Applied GeoSystems, Inc.
A RESNA Company

RESNA
Working To Restore Nature

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

92 JAN -8 AM 8:37

TRANSMITTAL

TO: MS. SUSAN HUGO
ACHCSA-DEH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

DATE: 1/3/92
PROJECT NUMBER: 60000.07
SUBJECT: ARCO STATION 771 AT 899 RINCON AVENUE, LIVERMORE, CALIF.

FROM: JOEL COFFMAN
TITLE: PROJECT GEOLOGIST

WE ARE SENDING YOU [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Reports [ ] Specifications

[X] Letters [ ] Change Orders [ ] _____

COPIES	DATED	NO.	DESCRIPTION
1	1/3/92		LETTER REPORT OF A VAPOR EXTRACTION TEST PERFORMED 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

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[X] For your files [ ] _____

REMARKS: _____

Copies: 1 to project file no. 60000.07

*Revision Date: 11/21/91
*File Name: TRANSMT.PRJ

ULTRA

P.O. Box 571 • Santa Clara, CA 95052
408-562-4300

Date: 1-3-91

Waybill 339171

Susan Hugo
Cty Health Care Agency
Juan Way
CA
Spates

(Your Name)

Phone Number (Very important)
(   )

Company: applied GeoSystems
Department/Floor No.

Street Address: 3315 almaden Road

City: San Jose
State: CA
Zip Code

Print When Picked Up (Returned)
X R Aragon
Time A.M. P.M. 2:30

YOUR BILLING REFERENCE INFORMATION

SPECIAL INSTRUCTIONS

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TOTAL

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San Jose, CA 95118
Phone: (408) 264-7723
Fax: (408) 264-2435

January 3, 1992
013CCAR.VET
60000.07

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

Subject: **Letter Report of a Vapor Extraction Test Performed at ARCO Station 771, 899 Rincon Avenue, Livermore, California.**

Mr. Carmel:

At the request of ARCO Products Company (ARCO), RESNA (formerly Applied GeoSystems [AGS]) has prepared this letter report summarizing the results and conclusions of a vapor extraction test (VET) performed at the above subject site on December 12, 1991. This VET was performed in conjunction with an on-going subsurface environmental investigation and anticipated treatment of hydrocarbon-bearing soil beneath the subject site. The site location is shown on the Site Vicinity Map, Plate 1.

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 (AGS, May 1991), in the Work Plan for Supplemental Subsurface Investigation (AGS, September 1990) and in the Supplemental Subsurface Investigation Report submitted to ARCO, the Regional Water Quality Control Board (RWQCB), and Alameda County Health Care Services Agency (ACHCSA) for review and approval (AGS, April 1991). Addendum One to the May 1991 Work Plan detailing the proposed subsurface investigation to be performed was also submitted for review and approval to ARCO, RWQCB and ACHCSA (AGS, May 1991). RESNA completed all proposed phases of work outlined in Addendum One by September 1991. Results of the work completed are summarized in the "Report Additional Subsurface Investigation" (RESNA, October 1991).

WORK DESCRIPTION

The VET had two objectives: (1) to collect operational data to evaluate the efficiency and practicality of vapor-extraction as a soil remediation alternative; and (2) to select the most appropriate off-gas treatment alternative, if the operational data suggest that vapor-extraction is a viable soil remediation alternative.

The vapor-extraction equipment consisted of: a six-cylinder internal combustion (I.C.) engine; instrumentation for measuring air flow, air velocity, air pressure, temperature, and volatile organic compound concentrations; and polyvinyl chloride (PVC) piping, fittings, and wellhead connections. RESNA performed the VET in accordance with Bay Area Air Quality Management District (BAAQMD) guidelines.

A total of five existing groundwater monitoring wells, MW-1, MW-2, MW-4, MW-5 and MW-7 were used during the VET. The location of these wells, as well as other pertinent site features, are shown on the Generalized Site Plan, Plate 2. Based on results of previous site assessments conducted to date, the known lateral extent of onsite hydrocarbon-impacted soils at depths of 30 to 43 feet below grade is depicted on Plate 3.
RESNA operated the vapor-extraction equipment on MW-4 for two and a half hours while monitoring the change in induced vacuum response at observation wells MW-1, MW-2, MW-5 and MW-7. The distances between MW-4 and MW-1, MW-2, MW-5, and MW-7 are 60.0, 40.0, 40.0, and 35 feet, respectively. The vapor extraction well air flow rate ranged from 63 cubic feet per minute (cfm) to 91.6 cfm at applied vacuums of 50 to 100 inches of water column. After the I.C. engine was operated for thirty minutes an influent vapor sample was collected. A second, influent vapor sample and an effluent sample were collected approximately two hours later.

After 2-⅓ hours, the vapor-extraction equipment was subsequently relocated to each observation well and operated for 30 minutes on each well before influent vapor samples were collected from MW-5, and MW-7. Induced vacuums were again measured in the observation wells. A portable field organic vapor monitoring instrument was also used to monitor influent vapor concentrations from each extraction well during the VET.

LABORATORY METHODS

Influent and effluent air samples for laboratory analysis were collected and sealed in Tedlar bags, and labeled with the sample number, date, time and sampler's name. RESNA initiated a Chain of Custody Record and it accompanied the vapor samples to a State-certified laboratory. The samples were analyzed for benzene, toluene, ethyl benzene, and total xylene isomers (BTEX) by Environmental Protection Agency (EPA) Method 8020; and

for total petroleum hydrocarbons reported as gasoline (TPHg), using modified EPA Method 8015.

RESULTS

Field Results

The field results of the VET are summarized in Table 1. With the I.C. engine operating on MW-4 for two and a half hours, significant induced vacuum responses were seen in all observation wells located 35 to 60 feet from the vapor extraction well. These results indicated very good communication in the sandy clay and sandy gravel layer in which the wells were screened (26 to 40 feet below grade). No appreciable loss of induced vacuum was observed in MW-2, MW-5, and MW-7 on reducing the applied vacuum at MW-4 from 100 inches of water column to 50 inches of water column. Lower induced vacuum responses were seen in observation wells when extracting vapors from MW-5 and MW-7 due to the smaller available screen interval for venting (7 feet) in comparison to 15 feet of available screen interval in MW-4.

Field organic vapor monitoring of extracted vapors at each of the extraction wells (MW-4, MW-5 and MW-7) reported vapor concentrations exceeding the maximum detection limit of the instrument (10,000 parts per million by volume [ppmv]). RESNA used a molecular weight of 100 for gasoline when converting vapor concentrations in mg/m^3 to equivalent concentrations in ppmv.

Laboratory Results

Table 2 reports the results of laboratory analysis of vapor samples collected at the extraction well MW-4, at each observation well, and also at the exhaust point of the I.C. engine. Copies of the Chain of Custody Record and laboratory analysis reports for the vapor samples are enclosed in Attachment A. Analytical results indicated benzene and TPHg influent concentrations ranging from 180 to 1200, and 8,600 to 62,000 milligrams per cubic meter (mg/m^3), respectively. Analysis of the effluent sample from the I.C. engine, collected to verify the destruction efficiency of the engine, reported benzene and TPHg concentrations of 19 and 1,000 mg/m^3, respectively.

CONCLUSIONS

RESNA concludes that vapor extraction is a practical and cost effective soil remediation alternative at this site. Based on the VET results, the effective radius of influence is very good and is estimated to be approximately 30 feet from each vapor extraction well. This radius of influence of 30 feet can be achieved by inducing a vacuum pressure of 50 inches

of water at each vapor-extraction well, at an air flow of approximately 60 cfm from each well. The number of additional vapor extraction wells and the number of existing wells to be used to extract hydrocarbon-bearing vapor from the known lateral extent of impacted soils (Plate 3) will be determined during the engineering design phase of the vapor extraction system (VES). The high induced vacuums in all of the observation wells indicated that the subsurface soils are very porous to air flow and will provide an above average radius of influence in each well. Also, due to the large volume of soil containing elevated soil TPHg concentrations, and due to the porous nature of the soil, the mass extraction rate of TPHg at startup of the proposed VES is expected to be high. Thus at startup, additional methods of abatement and/or operational adjustments to meet the BAAQMD off-gas limit of 15 lb volatiles/day after abatement may be required. This will be determined during the engineering design phase of the project.

A Remedial Action Plan consisting primarily of the engineering design, permitting, construction, and startup of the proposed VES will be submitted for review and approval to ARCO, the ACHCSA, and RWQCB, prior to the design the proposed VES.

RESNA estimates that the approximate initial TPHg concentration of the combined vapor-extraction wells to be about 8,300 ppmv (34,520 mg/m^3). Results of the VET indicate a benzene and TPHg destruction efficiency of 98.3 percent (%) with the use on an I.C. engine.

DISTRIBUTION

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

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

Please call if you have any questions regarding this letter report.

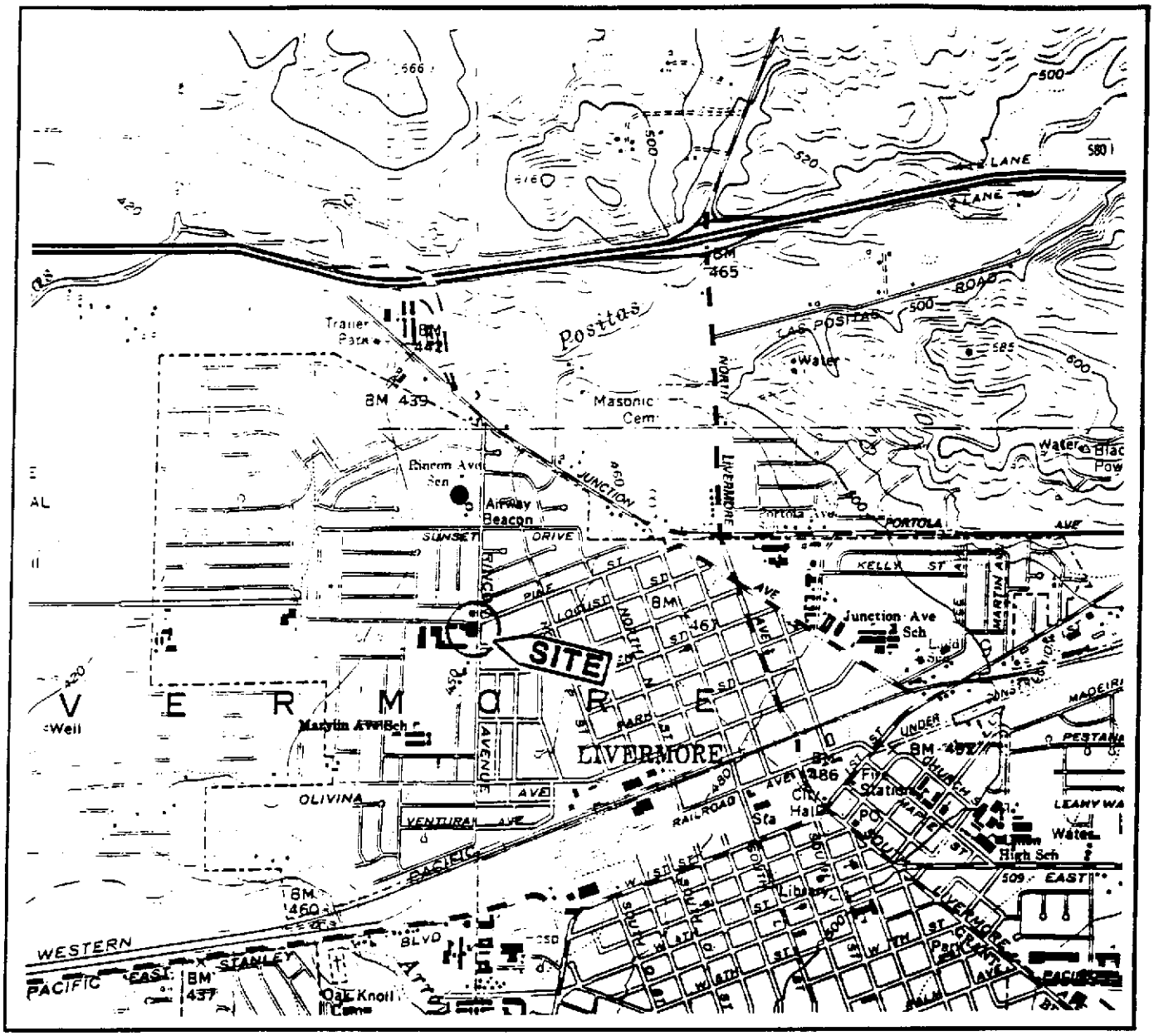
Sincerely,
RESNA

Valli Voruganti
Project Engineer

Joel Coffmann
Project Geologist

Joan E. Tiernan, Ph.D, P.E
Engineering Manager

Attachments:
Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, TPHg Concentrations in Soils at 30 to 43 feet Depth
Table 1, Vapor-Extraction Test Monitoring Data
Table 2, Laboratory Analysis of Air Samples
Attachment A, Chain of Custody and Laboratory Analysis Reports for Vapor Samples



Base: U.S. Geological Survey
7.5–Minute Quadrangle
Livermore, California
Photorevised 1980

N

LEGEND

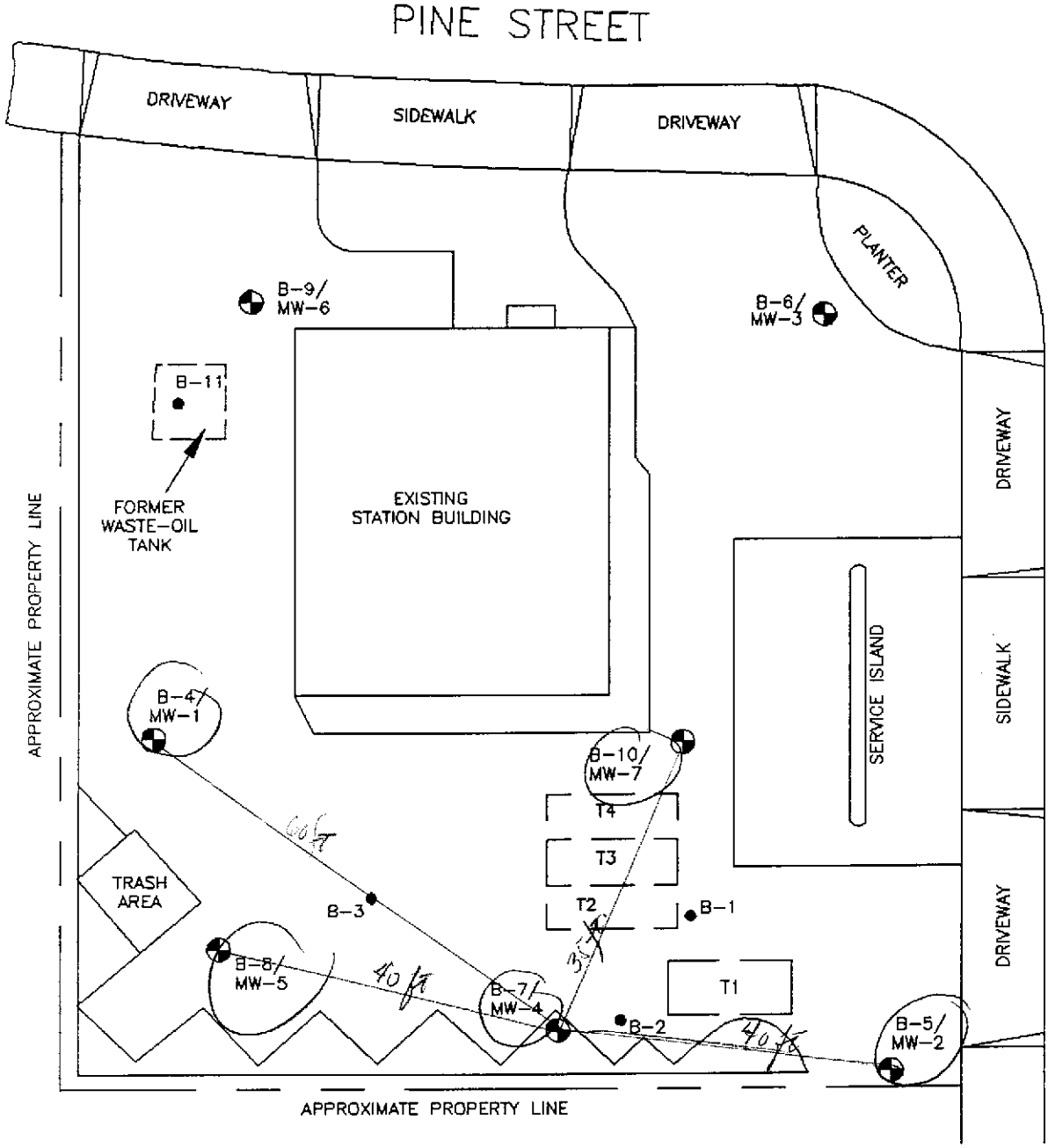
⊙ = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

RESNA	**SITE VICINITY MAP** **ARCO Station 771** **899 Rincon Avenue** **Livermore, California**	**PLATE** **1**
PROJECT 60000.07		



EXPLANATION

B-10/ MW-7 = Monitoring well (Applied GeoSystems, December 1990, June, and July 1991)

B-11 = Soil boring (Applied GeoSystems, February 1990, July 1991)

T4 = Underground gasoline-storage tank

N

Approximate Scale

20 10 0 20 40

feet

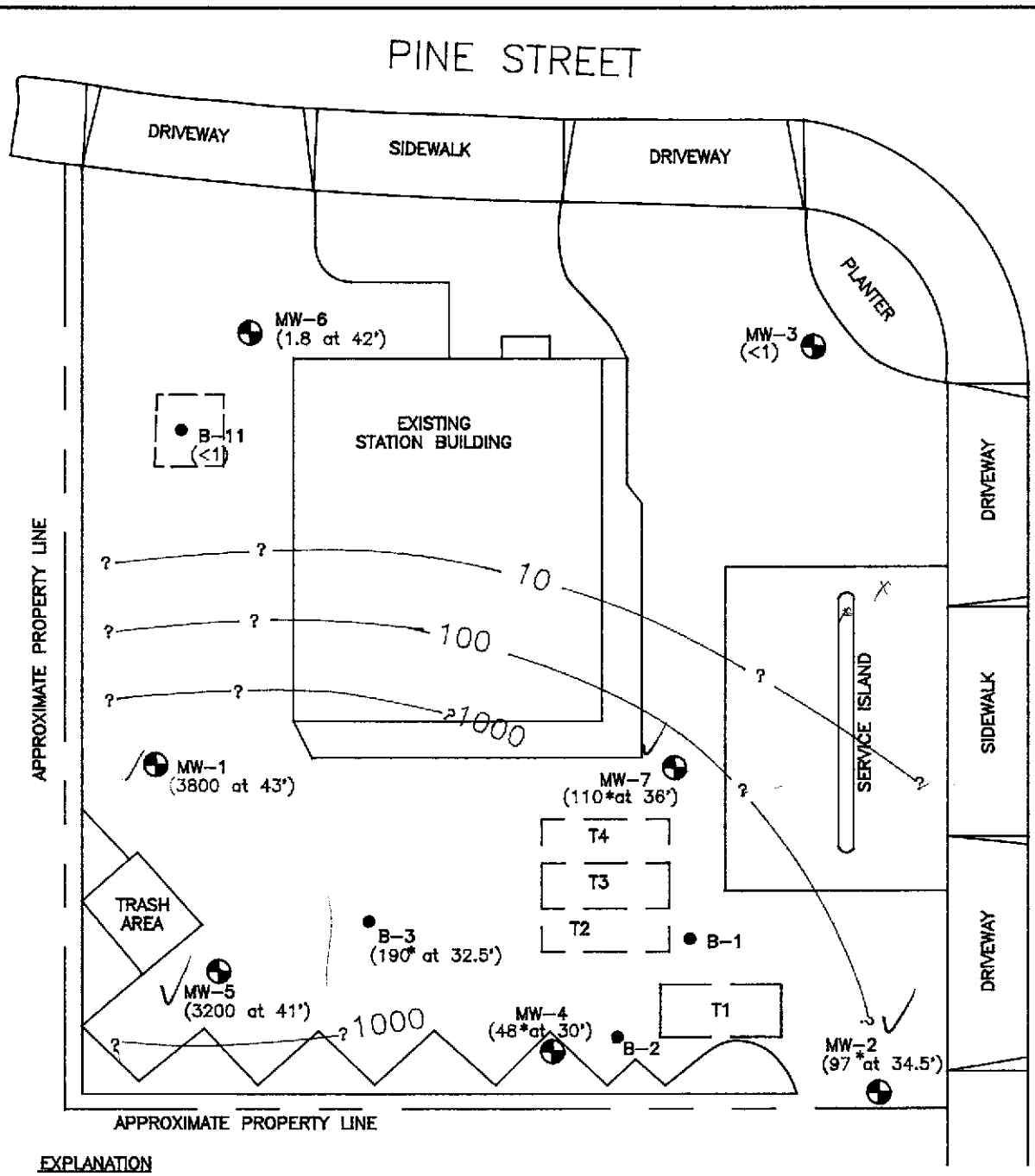
Source: Surveyed by John Koch, Licenced Land Surveyor.

RESNA

PROJECT 60000.07

GENERALIZED SITE PLAN
ARCO Station 771
899 Rincon Avenue
Livermore, California

PLATE 2



EXPLANATION

1000 = Line of equal concentration of TPHg in soil, in ppm

3800 = Concentration of TPHg in soil in ppm, at stated depth, 1990, 1991

B-11 ● = Soil boring (Applied GeoSystems, February 1990, July 1991)

MW-7 ◔ = Monitoring well (Applied GeoSystems, December 1990, June, and July 1991)

T4 = Underground gasoline-storage tank

* = Concentration may be greater at 42 feet, but boring drilled to shallower depth

N

Approximate Scale

20 10 0 20 40

feet

Source: Surveyed by John Koch, Licensed Land Surveyor.

RESNA	**TPHg CONCENTRATIONS IN SOIL At 30 to 43 feet Depth ARCO Station 771 899 Rincon Avenue Livermore, California**	**PLATE 3**
PROJECT 60000.07		

TABLE 1
VAPOR-EXTRACTION TEST MONITORING DATA
ARCO Station 771
Livermore, California

Influent Air Stream					Observation Wells			
Flow	Concentration	Applied Vacuum	Temp.	Elapsed Time (min)	MW-2 Induced Vacuum	MW-5 Induced Vacuum	MW-7 Induced Vacuum	MW-1 Induced Vacuum
53.4	NM	39	50	0	1.0	0.8	0.7	NM
87.2	>10,000	>100	55	30	4.3	5.8	3.7	NM
89.4	>10,000	98	57	60	4.8	6.9	5.0	NM
91.6	>10,000	105	57	90	4.9	7.2	5.7	NM
91.6	>10,000	105	60	120	4.9	7.3	6.0	NM
91.6	>10,000	105	60	150	4.9	7.3	6.0	NM
63.2	>10,000	49	64	30	4.8	5.0	5.1	NM
63.2	>10,000	49	63	60	4.8	5.0	5.1	>3
				Distance from extraction well MW-4 (feet):	40.0	40.0	35.0	60.0

Influent Air Stream					Observation Wells			
Flow	Concentration	Applied Vacuum	Temp.	Elapsed Time (min)	MW-1 Induced Vacuum	MW-4 Induced Vacuum	MW-2 Induced Vacuum	MW-7 Induced Vacuum
81.6	>10,000	96	56	0	2.0	0.9	0.04	0.0
81.6	>10,000	81.8	55	30	5.0	3.3	0.5	1.1
				Distance from extraction well MW-5 (feet):	30.0	40.0	80.0	60.0

Influent Air Stream					Observation Wells		
Flow	Concentration	Applied Vacuum	Temp.	Elapsed Time (min)	MW-2 Induced Vacuum	MW-4 Induced Vacuum	MW-5 Induced Vacuum
82.8	>10,000	95	57	0	2.0	2.0	1.2
82.8	>10,000	100	54	30	2.0	2.3	1.3
				Distance from extraction well MW-7 (feet):	44.0	35.0	57.0

Flow measured in cubic feet per minute (CFM).
Concentration measured in parts per million by volume (ppmv) on Lower Explosion Level (LEL) Meter.
Vacuum measured in inches of water column vacuum.
Temperature measured in degrees Fahrenheit.
NM = Not Measured.

TABLE 2
LABORATORY ANALYSIS OF AIR SAMPLES
ARCO Station 771
Livermore, California

Sample ID	Sample Location	Elapsed Time of Sample	TPHg	B	T	E	X
60000.07-AS1	MW-4	30	62,000	1200	150	28	48
60000.07-AS2	MW-4	150	58,000	1100	180	43	86
effluent	Outlet*	30	1,000	19	14	6.4	18
60000.07-AS3	MW-4	30	14,000	180	23	<12	<12
60000.07-AS4	MW-7	30	30,000	740	150	15	87
60000.07-AS5	MW-5	30	8,600	220	<12	<12	<12

Concentrations reported in milligrams per cubic meter (mg/m^3)
< : Below the minimum laboratory detection limit for air.
NA: Not analyzed.
TPHg: Total petroleum hydrocarbons as gasoline (analyzed by EPA Methods 8015 and 8020).
B: benzene, T: toluene, E: ethylbenzene, X: total xylene isomers
BTEX: Analyzed by EPA Methods 8015 and 8020
*: Outlet effluent vapors sampled after abatement by the internal combustion engine.

ATTACHMENT A

CHAIN OF CUSTODY AND LABORATORY ANALYSIS REPORT FOR VAPOR SAMPLES

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 771-

Chain of Custody

ARCO Facility no. 771	City (Facility) [illegible]
ARCO engineer CHUCK CARMEL	Telephone no. (ARCO) (415) 571-24[illegible]
Consultant name [illegible]	Address (Consultant) [illegible] ALMADEN EXPRESSWAY STE 34 SAN JOSE, CA 95118
Project manager (Consultant) JOEL COFFMAN / MICHAEL HODGES	
Telephone no. (Consultant) (408) 264 7723	Fax no. (Consultant) (408) 264 2435
Laboratory name SEQUOIA	Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other Air	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
[illegible]					X			12/12	11:00		X											
[illegible]					X			12/12	1:00		X											
[illegible]					X			12/12	2:00		X											
[illegible] AS3					X			12/12	2:00		X											
[illegible] AS4					X			12/12	3:00		X											
[illegible]					X			12/12	3:40		X											

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks
72 hr hold time
Please report results in mg/m³

Lab number

Turnaround time
Priority Rush 1 Business Day ☐
Rush 2 Business Days ☐
Expedited 5 Business Days ☐
Standard 10 Business Days ☐

Condition of sample: Good

Temperature received:

Relinquished by sampler [signature]	Date 12-12-91	Time 4:02pm	Received by [signature]
Relinquished by [signature]	Date 12-12-91	Time 5:30pm	Received by
Relinquished by [signature]	Date 12-12-91	Time 6:45	Received by laboratory / Date / Time

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Project: ARCO 771, Livermore

Enclosed are the results from 6 special matrix samples received at Sequoia Analytical on December 12,1991. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
1122020	Air, 60000.07 AS-1	12/12/91	EPA 5030/8015/8020
1122021	Air, 60000.07 AS-2	12/12/91	EPA 5030/8015/8020
1122022	Air, 60000.07 EFF	12/12/91	EPA 5030/8015/8020
1122023	Air, 60000.07 AS-3	12/12/91	EPA 5030/8015/8020
1122024	Air, 60000.07 AS-4	12/12/91	EPA 5030/8015/8020
1122025	Air, 60000.07 AS-5	12/12/91	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Maria Lee

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID:	ARCO 771, Livermore	Sampled:	Dec 12, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Air	Received:	Dec 12, 1991
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 13, 1991
Attention: Joel Coffman	First Sample #:	112-2020	Reported:	Dec 17, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L	Benzene µg/L	Toluene µg/L	Ethyl Benzene µg/L	Xylenes µg/L
112-2020	60000.07 AS-1	62,000	1,200	150	28	48
Detection Limits:		1,500	15	15	15	15

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

1122020.RRR <1>

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID:	ARCO 771, Livermore	Sampled:	Dec 12, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Air	Received:	Dec 12, 1991
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 13, 1991
Attention: Joel Coffman	First Sample #:	112-2021	Reported:	Dec 17, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L	Benzene µg/L	Toluene µg/L	Ethyl Benzene µg/L	Xylenes µg/L
112-2021	60000.07 AS-2	58,000	1,100	180	43	86
112-2023	60000.07 AS-3	14,000	180	23	N.D.	N.D.
112-2024	60000.07 AS-4	30,000	740	150	15	87
112-2025	60000.07 AS-5	8,600	220	N.D.	N.D.	N.D.
Detection Limits:		1,200	12	12	12	12

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID:	ARCO 771, Livermore	Sampled:	Dec 12, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Air	Received:	Dec 12, 1991
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 13, 1991
Attention: Joel Coffman	First Sample #:	112-2022	Reported:	Dec 17, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L	Benzene µg/L	Toluene µg/L	Ethyl Benzene µg/L	Xylenes µg/L
112-2022	60000.07 EFF	1,000	19	14	6.4	18
Detection Limits:		**60**	**0.60**	**0.60**	**0.60**	**0.60**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 771, Livermore

QC Sample Group: 1122020-22, 25

Reported: Dec 17, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	L. Laikhtman	L. Laikhtman	L. Laikhtman	L. Laikhtman
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Dec 13, 1991	Dec 13, 1991	Dec 13, 1991	Dec 13, 1991
QC Sample #:	BLK121391	BLK121391	BLK121391	BLK121391
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	11	11	12	34
Matrix Spike % Recovery:	110	110	120	113
Conc. Matrix Spike Dup.:	11	11	12	34
Matrix Spike Duplicate % Recovery:	110	110	120	113
Relative % Difference:	0.0	0.0	0.0	0.0

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / Conc. of M.S. - Conc. of M.S.D.) / 2	x 100

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 771, Livermore

QC Sample Group: 1122023-24

Reported: Dec 17, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	L. Laikhtman	L. Laikhtman	L. Laikhtman	L. Laikhtman
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Dec 13, 1991	Dec 13, 1991	Dec 13, 1991	Dec 13, 1991
QC Sample #:	BLK121391	BLK121391	BLK121391	BLK121391
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	11	12	12	34
Matrix Spike % Recovery:	110	120	120	113
Conc. Matrix Spike Dup.:	12	12	12	36
Matrix Spike Duplicate % Recovery:	120	120	120	120
Relative % Difference:	8.7	0.0	0.0	5.7

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

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