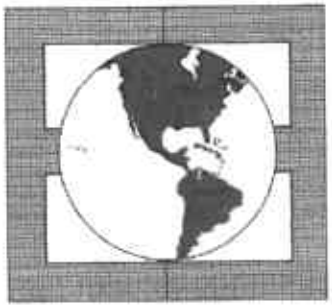
WORK PLAN
FOR MONITORING WELL INSTALLATION
AT
223 E. 14TH STREET
SAN LEANDRO, CALIFORNIA

Prepared by:



Earth

Engineers

July 12, 1999

1121.001

Earth Engineers

P.O. Box 490, Cedarville, CA 96104

tel (800) 692-0787
fax (530) 279-2257

July 12, 1999

Ms. Juliet Shin
Hazardous Materials Specialist
Environmental Protection (LOP)
Environmental Health Services
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: Monitoring Well Installation at 223 E. 14th Street, San Leandro, California (Earth Engineers file reference 1121.001)

Dear Ms. Shin:

Enclosed please find the Work Plan to install four groundwater monitoring wells at 223 E. 14th Street, San Leandro, California. The plan is designed to provide accurate and consistent soil and groundwater data using the standard operating procedures designed for this type of investigation (enclosed as Appendix A). A site-specific Health and Safety Plan will be prepared in accordance with Occupational Safety and Health Administration (OSHA) regulations to protect the health and safety of personnel and subcontractors investigating the subject site. All equipment used at the subject site will be properly decontaminated to reduce the risk of cross-contamination.

Proposed well construction diagrams and the Drilling Permit Application appear at the end of this document in Appendix B.

We plan to complete all field work in July 1999. Please call if you have any questions.

Sincerely,

R. Mark Armstrong, RG, RPG, REA
Principal

PLAN TO PERFORM MONITORING WELL INSTALLATION

1. LOCATION AND SUBJECT SITE DESCRIPTION

The subject site is located at 223 E. 14th Street in the City of San Leandro (see Figure 1). The subject site is used as a strip mall in a commercial neighborhood.

2. BACKGROUND

The subject site has had a dry cleaner located in one of the buildings. During excavation of the sewer line, it was determined that halogenated volatile organic compounds (HVOCs) were present in the soil. Subsequent groundwater analysis has determined that slight concentrations of HVOCs are present in the groundwater.

3. CONTACT PERSONS

Subject Site Owner:

Mr. James Reed
3 Altarinda Road, #201
Orinda, CA 94563
Telephone No. (916) 336-5050
Fax No. (916) 336-5366

Environmental Consultant:

Mr. R. Mark Armstrong
Earth Engineers
P.O. Box 490
Cedarville, CA 96104
Telephone No. (800) 692-0787
Fax No. (530) 279-2257

Analytical Test Laboratory:

Entech Analytical Labs, Inc.
525 Del Rey Avenue, Suite E
Sunnyvale, CA 94086
Telephone No. (408) 735-1550
Fax No. (408) 735-1554

Select Agencies:

Ms. Juliet Shin
Hazardous Materials Specialist
Environmental Protection (LOP)
Environmental Health Services
Alameda Co. Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
Telephone No. (530) 667-6700
Fax No. (510) 337-9335

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
Telephone No. (415) 771-6000

4. MOBILIZATION

- Mark the subject site at the locations of well installation, locate the utilities, and open the concrete

(see Figure 2). Hand auger the first three feet to check for obstacles.

- Vironex, Inc. will perform the drilling operations at the subject site. The proposed drilling rig to be used at the subject site is a mobile B-53.

- Drill to a maximum depth of approximately 35 feet at the test locations where the shallow monitoring wells are to be installed. (See construction details in Appendix B.)

- Drill to a maximum depth of approximately 50 feet at the test location where the deep monitoring well is to be installed. Install a conductor casing and allow the concrete to cure for at least 24 hours. Drill through the neat concrete and install a well below the conductor casing. (See construction details in Appendix B.)

5. SOIL SAMPLING

- Collect soil samples at the 5, 10, 15, 20, 25, 30, and 35 foot depths, from the drilling locations of all four wells; and additionally at 40, 45, and 50 feet at the location of the deep well. Note: Groundwater may be encountered at approximately 25 feet below surface grade.

- During drilling operations, use a portable organic gas detection device to scan for the potential presence of hydrocarbon vapors in soil.

6. GROUNDWATER SAMPLES

- Convert the borings to permanent monitoring wells for the purpose of purging and collecting groundwater samples.

- Allow the concrete in the wells to cure for at least 48 hours, and then develop the wells with a surge block.

- Determine the relative elevation of the tops of casing of the four new wells. Measure the depth to the top of the water table to determine the gradient on the subject site once a month for the first three months of the life of the four new wells.

- After development, purge at least three well volumes from each of the four wells and determine the temperature, pH, and conductivity of the water. Collect groundwater samples for analysis after the temperature, pH, and conductivity stabilizes.

- Transport soil and groundwater samples under proper Chain of Custody for laboratory analysis.

7. ANALYSES

- Conduct laboratory analyses on a 15 working day turnaround period, as summarized in Table 1.

TABLE 1. SOIL TESTS PROPOSED FOR 223 E. 14TH STREET, SAN LEANDRO, CALIFORNIA

TEST PARAMETER	EPA METHOD OR LUFT METHOD	NUMBER OF SOIL SAMPLES TESTED BY STATED METHOD
(s) HVOCs	8010	18
(w) HVOCs	8010	4/quarter
TOTAL NUMBER OF TESTS PROPOSED		18 + 4/quarter

(s) = soil
(w) = water

Source: Earth Engineers, 1999.

- Test a total of 18 soil samples for HVOCs by EPA method 8010 or equivalent method on a 15 working day turnaround.
- Test a total of four groundwater samples for HVOCs by EPA Method 8010 or equivalent method on a 15 working day turnaround.
- Split samples will be taken back to Earth Engineers facility and the hydraulic conductivity estimated for the sediments using a constant head permeameter.
- Samples from the split samples will be examined under the microscope at Earth Engineers facility to investigate the porosity of the sediments.

8. QUALITY ASSURANCE/QUALITY CONTROL PLAN

- Proper sample containerization, labeling, preservation, and Chain of Custody will be followed according to Earth Engineers protocol.
- Entech Analytical Labs, Inc., in Sunnyvale, California, will perform all analytical testing. Entech is a California DHS-certified laboratory.

9. DATA MANAGEMENT PLAN

- All original laboratory reports will be kept at Entech. In addition, one copy each of the signed laboratory letter reports will be kept on file at Earth Engineers for a period of no more than three years.

- The original signed Chain of Custody will be kept on file at Earth Engineers for a period of no more than three years.

- The original signed Well Sampling Logs will be kept similarly on file at Earth Engineers.

- Data results will be entered from the original copy of the signed letter reports to a computer file at Earth Engineers office.

10. REPORTAGE

- Oral reportage will identify detectable contaminants, if any, where found, and appropriate recommendations.

- Submit a typewritten report summarizing results of well installation, with the laboratory report of soil and groundwater test results, in two (2) copies. Include interpretation of test results, recommendations, and a narrative description of the sampling and field observations.

11. SCHEDULE

- Soil sampling and well installation is scheduled for July 1999.

- Reportage of well installation is scheduled for August 1999.

- Groundwater sampling is scheduled for July 1999 and once a quarter for a year. All four wells will be purged and sampled for HVOCs.

12. DISPOSAL OF WASTE

- Disposal of drill cuttings or purge water will be accomplished after well installation, in accordance with all applicable laws.

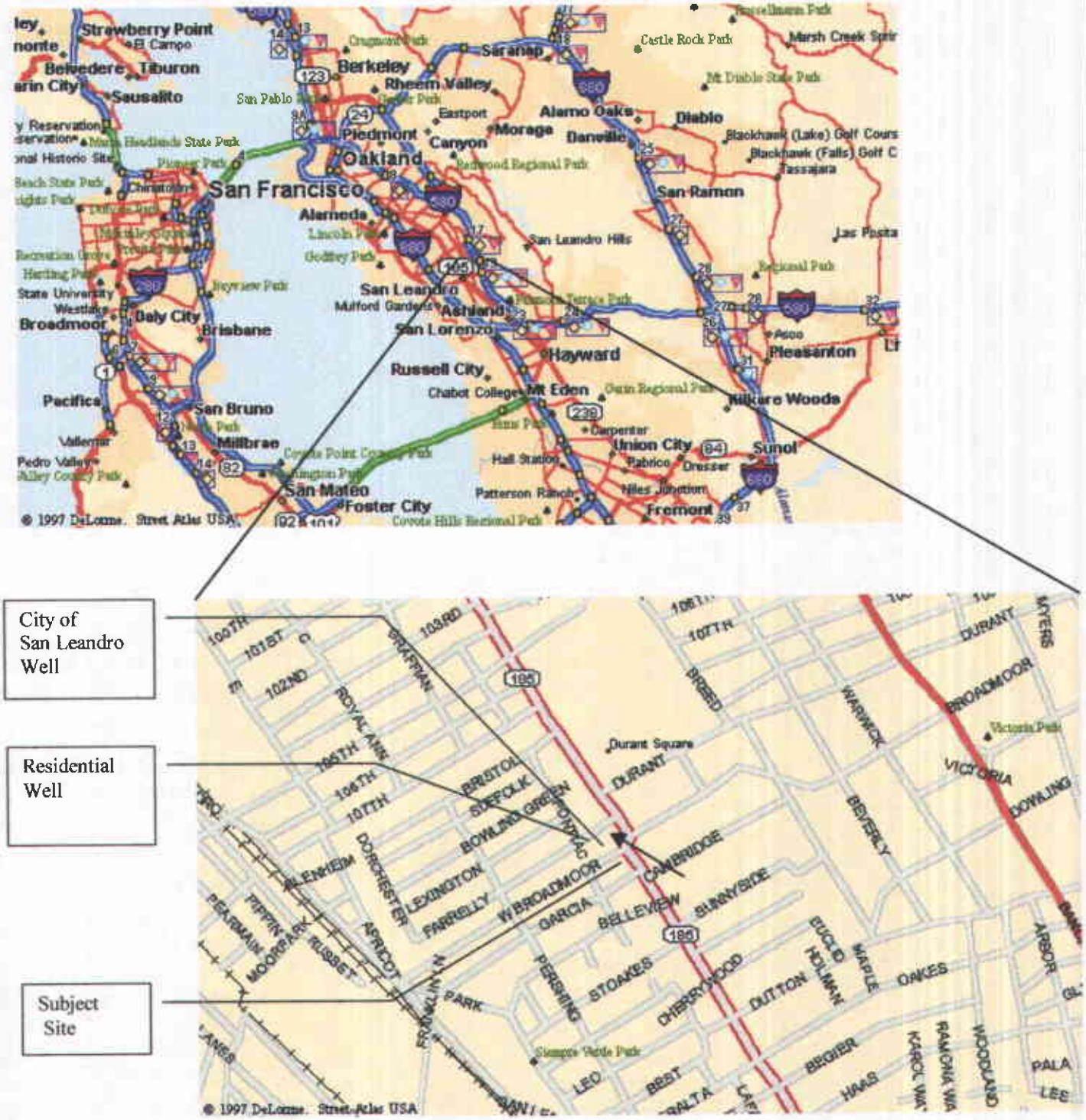
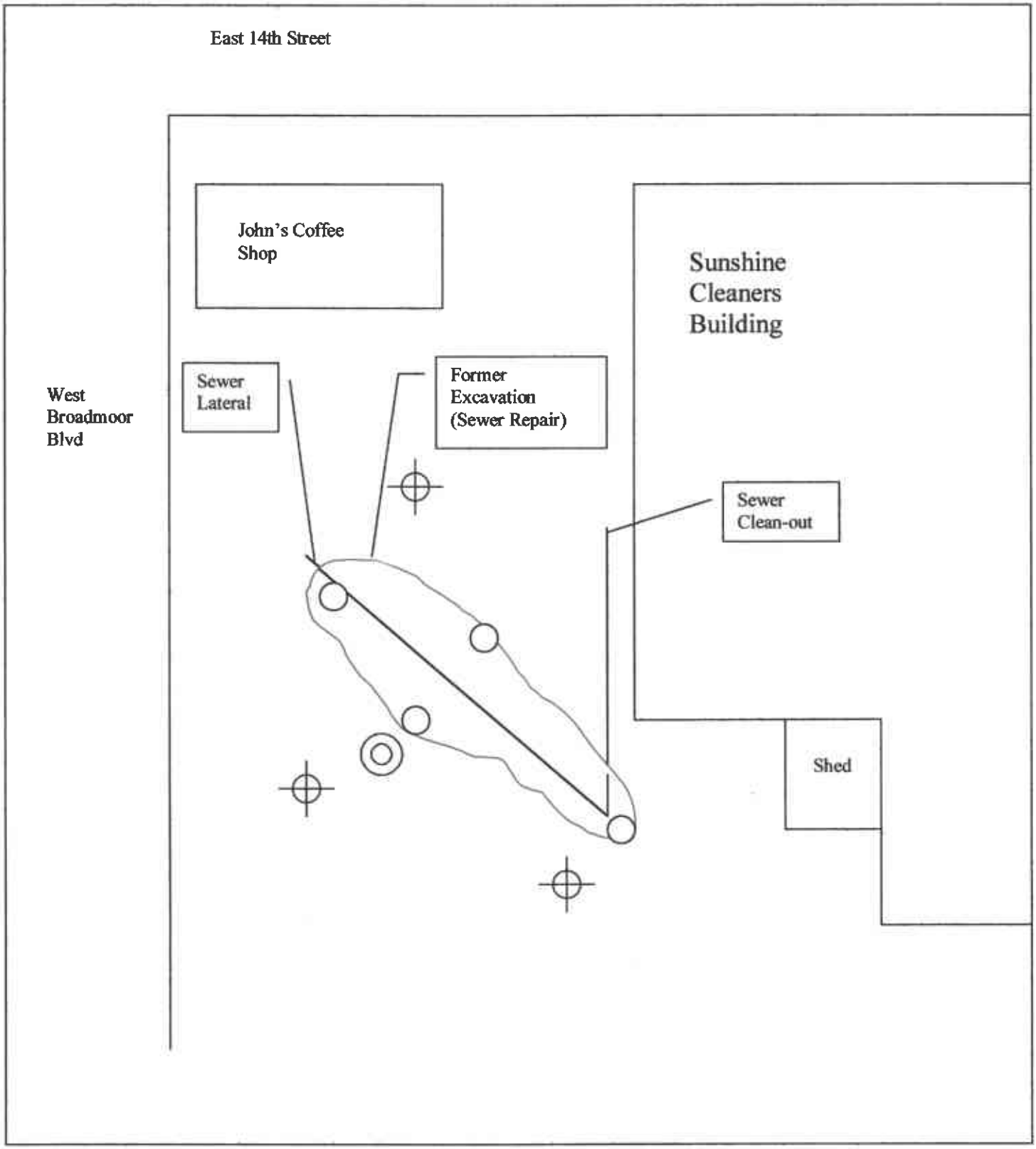


Figure 1: Subject Site Map

Apparent Groundwater Direction
(Environmental Testing and Management)

Earth Engineers



Earth Engineers

Figure 2: ACC Environmental Consulting Sample Locations

Proposed Shallow Monitoring Well Location

Proposed Deep Monitoring Well Location

1"= 25'

N

APPENDIX A

FIELD INVESTIGATION PROCEDURES

FIELD INVESTIGATION PROCEDURES OF EARTH ENGINEERS

Sample Collection, Subjective Analysis, and Classification

Collect soil samples from each of the borings at intervals of five feet or less in depth from the ground surface to the total depth of the boring. Collect samples using a California-modified, split-spoon sampler containing three six-inch-long brass sleeves. Collect samples by advancing the boring to a point immediately above the sampling depth and then driving the sampler through the hollow center of the auger and into the soil. Drive the sampler 18 inches with a hydraulic hammer repeatedly pounding the top of the rod attached to the sampler. Count and record the number of blows needed to drive the sampler each six-inch increment to evaluate the relative consistency of the soil.

After recovery of the sampler, remove the soil samples, and promptly seal one six-inch sample in its brass sleeve with aluminum foil, plastic caps, and tape. Label the sample and place in iced storage, pending transport to a laboratory certified by the State of California to undergo the required testing. The field geologist will initiate a Chain of Custody Record for each sample. Include the Chain of Custody Records in the final report. For the soil sample from each interval, use a second sleeve to describe the sample. The field geologist will note any product discoloration on the Boring Log. Use a photoionization detector (PID) to evaluate the organic vapor concentrations present in the soil samples. Collect readings by placing the rubber cup skirting the intake probe flush against the end of the soil sample immediately after the sleeve is removed from the sampler. Place the soil in the second sleeve in a plastic bag and test the head space with the PID. Measurements from instruments such as the Organic Vapor Analyzer (OVA) or PID can be used to indicate relative organic vapor concentrations in soil but cannot be used to measure the level of hydrocarbon compounds with the confidence of laboratory analytical methods.

Use the Unified Soil Classification System to identify the soil encountered in the boreholes. A copy of this classification system will be on site and is included in Appendix B. Describe on the Logs of Borings the soil encountered in the boring. Show the PID readings on the Logs of Borings in the column labeled "Product Odor."

Prior to reusing the California-modified, split-spoon sampler, wash and triple rinse the sampler. Steam clean all equipment used on site that may have come into contact with hydrocarbon contamination before the equipment leaves the subject site or enters a new boring.

At the subject site Earth Engineers will convert all four of the borings to permanent monitoring wells for the purpose of purging and collecting groundwater samples. Well construction varies with soil type. The sand around the casing is used to filter the fines from the groundwater when the groundwater is pumped from

the well. The casing slot size is selected to screen out the sand selected to filter the fines from the subsurface. To filter the clay from the groundwater, a sand size of 12/20 has been chosen. The filter pack material will meet or exceed American Water Well Association Standard for water wells AWWA A100-84. The screen size for this filter pack has been chosen to be 020.

Allow the concrete on the wells to cure for at least 48 hours, then develop the wells with a surge block and pump. Initially, pump the fluid in the well from the well into a drum. Place a four-inch surge block in the well and thrust up and down by hand. Pump the fluid from the well into a drum again. Repeat this procedure until the fluid appears to be free of fine particles.

Using a transit, determine the relative elevation of the tops of casing of the four new wells. Using a sounder, measure the depth to the top of the water table to determine the gradient on the subject site once a month for the first three months of the life of the four new wells.

After development, purge three well volumes from each of the four wells and determine the temperature, pH, and conductivity of the water once for each well volume removed. The well volume is calculated using the standard 0.653 gallons per foot of depth of water. The depth of water is calculated by subtracting the depth to water from the total depth of the well.

Collect groundwater samples for analysis using a dedicated disposable bailer. Lower the bailer slowly into the well until it is partially submerged in the fluid, then extract the bailer from the well and, using a valve to slowly remove fluid from the bailer, fill four 40 ml vials.

Transport soil and groundwater samples in a cooler under proper Chain of Custody for laboratory analysis. Double-contain all samples. The cooler will have a temperature monitoring device and a heat sink (i.e., ice). Enter any and all problems associated with sampling into a field notebook. Retain the field notebook for at least three years.

APPENDIX B

PROPOSED WELL CONSTRUCTION

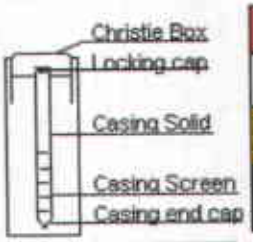
AND DRILLING PERMIT APPLICATION

Unified Soil Classification System

COARSE GRAINED SOILS <50% passes #200 sieve	**GRAVELS <50% coarse fraction passes #4 sieve**	Gravels Little or no fines	GW		Well-graded gravels, gravel-sand mixtures, little fines
			GP		Poorly-graded gravels, gravel-sands mixtures, little fines
		Gravels with > 12 % fines	GM		Silty gravels, poorly graded gravel-sand-silt mixture
			GC		Clayey gravels, poorly graded gravel-sand-clay mixture
	SANDS >50% coarse fraction passes #4 sieve	Sands Little or no fines	SW		Well-graded sands, gravelly sands, little or no fines
			SP		Poorly-graded sands, gravelly sands, little or no fines
		Sands with > 12 % fines	SM		Silty sands, poorly graded sand-gravel-silt mixture
			SC		Clayey sands, poorly graded sand-gravel-clay mixture
FINE GRAINED SOILS >50% passes #200 sieve	**SILTS & CLAYS Liquid Limit < 50**		ML		Inorganic silt & very fine sands, silty or clayey fine sands, clayey silts with slight plasticity
			CL		Inorganic clays with low or medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic silts & clays with low plasticity
	SILTS & CLAYS Liquid Limit > 50		MH		Inorganic silts, micaceous or diatomaceous fine sand / silt
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic silts & clays of medium to high plasticity
Highly Organic Soils			PT		Peat, humus, swamp soils with high organic content

KEY to LOG SYMBOLS

- Water first encountered
- Water after stabilization
- Soil sample driven
- Soil sample analyzed
- ⊠ Sample attempted no recovery



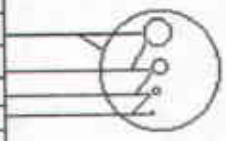
Bentonite	
Neat Cement	
Sand Pack	
Asphalt or Concrete	

Modifiers

Trace	<5%
Some	5-12%
With	>12%

Grain Size

Gravel	Coarse	Thumb to fist size
	Fine	Pea to Thumb size
Sand	Coarse	Rock salt to pea size
	Medium	Sugar to Rock salt
	Fine	Sugar to flour size
Silts & Clay		Flour size and smaller



Coarse grain Apparent density	Cali. Mod blows/ft	Cali Samp blows/ft	SPT blows/ft	Relative Density	Field Test
Very Loose	<4	<4	<5	0-15	Easily penetrated with 1/2 rod
Loose	5-12	5-15	4-10	15-30	Difficult to penetrate with 1/2" rod
Medium Dense	12-35	15-40	10-30	35-65	Easily to drive 1/2" rod with hammer
Dense	35-60	40-70	30-50	65-85	Difficult to drive 1/2" rod with hammer
Very Dense	<60	<70	<50	85-100	Penetrates only 2"max with 1/2 rod
FINE GRAIN SOIL					
Very Soft	<2	<2	<2		Exudes between fingers when squeezed
Soft	2-5	2-5	2-4		Easily penetrated one inch by thumb
Med Stiff	5-10	5-15	4-8		Penetrated over 1/2" by thumb moderate effort
Stiff	10-30	15-35	8-15		Penetrate 1/2" by thumb great effort
Very Stiff	30-45	35-50	15-30		Readily indented by thumbnail
Hard	>45	>50	>30		Indented by thumbnail with difficulty

Earth Engineers

Shallow Well Construction

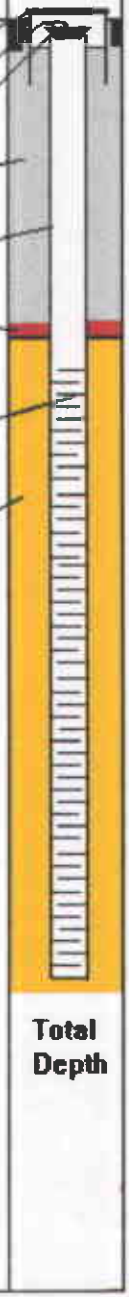
Drilling Co.
Driller
EE Geologist R. Mark Armstrong

Drilling Method
Hole Diameter
Total Depth
Sampling Method
Hammer (lbs/fall)

Boring No.
Sheet ____ of ____
Date Drilled

Casing Size
Screen length
Screen Slot
Filter Pack
Bentonite

Recovery	Sample Depth	Blows 6/in	Time	Moisture Content	Odor PPM	Depth	Description	Well Const



Earth Engineers

Deep Well Construction

Not to Scale

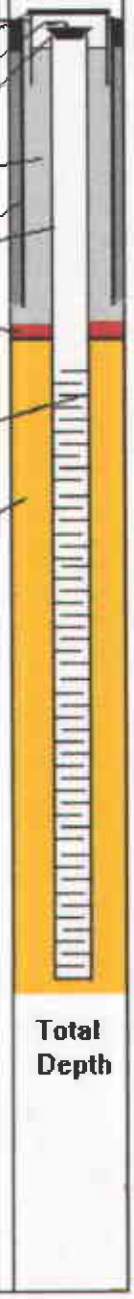
Drilling Co.
Driller
EE Geologist R. Mark Armstrong

Drilling Method
Hole Diameter
Total Depth
Sampling Method
Hammer (lbs/fall)

Boring No.
Sheet _____ of _____
Date Drilled

Casing Size
Screen length
Screen Slot
Filter Pack
Bentonite

Recovery	Sample Depth	Blows 6/in	Time	Moisture Content	Odor PPM	Depth	Description	Well Const



ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
951 TURNER COURT, SUITE 300, HAYWARD, CA 94545-2651
PHONE (510) 670-5575 ANDREAS GODFREY FAX (510) 670-5262
(510) 670-5248 ALVIN KAN

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 223 E. 14th Street
San Leandro

California Coordinates Source _____ ft. Accuracy ± ___ ft.
CCN _____ ft. CCE _____ ft.
APN _____

CLIENT
Name Mr. James Reed
Address 3 Altarinda #201 Phone 916-336-5050
City Orinda, CA Zip 94563

APPLICANT
Name Earth Engineers
Fax 530-279-2257
Address P.O. Box 490 Phone 530-279-2270
City Cedarville, CA Zip 96104

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	☐	General	☐
Water Supply	☐	Contamination	☒
Monitoring	☒	Well Destruction	☐

PROPOSED WATER SUPPLY WELL USE

New Domestic	☐	Replacement Domestic	☐
Municipal	☐	Irrigation	☐
Industrial	☐	Other monitoring	X

DRILLING METHOD:

Mud Rotary	☐	Air Rotary	☐	Auger	☒
Cable	☐	Other	☐		

DRILLER'S LICENSE NO. C57-705927

WELL PROJECTS
Drill Hole Diameter 8 in. Maximum
Casing Diameter 2 in. Depth 50 ft.
Surface Seal Depth 20 ft. Number 4

GEOTECHNICAL PROJECTS
Number of Borings _____ Maximum
Hole Diameter _____ in. Depth _____ ft.

ESTIMATED STARTING DATE 7/20/99
ESTIMATED COMPLETION DATE 7/23/99

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE _____ DATE 7/12/99

FOR OFFICE USE

PERMIT NUMBER _____
WELL NUMBER _____
APN _____

PERMIT CONDITIONS

Circled Permit Requirements Apply

A. GENERAL
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
2. Submit to ACPWA within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 Feet.

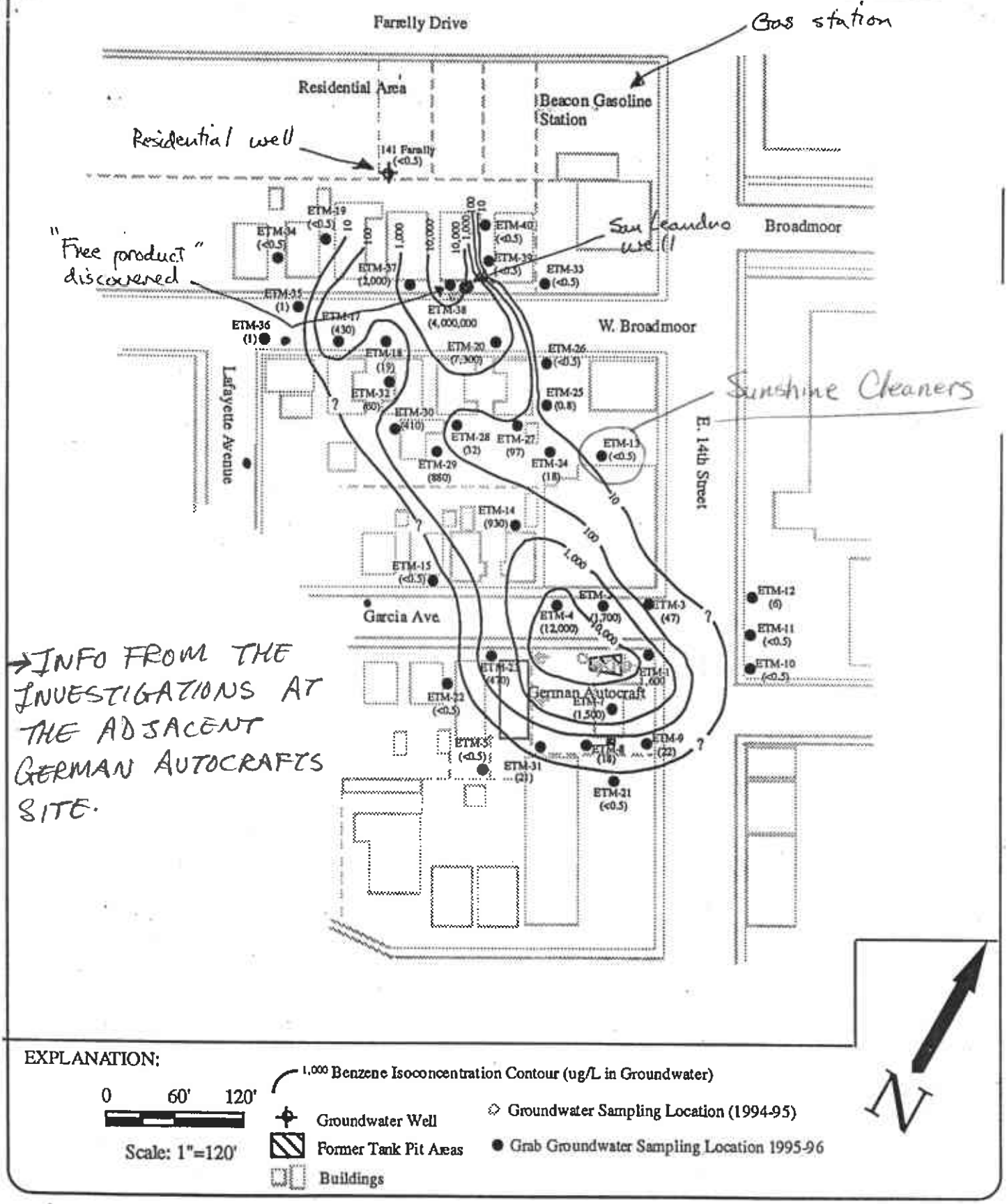
D. GEOTECHNICAL
Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

E. CATHODIC
Fill hole above anode zone with concrete placed by tremie.

F. WELL DESTRUCTION
See attached.

G. SPECIAL CONDITIONS

APPROVED _____ DATE _____



→INFO FROM THE INVESTIGATIONS AT THE ADJACENT GERMAN AUTOCRAFTS SITE.

EXPLANATION:

0 60' 120'

Scale: 1"=120'

1,000 Benzene Isoconcentration Contour (ug/L in Groundwater)

Groundwater Well

Former Tank Pit Areas

Buildings

Groundwater Sampling Location (1994-95)

Grab Groundwater Sampling Location 1995-96

N

Environmental Testing and Management
2916 Magliocco #2
San Jose, California

BENZENE ISOCONCENTRATION MAP
German Autocraft
301 East 14th Street
San Leandro, California

Figure 7

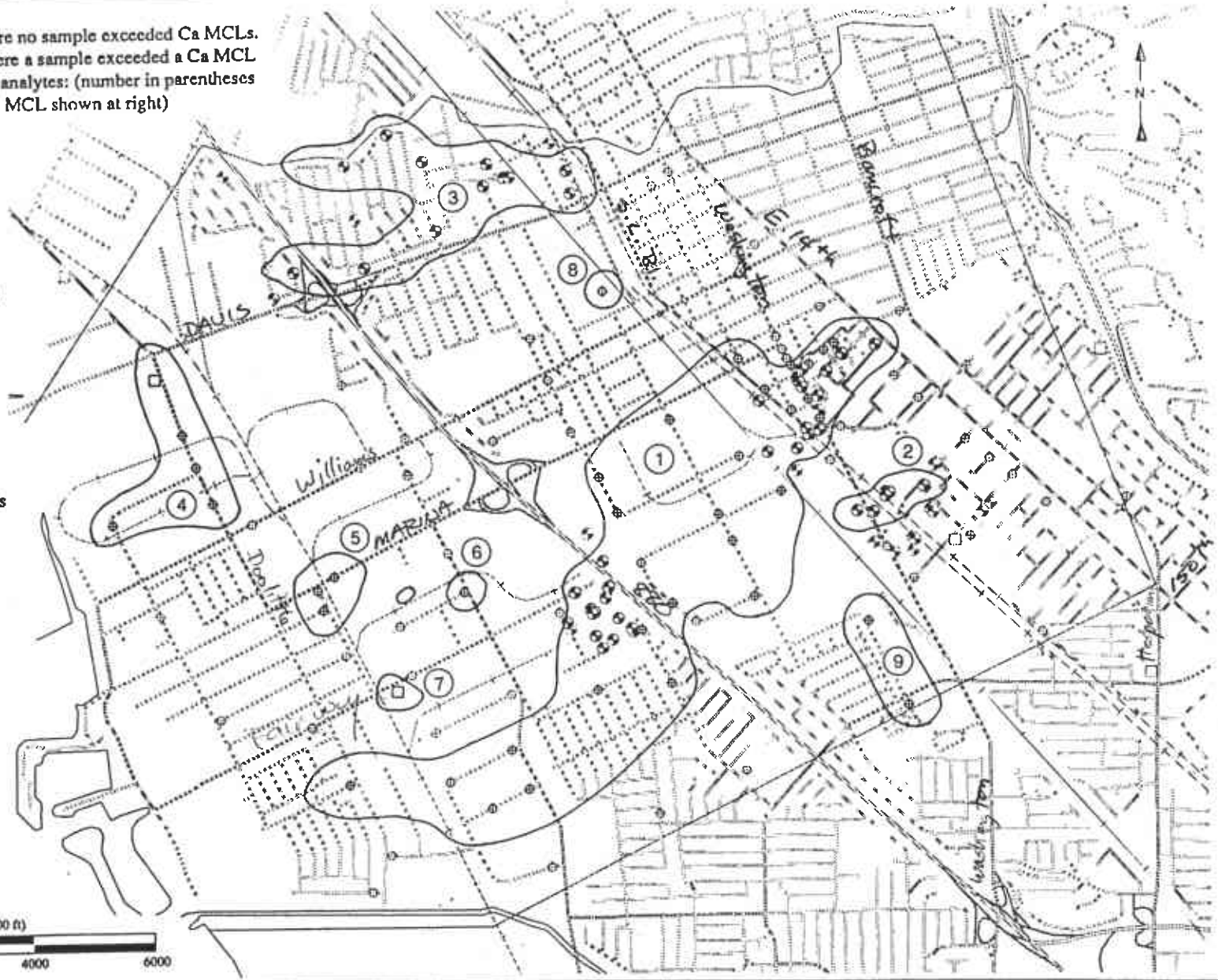
Project No. 94-52
Date: 7/96

All sampling locations are shown.
Gray icons represent locations where no sample exceeded Ca MCLs.
Black icons represent locations where a sample exceeded a Ca MCL for one or more of the following analytes: (number in parentheses indicates the number of samples, MCL shown at right)

(94) TCE ≥ 5 ppb
(56) PCE ≥ 5 ppb
(12) 1,1-DCA ≥ 5 ppb
(12) 1,2-DCA ≥ 0.5 ppb
(31) 1,1-DCE ≥ 6 ppb
(25) cis-1,2-DCE ≥ 6 ppb
(16) carbon tetrachloride ≥ 0.5 ppb
(2) vinyl chloride ≥ 0.5 ppb
(0) chloroform ≥ 100 ppb
(0) trans-1,2-DCE ≥ 10 ppb
(0) 1,1,1-TCA ≥ 200 ppb
(0) 1,1,2-TCA ≥ 32 ppb
(0) Freon 11 ≥ 150 ppb
(0) Freon 113 ≥ 1200 ppb

115 total samples from 89 locations (40 Hydropunch, 47 monitoring wells, 2 voluntary participants)

Other EPA Method 8010 analytes were not detected



LEGEND

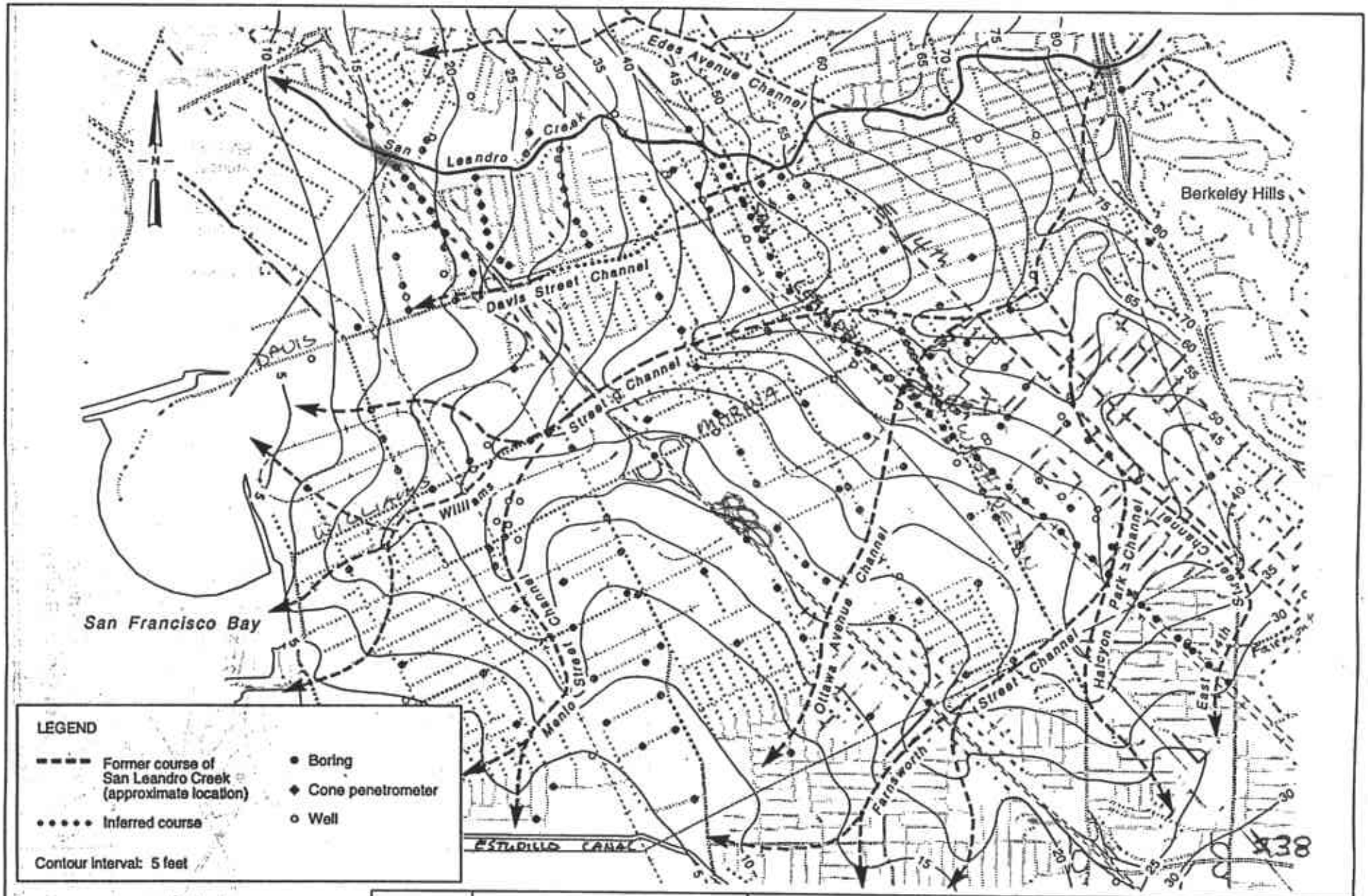
- Hydropunch
- Monitoring Well
- Voluntary Participant

ft (1 in = 2500 ft)

0 2000 4000 6000

Note: Lines are not intended to show the limits of groundwater contamination. They only group locations exceeding Ca MCLs for VOCs

Project No. 92C0805F	California EPA Department of Toxic Substances Control	Locations With Samples Exceeding CA MCLs For VOCs	December 1993
Woodward-Clyde Consultants			Figure 7 (1.5-7)



Project No. 92C0805F	San Leandro Plume	GENERALIZED TOPOGRAPHIC MAP OF THE SAN LEANDRO ALLUVIAL CONE SHOWING FORMER CHANNELS OF SAN LEANDRO CREEK	Figure 11 (4.3-10)
Woodward-Clyde Consultants			

92C0805F-2000/111193