Kleen Environmental Technologies, Inc.

May 10, 2001

Mr. Ron Tims
Toxic Cleanup Program
Washington State Department of Ecology
NW Regional Office
3190 - 160th Ave. SE,
Bellevue, WA 98008-5452

RECEIVED
MAY 23 2001
DEPT OF ECOLOGY

Subject: Quarterly Groundwater Sampling Report
April 2001 Sampling Event (#N-17-5513-000)

Dear Mr. Tims:

Kleen Environmental Technology, Inc. (Kleen), has completed its first groundwater monitoring sample event at the AMD L.L.C's Roy Street site in Seattle, Washington (Figure 1). Kleen installed two groundwater-monitoring wells and sampled two of three wells for contaminants of concern, as required as part Washington State Department of Ecology's (Ecology) determination of No Further Action for the site.

Field Activities

On April 12, 2001 Kleen installed one on-site (MW-4) and off-site (MW-5) groundwater monitoring wells at the site. Figure 2 shows the location of the wells. Well logs are presented in Appendix A. The wells were constructed following specifications presented in Kleen's March 12, 2001 workplan. A copy of the workplan is on file with Ecology. Soil boring/well installation logs are presented in Appendix A.

Groundwater monitoring well MW-4 was installed in the sidewalk adjacent to the south side of the Roy Street site. Soil encounter during the installation of the well was predominately dry to damp, stiff to hard silty clay between 7.5 to 25 feet below ground surface (bgs). Groundwater was not intercepted in the soil boring. The soil and groundwater conditions encountered at well MW-4 were anticipated prior to the installation of the well; however, Ecology requested Kleen install a well to show a lack of groundwater in this area of the site. A detail discussion of the site geology is presented in Kleen's site Remedial Action Plan dated February 1999.

Monitoring well MW-5 was installed on the south side of Roy Street, just west of existing monitoring well MW-3. The well log for MW-3 is presented in Appendix A. Both wells MW-4 and MW-5 were screened between 10 and 20 feet bgs. Soil intercepted in soil boring MW-5 included:

- From 4.0 to 4.5 feet bgs a brownish yellow, dry, loose, , slightly fine gravelly, slightly silty, fine to coarse Sand;

- From 9 to 10.5 feet bgs a brownish yellow, damp, medium-dense, trace silt, medium to fine Sand
- From 14 to 15.5 feet bgs an olive-gray, wet, dense, trace silty, fine to coarse Sand. **Soil at this sampling interval had a strong fuel odor**; and
- From 19 to 19.5 feet bgs an olive-gray, wet, dense, trace silty, fine to coarse Sand, overlying brown, hard, dry, slightly silty, Clay.

Groundwater Elevation and Flow Direction

Groundwater elevations are presented in Table 1. Because only wells MW-3 and MW-5 contained water, the groundwater gradient and flow direction could not be determined. However, based on past groundwater elevation data collected from wells installed at the former Unocal Gasoline Station, located directly west of the site, groundwater flows southeast to southwest. Groundwater elevations for well MW-3 and MW-5 are presented in Table 1.

Chemical Analyses

Two groundwater samples (including a field duplicate and trip blank) were be analyzed for the contaminants of concern using the following methods:

- Volatile Organic Compounds (VOCs): EPA Test Method 8260B
- Gasoline, Diesel, and Heavy Oil Range Total Petroleum Hydrocarbons: Washington State Test Methods NWTPH-Gx and Dx.

In addition, a sample of groundwater from well MW-5 was sent to Zymax Forensics in California for hydrocarbon characterization. Results from this analysis are pending.

Groundwater Quality Results

Groundwater quality results are present in Table 2 and on Figure 2. Laboratory certificates are presented in Appendix B. The combined concentrations of gasoline and mineral spirit range TPHs in the groundwater at well MW-5 exceeds the Method A cleanup level for TPH in groundwater. As discussed in the laboratory case narrative (Appendix B), Mineral spirit range TPHs do not indicate the presence of neat mineral spirits in the groundwater, but reflect various heavy end petroleum hydrocarbons of weathered gasoline.

Concentrations of ethyl benzene and xylenes exceed the Method A cleanup in well MW-5 only. Concentrations of tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE), 1,2-Dichloropropane, and vinyl chloride (VC) exceed Method B cleanup levels in groundwater samples collected from wells MW-3 and MW-5. The concentration of 1,1-dichloroethylene (1,1-DCE) in the groundwater at well MW-3

exceeds the Method B cleanup level as the does the reported detection limit for 1,1-DCE for groundwater sample MW-5. Additional VOCs were detected in the groundwater sample MW-5, however, there are no Method B cleanup levels for these compounds. It should be noted that sample MW-6 is a field duplicate of sample MW-3.

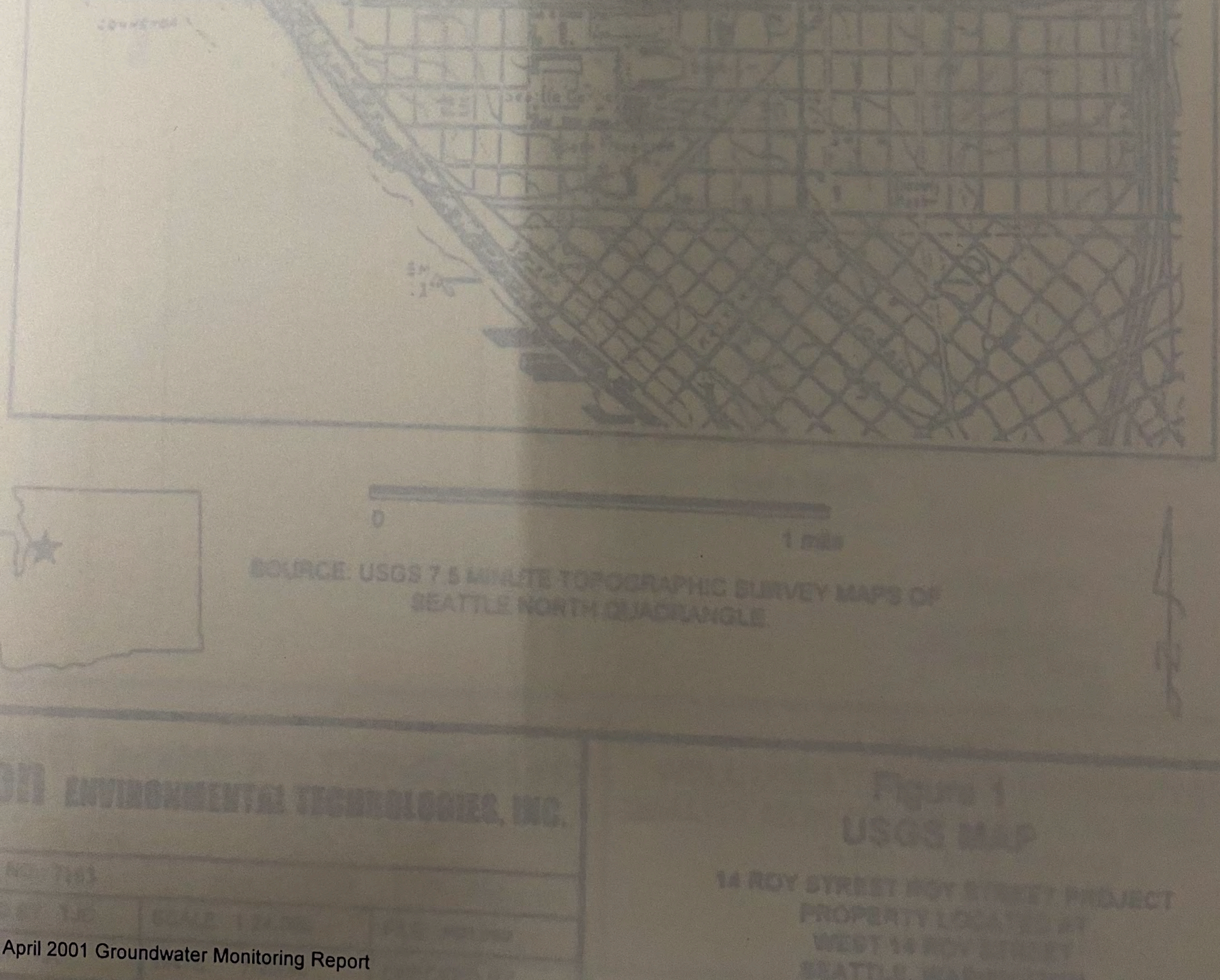
If we may provide any additional information or clarification, please call Thomas Cammarata at 206-285-8010

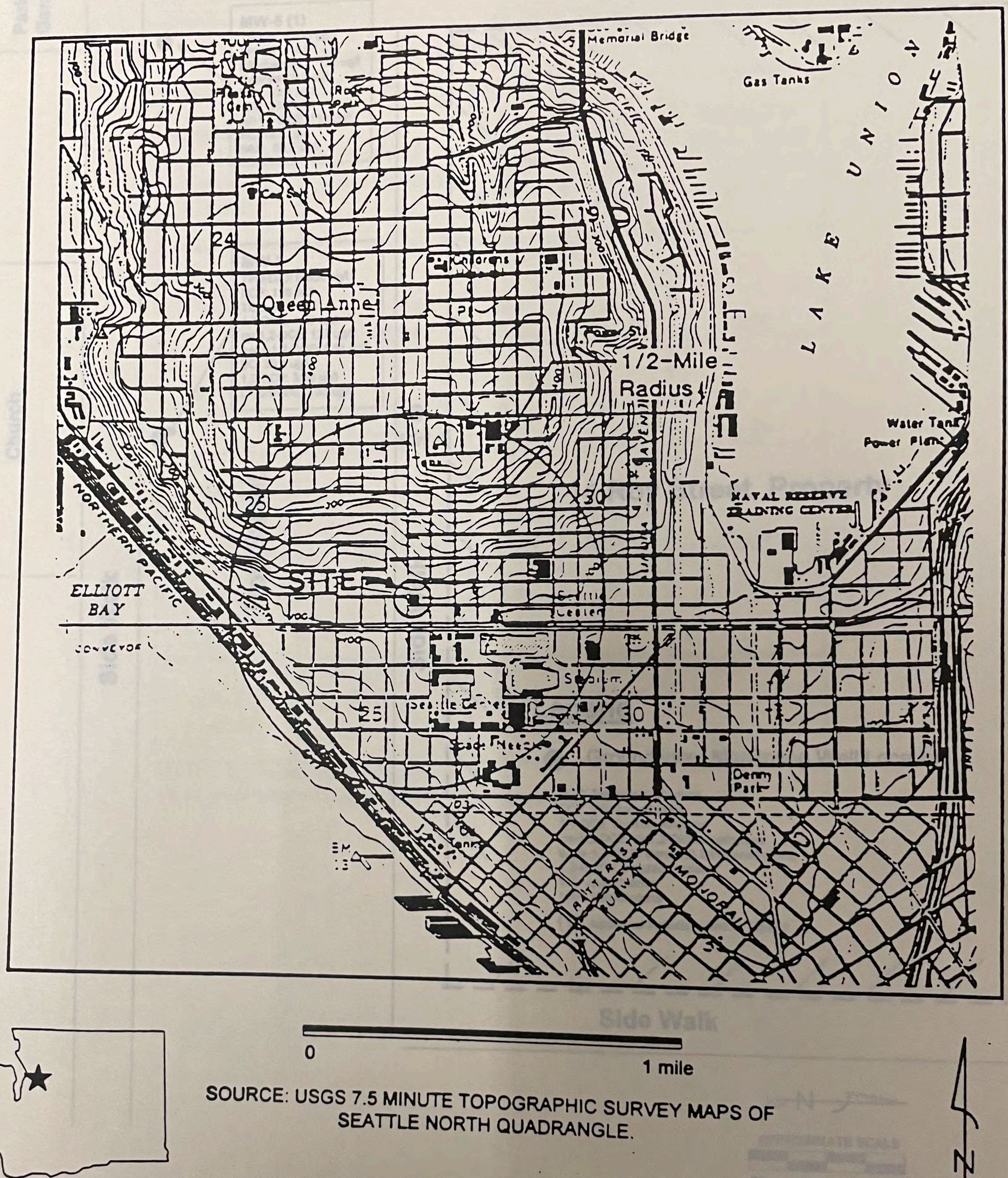
Sincerely,

Dawn C. Ferrolly for Tom Cammarata

Kleen Environmental Technologies, Inc.

Thomas Cammarata,
Project Manager





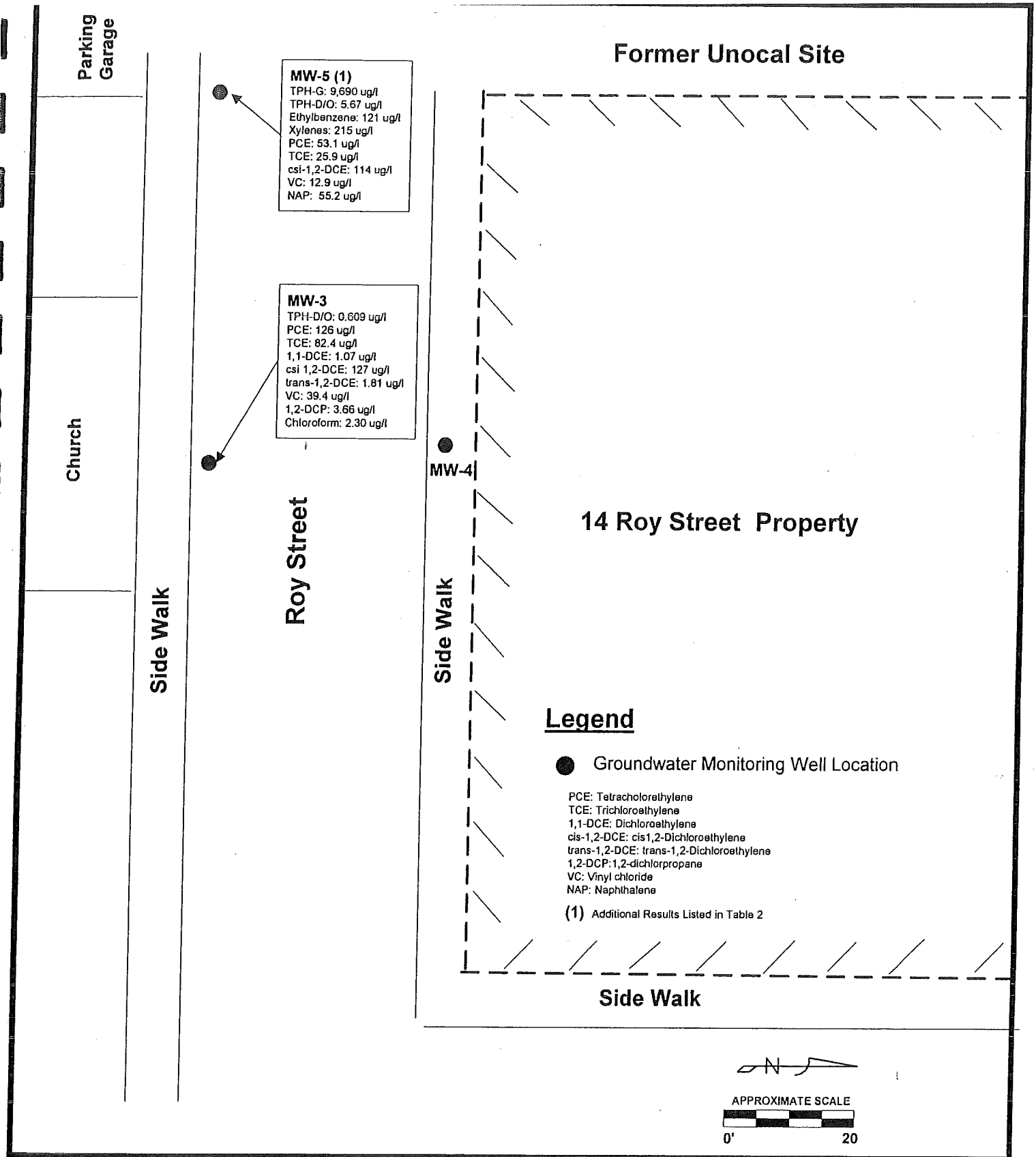
SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC SURVEY MAPS OF
SEATTLE NORTH QUADRANGLE.

Kleen ENVIRONMENTAL TECHNOLOGIES, INC..

PROJECT NO.: 7163		
DESIGNED BY: TJC	SCALE: 1:24,000	FILE: FIG1.VSD
DRAWN BY: TJC	DATE: 7/20/98	CHECKED BY:

Figure 1
USGS MAP

14 ROY STREET ROY STREET PROJECT
PROPERTY LOCATED AT
WEST 14 ROY STREET
SEATTLE, WASHINGTON



Kleen ENVIRONMENTAL TECHNOLOGIES, INC.

PROJECT NO.: 7949		
DESIGNED BY: TJC	SCALE: 1" = 20'	FILE: Fig2gw.vsd
DRAWN BY: TJC	DATE : 5/10/01	CHECKED BY:

Figure 2
WELL LOCATIONS AND GROUNDWATER QUALITY MONITORING RESULTS APRIL 2001

14 ROY STREET PROJECT
PROPERTY LOCATED AT
WEST 14 ROY STREET
SEATTLE, WASHINGTON

Table 1. Groundwater Elevations

Well Number/ Top of Casing Elevation (feet)	Date of Measurement	Depth to Water (feet)	Static Water Level (feet)	Change in Static Water Level (feet)
MW-1 (1) 120.81	07/05/95 01/09/96	9.44 6.42	111.37 114.39	 -3.02
MW-2 (1) 120.30	07/05/95 01/09/96	9.84 7.00	110.46 113.30	 -2.84
MW-3 (2) 141.45	01/09/96 04/20/01	11.66 11.28	129.79 130.17	 -0.38
MW-4 (2) 140.69	04/20/01	Dry		
MW-5 (2) 142.87	04/20/01	14.81	128.06	

(1) TOC elevation datum unknown
(2) TOC elevation based on original City of Seattle Datum

Table 2. Summary of Groundwater Results

Sample Number	Date Sampled	TPH-G (ug/l)	TPH-M [3] (ug/l)	TPH-D (ug/l)	TPH-O (ug/l)	Benzene (ug/l)	Toluene (ug/l)	Ethyl benzne (ug/l)	Xylenes (ug/l)	sec-BB (ug/l)	PCE (ug/l)	TCE (ug/l)	1,1-DCE (ug/l)	cis-1,2-DCE (ug/l)
MW-1 [4]	05-Jan-96	800	-	-	-	< 2	< 2	< 2	< 2	*	**12.0**	**8.00**	**46.0**	-
MW-2 [4]	05-Jan-96	500	-	-	-	< 2	< 2	< 2	< 2	*	**340**	**17.0**	**< 5.00**	**< 5.00**
MW-3	04-Jan-96	< 200	-	-	-	< 2	< 2	< 2	< 2	*	**120**	**42.0**	**< 5.00**	**< 5.00**
	20-Apr-01	84.4	< 50.0	0.250	0.359	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	**126**	**82.4**	**1.07**	**127**
MW-5	20-Apr-01	**7160** [5]	**2,530**	0.436	5.23	< 1.00	10.2	**121**	**215**	< 1.00	**53.1**	**25.9**	**< 1.00**	**114**
MW-6 [2]	20-Apr-01	177	< 50.0	< 0.250	0.353	< 1.00	< 1.00	< 1.00	< 2.00	1.91	**255**	**118**	**1.24**	**136**
Method A Cleanup Levels		1,000				5.00	40.0	30.0	20.0	na	na	na	na	na
Method B Cleanup Levels						na	na	na	na	- [1]	0.85	3.98	0.0729	80.0

TPH-G = gasoline range total petroleum hydrocarbons

TPH-D = diesel range total petroleum hydrocarbons

TPH-O = heavy oil total petroleum hydrocarbons

TPH-M = mineral spirits range total petroleum hydrocarbons

na = not applicable

- [1] = No IRIS or HEAST Toxic data

(2)" MW-6 is field duplicate of MW-3

(3) Mineral spirit range TPHs represent weathered gasoline not neat mineral spirits

- not analyzed

* not reported by Clayton Environmental

PCE: Tetracholorethylene

TCE: Trichloroethylene

1,1-DCE: Dichloroethylene

cis-1,2-DCE: cis-1,2-dichloroethylene

sec-BB: sec-Butylbenzene

(4) Monitoring wells MW-1 and MW-2 were removed during remedial action

(5) Bold values exceed cleanup level

Table 2. Summary of Groundwater Results - Continued

Sample Number	Date Sampled	trans-1,2-DCE (ug/l)	i-PB (ug/l)	1,2-DCP (ug/l)	p-IPT (ug/l)	NAP (ug/l)	n-PB (ug/l)	1,2,4-TMB (ug/l)	1,3,5-TMB (ug/l)	Chloroform (ug/l)	VC (ug/l)
MW-1 [4]	05-Jan-96	*	*	**23** [5]	*	*	*	*	*	*	**< 5.00**
MW-2 [4]	05-Jan-96	*	*	**< 5.00**	*	*	*	*	*	*	**< 5.00**
MW-3	04-Jan-96	*	*	**< 5.00**	*	*	*	*	*	*	**< 5.00**
	20-Apr-01	1.81	< 1.00	**3.66**	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	2.30	**39.4**
MW-5	20-Apr-01	< 1.00	31.1	< 1.00	19.5	55.2	41.8	115	93.7	< 1.00	**12.9**
MW-6 [2]	20-Apr-01	1.59	< 1.00	**5.02**	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	1.15	**37.4**
Method A Cleanup Levels		na	na	na	na	na	na	na	na	na	na
Method B Cleanup Levels		160	- [1]	0.643	- [1]	320	- [1]	- [1]	- [1]	7.17	0.023

- [1] = No IRIS or HEAST Toxic data

(2)" MW-6 is field duplicate of MW-3

(4) Monitoring wells MW-1 and MW-2 were removed during remedial action

na = not applicable

(5) Bold values exceed cleanup level

trans-1,2-DCE: trans-1,2-dichloroethylene

1,2,4-TMB: 1,2,4-trimethylbenzene

1,3,5-TMB: 1,3,5-trimethylbenzene

VC: Vinyl chloride

I-PB: isopropylbenzene

p-IPT: p-isopropyltoluene

NAP: Naphthalene

n-PB: n-propylbenzene

1,2-DCP: 1,2-dichlorpropane

Appendix A
Soil Boring/Well Installation Logs

Clayton
ENVIRONMENTAL
CONSULTANTS

Soil Boring Log MW3

Project: #66314, Orestes

Boring Location: Approximately 50 feet south of south central portion of subject property
Depth to GW: 6.6 ft.

Sample Date: 12/27/95

Hole Depth: 19 ft.

Hole Diam.: 8 in.

Logged By: C. Torzynski

Drilled By: Environmental Drilling

Sampling Method: Split Stainless Steel

Well Construction Summary	Laboratory Sample	PID Reading for VOCs	Sample Depth*	ASTM Classif.	Soil Description
0' Cement grout seal 1.5' Bentonite pellet seal 3.0' Silica sand pack 9.0' 2" dia. Sched. 40 blank PVC 2" dia. Sched. 40 slotted PVC 19.0'	MW3-8.5 MW3-17.5	2.1 ppm	0 1 2 3 3 3 4 4 5 2 2 6 1 7 2 4 8 6 9 4 10 4 5 11 12 10 15 13 42 14 7 15 21 20 16 6 7 18 8 19 20 17	SM SM SP SP SP SP CL	Light brown pebbley silty sand. Dry, crumbly. Light brown pebbley silty sand. Dry, crumbly. Very slightly moist lt. brown to yellowish orange fine sand. Few pebbles. Moist to wet fine sand. No pebbles. Saturated medium grain sand. Few pebbles Saturated medium grain sand. Few pebbles. Saturated sandy clay, brown clay and dark gray clay.

Notes:
* small numbers along left side of scale indicate driller blows per section of sample.

Soil Boring Log and Well Instillation Form

Kleen Environmental Technologies, Inc.

Obs. Well Install. ~~Yes~~ No

Kleen Environmental Technologies, Inc.

Boring MW-4 Date 4/12/01 Sheet 1 of 2

Job 14 Roy Street Job No. 7939

Logged By TJC Weather Sunny

Drilled By Holt

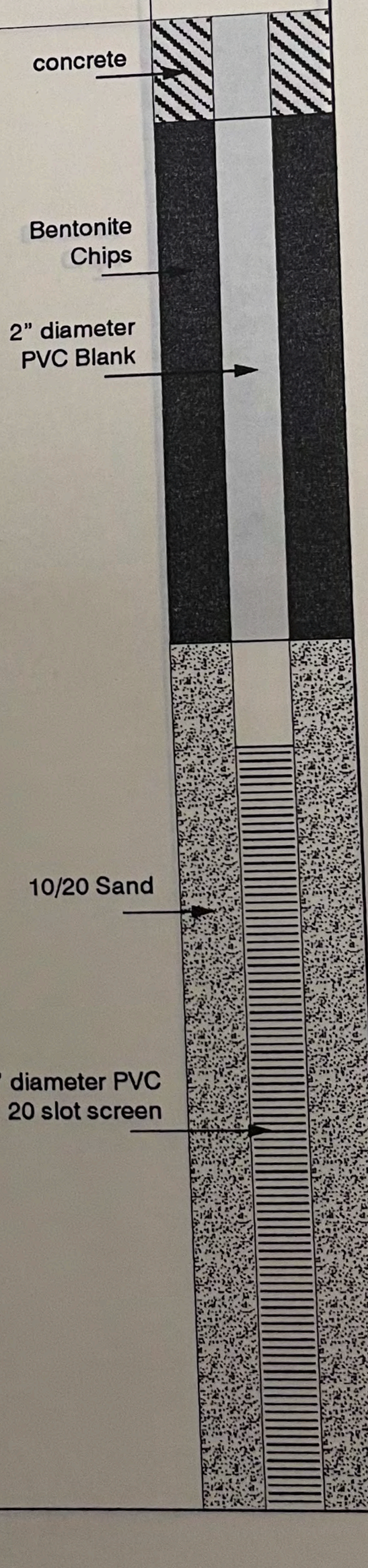
Drill Type/Method Hollow-stem auger

Sampling Method Split-spoon

Bottom of Boring 25.5 ft ATD Water Level Depth 0 ft No

DEPTH From	DEPTH To	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist, color, minor, MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
			0	concrete
4	5.5		12 9 13	yellowish-brown to yellowish-red, medium-dense, dry, slightly fine gravelly, silty, fine to medium Sand.
9	10.5		7 12 15	brownish-yellow, dry, very stiff, dry to damp, silty, Clay.
14	15.5		8 16 17	brown olive-gray, very stiff, dry to damp, slightly silty, Clay.
19	20.5			gray, hard, dry to damp, Clay.

Well Construction Log



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Soil Boring Log and Well Instillation Form

Kleen Environmental Technologies, Inc.

Obs. Well Install. Yes No

Kleen Environmental Technologies, Inc.

Boring MW-4 Date 4/12/01 Sheet 2 of 2

Job 14 Roy Street Job No. 7939

Logged By TJC Weather Sunny

Drilled By Holt

Drill Type/Method Hollow-stem auger

Sampling Method Split-spoon

Bottom of Boring 25.5 ft ATD Water Level Depth 0 ft No

DEPTH From	DEPTH To	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist, color, minor, MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
24	25.5	4	12 24 29	gray, hard, dry Clay.

Well Construction Log

Bentonite Chips

g/project/clients/tjc/log0003.cdr

Soil Boring Log and Well Instillation Form

Kleen Environmental Technologies, Inc.

Obs. Well Install. ~~Yes~~ No

Kleen Environmental Technologies, Inc.

Boring MW-5 Date 4/12/01 Sheet 1 of 1

Job 14 Roy Street Job No. 7939

Logged By TJC Weather Sunny

Drilled By Holt

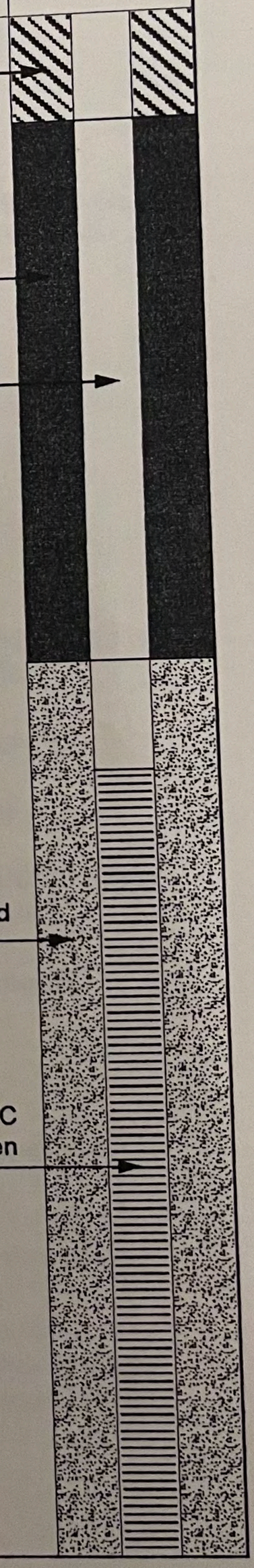
Drill Type/Method Hollow-stem auger

Sampling Method Split-spoon

Bottom of Boring 20.5 ft ATD Water Level Depth 14 ft No

DEPTH From	DEPTH To	SAMPLE RECOVERY	Penetration Resistance	DESCRIPTION: Den., moist, color, minor, MAJOR CONSTITUENT. NON-SOIL SUBSTANCES: Odor, staining, sheen, scrap, slag, etc.
			0	concrete
4	5.5		4 4 5	brownish-yellow, dry, loose, slightly silty, slightly fine gravelly, fine to coarse Sand.
9	10.5		6 11 11	brownish-yellow, damp, medium dense, trace silt, medium to fine Sand.
14	15.5		6 9 17	olive-gray, wet, meduim-dense, trace silt, fine to coarse Sand (strong fuel odor).
14	15.5		6 9 17	olive-gray, meduim-dense, trace silt, fine to coarse Sand (19 to 19.5'); brown, dry, very stiff, slightly silty, Clay.

Well Construction Log



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