WORK PLAN
FOR SOIL-VENT SYSTEM
AND RECOVERY-WELL INSTALLATION

JUNE 15, 1990

GROUNDWATER TECHNOLOGY, INC.
CONCORD, CALIFORNIA

GROUNDWATER
TECHNOLOGY, INC.

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WORK PLAN
FOR SOIL-VENT SYSTEM
AND RECOVERY-WELL INSTALLATION
JUNE 15, 1990

Prepared for:

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R5016C.RT

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WORK PLAN
FOR SOIL-VENT SYSTEM
AND RECOVERY-WELL INSTALLATION
JUNE 15, 1990

INTRODUCTION

This work plan presents the details of installation of a soil-vent system (SVS) and recovery well at the Safety-Kleen Corporation (Safety-Kleen) facility in Oakland, California (Figure 1). The soil-vent system and recovery well are to be used for future remediation of soil and groundwater contamination by mineral spirits and volatile organic compounds (VOCs). Installation is scheduled during underground storage tank replacement activities planned for June 1990, in order to minimize interruption of facility operations due to construction.

PROJECT OVERVIEW

Safety-Kleen operates a commercial-cleaning products distribution facility at 404 Market Street in Oakland. Presently, three underground storage tanks (USTs) are utilized at the facility. Two 6,000-gallon steel USTs store spent mineral spirits solvent which is sent for recycling to the Safety-Kleen recycling center in Reedley, California, and one 10,000-gallon UST is used to store clean mineral spirits solvent for distribution to customers (Figure 2).

FIGURE 1. SITE LOCATION MAP

N

0 MILES 1

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404 MARKET ST.
OAKLAND, CALIFORNIA

ML 5/90

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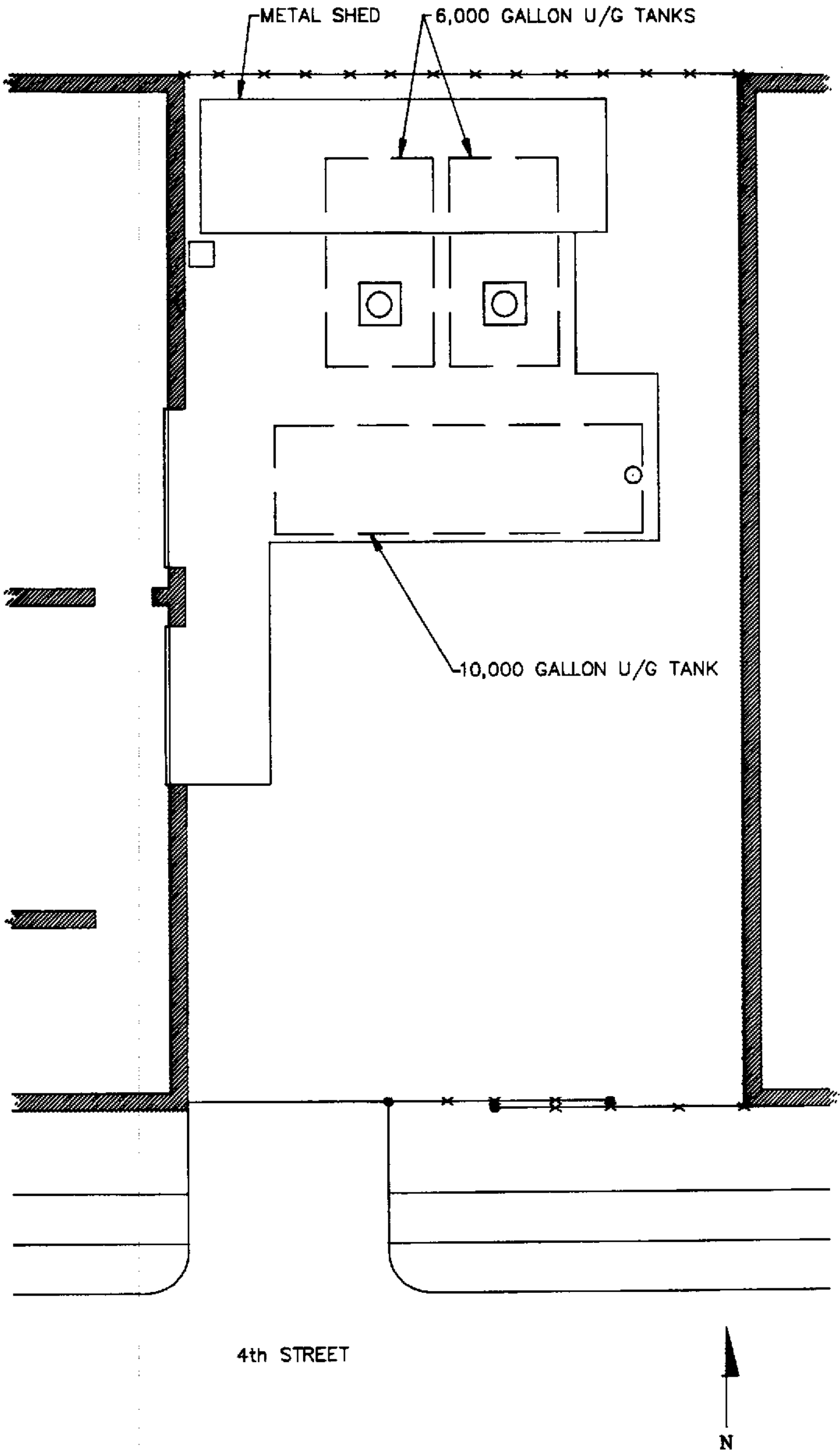

FIGURE 2
PRE-REPLACEMENT UST LOCATIONS

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CWC-HDR Consulting Engineers performed preliminary site assessment work in 1986, which included drilling three 20-foot depth soil borings, collection of soil samples for laboratory analyses, installation of two groundwater monitoring wells, and collection of groundwater samples for laboratory analyses. Additional site assessment performed by Groundwater Technology, Inc. included a soil-gas survey, soil sampling and analyses, tank precision testing, installation and sampling of twelve shallow (30-foot depth) monitoring wells and one deeper well (65-foot depth). Well locations are shown on Figure 3. Results from laboratory analyses of soil and groundwater samples indicate that impact to both soil and groundwater has occurred. Concentrations of total petroleum hydrocarbons (TPH) as mineral spirits were detected in soil samples near the USTs, and separate-phase hydrocarbon (free product) mineral spirits thicknesses have been measured in wells in the vicinity of the USTs (Figure 4). Shallow groundwater occurs at approximately 10 feet below grade; however, seasonal fluctuations occur, and the depth to water in wells has ranged from about 7 to 13 feet.

Chlorinated hydrocarbons have been detected in both the soil and shallow groundwater beneath the facility; however, the concentrations and specific constituents detected do not relate to those present in samples of the free-phase mineral spirits at the site, suggesting another source (upgradient) may be contributing to the observed dissolved-phase plume. Figure 5 illustrates the dissolved trichloroethene (TCE) distribution in the site vicinity. A southerly groundwater flow direction has been estimated based on water levels in monitoring wells (Figure 6).

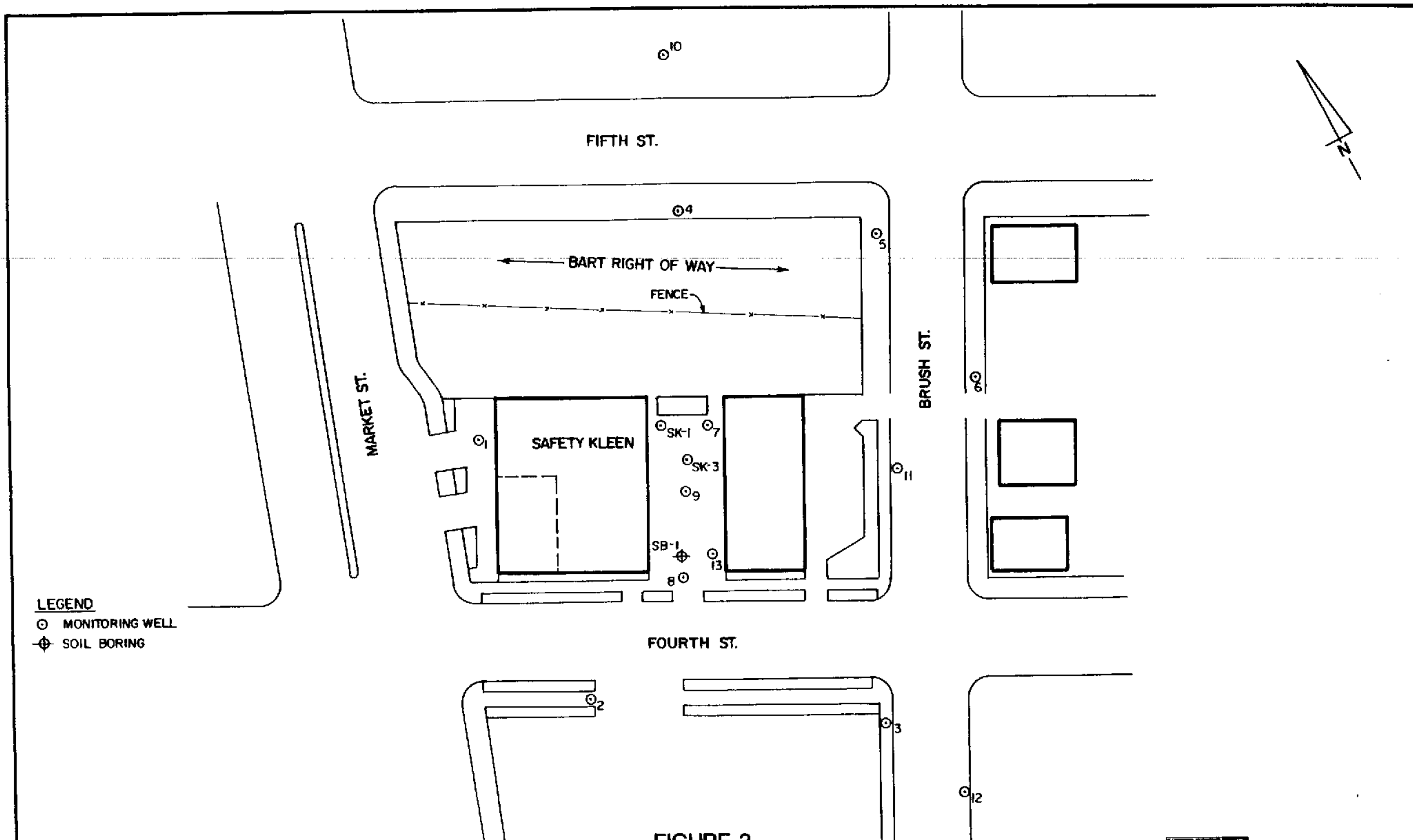

FIGURE 3
MONITORING WELL AND SOIL BORING LOCATIONS

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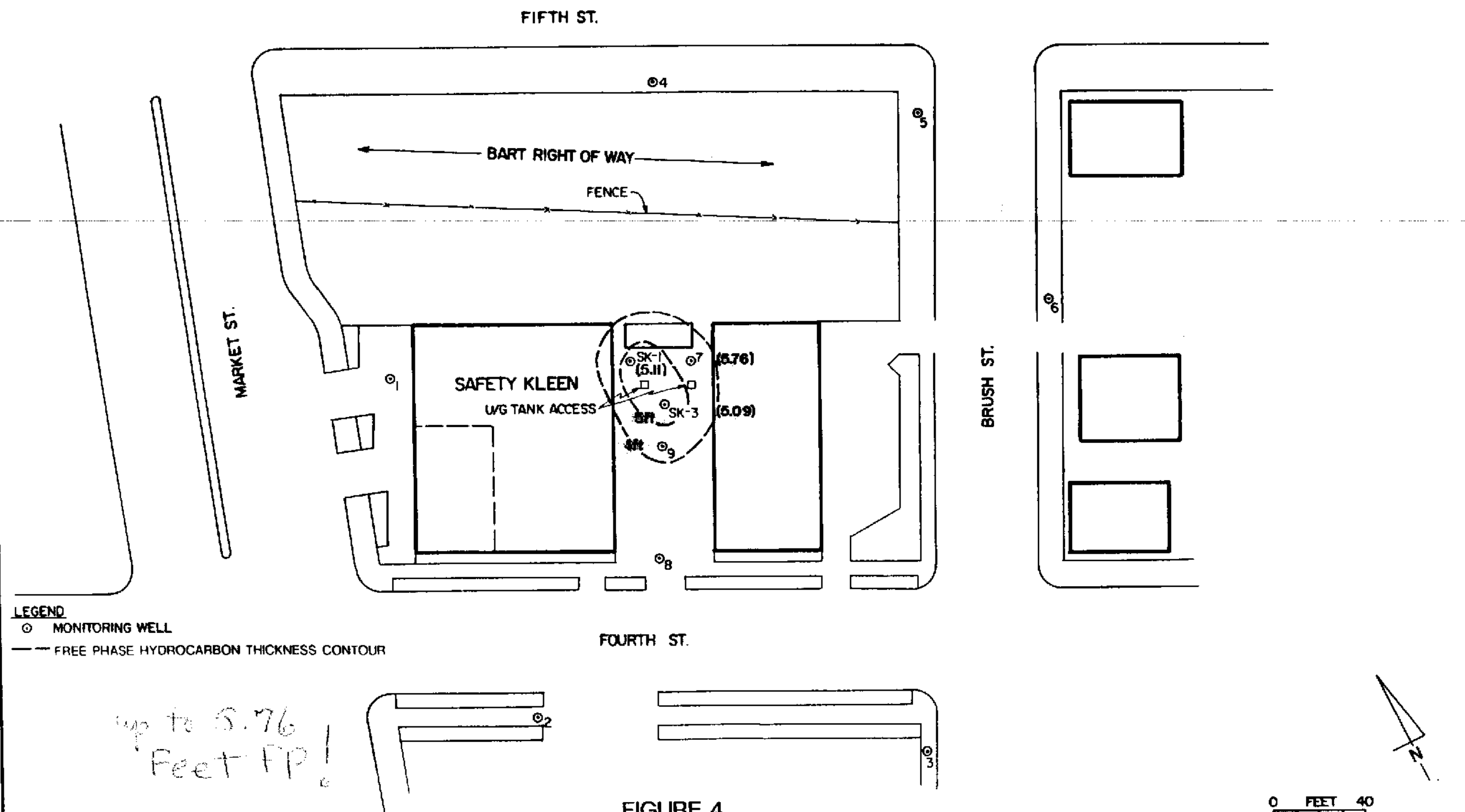

FIGURE 4
FREE PHASE HYDROCARBON THICKNESS MAP
(8/4/88)

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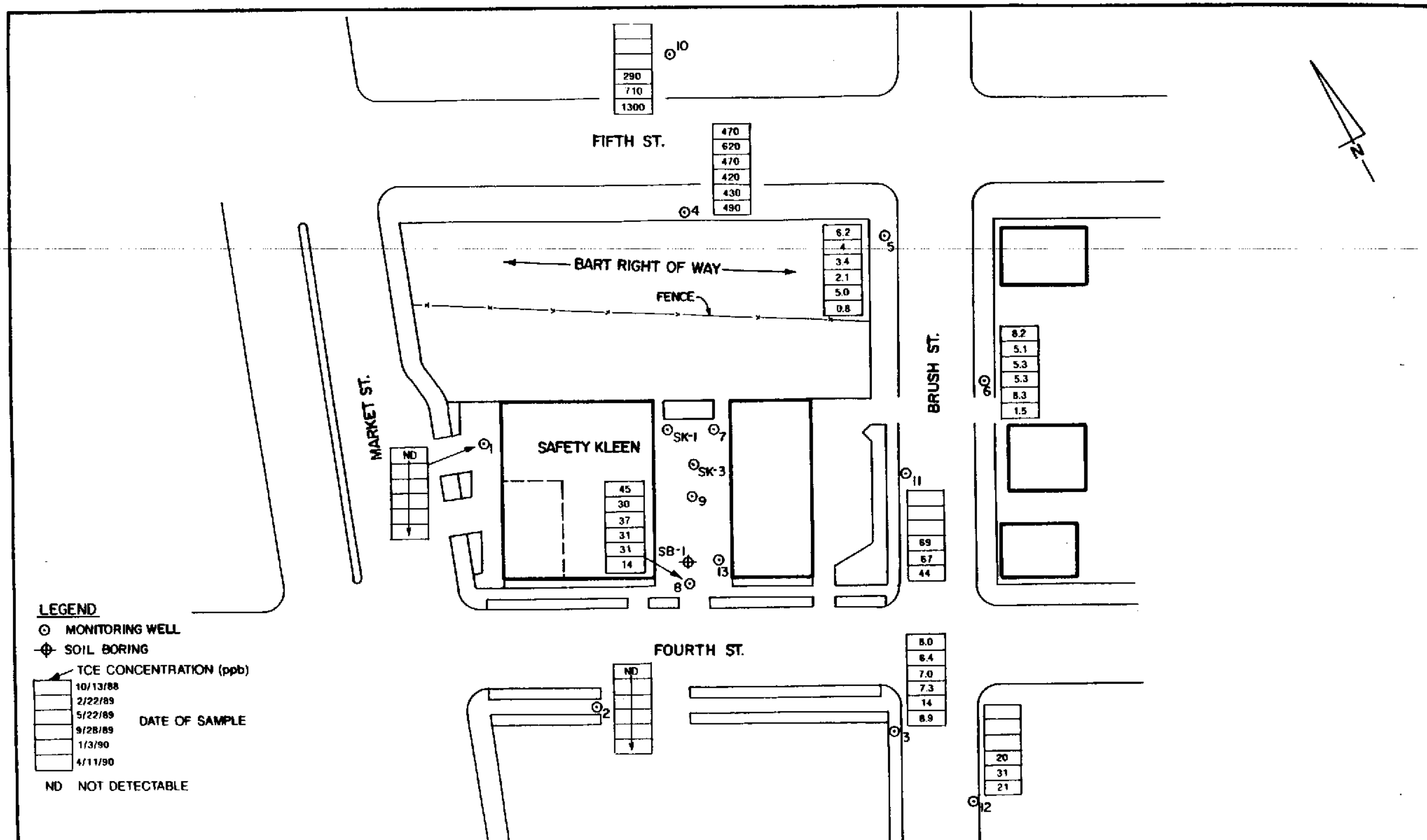

FIGURE 5
DISSOLVED TRICHLOROETHENE (TCE) DISTRIBUTION

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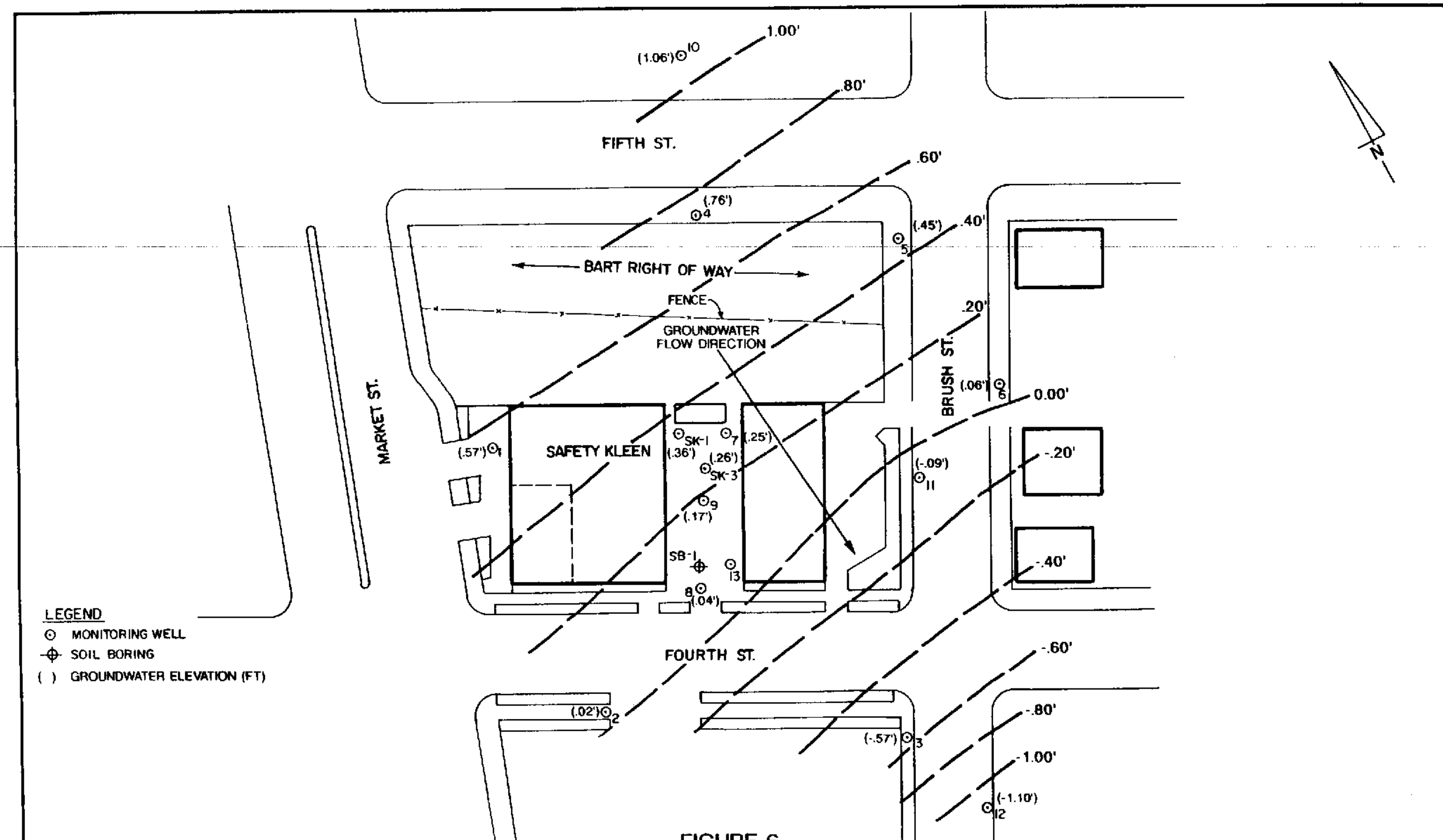

FIGURE 6
POTENTIOMETRIC SURFACE MAP
(4/11/90)

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OAKLAND, CALIFORNIA

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Safety-Kleen plans to remove the three existing USTs and replace them with two new double-walled tanks. Replacement activities for the existing tanks are described in the "Partial Closure Plan for Underground Storage Tanks", dated April 1989. Subsequent correspondence with the California Department of Health Services (DHS) provided approval of the tank replacement activities under Section 66389, Article 4, Title 22, CAC. The new tanks will be installed in compliance with applicable local, state and federal regulations as described in "Assessment of Proposed Underground Storage Tanks, Safety-Kleen Corporation, Oakland Service Center", dated February 1990.

This work plan covers only the installation of the soil-vent system and recovery well. Construction of treatment facilities for resultant soil gas and groundwater, as well as regulatory permitting, operations and maintenance, and the monitoring program for the system, will be addressed in a separate work plan.

In order to evaluate the applicability of soil venting for remediation of the observed soil contamination, Groundwater Technology conducted a **Soil-Vent Feasibility Study** at the site. The study consisted of collecting data to determine the flow characteristics of the soil, the radius of influence for vapor-extraction wells, and the concentration of hydrocarbon vapors in the soil gas. A summary of the test procedures and results is included in **Appendix A**.

TECHNICAL APPROACH

SOIL-VENT SYSTEM

Results of the soil-vent feasibility study indicate that the transmissivity of the unsaturated zone is quite low, due to the silt and clay content of the soil. The radius of influence of a vertical vent point is calculated to be approximately 35 feet.

Based on the results of the test and the shallow depth to groundwater, it was determined that a soil-vent system (SVS) utilizing a horizontally-trenched piping design would be most suitable for the site. The system will consist of seven 20-foot lengths of perforated 4-inch diameter poly-vinyl chloride (PVC) pipe (SV-1 to SV-7) layout of the SVS will be as shown on figure 7. The piping will be manifolded in the southern corner of the site (Future treatment area) and will be valved separately to enable independent operation.

SV-1 through SV-6 are designed to effect remedial action of the soils beneath the buildings and away from the tank pit area. The vent piping will be placed at a depth of 5 feet (approximately 2 feet above the high groundwater elevation) to maximize the removal of contaminants from the capillary fringe zone. The piping will be installed within the excavation during tank replacement activities and also in trenches (areas away from tank excavation). Polyethylene film (10 mil) and geotextile fiber will be utilized to maximize venting of the unexcavated native soil beyond the edges of the excavation (Figure 8). SV-7 will be placed inside the tank pit area to address potential VOCs which may enter the backfill material. No polyethylene film or geotextile will be used near SV-7.

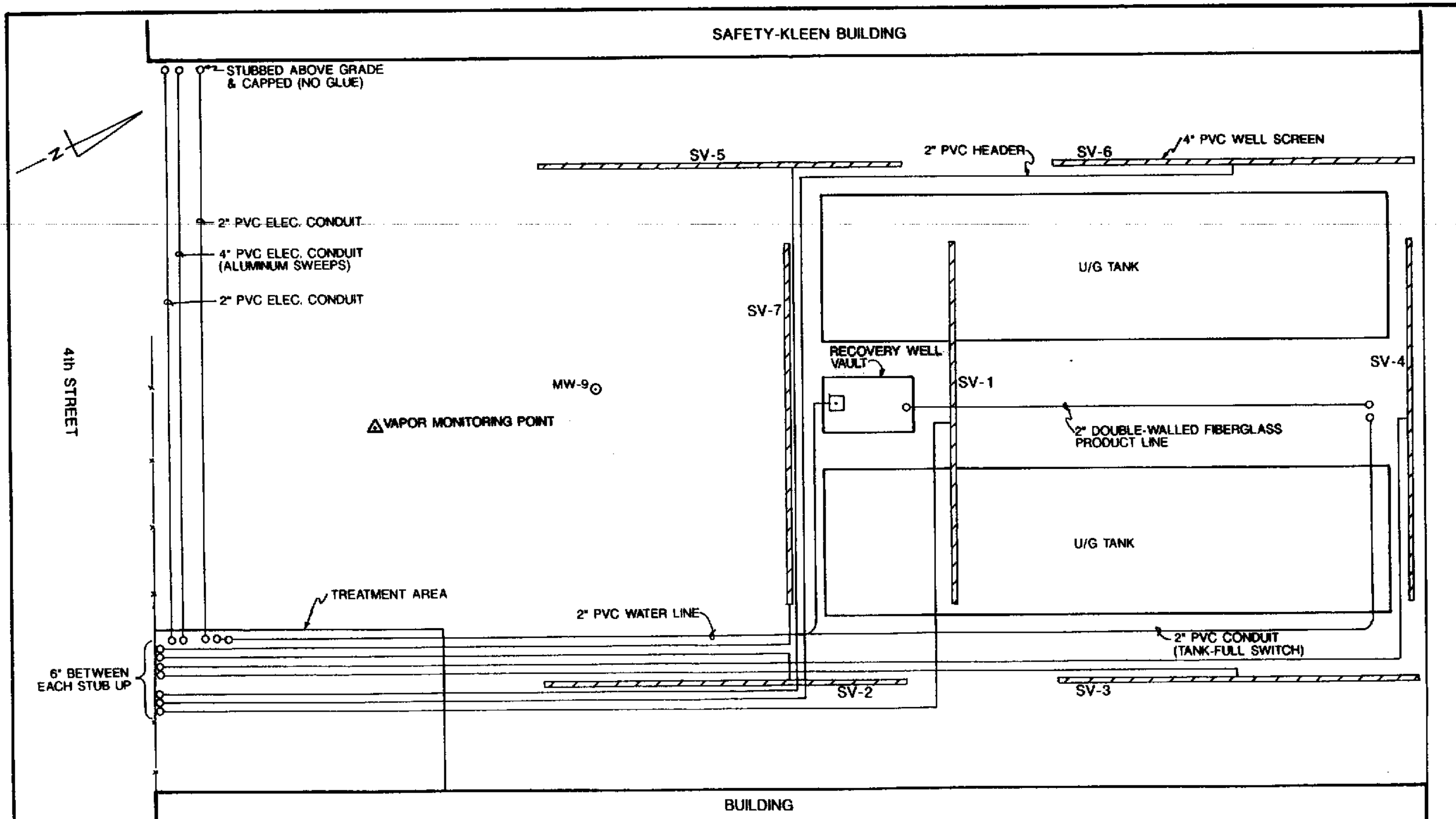

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FIGURE 7
SOIL VENT SYSTEM LAYOUT

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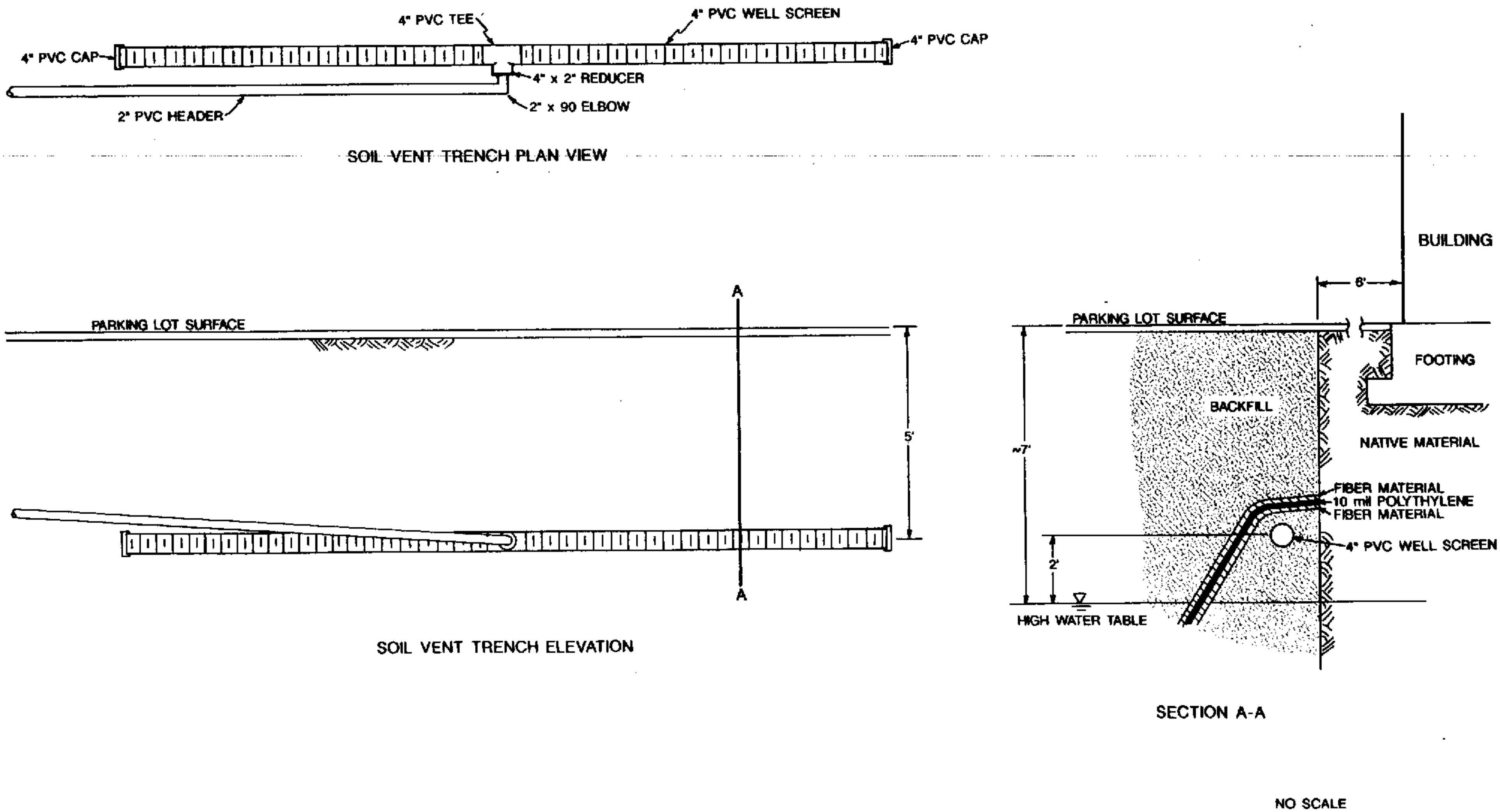

FIGURE 8
SOIL VENT SYSTEM DETAILS

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OAKLAND, CALIFORNIA

ML 6/90

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The soil-vent system piping will be connected to a high-vacuum blower to enable removal of contaminants from the unsaturated zone. The extracted soil-gas may be treated using an abatement system such as granular activated carbon. Details of the treatment system design and construction will be presented in a separate work plan.

SOIL-VENT SYSTEM MONITORING

Two/one-inch diameter PVC vapor-monitoring points will be installed as a nested pair at separate depths in one boring to monitor the influence of the soil-vent system during system operation. The deep vapor-monitoring point will be screened from 7.5- to 8.5-feet below grade. The location of the vapor monitoring point pair is shown on Figure 7. The shallow vapor-monitoring point will be screened from approximately 4- to 5-feet below grade. (Figure 9). The screen slot size will be 0.020-inch.

Installation of the nested vapor-monitoring points will be accomplished using a drill rig equipped with 10-inch diameter, hollow-stem augers. A borehole will be drilled to approximately 9 feet below grade. The deep monitoring point casing and screen will be suspended in the borehole with the screened interval at the appropriate depth (7.5- to 8.5-feet). Monterey sand will be placed around the PVC casing and screen and extended approxi-

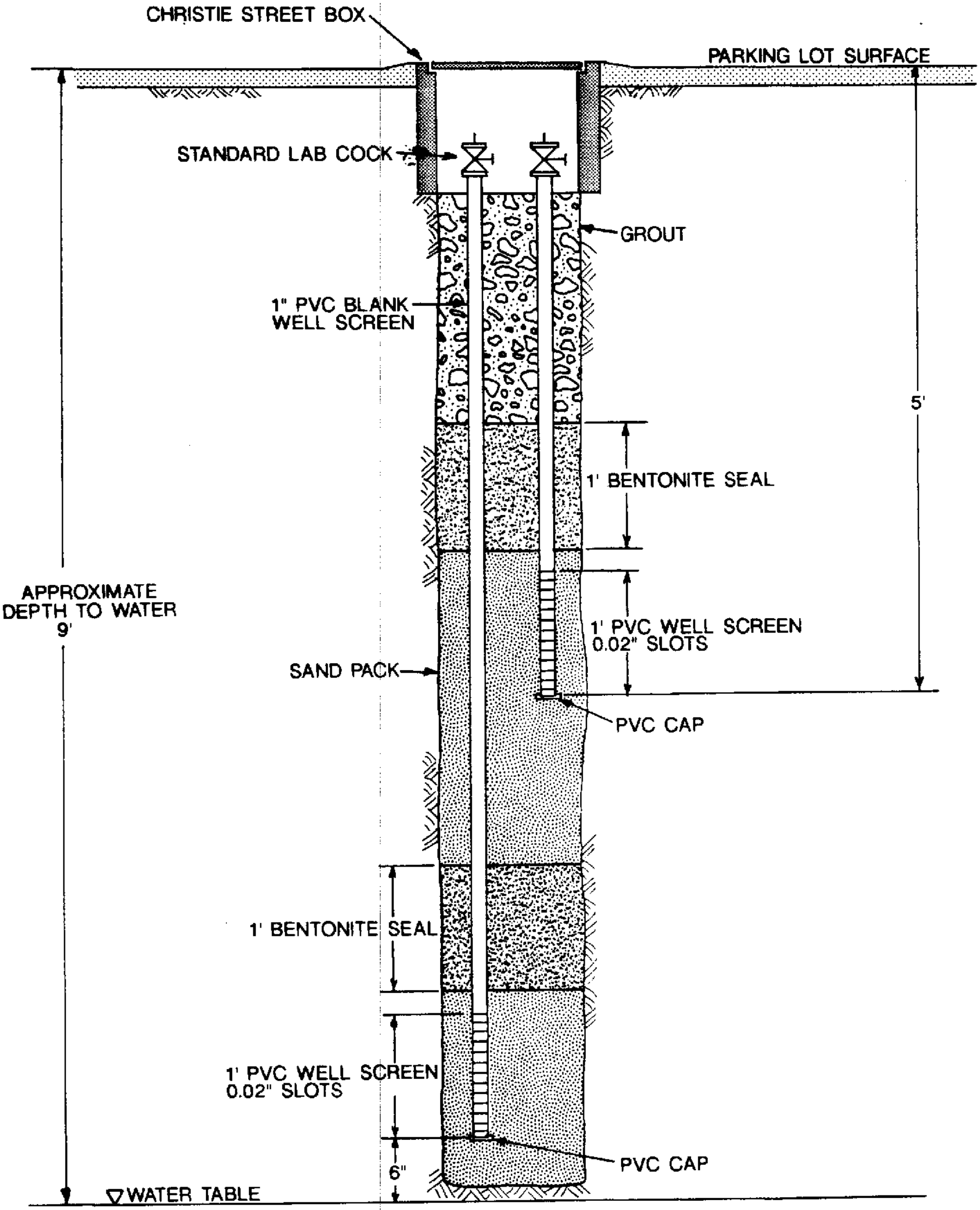

FIGURE 9
SOIL VENT SYSTEM MONITORING POINTS

NO SCALE

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OAKLAND, CALIFORNIA

mately 3 inches above the top of the screened interval. A one-foot seal of hydrated granular bentonite will be placed above the sand pack.

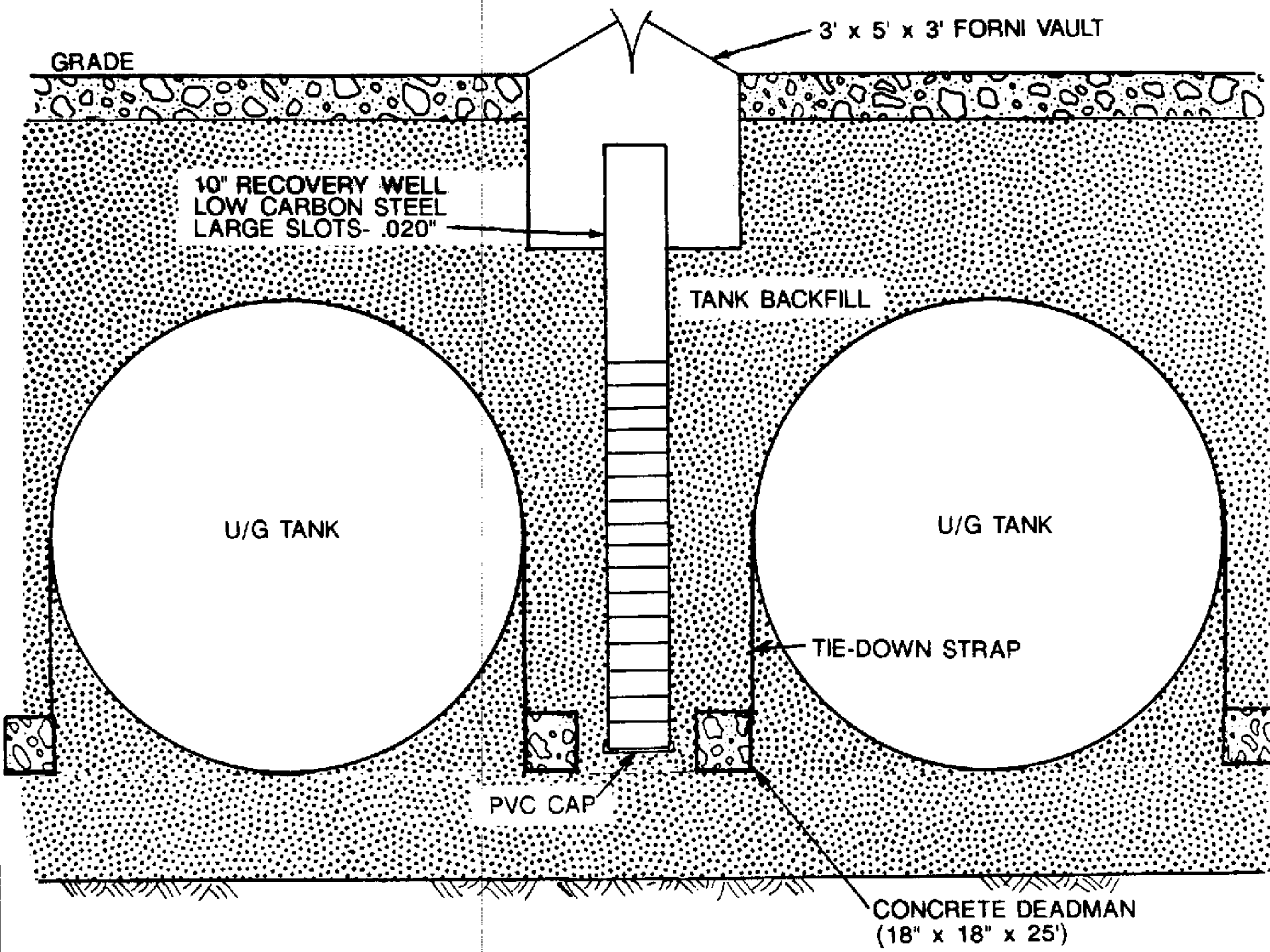
The shallow vapor-monitoring point will be completed in a similar manner, by suspending the casing and screen at the appropriate depth in the borehole and placing the Monterey sand filter pack around the screen and a one-foot bentonite seal above.

The borehole will be backfilled to just below the ground surface with neat cement, and a traffic-rated Christie box will be cemented in place to protect the monitoring points.

SEPARATE-PHASE HYDROCARBON RECOVERY WELL

To facilitate future separate-phase hydrocarbon removal, a recovery well will be installed within the tank pit during tank replacement activities. The well will be constructed of large diameter (10-inch) stainless steel pipe and screen. The screen-slot size will be 0.020 inches. The well screen and casing will be installed at the time the new tanks are installed in the excavation (Figure 10). The backfill around the well screen will consist of pea gravel.

A 3-foot by 5-foot Forni vault will be installed at the surface to protect the wellhead. The wellhead will be connected to the future treatment area by 2-inch diameter PVC pipe and conduit to enable future application of the well for groundwater extraction. A 2-inch diameter iron pipe with fiberglass secondary containment will connect the wellhead to the onsite spent mineral spirits disposal dumpster for separate-phase hydrocarbon recovery.



NOTE: U/G TANKS SPACED 7 FEET APART

FIGURE 10
PRELIMINARY PRODUCT RECOVERY WELL DESIGN

NO SCALE

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OAKLAND, CALIFORNIA

ML 2/90

SCHEDULE

Tank excavation and replacement is scheduled to begin early June 1990. The activities described above will be performed simultaneously to minimize disruption of facility operations. Completion of the soil-vent system and recovery well installations is estimated around June 20, 1990.

The soil-vent system monitoring points will be installed after completion of grading and resurfacing (estimated to be completed July 2, 1990).

APPENDIX A

SOIL-VENT FEASIBILITY TEST RESULTS

SOIL VENT FEASIBILITY TEST
SAFETY-KLEEN
OAKLAND SERVICE CENTER
404 MARKET STREET
OAKLAND, CA

On January 18, 1990, Groundwater Technology, Inc. conducted a Soil-Vent Feasibility Study at the Safety-Kleen Oakland Service Center. The feasibility study consisted of collecting data to determine the flow characteristics of the soil, the radius of influence for vapor extraction wells, and the concentration of hydrocarbon vapors in the soil gas.

A soil-vent remediation system operates by creating a vacuum in soil-vent points with a high-vacuum blower. This vacuum draws fresh air through the ground to the contaminated soil. The liquid hydrocarbons trapped in the soil vaporize into the air within the pore spaces and are captured by the vacuum at the soil-vent point. This air may then be treated to remove the hydrocarbon vapors and discharged to the atmosphere.

To determine the applicability of soil-vent remediation, a soil-vent feasibility study was conducted. The two criteria for determining the feasibility of soil-vent feasibility are the ability of air to move through the soil (transmissivity), and the concentration of hydrocarbon vapors in the air extracted from the soil.

To measure the transmissivity of the soil, a vacuum drawdown test was conducted. This test is similar to a pump test for a water well. The test was conducted by using an Internal Combustion Catalytic Unit (ICCU) which utilizes a 1-1/2 horsepower high-vacuum blower to evacuate air from the soil-vent point being tested. The vacuum created by the blower was measured in inches of water column by a vacuum gauge and the air-flow velocity was measured with a hot-wire anemometer. An existing groundwater monitoring well was utilized at the Safety-Kleen site for the vacuum drawdown test and the vacuum induced in nearby monitoring wells was measured using magnehelic vacuum gauges. To determine the concentration of hydrocarbon vapors in the extracted air, samples were collected in Tedlar[R] bags for laboratory analysis.

At the Safety-Kleen location, groundwater monitoring wells MW-9 and MW-8 were utilized as vapor extraction points for two vapor extraction tests. These monitoring wells are screened from 5 to 30 feet below surface. The depth to water in these wells was approximately 9 feet in MW-9 and 7.75 in MW-8. Several feet of free floating mineral spirits were present on top of the water in MW-9.

Lithologic data from the boring logs for the groundwater monitoring wells at the site suggests that the subsurface materials are fairly uniform across the site and consist primarily of clayey, silty, fine-grained sands in the interval above the water table.

During the first test, monitoring well MW-9 was used as the extraction point. For a second test, monitoring well MW-8 was used as the extraction point. During both of these tests, vacuum response was measured in other on-site groundwater monitoring wells. The wells labeled as "MW" wells were all installed by Groundwater Technology and are completed from 5 to 30 feet with approximately 2 to 4 feet of screened section above the water table. Two monitoring wells on the site (Sk-1 and SK-3) were installed by another consultant, and are screened from 5 to 20 feet below grade. The high vacuum blower was operated at a vacuum of approximately 60- to 70-inches of water column while venting from MW-9. Flow from this well was approximately 3.5 cubic feet per minute (CFM). While venting from MW-8, vacuum was approximately the same and flow was approximately 4.0 CFM.

During the period of each vent test, the induced vacuum in monitoring well SK-3 was monitored versus time by utilizing a Magnehelic vacuum transducer capable of detecting variations of .01" of water column. The data from this transducer along with the time of each measurement was recorded in an ORS Environmental Equipment Model DL-120 Datalogger. This data set was then downloaded at the office into an IBM-PC computer for reduction and analysis.

RESULTS

The vacuum drawdown data from monitoring well SK-3 was plotted versus time on a log-log plot and analyzed by matching with Hantush type-curves for leaky confined aquifers in a method analogous to that used for the analysis of aquifer pumping tests. The applicability of using aquifer testing methods in the analysis of vapor extraction tests was explored by J.W. Massman in the Journal of Environmental Engineering, Vol. 115, No. 1, February, 1989. The analysis of time-drawdown data from soil vent tests offers the advantage of allowing for a more accurate determination of transmissivity to air and the opportunity to more accurately detect inhomogeneities in the subsurface materials beneath the potential soil vent test.

The data plot and type-curve fit generated for the soil vent test on Monitoring Well MW-9 are attached. The analysis of this test yielded a hydraulic conductivity to air of 0.00235 meter per second. This is a relatively low value due to the silty and clayey nature of the new nearsurface materials at the site. Due to the distance from Monitoring Well MW-8 to SK-3 being in excess of the radius of influence for the well, no drawdown data was recorded during the vent test on MW-8

Radius of influence for the soil vent points was determined directly by plotting the induced vacuum in the observation wells against the log of the distance from the vented well. When the observation wells are at different distances from the vented well, this plot defines a straight line that can be extended to the zero vacuum intercept to estimate radius of influence. The plots of the data are attached. During the test on MW-9, a radius of influence of less than 35 feet was determined. This was based on a significant induced vacuum of 0.35-inch of water, measured in SK-3 at a distance of 18 feet, and near zero readings in monitoring wells at 38 and 40 feet from the vented well. During the test on MW-8, the closest observation well was 50 feet away and the data from this well is inconclusive, indicating that if there was an influence on this well, it was small enough to be lost in noise created by wind at the site.

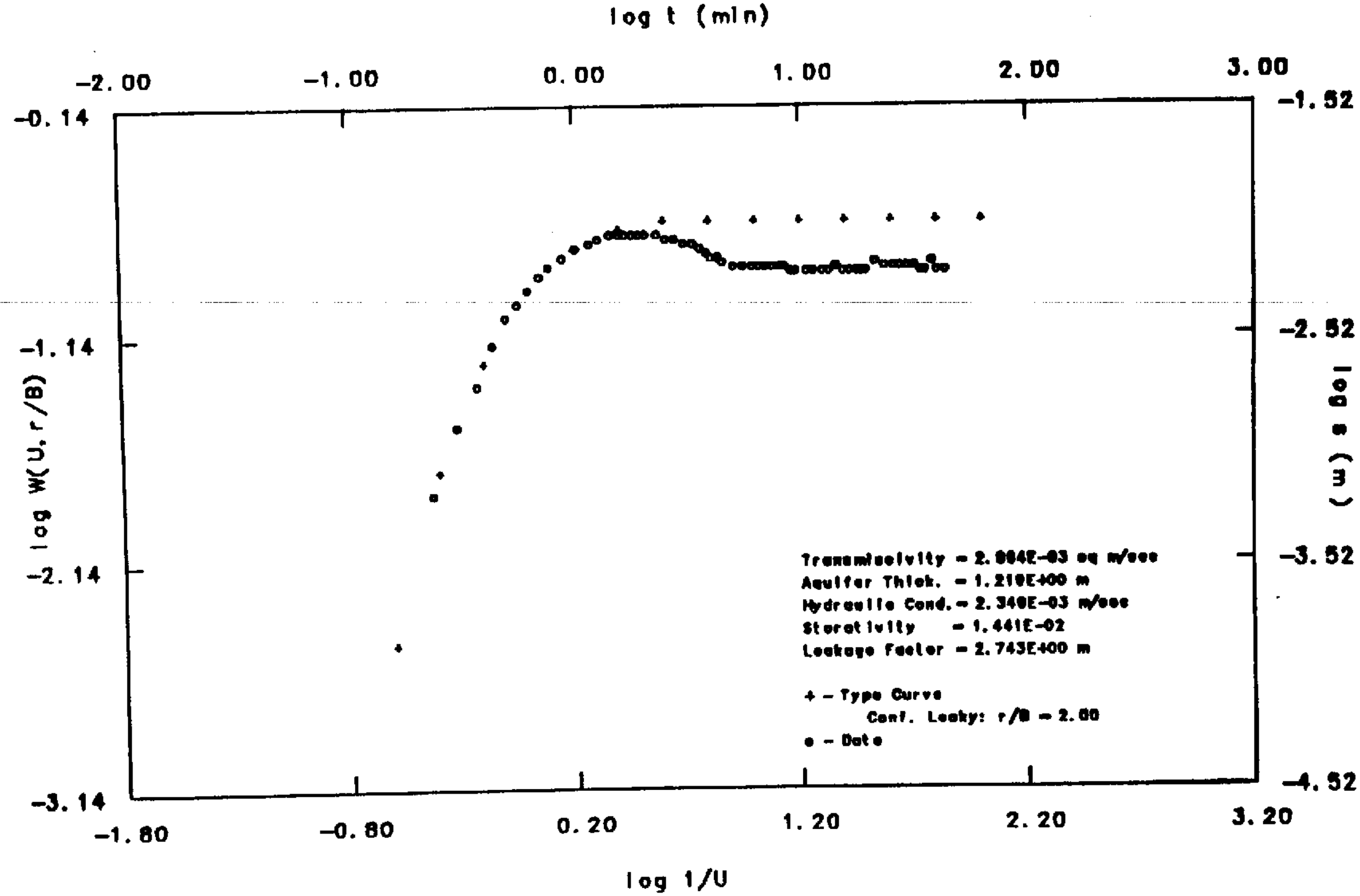
Given the low flow (3.5 to 4.0 CFM) recovered during the tests, several venting wells would be required to supply an adequate volume of air for efficient cleanup of the subsurface. Since the plume at the site extends underneath buildings, and since the unsaturated zone is generally less than 8 feet in thickness, it has been recommended that a system of horizontal trenches at the perimeter of each building may be the most efficient extraction system for this site.

Samples of extracted air were collected during the soil vent testing conducted on MW-8, and were submitted to a California-certified laboratory for analysis. After venting from extraction point MW-8 for 20 minutes, 63 minutes, and 120 minutes, samples of the influent air to the ICCU were collected in Tedlar^R bags. A sample of the effluent air from the ICCU was simultaneously collected at about 20 minutes into the test. The influent and effluent samples collected at 20 minutes into the test (MW8-IN1 and MW8-OUT1) as well as the influent sample collected after 120 minutes (MW8-IN3) were submitted for laboratory analyses. The samples were analyzed within 48 hours of collection for volatile organic compounds using U.S. Environmental Protection Agency (EPA) Method 8010 to look for chlorinated components and also for Total Petroleum Hydrocarbons (TPH) as Mineral Spirits. The laboratory analyses reports are attached. No chlorinated components were detected in either the influent or effluent samples. The analyses for TPH as Mineral Spirits detected 40 micrograms per litter (ug/l) in sample MW8-IN1, 24 ug/l in sample MW8-OUT1, and 8 ug/l in sample MW8-IN3. Since monitoring contamination, it is recommended that the soil vent system be retested after installation in order to obtain the data necessary to design emission controls for the site.

EMISSION CONTROLS

This test was conducted as a pilot test for soil vapor extraction under Regulation 8, Rule 46 of the Bay Area Air Quality Management District (BAAQMD). The extracted vapors were routed through the ICCU where the hydrocarbon vapors were combusted. Effluent concentrations were monitored with a Lower Explosive Limit Meter at intervals of approximately 30 minutes while the system was operating.

SK OAKLAND * SVT MW9-SK3



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Data for Soil Vent Test

SAFETY KLEEN OAKLAND

Well Name: MW9-SK3 Date of Test: 1/18/90

Aquifer Thickness (b) = 4.000 ft
Vented Well Discharge(Q) = 3.000 cfm
Radius of Vented Well = 0.167 ft
Distance of Observation Well from Vented Well = 18.0 ft

Entry No.	Time(t) (min)	Drawdown(s) (ft)	t / d^2 (min/sq ft)
1	0.000	0.000	
2	0.033	0.000	1.02E-04
3	0.067	0.000	2.07E-04
4	0.101	0.000	3.12E-04
5	0.167	0.000	5.15E-04
6	0.234	0.002	7.22E-04
7	0.300	0.004	9.26E-04
8	0.368	0.006	1.14E-03
9	0.434	0.009	1.34E-03
10	0.500	0.012	1.54E-03
11	0.568	0.014	1.75E-03
12	0.634	0.016	1.96E-03
13	0.700	0.018	2.16E-03
14	0.768	0.020	2.37E-03
15	0.900	0.022	2.78E-03
16	1.034	0.024	3.19E-03
17	1.167	0.025	3.60E-03
18	1.301	0.026	4.02E-03
19	1.433	0.027	4.42E-03
20	1.567	0.027	4.84E-03
21	1.701	0.028	5.25E-03
22	1.833	0.028	5.66E-03
23	1.967	0.027	6.07E-03
24	2.100	0.027	6.48E-03
25	2.350	0.027	7.25E-03
26	2.600	0.026	8.02E-03
27	2.850	0.026	8.80E-03
28	3.100	0.025	9.57E-03
29	3.350	0.025	1.03E-02
30	3.600	0.024	1.11E-02
31	3.850	0.023	1.19E-02
32	4.100	0.022	1.27E-02
33	4.350	0.022	1.34E-02
34	4.600	0.021	1.42E-02
35	5.100	0.020	1.57E-02
36	5.600	0.020	1.73E-02
37	6.100	0.020	1.88E-02
38	6.600	0.020	2.04E-02
39	7.100	0.020	2.19E-02

GROUNDWATER TECHNOLOGY, INC.

SAFETY KLEEN OAKLAND * SOIL VENT TEST * MW9 - SK3

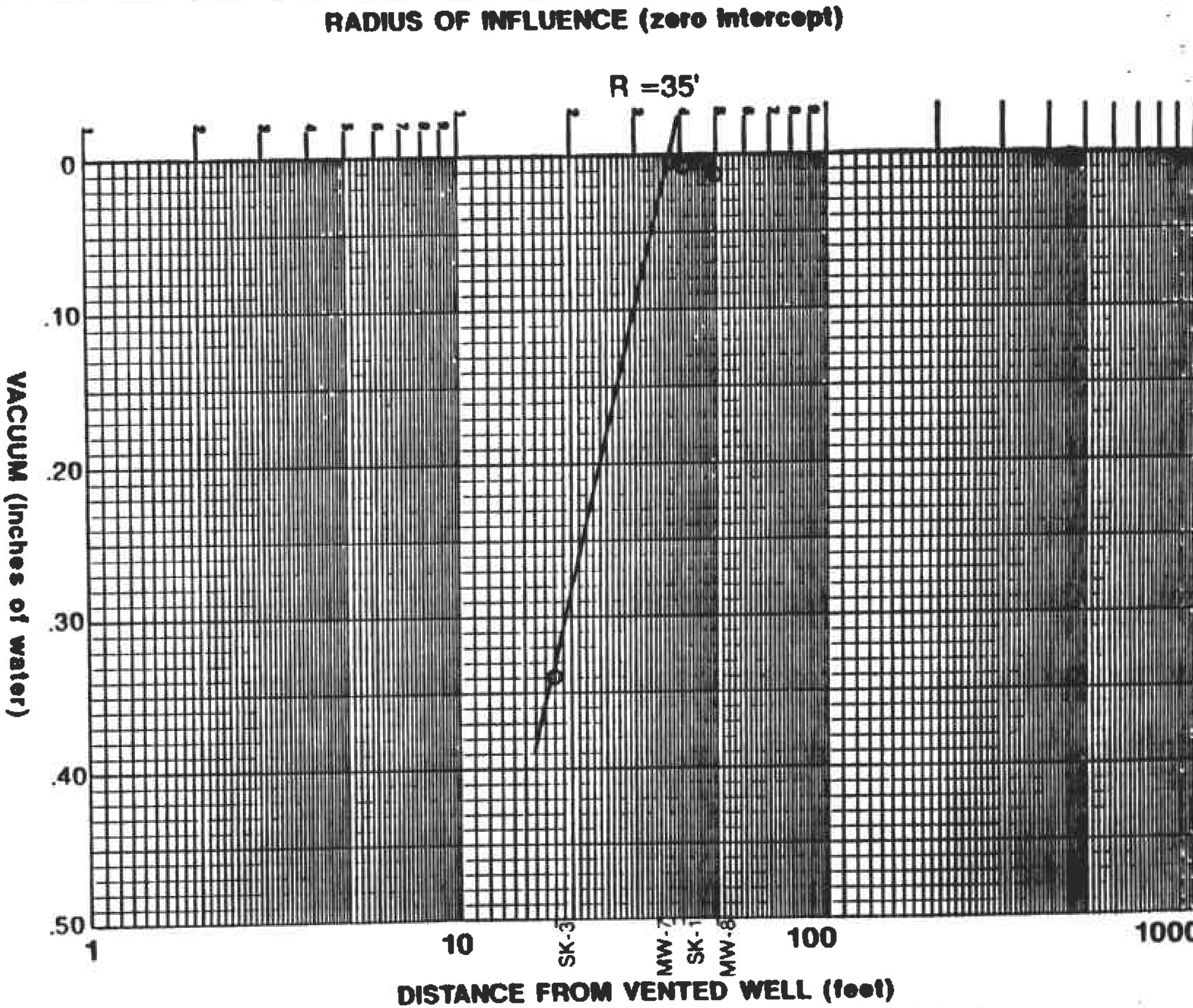
40	7.600	0.020	2.35E-02
41	8.100	0.020	2.50E-02
42	8.600	0.020	2.65E-02
43	9.100	0.019	2.81E-02
44	9.600	0.019	2.96E-02
45	10.600	0.019	3.27E-02
46	11.600	0.019	3.58E-02
47	12.600	0.019	3.89E-02
48	13.600	0.019	4.20E-02
49	14.600	0.020	4.51E-02
50	15.600	0.019	4.81E-02
51	16.600	0.019	5.12E-02
52	17.600	0.019	5.43E-02
53	18.600	0.019	5.74E-02
54	19.600	0.019	6.05E-02
55	21.600	0.021	6.67E-02
56	23.600	0.020	7.28E-02
57	25.600	0.020	7.90E-02
58	27.600	0.020	8.52E-02
59	29.600	0.020	9.14E-02
60	31.600	0.020	9.75E-02
61	33.600	0.019	1.04E-01
62	35.600	0.019	1.10E-01
63	37.600	0.021	1.16E-01
64	39.600	0.019	1.22E-01
65	43.600	0.019	1.35E-01

VENTED WELL: MW-9

APPLIED
VACUUM: 70"

FLOW: 3.5 CFM

TIME: 60 min.



DISTANCE / VACUUM PLOT

SAFETY-KLEEN
OAKLAND, CALIFORNIA

ML 2/90

GROUNDWATER TECHNOLOGY, INC.

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080 Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

01/25/90 GP

WORK ORD#:D001437
CLIENT: PAUL HORTON
GROUNDWATER TECHNOLOGY, INC
4080-D PIKE LANE
CONCORD, CA 94520
PROJECT#: 203-680-5016.06
LOCATION: OAKLAND, CA

SAMPLED: 01/18/90 BY: F. GEILER
RECEIVED: 01/18/90
ANALYZED: 01/18/90 BY: R. GONZALEZ

MATRIX: Air
UNITS: ug/L

PARAMETER	MDL	SAMPLE # I.D.	01 MWB IN 1	02 MWB OUT 1	03 MWB IN 3		
Benzene	0.5		<0.5	<0.5	<0.5		
Toluene	0.5		<0.5	<0.5	<0.5		
Ethylbenzene	0.5		<0.5	<0.5	<0.5		
Xylenes	0.5		<0.5	<0.5	<0.5		
Total BTEX	0.5		<0.5	<0.5	<0.5		
Misc. Hydrocarbons (C4-C12)	1		40	24	8		
Total Petroleum Hydrocarbons in the range of Mineral Spirits	1		40	24	8		

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD: Modified EPA 5030/8020/8015

Emma P. Popek, Laboratory Director

GTEL

ENVIRONMENTAL LABORATORIES, INC.

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4080 Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

01/23/90 JP

WORK ORD#: D001492
CLIENT: PAUL HORTON
GROUNDWATER TECHNOLOGY, INC.
4080-D PIKE LANE
CONCORD, CA 94520
PROJECT#: 203-680-5016.06
LOCATION: 404 MARKET STREET
OAKLAND, CA
SAMPLED: 01/18/90 BY: F. SEILER
RECEIVED: 01/18/90 BY: K. FILLINGER
ANALYZED: 01/19/90 BY: R. GONZALEZ

MATRIX: Air
UNITS: ug/L

PARAMETER	MDL	SAMPLE # I.D.	01 MW8INLET				
Total Petroleum Hydrocarbons as Mineral Spirits	10		43				

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD: Modified 8015

Emma P. Popek

EMMA P. POPEK, Laboratory Director

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LABORATORIES, INC.

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(800) 423-7143 from outside California

01/23/90 rw

WORK ORD#: D001438
CLIENT: PAUL HORTON
GROUNDWATER TECHNOLOGY, INC.
4080-D PIKE LANE
CONCORD, CA 94520
PROJECT#: 203-680-5016.06
LOCATION: 404 MARKET STREET
OAKLAND, CA
SAMPLED: 01/18/90 BY: F. BEILER
RECEIVED: 01/18/90 BY: K. FILLINGER
ANALYZED: 01/21/90 BY: K. PATTON
MATRIX: AIR
UNITS: ug/L

TEST RESULTS

PARAMETER	MDL	SAMPLE # / I.D.	01 / MW8INLET3		
Methane	20		<20		

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD: GC TCD

Emma P. Popek

EMMA P. POPEK, Laboratory Director

GTEL
ENVIRONMENTAL LABORATORIES, INC.

Northwest Region
4080 Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 from inside California
(800) 423-7143 from outside California

01/23/90 jp

WORK ORD#: D001493
CLIENT: PAUL HORTON
GROUNDWATER TECHNOLOGY, INC.
4080-D PIKE LANE
CONCORD, CA 94520
PROJECT#: 203-680-5016.06
LOCATION: 404 MARKET STREET
OAKLAND, CA
SAMPLED: 01/18/90 BY: F. SEILER
RECEIVED: 01/18/90 BY: K. FILLINGER
ANALYZED: 01/22/90 BY: R. CONDIT
MATRIX: AIR
UNITS: ug/L

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	01 MW8OUTLET1	02 MBINLET3
Bromodichloromethane	0.5		<0.5	<0.5
Bromoform	0.5		<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0
Chloroform	0.5		<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5
1,4-Dichlorobenzene	0.5		<0.5	<0.5
Dichlorodifluoromethane	0.5		<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	<0.5
1,2-Dichloroethane	0.5		<0.5	<0.5
1,1-Dichloroethene	0.2		<0.2	<0.2
trans-1,2-Dichloroethene	0.5		<0.5	<0.5
1,2-Dichloropropane	0.5		<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5
Methylene chloride	0.5		<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5
Tetrachloroethene	0.5		<0.5	<0.5
1,1,1-Trichloroethane	0.5		<0.5	<0.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5
Trichloroethene	0.5		<0.5	<0.5
Trichlorofluoromethane	0.5		<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0

MDL = Method Detection Limit.

METHOD: Modified ADDL002

Emma P. Popek

EMMA P. POPEK, Laboratory Director

GTEL ENVIRONMENTAL LABORATORIES, INC

4080- Pike Lane
Concord, CA 94520
415-685-7852

800-544-3422 (In CA)
800-423-7143 (Outside CA)

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

72- 6441

Project Manager: PAUL HORTON

Phone #: 6712387

FAX #:

Address: 404 Market St. Oakland

Site location:

Project Number: 203680 5016.06

Project Name: Safety-Kleen/Oakl.

I attest that the proper field sampling procedures were used during the collection of these samples.

Sampler Name (Print): Frank Seiler

ANALYSIS REQUEST

Field Sample ID	Source of Sample	GTEL Lab # (Lab use only)	# CONTAINERS	Matrix: WATER	SOIL	AIR	SLUDGE	OTHER	Method Preserved: HCl	HNO3	H2SO4	ICE	NONE	OTHER	Sampling: DATE	TIME	BTEX 602 □ 8020 □ with MTBE □	BTEX/TPH Gas 602/8015 □ 8020/8015 □ MTBE □	TPH as □ Gas □ Diesel □ Jet Fuel	Product I.D. by GC (SIMDIS) □	Total Oil & Grease 413.1 □ 413.2 □ 503A □	Total Petroleum Hydrocarbons 418.1 □ 503E □	EPA 601 □ 8010 □ DCA only □	EPA 602 □ 8020 □	EPA 608 □ 8080 □ PCBs only □	EPA 610 □ 8310 □	EPA 624 □ 8240 □ NBS +15 □	EPA 625 □ 8270 □ NBS +25 □	EPTOX: Metals □ Pesticides □ Herbicides □	TCLP Metals □ VOA □ Semi VOA □	EPA Priority Pollutant Metals □ HSL □	LEAD 7420 □ 7421 □ 239.2 □ 6010 □ Org. Lead □	CAM Metals □ STLC □ TTLC	Corrosivity □ Flashpoint □ Reactivity □	METHANE	HOLD
mw-8 inlet 1			1			X								X	1/18/90	1240		X																		
mw-8 outlet 1			1			X								X	↓	1248		X																		
mw-8 inlet 2			1			X								X	↓	128																				X
mw-8 inlet 3			1			X								X	↓	228		X																	X	

SPECIAL HANDLING

24 HOURS □
EXPEDITED 48 Hours □
SEVEN DAY □
OTHER 72 hrs (#) BUSINESS DAYS
QA/QC CLP Level □ Blue Level □
FAX □

SPECIAL DETECTION LIMITS (Specify)

SPECIAL REPORTING REQUIREMENTS (Specify)

REMARKS:

Lab Use Only
Lot #:

Storage Location
Work Order #:

CUSTODY RECORD

Relinquished by Sampler: Frank C. Seiler	Date 1/18/90	Time	Received by:
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date 1-18	Time [illegible]	Received by Laboratory: [signature] Waybill #: [illegible]