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DATE: January 29, 1993
PROJECT NUMBER: 60026.05
SUBJECT: ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California

FROM: Robert Campbell
TITLE: Staff Geologist

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REMARKS:

As requested by ARCO (Mr. Michael Whelan), copies of this Additional Subsurface Investigation and Interim Remediation Report have been forwarded to you for your review.

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ADDITIONAL SUBSURFACE INVESTIGATION AND INTERIM REMEDIATION

at

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

60026.05

Report prepared for
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January 29, 1993

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ADDITIONAL SUBSURFACE INVESTIGATION AND INTERIM REMEDIATION
at
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

For ARCO Products Company

INTRODUCTION

At the request of ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) performed an additional onsite and offsite subsurface environmental investigation and initiated onsite vapor extraction as a means of interim remediation at ARCO Station 276, located at 10600 MacArthur Boulevard in Oakland, California. This investigation was initiated in response to an Alameda County Health Care Services Agency (ACHCSA) request to accelerate the ongoing onsite and offsite investigation and initiate interim remediation (as necessary) at the site. The purpose of the subsurface investigation was to evaluate further the lateral and vertical extents of gasoline and waste-oil hydrocarbons in the soil and groundwater in the area of the former underground storage tanks and offsite to the southeast; evaluate a possible offsite and upgradient source of solvents in groundwater; and to provide additional extraction points for use in the existing vapor extraction system as a means of interim remediation at the site.

Work performed for this investigation included gaining offsite access; submitting and receiving a well drilling permit from Alameda County Flood Control and Water Conservation District, Zone 7 (ACFCWCD); drilling two offsite and eight onsite soil borings (B-10 through B-19); collecting and describing soil samples from the borings; installing and developing two offsite 2-inch diameter monitoring wells (MW-6 and MW-7) in borings B-10 and B-11, one onsite 4-inch diameter groundwater monitoring well (MW-8) in boring B-12, and seven onsite 4-inch diameter vapor extraction wells (VW-1 through VW-7) in borings

B-13 through B-19; submitting selected soil samples for laboratory analyses; surveying the wells to a local Geodetic Datum; completing installation of the site vapor extraction system; performing a one-day vapor extraction test (VET); and preparing this report presenting field procedures, results and conclusions. This work was performed as outlined in the RESNA/Applied GeoSystems (AGS) Work Plan and Addendum One to Work Plan (RESNA/AGS, June 27, 1991), and Addendum Four to Work Plan (RESNA, April 16, 1992).

SITE DESCRIPTION AND BACKGROUND

General

ARCO Station 276 is located at the southeastern corner of the intersection of MacArthur Boulevard and 106th Avenue in Oakland, California, as shown on Plate 1, Site Vicinity Map. Immediately adjacent to and southeast of the station property is the Foothill Square Shopping Center parking lot. Several commercial business are located in the Foothill Square Shopping Center, including a grocery store, coin laundry, dry cleaners, drug store, offices, and another service station at Foothill Boulevard and 108th Avenue. Private residences are north and northeast of the service station. The schematic layout of the service station and the offsite area showing soil boring locations is presented on Plate 2, Generalized Site and Area Plan.

Four underground gasoline-storage tanks (T-1 through T-4) are present in the western portion of the site. These tanks replaced four former gasoline-storage tanks (FT-1 through FT-4) which were located in the southern portion of the site. The former waste-oil tank was removed from its location adjacent to the northeastern wall of the station building in 1988. The locations of the former tanks, existing tanks and other pertinent site features are shown on Plate 2.

Regional Geology and Hydrogeology

The site is located within the East Bay Plain which is situated in the San Francisco Bay depression that is in part an irregular downward block bordered by faulting principally along northwest trending faults (Alameda County Flood Control and Water Conservation District, June 1988). The site is at an elevation of approximately 55 feet above mean sea level (msl) and is approximately ½-mile west of the Hayward Fault Zone. The subsurface soils in the vicinity of the site consist of highly permeable Pleistocene alluvium composed of poorly consolidated to unconsolidated clay, silt, sand, and gravel. The alluvium was derived mainly from the Diablo Range and represents coalescing alluvial fans (Alameda County Flood Control and Water Conservation District, June 1988). Groundwater flow direction in the area is generally inferred to be to the west toward San Francisco Bay, but may have components to the north and east due to recharge areas along the Hayward Fault.

Previous Environmental Work

Previous subsurface environmental investigations which were performed at and near the site are summarized in Appendix A.

FIELD WORK

Drilling

Field work was conducted in accordance with the Site Safety Plan (RESNA, May 27, 1992). A description of the field methods is included in Appendix B, Field Methods. A well construction permit was acquired from the ACFCWCD prior to drilling onsite and offsite borings B-10 through B-19. A copy of the permit is included in Appendix C of this report. Locations of borings/wells are shown on Plate 2, Generalized Site and Area Plan. Prior to drilling offsite borings B-10 and B-11, offsite access was granted from the adjacent private property owners. Offsite soil borings B-10 and B-11 were drilled on June 16, 1992, and were completed as 2-inch diameter groundwater monitoring wells MW-6 and MW-7. Onsite borings B-12 through B-19 were drilled on July 15 through July 17, 1992. Boring B-12 was

completed as 4-inch diameter groundwater monitoring well MW-8 and borings B-13 through B-19 were completed as 4-inch diameter vapor extraction wells VW-1 through VW-7.

Borings B-10 and B-11 were drilled offsite in the Foothill Square Shopping Center parking lot southeast of the subject site to evaluate the presence of gasoline hydrocarbons and halogenated volatile organic compounds (VOCs) in soil and groundwater upgradient from the subject site. Approximately 3 cubic yards of soil was generated during the drilling of offsite borings B-10 and B-11 and was temporarily stored onsite on asphalt and covered with visqueen pending proper disposal.

Borings B-12 through B-19 were drilled onsite in the immediate vicinity of the former USTs and near the southwestern service island. (Boring numbers 7 through 11 have not been drilled due to changes in plans). Boring B-12 was completed as well MW-8 to evaluate the extent of gasoline hydrocarbons in the soil and groundwater cross-gradient from the former USTs. Borings B-13 through B-19 were drilled and completed as vapor extraction wells VW-1 through VW-7 to evaluate further the source area(s), the vertical and horizontal extent of hydrocarbons, potential subsurface pathways beneath the site, and the efficiency and practicality of vapor extraction as an interim soil remediation alternative. Approximately 10 cubic yards of soil was generated during the drilling and installation of onsite well B-12/MW-8 and onsite vapor extraction wells B-13/VW-1 through B-19/VW-7. The soil was separated into two stockpiles based on field measurements with an organic vapor meter (OVM), which provided a qualitative field measurement of organic content. Soil stockpile SP-1 consisted of approximately 6 cubic yards which indicated OVM concentrations less than 100 ppm, while SP-2 consisted approximately 4 cubic yards which indicated OVM concentrations greater than 100 ppm. Both soil stockpiles were temporarily stored onsite on asphalt and covered with visqueen.

Soil Sampling and Description

Soil samples were collected from the soil borings and described in accordance with the Unified Soil Classification System as shown on Plate 3. Borings B-10 through B-19 were sampled at 5-foot intervals from ground surface to the total depths of approximately 20 to

60 feet. Sampling procedures utilized to perform this field work are described in Appendix B.

Field measurements of organic vapors from selected soil samples collected from the borings were obtained using an OVM. OVM readings are shown on the boring logs, Plates 4 through 17, in the column labeled PID (Photoionization Detector). OVM measurements ranged from 0 to 1850 parts per million (ppm) with the highest readings in onsite borings B-13 through B-18, in samples collected just above the perched water zone.

Materials encountered during drilling consisted primarily of silty clay to clayey silt, and silty sand to sandy gravel, as shown on the boring logs, Plates 4 through 17. Geologic cross-sections showing interpreted soil stratigraphic correlations are presented on Plates 18 through 20. Locations of the geologic cross-sections are shown on Plate 2. The correlations are based upon subsurface geologic information collected from the soil borings drilled during this investigation and from previous investigations performed at and near this site. Silty clay to clayey silt interbedded with silty sand to sandy was encountered in borings from 0 to approximately 4 and 28 feet below ground surface. Beneath this silty clay to clayey silt, silty sand to sandy gravel with some clay interbeds was encountered to approximately 61 feet deep.

Groundwater was encountered at two different levels on and offsite. Groundwater was first encountered in offsite boring B-11 and onsite borings B-13 through B-19 at depths of 18 to 23 feet in strata varying from sandy gravel to silty clay. This groundwater is correlative with groundwater encountered previously in borings for MW-2 and MW-3 (by Western Geologic Resources, Inc.), and may be a local, unconfined perched water-bearing zone in the southern and western portion of the site area. Groundwater was first encountered in offsite boring B-10 and in onsite boring B-12 at depths of 40 and 32 feet in sand to gravelly sand. This groundwater is correlative with groundwater encountered previously in borings for wells MW-1, MW-3 through MW-5, and RW-1 (and for wells MW-6 during the present investigation), and appears to be under unconfined to semi-confined conditions. The gravelly to sandy clay interbed encountered at approximately 50 feet in borings B-4 and B-6

in the eastern portion of the site may be functioning as a local perching or confining layer beneath this deeper water-bearing zone.

Groundwater Monitoring Well Construction

Groundwater monitoring wells MW-6 through MW-8 were constructed in borings B-10 through B-12, respectively, using schedule 40, polyvinyl chloride (PVC) casing and screened casing. Offsite monitoring wells MW-6 and MW-7 were completed as 2-inch diameter wells, and onsite well MW-8 was completed as a 4-inch diameter well. Well MW-6 was set to an approximate depth of 56 feet with 0.020-inch machine-slotted PVC casing from 37½ to 56 feet, and well MW-8 was set to an approximate depth of 49 feet with 0.020-inch machine slotted PVC casing from 29 to 49 feet; both of these wells are screened in the deeper water-bearing zone. Well MW-7 was set to a depth of approximately 37½ feet with 0.020-inch machine slotted PVC casing from 17½ to 37½ feet, in the shallow water-bearing zone. Monterey Sand #3 was used as filter pack material installed in the annulus of each well to approximately 2 feet above the top of the well screen. Blank PVC casing was set from the top of the screened casing to within a few inches below the ground surface. Plates 4 through 10 illustrate groundwater monitoring well construction details.

Vapor Extraction Well Construction

Soil borings B-13 through B-19 were completed as vapor extraction wells designated as VW-1 through VW-7, respectively, using 4-inch diameter schedule 40, PVC casing. Vapor extraction well casings were set directly above first-encountered groundwater in the shallow water-bearing zone (total depths of approximately 18 to 21½ feet). Vapor extraction wells VW-2, VW-3, and VW-5 were constructed with 0.010-inch screened casing from 8 to 18 feet below ground surface, VW-1 and VW-7 were constructed with screened casing from 7½ to 17½ feet below ground surface and VW-4 and VW-6 were constructed with screened casing from 9 to 19 and 9 to 18 feet below ground surface, respectively. Three-eighths-inch diameter washed pea gravel was installed in the annulus of each well to about 1 to 2 feet above the top of the well screen. Blank casing was set from the top of the screened casing

and completed to within a few inches below ground surface. Details of vapor-extraction well construction are shown on Plates 11 through 17.

Groundwater Monitoring Well Development

Groundwater monitoring wells MW-6 and MW-7 were developed on June 24, 1992 by surge block and bailing techniques, and by pumping techniques until water being removed from the wells was found to be relatively free of sediments. The turbidity in each of the wells remained above 200 NTUs (nephelometric turbidity units) and recharge to offsite wells MW-6 and MW-7 was slow. Well MW-8 showed low recharge rates and was developed twice (July 31 and August 7, 1992) by hand surge and bail techniques. MW-8 was bailed dry after 3 gallons were purged from the well during both development episodes. The turbidity of this well remained above 200 NTUs after each development. Field procedures used by RESNA for well development are included in Appendix B.

Surveying

On August 18, 1992 the wellheads for the groundwater and vapor extraction wells were surveyed to a local National Geodetic Vertical Datum benchmark by John Koch Surveyors of Oakland, California, a licensed land surveyor. The results of this survey are included in Appendix D.

Vapor Extraction System (VES) Installation

Installation of the VES was performed by Aronson Associates, a State-licensed contractor, in accordance with the Site Safety Plan (RESNA, May 27, 1992). After the vapor extraction wells were installed. trenching for installation of the subgrade piping was performed during July and August 1992. The locations of the trenches and subgrade piping are shown on Plate 21, VES Schematic. Two 2-inch diameter and two 4-inch diameter schedule 40 PVC casings were placed in the trenches which extended to vapor extraction wells VW-1 through VW-7 and monitoring wells MW-2 and MW-8, and recovery well RW-1. The two 4-inch diameter pipes are to be used for vapor extraction and possible groundwater extraction

conduits at the site. The two 2-inch diameter pipes are to be used for electrical and air hose conduits for possible groundwater extraction at the site. The wellheads from MW-2, MW-8, RW-1, and VW-1 through VW-7 were lowered and 3 X 3 X 3 foot remediation boxes, covered with 36 X 36 X ¼-inch steel, traffic rated wellhead lids, were installed over the subject wellheads after piping activities were completed. The 2-inch and 4-inch diameter conduits were piped into the onsite remediation compound for the existing remediation system, in order to allow connection with the existing blower and Catox unit at the subject site. This previously existing system was installed in the adjacent Foothill Square Shopping Center parking lot for ARCO by Pacific Environmental Group (PEG) in 1989.

During trenching activities, a RESNA Field Technician equipped with an OVM followed directly behind the excavator and screened soil removed from the trenches for the presence of gasoline hydrocarbons. Soil that indicated detectable amounts of hydrocarbons was temporarily placed in portable storage bins. Soil which indicated nondetectable concentrations of hydrocarbon vapors by the OVM was used as backfill in the trenches. Approximately 55 cubic yards of soil was generated during trenching for subgrade VES piping, of which approximately 45 yards was stored temporarily onsite pending disposal, and 10 cubic yards was used as backfill material.

not proper

During subgrade VES piping installation in August 1992, the Horner EZY Floating Product Skimmer was removed from well MW-2. This was done when this well was connected to the VES.

Soil Stockpile Sampling

Four soil samples were collected from the drill cutting stockpile generated during drilling of offsite borings B-10 and B-11 on June 16, 1992. Four soil samples were collected from each of the two drill cutting stockpiles (SP-1 and SP-2) generated during drilling onsite borings B-12 through B-19 on July 17, 1992. Four soil samples were collected from soil placed in the portable storage bins during VES installation activities. These samples were collected for analysis prior to disposal of the soil stockpiles at a Class III landfill. A description of the soil sample collection protocol is included in Appendix B.

Vapor Extraction Test (VET)

RESNA performed a one-day onsite VET on August 24, 1992, to collect site-specific data and evaluate the performance of the VES. The VET had three main objectives: (1) to evaluate the vapor flow rates that can be extracted from the vapor extraction wells; (2) to evaluate the hydrocarbon concentrations of extracted vapors; and (3) to estimate an effective radius of influence for the vapor extraction wells.

VET Equipment and Protocol

Eight onsite vapor extraction wells (VW-1 through VW-7) and MW-2 were evaluated during the VET. The eight wells were connected with subsurface piping to an existing 1.5 horsepower (hp) Rotron blower rated at a maximum 125 standard cubic feet per minute (scfm). Extracted vapors were directed to an existing 500 scfm Anguil Catalytic Oxidation (Catox) unit for abatement. This Catox operates under an existing permit from the Bay Area Air Quality Management District (BAAQMD). Each well was equipped with a vacuum gauge, sample port, and a ball valve to adjust airflow from the wells. Other equipment used during the VET included instrumentation for measuring air velocity, air pressure, temperature, and organic vapor concentrations.

Vacuum was applied to the wells using the 1.5 hp blower. The VET was conducted in three phases. Eight short-term 30 to 60-minute duration tests were first performed using VW-1 through VW-7 and MW-2 separately as extraction wells to collect radius of influence data and representative influent vapor samples from each well. A second 60-minute short-term test was conducted with the wells operating simultaneously to evaluate if the 1.5 hp Rotron blower was limiting air flow from the subsurface soils. An 18.5-hour long-term test was then performed on wells VW-3 and VW-4 to observe changes in radius of influence measurements, air flow, and extracted hydrocarbon vapor concentrations over an extended period of time. Upon completion of the 18.5-hour VET, the VES was left operational with only wells VW-3 and VW-4 opened for vapor extraction. The offsite vapor extraction points installed by PEG in 1989 were shut off during the VET.

Short-Term VET

Prior to the start of the short-term testing, depth-to-water was measured in onsite monitoring wells MW-1 through MW-5, MW-8 and RW-1, and offsite well MW-7. Monitoring well MW-6 could not be located at the time of the VET because it had been recently paved over. Vacuum was applied to each well (VW-1 through VW-7, and MW-2) separately by opening the ball valve at each well and closing the valves to the other wells. The 1.5 hp Rotron blower and Catox were operated on each well for at least 30 minutes at the highest flowrate sustainable. Vapor samples were then collected from a sample port on the influent side of the blower (prior to fresh air dilution) using a sample pump and mylar sample bags (see Air Sampling, below). Induced air flowrates were measured from each well using a pitot tube velocity-meter installed within a 3-inch PVC pipe connecting the blower and the Catox unit. Applied vacuum at the wellhead was measured using a magnehelic pressure gauge placed at the wellhead. Extracted vapors were screened for percent oxygen and organic vapor concentrations using a combination oxygen meter and Lower Explosive Limit (LEL) meter calibrated to methane. Throughout each short term test, induced vacuum at nearby observation wells was monitored with a magnehelic pressure gauge as a secondary indicator of subsurface airflow. At the end of each short term test, the well was subjected to different applied vacuums and the resulting extracted air flow rates were measured to evaluate well characteristics. Other field data collected during this short-term VET included air temperature and pressure at the blower outlet, inlet and outlet temperature of the Catox, percent LEL of extracted vapor to the Catox unit after fresh air dilution, and natural gas consumption rate from the gas meter. The short-term tests were conducted in the following order: VW-7, VW-2, VW-3, VW-6, VW-1, VW-4, MW-2, and VW-5.

A second short-term test of 60 minutes duration was conducted with wells VW-1 through VW-7 and MW-2 operating simultaneously to evaluate if the existing 1.5 hp Rotron blower was limiting the volume of air that could be extracted from the wells. During this short-term test, field data collected included: total air flowrate from the wells, applied and induced vacuum at each wellhead, total applied vacuum at the blower inlet; and other data

detailed above. In addition, an air sample was collected from the combined extracted vapor stream influent to the blower (prior to fresh air dilution) for laboratory analyses.

Long-Term VET

For the long-term test, the blower and Catox unit were operated on vapor wells VW-3 and VW-4 for 18.5 hours. These wells were chosen due to their relatively elevated LEL readings and reasonably high flow rates. Induced vacuum was measured from observation wells VW-1, VW-2, VW-5 through VW-7, and MW-2 after 20 minutes, 50 minutes, 60 minutes, and 1,110 minutes of operation. Applied wellhead vacuum, air flow rate, percent oxygen content, and organic vapor concentrations of the extracted vapor was also monitored periodically. Combined air samples from wells VW-3 and VW-4 were collected from the blower inlet after 50 minutes and 1,100 minutes of operation.

During the long-term test, air samples were also collected influent to the blower with wells VW-3 and VW-4 in operation for laboratory analyses to determine organic lead content. Prior to collecting samples, the air flow to the sample pump was adjusted to 2.5 cubic feet per hour using a lab cock valve and an in-line flow meter. The ends of the charcoal-filled glass sampling tube were clipped off and the tube was placed between two Tygon-type tubes and sealed with duct tape. The charcoal filter was left in place for a sample time of 17 minutes. As requested by the laboratory, three duplicate sets of charcoal-filled tubes were collected for analysis. The charcoal-filled tubes were capped, labeled, and sent to a State Certified analytical laboratory under Chain of Custody documentation.

ANALYTICAL METHODS

Soil Samples

The ninety-one soil samples collected from soil borings B-10 through B-19 were submitted under Chain of Custody Record to Sequoia Analytical, a state-certified laboratory (Certification No. 1210) located in Redwood City, California. The Chain of Custody

Records are attached in Appendix E. Selected soil samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency (EPA) Methods 5030/8020, and total petroleum hydrocarbons as gasoline (TPHg) using EPA Methods 5030/8015. Selected offsite soil samples, and the deepest onsite soil sample, were analyzed for halogenated volatile organic compounds (VOCs) using EPA Method 8240. Selected soil samples collected from borings B-10 and B-11 were also analyzed by Sequoia Analytical for particle size distribution by weight (sieve analysis) to evaluate the feasibility of installing a future offsite recovery well in the first encountered water-bearing zone.

The soil samples selected for laboratory analysis were based on :

- location above first-encountered groundwater;
- areas where the presence of gasoline hydrocarbons were suspected; and
- areas where the presence of halogenated volatile organic compounds were suspected.

Soil Stockpile Samples

The four soil samples (CSP 1-4 Composite) collected from the drill cuttings stockpile generated during drilling of offsite borings B-10 and B-11 were submitted under Chain of Custody Record to Sequoia Analytical, a state-certified laboratory (Certification No. 1210) in Redwood City, California, composited in the laboratory, and analyzed for total petroleum fuel hydrocarbons with BTEX distinction using EPA Methods 5030/8015/8020, and VOCs using EPA Method 8240. The two sets of four soil samples (S-0717-SP1 A-D Comp. and S-0717-SP2 Comp.) collected from the two soil stockpiles generated during drilling of onsite borings B-12 through B-19 were submitted under Chain of Custody Record to Sequoia Analytical, composited in the laboratory, and analyzed for total petroleum fuel hydrocarbons with BTEX distinction using EPA Methods 5030/8015/8020. The four soil samples (S-0722 A-D Comp.) collected from the stockpile generated during trenching for installation of VES piping were submitted under Chain of Custody Record to Sequoia Analytical, composited in the laboratory, and analyzed for total purgeable petroleum hydrocarbons with BTEX distinction using EPA Methods 5030, 8015, 8020; toxicity characteristic leaching procedure (TCLP) for BTEX, total threshold limit concentration (TTLC) for TPHg, soluble threshold

limit concentration (STLC) for lead, pH, flashpoint and reactive sulfides and cyanides as per landfill requirements prior to soils being accepted to a local Class III landfill. Chain of Custody Records are attached in Appendix E.

Air Samples

Air samples collected in mylar bags during the VET were delivered with Chain of Custody Records to GTEL, a State-certified laboratory (certification no. 058), of Concord, California, and analyzed for total petroleum hydrocarbons as gasoline (TPHg) using modified Environmental Protection Agency (EPA) Method 8015, for BTEX using EPA Method 8020, and VOCs using EPA Method 8240. Charcoal air-sampling tubes for lead analyses were sent to BC Analytical, a State-certified laboratory (certification no. 1353) of Emeryville, California, and analyzed for lead using EPA Method 7420/7421.

FIELD WORK RESULTS

Groundwater Gradient Evaluation

Measuring depth-to-water (DTW) in the monitoring wells, and evaluating the groundwater gradient, were accomplished during previous quarterly groundwater monitoring. Cumulative DTW measurements, wellhead elevations, and groundwater elevations are presented in Table 1. The Groundwater Gradient Maps for the four most recent DTW measurements are reproduced and modified from previous reports on Plates 22 through 25. The groundwater gradients interpreted from the data collected during the four recent measuring events fluctuated between 0.002 to 0.11, and the groundwater flow direction was toward the north-northwest, with the exception of the September 9, 1992 gradient, in which the flow direction was toward the north-northeast. The groundwater gradient estimates for the onsite wells produced results which ranged from 0.002 to 0.08 and are consistent with previously interpreted groundwater gradients. Offsite well MW-7 and onsite well MW-2 were constructed in the shallow water-bearing zone and therefore not used in groundwater elevation calculations or to evaluate groundwater flow directions.

Vapor-Extraction Test Field Results

VET Air Flow Rate Measurements

Vacuum and air flow rate data collected during the VET are summarized in Table 2, Vapor Extraction Test Field Monitoring Data. Other operational data collected is summarized in Table 3, Operating Conditions of Catox and Blower during VET. Using the existing 1.5 hp Rotron blower, air flow rates ranging from 38 to 90 standard cubic feet per minute (scfm) per well were observed at applied wellhead vacuums of 10 to 56 inches water column (inches. W.C.). The highest air flow rate (90 scfm) was observed from well VW-1 at an applied vacuum of only 10 inches W.C. The lowest air flow rate (3 scfm) was observed in well VW-6 at an applied vacuum of 56 inches W.C.

VET Radius of Influence Measurements

Induced vacuum data collected during the VET is summarized in Table 2. For extraction well vacuums of 10 to 56 inches W.C., induced vacuum readings at the observation wells ranged from less than 0.01 to a high of 1.8 inches W.C. Upon performing the VET on vapor extraction wells VW-1 through VW-7 (screened above the shallow perched water-bearing zone), and groundwater monitoring wells MW-2 (screened in the shallow water-bearing zone), no vacuum influence was observed in observation well MW-8, because it is screened in the deeper water-bearing zone, 29 to 49 feet.

During the short-term (40 minute) testing on well VW-1, induced vacuum was monitored from the remaining seven vapor extraction (VW-2 through VW-7) wells and groundwater monitoring wells MW-2 and MW-8, located 13 to 75 feet away. At an applied vacuum of 10 inches WC and a well-head air flow rate of 90 scfm, induced vacuum measurements at the observation wells ranged from 0.02 to 1.5 inches WC. The high induced vacuum response in VW-6 (3.4 inches WC), located 75 feet away may be attributable to the residual applied vacuum on VW-6, since the short-term VET on VW-1 was performed after it was performed on VW-6

During the short-term (70 minute) testing on well VW-2, induced vacuum was monitored from the remaining seven vapor extraction wells (VW-1, VW-3 through VW-7) and groundwater monitoring wells MW-2 and MW-8, located 18 to 74 feet away. At an applied vacuum of 55 inches WC and a well-head air flow rate of 38 scfm, induced vacuum measurements at the observation wells ranged from 0.02 to 0.4 inches WC.

During the short-term (50 minute) testing on well VW-3, induced vacuum was monitored from the remaining seven vapor extraction wells (VW-1, VW-2, VW-4 through VW-7) and groundwater monitoring wells MW-2 and MW-8, located 16 to 48.5 feet away. At an applied vacuum of 33 inches WC and a well-head air flow rate of 70 scfm, induced vacuum measurements at the observation wells ranged from 0.03 to 0.5 inches WC.

During the short-term (50 minute) testing on well VW-4, induced vacuum was monitored from the remaining seven vapor extraction wells (VW-1 through VW-3, VW-5 through VW-7) and groundwater monitoring wells MW-2 and MW-8, located 13 to 72 feet away. At an applied vacuum of 52 inches WC and a well-head air flow rate of 43 scfm, induced vacuum measurements at the observation wells ranged from 0.02 to 0.225 inches WC. The high induced vacuum response in VW-6 (3.4 inches WC), located 72 feet away is attributable to the residual applied vacuum on VW-6, since the short-term VET on VW-4 was performed after it was performed on VW-6.

During the short-term (45 minute) testing on well VW-5, induced vacuum was monitored from the remaining seven vapor extraction wells (VW-1, through VW-4, VW-6 and VW-7) and groundwater monitoring wells MW-2 and MW-8, located 16 to 45 feet away. At an applied vacuum of 40 inches WC and a well-head air flow rate of 61 scfm, induced vacuum measurements at the observation wells ranged from 0.10 to 1.8 inches WC. The high induced vacuum response in VW-6 (3.4 inches WC), located 72 feet away is attributable to the residual applied vacuum on VW-6, since the short-term VET on VW-5 was done after VW-6.

During the short-term (30 minute) testing on well VW-6, induced vacuum was monitored from the remaining seven vapor extraction wells (VW-1 through VW-5, and VW-7) and

groundwater monitoring wells MW-2 and MW-8, located 13 to 72 feet away. At an applied vacuum of 56 inches WC and a well-head air flow rate of 3 scfm, induced vacuum measurements at the observation wells ranged from 0.02 to 0.6 inches WC.

During the short-term (60 minute) testing on well VW-7, induced vacuum was monitored from the remaining seven vapor extraction wells (VW-1 through VW-6) and groundwater monitoring wells MW-2 and MW-8, located 15 to 61 feet away. At an applied vacuum of 38 inches WC and a well-head air flow rate of 56 scfm, induced vacuum measurements at the observation wells ranged from 0.03 to 0.72 inches WC.

During the short-term (45 minute) testing on well MW-2, induced vacuum was monitored from the remaining seven vapor extraction wells (VW-1 through VW-7) and groundwater monitoring well MW-8, located 22 to 60 feet away. At an applied vacuum of 19 inches WC and a well-head air flow rate of 83 scfm, induced vacuum measurements at the observation wells ranged from 0.04 to 0.95 inches WC. The high induced vacuum response in VW-6 (1.6 inches WC), located 40 feet away is attributable to the residual applied vacuum on VW-6, since the short-term VET on MW-2 was performed after it was performed on VW-6.

During the short-term (20 minute) testing with all the above wells operational, at an applied vacuum of 3 inches WC and a combined air flow rate of 90 scfm, induced vacuum measurements at the observation wells were measured to be an average of 3.1 inches WC.

During the long-term test (18.5 hours) with wells VW-3 and VW-4 operational, vacuum impact was measured using the remaining six vapor extraction wells (VW-1, 2, VW-5 through VW-7) and monitoring well MW-2 as the observation wells. At a total applied vacuum of 23 inches of WC and a combined air flow rate of 80 scfm, induced vacuum at the observation wells ranged from 0.12 to 2.3 inches WC.

ANALYTICAL RESULTS

Soil Analyses

Results of laboratory analyses of soil samples are summarized in Table 4, Cumulative Results of Laboratory Analyses of Soil Samples From Borings. Copies of laboratory reports and Chain of Custody documents for soil samples obtained during this investigation are included in Appendix E. Laboratory analyses of soil samples indicated nondetectable concentrations of TPHg and BTEX in samples collected from offsite boring B-10 and onsite borings B-13 and B-19. Laboratory analyses of soil samples collected from offsite boring B-11 and onsite borings B-12, B-14 through B-16, and B-18 indicated concentrations of TPHg ranging from nondetectable to 690 ppm, and concentrations of BTEX ranging from nondetectable to 92 ppm. The greatest concentrations of benzene (48 ppm), toluene (160 ppm), ethylbenzene (94 ppm), total xylenes (420 ppm), and TPHg (3,700 ppm) were detected in the sample collected from 18 feet below ground surface in onsite boring B-17. Soil laboratory analyses for VOCs indicated tertachloroethene (PCE) in the sample from offsite boring B-10 at 60½ feet (0.220 ppm); and BTEX in samples from offsite boring B-11 at concentrations ranging from nondetectable to 3 ppm. VOC analysis of the remaining samples from offsite boring B-10 and one sample from onsite boring B-12 indicated nondetectable concentrations of VOCs.

Soil samples collected from aquifer material in offsite boring B-10 at depths of 45, 50, and 55 feet below ground surface, and soil samples collected from offsite boring B-11 at depths of 24½, 29½, and 35 feet below ground surface indicated a silt to fine gravel soil type for samples collected from both borings. Particle Size Distribution Graphs for these samples are shown on Plates 26 and 27.

Soil Stockpile Analyses

Laboratory analysis of the composited soil samples collected from the stockpiled soil generated during drilling and trenching activities indicated nondetectable concentrations of VOCs, and concentrations of TPHg ranging from nondetectable to 94 ppm, benzene ranging

from nondetectable to 0.58 ppm, toluene ranging from nondetectable to 1.0 ppm, ethylbenzene ranging from nondetectable to 0.86 ppm, and total xylenes ranging from nondetectable to 5.0 ppm. Laboratory results are shown on Table 4, and the laboratory reports are presented in Appendix E.

Based on these results and those of the testing required by the landfill (Appendix E), soil generated during the drilling of offsite borings B-10 and B-11 (approximately 3 cubic yards) was taken by Dillard Trucking, Inc., a State-licensed hauler, to BFI Vasco Road Landfill in Livermore on June 26, 1992. Soil stockpiles SP-1 and SP-2 (generated during the drilling and installation of onsite monitoring well B-12/MW-8 and onsite vapor extraction wells B-13/VW-1 through B-19/VW-7, approximately 10 cubic yards) and soil generated during trenching activities (approximately 45 cubic yards) were removed by Dillard Trucking and taken to BFI Vasco Road Landfill in Livermore on July 30, 1992. A total of 58 cubic yards of soil were removed during this additional subsurface investigation and interim remediation. Waste manifests are presented in Appendix F.

Water Analyses

Groundwater sampling and laboratory analyses were accomplished during previous quarterly groundwater monitoring. Cumulative Results of Laboratory Analyses of Groundwater Samples are shown on Table 5 (TPHg, TPHd, BTEX, and TOG) and Table 6 (VOCs and Metals). Maps depicting interpreted concentrations of compounds in groundwater are reproduced and modified here. Concentrations of TPHg in Groundwater on June 30 and September 9, 1992 are shown on Plates 28 and 29. Concentrations of Benzene in Groundwater on June 30, and September 9, 1992 are shown on Plates 30 and 31, and Concentrations of PCE in Groundwater on June 30 and September 9, 1992 are shown on Plates 32 and 33.

Air Analyses

Laboratory results of air samples collected during the VET are summarized in Table 7, Results of Laboratory Analyses of Air Samples. The laboratory analyses reports are included in Appendix G.

Vapor samples collected after approximately 30 minutes of operation from wells VW-2, VW-3, VW-4, VW-5 and MW-2 contained reported TPHg concentrations ranging from 11,000 to 48,000 milligrams per cubic meter (mg/m^3), respectively. TPHg concentrations in the wellhead vapor samples from VW-1, VW-6, and VW-7 ranged from 330 mg/m^3 to over 5,100 mg/m^3. Samples analyzed for BTEX components from the wells ranged from 4 to 1800 mg/m^3 for benzene, 3 to 600 mg/m^3 for toluene, less than 0.5 to 74 mg/m^3 for ethylbenzene, and 3 to 200 mg/m^3 for total xylenes.

The air sample collected after 30 minutes of operation of the VES with all wells open reported TPHg and BTEX concentrations in extracted vapor of 10,000 and 19 to 160 mg/m^3, respectively.
No VOCs were detected in this sample except BTEX constituents analyzed by EPA Method 8240.

Air samples collected during the long-term test from wells VW-3 and VW-4 contained TPHg at 11,000 (mg/m^3) after 50 minutes of operation, and 9,500 (mg/m^3) after 18.5 hours of operation. During this period, benzene concentrations in the air samples decreased from 560 to 280 (mg/m^3), suggesting that the composition of the vapor stream decreased from 5% to 2.9% benzene.

Lead analyses performed on the charcoal sample tubes indicated an average lead content of 7.0 micrograms per tube. For a sample volume of 0.71 cubic feet of air, this weight corresponds to a lead concentration of 1.0 micrograms per cubic meter ($\mu g/m^3$).

DISCUSSION

Subsurface Evaluation

Gasoline-Impacted Soil and Groundwater

The soil sample results from the borings drilled during this and previous investigations indicate that gasoline hydrocarbons are present mainly in the clayey sand to sandy gravel unit directly above groundwater beneath the former USTs and adjacent western portion of the Foothill Square Shopping Center parking lot. Graphic interpretations of the extent of gasoline hydrocarbons in soil are shown on the Geologic Cross Sections, Plates 18 through 20. Offsite well MW-7 and onsite well MW-2, which are screened in the shallow water-bearing zone, have been impacted by gasoline hydrocarbons. Wells MW-1, MW-3 through MW-6, and RW-1, which are screened in the deeper water-bearing zone, have not been impacted by gasoline hydrocarbons. Low concentrations of benzene but not TPHg were detected in groundwater from well MW-8, which is also screened in the deeper water-bearing zone, and has been sampled only once.

Oil and Grease-Impacted Groundwater

Well MW-4 indicated detectable concentrations of waste-oil and grease during the second and third quarter 1992; however, the method used (413.2) extracts both petroleum-derived hydrocarbons and naturally-occurring organic hydrocarbons. Well MW-4 has indicated nondetectable concentrations of oil and grease since the initial groundwater sampling in June 1991 through June 1992 using the preferred method 418.1 (see Table 5), and the relatively low concentrations (0.5 and 3.6 ppm) of oil and grease probably represent naturally occurring organic hydrocarbons.

VOC-Impacted Soil and Groundwater

The highest concentrations of PCE were detected in soil and groundwater upgradient of the site, where a possible historical source has been documented. The PCE has been detected in the eastern portion of the site and adjoining Foothill Square Shopping Center parking lot. PCE was detected in a soil sample from an aquitard beneath the deeper water-bearing zone.

Vapor-Extraction Test

VET Air Flow Rate Results

Relatively large air flow rates (83 to 90 scfm) could be extracted from wells VW-1 and MW-2 at low to moderate applied well vacuums (10 to 20 inches W.C.). This data appears to be indicative of air flow through relatively moderate to high permeability soils. Well boring logs indicate that for MW-2, with the DTW at 22.0 feet below grade, the zone of permeable sandy gravel was exposed to venting thus resulting in a relatively large air flow rate at a low applied vacuum. The reasons for higher flows in well VW-1 are not as readily apparent, but may relate to the absence of soil stratigraphic permeability boundaries near this well.

The other vapor extraction wells tested during the VET exhibited low to moderate air flow rates (38 to 70 scfm) at applied vacuums ranging from 34 to 56 inches W.C. This data appears consistent with wells screened within soils with medium to low permeability (clayey to silty sand with small amounts of sandy gravel) and marginally favorable soil stratigraphy.

To evaluate air flow characteristics from each well, air flow rates were converted to scfm conditions (atmospheric pressure and temperature) and plotted versus wellhead vacuum. Wellhead characteristic graphs are presented in Appendix H. Using the Cricket-graph plotting program, the data appeared to best approximate an exponential function. Correlation coefficients (r) for these equations were generally in the range of 0.98 to 0.99 (out of 1.0) suggesting a good fit. These exponential functions generally appear to over-estimate air flow rate data at higher applied vacuums. However, in general, the graphs can be used to predict whether higher applied vacuums will yield larger air flow rates, or if air

flow from the well has reached a plateau with respect to further increases in applied vacuum.

Vapor extraction wells VW-1, VW-3, VW-7, MW-2 continued to exhibit an increase in induced air flow rate with an increase in the applied vacuum (10, 33, 39, and 19 inches WC, respectively). However, the maximum sustainable well yield could not be evaluated due to the limitations of the 1.5 hp Rotron blower used to extract vapor from these wells. For the other vapor extraction wells (VW-2, VW-4, and VW-5), the graphs indicate that the extracted air flow rate from the wells appeared to plateau with respect to any further increase in applied vacuum beyond 60 inches of WC. Using these results and the exponential curve fit equations for each well, an increase in applied vacuum to 60 inches W.C. would result in a 22% increase in flow from each well. A further increase in an applied vacuum to 100 inches W.C. is estimated to increase the total flow by only an additional 8%.

A small measurable flow of 3 cfm was observed when venting from VW-6 at a high applied vacuum of 56 inches WC. This lack of air flow may be attributable to the well being screened predominantly in low permeability soils (mainly sandy clay). The interpreted soil stratigraphy shows a stratum of relatively lower permeability sandy silt north-northwest of VW-6. This sandy silt may represent a boundary to the perched, unconfined water bearing zone. Such a boundary would also affect flow in the unsaturated zone.

The short-term test conducted with wells VW-1 through VW-7 and MW-2 operating yielded a total extracted air flow of 60 scfm at a small applied vacuum of 3 inches WC indicating that the 1.5 HP Rotron blower cannot be used at the site to operate all wells simultaneously.

VET Air Sample Results

Air samples collected during the VET from wells VW-2, VW-3, VW-4, VW-5 and MW-2 contained high concentrations of gasoline hydrocarbons (ranging from 10,000 to 48,000 mg/m^3). Air samples collected from VW-1, VW-6 and VW-7 did not contain high concentrations of gasoline hydrocarbons (330 mg/m^3 to 5,100 mg/m^3). These results are not

generally in agreement with the concentrations of TPHg reported in the soil borings for these wells. Differences may relate to soil stratigraphic permeability conditions, as well as differing proximities to gasoline hydrocarbons in the subsurface.

With wells VW-1 through VW-7 and MW-2 operating, TPHg concentrations of the combined vapor stream extracted vapors were reported at 10,000 mg/m3. Based upon a molecular weight of 95 grams per mole, this concentration corresponds to a volumetric concentration of 2,531 parts per million by volume (ppmv), equivalent to 18 percent (%) of the Lower Explosive Limit (LEL) for gasoline. Considering most Catox units can process hydrocarbon concentrations up to 25% LEL (3,000 ppmv), it appears that the existing onsite Catox could process the vent-gas stream directly, with little or no fresh-air dilution (provided the vent gas stream contains sufficient amounts of oxygen).

VET Hydrocarbon Removal Rate Estimates

Initial hydrocarbon removal rates were estimated from wellhead air flow rate and vapor concentration data obtained during the VET. These removal rates are summarized for each vapor extraction well in Table 8. Based upon vapor-phase TPHg concentrations of 330 mg/m^3 to 48,000 mg/m^3, and well head air-flow rates of 3 to 90 scfm, initial TPHg removal rates were projected to be as low as 0.14 pounds per day (lb/day) to a high of 164 lbs/day (0.02 gal/day to 25 gals/day). These initial removal rates typically decrease rapidly with time, depending on site-specific conditions.

With all the above wells operational, at an applied vacuum of 4 inches of WC and a combined air flow rate of 60 scfm, the combined initial hydrocarbon removal rate was estimated to be 54.0 lbs/day (8.7 gals/day).

VET Radius of Influence Estimates

Utilizing induced vacuum and distance measurements obtained during the VET, an effective R.O.I. was estimated for the vapor wells at the site. The effective R.O.I. has been defined as the radial distance from a vapor extraction well at which recorded vacuum levels suggest

that subsurface air flow occurs and is presumed to be sufficient for remediation. As in most R.O.I concepts assume that subsurface air flows through homogeneous and isotropic soils and that short-circuiting effects are neglected.

Methods for estimating an effective R.O.I. vary due to the complexity of modeling the vapor extraction process and limited case-study information. Based on our experience, RESNA generally assumes that an induced vacuum of 0.3 inches of WC should be sufficient to induce subsurface airflow within the zone of influence, depending on soil type. To evaluate R.O.I., RESNA typically plots the observed induced vacuum response as a function of the distance from the extraction well on a semi-log graph. Using linear regression techniques, a straight line is fit to the plotted data. The radial distance corresponding to the value of the cut-off vacuum (0.3 inches WC) is interpolated to be the effective R.O.I. for a given extraction well at a certain applied vacuum.

Air-modeling studies conducted by others suggest that the distance from the extraction well at which 1 percent (%) of the applied well-head vacuum occurs can be interpreted as an effective R.O.I. (Chevron, 1991). This method is based upon theoretical model predictions which project that roughly 90 percent of the total air extracted from the well flows through soils within the radius of influence when a 1% cut-off is used. As discussed above, the normalized induced vacuum response; i.e., % applied vacuum (monitoring point vacuum x 100/extraction well vacuum) is plotted as a function of distance from the extraction well. The effective R.O.I. is then computed for each well by fitting a straight line to the plotted data using regression techniques, and interpolating the radial distance at which the cut-off vacuum (1% of the applied vacuum) is observed on the straight line.

The effective R.O.I. for this site was estimated using the predictions obtainable from both RESNA's assumptions and Chevron's air flow models (i.e., either 0.3 " WC or 1% of the applied wellhead vacuum whichever was more conservative). Attached in Appendix I are semi-log graphs that depict induced vacuum response as a function of distance from the extraction well and the effective R.O.I. estimated for each well based on the above-mentioned cut-off points. Table 8 summarizes the estimated effective R.O.I. for each vapor extraction well. Effective R.O.I estimates ranged from 17 to 32 ft during the VET.

A R.O.I. was not estimated for well VW-6 since less than 3 scfm was observed from the well at an applied 56 inches WC and little or no vacuum impact was measured in the observation wells. This result could be due to the low permeability soil the well is screened in (mainly sandy clay rather than clayey sand and sandy gravel). A larger radius of influence may be possible at higher applied vacuums.

CONCLUSIONS

Based on the results of this work, RESNA concludes the following:

- The majority of gasoline hydrocarbons in the soil onsite are located approximately 15 to 18 feet below ground surface directly above first-encountered water within the shallow perched water-bearing zone, in the immediate vicinity of the former USTs at the site.

- The majority of gasoline hydrocarbons in the groundwater are in the monitoring wells screened in the shallow perched water-bearing zone (onsite well MW-2 and offsite well MW-7) located near the former USTs.

- Concentrations of TOG detected in well MW-4 are probably not representative of petroleum-based oil and grease, but naturally occurring organic carbon matrix due to the laboratory method used.

- An offsite source of PCE is probable, as evidenced by relatively high PCE concentrations in groundwater offsite and upgradient, the distribution of the PCE, and a possible historical source offsite and upgradient.

- Laboratory results of air samples and field organic vapor measurements collected from all vapor extraction wells during the VET suggest that petroleum hydrocarbons exist in the area of the former gasoline storage tank excavation and its immediate vicinity.

$$ppm = \frac{24.5\,(mg/m^3)}{MW}$$

$$\frac{ppm\,(MW)}{24.5} = (mg/m^3)$$

- Based on estimated effective radii of influence for vapor wells VW-1 through VW-7 and MW-2 ranging from approximately 17 to 32 feet, and estimated flow rates of approximately 38 to 90 scfm, vapor extraction appears to be a viable soil remediation alternative for the remediation of gasoline hydrocarbons from onsite soils.

- Based on initial extracted vapor concentrations (10,000 mg/m3 or 18% LEL) detected in air samples taken during the VET with wells VW-1 through VW-7 and MW-2 operational, it is likely that no fresh air dilution of extracted vapor will be necessary to abate extracted vapor through the Catox.

- The initial volumetric removal rates are estimated to be roughly 0.02 to 25 gallons per day. These relatively high removal rates will likely decrease rapidly with time, depending on site-specific conditions.

LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental geological practice in California at the time this investigation was performed. This investigation was conducted solely for the purpose of evaluating environmental conditions of the soil and groundwater near and southeast of the former site underground storage tanks with respect to gasoline, waste-oil, and volatile organic hydrocarbons previously detected or known to have been stored in the former underground tanks at the site. No soil engineering or geotechnical references are implied or should be inferred. Evaluation of the geologic conditions at and near the site for the purpose of this investigation is made from a limited number of observation points. Subsurface conditions may vary away from the data points available. This report has been prepared solely for ARCO Products Company, and any reliance on this report by third parties shall be at such party's sole risk.

DISTRIBUTION

We recommend that copies of this report be forwarded to:

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

Mr. Richard Hiett
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
San Francisco, California 94612

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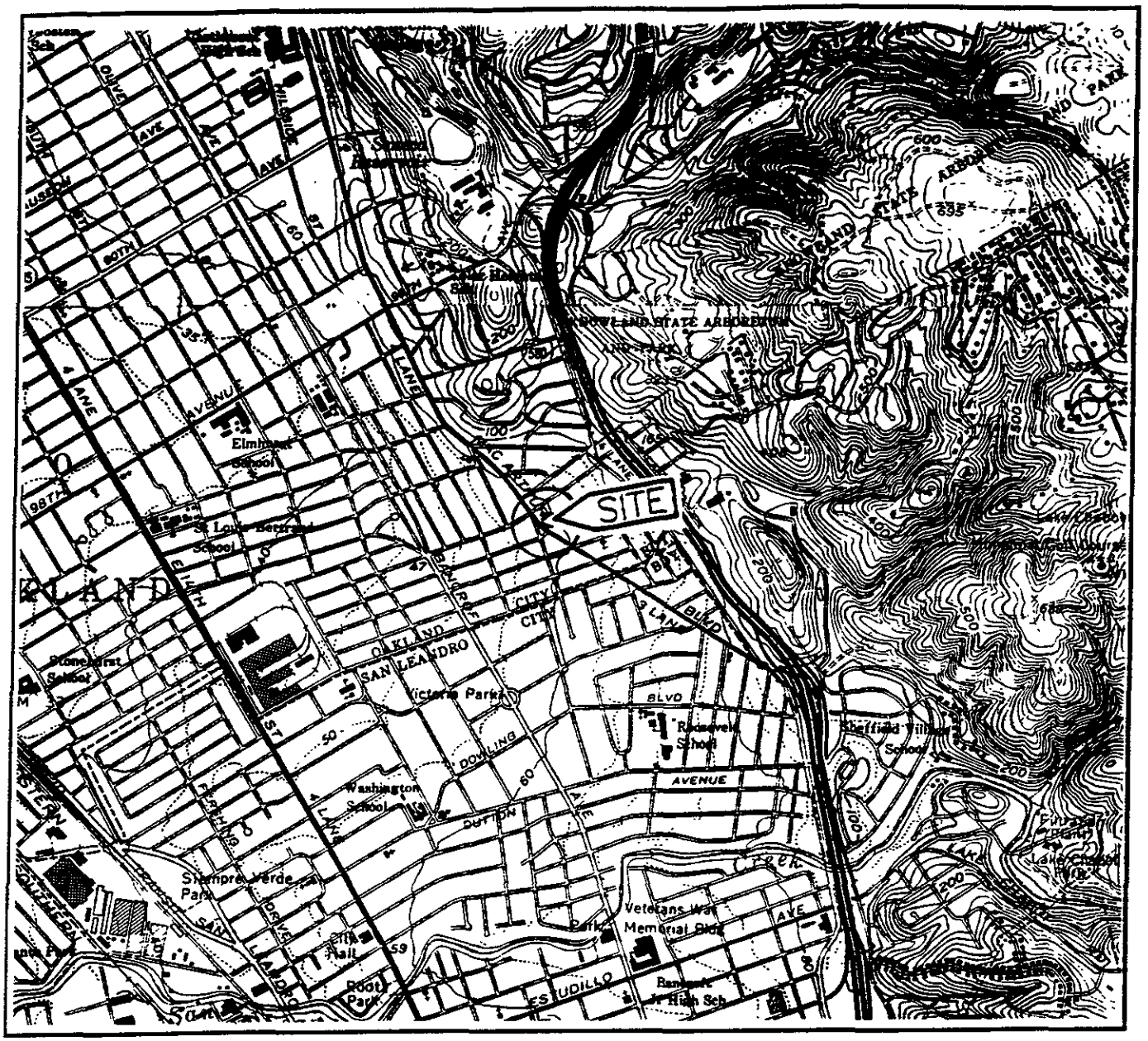

Base: U.S. Geological Survey
7.5–Minute Quadrangles
Oakland East/San Leandro,
California.
Photorevised 1980

LEGEND

(•) = Site Location

N

Approximate Scale

2000 1000 0 2000 4000

Feet

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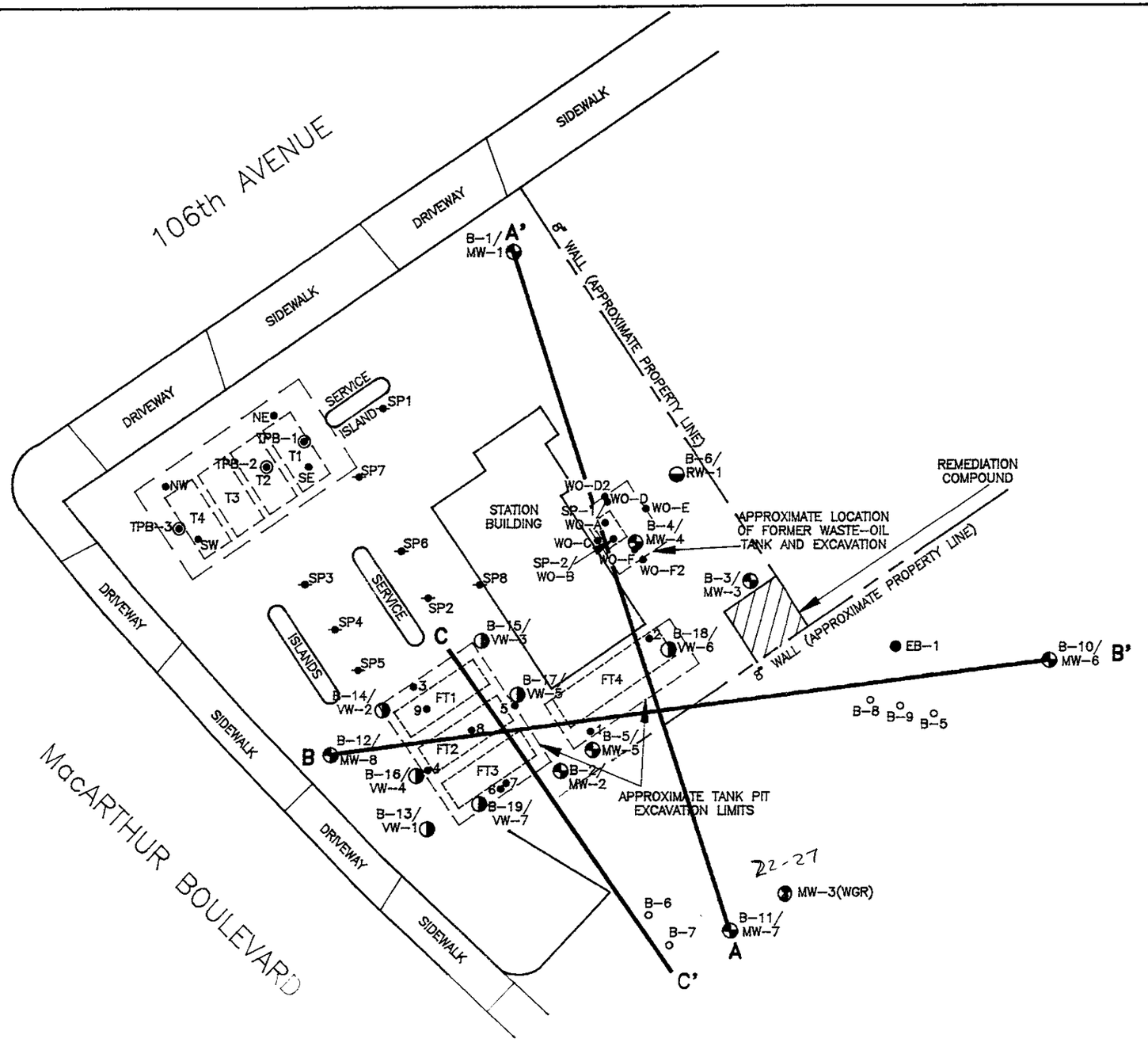
SITE VICINITY MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 1



EXPLANATION

- B-12/ MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)
- B-19/ VW-7 = Vapor well (RESNA, 1992)
- B-7/ RW-1 = Recovery well (RESNA, 1991)
- TPB-3 = Boring in proposed new tank pit (RESNA, 1990)
- NW = New tank pit excavation bottom sample (RESNA, 1990)
- 9 = Former tank pit sample (S7-TP1SW-1 through -9; RESNA, 1990)
- SP8 = Product line trench soil sample (RESNA, May 1990)
- MW-3(WGR) = Groundwater monitoring well (WGR, 1988)
- EB-1 = Exploratory boring (KA, 1988)
- SP-2 WO-F WO-F2 = Former waste-oil tank pit excavation bottom and sidewall sample (PEG, 1988)
- T4 = Existing underground storage tanks
- FT4 = Former underground storage tanks
- C C' = Geologic cross section
- B-9 = Offsite boring (AGS, 1989)

N

Approximate Scale

30 15 0 30 60

feet

Source: Surveyed by John E. Koch, Licensed Land Surveyor.

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GENERALIZED SITE PLAN
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
2

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION		LTR	DESCRIPTION	MAJOR DIVISION		LTR	DESCRIPTION
COARSE-GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.	FINE-GRAINED SOILS	SILTS AND CLAYS LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or cloyey silts with slight plasticity.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		GM	Silty gravels, grave-sand-silt mixtures.			OL	Organic silts and organic silt-clays of low plasticity.
		GC	Clayey gravel, gravel-sand -clay mixtures.		SILTS AND CLAYS LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
	SAND AND SANDY SOILS	SW	Well-graded sand or gravelly sands, little or no fines.			CH	Inorganic clays of high plasticity, fat clays.
		SP	Poorly-graded sands or gravelly sands, little or no fines.			OH	Organic clays of medium to high plasticity, organic silts.
		SM	Silty sands, sand-silt mixtures.				
		SC	Clayey sands, sand-clay mixtures.	HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils.


Depth through which sampler is driven


Relatively undisturbed sample


No sample recovered


Static water level observed in well/boring


Initial water level observed in boring

S-10 Sample number


Sand pack


Bentonite

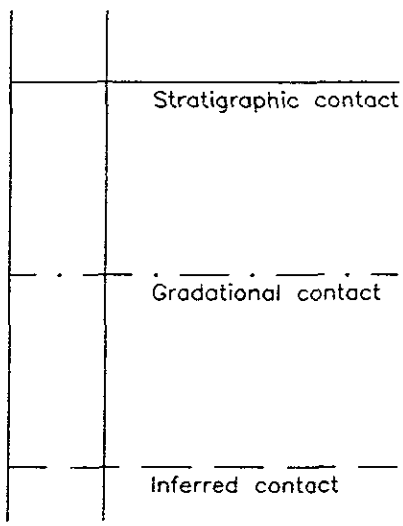

Neat cement


Caved native soil


Blank PVC


Machine-slotted PVC

P.I.D. Photoionization detector



BLOWS REPRESENT THE NUMBER OF BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES TO DRIVE THE SAMPLER THROUGH EACH 6 INCHES OF AN 18-INCH PENETRATION

GRADATIONAL AND INFERRED CONTACT LINES SEPARATING UNITS ON THE LOG REPRESENT APPROXIMATE BOUNDARIES ONLY. ACTUAL BOUNDARIES MAY BE GRADUAL. LOGS REPRESENT SUBSURFACE CONDITIONS AT THE BORING LOCATION AT THE TIME OF DRILLING ONLY

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UNIFIED SOIL CLASSIFICATION SYSTEM PLATE AND SYMBOL KEY
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

3

Depth of boring: 61 feet Diameter of boring: 8 inches Date drilled: 06/16/92

Well depth: 56 feet Material type: Sch 40 PVC Casing diameter: 2 inches

Screen interval: 37-1/2 to 56 feet Slot size: 0.020-inch

Drilling Company: Exploration GeoServices Driller: John Collins

Method Used: Hollow-Stem Auger Field Geologist: Rob Campbell

Signature of Registered Professional: Diane M. Lauby

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
					Pavement.	
0				CH	Asphalt (2 inches).	
2					Silty clay, trace sand, dark brown with black mottling, damp, high plasticity, stiff; brick fragments: fill. Color change to black at 2 feet.	
4					Concrete slab, concrete fragments from 4 to 4-1/2 feet.	
	S-5	4	0	CH	Silty clay, black, damp, high plasticity, stiff.	
6	S-5.5	6 8				
					Color change to brown at 7-1/2 feet.	
8				SC	Clayey sand, fine-grained, trace silt, brown, damp, dense; root holes.	
10	S-10	9	0			
	S-10.5	15 15				
12						
14						
	S-15	10	0			
16	S-15.5	19 24				
18						
20	S-20	9	0			
	S-20.5	13 14				

(Section continues downward)

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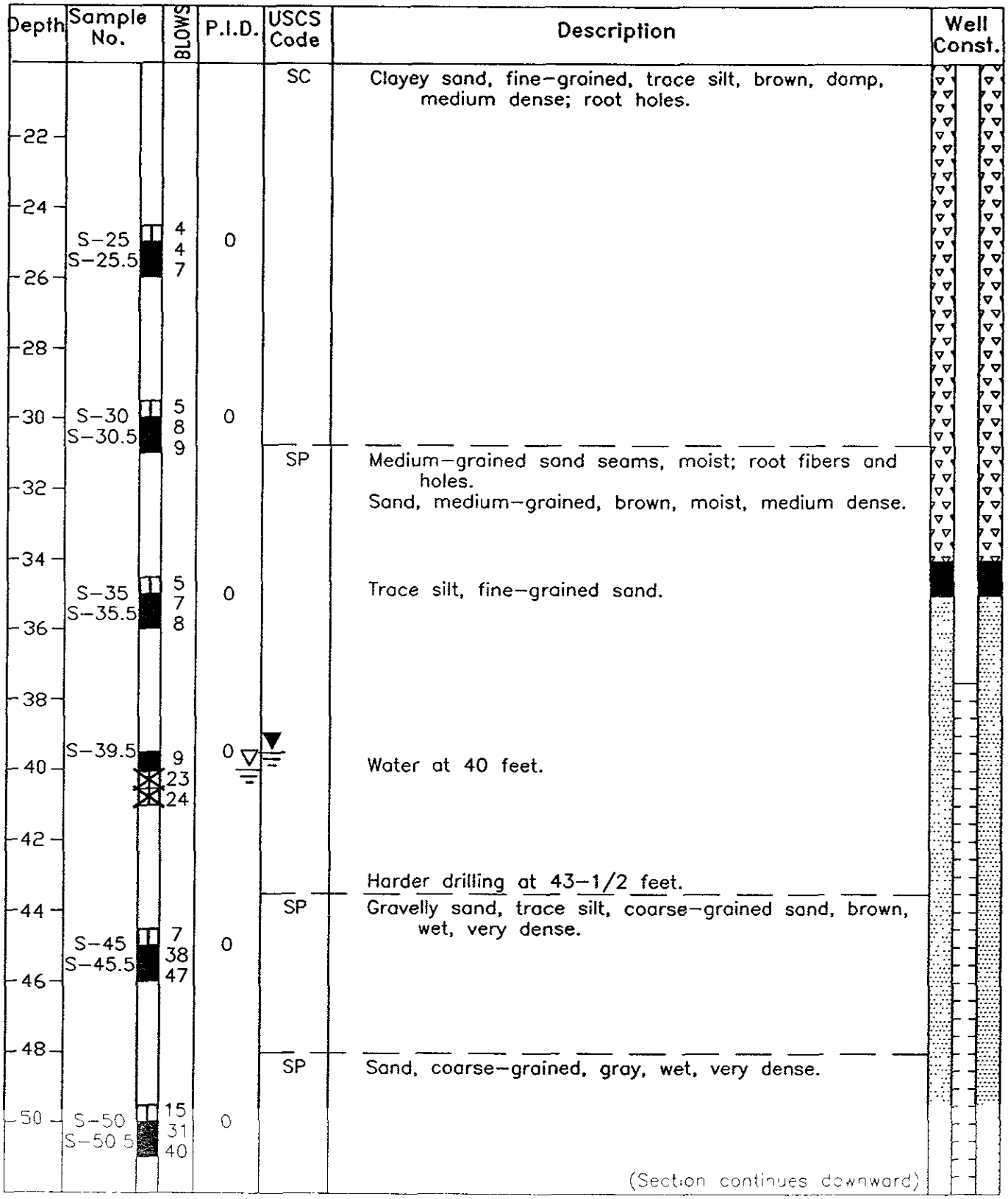
LOG OF BORING B-10/MW-6

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 4



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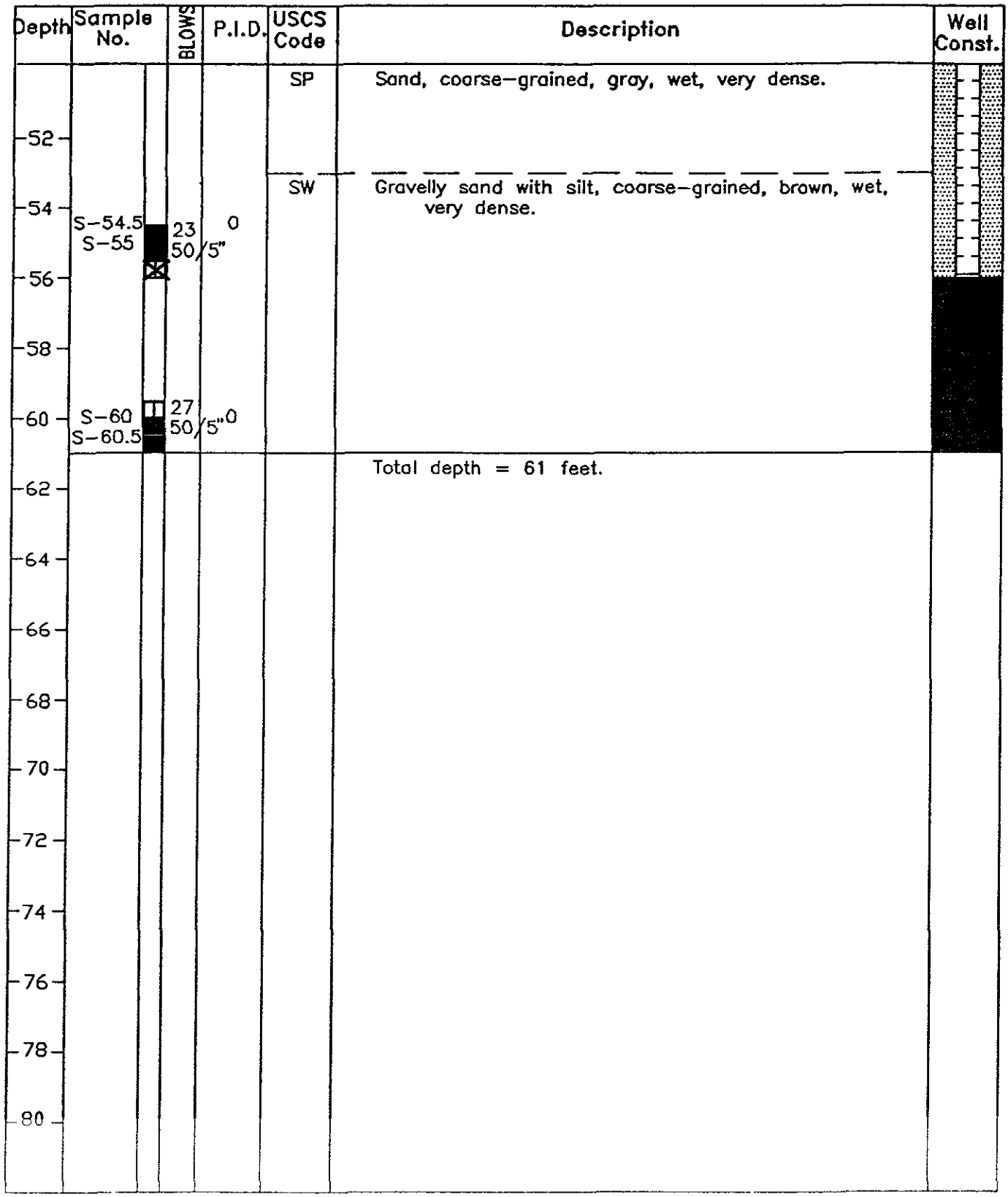
PROJECT 60026.05

LOG OF BORING B-10/MW-6

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 5



RESNA
Working to Restore Nature

PROJECT 60026.05

LOG OF BORING B-10/MW-6

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 6

Depth of boring: 37-1/2 feet Diameter of boring: 8 inches Date drilled: 06/16/92

Well depth: 37-1/2 feet Material type: Sch 40 PVC Casing diameter: 2 inches

Screen interval: 17-1/2 to 37-1/2 feet Slot size: 0.020-inch

Drilling Company: Exploration GeoServices Driller: John Collins

Method Used: Hollow-Stem Auger Field Geologist: Rob Campbell

Signature of Registered Professional: Diane M Barclay

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Pavement.	
				CH	Asphalt (2 inches).	
2					Silty clay, black, damp, high plasticity, stiff.	
				SM	Silty sand, trace clay, fine-grained, brown, damp, dense; root fibers.	
4	S-4.5	8	0			
		15				
6		17				
8					Grades to coarser sand at 8 feet.	
	S-9.5	14	0			
10	S-10	16				
		16				
12						
				SP	Sand, trace clay, fine- to medium-grained, brown, damp, dense; root fibers.	
14	S-15	8	0			
	S-15.5	7				
16		9				
18				SP	Gravelly sand, trace silt, coarse-grained sand, brown, very moist, dense.	
		7				
20	S-20	9	24			
	S-20.5	12				

(Section continues downward)

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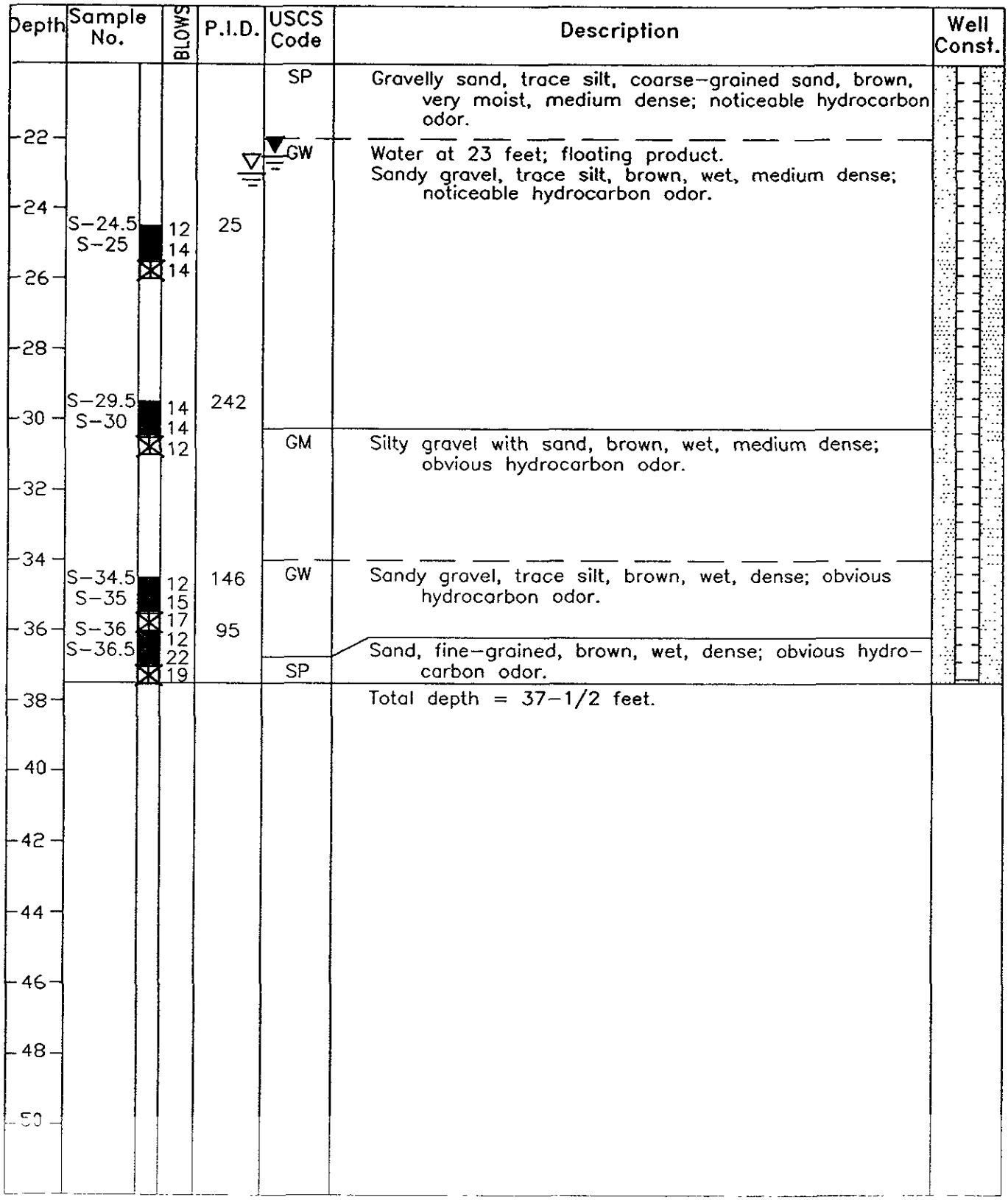
PROJECT: 60026.05

LOG OF BORING B-11/MW-7

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 7



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PROJECT 60026.05

LOG OF BORING B-11/MW-7

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 8

Depth of boring: 50-1/2 feet Diameter of boring: 12 inches Date drilled: 07/16/92

Well depth: 49 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 29 to 49 feet Slot size: 0.020-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Diane M Barclay

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
					Asphalt-covered surface.	
0				SP	Asphalt (4 inches).	
				CL/CH	Gravelly sand, gray, damp, dense: baserock.	
2					Silty clay, dark brown, damp, medium to high plasticity, stiff.	
4	S-5	6 8 11	0	CL	Sandy clay, brown, damp, low to medium plasticity, stiff.	
6						
8				SC	Clayey sand, fine-grained, gray, damp, medium dense; obvious product odor.	
10	S-9.5	4 5 7	127			
12					Becoming very moist. No water after waiting 10 minutes.	
14				CL	Sandy clay, brown mottled with gray, damp, medium plasticity, very stiff; obvious product odor.	
16	S-15.5	2 6 11	176			
18	S-19	4 9 12	240		Increasing sand.	
20	S-20.5	9 12 14	16	SC	Clayey sand, fine-grained, brown, moist, medium dense	

(Section continues downward)

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PROJECT: 60026.05

LOG OF BORING B-12/MW-8

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 9

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22	S-22	6 12 14	0	SC	Clayey sand, fine-grained, brown, moist, medium dense.	
24	S-24.5	5 7 13	0		Decreasing clay.	
26						
28	S-29	6 9 10	34			
30		5 13		SP	Sand, medium-grained, brown, very moist, dense.	
32	S-31.5	21 9	0	SP	Gravelly sand, medium- to coarse-grained, brown, wet, dense.	
	S-33	15 28	0			
34	S-34	9 16 22	0			
36						
38					Coarser gravel at 38 feet.	
40	S-39.5	10 16	0			
42						
44	S-44.5	14 24 30	0		Very dense.	
46						
48						
50	S-50	14 28 34	0			
					Total depth = 50-1/2 feet.	

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PROJECT 60026.05

LOG OF BORING B-12/MW-8
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
10

Depth of boring: 20-1/2 feet Diameter of boring: 12 inches Date drilled: 07/15/92

Well depth: 17-1/2 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 7-1/2 to 17-1/2 feet Slot size: 0.100-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Dione M. Barclay

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
					Asphalt-covered surface.	
0					Asphalt (4 inches).	
				SP	Gravelly sand, gray, damp, dense: baserock.	
2				CL/CH	Silty clay, dark brown, damp, medium to high plasticity, stiff.	
4				CL	Sandy clay, brown, damp, low plasticity, very stiff.	
	S-5	5 9 12	0			
6				SC	Clayey sand, fine-grained, brown, damp, medium dense.	
8						
10	S-10	5 9 12	0		Fine- to medium-grained sand, less clay, trace fine gravel.	
12						
14						
	S-15	5 7 10	143	GP	Sandy gravel, trace clay, gray, moist, medium dense; obvious product odor.	
16						
18	S-18	9 15 27	121		Decreasing sand.	
		12			Wet, free product present.	
	S-19.5	11 10	1280			
20					Total depth = 20-1/2 feet	

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PROJECT: 60026.05

LOG OF BORING B-13/VW-1
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
11

Depth of boring: 21-1/2 feet Diameter of boring: 12 inches Date drilled: 07/16/92

Well depth: 18 feet Material type: Sch 40 PVC Casing diameter: 4 inches

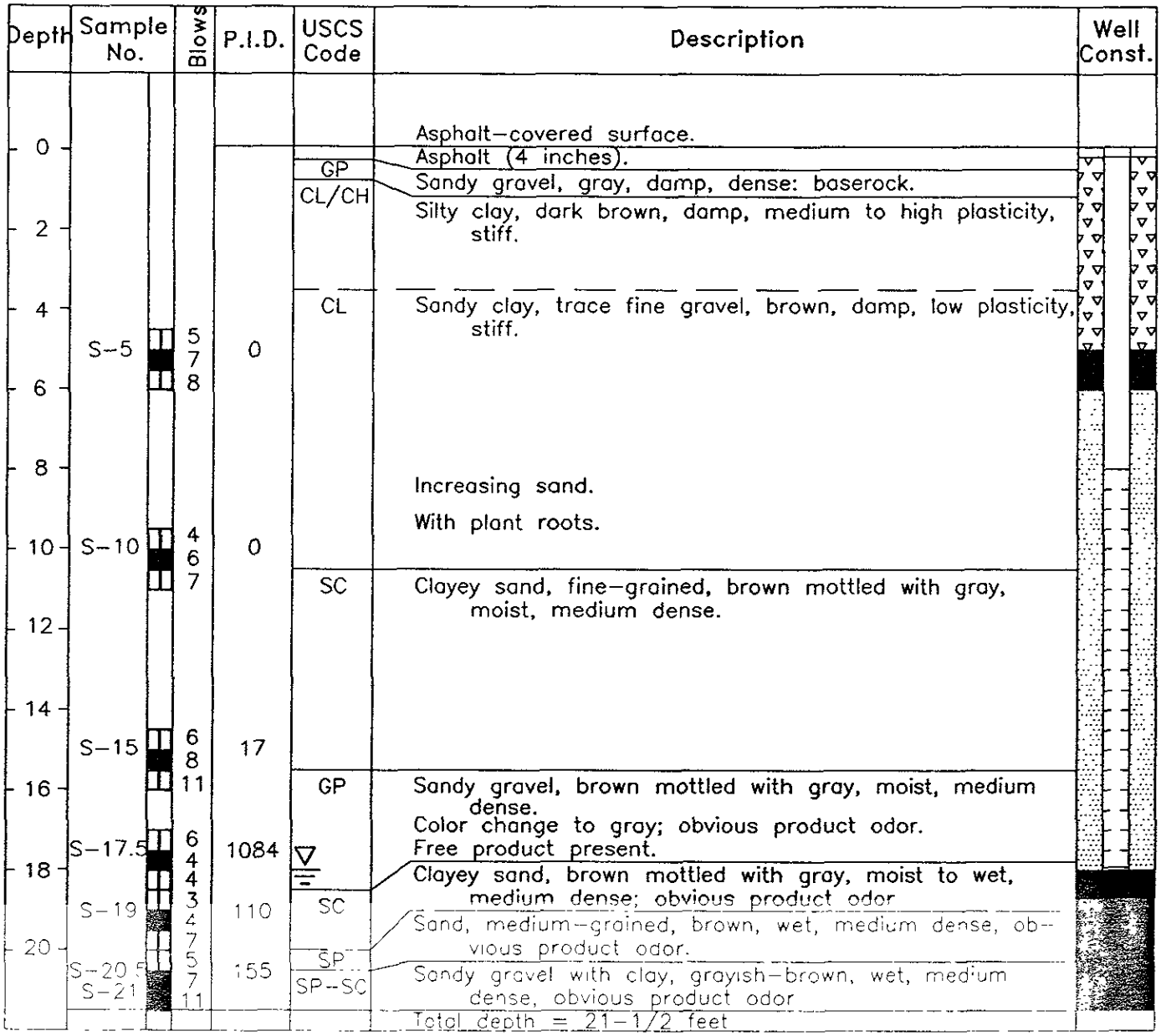
Screen interval: 8 to 18 feet Slot size: 0.100-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Dione M Lawley

Registration No.: CEG 1366 State: CA



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PROJECT: 60026.05

LOG OF BORING B-14/VW-2

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 12

Depth of boring: 20-1/2 feet Diameter of boring: 12 inches Date drilled: 07/17/92

Well depth: 18 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 8 to 18 feet Slot size: 0.100-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Dione M. Barclay

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
					Asphalt-covered surface.	
0				GP	Asphalt (4 inches).	
				CL	Sandy gravel, gray, damp, dense: baserock.	
2					Sandy clay, brown, damp, medium plasticity, stiff; with pieces of wood, asphalt, bricks: backfill.	
				CL/CH	Silty clay, dark brown, damp, medium to high plasticity, stiff.	
4				CL	Sandy clay, trace gravel, brown mottled with gray, damp, low plasticity, very stiff.	
	S-5	7 9 12	21			
6						
				SC	Clayey sand, fine-grained, brown mottled with gray, moisture, medium dense; noticeable product odor.	
8						
10	S-10	4 5 6	50			
12						
14					Increasing clay.	
	S-15	4 7 11	617		Obvious product odor.	
16				SP-SC	Sand with fine gravel and clay, medium-grained sand, brown mottled with gray, very moist, medium dense; obvious product odor.	
					No gravel.	
18	S-18	5 7 13	206	GP-SC	Sandy gravel with clay, gray, wet, medium dense; obvious product odor.	
	S-19	5 10 10	204		Free product present	
20					Total depth = 20-1/2 feet.	

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PROJECT: 60026.05

LOG OF BORING B-15/VW-3
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 13

Depth of boring: 21 feet Diameter of boring: 12 inches Date drilled: 07/15/92

Well depth: 19 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 9 to 19 feet Slot size: 0.100-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Diane M. Barclay

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
					Asphalt-covered surface.	
0					Asphalt (4 inches).	
				GP	Sandy gravel with cobbles, brown, damp, dense: baserock.	
2				CL/CH	Silty clay, dark brown, damp, medium to high plasticity, stiff.	
4						
	S-5	4 7 8	0	CL	Sandy clay, brown, damp, low plasticity, stiff.	
6						
8						
10	S-10	4 7 7	0		With plant roots. Color change to brown with gray mottling, trace fine gravel.	
12						
					Rougher drilling at 13 feet. With cobbles, color change to gray.	
14						
	S-15	3 4 6	1244	SP-SC	Gravelly sand with clay, fine- to medium-grained, brown mottled with gray, moist, medium dense; obvious product odor.	
16				GP-GC		
	S-17	8 11 12	1850		Sandy gravel with clay, gray, moist to wet, medium dense; obvious product odor.	
18		2		SC		
	S-19	2 2	27		Clayey sand, medium-grained, gray, moist to wet, loose; obvious product odor.	
				CL	No water after waiting 15 minutes.	
20	S-20	6 9 14	17		Sandy clay, brown, moist to damp, low plasticity, soft.	
					Total depth = 21 feet	

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PROJECT: 60026.05

LOG OF BORING B-16/VW-4
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 14

Depth of boring: 20-1/2 feet Diameter of boring: 12 inches Date drilled: 07/17/92

Well depth: 18 feet Material type: Sch 40 PVC Casing diameter: 4 inches

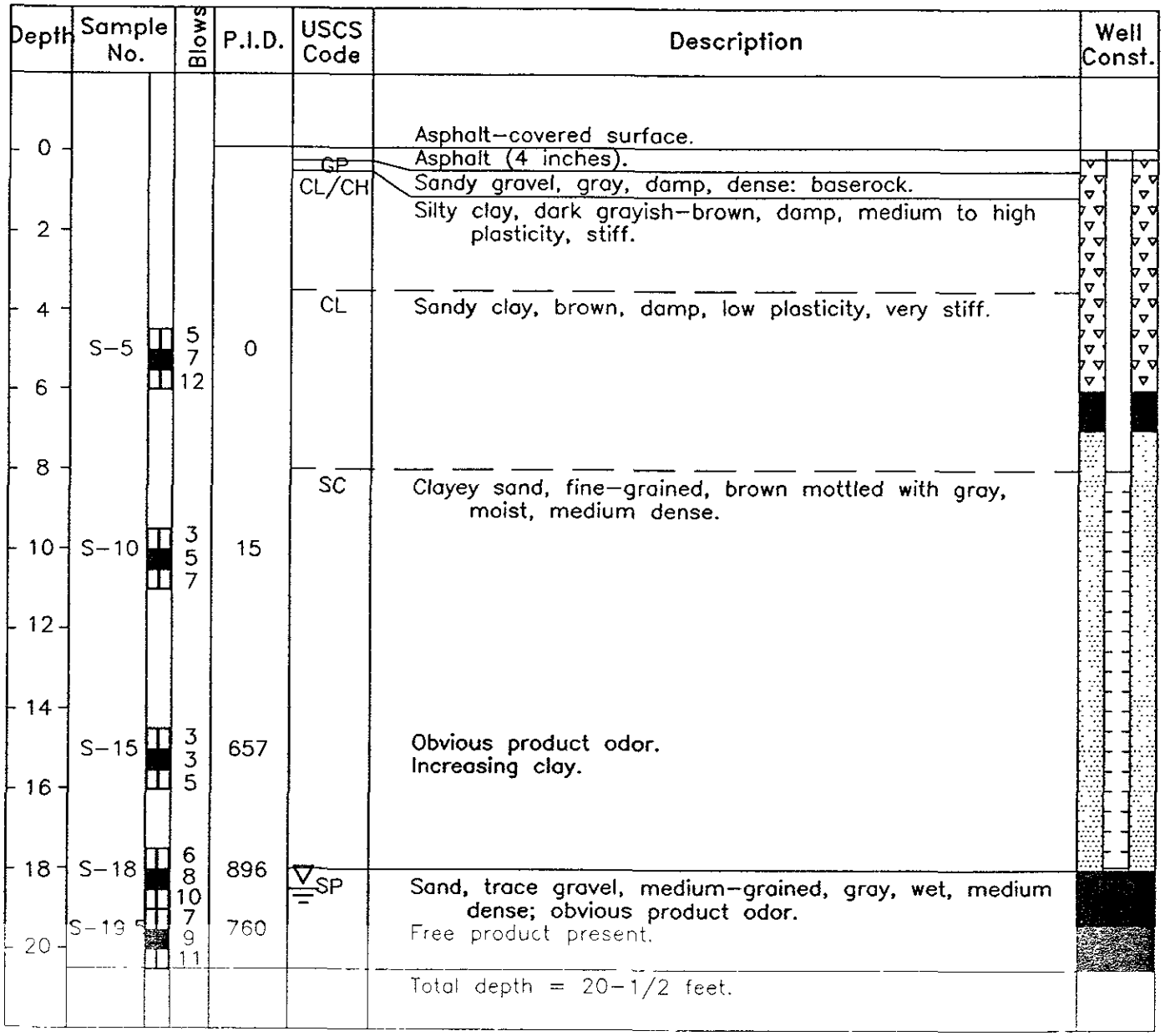
Screen interval: 8 to 18 feet Slot size: 0.100-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Diane M. Bruley

Registration No.: CEG 1366 State: CA



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PROJECT: 60026.05

LOG OF BORING B-17/VW-5

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 15

Depth of boring: 20 feet Diameter of boring: 12 inches Date drilled: 07/15/92

Well depth: 18 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 9 to 18 feet Slot size: 0.100-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Diane M. Barclay

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt-covered surface.	
					Asphalt (4 inches).	
				GP	Sandy gravel with cobbles, brown, damp, dense; baserock.	
2				CL/CH	Silty clay, dark brown, damp, medium to high plasticity, stiff.	
4				CL	Sandy clay, brown, damp, low plasticity, very stiff.	
6	S-5.5	4 8 9	0			
8						
10	S-10.5	4 5 7	0		Color change to brown with gray mottling, increasing sand, trace fine gravel.	
12						
14				SC	Clayey sand, brown with gray mottling, moist, medium dense; obvious product odor.	
16	S-15.5	4 12 24	1361	GP-GC	Sandy gravel with clay, gray, moist, dense; obvious product odor.	
18	S-17.5	5 6 7	880	SP-SC	Gravelly sand with clay, gray, moist to wet, medium dense; obvious product odor.	
	S-19	10 12 ?	836	▽	Wet, free product present.	
20					Total depth = 20 feet.	

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PROJECT: 60026.05

LOG OF BORING B-18/VW-6
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 16

Depth of boring: 20 feet Diameter of boring: 12 inches Date drilled: 07/17/92

Well depth: 17-1/2 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 7-1/2 to 17-1/2 feet Slot size: 0.100-inch

Drilling Company: Exploration Geoservices Driller: Dave and Fred

Method Used: Hollow-Stem Auger Field Geologist: Barbara Sieminski

Signature of Registered Professional: Duane M Barclay

Registration No.: CEG 1366 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt-covered surface.	
				GP	Asphalt (4 inches).	
					Sandy gravel, brown, damp, dense: baserock.	
2				GP	Asphalt (3 inches).	
				CL/CH	Sandy gravel, brown, damp, dense: baserock.	
					Silty clay, dark brown, damp, medium to high plasticity, stiff.	
4				CL		
	S-5	9 16 24	0		Sandy clay, brown, damp, low plasticity, hard.	
6						
				ML	Sandy silt, brown, damp, low plasticity, hard.	
8						
10	S-10	10 16 18	0			
12						
14						
	S-15	6 7 8	14	SC	Clayey sand with gravel, medium-grained, brown mottled with gray, very moist, medium dense.	
16				GP-GC	Sandy gravel with clay, gray, wet, medium dense; noticeable product odor.	
	S-17.5	10 13	23	▽		
18	S-18	10 7		CL	Silty clay, brown, damp, medium plasticity, very stiff.	
	S-19	9 11	0			
20					Total depth = 20 feet	

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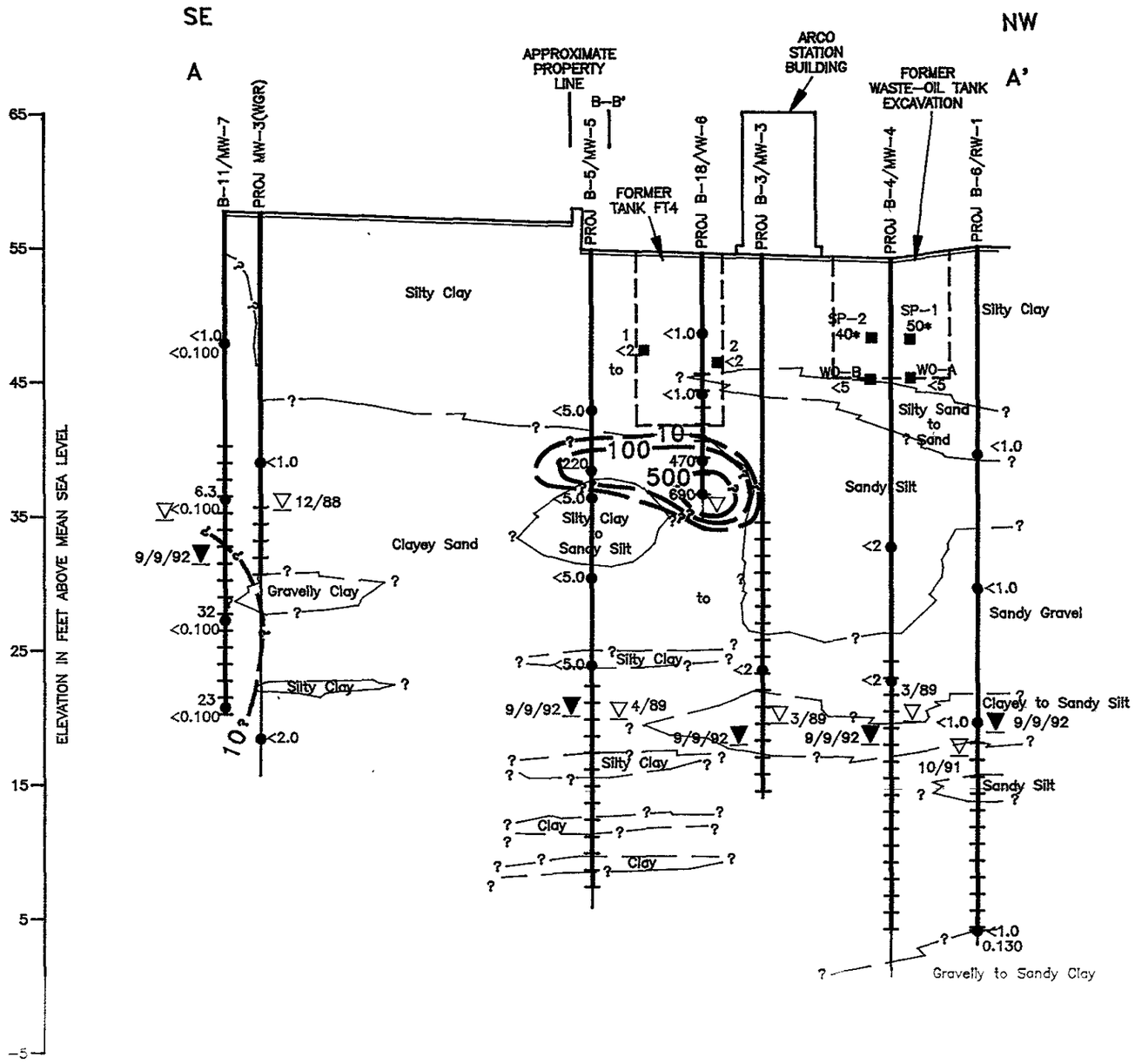
PROJECT: 60026.05

LOG OF BORING B-19/VW-7

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 17



EXPLANATION

500 = Line of equal concentration of TPHg in soil in parts per million (ppm)

SP-1 50* = Former tank pit (2) and former waste-oil tank pit (SP-2, WO-B) soil sample showing concentration of TPHg in ppm; * indicates chromatographic pattern of compounds detected and calculated as gasoline does not match that of the gasoline standard

<1.0 / 0.130 = Laboratory analyzed soil sample showing concentration of TPHg and PCE in ppm

= Well casing

= Well screen

= Boring

= Initial water level in boring at time of drilling

= Static water level 9/9/92 at time of drilling

REGISTERED GEOLOGIST
DIANE M. BARCLAY
No. EG1366
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale
20 10 0 20 40
feet

Approximate Vertical Scale
10 5 0 10 20
feet

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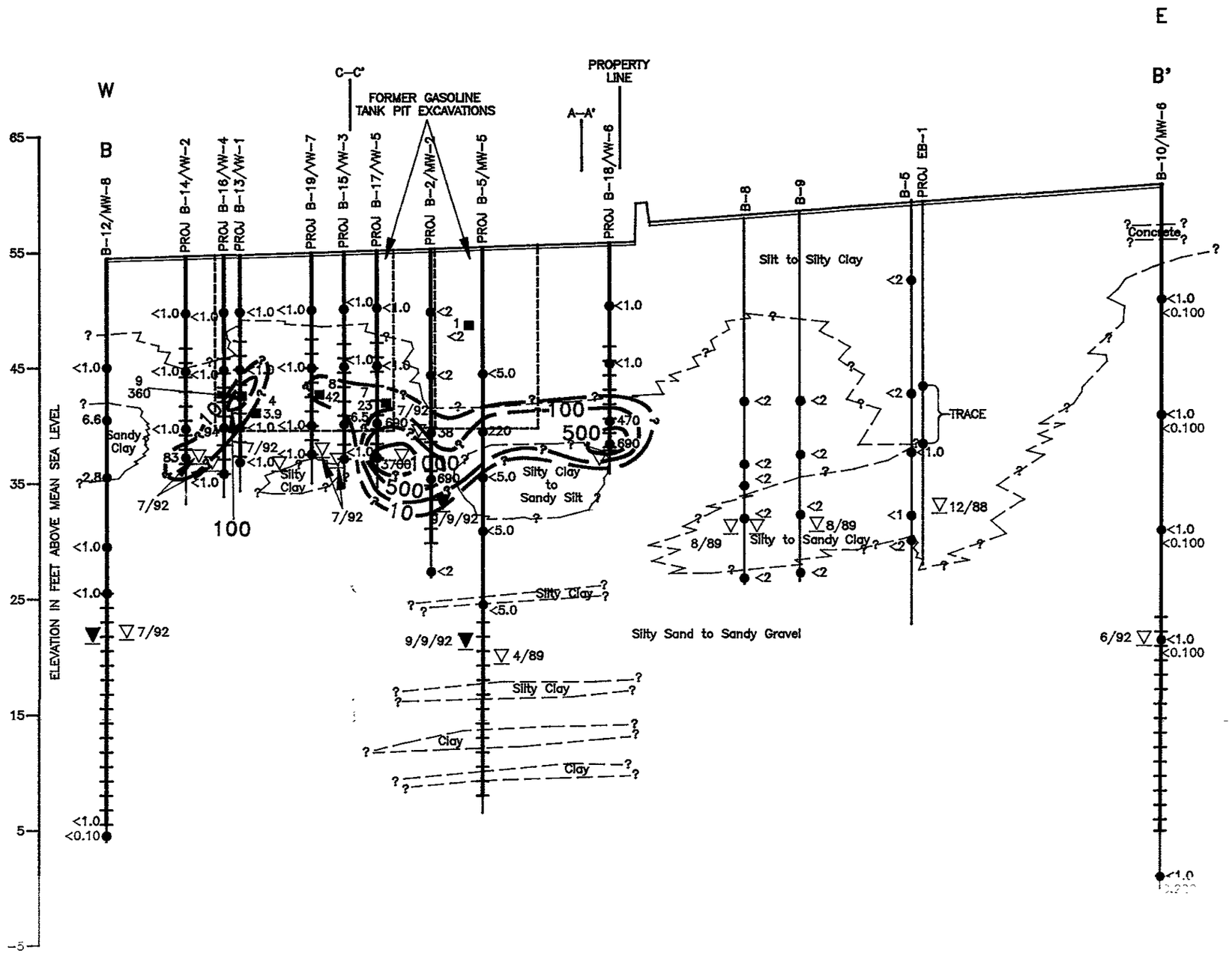
PROJECT 60026.05

GEOLOGIC CROSS SECTION A-A'
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
18



EXPLANATION

1000 = Line of equal concentration of TPHg in soil in parts per million (ppm)

9 / 42 ■ = Former tank pit soil sample showing concentration of TPHg in ppm

3700 / 0.22 = Laboratory analyzed soil sample showing concentration of TPHg and PCE in ppm; brackets indicate composite sample

= Well casing

= Well screen

= Boring

▽ = Initial water level in boring

▼ = Static water level in well 9/9/92

Approximate Horizontal Scale

20 10 0 20 40

feet

Approximate Vertical Scale

10 5 0 10 20

feet

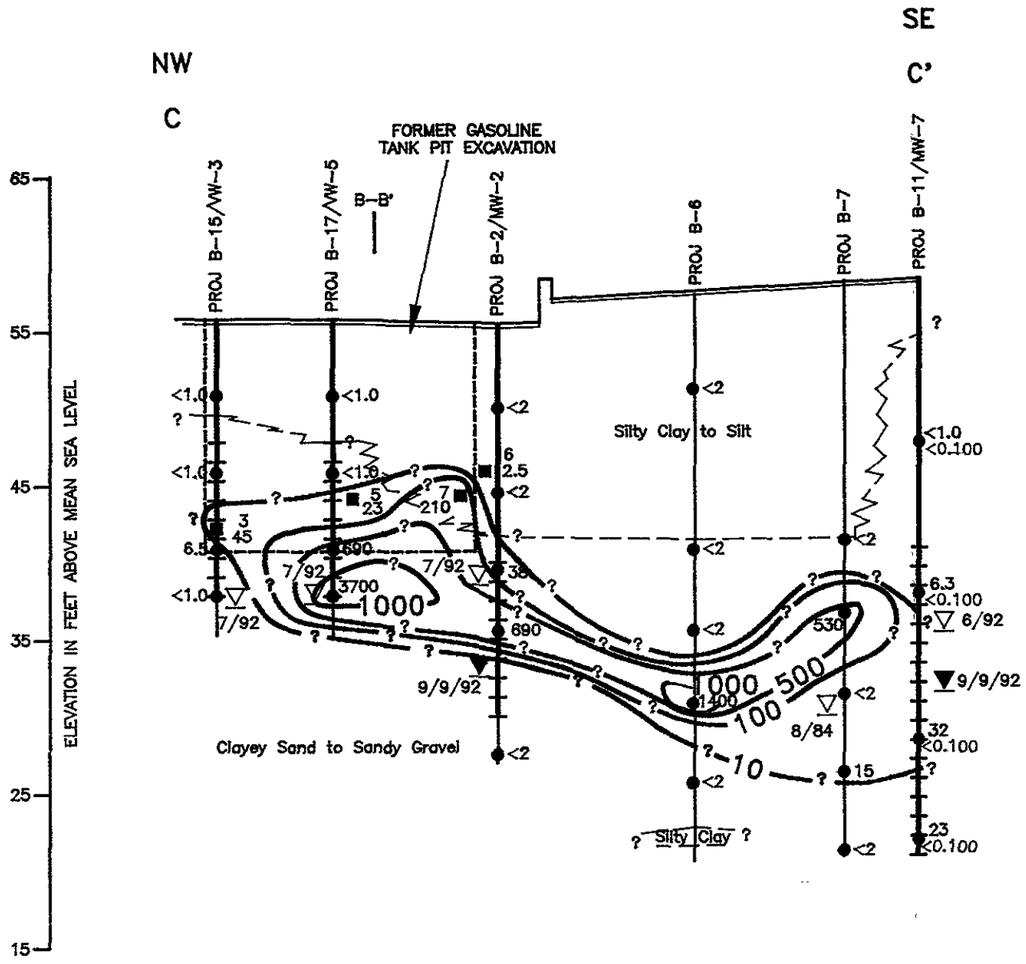
REGISTERED GEOLOGIST
DIANE M. BARCLAY
No. EG1366
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

RESNA
Working to Restore Nature

PROJECT 60026.05

GEOLOGIC CROSS SECTION B-B'
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 19



EXPLANATION

1000 = Line of equal concentration of TPHg in soil in parts per million (ppm)

P-6 2.5 = Former tank pit soil sample showing concentration of TPHg in ppm

3700 <0.10 = Laboratory analyzed soil sample showing concentration of TPHg and PCE in ppm

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in boring 9/9/92

REGISTERED GEOLOGIST
DIANE M. BARCLAY
No. EG1366
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Approximate Horizontal Scale

20 10 0 20 40

feet

Approximate Vertical Scale

10 5 0 10 20

feet

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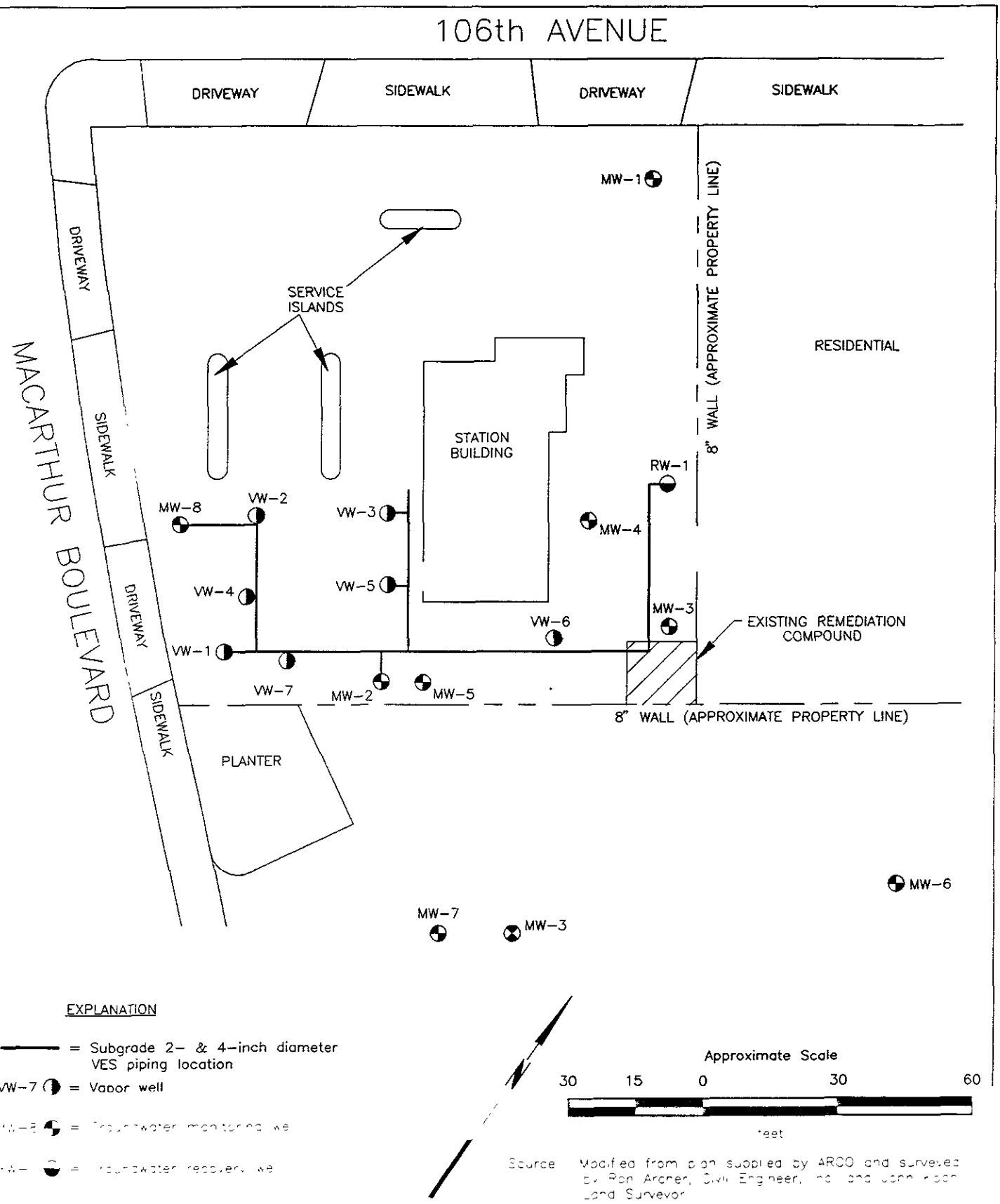
Working to Restore Nature

PROJECT 60026.05

GEOLOGIC CROSS SECTION C-C'
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
20



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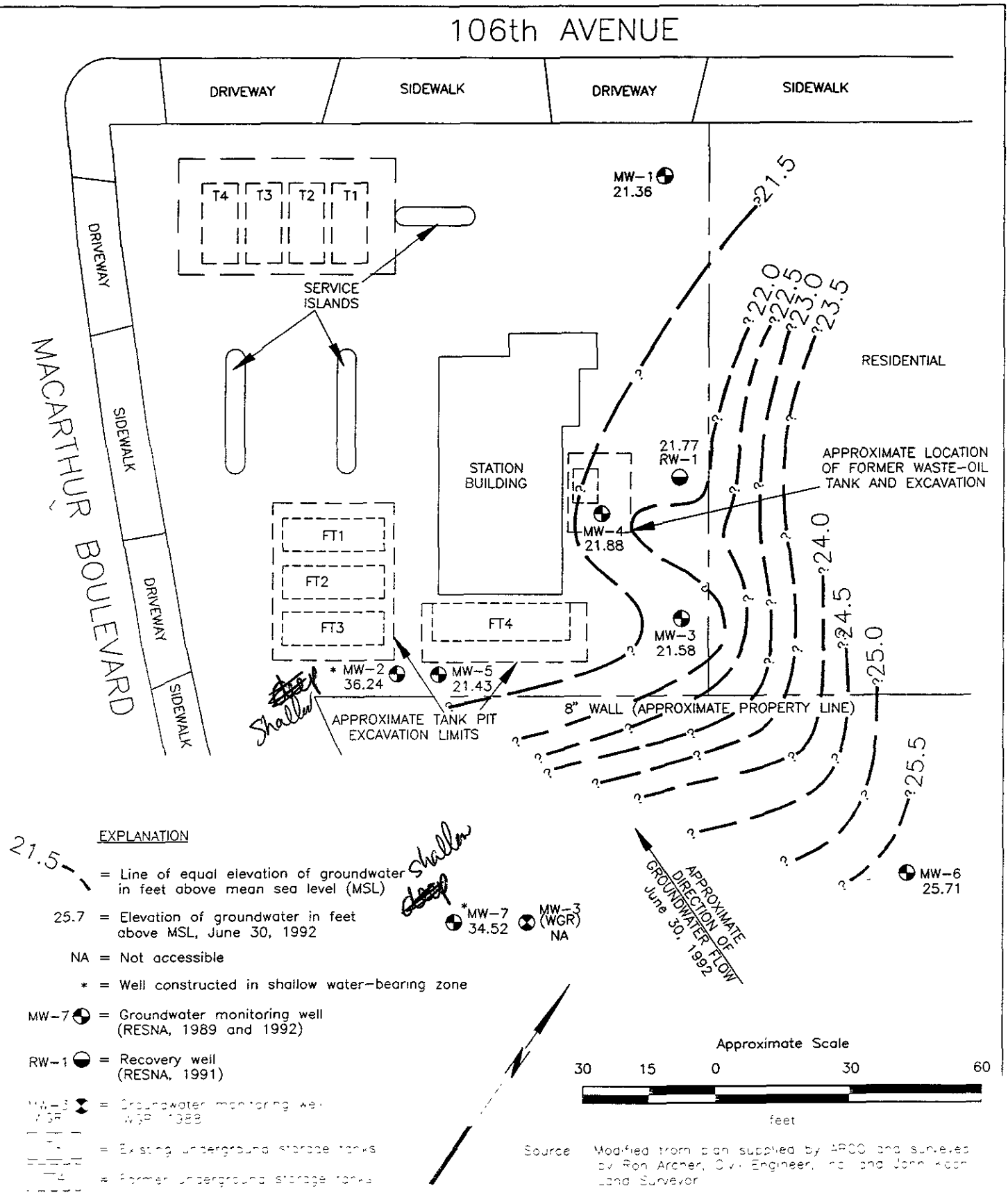
PROJECT 60026.05

VES SCHEMATIC
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
21



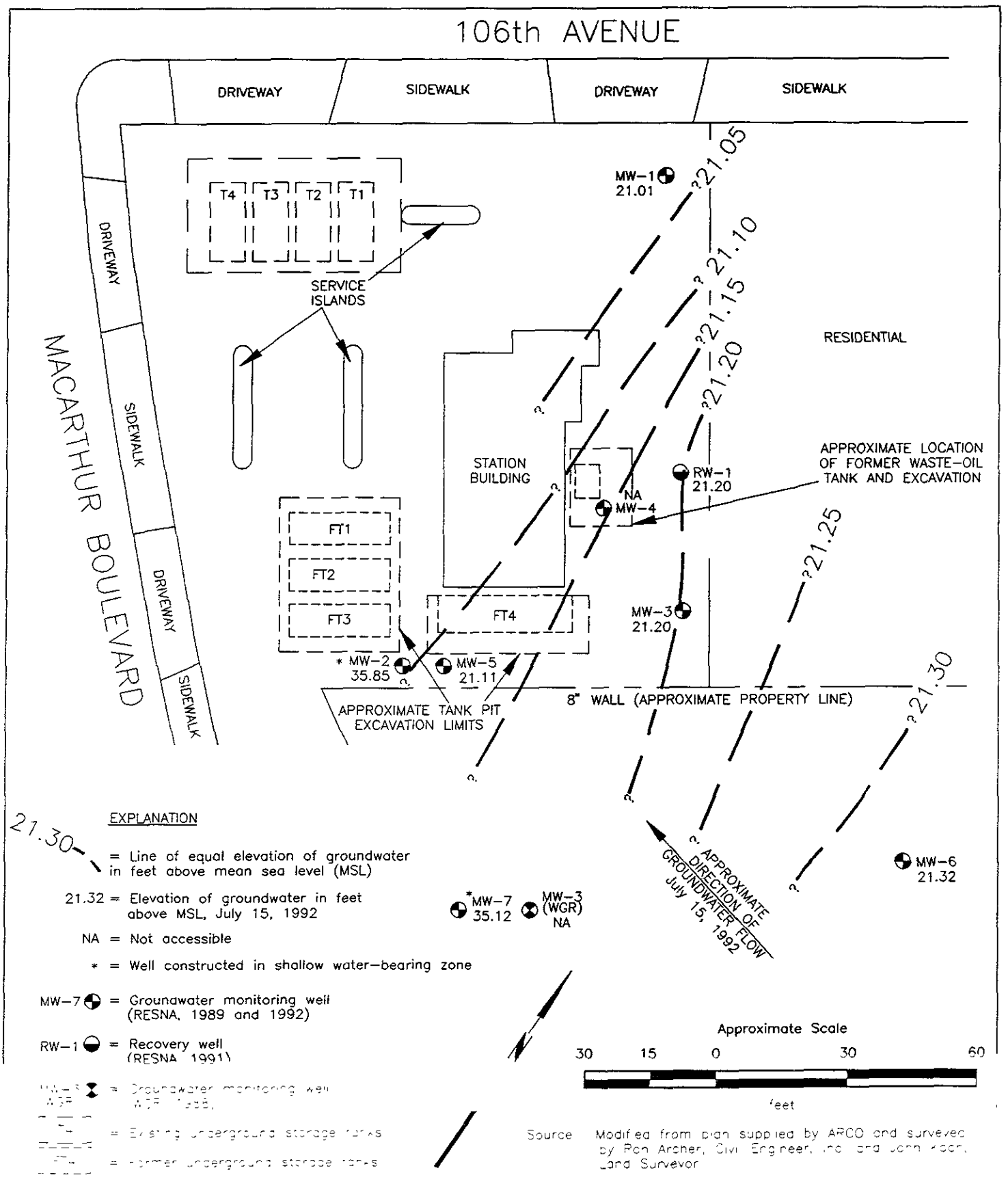
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, and John Kaar, Land Surveyor

RESNA
Industry and Resource Center

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
22

PROJECT 60026.05



Source Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koon, Land Surveyor

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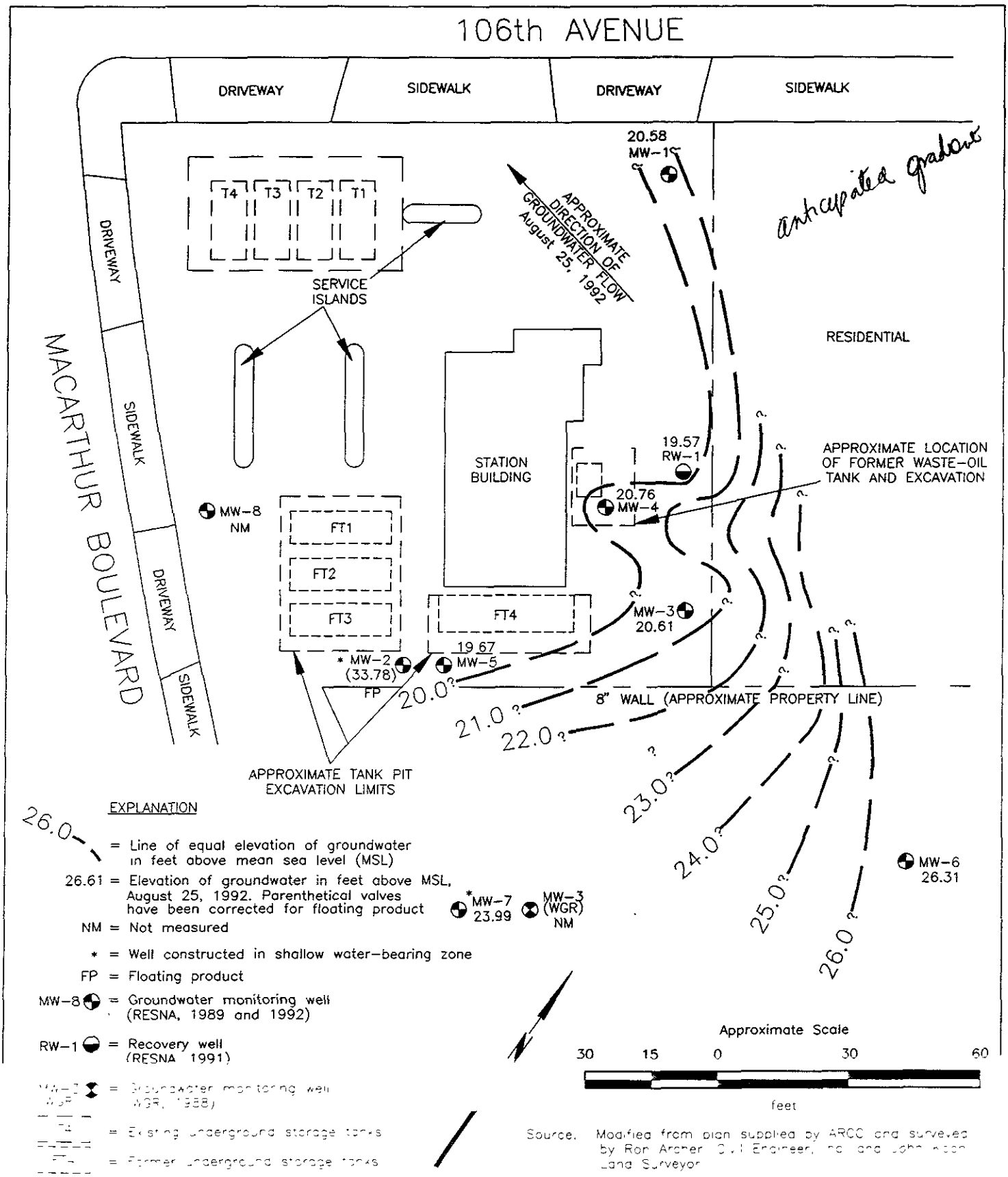
GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
23

PROJECT 60026.05



Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, RCE and John Olson, Land Surveyor

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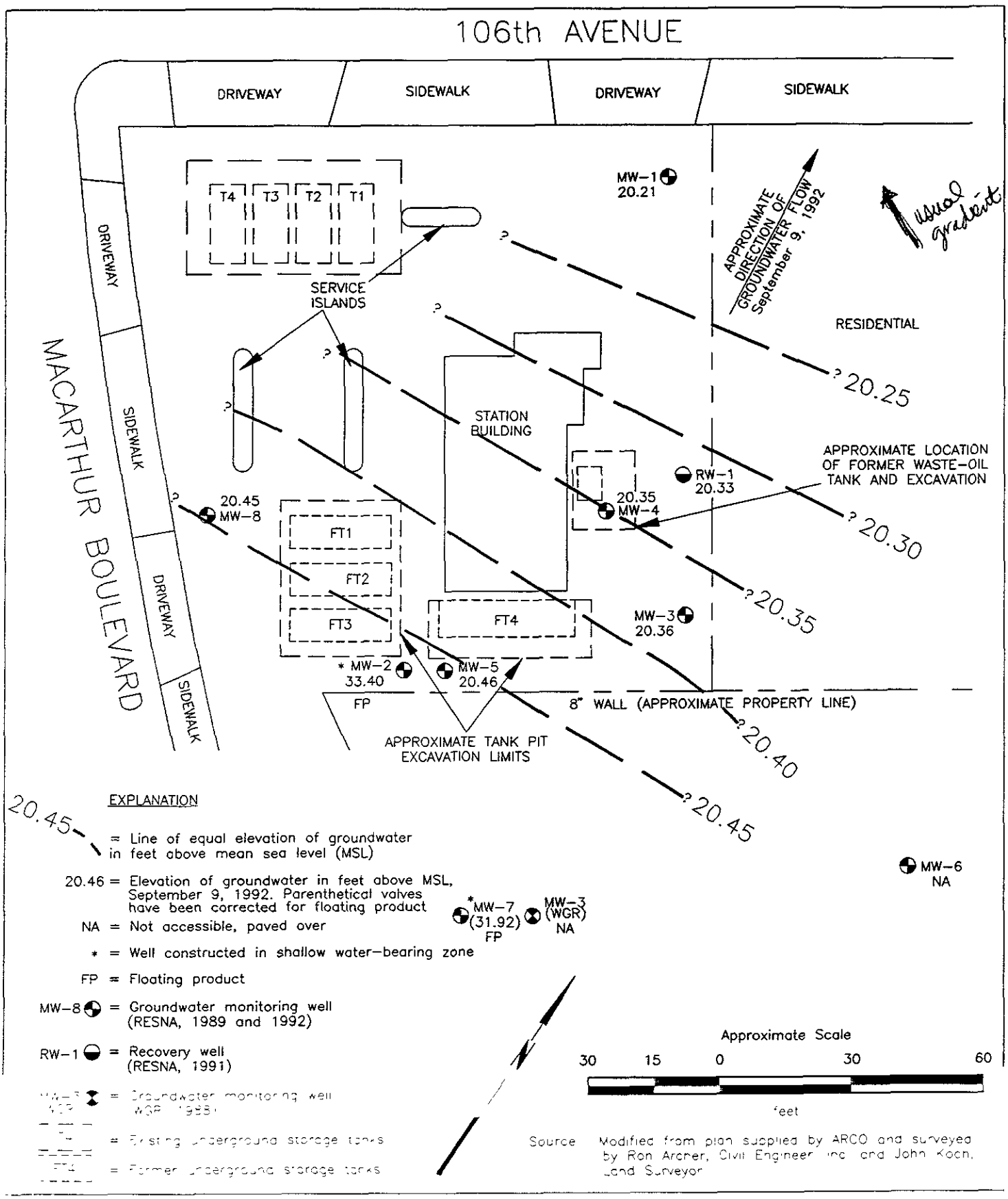
PROJECT 60026.05

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
24



Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, inc. and John Koch, Land Surveyor

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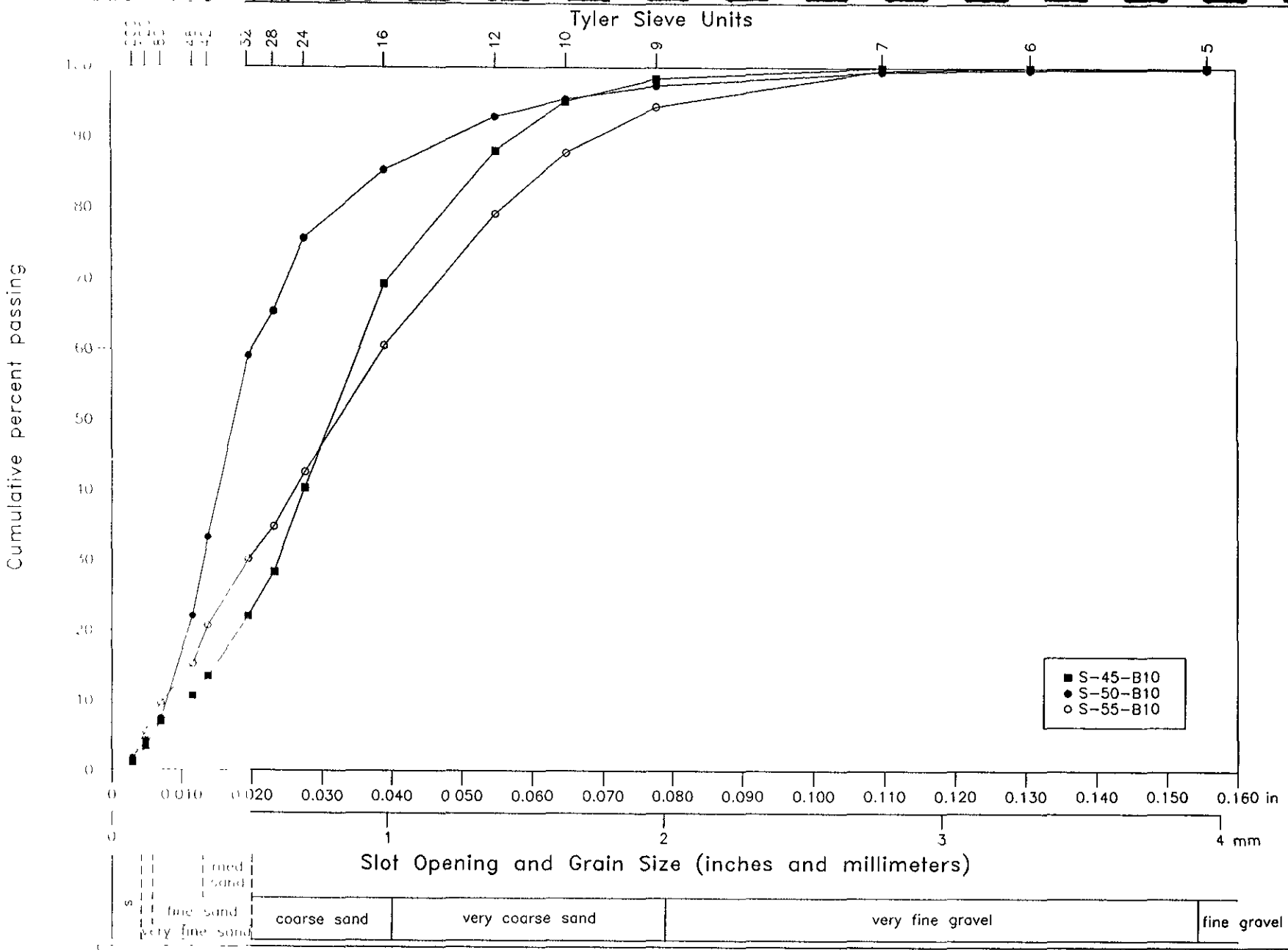
PROJECT 60026.05

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
25



PLATE

26

PARTICLE SIZE DISTRIBUTION GRAPH FOR BORING B-10
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

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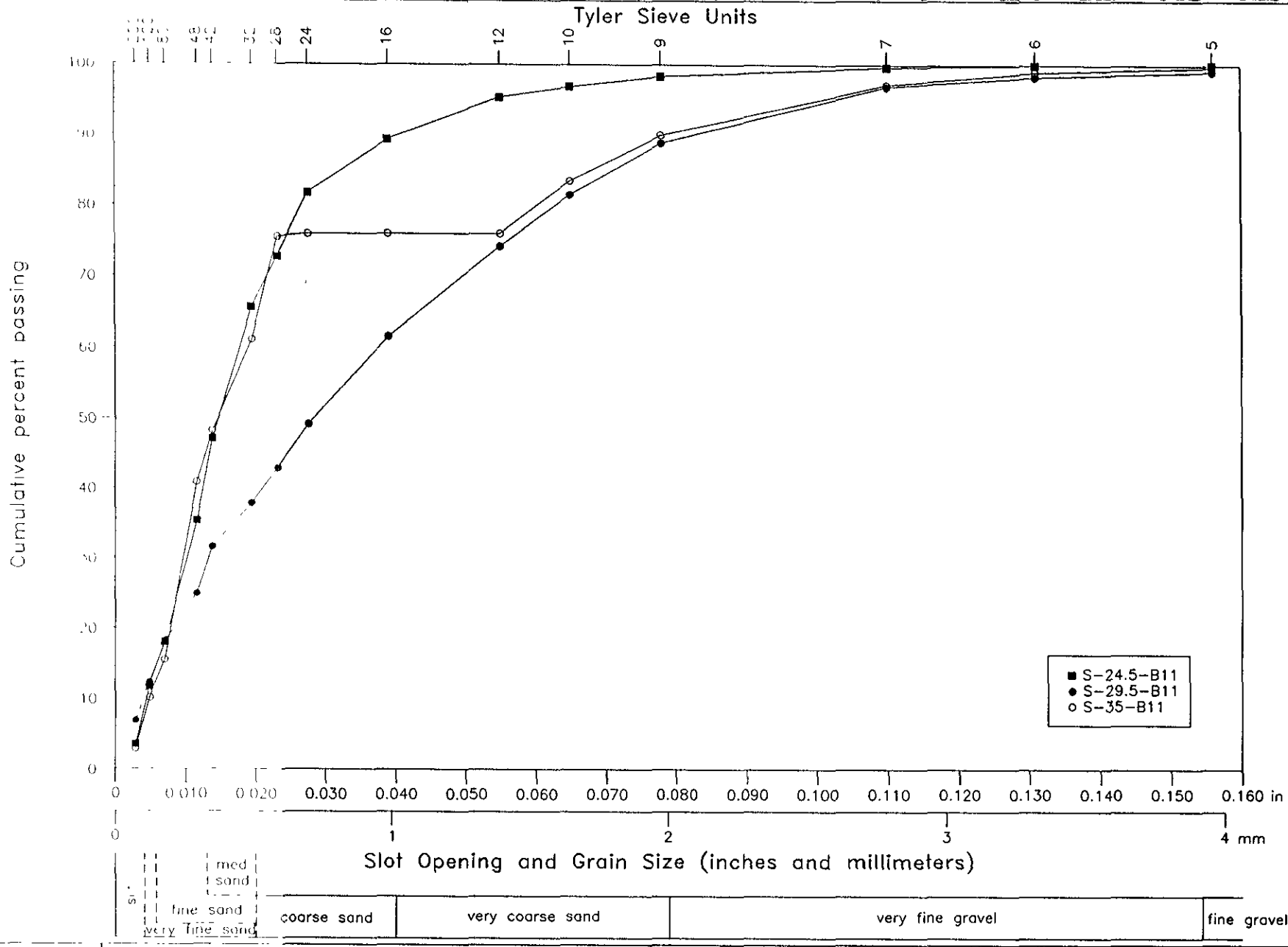
PROJECT **60026.05**



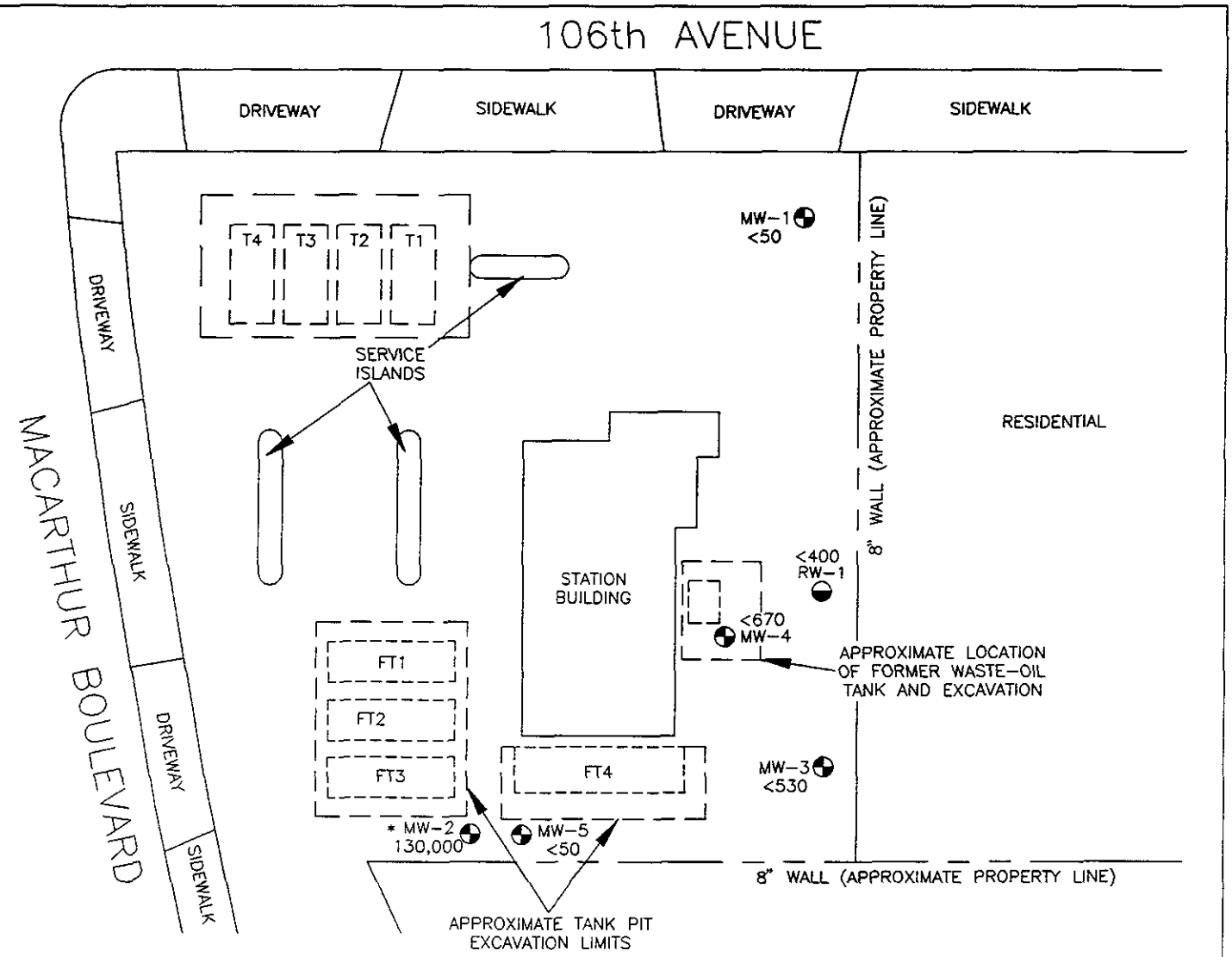
PLATE

27

PARTICLE SIZE DISTRIBUTION GRAPH FOR BORING B-11
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

RESNA
Working to Restore Nature

PROJECT **60026.05**



EXPLANATION

130,000 = Concentration of TPHg in groundwater in parts per billion June 30, 1992

NS = Not sampled

* = Well constructed in shallow water-bearing zone

MW-7 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

T4 = Existing underground storage tanks

FT4 = Former underground storage tanks

*MW-7 71,000 MW-3 (WGR) NS

MW-6 <850

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer [illegible] and John Koch, Land Surveyor

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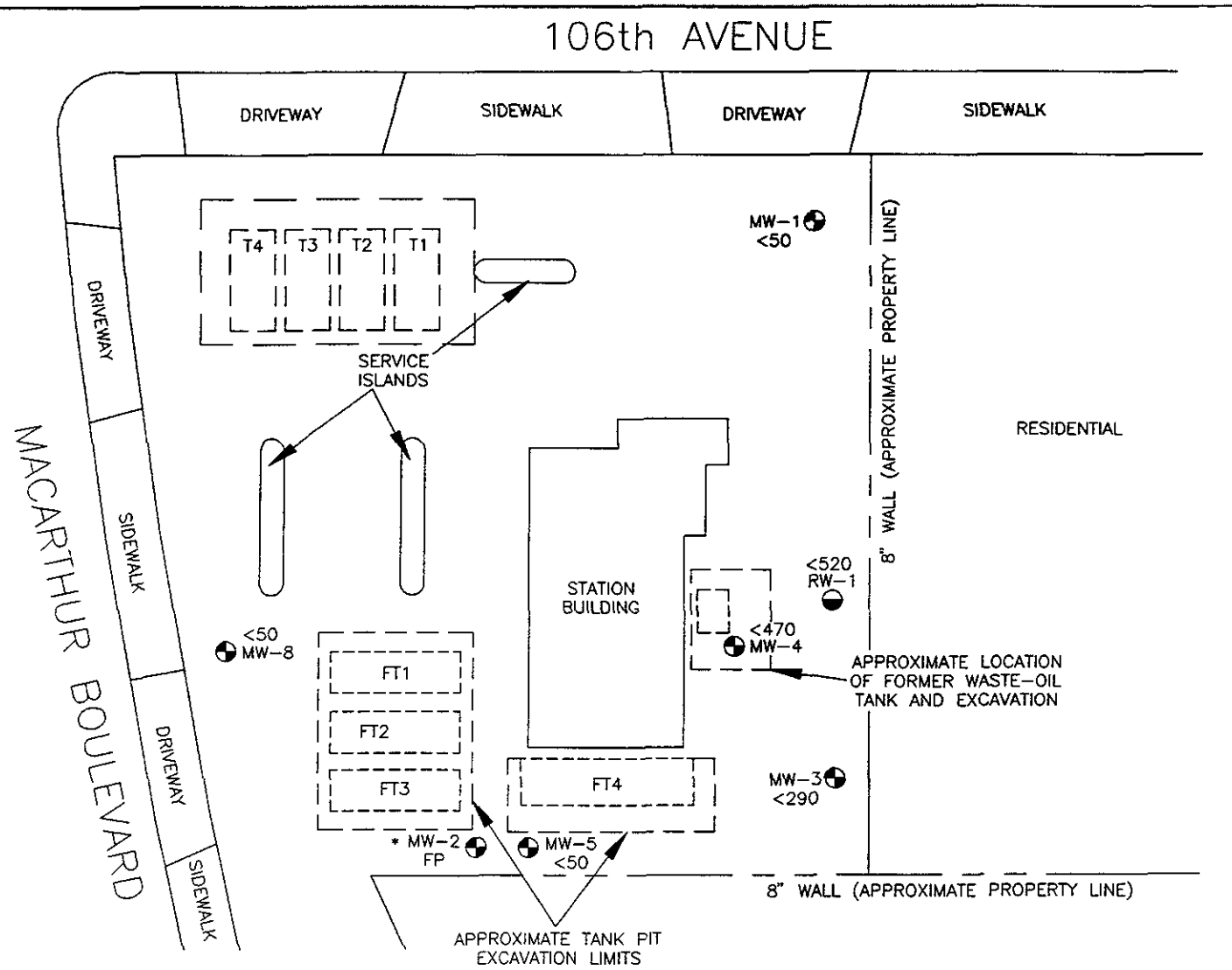
PROJECT 60026.05

TPHg CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
28



EXPLANATION

<520 = Concentration of TPHg in groundwater in parts per billion September 9, 1992

NS = Not sampled

FP = Floating product, well not sampled

IW = Inaccessible well, paved-over

* = Well constructed in shallow water-bearing zone

MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

= Existing underground storage tanks

= Former underground storage tanks

MW-6 IW

*MW-7 FP

MW-3 (WGR) NS

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer Civil Engineer, Inc. and John Koch Land Surveyor

RESNA
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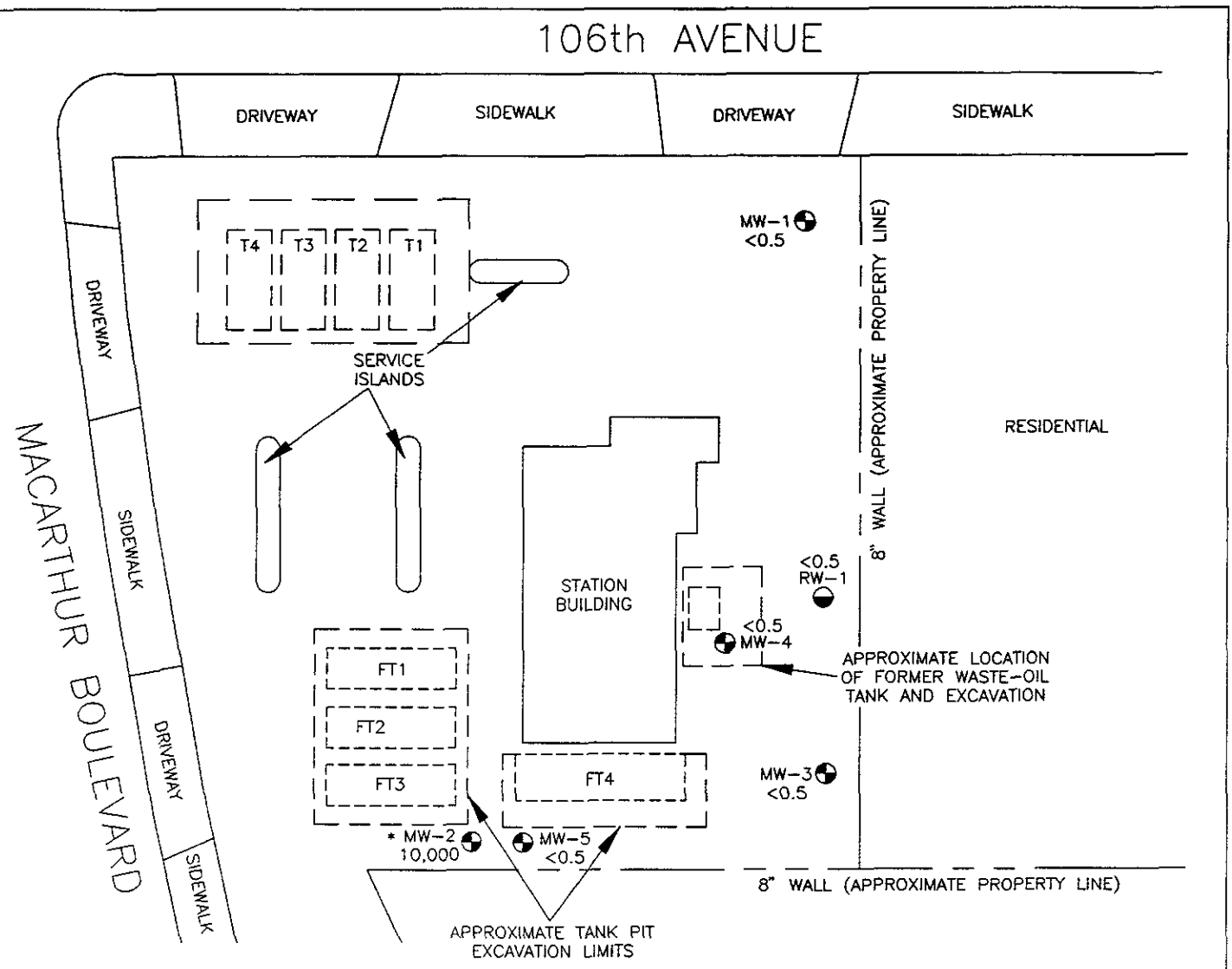
PROJECT 60026.05

TPHg CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
29



EXPLANATION

10,000 = Concentration of benzene in groundwater in parts per billion June 30, 1992

NS = Not sampled

* = Well constructed in shallow water-bearing zone

MW-7 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

[illegible] = Groundwater monitoring well (AGI, 1988)

T4 = Existing underground storage tanks

FT4 = Former underground storage tanks

*MW-7 5,100 MW-3 (WGR) NS

MW-6 <0.5

Approximate Scale

30 15 0 30 60

feet

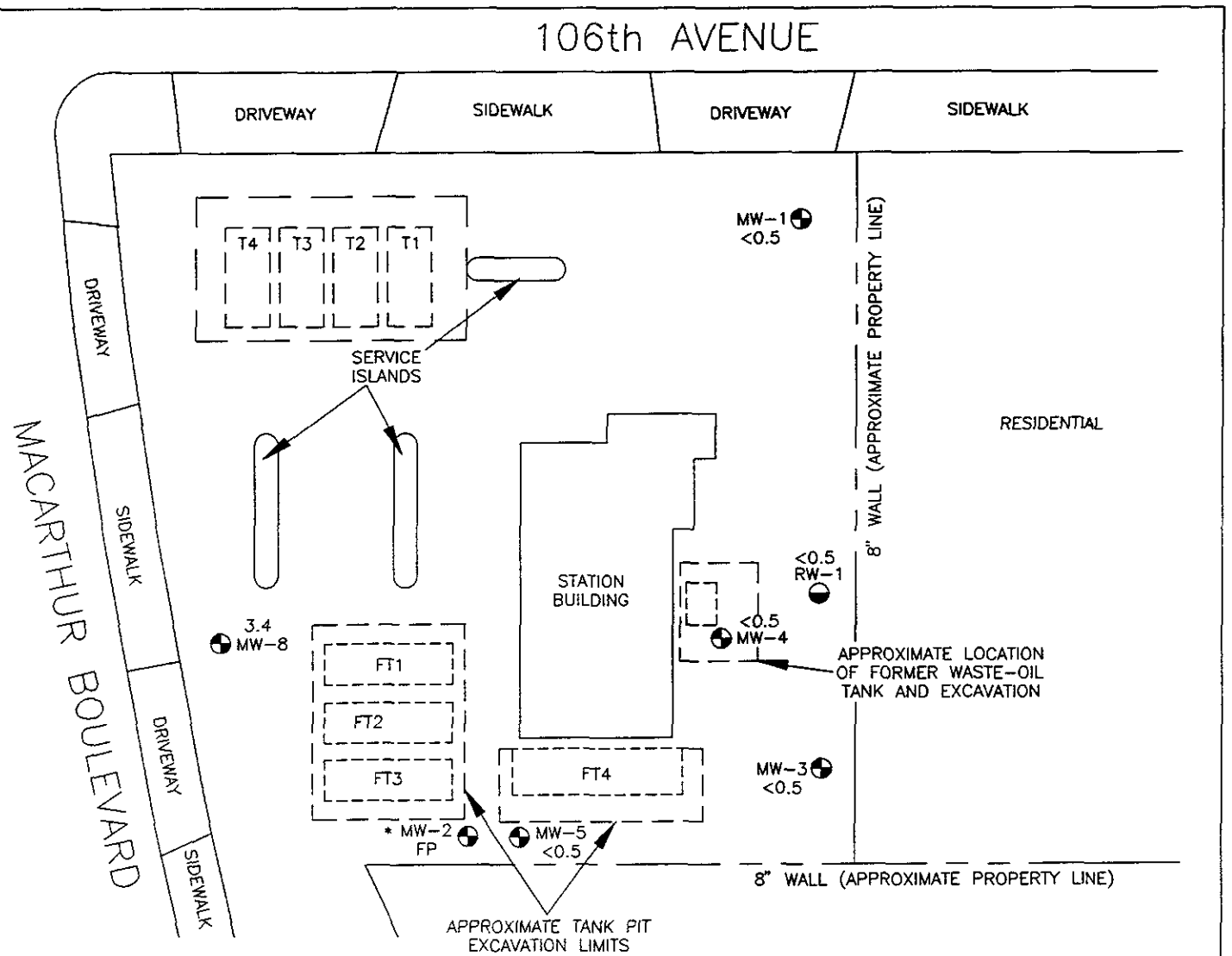
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer Civil Engineer [illegible] and John Koch Land Surveyor

RESNA
Working to Restore Nature

PROJECT 60026.05

BENZENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
30



EXPLANATION

3.4 = Concentration of benzene in deeper water-bearing zone in parts per billion (ppb)

<0.5 = Concentration of benzene in groundwater in ppb, September 9, 1992

NS = Not sampled

FP = Floating product, well not sampled

IW = Inaccessible well, paved over

* = Well constructed in shallow water-bearing zone

MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

= Existing underground storage tanks

= Former underground storage tanks

*MW-7 FP

MW-3 (WGR) NS

MW-6 IW

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, inc. and John Koch Land Surveyor

RESNA
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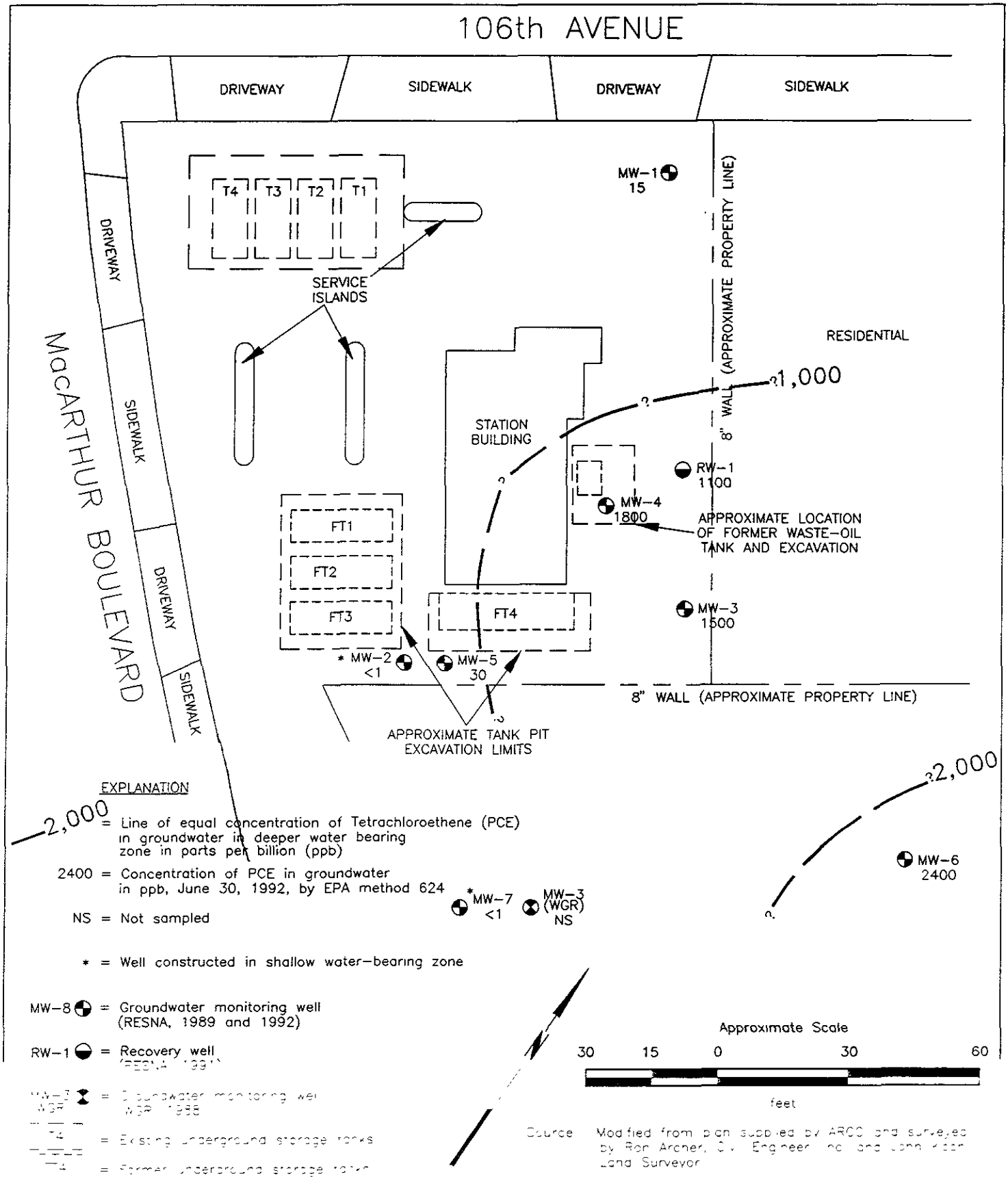
PROJECT 60026.05

BENZENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
31



Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, inc. and John Kerr, Land Surveyor

RESNA
Working to Restore Nature

TETRACHLOROETHENE CONCENTRATIONS PLATE
IN GROUNDWATER ppb
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

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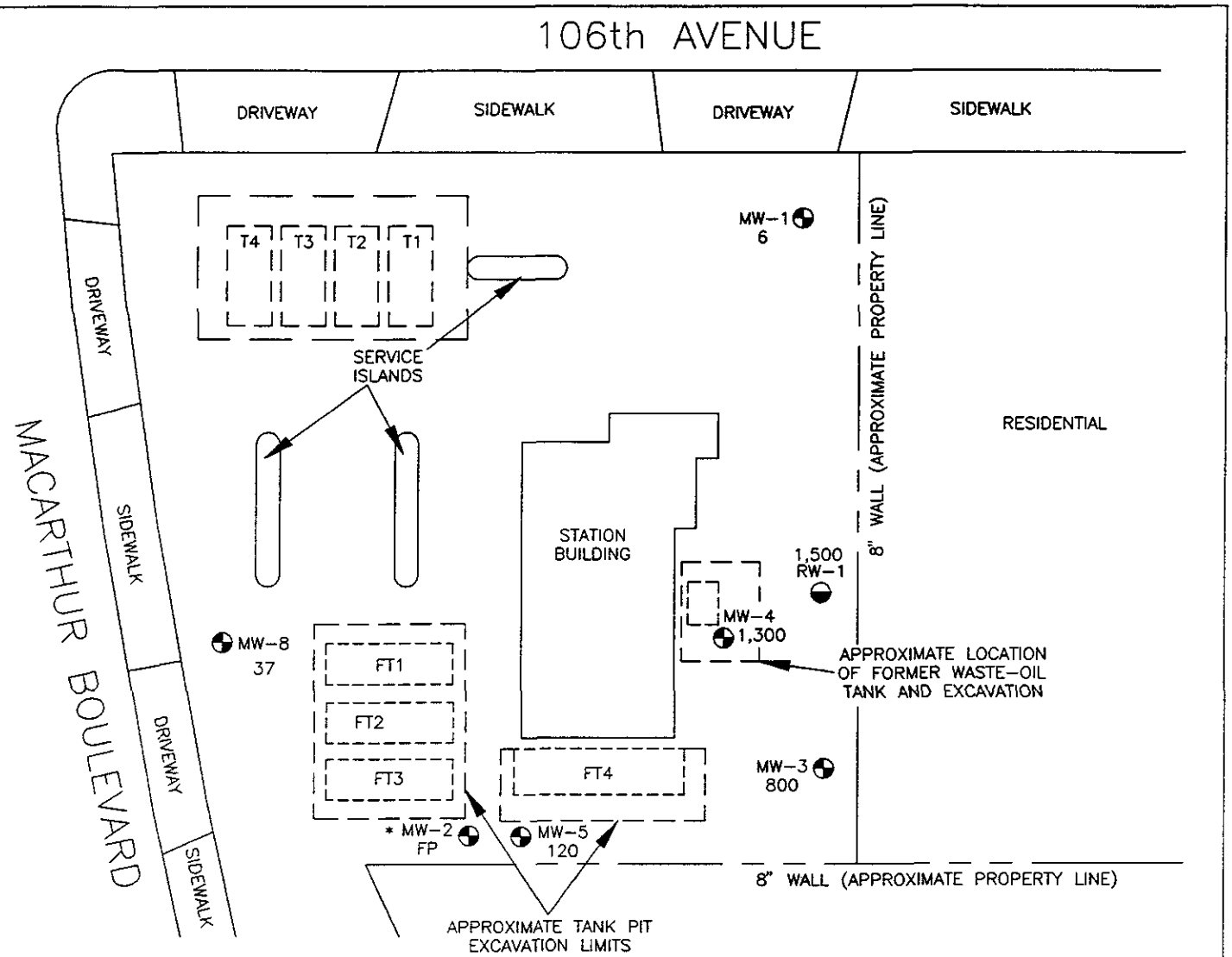
PROJECT 60026.05



EXPLANATION

1,300 = Concentration of PCE in groundwater in ppb, September 9, 1992, by EPA method 624

NS = Not sampled

FP = Floating product, well not sampled

IW = Inaccessible well, paved over

* = Well constructed in shallow water-bearing zone

MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

T4 = Existing underground storage tanks

FT4 = Former underground storage tanks

MW-6 IW

* MW-7 FP

MW-3 (WGR) NS

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, inc. and John Koch Land Surveyor

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TETRACHLOROETHENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 33

PROJECT 60026.05

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 1 of 5)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
04/17/89		33.04	22.87	None
04/24/89		33.84	22.07	None
10/13/89	55.91	37.19	18.72	None
02/01/90		36.73	19.18	None
07/31/90		36.42	19.49	None
08/01/90		36.41	19.50	None
08/28/90		36.88	19.03	None
10/30/90		37.73	18.18	None
11/20/90		37.92	18.37	None
12/19/90		37.90	18.01	None
01/30/91		38.06	17.85	None
02/27/91		37.66	18.25	None
03/20/91		36.77	19.14	None
04/30/91		34.63	21.28	None
05/31/91		34.83	21.08	None
07/24/91		35.96	19.95	None
08/06/91		36.21	19.70	None
09/03/91		36.74	19.17	None
10/17/91		37.57	18.34	None
11/05/91		37.65	18.26	None
12/24/91		38.14	17.77	None
01/19/92		37.62	18.29	None
02/20/92		36.23	19.68	None
03/10/92		34.58	21.33	None
04/20/92		32.82	23.09	None
05/15/92		33.17	22.74	None
06/30/92		34.55	21.36	None
07/15/92		34.90	21.01	None
08/25/92	55.92	35.34	20.58	None
09/09/92		35.71	20.21	None
MW-2				
04/17/89		17.20	38.15	None
04/24/89		[illegible]	[illegible]	None
10/13/89	55.35	21.15*	35.2*	[illegible]
02/01/90		NM	NM	None
07/31/90		[illegible]	[illegible]	None
08/01/90		[illegible]	[illegible]	[illegible]
08/28/90		21.25*	34.1*	[illegible]
10/30/90		21.21*	[illegible]	[illegible]

See notes on Page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 2 of 5)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2 Cont.				
11/20/90		25.08*	30.27*	0.60
12/19/90		18.23*	37.12*	None
01/30/91		19.47*	35.88*	0.03
02/27/91		18.84*	36.51*	0.02
03/20/91		16.02*	39.33*	0.01
04/30/91		16.55	38.80	Sheen
05/31/91		18.41*	36.94*	0.01
07/24/91		19.81	35.54	Sheen
08/06/91		20.59*	34.76*	0.14
09/03/91		23.23*	32.12*	0.54
10/17/91		24.81*	30.54*	0.20
11/05/91		18.88*	36.47*	0.01
12/24/91		19.34*	36.01*	0.09
01/19/92		18.00	37.35	Sheen
02/20/92		14.81	40.54	Skimmer
03/10/92		14.95	40.40	Skimmer
04/20/92		16.13	39 22	None
05/15/92		17.66	37.69	None
06/30/92		19.11	36.24	Sheen
07/15/92		19.50	35 85	None
08/25/92	55.10	21.32*	33.78*	0.02
09/09/92		22.70*	33.40*	0.05
MW-3				
04/24/89		34.47	22.08	None
10/13/89	56.55	37.60	18.95	None
02/01/90		37.20	19.35	None
07/31/90		36 90	19.65	None
08/01/90		36.87	19.68	None
08/28/90		37.33	19.22	None
10/30/90		38.15	18 40	None
11/20/90		38.33	18.58	None
12/19/90		[illegible]	18.25	None
01/30/91		Well	Dry	
02/27/91		[illegible]	[illegible]	None
03/20/91		[illegible]	[illegible]	None
04/30/91		[illegible]	[illegible]	None
05/31/91		[illegible]	[illegible]	None
07/24/91		[illegible]	[illegible]	None
08/06/91		[illegible]	[illegible]	None

See notes on page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 3 of 5)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-3 Cont.				
09/03/91		37.20	19.35	None
10/17/91		38.04	18.51	None
11/05/91		38.08	18.47	None
12/24/91		Well	Dry	
01/19/92		38.07	18.48	None
02/20/92		36.71	19.84	None
03/10/92		34.96	21.59	None
04/20/92		33.20	23.35	None
05/15/92		33.70	22.85	None
06/30/92		34.97	21.58	None
07/15/92		35.35	21.20	None
08/25/92	56.55	35.94	20.61	None
09/09/92		36.19	20.36	None
MW-4				
04/17/89		33.87	22.07	None
04/24/89		33.76	22.18	None
10/13/89	55.94	37.03	18.91	None
02/01/90		36.57	19.37	None
07/31/90		36.39	19.55	None
08/01/90		36.32	19.62	None
08/28/90		36.79	19.15	None
10/30/90		37.62	18.32	None
11/20/90		37.82	18.52	None
12/19/90		37.74	18.20	None
01/30/91		37.97	17.97	None
02/27/91		37.52	18.42	None
03/20/91		36.69	19.25	None
04/30/91		34.48	21.46	None
05/31/91		34.73	21.21	None
07/24/91		35.86	20.08	None
08/06/91		36.15	19.79	None
09/03/91		36.66	19.28	None
10/17/91		37.47	18.48	None
11/05/91		37.54	18.40	None
12/24/91		38.11	17.83	None
01/19/92		37.48	18.46	None
02/20/92		36.11	19.83	None
03/10/92		34.46	21.54	None
04/20/92		32	23.34	None

See notes on page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 4 of 5)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4 Cont.				
05/15/92		33.12	22.82	None
06/30/92		34.06	21.88	None
07/15/92			Well Not Accessible	
08/25/92	55.98	35.22	20.76	None
09/09/92		35.63	20.35	None
MW-5				
04/17/89		33.17	22.26	None
04/24/89		33.06	22.37	None
10/13/89	55.43	36.33	19.10	None
02/01/90		35.96	19.47	None
07/31/90		35.70	19.73	None
08/01/90		35.69	19.74	None
08/28/90		36.14	19.29	None
10/30/90		36.94	18.49	None
11/20/90		37.09	18.64	None
12/19/90		37.05	18.38	None
01/30/91		37.26	18.17	None
02/27/91		36.81	18.62	None
03/20/91		36.04	19.39	None
04/30/91		33.75	21.68	None
05/31/91		34.01	21.42	None
07/24/91		35.20	20.23	None
08/06/91		35.48	19.95	None
09/03/91		36.00	19.43	None
10/17/91		36.84	18.59	None
11/05/91		36.86	18.57	None
12/24/91		37.31	18.12	None
01/19/92		36.95	18.48	None
02/20/92		35.39	20.04	None
03/10/92		33.67	21.76	None
04/20/92		31.80	23.63	None
05/15/92		32.37	23.06	None
06/30/92		34.00	21.43	None
07/15/92		34.32	21.11	None
08/25/92	55.43	35.76	19.67	None
09/09/92		34.97	20.46	None
MW-6				
06/30/92		35.56	25.87	None

See notes on page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 5 of 5)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-6 Cont.				
07/15/92		39.89	21.32	None
08/25/92	61.21	34.90	26.31	None
09/09/92			Well Not Accessible	
MW-7				
06/30/92		23.70	34.52	None
07/15/92		23.10	35.12	None
08/25/92	58.22	34 23	23.99	None
09/09/92		26.30*	31.92*	1.31
MW-8	53.65			
09/09/92		33.20	20 45	None
RW-1				
11/05/91	56.32	37.89	18.43	None
12/24/91		38.35	17 97	None
01/19/92		37.82	18.50	None
02/20/92		36.42	19.90	None
03/10/92		34.74	21.58	None
04/20/92		32.90	23 42	None
05/15/92		33.43	22.89	None
06/30/92		34.55	21.77	None
07/15/92		35 12	21.20	None
08/25/92	56.32	36.75	19.57	None
09/09/92		35.99	20.33	None

Depths are in feet below top of each well casing. Floating product reported in feet.
Elevations are referenced in feet above mean sea level.
NM = Not monitored.
* = Depth to water and water elevation adjusted as followed: The thickness of the floating product and the ground-water depths were recorded. The recorded thickness of the floating product was then 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

TABLE 2
VAPOR EXTRACTION TEST FIELD MONITORING DATA
ARCO Station 276
Oakland, California
(Page 1 of 5)

Influent Air From VW-1					Observation Wells							
Flow	Applied Vacc.	% LEL	$\%O_2$	Elapsed Time (Min.)	VW-2 Induced Vacuum	VW-3 Induced Vacuum	VW-4 Induced Vacuum	VW-5 Induced Vacuum	VW-6 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum	MW-8 Induced Vacuum
90	10	5	18.5	5	0.25	0.08	1.2	0.03	3.4*	1.5	0.08	0
90	10	5	18.5	10	0.26	0.08	1.23	0.03	3.4*	1.4	0.06	0
90	10	5	16.5	25	0.26	0.06	1.2	0.02	3.4*	1.4	0.06	0
90	10	5	16.5	25	0.26	0.06	1.2	0.02	3.4*	1.4	0.06	0
75	5	NM	NM	35	NM	NM	NM	NM	NM	NM	NM	NM
25	1	NM	NM	40	NM	NM	NM	NM	NM	NM	NM	NM
Distance from Well VW-1 (ft):					26	48.5	13	40	75	15	37	25
Screen interval (ft):					8-18	8-18	9-19	8-18	9-18	7.5-17.5	15-25	29-49
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	21.25	32.90

Vapor Extraction Well VW-1 screened from 7 ft. to 17 ft. DTW = DRY.
* Residual applied vacuum at VW-6

Influent Air From VW-2					Observation Wells							
Flow	Applied Vacc.	% LEL	$\%O_2$	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-3 Induced Vacuum	VW-4 Induced Vacuum	VW-5 Induced Vacuum	VW-6 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum	MW-8 Induced Vacuum
38	56	0	18	5	0.06	0.95	0.35	0.04	0	0.025	0	0
38	56	0	21	10	NM	NM	NM	NM	NM	NM	NM	NM
38	55	0	18	15	0.06	0.105	0.45	0.04	0	0.03	0	0
38	55	10	18	20	NM	NM	NM	NM	NM	NM	NM	NM
38	55	10	19.5	35	0.06	0.11	0.40	0.03	0	0.03	0.02	0
38	55	20	19.5	40	NM	NM	NM	NM	NM	NM	NM	NM
38	55	20	19.0	50	0.06	0.11	0.40	0.03	0	0.03	0.02	0
35	47	NM	NM	55	NM	NM	NM	NM	NM	NM	NM	NM
28	30	NM	NM	60	NM	NM	NM	NM	NM	NM	NM	NM
19	24	NM	NM	65	NM	NM	NM	NM	NM	NM	NM	NM
6	4	NM	NM	70	NM	NM	NM	NM	NM	NM	NM	NM
Distance from Well VW-2 (ft):					2	36	18	34	74	35	48	18
Screen interval (ft):					7-17	9-19	9-19	9-18	9-18	7.5-17.5	15-25	29-49
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	21.25	32.90

Vapor Extraction Well VW-2 screened from 9 ft. to 19 ft. DTW = DRY

See notes on page 5 of 5

TABLE 2
VAPOR EXTRACTION TEST FIELD MONITORING DATA
ARCO Station 276
Oakland, California
(Page 2 of 5)

Influent Air From VW-3					Observation Wells							
Flow	Applied Vacc.	% LEL	%O_2	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-2 Induced Vacuum	VW-4 Induced Vacuum	VW-5 Induced Vacuum	VW-6 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum	MW-8 Induced Vacuum
70	34	35	12	5	0.03	0.32	0.25	0.40	.07	0.03	0.05	0
70	35	15	17½	10	0.03	0.32	0.25	0 48	08	0.03	0.05	0
70	33	10	18	15	0.03	0.36	0.25	0.495	09	.04	0 07	0
70	33	10	18.5	20	0.03	0.35	0.25	0.495	09	0.04	0.08	0
70	33	10	18.5	30	0.03	0.35	0.25	0.50	.09	0.04	0.08	0
63	27	NM	NM	35	NM	NM	NM	NM	NM	NM	NM	NM
58	20	NM	NM	40	NM	NM	NM	NM	NM	NM	NM	NM
45	15	NM	NM	45	NM	NM	NM	NM	NM	NM	NM	NM
28	4	NM	NM	50	NM	NM	NM	NM	NM	NM	NM	NM
Distance from Well VW-3 (ft):					48.5	30	38	16	48	41	38	47
Screen interval (ft):					7-17	8-18	9-19	8-18	9-18	7.5-17.5	15-25	29-49
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	21.25	32.90

Vapor Extraction Well VW-3 screened from 8 ft. to 18 ft. DTW = DRY.

Influent Air From VW-4					Observation Wells							
Flow	Applied Vacc.	% LEL	%O_2	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-2 Induced Vacuum	VW-3 Induced Vacuum	VW-5 Induced Vacuum	VW-6 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum	MW-8 Induced Vacuum
43	52	50	5	5	0.2	0.6	0.11	0.04	3.4*	0.15	0.04	0
43	52	NM	NM	10	0.2	0.6	0.11	0.04	3.4*	0.15	0.04	0
43	50	25	15	20	0.225	0.6	0 11	0.04	3.4*	0.17	0.04	0
43	50	25	15	30	0.225	0.6	0 11	0.04	3.4*	0.18	0.04	0
43	38	NM	NM	35	NM	NM	NM	NM	NM	NM	NM	NM
29	21.5	NM	NM	40	NM	NM	NM	NM	NM	NM	NM	NM
24	10	NM	NM	45	NM	NM	NM	NM	NM	NM	NM	NM
12	1	NM	NM	50	NM	NM	NM	NM	NM	NM	NM	NM
Distance from Well VW-4 (ft.)					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Screen interval (ft)					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.5-17.5	15-25	29-49
Depth-to-Water (DTW-ft)					DRY	DRY	DRY	DRY	DRY	DRY	21.25	32.90

Vapor Extraction Well VW-4 screened [illegible] from DTW DRY

* Residual applied vacuum at VW-6.

See notes on page 5 of 5

TABLE 2
VAPOR EXTRACTION TEST FIELD MONITORING DATA
ARCO Station 276
Oakland, California
(Page 3 of 5)

Influent Air From VW-5					Observation Wells							
Flow	Applied Vacc.	% LEL	%O_2	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-2 Induced Vacuum	VW-3 Induced Vacuum	VW-4 Induced Vacuum	VW-6 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum	MW-8 Induced Vacuum
61	41	20	18	5	0.30	0.24	1.725	1.2	3.0*	0.065	0.10	0
61	40	45	10	10	0.035	0.261	1.725	1.2	3.0*	0.45	0.10	0
61	40	15	18.5	20	0.35	0.27	1.80	1.3	3.0*	NM	NM	NM
45	20	NM	35	NM	NM	NM	NM	NM	NM	NM	NM	NM
39	10	NM	NM	40	NM	NM	NM	NM	NM	NM	NM	NM
24	4	NM	NM	45	NM	NM	NM	NM	NM	NM	NM	NM
Distance from Well VW-5 (ft):					40	34	16	28	40	25	23	45
Screen interval (ft):					7-17	8-18	8-18	9-19	9-18	7.5-17.5	15-22	29-39
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	21.25	32.90

Vapor Extraction Well VW-5 screened from 8 ft. to 18 ft. DTW = DRY
*Residual applied vacuum at VW-6.

Influent Air From VW-6					Observation Wells							
Flow	Applied Vacc.	% LEL	%O_2	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-2 Induced Vacuum	VW-3 Induced Vacuum	VW-4 Induced Vacuum	VW-5 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum	MW-8 Induced Vacuum
3	56	<2	19.5	5	3	0.03	0.6	0.005	0.03	0	0.02	0
3	55	<2	20	10	0	0.02	0.045	0.005	0.03	0	0.02	0
3	54	<2	20	20	0	0.02	0.045	0.005	0.03	0	0.02	0
3	54	<2	20	30	0	0.02	0.045	0.005	0.03	0	0.02	0
Distance from Well VW-6 (ft):					75	74	48	72	25	61	40	85
Screen interval (ft):					7-17	8-18	8-18	9-19	8-18	7.5-17.5	15-25	29-39
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	21.25	32.90

Vapor Extraction Well VW-6 screened from 9 ft. to 18 ft. DTW = DRY.

See notes on Page 5 of 5

TABLE 2
VAPOR EXTRACTION TEST FIELD MONITORING DATA
ARCO Station 276
Oakland, California
(Page 4 of 5)

Influent Air From VW-7					Observation Wells							
Flow	Applied Vacc.	% LEL	$\%O_2$	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-2 Induced Vacuum	VW-3 Induced Vacuum	VW-4 Induced Vacuum	VW-5 Induced Vacuum	VW-6 Induced Vacuum	MW-2 Induced Vacuum	MW-8 Induced Vacuum
56	35	0	20	5	NM	NM	NM	NM	NM	NM	NM	NM
56	40	0	20	10	0.72	0.11	0.03	0.35	0	0	0.04	0
56	38	0	20	20	0.72	0.11	0.03	0.35	0	0	0.04	0
56	38	0	20	30	0.72	0.11	0.03	0.35	0	0	0.04	0
56	39	0	20	50	0.72	0.11	0.03	0.35	0	0	0.04	0
46	21	NM	NM	55	NM	NM	NM	NM	NM	NM	NM	NM
18	8	NM	NM	60	NM	NM	NM	NM	NM	NM	NM	NM
Distance from Well VW-7 (ft):					15	35	41	17	25	61	22	40
Screen interval (ft):					7-17	8-18	8-18	9-19	8-18	9-18	15-25	29-39
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	22.5	32.90

Vapor Extraction Well VW-7 screened from 7.5 ft to 17.5 ft. DTW = DRY.

Influent Air From MW-2					Observation Wells							
Flow	Applied Vacc.	% LEL	$\%O_2$	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-2 Induced Vacuum	VW-3 Induced Vacuum	VW-4 Induced Vacuum	VW-5 Induced Vacuum	VW-6 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum
83	20	70	12	10	0.01	0.95	0.11	0.95	0.05	1.6*	0.11	0
83	19	20	15	15	0.005	0.08	0.12	0.80	0.05	1.6*	0.115	0
83	18	20	15	20	0.05	0.08	0.12	0.80	0.05	1.6*	0.1	0
83	19	20	17	30	0.05	0.95	0.12	0.85	0.04	1.6*	0.11	0
70	11	NM	NM	35	NM	NM	NM	NM	NM	NM	NM	NM
58	6	NM	NM	40	NM	NM	NM	NM	NM	NM	NM	NM
35	2	NM	NM	45	NM	NM	NM	NM	NM	NM	NM	NM
Distance from Well MW-2 (ft):					37	48	38	37	23	40	22	60
Screen interval (ft):					7-17	8-18	8-18	9-19	8-18	9-18	15-25	29-39
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	DRY	32.90

Vapor Extraction Well VW-6 screened from 7.5 ft to 17.5 ft. DTW = 22.25 DTP = 2.2+

* Residual applied vacuum at VW-6

See notes on page 5 of 5

TABLE 2
VAPOR EXTRACTION TEST FIELD MONITORING DATA
ARCO Station 276
Oakland, California
(Page 5 of 5)

Influent Air From Wells					Wells Operating
Flow	Applied Vacc.	% LEL	$\%O_2$	Elapsed Time (Min.)	
60.0	42	30	14	5	VW-5
61.3	40	10	19	7	VW-5 & VW-6
83.0	18	15	18	9	VW-5, VW-6, MW-2
95.0	16	10	18.5	11	VW-5, VW-6, MW-2, VW-3
96.3	12	100	18.5	13	VW-5, VW-6, MW-2, VW-3, VW-4
90.0	6	18.5	18	15	VW-5, VW-6, MW-2, VW-3, VW-4, VW-1
90.0	6	12	18	17	VW-5, VW-6, MW-2, VW-3, VW-4, VW-1
90.0	3	15	18	20	All wells on.

Induced vacuum at wells was measured to be an average of 3.1" W.C.

Influent Air From VW-3 and VW-4					Observation Wells							
Flow	Applied Vacc.	% LEL	$\%O_2$	Elapsed Time (Min.)	VW-1 Induced Vacuum	VW-2 Induced Vacuum	VW-3 Induced Vacuum	VW-4 Induced Vacuum	VW-5 Induced Vacuum	VW-6 Induced Vacuum	VW-7 Induced Vacuum	MW-2 Induced Vacuum
80	23.5	15	17.5	10	0.175	2.0	25	25	2.4	0.48	0.6	0.185
80	23.5	NM	NM	20	NM	NM	NM	NM	NM	NM	NM	NM
80	23.5	NM	NM	50	NM	NM	NM	NM	NM	NM	NM	NM
80	23.5	15	17.0	60	0.18	2.0	25	25	2.4	0.46	0.62	0.105
80	23.0	NM	NM	1110	0.20	2.0	25	25	2.3	0.45	0.6	0.12
Distance from Well VW-3 & VW-4:					15	35	41	17	25	61	22	40
Screen interval (ft):					7-17	8-18	8-18	9-19	8-18	9-19	7.5-17.5	15-25
Depth-to-Water (DTW-ft):					DRY	DRY	DRY	DRY	DRY	DRY	DRY	21.25

Notes:
Flow measured in cubic feet per minute and converted to standard cubic feet per minute (SCFM)
Concentrations measured as percent lower explosive limit (LEL) by volume on a combustible gas meter
Vacuum measured in inches of water column
NM = Not measured

TABLE 3
OPERATING CONDITIONS OF CATOX AND BLOWER DURING VET
ARCO Station 276
Oakland, California

Well ID#	Outlet Temperature @ Blower (°F)	Outlet Pressure @ Blower (psi)	Inlet Process Temp (°F)	Outlet Temperature @ CAT-OX	% LEL @ CATOX after Dilution	Gas-Consumption Rate
FRESH AIR	NM	NM	625	NM	NM	0.017
VW-7	130	2	NM	NM	NM	NM
VW-2	130	2	671	812	4	0.017
VW-3	130	2	677	878	3-4	0.014
VW-1	130	2	638	719	2	0175
VW-6	130	2	NM	NM	NM	NM
VW-4	160	2	709	795	2.5	019
VW-5	150	2	628	822	2.5	.017
MW-2	130	2	647	837	2.5	0.014
ALL WELLS ON	130	2	687	689	3	0.015
VW-3 & VW-4	130	2	629	844	2%	0.0145

Notes:
Outlet temperature on the pressure side of the blower measured in degrees Fahrenheit (°F)
Outlet pressure at blower measured in pounds per square inch (psi)
Inlet temperature measured in °F at the Catox.
Concentration measured as percent lover explosive limit (LEL) after fresh air dilution.
Natural gas consumption rate measured as cubic feet per second.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES FROM BORINGS
ARCO Station 276
Oakland, California
July 1992
(Page 1 of 5)

Sample Number	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	PCE1	Lead
Onsite							
S-11-B1	<2	<0.005	0.066	<0.05	0.079	NA	NA
S-26-B1	<2	<0.005	<0.005	<0.05	<0.005	NA	NA
S-31-B1	<2	<0.005	<0.005	<0.05	0.078	NA	NA
S-5½-B2	<2	<0.005	<0.005	<0.05	<0.005	NA	NA
S-16-B2	38	0.30	0.91	0.38	2.4	NA	NA
S-20-B2	690	7.4	36	10	62	NA	NA
S-28-B2	<2	<0.05	<0.05	<0.05	<0.05	NA	NA
S-30½-B3	<2	<0.005	<0.005	<0.05	<0.005	NA	NA
S-21-B4#	<2	<0.05	<0.05	<0.05	<0.05	NA	NA
S-31-B4	<2	<0.05	<0.05	<0.05	<0.05	NA	NA
S-11-B5	<5.0	0.13	<0.05	<0.05	<0.05	NA	NA
S-16-B5	220	0.83	3.4	2.2	14	NA	NA
S-18-B5	<5.0	0.23	0.11	<0.05	0.21	NA	NA
S-24-B5	<5.0	0.086	<0.05	<0.05	<0.05	NA	NA
S-31-B5	<5.0	0.13	<0.05	<0.05	<0.05	NA	NA
S-15½-B6	<1.0	<0.005	<0.005	<0.005	<1.0	ND	NA
S-25½-B6	<1.0	<0.005	<0.005	<0.005	<1.0	ND	NA
S-35½-B6	<1.0	<0.005	<0.005	<0.005	<1.0	ND	NA
S-51-B6	<1.0	<0.005	<0.005	<0.005	<1.0	0.130*	NA
S-1030-SP(A-D)	<0.005	<0.005	<0.005	<0.005	<1.0	NA	
S-9.5-TPB1	<2	<0.05	<0.05	<0.05	<0.05	NA	NA
S-15-TPB1	290	0.19	0.47	3.3	6.6	NA	NA
S-18.5-TPB1	58	<0.05	0.069	0.14	0.22	NA	NA
S-21-TPB1	<2	<0.05	<0.05	<0.05	<0.05	NA	NA
S-11-TPB2	2	<0.5	5	5	5	NA	NA
S-16-TPB2	<2	<0.5	5	<0.5	<0.5	NA	NA
S-18.5-TPB2	2	<0.5	<0.5	<0.5	<0.5	NA	NA
S-5-TPB3	2	5	<0.5	5	<0.5	NA	NA
S-30-TPB3	2	<0.5	<0.5	5	<0.5	NA	NA
S-15-TPB3	2	<0.05	<0.05	<0.05	<0.05	NA	NA

See notes on page 5 of 5

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES FROM BORINGS
ARCO Station 276
Oakland, California
(Page 2 of 5)

Sample Number	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	PCE1	Lead
Onsite (Continued)							
S-20-TPB3	2.1	0.46	<0.05	0.086	<0.05	NA	NA
S-9½-B12	<1.0	0.22	<0.0050	0.031	0.034	NA	NA
S-15½-B12	6.6	0.90	0.78	0.17	0.78	NA	NA
S-19-B12	2.8	1.2	0.79	0.043	0.23	NA	NA
S-24½-B12	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-29-B12	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-50-B12	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.100	NA
S-5-B13	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-10-B13	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-15-B13	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-18-B13	<1.0	0.084	0.013	0.034	0.14	NA	NA
S-5-B14	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-10-B14	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-15-B14	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-17½-B14	83	0.14	0.40	1.0	5.0	NA	NA
S-5-B15	<1.0	0.21	<0.0050	0.014	0.027	NA	NA
S-10-B15	<1.0	0.16	<0.0050	0.065	0.11	NA	NA
S-15-B15	6.5	0.83	0.47	0.22	0.81	NA	NA
S-18-B15	<1.0	0.21	0.47	0.021	0.11	NA	NA
S-5-B16	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-10-B16	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-15-B16	94	0.16	0.18	2.1	11	NA	NA
S-19-B16	<1.0	0.28	0.018	0.048	0.082	NA	NA
S-5-B17	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-10-B17	<1.0	0.0059	<0.0050	<0.0050	0.0090	NA	NA
S-15-B17	690	2.1	3.1	11	42	NA	NA
S-18-B17	3,700	48	160	94	420	NA	NA
S-5 [illegible]-B18	<1.0	[illegible]	[illegible]	[illegible]	[illegible]	NA	NA
S-10 [illegible]-B18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	NA
S-15 [illegible]-B18	47[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	NA
S-17 [illegible]-B18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NA	NA

See notes on page 5 of 5

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES FROM BORINGS
ARCO Station 276
Oakland, California
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Sample Number	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	PCE1	Lead
Onsite (Continued)							
S-5-B19	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-10-B19	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-15-B19	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-17½-B19	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
CSP1-4 Comp.	94	0.58(0.180)	1.0(0.480)	0.86(0.410)	5.0(2.900)	<0 100	NA
S-0717-SP-1	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA
S-0717-SP-2	<1.0	0.0080	<0.0050	0.010	0.052	NA	NA
S-0722 A-D	<1.0	<0.50	<0.50	<0.50	<0.50	NA	0.27
Offsite							
S-16½-B1	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-21½-B1	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-24-B1	<1	<10	<0.005	<0.005	<0.005	<0.005	NA
S-29-B1	2.3	NA	0.27	0.087	0.054	0.15	NA
S-6½-B2	<2.0	NA	<0.050	<0.050	<0.050	<0 050	NA
S-16½-B2	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-24-B2	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-24/26-B2	NA	<10	NA	NA	NA	NA	NA
S-29-B2	<1	NA	<0.005	<0.005	<0.005	<0.005	NA
S-11½-B3	<2.0	NA	<0.050	<0.050	<0.050	<0 050	NA
S-16½-B3	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-21½-B3	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-26½-B3	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-29-B3	<1	NA	<0.005	<0.005	<0.005	<0.005	NA
S-6½-B4	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-16½-B4	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-21½-B4	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-26½-B4	4	<10	0.41	0.07	0.08	0.16	NA
S-29-B4	<2.0	NA	<0 050	<0 050	<0 050	<0 050	NA
S-6½-B5	2	NA	<50	5	<5	0 050	NA
S-16½-B5	2 0	NA	5	5	<5	<50	NA
S-21½-B5	2 0	NA	5	5	<5	<50	NA
S-26½-B5	1	NA	32	5	<5	<005	NA
S-29½-B5	2	NA	<50	<5	5	<050	NA

See notes on page 5 of 5

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES FROM BORINGS
ARCO Station 276
Oakland, California
(Page 4 of 5)

Sample Number	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	PCE1	Lead
Offsite (Continued)							
S-6½-B6	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-16½-B6	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-21½-B6	<2.0	NA	0.22	0.14	0.013	0.56	NA
S-26½-B6	1.400	320	<2	19	12	63	NA
S-29-B6	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-16-B7	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-21-B7	530	NA	1.1	5.8	5.8	30	NA
S-26-B7	<2.0	NA	0.084	<0.050	<0.050	<0.050	NA
S-31-B7	15	NA	0.61	0.57	0.24	0.29	NA
S-36-B7	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-16-B8	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-21-B8	<2.0	NA	0.18	<0.050	0.72	<0.050	NA
S-23-B8	<2.0	NA	0.11	<0.050	<0.050	0.075	NA
S-26-B8	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-31-B8	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-16-B9	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-21-B9	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-26-B9	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-31-B9	<2.0	NA	<0.050	<0.050	<0.050	<0.050	NA
S-10½-B10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.10	NA
S-20-B10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.10	NA
S-30-B10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.10	NA
S-39½-B10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.10	NA
S-60½-B10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	0.22	NA
S-10-B11	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.100	NA
S-20½-B11	6.3	0.072	0.069	0.21(0.390)	1.7(3.000)	<0.100	NA
S-30-B11	32	0.26(0.190)	0.65(0.310)	0.56(0.120)	2.9(0.600)	<0.100	NA
S-36½-B11	23	0.13	0.36	0.33	1.8(0.360)	<0.100	NA

See notes on page 5 of 5

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES FROM BORINGS
ARCO Station 276
Oakland, California
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Sample	Compound	Amount Detected
S-26½-B4	Benzene	0.220
	Toluene	0.040
	Ethylbenzene	0.043
	Total Xylenes	0.100
	** unknown	0.070
	** 2,3-dimethylbutane	0.070
	** unknown	0.060
	** 1-ethyl-2-methylbenzene	0.030
	** 1,3,5-trimethylbenzene	0.040
S-26½-B5	Benzene	0.007
S-26½-B6	Benzene	5
	Toluene	20
	Ethylbenzene	16
	Total Xylenes	88
	** unknown	110
	** unknown	100
	** methylcyclohexane	30
	** 1-ethyl-2-methylbenzene	40
	** 1,3,5-trimethylbenzene	60

Results in parts per million (ppm).
B = benzene, T = toluene, E = ethylbenzene, X = total xylenes. BTEX measured by 5030/8015/8020.
TPHg: Total petroleum hydrocarbons as gasoline by EPA 5030/8015/8020
VOCs: Volatile organics by GC/MS (EPA 8240)
<: Less than the laboratory detection limit.
1: Tetrachloroethene was the only non-petroleum volatile organic compound detected by EPA Method 8240.
( ): Concentrations of gasoline hydrocarbon constituents BTEX detected by EPA Method 8240.
ND: Not detected for 37 compounds tested.
#: Sample S-21-B4 also analyzed for TOG (not detected).
*: 0.130 ppm of tetrachloroethene and not detected for 36 other compounds tested.
**: Tentatively Identified Compounds (TICs).
NA: Not analyzed

Sample Identification

S-5[illegible]-16
——— Boring number
——— Sample depth
——— Soil sample

S-[illegible]-SP-A-[illegible] Composite sample
——— Stockpile
——— Date sampled
——— Sample [illegible]

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 1 of 3)

Date/Well	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-1							
04/24/89	<50	NA	<0.50	<0.50	<0.50	<0.50	NA
10/13/89	<20	NA	<0.50	<0.50	<0 50	<0.50	NA
02/01/90#	91	NA	<0.30	<0.30	<0.30	0.36	NA
07/31/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90	<50	NA	<0 5	<0.5	<0 5	<0.5	NA
01/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/30/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
08/06/91	<30	NA	<0 30	<0 30	<0.30	<0.30	NA
11/05/91	<30	NA	<0.30	<0.30	<0 30	<0.30	NA
03/10/92	<50	NA	<0.5	<0.5	<0 5	<0.5	NA
06/30/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-2							
04/24/89	165,000	NA	13,000	21,000	2,100	12,700	NA
10/13/89	Not sampled--floating product						
02/01/90	Not sampled--sheen						
07/31/90	240,000	NA	14,000	24,000	3,000	17,000	NA
10/30/90	Not sampled--floating product						
01/30/91	Not sampled--floating product						
04/30/91	Not sampled--sheen						
08/06/91	Not sampled--floating product						
11/05/91	Not sampled--floating product						
03/10/92	220,000	NA	8,200	13,000	4,500	22,000	NA
06/30/92	130,000	NA	10,000(9,300)	16,000(18,000)	4,700(4,200)	24,000(27,000)	NA
09/09/92	Not sampled--floating product						
MW-3							
04/24/89#	560	NA	0 54	0.75	<0.50	<0.50	NA
10/13/89#	450	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90#	360	NA	<0.30	<0.30	<0.30	0.85	NA
08/01/90#	440	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90#	340	NA	<0 5	<0 5	<0 5	<0 5	NA
[illegible]	Not sampled--well [illegible]						
[illegible]	Not sampled--well [illegible]						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

See notes on Page 3 of 3

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 2 of 3)

Date/Well	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-3 Cont.							
06/30/92	<530**	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<290**	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-4							
04/24/89#	2,500	NA	270	1.4	<0.50	85	NA
10/13/89#	760	NA	0.86	<0.50	1.2	<0.50	NA
02/01/90#	680	NA	<0.30	<0.30	<0.30	1.6	NA
07/31/90#	470	240	<0.50	<0.50	<0.50	<0.50	<5,000
10/30/90#	430	<100	<0.5	<0.5	<0.5	<0.5	<5,000
01/30/91	<50	<100	<0.5	<0.5	1.2	<0.5	<5,000
04/30/91#	600	NA	<0.30	0.30	<0.30	0.43	NA
08/06/91#	520	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91#	900	NA	<3.0	<3.0	<3.0	<3.0	NA
03/10/92	<730**	NA	<0.5	<0.5	<0.5	<0.5	<2500
06/30/92	<670**	NA	<0.5	<0.5	<2.3**	<0.5	500
09/09/92	<470**	NA	<0.5	<0.5	<0.5	<0.5	3,600[1]
MW-5							
04/24/89#	130	NA	0.67	<0.50	<0.50	<0.50	NA
10/13/89#	75	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90#	81	NA	0.94	0.88	<0.30	1.8	NA
07/31/90#	110	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/30/91#	120	NA	<0.30	<0.30	<0.30	<0.30	NA
08/06/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91#	77	NA	1.0	3.6	0.60	2.6	NA
03/10/92	<110**	NA	<0.5	<0.5	<0.5	<0.6*	NA
06/30/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-6							
06/30/92	<850**	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92		Not a					
MW-7							
06/30/92		NA					NA
09/09/92		Not a					

See notes on Page 3 of 3

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 3 of 3)

Date/Well	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-8							
09/09/92	<50	NA	3.4(4)	<0.5	<0.5	0.7	NA
RW-1							
11/05/91#	750	NA	4.8	3.7	<3.0	<3.0	NA
03/10/92	<140**	NA	<0.5	<0.5	<0.5	<0.6*	NA
06/30/92	<400**	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<520**	NA	<0.5	<0.5	<0.5	<0.5	NA
January 1990							
MCLs	---	---	1.0	---	680	1,750	---
Als	---	---	---	100	---	---	---

Results in parts per billion (ppb).
TPHg: Total petroleum hydrocarbons as gasoline by EPA method 8015.
TPHd: Total petroleum hydrocarbons as diesel by EPA method 3550/3510
B: Benzene, T: Toluene, E: Ethylbenzene, T: Total Xylene isomers
BTEX: Measured by EPA method 8020/602.
NA: Not analyzed.
<: Results reported as less than detection limit.
#: Based on new results, the previous data is being re-evaluated to evaluate possible effects from single-peak hydrocarbons.
*: Detection limit reportedly raised by laboratory due to matrix interference.
**: Detection limit reportedly raised by laboratory because matrix contains a discrete non-fuel peak.
1: Analyte concentration is an estimate because analyte was also found in the method blank
( ): BTEX as measured by EPA Method 624.
IW: Inaccessible well, recently paved over before sampling event

TABLE 6
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 1 of 2)

Date/Well	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
MW-1							
09/03/91	Tetrachloroethene	4.5	NA	NA	NA	NA	NA
11/06/91	All Compounds	<2.0	NA	NA	NA	NA	NA
03/10/92	Tetrachloroethene	8.2*	NA	NA	NA	NA	NA
06/30/92	Tetrachloroethene	15*	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	6*	NA	NA	NA	NA	NA
MW-2							
09/03/91	————	Not sampled--floating product					
11/06/91	————	Not sampled--floating product					
03/10/92	Tetrachlorethene	0.9	NA	NA	NA	NA	NA
	1,2-Dichloroethene	5.4	NA	NA	NA	NA	NA
06/30/92**	All Compounds (except BTEX)	<2.000	NA	NA	NA	NA	NA
09/09/92	————	Not sampled--floating product					
MW-3							
09/03/91	Tetrachloroethene	1.600*	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	400*	NA	NA	NA	NA	NA
03/10/92	Freon 12	3.4	NA	NA	NA	NA	NA
	cis-1,2-Dichloroethene	1.0					
	Trichloroethene	5.6					
	Tetrachloroethene	980*					
06/30/92**	Tetrachloroethene	1.500*	NA	NA	NA	NA	NA
09/09/92**	Tetrachloroethene	800*	NA	NA	NA	NA	NA
MW-4							
07/31/90	Trichloroethene	7.5	NA	NA	NA	NA	NA
	Tetrachloroethene	1600*	NA	NA	NA	NA	NA
	1,2 Dichloroethene	0.7	NA	NA	NA	NA	NA
10/30/90	Trichloroethene	8.1	NA	NA	NA	NA	NA
	Tetrachloroethene	3600*	NA	NA	NA	NA	NA
	1,2 Dichloroethene	0.7	NA	NA	NA	NA	NA
01/30/91	Trichloroethene	12	NA	NA	NA	NA	NA
	Tetrachloroethene	4,900*	NA	NA	NA	NA	NA
04/30/91	Tetrachloroethene	2,200*	NA	NA	NA	NA	NA
08/06/91	Tetrachloroethene	[illegible]*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
09/03/91	Tetrachloroethene	2,400*	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	1,400*	NA	NA	NA	NA	NA
	Trichloroethene	[illegible]	NA	NA	NA	NA	NA
03/10/92**	cis-1,2-Dichloroethene	[illegible]	NA	NA	NA	NA	NA
	Trichloroethene	[illegible]					
	Tetrachloroethene	2,300*					

See notes on Page 2 of 2

TABLE 6
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 2 of 2)

Date/Well	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
06/30/92**	Tetrachloroethene	1,800*	NA	NA	NA	NA	NA
09/09/92**	Tetrachloroethene	1,300*	NA	NA	NA	NA	NA
MW-5							
08/06/91	Tetrachloroethene	73*	NA	NA	NA	NA	NA
09/03/91	Tetrachloroethene	25*	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	12*	NA	NA	NA	NA	NA
03/10/92	Trichloroethene	1.3	NA	NA	NA	NA	NA
	Tetrachloroethene	300*					
06/30/92	Tetrachloroethene	30*	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	120*	NA	NA	NA	NA	NA
MW-6							
06/30/92**	Tetrachloroethene	2,400*	NA	NA	NA	NA	NA
09/09/92		Not sampled--well inaccessible					
MW-7							
06/30/92**	All Compounds (except BTEX)	< 1000	NA	NA	NA	NA	NA
09/09/92		Not sampled--floating product					
MW-8							
09/09/92	Tetrachloroethene	37	NA	NA	NA	NA	NA
RW-1							
11/06/91	Tetrachloroethene	980*	NA	NA	NA	NA	NA
03/10/92	Trichloroethene	1.7	NA	NA	NA	NA	NA
	Tetrachloroethene	400*					
06/30/92**	Tetrachloroethene	1,100*	NA	NA	NA	NA	NA
09/09/92**	Tetrachloroethene	1,500*	NA	NA	NA	NA	NA
MCLs			0.010	0.05	0.05	5.0	---

Results in parts per billion (ppb), except heavy metals which are in parts per million (ppm).
VOCs: Halogenated Volatile Organic Compounds by EPA method 601/8010. Compounds not shown were not detected.
Cd: Cadmium by EPA method 200.7
Cr: Chromium by EPA method 200.7
Pb: Lead by EPA method 239.2
Zn: Zinc by EPA method 200.7
Ni: Nickel by EPA method 200.7
Results reported as less than the detection limit.
NA: Not analyzed. Compounds not known to be present.
*: Exceeds the MCL of 5 ppb for Tetrachloroethene.
MCLs: Maximum Contaminant Levels as established by the California Department of Health Services.
**: Raised Method Reporting Limit (MRL) because of high concentrations of Tetrachloroethene.

TABLE 7
RESULTS OF LABORATORY ANALYSES OF AIR SAMPLES
ARCO Station 276
Oakland, California

Sample ID	Sample Location	Elapsed Time of Sample	TPHg	B	T	E	X	Pb
AS-VW1-30	VW-1	30	5,100	120	47	6	25	NA
AS-VW2-36	VW-2	36	48,000	1800	600	74	170	NA
AS-VW3-30	VW-3	30	15,000	560	160	58	150	NA
AS-VW4-30	VW-4	30	13,000	500	84	18	37	NA
AS-VW5-30	VW-5	30	16,000	510	270	47	150	NA
AS-VW6-30	VW-4	30	510	9	6	4	15	NA
AS-VW7-50	VW-7	50	330	4	3	<0.5	3	NA
AS-MW2-30	MW-2	30	11,000	430	350	36	200	NA
AS-COMB-30	VW-1 to VW-7, MW-2	30	10,000	(160)	(130)	(19)	(83)	NA
AS-VW34-50	VW-3&4	50	11,000	560	120	43	120	1.6
AS-VW34-1830	VW-3&4	1110	9,500	280	190	55	170	NA

Concentrations reported in milligrams per cubic meter (mg/m³), which is equivalent to (μg/ℓ).
Nondetectable concentrations of VOCs as analyzed by EPA Method 8240 were reported for sample AS-COMB-30.
< : Below the minimum laboratory detection limit for air.
NA: Not analyzed.
TPHg: Total petroleum hydrocarbons as gasoline (analyzed by EPA Method 8015).
B: benzene, T: toluene, E: ethylbenzene, X: total xylene isomers
BTEX: Analyzed by EPA Method 8020 except parenthetical values, which were obtained by EPA Method 8240.
Pb: Lead analyzed by EPA 7420/7421. μg/m³

TABLE 8
ESTIMATED RADIUS OF INFLUENCE AND
PROJECTED INITIAL HYDROCARBON EXTRACTION RATES
DURING VAPOR EXTRACTION TEST
ARCO Station 276
Oakland, California

Vapor Well	Applied Vacuum	Air Flowrate	Initial TPHg Vapor Concentration	Initial TPHg Removal Rate	Initial TPHg Removal Rate	Estimated ROI
VW-1	10	90 scfm	5,100 mg/m^3	41.2 lb/day	6.33 gals/day	32
VW-2	54	38 scfm	48,000 mg/m^3	164 lb/day	25.2 gals/day	20
VW-3	33	70 scfm	15,000 mg/m^3	94.0 lb/day	14.5 gals/day	25
VW-4	50	43 scfm	13,000 mg/m^3	50.0 lb/day	7.7 gals/day	17
VW-5	40	61 scfm	16,000 mg/m^3	88.0 lb/day	13.5 gals/day	20
VW-6	56	3 scfm	510 mg/m^3	0.14 lb/day	0.02 gals/day	0
VW-7	39	56 scfm	330 mg/m^3	1.7 lb/day	0.26 gals/day	20
MW-2	19	83 scfm	11,000 mg/m^3	82.0 lb/day	12.6 gals/day	25
VW-3 & VW-4	23.5	80 scfm	11,000 mg/m^3	79.0 lb/day	12.1 gals/day	-
1110 min	23.5	80 scfm	9,500 mg/m^3	68.0 lb/day	10.5 gals/day	-
ALL ABOVE WELLS	4	60 scfm	10,000 mg/m^3	54.0 lb/day	8.3 gals/day	-

Applied vacuum measured in inches of water column.
min = Elapsed time in minutes.
scfm = Air flowrate measured in standard cubic feet per minute.
mg/m^3 = Milligrams per cubic meter
TPHg = Total petroleum hydrocarbons as gasoline (analyzed by EPA Method 8015/8020).
ROI = Radius of influence in feet.
lb/day = Removal rate measured in pounds per day.
gals/day = Removal rate measured in gallons of gasoline per day (Gasoline S.G = 0.78)

TPHg removal rate = air flowrate (ft^3/min) X Air concentration (mg/m^3) X [1440 min/day] X [0.02832 m^3/ft^3]

APPENDIX A

PREVIOUS ENVIRONMENTAL WORK

PREVIOUS ENVIRONMENTAL WORK

1988 Offsite Investigation

Kaldveer Associates (KA) conducted a preliminary site history survey at the Foothill Square Shopping Center property southeast and adjacent to the ARCO Station 276 (KA, October 3, 1988). The work focused on a survey of present and past site and near-vicinity conditions and concluded that there was potential for soil and groundwater contamination from past uses of the site, and that several facilities within a 1½ mile radius of the site had a history of releases. KA also conducted a subsurface environmental investigation. The work included drilling 15 soil borings on the shopping center site, collecting soil samples, collecting "grab" water samples from a seasonally saturated perched water bearing zone encountered in the borings, and analyzing soil and groundwater samples. Analyses of soil and groundwater samples indicated the presence of petroleum hydrocarbons, primarily in the northwestern parking lot area of the shopping center, the area which is immediately adjacent to the ARCO Station 276. Free product was present in Boring EB-1, located about 90 feet east of the ARCO station building. Concentrations of TPHg in the groundwater samples ranged from nondetectable (ND) to 8,360 ppm. Concentrations of BTEX in groundwater ranged from ND to 877 ppm. Pesticides, polychlorinated biphenyls (PCBs), and semi-volatile compounds were also detected in a water sample. Concentrations of PCE were below the method detection limit, however, the detection limit was raised to 125 ppm due to the high levels of hydrocarbons in the sample. TPHg and TPHd concentrations were present in trace amounts in some of the soil samples taken and benzene was detected in one soil sample at 0.11 ppm (KA, October 7, 1988).

Western Geologic Resources, Inc., (WGR) conducted a subsurface environmental investigation at the Foothill Square Shopping Center, which included constructing five groundwater monitoring wells and analyzing nine soil and five groundwater samples for TPHg and BTEX. Concentrations of TPHg were not detected in the soil samples, but benzene was present in one sample at 0.016 ppm. Concentrations of TPHg in groundwater samples ranged from ND to 0.3 ppm. Groundwater samples also contained near trace level concentrations of BTEX and trichloroethane (WGR, January 17, 1989). The groundwater flow direction was interpreted to be toward the south at a gradient of about 0.04 ft/ft.

1988 Onsite Investigation

Pacific Environmental Group, Inc. (PEG) removed an underground waste-oil storage tank and excavated soils from the tank pit, and collected soil samples for analyses from the ARCO station

site between September 29 and December 6, 1988. Hydrocarbons in soil in the vicinity of the tank pit were delineated and the soil excavated for disposal (PEG, February 6, 1989).

March 1989 Onsite Investigation

AGS drilled five soil borings (B-1 through B-5) onsite, collected soil samples for description and laboratory analysis for TPHg and BTEX, installed five groundwater monitoring wells in the borings (MW-1 through MW-5, respectively), and collected and analyzed ground-water samples for TPHg and BTEX. Boring/monitoring well locations are shown on Plate 2, Generalized Site and Area Plan, in the main body of this report. Soils encountered during drilling were primarily sandy and silty clay underlain by silty sand with clay and gravel lenses. The depth to first-encountered groundwater in the borings was approximately 35 feet, with the exception of boring B-2 in which ground water was encountered at 17 feet below ground surface in an apparently localized perched water-bearing zone.

Concentrations of TPHg were present in soil samples collected from borings B-2 (MW-2) and B-5 (MW-5), located in the southeastern portion of the station site near the former underground gasoline-storage tanks, at concentrations up to 690 ppm. TPHg was not detected at concentrations above laboratory detection limits in borings B-3 and B-4, located behind the station building in the vicinity of the former waste-oil tank. Groundwater samples from four of the five wells contained TPHg concentrations which ranged from nondetectable in monitoring well MW-1 to 165 ppm in monitoring well MW-2 (the perched zone well). Concentrations of BTEX ranged from nondetectable to 21 ppm of toluene in monitoring well MW-2. No laboratory evidence of hydrocarbon-impacted groundwater was detected in samples collected from monitoring well MW-1, located in the northern corner of the site. PCE was detected in the groundwater sample collected from monitoring well MW-4 at 1.5 ppm (AGS, August 8, 1989). Waste-oil hydrocarbons were not detected in samples collected from monitoring well MW-4 located near the former waste-oil tank. Cumulative results of laboratory analyses of onsite soil samples are shown on Table 4 in the main body of this report.

A records check of local wells within a ½-mile radius of the area identified three domestic wells, two irrigation wells, and three wells used for cathodic protection (information obtained from Mr. Kelvin Hickenbottom of Alameda County Flood Control and Water Conservation District; AGS, August 8, 1989). The total well depths ranged from 75 feet to 120 feet below ground surface. Data gathered during the well research is shown on Table 1-A, Water Well Data.

Since the first quarter of 1989, RESNA and Emcon Associates (EMCON) have been conducting quarterly monitoring of the onsite groundwater monitoring wells on ARCO property. Groundwater monitoring data is presented in Table 1, Cumulative Groundwater Monitoring Data, and groundwater laboratory analytical data is presented in Tables 5 and 6, Cumulative Results of Laboratory Analyses of Water Samples, in the main body of this report.

June 1989 Onsite and Offsite Soil Vapor Survey

PEG conducted a soil-vapor survey at the ARCO Station and the adjacent Foothill Square Shopping Center parking lot. The highest total hydrocarbon gas concentrations (40,000 ppm) were found within approximately 125 feet south of the station building at depths of 21 - 24 feet below ground surface (PEG, July 17, 1989). Results of the soil-vapor survey are shown on Table 2-A, Results of Laboratory Analyses of Soil Vapor Survey Soil-Gas Samples.

August 1989 Offsite Investigation

Based on the PEG soil vapor survey, ARCO requested additional offsite soil borings and AGS drilled nine borings (B-1 through B-9) at the Foothill Shopping Center parking lot to assess the extent of hydrocarbons in the subsurface soil. These boring locations are shown on Plate 2 in the main body of this report. The field and analytical data suggested a zone of hydrocarbons located approximately 20 feet below ground surface and centralized around 2 borings (B-6 and B-7), 50 - 65 feet south/southeast of the ARCO station building, where the maximum TPHg concentrations were up to 1,400 ppm and total petroleum hydrocarbons as diesel (diesel) concentrations up to 320 ppm (AGS, January 17, 1991). The soil samples from other borings were found to contain hydrocarbon levels near or below the detection limits. Results of laboratory analyses of soil samples collected from onsite and offsite borings are shown on Table 4, in the main body of this report.

Two water bearing zones were confirmed to be present at the ARCO station site and adjacent property: a shallow perched zone which occasionally was dry and had a relatively steep gradient (0.04 ft/ft) toward south/southeast; and a deeper water-bearing zone which had a flatter gradient of about 0.002 ft/ft and a northerly flow direction.

January - February 1990 Onsite Investigation

AGS personnel supervised the drilling of three soil borings (TPB-1 through TPB-3) to depths of approximately 20 feet below ground surface in the proposed new gasoline underground storage tank (UST) pit area, shown on Plate 2. Soil samples collected contained concentrations

of TPHg and BTEX up to 290 ppm and 6.6 ppm, respectively. The groundwater table was encountered at about 18-1/2 feet below the ground surface in the borings (AGS, February 11, 1991). Laboratory results of the soil samples from borings TPB-1 through TPB-3 are shown on Table 4, in the main body of this report.

On February 8, 1990 four underground storage tanks (FT-1 through FT-4) were removed from the site under observation of an AGS geologist. The tanks consisted of a 6,000 gallon supreme unleaded (FT-1), a 6,000 gallon regular unleaded (FT-2), a 4,000 gallon regular unleaded (FT-3), and a 10,000 gallon regular leaded (FT-4) tank. Visible inspection of the removed tanks revealed that the tanks appeared to be in good condition with no visible signs of leaks, puncture or corrosion. Locations of the former tanks are shown on Plate 2. Nine soil samples were obtained from the walls and the base of former tank pit excavation (13 feet below ground surface) and submitted for analyses. The samples contained concentrations of TPHg and BTEX up to 360 ppm and 43 ppm, respectively. Five composite samples from stockpiled soil from former tank pits were analyzed for aeration and disposal characterization. Soils were then aerated and removed from the site and properly disposed. Results of the soil samples taken from the former tank pits are shown on Table 3-A, Analytical Results of Soil Samples from Former Tank Pits FT1, FT2, FT3, and FT4.

April 1990 Onsite Investigation

The excavation for the installation for four new USTs was performed April 26, 1990. The excavated soil was visually inspected for any indication of petroleum hydrocarbons and monitored with an organic vapor monitor (OVM). OVM readings indicated concentrations of hydrocarbons greater than 500 ppm in saturated gravel lenses at depths between 11 and 15 feet below ground surface. Soil samples collected from the bottom corners of the new tank pit (19 feet below ground surface) showed no detectable concentrations of TPHg and low levels of BTEX (maximum 0.035 ppm). Excavated soil containing hydrocarbon concentrations greater than 100 ppm was aerated and then removed from the site and properly disposed (AGS, February 11, 1991). Results of the new tank pit soil samples and stockpiled soil samples are shown on Table 4-A.

May 1990 Onsite Investigation

The product supply pipelines associated with the former USTs and surrounding fill material were removed on May 29 and May 30, 1990 under AGS observation. Eight soil samples were collected for analyses along the trench at 20 foot lateral intervals. The maximum TPHg concentration detected in product line trench soil samples was 14 ppm (AGS, February 11,

1991). Results of laboratory analyses of soil samples from the product-line trenches and stockpiled soil from former product-line trenches are shown on Table 5-A, Results of Laboratory Analyses of Soil Samples from Product-Line Trenches and Stockpiled Soil.

October - November 1991 Additional Subsurface Investigation and Pumping Test

An additional subsurface investigation and pumping test were performed at the site (RESNA, January 11, 1993). One onsite soil boring (B-6) was drilled and a 6-inch diameter recovery well (RW-1) was installed in the boring. Results of laboratory analyses of four soil samples from B-6 indicated nondetectable concentrations of TPHg and BTEX. PCE was detected at a concentration of 0.13 ppm in the sample collected at 51 feet below ground surface (see Table 4). Results of laboratory analyses of groundwater samples indicated concentrations of TPHg (up to 900 ppb) in wells RW-1 and MW-3 though MW-5 installed in the deeper water-bearing zone, and concentrations of BTEX (up to 4.8 ppb) in wells RW-1 and MW-5; however, these data were being studied further to evaluate effects of the originally unknown presence of PCE in the groundwater. Concentrations of PCE (up to 1,000 ppb) were detected in wells RW-1 and MW-3 through MW-5, and 6.3 ppb of trichloroethene (TCE) was detected in the groundwater sample collected from well MW-4. Results of groundwater samples are shown on Tables 5 and 6, in the main body of this report. The shallow, perched water-bearing zone, and gasoline hydrocarbons in soil, did not appear to exist in the eastern portion of the site. PCE detected in the soil and groundwater onsite, and possibly some fuel hydrocarbons, were thought to have migrated onsite from an offsite, upgradient source. Results of the pumping test indicated that the recovery well could easily sustain a pumping rate of 5 gpm and could possibly sustain a rate as high as 15 gpm. The predicted maximum zone of capture was sufficiently large to capture onsite groundwater downgradient in the deeper water-bearing zone, and a considerable portion of downgradient, offsite groundwater.

Ongoing Quarterly Monitoring

Water-level measurements and sampling for analyses and reporting by RESNA have continued since 1989. Groundwater monitoring data is presented in Table 1, and groundwater laboratory analytical data is presented in Tables 5 and 6, in the main body of this report. The groundwater gradient has fluctuated between 0.002 and 0.08 to the north-northwest and north-northeast. Since groundwater sampling began, the onsite wells in the deeper water-bearing zone (MW-1, MW-3 through MW-6, MW-8, and RW-1) have contained either nondetectable concentrations of TPHg, or reported concentrations of a discrete non-fuel peak hydrocarbon that was not known at the time of testing. The method detection limit has been continually raised by the laboratory due to this discrete non-fuel peak detected in most samples (see Table 5, in the main body of

this report). TPHg was not detected in well MW-8; however, low concentrations of BTEX (0.7 - 4 ppb) were detected in this well.

Floating product was detected during the second and third quarter of 1992 in onsite well MW-2, and during the third quarter of 1992 in offsite well MW-7. Monitoring for the presence of floating product, and if present, product bailing, is currently being performed in onsite well MW-2. Floating product removed from onsite well MW-2 is shown on Table 6-A, Approximate Cumulative Product Removed. A Horner EZY Floating Product Skimmer was installed in offsite well MW-7 in October 1992. Product removal information will be included in future reports.

PCE has been detected in each of the wells in the deeper water-bearing zone. The highest concentration of PCE (2,400 ppb) was detected in offsite and upgradient well MW-6.

Groundwater from well MW-4 has been sampled and analyzed for TOG on five separate occasions since July 31, 1990. Results have indicated nondetectable concentrations, with the exception of the June 30 and September 9, 1992 results, in which TOG was detected at low concentrations (see Table 5, in the body of this report). The detectable concentrations of TOG were probably due to a change in the sample method to EPA Method 413.2, in which the laboratory uses freon as an extraction medium. The freon medium incorporates both organic and petroleum-based oil and grease present in the sample, and both are reported as total TOG (RESNA, September 25, 1992).

TABLE 1-A
WATER WELL DATA
ARCO Station 276
Oakland, California

Well ID	DTW*	Total Depth of Well	Use	Year Drilled and Installed
$B1_1$	42	75	Domestic	1977
$B1_2$	35	102	Domestic	1971
E1	NR	50	Cathodic Protection	1977
E2	NR	120	Cathodic Protection	1976
J1	NR	120	Cathodic Protection	1976
K1	NR	120	Domestic	1974
M1	38	58	Irrigation	1977
N1	40	79	Irrigation	1977
R2	29	60	Destroyed	1977

Source: Alameda County Flood Control and Water Conservation District, Zone 7.
Measurement in feet.
*: Believed to represent depth to static water when well was installed.
NR: Not recorded.
$_1$: Located in quadrant 23
$_2$: Located in quadrant 24

TABLE 2-A
ANALYTICAL RESULTS OF SOIL VAPOR SURVEY SOIL-GAS SAMPLES
ARCO Station 276
Oakland, California

Probe No.	Depth	Benzene	Toluene	Ethylbenzene	P,M-Xylene	O-Xylene	THC	Total BTEX
1	14-16	EHI	1,000	45	190	26	31,900	1,300
1	19-21	.8	9.3	40	33	14	20,000	98
2	14-16	EHI	63	9.7	47	16	200	140
2	19-21	3.2	7.3	1.0	4.1	.6	200	16
3	14-16	10	60	7.9	32	5.2	1,000	110
3	19-21	63	9.3	< 1	1.9	<.1	25,000	74
4	14-16	<.1	8	4	1.6	4	200	3.2
4	19-21	.2	1	2	1.3	4	500	2.2
5	17-19	1.3	1.3	<.1	<.1	< 1	300	2.6
5	22-24	130	190	20	17	19	25,300	380
6	17-19	<.1	<.1	<.1	<.1	< 1	80	<.1
6	22-24	130	39	<.1	< 1	<.1	21,500	170
7	17-19	.1	.5	<.1	2	<.1	10	.8
7	22-24	<.1	<.1	<.1	<.1	<.1	20	<.1
8	17-19	<.1	<.1	<.1	<.1	< 1	45	< 1
8	22-24	<.1	2	<.1	<.1	< 1	100	2
9	17-19	<.1	<.1	<.1	<.1	< 1	<5	< 1
9	22-24	6.7	7.8	15	4.5	< 1	2,100	34
10	17-19	1	.3	<.1	.1	< 1	160	.5
10	22-24	1.2	.8	<.1	< 1	<.1	800	2.0
11	17-19	< 1	<.1	<.1	<.1	<.1	5	<.1
11	22-24	.7	9.7	.1	2.2	1.5	14,000	14
12	17-19	<.1	4	<.1	<.1	<.1	10	.4
12	22-24	EHI	300	<.1	<.1	<.1	33,500	300
13	17-19	.1	.5	.1	.2	.1	60	1.0
13	22-24	300	190	<.1	24	< 1	24,500	510
14	17-19	.1	.3	.1	.2	1	50	.8
14	22-24	20	29	1.8	6.3	1.6	5,000	59
15	17-19	100	180	11	7.4	8.7	23,500	300
15	22-24	EHI	2,000	79	230	48	40,000	2,400
16	17-19	3.1	4.1	.5	5	<.1	500	8.2
16	22-24	.5	1.2	<.1	.4	.1	500	2.2

Results in parts per million (ppm) on a volume to volume basis. Depth measured in feet

P,M-xylene: Para- and Meta-xylene.

O-xylene: Ortho-xylene

THC: Total hydrocarbons reported by Flame Ionization Detector. Other gasoline constituents not included in chromatograph

EHI: Not quantified due to Excessive Heavy Hydrocarbon Interference. Vapor volume injected was adjusted to set sensitive gain set for gas chromatograph

BTEX: Benzene, toluene, ethylbenzene, and total xylene isomers

TABLE 3-A
RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
FROM FORMER TANK PITS FT1, FT2, FT3, AND FT4
ARCO Station 276
Oakland, California

Sample	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes
S-7-TP1SW-1	<2	0.13	<0.05	<0.05	0.15
S-8-TP1NE-2	<2	0.088	<0.05	<0.05	<0.05
S-13-TP2N-3	45	0.32	0.46	0.083	0.68
S-13-TP2W-4	3.9	0.24	0.15	0.094	0.67
S-13-TP2E-5	23	0.43	0.95	0.36	3.7
S-10-TP2S-6	2.5	0.13	0.10	<0.05	0.29
S-12-TP2S-7	210	1.8	14	3.4	29
S-12-TP2BM-8	42	0.33	1.2	0.77	6.1
S-13-TP2BN-9	360	0.86	5.5	6.7	43

Results in parts per million (ppm).
TPHg: Total petroleum hydrocarbons as gasoline.
<: Less than laboratory detection limit.

Sample designation: S-13-TP2BN-9

- Sample location
- Sample depth in feet below ground surface
- Soil sample

TABLE 4-A
RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
FROM THE NEW TANK PIT EXCAVATION AND STOCKPILED SOILS
ARCO Station 276
Oakland, California

Sample	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	Organic Lead
Tank Pit						
NE	<1.0	0.005	0.010	<0.005	<0.005	NA
SE	<1.0	<0.005	0.022	<0.005	<0.005	NA
NW	<1.0	0.029	0.014	<0.005	<0.005	NA
SW	<1.0	0.035	0.013	<0.005	0.005	NA
Stockpiled Soils						
S-0507-SP2(A-D)	<1	<0.005	<0.005	<0.005	0.005	NA
S-0507-SP5(A-D)	<1	<0.005	<0.005	<0.005	<0.005	NA
S-0509-SP3(A-D)	16	<0.05	<0.05	<0.05	0.13	NA
S-0509-SP4(A-D)	610	0.5	<0.5	3.1	25	NA
S-0509-SP6(A-D)	<1	<0.005	<0.005	<0.005	<0.005	<0.08
S-0509-SP6(E-H)	<1	<0.005	<0.005	<0.005	<0.005	<0.08
S-0509-SP11(A-D)	49	<0.1	<0.1	<0.1	0.69	NA
S-0509-SP12(A-D)	40	<0.1	<0.1	<0.1	0.69	NA
S-0509-SP13A-D)	9.0	<0.05	<0.05	<0.05	0.13	NA
S-0509-SP14(A-D)	33	<0.1	<0.1	<0.1	0.45	NA
S-0509-SP15(A-D)	25	<0.2	4.9	<0.2	0.34	NA
S-0509-SP16(A-D)	13	<0.05	<0.05	<0.05	0.13	NA
S-0517-SP4(A-D)	120	<0.2	1.8	0.7	6.7	NA
S-0525-SP4(A-D)	<2.0	<0.05	<0.05	<0.05	<0.05	NA
S-0525-SP7(A-D)	34	<0.05	0.16	0.082	2.4	NA
S-0530-CP1(1-4)	66	0.20	1.1	0.54	3.2	NA
S-0530-CP2(1A-D)	43	<0.05	0.093	0.095	0.39	<0.08
S-0530-CP2(2A-D)	<1.0	<0.005	<0.005	<0.005	<0.005	<0.08
S-0530-CP2(3A-D)	1.2	<0.005	<0.005	<0.005	0.021	<0.08
S-0530-CP2(4A-D)	<1.0	<0.005	<0.005	<0.005	<0.00	<0.085
S-0530-CP2(5A-D)	<1.0	<0.005	<0.005	<0.005	<0.005	<0.08
S-0530-CP2(6A-D)	30	<0.05	<0.05	0.16	0.11	<0.08

Results in parts per million (ppm).
TPHg: Total petroleum hydrocarbons as gasoline.
NE: Sample Location.
<: Less than laboratory detection limit
NA: Not analyzed

Sample designation S-0530-CP2(1A-D)

TABLE 5-A
RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
FROM PRODUCT-LINE TRENCHES AND STOCKPILED SOIL
ARCO Station 276
Oakland, California

Sample	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes
Product Lines					
S-0529-SP1	<2	<0.05	<0.05	<0.05	<0.05
S-0529-SP2	<2	<0.05	<0.05	<0.05	0.076
S-0529-SP3	<2	<0.05	<0.05	<0.05	<0.05
S-0529-SP4	<2	<0.05	<0.05	<0.05	<0.05
S-0529-SP5	14	0.41	0.14	0.17	1.1
S-0530-SP6	6.8	0.19	0.17	0.07	0.24
S-0530-SP7	<1	<0.005	<0.005	<0.005	<0.005
S-0613-SP8	<2	<0.05	<0.05	<0.05	0.062
Stockpile					
S-0322-1(A-D)	9.6	<0.05	<0.05	<0.05	0.054
S-0322-2(A-D)	67	<0.05	<0.05	<0.05	1.6
S-0322-3(A-D)	110	<0.05	<0.05	<0.05	0.071
S-0322-3(A-D)*	59	<0.05	<0.05	<0.05	<0.05
S-0326-4(A-D)	69	<0.05	<0.05	<0.05	0.13

Results in parts per million (ppm).

TPHg: Total petroleum hydrocarbons as gasoline.
<: Less than laboratory detection limit.
*: Second sample collected after aeration for several days.
1(A-D): Stockpile sample location.
SP4: Product-line trench sample location.

Sample designation: S-0613-SP8

- Sample location
- Sample date
- Soil sample

TABLE 6-A
APPROXIMATE CUMULATIVE PRODUCT REMOVED
ARCO Station 276
Oakland, California

Year		Floating Product Removed (gallons)
1991	TOTAL:	18.15

Date	Floating Product Removed (gallons)
1992	
MW-2	
01-29-92	0.09
02-28-92	None present
03-25-92	None present
06-30-92	None present
09-25-92	Product present
Total:	0.09 Gallons

APPENDIX B

FIELD METHODS

FIELD PROTOCOL

The following presents RESNA Industries' field protocol for a typical investigation involving gasoline hydrocarbon-impacted soil and/or groundwater.

Site Safety Plan

The Site Safety Plan (RESNA, May 27, 1992) describes the safety requirements for the evaluation of gasoline hydrocarbons in soil, groundwater, and the vadose-zone. The Site Safety Plan is applicable to personnel of RESNA Industries and its subcontractors. RESNA Industries personnel and subcontractors of RESNA Industries scheduled to perform the work are briefed on the contents of the Site Safety Plan before work begins. A copy of the Site Safety Plan is available for reference by appropriate parties during the work. A site Safety Officer is assigned to the project.

Soil Excavation

Permits are acquired prior to the commencement of work. Excavated soil is evaluated using a field calibrated (using isobutylene) Thermo-Environmental Instruments Model 580 Organic Vapor Meter (OVM). This evaluation is done upon arrival of the soil at the ground surface in the excavator bucket by removing the top portion of soil from the bucket, and then placing the intake probe of the OVM against the surface of the soil in the bucket. Field instruments such as the OVM are useful for measuring relative concentrations of vapor content, but cannot be used to measure levels of gasoline hydrocarbons with the accuracy of laboratory analysis. Samples are taken from the soil in the bucket by driving laboratory-cleaned brass sleeves into the soil. The samples are sealed in the sleeves using aluminum foil, plastic caps, and aluminized duct tape; labeled; and promptly placed in iced storage. If field subjective analyses suggest the presence of gasoline hydrocarbons in the soil, additional excavation and soil sampling is performed, using similar methods. If groundwater is encountered in the excavation, groundwater samples are collected from the excavation using a clean Teflon® bailer. The groundwater samples are collected as described below under "Groundwater Sampling". The excavation is backfilled or fenced prior to departure from the site.

Sampling of Stockpiled Soil

One composite soil sample is collected for each 50 cubic yards of stockpiled soil, and for each individual stockpile composed of less than 50 cubic yards. Composite soil samples are obtained by first evaluating relatively high, average, and low areas of hydrocarbon concentration by digging approximately one to two feet into the stockpile and placing the intake probe of a field calibrated OVM against the surface of the soil; and then collecting one sample from the "high" reading area, and three samples from the "average" areas. Samples are collected by removing the top one to two feet of soil, then driving laboratory-cleaned brass sleeves into the soil. The samples are sealed in the sleeves using aluminum foil, plastic caps, and aluminized duct tape; labeled; and promptly placed in iced storage for transport to the laboratory, where compositing is performed.

Soil Borings

Prior to the drilling of borings and construction of monitoring wells, permits are acquired from the appropriate regulatory agency. In addition to the above-mentioned permits, encroachment permits from the City or State are acquired if drilling of borings offsite on City or State property is necessary. Copies of the permits are included in the appendix of the project report. Prior to drilling, Underground Services Alert (USA) is notified of our intent to drill, and known underground utility lines and structures are approximately marked.

The borings are drilled by a truck-mounted drill rig equipped with 8- or 10-inch-diameter, hollow-stem augers. The augers are steam-cleaned prior to drilling each boring to minimize the possibility of cross-contamination. After drilling the borings, monitoring wells are constructed in the borings, or neat-cement grout with bentonite is used to backfill the borings to the ground surface.

Borings for groundwater monitoring wells are drilled to a depth of no more than 20 feet below the depth at which a saturated zone is first encountered, or a short distance into a stratum beneath the saturated zone which is of sufficient moisture and consistency to be judged as a perching layer by the field geologist, whichever is shallower. Drilling into a deeper aquifer below the shallowest aquifer is begun only after a conductor casing is properly installed and allowed to set, to seal the shallow aquifer.

Drill Cuttings

Drill cuttings subjectively evaluated as containing gasoline hydrocarbons at levels greater than 100 parts per million (ppm) are separated from those subjectively evaluated as containing gasoline hydrocarbons at levels less than 100 ppm. Evaluation is based either on subjective evidence of soil discoloration, or on measurements made using a field calibrated OVM. Readings are taken by placing a soil sample into a ziplock-type plastic bag and allowing volatilization to occur. The intake probe of the OVM is then inserted into the headspace created in the plastic bag immediately after opening it. The drill cuttings from the borings are placed in labeled 55-gallon drums approved by the Department of Transportation, or on plastic at the site, and covered with plastic. The cuttings remain the responsibility of the client.

Soil Sampling in Borings

Soil samples are collected at no greater than 5-foot intervals from the ground surface to the total depth of the borings. The soil samples are collected by advancing the boring to a point immediately above the sampling depth, and then driving a California-modified, split-spoon sampler containing brass sleeves through the hollow center of the auger into the soil. The sampler and brass sleeves are laboratory-cleaned, steam-cleaned, or washed thoroughly with Alconox® and water, prior to each use. The sampler is driven with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows to drive the sampler each successive six inches are counted and recorded to evaluate the relative consistency of the soil.

The samples selected for laboratory analysis are removed from the sampler and quickly sealed in their brass sleeves with aluminum foil, plastic caps, and plastic zip-lock bags or aluminized duct tape. The samples are then labeled, promptly placed in iced storage, and delivered to a laboratory certified by the State of California to perform the analyses requested.

One of the samples in brass sleeves not selected for laboratory analysis at each sampling interval is tested in the field using an OVM that is field calibrated at the beginning of each day it is used. This testing is performed by inserting the intake probe of the OVM into the headspace in the plastic bag containing the soil sample as described in the Drill Cuttings section above. The OVM readings are presented in Logs of Borings included in the project report.

Logging of Borings

A geologist is present to log the soil cuttings and samples using the Unified Soil Classification System. Samples not selected for chemical analysis, and the soil in the sampler shoe, are extruded in the field for inspection. Logs include texture, color, moisture, plasticity, consistency, blow counts, and any other characteristics noted. Logs also include subjective evidence for the presence of gasoline hydrocarbons, such as soil staining, noticeable or obvious product odor, and OVM readings.

Groundwater Monitoring and Vapor Extraction Well Construction

Groundwater monitoring wells were constructed in selected borings using clean 2-inch-diameter, and vapor extraction wells were constructed in selected borings using clean 4-inch-diameter thread-jointed, Schedule 40 PVC casing. No chemical cements, glues, or solvents were used in well construction. Each casing bottom was sealed with a threaded end-plug, and each casing top with a locking plug. The screened portions of the groundwater monitoring wells were constructed of machine-slotted PVC casing with 0.020-inch-wide slots and the screened portions of the vapor extraction wells were constructed of machine-slotted PVC casing with 0.100-inch-wide slots. Slot size for the subsequent groundwater monitoring and vapor extraction wells was based on previous drilling and well installation data. The screened sections in groundwater monitoring wells were placed to allow monitoring during seasonal fluctuations of groundwater levels.

The annular space of each groundwater monitoring well was backfilled with No. 3 sand, and each vapor extraction well was backfilled with washed ⅜-inch-diameter pea gravel to approximately two feet above the top of the screened casing for monitoring and vapor wells. The sand pack grain size for subsequent wells was based on previous groundwater monitoring and vapor extraction well installation data. A 1- to 2-foot-thick bentonite plug was placed above the sand pack as a seal against cement entering the filter pack. The remaining annulus was then backfilled with a slurry of water, neat cement, and bentonite to approximately one foot below the ground surface.

An Emmco-Wheton Christy box with a PVC apron was placed over each groundwater monitoring wellhead, with the exception of wells MW-2, MW-8, and RW-1, and set in concrete placed flush with the surrounding ground surface. Remediation boxes were placed over each vapor extraction well (VW-1 through VW-7), and groundwater monitoring wells MW-2, MW-8, and RW-1. Each wellhead cover has a seal to protect the monitoring and vapor wells against surface-water infiltration and requires a special wrench to open. The

design discourages vandalism and reduces the possibility of accidental disturbance of the well.

Groundwater Monitoring Well Development

The monitoring wells are developed by bailing or over-pumping and surge-block techniques. The wells are either bailed or pumped, allowed to recharge, and bailed or pumped again until the water removed from the wells is evaluated to be clear. Turbidity measurements (in NTU's) are recorded during well development and are used in evaluating well development. The development method used, initial turbidity measurement, volume of water removed, final turbidity measurement, and other pertinent field data and observations are recorded. The wells are allowed to equilibrate for at least 48 hours after development prior to sampling. Water generated by well development is stored in 17E Department of Transportation (DOT) 55-gallon drums on site, and remains the responsibility of the client.

Groundwater Sampling

The static water level in each well is measured to the nearest 0.01-foot using a Solinst® electric water-level sounder or oil/water interface probe (if the wells contain floating product) cleaned with Alconox® and water before use in each well. The liquid in the wells is examined for visual evidence of gasoline hydrocarbons by gently lowering approximately half the length of a Teflon® bailer (cleaned with Alconox® and water) past the air/water interface. The sample is then retrieved and inspected for floating product, sheen, emulsion, color, and clarity. If floating product is present in the well, the thickness of floating product is measured using an oil/water interface probe and is recorded to the nearest 0.01 foot. Floating product is removed from wells on site visits.

Wells which do not contain floating product are purged using a submersible pump. The pump, cables, and hoses are cleaned with Alconox® and water prior to use in each well. The wells are purged until withdrawal is of sufficient duration to result in stabilized pH, temperature, and electrical conductivity of the water, as measured using portable meters calibrated to a standard buffer and conductivity standard. If the well becomes dewatered, the water level is allowed to recover to at least 80 percent of the initial water level. Prior to the collection of each groundwater sample, the Teflon® bailer is cleaned with Alconox® and rinsed with tap water and deionized water, and the latex gloves worn by the sampler changed. Hydrochloric acid is added to the sample vials as a preservative (when applicable). A sample method blank is collected by pouring distilled water into the bailer and then into sample vials. A sample of the formation water is then collected from the surface of the

water in each of the wells using the Teflon® bailer. The water samples are then gently poured into laboratory-cleaned, 40-milliliter (ml) glass vials, 500 ml plastic bottles or 1-liter glass bottles (as required for specific laboratory analysis) and sealed with Teflon®-lined caps, and inspected for air bubbles to check for headspace, which would allow volatilization to occur. The samples are then labeled and promptly placed in iced storage. A field log of well evacuation procedures and parameter monitoring is maintained. Water generated by the purging of wells is stored in 17E DOT 55-gallon drums, and floating product bailed from the wells is stored in double containment onsite; this water and product remains the responsibility of the client.

Vadose-Zone Sampling

Vapor readings are made with a field calibrated OVM, which has a lower detection limit of 0.1 ppm. Prior to purging each vadose-zone monitoring well, an initial reading is taken inside the well by connecting the tubing of the OVM to a tight fitting at the top of the well. Each vadose-zone monitoring well is then purged for approximately 60 seconds using an electric vacuum pump connected to the tight fitting. Ambient readings of the air at the site are taken with the OVM after each well is purged. The OVM is then connected to the well fitting, and the reading recorded. The well is then again purged for approximately 30 seconds, and again measured using the OVM. These purging and measuring procedures are repeated until two consecutive OVM readings are within ten percent of each other.

Air Sampling

Air samples are collected in opaque Mylar air sample bags using a sample pump with ¼-inch Tygon-type tubing connected to a brass wellhead fitting. Tygon-type tubing is used to minimize sample loss through adsorption and the possibility of distorted results from a sample line contaminated by a previous test run. The samples are sealed in the bags and labeled with the sample number, date, time, and sampler's name. The samples are immediately stored in a cool place for transport to a State-certified laboratory under Chain of Custody documentation.

Sample Labeling and Handling

Sample containers are labeled in the field with the job number, sample location and depth, and date, and promptly placed in iced storage for transport to the laboratory. A Chain of Custody Record is initiated by the field geologist and updated throughout handling of the samples, and accompanies the samples to a laboratory certified by the State of California

for the analyses requested. Samples are transported to the laboratory promptly to help ensure that recommended sample holding times are not exceeded. Samples are properly disposed of after their useful life has expired.

APPENDIX C

WELL CONSTRUCTION PERMIT

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94588 • (510) 484-2600

11 February 1992

Resna
3315 Almaden Expressway, Ste. 34
San Jose, CA 95118

Gentlemen:

Enclosed is drilling permit 92071 for a monitoring well construction project at 10600 MacArthur Boulevard in Oakland for Arco Products Company.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Craig Mayfield or me at 484-2600.

Very truly yours,

Wyman Hong

Wyman Hong
Water Resources Technician

WH:mm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT ARCO Station 276
10600 MacArthur Blvd.
Oakland, CA 94621

(2) CLIENT
Name ARCO Products Company
Address P.O. Box 5811 Phone (415) 571-2434
City San Mateo Zip 94402

(3) APPLICANT
Name RESNA Industries
Address 3315 Almaden Exp. Suite 34 Phone (408) 264-7723
City San Jose Zip 95118

(4) DESCRIPTION OF PROJECT
Water Well Construction ___ Geotechnical ___
Cathodic Protection ___ Well Destruction ___

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring ___ Other Vapor extraction wells

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger ✓
Cable ___ Other ___

WELL PROJECTS
Drill Hole Diameter 10 1/4 in. Depth(s) 35 ft.
Casing Diameter 4 in. Number
Surface Seal Depth 8 ft. of Wells 8
Driller's License No. 384167

GEOTECHNICAL PROJECTS
Number ___
Diameter ___ in. Maximum Depth ___ ft.

(7) ESTIMATED STARTING DATE 2/19/92
ESTIMATED COMPLETION DATE 2/21/92

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

APPLICANT'S SIGNATURE Robert D. Campbell for RESNA Date 2/5/92

FOR OFFICE USE

PERMIT NUMBER 92071
LOCATION NUMBER

Approved Wyman Hong Date 10 Feb 92
Wyman Hong

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (484-2600) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.

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

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.

E. WELL DESTRUCTION. See attached.

91987

APPENDIX D

WELLHEAD SURVEY

JOHN E. KOCH
Land Surveyor
CA. State Lic. No. LS4811
5427 Telegraph Ave., Suite A
Oakland, CA 94609
(510)655-9956
FAX(510)655-9745

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

08/13/92

Tabulation of Elevations as of
03:00 p.m. 08/13/92

Job #92069
RESNA Project Job # 60026.05
Project Manager: Joel Coffman
Site: Arco Station 276
10600 MacArthur Blvd.
@ 106th Ave.
Oakland, CA

BENCHMARK:#14/B
Top of disc set in a standard City of Oakland monument casing in middle of concrete sidewalk on the most S'LY corner of 106th Ave. and MacArthur Boulevard.
(Elev. 52.811' City of Oakland Datum) *see note 1.

MONITOR WELL DATA TABLE

Well Designation	Elevation	Description
MW-1	55.92	Top of PVC Casing
	56.25	Top of Box
MW-2	55.10	Top of PVC Casing
	55.64	Top of Box
MW-3	56.55	Top of PVC Casing
	56.91	Top of Box
MW-4	55.98	Top of Casing
	56.51	Top of Box
MW-5	55.43	Top of PVC Casing
	55.99	Top of Box

JOHN E. KOCH, P.L.S. RESNA PROJ.#60026.05 JEK JOB #92069

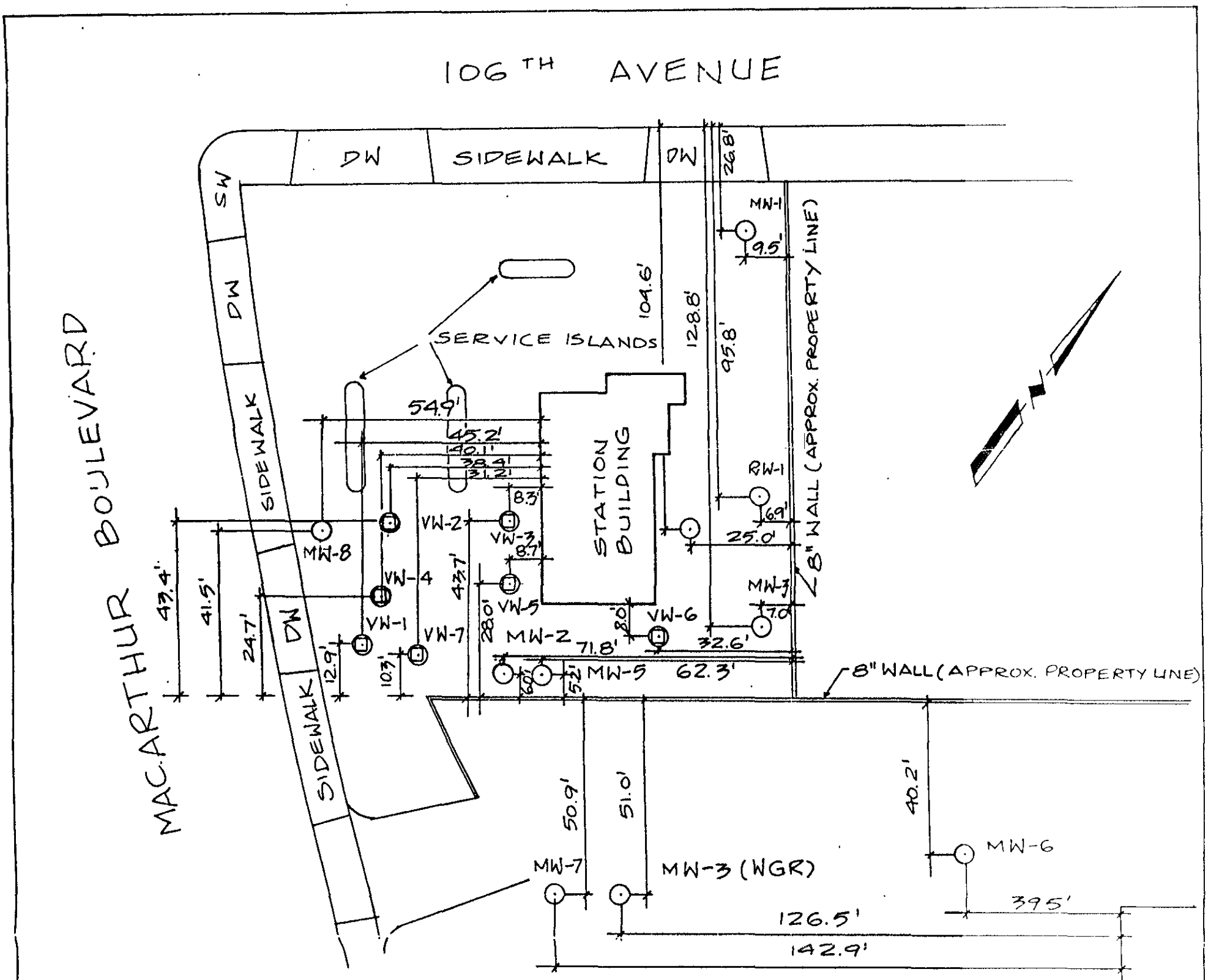
Well Designation	Elevation	Description
MW-6	61.21	Top of PVC Casing
	61.54	Top of box
MW-7	58.22	Top of PVC Casing
	58.54	Top of Box
MW-8	53.65	Top of PVC Casing
	54.75	Top of Box
VW-1	53.58	Top of PVC Casing
	54.95	Top of Box
VW-2	54.46	Top of PVC Casing
	55.32	Top of Box
VW-3	54.64	Top of PVC Casing
	55.89	Top of Box
VW-4	54.44	Top of PVC Casing
	55.11	Top of Box
VW-5	54.85	Top of PVC Casing
	55.81	Top of Box
VW-6	55.68	Top of PVC Casing
	56.43	Top of Box
VW-7	54.21	Top of PVC Casing
	55.20	Top of Box
RW-1	56.32	Top of PVC Casing
	56.60	Top of Box

NOTE:

1. Datum is City of Oakland = (USGS) +3.00

2. Top of PVC Casing Elevation is at notch on rim of PVC for RW-1 and all MW's and at mark set at 1/2" port with pressure gauge removed for all VW's.

3. T.O.C. of MW-1 was checked and found to be at same El. (55.91') as on report of May 11, 1989 provided by client.



ELEVATIONS

WELL NUMBER	TOP OF CASING	TOP OF BOX
MW-1	55.92'	56.25
MW-2	55.10	55.64
MW-3	56.55	56.81
MW-4	55.98	56.51
MW-5	55.43	55.89
MW-6	61.21'	61.54'
MW-7	58.22	58.54
MW-8	53.65	54.75
VW-1	53.58	54.95
VW-2	54.46	55.32'
VW-3	54.64	55.89
VW-4	54.44	55.11
VW-5	54.85	55.81
VW-6	55.68	56.43
VW-7	54.21	55.20
RW-1	56.32	56.60

LEGEND

⊙ MW; RW

⊙ VW

SW - SIDEWALK

DW - DRIVEWAY

SCALE : 1" = 30'

SITE:

ARCO STATION 276
10600 MACARTHUR BLVD
OAKLAND, CA
RESNA PROJECT 60026.05

CLIENT :
RESNA:
3315 ALMADEN EXPRESSWAY
SUITE 34
SAN JOSE, CA 95118

JOHN E. KOCH
LAND SURVEYOR
CA. STATE LIC. NO. LS4811
5427 TELEGRAPH AVE., SUITE A
OAKLAND, CA. 94609
(510) 655-9956
(510) 655-9745

JOB #	DRAWN BY	DATE
92069	T. ROSU	08.18.92

APPENDIX E

LABORATORY ANALYSIS REPORTS AND CHAIN OF CUSTODY RECORDS-SOIL

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-92-5

Chain of Custody

ARCO Facility no. 76	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Michael Whelan	Telephone no. (ARCO) (415) 2435	Telephone no. (Consultant) (408) 264-7723	Fax no. (Consultant) (408) 264-2435	Contract number 07-072
Consultant name RESNA Industries	Address (Consultant) 3315 Almaden Exp. Suite 34, San Jose, CA, 95118			Method of shipment

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	TPH-D	Sieve
S 1/1			X			X		6-16-92													X	
S 1/2			X			X															X	
10 1/1			X			X															X	
S 1/1			X			X					X					X						
15 1/2			X			X															X	
1/1			X			X															X	
2 1/1			X			X					X					X						
1/1			X			X															X	
2 1/1			X			X															X	
1/1			X			X															X	
2 1/1			X			X															X	
1/1			X			X															X	
30 1/2			X			X					X					X						
30 1/2			X			X															X	
S 1/2			X			X															X	
35 1/2			X			X															X	
35 1/2			X			X					X					X						
45 1/2			X			X																X

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample: cool		Temperature received: cool	
Relinquished by sampler: [signature] for RESNA	Date 6/17/92	Time 1100	Received by: [signature]
Relinquished by: [signature]	Date 6/17/92	Time 1135	Received by:
Relinquished by:	Date	Time	Received by laboratory: [signature] Date 6-17 Time 1331

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

ARCO Products Company
Division of Atlantic Richfield Company

Task Order No. 276-92-5

Chain of Custody

ARCO Facility no 76	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Mike Whelan	Telephone no. (ARCO) (415) 571-2435	Telephone no. (Consultant) (408) 264-7723	Fax no. (Consultant) (408) 264-2435	Contract number 07-073
Consultant name [illegible] Industries	Address (Consultant) 3315 Almaden Expy. Suite 34, San Jose, CA, 95118		Method of shipment

Sample ID	Lab no	Container no	Matrix: Soil	Water	Other	Preservation: Ice	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Hold	Store
[illegible]			X			X		6-16-92													X	
30 - 10[illegible]			X			X																X
3[illegible] - 13[illegible]			X			X															X	
[illegible] - [illegible]			X			X															X	
[illegible] - [illegible]			X			X																X
[illegible] - [illegible]			X			X															X	
60 - 6[illegible]			X			X					X					X						
[illegible] 21[illegible]			X			X		6-16-92													X	
[illegible] 11[illegible]			X			X															X	
[illegible] 11[illegible]			X			X					X					X						
[illegible] 11[illegible]			X			X															X	
[illegible] 11[illegible]			X			X															X	
[illegible] 11[illegible]			X			X															X	
[illegible] 11[illegible]			X			X															X	
[illegible] 11[illegible]			X			X					X					X						
[illegible] 11[illegible]			X			X																X

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample [illegible] 90%		Temperature received: cmf	
Relinquished by sampler [illegible] for RESNA	Date 6/17/92 Time 1100	Received by [illegible]	
Relinquished by [illegible]	Date 6/17/92 Time 1335	Received by	
Relinquished by	Date Time	Received by laboratory [illegible]	Date 6-17 Time 1335

Distribution White copy — Laboratory, Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APPC-3292 (2-91)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-92-5

Chain of Custody

ARCO Facility no. 276	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Michael Whelan	Telephone no. (ARCO) (415) 571-2435	Telephone no. (Consultant) (408) 264-7723	Fax no. (Consultant) (408) 264-2435
Consultant name Star Industries	Address (Consultant) 3315 Almaden Exp. Suite 34, San Jose, CA 95118		Contract number

Sample I.D.	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Hold	Sieve
2-			X			X		6-16-92													X	
2-			X			X																X
3-			X			X					X					X						
4-			X			X															X	
3-			X			X																X
			X			X															X	
			X			X					X					X						

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample

Relinquished by sampler: [signature] for RESNA — Date 6/17/92 — Time 1100

Relinquished by: [signature] — Date 6/17/92 — Time 1335

Relinquished by: [signature] — Date — Time

Temperature received:

Received by: [signature]

Received by: [signature]

Received by laboratory: [signature] — Date 6-17 — Time 1331

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 276, Oakland

Enclosed are the results from 15 soil samples received at Sequoia Analytical on June 17,1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2063383	Soil, S10.5-B10	6/16/92	EPA 5030/8015/8020 EPA 8240
2063384	Soil, S20-B10	6/16/92	EPA 5030/8015/8020 EPA 8240
2063385	Soil, S30-B10	6/16/92	EPA 5030/8015/8020 EPA 8240
2063386	Soil, S39.5-B10	6/16/92	EPA 5030/8015/8020 EPA 8240
2063387	Soil, S-45-B10	6/16/92	Particle Size Distribution by Weight
2063388	Soil, S-50-B10	6/16/92	Particle Size Distribution by Weight
2063389	Soil, S-55-B10	6/16/92	Particle Size Distribution by Weight
2063390	Soil, S60.5-B10	6/16/92	EPA 5030/8015/8020 EPA 8240
2063391	Soil, S10-B11	6/16/92	EPA 5030/8015/8020 EPA 8240
2063392	Soil, S20.5-B11	6/16/92	EPA 5030/8015/8020 EPA 8240

SEQUOIA ANALYTICAL

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

2063393	Soil, S-24.5-B11	6/16/92	Particle Size Distribution by Weight
2063394	Soil, S-29.5-B11	6/16/92	Particle Size Distribution by Weight
2063395	Soil, S30-B11	6/16/92	EPA 5030/8015/8020 EPA 8240
2063396	Soil, S-35-B11	6/16/92	Particle Size Distribution by Weight
2063397	Soil, S36.5-B11	6/16/92	EPA 5030/8015/8020 EPA 8240

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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Matrix Descript:	Soil	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jun 19, 1992
Attention: Joel Coffman	First Sample #:	206-3383	Reported:	Jun 24, 1992

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
206-3383	S10.5-B10	N.D.	N.D.	N.D.	N.D.	N.D.
206-3384	S20-B10	N.D.	N.D.	N.D.	N.D.	N.D.
206-3385	S30-B10	N.D.	N.D.	N.D.	N.D.	N.D.
206-3386	S39.5-B10	N.D.	N.D.	N.D.	N.D.	N.D.
206-3390	S60.5-B10	N.D.	N.D.	N.D.	N.D.	N.D.
206-3391	S10-B11	N.D.	N.D.	N.D.	N.D.	N.D.
Detection Limits:		1.0	0.0050	0.0050	0.0050	0.0050

BTEX = max 6

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection

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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Matrix Descript:	Soil	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jun 21, 1992
Attention: Joel Coffman	First Sample #:	206-3392	Reported:	Jun 24, 1992

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
206-3392	S20.5-B11	6.3	0.072	0.069	0.21	1.7
Detection Limits:		2.5	0.013	0.013	0.013	0.013

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline 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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Matrix Descript:	Soil	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jun 21, 1992
Attention: Joel Coffman	First Sample #:	206-3395	Reported:	Jun 24, 1992

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
206-3395	S30-B11	32	0.26	0.65	0.56	2.9
Detection Limits:		10	0.050	0.050	0.050	0.050

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline 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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Matrix Descript:	Soil	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jun 21, 1992
Attention: Joel Coffman	First Sample #:	206-3397	Reported:	Jun 24, 1992

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
206-3397	S36.5-B11	23	0.13	0.36	0.33	1.8
Detection Limits:		5.0	0.025	0.025	0.025	0.025

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline 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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S10.5-B10 ←	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 24, 1992
Attention: Joel Coffman	Lab Number:	206-3383	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection

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Maria Lee
Project Manager

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S20-B10	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 24, 1992
Attention: Joel Coffman	Lab Number:	206-3384	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	~~N.D.~~
Tetrachloroethene (Perc)	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S30-B10	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 24, 1992
Attention: Joel Coffman	Lab Number:	206-3385	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S39.5-B10	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 25, 1992
Attention: Joel Coffman	Lab Number:	206-3386	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D.
Vinyl chloride	100	N D
Total Xylenes	100	N.D

Analytes reported as N D were not present above the stated limit of detection

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S60.5-B10	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 24, 1992
Attention: Joel Coffman	Lab Number:	206-3390	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	220
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S10-B11	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 25, 1992
Attention: Joel Coffman	Lab Number:	206-3391	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N D.
Vinyl chloride	100	N D
Total Xylenes	100	N.D.

Analytes reported as N D were not present above the stated limit of detection

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S20.5-B11	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 25, 1992
Attention: Joel Coffman	Lab Number:	206-3392	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	390
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	3,000

Analytes reported as N.D. were not present above the stated limit of detection

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Maria Lee
Project Manager

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S30-B11	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 25, 1992
Attention: Joel Coffman	Lab Number:	206-3395	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	190
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	120
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	310
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	600

Analytes reported as N.D. were not present above the stated limit of detection

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S36.5-B11	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 25, 1992
Attention: Joel Coffman	Lab Number:	206-3397	Reported:	Jul 1, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D
Vinyl chloride	100	N.D.
Total Xylenes	100	360

Analytes reported as N.D. were not present above the stated limit of detection

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S-45-B10	Received:	Jun 17, 1992
San Jose, CA 95118			Analyzed:	Jun 22, 1992
Attention: Joel Coffman	Lab Number:	206-3387	Reported:	Jul 1, 1992

PARTICLE SIZE DISTRIBUTION BY WEIGHT

Seive # Tyler Sieve Units	Weight grams	Percent Distribution
5	0.0	0.0
6	6.0	0.02
7	6.2	0.03
9	1.4	1.6
10	2.9	3.2
12	6.3	7.0
16	17.1	18.8
24	26.3	29.
28	10.9	12
32	5.7	6.3
42	7.8	8.6
48	2.5	2.8
80	3.4	3.7
120	3.3	3.6
200	2.1	2.3
Pan	0.81	0.9

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S-50-B10	Received:	Jun 17, 1992
San Jose, CA 95118			Analyzed:	Jun 22, 1992
Attention: Joel Coffman	Lab Number:	206-3388	Reported:	Jul 1, 1992

PARTICLE SIZE DISTRIBUTION BY WEIGHT

Seive # Tyler Sieve Units	Weight grams	Percent Distribution
5	0.24	0.2
6	0.15	0.1
7	0.34	0.31
9	2.2	2.0
10	2.1	1.9
12	2.8	2.5
16	8.2	7.6
24	10	9.7
28	11	10.3
32	6.8	6.3
42	28	25.8
48	12	11.2
80	16	14.7
120	3.4	3.2
200	2.6	2.4
Pan	2.0	1.9

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S-55-B10	Received:	Jun 17, 1992
San Jose, CA 95118			Analyzed:	Jun 22, 1992
Attention: Joel Coffman	Lab Number:	206-3389	Reported:	Jul 1, 1992

PARTICLE SIZE DISTRIBUTION BY WEIGHT

Seive # Tyler Sieve Units	Weight grams	Percent Distribution
5	0.0	0.0
6	0.0	0.0
7	0.27	0.4
9	3.8	5.2
10	4.7	6.5
12	6.3	8.7
16	13	18.6
24	13	18
28	5.7	7.8
32	3.5	4.7
42	6.8	9.4
48	4.0	5.5
80	4.6	5.6
120	2.9	4.0
200	2.9	4.0
Pan	1.2	1.6

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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S-24.5-B11	Received:	Jun 17, 1992
San Jose, CA 95118			Analyzed:	Jun 22, 1992
Attention: Joel Coffman	Lab Number:	206-3393	Reported:	Jul 1, 1992

PARTICLE SIZE DISTRIBUTION BY WEIGHT

Seive # Tyler Sieve Units	Weight grams	Percent Distribution
5	0.0	0.0
6	0.050	0.04
7	0.28	0.30
9	0.33	1.3
10	1.5	1.5
12	1.5	1.5
16	6.0	6.0
24	7.6	7.6
28	9.0	9.0
32	7.1	7.1
42	19	18.5
48	12	11.8
80	17	17.3
120	6.3	6.3
200	8.3	8.2
Pan	3.6	3.6

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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S-29.5-B11	Received:	Jun 17, 1992
San Jose, CA 95118			Analyzed:	Jun 22, 1992
Attention: Joel Coffman	Lab Number:	206-3394	Reported:	Jul 1, 1992

PARTICLE SIZE DISTRIBUTION BY WEIGHT

Seive # Tyler Sieve Units	Weight grams	Percent Distribution
5	1.0	0.9
6	0.94	0.8
7	1.6	1.4
9	9.1	8.0
10	8.4	7.4
12	8.4	7.3
16	14	12.6
24	14	12.4
28	7.2	6.3
32	5.8	5.0
42	7.2	6.3
48	7.7	6.7
80	7.6	6.6
120	6.9	6.0
200	6.1	5.4
Pan	7.9	7.0

SEQUOIA ANALYTICAL

Mária Lee
Project Manager

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S-35-B11	Received:	Jun 17, 1992
San Jose, CA 95118			Analyzed:	Jun 22, 1992
Attention: Joel Coffman	Lab Number:	206-3396	Reported:	Jul 1, 1992

PARTICLE SIZE DISTRIBUTION BY WEIGHT

Seive # Tyler Sieve Units	Weight grams	Percent Distribution
5	0.28	0.3
6	0.76	0.7
7	1.9	1.8
9	7.5	7.2
10	6.8	6.5
12	7.8	7.5
16	0.030	0.02
24	6.0	0.03
28	0.38	0.4
32	15	14.4
42	13	12.9
48	7.8	7.4
80	26	25.3
120	5.7	5.4
200	7.6	7.3
Pan	3.0	2.8

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 276, Oakland

QC Sample Group: 2063383-6, 90-2, 95, 97

Reported: Jul 1, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	B. Ali	B. Ali	B. Ali	B. Ali
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jun 19, 1992	Jun 19, 1992	Jun 19, 1992	Jun 19, 1992
QC Sample #:	GBLK061992 MS/MSD-A	GBLK061992 MS/MSD-A	GBLK061992 MS/MSD-A	GBLK061992 MS/MSD-A
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.17	0.17	0.17	0.50
Matrix Spike % Recovery:	85	85	85	83
Conc. Matrix Spike Dup.:	0.18	0.18	0.18	0.52
Matrix Spike Duplicate % Recovery:	90	90	90	87
Relative % Difference:	5.7	5.7	5.7	3 9

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

% Recovery	$\frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}}$	x 100
Relative % Difference	$\frac{\text{Conc of M S - Conc of M S D}}{(\text{Conc of M S + Conc of M S D}) / 2}$	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 276, Oakland

QC Sample Group: 2063383-6, 90-2, 95, 97

Reported: Jul 1, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	C. Donohue	C. Donohue	C. Donohue	C. Donohue
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jun 19, 1992	Jun 19, 1992	Jun 19, 1992	Jun 19, 1992
QC Sample #:	GBLK061992 MS/MSD	GBLK061992 MS/MSD	GBLK061992 MS/MSD	GBLK061992 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.21	0.21	0.21	0.61
Matrix Spike % Recovery:	105	105	105	102
Conc. Matrix Spike Dup.:	0.21	0.20	0.20	0.62
Matrix Spike Duplicate % Recovery:	105	100	100	103
Relative % Difference:	0.0	4.9	4 9	1.6

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\%\ \text{Recovery} = \frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc of M S - Conc of M S D}}{(\text{Conc of M S + Conc of M S D}),\ 2} \times 100$$

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 276, Oakland

QC Sample Group: 2063383-6, 90-2, 95, 97

Reported: Jul 1, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	A. Miraftab	A. Miraftab	A. Miraftab	A. Miraftab
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jun 21, 1992	Jun 21, 1992	Jun 21, 1992	Jun 21, 1992
QC Sample #:	BLK061992	BLK061992	BLK061992	BLK061992
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.20	0.20	0.20	0.59
Matrix Spike % Recovery:	100	100	100	98
Conc. Matrix Spike Dup.:	0.18	0.18	0.18	0.54
Matrix Spike Duplicate % Recovery:	90	90	90	90
Relative % Difference:	11	11	11	8.8

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

% Recovery	$\frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}}$	x 100
Relative % Difference	$\frac{\text{Conc of M S - Conc of M S D}}{(\text{Conc of M S + Conc of M S D}) \div 2}$	x 100

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	
3315 Almaden Expwy., Suite 34	Method (units):	EPA 8240 (µg/L purged)	Q.C. Sample Dates
San Jose, CA 95118	Analyst(s):	S. Scott	
Attention: Joel Coffman	QC Sample #:	BLK062592	Analyzed: Jun 25, 1992
			Reported: Jul 1, 1992

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	Matrix Spike % Recovery	Conc. Matrix Spike Duplicate	Matrix Spike Duplicate % Recovery	Relative % Difference
1,1-Dichloro-ethene	N.D.	50	44	88	46	92	4.4
Trichloroethene	N.D.	50	48	92	51	102	6.1
Benzene	N.D.	50	51	102	53	106	3.8
Toluene	N.D.	50	49	98	54	108	9.7
Chlorobenzene	N.D.	50	51	102	54	108	5.7

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\% \text{ Recovery} = \frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc of M S. - Conc of M S D}}{(\text{Conc of M S + Conc of M S D}) \ 2} \times 100$$

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	
3315 Almaden Expwy., Suite 34	Method (units):	EPA 8240 (µg/L purged)	Q.C. Sample Dates
San Jose, CA 95118	Analyst(s):	S. Scott	
Attention: Joel Coffman	QC Sample #:	BLK062492	Analyzed: Jun 24, 1992
			Reported: Jul 1, 1992

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	Matrix Spike % Recovery	Conc. Matrix Spike Duplicate	Matrix Spike Duplicate % Recovery	Relative % Difference
1,1-Dichloro-ethene	N.D.	50	60	120	55	110	8.7
Trichloroethene	N.D.	50	62	124	56	112	10
Benzene	N.D.	50	66	132	59	118	11
Toluene	N.D.	50	60	120	58	116	3.4
Chlorobenzene	N.D.	50	64	128	58	116	9.8

Quality Assurance Statement. All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\%\ \text{Recovery} = \frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc of M S - Conc of M S D}}{(\text{Conc of M S - Conc of M S D}) / 2} \times 100$$

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-92-5

Chain of Custody

ARCO Facility no 276	City (Facility) Oakland	Project manager (Consultant) Joel Coffman		Laboratory name [redacted]
ARCO engineer Mike Whelan	Telephone no. (ARCO) (415) 571-2735	Telephone no. (Consultant) (408) 264-7723	Fax no. (Consultant) (408) 264-2435	Contract number
Consultant name LFA Industries	Address (Consultant) 3315 Almaden Expy Suite 34 San Jose, CA 95118			Method of shipment

Sample I.D.	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
SP 1		2	X			X		6-16-92			X					X						
SP 2																						
SP 3																						
SP 4																						

Special detection Limit/reporting

Special QA/QC

Remarks: Composite 4 samples into 1 and analyze

Lab number

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☒
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☐

Condition of sample		Temperature received:	
Relinquished by sampler [signature] FRESNO	Date 6-17-92 Time 900	Received by [signature]	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	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 276, Oakland

Enclosed are the results from 1 soil sample received at Sequoia Analytical on June 17,1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2063150	Soil, CSP1-4 Composite	6/16/92	EPA 5030/8015/8020 EPA 8240

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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, CSP1-4, Comp.	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jun 19, 1992
Attention: Joel Coffman	Lab Number:	206-3150	Reported:	Jun 19, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	**100**	**180**
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	**100**	**410**
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	**100**	**480**
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N D
Trichlorofluoromethane	100	N D
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	2,900

Analytes reported as N D were not present above the stated limit of detection.

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 276, Oakland	Sampled:	Jun 16, 1992
3315 Almaden Expwy., Suite 34	Matrix Descript:	Soil	Received:	Jun 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jun 18, 1992
Attention: Joel Coffman	First Sample #:	206-3150	Reported:	Jun 19, 1992

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
206-3150	CSP1-4 Composite	94	0.58	1.0	0.86	5.0
Detection Limits:		2.0	0.010	0.010	0.010	0.010

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline 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 276, Oakland
Method (units): EPA 8240 (µg/L purged)
Analyst(s): G. Meyer
QC Sample #: BLK061692A

Q.C. Sample Dates
Analyzed: Jun 16, 1992
Reported: Jun 19, 1992

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	Matrix Spike % Recovery	Conc. Matrix Spike Duplicate	Matrix Spike Duplicate % Recovery	Relative % Difference
1,1-Dichloro-ethene	N.D.	50	41	82	37	74	10
Trichloroethene	N.D.	50	41	82	38	76	7.6
Benzene	N.D.	50	44	88	42	84	4.7
Toluene	N.D.	50	43	86	45	90	4.5
Chlorobenzene	N.D.	50	44	88	42	84	4.7

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\% \text{ Recovery} = \frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc of M S - Conc of M S D}}{(\text{Conc of M S + Conc of M S D}) / 2} \times 100$$

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 276, Oakland

QC Sample Group: 206-3150

Revised: Jun 19, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	B. Ali	B. Ali	B. Ali	B. Ali
Reporting Units:	mg/L	mg/L	mg/L	mg/L
Date Analyzed:	Jun 18, 1992	Jun 18, 1992	Jun 18, 1992	Jun 18, 1992
QC Sample #:	GBLK061892 MS/MSD	GBLK061892 MS/MSD	GBLK061892 MS/MSD	GBLK061892 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.17	0.17	0.17	0.49
Matrix Spike % Recovery:	85	85	85	82
Conc. Matrix Spike Dup.:	0.17	0.17	0.17	0.51
Matrix Spike Duplicate % Recovery:	85	85	85	85
Relative % Difference:	0.0	0 0	0.0	4 0

Quality Assurance Statement. All standard operating procedures and quality control requirements have been met

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

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-91-48

Chain of Custody

ARCO Facility no	176	City (Facility)	Oakland
ARCO engineer	Mr Michael Whelan	Telephone no (ARCO)	(415) 571-2434
Consultant name	RESNA	Address (Consultant)	3315 Almaden Exp. Suite 34, San Jose, CA 95118
Project manager (Consultant)	Joel Coffman	Telephone no (Consultant)	(408) 264-7723
Fax no. (Consultant)	(408) 264-2435		

Laboratory name: Sequoia
Contract number: 07-073.1
Method of shipment: Sequoia Courier

Sample ID	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		H2O
S-5	512	1	✓			✓		7/16/92														X
S-9	513	1	✓			✓		7/16/92			X									20	29/17	
S-15	514	1	✓			✓		7/16/92			X										9/8	
S-19	515	1	✓			✓		7/16/92			X										9/9	
S-20	516	1	✓			✓		7/16/92														X
S-21	517	1	✓			✓		7/16/92			[illegible]											X
S-24	518	1	✓			✓		7/16/92			X									20	29/20	
S-29	519	1	✓			✓		7/16/92			X										9/21	
S-31	520	1	✓			✓		7/16/92														X
S-33	521	1	✓			✓		7/16/92														
S-34	522	1	✓			✓		7/16/92														
S-35	523	1	✓			✓		7/16/92														
S-44	524	1	✓			✓		7/16/92														
S-50	525	1	✓			✓		7/16/92			X						X			20	29/22	

Special detection Limit/reporting

Special QA/QC

Remarks: RESNA will call regarding samples to be analyzed

Lab number

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

Condition of sample

Temperature received:

	Date	Time	
Relinquished by sampler: Barbara Sieminski	07/17/92	359 PM	Received by: P A Hakeem
Relinquished by	Date	Time	Received by: [illegible] 7/17 1800
Relinquished by	Date	Time	Received by laboratory: [illegible] Date: 7/21/92 Time: 1105

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APRC-3292 (2 91)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-91-48

Chain of Custody

ARCO Facility no 276	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Michael Whelan	Telephone no. (ARCO) (415)-571-2434	Telephone no. (Consultant) (408) 264-7723	Fax no. (Consultant) (408) 261-2435
Consultant name RESNA	Address (Consultant) 3315 Almaden Expressway, Suite 34, San Jose, CA 95118		Contract number 07-073

Method of shipment: Sequoia Courier

Sample ID	Lab no	Container no	Matrix: Soil	Water	Other	Preservation: Ice	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		HOLD
S-5 B13		1	✓			✓		7/15/92			X									20	12916	
S-10 B13		1	✓			✓		7/15/92			X										906	
S-15-B13		1	✓			✓		7/15/92			X										907	
S-18 B13		1	✓			✓		7/15/92			X									✓	908	
S-18.5 B13		1	✓			✓		7/15/92														X
S-5 B16		1	✓			✓		7/15/92			X									20	12 911	
S-10 B16		1	✓			✓		7/15/92			X										910	
S-15 B16		1	✓			✓		7/15/92			X										911	
S-17-B16		1	✓			✓		7/15/92														X
S-19 B16		1	✓			✓		7/15/92			X									20	12912	
S-20.5-B16		1	✓			✓		7/15/92														X
S-5.5-B18		1	✓			✓		7/15/92			X									20	729 13	
S-10.5-B18		1	✓			✓		7/15/92			X										914	
S-15.5-B18		1	✓			✓		7/15/92			X										915	
S-17.5-B18		1	✓			✓		7/15/92			X										916	
S-19-B18		1	✓			✓		7/15/92														X

Special detection Limit/reporting

Special QA/QC

Remarks: RESNA will call regarding samples to be analyzed.

Lab number

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

Condition of sample

Temperature received:

	Date	Time	
Relinquished by sampler: Barbara Sieminski	07/17/92	3:50 PM	Received by: P.A. Hamilton
Relinquished by: P.A. Hamilton			Received by: [illegible] 7/17 1800
Relinquished by:			Received by laboratory: [illegible] Date 7.17.92 Time 1705

Distribution: White copy — Laboratory, Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APRC-3292 (2 91)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-91-48

Chain of Custody

ARCO Facility no 276	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Michael Whelan	Telephone no. (ARCO) (415) 571-2434	Telephone no. (Consultant) (408) 264-7723	Fax no. (Consultant) (408) 264-2435
Consultant name RESNA	Address (Consultant) 3315 Almaden Expy, Suite 34, San Jose, CA 95115		Contract number 07-073

Method of shipment: Sequoia Courier

Sample I.D.	Lab no	Container no	Matrix: Soil	Water	Other	Preservation: Ice	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		Hold
S-15-B14		1	✓			✓		7/16/92			X										9223	
S-10-B14		1	✓			✓		7/16/92			X										9224	
S-15-B14		1	✓			✓		7/16/92			X										9225	
S-17.5-B14		1	✓			✓		7/16/92			X										9226	
S-13-B14		1	✓			✓		7/16/92														X
S-20.5-B14		1	✓			✓		7/17/92														X
S-5-B19		1	✓			✓		7/17/92			X										9227	
S-10-B19		1	✓			✓		7/17/92			X										9228	
S-15-B19		1	✓			✓		7/17/92			X										9229	
S-17.5-B19		1	✓			✓		7/17/92			X										9230	
S-13-B19		1	✓			✓		7/17/92														X
S-19.5-B19		1	✓			✓		7/17/92														X

Special detection Limit/reporting

Special QA/QC

Remarks: RESNA will call regarding samples to be analyzed

Lab number

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☑

Condition of sample

Temperature received:

	Date	Time		Date	Time
Relinquished by sampler: Barbara Sieminski	07/17/92	3:50 PM	Received by		
Relinquished by			Received by	7/17	1800
Relinquished by			Received by laboratory	7/21/92	1405

Distribution: White copy — Laboratory, Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APPC-3292 (2-91)

ARCO Products Company
Division of Atlantic Richfield Company

Task Order No. 276-91-48

Chain of Custody

ARCO Facility no: 276	City (Facility): Oakland	Project manager (Consultant): Joel Coffman	Laboratory name: Sequoia
ARCO engineer: Michael Whelan	Telephone no. (ARCO): (415)571-2434	Telephone no. (Consultant): (408)264-7723	Fax no. (Consultant): (408)264-2435
Consultant name: RESNA	Address (Consultant): 3315 Almaden Expy, Suite 34, San Jose, CA 95118		Contract number: 07-073

Sample ID	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		HOLD
S-5-B15	1	1	✓			✓		7/17/92			X									2072931		
S-10-B15	1	1	✓			✓		7/17/92			X										932	
S-15-B15	1	1	✓			✓		7/17/92			X										933	
S-18.5-B15	1	1	✓			✓		7/17/92			X									↓	934	
S-18.5-B15	1	1	✓			✓		7/17/92														X
S-5-B11	1	1	✓			✓		7/17/92			X									2072935		
S-10-B11	1	1	✓			✓		7/17/92			X										936	
S-15-B11	1	1	✓			✓		7/17/92			X										937	
S-15-B11	1	1	✓			✓		7/17/92			X									↓	938	
S-18.5-B11	1	1	✓			✓		7/17/92														X

Condition of sample:

Temperature received:

Relinquished by sampler: Barbara Sieminski	Date: 07/17/92	Time: 3:50 PM	Received by: PA Hawkins 1725
Relinquished by: [illegible]	Date:	Time:	Received by: [illegible] 7/17 1800 1714
Relinquished by:	Date:	Time:	Received by laboratory: [illegible] Date: 7-21-92 Time: 1405

Laboratory name: Sequoia

Contract number: 07-073

Method of shipment: Sequoia Courier

Special detection Limit/reporting

Special QA/QC

Remarks: RESNA will call regarding Samples to be analyzed

Lab number:

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☑

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 276, Oakland

Enclosed are the results from 34 soil samples received at Sequoia Analytical on July 17,1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2072905	Soil, S-5-B13	7/15/92	EPA 5030/8015/8020
2072906	Soil, S-10-B13	7/15/92	EPA 5030/8015/8020
2072907	Soil, S-15-B13	7/15/92	EPA 5030/8015/8020
2072908	Soil, S-18-B13	7/15/92	EPA 5030/8015/8020
2072909	Soil, S-5-B16	7/15/92	EPA 5030/8015/8020
2072910	Soil, S-10-B16	7/15/92	EPA 5030/8015/8020
2072911	Soil, S-15-B16	7/15/92	EPA 5030/8015/8020
2072912	Soil, S-19-B16	7/15/92	EPA 5030/8015/8020
2072913	Soil, S-5.5-B18	7/15/92	EPA 5030/8015/8020
2072914	Soil, S-10.5-B18	7/15/92	EPA 5030/8015/8020
2072915	Soil, S-15.5-B18	7/15/92	EPA 5030/8015/8020
2072916	Soil, S-17.5-B18	7/15/92	EPA 5030/8015/8020
2072917	Soil, S-9.5-B12	7/16/92	EPA 5030/8015/8020
2072918	Soil, S-15.5-B12	7/16/92	EPA 5030/8015/8020
2072919	Soil, S-19-B12	7/16/92	EPA 5030/8015/8020
2072920	Soil, S-24.5-B12	7/16/92	EPA 5030/8015/8020
2072921	Soil S-29-B12	7/16/92	EPA 5030/8015/8020
2072922	Soil, S-50-B12	7/16/92	EPA 5030/8015/8020 EPA 8240
2072923	Soil S-5-B14	7/16/92	EPA 5030/8015/8020
2072924	Soil S-10-B14	7/16/92	EPA 5030/8015/8020

SEQUOIA ANALYTICAL

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SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2072925	Soil, S-15-B14	7/16/92	EPA 5030/8015/8020
2072926	Soil, S-17.5-B14	7/16/92	EPA 5030/8015/8020
2072927	Soil, S-5-B19	7/17/92	EPA 5030/8015/8020
2072928	Soil, S-10-B19	7/17/92	EPA 5030/8015/8020
2072929	Soil, S-15-B19	7/17/92	EPA 5030/8015/8020
2072930	Soil, S-17.5-B19	7/17/92	EPA 5030/8015/8020
2072931	Soil, S-5-B15	7/17/92	EPA 5030/8015/8020
2072932	Soil, S-10-B15	7/17/92	EPA 5030/8015/8020
2072933	Soil, S-15-B15	7/17/92	EPA 5030/8015/8020
2072934	Soil, S-18-B15	7/17/92	EPA 5030/8015/8020
2072935	Soil, S-5-B17	7/17/92	EPA 5030/8015/8020
2072936	Soil, S-10-B17	7/17/92	EPA 5030/8015/8020
2072937	Soil, S-15-B17	7/17/92	EPA 5030/8015/8020
2072938	Soil, S-18-B17	7/17/92	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 276, Oakland	Sampled: Jul 16, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Soil	Received: Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported: Jul 31, 1992
Attention: Joel Coffman	First Sample #:	207-2917	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 207-2917 S-9.5-B12	Sample I.D. 207-2918 S-15.5-B12	Sample I.D. 207-2919 S-19-B12	Sample I.D. 207-2920 S-24.5-B12	Sample I.D. 207-2921 S-29-B12	Sample I.D. 207-2922 S-50-B12
Purgeable Hydrocarbons	1.0	N.D.	6.6	2.8	N.D.	N.D.	N.D.
Benzene	0.0050	0.22	0.90	1.2	N.D.	N.D.	N.D.
Toluene	0.0050	N.D.	0.78	0.79	N.D.	N.D.	N.D.
Ethyl Benzene	0.0050	0.031	0.17	0.043	N.D.	N.D.	N.D.
Total Xylenes	0.0050	0.034	0.78	0.23	N.D.	N.D.	N.D.
Chromatogram Pattern:		Gas	Gas	Gas	--	--	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	1.0	1.0
Date Analyzed:	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92
Instrument Identification:	GCHP-1	GCHP-1	GCHP-7	GCHP-7	GCHP-7	GCHP-1
Surrogate Recovery, %: (QC Limits = 70-130%)	92	130	90	78	91	96

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard
Analytes reported as N.D. were not detected above the stated reporting limit

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 276, Oakland	Sampled:	Jul 16, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Soil	Received:	Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jul 31, 1992
Attention: Joel Coffman	First Sample #:	207-2923		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 207-2923 S-5-B14	Sample I.D. 207-2924 S-10-B14	Sample I.D. 207-2925 S-15-B14	Sample I.D. 207-2926 S-17.5-B14
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	83
Benzene	0.0050	N.D.	N.D.	N.D.	0.14
Toluene	0.0050	N.D.	N.D.	N.D.	0.40
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	1.0
Total Xylenes	0.0050	N.D.	N.D.	N.D.	5.0
Chromatogram Pattern:		--	--	--	Gas

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	20
Date Analyzed:	7/22/92	7/22/92	7/22/92	7/23/92
Instrument Identification:	GCHP-7	GCHP-1	GCHP-7	GCHP-7
Surrogate Recovery, %: (QC Limits = 70-130%)	92	101	99	96

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard
Analytes reported as N.D. were not detected above the stated reporting limit

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 276, Oakland	Sampled:	Jul 17, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Soil	Received:	Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jul 31, 1992
Attention: Joel Coffman	First Sample #:	207-2927		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 207-2927 S-5-B19	Sample I.D. 207-2928 S-10-B19	Sample I.D. 207-2929 S-15-B19	Sample I.D. 207-2930 S-17.5-B19	Sample I.D. 207-2931 S-5-B15	Sample I.D. 207-2932 S-10-B15
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	0.21	0.16
Toluene	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	0.014	0.065
Total Xylenes	0.0050	N.D.	N.D.	N.D.	N.D.	0.027	0.11
Chromatogram Pattern:		--	--	--	--	--	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	1.0	1.0
Date Analyzed:	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92
Instrument Identification:	GCHP-7	GCHP-7	GCHP-7	GCHP-7	GCHP-7	GCHP-7
Surrogate Recovery, %: (QC Limits = 70-130%)	99	87	98	108	90	77

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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 276, Oakland	Sampled:	Jul 17, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Soil	Received:	Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jul 31, 1992
Attention: Joel Coffman	First Sample #:	207-2933		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 207-2933 S-15-B15	Sample I.D. 207-2934 S-18-B15	Sample I.D. 207-2935 S-5-B17	Sample I.D. 207-2936 S-10-B17	Sample I.D. 207-2937 S-15-B17	Sample I.D. 207-2938 S-18-B17
Purgeable Hydrocarbons	1.0	6.5	N.D.	N.D.	N.D.	690	3,700
Benzene	0.0050	0.83	0.21	N.D.	0.059	2.1	48
Toluene	0.0050	0.47	0.47	N.D.	N.D.	3.1	160
Ethyl Benzene	0.0050	0.22	0.021	N.D.	N.D.	11	94
Total Xylenes	0.0050	0.81	0.11	N.D.	0.0090	42	420
Chromatogram Pattern:		--	--	--	Gas	Gas	Gas

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	100	1,000
Date Analyzed:	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92	7/23/92
Instrument Identification:	GCHP-7	GCHP-7	GCHP-7	GCHP-7	GCHP-7	GCHP-7
Surrogate Recovery, %: (QC Limits = 70-130%)	92	91	101	97	88	92

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard
Analytes reported as N.D. were not detected above the stated reporting limit

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 276, Oakland	Sampled:	Jul 15, 1992
3315 Almaden Expwy., Suite 34	Sample Descript:	Soil, S-50-B12	Received:	Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 8240	Analyzed:	Jul 28, 1992
Attention: Joel Coffman	Lab Number:	207-2922	Reported:	Jul 31, 1992

VOLATILE ORGANICS by GC/MS (EPA 8240)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acetone	500	N.D.
Benzene	100	N.D.
Bromodichloromethane	100	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
2-Butanone	500	N.D.
Carbon disulfide	100	N.D.
Carbon tetrachloride	100	N.D.
Chlorobenzene	100	N.D.
Chloroethane	100	N.D.
2-Chloroethyl vinyl ether	500	N.D.
Chloroform	100	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	100	N.D.
1,1-Dichloroethane	100	N.D.
1,2-Dichloroethane	100	N.D.
1,1-Dichloroethene	100	N.D.
cis-1,2-Dichloroethene	100	N.D.
trans-1,2-Dichloroethene	100	N.D.
1,2-Dichloropropane	100	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Ethylbenzene	100	N.D.
2-Hexanone	500	N.D.
Methylene chloride	250	N.D.
4-Methyl-2-pentanone	500	N.D.
Styrene	100	N.D.
1,1,2,2-Tetrachloroethane	100	N.D.
Tetrachloroethene	100	N.D.
Toluene	100	N.D.
1,1,1-Trichloroethane	100	N.D.
1,1,2-Trichloroethane	100	N.D.
Trichloroethene	100	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl acetate	100	N.D.
Vinyl chloride	100	N.D.
Total Xylenes	100	N.D.

Analytes reported as N.D. were not present above the stated limit of detection

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 276, Oakland

QC Sample Group: 2072905-38

Reported: Jul 31, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Geckler	R. Geckler	R. Geckler	R. Geckler
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jul 22, 1992	Jul 22, 1992	Jul 22, 1992	Jul 22, 1992
QC Sample #:	GBLK072292 MS/MSD	GBLK072292 MS/MSD	GBLK072292 MS/MSD	GBLK072292 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.18	0.18	0.18	0.53
Matrix Spike % Recovery:	90	90	90	88
Conc. Matrix Spike Dup.:	0.18	0.19	0.19	0.56
Matrix Spike Duplicate % Recovery:	90	95	95	93
Relative % Difference:	0.0	5.4	5.4	5.5

Quality Assurance Statement All standard operating procedures and quality control requirements have been met

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\%\ \text{Recovery} = \frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) \div 2} \times 100$$

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 276, Oakland

QC Sample Group: 2072905-38

Reported: Jul 31, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	A. Miraftab	A. Miraftab	A. Miraftab	A. Miraftab
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jul 22, 1992	Jul 22, 1992	Jul 22, 1992	Jul 22, 1992
QC Sample #:	GBLK072292	GBLK072292	GBLK072292	GBLK072292
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.21	0.20	0.20	0.61
Matrix Spike % Recovery:	105	100	100	102
Conc. Matrix Spike Dup.:	0.21	0.20	0.20	0.61
Matrix Spike Duplicate % Recovery:	105	100	100	102
Relative % Difference:	0.0	0.0	0.0	0.0

Quality Assurance Statement All standard operating procedures and quality control requirements have been met

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 276, Oakland

QC Sample Group: 2072905-38

Reported: Jul 31, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	A. Maralit	A. Maralit	A. Maralit	A. Maralit
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jul 23, 1992	Jul 23, 1992	Jul 23, 1992	Jul 23, 1992
QC Sample #:	GBLK072392	GBLK072392	GBLK072392	GBLK072392
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.16	0.16	0.16	0.48
Matrix Spike % Recovery:	80	80	80	80
Conc. Matrix Spike Dup.:	0.16	0.16	0.16	0.48
Matrix Spike Duplicate % Recovery:	80	80	80	80
Relative % Difference:	0.0	0.0	0.0	0.0

Quality Assurance Statement All standard operating procedures and quality control requirements have been met

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\%\ \text{Recovery} = \frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$$

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

RESNA	Client Project ID:	ARCO 276, Oakland	
3315 Almaden Expwy., Suite 34	Method (units):	EPA 8240 (µg/L purged)	Q.C. Sample Dates
San Jose, CA 95118	Analyst(s):	S. Scott	
Attention: Joel Coffman	QC Sample #:	BLK072892	Analyzed: Jul 28, 1992
			Reported: Jul 31, 1992

QUALITY CONTROL DATA REPORT

Analyte	Sample Conc.	Spike Conc. Added	Conc. Matrix Spike	Matrix Spike % Recovery	Conc. Matrix Spike Duplicate	Matrix Spike Duplicate % Recovery	Relative % Difference
1,1-Dichloro-ethene	N.D.	50	68	126	62	124	1.6
Trichloroethene	N.D.	50	47	94	49	98	4.2
Benzene	N.D.	50	51	102	51	102	0.0
Toluene	N.D.	50	51	102	52	104	1.9
Chlorobenzene	N.D.	50	51	102	52	104	1.9

Quality Assurance Statement All standard operating procedures and quality control requirements have been met

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\%\ \text{Recovery} = \frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) \div 2} \times 100$$

SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jul 15, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Soil	Received:	Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jul 31, 1992
Attention: Joel Coffman	First Sample #:	207-2905		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 207-2905 S-5-B13	Sample I.D. 207-2906 S-10-B13	Sample I.D. 207-2907 S-15-B13	Sample I.D. 207-2908 S-18-B13	Sample I.D. 207-2909 S-5-B16	Sample I.D. 207-2910 S-10-B16
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzene	0.0050	N.D.	N.D.	N.D.	0.084	N.D.	N.D.
Toluene	0.0050	N.D.	N.D.	N.D.	0.013	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	0.034	N.D.	N.D.
Total Xylenes	0.0050	N.D.	N.D.	N.D.	0.14	N.D.	N.D.
Chromatogram Pattern:		--	--	--	Gas	--	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	1.0	1.0
Date Analyzed:	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92
Instrument Identification:	GCHP-7	GCHP-7	GCHP-7	GCHP-7	GCHP-7	GCHP-1
Surrogate Recovery, %: (QC Limits = 70-130%)	76	96	97	93	77	100

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

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 276, Oakland	Sampled:	Jul 15, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Soil	Received:	Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jul 31, 1992
Attention: Joel Coffman	First Sample #:	207-2911		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 207-2911 S-15-B16	Sample I.D. 207-2912 S-19-B16	Sample I.D. 207-2913 S-5.5-B18	Sample I.D. 207-2914 S-10.5-B18	Sample I.D. 207-2915 S-15.5-B18	Sample I.D. 207-2916 S-17.5-B18
Purgeable Hydrocarbons	1.0	94	N.D.	N.D.	N.D.	470	690
Benzene	0.0050	0.16	0.28	N.D.	N.D.	0.50	3.0
Toluene	0.0050	0.18	0.018	N.D.	N.D.	9.6	15
Ethyl Benzene	0.0050	2.1	0.048	N.D.	N.D.	8.7	15
Total Xylenes	0.0050	11	0.082	N.D.	N.D.	81	92
Chromatogram Pattern:		Gas	Gas	--	--	Gas	Gas

Quality Control Data

Report Limit Multiplication Factor:	10	1.0	1.0	1.0	50	100
Date Analyzed:	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92	7/22/92
Instrument Identification:	GHCP-1	GHCP-1	GHCP-1	GHCP-1	GHCP-7	GHCP-7
Surrogate Recovery, %: (QC Limits = 70-130%)	107	105	100	101	91	102

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-91-48

Chain of Custody

ARCO Facility no	216	City (Facility)	Oakland
Project manager (Consultant)	Joel Coffman		
ARCO engineer	Michael Whelan	Telephone no. (ARCO)	(415) 571-2434
Telephone no (Consultant)	(408) 264-7723	Fax no. (Consultant)	(408) 264-2435
Consultant name	RESNA	Address (Consultant)	3315 Almaden Expy, Suite 34, San Jose, CA 95118

Sample ID	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015 gas	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
S-0717-SP1A		1	✓			✓		07/17/92			✓											
S-0717-SP1B		1	✓			✓		7/17/92			✓											
S-0717-SP1C		1	✓			✓		7/17/92			✓											
S-0717-SP1D		1	✓			✓		7/17/92			✓											
S-0717-SP2A		1	✓			✓		7/17/92			✓											
S-0717-SP2B		1	✓			✓		7/17/92			✓											
S-0717-SP2C		1	✓			✓		7/17/92			✓											
S-0717-SP2D		1	✓			✓		7/17/92			✓											

Laboratory name: Sequoia
Contract number: 07-073
Method of shipment: Sequoia Courier
Special detection Limit/reporting:
Special QA/QC:
Remarks: 48 hrs turnaround time! Composite Samples
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: cool

	Date	Time		Date	Time
Relinquished by sampler: Barbara Sieminski	07/17/92	3:50 PM	Received by: [signature]		
Relinquished by: [signature]			Received by		
Relinquished by			Received by laboratory: [signature]	7/17	5:30 PM

Distribution: White copy - Laboratory, Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

PPC-3292 (2-91)

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-91-48

Chain of Custody

ARCO Facility no 276	City (Facility) 10600 MACARTHUR BLVD OAKLAND, CA	Project manager (Consultant) JOEL COFFMAN | VALLI VORUGANTI	Laboratory name SEQUOIA
ARCO engineer MR MICHAEL WHELAN	Telephone no. (ARCO) (415) 571-2449	Telephone no. (Consultant) (408) 264 7723	Fax no. (Consultant) (408) 264-2435	Contract number 0703
Consultant name RESNA INDUSTRIES	Address (Consultant) 3315 ALMADEN EXPRESSWAY, SUITE 34, SAN JOSE 95118		Method of shipment COURIER

Sample I.D.	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
Soil: A			X		13185	X		7/22/92	8:10	Please run the composite sample for (a) TCLP for BTEX (b) TTLC for TPH-gas (c) STLC for Lead (d) pH (e) Flash point (f) Reactive Sulfides and Cyanides.										
Soil: B					↓			↓	↓											
Soil: C																				
Soil: D																				

Special detection Limit/reporting: —

Special QA/QC

Remarks: IF FOUR INDIVIDUAL SAMPLES ARE SUBMITTED, COMPOSITE TO ONE SAMPLE PRIOR TO ANALYSIS.

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: cool	
Relinquished by sampler	Date 7/22/92 Time 9:15	Received by	
Relinquished by	Date 7/22/92 Time (2:35 PM)	Received by	7/22/92 10:10 AM
Relinquished by	Date Time	Received by laboratory	Date 7/22/92 Time 1235p

Distribution: White copy — Laboratory, Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APRC-3292 (2-91)

SEQUOIA ANALYTICAL

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

RECEIVED

JUL 22 1992

RESNA
SAN JOSE

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

Project: ARCO 276, Oakland

Enclosed are the results from 2 soil samples received at Sequoia Analytical on July 17,1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2072596	Soil, S-0717-SP1 A-D Comp.	7/17/92	EPA 5030/8015/8020
2072597	Soil, S-0717-SP2 A-D Comp.	7/17/92	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 276, Oakland	Sampled:	Jul 17, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Soil, Composite	Received:	Jul 17, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jul 21, 1992
Attention: Joel Coffman	First Sample #:	207-2596		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 207-2596 S-0717-SP1 A-D	Sample I.D. 207-2597 S-0717-SP2 A-D
Purgeable Hydrocarbons	1.0	N.D.	N.D.
Benzene	0.0050	N.D.	0.0080
Toluene	0.0050	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	0.010
Total Xylenes	0.0050	N.D.	0.052
Chromatogram Pattern:		--	Gas

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0
Date Analyzed:	7/20/92	7/20/92
Instrument Identification:	GCHP-1	GCHP-1
Surrogate Recovery, %: (QC Limits = 70-130%)	85	96

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard
Analytes reported as N.D. were not detected above the stated reporting limit

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 276, Oakland

QC Sample Group: 2072596-7

Reported: Jul 21, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	A. Maralit	A. Maralit	A. Maralit	A. Maralit
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jul 20, 1992	Jul 20, 1992	Jul 20, 1992	Jul 20, 1992
QC Sample #:	GBLK072092	GBLK072092	GBLK072092	GBLK072092
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.19	0.19	0.19	0.57
Matrix Spike % Recovery:	95	95	95	95
Conc. Matrix Spike Dup.:	0.20	0.20	0.20	0.61
Matrix Spike Duplicate % Recovery:	100	100	100	102
Relative % Difference:	5.1	5.1	5.1	6.8

Quality Assurance Statement All standard operating procedures and quality control requirements have been met

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\%\ \text{Recovery} = \frac{\text{Conc. of M S - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc. of M S - Conc. of M S D}}{(\text{Conc. of M S + Conc. of M S D}) / 2} \times 100$$

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: Valli Voruganti

Project: ARCO 276, Oakland

Enclosed are the results from 1 soil sample received at Sequoia Analytical on July 22, 1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2073185	Soil, S-0722 A-D Comp.	7/22/92	EPA 5030/8020 by TCLP Extraction EPA 5030/8015 Corrosivity, Ignitability, and Reactivity STLC/Lead

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
Project Manager

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Jul 22, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	TCLP Extraction of Soil Comp.	Received:	Jul 22, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8020	Reported:	Jul 28, 1992
Attention: Valli Voruganti	First Sample #:	207-3185		

BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 207-3185 S-0722 A-B Comp.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Total Xylenes	0.50	N.D.

Quality Control Data

Report Limit Multiplication Factor:	20
Date Analyzed:	7/23/92
Instrument Identification:	GHCP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	103

Analytes reported as N.D. were not detected above the stated reporting limit

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: Valli Voruganti

Client Project ID: ARCO 276, Oakland

QC Sample Group: 207-3185

Reported: Jul 28, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	M. Nipp	M. Nipp	M. Nipp	M. Nipp
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Jul 23, 1992	Jul 23, 1992	Jul 23, 1992	Jul 23, 1992
QC Sample #:	GBLK072392	GBLK072392	GBLK072392	GBLK072392
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	11	11	10	32
Matrix Spike % Recovery:	110	110	100	107
Conc. Matrix Spike Dup.:	11	11	11	33
Matrix Spike Duplicate % Recovery:	110	110	110	110
Relative % Difference:	0.0	0.0	9.5	3.1

Quality Assurance Statement All standard operating procedures and quality control requirements have been met

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: Valli Voruganti

Client Project ID: ARCO 276, Oakland

QC Sample Group: 207-3185

Reported: Jul 28, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Geckler	R. Geckler	R. Geckler	R. Geckler
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jul 23, 1992	Jul 23, 1992	Jul 23, 1992	Jul 23, 1992
QC Sample #:	GBLK072392	GBLK072392	GBLK072392	GBLK072392
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.19	0.19	0.19	0.56
Matrix Spike % Recovery:	95	95	95	93
Conc. Matrix Spike Dup.:	0.18	0.19	0.18	0.53
Matrix Spike Duplicate % Recovery:	90	95	90	88
Relative % Difference:	5 4	0 0	5 4	5 5

Quality Assurance Statement. All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

$$\%\ \text{Recovery} = \frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc of M S - Conc of M S D}}{|\text{Conc of M S - Conc of M S D}|\ .\ 2} \times 100$$

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: Valli Voruganti

Client Project ID: ARCO 276, Oakland
QC Sample Group: 207-3185
Reported: Jul 28, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Flashpoint	Sulfide	pH	Cyanide	Lead
Method:	EPA 1010	EPA 9030	EPA 9045	EPA 9010	EPA 200.7
Analyst:	K. Follett	K. Follett	Y. Arteaga	A. Savva	M. Mistry
Reporting Units:	°C	mg/kg	N.A.	mg/kg	mg/L
Date Analyzed:	Jul 23, 1992	Jul 27, 1992	Jul 22, 1992	Jul 27, 1992	Jul 27, 1992
QC Sample #:	207-3185	207-3320	207-2986	207-2882	207-0172
Sample Conc.:	>100	N.D.	3.9	N.D.	0.69
Spike Conc. Added:	N.A.	1300	N.A.	8.0	10
Conc. Matrix Spike:	N.A.	1400	N.A.	7.3	9.6
Matrix Spike % Recovery:	N.A.	108	N.A.	91	89
Conc. Matrix Spike Dup.:	>100	1400	3.9	7.2	9.5
Matrix Spike Duplicate % Recovery:	N.A.	108	N.A.	90	88
Relative % Difference:	0 0	0 0	0 0	1 4	1 0

Quality Assurance Statement *All standard operating procedures and quality control requirements have been met*

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

% Recovery	$\frac{\text{Conc of M S - Conc of Sample}}{\text{Spike Conc Added}}$	x 100
Relative % Difference	$\frac{\text{Conc of M S - Conc of M S D}}{(\text{Conc of M S + Conc of M S D}) / 2}$	x 100

APPENDIX F

WASTE MANIFEST FORMS

Dillard Trucking, Inc.
ENVIRONMENTAL SERVICES
P.O. BOX 218 BYRON, CALIFORNIA 94514
(510) 634-6850 FAX (510) 634-0569

October 12, 1992

RESNA
3315 Almaden Expressway #34
San Jose, CA 94118

Attn: **Mr. Robert Campbell**

Re: **Arco Station #276 - 10600 MacArthur, Oakland**

Dear Robert:

Enclosed herewith please find copies of the BFI Non Hazardous Special Waste Manifests from the above mentioned site. These are dated June 26, 1992, July 23, 1992 and July 30, 1992.

I trust that you will find everything in order. If you have any questions, please do not hesitate to call me.

Respectfully yours,

DILLARD TRUCKING, INC.

Donna L. Pedersen
Estimator

DLP/st

cc:file

BFI Waste Systems™
BROWNING-FERRIS INDUSTRIES

No. 816943

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name: ARCO Products
Address: P. O. Box 5811
San Mateo, Ca. 94402
Phone No.: 415-574-4?4?

Generating Location: ARCO Station #270
Address: 10600 Macarthur Blvd.
Oakland, CA
Phone No.:

BFI Waste Code: CA 405 062492 388 50

Description of Waste: NON HAZARDOUS SOIL

Quantity	Units	No.	Type
00003	Y	02	T

Containers — Type: D - Drum, C - Carton, B - Bag, T - Truck, P - Pounds, Y - Yards, O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Matthew Dutra for Arco — Generator Authorized Agent Name
Matthew Dutra — Signature
062692 — Shipment Date

TRANSPORTER

Truck No.: 78 78A
Phone No.: 510-634-6850
Transporter Name: Dillard Trucking, Inc. 1001/39
Driver Name (Print): Bud Lawrence
Address: P. O. Box 218
Byron, California 94544
Vehicle License No./State: 3V19627 JUH952
Vehicle Certification: 300834 300835

I hereby certify that the above named material was picked up at the generator site listed above.

Bud Lawrence — Driver Signature
062692 — Shipment Date

I hereby certify that the above named material was delivered without incident to the destination listed below.

Bud Lawrence — Driver Signature
062692 — Delivery Date

DESTINATION

Site Name: B.F.I. Vasco Road Landfill
Phone No.: 510-447-0491
Address: 4001 North Vasco Rd., Livermore, Ca. 94550

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Name of Authorized Agent
Signature
062692 — Receipt Date

PASS CODE

10/86

BFI260-

BFI Waste Systems™
BROWNING-FERRIS INDUSTRIES

No. 854420

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name: ARCO Products
Address: P. O. Box 5811
San Mateo. Ca. 94402
Phone No.: 415-571-2434

Generating Location: ARCO Station #276
Address: 10600 MacArthur Blvd.
Oakland. CA
Phone No.:

BFI Waste Code: CA 405 072192 40844

Description of Waste: NON HAZARDOUS SOIL

Quantity	Units	Containers No.	Containers Type
00010	Y	01	T

Type: D - Drum, C - Carton, B - Bag, T - Truck, P - Pounds, Y - Yards, O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

Generator Authorized Agent Name: PATRICK GOO
Signature:
Shipment Date: 07 23 92

TRANSPORTER

Truck No.: 185
Phone No.: 510-634-6850
Transporter Name: Dillard Trucking, Inc. ~~1002/32~~
Driver Name (Print): STEVE COSSITT
Address: P. O. Box 218
Byron, California 94544
Vehicle License No./State: 4A79253
Vehicle Certification: 300816/309572

I hereby certify that the above named material was picked up at the generator site listed above.
Driver Signature:
Shipment Date: 07 23 92

I hereby certify that the above named material was delivered without incident to the destination listed below.
Driver Signature:
Delivery Date: 07 23 92

DESTINATION

Site Name: B.F.I. Vasco Road Landfill
Phone No.: 510-447-0491
Address: 4001 North Vasco Rd.. Livermore. Ca. 94550

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate

Name of Authorized Agent:
Signature:
Receipt Date:

PASS CODE:

10/86

BFI260-720

TRANSPORTER RETAIN

BFI Waste Systems™
BROWNING-FERRIS INDUSTRIES

No. 854198

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name: ARCO Products
Address: P. O. Box 5811
San Mateo. Ca. 94402
Phone No.: 415-571-2434

Generating Location: ARCO Station #276
Address: 10600 MacArthur Blvd.
Oakland. CA
Phone No.:

BFI Waste Code: CA 405 072992 408912

Description of Waste	Quantity	Units	Containers No.	Containers Type
NON HAZARDOUS SOIL	0018	Y	02	T

Type: D - Drum, C - Carton, B - Bag, T - Truck, P - Pounds, Y - Yards, O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

ARCO — Generator Authorized Agent Name
Randy Hyland FOR ARCO — Signature
072292 — Shipment Date

TRANSPORTER

Truck No.: 185
Phone No.: 510-634-6850
Transporter Name: Dillard Trucking. Inc. 1002/32
Driver Name (Print): Sam Lodigs
Address: P. O. Box 218
Byron. California 94544
Vehicle License No./State: 4A79253 - 1U18073
Vehicle Certification: 301547 - 309575

I hereby certify that the above named material was picked up at the generator site listed above.
Driver Signature: Randy Hyland
Shipment Date: 072292

I hereby certify that the above named material was delivered without incident to the destination listed below.
Driver Signature: Sam Lodigs
Delivery Date: 073092

DESTINATION

Site Name: B.F.I. Vasco Road Landfill
Phone No.: 510-447-0409
Address: 4001 North Vasco Rd., Livermore. Ca. 94550

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate

Name of Authorized Agent — Signature — Receipt Date

PASS CODE

10 86

260-7

TRANSPORTER COPY

BFI Waste Systems™
BROWNING-FERRIS INDUSTRIES

No. 854196

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name: ARCO Products
Address: P. O. Box 5811
San Mateo. Ca. 94402
Phone No.: 415-571-2434

Generating Location: ARCO Station #276
Address: 10600 MacArthur Blvd.
Oakland. CA
Phone No.:

BFI Waste Code: CA 45 072992 40892

Description of Waste: NON HAZARDOUS SOIL

Quantity	Units	Containers No.	Containers Type
00009	Y	01	T

Type: D - Drum; C - Carton; B - Bag; T - Truck; P - Pounds; Y - Yards; O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

ARCO — Generator Authorized Agent Name
Randy Skyland For ARCO — Signature
072292 — Shipment Date

TRANSPORTER

Truck No.: 185
Phone No.: 510-634-6850
Transporter Name: Dillard Trucking. Inc. ~~1002/32~~
Driver Name (Print): SAM RODRIGUEZ
Address: P. O. Box 218
Byron. California 94544
Vehicle License No./State: 4A79253
Vehicle Certification: 300816

I hereby certify that the above named material was picked up at the generator site listed above.

Randy Skyland — Driver Signature
072292 — Shipment Date

I hereby certify that the above named material was delivered without incident to the destination listed below.

Sam Rodriguez — Driver Signature
073092 — Delivery Date

DESTINATION

Site Name: B.F.I. Vasco Road Landfill
Phone No.: 510-447-0499
Address: 4001 North Vasco Rd.. Livermore. Ca. 94550

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate

Name of Authorized Agent — Signature — Receipt Date

PASS CODE

10/86

BFI260-72

TRANSPOR[illegible]

BFI Waste Systems™
BROWNING-FERRIS INDUSTRIES

No. 854199

NON-HAZARDOUS SPECIAL WASTE MANIFEST

GENERATOR

Generator Name: ARCO Products
Address: P. O. Box 5811
San Mateo. Ca. 94402
Phone No.: 415-571-2434

Generating Location: ARCO Station #276
Address: 10600 MacArthur Blvd.
Oakland. CA
Phone No.:

BFI Waste Code: CA 405
Description of Waste: NON HAZARDOUS SOIL

Quantity	Units	Containers No.	Containers Type
00018	Y	02	T

Type: D - Drum, C - Carton, B - Bag, T - Truck, P - Pounds, Y - Yards, O - Other

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations.

ARCo — Generator Authorized Agent Name
For ARCO — Signature
072292 — Shipment Date

TRANSPORTER

Truck No.: 185 - 185 A
Phone No.: 510-634-6850
Transporter Name: Dillard Trucking, Inc. 1002/32
Driver Name (Print): SAM RODRIGUEZ
Address: P. O. Box 218
Byron, California 94544
Vehicle License No./State: 4A79253 (TRUCK) - 1UR8023 (TRAILER)
Vehicle Certification: 301549 - 309727

I hereby certify that the above named material was picked up at the generator site listed above.

AL FRANK — Driver Signature
072292 — Shipment Date

I hereby certify that the above named material was delivered without incident to the destination listed below.

Sam Rodriguez — Driver Signature
073092 — Delivery Date

DESTINATION

Site Name: B.F.I. Vasco Road Landfill
Phone No.: 510-447-0491
Address: 4001 North Vasco Rd.. Livermore. Ca. 94550

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate

Name of Authorized Agent — Signature — 073092 — Receipt Date

PASS CODE

10/86

BFI260 72

TRANSPORTER - TAN

APPENDIX G

LABORATORY ANALYSEIS REPORTS AND CHAIN OF CUSTODY RECORDS-AIR

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080-C Pike Lane
Concord, CA 94520
(510) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*
(510) 825-0720 (FAX)

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-628

August 31, 1992

Valli Voruganti
RESNA Industries
3315 Almaden Expressway, #34
San Jose, CA 95118

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 08/25/92, under task order number 276-92-2.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Eileen F. Bullen

Eileen F. Bullen
Laboratory Director

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-628

Table 1

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Method 8015[a]

a. Test Methods for Evaluating Solid Waste, SW-846. Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

GTEL Sample Number		01	02		
Client Identification		AS COMB-30	METHOD BLANK		
Date Sampled		08/24/92	08/24/92		
Date Analyzed		08/26/92	08/26/92		
Analyte	Detection Limit, mg/m^3	Concentration, mg/m^3			
Gasoline	10	10000	<10		
BFB surrogate, % recovery		95.0	79.8		
Detection Limit Multiplier		1	1		

GTEL ENVIRONMENTAL LABORATORIES

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080-C Pike Lane
Concord, CA 94520
(510) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*
(510) 825-0720 (FAX)

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-627

August 31, 1992

Valli Voruganti
RESNA Industries
3315 Almaden Expressway, #34
San Jose, CA 95118

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 08/25/92, under task order number 276-92-2.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Eileen F. Bullen
Laboratory Director

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-627

Table 1

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Methods 8020 and 8015[a]

GTEL Sample Number		01	02	03	04
Client Identification		AS VW7-50	AS VW-2 36	AS VW3-30	AS VW6-30
Date Sampled		08/24/92	08/24/92	08/24/92	08/24/92
Date Analyzed		08/25/92	08/25/92	08/25/92	08/25/92
Analyte	Detection Limit, mg/m^3	Concentration, mg/m^3			
Benzene	0.5	4	1800	560	9
Toluene	0.5	3	600	160	6
Ethylbenzene	0.5	<0.5	74	58	4
Xylene, total	0.5	3	170	150	15
BTEX, total	--	10	2600	930	34
Gasoline	10	330	48000	15000	510
BFB surrogate, % recovery		81.6	98.0	94.7	88.0
Detection Limit Multiplier		1	1	1	1

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-627

Table 1 (Continued)

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Methods 8020 and 8015[a]

GTEL Sample Number		05	06	07	08
Client Identification		AS VW1-30	AS VW4-30	AS MW2-30	AS MW5-30
Date Sampled		08/24/92	08/24/92	08/24/92	08/24/92
Date Analyzed		08/25/92	08/25/92	08/25/92	08/25/92
Analyte	Detection Limit, mg/m^3	Concentration, mg/m^3			
Benzene	0.5	120	500	430	510
Toluene	0.5	47	84	350	270
Ethylbenzene	0.5	6	18	36	47
Xylene, total	0.5	25	37	200	150
BTEX, total	--	200	640	1000	980
Gasoline	10	5100	13000	11000	16000
BFB surrogate, % recovery		91.6	88.5	96.1	103
Detection Limit Multiplier		1	1	1	1

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-627

Table 1 (Continued)

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Methods 8020 and 8015[a]

GTEL Sample Number		09	10		
Client Identification		AS VW34-50	METHOD BLANK		
Date Sampled		08/24/92	08/24/92		
Date Analyzed		08/25/92	08/25/92		
Analyte	Detection Limit, mg/m^3	Concentration, mg/m^3			
Benzene	0.5	560	<0.5		
Toluene	0.5	120	<0.5		
Ethylbenzene	0.5	43	<0.5		
Xylene, total	0.5	120	<0.5		
BTEX, total	--	840	--		
Gasoline	10	11000	<10		
BFB surrogate, % recovery		95.5	82.5		
Detection Limit Multiplier		1	1		

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080-C Pike Lane
Concord, CA 94520
(510) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*
(510) 825-0720 (FAX)

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-629

September 2, 1992

Valli Voruganti
RESNA Industries
3315 Almaden Expressway, #34
San Jose, CA 95118

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 08/25/92 under task order number 276-92-2.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Eileen F. Bullen

Eileen F. Bullen
Laboratory Director

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-629

Table 1

ANALYTICAL RESULTS

Volatile Organics in Air

EPA Method 8240[a]

GTEL Sample Number		01	02		
Client Identification		AS COMB-30	METHOD BLANK		
Date Sampled		08/24/92	08/24/92		
Date Analyzed		08/26/92	08/26/92		
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Chloromethane	10	<10	<10		
Bromomethane	10	<10	<10		
Vinyl chloride	10	<10	<10		
Chloroethane	10	<10	<10		
Methylene chloride	5	<5	<5		
Acetone	100	<100	<100		
Carbon disulfide	5	<5	<5		
1,1-Dichloroethene	5	<5	<5		
1,1-Dichloroethane	5	<5	<5		
1,2-Dichloroethene, total	5	<5	<5		
Chloroform	5	<5	<5		
1,2-Dichloroethane	5	<5	<5		
2-Butanone	100	<100	<100		
1,1,1-Trichloroethane	5	<5	<5		
Carbon tetrachloride	5	<5	<5		
Vinyl acetate	50	<50	<50		
Bromodichloromethane	5	<5	<5		
1,2-Dichloropropane	5	<5	<5		
cis-1,3-Dichloropropene	5	<5	<5		
Trichloroethene	5	<5	<5		

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986 (method modified for additional compounds). Sample introduction by EPA Method 5030.

Table 1 (Continued)

ANALYTICAL RESULTS

Volatile Organics in Air

EPA Method 8240[a]

GTEL Sample Number		01	02		
Client Identification		AS COMB-30	METHOD BLANK		
Date Sampled		08/24/92	08/24/92		
Date Analyzed		08/26/92	08/26/92		
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Dibromochloromethane	5	<5	<5		
1,1,2-Trichloroethane	5	<5	<5		
Benzene	5	160	<5		
trans-1,3-Dichloropropene	5	<5	<5		
2-Chloroethylvinyl ether	10	<10	<10		
Bromoform	5	<5	<5		
4-Methyl-2-pentanone	50	<50	<50		
2-Hexanone	50	<50	<50		
Tetrachloroethene	5	<5	<5		
1,1,2,2-Tetrachloroethane	5	<5	<5		
Toluene	5	130	<5		
Chlorobenzene	5	<5	<5		
Ethylbenzene	5	19	<5		
Styrene	5	<5	<5		
1,2-Dichlorobenzene	5	<5	<5		
1,3-Dichlorobenzene	5	<5	<5		
1,4-Dichlorobenzene	5	<5	<5		
Xylene, total	5	83	<5		
Trichlorofluoromethane	5	<5	<5		
Detection Limit Multiplier		1	1		

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986 (method modified for additional compounds). Sample introduction by EPA Method 5030.

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-627, C2-08-628, C2-08-629

QC Matrix Spike and Duplicate Spike Results

Matrix: Soil

Analyte	Sample ID	Date of Analysis	Spike Amount	Units	Recovery, %	Duplicate Recovery, %	RPD[a], %
EPA 8240:							
1,1-Dichloroethene	C208384-01	08/24/92	50	mg/Kg	108	105	2.44
Trichloroethene	C208384-01	08/24/92	50	mg/Kg	100	95.0	5.33
Benzene	C208384-01	08/24/92	50	mg/Kg	112	102	8.60
Toluene	C208384-01	08/24/92	50	mg/Kg	97.2	98.8	1.60
Chlorobenzene	C208384-01	08/24/92	50	mg/Kg	97.8	97.6	0.20

Sample and Sample Duplicate Results

Matrix: Air

Analyte	Sample ID	Date of Analysis	Sample Results	Sample Duplicate Results	Units	RPD[a], %
Modified EPA 8020:						
Benzene	C208650-5	08/26/92	121	120	ug/L	0.830
Toluene	C208650-5	08/26/92	26.1	26.1	ug/L	0
Ethylbenzene	C208650-5	08/26/92	1.36	1.07	ug/L	23.9
Xylene, total	C208650-5	08/26/92	5.09	4.13	ug/L	20.8
Modified EPA 8020:						
Benzene	C208650-5	08/26/92	121	120	ug/L	0.830
Toluene	C208650-5	08/26/92	26.1	26.1	ug/L	0
Ethylbenzene	C208650-5	08/26/92	1.36	1.07	ug/L	23.9
Xylene, total	C208650-5	08/26/92	5.09	4.13	ug/L	20.8

a. See attached table for acceptability limits.

QC Acceptability Limits

Analyte	QC Check Sample Recovery (%)	Duplicate Water Sample RPD (%)	Duplicate Soil Sample RPD (%)	Water Matrix Spike Recovery (%)	Soil Matrix Spike Recovery (%)	Reagent Water Spike Recovery (%)
Modified EPA 8020:						
Benzene	80 - 120	30	30	55 - 129	24 - 127	70 - 147
Toluene	80 - 120	30	30	72 - 149	17 - 124	67 - 150
Ethylbenzene	80 - 120	30	30	75 - 138	19 - 129	69 - 145
Xylene	80 - 120	30	30	74 - 147	23 - 124	71 - 152
Modified EPA 8015:						
Gasoline	---	30	30	---	---	
Analyte	**QC Check Sample Recovery (%)**	**Duplicate Water Sample RPD (%)**	**Duplicate Soil Sample RPD (%)**	**Water Matrix Spike Recovery (%)**	**Soil Matrix Spike Recovery (%)**	**Reagent Water Spike Recovery (%)**
Diesel	---	30	30	63 - 127	58 - 144	48 - 134
EPA 8010/8020:						
Chlorobenzene	80 - 120	30	---	34 - 134	58 - 126	62 - 111
Benzene	80 - 120	30	---	66 - 118	24 - 127	58 - 127
Toluene	80 - 120	30	---	53 - 115	17 - 124	60 - 120
Ethylbenzene	80 - 120	30	---	43 - 131	19 - 129	58 - 126
Xylene, total	80 - 120	30	---	55 - 115	23 - 124	63 - 128
1,1-Dichloroethene	80 - 120	30	---	30 - 160	72 - 116	56 - 138
Trichloroethene	80 - 120	30	---	78 - 184	79 - 120	82 - 187
EPA 8080:						
Heptachlor	80 - 120	30	---	---	34 - 111	34 - 111
Aldrin	80 - 120	30	---	---	42 - 122	42 - 122
DDE	80 - 120	30	---	---	30 - 145	30 - 145
Dieldrin	80 - 120	30	---	---	36 - 146	36 - 146
Endrin	80 - 120	30	---	---	30 - 147	30 - 147
DDD	80 - 120	30	---	---	31 - 141	31 - 114
DDT	80 - 120	30	---	---	10 - 180	10 - 180
Arochlor 1260	45 - 127	30	---	---	53 - 128	53 - 128

GTEL ENVIRONMENTAL LABORATORIES INC

QC Acceptability Limits

Analyte	QC Check Sample Recovery (%)	Duplicate Water Sample RPD (%)	Duplicate Soil Sample RPD (%)	Water Matrix Spike Recovery (%)	Soil Matrix Spike Recovery (%)	Reagent Water Spike Recovery (%)
EPA 8310:						
Fluorene	80 - 120	68	—	—	—	49 - 116
Anthracene	80 - 120	41.7	—	—	—	24 - 116
Chrysene	80 - 120	65.2	—	—	—	44 - 128
Benzo(a)pyrene	80 - 120	52.8	—	—	—	26 - 126
Naphthalene	80 - 120	42.3	—	—	—	51 - 106
EPA 8240:						
All 8240 Compounds	60 - 140	—	—	—	—	—
Trichloroethene	—	14	24	71 - 120	62 - 137	71 - 120
Toluene	—	13	21	76 - 125	59 - 139	76 - 125
Chlorobenzene	—	13	21	75 - 130	60 - 133	75 - 130
1,1-Dichloroethene	—	14	22	61 - 145	59 - 172	61 - 145
Benzene	—	11	21	76 - 127	66 - 142	76 - 127
TPH/IR:	80 - 120	20	20	70 - 130	70 - 130	70 - 130
Metals:						
Arsenic	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Barium	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Cadmium	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Chromium	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Lead	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Mercury	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Selenium	90 - 110	20	20	80 - 120	80 - 120	90 - 110
Silver	90 - 110	20	20	80 - 120	80 - 120	90 - 110
Wet Chemistry:						
TOC	90 - 110	20	NA	90 - 110	NA	90 -110

NA = Not Applicable.

QC Acceptability Limits

Analyte	QC Check Sample Recovery (%)	Duplicate Water Sample RPD (%)	Duplicate Soil Sample RPD (%)	Water Matrix Spike Recovery (%)	Soil Matrix Spike Recovery (%)	Reagent Water Spike Recovery (%)
Modified EPA 8020:						
Benzene	80 - 120	30	30	55 - 129	24 - 127	70 - 147
Toluene	80 - 120	30	30	72 - 149	17 - 124	67 - 150
Ethylbenzene	80 - 120	30	30	75 - 138	19 - 129	69 - 145
Xylene	80 - 120	30	30	74 - 147	23 - 124	71 - 152
Modified EPA 8015:						
Gasoline	---	30	30	---	---	
Analyte	**QC Check Sample Recovery (%)**	**Duplicate Water Sample RPD (%)**	**Duplicate Soil Sample RPD (%)**	**Water Matrix Spike Recovery (%)**	**Soil Matrix Spike Recovery (%)**	**Reagent Water Spike Recovery (%)**
Diesel	---	30	30	63 - 127	58 - 144	48 - 134
EPA 8010/8020:						
Chlorobenzene	80 - 120	30	---	34 - 134	58 - 126	62 - 111
Benzene	80 - 120	30	---	66 - 118	24 - 127	58 - 127
Toluene	80 - 120	30	---	53 - 115	17 - 124	60 - 120
Ethylbenzene	80 - 120	30	---	43 - 131	19 - 129	58 - 126
Xylene, total	80 - 120	30	---	55 - 115	23 - 124	63 - 128
1,1-Dichloroethene	80 - 120	30	---	30 - 160	72 - 116	56 - 138
Trichloroethene	80 - 120	30	---	78 - 184	79 - 120	82 - 187
EPA 8080:						
Heptachlor	80 - 120	30	---	---	34 - 111	34 - 111
Aldrin	80 - 120	30	---	---	42 - 122	42 - 122
DDE	80 - 120	30	---	---	30 - 145	30 - 145
Dieldrin	80 - 120	30	---	---	36 - 146	36 - 146
Endrin	80 - 120	30	---	---	30 - 147	30 - 147
DDD	80 - 120	30	---	---	31 - 141	31 - 114
DDT	80 - 120	30	---	---	10 - 180	10 - 180
Arochlor 1260	45 - 127	30	---	---	53 - 128	53 - 128

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080-C Pike Lane
Concord, CA 94520
(510) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*
(510) 825-0720 (FAX)

RECEIVED
1992

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-652

September 2, 1992

Valli Voruganti
RESNA Industries
3315 Almaden Expressway, #34
San Jose, CA 95118

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 08/26/92, under task order number 276-92-2.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Eileen F. Bullen/R.M.

Eileen F. Bullen
Laboratory Director

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-652

Table 1

ANALYTICAL RESULTS

Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Air

Modified EPA Methods 8020 and 8015[a]

GTEL Sample Number		01	02		
Client Identification		AS VW341830	METHOD BLANK		
Date Sampled		08/25/92	08/25/92		
Date Analyzed		08/26/92	08/26/92		
Analyte	Detection Limit, mg/m^3	Concentration, mg/m^3			
Benzene	0.5	280	<0.5		
Toluene	0.5	190	<0.5		
Ethylbenzene	0.5	55	<0.5		
Xylene, total	0.5	170	<0.5		
BTEX, total	--	700	--		
Gasoline	10	9500	<10		
BFB surrogate, % recovery		93.9	82.5		
Detection Limit Multiplier		1	1		

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision.

Client Number: RSN04ARC01
Facility Number: 276
Arco Representative: Michael Whelan
Work Order Number: C2-08-652

Sample and Sample Duplicate Results

Matrix: Air

Analyte	Sample ID	Date of Analysis	Sample Results	Sample Duplicate Results	Units	RPD[a], %
Modified EPA 8020:						
Benzene	C208650-05	08/26/92	121	120	ug/L	0.830
Toluene	C208650-05	08/26/92	26.1	26.1	ug/L	0
Ethylbenzene	C208650-05	08/26/92	1.36	1.07	ug/L	23.9
Xylene, total	C208650-05	08/26/92	5.09	4.13	ug/L	20.8

a. See attached table for acceptability limits.

QC Acceptability Limits

Analyte	QC Check Sample Recovery (%)	Duplicate Water Sample RPD (%)	Duplicate Soil Sample RPD (%)	Water Matrix Spike Recovery (%)	Soil Matrix Spike Recovery (%)	Reagent Water Spike Recovery (%)
EPA 8310:						
Fluorene	80 - 120	68	---	---	---	49 - 116
Anthracene	80 - 120	41.7	---	---	---	24 - 116
Chrysene	80 - 120	65.2	---	---	---	44 - 128
Benzo(a)pyrene	80 - 120	52.8	---	---	---	26 - 126
Naphthalene	80 - 120	42.3	---	---	---	51 - 106
EPA 8240:						
All 8240 Compounds	60 - 140	---	---	---	---	---
Trichloroethene	---	14	24	71 - 120	62 - 137	71 - 120
Toluene	---	13	21	76 - 125	59 - 139	76 - 125
Chlorobenzene	---	13	21	75 - 130	60 - 133	75 - 130
1,1-Dichloroethene	---	14	22	61 - 145	59 - 172	61 - 145
Benzene	---	11	21	76 - 127	66 - 142	76 - 127
TPH/IR:	80 - 120	20	20	70 - 130	70 - 130	70 - 130
Metals:						
Arsenic	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Barium	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Cadmium	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Chromium	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Lead	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Mercury	90 - 110	20	20	80 - 120	80 - 120	80 - 120
Selenium	90 - 110	20	20	80 - 120	80 - 120	90 - 110
Silver	90 - 110	20	20	80 - 120	80 - 120	90 - 110
Wet Chemistry:						
TOC	90 - 110	20	NA	90 - 110	NA	90 -110

NA = Not Applicable.

ARCO Products Company
Division of Atlantic Richfield Company

Task Order No. 276-92-2

Chain of Custody

ARCO Facility no	ARCO 276	City (Facility)	Oakland, CA
ARCO engineer	MICHAEL WHELAN	Telephone no (ARCO)	(415) 541-244
Consultant name	RESNA INDUSTRIES	Address (Consultant)	3315 ALMADEN EXPRESSWY, #34 SAN JOSE CA 95118
Project manager (Consultant)	ALEX VORUGANTI	Telephone no (Consultant)	(408) 264 7723
		Fax no. (Consultant)	(408) 264 2435

Laboratory name: GTEL
Contract number:
Method of shipment: Courier

Sample ID	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	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 413.2	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi / Metals VOA / VOA	CAM Metals EPA 6010/7000 / STLC	Lead Org./DHS / Lead EPA 7420/7421		
AS-WW34-1880	01				Air			08/25			X			84								
method BLK-	02													8128	94							

Special detection Limit/reporting: Report results in mg/m3

Special QA/QC: BOY 7

Remarks: Please fax results

Lab number: C208652

Condition of sample: On a cooler

Temperature received: 9.25

	Date	Time		Date	Time
Relinquished by sampler	08/26/92	900pm	Received by	Concord Courier	9/24/92
Relinquished by	8/26/92	1250	Received by		
Relinquished by			Received by laboratory		

Turnaround time

- Priority Rush 1 Business Day
- Rush 2 Business Days
- Expedited 5 Business Days
- Standard 10 Business Days ✓

B C Analytical

1255 Powell Street
Emeryville, CA 94608
510/428-2300
Fax: 510/547-3643

ANALYTICAL REPORT

LOG NO: E92-08-560

Received: 27 AUG 92

Mailed: SEP 05 1992

Mr. Bruce Maeda
Resna Industries
3315 Almaden Expressway, Suite 34
San Jose, California 95118

Project: 61126.10

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION	DATE SAMPLED
08-560-1	AS-PB,1-3	24 AUG 92

PARAMETER	08-560-1
Charcoal Digestion, Date	08.31.92
Lead, ug	7.0

Edward Wilson, Laboratory Director

BCA

RESNA

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO: 60026.10

PROJECT NAME/SITE: ARCO 276
10600 MACARTHUR BLVD
OAKLAND, CALIFORNIA

SAMPLERS (SIGN): [signature] (PRINT) BRUCE MAGDA

SAMPLE IDENTIFICATION	DATE	TIME	COMP	GRAB	PRES. USED	ICED	NO. CONTAINERS	SAMPLE TYPE	BTEX (602/8020)	TPHg (8015)	TPHd (8015)	TOG 418.1/5520	601/8010	624/8240	625/8270	ORGANIC LEAD	REMARKS
AS-Pb-1	8/24/92	6:36pm	✓				1								X		SAMPLE AIRFLOW = 2.5 ft³/hr. SAMPLE TIME = 17 minutes
AS-Pb-2	8/24/92	7:01pm	✓				1								X		
AS-Pb-3	8/24/92	7:21pm	✓				1								X		

RELINQUISHED BY	DATE	TIME	RECEIVED BY:
[signature]	8/26/92	2:55	[signature]
RELINQUISHED BY	DATE	TIME	RECEIVED BY:
[signature]	8/27/92	1745	[signature]
RELINQUISHED BY	DATE	TIME	RECEIVED BY:
RELINQUISHED BY	DATE	TIME	RECEIVED BY LABORATORY:

LABORATORY: BROWN & CALDWELL

REQUESTED TURNAROUND TIME: NORMAL ARCO

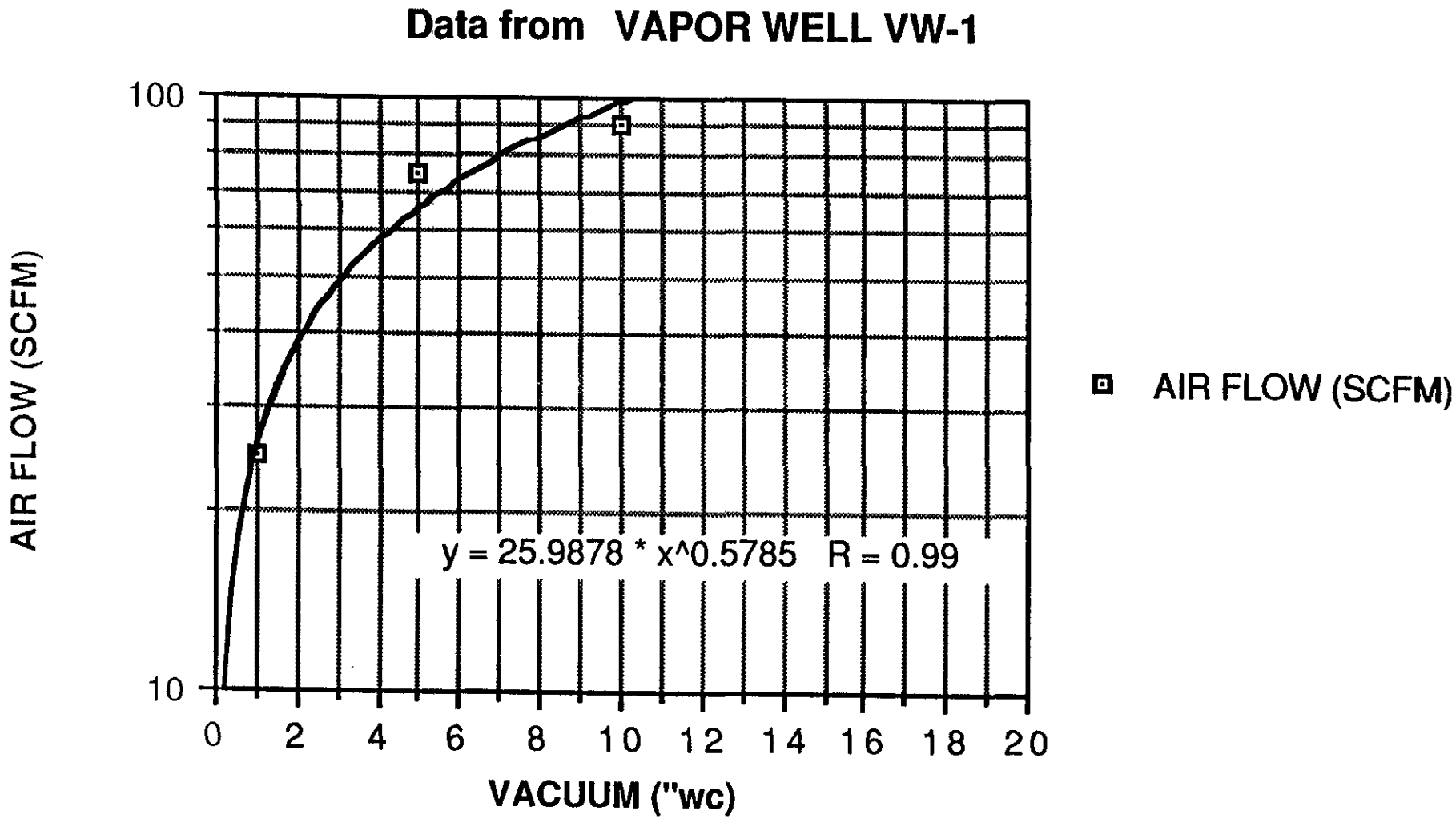
RECEIPT CONDITION:

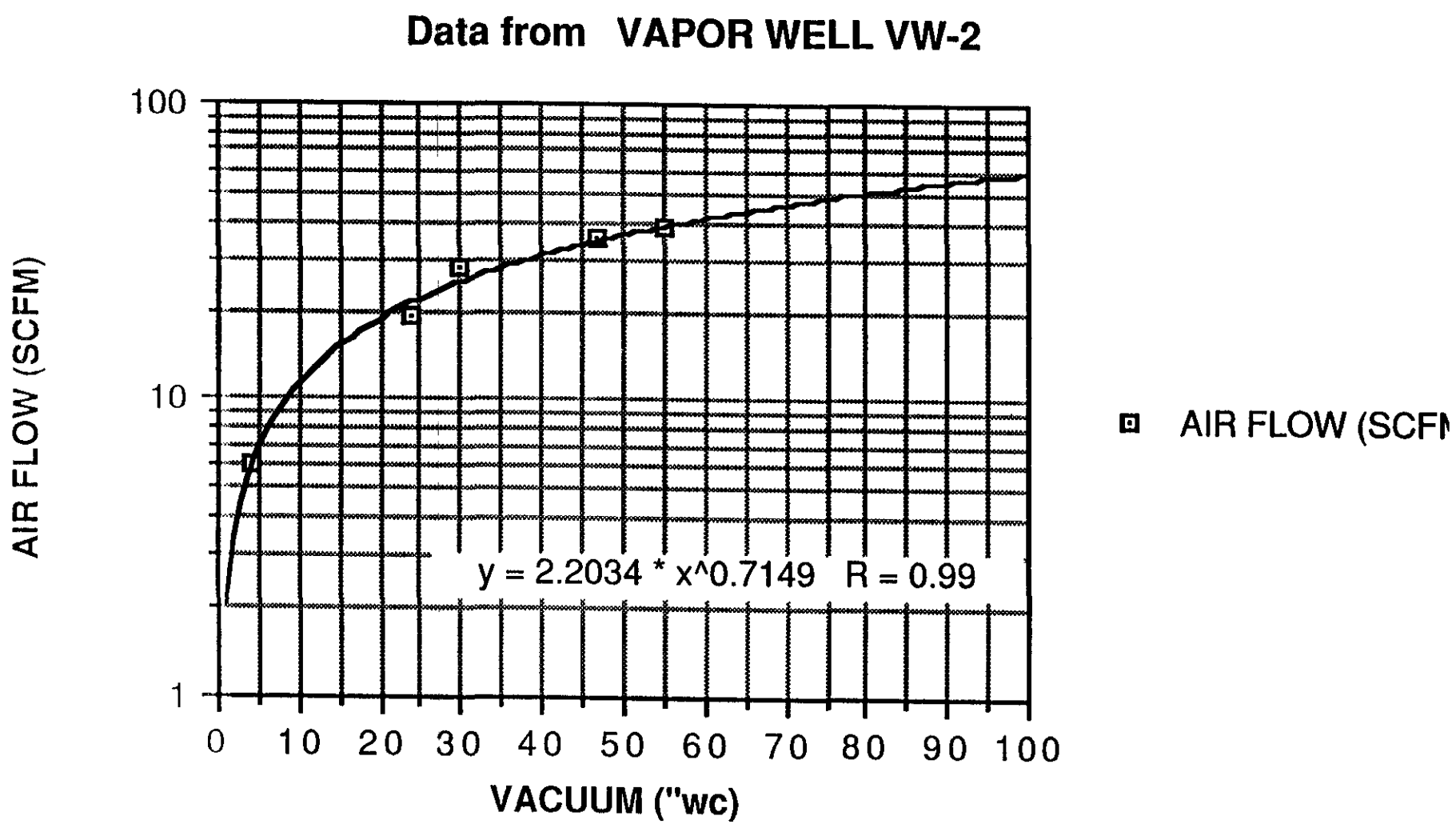
PLEASE SEND RESULTS TO: BRUCE MAGDA, RESNA

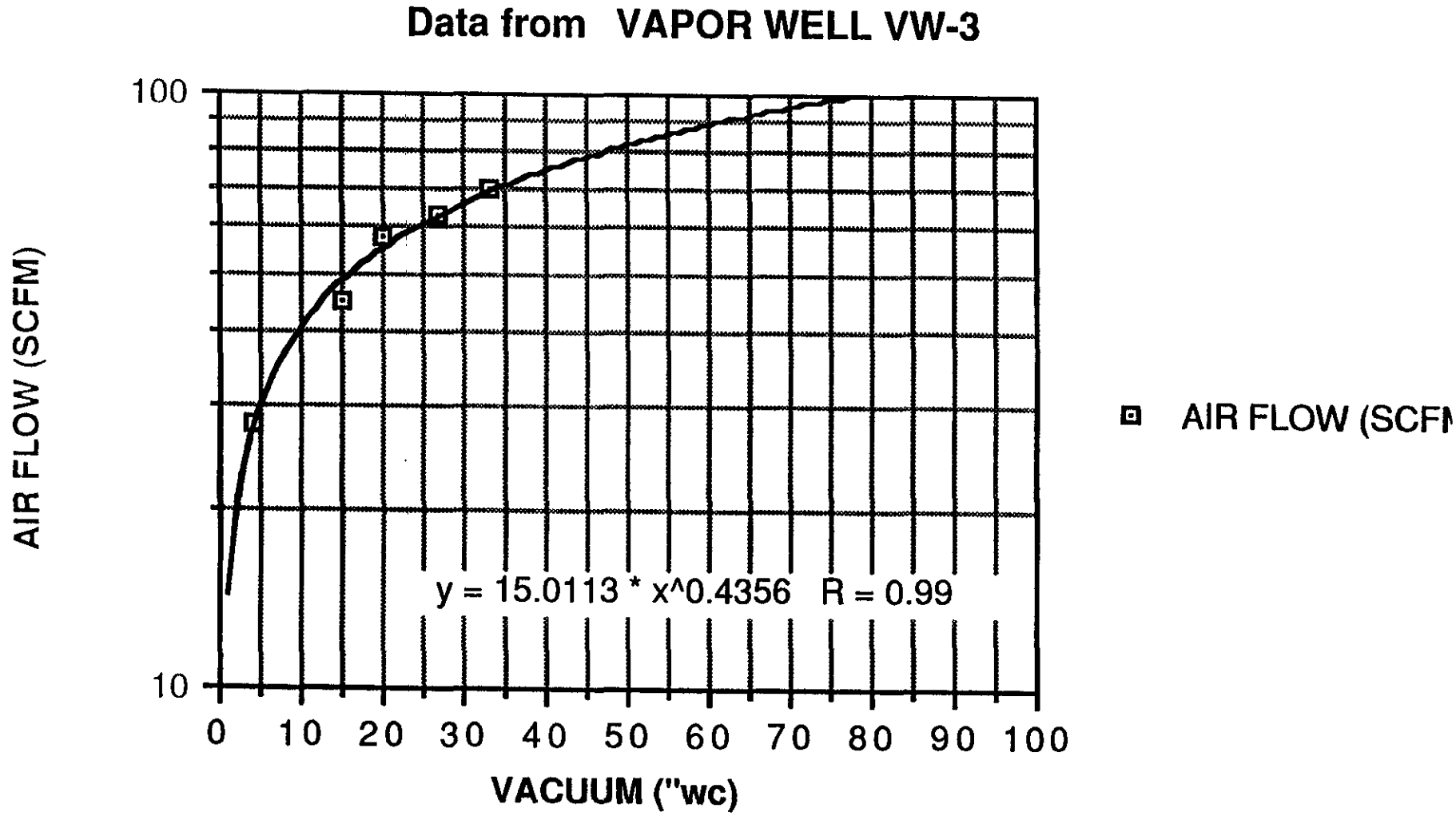
PROJECT MANAGER:

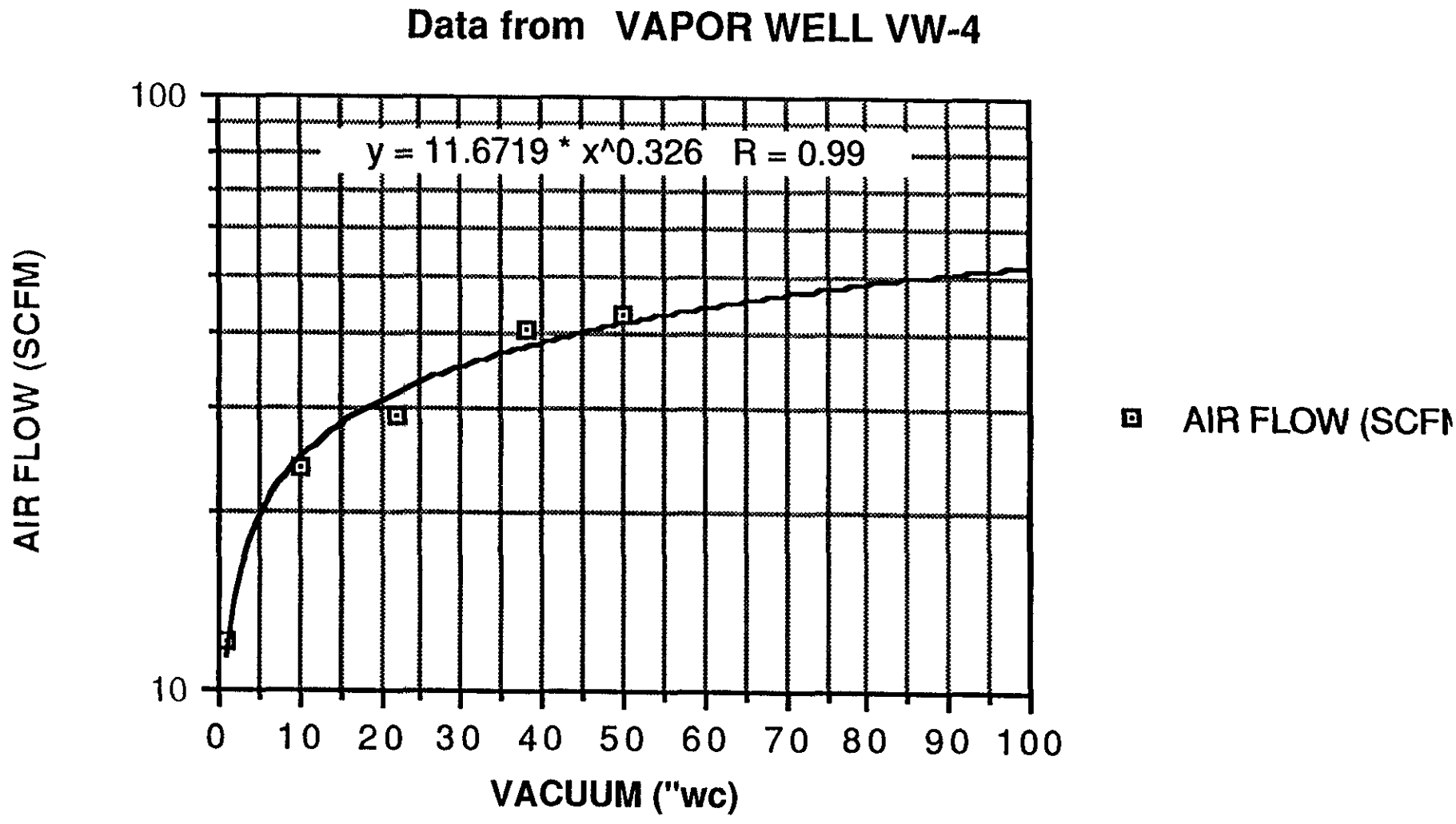
APPENDIX H

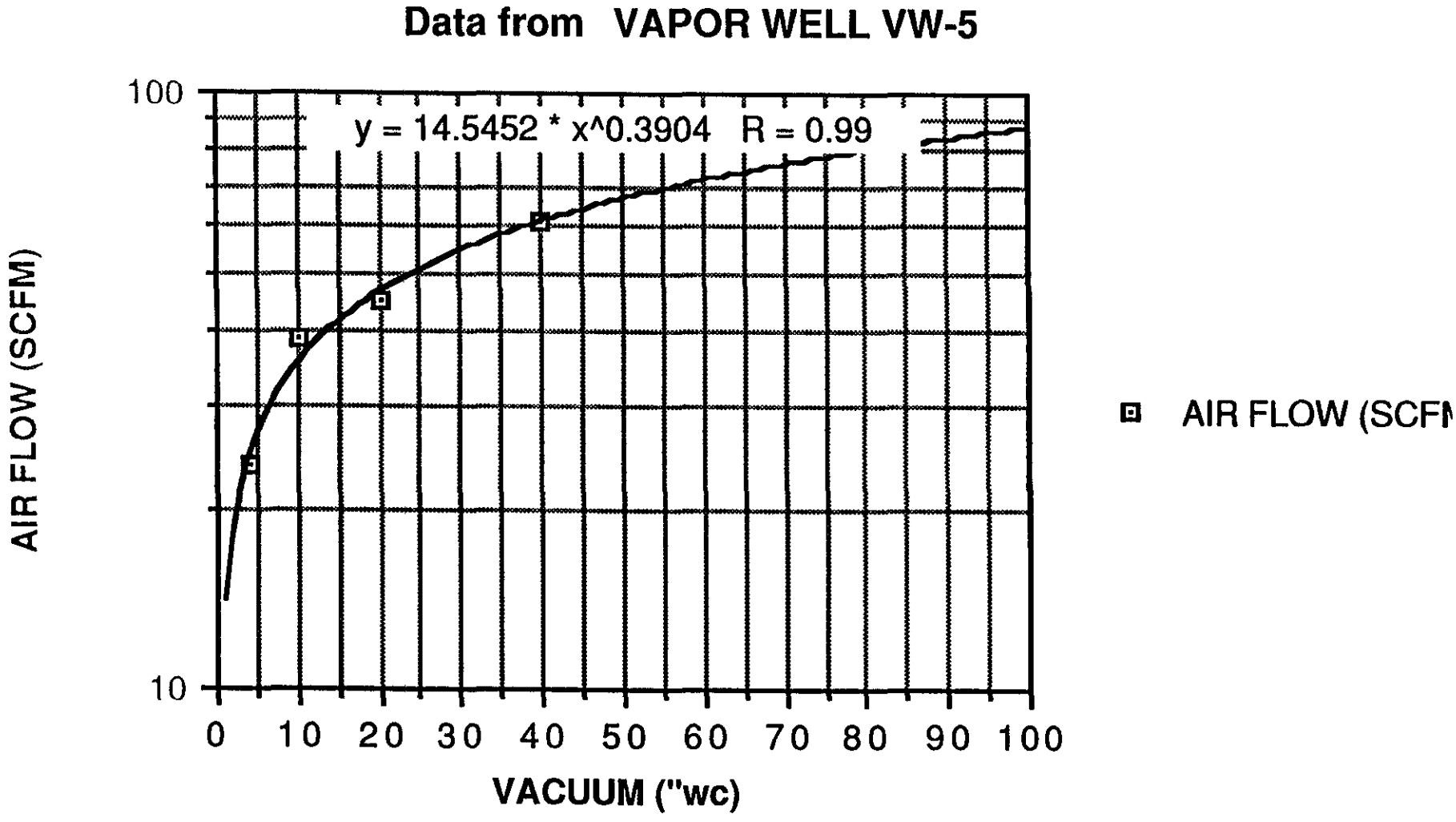
WELLHEAD AIR FLOW CHARACTERISTICS

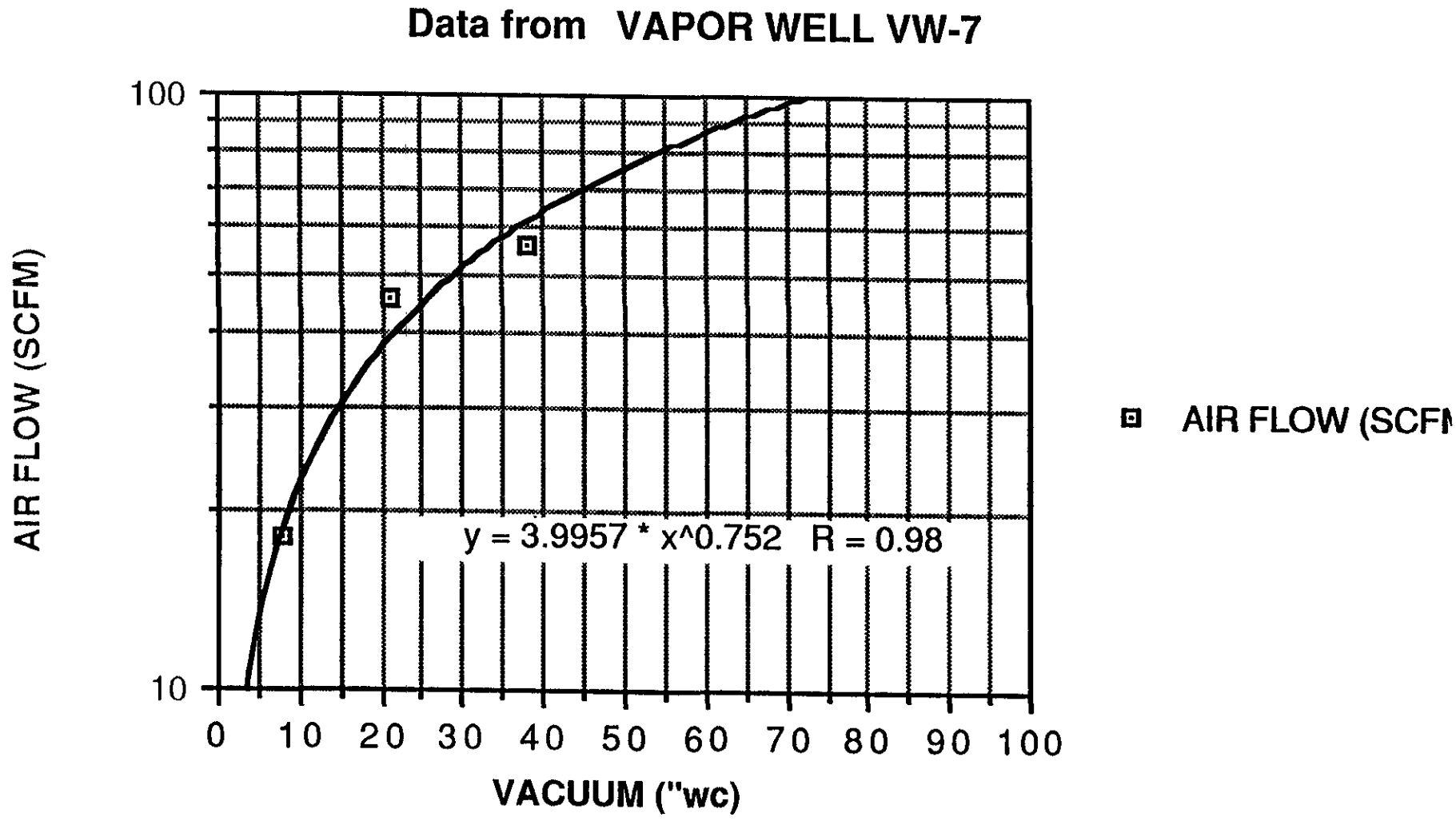

Data from VAPOR WELL VW-1
100
10
AIR FLOW (SCFM)
y = 25.9878 * x^0.5785 R = 0.99
0
2
4
6
8
10
12
14
16
18
20
VACUUM ("wc)
AIR FLOW (SCFM)

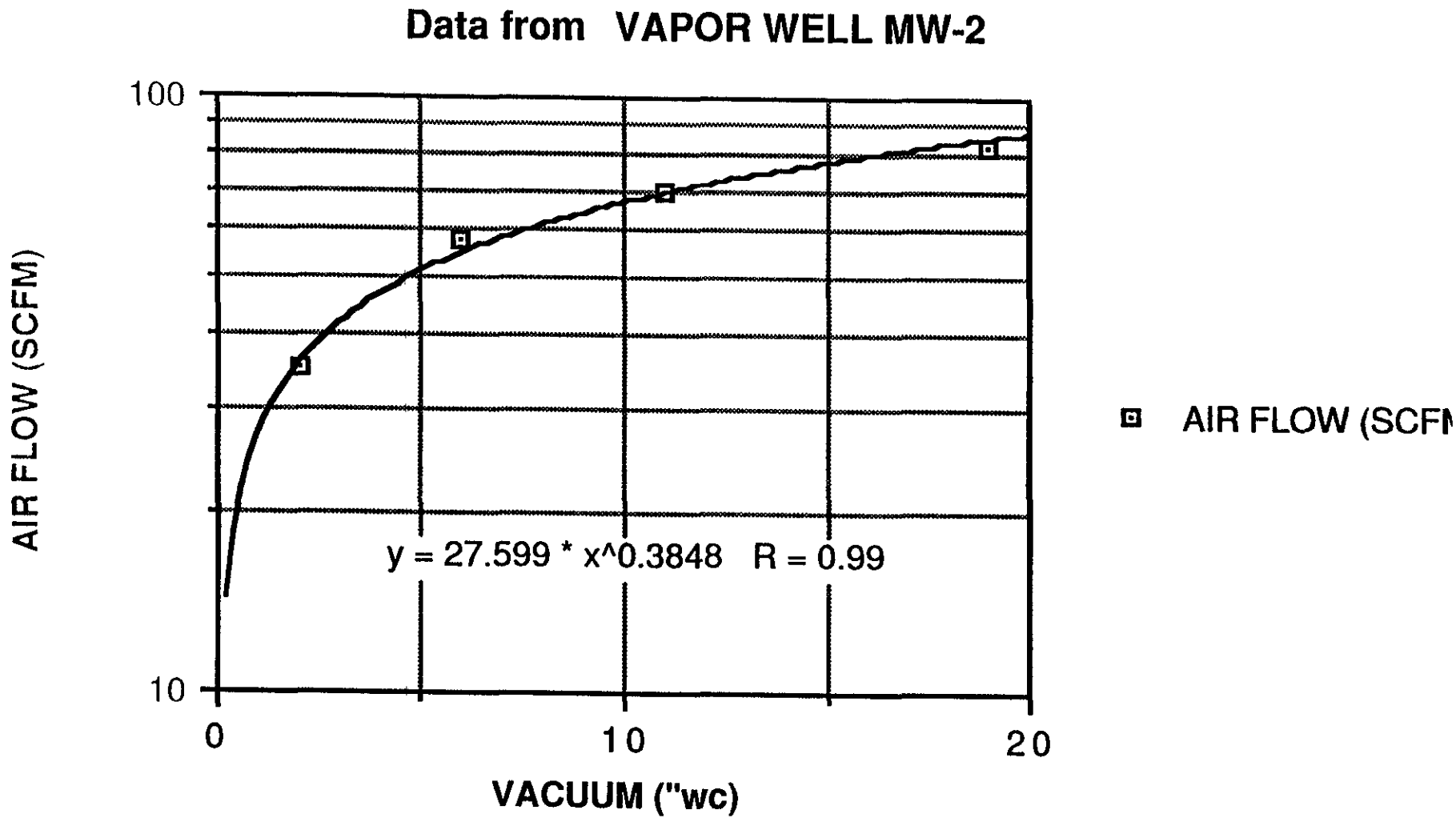

Data from VAPOR WELL VW-2
AIR FLOW (SCFM)
100
10
1
0
10
20
30
40
50
60
70
80
90
100
VACUUM ("wc)
y = 2.2034 * x^0.7149 R = 0.99
AIR FLOW (SCFM


Data from VAPOR WELL VW-3
100
10
AIR FLOW (SCFM)
y = 15.0113 * x^0.4356 R = 0.99
0 10 20 30 40 50 60 70 80 90 100
VACUUM ("wc)
AIR FLOW (SCFM


Data from VAPOR WELL VW-4
y = 11.6719 * x^0.326 R = 0.99
100
10
AIR FLOW (SCFM)
0 10 20 30 40 50 60 70 80 90 100
VACUUM ("wc)
AIR FLOW (SCFM


Data from VAPOR WELL VW-5
y = 14.5452 * x^0.3904 R = 0.99
100
10
AIR FLOW (SCFM)
0 10 20 30 40 50 60 70 80 90 100
VACUUM ("wc)
AIR FLOW (SCFM

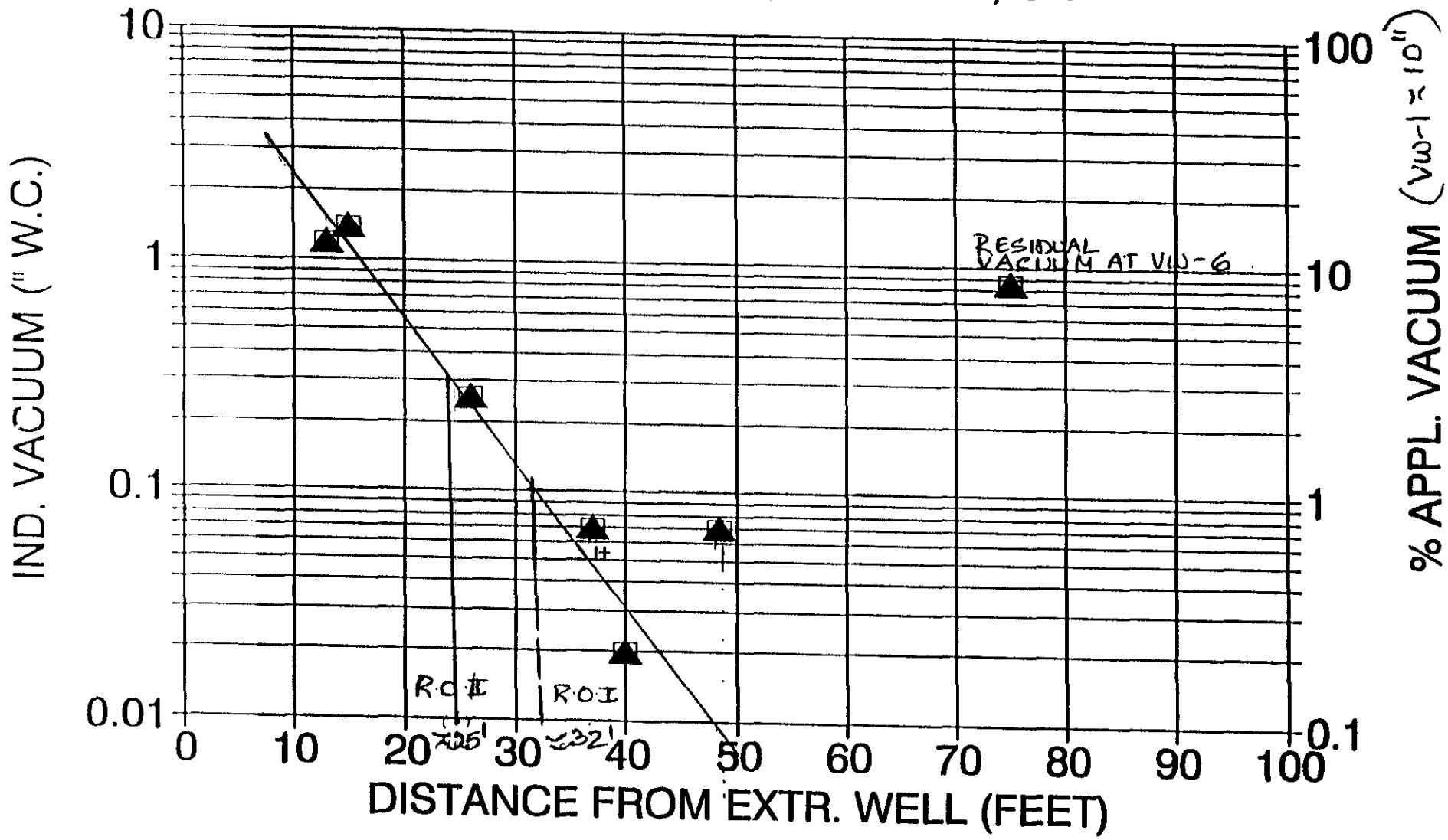

Data from VAPOR WELL VW-7
AIR FLOW (SCFM)
100
10
0
10
20
30
40
50
60
70
80
90
100
VACUUM ("wc)
y = 3.9957 * x^0.752 R = 0.98
AIR FLOW (SCFM


Data from VAPOR WELL MW-2
100
10
AIR FLOW (SCFM)
y = 27.599 * x^0.3848 R = 0.99
0
10
20
VACUUM ("wc)
AIR FLOW (SCFM

APPENDIX I

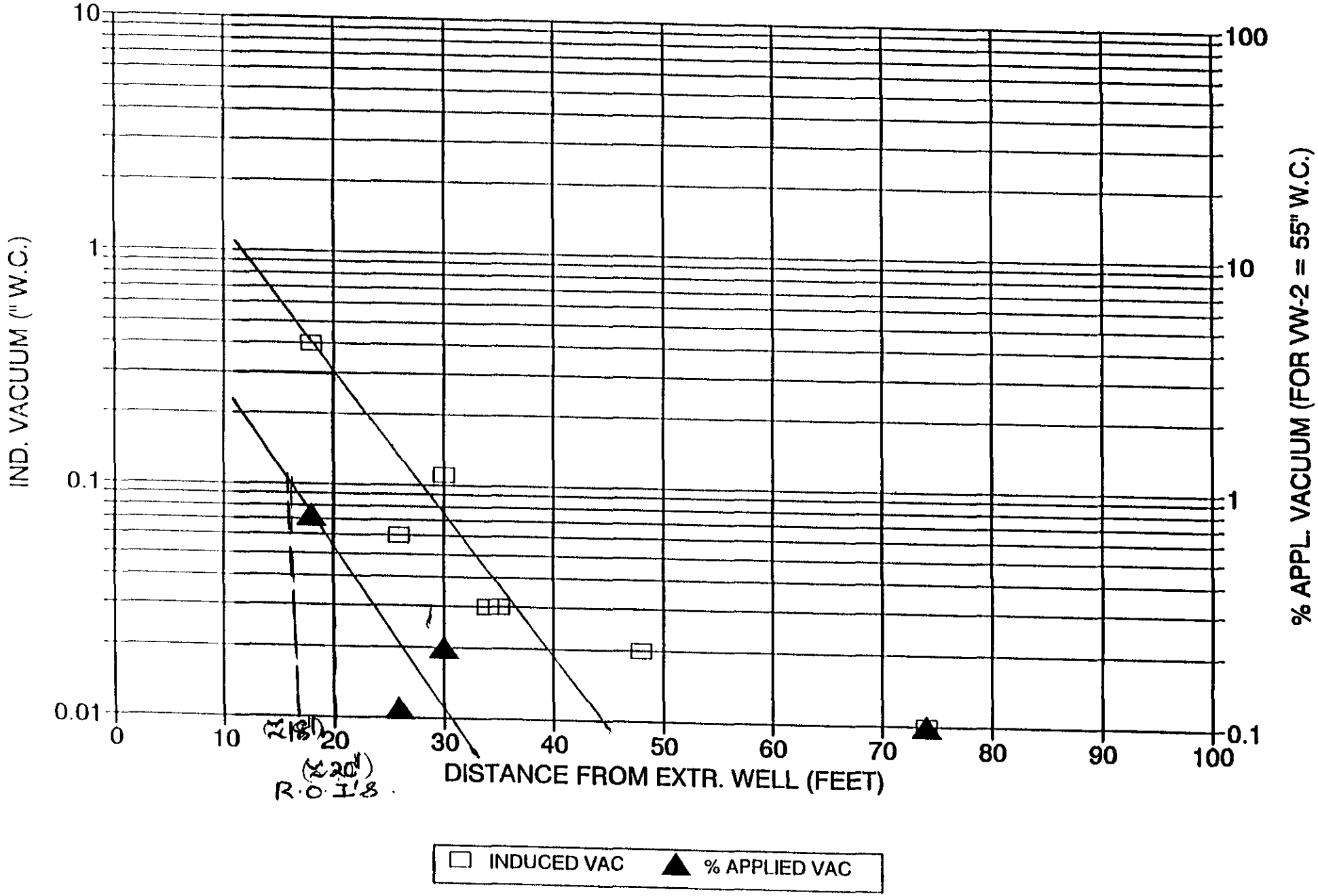
RADIUS OF INFLUENCE GRAPHS

R.O.I OF EXTR. WELL VW-1
ARCO STATION 276, OAKLAND, CA



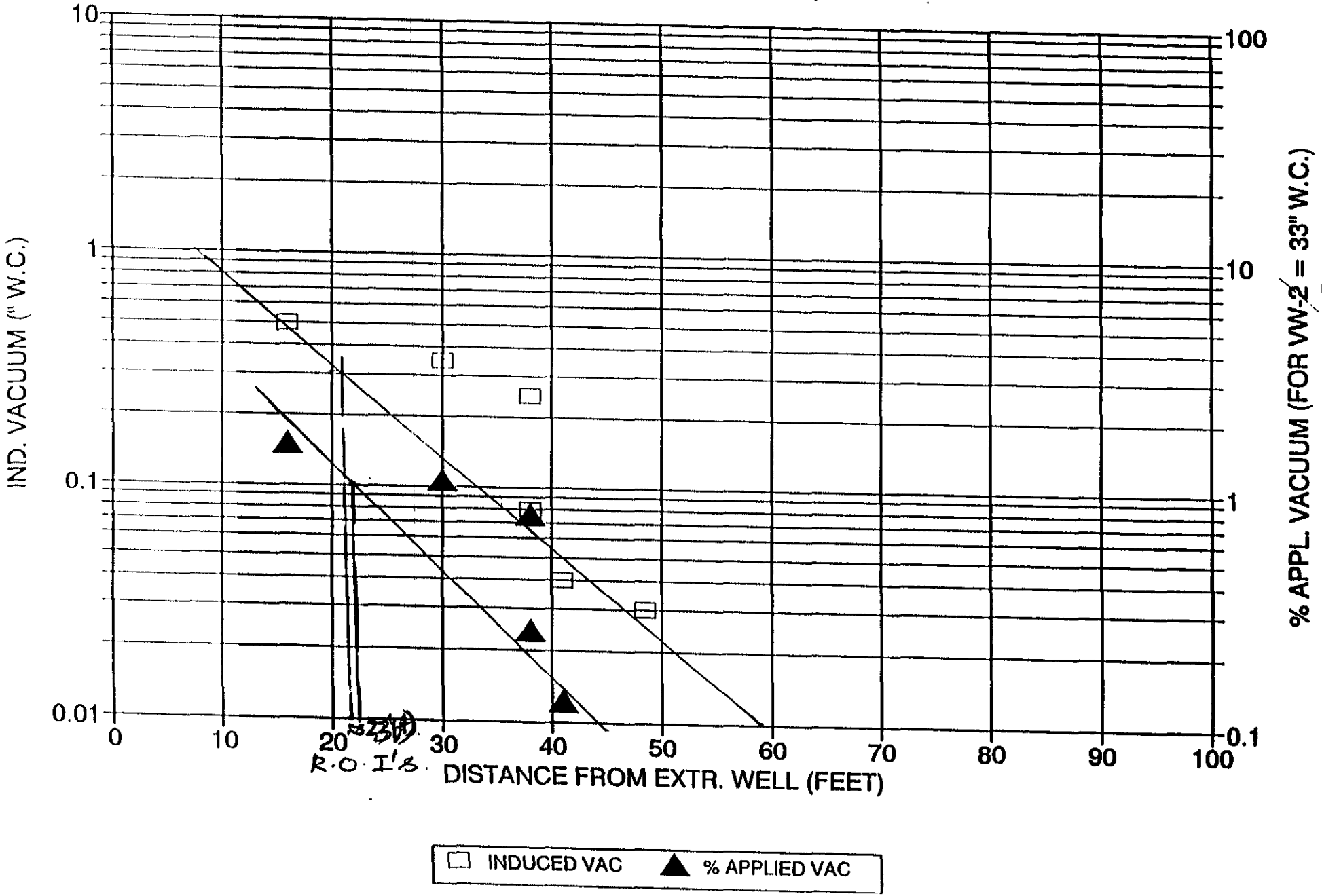
R.O.I OF EXTR. WELL VW-2

ARCO STATION 276, OAKLAND, CA



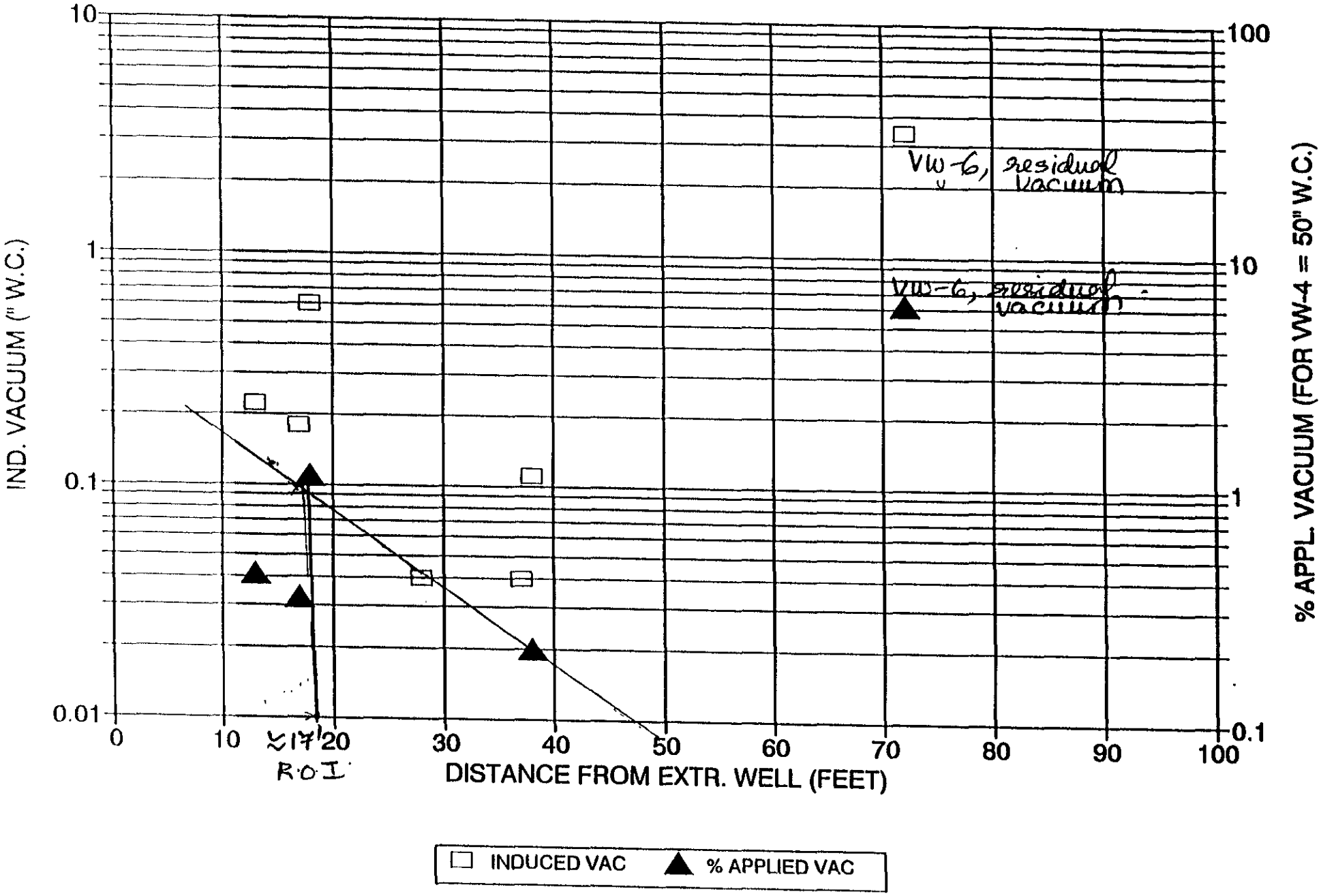
R.O.I OF EXTR. WELL VW-3

ARCO STATION 276, OAKLAND, CA



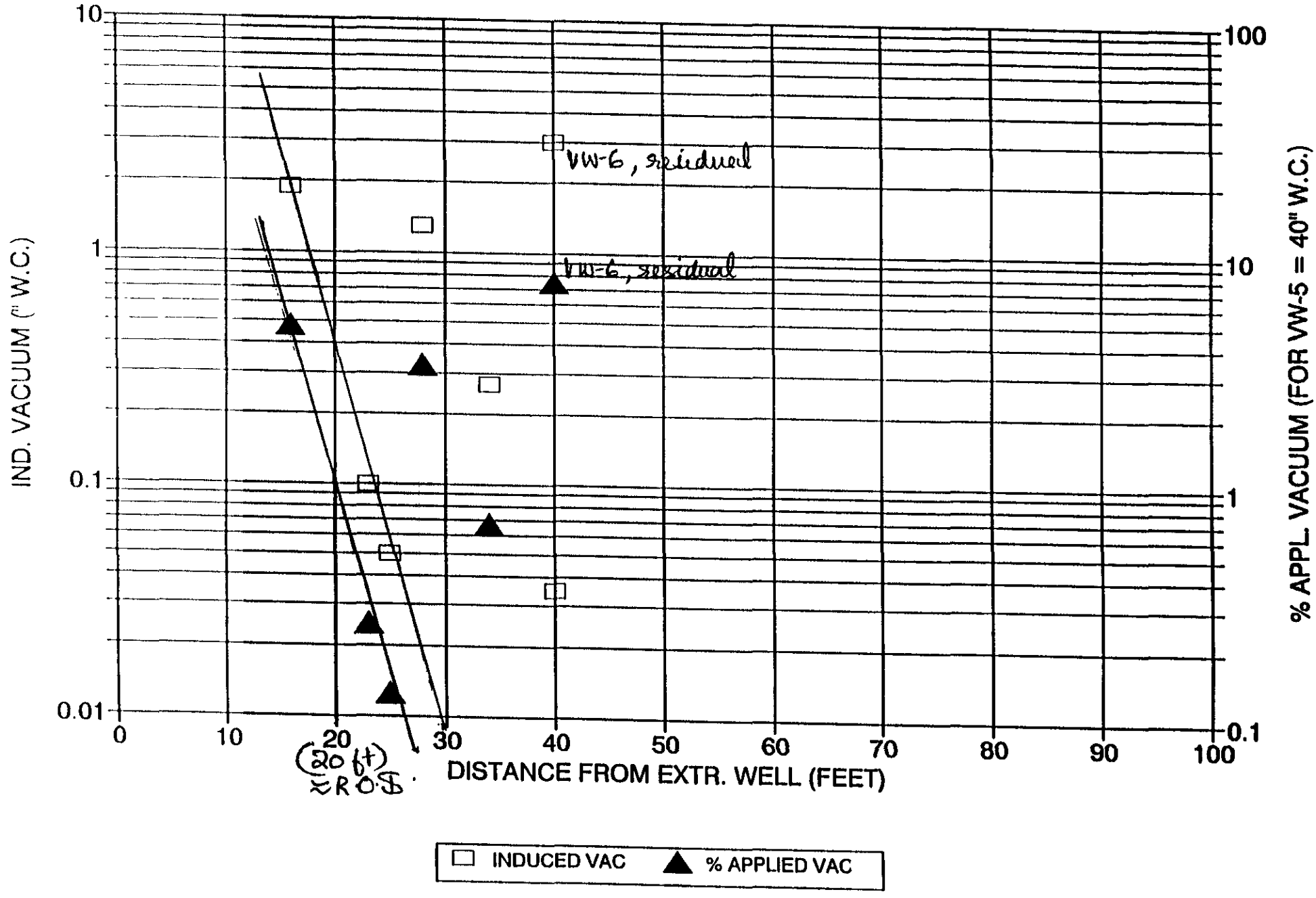
R.O.I OF EXTR. WELL VW-4

ARCO STATION 276, OAKLAND, CA



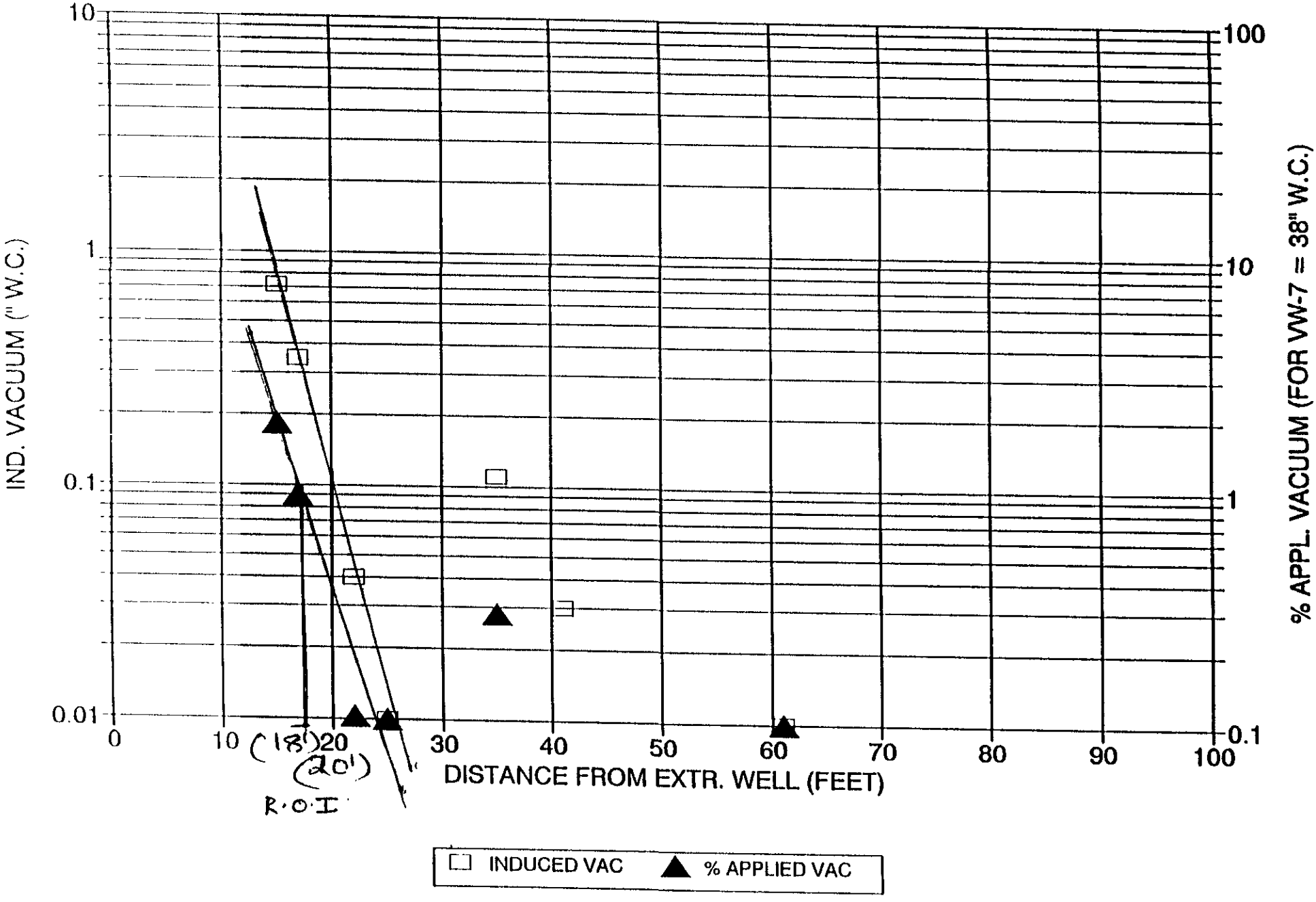
R.O.I OF EXTR. WELL VW-5

ARCO STATION 276, OAKLAND, CA



R.O.I OF EXTR. WELL VW-7

ARCO STATION 276, OAKLAND, CA



R.O.I OF EXTR. WELL MW-2

ARCO STATION 276, OAKLAND, CA