

VCP NW2651

SUBSURFACE PETROLEUM HYDROCARBON
INVESTIGATION

SKAGIT FARMERS Supply
MT. VERNON
RELEASE 1759
ISIS 4567
NW 2657

WOLFKILL YARD

Mount Vernon, Washington

Prepared For

CN Liquidating

W-6588

March, 1990

RITTENHOUSE-ZEMAN & ASSOCIATES

Geotechnical & Environmental Consultants





RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
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9 March 1990

W-6588

CN Liquidating
P.O. Box 280
Mount Vernon, Washington 98273

Attention: Mr. Mike Crawford

Subject: Subsurface Petroleum Hydrocarbon Evaluation
Wolfkill Yard
205 West Fir
Mount Vernon, Washington

Dear Mr. Crawford:

Rittenhouse-Zeman and Associates, Inc. (RZA) is pleased to present herein a copy of the above referenced report. This report presents the results of our subsurface petroleum hydrocarbon evaluation including observation of soils excavation, soil sampling, monitoring well installation, quantitative analyses and recommendations based on the assembled data. Our work has been performed in accordance with generally accepted environmental assessment practices. No other warranty, expressed or implied is made. The initial phases of this investigation were authorized during telephone conversations with Mr. Mike Crawford in December 1989 and January 1990. Authorization to proceed with the latter stages of this investigation was provided in a memo from Mr. Mike Crawford of CN Liquidating on 2 February 1990.

We appreciate the opportunity to be of service to you and would be pleased to discuss the contents of this report or other aspects of the project with you at your earliest convenience.

Respectfully submitted,

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.



Stanley S. Thompson
Project Environmental Geologist

SUBSURFACE PETROLEUM HYDROCARBON INVESTIGATION

Wolfkill Yard
205 West Fir
Mount Vernon, Washington

Prepared for

CN Liquidating
P.O. Box 280
Mount Vernon, Washington 98273

Prepared by

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.

1400 - 140th Avenue NE
Bellevue, Washington 98005

March 1990

W-6588

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Figure 1: Site and Vicinity Map

Figure 2: Site and Exploration Plan

Figure 3: Groundwater Surface Elevation Contour Map (19 February 1990)

Appendix A: Field Exploration Procedures and Boring Logs

Appendix B: Laboratory Analytical Results

SUBSURFACE PETROLEUM HYDROCARBON INVESTIGATION

W-6588

WOLFKILL YARD

205 WEST FIR

MOUNT VERNON, WASHINGTON

1.0 SUMMARY

A brief summary of the results of our site characterization and chemical analyses of the site soils and groundwater is presented below. The main body of the report should be consulted for detailed discussion of the report findings.

- ✓
 - **Soils:** Site soils generally consist of silty sand fill overlying silty sands and sandy silts, overlying clayey silts. Groundwater was observed at a depth of approximately 4 to 5 feet below the existing ground surface.
- **Soil Conditions During Tank Pit Excavation:** Initially, petroleum hydrocarbon contamination was present in the vicinity of the former tank locations, and appeared to extend northeast, northwest and southwest of the tank locations. At the completion of the excavation activities, soils collected and analyzed from the sidewalls of the tank pit excavation contained levels of total petroleum hydrocarbons (TPH) below current Washington State Department of Ecology (Ecology) draft cleanup criteria.
- **Soil Conditions During Boring Operation:** Analyses of soil samples collected encountered during the drilling of two of the three soil borings (B-1 and B-3) yielded nondetectable or low concentrations of benzene, toluene, ethyl benzene and xylene (BTEX) and TPH. Analysis of the soil sample collected from boring B-2 contained levels of TPH, benzene and ethyl benzene in excess of Ecology criteria.

- **Groundwater Analytical Results:** Results of analyses of groundwater collected from the three monitoring wells indicate an elevated TPH level in monitoring well MW-2, and a slightly elevated benzene concentration in MW-1. Petroleum hydrocarbon concentrations in MW-3 were below Ecology guidelines.
- **Conclusions and Recommendations:** Based on our explorations, petroleum hydrocarbon contamination slightly above Ecology draft cleanup criteria still exists near the southwest end of the tank excavation, in the vicinity of MW-2. We recommend groundwater quality monitoring and depth to groundwater measurements be repeated at a later date, to evaluate seasonal variations in groundwater flow direction and petroleum hydrocarbon concentrations.

2.0 PROJECT CHRONOLOGY

A brief chronology of RZA's involvement in this project is presented herein:

- On 12 December 1989, RZA was contracted by Mr. Mike Crawford of CN Liquidating to assist in the characterization and remediation of petroleum hydrocarbon contaminated soil, discovered during the removal of three underground gasoline storage tanks and one underground diesel tank from the site.
- Our initial visit to the site was accomplished on 18 December 1989. Using an organic vapor meter (OVM) to screen sidewall soil in the excavation, we identified areas of elevated concentrations of hydrocarbon contamination. These areas were further delineated using a backhoe to trench radially from the excavation. Soil samples were collected at the ends of the trenches and analyzed to determine the lateral extent of contamination. The limits of excavation of suspected contaminated soils was based upon hydrocarbon concentrations in soil encountered in these lateral trenches, and continued in this manner until TPH concentrations in sidewall samples were below Ecology draft clean-up criteria.

- o A meeting was held on 2 February 1990, at the site. The parties represented were Wolfkill Feed and Fertilizer, CN Liquidating, and RZA. In this meeting, we proposed the drilling of three soil borings to be completed as monitoring wells, sampling soil and groundwater from these borings/wells, and our production of this report. Wolfkill and CN Liquidating agreed to share responsibility for this phase of the investigation.
- 19 / o On 13 and 14 February 1990, three soil borings were accomplished to depths of approximately 19 feet below ground surface, and monitoring wells were installed in each of the borings. Soil samples from the borings were collected and analyzed for TPH and BTEX.
- o On 14 and 15 February 1990, the elevation of the top of well casings were established, and groundwater levels were measured to the nearest hundredth (0.01) of a foot. These procedures enabled us to evaluate groundwater flow direction. During this period, the monitoring wells were developed and purged, and samples were collected for quantitative chemical analysis.
- o On 5 March, we returned to the site to collect three soil samples following removal of the contaminated soil still remaining in the extreme northeast corner of the tank pit excavation.

This summary and project chronology are presented for introductory purposes only and should be used in conjunction with the full text of this report. The site description, site conditions, investigative techniques, and evaluation results are presented within the remainder of this report.

3.0 SITE DESCRIPTION AND HISTORY

The subject site is located at 205 West Fir, in Mount Vernon, Washington. Wolfkill has occupied this site in excess of 25 years. Immediately to the west of the site, the Mount Vernon City Shops house underground storage tanks, at least one of which was recently reported to have had a substantial release. The City Shops have been at their present location for approximately 15 years. South of the site, across West Fir, a trucking company and an asphalt company staging area were located, and could possibly have

contained underground fuel storage tanks. Within 500 yards of the site to the east, are the sites of two former bulk fuel depots and two gasoline retail facilities. ✓

4.0 SUBSURFACE INVESTIGATION

The subsurface investigations were accomplished in two phases. The first phase included collecting soil samples from the tank pit excavation following removal of the underground storage tanks. The second phase of investigation involved the completion of three soil borings to depths of approximately 19 feet below the existing ground surface and installing 4-inch inside diameter (I.D.) PVC monitoring wells within each of the borings. ✓

4.1 Tank Pit Excavation

✓ Prior to RZA's involvement in the project, four underground storage tanks were removed from the site. According to Jerry Harman of Excavating Northwest, these tanks included one 8,000 gallon diesel tank, which appeared to be structurally sound upon removal, one 1,000 gallon gasoline tank, which also appeared uncompromised, and two 500 gallon gasoline tanks, both of which had been out of service for several years, and both of which displayed signs of structural compromise, in the form of deep pitting, corrosion and rust holes.

Soil was removed to an extent that the samples collected from the sidewalls exhibited TPH and BTEX concentrations below current Ecology draft clean-up guidelines. A total of approximately 670 cubic yards of soil apparently impacted with hydrocarbon contamination was removed during the excavation. ✱

Collected samples were observed, screened in the field for volatiles using an organic vapor meter (OVM) and olfactory perceptions. The samples were placed in laboratory cleaned glass jars with Teflon lined caps, and immediately stored in a cooler. The samples were transported under RZA's chain-of-custody procedures to a subcontract analytical laboratory for quantitative analyses.

4.2 Soil Borings and Monitoring Wells

Three soil borings and well installations were accomplished at the approximate locations shown on Figure 1. The borings were completed by a licensed well drilling company

under subcontract to our firm. The wells were installed such that the interface between the saturated zone and unsaturated zone was spanned by screened casing, thereby allowing constituents which are less dense than water and floating on the interface (e.g. gasoline constituents), to enter the wells.

Soil samples were collected during drilling at each 5-foot depth interval using procedures designed to minimize the risk of cross-contamination. Prior to each boring, the drilling equipment and sampling tools were steam cleaned. Between sampling attempt the sampling tools were scrubbed with a stiff brush and a detergent solution consisting of Alconox and water, and then rinsed with potable water and liberal quantities of distilled water.

The boring logs presented in Appendix A are based on the drilling action, visual inspection of the samples secured, laboratory results and field logs. The various types of soils are indicated, as well as the depths where the soils or characteristics of the soils changed. It should be noted that these changes may have been gradual, and if the changes occurred between sample intervals, they were interpreted. Subsurface water conditions were evaluated by observing the moisture condition of the samples, the free water on the sampling rods, and groundwater levels measured after installation of monitoring wells in the borings.

Prior to sampling the groundwater, the monitoring wells were purged of water to insure a sample representative of the formation. Purging of the wells was accomplished by hand-bailing at least three well volumes. Groundwater samples were collected by carefully lowering a bailer through the air/water interface and retrieving a sample from near the surface of the water in the well. The sample was carefully decanted into laboratory cleaned glass vials with Teflon seals, excluding any air from the vials. The samples were immediately preserved by cooling, and transported to an analytical laboratory as previously described.

The elevations of the top of the well casings were established using standard differential optical levelling techniques. The static water level elevations in the monitoring wells were measured with respect to a site relative datum. Water level measurements performed

during groundwater sampling indicate an inferred shallow groundwater migration direction to the northeast.

5.0 PETROLEUM HYDROCARBON OCCURRENCE

5.1 Subsurface Petroleum Hydrocarbon Occurrence - Tank Pit Excavation

All laboratory analyses were subcontracted to Sound Analytical Services, Inc., of Tacoma, Washington. The analytical results are summarized in Tables 1 and 2, and the laboratory analytical results are presented in Appendix B. The analytical test results are presented in milligram per kilogram (mg/kg) and milligram per liter (mg/l) units which are equivalent to part per million (ppm) concentrations.

X Soil samples collected during our first visit to the site indicated concentrations of TPH in the sidewalls were generally below 30 ppm, with the exception of one sample collected near the northeast corner of the excavation, which exhibited a TPH concentration of 1,999 ppm. The samples from in the western side of the excavation were collected at the limits of the radial trenches, described earlier in this report. The contractor extended the western side of the excavation to the limits of the radial trenches, and after we received analytical results from the first set of samples, we returned to the site to collect samples from the newly excavated western side of the excavation, and from the northeast corner.

Analyses of samples collected during this visit indicated only low levels of TPH contamination throughout the excavation, with the exception of an elevated TPH concentration (897 ppm) in the soil sample collected from the northeast corner.

During our next visit to the site, we noted the utility pole which had been in the northeast portion of the excavation and had been hindering further efforts to remove contamination, had been relocated away from the excavation. Further removal of contaminated soil was continued until field screening methods indicated no elevated levels of contamination remained in the excavation. (The location of samples taken at the final limits of the excavation are shown on plan on Figure 2. (For simplicity, sample locations subsequently removed by excavation have been omitted.

5.2 Subsurface Petroleum Hydrocarbon Occurrence - Soil Borings

Analyses of representative soil samples from borings B-1 and B-2, located near the northeast and northwest limits of the excavation, respectively, yielded low concentrations (less than 20 ppm) of TPH, and concentrations of BTEX below the 0.05 mg/kg detection limit. The soil sample collected and analyzed from boring B-2 contained 305 ppm TPH, as well as elevated concentrations of BTEX (benzene = 3.25 mg/kg; toluene = 3.17 mg/kg; ethyl benzene = 16.6 mg/kg and xylenes = 42.9 mg/kg). Analyses of soil samples collected from the subsurface borings indicate petroleum hydrocarbons impacted soils do not occur beyond the locations of borings B-1 to the northeast and B-3 to the northwest. Some residual petroleum hydrocarbons remain in soil near the location of boring B-2, located south/southwest of the tank excavation.

5.3 Subsurface Petroleum Hydrocarbon Occurrence - Groundwater

Analyses of groundwater samples collected from the three monitoring wells indicate detectable concentrations of petroleum hydrocarbons in each of the wells. The only analyte concentrations in excess of Ecology draft criteria, however, are a TPH concentration in MW-2 of 23.0 ppm (Ecology's draft maximum concentration is 15 ppm TPH) and a benzene concentration in MW-1 of 0.074 ppm (Ecology's draft maximum for benzene is 0.066 ppm).

6.0 CONCLUSIONS AND RECOMMENDATIONS

- ✓ Analyses of soil samples collected from the tank pit excavation at its final limits exhibited
- ✓ TPH concentrations below Ecology cleanup criteria. The laboratory analyses of soil samples collected from the auger borings indicate minor residential soil contamination remains in the vicinity of B-2/MW-2, near the southwest corner of the excavation. While petroleum hydrocarbon concentrations in soil and groundwater at this boring are elevated, we recommend no further excavation at this time. It is not apparent from the inferred groundwater migration directions that the subject tanks were the source for contamination extending into this area. /

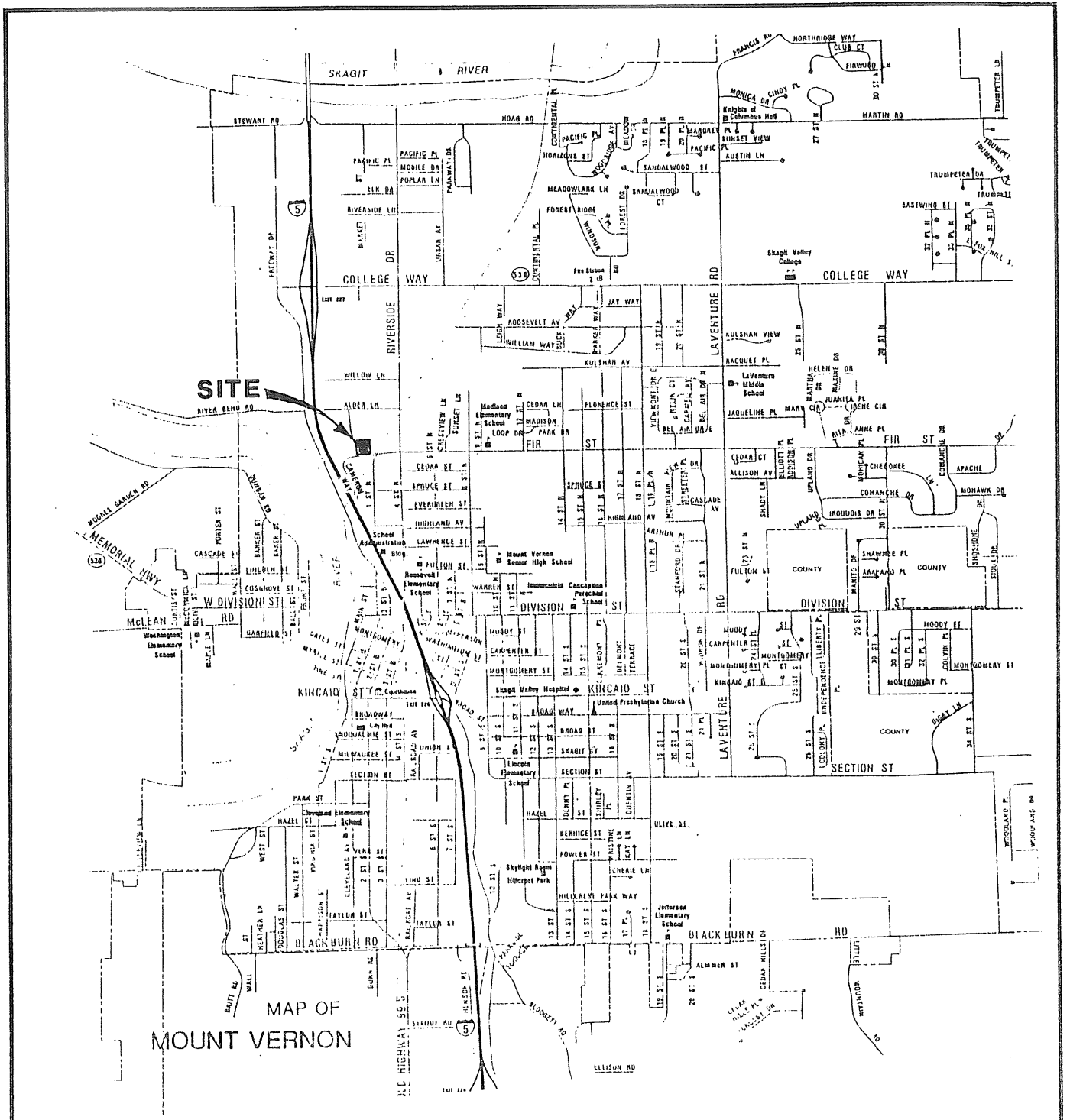
Removal of affected soil would necessitate the destruction of monitoring well MW-2. We recommend that monitoring well MW-2 remain in place at this time for further groundwater migration measurements and chemical studies. In our opinion, removal of the underground storage tanks and petroleum hydrocarbon impacted soil from the

subject site precludes worsening of the contaminations from that on-site area. Data obtained from this monitoring structure is necessary to further define seasonal groundwater fluctuation, flow direction and velocity, in order to assess possible offsite contaminant source areas.

We recommend further measurement of water levels in the monitoring wells, to assess potential seasonal changes in groundwater migration direction. We also recommend at least one additional groundwater sampling episode to take place in mid-summer 1990 and further assessment of residual petroleum hydrocarbon concentrations in groundwater at that time. We suggest these conclusions and recommendations be reviewed by Ecology personnel and their input solicited. At that time, an assessment may be made as to any further action necessary.

7.0 CLOSURE

Information in this report is based on the explorations and the laboratory analyses accomplished for this study. The conclusions presented herein are professional opinions based on our interpretation of the analytical laboratory test results, as well as our experience and observations during project field studies. The number, locations, and depth of the explorations, including analytical testing scope, were completed within the site and proposal constraints so as to yield the information required to formulate our conclusions.



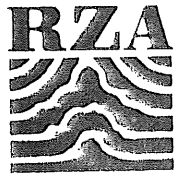
MAP OF
MOUNT VERNON

**WOLFKILL YARD
MOUNT VERNON, WASHINGTON
SITE VICINITY MAP**

FIGURE 1

W.O. W-6588
 BY SST
 DATE MAR 1990
 SCALE N.T.S.

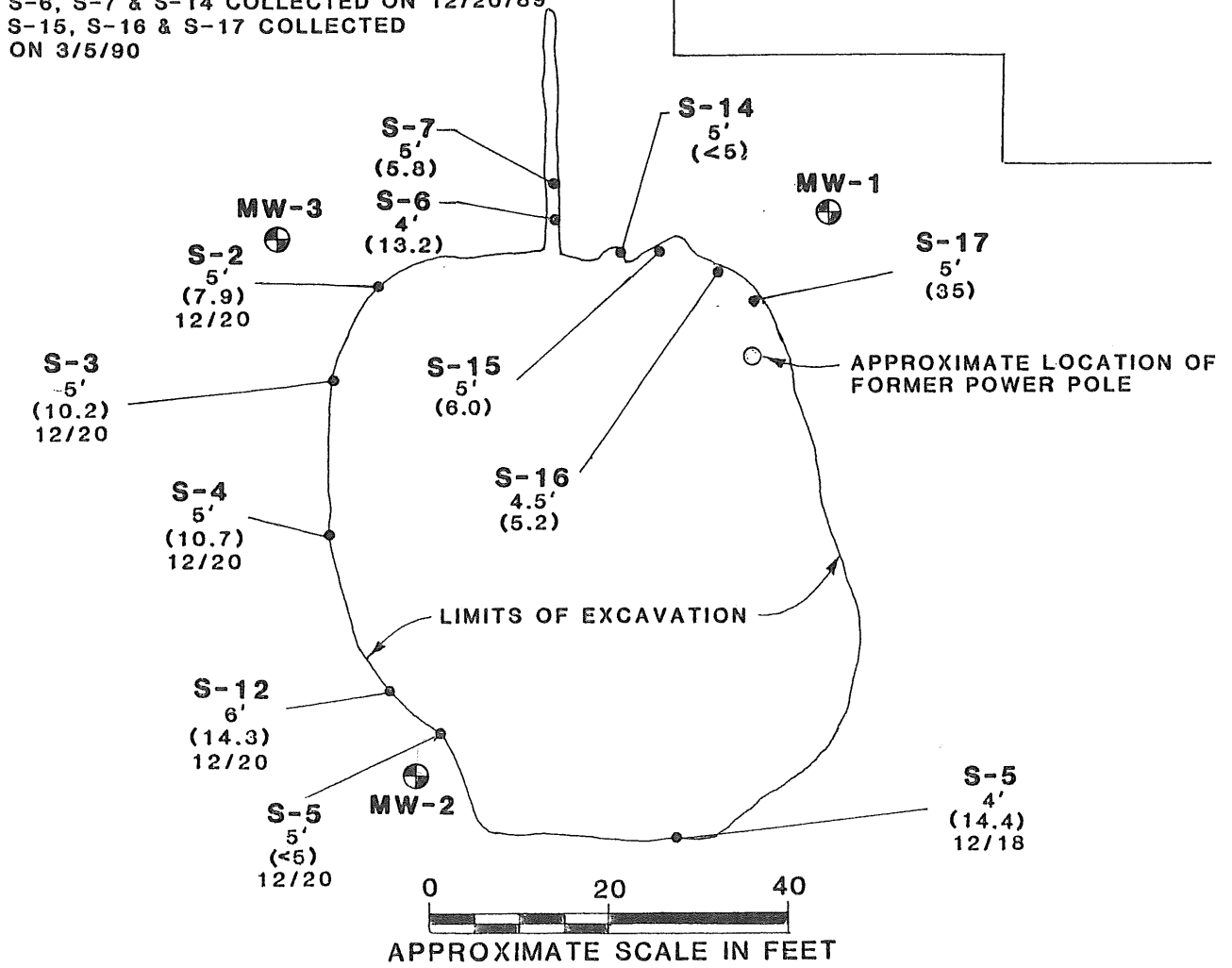
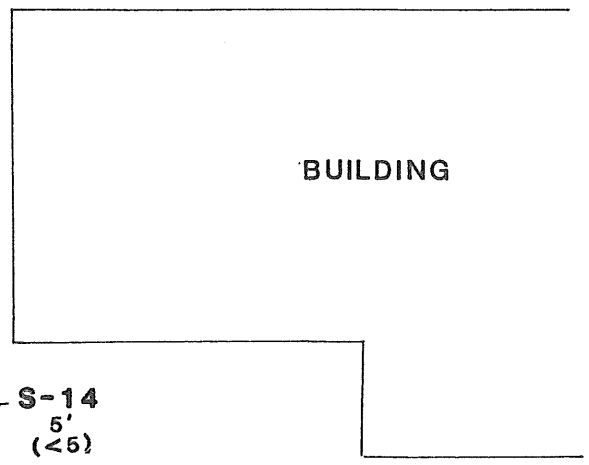
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 Bellevue, WA 98005



LEGEND



- S-10 INDICATES SOIL SAMPLE NUMBER AND APPROXIMATE LOCATION
- MW-3 INDICATES MONITORING WELL NUMBER AND APPROXIMATE LOCATION
- (35) TOTAL PETROLEUM HYDROCARBON (TPH) CONCENTRATION IN PARTS PER MILLION (PPM)
- 6' INDICATES APPROXIMATE DEPTH IN FEET SAMPLE WAS RECOVERED
- 12/20 INDICATES DATE SAMPLED
- S-6, S-7 & S-14 COLLECTED ON 12/20/89
- S-15, S-16 & S-17 COLLECTED ON 3/5/90



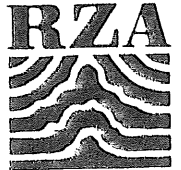
NOTE: SAMPLES SHOWN REFLECT PERIMETER SAMPLING FOLLOWING EXCAVATION. SAMPLES COLLECTED OF MATERIAL LATER REMOVED NOT SHOWN.

**WOLFKILL YARD
MOUNT VERNON, WASHINGTON
SITE & EXPLORATION PLAN**



FIGURE 2

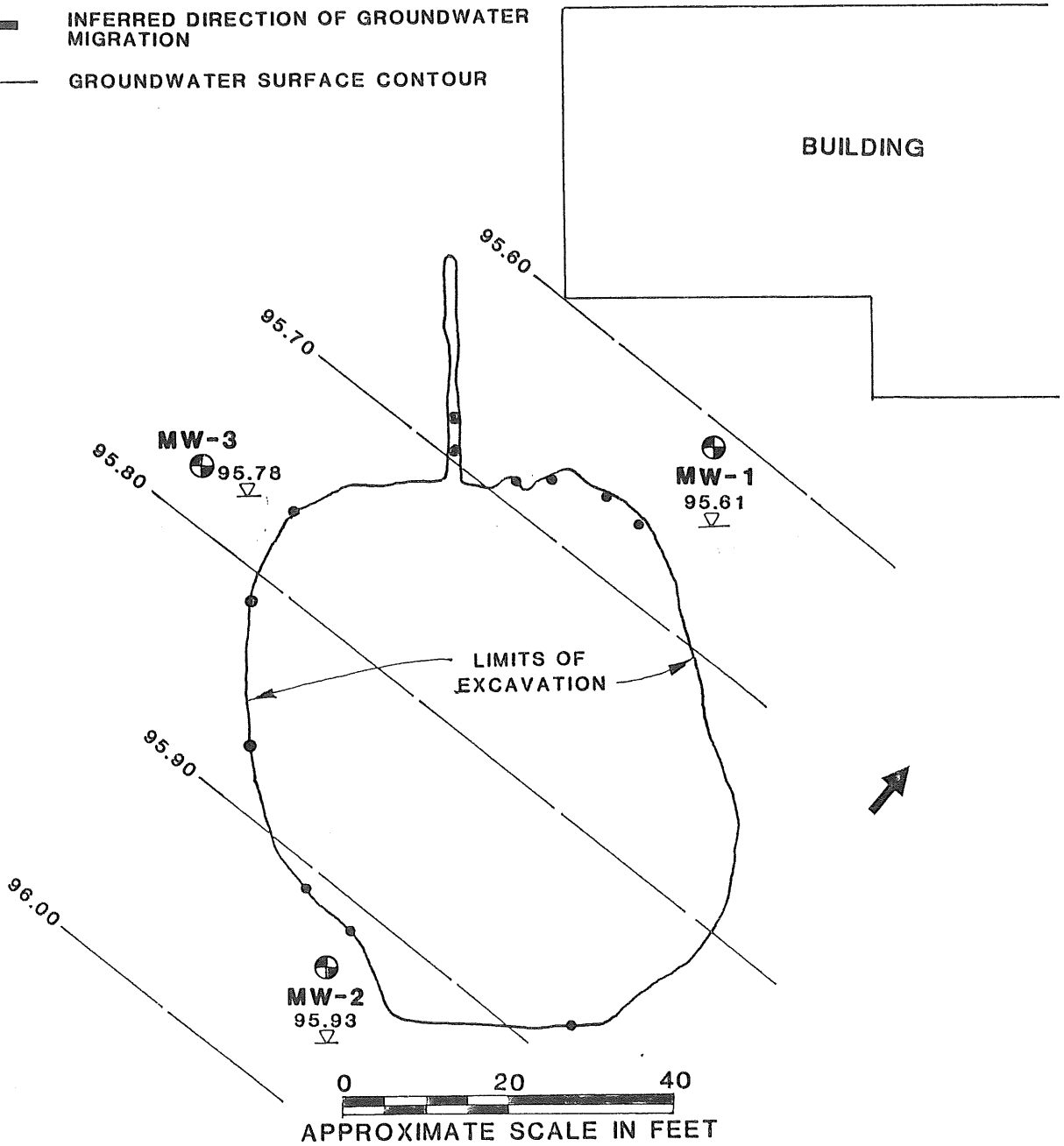
W.O. W-6588
 BY SST
 DATE MAR 1990
 SCALE NOTED

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 Bellevue, WA 98005*



LEGEND

- 95.93  GROUNDWATER ELEVATION IN WELL AS MEASURED ON 19 FEB. 1990
-  INFERRED DIRECTION OF GROUNDWATER MIGRATION
- 96.00 — GROUNDWATER SURFACE CONTOUR



**WOLFKILL YARD
MOUNT VERNON, WASHINGTON**

**GROUNDWATER SURFACE ELEVATION CONTOUR
MAP FOR 19 FEBRUARY 1990**

FIGURE 3

W.O. W-6588
BY SST
DATE MAR 1990
SCALE NOTED

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W-6588
TABLE 1
ANALYTICAL RESULTS OF
SOIL SAMPLES FROM TANK PIT
EXCAVATION

Sample # & Depth	Date	TPH	Benzene	Toluene	Ethyl benzene	Xylenes
S-1-4'	12/18/89	<5.0	0.07	0.11	0.08	0.33
S-2-5'	12/18/89	6.3	<0.05	0.07	<0.05	0.07
S-3-5'	12/18/89	12.7	0.07	0.08	0.09	0.14
S-4-4'	12/18/89	10.8	0.08	0.12	<0.05	0.28
S-5-4'	12/18/89	14.4	<0.05	0.07	<0.05	0.13
S-6-4'	12/18/89	1,999	<0.05	0.80	6.62	37.70
S-7-5'	12/18/89	27.2	0.11	0.49	0.22	1.54
S-1-5'	12/20/89	14.0	0.11	<0.05	0.13	0.87
S-2-5'	12/20/89	7.9	<0.05	<0.05	<0.05	<0.05
S-3-5'	12/20/89	10.2				
S-4-5'	12/20/89	10.7	<0.05	<0.05	<0.05	<0.05
S-5-5'	12/20/89	<5.0				
S-6-4'	12/20/89	13.2				
S-7-5'	12/20/89	5.8				
S-8-5'	12/20/89	<5.0				
S-9-5'	12/20/89	<5.0				
S-10-5'	12/20/89	897				
S-11-5'	12/20/89	5.6	<0.05	<0.05	<0.05	<0.05
S-12-5'	12/20/89	14.3	0.05	<0.05	<0.05	0.14
S-13-5'	12/20/89	10.5				
S-14-5'	12/20/89	<5.0	<0.05	<0.05	<0.05	0.11
S-1 6'	01/03/90	321				
S-2 6'	01/03/90	15.5				
S-3 6'	01/03/90	1,995				
S-15 5'	03/05/90	6.0	<0.05	<0.05	<0.05	<0.05
S-16 4.5'	03/05/90	5.2				
S-17 5'	03/05/90	35.1				
Ecology (Soil)		200	0.660	143	14	

Notes:

TPH by EPA method 418.1

BTEX by EPA method 8020

Concentrations reported in mg/kg for soil, mg/l for
water -- equivalent to parts per million (ppm)

Ecology - Washington State Department of Ecology Draft
Cleanup Recommendations

W-6588
 TABLE 2
 ANALYTICAL RESULTS OF
 SOIL SAMPLES FROM BORINGS
 AND WATER SAMPLES FROM MONITORING WELLS

Sample #	Depth	TPH	Benzene	Toluene	Ethyl benzene	Xylenes
SOIL ANALYSES						
B-1 S-1	2.5	18.4	<0.05	<0.05	<0.05	<0.05
B-1 S-2	7.5	12.0	<0.05	<0.05	<0.05	<0.05
B-2 S-2	7.5	305 ✓	3.25	3.17	16.6	42.9
B-3 S-2	7.5	15.6	<0.05	<0.05	<0.05	<0.05
Ecology (Soil)		200	0.660	143	14	
GROUNDWATER ANALYSES						
MW-1		5.1	0.074	0.011	<0.001	0.072
MW-2		23.0	0.049	0.150	0.177	0.648
MW-3		<5.0	0.007	0.003	<0.001	0.038
Ecology (Water)		15	0.066	14.3	1.4	

Notes:

TPH in soil by EPA method 418.1
 TPH in groundwater by EPA method 8015, modified
 BTEX by EPA method 8020
 Concentrations reported in mg/kg for soil, mg/l for
 water -- equivalent to parts per million (ppm)
 Ecology - Washington State Department of Ecology Draft Cleanup
 Recommendations

*15 ppm
 1 ppm
 1000 ug/l.*

APPENDIX A
BORING LOGS

Elevation reference: 100.00 feet Ground surface elevation: 99.69 feet Casing elevation: 99.43 feet							AS-BUILT DESIGN	TESTING
DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING	GROUND WATER		
0	Asphalt							
	Loose, moist, brown, silty fine SAND.		S-1	4	0			
5	becomes saturated							
	gray with rust mottling		S-2	7	0			
10	Loose to medium dense, saturated, gray, silty SAND.							
	Medium dense, saturated, gray, silty SAND with gravel.		S-3	15	0			
15	Very stiff, wet, tannish-gray, clayey SILT with some fine sand							
			S-4	25	0			
20	Boring terminated at 19 feet.							
25								
30								

Well completed: 13 February 1990

LEGEND

I 2-inch O.D. split-spoon sample

▽ Observed groundwater level (2/19/90)



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Elevation reference: 100.00 feet Ground surface elevation: 101.13 feet Casing elevation: 100.64 feet							AS-BUILT DESIGN	TESTING
DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING	GROUND WATER		
0	Asphalt							
	Moist, dark brown, silty fine SAND with gravel and some coarse sand							
	Loose, moist, brown, silty fine SAND		S-1	5	0			
5	becomes saturated							
	becomes gray; petroleum hydrocarbon odor		S-2	4	23			
10								
	Dense, saturated, gray, coarse sandy GRAVEL, trace to some silt; no petroleum hydrocarbon odor		S-3	36	0			
15								
	Stiff, wet, tannish-gray, clayey SILT with some sand and trace gravel.		S-4	13	0			
20	Boring terminated at 19 feet.							
25								
30								

Well completed: 13 February 1990

LEGEND

┆ 2-inch O.D. split-spoon sample

▽ Observed groundwater level (2/19/90)



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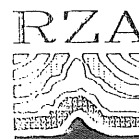
Elevation reference: 100.00 feet Ground surface elevation: 100.28 feet Casing elevation: 100.03 feet							AS-BUILT DESIGN	TESTING
DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OWM READING	GROUND WATER		
0	Asphalt							
	Very loose to loose, moist, brown, silty fine SAND; slight petroleum hydrocarbon odor.							
	some medium sand		S-1	4	0			
5	becomes gray and saturated					▽ 27.14/90		
	Loose, saturated, grayish-tan, silty, fine SAND with fine sandy silt laminae; slight petroleum hydrocarbon odor.							
	Medium dense, saturated, tannish-gray, medium to coarse SAND with gravel, some silt, and some fine sand.		S-2	7	0			
10	Very stiff, saturated, tan, fine sandy SILT with some coarse sand and gravel and silty sand laminae.							
	Very stiff, wet, tannish-gray with rust mottling, fine sandy SILT with some clay and trace coarse sand		S-3	17	0			
15	Boring terminated at 19 feet.		S-4	23	0			
20								
25								
30								

Well completed: 14 February 1990

LEGEND

I 2-inch O.D. split-spoon sample

▽
27.14/90 Observed groundwater level (2/19/90)



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Geotechnical & Environmental Consultants
1400 140th Ave NE
Bellevue, Washington 98005

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Rittenhouse-Zeman

Date: December 20, 1989

Report On: Analysis of Soil

Lab No.: 8991

IDENTIFICATION:

Samples Received on 12-19-89

Project No. W-6588 CN Liquidating

ANALYSIS:

Lab Sample No.	RUSH 1	RUSH 2	RUSH 3	RUSH 4
Client ID.	S-1-4'	S-2-5'	S-3-5'	S-4-4'
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	0.07	< 0.05	0.07	0.08
Toluene	0.11	0.07	0.08	0.12
Ethyl Benzene	0.08	< 0.05	0.09	< 0.05
Xylenes	0.33	0.07	0.14	0.28
BTEX by EPA SW-846 Method 8020				
Total Petroleum Hydrocarbons by EPA Method 418.1	< 5.0	6.3	12.7	10.8

Continued . . .

SOUND ANALYTICAL SERVICES, INC.

Rittenhouse-Zeman
 Project No. W-6588 CN Liquidating
 Page 2 of 2
 Lab No. 8991
 December 20, 1989

Lab Sample No.	RUSH 5	RUSH 6	RUSH 7
Client ID.	S-5-4'	S-6-4'	S-7-5'
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	< 0.05	< 0.05	0.11
Toluene	0.07	0.80	0.49
Ethyl Benzene	< 0.05	6.62	0.22
Xylenes	0.13	37.7	1.54
BTEX by EPA SW-846 Method 8020			
Total Petroleum Hydrocarbons by EPA Method 418.1	14.4	1,999	27.2

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QUALITY CONTROL REPORT

DUPLICATES

Lab No: 8991
Date: December 20, 1989
Client: Rittenhouse-Zeman

Client ID: S-7-5'
Matrix: Soil
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Hydrocarbons	27.2	25.2	7.6	

*RPD = relative percent difference
= $[(S - D) / ((S + D) / 2)] \times 100$

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Report To: Rittenhouse-Zeman

Date: December 22, 1989

Report On: Analysis of Soil

Lab No.: 9042

Page 1 of 2

IDENTIFICATION:

Samples Received on 12-21-89

Project No: W6588 CN Liquidators

ANALYSIS:

<u>Lab Sample No.</u>	<u>Client Identification</u>	<u>Total Petroleum Hydrocarbons, mg/kg by EPA Method 418.1</u>
RUSH 1	S-1-5'	14.0
RUSH 2	S-2-5'	7.9
RUSH 3	S-4-5'	10.7
RUSH 4	S-11-5'	5.6
RUSH 5	S-12-5'	14.3
RUSH 6	S-3-5'	10.2
RUSH 7	S-5-5'	< 5.0
RUSH 8	S-6-4'	13.2
RUSH 9	S-7-5'	5.8
RUSH 10	S-8-5'	< 5.0
RUSH 11	S-9-5'	< 5.0
RUSH 12	S-10-5'	897

Continued

SOUND ANALYTICAL SERVICES, INC.

Rittenhouse-Zeman
Lab No. 9042
Page 2 of 2
December 22, 1989

Lab Sample Number	1	2	3	4	5
Client ID	S-1-5'	S-2-5'	S-4-5'	S-11-5'	S-12-6'
Matrix Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Benzene	0.11	< 0.05	< 0.05	< 0.05	0.05
Toluene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethyl Benzene	0.13	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes	0.87	< 0.05	< 0.05	< 0.05	0.14

BTEX by EPA SW-846 Method 8020

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QUALITY CONTROL REPORT

DUPLICATES

Lab No: 9042 Client ID: 9042
Date: December 22, 1989 Matrix: Soil
Client: Rittenhouse-Zeman Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Hydrocarbons	897	842	6.3	

*RPD = relative percent difference
= $[(S - D) / ((S + D) / 2)] \times 100$

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Report To: Rittenhouse-Zeman

Date: December 22, 1989

Report On: Analysis of Soil

Lab No.: 9041

IDENTIFICATION:

Samples Received on 12-21-89

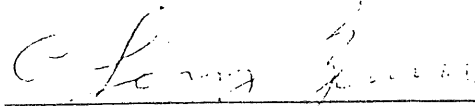
Project No: W6588 CN Liquidators

ANALYSIS:

Lab Sample No.	1	2
Client Identification	S-13-5'	S-14-5'
Matrix/Units	Soil mg/kg	Soil mg/kg
Benzene	NT	< 0.05
Toluene	NT	< 0.05
Ethyl Benzene	NT	< 0.05
Xylenes	NT	0.11
BTEX by EPA SW-846 Method 8020		
Total Petroleum Hydrocarbons by EPA Method 418.1	10.5	< 5.0

NT = NOT TESTED

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QUALITY CONTROL REPORT

DUPLICATES

Lab No: 9041 Client ID: S-14-5'
Date: December 22, 1989 Matrix: Soil
Client: Rittenhouse-Zeman Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Hydrocarbons	< 5.0	< 5.0	----	

*RPD = relative percent difference
= $[(S - D) / ((S + D) / 2)] \times 100$

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Report To: Rittenhouse-Zeman

Date: January 4, 1990

Report On: Analysis of Soil

Lab No.: 9184

IDENTIFICATION:

Samples Received on 1-4-90

Project: W-6588 CN Liquidators

ANALYSIS:

<u>Lab Sample No.</u>	<u>Client Identification</u>	<u>Total Petroleum Hydrocarbons, mg/kg by EPA Method 418.1</u>
1	S-1	321
2	S-2	15.5
3	S-3	1,995

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QUALITY CONTROL REPORT

DUPLICATES

Lab No: 9184
Date: January 4, 1990
Client: Rittenhouse-Zeman
Client ID: S-3
Matrix: Soil
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*
Total Petroleum Hydrocarbons	1,995	1,978	0.9

*RPD = relative percent difference
= $[(S - D) / ((S + D) / 2)] \times 100$

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Report To: Rittenhouse - Zeman

Date: February 20, 1990

Report On: Analysis of Soil

Lab No.: 9900

IDENTIFICATION:

Samples Received on 2-15-90

Project: W-6588 Concrete NW/Wolfkill Fertilizer

ANALYSIS:

Lab Sample No.	1	2	3	4
Client ID:	B-1 S-1	B-1 S-2	B-2 S-2	B-3 S-2
Matrix/Units	Soil mg/kg	Soil mg/kg	Soil mg/kg	Soil mg/kg
Total Petroleum Hydrocarbons by EPA Method 418.1	18.4	12.0	305	15.6
Benzene	< 0.05	< 0.05	3.25	< 0.05
Toluene	< 0.05	< 0.05	3.17	< 0.05
Ethyl Benzene	< 0.05	< 0.05	16.6	< 0.05
Xylenes	< 0.05	< 0.05	42.9	< 0.05
BTEX by EPA SW-846 Method 8020				

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QUALITY CONTROL REPORT

DUPLICATES

Lab No: 9900
Date: February 20, 1990
Client: Rittenhouse-Zeman

Client ID: B-1 S-2
Matrix: Soil
Units: mg/kg

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Hydrocarbons	12.0	10.8	10.5	

*RPD = relative percent difference
= $[(S - D) / ((S + D) / 2)] \times 100$

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Report To: Rittenhouse - Zeman

Date: February 22, 1990

Report On: Analysis of Water

Lab No.: 9953

IDENTIFICATION:

Samples Received on 2-20-90

Project: W-6588 Wolfkill Fertilizer

ANALYSIS:

Lab Sample No.	1	2	3
Client ID:	MW-1	MW-2	MW-3
Matrix/Units	Water mg/l	Water mg/l	Water mg/l
Total Petroleum Hydrocarbons by EPA Method 418.1	5.1	23.0	< 5.0
Benzene	0.074	0.049	0.007
Toluene	0.011	0.150	0.003
Ethyl Benzene	< 0.001	0.177	< 0.001
Xylenes	0.072	0.648	0.038
BTEX by EPA SW-846 Method 8020			

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QUALITY CONTROL REPORT

DUPLICATES

Lab No: 9953
Date: February 22, 1990
Client: Rittenhouse-Zeman

Client ID: MW-3
Matrix: Water
Units: mg/l

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum Hydrocarbons	< 5.0	< 5.0	---	

*RPD = relative percent difference
= $[(S - D) / ((S + D) / 2)] \times 100$

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Report To: Rittenhouse-Zeman

Date: March 7, 1990

Report On: Analysis of Soil

Lab No.: 10176

IDENTIFICATION:

Samples Received on 3-6-90

Project: W-6588 Wolfkill Fertilizer

ANALYSIS:

Lab Sample No. RUSH 1

Client ID: S-15

Parameter

Concentration, ppm

Total Petroleum Hydrocarbons
by EPA Method 418.1

6.0

Benzene

< 0.05

Toluene

< 0.05

Ethyl Benzene

< 0.05

Xylenes

< 0.05

BTEX by EPA SW-846 Method 8020

Lab Sample No. RUSH 2

Client ID: S-16

Parameter

Concentration, ppm

Total Petroleum Hydrocarbons
by EPA Method 418.1

5.2

Lab Sample No. RUSH 3

Client ID: S-17

Parameter

Concentration, ppm

Total Petroleum Hydrocarbons
by EPA Method 418.1

35.1

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QUALITY CONTROL REPORT

DUPLICATES

Lab No: 10176
Date: March 7, 1990
Client: Rittenhouse-Zeman

Client ID: S-17
Matrix: Soil
Units: ppm

Compound	Sample(S)	Duplicate(D)	RPD*	
Total Petroleum hydrocarbons	35.1	32.2	8.6	

RPD = relative percent difference
= $[(S - D) / ((S + D) / 2)] \times 100$