



Working To Restore Nature

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**ADDENDUM TWO TO WORK PLAN
INITIAL OFFSITE AND ADDITIONAL ONSITE
SUBSURFACE INVESTIGATION AND AQUIFER PUMPING TEST**

at

**ARCO Station 6113
785 East Stanley Boulevard
Livermore, California**

69028.11

*Dec
1992*

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

by

RESNA Industries Inc.

December 29, 1992



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

Subject: Addendum Two to Work Plan 69028.06 to perform an Initial Offsite and Additional Onsite Subsurface Investigation and Aquifer Pumping Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) has prepared this Addendum Two to RESNA's previous Work Plan (RESNA, 69028.06, October 17, 1991) to perform an Initial Offsite and Additional Onsite Subsurface Investigation and Aquifer Pumping Test at the subject site. The location of the subject site is shown on the Site Vicinity Map, Plate 1.

The objectives of this work are to evaluate aquifer characteristics and the design flow rates for a possible future groundwater extraction, collection and treatment system; to provide additional extraction points for a future vapor extraction system, to delineate the extent of gasoline hydrocarbons in the soil and groundwater in the northwestern portion of the site and in the downgradient (northern and northeastern) vicinity of the site, and to identify potential offsite sources of hydrocarbons detected in soil and groundwater at the subject site.

RESNA's proposed tasks for this phase of work at the subject site include: obtaining a street encroachment permit from the City of Livermore, and a permit for the construction of the wells from Alameda County Flood Control and Water Conservation District, Zone 7 (ACFCWCD); drilling and collecting soil samples from five onsite (B-13 through B-17) and two offsite (B-18 and B-19) soil borings; installing three 4-inch diameter vapor extraction wells (VW-3 through VW-5) in borings B-13 through B-15, respectively; installing a 6-inch diameter recovery well (RW-1) in boring B-16; installing a 4-inch diameter onsite groundwater monitoring well (MW-10) in boring B-17; installing two 2-inch diameter offsite groundwater monitoring wells (MW-11 and MW-12) in borings B-18 and B-19, respectively;



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TRANSMITTAL

TO: Ms. Susan Hugo
ACHCSA
Dept of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

DATE: December 29, 1992
PROJECT NUMBER: 69028.11
SUBJECT: Final - Addendum Two
to Work Plan Initial Offsite & Additional
Onsite Subsurface Investigation at ARCO
Station 6113, 785 East Stanley Blvd.,
Livermore, California.

FROM: Barbara Sieminski
TITLE: Assistant Project Geologist

12/92

WE ARE SENDING YOU:

COPIES DATED	DESCRIPTION
1 12/11/92	Final - Addendum Two to Work Plan at the above subject site.

THESE ARE TRANSMITTED as checked below:

- For review and comment Approved as submitted Resubmit ___ copies for approval
- As requested Approved as noted Submit ___ copies for distribution
- For approval Return for corrections Return ___ corrected prints
- For your files

REMARKS:

Per ARCO's request (Mr. Michael Whelan) this Addendum Two to Work Plan has been forwarded to you for your review.

Copies: 1 to RESNA project file no. 69028.11

developing recovery well RW-1 and monitoring wells MW-10 through MW-12; surveying recovery well RW-1, monitoring wells MW-10 through MW-12, and vapor extraction wells VW-3 through VW-5 for locations and top-of-casing elevations relative to mean sea level datum by a licensed surveyor; sampling and measuring water levels in recovery well RW-1 and monitoring wells MW-10 through MW-12; performing laboratory analyses of soil and groundwater samples; performing an aquifer pumping and recovery test; performing an environmental record search to identify potential offsite sources of hydrocarbons detected in soil and groundwater at the subject site; and preparing a report of our findings, interpretations, and conclusions.

A summary of previous work performed at the site by RESNA and others is included in the Work Plan (RESNA, 69028.06, October 17, 1991), and the reports listed in the References section of this Addendum Two to Work Plan.

PROPOSED WORK

RESNA recommends the following work at the site for this phase of subsurface investigation:

- Step 1: Receive approval of this Addendum Two to Work Plan from the Alameda County Health Care Services Agency (ACHCSA). Obtain a street encroachment permit from the City of Livermore, and a well construction permit from the ACFCWCD.
- Step 2: Drill and obtain soil samples for soil classification and laboratory analyses from five onsite (B-13 through B-17) and two offsite (B-18 and B-19) soil borings as shown on Plate 2, Proposed Boring/Well Locations. Drill borings B-13 through B-15 to depths of approximately 2 feet above the first encountered groundwater (total depth of approximately 55 feet). Drill borings B-16 through B-19 up to 5 feet into a possible perching or confining layer beneath the first encountered groundwater, or no more than 20 feet into the first water-bearing zone (total depth of approximately 75 feet). Collect soil samples every 5 feet and at changes in soil stratigraphy in borings B-13, B-14, B-15, B-17, B-18, and B-19, and continuously in boring B-16. Install three vapor extraction wells (VW-3 through VW-5) with 4-inch diameter well casing in borings B-13 through B-15, respectively; install a recovery well (RW-1) with 6-inch diameter well casing in boring B-16; install one onsite groundwater monitoring well (MW-10) with 4-inch diameter well casing in boring B-17; and install two offsite groundwater monitoring wells (MW-11 and MW-12) with

2-inch diameter well casing in borings B-18 and B-19, respectively. Submit selected soil samples from borings B-13 through B-19 to a State-certified laboratory for analyses of total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency (EPA) methods 5030/8015/8020.

- Step 3: Survey recovery well RW-1, groundwater monitoring wells MW-10 through MW-12, and vapor extraction wells VW-3 through VW-5 to a National Geodetic Vertical Datum for locations and top of casing elevations relative to mean sea level (msl).
- Step 4: Develop recovery well RW-1 and groundwater monitoring wells MW-10 through MW-12.
- Step 5: Measure depth-to-water (DTW) level, record visual evidence of floating product, if present, in groundwater samples, and purge and collect groundwater samples for laboratory analyses from recovery well RW-1 and groundwater monitoring wells MW-10 through MW-12. Submit groundwater samples to a State-certified laboratory for analyses for TPHg and BTEX using EPA methods 5030/8015/8020. The groundwater sample collected from monitoring well MW-1 will also be analyzed for total oil and grease (TOG) using standard method 5520 C&F (Gravimetric).
- Step 6: Perform a step draw-down test and use the data to estimate the sustainable pumping rates for an aquifer pumping test. Perform the aquifer pumping test using RW-1 as the pumping well and the other wells associated with the site as observation wells. Data obtained from the pumping and recovery tests will be used to evaluate the hydraulic conductivity, transmissivity, and storativity of the aquifer. The information will also be used to evaluate the zone of capture of the extraction well and the feasibility of groundwater extraction as an effective means of remediation at the site. Pumping and recovery test methods to be used are as follows: 1) measure the initial water levels in well RW-1 and observation wells prior to commencement of pumping; 2) adjust the flow rate of the pump to the desired rate, as determined in the step draw-down test; 3) record the starting time of the pumping test; 4) measure water levels in RW-1 and the observation wells at timed intervals throughout the pumping test; 5) shut off the pump after 18 hours of pumping and measure water levels in RW-1 and the observation wells at intervals until recovery is at least 80 percent of the initial water levels. Collect barometric pressure for

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the time interval of the pumping and recovery test to allow screening of possible effects of atmospheric pressure on the groundwater levels.

- Step 7: Obtain and study aerial photographs of the site vicinity and obtain a report containing environmental data which identifies environmental problem sites and activities in the vicinity of the site to identify potential offsite sources of hydrocarbons detected in soil and groundwater at the subject site.
- Step 8: Prepare a draft report to include results of the investigation and our interpretations and conclusions.
- Step 9: Review of draft report by ARCO.
- Step 10: Issue final report.

Field work proposed in this Addendum Two to Work Plan will be performed according to the Field Protocol included in Appendix A of the Work Plan (RESNA, 69028.06, October 17, 1991) for the subject site. A preliminary time schedule to perform Steps 1 through 10 is shown on Plate 3. Subsequent addenda to the Work Plan will be prepared and submitted to ARCO and proper regulatory agencies as necessary to describe future work proposed at the site.

Addendum Two to Work Plan
ARCO Station 6113, Livermore, California

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Copies of this Addendum Two should be forwarded to:

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

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

Ms. Danielle Stefani
Livermore Fire Department
4550 East Avenue
Livermore, California 94550

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

Sincerely,
RESNA Industries Inc.

Barbara Sieminski

Barbara Sieminski
Assistant Project Geologist

Joel Coffman
BSA

Joel Coffman
Project Geologist

Enclosures:

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

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ARCO Station 6113, Livermore, California

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REFERENCES

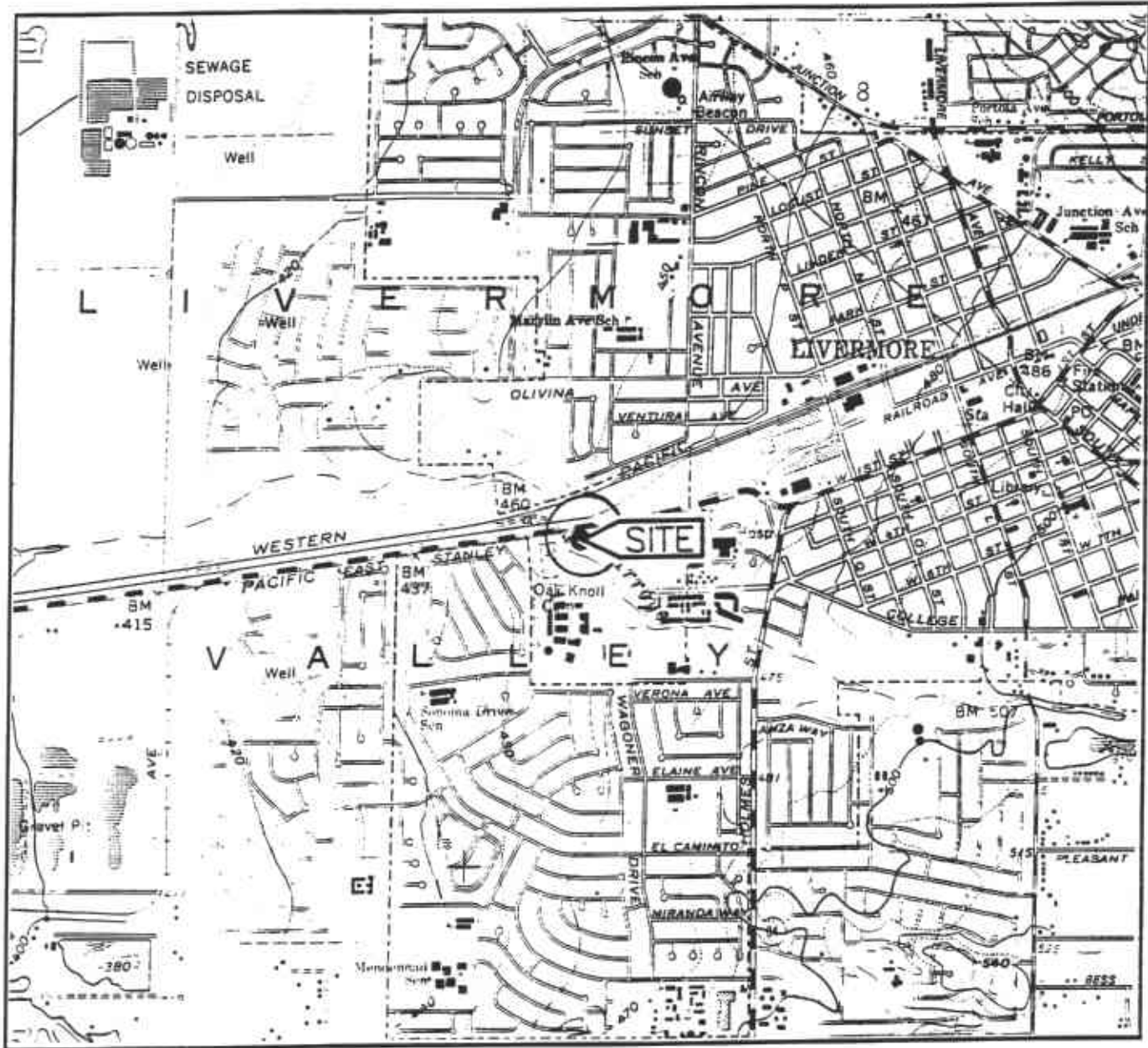
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- Applied GeoSystems. July 11, 1991. Letter Report, Quarterly Ground-Water Monitoring Second Quarter 1991 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-5.
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- RESNA. October 18, 1991. Letter Report, Quarterly Groundwater Monitoring, Third Quarter 1991, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.05

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ARCO Station 6113, Livermore, California

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(Continued)

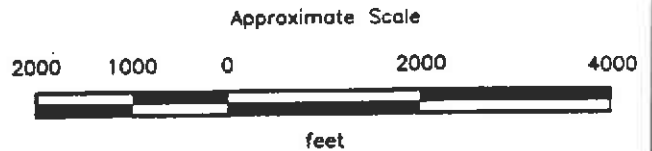
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- RESNA. May 4, 1992. Letter Report, Quarterly Groundwater Monitoring, First Quarter 1992, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.05
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- RESNA. October 27, 1992. Draft Additional Subsurface Investigation and Vapor Extraction Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.07
- RESNA. November 30, 1992. Letter Report, Quarterly Groundwater Monitoring, Third Quarter 1992, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.08



Base: U.S. Geological Survey
 7.5-Minute Quadrangles
 Livermore, California
 Photorevised 1980

LEGEND

⊙ = Site Location

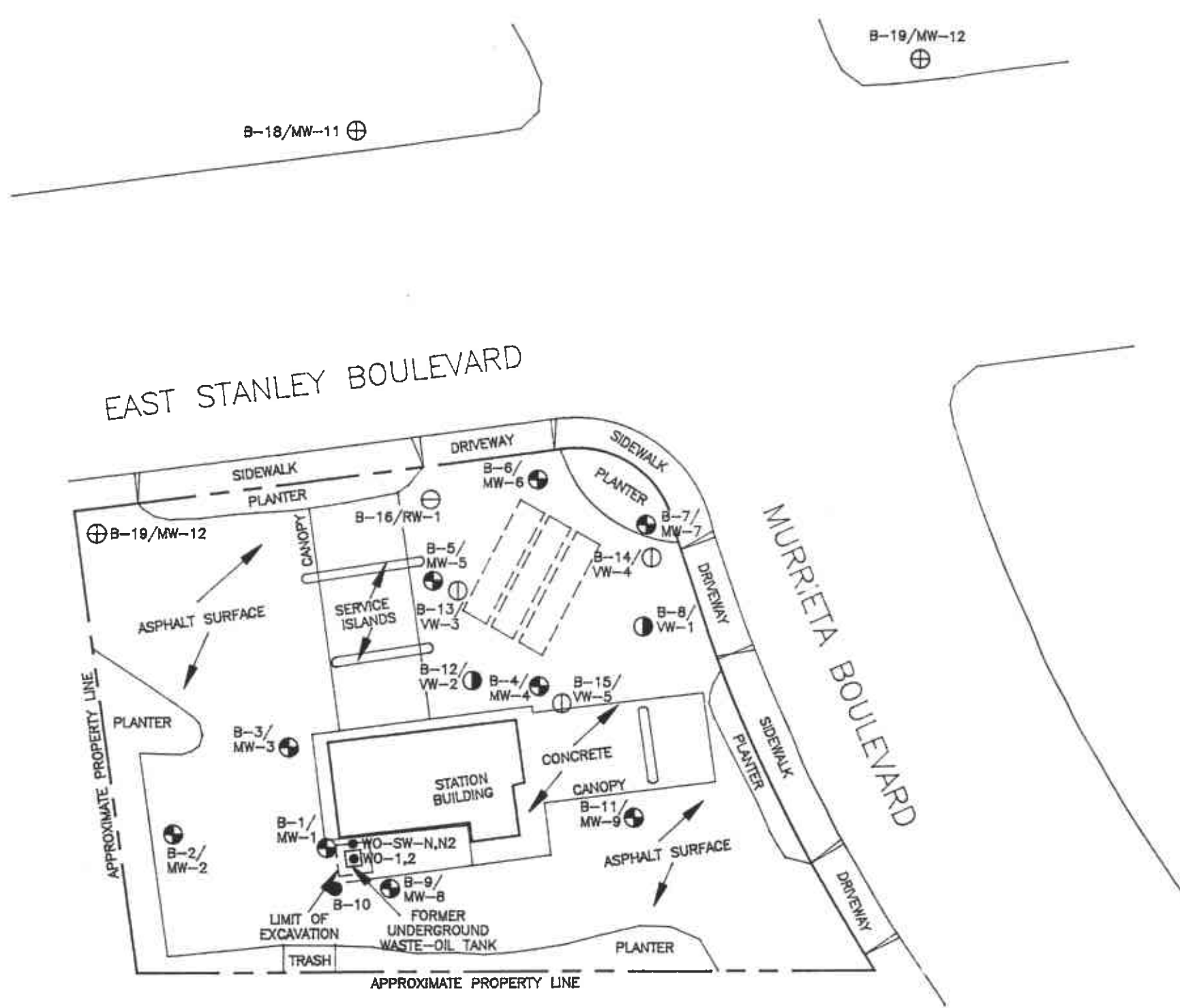


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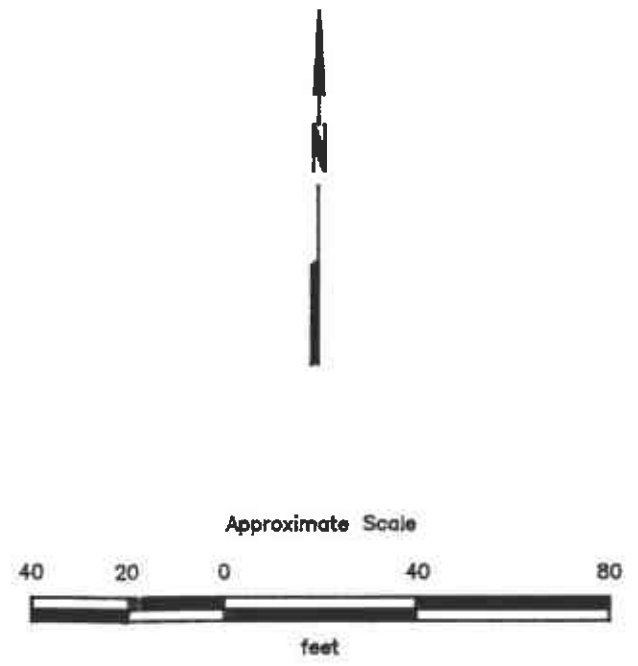
SITE VICINITY MAP
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
1



EXPLANATION

- B-15/VW-5 ⊕ = Proposed boring/vapor extraction well
- B-16/RW-1 ⊖ = Proposed boring/recovery well
- B-19/MW-12 ⊕ = Proposed boring/monitoring well
- B-11/MW-9 ⊕ = Boring/monitoring well (RESNA, 09/89, 02/91, and 06/92)
- B-12/VW-2 ⊕ = Boring/vapor extraction well (RESNA, 06/92)
- B-10 ● = Boring (RESNA, 06/92)
- WO-SW-N,N2 ● = Soil sample collected by Pacific (1989)



Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., October 1988.



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PROPOSED BORING/WELL LOCATIONS
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
2

STEP 1:
Obtain a street encroachment permit and a well construction permit

STEP 2:
Drill soil borings, install wells, and receive soil sample analyses reports

STEP 3:
Well head survey

STEP 4:
Well development

STEP 5:
Well monitoring and sampling

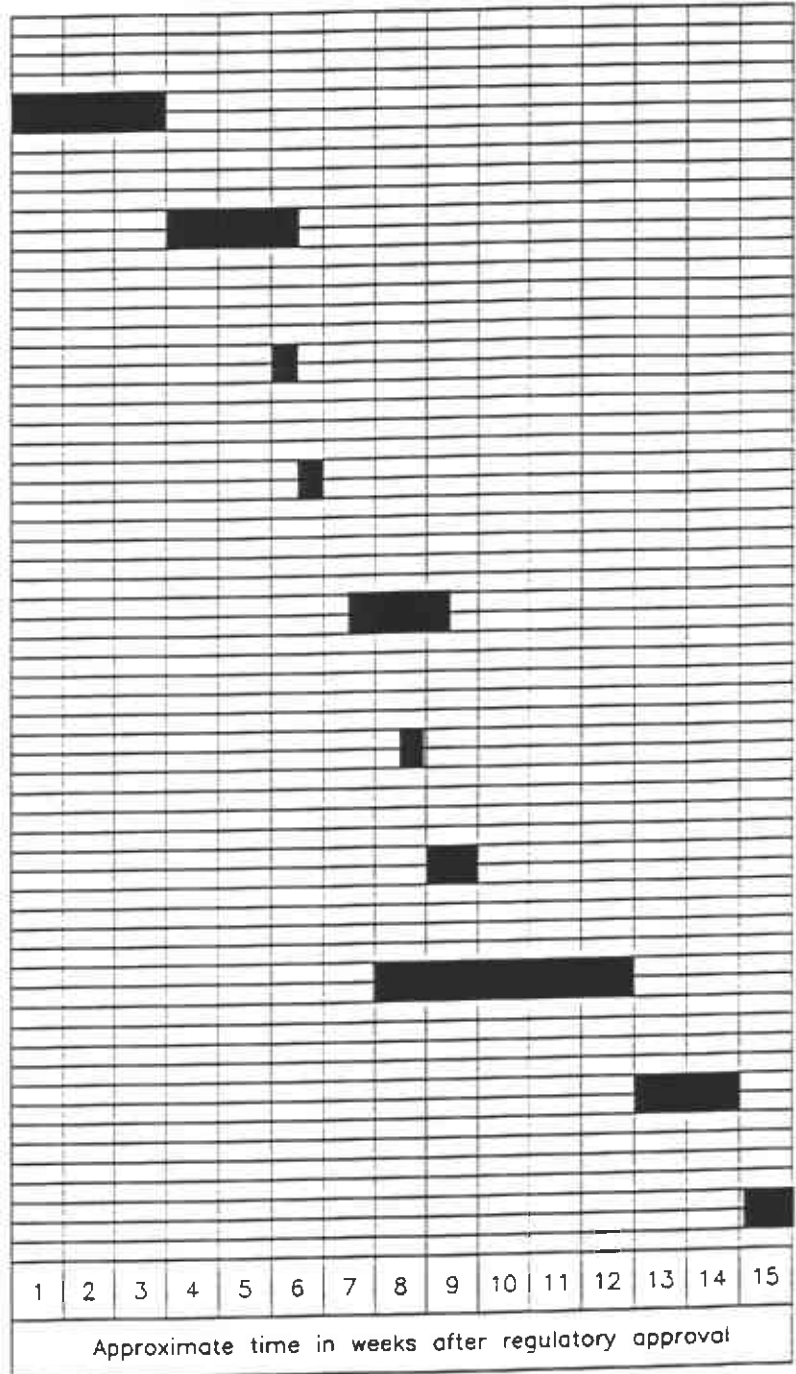
STEP 6:
Pumping and recovery test

STEP 7:
Environmental report search

STEP 8:
Draft report preparation

STEP 9:
Review of draft report by ARCO

STEP 10:
Finalize report



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PRELIMINARY TIME SCHEDULE
ARCO Station 6113
1100 East Stanley Boulevard
Livermore, California

PLATE

3