THE PHASE IV SUBSURFACE INVESTIGATION NEAR THE METRO RAIL A-130 CORRIDOR LOS ANGELES, CALIFORNIA

Prepared by

THE EARTH TECHNOLOGY CORPORATION
3777 Long Beach Boulevard
Long Beach, California

Prepared for

METRO RAIL TRANSIT CONSULTANTS
548 South Spring Street
Seventh Floor
Los Angeles, California

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A1584

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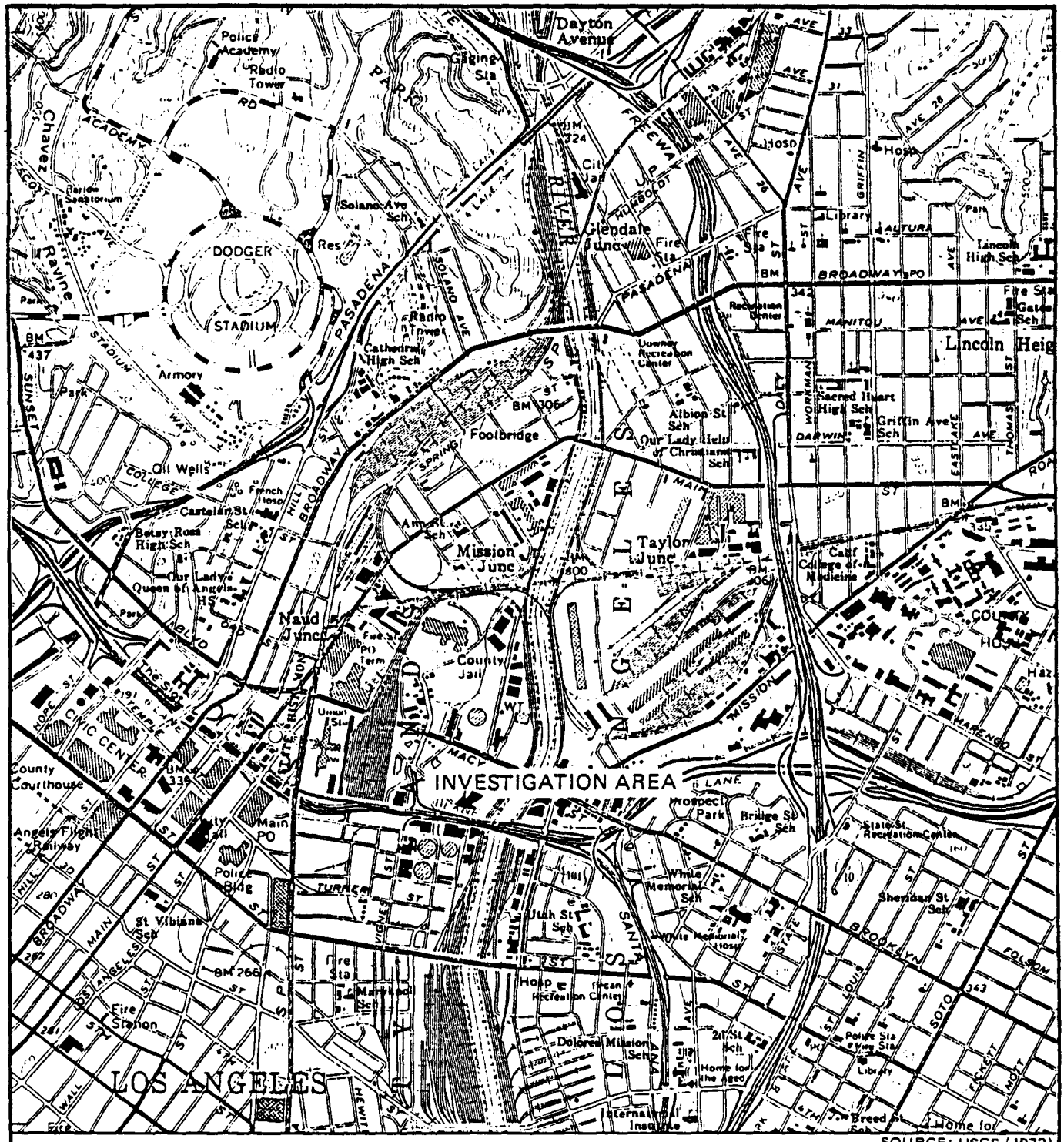
1.0 INTRODUCTION

This report documents the subsurface investigation that was conducted by The Earth Technology Corporation in January 1987 near the Metro Rail A-130 corridor. This investigation entailed drilling nine boreholes to depths ranging from 40 to 60 feet in the vicinity adjacent to both on and off ramps of the north and south bound Santa Ana Freeway and Vignes Street exit and near Center Street. Soil samples were collected from each borehole. When possible, groundwater samples were taken from boreholes. Because of mechanical difficulties, groundwater samples could not be taken in two of the nine boreholes. Thirteen soil and 2 groundwater samples were analyzed for total petroleum hydrocarbons, organic priority pollutants, and pH. An additional 6 groundwater samples are analyzed for pH and sulfides only.

1.1 SITE BACKGROUND

The subsurface investigation area is bordered by the Santa Ana Freeway (Route 101) and by Macy, Ramirez, Keller, and Lyon Streets in the City of Los Angeles (T1S, R13W, Sec. 27), California. Land use in the vicinity consists of industrial plants, a City technical center, an Amtrak station, and a Denny's Restaurant. Figure 1 shows the general location of the study area relative to the industrialized Los Angeles area. Figure 2 is an areal geologic map.

Scattered data suggest that, from 1870 to 1941, the Southern California Gas Company and a predecessor, the Los Angeles Gas and Electric Company, used a portion of the study area on Aliso Street for coal/oil gas generation. In 1943, the Southern California Gas Company ceased the gas generation operation and converted the plant into a butadiene production facility. Butadiene gas was produced through a thermal "cracking" process. This process consisted of mixing oil distillates with steam and heating the mixture in gas generators. Liquid from the condensed gas was piped to the Shell Chemical Company in Torrance for purification. The Southern California Gas Company ceased production of the butadiene gas around 1946. Southern California Gas Company sold the property about 30 years ago, and there is no available data on the use of the buildings or land after 1946.



SOURCE: USGS (1972)

SCALE

0 ½ 1 MILE

0 ½ 1 KILOMETER

NORTH

The Earth Technology Corporation

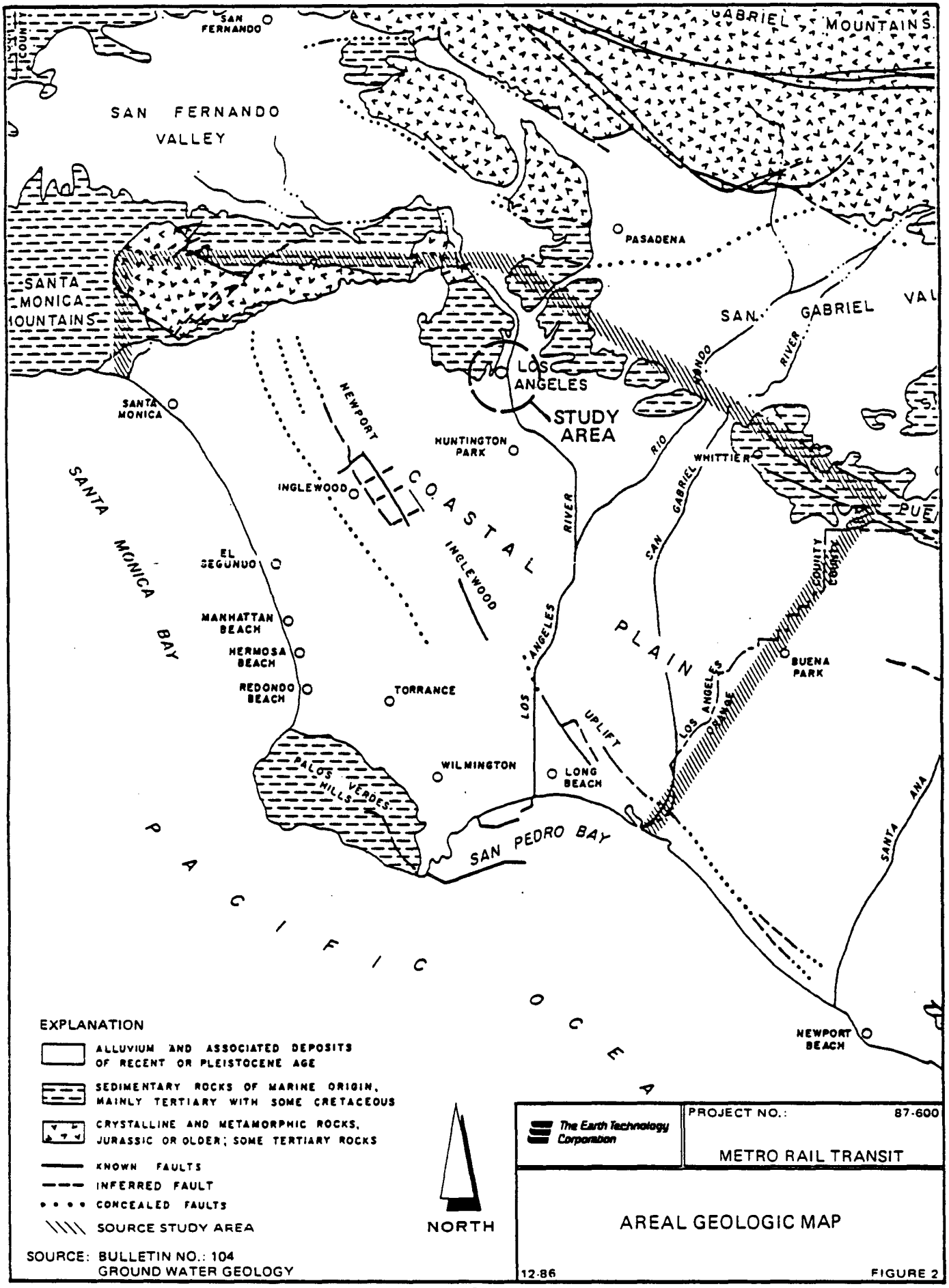
PROJECT NO.: 87-600

METRO RAIL

GENERAL LOCATION MAP
METRO RAIL INVESTIGATION SITE
LOS ANGELES, CA

9-86

FIGURE 1



SOURCE: BULLETIN NO.: 104
GROUND WATER GEOLOGY

The Earth Technology Corporation

PROJECT NO.: 87-600

METRO RAIL TRANSIT

AREAL GEOLOGIC MAP

12-86

FIGURE 2

1.2 PURPOSE AND SCOPE OF INVESTIGATION

The investigation was undertaken to estimate the nature and extent of potential hazardous materials in the subsurface and groundwater at the site. The findings of this investigation will form the technical basis for Metro Rail route planning.

The scope of work consisted of numerous tasks. These tasks were described in the Work Plan, which was prepared by Earth Technology, and are summarized below:

- Obtain necessary permits for drilling activities.
- Prepare and implement a site specific Health and Safety Plan.
- Prepare and implement an on site decontamination program during drilling activities.
- Set up procedures for storing drums containing soil and waste water on site and for transporting the drums to an acceptable disposal site.
- Conduct a geophysical investigation to assist in finding locations where drilling may be possible.
- Conduct a subsurface soil and groundwater sampling program.
- Conduct an organic vapor analyzer (OVA) and hydrogen sulfide gas detection program.
- Submit soil and groundwater samples for chemical analysis to an approved laboratory.
- Evaluate data developed during the site investigation.
- Prepare and submit a report documenting the findings, assessments and conclusions resulting from the investigation.

2.0 GEOLOGY AND HYDROLOGY

2.1 SITE GEOLOGY

REGIONAL GEOLOGY

The investigation area is located within an alluviated lowland known as the Los Angeles Basin. The basin is underlain by a structural depression composed primarily of marine and non-marine clastic sedimentary rock. Specific features to the basin area are:

- The Newport-Inglewood and Whittier fault zones, which separate the basin into northwestern, southwestern, northeastern, and central blocks
- The N70W Los Angeles anticline, a major geologic influence to the central block
- A narrow fault and folding zone of the south limb of the Elysian Park anticline.

The Metro Rail A-130 Corridor is within the central block and within the boundaries of major Newport-Inglewood, Whittier, and Santa Monica fault zones. There are no known active or potentially active faults identified within the study area.

The Los Angeles City oil field is another feature specific to the study area. The field is in the east-central part of the metropolitan area and is located along the south side of the narrow fault and folding zone on the south limb of the Elysian Park Anticline. It consists of three distinct production areas - eastern, central, and western. Plate 1 shows the location of the oil field in relation to the site.

SITE GEOLOGY

The Basin bedrock is exposed in Elysian Park, about 2 miles north of the site. The bedrock is composed of about two thousand feet of sandy siltstone and interbedded conglomerate of the Fernando Formation; and oil-bearing sandstone, shale, and siliceous shale of the Puente Formation. Borehole records from a previous study show the Puente Formation to be 100 feet below the surface within the corridor area. Visual identification of soil samples by Earth Technology's geologist shows that subsurface soils are mainly composed of:

- An upper fill consiting mainly of silty sand with concrete, wood, and brick debris. In borehole BH-209 an old brick road was encountered 6 inches beneath the ground surface which was underlain by 3 inches of concrete.
- A unit of silty and/or clayey sands that grades to sand.
- A middle unit (20 to 45 feet) of gravelly sands and cobbles.
- A lower unit of sand which grades to gravelly sands and cobbles in BH-201, BH-203, BH-207, and BH-209.

In borehole BH-201 at 46.5 feet there was auger refusal due to what appeared to be a large cobble or boulder.

2.2 SITE HYDROLOGY

The site is located in the Los Angeles Forebay area. Plate 2 shows the boundary of the forebay area. A semiperched aquifer consisting of coarse sands and gravels is common near the surface in the Forebay area. Thickness of the aquifer is 0 to 50 feet, and occurs as irregular patches. The Gaspur and Exposition aquifers exist west and south of the Los Angeles River and in the vicinity of the study area (Department of Water Resources, Bulletin No. 104). These aquifers are from 10 feet to greater than 100 feet in thickness and consist mainly of sand and gravel with clay and silt lenses. The aquifers are

not differentiated from each other and are overlain by alluvium. Historically, wells were installed in the Gaspur aquifer. These existing well yields are high.

Based on visual observation and site borehole logs, it appears that the site geology consists of mixed alluvium, bedrock, and river gravel and cobble deposits.

Groundwater on site was encountered at 25 to 30 feet below the surface. Water-bearing material at the site consists of coarse sands and gravelly sands with occasional lenses of clay.

Based on regional groundwater data from the Los Angeles County Flood Control District, the 1975 static groundwater table is 50 to 100 feet below the bedrock surface in the vicinity of Union Station, approximately 1 mile northwest of the study site.

3.0 SITE INVESTIGATION

3.1 DRILLING AND SOIL SAMPLING

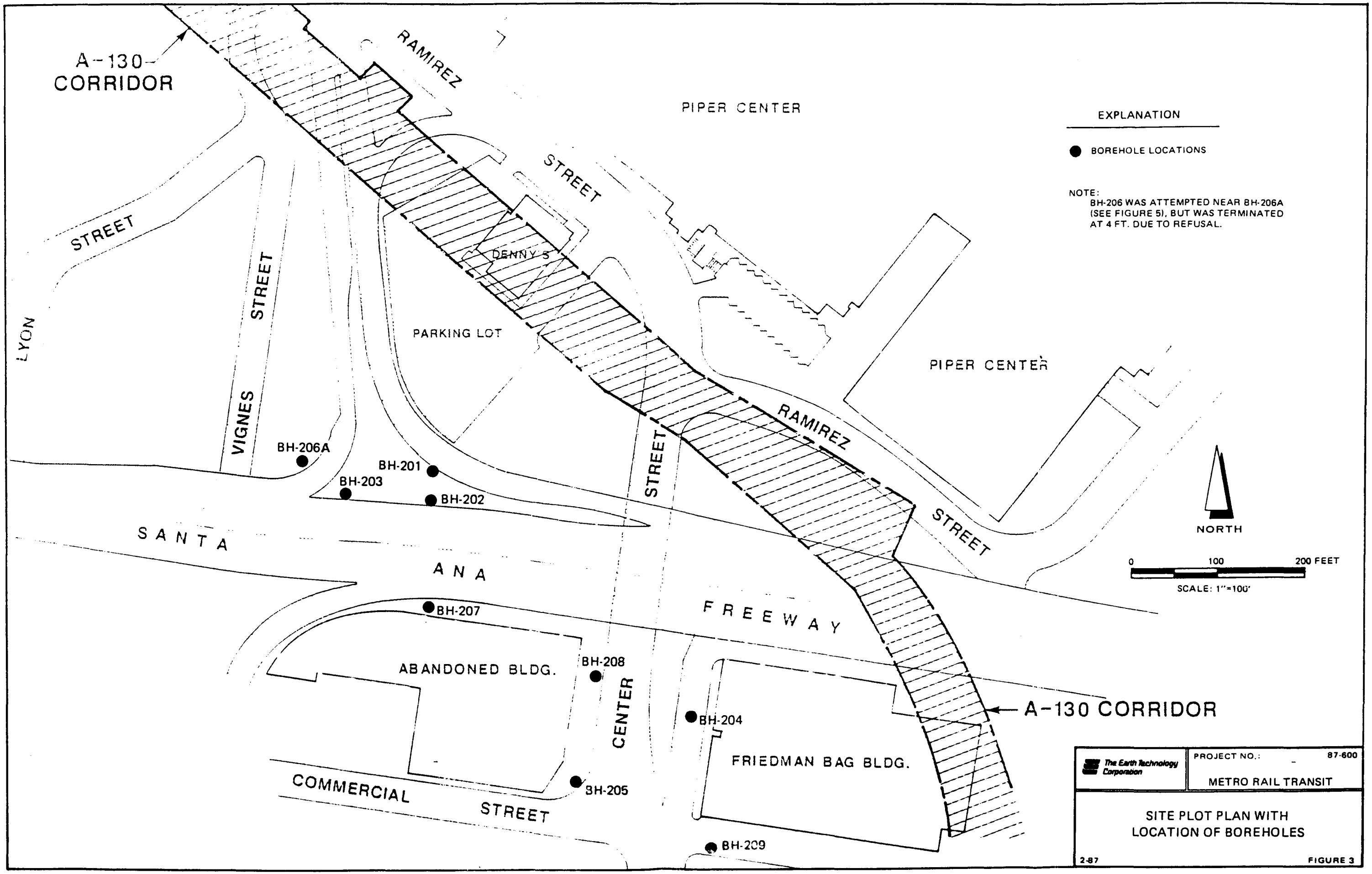
Ten drilling attempts were made at the site, nine of which were successful. The boreholes were drilled to depths ranging between four feet and 61½ feet using a B-53 drill rig with 6-inch outer diameter hollow stem augers. One borehole, BH-203, was slant drilled at an angle of 20° from vertical under the Santa Ana Freeway. BH-203 was completed to a total vertical depth of 60 feet and extended horizontally from the borehole in the direction of the freeway approximately 21 feet. The borehole bottom is located about 10 feet (horizontally) under the freeway.

Borehole locations are presented in Figure 3. Coordinates of the boreholes are tabulated below:

Borehole No.	Elevation, feet	North, feet	East, feet
201	277.4	132,003.5	217,596.8
202	277.3	131,986.1	217,595.8
203	276.5	131,992.5	217,531.4
204	275.4	131,722.0	217,908.4
205	274.7	131,659.8	217,770.9
206	276.8	132,049.0	217,471.8
206A	276.5	132,046.5	217,467.5
207	276.9	131,835.0	217,631.3
208	270.6	131,727.7	217,793.1
209	273.6	131,550.0	217,793.1

Sixty soil samples were collected from the 9 boreholes. Site daily activity records are presented in Appendix A.

Samples were collected at five-feet intervals using a split spoon sampler containing brass liners. The sampler was opened as soon as it was removed from the borehole. Brass liners were removed and sealed with polycarbonate caps, labelled, placed in airtight sample containers, and placed on ice in


A-130 CORRIDOR
RAMIREZ
STREET
PIPER CENTER
STREET
DENNY'S
PARKING LOT
LYON
STREET
VIGNES
STREET
PIPER CENTER
RAMIREZ
STREET
STREET
BH-206A
BH-201
BH-203
BH-202
SANTA ANA FREEWAY
BH-207
ABANDONED BLDG.
BH-208
CENTER
BH-204
FRIEDMAN BAG BLDG.
A-130 CORRIDOR
COMMERCIAL STREET
BH-205
BH-209
EXPLANATION
BOREHOLE LOCATIONS
NOTE:
BH-206 WAS ATTEMPTED NEAR BH-206A (SEE FIGURE 5), BUT WAS TERMINATED AT 4 FT. DUE TO REFUSAL.
NORTH
0
100
200 FEET
SCALE: 1"=100'
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METRO RAIL TRANSIT
SITE PLOT PLAN WITH LOCATION OF BOREHOLES
2-87
FIGURE 3

preparation for delivery to the certified analytical laboratory. All samples were accompanied by chain-of-custody forms (Appendix B).

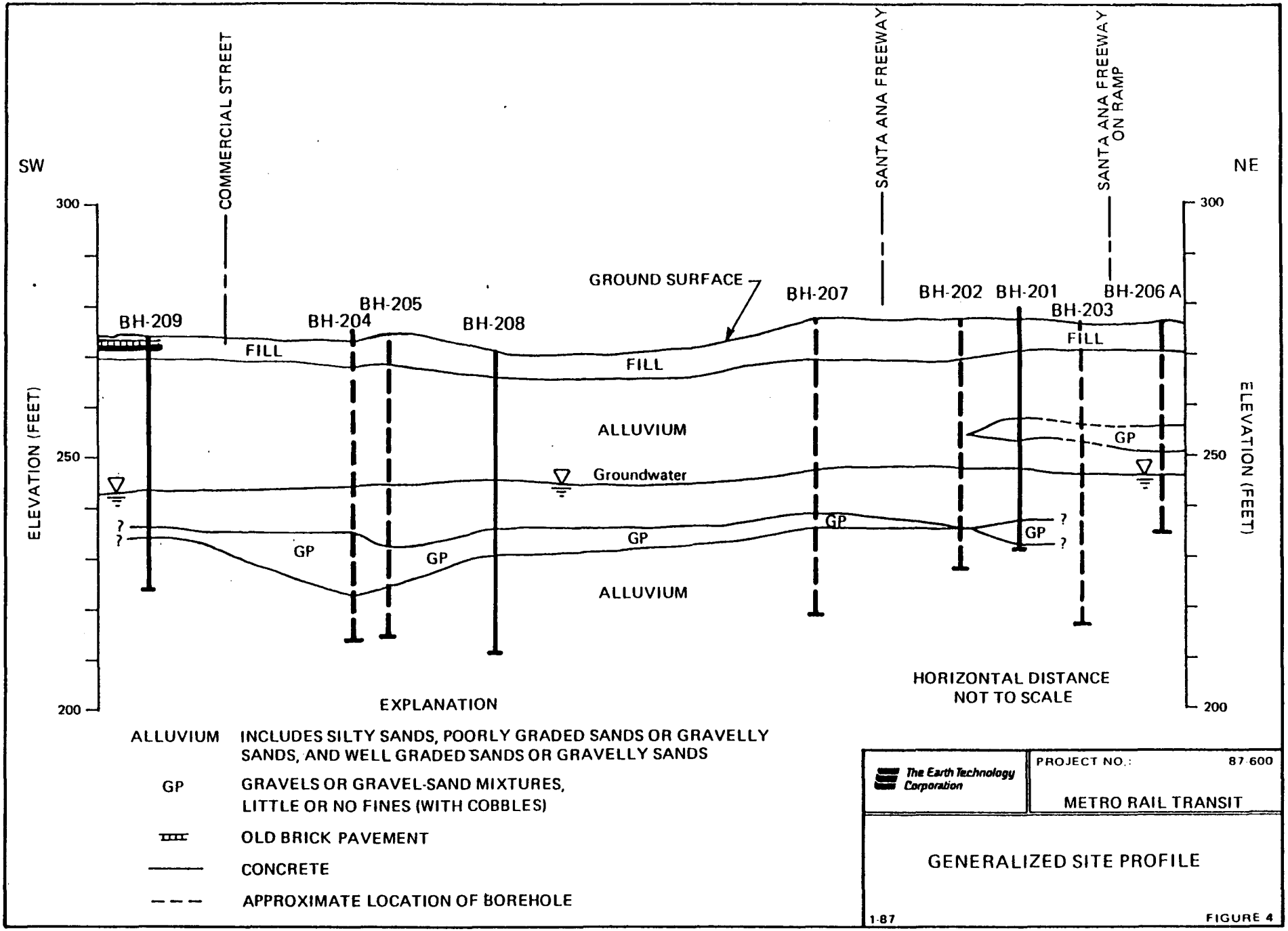
After each sampling event, the sampler was cleaned with an Alconox wash, followed by two water rinses and a distilled water rinse. Downhole sampling equipment and tools, including augers, and the work area of the drill rig were decontaminated between each borehole using a steam cleaner. Boreholes were grouted with cement to the surface. Spoils were stored in a central area on site in class 17-H 55-gallon drums and identified by borehole. Spoils will be disposed of by a qualified disposal company following laboratory analysis of soil samples.

Borehole logs are presented in Appendix C. Boreholes were logged by The Earth Technology geologist. Observations of the soil were made visually for color, grain size, and texture. Soils were identified using the Unified Soil Classification System.

Fill material was encountered in most boreholes at depths from about 0.5 to 10 ft. The fill consists of dark brown silty sand. Between 5 and approximately 11 ft, pieces of brick, woodchips, and concrete were encountered in the area of boreholes BH-201 and BH-203. It was impossible to identify whether soils immediately beneath the debris were also fill material. Below 15 ft, the soil consists mainly of coarse sand, sandy gravel, and cobble. Occasional thin lenses of clayey sands and boulders were encountered.

An oily film appeared on the sampler and an oily odor was detected in boreholes BH-201, BH-202, BH-203, BH-204, BH-208, and BH-209 at depths from approximately 20 to 50 feet. A creosote odor was encountered in boreholes BH-204, BH-208 and BH-209 at 40 to 60 foot depths and also upon removal of the augers. In addition, a strong gasoline odor and hydrogen sulfide odor was encountered in BH-209 at 15-foot and 30 to 35 feet depths, respectively.

Odors and discolored soils were not observed in boreholes BH-206A and BH-207. Figure 4 shows a preliminary cross-section of subsurface conditions at the site.


SW
NE
COMMERCIAL STREET
SANTA ANA FREEWAY
SANTA ANA FREEWAY ON RAMP
GROUND SURFACE
BH-209
BH-204
BH-205
BH-208
BH-207
BH-202
BH-201
BH-203
BH-206 A
FILL
FILL
FILL
ALLUVIUM
ALLUVIUM
Groundwater
GP
GP
GP
GP
GP
?
?
?
?
300
250
200
ELEVATION (FEET)
ELEVATION (FEET)
HORIZONTAL DISTANCE
NOT TO SCALE
EXPLANATION
ALLUVIUM INCLUDES SILTY SANDS, POORLY GRADED SANDS OR GRAVELLY SANDS, AND WELL GRADED SANDS OR GRAVELLY SANDS
GP GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES (WITH COBBLES)
OLD BRICK PAVEMENT
CONCRETE
APPROXIMATE LOCATION OF BOREHOLE
The Earth Technology Corporation
PROJECT NO.: 87-600
METRO RAIL TRANSIT
GENERALIZED SITE PROFILE
1-87
FIGURE 4

3.2 GROUNDWATER QUALITY INVESTIGATION

Groundwater samples were obtained using a PVC bailer and were collected from the bottom of seven boreholes. The bailer was steam cleaned between boreholes. Samples were properly labelled, iced, and packed for transport to the laboratory. One duplicate sample was collected and labelled BH-208-60 to ensure the integrity of the laboratory procedure since a water sample was not obtained from the true BH-208. All samples were accompanied by chain-of-custody forms. Appendix B contains the chain-of-custody forms and laboratory sheets.

Water samples were collected from the following boreholes at the following completion depths:

1. BH-201 at 46.5 feet
2. BH-203 at 60 feet
3. BH-204 at 61.5 feet
4. BH-205 at 60 feet
5. BH-206A at 40 feet
6. BH-207 at 60 feet
7. BH-209 at 50 feet.

Groundwater samples were not collected from boreholes BH-202 and BH-208 due to breakage of the hammer and the sampler becoming stuck in the augers.

3.3 LABORATORY ANALYSES

A total of 13 soil samples from the 9 boreholes were selected for laboratory analysis (Table 1). Sample selection was based on visual observations, headspace OVA readings, and the soil material encountered. At least one sample per borehole was chosen.

Soil samples were analyzed for organic priority pollutants (EPA Methods 8240 and 8270), total petroleum hydrocarbons (EPA Method 418.1), and pH (EPA Method 150.1) (Table 4).

TABLE 1. SOIL AND GROUNDWATER SAMPLES COLLECTED AND ANALYZED FOR METRO RAIL CORRIDOR A-130

Borehole No.	Completion Depth (ft)	Total Soil Samples	Laboratory Analysis Samples	
			Total Water Samples	Total Soil (1) Samples
BH-201	46.5	6	1	1 (30)
BH-202	50	8	-	2 (30,40)
BH-203	60	5	1	2 (10,35)
BH-204	61.5	6	1	1 (30)
BH-205	60	7	2	1 (55)
BH-206A	40	6	1	2 (15,35)
BH-207	60	7	1	1 (30)
BH-208	60	6	-	1 (25)
BH-209	50	8	1	2 (15,35)

(1) Numbers in parantheses indicate sample depths in ft.

TABLE 2. SUMMARY OF LABORATORY ANALYSIS OF GROUNDWATER IN METRO RAIL CORRIDOR A-130

Borehole No.	Depth (ft)	Sulfide (ppm)	pH
BH-201	46.5	0.55	7.43
BH-203	60	1.50	7.24
BH-204	60	14.58	7.63
BH-205	60	7.30	7.29
BH-206A	40	0.61	7.24
BH-207	60	0.64	9.29
BH-208 (Duplicate sample of BH-205)	60	8.00	7.29
BH-209	50	0.47	7.56

TABLE 3. SUMMARY OF LABORATORY ANALYSIS OF GROUNDWATER FOR EPA METHODS 624, 625[1]

Constituent	BH-204-60	BH-209-60
Toluene	*	450
Benzene	*	110
Ethylbenzene	12	130
Xylene	*	560
Napthelene	110	180
2-Methylnapthalene	*	17
Acenaphthylene	67	19
Fluorene	*	15
Phenanthrene	47	19
Anthracene	36	20
Fluoranthene	119	23
Pyrene	132	39
Benzo (a) Anthracene	54	19
Chrysene	65	18
Benzo (b) Fluoranthene	38	*
Benzo (k) Fluoranthene	*	18
Benzo (a) Pyrene	40	15

* Below Limit of Detection

(1) Concentration in µg/l

TABLE 4. SUMMARY OF LABORATORY ANALYSIS OF SOIL (1) IN METRO RAIL CORRIDOR A-130

Constituent	BH-201 30'	BH-202 30'	BH-202 40'	BH-203 10'	BH-203 35'	BH-204 30'	BH-205 55'	BH-206A 15'	BH-206A 35'	BH-207 30'	BH-208 25'	BH-209 15'	BH-209 35'
TPH	9	4	4	7	4	6	8	6	7	3	4	3	61
pH	8.24	9.34	7.69	8.12	7.05	8.85	8.74	8.60	8.39	9.10	8.12	7.25	7.52
Naphthalene	*	*	*	*	*	*	*	*	*	0.3	*	*	*
Acenaphthylene	*	*	*	*	*	*	*	*	*	0.3	*	*	*
Fluorene	*	*	*	*	*	*	*	*	*	*	*	*	0.7
Phenanthrene	*	*	*	*	*	*	*	*	*	0.2	*	*	2.0
Anthracene	*	*	*	*	*	*	*	*	*	*	*	*	0.6
Fluoranthene	*	*	*	*	*	*	*	*	*	0.5	*	*	1.0
Pyrene	0.2	*	*	11	*	*	*	*	*	0.7	*	*	1.4
Benzo(a) Anthracene	*	*	*	*	*	*	*	*	*	*	*	*	0.6
Chrysene	*	*	*	*	*	*	*	*	*	0.3	*	*	0.6
Benzo(b) Fluoranthene	*	*	*	*	*	*	*	*	*	*	*	*	0.4
Benzo (a) Pyrene	*	*	*	5	*	*	*	*	*	*	*	*	0.5
4-Methyl-2-Pentanone	0.19	*	*	0.10	*	0.07	*	*	*	0.55	*	0.4	*
2-Methylnaphthalene	*	*	*	*	*	*	*	*	*	*	*	*	*
Benzo (g,h,i) Perylene	*	*	*	27	*	*	*	*	*	*	*	*	*

* Below Limit of Detection

(1) Concentration in mg/kg unless otherwise noted.

Groundwater samples from seven boreholes were collected for laboratory analysis (Table 1).

Groundwater samples were analyzed for total sulfides and pH (Table 2). In addition, samples from boreholes BH-204-60 and BH-209-50 were also analyzed for organic priority pollutants using EPA Methods 624, 625 (Table 3). All the other water samples were stored for possible later analysis. From the site history, it was suspected that there may be a possibility of contaminants (coal tar derived hydrocarbons) that may have originated from the earlier gasification and/or butadiene production activities northwest of the area.

Laboratory quality assurance/quality control (QA/QC) included, in addition to reagent blanks and standards, 10 percent duplicates and 10 percent spikes (surrogates). The replicate and recovery data are within the acceptable ranges of reproducibility and accuracy described by the California Department of Health Services. The Earth Technology Corporation ran moisture and density tests on selected soil samples. Generally, samples selected were the same as the soil samples sent to the laboratory. If this was not possible then a sample was chosen from five feet above or below that depth.

4.0 ADDITIONAL INVESTIGATIONS

4.1 UNDERGROUND PIPE AND CABLE INVESTIGATION

Each designated borehole location was surveyed for underground pipes and cables. Two to three areas in the vicinity of the planned boreholes were cleared for drilling by a subcontractor using geophysical equipment. The locator equipment used a sensor that detected subsurface metallic pipes and cables. However, the equipment is limited in its capabilities, and cannot detect wiring or piping located beneath concrete. Nine cleared borehole locations were successfully drilled. One drilling attempt at borehole location BH-206 was unsuccessful. The second attempt (BH-206A) was successful. The locations of the CPT probes are presented in Figure 5 and daily site activity records of January 7 and 12.

4.2 CPT INVESTIGATION

On January 7 and 12, Earth Technology conducted field probing using an electronic cone penetrometer (CPT). The objective of this investigation was to penetrate borehole sites by probing with the CPT. Utilizing the hydraulics of the CPT, Earth Technology personnel pushed 1 1/4-inch diameter rods fitted with a "dummy" tip into the soil in specific areas in which borehole locations were required. This method proved efficient in finding borehole locations that a drill rig, equipped with hollow stem augers, could penetrate.

The target depth of probing for the CPT was 30 feet. It was evaluated that if the CPT were able to attain a depth of 30 feet, there should be no deeper artificial obstructions to impede drilling. During pushing of the rods, hydraulic pressure was monitored. Refusal was noted when pressures in excess of 1,800 to 2,000 psi were applied.

To penetrate the nine borehole locations, Earth Technology personnel attempted a total of 25 CPT probings (See Table 4 and Figure 5). Although the target depth of 30 feet was not attained in any of the probing attempts, a decision

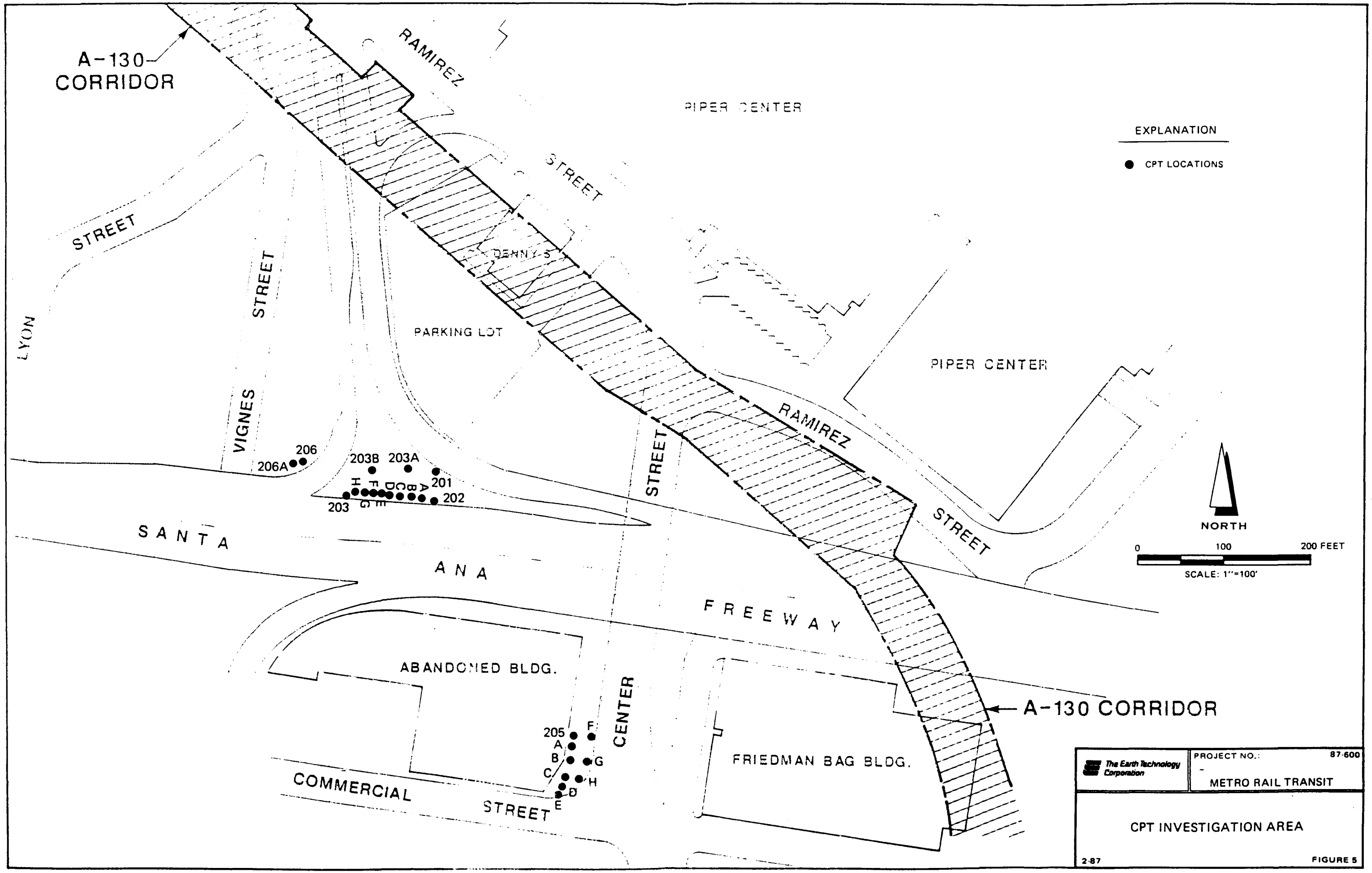

A-130 CORRIDOR
RAMIREZ
STREET
PIPER CENTER
EXPLANATION
CPT LOCATIONS
STREET
DENNY'S
STREET
LYON
PARKING LOT
VIGNES
STREET
PIPER CENTER
RAMIREZ
STREET
206
206A
203B
203A
201
202
203
205
A
B
C
D
E
F
G
H
SANTA
ANA
FREEWAY
ABANDONED BLDG.
CENTER
STREET
A-130 CORRIDOR
FRIEDMAN BAG BLDG.
COMMERCIAL
STREET
NORTH
0
100
200 FEET
SCALE: 1"=100'
The Earth Technology Corporation
PROJECT NO.: 87-600
METRO RAIL TRANSIT
CPT INVESTIGATION AREA
2-87
FIGURE 5

TABLE 5. SUMMARY OF CPT PROBINGS
PHASE IV CORRIDOR A-130

CPT LOCATION	CPT SITE	CPT ID	COMPLETION DEPTH(FT)	REMARKS
Traffic Island Vignes on & off Ramp	BH-201	C-1	25.5	Crunching @ 11' - 12' Crunching @ 16' - 17'
	BH-202	C-2	22.3	Refusal
		C-2A	20.9	Refusal
		C-2B	23.1	Refusal
		C-2C	19.5	Refusal
		C-2D	26.3	Refusal
		C-2E	24.4	Refusal
		C-2F	17.3	Refusal
		C-2G	17.2	Refusal
		C-2H	18.3	Refusal
	BH-203	C-3	22.9	Refusal
		C-3A	17.3	Refusal
		C-3B	23.5	Refusal
		C-3C	20.1	Refusal
East of Viges St. Near Freeway On Ramp	BH-206	C-6	27.2	Refusal
		C-6A	22.4	Refusal
Northeast Corner of Center Street (Commercial Cross Street)	BH-205	C-5	14.1	Refusal
		C-5A	16.5	Refusal
		C-5B	15.5	Refusal
		C-5C	15.6	Crunching @ 11'
		C-5D	15.4	Refusal
		C-5E	15.2	Crunching @ 2' - 3'
		C-5F	15.5	Crunching @ 12' - 13'
		C-5G	14.1	Crunching @ 12' - 13'
		C-5H	16.3	Refusal

was made that 20 feet was adequate. This decision proved correct, and the CPT method was successful in finding locations suitable for drilling.

Decontamination of the CPT rods was accomplished by remvoing the rods below the CPT rig and steam cleaning them using the drill rigs steam cleaner. Wash water was collected and stored on site in 55-gallon capacity drums. Because of the small probehole diameter and the depth of the groundwater, probeholes were not grouted.

Field personnel worked in Level C personal protection equipment because it was assessed that the possibility existed for contact with potentially hazardous contaminants. This level of protection was also used during grouting and decontamination procedures.

5.0 RESULTS AND DISCUSSION

5.1 SOIL CONTAMINATION

The depths of soil samples that were analyzed vary from 10 to 55 feet. The concentrations of total petroleum hydrocarbons ranged from 3 to 9 mg/kg in boreholes BH-201 through BH-209-15 (Table 4). In the BH-209-35 sample the total petroleum hydrocarbon concentration was 61 mg/kg which was expected since the soil at this depth had some gasoline contamination. There appeared to be no correlation between the headspace OVA readings and total petroleum hydrocarbons levels. This suggests that petroleum hydrocarbons are probably waste oil, coal tar, and other high boiling point hydrocarbons.

As described in Section 3.1, the materials encountered in most boreholes were fill in the first 5 feet, and pieces of wood, brick and concrete for the next 10 feet. No odors or stained soils were observed in most boreholes. In borehole BH-209 stains and gasoline and hydrogen sulfide odors were observed at 15 feet and 30 to 35 ft depths, respectively. A creosote-like odor was detected at depths from approximately 40 to 60 feet in boreholes BH-204, BH-208, and BH-209 in the vicinity of Center and Commercial streets.

Soil pH's ranged from 7.05 (BH-203-35) to 9.34 (BH-202-30) with most pH's between 8.1 and 9.1, in the slightly basic range.

Six of the thirteen soil samples analyzed contained detectable (but generally low) levels of organic priority pollutants (Table 4). Samples BH-207-30 and BH-209-35 exhibited the largest range of organic priority pollutants with most of the concentrations near the detection limit. In the BH-207-30 sample, the only exception was 4-methyl-2-pentanone with a concentration of 0.55 mg/kg (detection limit is 0.05 mg/kg). In BH-209-35 soil sample, phenanthrene, fluoranthene, and pyrene had measurable concentrations but were still not far above the detection limit. The soil sample from BH-201-30 contained low levels of pyrene (0.2 mg/kg) and 4-methyl-2-pentanone (0.19 mg/kg). Soils from BH-203-10 contained measurable levels of pyrene (11 mg/kg), benzo (a) pyrene (5 mg/kg), and benzo (g, h, i) perylene (27 mg/kg). Two samples,

BH-204-30 and BH-209-15, contained detectable levels of 4-methyl-2-pentanone, 0.07 and 0.4 mg/kg, respectively.

Phase I of the Metro Rail project was performed prior to this investigation. The Phase I study area was directly north of the present field investigation. Soil analyses for the present study identified similar findings (polynuclear aromatics) with Phase I, however, the concentrations of these constituents were significantly lower than those of Phase I. Concentrations of contaminants found in the samples analyzed for this phase of the effort indicate that the volume of soil that would be classed as hazardous is probably small.

5.2 GROUNDWATER CONTAMINATION

Eight groundwater samples were analyzed for sulfides and pH. One water sample, BH-208, was a duplicate of BH-205. The laboratory results for these two samples found similar sulfide concentrations, 7.3 and 8.0 ppm, and a pH of 7.29. Two samples, BH-204 and BH-205 had measurable sulfide concentrations of 14.58 and 7.3 ppm, respectively. The remaining water samples had sulfide concentrations of 1.5 ppm or less. The pH of the water samples was in the 7.0 to 8.0 range except for BH-207 which had a pH of 9.29.

Two groundwater samples, BH-204 and BH-209, were analyzed for organic priority pollutants using EPA Methods 624 and 625 (Table 3). BH-204 is located on Old Center Street and BH-209 is located at the intersection of Old Center Street and Commercial Street (Figure 3). These groundwater samples were contaminated with low levels of polynuclear aromatic hydrocarbons. Naphthelene was measured at 110 and 180 µg/l and benzo (a) pyrene at 40 and 15 µg/l. In the BH-204 water sample, fluoranthene and pyrene were measured at 119 and 132 µg/l, respectively. Several purgeable aromatic hydrocarbons including toluene, benzene, ethylbenzene, and xylene were detected in BH-209. Ethylbenzene was detected in BH-204 but at a lower concentration than the BH-209 water sample. No chlorinated solvents (e.g. trichloroethylene, tetrachloroethylene) were found in the groundwater samples. As with the soil, concentrations of contaminants in the groundwater were low.

6.0 CONCLUSIONS

Based on Phase I studies and the results of this field investigation (Phase IV), the following conclusions can be drawn:

- Fill material was encountered in six of the nine boreholes, with fill depths ranging from three to nine feet. At most of the nine borehole locations, gravel, cobbles, or debris (e.g., brick, concrete) was encountered in the upper 15 feet.

- There is evidence of low levels of contamination probably associated with past site operations north and east of the investigation area.

- Low level contaminants are identifed as polynuclear aromatic hydrocarbons that are coal-tar derivatives.

- Types of contaminants found are consistent with data presented in the Phase I study. However, concentrations of contaminants are much lower than reported in the Phase I data.

- Groundwater in boreholes BH-204 and BH-209 contain low levels to non-detectable levels of polynuclear aromatic hydrocarbons purgeable aromatic hydrocarbons such as ethylbenzene, xylene, and sulfides.

Quantitative results obtained, as reported herein, do not show evidence of significant contamination being present in the soil or groundwater. Based on the data thus available, development of the Metro Rail system through this area does not appear to be inhibited by the presence of hazardous contamination.

7.0 REFERENCES

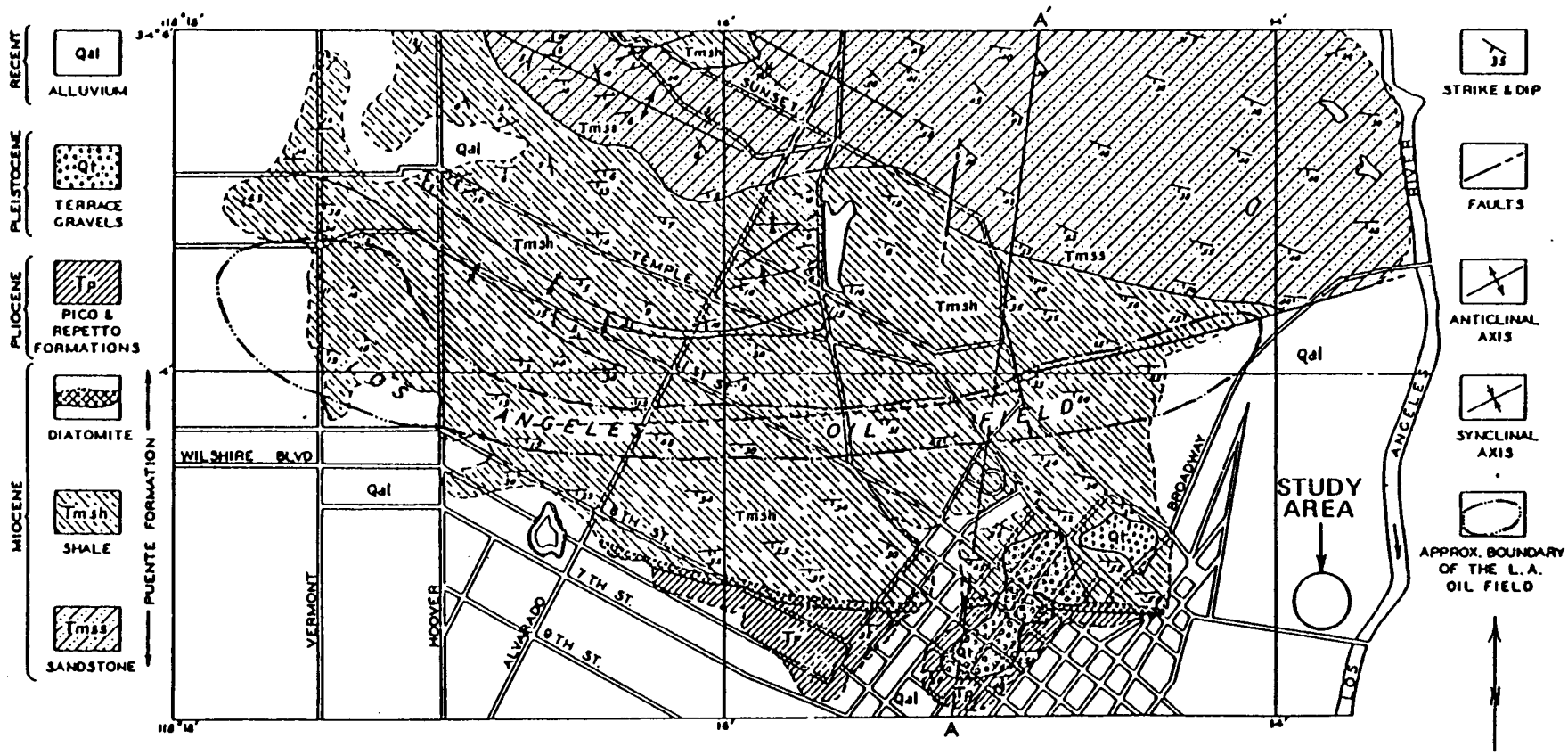
Earth Technology Corporation, 1986. Phase I - The Subsurface Investigation at the Metro Rail A-130 Corridor, Los Angeles, California, The Earth Technology Corporation, Long Beach, December.

State of California, 1943. Department of Natural Resources, Division of Mines, Geologic Formations and Economic Development of the Oil and Gas Fields of California, San Francisco, March.

State of California, Department of Water Resources, 1961. Planned Utilization of the Ground Water Basins of the Coastal Plan of Los Angeles County, Bulletin NO. 104, Appendix A, Ground Water Geology, June.

U.S. Geological Survey. Los Angeles Quadrangle - Los Angeles County, 7.5 Minute Series Topographic, U. S. Department of the Interior.

Woodward-Clyde Consultants, 1986. Hazardous Materials Investigation at the Construction Site of the Los Angeles Busway, Volumes 1 and 2, prepared for C. C. Meyers, Inc., Pico Rivera, California.



NOT TO SCALE

SOURCE: BULLETIN NO. 118, CALIFORNIA DIVISION OF MINES

The Earth Technology Corporation

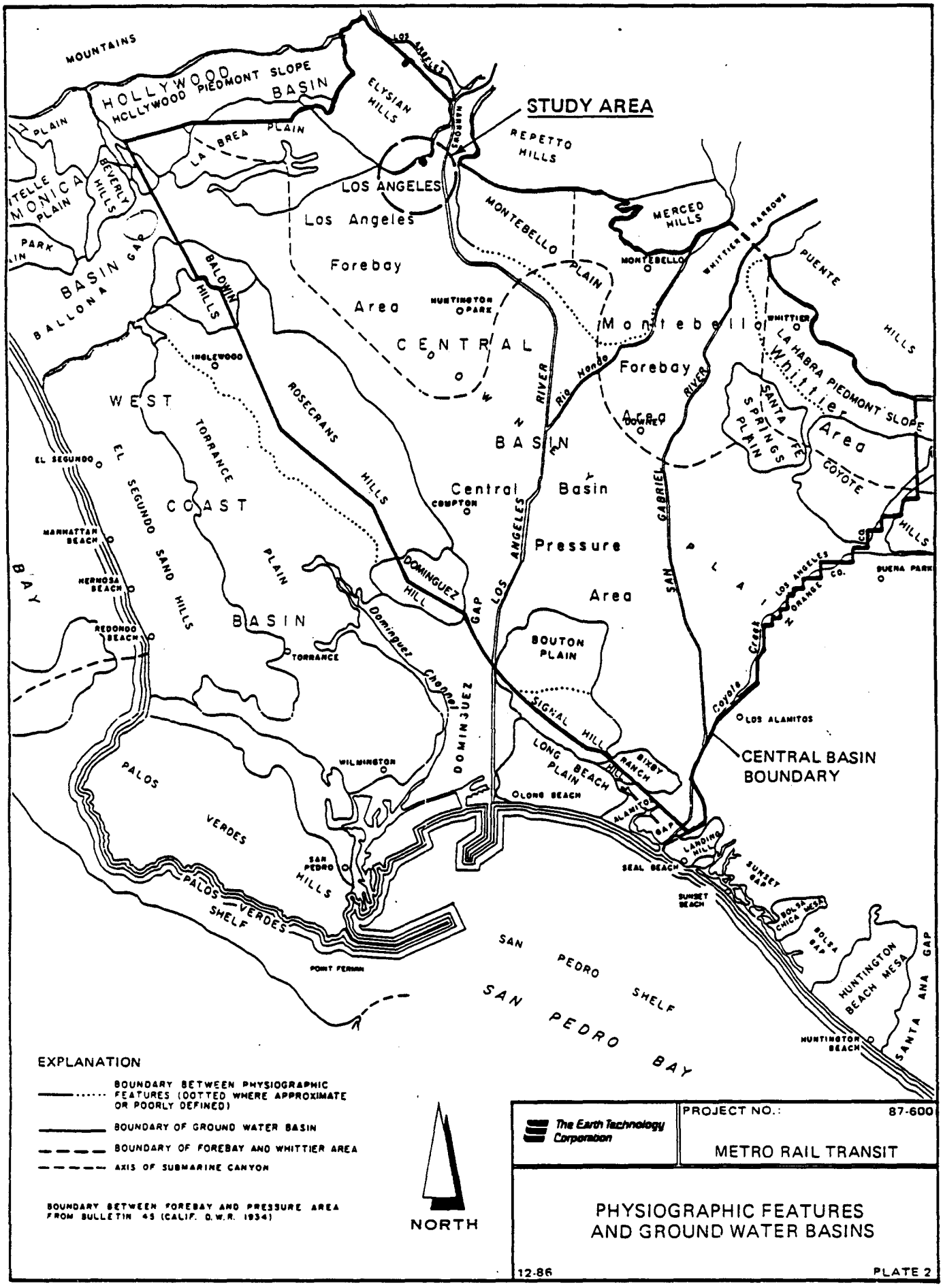
PROJECT NO.: 87-600

METRO RAIL TRANSIT

LOS ANGELES CITY OIL FIELD IN RELATION TO SITE

12-86

PLATE 1


STUDY AREA
MOUNTAINS
HOLLYWOOD PIEDMONT SLOPE
HOLLYWOOD BASIN
ELYSIAN HILLS
LOS ANGELES
REPETTO HILLS
LA BREA PLAIN
BEVERLY HILLS
BALDWIN HILLS
BALLONA GAP
BASIN
Los Angeles Forebay Area
HUNTINGTON PARK
CENTRAL BASIN
MONTEBELLO PLAIN
MERCED HILLS
MONTEBELLO
WHITTIER NARROWS
PUENTE HILLS
WHITTIER
LA HABRA PIEDMONT SLOPE
Whittier Area
SANTA FE SPRINGS PLAIN
COYOTE HILLS
Montebello Forebay Area
DOWNEY
INGLEWOOD
ROSECRANS HILLS
WEST COAST BASIN
TORRANCE
EL SEGUNDO
EL SEGUNDO SAND HILLS
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
TORRANCE
PLAIN
Central Basin Pressure Area
COMPTON
DOMINGUEZ HILL
DOMINGUEZ GAP
LOS ANGELES RIVER
RIO HONDO
SAN GABRIEL RIVER
LOS ANGELES - ORANGE CO.
BUENA PARK
Coyote Creek
LOS ALAMITOS
BOUTON PLAIN
SIGNAL HILL
LONG BEACH
BIXBY RANCH
ALAMITOS GAP
LANDING HILL
SEAL BEACH
SUNSET GAP
SUNSET BEACH
BOLSA CHICA MESA
BOLSA GAP
HUNTINGTON BEACH MESA
HUNTINGTON BEACH
SANTA ANA GAP
CENTRAL BASIN BOUNDARY
WILMINGTON
DOMINGUEZ CHANNEL
PALOS VERDES HILLS
PALOS VERDES SHELF
POINT FERMIN
SAN PEDRO SHELF
SAN PEDRO BAY
BAY
EXPLANATION
BOUNDARY BETWEEN PHYSIOGRAPHIC FEATURES (DOTTED WHERE APPROXIMATE OR POORLY DEFINED)
BOUNDARY OF GROUND WATER BASIN
BOUNDARY OF FOREBAY AND WHITTIER AREA
AXIS OF SUBMARINE CANYON
BOUNDARY BETWEEN FOREBAY AND PRESSURE AREA FROM BULLETIN 45 (CALIF. D.W.R. 1934)
NORTH
The Earth Technology Corporation
PROJECT NO.: 87-600
METRO RAIL TRANSIT
PHYSIOGRAPHIC FEATURES AND GROUND WATER BASINS
12-86
PLATE 2

APPENDIX A

SITE DAILY ACTIVITY REPORTS

DAILY ACTIVITY REPORT

1/7/87

SITE Metro Rail Transit PROJECT NO. 87-600-0032 DATE ~~1/6/87~~

CPT INVESTIGATION Earth Tech. Geophysics OPERATOR George Brown, Mark Roberts

HELPER Barbara Fontes

RIG USED TETC CPT CASING USED none SAMPLERS USED none

START TIME 8:00 AM END TIME 4:30 pm

PROTECTION LEVEL B C (D)

MONITORING EQUIPMENT HNU 11.7 10.2 OVA RAD EXPL

DESCRIPTION OF WORK PERFORMED Probed with the cone penetrometer in areas shown on attached Map. Completed drilling areas designate numbers 1, 2, 3, and 6 adjacent to the Santa Ana Freeway.

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION There is a possibility of a manhole and drainage system in the immediate area of drilling location 3. CPT didn't Probe closer than 5 feet to suspected drainage line.

ATTACHMENTS

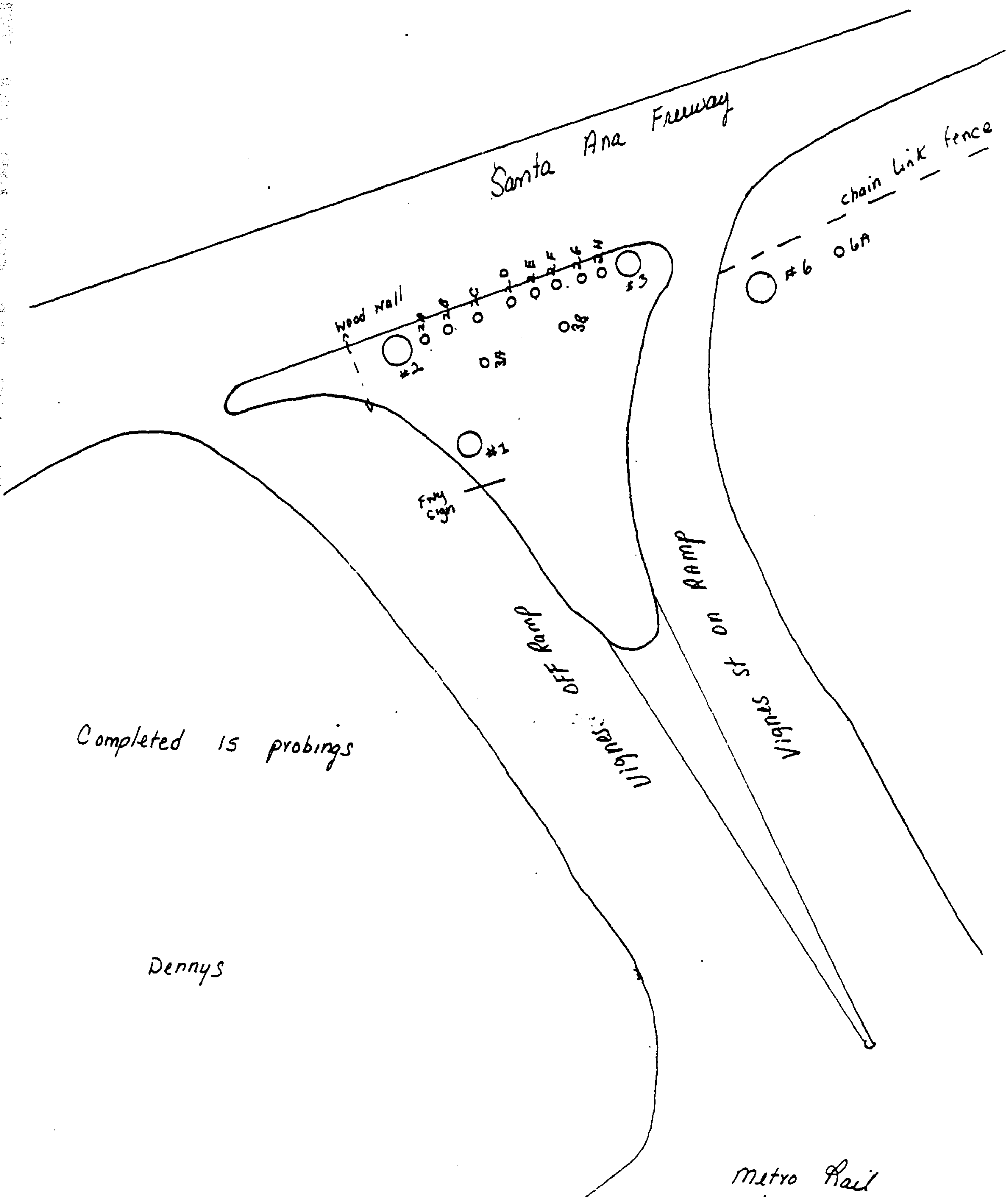
1. Boring Log(s)	(y)	n	attached
Gamma Log(s)	y	(n)	
2. Well Installation Details	y	(n)	
3. Water Level Observation	y	(n)	
4. Conversation Memo(s)	y	(n)	

Other – log book page 49

REPORT PREPARED BY Barbara Fontes DATE 1/6/87

CC: Joe Kylikowski
James Barker

Time	Probe	Remarks	Completion Depth	PSI
10:23 AM	C 1	11-12' Crunching hit something very hard at 25.5 ft.	25.5 ft	
10:30	C 2	16 ft. psi = 1780 18½ - 20 ft Crunching hit something very hard at 22.34 ft.	22.3 ft.	1,70
10:50	C 2A	hit refusal	20.9 ft	
11:09	C 2B	4' - hard crunching 15-16' hit something hard 19-20' (same) 23.10 - refusal	23.10 ft	1,90
11:26	C 2C	4-5' crunching 16-17' crunching 19.5' - refusal	19.5 ft	—
11:35	C 2D	26.3' - refusal	26.3 ft	—
	C 2E	24.4' - refusal broke tip of rod	24.4 ft	—
12:56	C 2E	17.32' refusal	refusal 17.32 ft	
1:11	C 2H C 2G	18.3 refusal 2.7' crunching 17.2' - refusal	18.3 17.2 ft	
1.42	C 3	22.9' refusal	22.9 ft	2,0
2:05	C 3A	14.2' Crunching 17.5' refusal	17.5 ft	1,70
2:25	C 3C	18.0' Crunching !! 26.4' refusal	20.4	2,0
3:15	C 6	13-14' Crunching 15' Crunching !! 27.2' refusal	27.2'	2,
3:38	C 6A	13' Crunching 20 - Crunching	22.4'	2,0



Metro Rail
1/6/87
B. Em[illegible]

Metro Rail

The Earth Technology Corporation

LOG OF PENETROMETER TESTS

Project Number 87-230-34 Logged By D. Bachus Date 1-7-87 JB

Project Name METRO RAIL Checked By _____ Date _____

Electrical System CPT # 2

CPT Number	Digital Designation	Total Penetration Depth	Instrument Number	Remarks
C-1		25.5		CRUNCHING @ 11-12', 16-17' ≈ 500 PSI 1700 PSI + TRUCK COMING UP @ 25.5'
C-2		22.3		" " " " 22.3'
C-2A = C-2+3' EAST ~~WEST~~ ~~NORTH~~		20.9		" " " " 20.9'
C-2B = C-2+6' EAST ~~NORTH~~		23.1		" " " " " 23.1
C-2C = C-2+9' EAST ~~NORTH~~		19.5		" " " " " 19.5
C-2D = C-2+12' EAST ~~NORTH~~		26.3		" " " " " 26.3
C-2E = C-2+15' EAST ~~NORTH~~		24.4		" " " " " 24.4
C-2F = C-2+18' EAST ~~NORTH~~		17.3		" " " " " 17.3
C-2G = C-2+21' EAST ~~NORTH~~		17.2		" " " " " 17.
C-2H = C-2+27' EAST ~~NORTH~~		18.3		" " " " " 18.

Date of Last Calibration (cone): _____ (piezo) _____

Calibration Settings: (cone) _____ (friction) _____ (piezo) _____

Calibration Values: (cone) _____ tsf/in-1 volt, (friction) _____ tsf/in-1 volt (piezo) _____ (units).

The Earth Technology Corporation

LOG OF PENETROMETER TESTS

Project Number 87-230-34 Logged By A. Bachus Date 1-7-87

Project Name METRO RAIL Checked By _____ Date _____

Electrical System CPT #2

CPT Number	Digital Designation	Total Penetration Depth	Instrument Number	Remarks
C-3		22.9'	—	2000 PSI @ 22.90' + TRUCK CUMING
C-3A 8' S of C-2C		17.3'		1700 " " 17.3' " " "
C-3B 8' S of C-2C		23.5'		2000 " @ 23.5' + " " "
C-3C		20.1'		2000 " " 20.1' " " "
C-6		27.2'		2000 " " 27.2' " " "
C-6A = C-6 + 8' ~~NORTH~~ EAST		22.4'		2000 " " 22.4' " " "

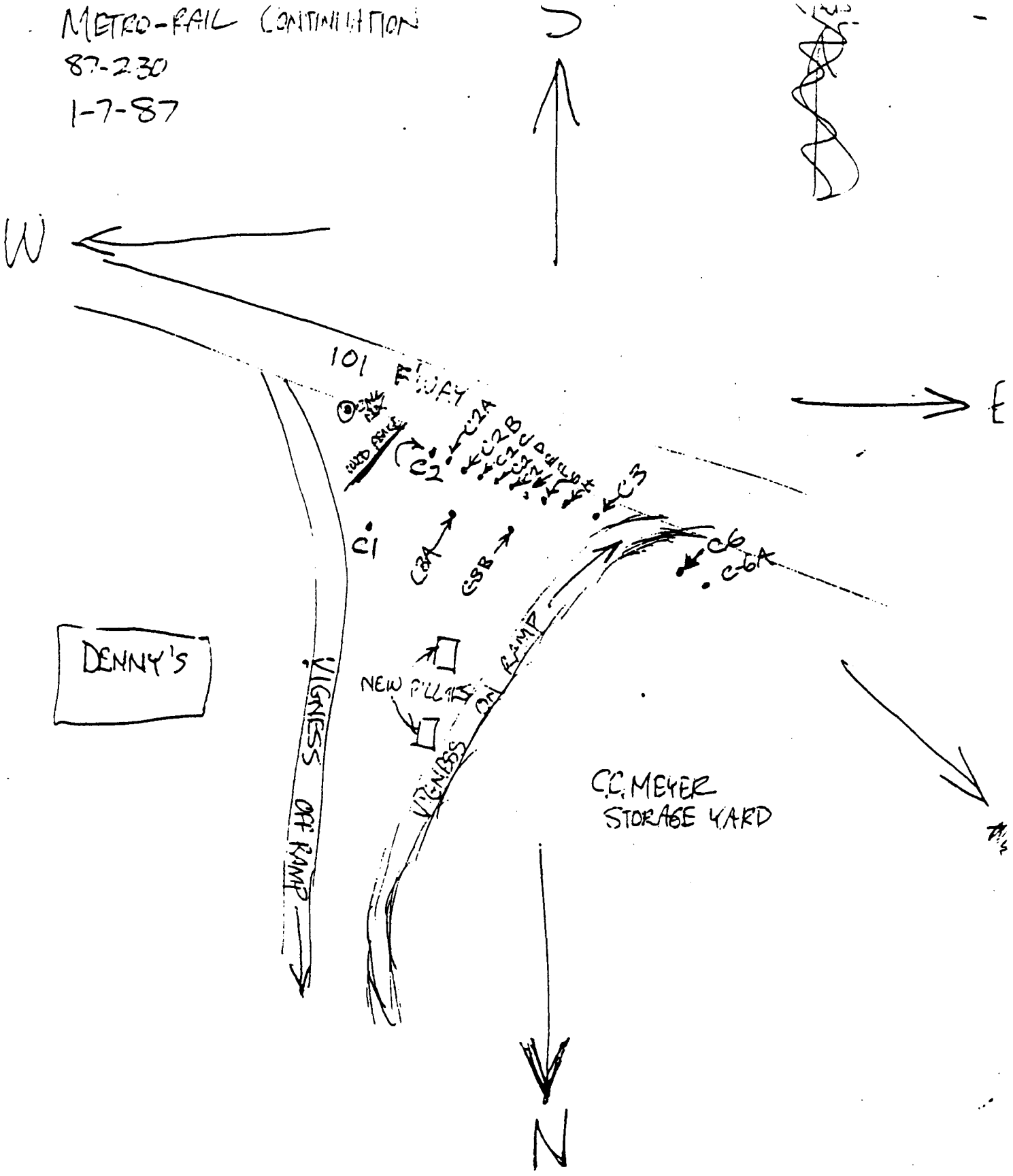
Date of Last Calibration (cone): _____ (piezo) _____

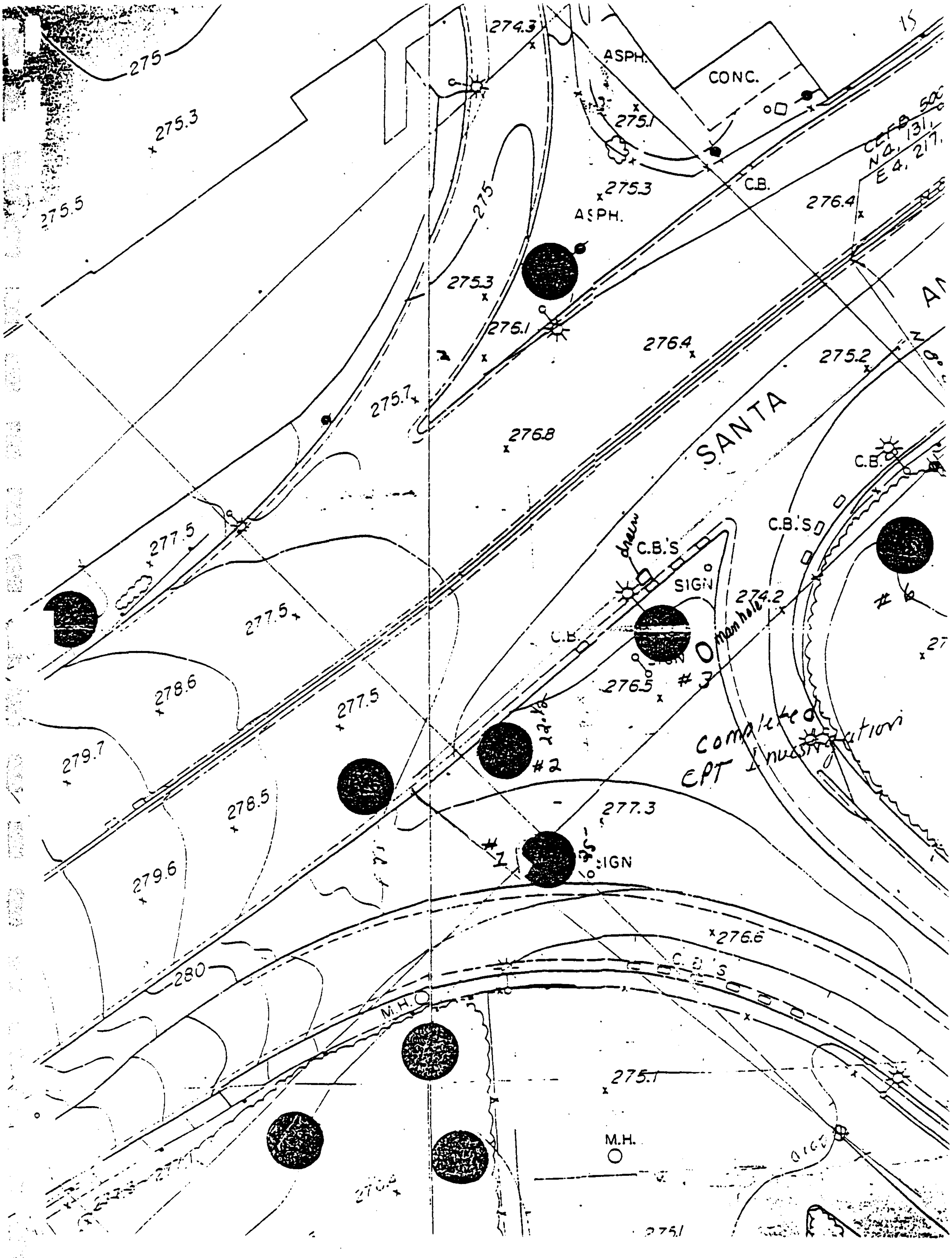
Calibration Settings: (cone) _____ (friction) _____ (piezo) _____

Calibration Values: (cone) _____ tsf/in-1 volt, (friction) _____ tsf/in-1 volt (piezo) _____ (units).

CPT-01 8/82

METRO-RAIL CONTINUATION
87-230
1-7-87





15
275
275.3
275.5
274.3
ASPH.
CONC.
275.1
275.3
ASPH.
C.B.
276.4
275
275.3
275.1
276.4
275.2
275.7
276.8
SANTA
C.B.
277.5
C.B.'S
C.B.'S
SIGN
274.2
manhole
#6
277.5
C.B.
276.5
#3
278.6
277.5
Completed CPT Investigation
#2
279.7
278.5
277.3
#1
SIGN
279.6
276.6
280
C.B.'S
M.H.
275.1
M.H.

DAILY ACTIVITY REPORT

SITE Metro Rail Transit PROJECT NO. 87-600-000 DATE 1-8-87

DRILLING CONTRACTOR Drill Line DRILLER Greg DeLuca

HELPER Tom Hale

RIG USED B-53 (6" augers) CASING USED None SAMPLERS USED Split spoon

START TIME 8:00 am END TIME 4:00 pm

PROTECTION LEVEL B C (D)

MONITORING EQUIPMENT HNU 11.7 10.2 (OVA) RAD EXPL

DESCRIPTION OF WORK PERFORMED Completed Borehole BH-201 to depth of 46.5 ft, could not go farther hit boulder. Water samples taken from BH-201. Completed Borehole BH-202 to ~~46.5~~ 50 ft, had to abandon further drilling/water sampling due to breaking of hammer.

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION Hammer broke on borehole BH-202 at 50 feet and decided not to redrill and did not get water sample

ATTACHMENTS

1. Boring Log(s) (y) n
   Gamma Log(s) y (n)
2. Well Installation Details y (n)
3. Water Level Observation (y) n
4. Conversation Memo(s) y (n)
5. Other - Log Book Log Book Page 51

REPORT PREPARED BY Sharon Kagan (CBI) DATE 1/8/87

cc: Joe Kulikowski
Larry Barker

DAILY ACTIVITY REPORT

SITE Metro Rail Transit PROJECT NO. 87-600-0033 DATE 1/9/87

DRILLING CONTRACTOR Drill Line DRILLER Gregg Deluca and John Hale

HELPER (John Hale)

RIG USED B-53 (6" augers) CASING USED None SAMPLERS USED Split spoon.

START TIME 8:00 am END TIME ≈ 3:00 pm

PROTECTION LEVEL B C (D)

MONITORING EQUIPMENT HNU 11.7 10.2 (OVA) RAD EXPL

DESCRIPTION OF WORK PERFORMED Completed Borehole 206A located adjacent to the Santa Ana Freeway on ramp and to excavated area of Brew 102. Borehole completed to 40 feet after two attempts. Concrete encountered at approximately 4-5 feet. The subsurface appears to consist of about 15 feet of fill mixed with brick fragments. Samples for laboratory analysis are: BH-206A-40 (PH, EPA METHOD 9030)
BH-206A (EPA METHOD 8240, 8270, 418.1, PH)

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION At 40 feet there was about 10 feet of slough in the augers. We couldnt get a representative sample of the soil or water (unless the borehole is redrilled). Because of the tight schedule and the close location of boreholes 201, 202, & 203 We did not redrill.

ATTACHMENTS

1. Boring Log(s)	(y)	n	
Gamma Log(s)	y	(n)	
2. Well Installation Details	y	(n)	
3. Water Level Observation	(y)	n	29.5 feet
4. Conversation Memo(s)	(y)	n	Log Bk pg 53, photo
other			

REPORT PREPARED BY Barbara Fontes DATE 1/9/87

cc: Larry Barker; J. Kulikowski

DAILY ACTIVITY REPORT

SITE Metro Rail Transit PROJECT NO. 87-606-0033 DATE 11/10/87

DRILLING CONTRACTOR Drill Line DRILLER Gregg Deluca and John Hale

HELPER John Hale

RIG USED B-53 (6" augers) CASING USED None SAMPLERS USED Split Spoon

START TIME 8:00 AM END TIME 10:00

PROTECTION LEVEL B (C) D

MONITORING EQUIPMENT HNU 11.7 10.2 (OVA) RAD EXPL

DESCRIPTION OF WORK PERFORMED Set up on borehole BH-204 in the center of old Center Street.

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION OVA would not work. Work was cancelled and the OVA was taken back to the ETC laboratory to be fixed. There was a short in the power switch.

ATTACHMENTS

1. Boring Log(s) y (n)
   Gamma Log(s) y (n)
2. Well Installation Details y (n)
3. Water Level Observation y (n)
4. Conversation Memo(s) y (n)

REPORT PREPARED BY Barbara Fontes DATE 11/12/87

DAILY ACTIVITY REPORT

SITE Metro Rail Transit PROJECT NO. 87-600-0033 DATE 11/12/87

DRILLING CONTRACTOR Drill Line DRILLER Gregg Deluca and John Hale

HELPER

RIG USED B-53 (6" augers) CASING USED None SAMPLERS USED Split spoon

START TIME 7:00 AM END TIME 5:00

PROTECTION LEVEL B C (D)

MONITORING EQUIPMENT HNU 11.7 10.2 (OVA) RAD EXPL

DESCRIPTION OF WORK PERFORMED Completed two boreholes to a depth of 60 feet each. Borehole BH-207 is located at the 101 Fwy entrance (South) and adjacent to an abandoned warehouse. BH-204 is located at the old Center Street, in front of The "bag factory"

Elevated OVA readings: BH-207-30' = 12ppm

Creosote odors was evident at BH-207-40' = 12 ppm

40', 45', 50', and 60' BH-204-25' = 160 ppm

BH-204-30' = 200 ppm

BH-204-60' = >1000 ppm

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION There wasn't sufficient recovery for laboratory samples from BH-204-60'. We were having problems with sand (Fine) heaving & sloughing into the augers causing the hammer & sampler to get stuck. Also when we hit a large cobble or a boulder the augers would angle & go crooked. We ever we would encounter the mentioned problem, we would auger down to 60' & try to get a soil sample. The problem usually started at about 40'

ATTACHMENTS

1. Boring Log(s)	(y)	n	
Gamma Log(s)	y	(n)	
2. Well Installation Details	y	(n)	
3. Water Level Observation	(y)	n	BH-207 is 30 ft + BH-204 is ± 30'
4. Conversation Memo(s)	y	n	
5. Other			Photo

REPORT PREPARED BY Barbara Fontes DATE 11/12/87

cc. J. Kalikowski, L. Barker,

TIME	Laboratory Samples
	BH-207-30 EPA 8240, 8270, 418.1, pH
	BH-207-60 pH
	BH-207-60 EPA 9030
	BH-207-60 pH
	BH-204-30 EPA 8240, 8270, 418.1, pH
	BH-204-60 pH
	BH-204-60 EPA 9030
	BH-204-60 pH
	Note - EPH Method 624, 625, 418.1 - Water Samples being held for the above analysis

Signature Barbara Fowles Date 1/12/87

Fwy 101 acce · ramp site.
Borehole area 201, 202, 203 and 206

The Earth Technology Corporation

LOG OF PENETROMETER TESTS

Project Number 87-230-34 Logged By D. Boehm Date 1-7-87 JB
Project Name METRO RAIL Checked By _____ Date _____
Electrical System CPT #2

CPT Number	Digital Designation	Total Penetration Depth	Instrument Number	Remarks
C-1		25.5		CRUNCHING @ 11-12', 16-17', ≈ 500 PSI 1700 PSI + TRUCK COMING UP @ 25.5'
C-2		22.3		" " " " 22.3'
C-2A = C-2+3' EAST NORTH		20.9		" " " " 20.9'
C-2B = C-2+6' EAST NORTH		23.1		" " " " 23.1
C-2C = C-2+9' EAST NORTH		19.5		" " " " 19.5
C-2D = C-2+12' EAST NORTH		26.3		" " " " 26.3
C-2E = C-2+15' EAST NORTH		24.4		" " " " 24.4
C-2F = C-2+18' EAST NORTH		17.3		" " " " 17.3
C-2G = C-2+21' EAST NORTH		17.2		" " " " 17.2
C-2H = C-2+27' EAST NORTH		18.3		" " " " 18.3

Date of Last Calibration (cone): _____ (piezo) _____
Calibration Settings: (cone) _____ (friction) _____ (piezo) _____
Calibration Values: (cone) _____ tsf/in-1 volt', (friction) _____ tsf/in-1 volt (piezo) _____ (units).

CPT-01 8/82

'LY LOG OF IN-SITU TESTING

PROJECT NUMBER 87-230-34 PROJECT NAME _____

DATE _____ TRUCK NUMBER CPT #2 CREW AB/MR

TIME
OPERATOR 0600 TO 1700 CHARGEABLE HOURS 10.5
HELPER 0600 TO 1700 CHARGEABLE HOURS 10.5
TRUCK 0900 TO 1545 HOURS: TESTING 6.5
MOB/TRAVEL 2.3 STBY 1.0 MAINTENANCE _____ OTHER _____

MILEAGE CPT START _____ END _____ TOTAL 60
SUPPORT VEHICLE START _____ END _____ TOTAL 60

INSTRUMENT(S) NUMBER _____

TEST LOG TYPE OF TEST NONE DUMMY PROBES

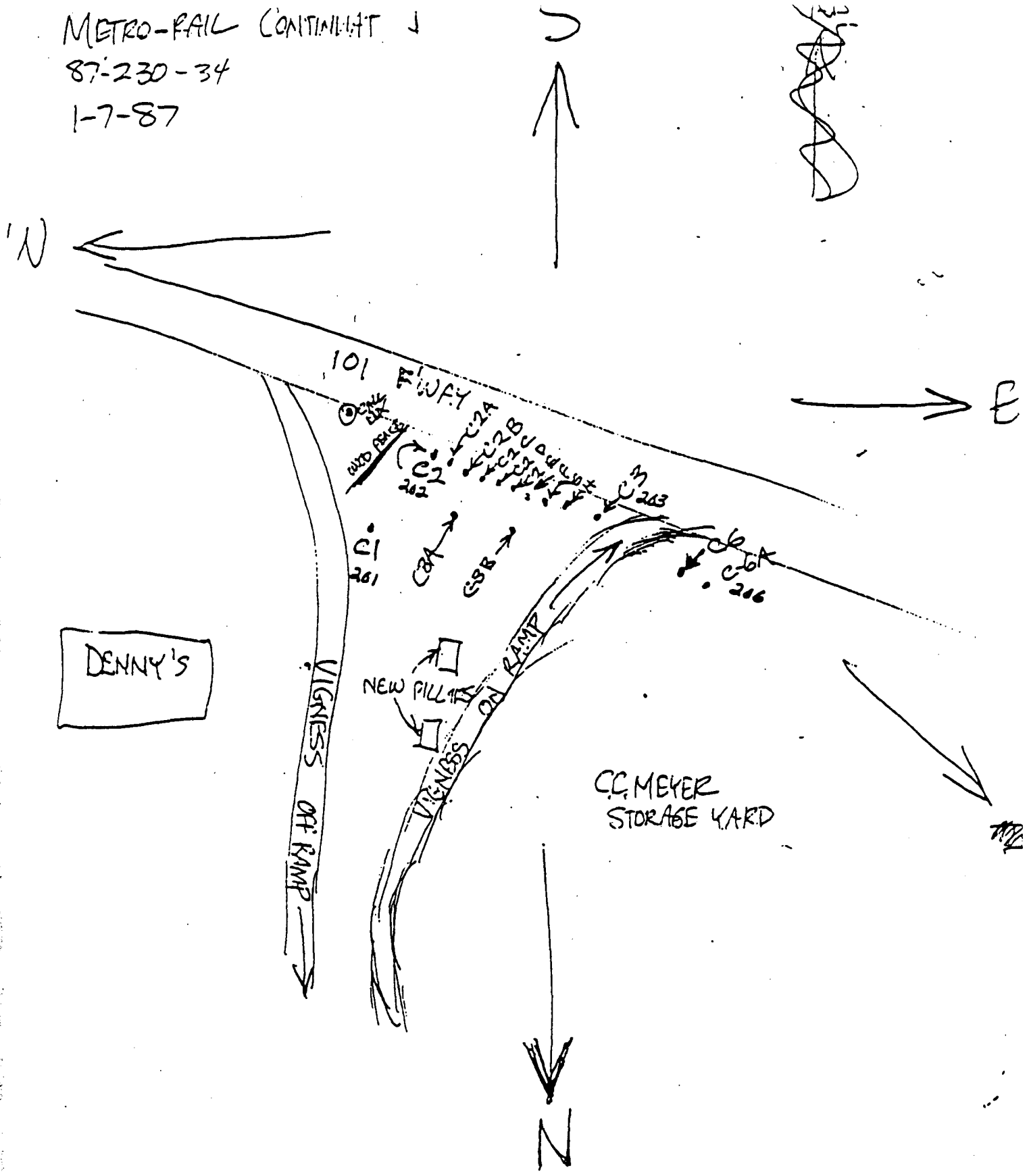
NUMBER	DEPTH (FT)	NUMBER	DEPTH (FT)	NUMBER	DEPTH (FT)	NUMBER	DEPTH (FT)
C-1	25 ~~C-3~~	C-3	22.9'				
2	22.3 ~~3A~~	3A	17.3'				
2A	20.9 ~~3B~~	3B	23.5'				
2B	23.1 ~~3C~~	3C	20.1'				
2C	19.5	6	27.2'				
2D	26.3	6A	22.4'				
2E	24.4						
2F	17.3						
2G	17.2						
2H	18.3						

REMARKS 0600-0700 LOAD HAZ WASTE EQUIP.
0700-0900 MOB TO SITE
0800-0900 STNBY + DISCUSS JOB
0900-1200 SET UP + PUNCH FIRST 6 HOLES
1200-1230 LUNCH
1230-1545 SETUP + PUNCH LAST 10 HOLES
1545-1700 MOB BACK TO SITE CLIENT _____

Ertec

E-06 6-81

METRO-RAIL CONTINUITY
87-230-34
1-7-87



The Earth Technology Corporation

LOG OF PENETROMETER TESTS

Project Number 87-230-34 Logged By JB Date 1-12-87

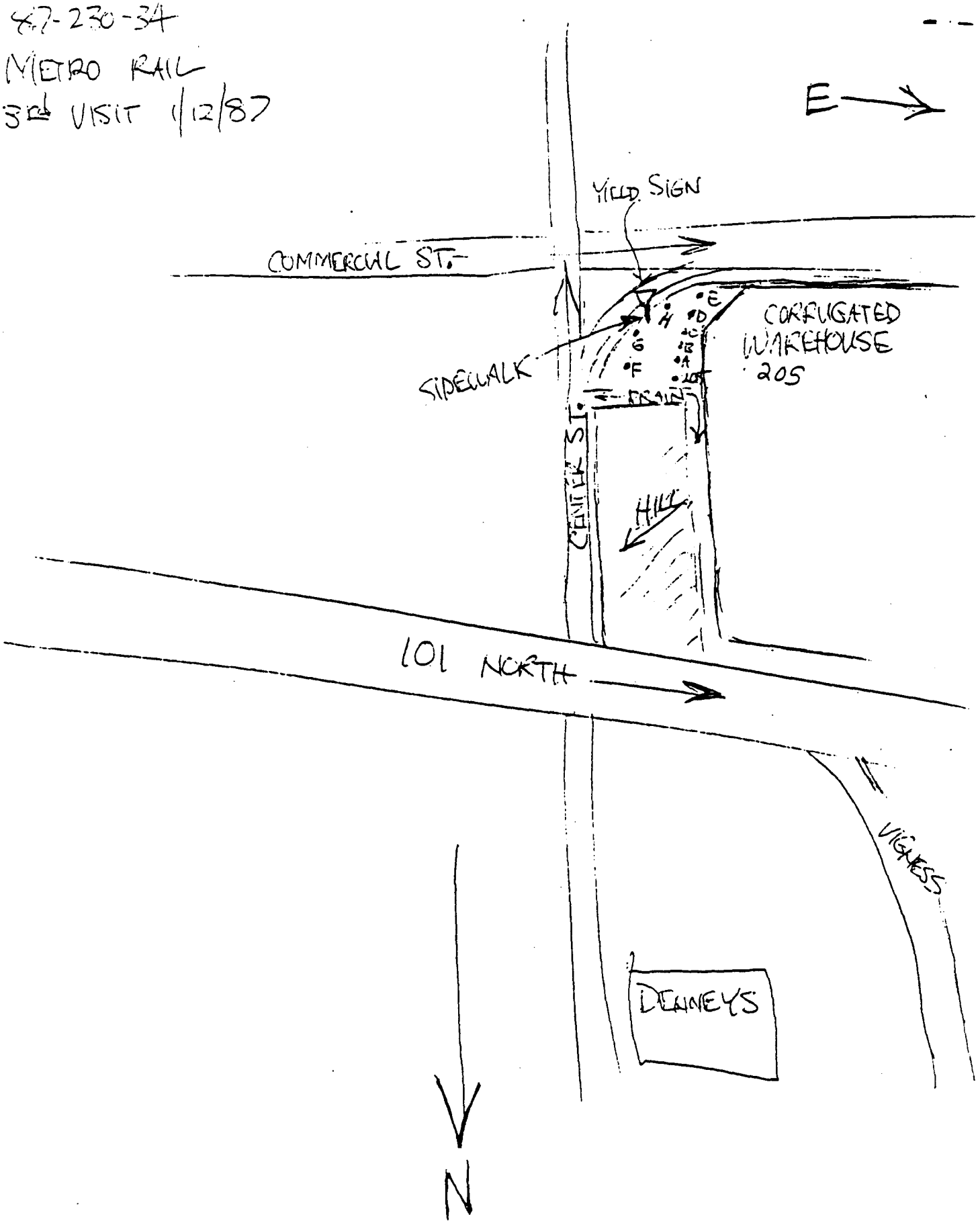
Project Name METRO RAIL Checked By _____ Date _____

Electrical System _____

CPT Number	Digital Designation	Total Penetration Depth	Instrument Number	Remarks SPECTRUM CLEAR UTILITIES QUESTIONABLE
205		14.1		100 BAR + CRUNCHING 14.1' 830 900
205A		16.5		100 BAR + CRUNCHING 16.5' 900 930
205B		15.5		" " " 15.5' 930-1000
205C		15.6		SLIGHT CRUNCHING + 40 BAR @ 11' 1000-1020 100 BAR + CRUNCHING @ 15.6'
205D		15.4		" " " 15.4' 1020-104
205E		15.2		SLIGHT CRUNCHING + 20-40 BAR @ 2-3' 1040- 100 BAR + CRUNCHING @ 15.2'
205F		15.5		SLIGHT CRUNCHING + 40-60 BAR 12-15' 1110- 100 BAR + CRUNCHING @ 15.5'
205G		14.1		SLIGHT CRUNCHING + 40-60 BAR 12-15' 1130-1200 100 BAR + CRUNCHING @ 14.1'
205H		16.3		" " " " 16.3'

CPT-01 8/82

87-230-34
METRO RAIL
3rd VISIT 1/12/87



DAILY ACTIVITY REPORT

SITE Metro Rail Transit PROJECT NO. 87-600-0033 DATE 11/12/87

DRILLING CONTRACTOR Drill Line DRILLER Gregg Deluca and John Hale

HELPER

RIG USED B-53 (6" augers) CASING USED None SAMPLERS USED Split spoon

START TIME 8:00 END TIME 5:00

PROTECTION LEVEL B C D

MONITORING EQUIPMENT HNU 11.7 10.2 (OVA) RAD EXPL

DESCRIPTION OF WORK PERFORMED Completed borehole BH-205 on the corner of Center and Commercial Street and BH-208 northeast of BH-205 adjacent to Center Street. Both boreholes were completed to 60 feet. There was a slight chemical odor in borehole BH-208 from 40 feet to 60 feet. Also it appears that the backfill used for the vacant buildings (backfill) - Z.B. 7/16/87 is not natural to the area. It contained sea shells which has not been encountered anywhere else on the site.

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION Had problems with the sampler and hammer getting stuck around 50 feet. Advanced augers beyond 50 feet to get a representative water sample. Results are: 1) Obtained Water Sample for borehole BH-205 and lost borehole BH-208 due to sampler stuck in the auger.

ATTACHMENTS

1. Boring Log(s) (y) n
   Gamma Log(s) y (n)
2. Well Installation Details y (n)
3. Water Level Observation (y) n BH-205 = 30' BH-208 = 25'
4. Conversation Memo(s) y (n)
5. Other Photos

REPORT PREPARED BY Barbara Fortin DATE 11/13/87

cc: J. Kulikowski) L. Barker

TIME	
9:00	PDCD crew arrived on site and tied in the drilling sites.
	Elevated OVA readings
	BH-208-25 = 100 ppm
	BH-208-30- = 40 ppm
	BH-205 -50' = 100 ppm
	BH-205 -55 = 100 ppm

Signature Barbara Fortin Date 11/3/87

DAILY ACTIVITY REPORT

SITE Metro Rail Transit PROJECT NO. 87-600-0033 DATE 1-14-87

DRILLING CONTRACTOR Drill Line DRILLER Gregg Deluca and

HELPER John Hale

RIG USED B-53 (6" augers) CASING USED None SAMPLERS USED Split spoon

START TIME 9:00 am END TIME 3:30 pm

PROTECTION LEVEL B C (D)

MONITORING EQUIPMENT HNU 11.7 10.2 OVA RAD EXPL

DESCRIPTION OF WORK PERFORMED Completed BH-203 (Vignes Offramp of 101) to 60 feet. Borehole was slant drilled at an angle of 20° to a vertical depth of 60 feet (used 65 feet of augers) which translated to a horizontal distance of ~20 feet from the borehole in the direction of the freeway. OVA was not functioning properly. Hammer was sticking and not falling properly so no samples collected from 40 to 60 feet. Collected water samples at 60 feet.

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION OVA not functioning properly, continued drilling since previous work in area showed it to be clean. Hammer was sticking and not falling properly so no samples collected between 40 and 60 feet.

ATTACHMENTS

1. Boring Log(s)	(y)	n	BH-203
Gamma Log(s)	y	(n)	
2. Well Installation Details	y	(n)	
3. Water Level Observation	(y)	n	approx. 30 feet
4. Conversation Memo(s)	y	(n)	
5. Other			

REPORT PREPARED BY Sharon Lagas DATE 1-14-87

DAILY ACTIVITY REPORT

SITE Metro Rail Transit PROJECT NO. 87-600-0033 DATE 1/21/87

DRILLING CONTRACTOR Drill Line DRILLER Gregg Deluca

HELPER John Hale

RIG USED B-53 (6" augers) CASING USED None SAMPLERS USED Split Spoon

START TIME 8:00 am END TIME 3:00 pm

PROTECTION LEVEL B (C) D

MONITORING EQUIPMENT HNU 11.7 10.2 (OVA) RAD EXPL

DESCRIPTION OF WORK PERFORMED Completed borehole BH-209 to a depth of 50 feet. The following was observed during the drilling:

1) Voids were encountered at 10 ft. and 30 ft. The sampler suddenly dropped during the last 8" of the blow counts

2) Soil was stained black and smelled like gasoline at 15 ft.

(cont)

DESCRIBE PROBLEMS/POTENTIAL PROBLEMS & ACTION At 45 ft. there was 4 ft. of slough in the augers. We drilled to 50 ft. with no recovery, and tried to knock out the plug to get a water sample. (It was successful).

ATTACHMENTS

1. Boring Log(s)	(y)	n	
Gamma Log(s)	y	(n)	
2. Well Installation Details	y	(n)	
3. Water Level Observation	(y)	n	about 30 feet
4. Conversation Memo(s)	y	n	Log Book - Page 57

REPORT PREPARED BY Barbara Fontes DATE 1/21/87

TIME

3) Strong oily odor at 25 feet and 30 feet and the soil appeared saturated (very moist)

4) Creosote odor was evident from 35 ft to 50 ft.

5) H_2S odor in soil at ± 30 feet and the water sample had the same odor

Elevated OVA Readings

Sample No.	OVA (PPm)
209-15(Ft)	33
209-30(Ft)	24
209-35(Ft)	46
209-40(Ft)	12

Signature Barbara Fontes Date 11/21/87

APPENDIX B

CHAIN-OF-CUSTODY FORMS AND LABORATORY DATA SHEETS

..EMICAL RESEARCH LABORATORIES, INC.

11631 SEABOARD CIRCLE, STANTON, CA 90680
TEL. NOS.: (714) 898-6370 (213) 598-0458

- ORANGE COUNTY
- VENTURA
- SANTA MARIA
- BAKERSFIELD
- L.A. COUNTY

CHAIN OF CUSTODY RECORD

Date 1-9-87 Page 1 of 2

CLIENT Earth Technology Corporation
ADDRESS 3777 Long Beach Blvd
Long Beach CA 90807

PROJECT MANAGER
Larry Barker
PHONE NUMBER
(213) 595-6611

PROJECT NAME
Metro Rail 87-600-0033

SAMPLERS: (Signature)
Barbara Fontes

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE WATER Comp.	WATER Grab.	AIR	SOLID	NO. OF CNTNRS	TESTS REQUIRED
BH-201-30	Traffic - Santa Ana	1-8-87	10:30				X	1 Brass	(EPA Method 8240, 8270)
BH-202-30	Traffic - Santa Ana	1-8-87	2:15				X	1 Brass	418.1, pH
BH-202-40	Traffic - Santa Ana	1-8-87	2:28				X	1 Brass	
BH-201-40.5	Traffic - Santa Ana	1-8-87	3:15		X			1 gal	EPA Method ~~9030~~ sulfide BF, pH
BH-201-40.5	Traffic - Santa Ana	1-8-87	3:15		X			2 VOAs	~~EPA Method 9030, pH~~ hold BF

Relinquished by: (Signature) Barbara Fontes 1/9/87	Received by: (Signature)	Date/Time 1/9/87 4:15 PM
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature) / Date/Time	Received for Laboratory by:	Date/Time 1/9/87 6PM

Method of Shipment:

Special Instructions: All water samples - Hold samples for EPA METHOD 624, 625, 418.1
24-48 hr RUSH

SOURCE: Adapted from U.S. EPA, 1985

EMICAL RESEARCH LABORATORIES, INC.
11631 SEABOARD CIRCLE, STANTON, CA 90680
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CHAIN OF CUSTODY RECORD

Date 1/9/87 Page 2 of 2

CLIENT Earth Technology Corporation
ADDRESS 3777 Long Beach Blvd.
Long Beach CA 90807

PROJECT MANAGER Larry Barker
PHONE NUMBER (213) 595-6611

PROJECT NAME Metro Rail 87-600-0033

SAMPLERS: (Signature) Barbara Fontes

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE WATER Comp.	WATER Grab.	AIR	SOLID	NO. OF CNTNRS	TESTS REQUIRED
BH-206A-40	Vignes St. - Adj. to Offramp	1-9-87	11:36		X			1 gal	pH hold
BH-206A-40	Vignes St. - Adj. to Offramp	1-9-87	11:36		X			2 VOAs	~~pH~~ hold
BH-206A-40	Vignes St. - Adj. to Offramp	1-9-87	11:36		X			1 pint	EPA Method 9030 sulfide, pH.
BH-206A-65	" " "	1-9-87	11:36				X	1	8240, 8270, 418.1, pH
BH-206A-35	" " "	1-9-87					X	1	" " " "

Relinquished by: (Signature) Barbara Fontes 1/9/87	Received by: (Signature)	Date/Time 1/9/87 4:15PM
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature) / Date/Time	Received for Laboratory by:	Date/Time 1/9/87 5pm
Method of Shipment:		

Special Instructions: All water samples - Hold samples for EPA Method 624, 625, 418.1
24-48 hr RUSH

SOURCE: Adapted from U.S. EPA, 1985

...EMICAL RESEARCH LABORATORIES, INC.

11631 SEABOARD CIRCLE, STANTON, CA 90680
TEL. NOS.: (714) 898-6370 (213) 598-0458

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CHAIN OF CUSTODY RECORD

Date 1/12/87 Page 1 of 2

CLIENT Earth Technology Corp
ADDRESS 3777 Long Beach Blvd
Long Beach CA 90807

Larry Barker
PROJECT MANAGER
(213) 595-6611
PHONE NUMBER

PROJECT NAME
Metro Rail 87-600-0033

SAMPLERS: (Signature)
Barbara Fontes

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE WATER Comp.	WATER Grab.	AIR	SOLID	NO. OF CNTNRS	TESTS REQUIRED
BH207-30	South 101 Fwy Entrance Ramps	1/12/86					X	1 Brass	EPA 8240, 8270, 418.1, pH
BH-207-60	Same	1/12/86			X			1 Gal	pH
BH-207-60					X			1 Pint	EPA 9030
BH-207-60					X			2 Vocs	~~Hold~~
BH-204-30	Old Center Street	1/12/86					X	1 Brass	EPA 8240, 8270, 418.1, pH
BH-204-60					X			1 Gal	pH
BH-204-60					X			1 Pint	EPA 9030

Relinquished by: (Signature) Barbara Fontes 1/12/87	Received by: (Signature) R Bartek	Date/Time 1-13-87 12:15 P
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature) / Date/Time	Received for Laboratory by:	Date/Time
Method of Shipment:		

Special Instructions: RUSH ON ANALYSES ~ 24-48 Hr.
All Water Samples — Hold samples for EPA Method 624, 625, 418.1

SOURCE: Adapted from U.S. EPA, 1985

MICAL RESEARCH LABORATORIES, INC.

11631 SEABOARD CIRCLE, STANTON, CA 90680
TEL. NOS.: (714) 898-6370 (213) 598-0458

RANGE COUNTY
- VENTURA
- SANTA MARIA
- BAKERSFIELD
- L.A. COUNTY

CHAIN OF CUSTODY RECORD

Date 1/12/87 Page 2 of 2

CLIENT Earth Technology Corp
ADDRESS 3777 Long Beach Blvd
Long Beach CA 90807

PROJECT MANAGER
Larry Barker
PHONE NUMBER
213 (595-6611)

PROJECT NAME
Metro Rail 87-600-0033

SAMPLERS: (Signature)
Barbara Fontes

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE WATER Comp.	WATER Grab.	AIR	SOLID	NO. OF CNTNRS	TESTS REQUIRED
BH-204-00	Old Center St	1/12/87			X			2 VOAs	~~pH~~ Hold
	TRIP BLANK							1 VOA	Hold

Relinquished by: (Signature)
Barbara Fontes 1/12/87

Received by: (Signature)
P Bartsch

Date/Time
1-13-87 12:15

Relinquished by: (Signature)

Received by: (Signature)

Date/Time

Relinquished by: (Signature)

Received by Mobile Laboratory for field analysis: (Signature)

Date/Time

Dispatched by: (Signature)

Date/Time

Received for Laboratory by:

Date/Time

Method of Shipment:

Special Instructions:
All Water Samples - Hold Samples for EPA Method 624, 625, 418.1

SOURCE: Adapted from U.S. EPA 1985

...EMICAL RESEARCH LABORATORIES, INC.

11631 SEABOARD CIRCLE, STANTON, CA 90680
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- L.A. COUNTY

CHAIN OF CUSTODY RECORD

Date 1/14/87 Page 1 of 2

CLIENT Earth Technology
ADDRESS 3777 Long Beach Blvd
Long Beach CA 90807

PROJECT MANAGER
Larry Bankus
PHONE NUMBER
(213) 595-6611

PROJECT NAME
Metro Rail 87-600-0033

SAMPLERS: (Signature)
Barbara Fontes & Sharon Lagas

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE: WATER Comp.	WATER Grab.	AIR	SOLID	NO. OF CNTNRS	TESTS REQUIRED
BH-205-55	Commercial + Center St	1/13/87	10:48				X	1 Brass	EPA METHOD 8240, 8270, 418.1 (pH)
BH-205-60	↓		10:59		X			1 Gal	pH
BH-205-60			10:59		X			1 Pint	EPA METHOD 9030
BH-205-60	↓		10:59		X			2 VOAs	pH
BH-208-55	NE of 205/Center St	1/13/87	1112				X	1 Brass	EPA METHOD 8240, 8270, 418.1 (pH)
BH-208-60	↓		3:00					1 Gal	pH
BH-208-60	↓		3:00					1 Pint	EPA METHOD 9030

Relinquished by: (Signature) 1/14/87
Barbara A Fontes

Received by: (Signature)

Date/Time 1/14/87 17:48

Relinquished by: (Signature)

Received by: (Signature)

Date/Time

Relinquished by: (Signature)

Received by Mobile Laboratory for field analysis: (Signature)

Date/Time

Dispatched by: (Signature)

Date/Time

Received for Laboratory by:

Date/Time

Method of Shipment:

Special Instructions: RUN EPA METHOD 624, 625, 418.1 on BH-208-60 Old Center Street [illegible]
Rush on Analysis 24-48 hr. Require QA with lab data. Hold EPA METHOD 624, 625, 418.1 on all water samples.

SOURCE: Adapted from U.S. EPA 1985

EMICAL RESEARCH LABORATORIES, INC.

11631 SEABOARD CIRCLE, STANTON, CA 90680
TEL. NOS.: (714) 898-6370 (213) 598-0458

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CHAIN OF CUSTODY RECORD

Date 1/14/87 Page 2 of 2

CLIENT Earth Technology Corporation
ADDRESS 3777 Long Beach Blvd
Long Beach CA 90807

PROJECT MANAGER
Larry Barker
PHONE NUMBER
(213) 595-6611

PROJECT NAME
Metro Rail 87-610-0033

SAMPLERS: (Signature)
Barbara Fontes & Sharon Lagos

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE WATER Comp.	WATER Grab.	AIR	SOLID	NO. OF CNTNRS	TESTS REQUIRED
BH-208-60	NE of 205/Center St	1/13/87	3:00		X			2 VOAs	pH
X BH-203-10	101 Fwy - North/Viaduct	1/13/87	10:51				X	1 brass	EPA Method 8240, 8270, 418.1 pH
BH-203-30			11:43				X	1 brass	EPA Method 8240, 8270, 418.1
BH-203-40			12:33		X			1 gal	pH
BH-203-60			12:33		X			1 Pint	EPA Method 9030
BH-203-60 X	X		12:33		X			2 VOAs	pH

Relinquished by: (Signature) 1/14/87 Barbara A. Fontes	Received by: (Signature)	Date/Time 1/14/87 17:40
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature) / Date/Time	Received for Laboratory by:	Date/Time
Method of Shipment:		

Special Instructions:
Rush on Analysis 24-48 hrs. QA with lab data Hold EPA Method 8240, 8270, 418.1 on all water samples

SOURCE: Adapted from U.S. EPA, 1985

CHEMICAL RESEARCH LABORATORIES, INC.

11631 SEABOARD CIRCLE, STANTON, CA 90680
TEL. NOS.: (714) 898-6370 (213) 598-0458

- ORANGE COUNTY
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- BAKERSFIELD
- L.A. COUNTY

CHAIN OF CUSTODY RECORD

Date 11/22/87 Page 1 of 1

CLIENT Earth Technology
ADDRESS 3777 Long Beach Blvd
Long Beach CA 90807

PROJECT MANAGER
Larry Barker
PHONE NUMBER
(213) 595-6611

PROJECT NAME
Metro Rail 87-600-0033

SAMPLERS: (Signature)
Barbara Fontes & Sharon Lagas

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE: WATER Comp.	WATER Grab.	AIR	SOLID	NO. OF CNTNRS	TESTS REQUIRED
209-15	Commercial + Center St	11/21/87	10:05				X	1 Brass	EPA METHOD 8240, 8270, 418.1 and pH
209-35	Same	11/21/87	10:44				X	1 Brass	
209-50	Same	11/21/87	11:11		X			2 VOAs	pH, 624
209-50	Same	11/21/87	11:11		X			1 Gal	pH, 625
209-50	Same	11/21/87	11:11		X			1 Pint	EPA METHOD ~~9030~~ Sulfide
	Trip Blank	11/22/87	—					1 VOA	624

Relinquished by: (Signature)
Barbara Fontes 9:12 am 11/22/87

Received by: (Signature)
R. Albany

Date/Time
11-22-87 10:15 A

Relinquished by: (Signature)

Received by: (Signature)

Date/Time

Relinquished by: (Signature)

Received by Mobile Laboratory for field analysis: (Signature)

Date/Time

Dispatched by: (Signature)

Date/Time

Received for Laboratory by:

Date/Time

Method of Shipment:

Special Instructions:
Rush on Analysis 24-48 hours. Require QA with lab data. Run all test

SOURCE: Adapted from U.S. EPA, 1985

REQUEST FOR S... C LAB TESTING
PROCEDURE QA-6

PROJECT NUMBER 87-215-16 DUE DATE Thursday EXIT LAB ________ DATE ________

PROJECT NAME Metro rail REQUESTED BY AP/LB DATE 1/20/87 APPROVED ________ DATE ________

REQUEST NUMBER 1 CHECKED BY ________ DATE ________ BILLED ________ DATE ________

BORING NUMBER	SAMPLE NUMBER	DEPTH INTERVAL	SAMPLE TYPE	MOISTURE/DENSITY	SIEVE	HYDROMETER	SPECIFIC GRAVITY	LIQUID & PLASTIC LIMIT	COMPACTION	RELATIVE DENSITY (δmin)	CBR	CONSOLIDATION: SATURATE AT	LOAD TO	REBOUND TO	RELOAD TO	REBOUND TO	TIME READINGS YES/NO	TRIAXIAL: TYPE	PRESSURE (PSI/KSF) VERTICAL δ_v	HORIZONTAL δ_h	PERMEABILITY: CELL PRESSURE (PSI)	BACK PRESSURE (PSI)	EXPANSION INDEX	VANE SHEAR	DIRECT SHEAR: VERTICAL PRESSURE (KSF)	PINHOLE EROSION	SAMPLE REMOLDING: DRY UNIT WT.	WATER CONTENT	OTHER TESTING			SPECIAL INSTRUCTION
201		30'	D	X						X																						HKS Level D All requested 5 minimum density tests.
202		40'	D	X						X																						
202		30'	D	X						X																						
204		30'	D	X																												
206A		15	D	X						X																						
206A		35	D	X						X																						
207		30	D	X																												
208		25	D	X																												
209		15'	D	X																												
209		40'	D	X																												
NUMBER OF TESTS			10	8						5																						
UNIT PRICE (1)				25						10																						
TOTAL PRICE				$250						$50																						TOTAL $300

LH 01 REV 3 12 81

(1) THE REQUESTOR SHOULD FILL OUT THE UNIT PRICES. FOR TESTS NOT CHARGED ON A UNIT PRICE BASIS, ... OUT N/A. THE UNIT PRICES WILL BE CHECKED BY THE LAB SUPERVISOR

(2) IF COMPACTION TESTS ARE REQUESTED, THE DRY UNIT WEIGHT CAN BE EXPRESSED AS A PERCENTAGE OF MAXIMUM DENSITY AND THE MOISTURE CONTENT CAN BE EXPRESSED AS A PERCENTAGE ABOVE OR BELOW OPTIMUM MOISTURE.

MOISTURE DENSITY SHEET

TEST PROCEDURE NO. 200

PROJECT: METRO RAIL
PROJECT NO.: 87-215-16 / [illegible]
BORING NO.:

TESTED BY: S.P. DATE: 1-21-87
COMPUTED BY: S.P. DATE: 1-22-87
CHECKED BY: [illegible] DATE: 1-22-87

SAMPLE TYPE	DRIVE	DRIVE	DRIVE	DRIVE	DRIVE	DRIVE	DRIVE
BORING NO.	201	202	202	20[illegible]	20[illegible]	206 A	20[illegible]
SAMPLE DEPTH (FT)	20	20	40	30	15	35	30
WET DENSITY (PCF) (A)	132.0	142.2	124.9	133.4	95.7	132.5	139.1
MOISTURE CONTENT (%) (B)	11.45	11.89	17.83	14.04	2.23	20.49	10.95
DRY DENSITY (PCF) (C)	118.4	127.1	106.0	117.0	93.6	110.0	125.4
VOID RATIO (D)	0.397	0.302	0.561	0.414	0.728	0.505	0.320
SATURATION (%) (E)	76.4	100	84.2	89.8	7.7	100	90.7
SOIL DESCRIPTION	Well graded sand with silt and gravel f-to-c, wet.	Poorly graded SAND with silt and gravel f-to-c, wet.	Poorly graded sand trace silt, f-to-m wet.	Poorly graded SAND trace silt and gravel f-to-c, wet.	Poorly graded SAND trace silt, trace gravel, slightly dry. f-to-c	Poorly graded SAND trace silt and gravel f-to-c, wet	well graded SAND with silt and gravel f-to-c, wet
U.S.C.S.	SW-SM	SP-SM	SP	SP	SP	SP	SW-SM
COLOR	grey	grey	grey	grey	yellowish Brown	grey	grey
MAXIMUM PARTICLE SIZE	3/4"	3/4"	—	3/8"	1/4"	1/4"	3/4"
CEMENTATION	—	—	—	—	—	—	—
GRAIN SIZE DIST. GR:SA:FI	25:67:8	22:70:8	0:95:5	5:95:5	8:90:2	2:9[illegible]:[illegible]	30:60:10
GRAIN SHAPE	SA	SA	SR-SA	SR-SA	SR	SR-SA	SR-SA
PLASTICITY	NONE	NONE	NONE	NONE	NONE	NONE	NONE
CONSISTENCY/REL. DENSITY	LOOSE	med	LOOSE	med	V LOOSE	med	med
REACTION TO HCL	—	—	—	—	—	—	—
CONTAINER NUMBER	502	503	527	533	567	574	577
WT. WET SOIL + TUBE/RINGS (GM) (1)	1114.2	1100.3	1095.0	965.7	784.0	1149.2	981.6
LENGTH OF SAMPLE (IN) (2)	5.8	5.3	6.0	4.8	5.1	6.0	4.7
WT. WET SOIL + CONT. (GM) (3)	349.57	317.86	302.44	326.1[illegible]	27[illegible]	273.39	415.07
WT. DRY SOIL + CONT. (GM) (4)	317.49	288.32	[illegible]	[illegible]	272.75	233.31	377.84
WT. CONTAINER (GM) (5)	37.41	39.88	40.43	40.79	39.6[illegible]	37.70	37.82
WT. TUBE OR RINGS (GM) TOTAL (6)	205.24	205.24	205.24	205.24	205.2	205.2	205.2
AVG. TUBE OR RING I.D. (7)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
AVG. CUT DIAMETER (IN)							
TUBE CLEARANCE RATIO (%)							
TUBE NUMBER							
SPECIFIC GRAVITY (assumed) (8)	2.65	2.65	2.65	2.65	2.65	2.65	2.65

L-11A 1081

MOISTURE DENSITY

TEST REPORT NO. 200

PROJECT: METRO RAIL

PROJECT NO. 87-215-6 / 87-600 CC33

BORING NO.

TESTED BY S.P DATE 1-21-87

COMPUTED BY S.P DATE 1-22-87

CHECKED BY [illegible] DATE 1-22-87

SAMPLE TYPE		DRIVE						
BORING NO		208						
SAMPLE DEPTH (FT)		25						
WET DENSITY (PCF)	(A)	142.1						
MOISTURE CONTENT (%) *	(B)	14.98						
DRY DENSITY (PCF) *	(C)	124.5						
VOID RATIO	(D)	0.329						
SATURATION (%)	(E)	100						
SOIL DESCRIPTION		Poorly graded sand with silt trace gravel, f-to-c, wet.						
U.S.C.S.		SP-SM						
COLOR		Grey						
MAXIMUM PARTICLE SIZE		3/8"						
CEMENTATION		—						
GRAIN SIZE DIST. GR:SA:FI		7 : 85 : 8						
GRAIN SHAPE		SR - SA						
PLASTICITY		NON-P						
CONSISTENCY/REL. DENSITY		DENSE						
REACTION TO HCL		—						
CONTAINER NUMBER		5						
WT. WET SOIL + TUBE/RINGS (GM)	(1)	1020.7						
LENGTH OF SAMPLE (IN)	(2)	4.8						
WT. WET SOIL + CONT. (GM)	(3)	372.02						
WT. DRY SOIL + CONT. (GM)	(4)	325.41						
WT. CONTAINER (GM)	(5)	36.52						
WT. TUBE OR RINGS (GM) TOTAL	(6)	205.24						
AVG. TUBE OR RING I.D.	(7)	2.4						
AVG. CUT DIAMETER (IN)		—						
TUBE CLEARANCE RATIO (%)								
TUBE NUMBER								
SPECIFIC GRAVITY (assumed)	(8)	2.65						

L-11A 1081

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

AMENDED REPORT

FROM: Earth Technology Corporation
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

ANALYSIS NO.: 701207-004
SAMPLING DATE: 01/08/87
DATE SAMPLE REC'D: 01/12/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-003 BH-201-46.5 (Traffic-Santa Ana) 1 of 2

PARAMETERS	RESULTS, in mg/l
Sulfide	0.55

LC
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 2/13/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

OM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

TURE OF SAMPLE:

Metro Rail 87-600-0033

ANALYSIS NO.: 701207-001,2,3,4,6,9&10
SAMPLING DATE: 1/8,9/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

MPLE ID	pH, in units
- 201 - 30 (Traffic-Santa Ana)	8.24
BH - 202 - 30 (Traffic-Santa Ana)	9.34
- 202 - 40 (Traffic-Santa Ana)	7.69
BH - 201- 46.5 (Traffic-Santa Ana) 1 of 2	7.43
- 206A - 40 (Vignes St. Adj. to off-ramp) 1 of 3	7.24
- 206A - 15 (Vignes St. Adj. to off ramp)	8.60
Bn - 206A - 35 (Vignes St. Adj. to off-ramp)	8.39

ANALYST

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CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

Earth Technology Corp.
)M: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

URE OF SAMPLE:

Metro Rail 87-600-0033

ANALYSIS NO.: 701207-001,2,3,9&10
SAMPLING DATE: 1/8,9/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

RESULTS, in mg/kg

SAMPLE IDENTIFICATION	TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)
BH - 201 - 30 (Traffic-Santa Ana)	9.
BH - 202 - 30 (Traffic-Santa Ana)	4.
BH - 202 - 40 (Traffic-Santa Ana)	4.
BH - 206A - 15 (Vignes St. Adj. to off-ramp)	6.
BH - 206A - 35 (Vignes St. Adj. to off-ramp)	7.

ANALYST

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CHEMICAL RESEARCH LABORATORIES

DATE 4/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

M: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

JRE OF SAMPLE:

ANALYSIS NO.: 701207-001
SAMPLING DATE: 1/08/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 201 - 30 (Traffic-Santa Ana) (soil)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
loromethane	<0.05	1,2-Dichloropropane	<0.02
romomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
oroethane	<0.05	Dibromochloromethane	<0.02
hylene Chloride	0.06*	1,1,2-Trichloroethane	<0.02
etone	0.07*	Benzene	<0.02
rbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
,1-Dichloroethane	<0.02	Bromoform	<0.02
rans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	0.19
loroform	0.05*	2-Hexanone	<0.05
,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1-Trichloroethane	<0.02	Toluene	<0.02
rbon Tetrachloride	<0.02	Chlorobenzene	<0.02
inyl Acetate	<0.05	Ethylbenzene	<0.02
romodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Also found in laboratory blanks.

Denotes compound was not detected above the value indicated.

SC
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REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

M: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

URE OF SAMPLE:

ANALYSIS NO.: 701207-001
SAMPLING DATE: 1/08/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 201 - 30 (Traffic-Santa Ana) (soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
s(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
nzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
s(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
Methylphenol	<0.3	4-Nitroaniline	<1
N-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
xachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
trobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
-Nitrophenol	<0.3	Pentachlorophenol	<1
4-Dimethylphenol	<0.3	Phenanthrene	<0.3
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
4-Dichlorophenol	<0.3	Fluoranthene	<0.3
1,2,4-Trichlorobenzene	<0.3	Pyrene	0.2
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
xachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
-Methylnaphthalene	<0.3	Chrysene	<0.3
xachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
enaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
Nitroaniline	<1		

< Denotes compound was not detected above value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/24/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

Earth Technology Corp.
OM: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

URE OF SAMPLE:

ANALYSIS NO.: 701207-002
SAMPLING DATE: 1/08/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 202 - 30 (Traffic-Santa Ana) (soil)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
ıloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
loroethane	<0.05	Dibromochloromethane	<0.02
hylene Chloride	<0.02	1,1,2-Trichloroethane	<0.02
acetone	<0.05	Benzene	<0.02
arbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
loroform	<0.02	2-Hexanone	<0.05
2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1-Trichloroethane	<0.02	Toluene	<0.02
rbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
Bromodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Denotes compound was not detected above the value indicated.

SP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/26/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

NATURE OF SAMPLE:

ANALYSIS NO.: 701207-002
SAMPLING DATE: 1/08/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 202 - 30 (Traffic-Santa Ana) (soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
is(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
enzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
s(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
Methylphenol	<0.3	4-Nitroaniline	<1
N-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
exachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
itrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
enzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
exachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	<0.3
exachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
cenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
-Nitroaniline	<1		

< Denotes compound was not detected above value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

OM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

ANALYSIS NO.: 701207-003
SAMPLING DATE: 1/08/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

TURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 202 - 40 (Traffic-Santa Ana) (soil)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
hloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
loroethane	<0.05	Dibromochloromethane	<0.02
thylene Chloride	<0.02	1,1,2-Trichloroethane	<0.02
cetone	<0.05	Benzene	<0.02
arbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
rans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
hloroform	<0.02	2-Hexanone	<0.05
,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
?-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
,1,1-Trichloroethane	<0.02	Toluene	<0.02
arbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
romodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Denotes compound was not detected above the value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

IOM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

ANALYSIS NO.: 701207-003
SAMPLING DATE: 1/08/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

.ATURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 202 - 40 (Traffic-Santa Ana) (soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
ɔis(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
2-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
.,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
?-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
is(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
-Methylphenol	<0.3	4-Nitroaniline	<1
N-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
Iexachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Iitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
?-Nitrophenol	<0.3	Pentachlorophenol	<1
?,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
?,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
.,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
ı-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Iexachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
?-Methylnaphthalene	<0.3	Chrysene	<0.3
Iexachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
?-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
?-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
.cenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
ı-Nitroaniline	<1		

< Denotes compound was not detected above value indicated.

MH
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: The Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

TURE OF SAMPLE:
Metro Rail 87-600-0033

ANALYSIS NO.: 701417-001/015
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

SAMPLE ID	pH, in units
BH-205-55 Commercial & Center St. (soil)	8.74
H-205-60 Commercial & Center St. (liquid)	7.29
BH-208-25 NE of 205/Center St. (soil)	8.12
-208-60 NE of 205/Center St. (1 of 3)(liquid)	7.29
BH-203-10 101 Fwy.N/Vignes (soil)	8.12
BH-203-35 101 Fwy.N/Vignes (soil)	7.05
H-203-60 101 Fwy.N/Vignes (1 of 3)(liquid)	7.24

JR
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 2/13/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

The Earth Technology Corp.
)M: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

'URE OF SAMPLE:
Metro Rail 87-600-0033

ANALYSIS NO.: 701417-001,5,9,10
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

RESULTS, in mg/kg

SAMPLE IDENTIFICATION	TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)
BH-205-55 Commercial & Center St.	8.
BH-208-25 NE of 205/Center St.	4.
BH-203-10 101 Fwy.N/Vignes	7.
BH-203-35 101 Fwy.N/Vignes	4.

JFC
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: The Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701417-003,6,12
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 (liquid)

SAMPLE ID	SULFIDE, in mg/L
BH-205-60 Commercial & Center St. (2 of 3)	7.3
BH-208-60 NE of 205/Center St (2 of 3)	8.0
BH-203-60 101 Fwy.N/Vignes (2 of 3)	1.5

LC

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CHEMICAL RESEARCH LABORATORIES

DATE 2/13/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

The Earth Technology
)M: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

URE OF SAMPLE:

ANALYSIS NO.: 701417-009
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

Metro Rail 87-600-0033 - BH-203-10 101 Fwy.N./Vignes

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
hloromethane	<0.05	1,2-Dichloropropane	<0.02
romomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
hloroethane	<0.05	Dibromochloromethane	<0.02
thylene Chloride	<0.05	1,1,2-Trichloroethane	<0.02
etone	0.15	Benzene	<0.02
arbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	0.10
hloroform	<0.02	2-Hexanone	<0.05
,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
,1,1-Trichloroethane	<0.02	Toluene	<0.02
arbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
Bromodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Denotes compound was not detected above the value indicated.

SLP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

1631 SEABOARD CIRCLE (213) 598-0458
:TANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

The Earth Technology Corp.
M: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701417-009
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

: IRE OF SAMPLE:

Metro Rail 87-600-0033 - BH-203-10 101 Fwy.N/Vignes

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	< 5	Acenaphthene	< 5
: s(-2-Chloroethyl)Ether	< 5	2,4-Dinitrophenol	<20
: Chlorophenol	< 5	4-Nitrophenol	<20
1,3-Dichlorobenzene	< 5	Dibenzofuran	< 5
1 4-Dichlorobenzene	< 5	2,4-Dinitrotoluene	< 5
: nzyl Alcohol	< 5	2,6-Dinitrotoluene	< 5
1,2-Dichlorobenzene	< 5	Diethylphthalate	< 5
2-Methylphenol	< 5	4-Chlorophenyl-phenylether	< 5
s(2-chloroisopropyl)Ether	< 5	Fluorene	< 5
lethylphenol	< 5	4-Nitroaniline	<20
. Nitroso-Di-n-Propylamine	< 5	4,6-Dinitro-2-Methylphenol	<20
Hexachloroethane	< 5	N-Nitrosodiphenylamine (1)	< 5
trobenzene	< 5	4-Bromophenyl-phenylether	< 5
Isophorone	< 5	Hexachlorobenzene	< 5
2-Nitrophenol	< 5	Pentachlorophenol	<20
4-Dimethylphenol	< 5	Phenanthrene	< 5
nzoic Acid	<20	Anthracene	< 5
bis(-2-Chloroethoxy)Methane	< 5	Di-n-Butylphthalate	< 5
4-Dichlorophenol	< 5	Fluoranthene	< 5
2,4-Trichlorobenzene	< 5	Pyrene	11
Naphthalene	< 5	Butylbenzylphthatlate	< 5
-Chloroaniline	< 5	3,3-Dichlorobenzidine	<10
Hexachlorobutadiene	< 5	Benzo(a)Anthracene	< 5
-Chloro-3-Methylphenol	< 5	bis(2-Ethylhexyl)Phthalate	< 5
-Methylnaphthalene	< 5	Chrysene	< 5
Hexachlorocyclopentadiene	< 5	Di-n-Octyl Phthalate	< 5
4,6-Trichlorophenol	< 5	Benzo(b)Fluoranthene	< 5
2,4,5-Trichlorophenol	< 5	Benzo(k)Fluoranthene	< 5
-Chloronaphthalene	< 5	Benzo(a)Pyrene	5
Nitroaniline	<20	Indeno(1,2,3-cd)Pyrene	< 5
Dimethyl Phthalate	< 5	Dibenzo(a,h)Anthracene	< 5
cenaphthylene	< 5	Benzo(g,h,i)Perylene	27
Nitroaniline	<10		

< denotes compound was not detected above the value indicated.

M H
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

OM: The Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

TURE OF SAMPLE:

ANALYSIS NO.: 701417-010
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

Metro Rail 87-600-0033 - BH-203-35 101 Fwy.N./Vignes

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Chloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
Chloroethane	<0.05	Dibromochloromethane	<0.02
Methylene Chloride	<0.05	1,1,2-Trichloroethane	<0.02
Acetone	0.08	Benzene	<0.02
Carbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
Chloroform	<0.02	2-Hexanone	<0.05
1,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1,1-Trichloroethane	<0.02	Toluene	<0.02
Carbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
Bromodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

< Denotes compound was not detected above the value indicated.

SLP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

OM: The Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701417-010
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

URE OF SAMPLE:

Metro Rail 87-600-0033 - BH-203-35 101 Fwy.N/Vignes

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
bis(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
2-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
is(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
-Methylphenol	<0.3	4-Nitroaniline	<1
-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
Hexachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Nitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
2,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
2,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
1,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Hexachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	<0.3
Hexachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
2-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
3-Nitroaniline	<1		

<Denotes compound was not detected above the value indicated

M.H
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701314-005
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 204 - 30 (Old Center Street) (soil)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Chloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
Chloroethane	<0.05	Dibromochloromethane	<0.02
Methylene Chloride	<0.02	1,1,2-Trichloroethane	<0.02
Acetone	0.24*	Benzene	<0.02
Carbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	0.07
Chloroform	<0.02	2-Hexanone	<0.05
1,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1,1-Trichloroethane	<0.02	Toluene	<0.02
Carbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
Bromodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Also found in laboratory blanks.

< Denotes compound was not detected above the value indicated.

SP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701314-005
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

NATURE OF SAMPLE: Metro Rail 87-600-0033 BE - 204 - 30 (Old Center Street) (soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
bis(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
2-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
bis(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
4-Methylphenol	<0.3	4-Nitroaniline	<1
N-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
Hexachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Nitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
2,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
2,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
1,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Hexachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	<0.3
Hexachlorocyclopentadiene	<0.0	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
2-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
3-Nitroaniline	<1		

< Denotes compound was not detected above value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701314-008
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 204 - 60 (old Center Street) (liquid)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	ug/L		ug/L
Chloromethane	< 10	1,2-Dichloropropane	< 5
Bromomethane	< 10	Trans-1,3-Dichloropropene	< 5
Vinyl Chloride	< 10	Trichloroethene	< 5
Chloroethane	< 10	Dibromochloromethane	< 5
Methylene Chloride	< 10	1,1,2-Trichloroethane	< 5
Acetone	25	Benzene	< 5
Carbon Disulfide	< 5	cis-1,3-Dichloropropene	< 5
1,1-Dichloroethene	< 5	2-Chloroethylvinyl ether	< 10
1,1-Dichloroethane	< 5	Bromoform	< 5
Trans-1,2-Dichloroethene	< 5	4-Methyl-2-Pentanone	< 10
Chloroform	< 5	2-Hexanone	< 10
1,2-Dichloroethane	< 5	Tetrachloroethene	< 5
2-Butanone	< 10	1,1,2,2-Tetrachloroethane	< 5
1,1,1-Trichloroethane	< 5	Toluene	< 5
Carbon Tetrachloride	< 5	Chlorobenzene	< 5
Vinyl Acetate	< 10	Ethylbenzene	12
Bromodichloromethane	< 5	Styrene	< 5
		Total Xylenes	< 5

< Denotes compound was not detected above the value indicated.

JP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

NATURE OF SAMPLE:

ANALYSIS NO.: 701314-006
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

Metro Rail 87-600-0033 (liquid) BH - 204 - 60 (Old Center Street)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	ug/l		ug/l
Phenol	< 40	Acenaphthene	< 40
bis(-2-Chloroethyl)Ether	< 40	2,4-Dinitrophenol	<200
2-Chlorophenol	< 40	4-Nitrophenol	<200
1,3-Dichlorobenzene	< 40	Dibenzofuran	< 40
1,4-Dichlorobenzene	< 40	2,4-Dinitrotoluene	< 40
Benzyl Alcohol	< 40	2,6-Dinitrotoluene	< 40
1,2-Dichlorobenzene	< 40	Diethylphthalate	< 40
2-Methylphenol	< 40	4-Chlorophenyl-phenylether	< 40
bis(2-chloroisopropyl)Ether	< 40	Fluorene	< 40
4-Methylphenol	< 40	4-Nitroaniline	<200
-Nitroso-Di-n-Propylamine	< 40	4,6-Dinitro-2-Methylphenol	<200
exachloroethane	< 40	N-Nitrosodiphenylamine (1)	< 40
Nitrobenzene	< 40	4-Bromophenyl-phenylether	< 40
Isophorone	< 40	Hexachlorobenzene	< 40
2-Nitrophenol	< 40	Pentachlorophenol	<200
2,4-Dimethylphenol	< 40	Phenanthrene	47
Benzoic Acid	<200	Anthracene	36
bis(-2-Chloroethoxy)Methane	< 40	Di-n-Butylphthalate	< 40
2,4-Dichlorophenol	< 40	Fluoranthene	119
1,2,4-Trichlorobenzene	< 40	Pyrene	132
Naphthalene	110	Butylbenzylphthatlate	< 40
4-Chloroaniline	< 40	3,3-Dichlorobenzidine	< 80
Hexachlorobutadiene	< 40	Benzo(a)Anthracene	54
4-Chloro-3-Methylphenol	< 40	bis(2-Ethylhexyl)Phthalate	< 40
2-Methylnaphthalene	< 40	Chrysene	65
Hexachlorocyclopentadiene	< 40	Di-n-Octyl Phthalate	< 40
2,4,6-Trichlorophenol	< 40	Benzo(b)Fluoranthene	38
2,4,5-Trichlorophenol	< 40	Benzo(k)Fluoranthene	< 40
2-Chloronaphthalene	< 40	Benzo(a)Pyrene	40
2-Nitroaniline	<200	Indeno(1,2,3-cd)Pyrene	< 40
Dimethyl Phthalate	< 40	Dibenzo(a,h)Anthracene	< 40
Acenaphthylene	67	Benzo(g,h,i)Perylene	< 40
3-Nitroaniline	<200		

< Denotes compound was not detected above value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701314-007
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 204 - 60 (Old Center Street)

PARAMETERS	RESULTS, in mg/L
Sulfide	14.58

JFC
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701314-009
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 Trip Blank (liquid)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	ug/L		ug/L
Chloromethane	< 10	1,2-Dichloropropane	< 5
Bromomethane	< 10	Trans-1,3-Dichloropropene	< 5
inyl Chloride	< 10	Trichloroethene	< 5
hloroethane	< 10	Dibromochloromethane	< 5
Methylene Chloride	< 10	1,1,2-Trichloroethane	< 5
cetone	21	Benzene	< 5
rbon Disulfide	< 5	cis-1,3-Dichloropropene	< 5
,1-Dichloroethene	< 5	2-Chloroethylvinyl ether	< 10
,1-Dichloroethane	< 5	Bromoform	< 5
rans-1,2-Dichloroethene	< 5	4-Methyl-2-Pentanone	< 10
Chloroform	< 5	2-Hexanone	< 10
1,2-Dichloroethane	< 5	Tetrachloroethene	< 5
-Butanone	< 10	1,1,2,2-Tetrachloroethane	< 5
,1,1-Trichloroethane	< 5	Toluene	< 5
Carbon Tetrachloride	< 5	Chlorobenzene	< 5
inyl Acetate	< 10	Ethylbenzene	< 5
romodichloromethane	< 5	Styrene	< 5
		Total Xylenes	< 5

Denotes compound was not detected above the value indicated.

SP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/26/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

M: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

URE OF SAMPLE:
Metro Rail 87-600-0033

ANALYSIS NO.: 701314-001,2,5,&6
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

AMPLE ID	pH, in units
H - 207 - 30 (101 S. Fwy. Entrance Vignes)	9.10
H - 207 - 60 (101 S. Fwy. Entrance Vignes)	9.29
- 204 - 30 (Old Center Street)	8.85
- 204 - 60 (Old Center Street)	7.63

JR
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

1631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

M: The Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

URE OF SAMPLE: Metro Rail 87-600-0033 - BH-205-55 Commercial & Center St.

ANALYSIS NO.: 701417-001
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Chloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
Chloroethane	<0.05	Dibromochloromethane	<0.02
Methylene Chloride	<0.05	1,1,2-Trichloroethane	<0.02
Acetone	0.08	Benzene	<0.02
Carbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
Chloroform	<0.02	2-Hexanone	<0.05
1,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1-Trichloroethane	<0.02	Toluene	<0.02
Carbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
Bromodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

< Denotes compound was not detected above the value indicated.

SLP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

LABORATORY REPORT

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

FROM: The Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701417-001
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 - BH-205-55 Commercial & Center St.

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
bis(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
2-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
bis(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
4-Methylphenol	<0.3	4-Nitroaniline	<1
N-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
Hexachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Nitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
2,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
2,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
1,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Hexachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	<0.3
Hexachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
2-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
3-Nitroaniline	<1		

<Denotes compound was not detected above the value indicated.

MH
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/2/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

AMENDED REPORT

FROM: Earth Technology Corporation
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

ANALYSIS NO.: 701207-008
SAMPLING DATE: 01/09/87
DATE SAMPLE REC'D: 01/12/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-003 BH-206A-40 (Vignes St Adj. to off-ramp) 3 of 3

PARAMETERS	RESULTS, in mg/l
Sulfide	0.61

LC
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 2/13/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

OM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

URE OF SAMPLE:

ANALYSIS NO.: 701207-009
SAMPLING DATE: 1/09/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 206A - 15 (Vignes St. Adj. to off-ramp) (soil)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
ıloromethane	<0.05	1,2-Dichloropropane	<0.02
ɔromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
loroethane	<0.05	Dibromochloromethane	<0.02
:hylene Chloride	<0.02	1,1,2-Trichloroethane	<0.02
..cetone	<0.05	Benzene	<0.02
ırbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
ıloroform	<0.02	2-Hexanone	<0.05
,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1-Trichloroethane	<0.02	Toluene	<0.02
ırbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
·omodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Denotes compound was not detected above the value indicated.

SP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

OM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

ANALYSIS NO.: 701207-009
SAMPLING DATE: 1/09/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

TURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 206A - 15 (Vignes St. Adj. to off-ramp)(soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
is(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
enzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
is(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
Methylphenol	<0.3	4-Nitroaniline	<1
Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
exachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
itrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
sophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
enzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
exachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	<0.3
exachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
-Nitroaniline	<1		

Denotes compound was not detected above value indicated

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

Earth Technology Corp.
OM: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

TURE OF SAMPLE:

ANALYSIS NO.: 701207-010
SAMPLING DATE: 1/09/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 206A - 35 (Vignes St. Adj. to off-ramp) (soil)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
hloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
hloroethane	<0.05	Dibromochloromethane	<0.02
thylene Chloride	<0.02	1,1,2-Trichloroethane	<0.02
cetone	<0.05	Benzene	<0.02
arbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
rans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
hloroform	<0.02	2-Hexanone	<0.05
,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
?-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
,1,1-Trichloroethane	<0.02	Toluene	<0.02
arbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
romodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Denotes compound was not detected above the value indicated.

SP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

ROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Larry Barker

ATURE OF SAMPLE:

ANALYSIS NO.: 701207-010
SAMPLING DATE: 1/09/87
DATE SAMPLE REC'D: 1/12/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 206A - 35 (Vignes St. Adj. to off-ramp)(soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
)is(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
!-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
',4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
)is(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
Methylphenol	<0.3	4-Nitroaniline	<1
-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
Hexachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Nitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Hexachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	<0.3
Hexachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
2-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
3-Nitroaniline	<1		

- Denotes compound was not detected above value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

NATURE OF SAMPLE:

ANALYSIS NO.: 701314-003
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

Metro Rail 87-600-0033 BH - 207 - 60 (101 S. Fwy. Entrance Vicnes)

PARAMETERS	RESULTS, in mg/L
Sulfide	0.64

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

Earth Technology Corp.
FROM: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701314-001
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 207 - 30 (101 S. Fwy. Entrancce Vignes)(soil)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Chloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
Chloroethane	<0.05	Dibromochloromethane	<0.02
Methylene Chloride	0.21*	1,1,2-Trichloroethane	<0.02
Acetone	0.13*	Benzene	<0.02
Carbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	0.55
Chloroform	<0.02	2-Hexanone	<0.05
1,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1,1-Trichloroethane	<0.02	Toluene	<0.02
Carbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
Bromodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Also found in laboratory blanks.

< Denotes compound was not detected above the value indicated.

SP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701314-001
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 BH - 207 - 30 (101 S. Fwy. Entrance Vignes)(soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
bis(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
2-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
bis(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
4-Methylphenol	<0.3	4-Nitroaniline	<1
-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
exachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Nitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
2,4-Dimethylphenol	<0.3	Phenanthrene	0.2
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
2,4-Dichlorophenol	<0.3	Fluoranthene	0.5
1,2,4-Trichlorobenzene	<0.3	Pyrene	0.7
Naphthalene	0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Hexachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	0.3
Hexachlorocyclopentadiene	<0.0	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
2-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	0.3	Benzo(g,h,i)Perylene	<0.3
3-Nitroaniline	<1		

Denotes compound was not detected above value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

NATURE OF SAMPLE:
Metro Rail 87-600-0033

ANALYSIS NO.: 701314-001,005&006
SAMPLING DATE: 1/12/87
DATE SAMPLE REC'D: 1/13/87
INVOICE NO.:

RESULTS, in mg/kg

SAMPLE IDENTIFICATION	TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)
BH - 207 - 30 (101 S. Fwy. Entrance Vignes)	3.
BH - 204 - 30 (Old Center Street)	6.
BH - 204 - 60 (Old Center Street)	9.

NOTE: Samples were received in a chilled state, intact and with chain of custody record attached.

JRC
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/20/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

M: The Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

URE OF SAMPLE:

ANALYSIS NO.: 701417-005
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

Metro Rail 87-600-0033 - BH-208-25 NE of 205/Center St.

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
ıloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
oroethane	<0.05	Dibromochloromethane	<0.02
hylene Chloride	<0.05	1,1,2-Trichloroethane	<0.02
cetone	<0.05	Benzene	<0.02
rbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
rans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
loroform	<0.02	2-Hexanone	<0.05
,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1-Trichloroethane	<0.02	Toluene	<0.02
rbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
romodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Denotes compound was not detected above the value indicated.

SLP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

The Earth Technology Corp.
OM: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 701417-005
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

URE OF SAMPLE:

Metro Rail 87-600-0033 - BH-208-25 NE of 205/Center St.

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
is(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
enzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
is(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
Methylphenol	<0.3	4-Nitroaniline	<1
Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
exachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
itrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
sophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
enzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
exachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	<0.3
exachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
imethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
-Nitroaniline	<1		

Denotes compound was not detected above the value indicated.

MH
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

The Earth Technology
)M: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

URE OF SAMPLE:

Metro Rail 87-600-0033 - Trip Blank

ANALYSIS NO.: 701417-014
SAMPLING DATE: 01/13/87
DATE SAMPLE REC'D: 01/14/87
INVOICE NO.:

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	ug/l		ug/l
hloromethane	<10	1,2-Dichloropropane	< 5
ɔromomethane	<10	Trans-1,3-Dichloropropene	< 5
Vinyl Chloride	<10	Trichloroethene	< 5
hloroethane	<10	Dibromochloromethane	< 5
thylene Chloride	<10	1,1,2-Trichloroethane	< 5
..cetone	<10	Benzene	< 5
arbon Disulfide	< 5	cis-1,3-Dichloropropene	< 5
,1-Dichloroethene	< 5	2-Chloroethylvinyl ether	<10
1,1-Dichloroethane	< 5	Bromoform	< 5
Trans-1,2-Dichloroethene	< 5	4-Methyl-2-Pentanone	<10
hloroform	< 5	2-Hexanone	<10
,2-Dichloroethane	< 5	Tetrachloroethene	< 5
2-Butanone	<10	1,1,2,2-Tetrachloroethane	< 5
,1,1-Trichloroethane	< 5	Toluene	< 5
arbon Tetrachloride	< 5	Chlorobenzene	< 5
Vinyl Acetate	<10	Ethylbenzene	< 5
³romodichloromethane	< 5	Styrene	< 5
		Total Xylenes	< 5

· Denotes compound was not detected above the value indicated.

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CHEMICAL RESEARCH LABORATORIES

DATE 1/21/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: The Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 702204-002 & 005
SAMPLING DATE: 01/21/87
DATE SAMPLE REC'D: 01/22/87
INVOICE NO.:

NATURE OF SAMPLE: Metro Rail 87-600-0033 - 87-600-0033 Commercial & Center St. (liquid)

SAMPLE ID	SULFIDE, in mg/L
Commercial & Center St. (209.50)	0.47

LC
ANALYST

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CHEMICAL RESEARCH LABORATORIES
DATE 2/13/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Mr. Larry Barker

NATURE OF SAMPLE:
Metro Rail 87-600-0033

ANALYSIS NO.: 704314-001 & 003
SAMPLING DATE: 01/21/87
DATE SAMPLE REC'D: 01/22/87
INVOICE NO.: 19289

SAMPLE ID	pH, in units
209-15 Commercial & Center St. (soil)	7.25
209-50 Commercial & Center St. (liquid)	7.56

JR
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 2/13/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: The Earth Technology Corp.
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Barbara Fontes

ANALYSIS NO.: 702204-002 & 005
SAMPLING DATE: 01/21/87
DATE SAMPLE REC'D: 01/22/87
INVOICE NO.:

NATURE OF SAMPLE: Metro Rail 87-600-0033 - 87-600-0033 Commercial & Center St. (soil)

SAMPLE ID	pH, in units
Commercial & Center St. (209.35)	7.52

JR
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 2/13/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807. 92648
ATTN: Mr. Larry Barker

NATURE OF SAMPLE:

Metro Rail - 87-600-0033 (soil)

ANALYSIS NO.: 704314-001
SAMPLING DATE: 01/21/87
DATE SAMPLE REC'D: 01/22/87
INVOICE NO.: 19289

RESULTS, in mg/kg

SAMPLE IDENTIFICATION	TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)
209-15 Commercial & Center St.	61.

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ANALYST

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DATE 2/15/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corporation
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Ms. Barbara Fontes

ANALYSIS NO.: 702204-002
SAMPLING DATE: 1/21/87
DATE SAMPLE REC'D: 1/22/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail Transit 87-600-0033 (soil)

SAMPLE IDENTIFICATION	RESULTS, in mg/kg TOTAL PETROLEUM HYDROCARBONS (EPA 418.1)
Commercial & Center St.	3.

209-35

JFC
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DATE 1/29/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corporation
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Ms. Barbara Fontes

ANALYSIS NO.: 702204-001
SAMPLING DATE: 1/21/87
DATE SAMPLE REC'D: 1/22/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 Commercial & Center St. (209-15) soil

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Chloromethane	<0.05	1,2-Dichloropropane	<0.02
Bromomethane	<0.05	Trans-1,3-Dichloropropene	<0.02
Vinyl Chloride	<0.05	Trichloroethene	<0.02
Chloroethane	<0.05	Dibromochloromethane	<0.02
Methylene Chloride	0.40*	1,1,2-Trichloroethane	<0.02
Acetone	<0.05	Benzene	<0.02
Carbon Disulfide	<0.02	cis-1,3-Dichloropropene	<0.02
1,1-Dichloroethene	<0.02	2-Chloroethylvinyl ether	<0.05
1,1-Dichloroethane	<0.02	Bromoform	<0.02
Trans-1,2-Dichloroethene	<0.02	4-Methyl-2-Pentanone	<0.05
Chloroform	<0.02	2-Hexanone	<0.05
1,2-Dichloroethane	<0.02	Tetrachloroethene	<0.02
2-Butanone	<0.05	1,1,2,2-Tetrachloroethane	<0.02
1,1,1-Trichloroethane	<0.02	Toluene	<0.02
Carbon Tetrachloride	<0.02	Chlorobenzene	<0.02
Vinyl Acetate	<0.05	Ethylbenzene	<0.02
Bromodichloromethane	<0.02	Styrene	<0.02
		Total Xylenes	<0.02

Present in laboratory blanks.

Denotes compound was not detected above the value indicated.

SLP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/29/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

Earth Technology Corporation
FROM: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Ms. Barbara Fontes

ANALYSIS NO.: 702204-001
SAMPLING DATE: 1/21/87
DATE SAMPLE REC'D: 1/22/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 Commercial & Center St. (209-15) soil

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
bis(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
2-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
bis(2-chloroisopropyl)Ether	<0.3	Fluorene	<0.3
4-Methylphenol	<0.3	4-Nitroaniline	<1
N-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
Hexachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Nitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
2,4-Dimethylphenol	<0.3	Phenanthrene	<0.3
Benzoic Acid	<1	Anthracene	<0.3
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
2,4-Dichlorophenol	<0.3	Fluoranthene	<0.3
1,2,4-Trichlorobenzene	<0.3	Pyrene	<0.3
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Hexachlorobutadiene	<0.3	Benzo(a)Anthracene	<0.3
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	0.4	Chrysene	<0.3
Hexachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	<0.3
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	<0.3
2-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<0.3	Benzo(g,h,i)Perylene	<0.3
3-Nitroaniline	<1		

< Denotes compound was not detected above value indicated

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CHEMICAL RESEARCH LABORATORIES

DATE 1/29/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Mr. Larry Barker

ANALYSIS NO.: 704314-002
SAMPLING DATE: 01/21/87
DATE SAMPLE REC'D: 01/22/87
INVOICE NO.: 19289

NATURE OF SAMPLE:

Metro Rail 87-600-0033 - 209-35 Commercial & Center St. (soil)

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
Phenol	<0.3	Acenaphthene	<0.3
bis(-2-Chloroethyl)Ether	<0.3	2,4-Dinitrophenol	<1
2-Chlorophenol	<0.3	4-Nitrophenol	<1
1,3-Dichlorobenzene	<0.3	Dibenzofuran	<0.3
1,4-Dichlorobenzene	<0.3	2,4-Dinitrotoluene	<0.3
Benzyl Alcohol	<0.3	2,6-Dinitrotoluene	<0.3
1,2-Dichlorobenzene	<0.3	Diethylphthalate	<0.3
2-Methylphenol	<0.3	4-Chlorophenyl-phenylether	<0.3
bis(2-chloroisopropyl)Ether	<0.3	Fluorene	0.7
4-Methylphenol	<0.3	4-Nitroaniline	<1
N-Nitroso-Di-n-Propylamine	<0.3	4,6-Dinitro-2-Methylphenol	<1
Hexachloroethane	<0.3	N-Nitrosodiphenylamine (1)	<0.3
Nitrobenzene	<0.3	4-Bromophenyl-phenylether	<0.3
Isophorone	<0.3	Hexachlorobenzene	<0.3
2-Nitrophenol	<0.3	Pentachlorophenol	<1
2,4-Dimethylphenol	<0.3	Phenanthrene	2.0
Benzoic Acid	<1	Anthracene	0.6
bis(-2-Chloroethoxy)Methane	<0.3	Di-n-Butylphthalate	<0.3
2,4-Dichlorophenol	<0.3	Fluoranthene	1.0
1,2,4-Trichlorobenzene	<0.3	Pyrene	1.4
Naphthalene	<0.3	Butylbenzylphthatlate	<0.3
4-Chloroaniline	<0.3	3,3-Dichlorobenzidine	<0.6
Hexachlorobutadiene	<0.3	Benzo(a)Anthracene	0.6
4-Chloro-3-Methylphenol	<0.3	bis(2-Ethylhexyl)Phthalate	<0.3
2-Methylnaphthalene	<0.3	Chrysene	0.6
Hexachlorocyclopentadiene	<0.3	Di-n-Octyl Phthalate	<0.3
2,4,6-Trichlorophenol	<0.3	Benzo(b)Fluoranthene	0.4
2,4,5-Trichlorophenol	<0.3	Benzo(k)Fluoranthene	<0.3
2-Chloronaphthalene	<0.3	Benzo(a)Pyrene	0.5
2-Nitroaniline	<1	Indeno(1,2,3-cd)Pyrene	<0.3
Dimethyl Phthalate	<0.3	Dibenzo(a,h)Anthracene	<0.3
Acenaphthylene	<1.1	Benzo(g,h,i)Perylene	<0.3
3-Nitroaniline	<1		

< denotes compound was not detected above the value indicated.

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REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 2/19/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

Earth Technology Corporation
OM: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Ms. Barbara Fontes

ANALYSIS NO.: 702204-003
SAMPLING DATE: 1/21/87
DATE SAMPLE REC'D: 1/22/87
INVOICE NO.:

URE OF SAMPLE:

Metro Rail 87-600-0033 Commercial & Center St. (209-50) liquid

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/L		mg/L
Chloromethane	<0.02	1,2-Dichloropropane	<0.01
omomethane	<0.02	Trans-1,3-Dichloropropene	<0.01
nyl Chloride	<0.02	Trichloroethene	<0.01
Chloroethane	<0.02	Dibromochloromethane	<0.01
thylene Chloride	<0.01	1,1,2-Trichloroethane	<0.01
tone	<0.02	Benzene	0.11
rbon Disulfide	<0.01	cis-1,3-Dichloropropene	<0.01
1-Dichloroethene	<0.01	2-Chloroethylvinyl ether	<0.02
1-Dichloroethane	<0.01	Bromoform	<0.01
ans-1,2-Dichloroethene	<0.01	4-Methyl-2-Pentanone	<0.02
Chloroform	<0.01	2-Hexanone	<0.02
2-Dichloroethane	<0.01	Tetrachloroethene	<0.01
Butanone	0.34*	1,1,2,2-Tetrachloroethane	<0.01
1,1,1-Trichloroethane	<0.01	Toluene	0.45
rbon Tetrachloride	<0.01	Chlorobenzene	<0.01
nyl Acetate	<0.02	Ethylbenzene	0.13
Bromodichloromethane	<0.01	Styrene	<0.01
		Total Xylenes	0.56

Present in laboratory blanks.

Denotes compound was not detected above the value indicated.

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ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/25/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

FROM: Earth Technology Corporation
3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Ms. Barbara Fontes

ANALYSIS NO.: 702204-004
SAMPLING DATE: 1/21/87
DATE SAMPLE REC'D: 1/22/87
INVOICE NO.:

NATURE OF SAMPLE:

Metro Rail 87-600-0033 Commercial & Center St. (209-50) liquid

EPA METHODS 625/8270 SEMI-VOLATILE POLLUTANTS DATA SHEET

	mg/kg		mg/kg
ıenol	<20	Acenaphthene	<20
bis(-2-Chloroethyl)Ether	<20	2,4-Dinitrophenol	<100
-Chlorophenol	<20	4-Nitrophenol	<100
3-Dichlorobenzene	<20	Dibenzofuran	<20
1,4-Dichlorobenzene	<20	2,4-Dinitrotoluene	<20
Benzyl Alcohol	<20	2,6-Dinitrotoluene	<20
2-Dichlorobenzene	<20	Diethylphthalate	<20
-Methylphenol	<20	4-Chlorophenyl-phenylether	<20
bis(2-chloroisopropyl)Ether	<20	Fluorene	15
Methylphenol	<20	4-Nitroaniline	<100
Nitroso-Di-n-Propylamine	<20	4,6-Dinitro-2-Methylphenol	<100
exachloroethane	<20	N-Nitrosodiphenylamine (1)	<20
itrobenzene	<20	4-Bromophenyl-phenylether	<20
ophorone	<20	Hexachlorobenzene	<20
-Nitrophenol	<20	Pentachlorophenol	<100
2,4-Dimethylphenol	<20	Phenanthrene	19
nzoic Acid	<100	Anthracene	20
s(-2-Chloroethoxy)Methane	<20	Di-n-Butylphthalate	<20
2,4-Dichlorophenol	<20	Fluoranthene	23
2,4-Trichlorobenzene	<20	Pyrene	39
phthalene	180	Butylbenzylphthatlate	<20
4-Chloroaniline	<20	3,3-Dichlorobenzidine	<60
exachlorobutadiene	<20	Benzo(a)Anthracene	19
Chloro-3-Methylphenol	<20	bis(2-Ethylhexyl)Phthalate	<20
-Methylnaphthalene	17.	Chrysene	18
Hexachlorocyclopentadiene	<20	Di-n-Octyl Phthalate	<20
4,6-Trichlorophenol	<20	Benzo(b)Fluoranthene	<20
4,5-Trichlorophenol	<20	Benzo(k)Fluoranthene	18
2-Chloronaphthalene	<20	Benzo(a)Pyrene	15
-Nitroaniline	<100	Indeno(1,2,3-cd)Pyrene	<20
methyl Phthalate	<20	Dibenzo(a,h)Anthracene	<20
Acenaphthylene	19.	Benzo(g,h,i)Perylene	<20
-Nitroaniline	<100		

Denotes compound was not detected above value indicated.

ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES

DATE 1/29/87

CHEMICAL RESEARCH LABORATORIES

11631 SEABOARD CIRCLE (213) 598-0458
STANTON, CA 90680 (714) 898-6370

LABORATORY REPORT

Earth Technology Corporation
ROM: 3777 Long Beach Blvd.
Long Beach, CA 90807
ATTN: Ms. Barbara Fontes

ANALYSIS NO.: 702204-006
SAMPLING DATE: 1/21/87
DATE SAMPLE REC'D: 1/22/87
INVOICE NO.:

ATURE OF SAMPLE:

Metro Rail 87-600-0033 Trip Blank (liquid)

EPA METHODS 624/8240 VOLATILE POLLUTANTS DATA SHEET

	mg/L		mg/L
Chloromethane	<0.01	1,2-Dichloropropane	<0.005
romomethane	<0.01	Trans-1,3-Dichloropropene	<0.005
inyl Chloride	<0.01	Trichloroethene	<0.005
Chloroethane	<0.01	Dibromochloromethane	<0.005
ethylene Chloride	<0.005	1,1,2-Trichloroethane	<0.005
etone	<0.01	Benzene	<0.005
rbon Disulfide	<0.005	cis-1,3-Dichloropropene	<0.005
1,1-Dichloroethene	<0.005	2-Chloroethylvinyl ether	<0.01
,1-Dichloroethane	<0.005	Bromoform	<0.005
rans-1,2-Dichloroethene	<0.005	4-Methyl-2-Pentanone	<0.01
Chloroform	<0.005	2-Hexanone	<0.01
,2-Dichloroethane	<0.005	Tetrachloroethene	<0.005
-Butanone	<0.01	1,1,2,2-Tetrachloroethane	<0.005
1,1,1-Trichloroethane	<0.005	Toluene	<0.005
arbon Tetrachloride	<0.005	Chlorobenzene	<0.005
inyl Acetate	<0.01	Ethylbenzene	<0.005
romodichloromethane	<0.005	Styrene	<0.005
		Total Xylenes	<0.005

< Denotes compound was not detected above the value indicated.

SLP
ANALYST

REVIEWED & APPROVED
CHEMICAL RESEARCH LABORATORIES
DATE 1/25/87

APPENDIX C

SITE BORING LOGS

The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-201 Sheet 1 of 2

Borehole Location: Traffic Island off 101 Fwy		Elevation and Datum: 277.4 feet	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1-8-87	Date Finished: 1-8-87
Drilling Equipment: B-53		Completion: Depth (feet) 46.5	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 6 Dist.:	Undist.: 6 Core:
Borehole Size: 8 Inch		Water Depth (ft): 29 First:	Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Sharon Lagas	Checked by: Barbara Fontes
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	Dry, dark brown, silty fine to medium size grain sand with some small gravel	SM Fill					9:30	Baseline OVA reading at 2 ppm. Traffic island has been disturbed during freeway construction
5	5-6.5' Same as above with small chips of brick	SM	1	1		12/26/26	10:00	OVA Readings at Baseline
	7' Hit debris (possibly brick)							
10	10-11.5' Dry, dark brown, silty, fine to medium size sand	SM	1	2		18/22/32	10:08	OVA Readings at Baseline
15	15-16.5' Dry, brown to light brown silty sand with gravel	SM	-	3		14/9/7	10:13	OVA Readings at Baseline No recovery for OVA
20	20' No recovery-cobble, gravel		-	-		NOTE	10:20	OVA Readings at Baseline
25	25' No recovery - 5" chunk of concrete		-	-		NOTE	10:30	Possibility of disturbed soil to 25 ft. OVA readings at Baseline
	Groundwater encountered at approximately 29 feet							
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-201 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.5' Wet, gray, fine to medium size sand	SP	70	4		16/32/37	10:37	OVA Readings at Baseline, sample has oily film and slight oily odor with sheen
35	35-36.5' Wet, gray, medium to coarse grained sand	SP	-	5		10/22/50	10:54	OVA Readings at Baseline No recovery for OVA
40	40' No recovery - cobble, gravel		-			50/6"	11:04	
45	45-46.0' Wet, dark gray, fine to medium size sand	SP	8	6		15/50	11:18	OVA Readings at Baseline
50	46.5' Hit boulder End Hole						11:25	Collected water samples
55	Note: On this and all logs that follow, there are missing blow counts at some sampling intervals. In those cases, blow counts were not recorded due to other demands on personnel time.							
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-202 Sheet 1 of 2

Borehole Location: Traffic Island off 101 FWY		Elevation and Datum: 277.3 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca / John Hale	Date Started: 1/8/87	Date Finished: 1/8/87
Drilling Equipment: B-53		Completion: Depth (feet) 50	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 8 / Dist.:	Undist.: 8 / Core:
Borehole Size: 8 Inch		Water Depth (ft): 29 / First:	Compl.: / 24 hrs.
Type of Perforation Backfill: None		Logged By: Sharon Lagas	Checked by: Barbara Fontes
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	Dry, dark brown, silty fine to medium size sand with gravel. Hit concrete @ 1'	SM fill					1:30	Baseline OVA Reading @2 ppm
5	5-6.5' Dry, light brown, fine to medium size sand with some silt	SM	2	1		8/12/13	1:40	OVA Readings at Baseline
10	10-10.5' Dry, brown, silty, fine to medium size sand with clay	SC	1	2		8/4/16	1:45	OVA Reading at Baseline
	10.5-11.5' Dry, light brown, medium to coarse grained sand with gravel	SP						
15	15-16.5' Dry, light brown, medium to coarse sand with gravel	SP	4	3		23/40/25	1:50	OVA Readings at Baseline
	17.5' Hit cobble							
20	20-21.0' Same as above	SP	2	4		28/50	1:58	OVA Readings at Baseline, oily film on sand
	25-25.5' Dry, light brown, medium to coarse sand which grades into a brown-gray silty clay	SP/CL	6	5		14/23	2:06	OVA Readings at Baseline
25	25.5-26.0' Moist, brown-gray, medium to coarse sand Groundwater encountered at approximately 29 feet	SP						
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-202 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.5' Wet, gray, medium to coarse grained sand	SP	16	6	/	13/35/50	2:15	OVA Readings at Baseline
35	35' No Recovery	-	-	-		8/16/40	2:20	
40	40-41.5' Wet, gray, medium to to coarse grained sand	SP	10	7	/	8/16 47	2:28	OVA Readings at Baseline
45	45' Hit boulder 45.5'-46.5' Wet, dark gray, fine to medium size sand	SP	-	8	/	30/50	2:42	OVA Readings at Baseline No recovery for OVA
50	50' Hammer broke, ended hole						3:15	No water sample
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-203 Sheet 1 of 2

Borehole Location: Traffic Island off 101 FWY		Elevation and Datum: 276.5 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1/14/87	Date Finished: 1/14/87
Drilling Equipment: B-53		Completion: Depth (feet) 60	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 5 / Dist.:	Undist.: 5 / Core:
Borehole Size: 8 Inch		Water Depth (ft): 30 / First:	Compl.: / 24 hrs.
Type of Perforation Backfill: None		Logged By: Sharon Lagas	Checked by: Barbara Fontes
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
								Slant Drilling Angle = 20°
	Dry, brown, silty fine to medium size sand - at 6" hit old brick and large boulder	SM FILL					10:00	OVA not working
5	5' Same as above with gravel and cobble - no sample collected			-		Note		No sample collected, augers grinding on gravel and cobble
	7' Broke through gravel	---						Black brown color soil
10	10-11.5' Dry, black-brown, fine to medium sand and silt with small wood fragments	SM		1		15/19/26	10:51	Soil becomes brown in color and fluffy in texture
15	15-16.5' Dry, brown, medium to coarse grained sand with gravel	SP		2		10/10/8	11:00	
20	20' No recovery			-		Note		Hammer sticking so drilling another 5 feet
25	25-25.5' Dry, light brown, medium to coarse grained sand with gravel	SP		3		Note	11:21	Only 6" of sample due to sampler falling at an angle. Sampler hitting against the auger
30	Groundwater encountered at approx. 30 feet							

The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-203 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-30.5' Wet, brown, coarse grained sand and gravel	SP		4		50/6"	11:30	
	32.5' Small Cobble, large gravel	GP						
35	35-35.7' Wet, gray, medium to coarse grained sand	SP		5		39/50 for 2"	11:43	Slight oily odor, only 8-10" of sample, rest was slough
	39' Small Cobble, large gravel (about 2 in.)	GP						
40	40' No recovery - Possibly cobble and gravel*			-		None	12:00	Hammer sticking
45	45' No recovery - Possibly cobble and gravel*			-		None	1:11	Hammer sticking-cannot sample without hammer getting stuck so continuing on to 60 feet
50	50' No recovery - Possibly cobble and gravel*			-		None	12:17	
55	55' No recovery			-		None		Hitting cobbles
	Wet, gray, medium to coarse grained sand with slight hydrocarbon odor coming up from augers							Appears to be predominantly slough
60	60' End hole						12:33	Collected water samples
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	*Augers bringing up slough from upper portion of borehole.							
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-204 Sheet 1 of 2

Borehole Location: Old Center St. (b/t Aliso & Comm.)		Elevation and Datum: 275.4 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1/12/87	Date Finished: 1/12/87
Drilling Equipment: B-53		Completion: Depth (feet) 61.5	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 6 Dist.:	Undist.: 6 Core:
Borehole Size: 8 Inch		Water Depth (ft): 30 First:	Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Barbara Fontes	Checked by: Sharon Lagas
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	Asphalt, concrete debris						7:30	Baseline OVA Reading at 4 ppm
	Dry, dark brown, silty fine to medium size sand	SM						
5	5' Same as above	SM		-				No samples collected
	8-9' Moist clayey sand	SC						
10	10-11.5' Dry, brown, silty, fine to medium size sand	SM	2	1		8/15/11	8:00	OVA Readings @ baseline
15	15-15.5' Same as above	SM	4	2		18/6"	8:10	Collected only OVA sample. Hit large object-refusal. Sampler is not penetrating
20	20-21.5' Dry, brown, medium to coarse grained sand with fragmented gravel and small cobbles	SP	4	3		39/50/49	8:17	OVA readings @ baseline
25	25-25.5' Same as above	SP	160	4		25/6"	8:25	Soil has hydrocarbon odor. OVA values recorded at 160 ppm
	Groundwater encountered at approx. 30 feet							
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-204 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.0' Wet, gray, coarse grained sand	SP	-	5		20/50		No OVA recovery
35	35-36.5' Same as above	SP		6		Note		
	38.5' Cobble, gravel							
40	40' No recovery - cobble, gravel			-		Note	8:59	OVA reading 2 ppm Hole has slight creosote odor (40 to 60 feet)
45	45' No recovery - cobble, gravel			-		Note		
50	50' No recovery - slough			-		Note		Augers contained approx. 4 feet of slough
55	55' No recovery			-		Note		
60	60' Wet, gray, coarse grained sand End Hole	SP	>1000	-		8/11/16	9:44 10:01	Collected water samples, not enough recovery for soil samples
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-205 Sheet 1 of 2

Borehole Location: Commercial and Center St., West		Elevation and Datum: 274.7 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1/13/87	Date Finished: 1/13/87
Drilling Equipment: B-53		Completion: Depth (feet) 61.5	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 7 Dist.:	Undist.: 7 Core:
Borehole Size: 8 Inch		Water Depth (ft): 30 First:	Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Barbara Fontes	Checked by: Sharon Lagas
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	Dry, brown, silty, fine to medium size sand with brick chips, possibly fill material	SM Fill					9:00	Baseline OVA reading @ 2ppm Surface soil contains shells and broken pottery. Soil type not evident in other areas
5	5' No sample collected	----		-		Note		
10	10-11.5' Dry, light brown, medium to coarse sand with gravel	SP	4	1		26/22/23	9:05	
15	15-16.0' Same as above	SP	-	2		48/50	9:10	
20	20-21.0' Dry, brown, coarse grained sand and small gravel	SP	-	3		49/50	9:20	
25	25-26.0' Same as above	SP	-	4		33/56	9:36	Decomposed granite cobble in auger (cobble > 3 in.)
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-205 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.0' Wet, grey, medium to coarse grained sand Groundwater encountered at approximately 30 feet	SP	30	5		28/50	9:48	OVA and 1 brass recovery
35	35-36.5' Same as above	SP	4	6		14/37/48	9:54	
40	40-41.5' Same as above	SP		7		Note	10:00	1 brass recovery, no OVA sample OVA reading @ base-line
	43' Cobble, gravel	GP						
45	45' No recovery - cobble, gravel			-		Note	10:27	
50	50' Wet, dark gray, fine to medium size sand, oily film and odor	SP	100	-		10/26/50	10:37	Only OVA sample recovery OVA reading @ base-line
55	55-56.5' Same as above	SP	100	-		3/13/50	10:48	
60	60' No recovery-sampler and "A" rods stuck in augers End Hole			-		Note	10:59	Water samples collected
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-206 Sheet 1 of 1

Borehole Location: Vignes St. (C.C. Meyer's yard)		Elevation and Datum: 276.8 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1-9-87	Date Finished: 1-9-87
Drilling Equipment: B-53		Completion: Depth (feet) N/A	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 0 / Dist.: / Undist.: / Core:	
Borehole Size: 8 inch		Water Depth (ft): / First: / Compl.: / 24 hrs.	
Type of Perforation Backfill: None		Logged By: Sharon Lagas	Checked by: Barbara Fontes
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
0	Dry, dark brown, silty sand with large cobbles and pieces of concrete	SM Fill					9:25	Baseline OVA reading @ 2 ppm. Hit concrete at 4 feet and could not get drill straight- abandoned hole.
5	4' concrete Borehole abandoned after two attempts						9:48	
10								
15								
20								
25								
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-003 Field Log of Borehole Number: BH-206A Sheet 1 of 2

Borehole Location: Vignes St. (C.C. Meyer's yard)		Elevation and Datum: 276.5 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1-9-87	Date Finished: 1-9-87
Drilling Equipment: B-53		Completion: Depth (feet) 41.5	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 6 Dist.:	Undist.: 6 Core:
Borehole Size: 8 Inch		Water Depth (ft): 29.5 First:	Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Sharon Lagas	Checked by: Barbara Fontes
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	Dry, dark brown, sand and gravel with some silt	SP					10:00	Baseline OVA reading @ 2 to 5ppm
5	5-6' Dry, medium to coarse sand with some gravel	SP	3	1		10/10/10	10:10	OVA reading @ baseline
	6-6.5' Dry, medium grained sand with silt and some clay	SC						
10	10' No recovery (probably fill)			-		10/15/27	10:13	OVA reading @ baseline
15	15-15.5' Dry, light brown, medium to coarse sand with gravel	SP	14	2		50/6"	10:23	OVA reading @ baseline
20	20' Dry, gravel with coarse grained sand	GP		-		23/6"	10:30	No recovery, cobble stuck in sampler
	23' Gravel and cobble	GP						
25	25-26.5' Moist, medium to coarse grained sand with gravel	SP	12	3		10/43/50	10:38	OVA reading @ baseline
	Groundwater encountered at approx. 29.5 feet							
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-206A Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.5' Wet, gray, medium to coarse grained sand	SP	8	4		3/6/10	11:20	OVA reading @ baseline
35	35-36.5' Wet, gray, fine to medium size sand	SP	10	5		6/10/13	11:26	OVA reading @ baseline
40	40-41.5' Same as above End Hole	SP	6	6		23/49/48	11:36	OVA reading at baseline, 10 feet of slough in hole Collected water samples
45								
50								
55								
60								
65								
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-207 Sheet 1 of 2

Borehole Location: 101 FWY South from Vignes		Elevation and Datum: 276.9 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1/12/87	Date Finished: 1/12/87
Drilling Equipment: B-53		Completion: Depth (feet) 60	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 4 Dist.:	Undist.: 4 Core:
Borehole Size: 8 Inch		Water Depth (ft): 30 First:	Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Barbara Fontes	Checked by: Sharon Lagas
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	Dry, dark brown, silty, fine to medium size sand with gravel and rock/garbage debris	Fill					12:10	Baseline OVA reading @ 2 ppm
5	5-6.5' Same as above	Fill				Note		Very little pressure on augers
	---							
10	10-11.5' Moist, black-brown, silty sand, medium plasticity clay with oxidation staining	SC	2	1		3/5/8	12:28	
	12.5' Hit debris-augers crunching							
15	15-16.5' Moist to dry, medium to coarse sand	SP	4	2		31/36/33	12:35	OVA reading @ baseline
	19' Gravel and cobbles	GP						
20	20' Dry, coarse grained sand with gravel and cobbles	SP	6	-		50/6"	12:56	OVA reading @ baseline, cobble stuck in sampler. No recovery for lab samples
25	25' Same as above	SP	6	-		50/6"	1:01	No recovery for lab samples
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-207 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.5' Wet, gray, coarse sand with some silt Groundwater encountered at approximately 30 feet	SP	12	3		4/4/24	1:07	
35	35-36.0' Same as above	SP	4	4		20/50/	1:14	
	38' Gravel and cobble	GP						Augers vibrating
40	40' Wet, gray, medium to coarse grained sand	SP	12	-		50/6"	1:27	No recovery for lab samples
45	45' No recovery - Possibly medium to coarse grained sand			-		Note	1:30	Having problem with sand heaves going to 60'-sand locking around drill
50	50' No recovery - Possibly medium to coarse grained sand			-		Note		
55	55' No recovery - Possibly medium to coarse grained sand			-		Note		
60	60' End Hole						2:15	Collected water Samples
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-208 Sheet 1 of 2

Borehole Location: NE of BH-205/Adjacent to Center St.		Elevation and Datum: 270.6 ft	
Drilling Agency: DRILL LINE	Driller: Gregg Deluca, John Hale	Date Started: 1/13/87	Date Finished: 1/13/87
Drilling Equipment: B-53		Completion: Depth (feet) 60	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 6 Dist.:	Undist.: 6 Core:
Borehole Size: 8 Inch		Water Depth (ft): 25 First:	Compl.: 24 hrs.
Type of Perforation Backfill: None		Logged By: Barbara Fontes	Checked by: Sharon Lagas
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	Dry, dark brown, silty fine to medium size sand	SM					12:42	Baseline OVA reading @ 2 ppm
5	5' No sample collected					Note	12:45	OVA reading @ baseline
10	10-11.5' Dry, brown, medium to coarse grained sand with gravel	SP	2	1		33/45/45	12:48	OVA reading @ baseline, large cobble in sampler
15	15-16.0' Dry, brown, fine to medium grained sand	SP	2	2		34/50	12:58	OVA reading @ baseline
20	20-21.0' Dry, brown, medium to coarse sand with gravel and broken cobble	SP	4	3		40/50	1:05	Bouncing off large cobble
25	25-26.5' Wet, gray, medium to coarse grained sand with occasional gravel Groundwater encountered at approx. 25 feet	SP	100	4		16/19/15	1:12	Slight oily odor
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-208 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.5' Same as above-not as coarse	SP	40	5		7/7/13	1:19	
	34' Gravel and cobble	GP						Drilling very difficult
35	35' No recovery-gravel and cobble	GP		-		Note	1:28	
40	40-41.5' Wet, gray, medium grained sand	SP	2	6		7/9/34	1:43	OVA reading @ baseline, slight creosote odor
45	45' No recovery - Possibly sand			-		Note		
50	50' No recovery-6 feet of slough in augers - Possibly sand			-		Note		
55	55' No recovery - Possibly sand			-		Note		
60	60' Abandoned hole due to sampler being stuck in augers. Could not advance hole any further						2:44	Upon removal of augers, strong creosote odor. No water samples collected due to sampler being stuck
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The Earth Technology Corporation

BOREHOLE LOG

Project Name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-209 Sheet 1 of 2

Borehole Location: East Corner Center & Commercial St.		Elevation and Datum: 273.6 ft	
Drilling Agency: DRILL LINE	Driller: Greg Deluca, John Hale	Date Started: 1/21/87	Date Finished: 1/21/87
Drilling Equipment: B-53		Completion: Depth (feet) 50	Rock Depth: (feet)
Method of Drilling: Hollow Stem Auger - 6 Inch Dia.		Number of Samples: 8 / Dist.:	Undist.: 8 / Core:
Borehole Size: 8 Inch		Water Depth (ft): 30 / First:	Compl.: / 24 hrs.
Type of Perforation Backfill: None		Logged By: Sharon Lagas	Checked by: Barbara Fontes
Type of Seal: 5% Bentonite Cement Grout			

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	0-6" Asphalt 6"-1.2' Brick Road 1.2'-1.6' Concrete Dry, dark brown, silty, fine to medium size sand with some gravel	Fill					9:18	Baseline OVA reading @ 6 ppm
5	5-6.5' Dry, brown-black, silty, fine to medium size sand with some gravel	SM	6	1		5/4/4	9:54	OVA reading @ baseline, only OVA sample recovery
10	10.7-11.7' Moist, black-brown, silty, fine to medium size sand with some gravel	SM	6	2		16/17	10:00	At 10' sampler hit pocket and dropped approx. 8"
15	15-16.5' Dry, brown, fine to medium sand with pea size gravel. Upper 8" stained black. Gravel increasing in size with depth. Entire sample saturated with gasoline	SP	33	3		14/41/37	10:05	OVA reading @ baseline Large cobble in bottom of sampler Oily film on sampler
20	20-20.5' Dry, brown, silty sand 20.5-21.5' Moist, gray, medium to coarse sand with pea size gravel	SM SP	6	4		20/37/43	10:20	OVA reading @ baseline Strong oily odor
25	25-26.0' Dry, brown, silty, medium to coarse sand with gravel. 27.5' Hit cobble and gravel Groundwater encountered at approx. 30 feet	SM GP	6	5		27/50	10:27	OVA reading @ baseline Strong oily odor
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The Earth Technology Corporation

BOREHOLE LOG

Project name: METRO RAIL TRANSIT

Project Number: 87-600-0033 Field Log of Borehole Number: BH-209 Sheet 2 of 2

Depth (feet)	Description	Graphic Log: Lithology	Graphic Log: OVA (ppm)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Drilling Rate/Time	Remarks
	30-31.0' Wet, green-gray, medium to coarse sand with some gravel	SP	24	6		36/50	10:35	OVA reading at baseline Hit void Soil has H_2S odor Oily film on sampler
35	35'-35.5' Wet, gray, medium to coarse grained sand	SP	46	7		50/6"	10:44	OVA reading @ baseline
	37' Hit cobble and gravel	GP						Strong H_2S odor
	39' Broke through cobble							Slight creosote odor on sampler
40	40-41.5' Wet, gray, medium to coarse grained sand with gravel	SP	12	8		6/8/16	10:59	OVA reading @ baseline Oily film on sampler
45	45' No recovery - 4' slough in augers			-		Note		
50	50' End hole - no recovery due to sampler sticking in augers						11:21	Water samples collected OVA reading 14 ppm at top of hole
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