Collection Point

FIGURE 1 SITE DIAGRAM WITH TEST PIT LOCATIONS AND SAMPLE COLLECTION POINTS IDENTIFIED

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REDMOND, WASHINGTON

been discussed in Section 3 of this report. All test pits were excavated with a rubber-tired backhoe to the limit of the backhoe reach. The reach enabled the excavation depth to be 13.5-feet below surface grade. The purpose of the test pit excavations was to evaluate the subsurface during the site characterization field activities.

Test pit TP-1 was excavated at a location several hundred feet east-northeast of the site characterization study area in order to determine geological and hydrogeological characteristics of the subsurface. The location was selected for TP-1 so that the subsurface would not be compromised by potential contaminants suspected in the study area proper. The remaining 6 test pits were excavated at selected locations circumscribing the site characterization study area.

Excavated soil removed from each test pit was continuously inspected by a Registered Geologist from Lone Rock Resources. At selected 2-foot intervals, discreet soil samples were collected for inspection, "field screening", and characterization of the subsurface soil profile. The soil samples were collected in 1.5-inch inside diameter (ID) by 6.0-inch long metal soil sample retainers which were driven into undisturbed soil in the backhoe bucket.

Upon retrieval of the soil sample retainer, the retainer was screened with a photoionization detector (PID) for potential volatile organic hydrocarbon compounds (VOCs). This procedure aided in the selection of soil samples for laboratory analysis. In addition, excavated soil that was continually brought to the surface by the backhoe bucket was screened with the PID. PID measurements were recorded on the test pit logs for each excavation.

The soil in the backhoe bucket and the metal sample retainers was inspected for alteration due to contamination and characterized in accordance with the Unified Soil Classification System (USCS) as specified by the American Society for Testing and Materials (ASTM). The soil color was characterized in accordance with Munsell Soil Color Charts.

Following inspection, PID screening, description, and total characterization; soil samples in metal sample retainers that were selected for laboratory analysis were immediately sealed with Teflon, plastic end caps, and tape; labeled; entered into chain-of-custody; and placed on ice in a cooler to minimize volatilization of potential contaminants until delivery to the analytical laboratory.

All relevant field data, including test pit excavation data, soil sample collection data, geological engineering data, soil characterization data, PID instrument readings, and hydrogeological data pertinent to the characterization of the study area were recorded on the field logs for each test pit. The Legend for Logs of Test Pits and the Test Pit Logs are located in Appendix A of this Site Characterization Report.

Two soil samples were retained from each test pit excavation for laboratory analyses. Field duplicate soil samples were collected from test pits TP-2 and TP-4 for Quality Assurance/Quality Control (QA/QC) purposes. In order to properly evaluate the soil profile at a depth consistent with the lower invert of both USTs, soil samples were collected at intervals of 10.0-feet to 10.5-feet below surface grade (BSG) and 13.0-feet to 13.5-feet BSG. These soil sample collection depths were chosen based on field observations, PID measurements, burial depths of the USTs, and anticipated vertical and horizontal migratory pathways of potential contaminants.

7.0 DECONTAMINATION OF SOIL SAMPLING EQUIPMENT

Prior to excavating a test pit, or the collection of individual soil samples from a test pit, the excavation equipment and soil sample collection equipment were decontaminated to prevent compromising environmental samples with potential contaminants. For excavation equipment, this included mechanically scraping excavation spoils from the equipment, steam cleaning with a Liquinox wash, and double rinsing with clean tap water. For soil sample collection equipment, this included mechanically scraping soil sample spoils from the soil sampling equipment, a Liquinox wash, a tap water rinse, a distilled water rinse, and air drying.

8.0 TEST PIT ABANDONMENT AND SITE RESTORATION

All test pit excavations were properly abandoned in accordance with Washington State engineering guidelines for non-shored, open excavations and trenches. Abandonment included backfilling with the clean, native soil that had been removed during the test pit excavations, and compaction with the bucket of the backhoe. Compaction of the clean, native soil backfill was completed with 1-foot lifts. All test pit excavations were prepared for final site restoration work. The preparatory work included compaction for structural integrity and soil profile continuity. The final restorative activities will include resurfacing with materials compatible and contiguous with existing surface grade at all test pit excavation locations.

9.0 DISPOSITION OF SOIL SAMPLE SPOILS

All clean excavated soil was returned to the test pit excavations and compacted as described in Section 8.0 of this report. Asphalt concrete pavement (ACP) and concrete pavement materials that were removed from the surface overlying test pits TP-2, TP-4, TP-5, and TP-7; were separated by "type-material" and stockpiled on NSMSC property for later engineering use. No additional soil sample spoils were generated during the test pit excavation and soil sampling activities.

10.0 GEOLOGY AND HYDROGEOLOGY

The regional geology is principally comprised of the older rocks of the North Cascade subcontinent overlain by more recent glacial debris. The Shuksan thrust fault trends southeast to northwest through the Sedro Woolley area, and North Cascade subcontinental rocks immediately north and east of Sedro Woolley have been thrust westward over younger oceanic crustal rocks. The geology of the Sedro Woolley area begins to become increasingly complex with depth.

The near surface geology of the site characterization study area is comprised of a relatively thin deposit of glacial debris including gravel, sand, silt, clay, and occasional boulders (erratics). Every test pit excavation revealed a soil profile of predominantly very dense, dark gray brown, dry, lean clay with occasional fine gravel and traces of silty sand. The soil was very "tight" and did not exhibit pervasive or contiguous porous sands that provide good aquifer matrices. Runoff that slowly percolates through the "tight" soil profile eventually becomes trapped between more structurally massive clay sediments. The result is a series of isolated, discontinuous, very small saturated lenses of silty sand that mimic the depositional trend of braided outwash from past Cascadian glacial events.

Surface water and near-surface water seeking a local migratory pathway will follow the local topographic relief and trend north-northeast toward Hansen Creek. Hansen Creek then drains south and empties into the Skagit River southeast of Sedro Woolley. Hansen Creek is a "protected" salmon habitat tributary of the Skagit River. Some beneficial use, potable water is withdrawn from Hansen Creek for restricted, limited local use. Municipal groundwater supplies are produced from deeper aquifers underlying the near-surface glacial clay.

11.0 SUMMARY OF FIELD OBSERVATIONS

The following observations were noted during the site characterization field activities conducted on March 11 and March 12, 1993:

* An open UST excavation located east of the east wall of Building No. 29 was partially filled with runoff water and/or snowmelt water;
* The water in the above UST excavation did NOT exhibit a hydrocarbon sheen;
* The multi-product dispensers (MPDs) and product delivery islands remain in place;
* The product delivery lines have been disconnected and capped;
* Bar-reinforced concrete paving debris, removed during UST closure operations, has been stockpiled on the south side of the UST excavation;

* The linear distance between Building No. 29 and Building No. 28 (to the east) is estimated at less than 60-feet;

* A canopy is attached to the west side of Building No. 28 and the underlying drive-through is paved with bar-reinforced concrete;

* An open UST excavation is located at the southwest corner of Building No. 28;

* NO water had accumulated in the above described UST excavation;

* A very slight petroleum hydrocarbon odor detected downwind of both UST excavations was noted during field site characterization activities;

* A small excavation scar remained where exploration activities for a third "potential" UST may have existed. No UST was found in this exploratory excavation at the southeast corner of Building No. 28;

* The surface of the site characterization study area is paved with bar-reinforced concrete to the south, west, and northwest sides of Building No. 28;

* The surface of the site characterization study area is paved with ACP to the north and east of Building No. 28;

* The remaining area of the site characterization study area is covered with grass;

* Crushed gravel for a French drain water dispersion area was noted between 3.0-feet and 4.5-feet BSG along the west and north walls of the excavation at the southwest corner of Building No. 28. The French drain disperses water from an eaves trough downspout on the west wall of Building No. 28;

* A slight discoloration/alteration of natural soil color was noted at 3.5-feet on the east and northeast walls of the excavation on the east side of Building No. 29;

* A slight discoloration/alteration of natural soil color was noted at 3.5-feet on the west and north walls of the excavation at the southwest corner of Building No. 28;

* The general characterization of the soil underlying the site characterization study area is medium stiff to very stiff, dark gray brown to yellowish brown, lean CLAY with traces of fine gravel and silty sand (dry);

* Local topography slopes very gently to the north-northeast (less than 1-foot across the site characterization study area);

* There is no specific, readily identifiable, contiguous, pervasive, porous horizon in the subsurface that can act as a "near-surface" water-bearing productive zone. Discontiguous, scattered silty sand lenses have marginal saturation due to percolation of seasonal precipitation;

* All test pits were "clean" and did NOT exhibit signs of petroleum hydrocarbon contamination from either of the former USTs;
* Surface runoff in the site characterization study area drains to the north and east; and
* No subsurface utilities were encountered during the site characterization.

12.0 ANALYTICAL PROGRAM

The analytical program was selected to best characterize the subsurface soil for gasoline and its constituent components. The methodologies used for the characterization of the subsurface soil were as follow:

* Washington Total Petroleum Hydrocarbons - Gasoline (WTPH-G); and
* Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX).

Field duplicate soil samples and analytical laboratory QA/QC samples were subjected to the same analytical methodologies listed above.

13.0 SUMMARY OF ANALYTICAL DATA

A total of 14 soil samples (including 2 QA/QC field duplicate soil samples) were submitted under chain-of-custody protocols to Friedman and Bruya, Inc. for analysis. Analytical results for WTPH-G analyses of the 14 soil samples are presented in Table 1. Analytical results for BTEX analyses of the 14 soil samples are presented in Table 2.

The analytical results for WTPH-G indicate that gasoline was not detectable in any of the 14 soil samples at the lower quantitation limit printed in the detection limit column of the laboratory Certificates-of-Analysis. These results include all QA/QC field duplicate samples and analytical laboratory QA/QC samples.

The analytical laboratory test results for BTEX indicate very minute traces of Toluene (0.04 ppm to 0.18 ppm) in all soil samples, including QA/QC field duplicate soil samples and analytical laboratory QA/QC samples. The concentrations are insignificant relative to a regulatory action criterion of 40.0 ppm (T). No contaminant concentrations of Benzene, Ethylbenzene, or Total Xylenes were detected in the soil samples, QA/QC field duplicate soil samples, or analytical laboratory QA/QC samples above the lower quantitation limits of 0.01 ppm, 0.01 ppm, and 0.02 ppm respectively, as printed in the detection limit column of the analytical laboratory Certificates-of-Analysis. The regulatory action criteria for Benzene, Ethylbenzene, and Total Xylenes are 0.5 ppm, 20.0 ppm, and 20.0 ppm in soil, respectively.

TABLE 1

SUMMARY OF WTPH-G ANALYTICAL DATA FOR SOIL
NORTHERN STATE MULTI-SERVICE CENTER
SEDRO WOOLLEY, WASHINGTON

SAMPLE NUMBER	SAMPLE DEPTH (FT-BSG)	SAMPLE DATE	SAMPLE TIME	FIELD PID (ppm)	ANALYTICAL WTPH-G (ppm)	REGULATORY ACTION CRITERIA (ppm)
TP-2 S-6	10.0-10.5	03-12	1310	0.0	1	100
TP-2 S-8	13.0-13.5	03-12	1330	0.0	1	100
TP-2 S-9 (Field Duplicate)	13.0-13.5	03-12	1345	0.0	1	100
TP-3 S-6	10.0-10.5	03-12	1100	0.0	1	100
TP-3 S-8	13.0-13.5	03-12	1130	0.0	1	100
TP-4 S-6	10.0-10.5	03-11	1215	0.0	1	100
TP-4 S-8	13.0-13.5	03-11	1230	0.0	1	100
TP-4 S-9 (Field Duplicate)	13.0-13.5	03-11	1245	0.0	1	100
TP-5 S-6	10.0-10.5	03-11	1030	0.0	1	100
TP-5 S-8	13.0-13.5	03-11	1100	0.0	1	100
TP-6 S-6	10.0-10.5	03-12	1015	0.0	1	100
TP-6 S-8	13.0-13.5	03-12	1030	0.0	1	100
TP-7 S-6	10.0-10.5	03-12	0915	0.0	1	100
TP-7 S-8	13.0-13.5	03-12	0930	0.0	1	100

NOTES: FT-BSG = Soil Sample Collection Depth In Feet Below Surface Grade
ppm = Parts Per Million
PID = Photoionization Detector
1 (Analytical) = Indicates Compound Was Not Detected In The Sample At The Detection Limit Of 1.0 ppm

TABLE 2

SUMMARY OF BTEX ANALYTICAL DATA FOR SOIL
NORTHERN STATE MULTI-SERVICE CENTER
SEDRO WOOLLEY, WASHINGTON

SAMPLE NUMBER	SAMPLE DEPTH (FT-BSG)	SAMPLE DATE	SAMPLE TIME	FIELD PID (ppm)	ANALYTICAL B/T/E/X (ppm)	REGULATORY ACTION CRITERIA (ppm)
TP-2 S-6	10.0-10.5	03-12	1310	N/A	.01/.04/.01/.02	0.5/40/20/20
TP-2 S-8	13.0-13.5	03-12	1330	N/A	.01/.05/.01/.02	0.5/40/20/20
TP-2 S-9 (Field Duplicate)	13.0-13.5	03-12	1345	N/A	.01/.09/.01/.02	0.5/40/20/20
TP-3 S-6	10.0-10.5	03-12	1100	N/A	.01/.05/.01/.02	0.5/40/20/20
TP-3 S-8	13.0-13.5	03-12	1130	N/A	.01/.10/.01/.02	0.5/40/20/20
TP-4 S-6	10.0-10.5	03-11	1215	N/A	.01/.11/.01/.02	0.5/40/20/20
TP-4 S-8	13.0-13.5	03-11	1230	N/A	.01/.10/.01/.02	0.5/40/20/20
TP-4 S-9 (Field Duplicate)	13.0-13.5	03-11	1245	N/A	.01/.18/.01/.02	0.5/40/20/20
TP-5 S-6	10.0-10.5	03-11	1030	N/A	.01/.08/.01/.02	0.5/40/20/20
TP-5 S-8	13.0-13.5	03-11	1100	N/A	.01/.08/.01/.02	0.5/40/20/20
TP-6 S-6	10.0-10.5	03-12	1015	N/A	.01/.12/.01/.02	0.5/40/20/20
TP-6 S-8	13.0-13.5	03-12	1030	N/A	.01/.15/.01/.02	0.5/40/20/20
TP-7 S-6	10.0-10.5	03-12	0915	N/A	.01/.08/.01/.02	0.5/40/20/20
TP-7 S-8	13.0-13.5	03-12	0930	N/A	.01/.07/.01/.02	0.5/40/20/20

NOTES: FT-BSG = Sample Collection Depth In Feet Below Surface Grade
ppm = Parts Per Million
PID = Photoionization Detector
N/A = PID Not Capable Of Discriminating Individual B/T/E/X Constituent Compounds
.01/.02 (Analytical) = Indicates That The Compound In The Sample Could Not Be Detected In The Sample Above The Lower Quantitation Limit Printed In The Detection Limit Column Of The Laboratory Certificates-Of-Analysis

The Chain-of-Custody forms and Analysis Request forms are located in Appendix B. Analytical laboratory Certificates-of-Analysis are located in Appendix C.

14.0 CONCLUSIONS/RECOMMENDATIONS

Based on data received from the analytical laboratory and from the field observations and findings which are presented in this report, conclusions and recommendations are presented as follow:

* No WTPH-G or BTEX contamination is present in soil samples collected from test pits circumscribing Building No. 28 and Building No. 29;
* WTPH-G and BTEX contamination of the subsurface soil profile most probably exists in the sidewall "skin" of each UST excavation;
* If the subsurface soil profile is contaminated with WTPH-G and BTEX, as related to the former UST emplacements and their past management history, that contamination lies between the UST excavation sidewalls and the closest point of the investigation circle circumscribing the UST excavations and Building No. 28 and Building No. 29, and, potentially under the eastern wall of Building No. 29 and western wall of Building No. 28; however,
* The very stiff, dry, lean CLAY soil underlying the site characterization study area will limit vertical and horizontal migration of WTPH-G and BTEX contamination, as well as, water and other transport liquid media. Therefore, it is unlikely that the WTPH-G and BTEX contamination has migrated far from the observed contamination on the UST sidewall "skin";
* The "tight" characteristics of the soil profile preclude remediation by "in-situ" soil venting, bio-remediation, or extraction well/injection well technological approaches;
* The proximity of the small contaminated area to Building No. 28 and Building No. 29 preclude remediation by excavation for reasons of compromising the structural integrity of both buildings;
* Shoring excavation sidewalls for soil remediation by excavation would compromise the structural integrity of Building No. 28 and Building No. 29, and, it would not be a cost-effective technological approach;
* "Shored" excavation/remediation practices will not enable removal of soil underlying either Building No. 28 or Building No. 29;
* "Stepped" excavation and engineering practices cannot effectively remove all the soil contamination that may potentially exist on and immediately adjacent to the sidewalls of the UST excavations. If implemented, these practices may compromise the structural integrity of Building No. 28 and Building No. 29;

* Bioremediation is not recommended for this site because of geological and hydrogeological conditions, climatological characteristics, excessive monitoring requirements, and limited value engineering effectiveness;

* It is recommended that any standing water in what remains of the open UST excavations be evacuated. The water should be sampled for predisposal analyses. The analytical results will be the "technology determining factor" in the removal and mitigative process;

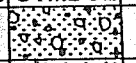
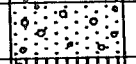
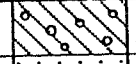
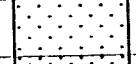
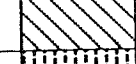
* It is recommended that what remains of the open UST excavations be backfilled with appropriate "clean" backfill that meets anticipated future NSMSC engineering requirements, and, the backfill operations should follow the water removal and mitigation operations; and

* It is recommended that any contaminated soil that may yet underlie either Building No. 28 or Building No. 29 be left in place until future NSMSC management plans require the demolition and removal of Building No. 28 and/or Building No. 29. Removal of any remaining contaminated soil should be "revisited" at that time.

Final site restoration activities will include permanent ACP and/or concrete resurfacing. This site restoration work will effect a "seal" of the study area and preclude the potential for percolation of runoff, leaching of the limited remaining traces of WTPH-G and BTEX contaminant head, and migration of WTPH-G and BTEX contaminants.

APPENDIX A

LEGEND FOR LOGS OF TEST PITS
AND
TEST PIT LOGS

MAJOR DIVISIONS			GROUP SYMBOL	GRAPHIC SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SEIVE*	GRAVELS 50% or More of Coarse Fraction Retained on No. 4 Sieve	CLEAN GRAVELS	gw		Well-graded gravel Well-graded gravel with sand
			gp		Poorly-graded gravel Poorly-graded gravel with sand
		GRAVELS WITH FINES	gm		Silty gravel Silty gravel with sand
			gc		Clayey gravel Clayey gravel with sand
	SANDS More than 50% of Coarse Fraction Passes No. 4 Sieve	CLEAN SANDS	sw		Well-graded sand Well-graded sand with gravel
			sp		Poorly-graded sand Poorly-graded sand with gravel
		SANDS WITH FINES	sm		Silty sand Silty sand with gravel
			sc		Clayey sand Clayey sand with gravel
FINE-GRAINED SOILS 50% OR MORE PASSES NO. 200 SIEVE*	SILTS AND CLAYS Liquid Limit 50% or Less		ml		Silt - silt with sand and gravel Sandy silt - Sandy silt with gravel Gravelly lean clay - Gravelly silt with sand
			cl		Lean clay - Lean clay with sand and gravel Sandy lean clay - Sand lean clay with gravel Gravelly lean clay - Gravelly lean clay with sand
			ol		Organic silts or organic clays of low plasticity
	SILTS AND CLAYS Liquid Limit Greater Than 50%		mh		Elastic silt - Elastic silt with sand or gravel Sandy elastic silt - Sandy elastic silt with gravel Gravelly elastic silt - Gravelly elastic silt with sand
			ch		Fat clay - Fat clay with sand or gravel Sandy fat clay - Sandy fat clay with gravel Gravelly fat clay - Gravelly fat clay with sand
			oh		Organic clays or organic silts of medium to high plasticity
HIGHLY ORGANIC SOILS			pt		Peat, muck and other highly organic soils

Legend for Log of Soil Borings Incorporating the Unified Soil Classification System (USGS) (ASTM D2487-85)

* Based on the material passing the 3-inch (75mm) sieve

Reference: ASTM Standard D2487-85

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA - NSMSC
SITE NSMSC
LOCATION NE OF SITE
REFERENCE CHARACTERIZATION STUDY AREA

Exploration No. TP-1 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface No SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-11-93
Date Completed 03-11-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / /	Depth (ft)		Description/Comments
S-1	0.0		0.0		GRASS AT SURFACE GRADE
			1.0	CL	Soft, dark brown (10 YR 3/3) lean CLAY with a trace of sandy, fine gravel and tree roots, moist.
S-2	0.0		2.0		
			3.0		
S-3	0.0		4.0	CL	CLAY becoming stiff to very stiff and color changes to gray (10 YR 5/1) at 4.0-feet below surface grade (BSG).
			5.0		
S-4	0.0		6.0		
			7.0		
S-5	0.0		8.0	CL	CLAY is very stiff and exhibits variable colors, gray to brown (10 YR 5/1 to 10 YR 5/3), dry, at 7.5-feet BSG.
			9.0		
S-6	0.0		10.0		
			11.0		

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA - NSMSC
SITE NSMSC
LOCATION NE OF SITE
REFERENCE CHARACTERIZATION STUDY AREA

Exploration No. TP-1 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-11-93
Date Completed 03-11-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / /	Depth (ft)		Description/Comments
			11.0		
				cl	Very stiff, gray to brown (10YR 5/1 to 10YR 5/3) lean CLAY, dry.
S-7	0.0		12.0		
S-8	0.0		13.0		
			14.0		Total Depth at 13.5-feet BSG. No hydrocarbon odor noted. No discoloration noted. No water encountered.
			15.0		

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA - NSMSC
SITE NSMSC
LOCATION CENTERED UNDER CANOPY
REFERENCE WEST OF BUILDING No. 28

Exploration No. TP-2 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-12-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / / /	Depth (ft)		Description/Comments
S-1	0.0		0.0	CONC.	6-INCHES OF BAR-REINFORCED CONCRETE AT SURFACE GRADE.
			1.0	GP	Loose, very dark gray (10 YR 3/1) medium GRAVEL with sand, moist.
S-2	0.0		2.0	GP/SP/CL	Loose to soft, very dark grayish brown (10 YR 3/2) interbedded medium GRAVEL, coarse SAND, and silty CLAY, moist, trace of tree roots and organic vegetative detritus.
			3.0		
S-3	0.0		4.0	CL/SP	Soft, dark brown (10 YR 3/3) lean CLAY with a trace of sandy fine GRAVEL, moist.
			5.0	CL	CLAY becomes stiff to very stiff and changes color to gray (10 YR 5/1) at 4.5-feet BSG, dry.
S-4	0.0		6.0		
			7.0		
S-5	0.0		8.0	CL	Very stiff, varicolored gray and brown (10 YR 5/1) and (10 YR 5/3) lean CLAY, dry.
			9.0		
S-6	0.0		10.0		
			11.0		

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA - NSMSC
SITE NSMSC
LOCATION CENTERED UNDER CANOPY
REFERENCE WEST OF BUILDING NO. 28

Exploration No. TP-2 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-12-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / /	Depth (ft)		Description/Comments
			11.0		
S-7	0.0		12.0	CL	Very stiff, gray to brown (10 YR 5/1 to 10 YR 5/3) lean CLAY, dry.
S-8	0.0		13.0		
S-9 (FIELD DUPLICATE OF S-8)					Total Depth at 13.5-feet BSG.
			14.0		NO HYDROCARBON ODOR NOTED.
					NO DISCOLORATION NOTED.
			15.0		NO WATER ENCOUNTERED.

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA - NSMSC
SITE NSMSC
LOCATION SOUTHWEST CORNER OF
REFERENCE BUILDING NO. 28

Exploration No. TP-3 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-12-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft)	Depth (ft)	Description/Comments
S-1	0.0		0.0	Loose, unconsolidated GRAVEL, SAND, and CLAY slough, moist.
			1.0	
S-2	0.0		2.0	
			3.0	Encounter French drain crush gravel backfill, moist. (FRENCH DRAIN ESTABLISHED TO DISPERSE RUNOFF TRANSMITTED FROM EAVES TROUGH DOWNSPOUT AT SOUTHWEST WALL OF BUILDING NO. 28).
S-3	0.0		4.0	
			5.0	
S-4	0.0		6.0	
			7.0	END OF "SLOUGH-IN" AT 9.5-FEET BSG. SLIGHT PETROLIFEROUS ODOR NOTED AT BASE OF "SLOUGH-IN" AND PID READING 43.2 → 73.1 ppm. Approximately 5-10 GALLONS OF WATER PERCOLATED DOWN INTO EXCAVATION FROM THE GRAVEL ENVELOPE FOR THE ABANDONED UST PRODUCT DELIVERY LINES, SLIGHT TRACE OF SHEEN NOTED WHEN THE WATER ENCOUNTERED SOME "SLOUGH-IN" MATERIAL. WATER WAS SNOW MELT AND RUNOFF WATER AND DID NOT PERCOLATE INTO THE CLAY AT THE BASE OF THE "SLOUGH-IN" MATERIAL.
S-5	0.0		8.0	
	43.2 → 73.1 @ 9.0-FEET BSG		9.0	
S-6	0.0		10.0	
			11.0	

90/SP/CL Excavating Through Slough

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA - NSMSC
SITE NSMSC
LOCATION SOUTHWEST CORNER OF
REFERENCE BUILDING NO. 28

Exploration No. TP-3 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-12-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / / /	Depth (ft)		Description/Comments
			11.0		
S-7	0.0		12.0	CL	STIFF to very stiff, dark gray (10YR 5/1) loan CLAY, dry;
S-8	0.0		13.0		
			14.0		TOTAL DEPTH AT 13.5-FEET BSG.
			15.0		* HYDROCARBON STAINED SOIL NOTED AT 8.5 to 9.5-feet BSG; WITH SLIGHT PETROLIFEROUS ODOR; RECORDED 43.2 TO 73.1 ppm on PID (SEE DETAIL LOG)

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA · NSHSC
SITE NSHSC
LOCATION NORTHEAST CORNER
REFERENCE OF BUILDING NO. 29

Exploration No. TP-4 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-11-93
Date Completed 03-11-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / / /	Depth (ft)		Description/Comments
S-1	0.0		0.0	CONC	6-INCHES OF BAR-REINFORCED CONCRETE AT SURFACE GRADE
			1.0	GP	Loose, very dark gray (10 YR 3/1) medium GRAVEL with sand, moist.
S-2	0.0		2.0	GP/CL	Loose, very dark gray (10 YR 3/1) medium GRAVEL and interbedded CLAY, moist, abundant tree roots.
			3.0	CL	Soft, dark brown (10 YR 3/3) lean CLAY with thin interbedded lenses of sandy, fine GRAVEL, dry.
S-3	0.0		4.0		Predominantly very stiff, dark gray (10 YR 5/1) lean CLAY, dry, at 4.5-feet BSG.
			5.0		
S-4	0.0		6.0	CL	Very stiff, gray and brown (10 YR 5/1 and 10 YR 5/3) lean CLAY, dry.
			7.0		
S-5	0.0		8.0		
			9.0		
S-6	0.0		10.0		
			11.0		

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA-NSMSC
SITE NSMSC
LOCATION NORTHEAST CORNER
REFERENCE OF BUILDING NO. 29

Exploration No. TP-4 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-11-93
Date Completed 03-11-93
Logged By O. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in interval (ft) / / /	Depth (ft)		Description/Comments
			11.0		
S-7	0.0		12.0	CL	Very stiff, gray to brown (10YR 5/1 to 10YR 5/3) lean CLAY, dry.
S-8			13.0		
S-9 (FIELD DUPLICATE OF S-8)			14.0		TOTAL DEPTH AT 13.5 FEET BSG.
			15.0		NO HYDROCARBON ODOR NOTED. NO DISCOLORATION NOTED. NO WATER ENCOUNTERED.

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA - NSMSC
SITE NSMSC
LOCATION NORTHEAST CORNER
REFERENCE OF BUILDING No. 28

Exploration No. TP-5
Contractor ENVIRONMENTAL EXCAVATION, INC.
Ground Surface NO SURVEY
Elevation NO SURVEY

Rig Type BACKHOE
Equipped With N/A
Bit diameter N/A
Hole Diameter N/A
Date Started 03-11-93
Date Completed 03-11-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / /	Depth (ft)		Description/Comments
S-1	2.7		0.0	ACP	6-INCHES OF ASPHALT CONCRETE PAVEMENT AT SURFACE GRADE.
			1.0	sp/sp/cl	Soft, very dark grayish brown (10 YR 3/2) interbedded fine GRAVEL, SAND, and CLAY with a trace of silt, moist.
S-2	3.1		2.0	cl/pt	Soft dark grayish brown (10 YR 3/2) lean CLAY, moist. Loose, black (10 YR 2/1) PEAT and decaying organic detritus.
			3.0	cl/ml	Soft, gray (10 YR 5/1) lean CLAY with thin interbedded silt lenses, moist.
S-3	3.3		4.0		
			5.0	cl	Very stiff, varicolored gray and brown (10 YR 5/1 to 10 YR 3/1) lean CLAY, dry.
S-4	0.0		6.0		
			7.0		
S-5	0.0		8.0		
			9.0		
S-6	0.0		10.0		
			11.0		

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA-NSMSC
SITE NSMSC
LOCATION NORTHEAST CORNER
REFERENCE OF BUILDING NO. 28

Exploration No. TP-5 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-11-93
Date Completed 03-11-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / /	Depth (ft)		Description/Comments
			11.0		
S-7	0.0		12.0	CL	Very stiff, gray to brown (10 YR 5/1 to 10 YR 5/3) lean CLAY, dry.
S-8	0.0		13.0		
					TOTAL DEPTH AT 13.5-FEET BSG.
			14.0		
					NO HYDROCARBON ODOR NOTED.
			5.0		NO DISCOLORATION NOTED.
					NO WATER ENCOUNTERED.

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA-NSHSC
SITE NSHSC
LOCATION CENTERED, WEST OF
REFERENCE WEST WALL OF BUILDING NO. 29

Exploration No. TP-6 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-12-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft) / /	Depth (ft)		Description/Comments
			0.0		GRASS AT SURFACE GRADE.
			1.0	CL	Soft, dark brown (10YR 3/3) lean CLAY with a trace of sandy, fine gravel, moist, occasional tree roots noted in excavated material.
S-1	0.0		2.0		
S-2	0.0		3.0		
			4.0	CL	CLAY becoming stiff to very stiff and color changes to gray (10YR 5/1) at 3.5-feet to 4.0-feet BSG.
S-3	0.0		5.0		
			6.0		
S-4	0.0		7.0		
			8.0	CL	CLAY is very stiff and exhibits varying color grading from gray to brown (10YR 5/1 to 10YR 5/3), dry, at 7.5-feet BSG.
S-5	0.0		9.0		
			10.0		
S-6	0.0		11.0		

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA-NSMSC
SITE NSMSC
LOCATION CENTERED; WEST OF
REFERENCE WEST WALL OF BUILDING NO. 29

Exploration No. TP-6 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-12-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft)	Depth (ft)		Description/Comments
			11.0		
S-7	0.0		12.0	CL	Very stiff, gray to brown (10 YR 5/1 TO 10 YR 5/3) lean CLAY, dry.
S-8	0.0		13.0		
			14.0		TOTAL DEPTH AT 13.5-FEET BSG. NO HYDROCARBON ODOR NOTED NO DISCOLORATION NOTED. NO WATER ENCOUNTERED.
			15.0		

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA-NSMSC
SITE NSMSC
LOCATION CENTERED, EAST OF
REFERENCE EAST WALL OF BUILDING NO. 28

Exploration No. TP-7 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO. SURVEY Hole Diameter N/A
Elevation NO. SURVEY Date Started 03-11-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in Interval (ft)	Depth (ft)	Description/Comments
S-1	0.0		0.0	3-INCHES OF ASPHALT CONCRETE PAVEMENT AT SURFACE GRADE, OVERLYING 6-INCHES OF BAR-REINFORCED CONCRETE.
			1.0	Loose to medium dense and medium stiff, very dark grayish brown (10YR 3/2) medium GRAVEL, moist, interbedded with thin lenses of medium SAND and lean CLAY.
S-2	0.0		2.0	
			3.0	← ABANDONED 6-INCH WATER LINE AND "FROZEN" CONTROL VALVE ENCOUNTERED AT 3.5-FEET BSG. NO ENVIRONMENTAL COMPROMISE.
S-3	0.0		4.0	Medium stiff to very stiff, very dark grayish brown (10YR 3/2) lean CLAY, dry.
			5.0	
S-4	0.0		6.0	← REPAIR BACKHOE HYDRAULICS. TEMPORARY TOTAL DEPTH AT 6.0-FEET BSG ON 03-11-93.
			7.0	
S-5	0.0		8.0	
			9.0	
S-6	0.0		10.0	
			11.0	

GEOLOGIC AND SAMPLE COLLECTION LOG

CLIENT WA-NSMSC
SITE NSMSC
LOCATION CENTERED, EAST OF
REFERENCE EAST WALL OF BUILDING NO. 28

Exploration No. TP-7 Rig Type BACKHOE
Contractor ENVIRONMENTAL EXCAVATION, INC. Equipped With N/A
Bit diameter N/A
Ground Surface NO SURVEY Hole Diameter N/A
Elevation NO SURVEY Date Started 03-11-93
Date Completed 03-12-93
Logged By J. SILKO

Sample Number	HNU Record (ppm)	Blow Count per 6-in interval (ft) / / /	Depth (ft)		Description/Comments
			11.0		
S-7	0.0		12.0	cl	VERY stiff, very dark grayish brown (10YR 3/2) lean CLAY, dry.
S-8	0.0		13.0		
			14.0		TOTAL DEPTH AT 13.5-FEET BSG. NO HYDROCARBON ODOR NOTED. NO DISCOLORATION NOTED. NO WATER ENCOUNTERED.
			15.0		

APPENDIX B

CHAIN-OF-CUSTODY FORMS

ANALYSIS REQUEST FORMS

DOCUMENT NO. 930210-1 B

SAMPLE ANALYSIS REQUEST

PACKING LIST

Project: NORTHERN STATE MULTI-SERVICE CENTER	Sampling Date(s): 03-11 THRU 03-12-93	Ship To: FRIEDMAN AND BRUYA, INC, 3008-B 16TH AVENUE, WEST SEATTLE, WASHINGTON 98119	For Lab Use Only
Sampling Contact: CHUCK M. SILKO (name)	Date Shipped: 03-15-93	Attn: (206) 285-8282 MR. ANDREW FRIEDMAN	Date Samples Rec'd: 3/15/93
(206) 869-2677 (phone)	Task Name/Code: 930210-1		Received By: C. Hicks

FAX 885-9884

Sample Numbers	Sample Description (Analysis/Matrix/Concentration/Preservative)			
1. TP-2 S-6	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
2. TP-2 S-8	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
3. TP-2 S-9	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
4.				
5. TP-3 S-6	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
6. TP-3 S-8	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
7.				
8. TP-4 S-6	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
9. TP-4 S-8	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
10. TP-4 S-9	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
11.				
12. TP-5 S-6	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
13. TP-5 S-8	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
14.				
15. TP-6 S-6	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
16. TP-6 S-8	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
17.				
18. TP-7 S-6	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
19. TP-7 S-8	WTPH-G AND BTEX (SERIES)	SOIL	NEAT	NONE
20.				

* STANDARD TURNAROUND; PRELIMINARY DATA BY FAX TO (206) 885-9884; SAMPLE DISPOSAL BY LABORATORY; FINAL REPORT VIA 1ST CLASS U.S. MAIL.

3-SDC-B
3-15-93-B
1:00 PM

DOCUMENT NO. 930210-1A

LONE ROCK RESOURCES

CHAIN OF CUSTODY RECORD

PROJECT SITE CHARACTERIZATION
NORTHERN STATE MULTI-SERVICE CENTER

SAMPLERS: (Signature) JOHN M. SILCO

SAMPLE NO.	SITE	DATE	TIME	SAMPLE MATRIX: WATER	SEDIMENT	TISSUE	AIR	OIL	OTHER	NUMBER OF CONTAINERS	REMARKS / TAG NO.
TP-2 S-6	NSMSC	03-12	1310		38227				✓	1	1.5 x 6.0 S. STEEL
TP-2 S-8	NSMSC	03-12	1330		38228				✓	1	1.5 x 6.0 S. STEEL
TP-2 S-9	NSMSC	03-12	1345		38229				✓	1	1.5 x 6.0 S. STEEL
TP-3 S-6	NSMSC	03-12	1100		38230				✓	1	1.5 x 6.0 S. STEEL
TP-3 S-8	NSMSC	03-12	1130		38231				✓	1	1.5 x 6.0 S. STEEL
TP-4 S-6	NSMSC	03-11	1215		38232				✓	1	1.5 x 6.0 S. STEEL
TP-4 S-8	NSMSC	03-11	1230		38233				✓	1	1.5 x 6.0 S. STEEL
TP-4 S-9	NSMSC	03-11	1245		38234				✓	1	1.5 x 6.0 S. STEEL
TP-5 S-6	NSMSC	03-11	1030		38235				✓	1	2.5 x 6.0 BRASS
TP-5 S-8	NSMSC	03-11	1100		38236				✓	1	2.5 x 6.0 BRASS
TP-6 S-6	NSMSC	03-12	1015		38237				✓	1	1.5 x 6.0 S. STEEL
TP-6 S-8	NSMSC	03-12	1030		38238				✓	1	1.5 x 6.0 S. STEEL
TP-7 S-6	NSMSC	03-12	0915		38239				✓	1	1.5 x 6.0 S. STEEL
TP-7 S-8	NSMSC	03-12	0930		38240				✓	1	1.5 x 6.0 S. STEEL

RELINQUISHED BY: (Signature) JOHN M. SILCO	**RECEIVED BY:** (Signature)	**DATE/TIME**
RELINQUISHED BY: (Signature)	**RECEIVED BY:** (Signature)	**DATE/TIME**
RELINQUISHED BY: (Signature)	**REC'V'D BY MOBILE LAB FOR FIELD ANAL.:** (Signature)	**DATE/TIME**
DISPATCHED BY: (Signature) **DATE/TIME**	**RECEIVED FOR LAB BY:** (Signature) CL Hicks	**DATE/TIME** 3/15/93 1:00 PM
METHOD OF SHIPMENT:		

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

FAX 885-9884

APPENDIX C

LABORATORY CERTIFICATES OF ANALYSIS

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 19, 1993
Date Received: March 15, 1993
Project: Northern State Multi-Service Center

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND GASOLINE USING EPA METHODS 8020 AND 8015
Results Reported as μg/g (ppm)

Sample #	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline	Internal Standard % Recovery
TP-2 S-6	<0.01	0.04	<0.01	<0.02	<1	118%
TP-2 S-8	<0.01	0.05	<0.01	<0.02	<1	115%
TP-2 S-9	<0.01	0.09	<0.01	<0.02	<1	114%
TP-3 S-6	<0.01	0.05	<0.01	<0.02	<1	116%
TP-3 S-8	<0.01	0.10	<0.01	<0.02	<1	115%
TP-4 S-6	<0.01	0.11	<0.01	<0.02	<1	111%
TP-4 S-8	<0.01	0.10	<0.01	<0.02	<1	107%
TP-4 S-9	<0.01	0.18	<0.01	<0.02	<1	109%
TP-5 S-6	<0.01	0.08	<0.01	<0.02	<1	81%
TP-5 S-8	<0.01	0.08	<0.01	<0.02	<1	104%
TP-6 S-6	<0.01	0.12	<0.01	<0.02	<1	107%
TP-6 S-8	<0.01	0.15	<0.01	<0.02	<1	101%
TP-7 S-6	<0.01	0.08	<0.01	<0.02	<1	96%
TP-7 S-8	<0.01	0.07	<0.01	<0.02	<1	88%

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 19, 1993
Date Received: March 15, 1993
Project: Northern State Multi-Service Center

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND GASOLINE USING EPA METHODS 8020 AND 8015

Results Reported as µg/g (ppm)
Quality Assurance

Sample #	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline	Internal Standard % Recovery
Blank	<0.01	<0.01	<0.01	<0.02	<1	115%
TP-5 S-6 (Duplicate)	<0.01	0.07	<0.01	<0.02	<1	80%
TP-5 S-6 (Matrix Spike) % Recovery	140%	140%	120%	110%	105%	87%
TP-5 S-6 (Matrix Spike Duplicate) % Recovery	105%	101%	89%	83%	114%	97%
Spike Blank % Recovery	106%	101%	88%	84%	103%	97%
Spike Level	1	1	1	2	10	