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**BSK & Associates**

November 16, 1992

BSK Job No. P92270.3

American Brass & Iron Foundry  
7825 San Leandro Street  
Oakland, CA 94621

Attention: Mr. David Robinson  
Environmental Engineering Manager

Subject: Work Plan  
Shallow Soil And Groundwater Characterization  
American Brass And Iron Foundry Facilities  
Oakland, California

Gentlemen:

As requested, BSK & Associates has prepared this Work Plan for American Brass & Iron (AB & I), for the preliminary evaluation of shallow soil and groundwater conditions with respect to gasoline, diesel and solvent releases from Underground Storage Tanks (USTs) at American Brass & Iron Foundry, located in Oakland, California.

BSK is pleased to have had this opportunity to serve you, and trusts will find this submittal suitable to your needs. If there are questions or concerns regarding this Work Plan, please contact us.

Respectfully submitted,  
BSK & Associates

Alex Y. Eskandari, P.E.  
Project Manager

Tim W. Berger, R.G.  
Project Geologist

AYE\TWB:kl\hhc  
(REPAENV\VP92270.3)

**WORK PLAN  
SHALLOW SOIL AND GROUNDWATER  
INVESTIGATION  
AMERICAN BRASS & IRON FOUNDRY  
OAKLAND, CALIFORNIA**

**Introduction**

This Work Plan has been requested by the Alameda County Department of Environmental Health (ACDEH), in their letter of October 2, 1992, to David Robinson of American Brass & Iron Foundry (AB & I). In their letter, ACDEH has requested the installation of four shallow groundwater monitoring wells; one per former UST location, shallow soil contaminant concentration information, groundwater quality data at each of the former UST locations, and record of disposal and status of excavated and emplaced soil, treated and disposed groundwater, and removed UST.

We have reviewed the following information in preparing this work order:

- Levine-Fricke's report entitled "Removal of 8,000-Gallon Capacity Underground Storage Tank, American Brass and Iron, Oakland, California," dated October 15, 1991.
- Levine-Fricke's report entitled "Removal of 550-Gallon Capacity Underground Gasoline Storage Tank, American Brass & Iron, Oakland, California," dated January 31, 1992.
- Site Plan showing the former 8,000-gallon capacity 1,1,1-trichloroethane (1,1,1-TCA) underground storage tank (UST) soil sample locations, and analytical results of soil and groundwater samples; AB & I tank removal report, dated April 8, 1992.
- Site Plan showing the former 10,000-gallon capacity diesel UST, soil sample locations, and analytical results of soil and groundwater samples; AB & I tank removal report, dated September 22, 1992.

**Background**

AB & I maintained three USTs to store petroleum products and one UST to store solvent. AB & I's tank closure program consisted of removing the four USTs between August 1991 and June 1992. Documentation of the removal and disposal of two of the USTs (the 8,000-gallon capacity gasoline tank and the 550-gallon capacity leaded gasoline tank) was described in the two reports mentioned above. Documentation of the removal and disposal of the two remaining USTs (the 8,000-gallon capacity 1,1,1-TCA UST and the 10,000-gallon capacity diesel UST) was reported by AB & I.

In general, analytical results for the soil and groundwater samples collected adjacent to the tanks during these tank removal projects contained detectable concentrations of Total Petroleum Hydrocarbons as gasoline (TPHg), Total Petroleum Hydrocarbons as diesel (TPHd), 1,1-DCA, Chloroethane, and 1,1,1-TCA. Affected soils at each former tank location were excavated vertically to the top of the saturated sediments and laterally until confirmation samples indicated that the chemicals of concern were at relatively low concentrations, or to where an obstruction made further excavation impossible or too hazardous.

## PURPOSE AND SCOPE

### Purpose

The objective of this Work Plan is to provide a preliminary characterization of shallow soil and groundwater conditions in the vicinity of four former USTs, and to address the concerns of the ACDEH.

### Scope

In order to meet our objective, the following tasks are planned:

1. Submittal and authorization of this Work Plan and a Health and Safety Plan by AB & I and the regulatory authority;
2. Installation of ~~three~~<sup>2</sup> two-inch and one four-inch shallow groundwater monitoring wells;
3. Excavation and sampling of one shallow soil boring to assess soil contamination;
4. Sampling of soil and groundwater from the monitoring well borings and wells to test for the contaminants of interest;
5. Analytical testing of soil and water samples by a California-certified analytical laboratory.
6. Assessment of the information obtained;
7. Preparation of a formal report presenting the observations, services performed, conclusions and recommendations based on our assessment of the data obtained;
8. Presentation of available manifests and documentation of soil, tank and groundwater fate associated with AB & I's removal of four USTs between August 1991 and June 1992.

Each task is described in detail below.

## Task 1 - SUBMITTAL OF A WORK PLAN AND HEALTH AND SAFETY PLAN

A ~~Work Plan~~ describing the rationale and methods to be used during the field investigation will be submitted to the ACDEH for review and approval. The Work Plan will also address the additional information requested by the ACDEH, such as copies of manifest forms for the USTs, status of excavated and emplaced soil, and treated and disposed groundwater.

*When will  
work plan  
be provided*

As required by the Occupational Safety and Health Administration (OSHA), the site Health and Safety Plan previously developed for the site will be used for this phase of work. The Health and Safety Plan incorporates safeguards against chemical and physical hazards associated with drilling and sampling activities. Personnel working on-site as part of this scope of work will be required to read and adhere to the plan. The Project Manager and Site Safety Officer (SSO) will be responsible for implementing the health and safety program. In addition to this plan, all employees will follow standard site procedures required by AB & I. The Site Health And Safety Plan is presented in Appendix "A" of this submittal.

## Task 2 - GROUNDWATER MONITORING WELL INSTALLATION

Three two-inch ID PVC groundwater monitoring wells would be installed at the former gasoline and diesel UST locations, as shown in Figure 2, Site Plan. One four-inch PVC groundwater monitoring well is to be installed adjacent to the former solvent UST location. The wells would be installed within 10 feet of the tank excavation limit, down-gradient from the former tank location. Analysis of local well records suggest that the appropriate down-gradient direction is to the northwest. The well data is included in Appendix "B" of this Work Plan.

The wells would be installed to a depth of 20 to 25 feet below present grade, and would screen 10 to 15 feet of the initial encountered groundwater, with two feet of screen above the water table for water table fluctuation. Details of well construction are provided in Figure 3, Typical Monitoring Well Construction Details. Each well head would be encased at the surface in a heavy traffic-worthy cast iron and aluminum well box, resistant to water and unauthorized intrusion, and marked "Monitoring Well". The well casing head would be further secured with an expanding, padlocked well plug. A card listing pertinent well data would also be enclosed in each well box.

A minimum of 72 hours following well installation and seal, each well would be developed by pumping, surging or bailing until coarse sediment is removed, a degree of clarity is achieved, and parameters such as temperature, conductivity and pH stabilize.

Following installation, each well would be surveyed to within 1/100th vertical foot, based on a USGS datum, by a California licensed surveyor.

## Task 3 - SHALLOW SOIL BORINGS

One shallow soil boring would be augered to a depth just above the groundwater table, in the area of the former 550-gallon gasoline tank, as shown in Figure 2, Site Plan. Soil samples would be obtained every five feet, or as necessary due to subsurface conditions, with the

deepest sample acquired near the top of the capillary fringe. Based on field observations and Photo-Ionization detector response, one or more samples would be chosen from the boring for chemical analysis. The soil boring would be closed by filling the boring with neat cement or 11 sack sand slurry (grout). If water is present in the boring, or the unsupported boring might cave, the boring would be sealed through the auger, or other tremie method. The boring would be advanced by angle drilling, beneath the adjacent building, for assessment of soil contamination in the building direction.

#### Task 4 - SOIL AND WATER SAMPLING

##### Soil Samples

Soil samples would be obtained every five feet from the ~~level of the bottom of the former UST to first encountered groundwater~~, and as necessary due to soil conditions or contaminant encounter. A specimen from each sampled horizon would be tested, as specified in the Tri-Regional Water Board Staff Recommendations.

Soil samples would be obtained through the hollow-stem auger by driving a Modified California barrel sampler, housing three stainless steel or brass sample liners, to the selected interval ahead of the auger bit, into undisturbed soil. Upon sampler retrieval, one or more of the soil filled liners would be capped with Teflon® sheeting and plastic caps, labeled, and refrigerated on-site in a cooler with dry ice to 4°C. The remaining soil would be used to classify site soil by the Unified Soil Classification System. Field logging would be performed by, or under the direct supervision of a California Registered Geologist. The selection of soil samples and sampling horizons would be aided in the field by the use of a Photo-ionization detector, calibrated daily to an isobutylene standard.

##### Water Samples

Water samples from site wells would be obtained after purging each well of four to ten casing volumes, and allowing eighty percent recovery. Observation of water level and for immiscible product would be performed using an electric sounder and point-source bailer prior to purging. The water level would be recorded to the nearest 1/100th of a foot. During the purge, the water parameters, pH, temperature and conductivity would be monitored and recorded at regular intervals to assess the influx of fresh formation water. Water samples for analytical testing would be obtained by Teflon® bailer or bladder pump, and transferred to the appropriate storage container, with preservative if needed. The samples would then be labeled, and refrigerated on-site using water or blue ice, to 4°C.

#### Task 5 - ANALYTICAL TESTING

Analytical testing of soil and water samples obtained from the site would be performed by a California certified analytical laboratory.

The analyses performed for each contaminant type are those specified by the Tri-Regional Water Board Staff Recommendations of August 10, 1992. The analyses proposed for this scope of work are:

Gasoline: TPH-G by GCFID-5030 (soil and water)  
BTEX by Methods 8020 (soil) and 602 (water)  
Total Lead by Atomic Adsorption (soil and water)  
Leaded Gasoline Tank only

Diesel Fuel: TPH-G by GCFID-3550 (soil) and 3510 (water)  
BTEX by Methods 8020 (soil) and 602 (water)

1,1,1 - TCA: EPA Methods 8010 (soil) and 601 (water)  
*also TPHg, BTEX*

Tarry Substance: Oil and Grease by Methods 5520 D&F (soil) and C&F (water)  
*and 8270.*

#### Blanks

For each day of water sampling, one set of Trip Blanks, prepared by the laboratory, would be provided for volatile analyses. In addition, one set of Equipment Blanks would be obtained using decontaminated sampling equipment, for each type of contaminant sampled for that day. Deionized water would be used for Equipment Blanks.

Samples and blanks would be submitted to the laboratory with Chain-Of-Custody documentation and procedures.

#### Tasks 6 & 7 - ANALYSIS AND REPORTING

Following completion of the field work and receipt of the analytical test results, BSK will prepare a formal report describing the work performed, observations made, and presentation of the analytical results. Conclusions regarding subsurface conditions and contamination would be presented, and recommendations made, if warranted, for additional investigation, monitoring, or closure.

The final report would be signed and stamped by a Registered California Civil Engineer.

#### Task 8 - ~~DOCUMENTATION OF SOIL AND WATER FATE, AND BACKFILL SOURCE FROM TANK REMOVALS~~

Submitted with, but separate from the contamination characterization investigation report, will be documentation of waste soil and water generated during the tank removals between August 1991 and June 1992. Also documented will be the source and condition of tank excavation backfill utilized at the site.

## GENERAL CONDITIONS

Field work performed at the site for this investigation would be performed by BSK personnel having completed OSHA Hazardous Waste Operations And Emergency Response Training, and supplemental refresher training.

Drilling will be performed by BSK B-53 Mobile Drill, truck-mounted rotary rig, utilizing 8" O.D. hollow-stem auger for 2" diameter wells, and 10" O.D. hollow-stem auger for the installation of 4" wells.

### Well Construction

Monitoring wells would be constructed by placing the well casing and screen through the hollow-stem auger to the bottom of the boring; one foot of sand would be provided at the bottom of the boring to set the well end on. Annular sand would then be poured around the screen, as the auger is lifted, to prevent caving of soil against the screen. The well casing and screen would be centered in the boring by the auger. Annular sand would be placed to a height of two feet above the screen. A one foot spacer of 1/4" bentonite pellets would cap the annular sand. The bentonite pellets would be actuated by the addition of 5 gallons of potable water, prior to providing the surface seal for the well. The surface seal would consist of neat Portland, Type II cement, or 11 sack sand slurry (grout). The seal would be emplaced directly into the boring if the boring is dry, and the seal bottom is less than 30 feet in depth. If water is present, or the seal bottom is greater than 30 feet, the seal will be emplaced by pumping cement to the bottom of the open hole through a 1" diameter tremie pipe, and filling the hole in one continuous lift. At surface, the well head would be encased in a heavy traffic-worthy, water and tamper resistant, metal box, marked "Monitoring Well." The box will be set in rapid setting, pre-mixed concrete. A locking plug will be used to seal the well casing.

### Decontamination

Decontamination of drilling and sampling equipment will be performed prior to introduction of equipment to the site, and as necessary between borings and sampling events. Decontamination will be performed using high-pressure, high-temperature spray and/or non-phosphate detergent wash and multiple rinse.

### Waste Containment

Drill cuttings, and waste water from development, purging, sampling and decontamination activities will be collected and containerized at the site in appropriate, DOT-approved 55 gallon steel drums for storage at the site, until determination is made from applicable analytical data of the wastes proper fate. Each waste storage container will be labeled with the nature of the contents, content source, date of accumulation, and name of the owner. AB & I would be responsible for the disposal of wastes generated during this investigation.

## Miscellaneous

AB & I will provide underground utility clearance for the proposed drilling locations. All drilling locations are located within the AB & I compound, so Underground Service Alert will not be contacted.

The required permits for the installation of monitoring wells and excavation of exploratory borings will be obtained from Alameda County Flood Control (ACFC) Zone 7, prior to the beginning of field work. Subsequent DWR Well Drillers Reports will be submitted to Zone 7, following well completion, as required by Zone 7 permits.

## SCHEDULING

Preparation for the performance of field work could begin the day of acceptance of this Work Plan by ACEDH. Permits from ACFC Zone 7 would be applied for, and received within one weeks time. Field work could begin one week after acceptance of this Work Plan. Approximately five working days may be required to complete the field activities. Well development would performed three days after installation of the well seal. Purging and sampling of each well would be performed three days following development of each well. Analytical testing results would be available by ten working days following receipt of the samples by the laboratory. Report preparation and draft submittal to AB & I would occur two to three weeks after receipt of the analytical results from the laboratory. Total investigation time would be approximately seven to eight weeks.

\* \* \* \*

The following figures and appendices complete this Work Plan:

- Figure 1 - Vicinity Map
- Figure 2 - Site Plan
- Figure 3 - Typical Monitoring Well Construction Details

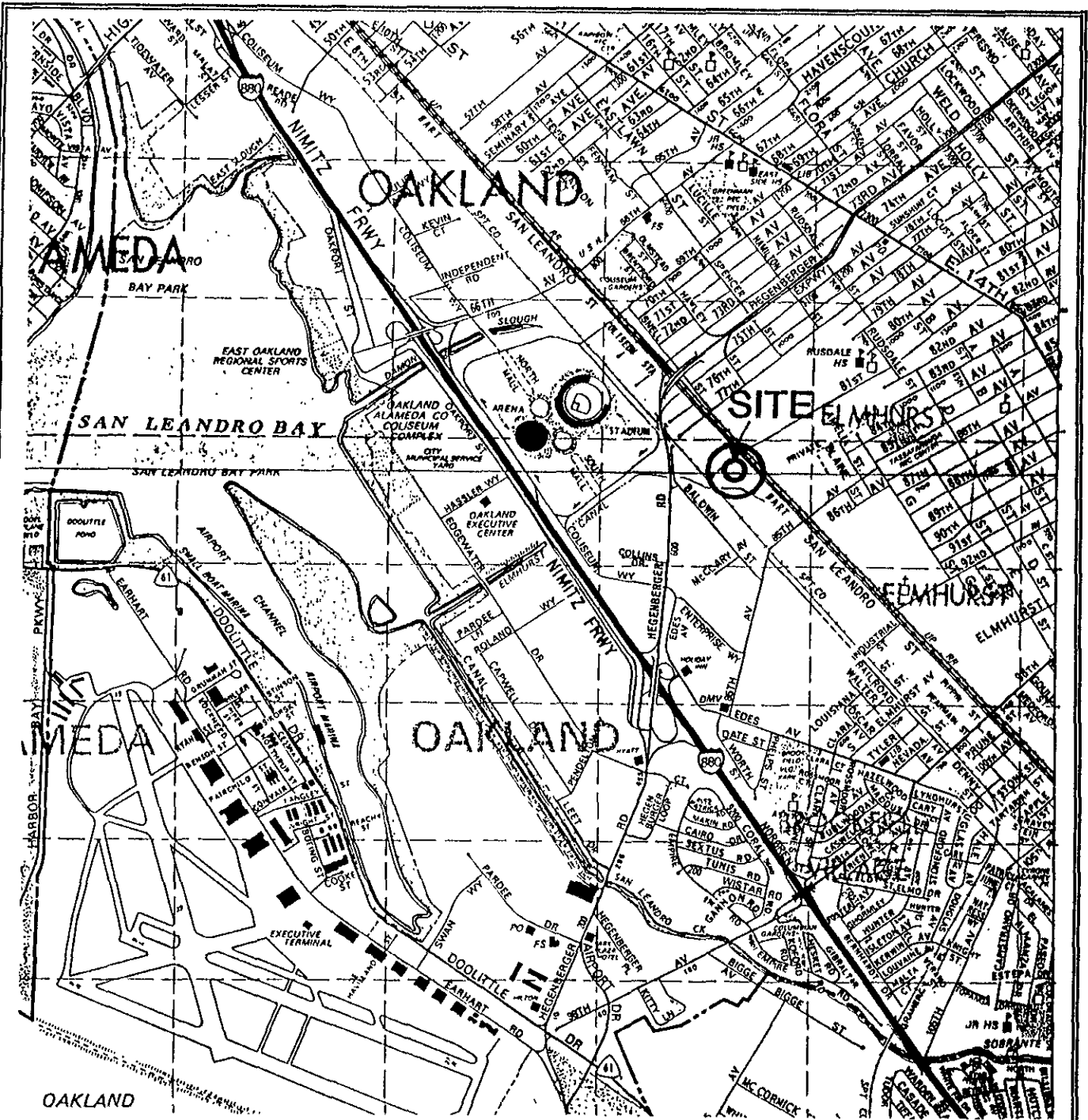
- Appendix "A" - Site Health And Safety Plan
- Appendix "B" - Surrounding Monitoring Well And Regional Groundwater Gradient Information



APPENDIX "A"

SITE HEALTH AND SAFETY PLAN

(As provided by AB & I)



Source: The Thomas Guide, 1990, Alameda and Contra Costa Counties  
 Map Scale: 1" = 2200'

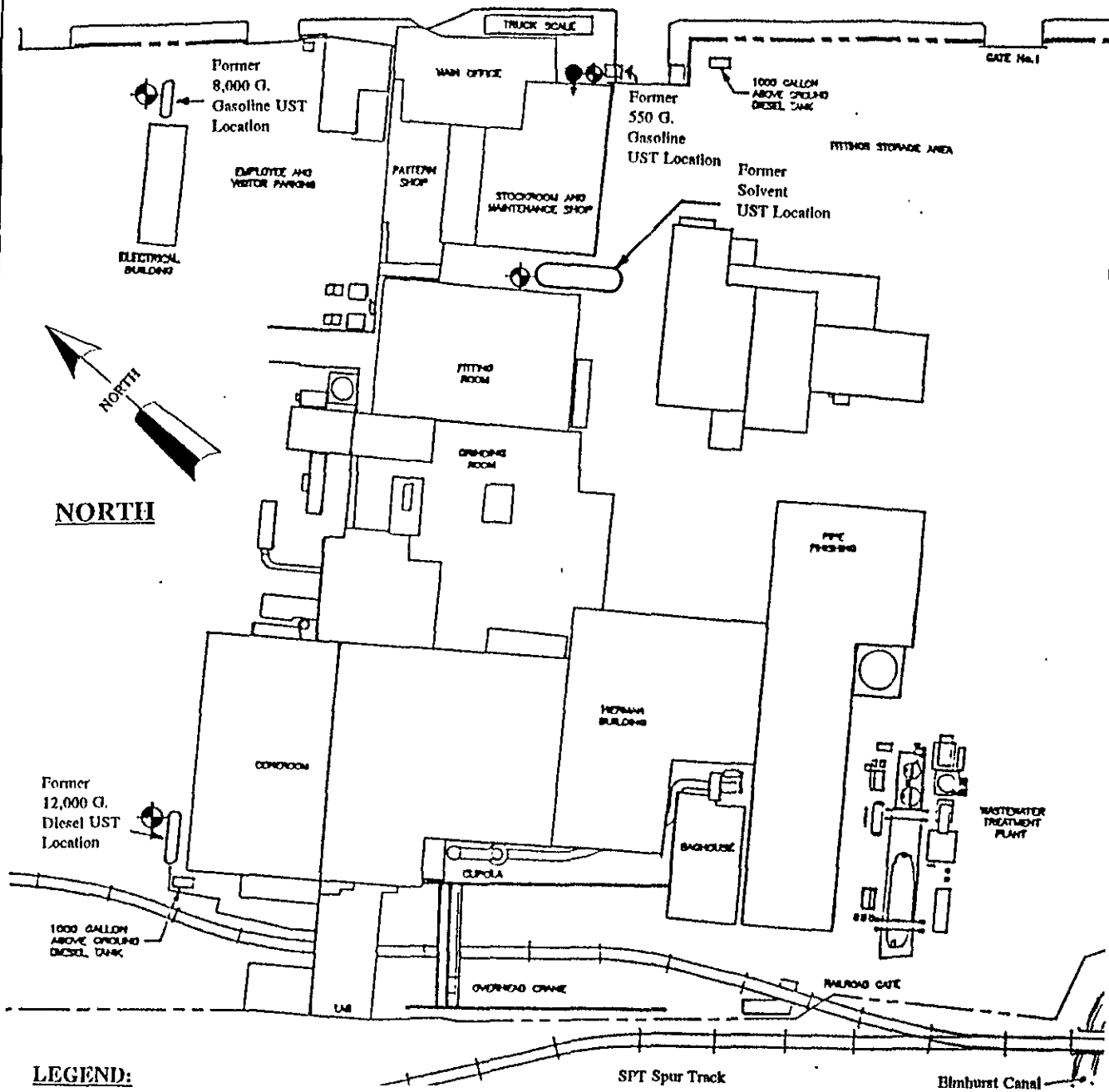
**WORK PLAN**  
**SHALLOW SOIL AND GROUNDWATER**  
**INVESTIGATION**  
**AMERICAN BRASS & IRON FOUNDRY**  
**OAKLAND, CALIFORNIA**

**VICINITY MAP**

**JOB NO. P92270.3**  
**NOVEMBER 1992**  
**FIGURE: 1**

**BSK**  
 & ASSOCIATES

SAN LEANDRO STREET



**LEGEND:**

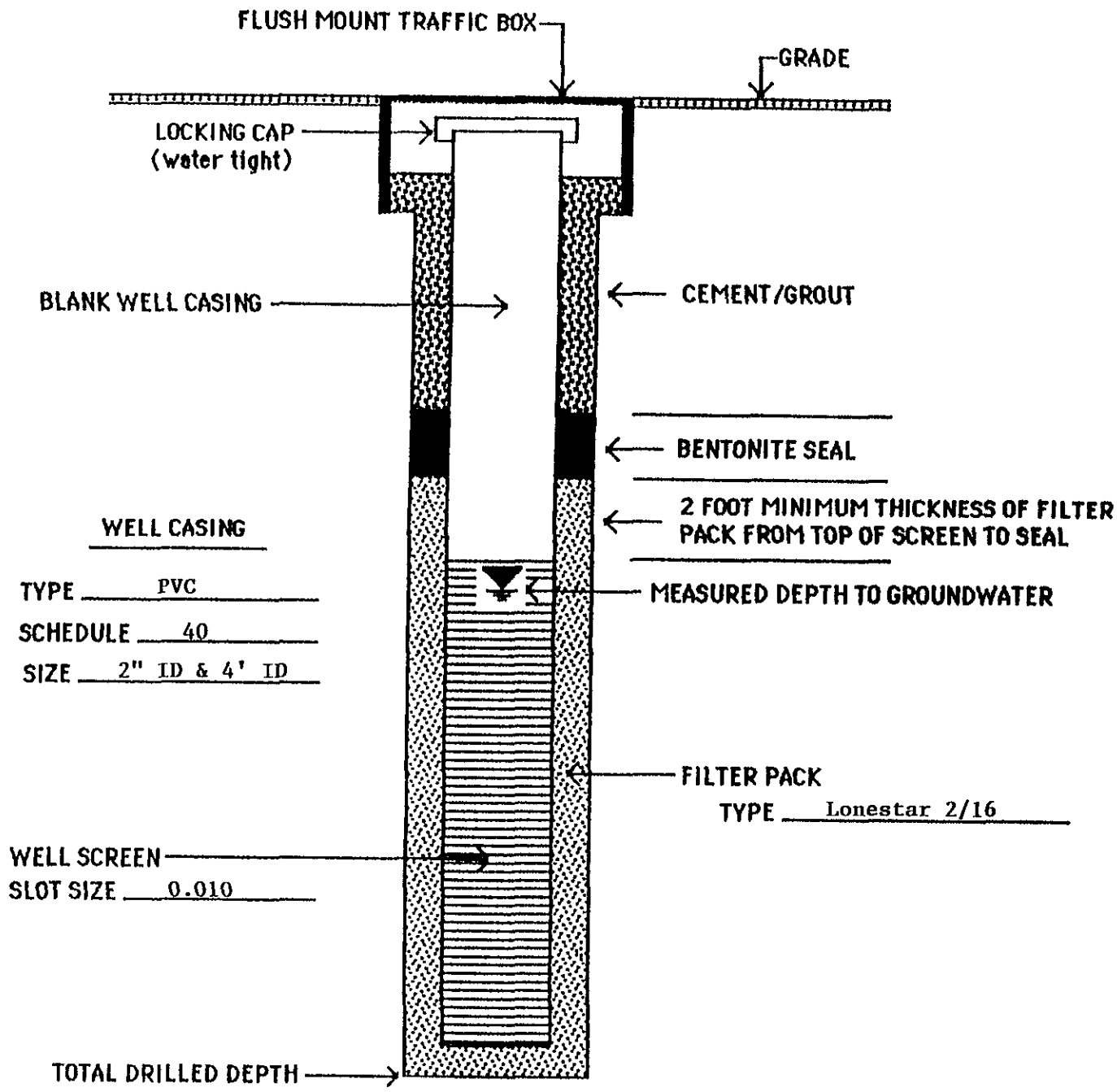
- ⊗ - Approximate Location Of Proposed Groundwater Monitoring Well
- ◄● - Approximate Location Of Proposed Battered Soil Boring (arrow indicates batter direction)

Scale: NTS

**WORK PLAN**  
**SHALLOW SOIL AND GROUNDWATER**  
**INVESTIGATION**  
**AMERICAN BRASS & IRON FOUNDRY**  
**OAKLAND, CALIFORNIA**

**SITE PLAN**  
**JOB NO. P92270.3**  
**NOVEMBER 1992**  
**FIGURE: 2**

**BSK**  
**& ASSOCIATES**



TYPICAL MONITORING WELL CONSTRUCTION DETAILS

Job No. P922270.3  
 November 1992  
 FIGURE: 3

**BSK**  
 & Associates



APPENDIX "B"

SURROUNDING MONITORING WELL  
AND  
REGIONAL GROUNDWATER GRADIENT INFORMATION

(As provided by AB & I)

## EXPLANATION OF DETERMINATION OF DOWNSTREAM GRADIENT

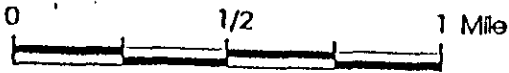
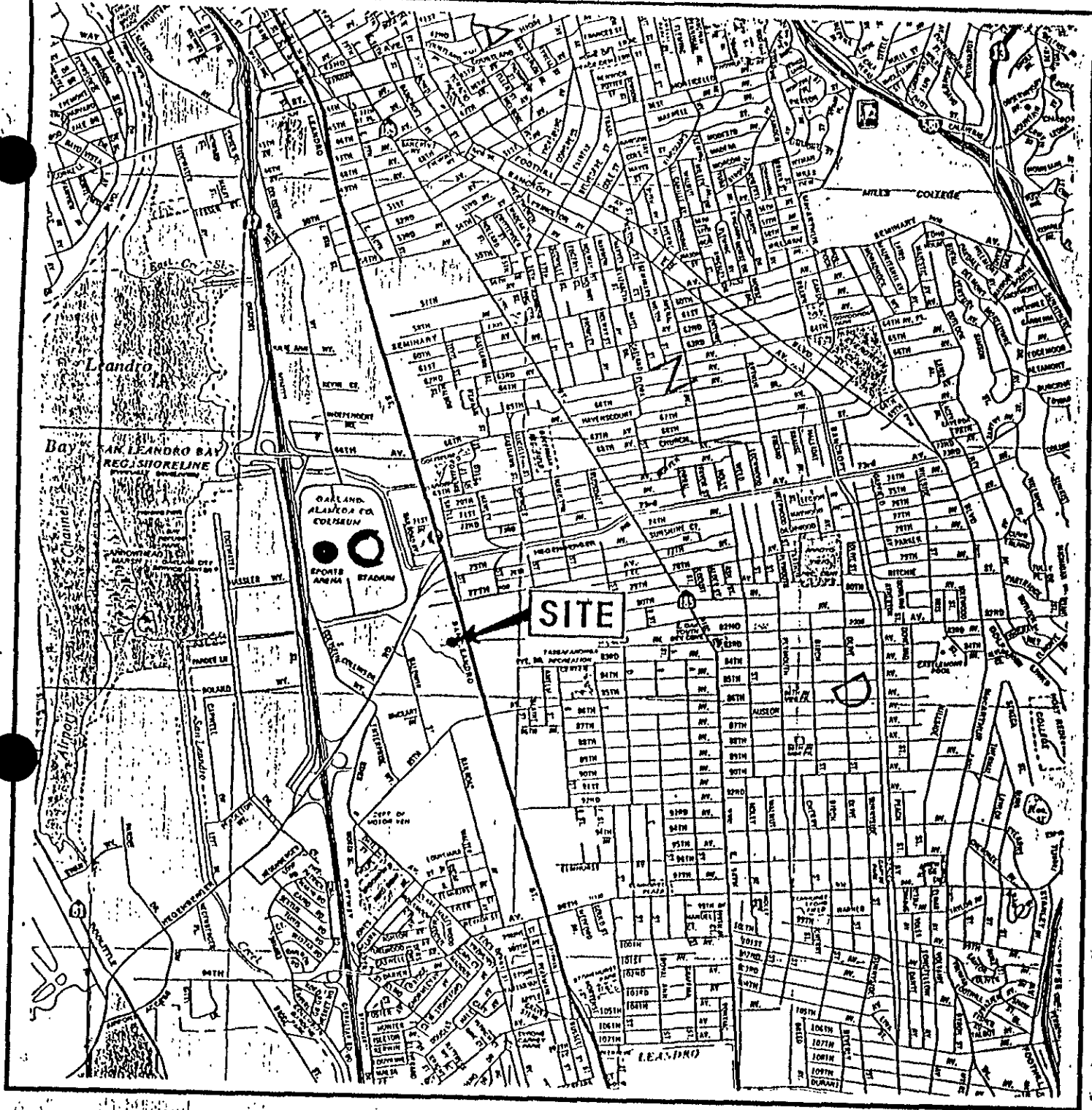
To assist in determination of downstream gradient, information was obtained from Alameda County Water District about surrounding monitoring wells. The location of these wells is shown on the map which follows.

This information was used to average depths to clay, groundwater, and depth from mean sea level to groundwater for sections 15, 16, 21, and 22 of township 2s/3w. These areas are shown on the map in Appendix B. The corresponding monitoring well data is contained in Table I. The numbers correspond to the numbered symbols on the map. The average for each section - 15, 16, 21, and 22, is plotted on the elevation graphs following the map. When surface elevations were listed as being zero, it was assumed that the surface elevation was unknown. The graph of mean sea level to groundwater indicates that water flow is generally in the northwest direction.

Next, the graph of clay depths which follows indicates that relatively impermeable clay exists to at least groundwater depth in the former R & A underground tank location when compared to the graph of groundwater depths. Thus, an extreme gradient caused by varying soil conditions is not likely.

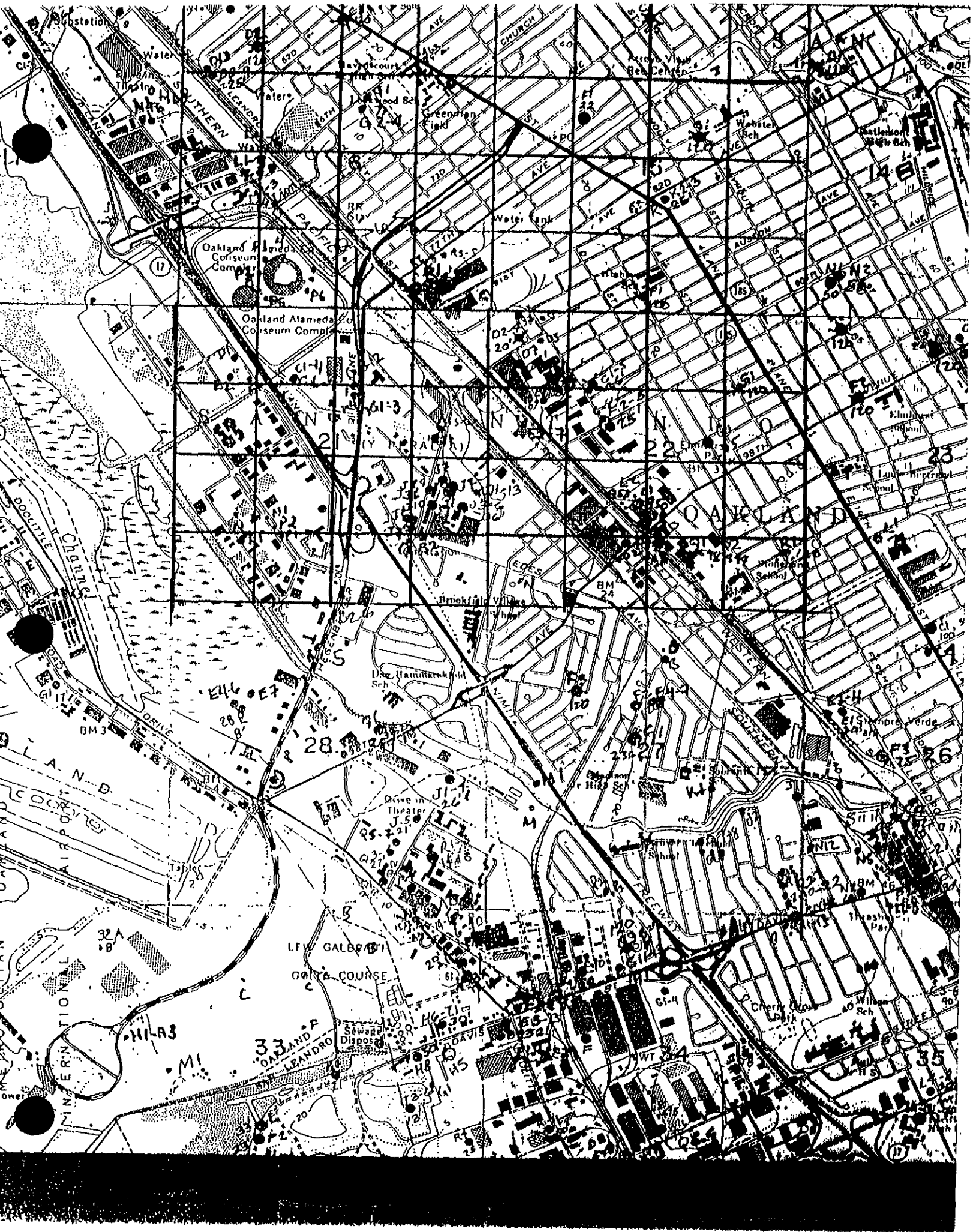
A similar downstream gradient was documented and adds verification in the monitoring well project for the nearby location of 8410 Amelia Street (map follows). Also, a plot of two monitoring wells at Malibu Fun Center, 8000 S. Coliseum Dr., Oakland, California, confirms a northwest direction of downstream gradient (see plot that follows). The monitoring well MW3 encountered water at a depth of 9.1 feet, and is at a surface elevation of 10.2 feet. Monitoring well MW2 encountered water at a depth of 7.38 feet, and is at a surface elevation of 9.9 feet. Thus, the distance to groundwater for MW3 was 1.1 feet above sea level and the distance to groundwater for MW2 was 2.52 feet above sea level. This indicates a northwest direction of downstream gradient.

Finally, the nearest well that pumps water on a large scale is more than 1300 feet from the R & A Trucking former underground tank site, and thus is not likely to cause a change of groundwater gradient (see list of industrial wells that follows). Also, if nearby industrial wells do have any effect on groundwater flow, the nearest wells are in the north and west directions, so these wells would also cause a northwest direction of downstream gradient for groundwater flow.



MAP SOURCE:  
Oakland, Berkeley, Alameda  
California State Automobile Association  
7-66

Figure 1 : SITE VICINITY

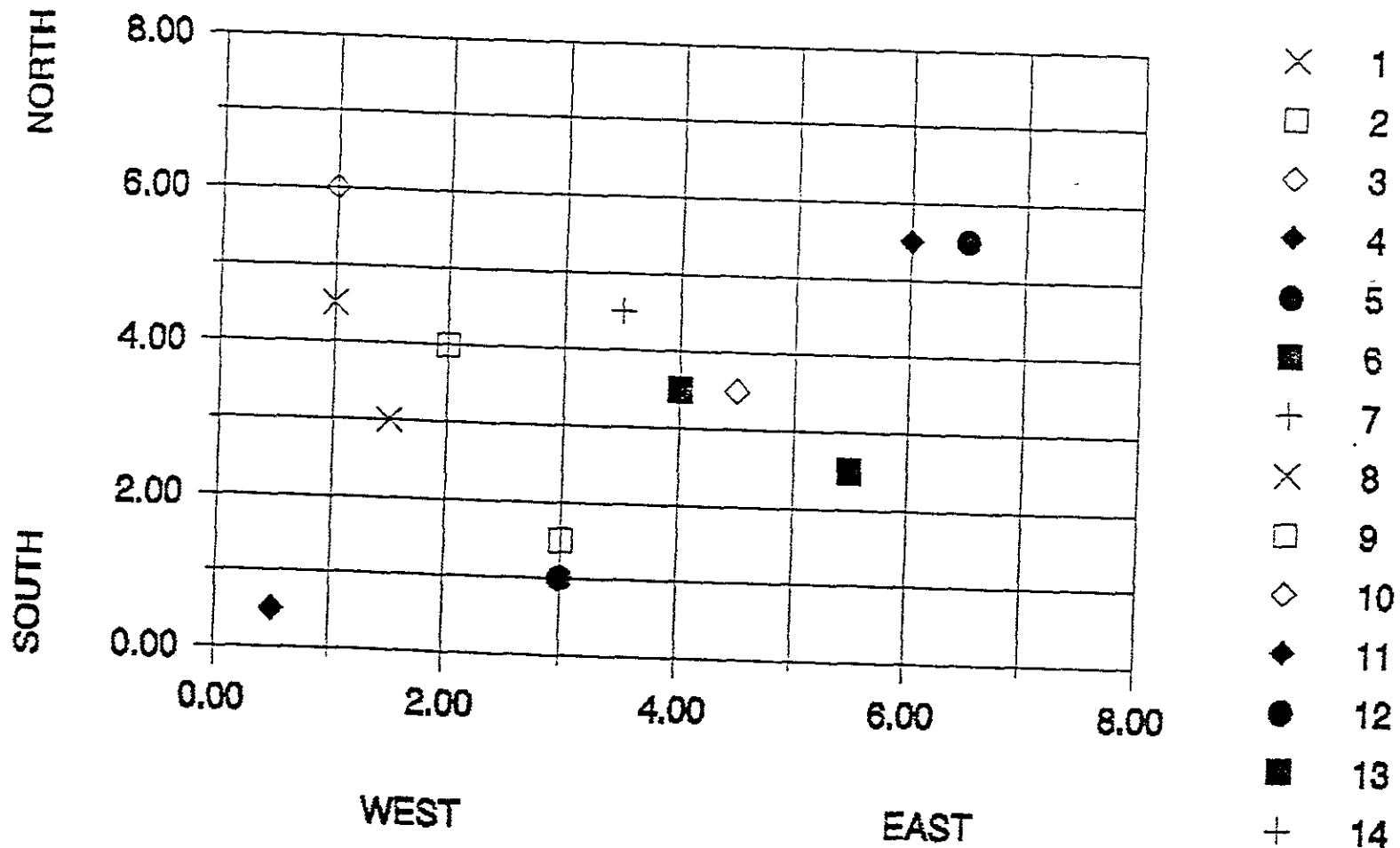




## COORDINATES OF MONITORING WELLS AND BORINGS

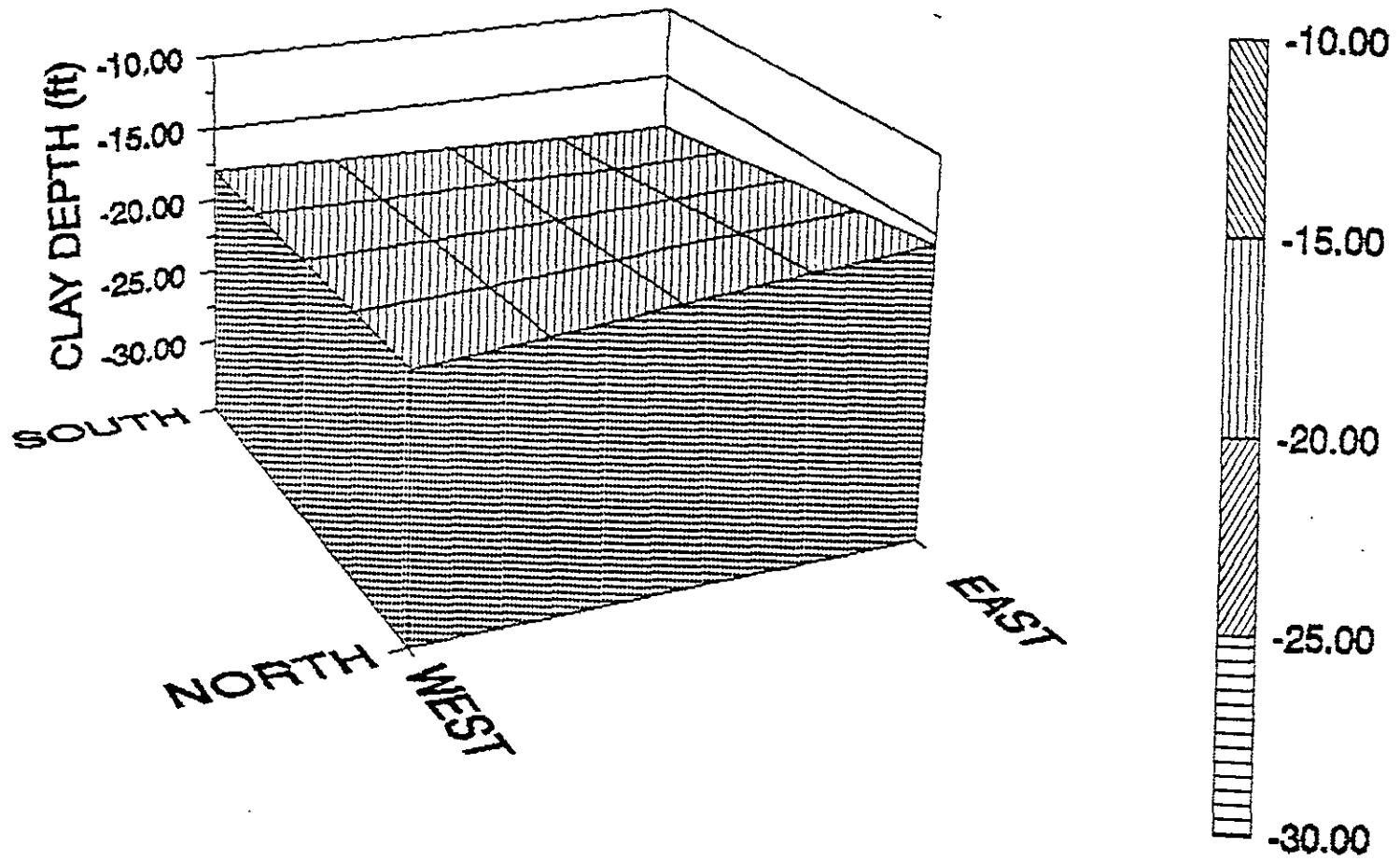
			COORDINATES		G W DEPTH	CLAY DEPTH	SUR ELEV	SE - GW
1	2S/3W 21C4	MALIBU FUN CENTER	1.50	3.00	-5.00	-13.00	10.00	5.00
2	2S/2W 21J8	IMO DELAVAL	3.00	1.50	-11.00	-22.00	10.00	-11.00
3	2S/3W 22D7	LONGVIEW FIBRE	4.50	3.50	-5.00	-27.00	0.00	
4	2S/3W 15K	KAISER ENGINEERS	6.00	5.50	-13.00	-20.00	26.00	13.00
5	2S/3W 15K2	CROSBY & OVERTON	6.50	5.50	-13.00	-8.00	25.00	12.00
6	2S/3W 22D2	LINCOLN PROPERTY	4.00	3.50	-11.00	-13.00	0.00	
7	2S/3W16R3	CHIP & STEAK	3.50	4.50	-7.00	-19.00	7.00	0.00
8	2S/3W 16P2	COLISEUM	1.00	4.50	-16.00		0.00	
9	2S/3W 16P6	COLISEUM	2.00	4.00	-14.00		0.00	
10	2S/3W 16L2	UNOCAL	1.00	6.00	-13.00		3.50	-13.00
11	2S/3W 21J30	IMO DELAVAL	0.50	0.50	-8.00		15.00	7.00
12	2S/3W 21R2	IMO DELAVAL	3.00	1.00	-8.00		0.00	
13	2S/3W 22F2	PUGET SOUND PIPE	5.50	2.50	-13.00		0.00	
14	2S/3W 22P12	CITY OF OAKLAND	4.00	0.00	-15.00		100.00	85.00

# MONITORING WELL LOCATIONS



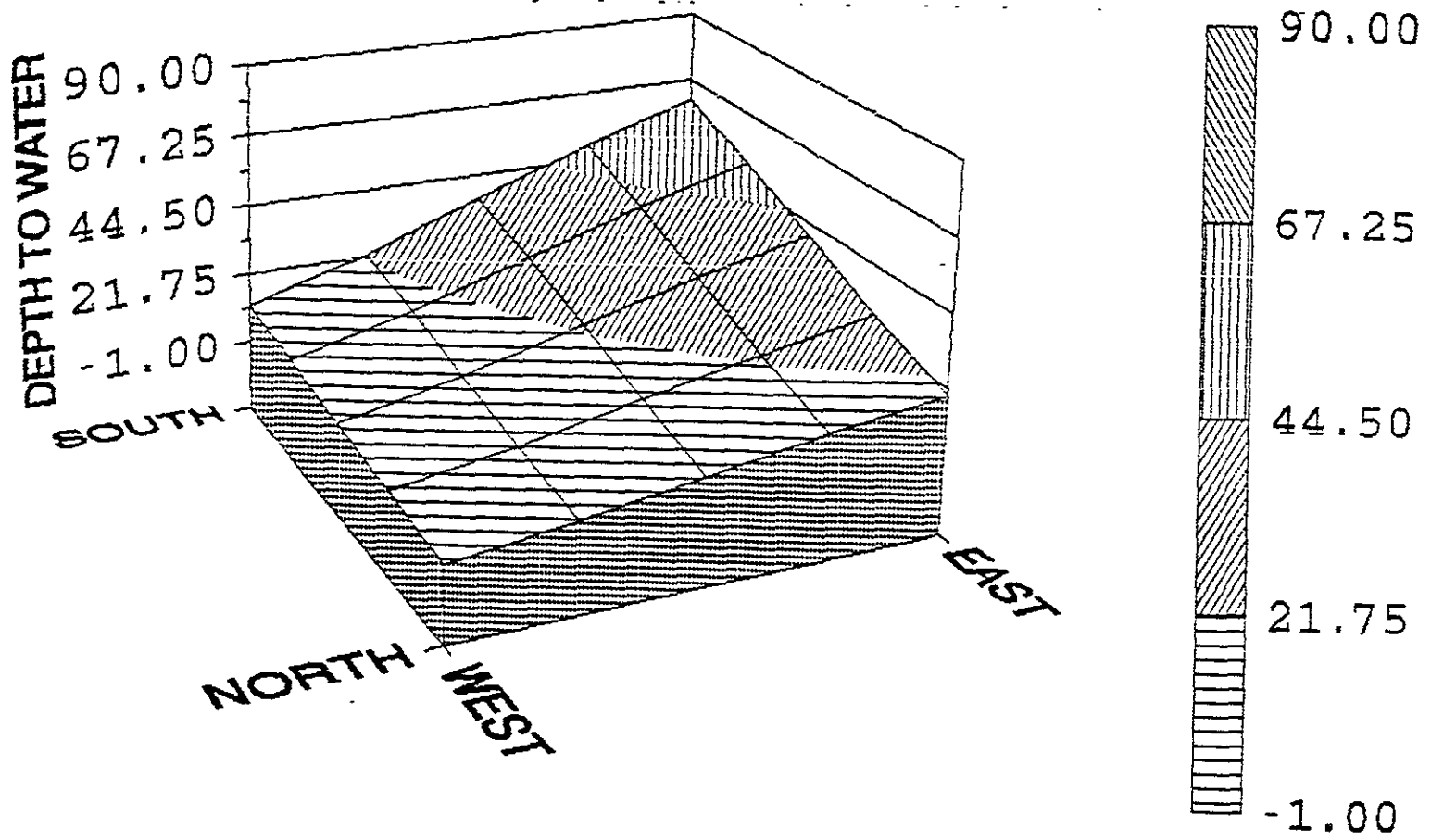
# MONITORING WELL DRILLING LOGS

## CLAY DEPTHS (ft)

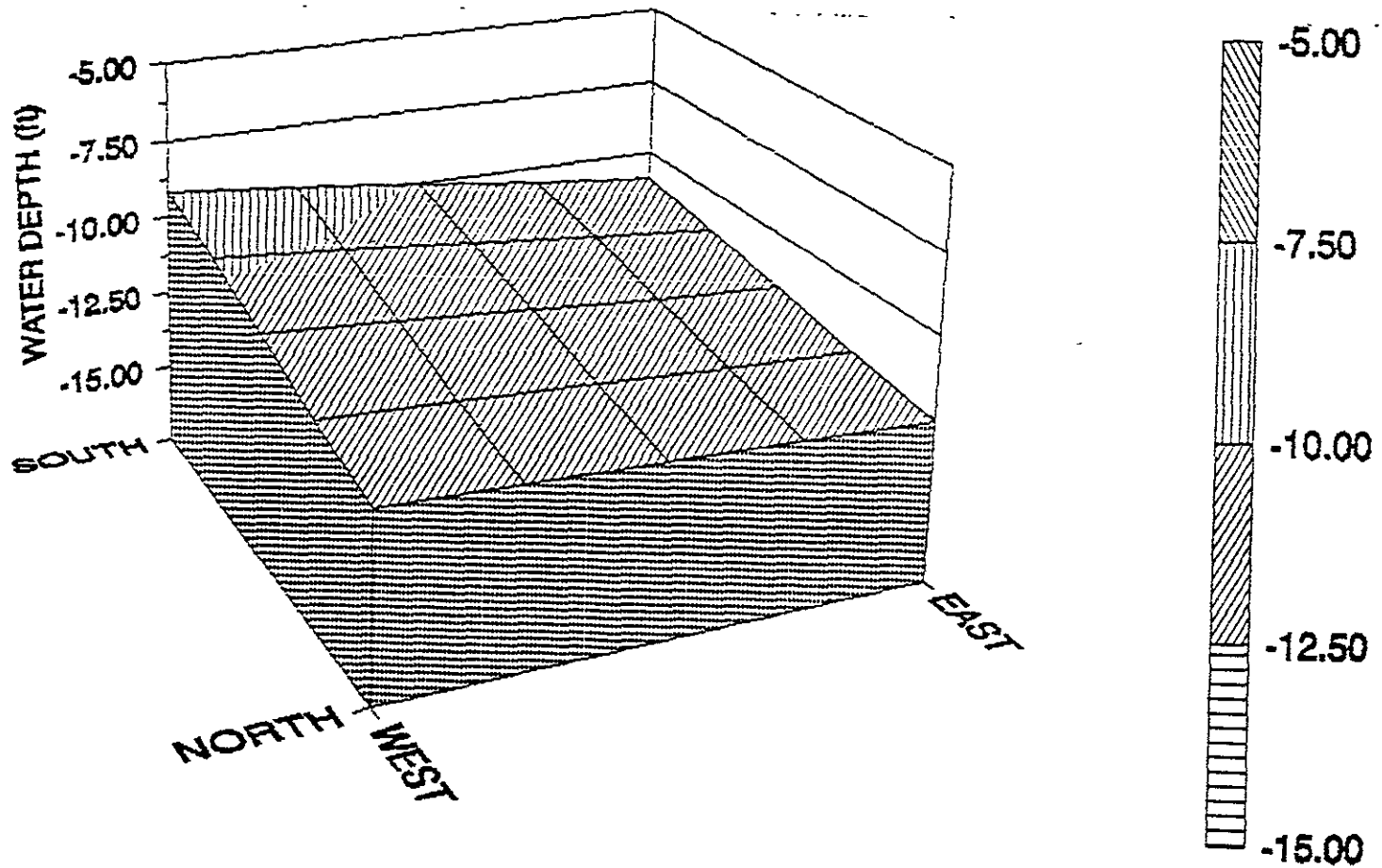


# GROUNDWATER DEPTHS

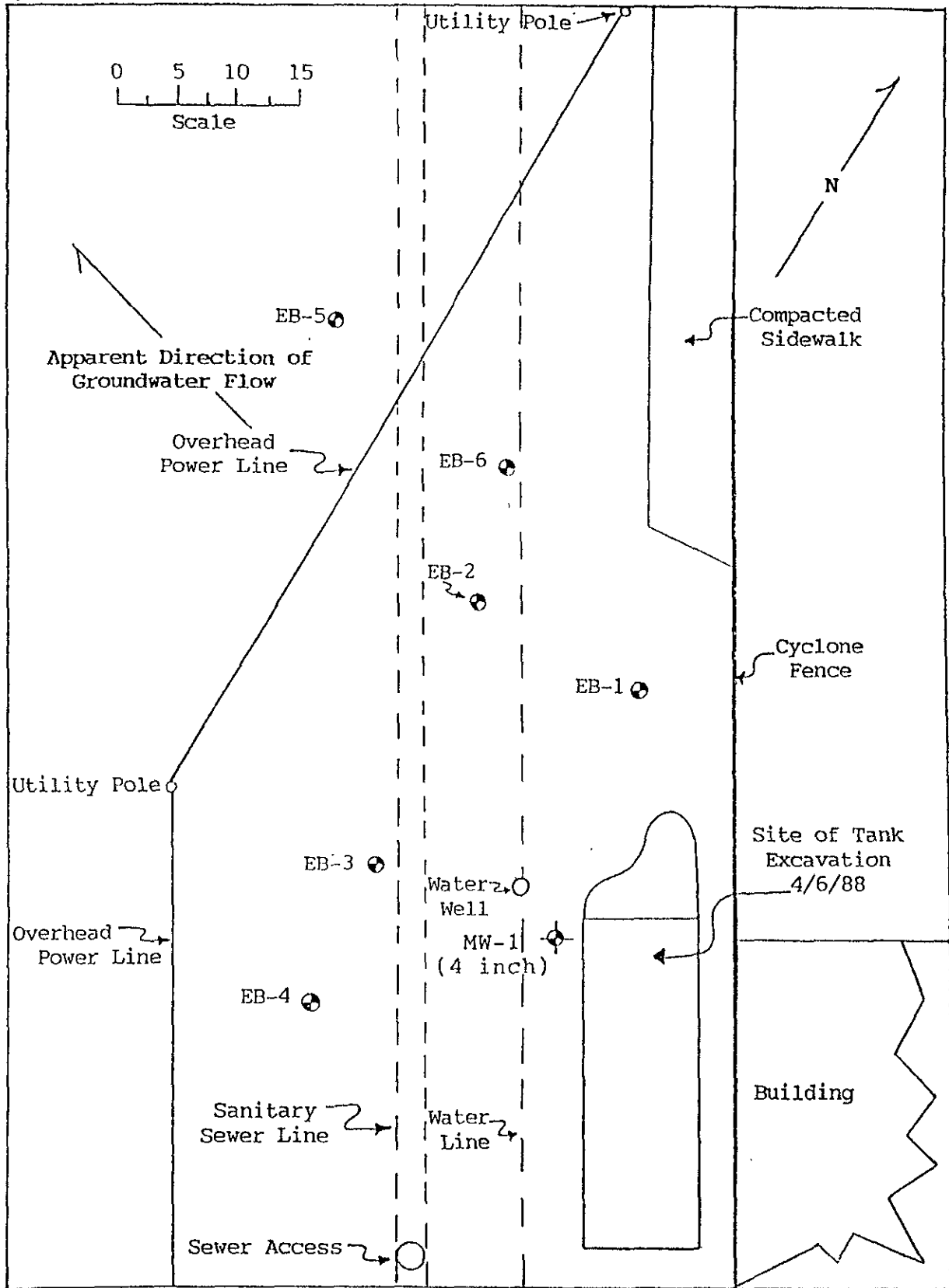
MEAN SEA LEVEL TO WATER



# MONITORING WELLS DEPTH TO GROUNDWATER FROM SURFACE



SITE ASSESSMENT REPORT- May 2, 1988  
(Figure 1)

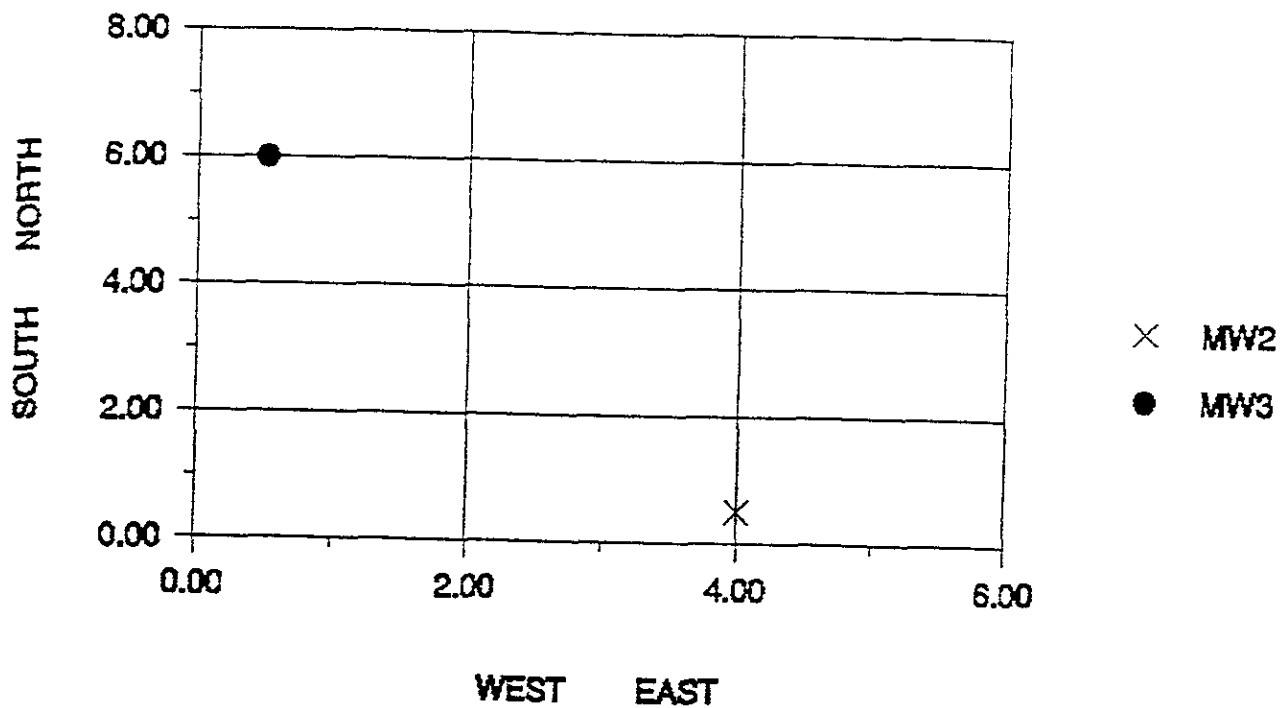


SITE MAP

8410 AMELIA STREET, OAKLAND, CA

# MALIBU FUN CENTER

## MONITORING WELL LOCATIONS



LIST OF INDUSTRIAL WELLS IN R & A TRUCKING VICINITY

2S/3W 16F1	K. D. COMPANY	6235 TEVIS STREET
2S/3W 16G1	GENERAL ELECTRIC	1034 66TH AVENUE
2S/3W 16R1	TRANSAMERICA DELAVAL	550 85TH AVENUE
2S/3W 22L1	PARKER HANNIFIN	888 92ND AVENUE
2S/3W 22L2	STANDARD BRANDS	921 98TH AVENUE
2S/3W 22L3	STANDARD BRANDS	921 98TH AVENUE
2S/3W 22P2	GERBERS PRODUCTS	801 98TH AVENUE
2S/3W 22P3	GERBERS PRODUCTS	801 98TH AVENUE