INDOOR AIR SCREENING
1461 PARK AVENUE
EMERYVILLE, CALIFORNIA

Prepared for:

UNION BANK
445 SOUTH FIGUEROA STREET
LOS ANGELES, CALIFORNIA 90071

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050-03C
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INTRODUCTION

The following report summarizes the results of an indoor air screening study undertaken at 1461 Park Avenue, Emeryville California (Figure 1). This property is underlain by soil and groundwater with gasoline which leaked or spilled from underground storage tanks. The purpose of this study is to assess whether gasoline constituents derived from the soil and ground water have infiltrated the air within the building; and if so, whether the building occupants could potentially suffer adverse health effects as a result of the petroleum hydrocarbons in the air.

SCOPE OF WORK

The Scope of Work for the indoor air screening activities included:

- Screening of indoor air for volatile organic compounds (VOCs) utilizing a portable organic vapor analyzer (OVA) equipped with a flame ionization detector (FID).
- Screening of indoor air for benzene using a Draeger hand-held air sampler.
- Chemical analysis of air samples collected at two locations: one indoors, at the location determined from the OVA screening to have the highest indoor VOC concentrations; and one collected outdoors.

FIELD INVESTIGATION

A total of thirteen stations, located both inside and outside the building, were screened for VOCs on April 13, 1992. The locations of the field screening stations are shown in Figure 2.

At each screening station, measurements of VOC concentrations were made at elevations of one and four feet above ground surface using a Foxboro 128 portable OVA. Measurements were made with and without an activated charcoal prefilter. The charcoal prefilter adsorbs VOCs except for methane, thereby providing a means for correcting total VOC levels for ambient indoor methane concentrations.

In addition, air at a height of one foot above ground surface at each station was field-screened for benzene using a hand-held Draeger air sampler equipped with Draeger #67 28 561 benzene detection tubes (0.5-10 ppmv range).

At station 7, which had the highest indoor VOC concentrations, two air samples were collected in pre-evacuated stainless steel canisters at heights of one and four feet above ground surface. For comparison, an outdoor air sample was collected at station 12, at a height of four feet above ground surface. The air samples were sent to a state-certified laboratory for chemical analysis.

FIELD SCREENING AND LABORATORY ANALYSES

Field measurements of total VOC concentrations and VOC concentrations exclusive of methane (Table 1) range from 0 to 6 parts per million by volume (ppmv) and 0 to 2 ppmv, respectively. Indoor concentrations of total VOCs and VOCs exclusive of methane were comparable to or higher than concentrations measured outside of the building.

Field measurements of indoor benzene concentrations made with the Draeger hand-held air sampler (Table 1) range from not detectable (<0.5 ppmv) to 0.8 ppmv. However, literature provided by the manufacturer indicates that the benzene detection tubes used in this instrument are sensitive to a large number of other aromatic organic compounds, including xylenes, toluene, and ethylbenzene, in addition to benzene itself. The relatively high indoor air concentrations obtained for benzene should be considered to represent the total concentration of aromatic compounds, not benzene concentration. By comparison, the outdoor stations did not have detectable levels of aromatic compounds (<0.5 ppmv).

The air samples collected in pre-evacuated stainless steel canisters were transmitted under chain of custody procedures to Environmental Analytical Services, Inc., of San Luis Obispo, California, for analysis by EPA Method TO-14, gas chromatography/mass spectrometry (GC/MS). The analyses were performed on April 16, 1992. Benzene was detected at concentrations of 28, 29 and 3.4 parts per billion by volume (ppbv) in the two samples from inside and the one sample obtained outside the building, respectively. Other VOCs present above analytical detection limits include:

- Dichloromethane 0.37 to 0.77 ppbv
- Ethylbenzene 0.60 to 4.8 ppbv
- 4-Ethyltoluene 1.8 to 18 ppbv

• Freon 11	0.30 ppbv
• Styrene	1.6 ppbv
• 1,1,1-Trichloroethane	0.93 to 1.6 ppbv
• Trichloroethene	0.32 ppbv
• 1,2,4-Trimethylbenzene	2.0 to 19 ppbv
• 1,3,5-Trimethylbenzene	0.86 to 8.0 ppbv
• Toluene	2.4 to 17 ppbv
• Xylenes	1.1 to 8.7 ppbv

DISCUSSION

The field measurements (Table 1) show that indoor air has VOC and aromatic compound levels which are elevated relative to ambient outdoor air. These observations suggest that the elevated indoor VOC and aromatic compound levels could be related to the presence of gasoline-contaminated soil underlying the building property. However, trucks enter the warehouse area of the building to load and offload supplies. It is therefore possible that some or all of the VOCs could be derived from vehicle exhaust emissions. The air screening data are not sufficient to distinguish between these possibilities.

Indoor concentrations of VOCs exclusive of methane vary from about 1 to 2 ppm. Assuming that all of the VOCs exclusive of methane are derived from gasoline, then the concentration of gasoline is approximately 150 times lower than the permissible exposure limit (PEL) from Title 8 of the California Code of Regulations, Section 5155 (8 CCR §5155).

The results of the laboratory analyses are given in Table 2. Several halogenated compounds were detected both inside and outside the building. These chemicals include Freon 11, dichloromethane (methylene chloride), 1,1,1-Trichloroethane (TCA) and Trichloroethene (TCE). The concentrations of these compounds in indoor and outdoor air are similar, suggesting that their presence is not related to contamination within or beneath the building property.

The remaining compounds detected by the laboratory analyses are gasoline constituents, and all have indoor concentrations which are elevated relative to the outdoor concentrations. This observation again suggests that their presence in the building air could be related to either the gasoline-contaminated soil which underlies the building property, or to the exhaust emissions of vehicles which were inside warehouse area of the building.

The 8 CCR PELs for the chemicals detected in the indoor air samples are summarized in Table 2. With the exception of benzene, the concentrations detected were approximately a factor of one thousand below the the PELs. Based on the laboratory results, the maximum concentration of benzene was below the PEL by at least a factor of thirty.

In 1986, Californians approved Proposition 65, the Safe Drinking Water and Toxic Enforcement Act. The regulations implementing Proposition 65 are given in 22 CCR §12000 to §14000. The compounds detected in air within the building which are included in the 22 CCR §12000 regulations are benzene and dichloromethane (methylene chloride). A specific regulatory level of 7 μg of benzene per day is defined as posing no significant risk by 22 CCR §12705. No regulatory level is presently available for methylene chloride.. Using the factors for calculating exposure given in the regulations and the maximum benzene concentration detected in the laboratory analyses, the daily benzene dosage calculated for air within the building could be as high as 362 μg/day. This dosage significantly exceeds the levels allowable under 22 CCR §12705.

CONCLUSIONS AND RECOMMENDATIONS

The results of the indoor air screening activities described above indicates that slightly elevated levels of gasoline constituents and some chlorinated substances occur in air within the building. The petroleum hydrocarbons detected inside the building may be derived from the gasoline detected in the subsurface or from vehicle emissions within the building. The concentrations of all detected compounds are far below the PELs; respiratory protection would not be required according to the regulations in 8 CCR. Methylene chloride and benzene however, are listed as carcinogens in 22 CCR §12000. The dosage of benzene exceeds the no significant risk level, and no significant risk level is currently available for methylene chloride. The building should therefore be posted as required in 22 CCR §12601 (c) and 22 CCR §12601 (d).

Respectfully Submitted,

REMEDIAL ACTION CORPORATION

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TABLE 1
FIELD SCREENING RESULTS

Sample Location	Height (feet)	Total VOCs (ppm)	Methane (ppm)	Draeger Benzene (ppm)
1	1 4	6 6	4 4	0 NS
2	1 4	6 6	4 4	0 NS
3	1 4	5 5	4 4	0 NS
4	1 4	6 6	4 4	0 NS
5	1 4	5 5	4 4	0.6 NS
6	1 4	6 6	4 4	0.7 NS
7	1 4	6 6	4 4	0.8 NS
8	1 4	6 6	4 4	0.6 NS
9	1 4	6 6	4 4	0.6 NS
10	1 4	6 6	4 4	0.8 NS
11	1 4	0 0	0 0	0 NS
12	1 4	0 0	0 0	0 NS
13	1 4	0 0	4 4	0.6 NS

Note: NS = Not Sampled

TABLE 2
ANALYTICAL RESULTS FOR AIR SAMPLES

Compound	Concentration (parts per billion by volume)				
	Detection Limit	7A (1 foot)	7B (4 feet)	12A (4 feet)	PEL
Freon 12	0.27	ND	ND	ND	1,000,000
Chloromethane	0.27	ND	ND	ND	5,000
Freon 114	0.27	ND	ND	ND	1,000,000
Vinyl Chloride	0.27	ND	ND	ND	500
Bromomethane	0.27	ND	ND	ND	5,000
Chloroethane	0.27	ND	ND	ND	1,000,000
Freon 11	0.27	ND	ND	0.30	1,000,000
1,1-Dichloroethene	0.27	ND	ND	ND	1,000
Dichloromethane	0.27	ND	0.37	0.77	100,000
Trichlorotriflouroethane	0.27	ND	ND	ND	1,000,000
1,1-Dichlorethane	0.27	ND	ND	ND	100,000
c-1,2-Dichloroethene	0.27	ND	ND	ND	200,000
Chloroform	0.27	ND	ND	ND	2,000
1,1,1-Trichloroethane	0.27	1.3	1.6	0.93	350,000
1,2-Dichloroethane	0.27	ND	ND	ND	1,000
Benzene	0.27	28	29	3.4	1,000
Carbon Tetrachloride	0.27	ND	ND	ND	2,000
Trichloroethene	0.27	ND	ND	0.32	25,000
1,2-Dichloropropane	0.27	ND	ND	ND	75,000
t-1,3-Dichloropropene	0.27	ND	ND	ND	1[2]
Toluene	0.27	37	39	7.1	100,000
c-1,3-Dichloropropene	0.27	ND	ND	ND	1[2]
1,1,2-Trichloroethane	0.27	ND	ND	ND	10,000
1,2-Dibromoethane	0.27	ND	ND	ND	15
Tetrachloroethene	0.27	ND	ND	ND	25,000
Chlorobenzene	0.27	ND	ND	ND	75,000
Ethylbenzene	0.27	4.8	6.0	0.60	100,000
m,p-Xylenes	0.27	15	17	2.4	100,000[1]
Styrene	0.27	1.6	ND	ND	50,000

TABLE 2 (cont'd)
ANALYTICAL RESULTS FOR AIR SAMPLES

Compound	Concentration (parts per billion by volume)				
	Detection Limit	7A (1 foot)	7B (4 feet)	12A (4 feet)	PEL
1,1,2,2-Tetrachloroethane	0.27	ND	ND	ND	1,000
o-Xylenes	0.27	8.7	2.8	1.1	100,000[1]
4-Ethyltoluene	0.40	ND	18	1.8	NR
1,3,5-Trimethylbenzene	0.40	5.9	8.0	0.86	25,000
1,2,4-Trimethylbenzene	0.40	14	19	2.0	25,000
m-Dichlorobenzene	0.40	ND	ND	ND	NR
Benzyl Chloride	0.40	ND	ND	ND	1,000
p-Dichlorobenzene	0.40	ND	ND	ND	75,000
o-Dichlorobenzene	0.40	ND	ND	ND	50,000
1,2,4-Trichlorobenzene	0.40	ND	ND	ND	5,000
Hexachlorobutadiene	0.40	ND	ND	ND	2.0

Notes: 1) NR = Not included in Title 22 Regulations
2) PEL given is for sum of o,m,p-xylenes
3) PEL given is for all isomers

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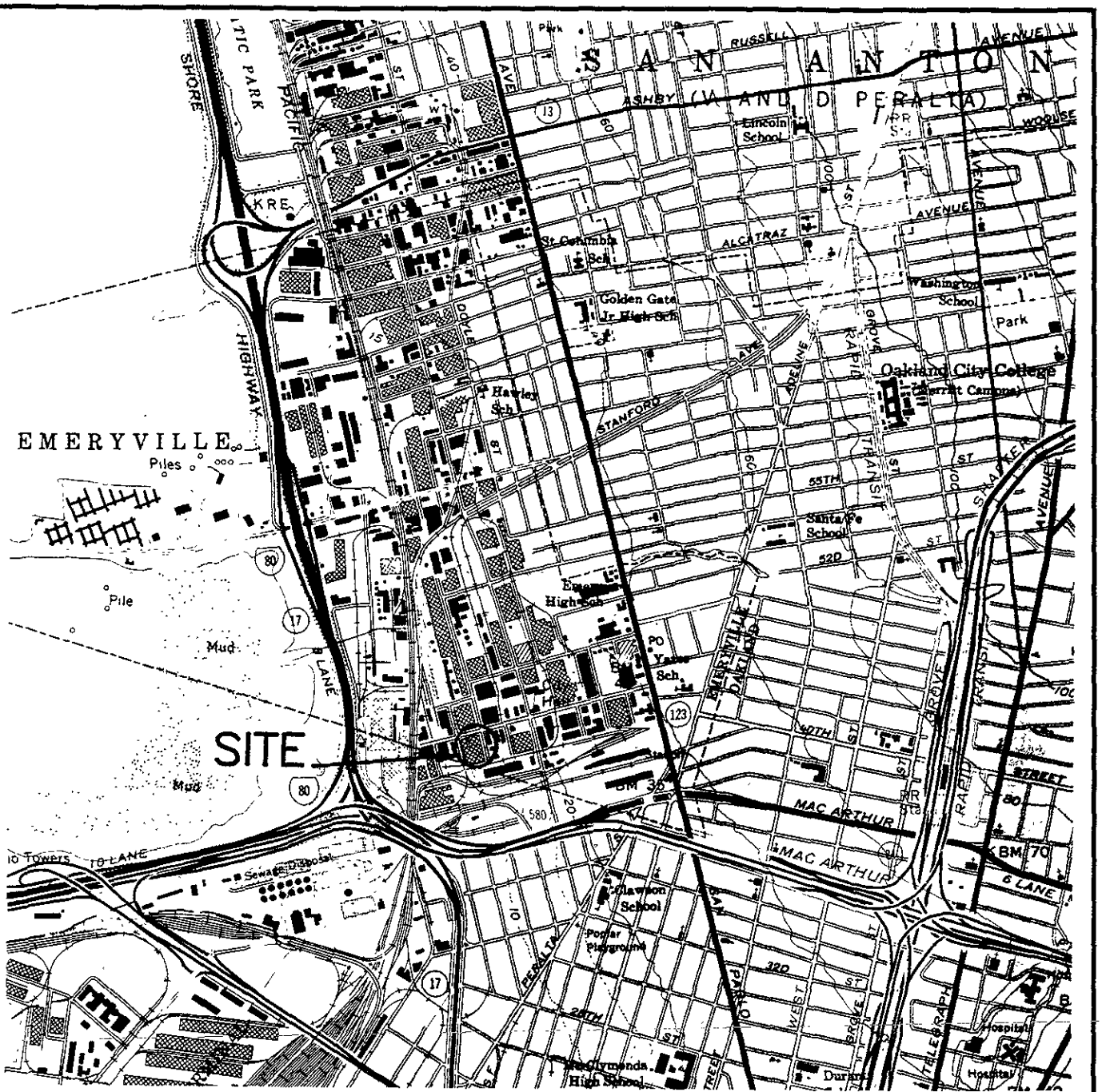

NOTES:

1) BASE MAP FROM USGS 7.5 MINUTE OAKLAND WEST TOPOGRAPHIC QUADRANGLE, 1959, (PHOTOREVISED 1988).

2) ALL LOCATIONS ARE APPROXIMATE.

NORTH

0 1/2 1 2

(SCALE IN MILES)

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SITE VICINITY MAP

CLIENT UNION BANK		PROJ NO.	050-03B
DRAWN BY BP	DATE 11/20/91	DWG. NO.	050-03B
CHECKED BY	DATE 12/6/91	FIGURE	1
APPROVED BY	DATE 12/6/91		

LEGEND

- EXISTING MONITORING WELL (HARDING LAWSON)
- EXISTING MONITORING WELL (PCC 1990)
- AIR SCREENING STATION
- AIR SCREENING STATION WITH AIR CANISTER SAMPLE

PARK AVENUE

PLANTER

SIDEWALK

RECEIVING DOCK ROOM

OFFICES

ENTRANCE

OFFICE

OFFICE

OFFICES

FORMER UST AREA

MW-1

WAREHOUSE

WAREHOUSE (SHIPPING)

MW-2

MW-3

ALLEY

HORTON STREET

SIDEWALK

1 2 3 4 5 6 7 8 9 10 11 12 13

NOTES: 1) ALL LOCATIONS ARE APPROXIMATE.

0 20 40

SCALE IN FEET

NORTH

RAC

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SITE SKETCH SHOWING
SAMPLE LOCATION 04/13/92
1461 PARK AVENUE
EMERYVILLE, CALIFORNIA

CLIENT	UNION BANK	PROJECT	050-03C
DRAWN BY	DATE 5/14/92	DWG	050-03
CHECKED BY	DATE 5/14/92	FIGURE	2
APPROVED BY	DATE 5/19/92		