RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

ADDENDUM SEVEN TO WORK PLAN
to
EVALUATE AQUIFER TEST DATA
and FEASIBILITY of REMEDIATION ALTERNATIVES
at
ARCO Station 601
712 Lewelling Boulevard
San Leandro, California

69034.14 3/30/93

Prepared by
RESNA Industries Inc.

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

Erin McLucas
Staff Geologist

Joel Coffman
Project Manager

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1463
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

James L. Nelson
C.E.G. 1428

March 30, 1993

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

March 30, 1993
0329MWHE
69034.14

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

Subject: Addendum Seven to Work Plan to Evaluate Aquifer Test Data and Feasibility of Remediation Alternatives at ARCO Station 601, 712 Lewelling Boulevard, San Leandro, California.

Mr. Whelan:

At the request of ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) has prepared this Addendum Seven to Work Plan for review and approval by the Regional Water Quality Control Board (RWQCB) and the Alameda County Health Care Services Agency (ACHCSA). This addendum to the original work plan (RESNA, March 21, 1991) describes proposed work to be performed as required by the RWQCB Cleanup and Abatement Order (RWQCB CAO No. 92-147, December 7, 1992) issued to ARCO and adjacent property owner, Mr. John J. Sullivan.

The location of the subject site is shown on Plate 1, Site Vicinity Map. Monitoring well locations, other pertinent site features, and surrounding properties to the site are shown on Plate 2, Generalized Site Plan.

The tasks in this Addendum Seven to Work Plan include: receiving approval of this Work Plan from the ACHCSA and the RWQCB; evaluating results of the step-drawdown and aquifer pumping tests; obtaining a copy of the results of an environmental investigation on the adjacent property owned by Mr. John J. Sullivan; scheduling a meeting with the RWQCB and the ACHCSA to discuss the feasibility of various remedial alternatives and the status of soil and groundwater delineation at the site; preparing minutes of the meeting to be held with the ACHCSA and the RWQCB; and initiating work for preparation of additional reports and/or work plans for additional work, if necessary.

PREVIOUS ENVIRONMENTAL WORK

August 1989

Applied GeoSystems (AGS, November 1989) performed a limited environmental site assessment at the request of ARCO to evaluate possible hydrocarbons in the soil in the vicinity of the underground storage tanks (USTs) prior to removal of the four gasoline USTs and one waste-oil UST. Work performed during this limited assessment included: drilling and obtaining soil samples for laboratory analysis from five soil borings (B-1 through B-5) to depths to, or just above, the first-encountered groundwater; analyzing selected soil samples from each of the borings for total petroleum hydrocarbons as gasoline (TPHg) and the gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX); analyzing selected soil samples from the boring located near the waste-oil UST for total oil and grease (TOG) and halogenated volatile organics (VOCs); and preparation of a report including results, conclusions and recommendations for future work.

Soil borings B-1 though B-5 were drilled to depths between approximately 10½ and 15½ feet. Groundwater was encountered in boring B-1 and B-2 at depths of 14½ and 11½ feet, respectively, and stabilized after a period of approximately one hour at a depth of approximately 11 feet. Groundwater was not encountered in borings B-3, B-4, and B-5 which were drill to total depths of approximately 10½ feet. Free hydrocarbon product was encountered in each of the five soil borings drilled. The soil encountered during this limited assessment consisted primarily of silty clay with lesser amounts of sandy clay and clayey silt.

Results of laboratory analyses of selected soil samples from boring B-1 through B-4, drilled in the area of the former gasoline USTs, indicated concentrations of TPHg up to 12,000 parts per million (ppm) and concentrations of BTEX up to 660 ppm. Results of laboratory analyses of selected samples from boring B-5, drilled adjacent to the former waste-oil UST, indicated TPHg at concentrations up to 2,600 ppm, TOG up to 4,800 ppm, and BTEX up to 130 ppm. No VOCs were detected in samples analyzed from boring B-5. The laboratory results are summarized in Table 1A of Appendix A in this addendum to work plan.

Applied GeoSystems concluded that the shallow soil in the area of the four underground gasoline USTs and the waste-oil UST had been impacted by elevated concentrations of hydrocarbons, and that the first-encountered groundwater beneath the site appeared to have been impacted by hydrocarbons.

January 1990

GeoStrategies, Inc., (GSI, June 1990) observed removal of four gasoline USTs and one waste-oil UST, noted contaminant distribution within the subsurface, obtained soil samples for laboratory analysis from the tank excavations (including new tank excavation), the product line trenches and soil stockpiles, and assisted in directing soil excavation.

Approximately 1565 cubic yards of soil were removed from the former gasoline UST and product line trench, the former waste-oil UST, and the new gasoline UST excavations. Laboratory analytical results of composite soil samples obtained from soil stockpiles from the former gasoline UST excavation indicated TPHg concentrations above 1,000 ppm for approximately 200 cubic yards, above 100 ppm for approximately 350 cubic yards, and less than 100 ppm for approximately 50 cubic yards. Laboratory analytical results from the soil stockpiles from the new UST excavation indicated TPHg concentrations of less than 100 ppm for approximately 950 cubic yards of soil. Laboratory analytical results from the soil stockpile from the former waste-oil UST indicated TPHg above 100 ppm for approximately 15 cubic yards of soil. The approximately 565 cubic yards of soil with TPHg above 100 ppm were removed to disposal facilities operated by GSX (as identified by GSI, presently Laidlaw Environmental Services, Inc., Limited Class I Disposal Facility, Button Willow, California). Approximately 1,000 cubic yards of soil with TPHg below 100 ppm were removed to a Class III landfill. Excavations were backfilled with clean pea gravel. In addition, a 6-inch diameter 0.020 slot site PVC casing product recovery well (RW-1) was installed in the backfill of the former waste-oil UST excavation, at the approximate location shown on the Generalized Site Plan (Plate 2) of this report.

The results of laboratory analysis of native soil samples obtained from the former gasoline UST excavation, former product line trenches, former waste-oil excavation, and new tank excavation are included in Table 2A of Appendix A in this addendum to work plan.

June 1990

In June 1990, RESNA (formerly AGS) performed a Limited Subsurface Investigation (RESNA/AGS, December 1990) at the site including drilling borings B-6 through B-8 and installing groundwater monitoring wells MW-1 through MW-3 in the borings. The monitoring wells were developed and sampled as part of this investigation, and selected soil and groundwater samples were sent to a state-certified laboratory for analyses. Groundwater monitoring data and laboratory analytical results are shown in Tables 3A and 4A of Appendix A of this addendum to work plan. The groundwater flow direction was tentatively evaluated to be to the southwest.

RESNA/Applied GeoSystems concluded: 1) The majority of gasoline and waste-oil hydrocarbons at concentrations above 100 parts per million (ppm) in the soil at the site, outside the immediate areas of the former gasoline and waste-oil USTs, appeared to be within or just above the interbedded clayey sand to silty clay at depths between approximately 8 and 12 feet, and that the presence of water in this relatively permeable zone appeared to have facilitated the movement of gasoline and waste-oil hydrocarbons laterally; 2) The lateral extent of the majority of hydrocarbons in the soil associated with the former gasoline and waste-oil USTs at the site had not been delineated below 100 ppm; 3) The vertical extent of TPHg and waste-oil related hydrocarbons in the soil had not been delineated; 4) Laboratory analytical results of soil and groundwater samples obtained from near the former waste-oil UST indicated concentrations of the metals cadmium, chromium, lead, and zinc at or below Total Threshold Limit Concentration Values and California Department of Health Services (DHS) drinking water action levels; 5) The lateral and vertical extent of hydrocarbons in the groundwater had not been delineated at the site; and 6) An additional offsite source of gasoline hydrocarbons may have been indicated by the presence of a product sheen in crossgradient well MW-3.

May and June 1991

In May and June 1991, a subsurface investigation and vapor extraction test was performed at the site (RESNA, October 1991). The tasks involved included drilling five soil borings (B-9 through B-13), installing five monitoring wells (MW-4 through MW-8), submitting for laboratory analyses selected soil and groundwater samples; researching wells located within ½-mile of the site and potential secondary hydrocarbon sources in the site vicinity; and performing a vapor extraction test. Wells MW-4, MW-6, and MW-7 were not sampled due to insufficient water in the wells. The groundwater flow direction was evaluated to be toward the southwest. RESNA concluded that: the lateral extent of TPHg was delineated to 100 ppm in the southern and eastern portions of the site, and northwest of the former gasoline UST excavation; The lateral extent of waste-oil hydrocarbons associated with the former waste-oil UST was delineated south and southwest of the waste-oil UST excavation; the vertical extent of TPHg in soil was delineated except east of the former gasoline USTs and near the former waste-oil UST; and the lateral and vertical extents of hydrocarbons in groundwater were not delineated except for waste-oil related hydrocarbons southwest of the former waste-oil UST.

RESNA's research indicated that several sites reported to have tank leaks are located upgradient of the ARCO site or near the ARCO site.

October 1992

In October 1992, RESNA conducted a limited offsite subsurface investigation (RESNA, February 1993) in response to the discovery of gasoline hydrocarbons by Pacific Gas and Electric (PG&E) during gas line replacement activities along Lewelling Boulevard. The investigation included drilling 9 soil borings (B-23 through B-31) along the shoulder of Lewelling Boulevard in the proposed PG&E alignment; sampling the borings; submitting selected soil samples to an onsite mobile laboratory and another analytical laboratory for analyses; and preparation of a report summarizing field procedures, findings, interpretations and conclusions.

All nine borings were drilled approximately 30 feet apart along Lewelling Boulevard, with boring B-30 extending into Washington Avenue. All nine borings were sampled at three depths, between ground surface and the depth of the proposed trench (up to 6 feet), immediately above shallowest groundwater, (6 to 10½ feet) and at the total depth of the boring (15½ feet).

Based on the analytical results from the soil samples, RESNA concluded that: 1) the majority of gasoline hydrocarbons appeared to be in the capillary fringe zone above first encountered groundwater, 2) the lateral extent of gasoline hydrocarbons appeared to be delineated to nondetectable TPHg and BTEX in the northeastern portion of the PG&E alignment in borings B-29 and B-30, and 3) the vertical extent of gasoline hydrocarbons appeared to be delineated to nondetectable TPHg and BTEX at a depth of 15½ feet along the alignment.

August, October and November 1992

In August, October and November 1992, RESNA conducted an Additional Subsurface Investigation (RESNA, March 3, 1993). The tasks for this investigation included drilling five onsite soil borings (B-16 and B-17, B-20 through B-22); constructing two 4-inch diameter groundwater monitoring wells (MW-11 and MW-12) in borings B-16 and B-17 respectively; drilling two offsite soil borings (B-18 and B-19); sampling the soil; constructing two 2-inch diameter groundwater monitoring wells (MW-13 and MW-14) in borings B-18 and B-19, respectively; developing the wells; surveying the monitoring wells; submitting selected soil samples collected from the borings and soil stockpile for laboratory analyses; and preparing a report which summarized field procedures, laboratory results, interpretation of data and conclusions.

Borings B-16 through B-19 were drilled to further delineate the lateral and vertical extents

of TPHg and BTEX. Laboratory analytical results from offsite borings B-18 and B-19, located across Washington Avenue northeast of the site and on the adjacent property to the southeast of the site, indicated nondetectable concentrations of TPHg and BTEX. Laboratory analytical results from onsite boring B-17, located in the southeastern corner of the site, indicated nondetectable TPHg, BTEX, and lead. Laboratory analytical results from boring B-16, located in the eastern central portion of the site, indicated nondetectable TPHg and BTEX except at 8 feet, just above groundwater.

Borings B-20 through B-22 were drilled to further evaluate the lead impact to soil in the vicinity of the former waste-oil tank. Laboratory analytical results for borings B-20 through B-22 indicated the greatest concentrations of hydrocarbons, metals, and BNAs to be at a depth of 7½ feet.

Based on these laboratory results RESNA concluded that 1) gasoline hydrocarbons in the soil beneath the site appear to have been delineated to 100 ppm except southwest of the former USTs and near boring B-8, 2) the soil appears to be vertically delineated to less than 100 ppm at a depth of about 15 feet beneath the site, 3) waste-oil hydrocarbons in the vadose zone soil and the aquitard underlying the water-bearing zone appear to be delineated laterally and vertically to 100 ppm, 4) VOCs (except BTEX) and BNA (except low levels of 2-methylnapthalene, napthalene, and phenanthrene in the capillary fringe zone) related to the former waste-oil UST appear to be vertically delineated to below detection limits, 5) Metals related to the former waste-oil UST appear to be delineated to below Total Threshold Limit Concentrations (TTLCs), 6) lead in the soil appears to be delineated to approximately 6 ppm in the vadose zone soils and in the aquitard underlying the water-bearing zone, and 7) groundwater impacted by gasoline hydrocarbons at the site appears to be delineated northeast and southeast of the site.

Ongoing Quarterly Monitoring

Quarterly water-level measurements and sampling for analyses were initiated in June 1990 by RESNA, and continue to be performed by ARCO's contracted sampler, EMCON Associates of San Jose, California. The results of these monitoring events are reported quarterly by RESNA (RESNA, March 1, 1993). Groundwater monitoring data is presented in Table 3A, and groundwater laboratory analytical data is presented in Table 4A of Appendix A of this addendum to work plan.

The groundwater at the site continues to flow generally westward, and appears to fluctuate between northwest and southwest. Hydrocarbon concentrations in the groundwater varies from quarter to quarter; however, the greatest concentrations are present in wells MW-1

through MW-5, located downgradient from, and in the vicinity of the former gasoline USTs.

ACTIONS TAKEN TOWARD COMPLIANCE OF CAO 92-147

On December 7, 1992, California RWQCB issued Cleanup and Abatement Order No. 92-147 to ARCO Products Company and Mr. John J. Sullivan requiring either a negotiated signed agreement between the two parties to perform a joint investigation or for each party to perform separate investigations. ARCO was unable to negotiate an agreement with Mr. Sullivan, but has proceeded with a separate investigation at the ARCO site.

On behalf of ARCO, RESNA has conducted an offsite investigation to the northeast, southeast, and northwest where access has been permitted to delineate the extent of gasoline hydrocarbons in the soil and groundwater. The results of this offsite work as well as additional onsite work are summarized in the previously mentioned Limited Offsite Subsurface Investigation Report (RESNA, February 3, 1993) and the Additional Subsurface Investigation Report (RESNA, March 3, 1993).

Further actions taken toward compliance for which reports have not yet been submitted include the drilling and installation of one additional offsite groundwater monitoring well (MW-15), and the performance of step-drawdown and aquifer pumping tests on wells MW-8 and MW-12 at the ARCO site.

Prior to installing one additional offsite groundwater monitoring well (MW-15), a letter requesting approval for the location of well MW-15 from Mr. John Jang of the RWQCB (RESNA letter to Mr. John Jang, January 25, 1993) was submitted and verbal approval was given by Mr. Jang to ARCO. The purpose of this additional offsite well (MW-15) is to further delineate the lateral and vertical extents of gasoline hydrocarbons in soil and groundwater to the west-southwest of the subject site. After obtaining approval from the RWQCB, an encroachment permit was secured from the City of San Leandro. On March 12, 1993, two soil borings (B-32a and B-32b) were drilled in front of Mr. John Sullivan's property at 724 Lewelling Boulevard and one groundwater monitoring well, MW-15, was installed in the sidewalk (on City of San Leandro property).

On March 12, 1993, RESNA submitted Addendum Six to Work Plan to the RWQCB to perform step-drawdown and aquifer pumping tests. During the second through fourth weeks of March 1993, step-drawdown and aquifer pumping tests were conducted. The results of these tests will be used to evaluate the feasibility of various remediation systems at the site.

PROPOSED WORK

To further comply with the RWQCB Cleanup and Abatement Order (CAO) #92-147, RESNA recommends performing the following work and schedule:

Step 1 Upon gaining regulatory approval of this Addendum Seven to Work Plan, evaluate the results of the recently performed step draw-down and aquifer pumping tests on monitoring wells MW-8 and MW-12. Prepare a report summarizing the results of an additional subsurface investigation including installation of offsite monitoring well MW-15 and aquifer tests.

Step 2 Obtain the results of an environmental subsurface investigation for Mr. John J. Sullivan's property from the RWQCB for use in evaluating remedial alternatives at the ARCO site. As discussed during a meeting at the ACHCSA on March 26, 1993 (attended by Mike Whelan of ARCO, Scott Seery of ACHCSA, John Jang of RWQCB, and Joel Coffman of RESNA) the data from Mr. Sullivan's property is crucial for evaluating whether gasoline hydrocarbons have impacted the adjacent property. The results from previously performed vapor extraction tests at the ARCO site, the aquifer tests results, data from Mr. John J. Sullivan's subsurface environmental investigation, and from ARCO's recent offsite subsurface investigation will be compared and evaluated with the RWQCB's criteria for consideration of alternative points of compliance. The feasibility of various remediation systems at the site will be evaluated and a remedial alternatives feasibility report will be prepared.

Step 3 Schedule a meeting between ARCO and the Regulatory Agencies (RWQCB and ACHCSA) to discuss the following topics: status of lateral and vertical assessment, gasoline attenuation/migration issues as they pertain to plume containment, and consideration for alternative points of compliance at this site as outlined in the San Francisco Region of the California RWQCB's Basin Plan Amendment.

Step 4 Prepare a summary of the meeting described in **Step 3** and pursue any additional work which may be required to further comply with the CAO No. 92-147.

SCHEDULE

A Preliminary Time Schedule (Plate 3) to perform Steps 1 through 4 is attached to this addendum. Field work in this Addendum Seven to Work Plan will be performed according to the field methods included in Appendix B of the Work Plan for Subsurface Investigations and Remediation for the subject site, dated March 21, 1991. Subsequent addenda to the Work Plan will be prepared and submitted to regulatory agencies as necessary to describe future work proposed at the site.

DISTRIBUTION

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

Mr. Mike Bakaldin
San Leandro Fire Department
835 East 14th Street
San Leandro, California 94577

Mr. Scott Seery
Alameda County Health Care Services Agency
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

Mr. John Jang
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94621

Mr. Stephen Ritchie
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94621

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

Sincerely,
RESNA Industries Inc.

Erin McLucas
Staff Geologist

Joel Coffman
Project Manager

Enclosures: Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Preliminary Time Schedule
Appendix A, Tables

cc: John Meck, ARCO Legal Dept.
Chris Winsor, ARCO Environmental

REFERENCES

Applied GeoSystems, November 9, 1989, Limited Environmental Site Assessment at ARCO Service Station No. 601, San Leandro, California, AGS Report 69034-1.

Alameda County Health Care Services Agency, July 30, 1992, Letter from Mr. Scott Seery concerning additional work at ARCO Station 601, 712 Lewelling Boulevard, San Leandro, California.

California Administrative Code, Title 22, Register 85, No. 2-1-12-85, p.1800.77.

California Department of Health Services, Office of Drinking Water, October 18, 1990. Summary of Drinking Water Standards.

California Regional Water Quality Control Board, December 7, 1992, Cleanup and Abatement Order (CAO) No. 92-147 issued to ARCO and Mr. John J. Sullivan.

California Regional Water Quality Control Board, October 21, 1992, Amendment to the Basin Plan, Internal Memo.

GeoStrategies, Inc. June 29, 1990, Tank Replacement Report, ARCO Service Station #601, San Leandro, California, GSI Report 7918-2.

GeoStrategies, Inc. June 29, 1990, Pump Testing at Former Shell Service Station at 15275 Washington Avenue, San Leandro, California. 61501-16.

Helley, E. S., K. R. Lajoie, W. E. Spangle, and M. L. Blair, 1979, Flatland Deposits of the San Francisco Bay Region, California, U.S. Geological Survey Professional Paper 943.

Hickenbottom, Kelvin and Muir, Kenneth, June 1988, Geohydrology and Groundwater - Quality overview of the East Bay Plain Area, Alameda County, California, Alameda County Flood Control and Water Conservation District, Report 205 (j).

RESNA/Applied GeoSystems, December 14, 1990, Subsurface Environmental Assessment at ARCO Station 601, RESNA/AGS Report 69034-4W.

REFERENCES
(Continued)

RESNA, October 17, 1991, Subsurface Environmental Assessment and Vapor Extraction Test at ARCO Service Station 601, RESNA Report 69034.04

RESNA, May 29, 1992, Site Safety Plan for ARCO Station 601, 712 Lewelling Boulevard, San Leandro, California, RESNA 69034.10.

RESNA, September 11, 1992, Letter Response to Alameda County Health Care Services Agency.

RESNA, September 14, 1992, Addendum Five to Work Plan for Additional Subsurface Investigation, RESNA Report 69034.10.

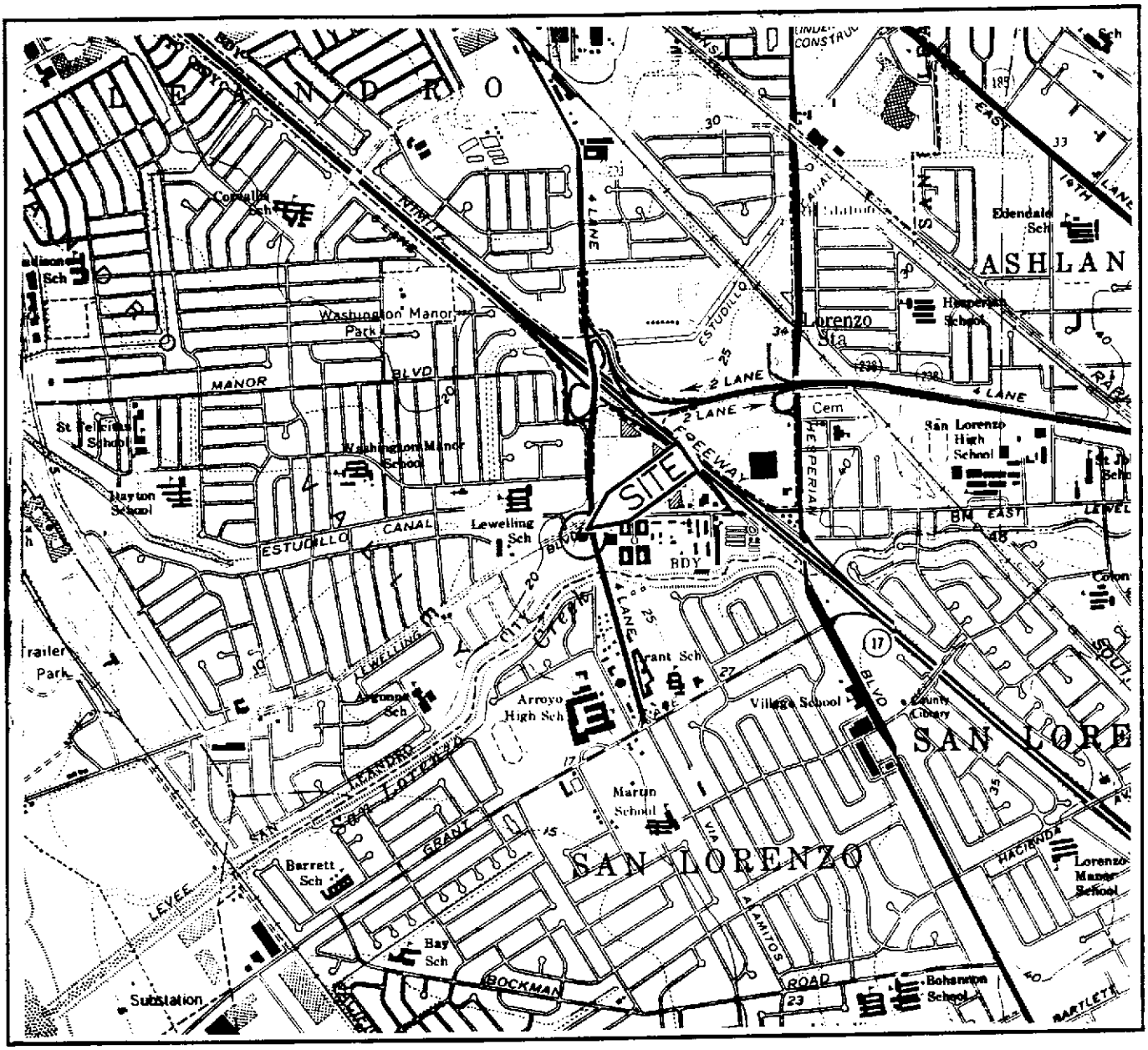
RESNA, January 25, 1993, Letter requesting approval to install one offsite groundwater monitoring well at ARCO Station 601, 712 Lewelling Boulevard, San Leandro, California, 69034.10

RESNA, February 3, 1993, Limited Offsite Subsurface Investigation at ARCO Station 601, 712 Lewelling Boulevard, San Leandro, California, RESNA Report 69034.11

RESNA, March 1, 1993, Letter Report, Quarterly Groundwater Monitoring Fourth Quarter 1992 at ARCO Station 601, 712 Lewelling Boulevard, San Leandro, California, RESNA Report 69034.12.

RESNA, March 3, 1993. Additional Subsurface Investigation at ARCO Station 601, 712 Lewelling Boulevard in San Leandro, California. RESNA Report 69034.10.

RESNA, March 12, 1993. Addendum Six to Work Plan, ARCO Station 601, 712 Lewelling Boulevard in San Leandro, California. RESNA Report 69034.13.



Base: U.S. Geological Survey
7.5–Minute Quadrangles
Hayward/San Leandro, California
Photorevised 1980

LEGEND

⊙ = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

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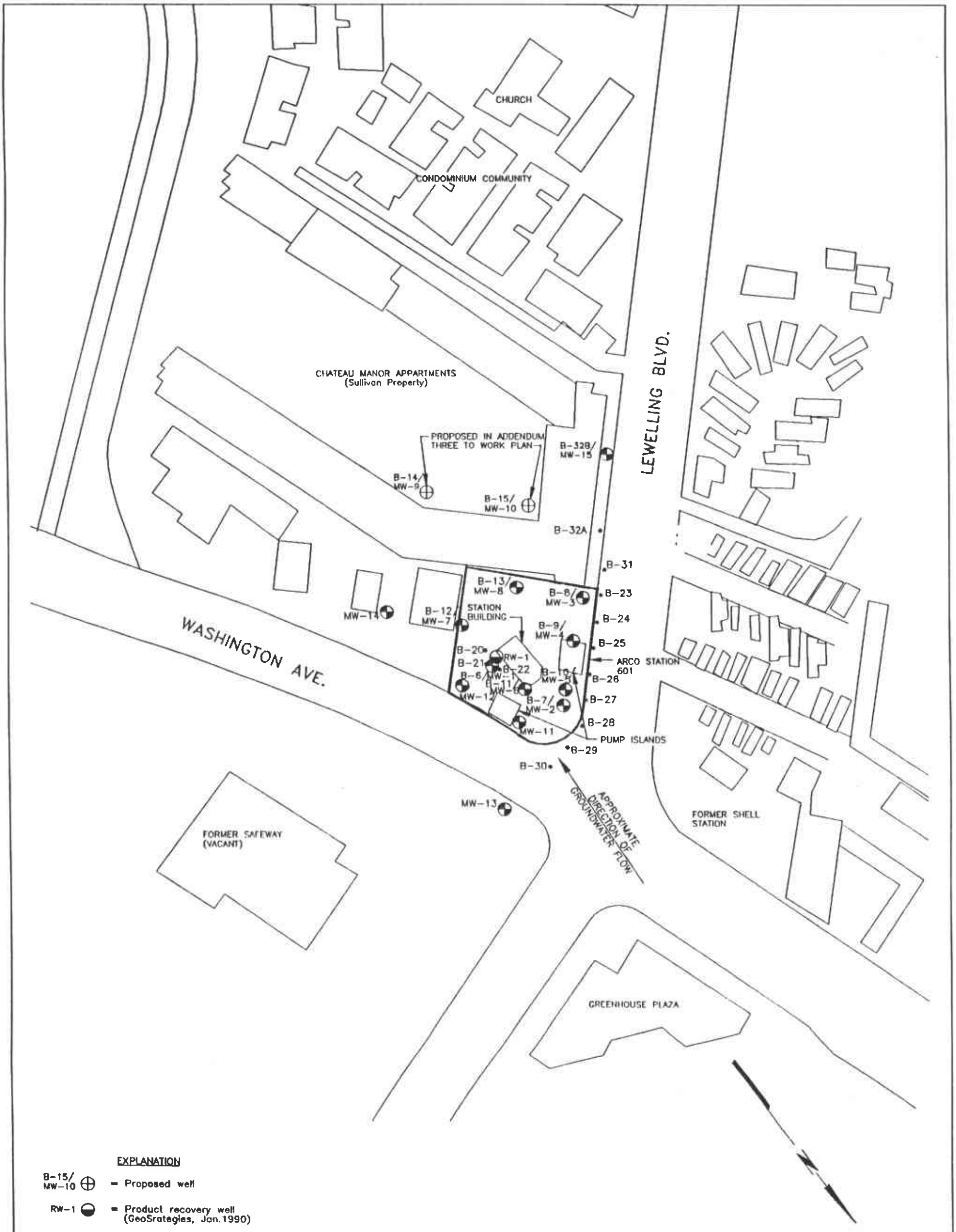
SITE VICINITY MAP
ARCO Station 601
721 Lewelling Boulevard
San Leandro, California

PLATE
1



EXPLANATION

B-15/MW-10 ⊕ = Proposed well

RW-1 = Product recovery well (GeoSrategies, Jan.1990)

B-13/MW-8 = Vapor extraction/groundwater monitoring well (RESNA, June 1990, May 1991, and March 1993)

B-31 • = Soil boring (Resna, October, 1992)

B-32A • = Soil boring (Resna, March 12, 1993)

Approximate Scale

100 50 0 100 200

feet

Source: Pacific Aerial and RESNA

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GENERALIZED SITE PLAN
ARCO Station 601
712 Lewelling Boulevard
San Leandro, California

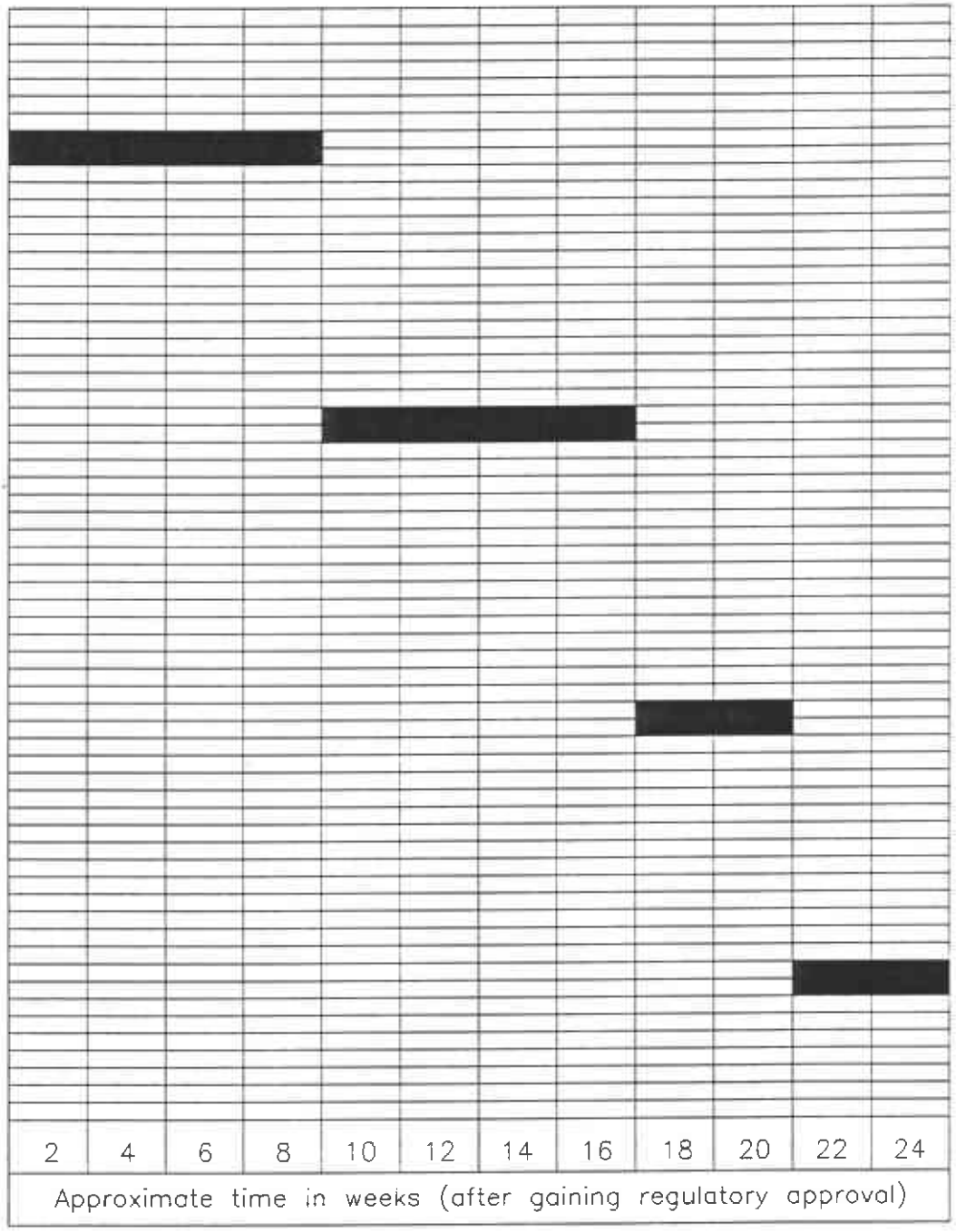
PLATE 2

STEP 1:
Evaluate aquifer test results, prepare report.

* STEP 2:
Obtain report of adjacent property environmental investigation (Sullivan property) Prepare Remedial Alternatives Feasibility Report

STEP 3:
Schedule meeting between ARCO, the RWQCB, and the ACHCSA

STEP 4:
Prepare minutes to meeting and initiate preparation of future reports/work plans (as necessary)



* Should delays in obtaining Adjacent Property Environmental Investigation Report occur, delays in preparing feasiblity study will be incurred.

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PRELIMINARY TIME SCHEDULE
ARCO Station 601
712 Lewelling Boulevard
San Leandro, California

PLATE
3

TABLE 1A
CUMULATIVE RESULTS OF LABORATORY
ANALYSES OF SOIL SAMPLES
ARCO Station 601
San Leandro, California
(Page 1 of 4)

Sample ID	TPHg	TPHd	TOG	B	T	E	X	Pb
Borings August 1989								
S-5-B1	350	NA	NA	8.3	19	5.1	26	NA
S-10-B1	610	NA	NA	10	37	6	48	NA
S-15-B1	<10	NA	NA	0.007	0.011	<0.005	0.012	NA
S-5-B2	12,000	NA	NA	60	450	110	660	NA
S-10-B2	<1	NA	NA	0.015	0.016	<0.005	0.018	NA
S-14-B2	<1	NA	NA	0.015	0.030	<0.005	0.035	NA
S-5-B3	23	NA	NA	0.710	<0.05	0.40	0.034	NA
S-10-B3	180	NA	NA	0.700	3.2	1.4	9.6	NA
S-5-B4	12	NA	NA	0.33	0.37	<0.05	0.75	NA
S-10-B4	65	NA	NA	1.9	2.0	0.7	4.6	NA
S-5-B5	370	NA	4,800	2.1	3.8	0.8	2.8	NA
S-10-B5	2,600	NA	130	10	90	21	130	NA
S-4.5-B6	9.5	<10	190	1.4	0.099	0.25	1.3	NA
S-7.5-B6	420	280	130	6.0	27	8.8	52	NA
S-12-B6	6.5	<10	130	0.062	0.29	0.10	0.60	NA
S-16.5-B6	<1.0	<10	63	<0.0050	0.040	0.011	0.069	NA
S-4.5-B7	9.3	NA	NA	0.71	0.040	0.18	0.68	NA
S-10-B7	15	NA	NA	0.99	0.71	0.50	1.3	NA
S-12.5-B7	<1.0	NA	NA	0.56	0.015	<0.0050	0.011	NA
S-16-B7	<1.0	NA	NA	0.0085	0.0071	<0.0050	0.0094	NA
S-6-B8	620	NA	NA	11	30	16	82	NA
S-9-B8	3.1	NA	NA	0.18	0.25	0.0094	0.43	NA
S-12-B8	1.7	NA	NA	0.034	0.039	0.0098	0.046	NA
S-15.5-B8	<1.0	NA	NA	0.082	0.076	<0.0050	0.079	NA
Borings May 1991								
S-5.5-B9	120	NA	NA	1.6	4.2	1.9	12	NA
S-7-B9	420	NA	NA	5.9	24	8.4	48	NA
S-8.5-B9	170	NA	NA	3.7	14	3.5	20	NA
S-11.5-B9	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-14.5-B9	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-17.5-B9	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-5.5-B10	500	NA	NA	2.8	8.1	7.4	34	NA
S-7.5-B10	2,700	NA	NA	27	150	65	370	NA

See notes on page 4 of 4.

TABLE 1A
CUMULATIVE RESULTS OF LABORATORY
ANALYSES OF SOIL SAMPLES
ARCO Station 601
San Leandro, California
(Page 2 of 4)

Sample ID	TPHg	TPHd	TOG	B	T	E	X	Pb
Borings May 1991								
S-10-B10	4.9	NA	NA	0.33	0.33	0.10	0.51	NA
S-16-B10	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-6-B11A	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-5.5-B11	4.4	NA	NA	0.72	0.019	0.022	0.041	NA
S-8.5-B11	100	NA	NA	3.0	9.3	2.7	1.5	NA
S-12-B11	<1.0	NA	NA	0.011	0.019	0.0055	0.025	NA
S-15-B11	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-5.5-B12	<1.0	<1.0	<30	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-7.5-B12	<1.0	<1.0	<30	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-10.5-B12	23	6.0	<30	<0.0050	0.24	0.50	2.2	NA
S-14.5-B12	<1.0	<1.0	<30	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-5.5-B13	8.4	15	<30	0.022	0.017	0.20	0.59	NA
S-11-B13	<1.0	<1.0	<30	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-15-B13	<1.0	<1.0	<30	<0.0050	<0.0050	<0.0050	<0.0050	NA
Borings Oct 1992								
S-6-B16	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-8-B16	87	NA	NA	<0.2500	<0.2500	8.4	37	NA
S-15.5-B16	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-5.5-B17	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-9-B17	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<5.0
S-14-B17	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	0.025	NA
Boring Nov 1992								
S-5-B18	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-7.5-B18	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-11-B18	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-16-B18	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
Composited Soil Samples Nov 1992								
SP A-D	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	0.0060
Boring Aug 1992								
S-7.5-B19	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA
S-15.5-B19	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA

See notes on page 4 of 4.

TABLE 1A
CUMULATIVE RESULTS OF LABORATORY
ANALYSES OF SOIL SAMPLES
ARCO Station 601
San Leandro, California
(Page 3 of 4)

Sample ID	TPHg	TPHd	TOG	B	T	E	X	Pb
Composited Soil Samples Aug 1992								
SP-0807 A-D	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA

Sample ID	TPHg	TEPH	TOG	B	T	E	X	VOCs	Cd	Cr	Pb	Zn	Ni	BNAs		
Borings Oct 1992																
S-4.5-B20	<1.0	<1.0	<50	0.074 (<0.100)	<0.0050 (<0.100)	<0.0050 (<0.100)	0.034 (<0.100)	ND	<0.50	49	5.0	70	53	ND		
S-7.5-B20	30	300	430	0.40 (0.480)	<0.1000 (<0.100)	0.88 (3.000)	0.96 (2.300)	ND	<0.50	44	5.4	59	43	7.100[a]	4.900[b]	0.120[c]
S-17-B20	<1.0	<1.0	<50	<0.0050 (<0.100)	<0.0050 (<0.100)	<0.0050 (<0.100)	<0.0050 (<0.100)	ND	<0.50	50	<5.0	64	60	ND		
S-4.5-B21	6.1	2.2	<50	0.42 (0.270)	0.0070 (<0.100)	0.10 (<0.100)	0.17 (0.130)	ND	<0.50	56	<5.0	67	56	ND		
S-7.5-B21	460	2,000	1,200	14 (2.100)	2.4 (<1.000)	9.6 (23.000)	14 (7.700)	ND	<0.50	42	7.9	52	46	3.600[a]	3.300[b]	
S-16.5-B21	2.8	<1.0	<50	0.013 (<0.100)	<0.0050 (<0.100)	0.056 (<0.100)	0.18 (<0.100)	ND	<0.50	50	5.4	71	67	ND		
S-4.5-B22	460	300	93	29 (57.000)	11 (18.000)	10 (28.000)	28 (77.000)	ND	<0.50	28	<5.0	80	48	ND		
S-7.5-B22	760	390	82	3.6 (1.300)	3.2 (<0.500)	12 (0.500)	43 (23.000)	ND	1.4	15	240	2,600	52	5.700[a]	4.100[b]	
S-16.5-B22	<1.0	<1.0	<50	0.014 (<0.100)	0.027 (<0.100)	0.014 (<0.100)	0.070 (0.160)	ND	<0.50	56	6.3	80	70	ND		

Metals	Cd	Cr	Pb	Zn	Ni
TTLC Value	100	500	1,000	5,000	2,000

Sample ID	TPHg	TPHd	TOG	B	T	E	X	Pb
Composited Stockpile Samples Oct 1992								
SPA-SPD	33	NA	NA	0.28	0.28	0.50	1.6	0.0060

See notes on page 4 of 4.

TABLE 1A
CUMULATIVE RESULTS OF LABORATORY
ANALYSES OF SOIL SAMPLES
ARCO Station 601
San Leandro, California
(Page 4 of 4)

Results in parts per million (ppm).
TPHg = Total petroleum hydrocarbons as gasoline using EPA Method 5030/8020/8015
TEPH = Total extractable petroleum hydrocarbons using EPA Method 3350/8015.
TOG = Total oil and grease using 5520 E&F (gravimetric).
B = benzene, T = toluene, E = ethylbenzene, X = total xylenes (EPA Method 8020/8015)
VOCs = Volatile organic compounds using EPA Method 8240 (except BTEX).
( ) = BTEX using EPA Method 8240.
BNAs = Semi-volatile organics using EPA 8270 ([a] = 2-Methylnaphthalene, [b] = Naphthalene, and [c] = Phenanthrene).
Cd = Cadmium Cr = Chromium Pb = Lead Zn = Zinc Ni = Nickel (EPA Method 6010)
TTLC Values = Total Threshold Limit Concentration (California Administrative Code, Title 22)
< = Below indicated laboratory reporting limits.
NA = Not analyzed
ND = Not detected
Sample Identification:

S-10-B12
- S = Soil sample
- 10 = Sample depth in feet below ground surface
- B12 = Boring number

SPA-SPD
- SP = Soil stockpile
- D = Composite sample

TABLE 2A
LABORATORY ANALYSIS OF SOIL SAMPLES BY GEOSTRATEGIES
ARCO Station 601
712 Lewelling Boulevard
San Leandro, California
(Page 1 of 1)

Sample ID	TPHg	TPHd	TPHo	TOG	B	T	E	X
AP-1	6.8	NA	NA	NA	0.13	<0.025	<0.025	0.20
AP-2	12	MA	MA	NA	0.71	0.049	0.31	0.60
AP-3	47	NA	NA	NA	1.1	2.1	0.63	5.5
AP-4	120	NA	NA	NA	5.2	10	2.8	18
AP-5	42	NA	NA	NA	1.5	3.9	0.95	14
AT-1a	<10	NA	NA	NA	0.043	0.072	0.013	0.085
AT-1b	<10	NA	NA	NA	0.014	0.035	0.0079	0.046
AT-2a	<10	NA	NA	NA	<0.005	0.0068	<0.005	<0.005
AT-2b	<10	NA	NA	NA	0.0071	<0.005	<0.005	<0.005
AT-3a	<10	NA	NA	NA	0.023	0.041	0.013	0.036
AT-3b	<10	NA	NA	NA	0.016	<0.005	<0.005	0.0077
AT-4a	<10	NA	NA	NA	0.068	0.17	<0.005	0.014
AT-4b	<10	NA	NA	NA	<0.005	0.048	<0.005	0.08
ASW-1	1,600	NA	NA	NA	36	111	50	210
ASW-2	7,100	NA	NA	NA	175	509	220	980
ASW-3	140	NA	NA	NA	3.1	3.1	3.8	15
ASW-4	1,400	NA	NA	NA	12	46	26	129
ANP-1	150	NA	NA	NA	8.1	3.9	5,8	20
ANP-2	36	NA	NA	NA	2	0.8	1.4	5.1
AWO-1	690	630	4,400	NA	<0.010	0.027	0.019	0.69
AWO-3	15	11	<50	<20	1.5	0.08	0.25	0.88
AWO-5	<3.0	<5	<50	<20	0.11	0.11	<0.03	0.10

Results in parts per million (ppm).
TPHg = Total petroleum hydrocarbons as gasoline
TPHd = Total petroleum hydrocarbons as diesel
TPHo = Total petroleum hydrocarbons as oil
TOG = Total oil and grease using SM 5520 E&F (gravimetric).
B = benzene, T = toluene, E = ethylbenzene, X = total xylenes (EPA Method 8020/8015)
< = Below indicated laboratory reporting limits.
NA = Not analyzed

Sample Number explanation:
AP-5 = Product line soil sample
AT-4b = Former product tank number base soil sample
ASW-4 = Former product tank excavation sidewall soil sample
ANP-2 = New product tank excavation soil sample
AWO-5 = Former waste-oil tank excavation soil sample

TABLE 3A
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 601
San Leandro, California
(Page 1 of 6)

Date Well Measured	Depth of Well	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
MW-1					
07/17/90	11.20	22.98	9.03	13.95	Emulsion
08/07/90			9.19	13.79	None
10/15/90			9.85*	13.13	0.25
11/20/90			9.79*	13.19	0.46
12/21/90			9.18	13.80	Sheen
01/09/91			9.47*	13.51*	0.02
02/27/91			9.31*	13.67*	0.03
03/20/91			7.81**	15.17**	Sheen
04/16/91			6.12	16.86	Sheen
05/16/91			8.60*	13.66*	0.01
06/10/91		22.26	9.00	13.26	Sheen
07/18/91			9.33*	12.93*	0.01
08/22/91			9.49*	12.77*	0.04
09/18/91			9.63*	12.63*	0.04
10/10/91			9.73*	12.53*	0.04
11/21/91			8.40*	13.86*	0.01
12/24/91			9.68*	13.30*	0.13
01/19/92	11.10		8.84	13.42	None
02/20/92			7.22	15.04	None
03/23/92			7.40	14.86	Sheen
04/21/92			8.30	13.96	None
05/15/92			8.77*	13.49*	0.01
06/08/92			9.08*	13.18*	0.02
07/15/92			9.40	12.86	None
08/25/92			8.21	14.05	None
09/15/92			8.18*	14.08*	0.02
10/28/92			8.62	13.64	None
11/16/92		22.26	9.09*	13.17*	0.02
12/16/92			8.10*	14.16*	0.02
MW-2					
07/17/90	12.33	22.06	7.86	14.20	None
08/07/90			8.03	14.03	None
10/15/90			8.61	13.45	None
11/20/90			8.76	13.30	None
12/21/90			8.28	13.78	None
01/09/91			8.43	13.63	None
02/27/91			8.28	13.78	None
03/20/91			7.26**	14.80**	None
04/16/91			6.97	15.09	None
05/16/91			7.52	15.27	None
06/10/91		21.33	7.91	14.88	None

TABLE 3A
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 601
San Leandro, California
(Page 2 of 6)

Date Well Measured	Depth of Well	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
MW-2					
07/18/91			8.30	14.49	None
08/22/91			8.50	14.29	None
09/18/91			8.63	14.16	None
10/10/91			8.82	13.97	None
11/21/91			8.46	14.33	None
12/24/91			8.72	14.07	None
01/19/92	12.20		7.96	14.83	None
02/20/92			6.55	16.24	None
03/23/92			6.86	15.93	None
04/21/92			7.15	14.18	None
05/15/92			7.61	13.72	None
06/08/92			7.95	13.38	None
07/15/92			8.45	12.88	None
08/25/92			8.53	12.80	None
09/15/92			8.71	12.62	None
10/28/92			8.89	12.44	None
11/16/92		21.33	7.93	13.40	None
12/16/92			7.44	13.89	None
MW-3					
07/17/90	11.99	20.84	7.03	13.81	Sheen
08/07/90			7.21	13.63	None
10/15/90			8.19*	12.65*	0.75
11/20/90			7.98*	12.85*	1.08
12/21/90			7.22*	13.62*	0.01
01/09/91			7.46*	13.38*	0.30
02/27/91			7.37*	13.47*	0.02
03/20/91			5.79**	15.05**	Sheen
04/16/91			7.95	12.89	Sheen
05/16/91			7.50	12.61	None
06/10/91		20.11	7.14	12.97	Sheen
07/18/91			7.55	12.56	None
08/22/91			7.64	12.47	Sheen
09/18/91			7.89*	12.22*	0.12
10/10/91			7.82*	12.29*	0.26
11/21/91			7.59*	12.52*	0.04
12/24/91			8.74*	11.37*	0.01
01/19/92	11.94		6.98	13.13	0.01
02/20/92			5.05	15.06	0.01
03/23/92			5.75	14.36	Sheen
04/21/92			6.55	13.56	None
05/15/92			7.11*	13.00*	0.03

See notes on page 6 of 6.

TABLE 3A
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 601
San Leandro, California
(Page 3 of 6)

Date Well Measured	Depth of Well	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
MW-3					
06/08/92			7.52*	12.59*	0.02
07/15/92			7.92	12.19	None
08/25/92			8.00	12.11	None
09/15/92			8.01*	12.10*	0.02
10/28/92			8.66	11.45	None
11/16/92		20.11	7.11	13.00	Sheen
12/16/92			6.62	13.49	None
MW-4					
06/10/91	8.30	20.75	Dry		None
07/18/91			7.86	12.89	None
08/22/91			7.85	12.90	None
09/18/91			7.84	12.91	None
10/10/91			Dry		None
11/21/91			Dry		None
12/24/91			Dry		None
01/19/92	12.02		8.20	Residual Water	None
02/20/92	8.50		8.13	Residual Water	None
03/23/92			7.94	Residual Water	None
04/21/92			8.20	Residual Water	None
05/15/92			8.16	Residual Water	None
06/08/92			8.12	Residual Water	None
07/15/92	8.90		8.81	Residual Water	None
08/25/92			8.39	Residual Water	None
09/15/92			Dry		None
10/28/92	8.4		8.23	Residual Water	None
11/16/92	8.5	20.75	8.29	Residual Water	None
12/16/92	8.5		8.18	Residual Water	None
MW-5					
06/10/91	9.88	20.90	7.58	13.32	None
07/18/91			7.97	12.93	None
08/22/91			8.18	12.72	None
09/18/91			8.31	12.59	None
10/10/91			8.51	12.39	Sheen
11/21/91			8.13	12.77	None
12/24/91			8.32	12.58	None
01/19/92	10.10		7.50	13.40	None
02/20/92			5.97	14.93	None
03/23/92			6.06	14.84	None
04/21/92			6.90	14.00	None
05/15/92			7.32	13.58	None

See notes on page 6 of 6.

TABLE 3A
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 601
San Leandro, California
(Page 4 of 6)

Date Well Measured	Depth of Well	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
MW-5					
06/08/92			7.66	13.24	None
07/15/92			8.34	12.56	None
08/25/92			8.18	12.72	None
09/15/92			8.40	12.50	0.02+
10/28/92			8.83	12.07	None
11/16/92		20.90	7.70	13.20	None
12/16/92			6.92	13.98	None
MW-6					
06/10/91	8.40	22.08	Dry		None
07/18/91			Dry		None
08/22/91			Dry		None
09/18/91			Dry		None
10/10/91			Dry		None
11/21/91			Dry		None
12/24/91			Dry		None
01/19/92	8.60		8.58	Residual water	None
02/20/92			7.28	14.80	None
03/23/92			7.45	14.63	None
04/21/92			7.74	14.34	None
05/15/92			8.50	Residual Water	None
06/08/92			Dry		None
07/15/92			8.81	Residual Water	None
08/25/92			8.42	Residual Water	None
09/15/92			Dry		None
10/28/92	8.75		8.75	Residual Water	None
11/16/92	8.6	22.08	8.57	Residual Water	None
12/16/92	8.6		8.10	Residual Water	None
MW-7					
06/10/91	9.36	22.89	Dry		None
07/18/91			Dry		None
08/22/91			Dry		None
09/18/91			Dry		None
10/10/91			Dry		None
11/21/91			Dry		None
12/24/91			Dry		None
01/19/92	9.55		Dry		None
02/20/92			8.74	14.15	None
03/23/92			8.20	14.69	None
04/21/92			8.86	14.03	None
05/15/92			9.29	Residual Water	None

See notes on page 6 of 6.

TABLE 3A
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 601
San Leandro, California
(Page 5 of 6)

Date Well Measured	Depth of Well	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
MW-7					
06/08/92			9.52	Residual Water	None
07/15/92			9.78	Residual Water	None
08/25/92			9.33	Residual Water	None
09/15/92			Dry		None
10/28/92	11.7**		10.38**	12.51	None
11/16/92	9.6	22.89	9.53	Residual Water	None
12/16/92	9.6		9.21	Residual Water	None
MW-8					
06/10/91	10.00	20.97	7.80	13.17	None
07/18/91			8.36	12.61	None
08/22/91			8.53	12.44	None
09/18/91			8.68	12.29	None
10/10/91			8.87	12.10	None
11/21/91			8.43	12.54	None
12/24/91			8.68	12.29	None
01/19/92	10.15		7.73	13.24	None
02/20/92			5.57	15.40	None
03/23/92			5.81	15.16	None
04/21/92			7.05	13.92	None
05/15/92			7.79	13.18	None
06/08/92			8.01	12.96	None
07/15/92			8.46	12.51	None
08/25/92			8.64	12.33	None
09/15/92			8.80	12.17	None
10/28/92			8.80	12.17	None
11/16/92		20.97	8.19	12.78	None
12/16/92			6.66	14.31	None
MW-11					
11/16/92	11.9	22.38	9.02	13.36	None
12/16/92			8.48	13.90	None
MW-12					
11/16/92	11.6	22.77	9.65	13.12	None
12/16/92			8.71	14.06	None
MW-13					
11/16/92	13.0	22.45	9.02	13.43	None
12/16/92			8.23	14.22	None

See notes on page 6 of 6.

TABLE 3A
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 601
San Leandro, California
(Page 6 of 6)

Date Well Measured	Depth of Well	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
MW-14					
09/15/92	13.0	22.99	10.66	12.33	None
10/28/92			10.91	12.08	None
11/16/92			10.33	12.66	None
12/16/92			9.20	13.79	None

Measurements in feet.
Datum mean sea level.
Depth-to-Water measured in feet below top of casing.
*The recorded thickness of the floating product was multiplied by 0.80 to obtain an approximate value for the displacement of water by the floating product. This approximate displacement value was then subtracted from the measured depth to water to obtain a calculated depth to water.
** = Anomalous data.
+ Floating Product entered well during purging, therefore DTW was not affected.
Residual Water = less than 4 inches of water trapped within the cap at the base of the well.