Delta
Environmental
Consultants, Inc.

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March 11, 2002

Mr. Amir Gholami, REHS
Hazardous Materials Specialist
Alameda County Health Care Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: *Abandonment of Vapor Extraction Well AV-3 and Air Sparging Wells AS-5 and AS-8*
ARCO 5387
20200 Hesperian Boulevard
Hayward, California
Delta Project No. D000-318

Dear Mr. Gholami:

Delta Environmental Consultants, Inc. (Delta) has been authorized by Atlantic Richfield Company to prepare a report summarizing the well abandonment activities at the subject site. The location of the site is presented on Figure 1 and a site map illustrating on-site features is shown on Figure 2. This report summarizes the well abandonment activities conducted on January 31, 2002 at the subject site. The well abandonment workplan was detailed in Delta's report entitled *Necessary Abandonment of Vapor Extraction Well AV-3 and Air Sparging Wells AS-5 and AS-8 due to Tank Pull and Replacement and Quarterly Monitoring Results for First Quarter 2002*, dated January 25, 2002. A copy of the well abandonment permits is included in Enclosure A.

Well Abandonment and Removal

On January 31, 2002, Delta supervised the abandonment of air sparging wells AS-5 and AS-8, and the removal of vapor extraction well AV-3. In an effort to protect the groundwater integrity from on-going site excavation activities, which had damaged air sparging wells AS-3 and AS-8 prior to their abandonment and limited vehicle site accessibility, the wells had to be gravity pressure grouted. Based on the depths of the wells, gravity pressures at the base of the well screens ranged from approximately 30 to 35 pounds per square inch. The volume of grout used for each well was approximately 2 cubic feet. The calculated required volumes of grout to completely fill the well casings and sand packs of AS-3 and AS-8 were calculated to be 1.37 and 1.30 cubic feet, respectively. Since the volume of grout used per well exceeded the calculated required volumes, the data indicates that the wells were adequately sealed and abandoned. Table 1 presents the calculated grout volumes required to abandon the wells. Vapor extraction well AV-3 was completely removed by excavation due to its shallow depth. The areas in which the abandoned wells resided were subsequently excavated down to a minimum of 5 feet for the purpose of future construction activities. The abandoned well locations are presented on Figure 2.

Remarks/Signatures

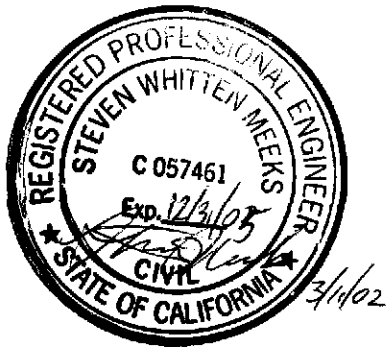
The interpretation contained in this document represent our professional opinions and are based, in part, on information supplied by the client. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydro-geologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

If you have any questions regarding this project, please contact Steven W. Meeks at (916) 536-2613.

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Brett Bardsley
Staff Geologist

Steven W. Meeks, P.E.
Project Manager
California Registered Civil Engineer No. C057461



BAB (Lrp004.318)
Enclosure

Cc: Paul Supple – Atlantic Richfield Company
Chuck Headlee – Regional Water Quality Control Board, San Francisco Bay Region

TABLE 1

THEORETICAL CALCULATED GROUT VOLUMES REQUIRED

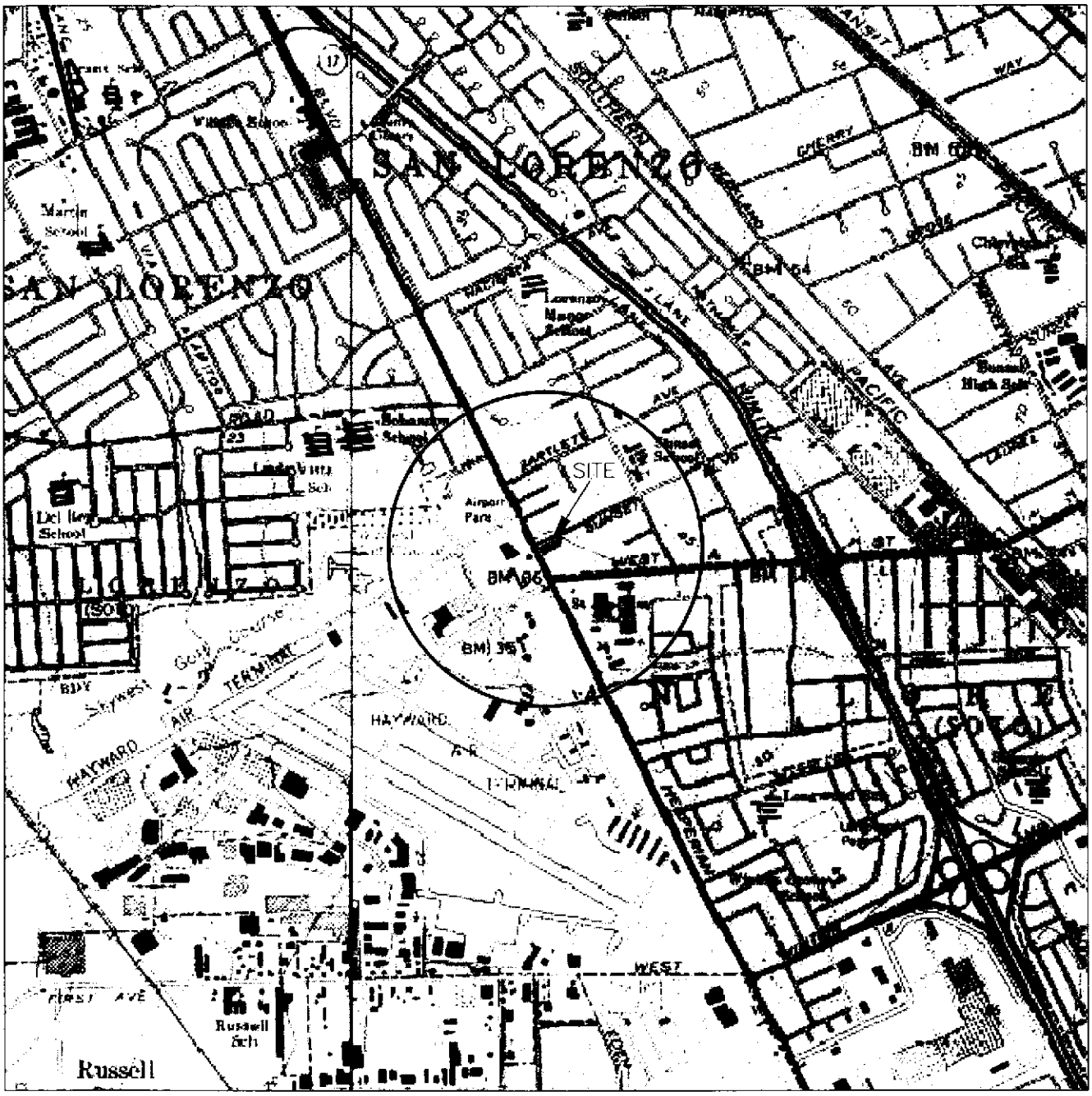
ARCO Service Station No. 5387
20200 Hesperian Blvd. Hayward,California

Well ID	Bore Radius (Feet)	Casing Radius (Feet)	Filter Pack Length (Feet)	Casing Length (Feet)	Sand Pack Porosity	Fractional Loss of Voids	Volume of Voids in Sand Pack (Feet^3) π(Filter Pack Length)[(Bore Radius)^2- (Casing Radius)^2](Sand Pack Porosity)(1 - Fractional Loss of Voids)	Well Casing Volume[A] (Feet^3) π(Radius)(Well Casing Length)	Calculated Volume of Grout Required (Feet^3) (Volume of Voids in Sand Pack) + (Well Casing Volume)
AS-3	0.333	0.086	6.00	34.00	0.30	0.02	0.57	0.79	1.37
AS-8	0.333	0.086	6.00	31.00	0.30	0.02	0.57	0.72	1.30
		Total Volume (feet^3) =					1.15	1.51	2.66

Total Calculated Grout Volume Required =	2.66
Actual Total Grout Volume Used[B]=	4.00
Total Amount of Grout Pushed into Formation =	1.34

π = 3.14159
Filter Pack Length = distance from the top of filter pack to bottom of well (typically 1 foot longer than screen).
Well Casing Length = distance from top of casing to bottom of casing.
Fractional Loss of Voids = The loss of voids in the sand pack through natural incrustation and siltation - assumed to be 0% range from 0% in vapor extraction wells up to 5% in ground water monitoring wells (assumed to be 2% for air sparging wells).

[A] Well casing volumes are based on casing being filled up to the top
[B] Assumes 1 sack of cement = 1 foot^3 - Total number of sacks used was recorded in the field by Delta personel.



North

GENERAL NOTES:
BASE MAP FROM U.S.G.S.
SAN LEANDRO & HAYWARD, CA.
7.5 MINUTE TOPOGRAPHIC
PHOTOREVISED 1980

QUADRANGLE LOCATION

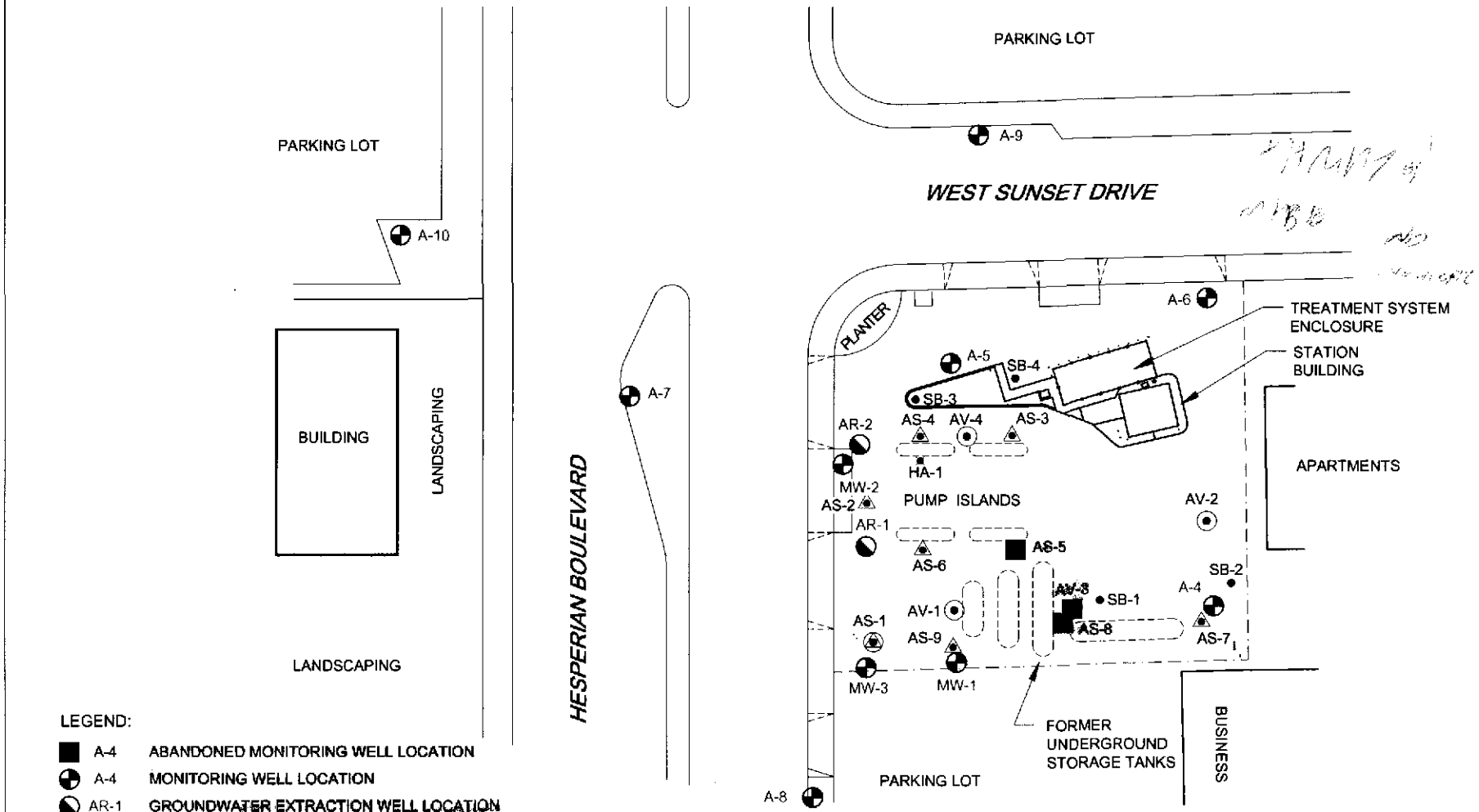
0 2000 FT

SCALE 1:24,000

FIGURE 1
SITE TOPOGRAPHIC MAP
ARCO SERVICE STATION NO. 05387
20200 HESPERIAN BOULEVARD
HAYWARD, CA.

PROJECT NO. D000-318	DRAWN BY M.L. 8/8/00
FILE NO. D000318A	PREPARED BY JWS
REVISION NO. 1	REVIEWED BY

Delta Environmental Consultants, Inc.



LEGEND:

■	A-4	ABANDONED MONITORING WELL LOCATION
◓	A-4	MONITORING WELL LOCATION
◔	AR-1	GROUNDWATER EXTRACTION WELL LOCATION
⊙	AV-1	SOIL VAPOR EXTRACTION WELL LOCATION
△	AS-2	AIR SPARGE WELL LOCATION
◈	AS-1	DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION
✱	HA-1	AIR SPARGE WELL LOCATION
•	SB-3	DUAL AIR SPARGE/SOIL VAPOR EXTRACTION WELL LOCATION

NOTE: SITE MAP ADAPTED FROM IT CORPORATION FIGURES.
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

North

0 50 FT

SCALE

FIGURE 2
SITE MAP

ARCO SERVICE STATION NO. 5387
20200 HESPERIAN BOULEVARD
HAYWARD, CALIFORNIA

PROJECT NO. D000-318	DRAWN BY TLA 2/22/02
FILE NO. 5387-1	PREPARED BY TLA
REVISION NO. 3	REVIEWED BY

Delta Environmental Consultants, Inc.

ENCLOSURE A

Copy of Well Abandonment Permits

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 ELMHURST ST. HAYWARD CA. 94544-1395
PHONE (510) 670-5554
FAX (510)782-1939

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT
ARCO Service Station No. 05397
20200 Hesperian Boulevard
Hayward, California

CLIENT
Name Atlantic Richfield Company
Address P.O. Box 6549 Phone
City Moraga, California Zip 94570

APPLICANT
Name Delta Environmental Consultants, Inc.
Fax (916) 638-8395
Address 3164 Gold Camp Dr. #200 Phone (916) 638-2164
City Rancho Cordova Zip 95670

FOR OFFICE USE
PERMIT NUMBER W02-0050
WELL NUMBER
APN

TYPE OF PROJECT
Well Construction
Cathodic Protection
Water Supply
Monitoring
Geotechnical Investigation
General
Contamination
Well Destruction ✓

PROPOSED WATER SUPPLY WELL USE
New Domestic
Municipal
Industrial
Replacement Domestic
Irrigation
Other

DRILLING METHOD:
Mud Rotary
Cable
Air Rotary
Other
Auger

DRILLER'S NAME Cascade Drilling
DRILLER'S LICENSE NO. C57 #717510

WELL PROJECTS
Drill Hole Diameter ____ in.
Casing Diameter ____ in.
Surface Seal Depth ____ ft.
Maximum Depth 13.70 ft.
Owner's Well Number AV-3
Soil Vapor Extraction Well

GEOTECHNICAL PROJECTS
Number of Borings
Hole Diameter ____ in.
Maximum Depth ____ ft.

ESTIMATED STARTING DATE 1/31/02
ESTIMATED COMPLETION DATE 1/31/02

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Brett Bardsley DATE 1/23/02
PLEASE PRINT NAME Brett Bardsley

Rev. 5-13-00

PERMIT CONDITIONS
Circled Permit Requirements Apply

A. GENERAL
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
2. Submit to ACPWA within 60 days after completion of permitted original Department of Water Resources-Well Completion Report.
3. Permit is void if project not begun within 90 days of approval date

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. GEOTECHNICAL
Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings.

E. CATHODIC
Fill hole anode zone with concrete placed by tremie.

F. WELL DESTRUCTION
Send a map of work site. A separate permit is required for wells deeper than 45 feet.

G. SPECIAL CONDITIONS

NOTE: One application must be submitted for each well or well destruction. Multiple borings on one application are acceptable for geotechnical and contamination investigations.

Excavate and replace in kind to existing condition.

APPROVED [signature] DATE 1-24-02

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 ELMHURST ST. HAYWARD CA. 94544-1395
PHONE (510) 670-5554
FAX (510)782-1939

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT
ARCO Service Station No. 05387
20200 Hesperian Boulevard
Hayward, California

CLIENT
Name Atlantic Richfield Company
Address P.O. Box 6549 Phone
City Moraga, California Zip 94570

APPLICANT
Name Delta Environmental Consultants, Inc.
3164 Gold Camp Dr. #200 Fax (916) 639-9385
Address Phone (916) 638-2164
City Rancho Cordova Zip 95670

TYPE OF PROJECT
Well Construction — Geotechnical Investigation
Cathodic Protection — General
Water Supply — Contamination
Monitoring — Well Destruction ✓

PROPOSED WATER SUPPLY WELL USE
New Domestic — Replacement Domestic
Municipal — Irrigation
Industrial — Other

DRILLING METHOD:
Mud Rotary — Air Rotary — Auger
Cable — Other

DRILLER'S NAME Cascade Drilling
DRILLER'S LICENSE NO. C57 # 717516

WELL PROJECTS
Drill Hole Diameter ____ in. Maximum
Casing Diameter ____ in. Depth 33.79
Surface Seal Depth ____ ft. Owner's Well Number AS-5
Air Sparge Well

GEOTECHNICAL PROJECTS
Number of Borings ____ Maximum
Hole Diameter ____ in. Depth ____ ft.

ESTIMATED STARTING DATE 1/31/02
ESTIMATED COMPLETION DATE 1/31/02

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Brett Bardsley DATE 1/23/02
PLEASE PRINT NAME Brett Bardsley

FOR OFFICE USE

PERMIT NUMBER W02-0052
WELL NUMBER
APN

PERMIT CONDITIONS
Circled Permit Requirements Apply

A. GENERAL
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
2. Submit to ACPWA within 60 days after completion of permitted original Department of Water Resources-Well Completion Report.
3. Permit is void if project not begun within 90 days of approval date

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→ pressure grout

APPROVED [signature] DATE 1-24-02

Rev. 5-13-00