**GeoStrategies Inc.**
Environmental Consulting,
Engineering and Geologic Services

2:10

# Letter of Transmittal

**Date:** 1/8/93

**From:** CLIFF GARRATT
**To:** MR. DENNIS BYRNE (CERTIFIED MAIL)
ACHCSA
80 SWAN WAY RM. 200
OAKLAND, CA 94607

**Project No:** 792708
**Subject:** WORK PLAN
ARCO SS# 2169
889 WEST GRAND AVE. ~~94610~~
OAKLAND, CA. 94607

**The following items are:** ☑ Enclosed ☐ Sent Separately via _____

| Date | Description | No. of Copies |
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| 1/8/93 | WORK PLAN | 1 |
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- ☐ For your action
- ☐ For your approval
- ☑ For your files
- ☐ For your review
- ☐ For your information
- ☐ Preliminary
- ☐ _____

**Comments:**

CC: MR. MICHAEL WHELAN, ARCO PRODUCTS CO.
MR. H. C. WINSOR, ARCO PRODUCTS CO.
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(CERTIFIED MAIL)

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(Signed)

GeoStrategies Inc.

# WORK PLAN

ARCO Service Station No. 2169
889 West Grand Avenue
Oakland, California

792708-6

January 8, 1993

GeoStrategies Inc.

January 8, 1993

ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Attn: Mr. Michael Whelan

Re: **WORK PLAN**
ARCO Service Station No. 2169
889 West Grand Avenue
Oakland, California

Gentlemen:

This Work Plan by GeoStrategies Inc. (GSI) describes the proposed installation of two off-site ground-water monitoring wells at the above referenced site (Plate 1). This scope of work was prepared at the request of ARCO Products Company. Field work and laboratory analysis methods will be performed to comply with current State of California Water Resources Control Board (SWRCB) guidelines. GSI Field Methods and Procedures were presented in the Work Plan dated October 29, 1991.

## SITE BACKGROUND

On May 14, 1991, GSI drilled five exploratory soil borings (A-A through A-E), as documented in a GSI Preliminary Tank Replacement Report dated July 1, 1991. Four soil borings were drilled adjacent to the underground storage tank (UST) complex (A-B through A-E) and one soil boring (A-A) was drilled in the proposed UST complex location. Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline) and as Diesel (TPH-Diesel) and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) were detected in soil samples from each boring collected from 5.5 to 11.0 feet below grade. In addition, a well adjacent to the existing USTs was properly abandoned.

In February and March 1992, the underground storage tanks at the site were removed and replaced. The former tank complex was composed of four steel tanks: one 12,000 gallon tank (unleaded), one 8,000 gallon tank (regular), and two 6,000 gallon tanks (diesel and super unleaded). The current tank complex is composed of four double wall fiberglass 10,000 gallon tanks containing unleaded gasoline and diesel products. The location of the former and present tank complexes are shown on Plate 2. Soil sample analytical results from the former tank complex confirmed results from previous soil boring samples that petroleum hydrocarbons had impacted soil in the tank complex vicinity to a depth of 12 feet below grade (fbg). Soil sample results from product line trenching revealed a TPH-Diesel concentration of 450 ppm in the vicinity of the diesel dispenser on the westernmost island. This area was overexcavated and resampled at a depth of 7 feet below ground surface. Results of the second sample identified TPH-Diesel at a concentration of 54 ppm. TPH-Gasoline and benzene were reported at levels of less than or equal to 120 ppm and 0.36 ppm, respectively, from the remaining trench samples. An Underground Storage Tank Removal and Soil Sampling Report documenting the tank removal and soil sampling analytical results was issued by ROUX Associates (ROUX) on July 14, 1992.

Between March 16 and 25, 1992 five exploratory soil borings were drilled and completed as recovery well AR-1 and ground-water monitoring wells A-1 through A-4. TPH-Gasoline was detected in the soil sample from a depth of 10.0-feet in Boring A-1 at a concentration of 2.2 parts per million (ppm). Benzene was identified in samples from depths of 4.5-feet and 10.0-feet in Boring A-1 at concentrations of 0.024 ppm and 0.13 ppm, respectively. Results of this investigation are presented in the GSI Well Installation Report dated June 30, 1992. Four additional exploratory borings were completed as vapor extraction wells AV-1 through AV-3 and groundwater extraction well AR-2 by GSI on June 8, 1992. TPH-

Gasoline was detected in soil samples submitted from borings; AV-1 (12 fbg), AV-2 (6.5 fbg and 11.5 fbg) and AV-3 (11.5 fbg) at concentrations of 12 ppm, 1.8 ppm, 1500 ppm and 110 ppm, respectively. Benzene was detected in soil samples submitted from AV-1 (6.5 fbg and 12 fbg), AV-2 (6.5 fbg and 11.5 fbg), and AV-3 (6.5 fbg and 11.5 fbg) at concentrations of 0.15 ppm, 0.81 ppm, 0.31 ppm, 21 ppm, 0.037 ppm and 2.4 ppm, respectively. TPH-Diesel was not detected in any of the soil samples submitted for analysis. These results were presented in the GSI report dated November 24, 1992.

Quarterly ground-water monitoring and sampling of site wells began in April 1992. Ground-water samples are currently analyzed for TPH-Gasoline according to EPA Method 8015 (Modified) and BTEX according to EPA Method 8020.

## HYDROGEOLOGIC CONDITIONS AND SITE GEOLOGY

### Regional Setting

The site is located in Oakland, California at the base of the Berkeley Hills approximately 1/2-mile east of the San Francisco Bay. The site is situated on alluvial-fan deposits of the Temescal Formation comprised of interfingering lenses of clayey gravel, sandy silty clay, and sand-clay-silt mixtures (Radbruch, D.H., 1957). Local topography suggests ground-water flows westward toward San Francisco Bay.

### Local Setting

Based on exploratory boring data from investigations performed to date, the local subsurface lithology appears to consist of clay, sand, silt, and minor gravel to the total depth explored of 30.5 feet below ground surface. The vadose zone appears to extend from the ground surface to a depth of approximately 12 feet. [redacted] of interbedded clay and silt with minor sand. The aquifer zone extends from

the vadose zone to approximately 28 feet below grade and is composed of sand with interbedded silt units. Clay was encountered in several borings at 28 feet and may represent a local aquitard. Groundwater was first encountered in Borings AV-1 through AV-3 at a depth of 12-feet below grade and in Boring AR-2 at a depth 15-feet below grade. Water-levels stabilized after completion of Well AR-2 at a depth of 13 feet below grade. This rise in the water-level in AR-2 indicates semi-confined to confined aquifer conditions.

## TECHNICAL RATIONALE

Based on a review of chemical analytical data, additional groundwater wells are required to further define the hydrocarbon plume extent. Current groundwater analytical data indicate that dissolved hydrocarbons are present on-site in the vicinity of the former tank complex. Non-detectable levels of TPH-Gasoline have been observed to the north, and southeast of the former tank complex. Two additional wells to the northwest and southwest would further define the extent of dissolved petroleum hydrocarbons. The proposed well locations are shown on Plate 2.

## SCOPE OF WORK

The following tasks are proposed:

TASK 1. Two 8-inch-diameter exploratory borings will be drilled to an anticipated depth of approximately 30 feet below ground surface. Conventional hollow-stem auger techniques will be used to advance the borings. If a clay aquitard of five feet or more is encountered before a depth of 30 feet, the boring advancement will stop.

TASK 2. Two ground-water monitoring wells will be constructed using 2-inch-diameter, precleaned Schedule 40 PVC well casing with 0.02-inch machine slotted well screen. The monitoring wells will be constructed in accordance with the GSI Field Methods and Procedures. The [redacted] the first encountered water-level. The annular sandpack will extend from total depth to a minimum of 1-foot above the well screen. A minimum 1-foot bentonite seal, followed by a cement grout seal to ground surface, will be placed above the sandpack. The well screens [redacted] so that well designs are compatible with subsurface geol[redacted]ons. No well screens will be installed that potentially may permit cross-contamination of adjacent aquifers.

TASK 3. Soil samples will be collected using a Modified California split-barrel sampler equipped with pre-cleaned stainless steel liners advanced ahead of the drill bit. Soil samples will be collected at five-foot intervals and at significant lithologic changes, at a minimum, for lithologic identification and field head-space analysis. The borings will be logged by a GSI geologist using the Unified Soil Classification System (ASTM-D2488-84) and the Munsell Soil Color Chart. Selected soil samples collected above the saturated zone will be retained for chemical analysis for the specific chemical parameters discussed in Task 6. Additional samples may be selected for physical testing (i.e., permeability). Soil samples will be collected in clean stainless steel liners, covered on both ends with aluminum foil and plastic end caps. Soil samples will then be labeled, placed in a cooler with blue ice and transported, under Chain-of-Custody to a California State-certified analytical laboratory.

TASK 4. The monitoring wells will be properly developed prior to collecting ground-water samples. A G-R Field Technician will perform the well development and evaluate completeness based on visual inspection of discharge water. Following well development, the wells will be sampled for parameters listed in Task 6.

TASK 5. Soil and ground-water samples will be analyzed for TPH-Gasoline and TPH-Diesel using EPA Method 8015 (Modified); and Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) using EPA Method 8020/602.

TASK 6. Upon completion of field work and receipt of chemical analytical data, a report will be prepared presenting the field and laboratory data, including copies of the exploratory borings logs, certified analytical reports, and a brief site history. This report will be prepared under the supervision of a State of California Registered Geologist.

If you have any questions, please call.

GeoStrategies Inc. by,

Cliff M. Garratt
Hydrogeologist

John F. Vargas
Senior Geologist
R.G. 5046

REGISTERED GEOLOGIST
JOHN F. VARGAS
NO. 5046
STATE OF CALIFORNIA

CMG/JFV/rmt

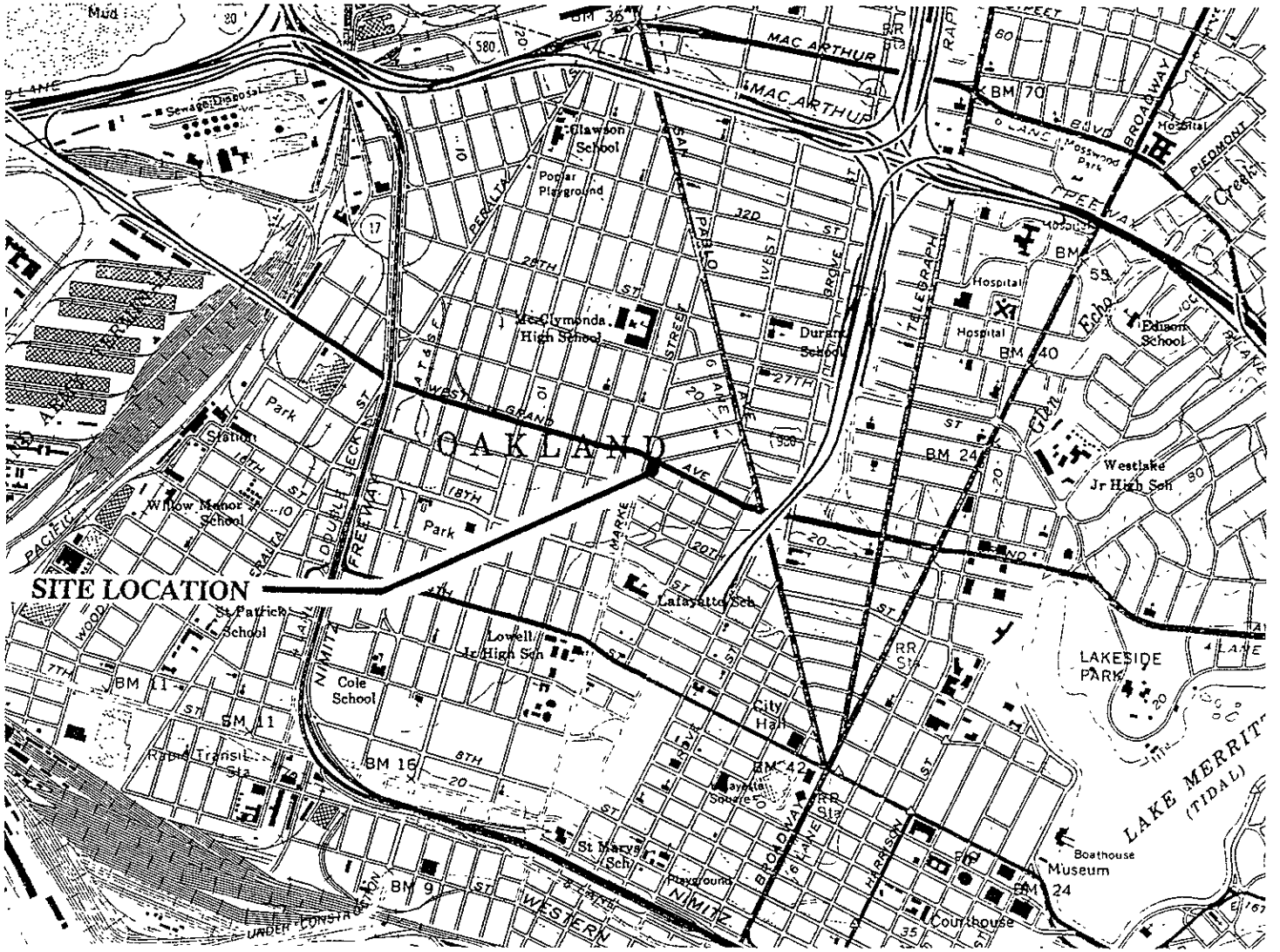
Plate 1. Vicinity Map
Plate 2. Site Plan

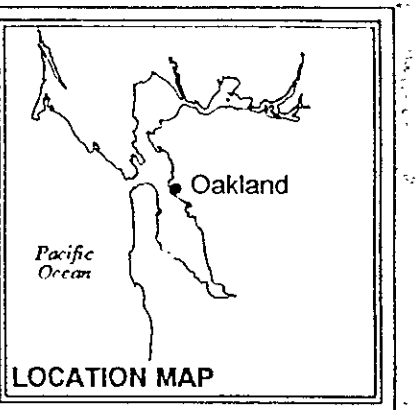
QC Review: rcm

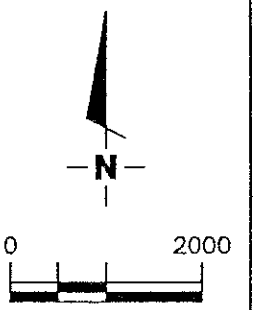
References Cited

Dorothy H. Radbruch, 1957, Areal and Engineering Geology of the Oakland West Quadrangle, California, U.S. Geological Survey Map I-239.

# ILLUSTRATIONS



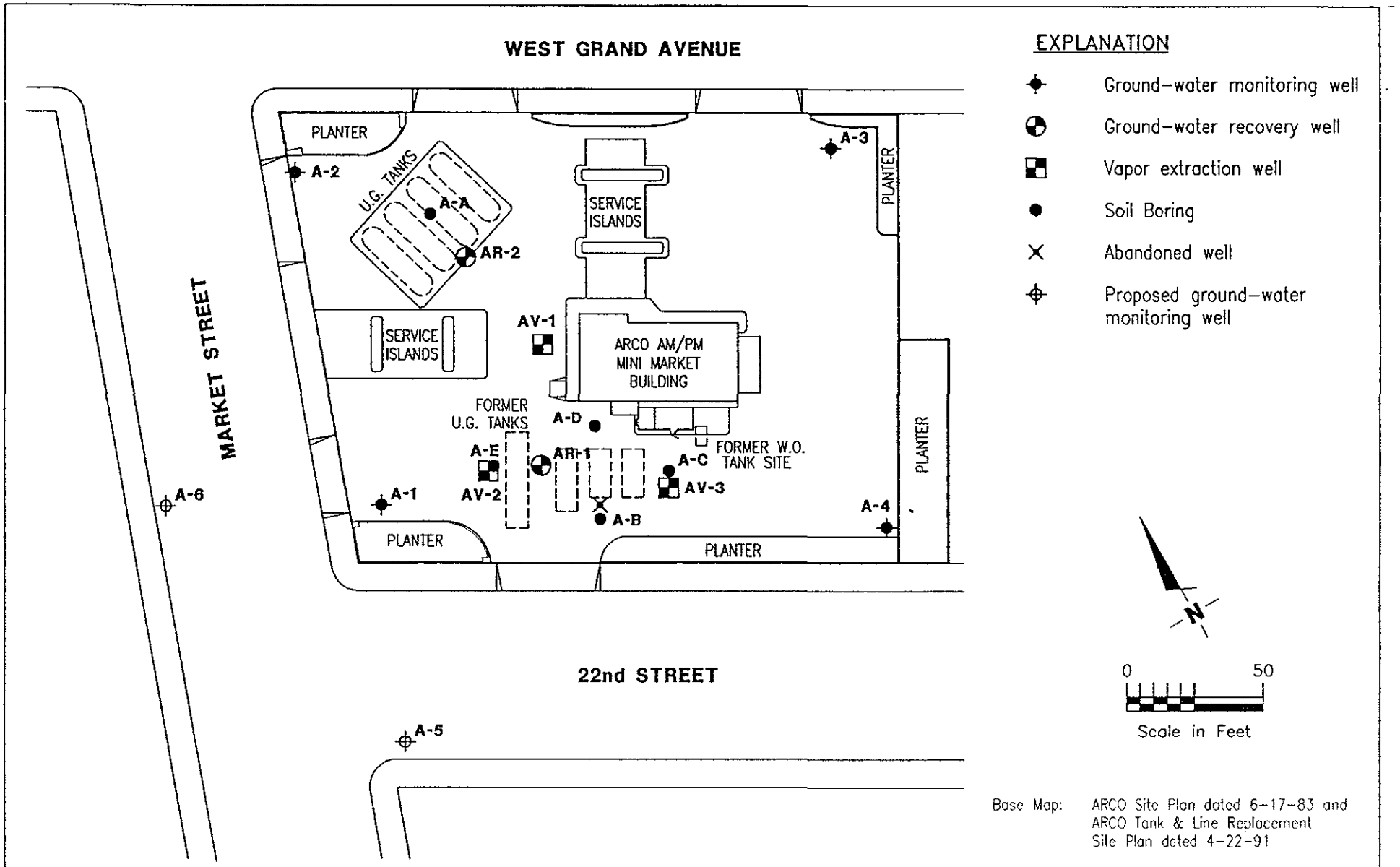

Base Map: USGS Topographic Map

GeoStrategies Inc.

VICINITY MAP
ARCO Service Station #2169
889 West Grand Avenue
Oakland, California

PLATE 1

| JOB NUMBER | REVIEWED BY | DATE | REVISED DATE |
|---|---|---|---|
| 7927 | | 5/91 | |




Base Map: ARCO Site Plan dated 6-17-83 and ARCO Tank & Line Replacement Site Plan dated 4-22-91

GeoStrategies Inc.

SITE PLAN
ARCO Service Station #2169
889 West Grand Avenue
Oakland, California

PLATE 2

| JOB NUMBER | REVIEWED BY | DATE | REVISED DATE |
|---|---|---|---|
| 7927 | RCM | 11/92 | |