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A RESNA Company

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3315 Almaden Expressway, Suite 34
San Jose, CA 95118
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92 APR 17 AM 8:54

TRANSMITTAL

TO: MR. PAUL SMITH
ACHCSA-DEH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

DATE: 4/16/92
PROJECT NUMBER: 60026.10
SUBJECT: ARCO STATION 276 AT 10600 MAC ARTHUR BOULEVARD, OAKLAND, CALIFORNIA

FROM: JOEL COFFMAN
TITLE: PROJECT GEOLOGIST

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REMARKS: THIS ADDENDUM FOUR TO WORK PLAN HAS BEEN FORWARDED TO YOU AS REQUESTED BY MR. MICHAEL WHELAN OF ARCO PRODUCTS COMPANY.

Copies: 1 to project file no. 60026.10

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ADDENDUM FOUR TO WORK PLAN

at

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

60026.10

April 16, 1992

Prepared for
ARCO Products Company
P.O. Box 6411
San Mateo, California 94402

by
RESNA Industries

Robert D. Campbell
Staff Geologist

Joel Coffman
Project Geologist

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REGISTERED PROFESSIONAL ENGINEER
JOAN E. TIERNAN
No. C 044600
Exp. 3-31-94
CIVIL
STATE OF CALIFORNIA

April 16, 1992

Applied GeoSystems, Inc.
A RESNA Company

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
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April 16, 1992
60026.10

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

Subject: Addendum Four to the Work Plan for Offsite Subsurface Investigation at ARCO Station 276, 10600 MacArthur Boulevard, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries (RESNA [formerly Applied GeoSystems {AGS}]) has prepared this letter to serve as Addendum Four to the Work Plan for Offsite Subsurface Investigation (RESNA, June 1991) for the subject site. This Addendum Four to Work Plan is in response to the letter from Mr. Paul Smith of the Alameda County Health Care Services Agency (ACHCSA), dated March 4, 1992, which requested "a Work Plan outlining a proposal to delineate the off site extent of (both soil and groundwater) contamination caused by petroleum hydrocarbons and halocarbons" at the adjacent property near the above referenced site. Elevated concentrations of solvents have been detected in water samples from groundwater monitoring wells during quarterly monitoring events at the above referenced site (RESNA, March 5, 1992). Previous investigations by RESNA and others, has determined the presence of solvents in the soil and groundwater beneath the adjacent Foothill Shopping Center property located in the upgradient from the site. The purpose of this proposed work is to investigate the existence of an off site, upgradient source of halocarbons in soil and groundwater at the site. The location of the subject site is shown on the Site Vicinity Map, Plate 1. This proposed work was discussed with Mr. Paul Smith during a telephone conversation with Joel Coffman of RESNA on April 9, 1992.

RESNA recommends the following project steps to investigate the presence and extent of gasoline hydrocarbons and solvents in the soil and groundwater beneath the Foothill Shopping Center parking lot, upgradient and adjacent to the subject site. The proposed additional work is discussed in detail in this addendum and includes the following: gaining offsite access; drilling and sampling two offsite soil borings (B-10 and B-11), as shown on Plate 2, Proposed Boring/Well Locations, in the Foothill Shopping Center parking lot;

installing two 2-inch diameter groundwater monitoring wells (MW-6 and MW-7) in the borings; developing, measuring water levels, and sampling the monitoring wells in conjunction with quarterly monitoring of all wells at the site; performing laboratory analyses of selected soil and groundwater samples; and preparing a report of the results. Future proposals and work plans will be prepared, as necessary, describing additional scopes of work for submittal to ARCO and ACHCSA upon request.

PREVIOUS WORK

A summary of previous work performed at this site by RESNA and others is included in the Work Plan for Subsurface Investigations and Remediation referenced above. Results of previous investigations at the site include the following:

- Due to the presence of a clay perching layer, two water bearing zones exist at the site. Onsite well (MW-2) is screened in the shallow water bearing zone which is encountered at seventeen feet below grade while, MW-1, MW-3, MW-4, MW-5, and RW-1 are screened in the deeper water bearing zone encountered at 35 feet below grade. Plate 2 shows the locations of wells and pertinent site features. Offsite wells on the adjoining property MW-1WGR, MW-2WGR, MW-3WGR, and MW-5WGR (only MW-3WGR is shown on Plate 2) were installed by Western Geological Resources Inc. (WGR) are screened in the shallow water bearing zone while offsite well MW-4WGR (not shown) is screened in the deeper zone. The shallow water-bearing zone has a relatively steep gradient (0.04 feet per feet [ft/ft]) toward the south/southeast. The deeper zone flows in the northerly direction and has a flatter gradient of 0.002 ft/ft (WGR, January 1989).

- Petroleum hydrocarbons have impacted groundwater onsite. In November 1991, onsite wells MW-3, MW-4, MW-5 and recovery well RW-1 reported concentrations of benzene and total petroleum hydrocarbons as gasoline (TPHg) ranging from nondetectable to 900 parts per billion (ppb). Monitoring well MW-2 (screened in the shallow water-bearing zone) is the only well which has contained floating product (Fourth Quarter 1991, Quarterly Groundwater Monitoring, RESNA, March, 1992). Available information on offsite wells indicated that TPHg concentrations in groundwater ranged from nondetectable to 300 ppb. Groundwater samples also contained near detection limit concentrations of benzene, toluene, ethyl benzene, and total xylenes (BTEX) and semi-volatile compounds (WGR, January 1989).

		TCA
mw-1	9/4/91	4.5
mw-3	11/6/91	400.0
mw-4	11/6/91	1000.0
	PCE	6.3
mw-5	11/6/91	12.0
Rw-1	11/6/91	980.0

- Purgeable halocarbons have impacted onsite groundwater. Laboratory analysis of groundwater samples obtained from wells MW-1, MW-3, MW-4, MW-5 and RW-1 in November 1991 reported tetrachloroethene (PCE) concentrations ranging from nondetectable to 1,000 ppb. Trichloroethylene was detectable at 6.3 ppb. The source of purgeable halocarbons in the groundwater is currently unknown (RESNA, March 1992).

- Total oil and grease (TOG) and total petroleum hydrocarbons reported as diesel (TPHd) have not impacted groundwater since nondetectable levels were reported in well MW-4 (located adjacent to the former waste-oil tank). Laboratory analysis of a groundwater sample obtained from well MW-4 also indicated either nondetectable levels or below state action levels of the metals, cadmium, chromium, lead and zinc.

- The lateral and vertical extent of hydrocarbons in groundwater have not been delineated at the site, with the exception of the nondetectable levels of TPHg, TOG, TPHd, BTEX and PCE reported from MW-1, north of the former tank pit (RESNA, March 1992).

- The majority of gasoline hydrocarbons in soils on and offsite appear to be in the vicinity of the former gasoline underground storage tanks (USTs) and within 60 feet south/southeast of the station building at depths of 21 - 24 feet below grade (PEG, July 1989 and AGS, January 1991).

- The former waste-oil tank apparently is not the source of halocarbons detected in groundwater at the site as soil samples analyzed for volatile organic compounds (VOCs) showed non-detectable levels of VOCs in soil samples collected during the waste-oil tank removal (PEG, February, 1989).

- A vapor extraction test (VET) performed offsite in the parking lot by Pacific Environmental Group (PEG) indicated that soil conditions would support a vapor extraction system (VES). As an interim off-gas abatement device to the VES, an internal combustion (I.C.) engine was installed and operated by PEG (PEG, February 1990). During 1991, PEG permitted, installed and initiated operation of a catalytic oxidizer with the VES.

- Results of the aquifer pump and recovery test performed in November 1991 using the groundwater recovery well RW-1, completed in the deeper water-bearing zone, indicated that the average sustainable pumping rate of well

RW-1 was 5.0 gallons per minute (gpm). The pump test results also indicated that the well could probably sustain a rate as high as 15 gpm. Transmissivity and hydraulic conductivity of the deeper water-bearing zone were estimated at 1049 square feet per day, and 87 feet per day, respectively.

- The pump test indicated that a pumping rate between 5 and 15 gpm from the extraction well (RW-1) should be adequate to influence the onsite hydrocarbon plume.

RESNA is currently permitting the onsite vapor extraction wells proposed in Addendum One to Work Plan through the Alameda County Flood Control and Water Conservation District (ACFCWCD) Zone 7. The vapor extraction wells will then be connected to the existing offsite VES. RESNA has completed several phases of work outlined in Addendum Two to Work Plan, including groundwater recovery well installation and performance of an aquifer pump and recovery test. Results of this phase of the work will be included in a forthcoming report to be submitted to ARCO and regulatory agencies.

Addenda One, Two, and Three to this Work Plan detailing proposed additional subsurface investigation, hydrogeologic investigation, and groundwater remediation to be performed were also submitted for review and approval to ARCO, The Regional Water Quality Control Board (RWQCB), and ACHCSA (RESNA, June 1991; RESNA, September 1991; and March 1992). The installation of onsite vapor extraction wells and connection of these wells to the existing vapor extraction system at the site, as proposed in Addendum One to the Work Plan, will commence in mid to late spring 1992. The installation of these vapor extraction wells will also help delineate the onsite extent of gasoline hydrocarbons at the site.

PROPOSED WORK

RESNA recommends the following project steps 1 through 7 listed below as a method to evaluate the vertical and lateral extent of gasoline hydrocarbons and investigate an off site source for solvents in the soil and groundwater at the site. Field work involved with the following project steps will be performed in accordance with the RESNA Field Protocol in Appendix A of the Work Plan (RESNA, June 1991) and the Site Safety Plan (RESNA, August 1991).

Step 1 Gain offsite access and obtain permits for the installation of monitoring wells from Alameda County Flood Control and Water Conservation District, Zone 7 at the subject site. It is possible that offsite access will not be granted, or

that the estimated time schedule (Plate 3) may be delayed due to negotiations with the offsite property owner.

Step 2 Drill and obtain soil samples for soil classification and laboratory analyses from two offsite soil borings (B-10 and B-11) as shown on Plate 2, Proposed Boring/Monitoring Well Locations. Drill borings B-9 and B-10 no more than 5 feet into a possible perching or confining layer beneath the deeper water-bearing zone (total depth of approximately 45 feet) and install two 2-inch diameter groundwater monitoring wells (MW-10 and MW-11) in the borings.

Step 3 Submit selected soil samples from borings B-10 and B-11 to a State-certified laboratory for analyses for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency (EPA) Methods 5030/8015/8020. Representative soil samples from borings B-10 and B-11 will be analyzed for volatile organic compounds (VOCs) using EPA Method 8240. Chain-of-custody protocol will be followed for samples submitted for laboratory analysis.

Step 4 Survey newly installed monitoring wells MW-6 and MW-7 to a U.S. Coast and Geodetic Survey Datum.

Step 5 Develop monitoring wells MW-6 and MW-7.

Step 6 Measure depths-to-water in wells MW-1 through MW-7 and RW-1, record visual evidence of floating product in initial groundwater samples, and purge and collect groundwater samples for laboratory analyses from wells MW-1 through MW-7 and RW-1. Submit groundwater samples to a State-certified laboratory for analyses for TPHg, BTEX, and VOCs using EPA Methods 5030/602 and 624, respectively. Chain-of-custody protocol will be followed for samples submitted for laboratory analysis.

Step 7 Prepare a report to include field methods, results of the investigation, and conclusions. Recommendations will be prepared under separate cover.

SCHEDULE

A preliminary time schedule to perform the steps described above is included as Plate 3, Preliminary Time Schedule. This time schedule is an estimate and is subject to change should circumstances dictate. A main source of unknown amount of time required to

complete this investigation shown in this schedule is the time required to obtain offsite access from the offsite property owner. ARCO and the appropriate regulatory agencies will be informed should the estimated time for completion of the work proposed in this Addendum Four to the Work Plan be delayed beyond the estimated time of completion depicted on Plate 3. Time is estimated in weeks after gaining regulatory approval of the Addendum Four to Work Plan and any changes which must be incorporated into this work plan due to regulatory request. RESNA can initiate work at the site within one week after receiving authorization to proceed.

DISTRIBUTION

It is recommended that copies of this Addendum be forwarded to:

Mr. Paul Smith
Hazardous Materials Specialist
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Mr. Eddy So
Water Quality Control Engineer
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

If you have any questions or comments about this Addendum to Work Plan, please call us at (408) 264-7723.

Sincerely,
RESNA Industries

Joel Coffman
Project Geologist

cc: H.C. Winsor, ARCO Products Company

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Proposed Boring/Monitoring Well Locations
Plate 3, Preliminary Time Schedule

REFERENCES

Applied GeoSystems, January 17, 1991. Report Limited Offsite Subsurface Environmental Investigation at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS job 19014-3.

Applied GeoSystems, February 11, 1991. Report Underground Gasoline Storage Tank Removal and Replacement at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS job 19014-5.

Kaldveer Associates, October 7, 1988. Preliminary Soil And Groundwater Quality Testing Program Foothill Square Oakland, California. Job No. KE812-3A, 12302.

Pacific Environmental Group Inc., February 6, 1989. Former Waste-Oil Tank Pit Analytical Results and Site Plan at ARCO Station 276.

Pacific Environmental Group Inc., July 17, 1989. Soil Gas Investigation at ARCO Station 276.

RESNA/AGS. June 27, 1991. Work Plan for Subsurface Investigations and Remediation at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026-3W.

RESNA/AGS. June 27, 1991. Addendum One to Work Plan at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026-3.

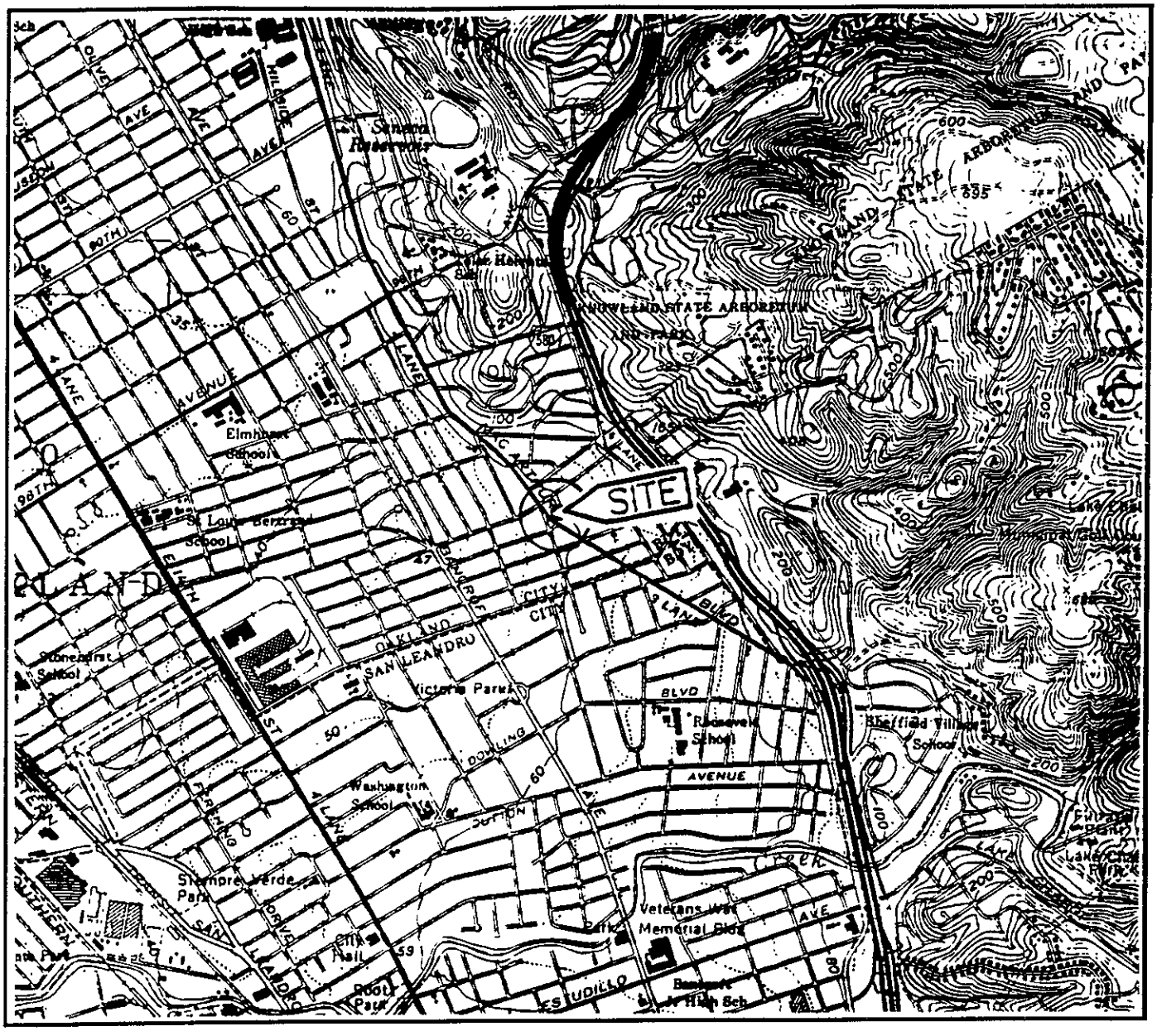
RESNA/AGS. August 15, 1991. Site Safety Plan for Additional Subsurface Environmental Investigation at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026.05SSP

RESNA/AGS. September 23, 1991. Addendum Two to Work Plan at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026-5.

RESNA. March 5, 1992. Letter Report on Quarterly Groundwater Monitoring, Fourth Quarter 1991 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. RESNA 60026-6.

RESNA. March 18, 1992. Addendum Three to Work Plan, Interim Groundwater Remediation at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026-8.

Western Geologic Resources Inc., January 17, 1989. Soil Sampling and Monitoring Well Installation Foothill Square Shopping Center, Oakland, California. Job No. 8-088.01.



Base: U.S. Geological Survey
7.5-Minute Quadrangles
Oakland East/San Leandro,
California
Photorevised 1980

LEGEND

⊙ = Site Location

N

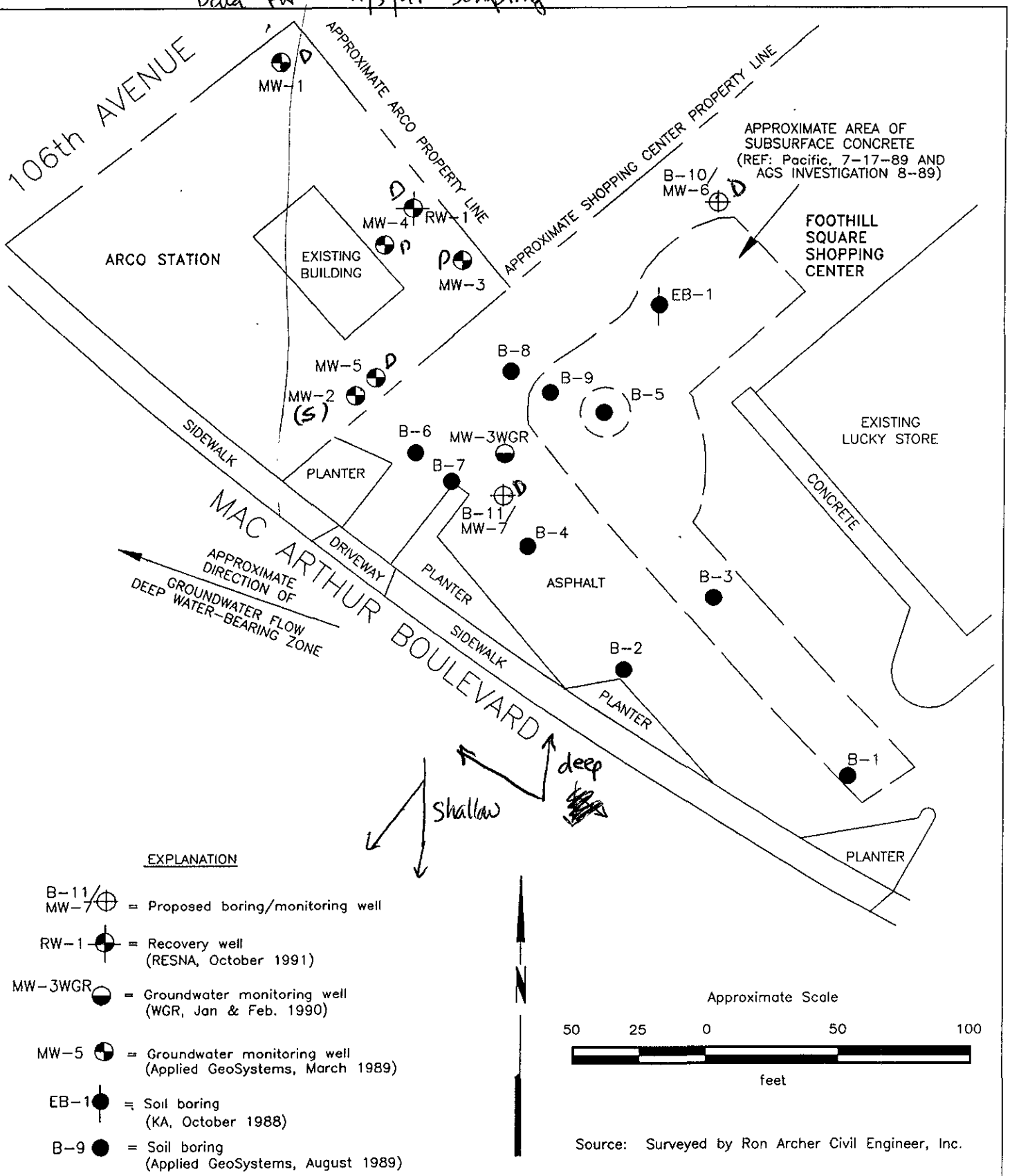
Approximate Scale

2000 1000 0 2000 4000

feet

RESNA	**SITE VICINITY MAP** **ARCO Station 276** **10600 MacArthur Boulevard** **Oakland, California**	**PLATE** **1**
PROJECT 60026.10		

Data for 11/5/91 Sampling



EXPLANATION

- B-11/MW-7 = Proposed boring/monitoring well
- RW-1 = Recovery well (RESNA, October 1991)
- MW-3WGR = Groundwater monitoring well (WGR, Jan & Feb. 1990)
- MW-5 = Groundwater monitoring well (Applied GeoSystems, March 1989)
- EB-1 = Soil boring (KA, October 1988)
- B-9 = Soil boring (Applied GeoSystems, August 1989)

RESNA

PROJECT 60026.10

PROPOSED BORING/ MONITORING WELL LOCATIONS
ARCO Station 276
10600 Mac Arthur Boulevard
Oakland, California

PLATE 2

STEP 1:
Gain offsite access and obtain well permits from ACFCWCD

STEP 2:
Drill soil borings B-10 and B-11 and install monitoring wells MW-6 and MW-7

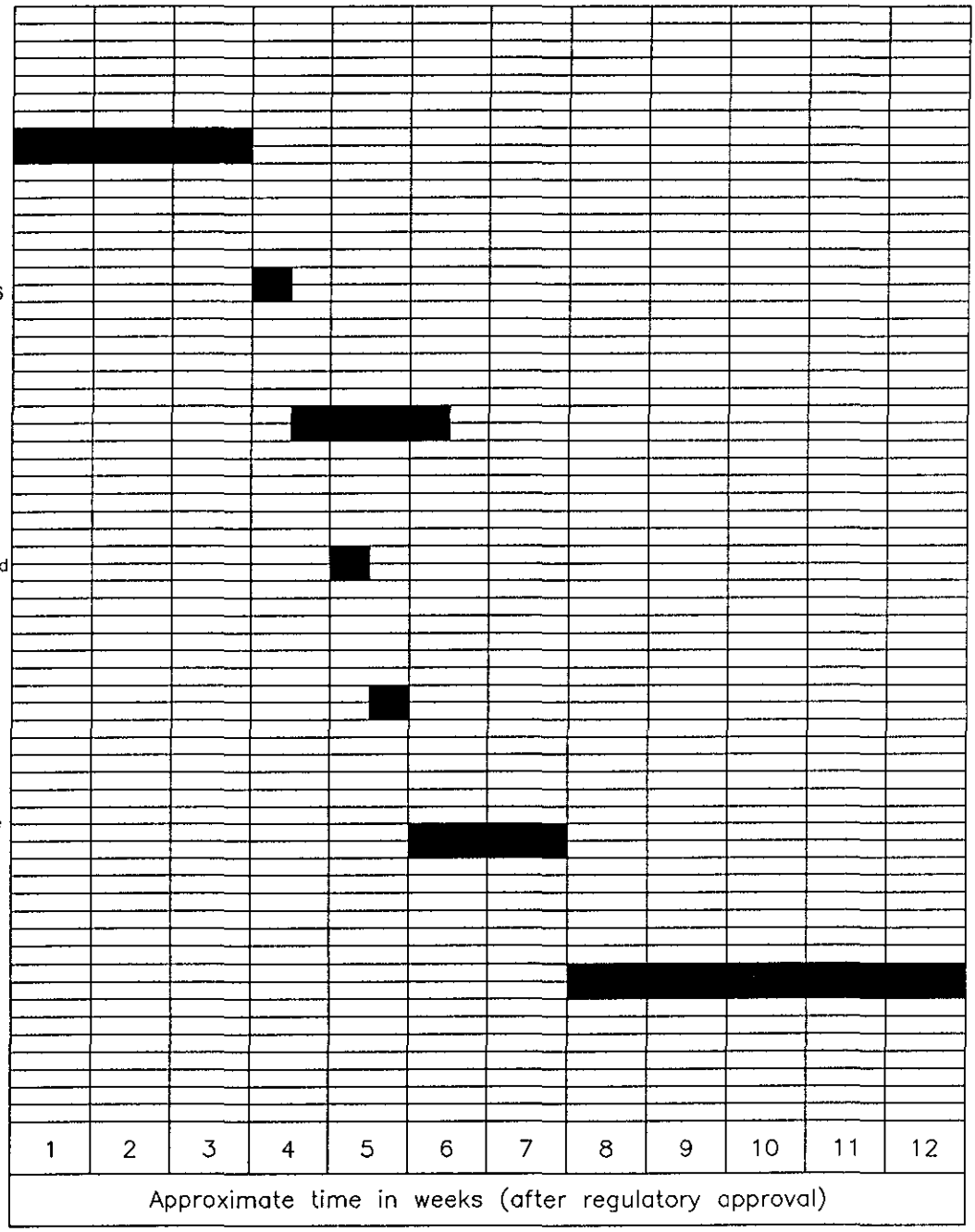
STEP 3:
Submit selected soil samples for laboratory analysis and receive results

STEP 4:
Survey monitoring wells MW-6 and MW-7

STEP 5:
Develop monitoring wells MW-6 and MW-7

STEP 6:
Measure depth to water, record visual evidence for product, purge and samples wells MW-1 through MW-7 and RW-1, submit water samples for laboratory analysis, and receive results

STEP 7:
Report preparation



Note: If offsite access is not obtained, steps 2 through 7 will be delayed indefinitely.

RESNA	**PRELIMINARY TIME SCHEDULE** **ARCO Station 276** **10600 MacArthur Boulevard** **Oakland, California**	**PLATE** **3**
PROJECT **60026.10**		