James P. Bowers, PE
R. William Rudolph, Jr., PE

LETTER OF TRANSMITTAL

TO: Mr. Dan Lau
Public Works Department
City of Oakland
1419 Broadway, Suite 700
Oakland, California 94612

DATE: July 17, 1989
PROJECT: 98th & Edes Avenues
SCI JOB NUMBER: 272.011

WE ARE SENDING YOU:

- 3 copies
- [x] of our final report
- [ ] a draft of our report
- [ ] a Service Agreement
- [ ] a proposed scope of services
- [ ] specifications
- [ ] grading/foundation plans
- [ ] soil samples/groundwater samples
- [ ] an executed contract
- [ ] _____

- [x] if you have any questions, please call
- [ ] for your review and comment
- [ ] please return an executed copy
- [ ] for geotechnical services
- [ ] with our comments
- [ ] with Chain of Custody documents
- [x] for your use
- _____
- _____

REMARKS:

COPIES TO: (1) Mr. Philip A. Grubstick, Engineering & Design, City of Oakland
One City Hall Plaza, Oakland, CA 94612
✓(1) Mr. Ariu Levi, Alameda County Health Care Svcs Agency,
80 Swan Way, Rm 200, Oakland, CA 94621
(1) Ms. Vicki Dvorak, Bay Area Air Quality Management Dist.,
939 Ellis Street, San Francisco, CA 94109

BY: _____
William K. Wikander

Subsurface Consultants, Inc.

171 12th Street • Suite 201 • Oakland, California 94607 • Telephone 415-268-0461

Rec'd 7/18/89

July 17, 1989

PRELIMINARY CONTAMINATED SOIL ASSESSMENT
98th AND EDES AVENUES
OAKLAND, CALIFORNIA
SCI 272.011

Prepared for:

Mr. Dan Lau
Public Works Department
City of Oakland
1419 Broadway, Suite 700
Oakland, California 94612

By:

William K. Wikander
Geotechnical Engineer 892 (expires 12/31/92)

REGISTERED PROFESSIONAL ENGINEER
WILLIAM K. WIKANDER
No. GE 000892
GEOTECHNICAL
STATE OF CALIFORNIA

R. William Rudolph
Geotechnical Engineer 741 (expires 12/31/92)

REGISTERED PROFESSIONAL ENGINEER
ROSS WILLIAM RUDOLPH
No. GE 000741
GEOTECHNICAL
STATE OF CALIFORNIA

Subsurface Consultants, Inc.
171 12th Street, Suite 201
Oakland, California 94607
(415) 268-0461

July 17, 1989

I INTRODUCTION

This report presents results of our preliminary soil contamination assessment at 670 98th Avenue in Oakland, California. The site is located at the northeast corner of the intersection of 98th and Edes Avenues, as shown on the Site Sketch, Plate 1.

The City of Oakland is currently widening 98th Avenue. In April 1989, workers encountered contaminated soil while excavating a water line trench at the site. Analytical tests of two soil samples from the trench were reported to have contained up to 350 parts per million (ppm) of total petroleum hydrocarbons (TPH).

The purpose of our services, as outlined in our Work Plan dated May 11, 1989, was to evaluate the soil contamination at the site and provide conclusions and/or recommendations regarding:

1. Soil conditions,
2. The presence of total extractable hydrocarbons (TEH) and total volatile hydrocarbons (TVH) in the samples tested,
3. The significance of contaminant levels with respect to state and local regulatory criteria,
4. The extent of soil contamination, if possible, and
5. The scope of future investigation, if necessary.

II PAST SITE USE

The site was previously occupied by a Union 76 gasoline service station from about 1947 through 1983. The configurations of the two different buildings that previously occupied the site, and the apparent locations of the previous underground storage tanks are shown on the Site Sketch. Prior to 1966, the service station had at least one underground fuel storage tank, probably located near Edes Avenue, in the vicinity of Boring 13. During 1966, the service station building was demolished, and the tank(s) was/were likely closed by removal. Also during 1966, a new service station was constructed, and two 10,000-gallon underground gasoline storage tanks, and one 280-gallon waste oil storage tank were installed at the site. In 1983, this service station was demolished and the underground storage tanks were removed.

III FIELD EXPLORATION

Subsurface conditions were explored by drilling 14 test borings at the locations shown on the Site Sketch. The boring locations were chosen to provide data regarding the lateral extent of significant petroleum hydrocarbon contamination at the site. The borings were drilled using truck-mounted, 8-inch-diameter, hollow-stem auger equipment. The drilling and sampling equipment were steam-cleaned prior to use. The borings were drilled to depths ranging from about 10.5 to 20 feet; all extended below the groundwater, as measured during drilling. Soil cuttings generated during drilling were encapsulated in polyethylene sheets, for later treatment and/or disposal by others. The boreholes were backfilled with neat cement at the completion of drilling.

Our geologist/engineer observed drilling operations and prepared logs of the soils encountered. Undisturbed soil samples were obtained at frequent intervals, ranging from about 2 to 5 feet. The samples were retained in brass liners. Aluminum foil was placed over the liner ends prior to capping, taping and labelling. The samples were refrigerated until delivery to the analytical laboratory. The samples were accompanied by Chain-of-Custody Records, copies of which are attached.

IV ANALYTICAL TESTING

Soil and groundwater analytical testing was performed by NET Pacific, Inc., and Curtis and Tompkins, Ltd., both State of California Department of Health Services (DHS) certified analytical laboratories for the tests performed. The NET Pacific, Inc. laboratory is mobile and allowed the analytical testing to be performed on-site. The previous underground tanks stored gasoline, waste oil and (possibly) diesel fuel. Accordingly, the analytical testing program included:

1. TVH - sample preparation and analysis using EPA methods 5030 (purge and trap) and 8015 (gas chromatograph coupled to a flame-ionization detector),

2. TEH - sample preparation and analysis using EPA methods 3350 (sonication) and 8015 (modified),

3. Benzene, toluene, xylene and ethylbenzene (BTXE)-sample preparation and analysis using EPA methods 5030 and 8020 (gas chromatograph coupled to a photo-ionization detector),

4. Total oil and grease (TOG) - sample preparation and analysis using EPA method 3550 (solvent extraction) and SMWW 503E (gravimetric determination), and

5. Volatile organic compounds (VOC) - sample preparation and analysis using EPA methods 5030 and 8240 (gas chromatograph and mass spectrometer).

The Laboratory Analytical Test Reports are presented in the Appendix. The results are summarized in the following table.

Table 1. ANALYTICAL TEST RESULTS

Location	Total Petroleum Hydrocarbons[1] (ppm)	Benzene (ppm)	Toluene (ppm)	Total Xylenes (ppm)	Ethyl Benzene (ppm)
1 @ 7'[2]	60[3]	ND[4]	ND[4]	ND[4]	ND[4]
1 @ 10'	1,100	8.1	2.6	120	31
1 @ 13.5	ND	0.025	0.015	0.23	0.052
2 @ 5'	280	3.1	17	72	12
2 @ 9'	1,100	16	31	130	39
2 @ 11'	13,000	--[5]	--	--	--
3 @ 4'	20	0.39	0.90	1.7	0.33
3 @ 7'	ND	--	--	--	--
3 @ 10'	260	1.7	6.2	26	3.1
4 @ 3'	14	0.83	1.1	3.6	0.71
4 @ 9'	150	4.7	5.9	4.9	6.8
5 @ 7'	130	4.7	17	58	13
5 @ 10'	930	--	--	--	--
5 @ 12'	2,600	11	32	90	20
6 @ 6'	ND	ND	ND	ND	ND
6 @ 9'	45[6]	1.1	1.2	16	2.2
7 @ 3'	45	3.7	6.0	14	2.6
7 @ 9'	200	5.2	8.3	16	2.9
8 @ 7'	ND	ND	0.018	ND	ND
8 @ 10'	120	15	0.27	--	4.7
9 @ 8'	ND	0.017	ND	ND	ND
9 @ 11'	100	0.50	0.32	7.3	2.4
10 @ 2'	ND	ND	0.048	0.047	0.012
10 @ 8'	ND	ND	0.12	ND	ND
11 @ 3'	16	0.94	1.9	2.5	0.48
11 @ 8'	150	3.3	6.3	15	3.4
12 @ 4'	ND	ND	0.046	ND	ND
12 @ 8'	440[6]	--	--	--	--
12 @ 10'	310	1.5	2.2	13	2.9
13 @ 8'[7]	9,600[8]	23[4]	270[4]	1,000[4]	190[4]
13 @ 11'	25,000	--	--	--	--
13 @ 13'	28	--	--	--	--
14 @ 12.5'	730	--	--	--	--

[1] As TVH, unless noted otherwise
[2] Also analytically tested for VOC, with none detected
[3] As TOG, also analytically tested for TVH & TEH, with none detected
[4] Analytically tested using EPA 8240, all others using EPA 8020 unless noted otherwise
[5] Not tested
[6] Also analytically tested for TEH, w/none detected
[7] Also analytically tested for VOC, w/none detected for all tested for chemicals except benzene, toluene, xylene and ethylbenzene
[8] Also analytically tested for TEH (67 ppm as diesel) and TOG (none detected)

V SITE CONDITIONS

A. Subsurface Conditions

The site is located on a relatively flat alluvial plain that slopes gently downward toward San Francisco Bay. The site elevation is approximately 20 feet (mean sea level datum).

For discussion purposes, we will assume that 98th Avenue runs south-north and that Edes Avenue is south of the site. The relatively level site is bordered by 98th and Edes Avenues to the west and south, and vacant land to the east and north.

Soil is exposed over much of the groundsurface. Sandy backfill is evident where underground tanks and fuel lines previously existed. Clayey native soils are exposed elsewhere at the groundsurface. An underground water line, including at least 2 laterals, and an underground storm drain lateral, have recently been constructed, across the site. A joint trench has been constructed, that terminates at the north and south sides of the site.

B. Soil Conditions

Our interpretation of soil conditions at the site is shown on Plate 11, Cross Sections. These sections are based upon data obtained from the test borings. The site is blanketed with a layer of silty clay and is underlain by clayey sands and gravels. In areas where previous underground tanks and fuel lines were located, the excavations have been backfilled with sand. The surface layer of silty clay extends to depths of about 8 to 13

feet. The clayey sands and gravels beneath the silty clay, extend to the depths drilled. The sand backfill is loose and extends to depths up to about 12 feet. Much of the silty clays and fill possessed petroleum product odors.

Groundwater was encountered at depths ranging from 7 to 11 feet during drilling. These groundwater levels do not reflect stabilized conditions. Recent measurements taken in piezometers that have been installed at another site located at 98th Avenue and Pearmain Street (about 1000 feet north of Edes Avenue) reveal stabilized groundwater levels at depths of about 10 feet, and a groundwater flow direction toward the southwest.

VI CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of our investigation, we conclude that significant concentrations of petroleum hydrocarbons (as gasoline) and BTXE exist in the soil at the test boring locations. In addition, relatively low concentrations of diesel fuel and oil and grease were also detected. The highest concentrations encountered in the soil samples for each contaminant type, and the number of soil samples analyzed for each, are presented in the following table.

Contaminant	Highest Concentration Encountered (ppm)	Number of Samples Tested
TVH	25,000	33
TEH	67	4
TOG	60	2
B	23	26
T	270	26
X	1,000	25
E	190	26

Current San Francisco Bay Regional Water Quality Control Board (RWQCB) guidelines indicate that a soil and groundwater investigation should be conducted where TPH (including TVH, TEH and TOG) concentrations in soil exceed 100 ppm. The purpose of the studies is to assess (1) the vertical and lateral extent of contamination, (2) whether groundwater has been impacted, and (3)

if groundwater in the area has a designated use. Soils with TPH concentrations greater than 1000 ppm are currently considered by the DHS to be hazardous materials, and will generally require remediation.

Based upon our preliminary investigation, we conclude that the highest concentrations of TPH in soil appear to be located in the backfill at the previous gasoline tank locations. Relatively high concentrations of TPH also exist in the soils just above groundwater and down gradient (southwest) from the previous gasoline tank locations. Considering the limited data available, we conclude that soil with TPH concentrations greater than 1000 ppm appears to be limited to areas on-site. Off-site TPH concentrations ranged up to 440 ppm at the test boring locations.

Limited data is available regarding contamination at the former waste oil tank location. However, the analytical test results to date do not suggest significant contamination.

Soil samples taken from just above groundwater and up gradient from the previous gasoline and waste oil tank had TPH concentrations ranging from 100 to 310 ppm. This suggests that an off-site contamination source may also be affecting the site.

We recommend that the most significantly contaminated soil at the site be excavated. We judge that it will be impractical to remove all of the contaminated soil and that an acceptable clean-up level should be determined through negotiation with the Alameda County Health Care Services Agency (ACHCSA) and RWQCB, if necessary. In addition, future excavation of the joint trench

will result in contaminated soil that must be treated, if it is to be used as backfill on-site. **Accordingly, we recommend that the joint trench be excavated as part of the remediation effort.** The excavated soils can be transported directly to a Class 1 disposal facility or an appropriate treatment facility. Alternatively, the soils can be treated on-site, by aeration or biodegradation, to reduce their TPH concentrations. The treated soils can then be reused as backfill on-site, or transported off-site. It is likely that the only off-site facility that would accept the treated soils would be a Class 3 landfill.

Assuming that clean-up levels of 500 ppm, in areas other than the joint trench and 100 ppm in the joint trench are acceptable, Plate 12 shows the approximate areas that would require excavation. The excavations would extend to, or slightly below, groundwater which exists at depths of about 10 feet. The joint trench excavation would extend to a depth of about 6 feet. Accordingly, **we estimate that about 2300 cubic yards of soil will require removal.**

Excavations should start at the previous gasoline and waste oil tank areas and at the joint trench location. Soil samples should be analytically tested on-site in a mobile laboratory during excavation. The test data should be used to define the limits of excavation necessary to satisfy the negotiated clean-up level.

Because the excavations will extend below groundwater, some groundwater will likely accumulate in the excavations. This

water should be removed and properly treated just prior to backfilling.

Excavated soil that contains TPH concentrations less than 100 ppm can typically be reused as backfill. However, this level will require negotiation with the ACHCSA. The predominant soil contaminant at the site is TVH, as gasoline, which can likely be remediated by aeration, in accordance with Bay Area Air Quality Management District (BAAQMD) guidelines, to below the required concentrations. The amount of time required to aerate the soil to proper levels will depend upon weather conditions, the amount of space available, and the soil contaminant concentrations.

Aeration is inappropriate for TEH (diesel) and oil and grease contamination. However, the analytical data suggests that TEH and TOG concentrations are not high enough to require remediation. However, if higher concentrations are encountered during excavation, other means of remediation (biodegradation) and/or off-site disposal of the TEH and TOG contaminated soil may be required.

During excavation, we recommend that three stockpiles of excavated soil be made. The stockpiles would contain (1) soil with TPH concentrations less than 100 ppm (relatively clean soil that overlies the more contaminated materials), (2) soil with TVH concentrations greater than 100 ppm, and (3) soil with TEH and/or TOG concentrations greater than 100 ppm. The contaminated soil stockpiles should be covered with polyethylene sheeting until

treatment or disposal. After the soil is treated, it should be placed in a separate stockpile.

The ACHCSA requires that a Work Plan and Health and Safety Plan be made prior to site remediation activities. These plans are presented in the Appendix. The Work Plan describes the site remediation procedures and contains other information utilized by the ACHCSA.

VII FUTURE SERVICES

SCI should assist in negotiating clean up levels with the regulatory agencies. During remediation, SCI should observe excavation operations, obtain appropriate soil samples, and define the extent of excavation. In addition, SCI should evaluate aeration rates, as required by the BAAQMD, and confirm that the soils have been satisfactorily remediated following aeration. Samples of groundwater accumulating in excavations should be obtained and analyzed, as required by the ACHCSA.

The RWQCB will require that a groundwater monitoring well be installed in the verified, downgradient direction from each contaminant source. In addition, because soil contamination was encountered in the upgradient direction, we recommend that at least one groundwater monitoring well be installed upgradient from the apparent on-site contaminant sources.

Groundwater from the monitoring wells should be analyzed for TVH, TEH, TOG and VOC. If the test results indicate significant groundwater contamination, an investigation may be required to determine the extent and magnitude of contamination, and to develop recommendations for remediation, if necessary. The scope of all remediation future work should be negotiated with the ACHCSA and RWQCB.

List of Attached Plates

Plate 1	Site Sketch
Plates 2 through 9	Logs of Test Borings
Plate 10	Unified Soil Classification System
Plate 11	Cross Sections
Plate 12	Estimated Excavation Areas

Appendix

Chain-of-Custody Records

Laboratory Analytical Test Reports

Work Plan

Guideline Health and Safety Plan

Distribution

3 copies:
Mr. Dan Lau
Public Works Department
City of Oakland
1419 Broadway, Suite 700
Oakland, California 94612

1 copy:
Mr. Philip A. Grubstick
Engineering and Design
City of Oakland
One City Hall Plaza
Oakland, California 94612

1 copy:
Mr. Ariu Levi
Alameda County Health Care Services Agency
80 Swan Way, Room 200
Oakland, California 94621

1 copy:
Ms. Vicki Dvorak
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

WKW:RWR:mbl/clh

TEST BORING

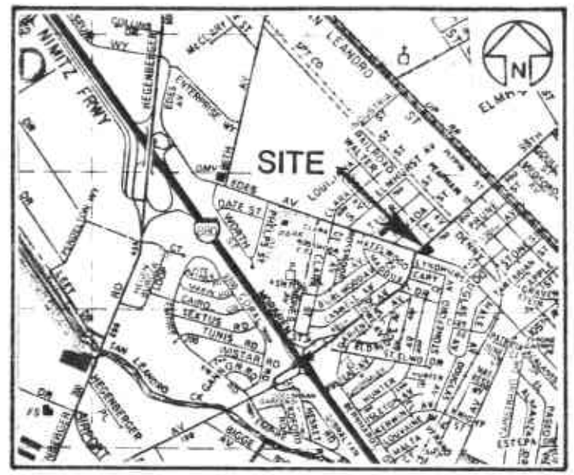
APPROXIMATE PREVIOUS TANK LOCATION BASED UPON TEST PROBES IN FIELD

APPROXIMATE STRUCTURE LOCATION (1959)

APPROXIMATE STRUCTURE LOCATION (1981)

UNDERGROUND STORAGE TANKS, AS SHOWN ON PLANS (1966)

CROSS SECTION, SEE PLATE 11.



VICINITY MAP

98th AVENUE

STORM DRAIN LATERAL

CURB LINE

WATER LINE

FENCE

EDES AVENUE

11 150 at 9'

4 150 at 9'

2 13,000 at 11'

3 260 at 10'

12 448 at 8'

1 730 at 12.5'

6 45 at 9'

14

7 200 at 9'

13 25,000 at 11'

5 2,600 at 10'

8 120 at 10'

10 N.D.

9 100 at 11'

A

B

C

A'

B'

C'

PREVIOUS WASTE OIL TANK LOCATION

N

APPROXIMATE SCALE (feet)

0 30 60

Subsurface Consultants

SITE SKETCH

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/6/89	

PLATE 1

LOG OF TEST BORING 1

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/25/89
ELEVATION --

LABORATORY TESTS

TVH	TEH	TOG	VOC
ND	ND	60	ND

TVH	B	T	X	E
1100	8.1	2.6	120	31

ND	0.025	0.015	0.23	0.052

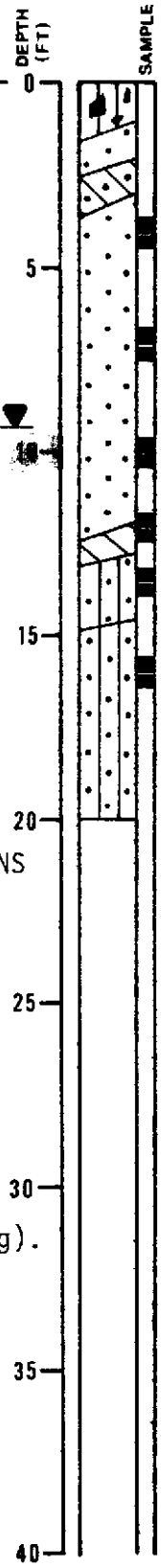
NOTES:

TEH: TOTAL EXTRACTABLE HYDROCARBONS
TOG: TOTAL OIL AND GREASE
VOC: VOLATILE ORGANIC COMPOUNDS
TVH: TOTAL VOLATILE HYDROCARBONS
B: BENZENE
T: TOLUENE
X: TOTAL XYLENES
E: ETHYLBENZENE
ND: NONE DETECTED

See analytical test reports for detection limits. All analytical test results reported in ppm (mg/kg).

SAMPLER TYPE:
CALIFORNIA DRIVE
O.D.: 2.5 inches
I.D.: 2.0 inches

HAMMER WEIGHT: 140 pounds
HAMMER DROP: 30 inches



BLOWS PER FOOT	
7	GRAY-BROWN SANDY GRAVEL (GM) medium dense, moist (fill)
	OLIVE-BROWN SAND (SP) medium dense, moist (fill)
	BROWN AND ORANGE CLAYEY SAND (SC) medium dense, moist (fill)
7	OLIVE-BROWN SAND (SP) medium dense, moist (fill) dark brown below 6 feet
	GROUNDWATER LEVEL DURING DRILLING
7	dark gray below 9½ feet
8	DARK GRAY SILTY CLAY (CL) medium stiff, wet
15	BROWN SILTY SAND (SM) medium dense, wet, with gravel
39	BROWN GRAVELLY SAND (SM) dense, wet, coarse grained
	(5 feet of heave in auger)
	BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/2/89	

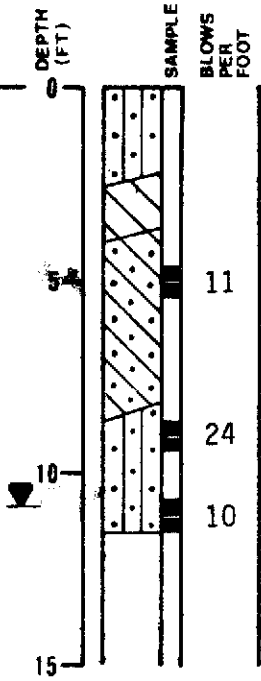
PLATE 2

LOG OF TEST BORING 2

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/25/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
280	3.1	17	72	12
1,100	16	31	130	39
13,000	-	-	-	-



DARK BROWN GRAVELLY SAND (SM)
medium dense, moist (fill)

MOTTLED DARK GRAY AND BLACK SILTY CLAY (CL)
medium stiff, moist (fill)

OLIVE-GREEN CLAYEY SAND (SC)
medium dense, moist, with occasional gravel (fill)

GRAY SILTY SAND (SM)
medium dense, moist

GROUNDWATER LEVEL DURING DRILLING

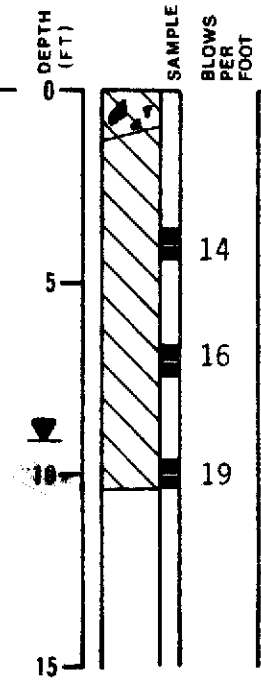
BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

LOG OF TEST BORING 3

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/25/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
20	0.39	0.90	1.7	0.33
ND	-	-	-	-
260	1.7	6.2	26	3.1



BROWN CLAYEY GRAVEL (GC)
medium dense, moist

DARK BROWN SILTY CLAY (CL)
medium stiff, moist
olive-green and gray below 3 feet

GROUNDWATER LEVEL DURING DRILLING

BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/2/89	

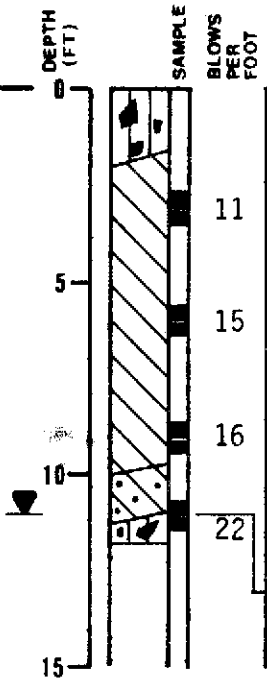
PLATE 3

LOG OF TEST BORING 4

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/25/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
14	0.83	1.1	3.6	0.71
150	4.7	5.9	49	6.8



BROWN SANDY GRAVEL (GM)
medium dense, moist (fill)
DARK BROWN SILTY CLAY (CL)
medium stiff, moist

mottled brown and gray below 6 feet

BROWN CLAYEY SAND (SC)
medium dense, wet
DARK GRAY SANDY GRAVEL (GM)
medium dense, wet
GROUNDWATER LEVEL DURING DRILLING

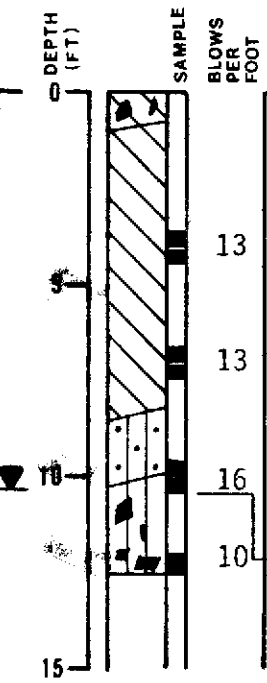
BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

LOG OF TEST BORING 5

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/25/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
130	4.7	17	58	13
930	11	32	90	20
2,600	-	-	-	-



BROWN CLAYEY GRAVEL (GC)
medium dense, moist (fill)
DARK BROWN SILTY CLAY (CL)
medium stiff, moist

brown below 5 feet

OLIVE-GREEN AND BROWN SILTY SAND (SM)
medium dense, moist, with gravel
GRAY SANDY GRAVEL (GM)
medium dense, wet
GROUNDWATER LEVEL DURING DRILLING

BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/2/89	

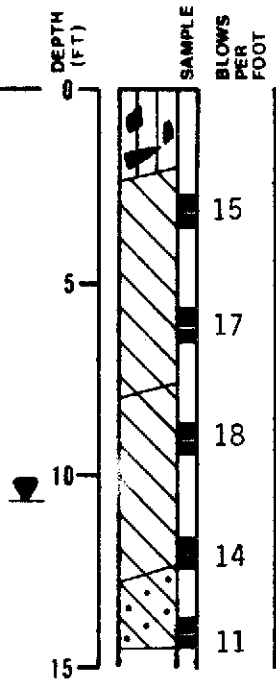
PLATE 4

LOG OF TEST BORING 6

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/25/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
ND	ND	ND	ND	ND
45	1.1	1.2	16	2.2
TOG				
ND				



BROWN SANDY GRAVEL (GM)
medium dense, moist (fill)
DARK BROWN SILTY CLAY (CL)
medium stiff, moist, with gravel

MOTTLED GRAY AND BROWN SILTY CLAY (CL)
medium stiff, moist
GROUNDWATER LEVEL DURING DRILLING

BROWN CLAYEY SAND (SC)
medium dense, moist

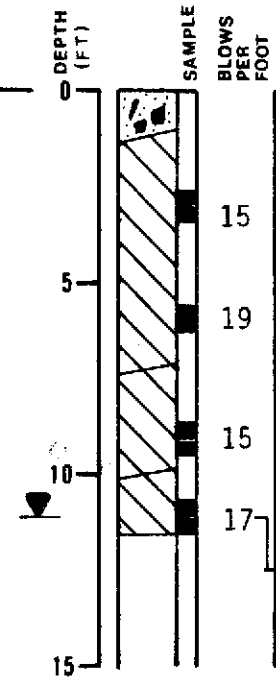
BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

LOG OF TEST BORING 7

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/25/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
45	3.7	6.0	14	2.6
200	5.2	8.3	16	2.9



BROWN SANDY GRAVEL (GP)
medium dense, moist (fill)
DARK BROWN SILTY CLAY (CL)
medium stiff, moist, with gravel

MOTTLED GRAY AND BROWN SILTY CLAY (CL)
medium stiff, moist, with gravel

MOTTLED GRAY AND BROWN SANDY CLAY (CL)
stiff, moist
GROUNDWATER LEVEL DURING DRILLING

BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER 272.011 | DATE 6/2/89 | APPROVED

PLATE 5

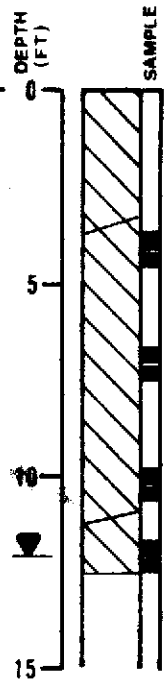
LOG OF TEST BORING 8

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/26/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
ND	ND	0.018	ND	ND
120	1.5	0.27	*	4.7

* not determinable



DARK BROWN SANDY CLAY (CL)
medium stiff, moist, with gravel (fill)

DARK BROWN SILTY CLAY (CL)
medium stiff, moist

mottled gray and brown below 6 feet

GROUNDWATER LEVEL DURING DRILLING

GRAY SANDY CLAY (CL)
stiff, moist

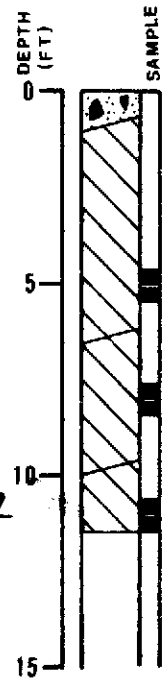
BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

LOG OF TEST BORING 9

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/26/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
ND	0.017	ND	ND	ND
100	0.50	0.32	7.3	2.4



BROWN SANDY GRAVEL (GP)
medium dense, moist (fill)

DARK BROWN SILTY CLAY (CL)
medium stiff, moist, with gravel

BROWN SILTY CLAY (CL)
medium stiff, moist

MOTTLED GRAY AND BROWN SANDY CLAY (CL)
stiff, moist, with gravel

GROUNDWATER LEVEL DURING DRILLING

BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER 272.011 | DATE 6/2/89 | APPROVED

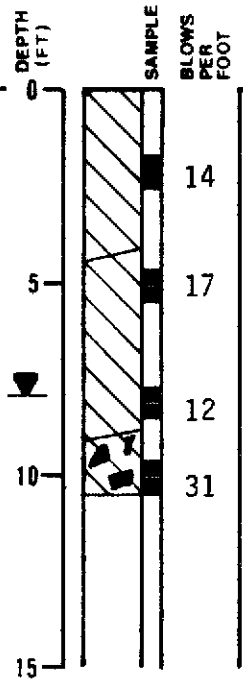
PLATE 6

LOG OF TEST BORING 10

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/26/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
ND	ND	0.048	0.047	0.012
ND	ND	0.12	ND	ND



DARK BROWN SILTY CLAY (CL)
medium stiff, moist

BROWN SANDY CLAY (CL)
medium stiff, moist, fine grained sand

GROUNDWATER LEVEL DURING DRILLING

GRAY CLAYEY GRAVEL (GC)
dense, moist

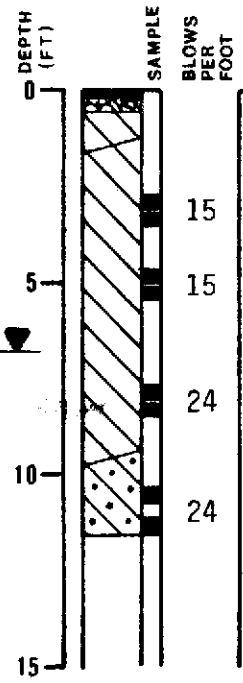
BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

LOG OF TEST BORING 11

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/26/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
16	0.94	1.9	2.5	0.48
150	3.3	6.3	15	3.4



ASPHALTIC CONCRETE - 2" thick
BASEROCK - 4" thick
BROWN SANDY CLAY (CL)
medium stiff, moist, with gravel (fill)
DARK BROWN SILTY CLAY (CL)
medium stiff, moist, with gravel
GROUNDWATER LEVEL DURING DRILLING
mottled gray and brown below 4½ feet

GRAY CLAYEY SAND (SC)
medium dense, moist, with gravel

BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/2/89	

PLATE 7

LOG OF TEST BORING 12

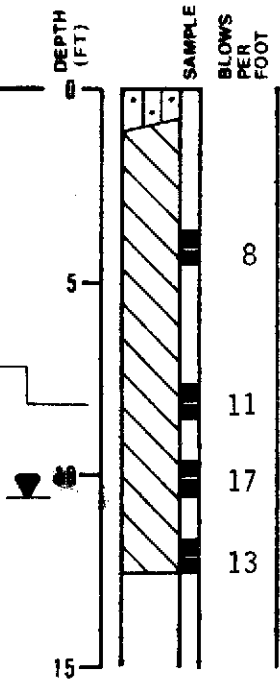
EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/26/89
ELEVATION --

LABORATORY TESTS

TVH	B	T	X	E
ND	ND	0.046	ND	ND

TVH	TEH
ND	ND

TVH	B	T	X	E
310	1.5	2.2	13	2.9



BROWN GRAVELLY SAND (SM)
medium dense, moist (fill)
DARK BROWN SILTY CLAY (CL)
medium stiff, moist, with gravel

mottled brown and gray below 6 feet

GROUNDWATER LEVEL DURING DRILLING

BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

LOG OF TEST BORING 13

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/26/89
ELEVATION --

LABORATORY TESTS

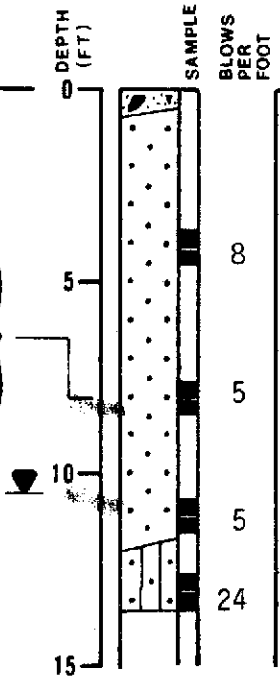
TEH	TOG	VOC
67	ND	ND*

TVH	B	T	X	E
9,600	23	270	1,000	190

TVH
25,000

TVH
28

* other than BTXE



BROWN SANDY GRAVEL (GP)
medium dense, moist
GRAY SAND (SP)
medium dense, moist (fill)

dark gray below 6 feet

GROUNDWATER LEVEL DURING DRILLING

GRAY GRAVELLY SAND (SM)
medium dense, wet

BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

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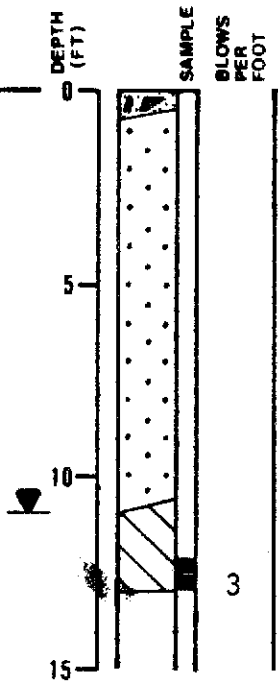
98th and EDES - OAKLAND, CA

JOB NUMBER 272.011 | DATE 5/26/89 | APPROVED

PLATE 8

LOG OF TEST BORING 14

EQUIPMENT 8" Hollow Stem Auger
DATE DRILLED 5/26/89
ELEVATION --



LABORATORY TESTS	
	BROWN SANDY GRAVEL (GP) medium dense, moist (fill)
	GRAY-BROWN SAND (SP) medium dense, moist (fill)
TVH 730	GROUNDWATER LEVEL DURING DRILLING GRAY SANDY CLAY (CL) soft, wet
	BOREHOLE BACKFILLED WITH CEMENT/BENTONITE GROUT

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/2/89	

PLATE 9

GENERAL SOIL CATEGORIES			SYMBOLS	TYPICAL SOIL TYPES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	**GRAVEL** More than half coarse fraction is larger than No. 4 sieve	Clean Gravel with little or no fines	GW	Well Graded Gravel, Gravel-Sand Mixtures
			GP	Poorly Graded Gravel, Gravel-Sand Mixtures
		Gravel with more than 12% fines	GM	Silty Gravel, Poorly Graded Gravel-Sand-Silt Mixtures
			GC	Clayey Gravel, Poorly Graded Gravel-Sand-Clay Mixtures
	SAND More than half coarse fraction is smaller than No. 4 sieve size	Clean sand with little or no fines	SW	Well Graded Sand, Gravelly Sand
			SP	Poorly Graded Sand, Gravelly Sand
		Sand with more than 12% fines	SM	Silty Sand, Poorly Graded Sand-Silt Mixtures
			SC	Clayey Sand, Poorly Graded Sand-Clay Mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	**SILT AND CLAY** Liquid Limit Less than 50%		ML	Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand, or Clayey Silt with Slight Plasticity
			CL	Inorganic Clay of Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay
			OL	Organic Clay and Organic Silty Clay of Low Plasticity
	SILT AND CLAY Liquid Limit Greater than 50%		MH	Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt
			CH	Inorganic Clay of High Plasticity, Fat Clay
			OH	Organic Clay of Medium to High Plasticity, Organic Silt
HIGHLY ORGANIC SOILS			PT	Peat and Other Highly Organic Soils

UNIFIED SOIL CLASSIFICATION SYSTEM

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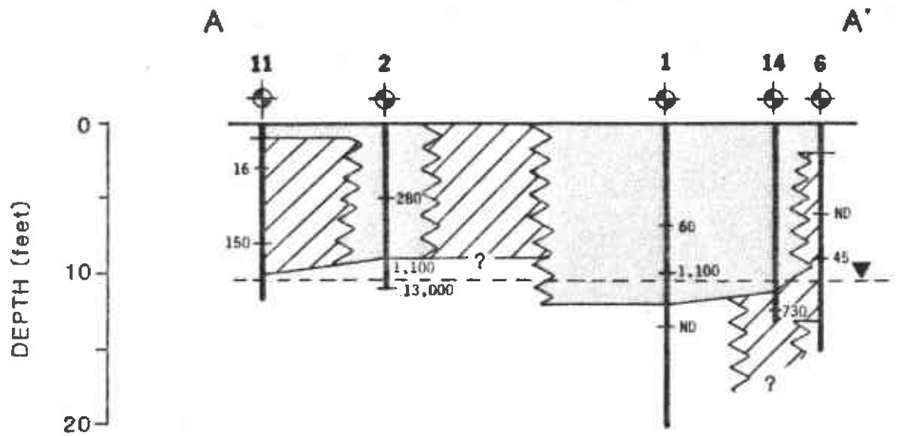
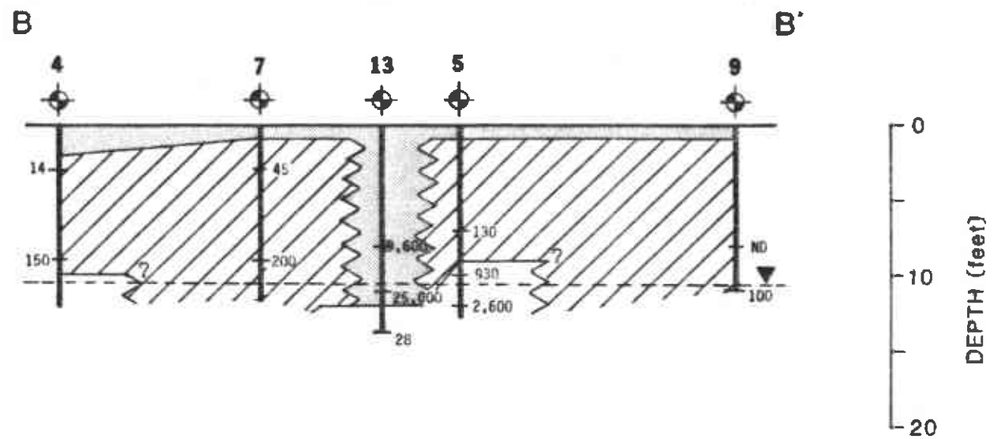
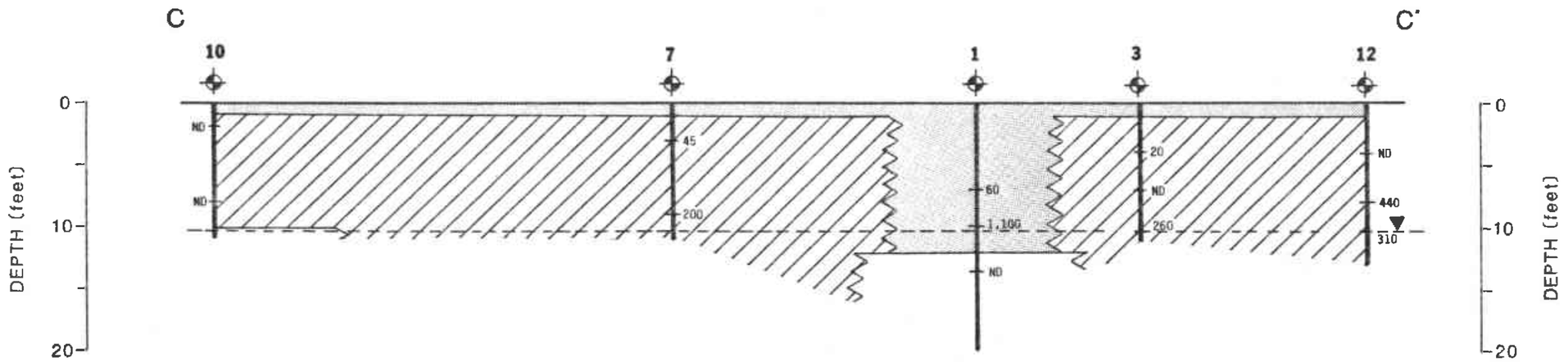
98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/2/89	

PLATE **10**







NOTES

1) The soil layer boundaries shown are based upon linear interpolations between borings; the actual boundaries could vary from those shown.

2) TPH concentrations (in ppm) are shown at the sampled depths.

3) The groundwater levels shown are based upon measurements during drilling. Stabilized levels could vary from those shown.

FILL
SILTY CLAY
SILTY AND CLAYEY SAND AND GRAVEL

APPROXIMATE SCALE (feet)

Horizontal	0	30	60
Vertical	0	10	20

CROSS SECTIONS

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98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	7/11/89	

PLATE 11

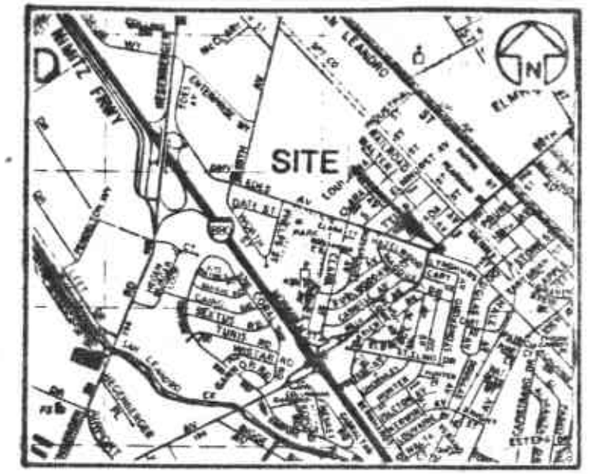
150 ppm TEST BORING (showing highest TVH concentration)
ND = none detected

TEST PROBE IN FILL

TEST PROBE IN NATIVE SOIL

APPROXIMATE PREVIOUS TANK LOCATION

PROPOSED APPROXIMATE LIMITS OF EXCAVATION



VICINITY MAP

98th AVENUE

STORM DRAIN LATERAL

CURB LINE

WATER LINE

APPROXIMATE JOINT TRENCH LOCATION

FENCE

EDES AVENUE

11 150 ppm
4 150 ppm
2 13,000 ppm
3 260 ppm
12 440 ppm
10 ND
7 200 ppm
25,000 ppm
13
1 11,000 ppm
6 45 ppm
14 730 ppm
5 2,600 ppm
120 ppm 8
9 100 ppm

APPROXIMATE SCALE (feet)
0 30 60

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ESTIMATED EXCAVATION AREAS

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/6/89	

PLATE 12

Subsurface Consultants

CHAIN OF CUSTODY RECORD & ANALYTICAL TEST REQUEST

Project Name: 98TH AND EDES

SCI Job Number: 277.011

Project Contact at SCI: BILL WIKANDER

Sampled By: TOM TEBB

Analytical Laboratory: NET PACIFIC

Analytical Turnaround: NORMAL

Sample ID	Sample Type[1]	Container Type[2]	Sampling Date	Hold	Analysis	Analytical Method
1@10'	SOIL	BRASS TUBE	5/25/89		TVH/BTXE	8015/8020
1@13.5'						
2@5'						
2@9'						
3@4'						
3@10'						
4@3'						
4@9'						
5@7'						
5@10'						

* * * * * *

Released by: [signature] Date: 5/25/89

Released by Courier: _____ Date: _____

Received by Laboratory: K Temple Date: 5/30/89

Relinquished by Laboratory: _____ Date: _____

Received by: _____ Date: _____

[1] Sample Type: W = water, S = soil, O = other (specify)
[2] Container Type: V = VOA, P = plastic, G = glass, T = brass tube, O = other (specify)

Notes to Laboratory:
-Notify SCI if there are any anomalous peaks on GC or other scans
-Questions/clarifications...contact SCI at (415) 268-0461

Subsurface Consultants

CHAIN OF CUSTODY RECORD & ANALYTICAL TEST REQUEST

Project Name: 98TH AND EDES

SCI Job Number: 277.011

Project Contact at SCI: BILL WIKANDER

Sampled By: TOM TEBBS & JOHN WOLFE

Analytical Laboratory: NET PACIFIC

Analytical Turnaround: NORMAL

Sample ID	Sample Type[1]	Container Type[2]	Sampling Date	Hold	Analysis	Analytical Method
6@6'	SOIL	BRASS TUBE	5/25/09		TVH/BTXE	8015/8020
6@9'						
7@3'			5/26/09			
7@9'						
8@7'						
8@10'						
9@8'						
9@11'						
10@2'						
10@8'						

Released by: [signature] Date: 5/26/09

Released by Courier: _____ Date: _____

Received by Laboratory: K Temple Date: 5/30/09

Relinquished by Laboratory: _____ Date: _____

Received by: _____ Date: _____

[1] Sample Type: W = water, S = soil, O = other (specify)

[2] Container Type: V = VOA, P = plastic, G = glass, T = brass tube, O = other (specify)

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Subsurface Consultants

CHAIN OF CUSTODY RECORD & ANALYTICAL TEST REQUEST

Project Name: 98TH AND EDES

SCI Job Number: 277.011

Project Contact at SCI: BILL WIKANDER

Sampled By: JOHN WOLFE

Analytical Laboratory: NET PACIFIC

Analytical Turnaround: NORMAL

Sample ID	Sample Type[1]	Container Type[2]	Sampling Date	Hold	Analysis	Analytical Method
11@3'	SOIL	BRASS TUBE	5/26/09		TVH/BTXE	8015/8020
11@8'	↓	↓	↓		↓	↓
12@4'	↓	↓	↓		↓	↓
12@10'	↓	↓	↓		↓	↓

* * * * * *

Released by: [signature] Date: 5/26/09

Released by Courier: _____ Date: _____

Received by Laboratory: [signature] Date: 5/30/09

Relinquished by Laboratory: _____ Date: _____

Received by: _____ Date: _____

[1] Sample Type: W = water, S = soil, O = other (specify)

[2] Container Type: V = VOA, P = plastic, G = glass, T = brass tube, O = other (specify)

Notes to Laboratory:

-Notify SCI if there are any anomalous peaks on GC or other scans

-Questions/clarifications...contact SCI at (415) 268-0461

Subsurface Consultants

CHAIN OF CUSTODY RECORD & ANALYTICAL TEST REQUEST

Project Name: 98TH AND EDES

SCI Job Number: 272.011

Project Contact at SCI: BILL WIKANDER

Sampled By: TOM TEBBS AND JOHN WOLFE

Analytical Laboratory: CURTIS AND TOMPKINS

Analytical Turnaround: NORMAL

Sample ID	Sample Type[1]	Container Type[2]	Sampling Date	Hold	Analysis	Analytical Method
1@7'	SOIL	BRASS TUBE	5/25/09		TVH	8015
					TEH	8015 MOD
					TOG	503E
					VOC	824
2@11'	SOIL	BRASS TUBE	5/25/09		TVH	8015
3@7'	SOIL	BRASS TUBE	5/25/09		TVH	8015
5@12'	SOIL	BRASS TUBE	5/25/09		TVH	8015
12@6'	SOIL	BRASS TUBE	5/26/09		TVH	8015
					TEH	8015 MOD

* * * * * *

Released by: Jeri Alexander Date: 6/7/09

Released by Courier: _____ Date: _____

Received by Laboratory: Karen Letter Date: 6/7

Relinquished by Laboratory: _____ Date: _____

Received by: _____ Date: _____

[1] Sample Type: W = water, S = soil, O = other (specify)

[2] Container Type: V = VOA, P = plastic, G = glass, T = brass tube, O = other (specify)

Notes to Laboratory:

-Notify SCI if there are any anomalous peaks on GC or other scans

-Questions/clarifications...contact SCI at (415) 268-0461

Subsurface Consultants

CHAIN OF CUSTODY RECORD & ANALYTICAL TEST REQUEST

Project Name: 98TH AND EDES

SCI Job Number: 272.011

Project Contact at SCI: BILL WIKANDER

Sampled By: JOHN WOLFE

Analytical Laboratory: CURTIS AND TOMPKINS

Analytical Turnaround: NORMAL

Sample ID	Sample Type[1]	Container Type[2]	Sampling Date	Hold	Analysis	Analytical Method
B3@8'	SOIL	BRASS TUBE	5/26/09		TVH	8015
					TEH	8015MOD.
					TOG	5030
					VOC	8021
B3@11'	SOIL	BRASS TUBE	5/26/09		TVH	8015
B3@13'	SOIL	BRASS TUBE	5/26/09		TVH	8015
B4@12½'	SOIL	BRASS TUBE	5/26/09		TVH	8015
FS 1	SOIL	BRASS TUBE	5/26/09		TEH	8015MOD.
					TOG	5030

* * * * * *

Released by: Jeri Alexander Date: 6/7/09

Released by Courier: _____ Date: _____

Received by Laboratory: Maria Platten Date: 6/7

Relinquished by Laboratory: _____ Date: _____

Received by: _____ Date: _____

[1] Sample Type: W = water, S = soil, O = other (specify)

[2] Container Type: V = VOA, P = plastic, G = glass, T = brass tube, O = other (specify)

Notes to Laboratory:

-Notify SCI if there are any anomalous peaks on GC or other scans

-Questions/clarifications...contact SCI at (415) 268-0461

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

Formerly: ANATEC Labs, Inc.

Jeri Alexander
Sub Surface Cons. Inc.
171 12th St Ste 201
Oakland, Ca 94607

05-31-89
NET Pacific Log No: 6623
Series No: 474
Client Ref: Alexander

Subject: Analytical Results for samples obtained at "Edes & 98th, Oakland"
Received 05-25-89 and 5-26-89.

Dear Ms. Alexander:

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Submitted by:

Judy Ridley for
Susan J. Griffin
Group Leader
Gas Chromatography

Approved by:

William G. Rotz
Group Leader
Mobile Laboratory

/ml

KEY TO ABBREVIATIONS

mean	:	Average; the sum of the measurements divided by the total number of measurments.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample, unless noted otherwise.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
ND	:	Not detected; the analyte concentration is less than the listed reporting limit.
NR	:	Not requested.
NTU	:	Nephelometric turbidity units.
RL	:	Reporting limit.
RPD	:	Relative percent difference, $[V^1-V^2/V$ mean$]x100$.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
ug/filter	:	Concentration in units of micrograms of analyte per filter.
umhos/cm	:	Micromhos per centimeter.
*	:	See cover letter for details.

THE COVER LETTER AND KEY TO ABBREVIATIONS ARE AN INTEGRAL PART OF THIS REPORT

Parameter	Reporting Limit (mg/Kg)	Descriptor, Lab No. and Results (mg/Kg) #1 @ 10' (-28352)5/25	#1 @ 13.5' (-28353)5/25	#2 @ 5' (-28354)5/25
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	1100	ND	280
Benzene	0.005	8.1	0.025	3.1
Ethyl benzene	0.005	31	0.052	12
Toluene	0.005	2.6	0.015	17
Xylenes, total	0.015	120	0.23	72

Parameter	Reporting Limit (mg/Kg)	Descriptor, Lab No. and Results (mg/Kg) #2 @ 9' (-28355)5/25	#3 @ 10' (-28356)5/25	#3 @ 4' (-28357)5/25
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	1100	260	20
Benzene	0.005	16	1.7	0.39
Ethyl benzene	0.005	39	3.1	0.33
Toluene	0.005	31	6.2	0.90
Xylenes, total	0.015	130	26	1.7

Parameter	Reporting Limit (mg/Kg)5/25	Descriptor, Lab No. and Results (mg/Kg) #4 @ 9' (-28358)5/25	#4 @ 3' (-28359)5/25	#5 @ 7' (-28360)5/25
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	150	14	130
Benzene	0.005	4.7	0.83	4.7
Ethyl benzene	0.005	6.8	0.71	13
Toluene	0.005	5.9	1.1	17
Xylenes, total	0.015	49	3.6	58

Parameter	Reporting Limit (mg/Kg)	Descriptor, Lab No. and Results (mg/Kg) #5 @ 10' (-28361)	#6 @ 6' (-28362)	#6 @ 9' (-28363)
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	930	ND	45
Benzene	0.005	11	ND	1.1
Ethyl benzene	0.005	20	ND	2.2
Toluene	0.005	32	ND	1.2
Xylenes, total	0.015	90	ND	16

Parameter	Reporting Limit (mg/Kg)	Descriptor, Lab No. and Results (mg/Kg) #7 @ 3' (-28364)	#7 @ 9' (-28365)	#8 @ 7' (-28366)
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	45	200	ND
Benzene	0.010	3.7	5.2	ND
Ethyl benzene	0.010	2.6	2.9	ND
Toluene	0.010	6.0	8.3	0.018
Xylenes, total	0.020	14	16	ND

Parameter	Reporting Limit (mg/Kg)	Descriptor, Lab No. and Results (mg/Kg) #9 @ 8' (-28367)	#8 @ 9' (-28368)	#9 @ 11' (-28369)
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	ND	120	100
Benzene	0.010	0.017	1.5	0.50
Ethyl benzene	0.010	ND	4.7	2.4
Toluene	0.010	ND	0.27	0.32
Xylenes, total	0.020	ND	NDET*	7.3

* NDET-- Not-determinable due to matrix interference

Parameter	Reporting Limit (mg/Kg)	Descriptor, Lab No. and Results (mg/Kg) #10 @ 2' (-28370)	#10 @ 8' (-28371)	#11 @ 3' (-28372)
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	ND	ND	16
Benzene	0.010	ND	ND	0.94
Ethyl benzene	0.010	0.012	ND	0.48
Toluene	0.010	0.048	0.12	1.9
Xylenes, total	0.020	0.047	ND	2.5

Parameter	Reporting Limit (mg/Kg)	Descriptor, Lab No. and Results (mg/Kg) #11 @ 8' (-28373)	#12 @ 4' (-28374)	#12 @ 10' (-28375)
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	10	150	ND	310
Benzene	0.010	3.3	ND	1.5
Ethyl benzene	0.010	3.4	ND	2.9
Toluene	0.010	6.3	0.046	2.2
Xylenes, total	0.020	15	ND	13

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

Formerly: ANATEC Labs, Inc.

Jeri Alexander
Sub Surface Cons. Inc.
171 12th St Ste 201
Oakland, CA 94607

06-27-89
NET Pacific Log No: 6694
Series No: 474
Client Ref: Alexander

Subject: Analytical Results for "Ades & 98th Oakland" Received 06-07-89

Dear Ms. Alexander:

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Submitted by:

Brian Fies
Group Leader
Atomic Spectroscopy

Approved by:

Sue J. Long
Group Leader
Classical Chemistry

/ml

KEY TO ABBREVIATIONS

mean	:	Average; the sum of the measurements divided by the total number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample, unless noted otherwise.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
ND	:	Not detected; the analyte concentration is less than the listed reporting limit.
NR	:	Not requested.
NTU	:	Nephelometric turbidity units.
RL	:	Reporting limit.
RPD	:	Relative percent difference, $[V^1-V^2/V \text{ mean}]x100$.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
ug/filter	:	Concentration in units of micrograms of analyte per filter.
umhos/cm	:	Micromhos per centimeter.
*	:	See cover letter for details.

THE COVER LETTER AND KEY TO ABBREVIATIONS ARE AN INTEGRAL PART OF THIS REPORT

SAMPLE DESCRIPTION: #6 @ 9'
LAB NO.: (-28732)

Parameter	Reporting Limit	Results	Units
Oil & grease (total)	50	ND	mg/Kg
Oil & grease (non-polar)	100	ND	mg/Kg

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

DATE RECEIVED: 06/07/89
DATE REPORTED: 06/20/89

LAB NUMBER: 17534

CLIENT: SUBSURFACE CONSULTANTS

REPORT ON: 10 SOIL SAMPLES

JOB #: 272.011
LOCATION: 98TH & EDES

RESULTS: SEE ATTACHED

Laboratory Director

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17534
CLIENT: SUBSURFACE CONSULTANTS
JOB #: 272.011
LOCATION: 98TH & EDES

DATE RECEIVED: 06/07/89
DATE ANALYZED: 06/16/89
DATE REPORTED: 06/20/89

Extractable Petroleum Hydrocarbons in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 3550

LAB ID	CLIENT ID	KEROSINE (mg/Kg)	DIESEL (mg/Kg)	OTHER (mg/Kg)
17534-1	1 @ 7'	ND(10)	ND(10)	ND(10)
17534-5	12 @ 8'	ND(10)	ND(10)	ND(10)
17534-6	13 @ 8'	ND(10)	67	ND(10)
17534-10	PS 1	ND(10)	ND(10)	ND(10)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	<1
Spike: % Recovery	87

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17534
CLIENT: SUBSURFACE CONSULTANTS
JOB #: 272.011
LOCATION: 98TH & EDES

DATE RECEIVED: 06/07/89
DATE ANALYZED: 06/18/89
DATE REPORTED: 06/20/89

Total Volatile Hydrocarbons as Gasoline in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 5030 (Purge & Trap)

LAB ID	CLIENT ID	TVH AS GASOLINE (mg/Kg)
17534-1	1 @ 7'	ND(10)
17534-2	2 @ 11'	13,000
17534-3	3 @ 7'	ND(10)
17534-4	5 @ 12'	2,600
17534-5	12 @ 8'	440
17534-6	13 @ 8'	9,600
17534-7	13 @ 11'	25,000
17534-8	13 @ 13'	28
17534-9	14 @ 12.5'	730

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

%RPD	4
Spike, % Recovery	101

Curtis & Tompkins, Ltd.

LAB NUMBER: 17534
CLIENT: SUBSURFACE CONSULTANTS
PROJECT # : 272.011

DATE RECEIVED: 06/07/89
DATE ANALYZED: 06/13/89
DATE REPORTED: 06/20/89

ANALYSIS: OIL AND GREASE
METHOD: SMWW 503E

LAB ID	SAMPLE ID	RESULT	UNITS	DETECTION LIMIT
17534-1	1 @ 7'	60	mg/Kg	50
17534-6	13 @ 8'	ND	mg/Kg	50
17534-10	PS 1	60	mg/Kg	50

ND = NONE DETECTED.

QA/QC SUMMARY

RPD, %	2
RECOVERY, %	94

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17534-1
CLIENT: SUBSURFACE CONSULTANTS
JOB #: 272.011
SAMPLE ID: 1 @ 7'

DATE RECEIVED: 06/07/89
DATE ANALYZED: 06/09/89
DATE REPORTED: 06/20/89

EPA METHOD 8240: VOLATILE ORGANICS IN SOILS & WASTES

COMPOUND	Result ug/kg	Detection Limit ug/kg
chloromethane	ND	50
bromomethane	ND	50
vinyl chloride	ND	50
chloroethane	ND	50
methylene chloride	ND	25
trichlorofluoromethane	ND	25
1,1-dichloroethene	ND	25
1,1-dichloroethane	ND	25
trans-1,2-dichloroethene	ND	25
chloroform	ND	25
1,2-dichloroethane	ND	25
1,1,1-trichloroethane	ND	25
carbon tetrachloride	ND	25
bromodichloromethane	ND	25
1,2-dichloropropane	ND	25
cis-1,3-dichloropropene	ND	25
trichloroethylene	ND	25
dibromochloromethane	ND	25
1,1,2-trichloroethane	ND	25
benzene	ND	25
trans-1,3-dichloropropene	ND	25
2-chloroethylvinyl ether	ND	50
bromoform	ND	25
1,1,2,2-tetrachloroethane	ND	25
tetrachloroethene	ND	25
toluene	ND	25
chlorobenzene	ND	25
ethyl benzene	ND	25

Non-Priority Hazardous Pollutant Substances List Compounds

acetone	ND	50
carbon disulfide	ND	25
2-butanone	ND	50
vinyl acetate	ND	50
2-hexanone	ND	50
4-methyl-2-pentanone	ND	50
styrene	ND	25
total xylenes	ND	25

QA/QC SUMMARY: SURROGATE RECOVERIES

1,2-Dichloroethane-d4	95%
Toluene-d8	102%
Bromofluorobenzene	97%

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17534-6
CLIENT: SUBSURFACE CONSULTANTS
JOB #: 272.011
SAMPLE ID: 13 @ 8'

DATE RECEIVED: 06/07/89
DATE ANALYZED: 06/10/89
DATE REPORTED: 06/20/89

EPA METHOD 8240: VOLATILE ORGANICS IN SOILS & WASTES

COMPOUND	Result ug/kg	Detection Limit ug/kg
chloromethane	ND	1000
bromomethane	ND	1000
vinyl chloride	ND	1000
chloroethane	ND	1000
methylene chloride	ND	500
trichlorofluoromethane	ND	500
1,1-dichloroethene	ND	500
1,1-dichloroethane	ND	500
trans-1,2-dichloroethene	ND	500
chloroform	ND	500
1,2-dichloroethane	ND	500
1,1,1-trichloroethane	ND	500
carbon tetrachloride	ND	500
bromodichloromethane	ND	500
1,2-dichloropropane	ND	500
cis-1,3-dichloropropene	ND	500
trichloroethylene	ND	500
dibromochloromethane	ND	500
1,1,2-trichloroethane	ND	500
benzene	23,000	500
trans-1,3-dichloropropene	ND	500
2-chloroethylvinyl ether	ND	1000
bromoform	ND	500
1,1,2,2-tetrachloroethane	ND	500
tetrachloroethene	ND	500
toluene	270,000	500
chlorobenzene	ND	500
ethyl benzene	190,000	500

Non-Priority Hazardous Pollutant Substances List Compounds

acetone	ND	1000
carbon disulfide	ND	500
2-butanone	ND	1000
vinyl acetate	ND	1000
2-hexanone	ND	1000
4-methyl-2-pentanone	ND	1000
styrene	ND	500
total xylenes	1,000,000	500

QA/QC SUMMARY: SURROGATE RECOVERIES

1,2-Dichloroethane-d4	89%
Toluene-d8	82%
Bromofluorobenzene	103%

WORK PLAN
CONTAMINATED SOIL REMEDIATION
98TH AND EDES AVENUES
OAKLAND, CALIFORNIA
SCI 272.011

Prepared for:

Mr. Dan Lau
Public Works Department
City of Oakland
1419 Broadway, Suite 700
Oakland, California 94612

Subsurface Consultants, Inc.
171 12th Street, Suite 201
Oakland, California 94607
(415) 268-0461

July 17, 1989

A. General

The City of Oakland is planning to remediate contaminated soil from a former gasoline station site located at 670 98th Avenue in Oakland, California. The site is located at the northeast corner of the intersection of 98th and Edes Avenues, as shown on Plate 1. A summary of past site use, and the results of field exploration and analytical testing are presented in the Preliminary Contaminated Soil Assessment Report dated July 14, 1989, to which this Work Plan is appended.

The City of Oakland proposes to remove contaminated soil with total petroleum hydrocarbon (TPH) concentrations greater than about 500 ppm at the site. However, this level could be revised, based upon negotiations with the Alameda County Health Care Services Agency (ACHCSA), and conditions encountered during excavation. In addition, contaminated soil from the joint trench location will be excavated. The excavated soils will either be transported directly to a Class 1 disposal facility, or treated on-site to reduce their TPH concentrations. The treatment method will be either aeration or biodegradation, depending upon the type of contaminant present. The treated soils will either be reused as backfill on-site, or transported off-site to a Class 3 disposal facility.

A Guideline Health and Safety Plan and the completed Underground Tank Closure/Modification Plan, as required by the ACHCSA, accompanies this report. Supplemental information

regarding the contaminated soil removal activities (including some duplicate information added for completeness) follows.

B. **Property Owner**

City of Oakland
One City Hall Plaza
Oakland, California 94612

Contact: Mr. James Abron
Phone: (415) 273-3051

C. **Company Overseeing Closure (Consultant)**

Subsurface Consultants, Inc.
171 12th Street, Suite 201
Oakland, California 94607

Contact: Mr. William K. Wikander
Phone: (415) 268-0461

D. **Company Performing the Work (Contractor)**

Not yet determined

E. **Site Location**

670 98th Avenue
(Northeast corner of the
intersection of 98th and Edes Avenues)
Oakland, California 94603

F. **Tank Information**

Three underground storage tanks existed at the site until their removal in 1983. Some fiberglass fuel lines still remain. The only information currently known about the tanks is that they stored gasoline in two 10,000 gallon tanks and waste oil in one 280 gallon tank. In addition, at least one underground fuel tank

existed at the site until it was removed in 1966. The size and type of fuel stored in the tank(s) is unknown.

G. Excavation and Stockpiling

The approximate areas to be excavated are shown on Plate 1. The excavations will extend to or slightly below groundwater. Accordingly, about 2300 cubic yards (cy) of soil will be excavated. The actual areas and volume to be excavated will depend upon conditions encountered during the work and the clean-up level used.

During excavation, soil samples will be obtained and analytically tested on-site, using a portable analytical laboratory. Soil will be stockpiled in accordance with the amount and type of contaminants they contain. Accordingly, we anticipate that two, and possibly three, stockpiles will exist. They will contain soil with TPH concentrations less than 100 ppm, soil with total volatile hydrocarbon (TVH) concentrations greater than 100 ppm and, if encountered, soil with total extractable hydrocarbon (TEH) and/or total oil and grease (TOG) concentrations greater than 100 ppm. The stockpile(s) containing TPH concentrations greater than 100 ppm will be kept covered with polyethylene sheeting until aeration, biodegradation and/or proper disposal is performed.

H. Soil Aeration

If time and space considerations permit, soil containing TVH concentrations greater than 100 ppm will be aerated on-site in accordance with the attached requirements of the Bay Area Quality

Management District (BAAQMD). The amount of soil that is allowed to aerate each day will depend upon the concentrations of TVH encountered. During aeration, the TVH contaminated soil will be placed in an about 6-inch-thick layer, and turned daily, until analytical tests of the aerated soil measure TVH concentrations of less than 100 ppm. The aerated soil will be either reused as excavation backfill on-site or transported to a Class 3 disposal facility.

TEH and/or TOG concentrations will not reduce significantly due to aeration; however, micro-organisms in the soil will biodegrade these chemicals with time. If soil with TEH and/or TOG concentrations greater than 100 ppm are encountered at the site, the contaminant concentrations will either be reduced by biodegradation, or the soil will be transported off-site to a Class 1 disposal facility. Biodegradation will be performed by providing the optimum conditions, including nutrients and moisture, to allow micro-organisms to biodegrade the contaminants to concentrations of less than 100 ppm. The resulting soils will be either reused on-site as backfill or transported to a Class 3 disposal facility.

After aeration (and biodegradation, if performed) and before reuse as backfill or transported to a Class 3 disposal facility, at least one soil sample per 100 cy of soil will be analytically tested for TPH. The aeration/biodegradation will continue until all TPH concentrations are measured to be less than 100 ppm.

I. Sampling and Analyses

1. Sampling

During excavation, at least one soil sample will be taken for every 75 cy of soil removed. After excavation, soil samples will be taken of the material to be left in-place. At least one soil sample will be taken from the excavation bottom for each 500 square feet (in plan) and at least one soil sample will be taken from the excavation side walls for each 25 linear feet.

Soil sampling will occur during backhoe excavation. For each sample, a backhoe bucket of soil will be brought to the surface. The engineer/geologist will scrape loose soil away, and a clean brass tube (4 to 6 inches long) will be driven into the soil. The ends of the filled tube will be covered with Teflon or foil sheets before capping, sealing with plastic tape and labeling. Each sample will be immediately refrigerated and then transported to the analytical testing laboratory. Chain-of-Custody records will be maintained.

The excavation will extend to (or slightly below) the groundwater surface. Accordingly, some groundwater is anticipated to be encountered. At least one groundwater sample will be obtained during the work. The water sample will be taken with a steam-cleaned sampling device, placed onto the appropriate clean vial, refrigerated and transported to the analytical testing laboratory. Chain-of-Custody records will be maintained.

2. **Analytical Testing**

Analytical testing will be performed by a California Department of Health Services (DHS) certified laboratory for the tests performed. The previous use of the tanks were to store motor fuel. Accordingly, the analytical tests will be directed toward the constituents of gasoline, diesel fuel, and oil and grease, as follows:

a) TVH, sample preparation and analysis using EPA methods 5030 (purge and trap) and 8015 (modified, gas chromatograph coupled to a flame ionization detector),

b) TEH, sample preparation and analysis using EPA methods 3550 (sonification) and 8015 (modified),

c) TOG, sample preparation and analysis using EPA methods 3550 (solvent extraction) and SMWW 503E (gravimetric determination), and

d) BTXE, sample preparation and analysis using EPA methods 5030 and 8020 (gas chromatograph coupled to a photo-ionization detector).

J. **Backfilling**

Free water at the bottom of the excavation will be pumped out by vacuum truck to the lowest possible level. The removed water will be transported under manifest to a recycling facility. Disturbed, loose soil will be removed from the excavation bottom. A 1.5-foot-thick layer of granular soil will be placed in one lift at the bottom of the excavation to "bridge" the wet soil beneath and provide a firm base over which to compact backfill. The excavation will then be backfilled with compacted soil. The method and amount of compaction will be in accordance with the specifications for the current 98th Avenue widening project.

City of Oakland Personnel will observe the excavation backfill operations and perform field density tests of check the amount of compaction achieved.

K. **Subcontractors**

1. **Analytical Laboratories**

a) Portable Laboratory

National Environmental Testing, Inc.
435 Tesconi Circle
Santa Rosa, California 95401

Contact: Mr. William G. Rotz
Phone: (707) 526-7200

Hazardous Waste Testing Laboratory Certificate No: 178

b) Other Analytical Testing

Curtis & Tompkins, Ltd.
2323 Fifth Street
Berkeley, California 94710

Contact: Mr. Stephen L. Jensen
Phone: (415) 486-0900

Hazardous Waste Testing Laboratory Certificate No. 159

2. **Waste Transporter**

Not yet determined

L. **Miscellaneous**

1. Hazardous Waste Manifests will be made out and accompany transport of waste materials, off-site to a disposal or reclaim facility.
2. Chain-of-Custody records will be used to document all sample transfers from the site to the analytical laboratory.

3. A report will be submitted to the ACHCSA describing the closure activities, presenting sample analyses results and documenting the final disposal of waste materials. Copies of laboratory reports, chain-of-custody records and manifests will be included in the report.

List of Attachments:

Plate 1 - Estimated Excavation Areas

Underground Tank Closure/Modification Plans

Regulation 8, Organic Compounds, Rule 40, Aeration of Contaminated Soil and Removal of Underground Storage Tanks

WKW:RWR:clh:mbl

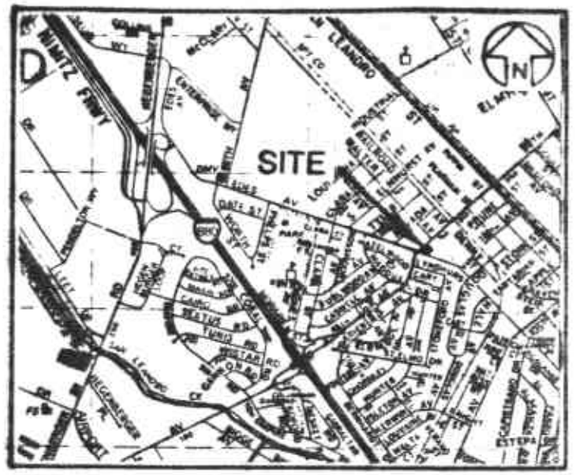
150 ppm TEST BORING (showing highest TVH concentration)
ND = none detected

TEST PROBE IN FILL

TEST PROBE IN NATIVE SOIL

APPROXIMATE PREVIOUS TANK LOCATION

PROPOSED APPROXIMATE LIMITS OF EXCAVATION



VICINITY MAP

98th AVENUE

STORM DRAIN LATERAL

CURB LINE

WATER LINE

APPROXIMATE JOINT TRENCH LOCATION

FENCE

EDES AVENUE

11 150 ppm
4 150 ppm
2 13,000 ppm
3 260 ppm
12 440 ppm
10 ND
7 200 ppm
25,000 ppm
13
11,000 ppm
1
6 45 ppm
14 730 ppm
5 2,600 ppm
120 ppm 8
9 100 ppm

APPROXIMATE SCALE (feet)
0 30 60

ESTIMATED EXCAVATION AREAS

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED	PLATE
272.011	6/6/89		1

ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS DIVISION
470 - 27TH ST., RM. 322
OAKLAND, CA 94612
PHONE NO. 415/874-7237

UNDERGROUND TANK CLOSURE/MODIFICATION PLANS

1. Business Name City of Oakland

   Business Owner _____

2. Site Address 670 98th Avenue

   City Oakland Zip 94603 Phone ---------

3. Mailing Address One City Hall Plaza

   City Oakland Zip 94612 Phone 273-3051

4. Land Owner City of Oakland

   Address One City Hall Plaza City, State Oakland, CA Zip 94612

5. EPA I.D. No. _____

6. Contractor _____

   Address _____

   City _____ Phone _____

   License Type _____ ID# _____

7. Other (Specify) _____

   Address _____

   City _____ Phone _____

8. Contact Person for Investigation

Name Mr. James Abron Title Acting Principal Civil Engineer

Phone 273-3051

9. Total No. of Tanks at facility 4 (already removed)

10. Have permit applications for all tanks been submitted to this office? Yes [ ] No [x]

11. State Registered Hazardous Waste Transporters/Facilities

a) Product/Waste Tranporter

Name _____ EPA I.D. No. _____

Address _____

City _____ State _____ Zip _____

b) Rinsate Transporter

Name _____ EPA I.D. No. _____

Address _____

City _____ State _____ Zip _____

c) Tank Transporter

Name _____ EPA I.D. No. _____

Address _____

City _____ State _____ Zip _____

d) Contaminated Soil Transporter

Name _____ EPA I.D. No. _____

Address _____

City _____ State _____ Zip _____

12. Sample Collector

Name John Wolfe, Bill Wikander

Company Subsurface Consultants, Inc.

Address 171 12th Street, #201

City Oakland State CA Zip 94607 Phone 268-0461

13. Sampling Information for each tank or area

Tank or Area		Material sampled	Location & Depth
Capacity	Historic Contents (past 5 years) (tanks removed more than 5 years ago)		
10,000	Gasoline	NA	NA
10,000	Gasoline	NA	NA
280	Waste Oil	NA	NA
5,000(?)	Gasoline (?)	NA	NA

14. Have tanks or pipes leaked in the past? Yes [x] No [ ]

If yes, describe. Petroleum contaminated soil, apparently due to tank and/or pipe leaks, has been encountered at the site

15. NFPA methods used for rendering tank inert? Yes [ ] No [ ]

If yes, describe. NA

16. Laboratories

Name National Environmental Testing, Inc.

Address 435 Tesconi Circle

City Santa Rosa State CA Zip 95401

State Certification No. 178

17. Chemical Methods to be used for Analyzing Samples

Contaminant Sought	EPA, DHS, or Other Sample Preparation Method Number	EPA, DHS, or Other Analysis Number
Gasoline	5030	8015 MOD
Benzene, Toluene Ethylbenzene, Xylene	5030	8020/602
Diesel Fuel	3550	8015 MOD
Oil and Grease	3550	503E
Purgeable Haolocarbons	5030	8010/601
Cadmium, chromium, lead and zinc	--	ICAP or AA

18. Site Safety Plan submitted? Yes [x] No [ ]

19. Workman's Compensation: Yes [ ] No [ ]

Copy of Certificate enclosed? Yes [ ] No [ ]

Name of Insurer _____

20. Plot Plan submitted? Yes [x] No [ ]

21. Deposit enclosed? Yes [ ] No [ ]

22. Please forward to this office the following information within 60 days after receipt of sample results.

a) Chain of Custody Sheets

b) Original Signed Laboratory Reports

c) TSD to Generator copies of wastes shipped and received

d) Attachment A summarizing laboratory results

I declare that to the best of my knowledge and belief the statements and information provided above are correct and true. I understand that information in addition to that provided above may be needed in order to obtain an approval from the Department of Environmental Health and that no work is to begin on this project until this plan is approved.

I understand that any changes in design, materials or equipment will void this plan if prior approval is not obtained.

I will notify the Department of Environmental Health at least two (2) working days (48 hours) in advance to schedule any required inspections. I understand that site and worker safety are soley the responsibility of the property owner or his agent and that this responsibility is not shared nor assumed by the County of Alameda.

Signature of Contractor

Name (please type) _____

Signature _____

Date _____

Signature of Site Owner or Operator

Name (please type) _____

Signature _____

Date _____

NOTES:

1. Any changes in this document must be approved by this Department.
2. Any leaks discovered must be submitted to this office on an underground storage tank unauthorized leak/contamination site report form within 5 days of its discovery.
3. Three (3) copies of this plan must be submitted to this Department. One copy must be at the construction site at all times.
4. A copy of your approved plan must be sent to the landowner.

5. Triple rinse means that:

   a) final rinse must contain less than 100 ppm of Gasoline (EPA method 8020 for soil, or EPA method 602 for water) or Diesel (EPA method 418.1) Other methods for halogenated volatile organics (EPA method 8010 for soil, EPA method 601 for water) may be required. The composition of the final rinse must demonstrated by an original or facsimile report from a laboratory certified for the above analyses.

   b) tank interior is shown to be free from deposits or residues upon a visual examination of tank interior.

   c) tank should be labelled as "tripled rinsed; laboratory certified analysis available upon request" with the name and address of the contractor.

   If all the above requirements cannot be met, the tank must be transported as a hazardous waste.

6. Any cutting into tanks requires local fire department approval.

UNDERGROUND TANK CLOSURE/MODIFICATION PLANS

ATTACHMENT A

SAMPLING RESULTS

Tank or Area	Contaminant	Location & Depth	Results (specify units)

INSTRUCTIONS

2. SITE ADDRESS
Address at which closure or modification is taking place.

5. EPA I.D. NO.
This number may be obtained from the State Department of Health Services, 916/324-1781.

6. CONTRACTOR
Prime contractor for the project.

7. OTHER
List professional consultants here.

12. SAMPLE COLLECTOR
Persons who are collecting samples.

13. SAMPLING INFORMATION
Historic contents - the principal product(s) used in the last 5 years.

Material sampled - i.e., water, oil, sludge, soil, etc.

16. LABORATORIES
Laboratories used for chemical and geotechnical analyses.

17. CHEMICAL METHODS:
All sample collection methods and analyses should conform to EPA or DHS methods.

Contaminant - Specify the chemical to be analyzed.

Sample Preparation Method Number - The means used to prepare the sample prior to analyses - i.e., digestion techniques, solvent extraction, etc. Specify number of method and reference if not an EPA or DHS method.

Analysis Method Number - The means used to analyze the sample - i.e., GC, GC-MS, AA, etc. Specify number of method and reference if not a DHS or EPA method.

NOTE:
Method Numbers are available from certified laboratories.

18. SITE SAFETY PLAN
A plan outlining protective equipment and additional specialized personnel in the event that significant amount of hazardous materials are found. The plan should consider the availability of respirators, respirator cartridges, self-contained breathing apparatus (SCBA) and industrial hygienists.

19. ATTACH COPY OF WORKMAN'S COMPENSATION

20. PLOT PLAN

The plan should consists of a scaled view of the facility at which the tank(s) are located and should include the following information:

a) Scale

b) North Arrow

c) Property Line

d) Location of all Structures

e) Location of all relevant existing equipment including tanks and piping to be removed

f) Streets

g) Underground conduits, sewers, water lines, utilities

h) Existing wells (drinking, monitoring, etc.)

i) Depth to ground water

j) All existing tanks in addition to the ones being pulled

1/88

REGULATION 8
ORGANIC COMPOUNDS
RULE 40
AERATION OF CONTAMINATED SOIL
AND
REMOVAL OF UNDERGROUND STORAGE TANKS

INDEX

REGULATION 8
ORGANIC COMPOUNDS
RULE 40
AERATION OF CONTAMINATED SOIL
AND
REMOVAL OF UNDERGROUND STORAGE TANKS
(Adopted July 16, 1986)

8-40-100 GENERAL

8-40-101 **Description:** The purpose of this Rule is to limit the emission of organic compounds from soil that has been contaminated by organic chemical or petroleum chemical leaks or spills; to describe an acceptable soil aeration procedure; and to describe an acceptable procedure for controlling emissions from underground storage tanks intended for removal.

8-40-110 **Exemption, Storage Piles:** Calculations of aeration volume under Section 8-40-204 shall not include storage piles that are covered per Section 8-40-303; nor shall they include active storage piles.

8-40-111 **Exemption, Excavated Hole:** The exposed surface of an excavated hole shall not be included in calculations of aerated volume under Section 8-40-204.

8-40-112 **Exemption, Sampling:** Contaminated soil exposed for the sole purpose of sampling shall not be considered to be aerated. Removal of soil for sampling shall not qualify a pile as "active."

8-40-113 **Exemption, Non-volatile Hydrocarbons:** The requirements of this Rule shall not apply if the soil is contaminated by a known organic chemical or petroleum liquid, and that chemical or liquid has an initial boiling point of 302°F or higher, provided that the soil is not heated.

8-40-200 DEFINITIONS

8-40-201 **Active Storage Pile:** A pile of contaminated soil to which soil is currently being added or from which soil is currently being removed. Activity must have occurred or be anticipated to occur within one hour to be current.

8-40-202 **Aeration:** Exposure of excavated contaminated soil to the air.

8-40-203 **Aeration Depth:** The smaller of the following: the actual average depth of contaminated soil; or 0.15 meters (0.5 feet) multiplied by the daily frequency with which soil is turned. The exposed surface area includes the pile of excavated soil unless the pile is covered per Section 8-40-303.

8-40-204 **Aeration Volume:** The volume of soil being aerated shall be calculated as follows: the exposed surface area (in square feet or square meters) shall be multiplied by the aeration depth.

8-40-205 **Contaminated Soil:** Soil which has an organic content, as measured using the procedure in Section 8-40-602, exceeding 50 ppm(wt).

8-40-206 **Organic Compound:** Any compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate.

8-40-207 **Organic Content:** The concentration of organic compounds measured in the composite sample collected and analyzed using the procedures in Sections 8-40-601 and 8-40-602.

8-40-208 **Vapor Free:** The process of purging gases from a tank using dry ice to replace organic vapors with an inert atmosphere.

8-40-209 **Ventilation:** The process of purging gases from a tank by blowing or drawing another gas through the tank.

~~8-40-210~~ Emergency Excavation: An excavation carried out pursuant to an order of a state or local government agency issued because the contaminated soil poses an imminent threat to public health and safety.

8-40-300 STANDARDS

8-40-301 Uncontrolled Aeration: A person shall not aerate contaminated soil at a rate in excess of that specified in Table 1 for the degree of organic content. The limitations in Table 1 apply to the entire facility, and indicate the volume of contaminated soil that may be added, on any one day, to soil that is already aerating.

Table 1
Allowable Rate of Uncontrolled Aeration

ORGANIC CONTENT ppm(weight)	RATE OF UNCONTROLLED AERATION Cubic meters/day	Cubic yards/day
<50	Exempt from this Rule	~~Subject to Rule 8-2~~
50-100	459.0	600
100-500	91.8	120
500-1000	45.9	60
1000-2000	22.9	30
2000-3000	11.5	15
3000-4000	7.6	10
4000-5000	5.7	8
>5000	0.08	0.1

8-40-302 Controlled Aeration: Soil may be aerated at rates exceeding the limitations of 8-40-301 provided emissions of organic compounds to the atmosphere are reduced by at least 90% by weight.

8-40-303 Storage Piles: Contaminated soil which is not being aerated shall be covered except when soil is being added or removed. Any uncovered contaminated soil will be considered to be aerated. The soil may be covered with a layer of uncontaminated soil no less than six inches deep; or it may be covered with a tarp or other covering, provided no head space where vapors may accumulate is formed.

8-40-310 Underground Storage Tanks—Decommissioning: Any person wishing to permanently decommission an underground storage tank which previously contained organic compounds shall follow the following procedure:

310.1 All piping shall be drained and flushed into the tank or other container.

310.2 All liquids and sludges shall be removed, to the extent possible, from the tank. It may be necessary to use a hand pump to remove the bottom few inches of product.

310.3 Vapors shall be removed from the tank using one of the following three methods:

3.1 The tank may be filled with water, displacing vapors and hydrocarbon liquids. Water used for this purpose must be collected and/or disposed of in a manner approved by the APCO.

3.2 Vapor freeing.

3.3 Ventilation.

8-40-311 Vapor Freeing: No person shall vapor free a tank containing more than 0.001 gallons of liquid organic compounds per gallon of tank capacity unless emissions of organic compounds to the atmosphere are reduced by at least 90%.

8-40-312 **Ventilation:** No person shall ventilate a tank containing more than 0.001 gallons of liquid organic compounds per gallon of tank capacity unless emissions of organic compounds to the atmosphere are reduced by at least 90%.

8-40-400 ADMINISTRATIVE REQUIREMENTS

8-40-401 Reporting: The person responsible for any operation to which this rule is applicable shall provide ~~in writing~~ to the APCO the following information:

401.1 Decommissioning of Tanks: The person responsible for decommissioning tanks which are subject to the provisions of Sections 8-40-310 shall provide written notice to the APCO of intention to decommission tanks. The written notice shall be postmarked at least 10 days prior to commencement of such decommissioning. The written notice of intention shall include:

1.1 names and addresses of persons performing and responsible for the tank decommissioning

1.2 location of site at which tank decommissioning will occur

1.3 starting date of tank decommissioning

1.4 procedures to be employed to meet the requirements of Sections 8-40-310

401.2 Excavation of Soil: The person responsible for the excavation of soil which might be subject to the provisions of Sections 8-40-301 or 302 shall provide written notice to the APCO of intention to excavate. The written notice shall be postmarked at least 10 days prior to commencement of such excavation or in emergency excavations, as early as possible prior to the commencement of such emergency excavation. Written notice of intention to excavate may be submitted to the APCO at the same time written notice of intention to decommission tanks is submitted provided that such notification precedes the commencement of either tank decommissioning or soil excavation by at least 10 days as indicated by postmark. The written notice of intention shall include:

2.1 names and addresses of persons performing and responsible for excavation.

2.2 location of site at which excavation will occur.

2.3 starting date of excavation.

2.4 procedures to be employed to meet the requirements of Sections 8-40-301 and 302.

2.5 if applicable, name, title and authority of the state or local government representative who has ordered an excavation which is subject to emergency procedures.

401.13 ~~Excavation~~ Aeration of Contaminated Soil: The person responsible for aeration of any contaminated soil shall provide the District, by telephone, with the following information. This shall be provided no less than 24 hours prior to the spreading or heating of any contaminated soil. The District shall again be notified within 24 hours of a change in one or more of the following parameters ~~if any of the parameters change~~.

13.1 Estimated total quantity of soil to be aerated.

13.2 Estimated quantity of soil to be aerated per day.

23.3 Estimated average degree of contamination, or total organic content of soil.

13.4 Chemical composition of contaminating organic compounds (i.e., gasoline, methylene chloride, etc.).

13.5 A description of the basis from which these estimates were derived (soil analysis test reports, etc.).

8-40-601 **Soil Sampling:** One composite sample shall be collected and analyzed for every 50 cubic yards of excavated contaminated soil to be aerated. At least one composite sample shall be collected from each inactive, uncovered storage pile within 24 hours of excavation. Samples are not required if the soil is uncontaminated.

601.1 Each composite sample shall consist of four separate soil samples taken using the procedures described below. The soil samples shall remain separate until they are combined in the laboratory just prior to analysis.

601.2 Each 50 cubic yard pile for which a composite sample is required shall be considered to have four equal sectors. One sample shall be taken from the center of each sector. Samples shall be taken from at least three inches below the surface of the pile. Samples shall be taken using one of the following two methods:

1.1 Samples shall be taken using a driven-tube type sampler, capped and sealed with inert materials, and extruded in the lab in order to reduce the loss of volatile materials; or

1.2 Samples shall be taken using a clean brass tube (at least three inches long) driven into the soil with a suitable instrument. The ends of the brass tube shall then be covered with aluminum foil, then plastic end caps, and finally wrapped with a suitable tape. The samples shall then be immediately placed on ice, or dry ice, for transport to a laboratory.

8-40-602 **Measurement of Organic Content:** Organic content of soil shall be determined by the Regional Water Quality Control Board's Revised Analytical Methods, Attachment 2, 11/8/85, or any other method approved by the APCO.

8-40-603 **Determination of Emissions:** Emissions of organic compounds as specified in Section 8-40-302 shall be measured as prescribed in the Manual of Procedures, Volume IV, ST-7.

GUIDELINE HEALTH AND SAFETY PLAN
CONTAMINATED SOIL REMEDIATION
98TH AND EDES AVENUES
OAKLAND, CALIFORNIA
SCI 272.011

Prepared for:

Mr. Dan Lau
Public Works Department
City of Oakland
1419 Broadway, Suite 700
Oakland, California 94612

By:

Subsurface Consultants, Inc.
171 12th Street, Suite 201
Oakland, California 94607
(415) 268-0461

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I INTRODUCTION

This Guideline Health and Safety Plan has been prepared to outline the minimum standards to be applied during contaminated soil remediation at the previous gasoline station site located at the northeast corner of 98th and Edes Avenues in Oakland, California. This Plan outlines a personnel and work site safety program to minimize the risks of endangering surrounding personnel and/or property. This Plan will be followed by the City of Oakland and Subsurface Consultants, Inc. (SCI) during their involvement in the project. The contractor will be responsible for the preparing and implementing a Health and Safety Plan for his/her own personnel.

The site is the former location of a Union 76 gasoline service station. Three underground motor fuel storage tanks and one waste oil tank were removed from the site in 1966 and 1983. Soil contaminated with motor fuel has recently been encountered at the site. The contaminant most prominent at the site is gasoline with comparatively small amounts of diesel fuel, and oil and grease. The 98th Avenue roadway is to be widened at the site. Accordingly, the contaminated soil is to be remediated prior to street widening.

As part of the contaminated soil remediation operations, soil with TPH concentrations greater than about 500 parts per million (ppm or mg/kg) will be excavated, aerated (and/or

biodegraded), and either reused as backfill on-site, or transported off-site to suitable disposal facilities. The approximate extent of excavation is shown on Plate 1.

During the project, the contractor will overexcavate, aerate and/or biodegrade the contaminated soil, backfill the excavations, and transport soil off-site, if necessary. SCI will perform analytical tests to check the soil contaminant concentrations, and monitor the excavation and aeration/biodegradation of the contaminated soils.

II HEALTH AND SAFETY CONSIDERATIONS

A. Key Personnel

Health and Safety Officer

SCI will designate a Health and Safety Officer who will be responsible for planning, implementing and auditing the health and safety program for the project.

B. Hazardous Substance Description

Gasoline, diesel fuel, and oil and grease, including benzene, toluene, xylene and ethylbenzene (BTXE) have been detected in soil at the site. The maximum concentrations that have been detected are as follow:

Material	Concentration (ppm)
Total Volatile Hydrocarbons (Gasoline)	25,000
Total Extractable Hydrocarbons (Diesel Fuel)	67
Total Oil and Grease (TOG)	60
Benzene	23
Toluene	270
Xylene	1,000
Ethylbenzene	190

C. Chemical Distribution

Gasoline was encountered in the soil above the groundwater level. The gasoline concentrations appear to be greatest

adjacent to the former tank locations, becoming less with distance from the tanks.

D. Chemical Hazards

Potential chemical hazards include skin and eye contact and inhalation or exposure to potentially toxic concentrations of chemical vapors. The identified toxic compounds that exist at the site are listed below with descriptions of specific effects of each. The list includes the main toxic constituents of motor fuel (benzene, toluene, xylene and ethylbenzene).

1. Benzene

a. **Characteristics:**

Clear, colorless, highly flammable liquid with characteristic odor

b. **High exposure levels may cause:**

Acute restlessness, convulsions, depression, respiratory failure, suspected carcinogen

c. **Permissible exposure level in air (PEL) for a time weighted average (TWA) over an 8-hour period:**

1.0 ppm

2. Toluene

a. **Characteristics:**

Refractive, flammable liquid with benzene-like odor

b. **High exposure levels may cause:**

Headache, nausea, eye irritation, mild macrocytic anemic, but not leukopenia (less toxic than benzene)

c. **PEL for an 8-hour TWA:**

100 ppm

3. Xylene

a. **Characteristics:**

Clear, mobile, flammable liquid

b. **High exposure levels may cause:**

Severe eye irritation, skin irritation, narcosis

c. **PEL for an 8-hour TWA:**

100 ppm

4. Ethylbenzene

a. **Characteristics:**

Colorless liquid, aromatic odor, highly flammable

b. **High exposure levels may cause:**

Skin, nose and eye irritation, dizziness, ataxia, loss of consciousness and respiratory failure

c. **PEL for an 8-hour TWA:**

100 ppm

E. Physical Hazards

Other on-site hazards may include physical injuries due to the proximity of workers to engine-driven heavy equipment and tools. Heavy equipment used during excavation will likely include a backhoe and may include other equipment as part of soil removal and the subsequent aeration and backfilling operations. Only trained personnel will operate machines, tools and equipment; all will be kept clean and in good repair. Safety apparel required around heavy equipment will include a hard hat.

The perimeter of the excavation will be shored and/or sloped to create acceptable stable temporary cut slopes. All work will be performed in accordance with OSHA guidelines.

III WORK PLAN INSTRUCTIONS

A. Level of Protection

Regular surveys of the site and knowledge of the anticipated hazards will determine the level of protection and the proper safety procedures to be employed. The workers coming into contact with the excavated materials will wear boots, disposable latex gloves and a hard hat.

Original vapor levels will be measured using an organic vapor meter calibrated to hexane. The level of protection for personnel working in the area will be upgraded if organic vapor levels exceed 5 ppm above background levels continuously for more than 5 minutes. In this event, personnel protective equipment will include double cartridge respirators for organic vapors, tyvex coveralls, gloves, and hard hat with safety shield or safety glasses.

Excavation will cease, equipment will be shut down, and personnel with withdraw from the area if either (1) the organic vapor concentration in the operators' breathing zone exceeds 200 ppm for a period of 5 minutes, or (2) the combustible gas vapor concentrations two feet above the excavation exceeds 2000 ppm or 25 percent of the lower explosive limit. The Health and Safety Officer will determine when personnel may return to the work area.

In the event low levels of organic vapors are detected, personnel will wear appropriate respirators (using NIOSH approved combination cartridges for organic vapors and dusts).

B. Site Entry Procedures

The general work area is shown on the Site Sketch, Plate 1. All personnel entering the work zone will be qualified field personnel wearing the proper level of protection. Eating, drinking, smoking and any other practices which increase the probability of combustion or hand-to-mouth transfer will be prohibited in the work zone. A first aid kit and a 20-pound ABC fire extinguisher and potable water will be available at the site.

C. Decontamination Procedures

All disposable protective clothing will be put into plastic bags and disposed of in a garbage receptacle. Excavated soils will be stockpiled in designated areas until chemical analyses have been performed on the soil samples. The soil will be covered with polyethylene sheeting.

In the event of a medical emergency, the injured party will be taken through decontamination procedures, if possible. However, the procedures will be omitted when it may aggravate or cause more harm to the injured party. A member of the work team will accompany the injured party to the medical facility to advise on matters concerning chemical exposure.

IV EMERGENCY MEDICAL CARE

In the event of an injury or suspected chemical exposure, the first responsibility of the Health and Safety Officer will be to prevent further injury. This objective will normally require an immediate end to work until the situated is rectified. The Health and Safety Officer may order an evacuation of the work party.

The Health and Safety Officer's primary responsibility in the event of an accident will be evacuation, first aid, and decontamination of injured team members. The Health and Safety Officer will determine safe evacuation areas and begin first aid.

V EMERGENCY PROCEDURES

A. Response to Emergency

In the case of an injury, the Health and Safety Officer will use the appropriate first aid kit and contact off-site medical help, if appropriate.

If medical evacuation is required, the route to the hospital shown on Plate 2 will be followed.

B. Emergency Contacts

Ambulance, Fire, Police: **911**

Hospital - Humana Hospital
13855 East 14th Street
San Leandro, California 94578
(415) 357-6500

Chemical Spills: National Response Center (24 hours)
(800) 424-9300

Chemtrec: Chemical Releases (24 hours)
(800) 424-9300

Environmental Protection Agency Emergency Response Section:
(415) 974-7511

Poison Control Center (24 hours)
(415) 428-3248

Cal-OSHA District Office: Occupational Injuries
(415) 557-1677

Regional Water Quality Control Board:
(415) 464-1255

C. **Acute Exposure Symptoms and First Aid**

Exposure Route	Symptoms	First Aid
Skin	Dermatitis	Wash immediately with soap and water, contact ambulance if evacuation is necessary
Eye	Irritated eyes	Flush eyes with water, contact ambulance
Inhalation	Vertigo, tremor	Move person to fresh air, cover source of chemicals
Ingestion	Nausea, vomiting	Call Poison Control Center

D. **Contingency Plan**

The following procedures will be sued in case of an unpredictable event:

Fire:	Use fire extinguisher if localized and call the fire department if uncontrolled
Chemical Exposure:	Follow first aid treatment specified previously
Physical Injury:	Provide first aid treatment and contact ambulance for evacuation, if appropriate

List of Attached Plates:

Plate 1	Estimated Excavation Areas
Plate 2	Escape Route

WKW:RWR:clh

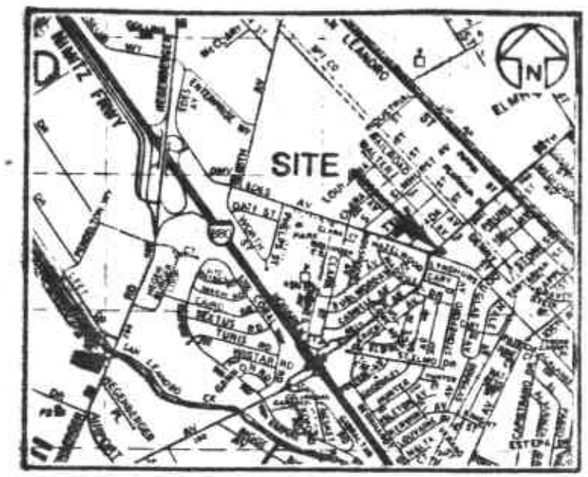
150 ppm TEST BORING (showing highest TVH concentration)
ND = none detected

TEST PROBE IN FILL

TEST PROBE IN NATIVE SOIL

APPROXIMATE PREVIOUS TANK LOCATION

PROPOSED APPROXIMATE LIMITS OF EXCAVATION



VICINITY MAP

98th AVENUE

STORM DRAIN LATERAL

CURB LINE

WATER LINE

FENCE

APPROXIMATE JOINT TRENCH LOCATION

EDES AVENUE

11 150 ppm

4 150 ppm

2 13,000 ppm

3 260 ppm

12 440 ppm

10 ND

11,000 ppm 1

7 200 ppm

25,000 ppm 13

6 45 ppm

14 730 ppm

5 2,600 ppm

120 ppm 8

9 100 ppm

APPROXIMATE SCALE (feet)

0 30 60

ESTIMATED EXCAVATION AREAS

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED	PLATE
272.011	6/6/89		1

ROUTE TO HOSPITAL

APPROXIMATE SCALE (feet)

0 2000 4000

N

ROUTE TO HOSPITAL

Subsurface Consultants

98th and EDES - OAKLAND, CA

JOB NUMBER	DATE	APPROVED
272.011	6/28/89	

PLATE 2