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April 19, 1993

Original Via Overnight Mail

Mr. Barney Chan
Alameda County Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

Subject: Former Exxon RAS #7-3006, 720 High Street, Oakland, California

Dear Mr. Chan:

Attached for your review and comment is a report entitled **Interim Remediation Investigation** for the above referenced site. This report, prepared by RESNA Industries, Inc., of San Jose, California, details the results of the recent well installations, vapor extraction test, and pumping test, completed primarily in the first quarter, 1993.

Exxon would like to meet with the Alameda County Department of Environmental Health after you have had the opportunity to review this report to discuss alternatives for the site. Exxon or RESNA will call to schedule a meeting at your convenience if you agree to do so.

Should you have any questions or comments, or require additional information, please do not hesitate to contact me at the above listed phone number.

Sincerely,

Marla D. Guensler

Marla D. Guensler

Attachment

c - w/attachment:
Mr. Richard Hiett - San Francisco Bay Region CRWQCB

w/out attachment:
Mr. Marc Briggs - RESNA Industries, Inc., San Jose

MDG/mdg

RESNA
Working To Restore Nature

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REPORT
INTERIM REMEDIATION INVESTIGATION
at
Former Exxon Station 7-3006
720 High Street
Oakland, California

130006.02

Report prepared for
Exxon Company, U.S.A.
P.O. Box 4032
2300 Clayton Road
Concord, California 94520
by
RESNA Industries Inc.

STID 136

Marc A. Briggs
Project Geologist

REGISTERED GEOLOGIST
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STATE OF CALIFORNIA

James L. Nelson
C.E.G. 1463

April 16, 1993

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RESNA
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INTERIM REMEDIATION INVESTIGATION
at
Exxon Station 7-3006
720 High Street
Oakland, California

For Exxon Company, U.S.A.

INTRODUCTION

Exxon Company, U.S.A. (Exxon) has contracted with RESNA Industries Inc. (RESNA) to perform an interim remediation investigation at Exxon Station 7-3006 located at 720 High Street in Oakland, California. This investigation was initiated after gasoline and diesel hydrocarbons were detected in the soil and groundwater during previous investigations performed by RESNA and others. The purpose of this investigation was to further evaluate the lateral and vertical extent of gasoline and diesel hydrocarbons in the soil; install a Passive Free Phase Gasoline Hydrocarbon Recovery System to remove free phase gasoline hydrocarbons from monitoring wells MW-2, MW-4, and MW-6 as a means of source removal and migration control; field test and evaluate vapor extraction as a possible method of interim remediation of gasoline hydrocarbons present in the soil at the site; and to perform aquifer pumping recovery tests to evaluate the general aquifer characteristics at the site for future recovery well location and interim remediation of gasoline and diesel hydrocarbons in the groundwater.

Work performed for this investigation included drilling four soil borings (B-35, B-35A, B-36, and B-37) on February 11, 1993; collecting and describing soil samples from the borings; installing three 4-inch inner-diameter vapor-extraction wells (VW-1, VW-2, and VW-3) in borings B-35A, B-36, and B-37; installing a Free Phase Gasoline Hydrocarbon Recovery Systems in MW-2, MW-4, and MW-6 on February 18, 1993; performing a vapor extraction test (VET) on the three vapor-extraction wells on February 18, 1993; performing a combined 24-hour pumping and recovery test on one groundwater monitoring well on February 25 and 26, 1993; surveying wellhead elevations; measuring monthly depth-to-water

levels (DTW) on January 27 and February 18, 1993; performing quarterly sampling and DTW measurements on March 10 and 11, 1993; and, submitting selected soil, vapor, and groundwater samples for laboratory analysis.

This report includes summaries of field procedures used during this investigation, findings, interpretation of the data, and conclusions. This work was performed in accordance with the Field Protocol (Appendix A), Addendum One to the Interim Groundwater Remediation Work Plan (RESNA, January 18, 1993), and the Site Safety Plan (RESNA, February 10, 1993).

BACKGROUND

General

The site is located at 720 High Street in Oakland, California, as shown on the Site Vicinity Map, Plate 1. The site is on a relatively flat, asphalt-covered lot at an elevation of approximately 14 feet above mean sea level (msl). The station is situated east of State of California Highway 880, at the intersection of High Street and Coliseum Way, on the western edge of an alluvial fan, less than 1/2 mile northeast of a tidal canal, and 3/4 mile north of San Leandro Bay (Plate 1). The station is in a predominantly industrial area, and is bounded to the northeast by a former dry-cleaning plant and Ed's Auto Parts (currently a lumber yard), to the northwest by High Street, to the southwest by Coliseum Way and Highway 880, and to the southeast by Alameda Avenue and a vacant lot. The site is currently used as a Coast gasoline service station. The locations of the former USTs, former used-oil UST, service islands, and other pertinent site facilities are shown on the Generalized Site Plan (Plate 2).

Regional and Local Geology

The site is located along the eastern margin of San Francisco Bay within the East Bay Plain, near the northwestern portion of the San Leandro Cone and the boundary of the Oakland Alluvial Plain (Hickenbottom and Muir, June 1988). The East Bay Plain lies within the

Coast Range geomorphic province and is characterized by broad alluvial fan margins sloping westward into San Francisco Bay.

Helley and others (1979) mapped the earth materials underlying the site area as being Holocene bay mud asterion deposits composed of unconsolidated, water-saturated, dark plastic clay and silty clay rich in organic materials, with local lenses and stringers of well-sorted silt, fine sand, and peat. These asterion materials, known locally as Bay Mud, were deposited primarily in brackish- to salt-water marshes along the margins and beneath the waters of San Francisco Bay during interglacial periods before and after the Wisconsin Glaciation in the late Pleistocene (Goldman, 1969). The asterion Bay Mud materials interfinger with Holocene-age fine-grained alluvium deposited by standing floodwaters that periodically inundate the low interfluvial basin areas and fresh-water marshes (Helley and others, 1979).

Regional and Local Hydrogeology

Groundwater quality in the water-bearing units of the San Leandro Cone generally meets recommended primary and secondary standards for drinking water. The most productive water wells in the San Leandro Cone are those completed within the older alluvium units. The older alluvium units consist of permeable alluvial fan deposits characterized by poorly consolidated to unconsolidated gravel, sand, silt and clay (Hickenbottom and Muir, June 1988). These units contain appreciable quantities of groundwater, and are therefore considered to be the principal groundwater reservoir in the East Bay Plain area. Smaller amounts of groundwater occur in the younger alluvium, fluvial deposits, interfluvial basin deposits, and Bay Mud asterion deposits. These deposits generally are relatively thin (less than 120 feet thick), and generally yield only small amounts of groundwater to wells. The Bay Mud acts as a barrier to the vertical movement of salt water from San Francisco Bay into the older alluvium. The Bay Mud is generally water-saturated because most of it lies below the water table. However, it is not considered as a useable source of groundwater to wells because of its low permeability and because it is believed to contain mostly salt water (Hickenbottom and Muir, June 1988).

The direction of groundwater flow at the site appears to be to the northwest based on groundwater elevations interpreted from depth-to-water (DTW) data collected at the site. The depth to first groundwater has been measured to be approximately 8 to 9 feet below grade during drilling, and stabilizes in the wells at depths of approximately 7 to 5 feet below grade.

The site is located approximately 2,000 feet east of San Leandro Bay, which is a smaller portion of San Francisco Bay. The nearest streams to the site are Peralta Creek, which is located approximately 5,000 feet north of the site, Sausal Creek which is located approximately 4,750 feet northwest of the site, and Arroyo Viejo which is located approximately 10,000 feet southeast of the site. These creeks originate in the East Bay Hills, which are a part of the Diablo mountain range, and drain directly into San Leandro Bay. Water enters these creeks by direct runoff from rural and urban areas, through numerous small tributaries, and through numerous storm sewer outlets originating in the urbanized areas.

Previous Site Environmental Work

Prior to this investigation, RESNA (formerly Applied GeoSystems [AGS]) performed an environmental investigation related to the removal of four USTs in April 1987 (AGS, May 13, 1987, July 10, 1987, and October 16, 1989), and an environmental investigation between September 1987 and May 1988 that included drilling nine boreholes (B-1 through B-9) around the former UST locations and installing groundwater monitoring wells MW-1 through MW-9 in the boreholes (AGS, August 5, 1988). AGS performed a Supplemental Subsurface Investigation that included; drilling eleven boreholes (B-10 through B-20) and installing groundwater monitoring wells MW-10 through MW-13 in boreholes B-10 through B-13 in November 1989 (AGS, January 30, 1990), and drilling boreholes B-21 through B-32 and installing groundwater monitoring wells MW-14 and MW-15 in boreholes B-31 and B-32 in November 1990 (AGS, May 21, 1991). Quarterly monitoring was initiated by AGS in the second quarter of 1989 (AGS, October 16, 1989) and is ongoing. Tables 1, 2, and 3 include previously reported results of monitoring of groundwater elevations, soil laboratory testing, and groundwater laboratory testing, respectively. A brief summary of the previous work

performed at the site, as well as the results of the recent quarterly sampling, is included in Appendix B of this report.

FIELD WORK

Passive Free Phase Gasoline Hydrocarbon Recovery System

In Addendum One to the Interim Groundwater Remediation Work Plan (RESNA, January 18, 1993) a Passive Free Phase Gasoline Hydrocarbon Recovery System was proposed for installation in monitoring wells MW-2 through MW-4. However, during the monthly monitoring conducted on February 18, 1993, no noticeable free phase gasoline hydrocarbons or gasoline hydrocarbon sheen was observed on well MW-3, free phase gasoline hydrocarbons were observed in monitoring well MW-2, and a gasoline hydrocarbon sheen was observed in monitoring wells MW-4 and MW-6. Based on these observations, the Passive Free Phase Gasoline Hydrocarbon Recovery System was installed in monitoring wells MW-2, MW-4, and MW-6 as an interim means of source removal and migration control.

Drilling

Well construction permits were acquired from the Alameda County Health Care Services Agency (ACHCSA) prior to drilling. Copies of the permits are included in Appendix C of this report. Four soil borings (B-35, B-35A, B-36, and B-37) were drilled on February 11, 1993. A summary of the field procedures employed by RESNA is included in the Work Plan previously submitted for this site (RESNA, January 18, 1993). The work for this assessment was performed in accordance with the Field Protocol (Appendix A), and Site Safety Plan (RESNA, February 10, 1993).

Borings B-35, B-35A, B-36, and B-37 were drilled in the vicinity of the USTs and pump islands to evaluate further the source area(s), the vertical and horizontal extent of hydrocarbons, and the potential subsurface pathways beneath the site. Boring B-35A was located immediately adjacent to boring B-35, and converted to a vapor-extraction well.

Vapor-extraction wells (VW-2 and VW-3) were constructed in borings B-36 and B-37 to evaluate the efficiency and practicality of vapor extraction as an interim soil remediation alternative by allowing performance of a vapor extraction test. The locations of borings, and vapor extraction wells are shown on Plate 2.

Soil Sampling and Description

Soil samples were collected from the soil borings and described in accordance with the Unified Soil Classification Systems (Plate 4). Borings B-35, B-36, and B-37 were sampled at 5 feet intervals from ground surface to the total depths of approximately 10 feet (just at or below first-encountered groundwater). Because vapor extraction well VW-1 (boring B-35A) was located immediately adjacent to boring B-35, it was decided that the soil stratigraphy, and the presence of gasoline and diesel hydrocarbons would be similar in both borings. As a result, in boring B-35A, soil samples were not collected or field screened. The field geologist logged soil types in boring B-35A from soil cuttings, and earth materials encountered in boring B-35. Sampling procedures used during this field work are described in the Field Protocol (Appendix A).

Soil samples collected in the field were screened by a geologist for the presence of gasoline hydrocarbon vapor using an Organic Vapor Meter (OVM). OVM measurements ranged from 12.4 parts per million (ppm) to greater than 2000 ppm, with the highest measurement recorded in borings B-35 and B-37 between the approximate depths of 6 and 9 feet. The individual OVM readings are listed on boring logs B-35 through B-37 (Plates 5, 6, and 8), in the column labeled PID (Photoionization Detector).

Materials encountered during various phases of subsurface investigations were interbeded layers of silty clay, silt, clayey gravel to gravel, and clayey sand to sand. An upper 6 to 12 feet of silty clay were encountered, which is underlain by saturated clayey gravel or clayey sand that appears to vary in thickness and extent. The permeable layer is underlain by a silty clay aquitard. Descriptions of materials encountered at depths of 3 to 3-½ in boring B-35, and at depths between 3 to 3-½ and 5 to 5-½ in boring B-37 suggest a possible perching zone. Descriptions of the materials encountered in the soil borings are presented

in the boring logs (Plates 5 through 8). Geologic cross-sections showing soil stratigraphic correlations are presented on Plate 9. 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 on this site. The cross-sections suggest that there are two permeable units beneath the site, one at depths of 7 to 12 feet below the surface and one at 20 to 30 feet below the surface. In the central part of the site, the two units appear to merge, as shown in Section D-D'. In other areas, one or both permeable units appear to pinch out, as shown in Sections A-A' and B-B'. In the northern area of the site, the shallow aquifer is separated from the deeper aquifer by a silty clay layer that varies in thickness. The southeastern portion of the site contains only the shallow aquifer which is underlain by a silty clay aquitard to a depth of approximately 35 feet.

Groundwater was initially encountered in boring B-35 at a depth of 9 feet below grade. However, during previous investigations performed at the site, in the northern corner of the site (MW-8, MW-10, and MW-11), groundwater had been encountered a depths of 20 to 24 feet below grade in the lower permeable unit. Water levels in these wells later stabilized at approximately 10 feet below grade, which support the assumption that the shallow aquifer is underlain by the deeper one in that portion of the site. Groundwater in both permeable units appear to be confined by a silty clay layer.

Soil Stockpile Sampling

Four soil samples were collected from the drill cutting stockpile on March 10, 1993 and April 6, 1993. A description of the composite soil sample collection protocol is included in Appendix A.

Vapor Extraction Well Construction

As mentioned previously, soil borings B-35A, B-36, and B-37 were completed as vapor extraction wells designated as VW-1, VW-2, and VW-3, respectively. The wells were constructed of 4-inch inner-diameter, PVC casing. Vapor extraction wells B-35A/VW-1, B-

36/VW-2, and B-37/VW-3 were constructed with screened casing from 4 to 8 feet below ground surface. The vapor wells were constructed with 0.10 inch machine-slotted screened casing using pea-sized gravel for a sandpack. Blank casing was set from the top of the screened casing and completed to within a few inches below ground surface (see Plates 4, 6, and 7 for vapor extraction well construction details).

Groundwater Level Measurements and Sampling

RESNA personnel measured DTW levels on January 27 and February 18, 1993, and performed quarterly sampling and DTW measurements on March 10 and 11, 1993 on the one offsite monitoring well (MW-1) and thirteen onsite monitoring wells (MW-2 through MW-4, and MW-6 through MW-15). Monitoring well MW-5 was destroyed in July 1989. Field work during this quarter consisted of measuring DTW levels, subjectively analyzing water from the wells for the presence of free-phase hydrocarbons, removing of any free-phase hydrocarbons encountered, and purging and sampling the groundwater from monitoring wells MW-1, MW-7, MW-9, MW-10, MW-11, and MW-14 for laboratory analysis. Monitoring wells MW-2 through MW-4, MW-6, MW-8, MW-12, MW-13, and MW-15 were not sampled due to the presence of free-phase hydrocarbons or product sheen observed during subjective analysis of the wells. Approximately 1/8 of a cup of free-phase hydrocarbons were recovered from MW-4, and approximately 1/2 of a cup was recovered from MW-6. Cumulative DTW levels and subjective analyses data are summarized in Table 1. Monitoring wells MW-1, MW-7, MW-9, MW-10, MW-11, and MW-14 were purged and sampled in accordance with RESNA's Field Protocol (Appendix A).

7 wells

Surveying

On March 17, 1993, the wellheads of the new vapor-extraction wells were surveyed to a local National Geodetic Vertical Datum benchmark by licensed land surveyor Ron Archer Civil Engineer, Inc. of Pleasanton, California. The results of this survey are included in Appendix D.

Vapor Extraction Test

RESNA performed a one day onsite VET on February 18, 1993 to collect site specific data and evaluate the feasibility of using vapor-extraction as a soil remediation alternative. The VET had three main objectives: (1) to evaluate what air flow rates can be extracted from the vapor extraction wells; (2) to evaluate hydrocarbon concentrations of the extracted vapors; and (3) to estimate an effective radius of influence for the vapor-extraction wells for future engineering design, if applicable.

VET Protocol and Equipment

The vapor-extraction equipment consisted of a six-cylinder internal combustion (I.C.) engine with a motor-driven vacuum blower, and instrumentation for measuring air velocity, air pressure, and organic vapor concentrations. The vapor extraction wells were connected to the I.C. engine using polyvinyl chloride (PVC) piping, fittings, and wellhead connections.

Air flow rates were measured from each wellhead using a pilot tube velocity-meter installed within the 2-inch PVC pipe manifold which connected the wellhead to the I.C. engine. Applied vacuum at the wellhead was measured using a magnehelic pressure gauge placed within the manifold piping. 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. Induced vacuum was measured from observation wells using magnehelic pressure gauges capable of reading differential pressures as low as 0.01 inches water column (WC). RESNA performed the VET in accordance with Bay Area Air Quality Management District (BAAQMD) guidelines.

Vapor Extraction Testing

Three vapor-extraction wells, VW-1 through VW-3, were monitored during the VET. The location of these wells, as well as other pertinent site features, are shown on Plate 2. The I.C. engine and blower were used to apply a vacuum to the wells and induce air flow

through the soils. Extracted hydrocarbon vapors were abated through the I.C. engine by combustion and additional treatment through a catalytic converter.

The VET was conducted in two phases. Two short-term tests (20 minutes) were first performed using vapor wells VW-2 and VW-3 separately as extraction wells to collect representative influent vapor samples. A longer-term test (60 minutes) was then performed on well VW-1 to collect radius of influence data. The tests were performed in the following order: VW-3, VW-2, and VW-1.

Vapor Extraction Well Bailing

Prior to the VET, groundwater was observed in vapor wells VW-1, VW-2, and VW-3. Using a hand bailer, the majority of this water was removed to within approximately 6 inches of the bottom of each well. Final DTW levels were measured at the end of the VET to evaluate the minimum length of exposed screen in each well during the VET. Exposed well screen intervals are presented in Table 2, Vapor Extraction Test Field Monitoring Data.

Short-Term VET Testing

For the short-term tests, the I.C. engine was separately connected to vapor extraction wells VW-2 and VW-3. The engine was operated on each well for at least 20 minutes at the highest flow rate sustainable. Wellhead air velocity, applied vacuum, percent oxygen content and organic vapor concentrations were measured after 20 minutes. Vapor samples were then collected after 20 minutes from a sample port on the influent side of the I.C. engine. Throughout the 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 wells were subjected to various applied vacuums and air flow rates to evaluate air flow/vacuum characteristics.

Long-Term VET Testing

A long-term VET was performed on well VW-1 to collect vacuum influence data used to estimate a radius of influence for the wells. The I.C. engine was operated on vapor well VW-1 for 60 minutes. Induced vacuum was measured from observation wells VW-2 and VW-3 located 40 and 50 feet, respectively, from VW-1. The existing monitoring wells could not be used as observation points due to a lack of exposed well screen. Wellhead air velocity, applied vacuum, percent oxygen content and organic vapor concentrations were measured after 60 minutes. Air samples were collected from well VW-1 after 20 and 60 minutes of operation.

Air Sampling

Air samples were 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 was used to minimize sample loss through adsorption and the possibility of distorted results from sample line contaminated by a previous test run. The samples were sealed in the bags and labeled with the sample number, date, time, and sampler's name. The samples were immediately stored in a cool place for transport to a State Certified analytical laboratory under Chain of Custody documentation.

Pumping and Recovery Test

Purpose and Scope

RESNA conducted a series of constant-rate pumping tests at the site to evaluate hydrogeologic and well conditions, and to provide baseline information for the possible design and operation of an interim groundwater remediation system. The pumping test program comprised three separate elements designed to provide different types of information.

The first element of the pumping test program consisted of two short-term constant-rate tests using monitoring well MW-13. The tests were used to select the rate for the longer-term constant-rate pumping test, which constituted the second element of the pumping test program. These tests along with the long term test also provided information regarding the well productivity and efficiency.

The second element of the pumping test program consisted of a longer duration test utilizing monitoring well MW-13 as the production well, and wells MW-2, MW-6, MW-8, MW-11 and MW-12 as the observation wells. Data from this test were used to evaluate the hydraulic parameters transmissivity (T) and specific yield (S_y), and to provide information regarding aquifer boundary conditions and anisotropy.

The third element consisted of a period of static groundwater monitoring. These data were used to establish background conditions to aid the evaluation of the significance of water-level changes observed during the pumping tests.

Test Instrumentation and Format

The production well MW-13 was outfitted with a 2-inch submersible pump which was plumbed through a gate valve and flow meter to several 17E Department of Transportation 55-gallon drums on-site. The discharge rate was controlled and recorded manually.

Drawdown in observation wells MW-2, MW-6, MW-8, MW-11 and MW-12 was recorded both manually with a conductivity probe and automatically using a data logger/pressure transducer system. Drawdown in the pumping well (MW-13) was monitored manually only.

The static monitoring component of the test program was performed after the completion of the pumping tests. Static water levels in well MW-8 were monitored periodically over two days. This monitoring was conducted to evaluate short term fluctuations in the shallow aquifer under non-pumping conditions. These data are shown on Plate 1E in Appendix E.

The pumping test program began with two short-duration constant-rate tests at approximately 0.5 and 1.0 gallons per minute (gpm). The pumping duration of these tests was 30 and 20 minutes, respectively. The well was allowed to recover completely between each test. The reciprocal of productivity, specific drawdown (ft/gpm), is plotted versus the pumping rate for the two short-term tests and the longer term test on Plate 2E in Appendix E. This plot is discussed in further detail in the following sections.

The longer term test entailed pumping well MW-13 for approximately 600 minutes while monitoring drawdown in wells MW-2, MW-6, MW-8, MW-11 and MW-12. This test was begun as a 0.6 gpm constant rate test, however, after 88 minutes of pumping it appeared that the well could not sustain this rate and it was lowered to 0.43 gpm. This rate was maintained to approximately 370 minutes whereupon the rate was increased slightly to approximately 0.47 gpm for the remainder of the test. At the end of the pumping period, partial recovery of well MW-13 was monitored. Plots of drawdown versus the log of pumping time (semi-log plot) for wells MW-6, MW-8, MW-12 and MW-13 are shown on Plates 3E through 7E in Appendix E. Water level recovery data for the pumping well (MW-13) are shown on Plate 8E in Appendix E.

Due to the limited drawdown observed in well MW-2, and problems with the monitoring of MW-11, data from these wells has not been included in the test analysis.

Background Water Level Monitoring

The static monitoring component of the test program consisted of manually monitoring well MW-8 at varying intervals over a two day period. This monitoring was performed approximately two weeks after the pumping test. The monitoring data are shown on Plate 1E in Appendix E.

The water elevation in MW-8 varied considerably during the monitoring period indicating non-pumping related head changes could be significant in the interpretation of the test data, at least for this well, which is screened from depths of 10 to 35 feet. Although any static

fluctuations during the test cannot be accounted for quantitatively, possible impacts on the test results are discussed below.

ANALYTICAL METHODS

Soil Samples

The ten soil samples collected from soil borings B-35 through B-37 were submitted under Chain of Custody Record to PACE Incorporated Laboratories (California Hazardous Waste Testing Laboratory Certification No. 1282) in Novato, California. The Chain of Custody Records are attached in Appendix F. The soil samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency (EPA) Methods 5030/8020M, total petroleum hydrocarbons as gasoline (TPHg) using EPA Methods 5030/8015M, and total petroleum hydrocarbons as diesel (TPHd) using EPA Methods 3550/8015. Additionally, a selected soil sample from B-35 was analyzed for total oil and grease (TOG) using Standard Method 5520. The soil samples selected for laboratory analysis were based on :

- location above first-encountered groundwater;
- areas where the presence of gasoline and diesel hydrocarbons were suspected; and
- 5-foot intervals and/or changes in stratigraphic units as recommended by ACDEHS for definition of gasoline and diesel hydrocarbons in soil.

Soil Stockpile Samples

The four samples collected from the drill cutting stockpile were submitted under Chain of Custody Record to PACE Incorporated Laboratories in Novato, California. The soil samples were composited and analyzed for the gasoline constituents BTEX and TPHg using modified Environmental Protection Agency (EPA) Methods 5030/8015/8020, and TPHd using EPA Methods 3550/8015. The Chain of Custody Record is attached in Appendix F.

Water Samples

Groundwater samples collected from monitoring wells MW-1, MW-7, MW-9, MW-10, MW-11, and MW-14 were analyzed for gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPHg) using modified Environmental Protection Agency (EPA) Methods 5030/8015/8020, and for total petroleum hydrocarbons as diesel (TPHd) using modified EPA Methods 3510/8015. Groundwater samples were analyzed by PACE Incorporated Laboratories in Novato, California. The Chain of Custody Record is attached in Appendix F.

Vapor Samples

Vapor samples obtained from vapor extraction wells VW-1, VW-2, and VW-3 were analyzed for TPHg and BTEX using EPA Methods 8020M/8015M. The vapor samples were submitted under Chain of Custody Record and analyzed by PACE Incorporated Laboratories in Novato, California. The Chain of Custody Record is attached in Appendix F.

FIELD AND LABORATORY RESULTS

Field Results

Floating Product Recovery System

The free product was reduced to 0.23 feet thickness on February 10, 1992 and to a sheen on March 13, 1992. The total amount of removed free product since February 10, 1993 was 6.29 gallons.

Groundwater Gradient Evaluation

RESNA calculated groundwater elevations for each well by subtracting the measured DTW, including corrections for product thickness when necessary, from the elevation of the

wellhead. The measured DTW levels, product thickness, wellhead elevations, and groundwater elevations for this and previous monitorings at the site are summarized in Table 1, Cumulative Groundwater Monitoring Data. Based on the January 27, February 18, and March 10, 1993, groundwater elevation data, the interpreted local groundwater gradients were interpreted to be 0.016, 0.019, and 0.018, respectively, toward the southwest. RESNA's interpretation of the local groundwater gradients for this quarter are shown on Plates 10 through 12, Groundwater Gradient Map. These groundwater gradients and flow direction are generally consistent with those previously interpreted.

Vapor Extraction Test Field Results

Depth to Water Measurements

Prior to the VET, depth to water was measured in the majority of on-site monitoring wells and vapor extraction wells to evaluate the extent of exposed well screen above the potentiometric water surface, if applicable. Depth to water measurements and well screen intervals are summarized in Table 1. None of the existing groundwater monitoring wells contained available exposed well screen for airflow and, as a result, none of the wells could be used as observation points for the VET. Water was also encountered in all three vapor extraction wells at depths of approximately 5.5 to 6.5 feet. As a result, the length of exposed well screen in these wells was reduced to approximately 0.5 to 2 feet, between the general depths of 4 to 6 feet below grade.

VET Air Flow Rate Measurements

Applied well vacuum and air flow rate data collected during the VET is summarized in Table 2, Vapor Extraction Test Field Monitoring Data. Utilizing the I.C. engine vacuum, air flow rates ranging from 43 to 51 standard cubic feet per minute (SCFM) could be extracted from wells VW-1, VW-2, and VW-3 at applied vacuums of approximately 100 inches water column (WC).

VET Radius of Influence Measurements

Induced vacuum data collected during the VET is summarized in Table 2, Vapor Extraction Test Field Monitoring Data. For extraction well vacuums of approximately 100 inches WC, no significant vacuum response was observed at observation wells located 24 to 50 feet away. A high residual induced vacuum (>0.25 inches WC) was noted in vapor well VW-3 following the short-term testing on this well. This residual vacuum was still observed 20 - 30 minutes after the applied vacuum was removed. However, when the magnehelic gauge was replaced with a different gauge, a vacuum reading of less than 0.01 inches WC was observed. As a result, these residual vacuum readings may be suspect.

Pumping and Recovery Test Results

Short-Duration Test

The specific drawdown s/Q (feet of drawdown/gpm) after 20 minutes of pumping is plotted versus the pumping rate (gpm) for the 0.5 and 1.0 gpm short-term tests and the longer-term test on Plate 2E in Appendix E.

The data plotted on Plate 2E in Appendix E were used to evaluate the well performance. The drawdown in a pumped well consists of two components, the aquifer losses and the well losses. The aquifer losses are generally related to laminar flow conditions and vary linearly with the pumping rate. The well losses include head loss which varies both linearly and non-linearly with well discharge rate. The linear well losses are generally related to disturbance of aquifer material during drilling and well development. The non-linear (non-darcy) well losses are related to turbulent flow within the well screen, the discharge pipe, and the formation. These two components can be characterized by the following equation:

$$s = AQ + BQ^P \quad \text{(Equation 1)}$$

where:

- AQ = linear head loss,
- BQ = non-linear head loss,
- s = drawdown at a given time,
- Q = discharge rate,

P = a discharge rate dependent value between 1.5 and 3.5, and A and B are constants

A value of 2 for P is commonly accepted in this equation (Ramey, 1982), which yields the equation:

$$s = AQ + BQ^2 \quad \text{(Equation 2)}$$

or dividing by Q

$$s/Q = A + BQ$$

The latter equation represents a straight line on an s/Q versus Q plot (Figure 2 in Appendix E). Using the approach of Jacob (1947), the data indicate a moderately significant non-darcy (non-linear) component of the drawdown. Near wellbore losses are also indicated by the rapid early time buildup on the pumping well recovery plot (Plate 8E in Appendix E).

The least squares best fit line shown on Plate 2E in Appendix E yields the following relationship between drawdown and pumping rate at a test time of 20 minutes:

$$s = 3.8\,Q + 0.88\,Q^2$$

The value for the coefficient of the well loss term of this equation indicates well losses due to turbulent flow are not insignificant. At 45 minutes in the 1 gpm test, the Q^2 term accounts for approximately 19% of the total drawdown. However, the turbulent flow loss calculated using a long term sustainable pumping rate from this well of 0.1 and 0.2 gpm represents less than 4% of the total drawdown. This estimated turbulent flow loss is fairly good considering that low well efficiencies are common in unconfined aquifers when drawdown encompasses a large portion of the saturated screen thickness. The turbulent flow loss is due to the partial penetration effect which induces steep vertical flow gradients in the vicinity of the well screen.

Long-Duration Constant Rate Test

As mentioned previously, the longer term test was intended to be run at a constant rate of 0.6 gpm, however, excessive drawdown resulted in a lowering of the pumping rate to approximately 0.43 gpm after 88 minutes. This lower rate was maintained until 370 minutes when it was increased to approximately 0.47 gpm (the average pumping rate up to that time) for the remainder of the test. The average pumping for the entire test was 0.47 gpm.

Well drawdown versus the log of time plots (semi-log plots) were prepared for wells MW-13, MW-6, MW-8 and MW-12 (Plates 3E through 7E in Appendix E). A heavy rain was falling during the test period which resulted in flooding of the wellbox around well MW-11 and a 1.7 foot rise in the water elevation at approximately 220 minutes pumping time. This necessitated removing the transducer and capping the well. At the time of capping no drawdown had occurred in MW-11, therefore it has not been included in the analysis. The flooding of MW-11 did appear to have an effect on well MW-8, which is located approximately 40 feet away. Well MW-8 recovered approximately 0.06 feet of drawdown beginning abruptly at 220 minutes and then quickly resumed a drawdown trend (Plate 4E in Appendix E). Because of this interruption in the drawdown of MW-8, the early (before 220 minutes) and late (after approximately 400 minutes) semi-log straight line portions of the plot have been analyzed separately (Plates 4E and 5E in Appendix E). Well MW-12 (situated approximately 60 feet from MW-11) also appeared to respond to the short term recharge, however, the fluctuation was only about 0.02 feet (Plate 7E in Appendix E). Well MW-6 did not appear to be affected (Plate 6E in Appendix E).

Because the drawdown in pumping well MW-13 exceeded 20% of the saturated screen interval the correction of Jacob (1946) was applied. The corrected drawdown is calculated as follows:

$$s_c = s - s^2/2D \text{ , where}$$

s	=	observed drawdown
D	=	saturated screen thickness

Only the corrected drawdown data are shown on the semi-log plot for MW-13 (Plate 3E in Appendix E).

In tests where the specific capacity of the well (gallons per minutes per foot of drawdown) is low in relation to the casing size, a portion of the test can be expected to be affected by well bore storage. The time when the casing storage effects become negligible in well MW-13 (t_c) was calculated using the methods of Schafer (1978) and Driscoll (1988). The Schafer method yielded a t_c of 1 minute. Using a modified version of the Papadopulas-Cooper Method (Driscoll, 1988), a t_c of 3 minutes was calculated; however, this approach assumes a 100% well efficiency. These estimates indicate data from the initial 1 to 3 minutes of the test probably cannot be interpreted in terms of radial flow within the aquifer. During the initial portion of the test much of the pumped water was derived from the well casing. Only after the water level has been lowered significantly does the aquifer begin producing. Various factors contribute to the occurrence of this effect, including permeability of the formation, the degree of well development and the relationship of casing diameter, pump column diameter, and pumping rate (Driscoll, 1988).

As the proportion of production derived from casing storage declines after the first several minutes of pumping the semi-log straight line segment representative of the formation can be expected to appear. Transmissivity (T) and storage coefficient (S) values were calculated from this data using the method of Cooper and Jacob (1946) utilizing AQTESOLV software (Geraghty & Miller, 1989). AQTESOLV was also used to analyze the MW-13 recovery data using the Theis method (1935).

Semi-log plots of drawdown versus time are shown for wells MW-13, MW-6, MW-8 (early slope), MW-8 (later time slope), and MW-12 on Plates 3E - 7E in Appendix E. The Theis recovery plot is shown on Plate 8E in Appendix E. Also a semi-log plot of the drawdown after 600 minutes pumping time in wells MW-2, MW-6, MW-8 and MW-12 versus their respective distances from the pumping well (MW-13) is shown on Plate 9E in Appendix E.

The fitted straight line on the semi-log plots from which aquifer parameters were calculated is shown on each of the plates.

The semi-log plot for pumping well MW-13 (Plate 3E in Appendix E) shows five distinct segments. A steep early time slope occurs up to approximately 90 minutes which reflects drawdown at the 0.6 gpm rate. From approximately 90 to 200 minutes the well recovers as it adjusts to a reduction in pumping rate to 0.43 gpm. From approximately 200 to 360 minutes a flatter slope segment occurs followed by a short steepening as the rate is increased to 0.47 gpm. After about 400 minutes a steeper straight slope segment persists to the end of the test. Because of these rate changes and their affect on the semi-log plot the occurrence of any delayed yield could not be evaluated.

Table 3 shows the transmissivity and unconfined storativity values calculated from each of the semi-log plots. The calculated transmissivity values from the observation well data range from 0.05 to 0.19 ft^2/min. and probably differ due to actual variations within the water-bearing zone. This would be expected because wells MW-6 and MW-8 were constructed with longer screened intervals (10 to 35 feet of screen) than wells MW-12 and MW-13 (5 to 15 feet of screen). Additionally, well logs from the site show significant formation heterogeneity. It should be noted that some groundwater recharge may have been occurring during the pumping tests, possibly related to ongoing precipitation. Recharge appears likely because the initial water levels in all of the wells had risen after the recovery from the short term pulse tests and before the beginning of the longer term test. Alternatively, this rise in water elevations may be related to a shorter term fluctuation such as was observed during the static monitoring (Plate 1E in Appendix E). This type of effect may include tidal influence, given the proximity of the bay and tidal channel. If a rising water level trend was occurring it would tend to lower the slope of the semi-log drawdown lines shown on Plates 3E through 7E in Appendix E, resulting in calculated transmissivities which are greater than actual.

It should also be noted that the T value calculated from the pumping well data (Plate 3E in Appendix E) is not representative due to partial penetration effects. Similarly, the T value calculated from the Theis recovery plot (Plate 8E in Appendix E) is probably not

representative due to the limited amount of recovery data (42 minutes). This is indicated by the impossible storativity value of 10.24 (1024%) calculated from the plot. The storativity values shown on Table 1E calculated from the drawdown plots vary to a degree similar to the T values and are in a range (0.003 to 0.01) generally characteristic of unconfined aquifers.

The average transmissivity calculated from the data shown on Table 3 equates to an average hydraulic conductivity (K) of approximately 0.011 ft^2/min, assuming a saturated thickness of 10 feet. This value is most typical of clean sands and not of silty/clayey materials, which comprises most of the section logged in the well borings. If it is taken into account that much of the 10 to 12 foot saturated zone logged in the site borings was comprised of clays or clayey sands it indicates specific zones of even higher permeability. This suggests that flow in the water bearing zone is largely controlled by the relatively thin zone of higher permeability gravels which were noted in a number of the wells between depths of 10 and 15 feet.

Zone of Capture

A preliminary estimate of the steady state downgradient limit of an extraction well capture zone can be made using the following equation:

$r_c = Q/2\pi Ti$, where:

r_c = limit of capture zone downgradient of a pumping test well (point where pumping induced groundwater velocity equals the natural velocity),

Q = pumping rate

T = average transmissivity

i = average groundwater gradient magnitude

For an extraction rate of 0.2 gpm from well MW-13 average values of T based on data collected during the pumping test (0.11 ft^2/min) and the gradient measured in September 1992 (0.04):

r_o = 1.0 feet vertical thickness

The width of this zone of capture would be approximately 6 feet.

These capture zone calculations should be considered approximate and preliminary given the formation heterogeneity and the irregular gradient configuration at the site. Water level contours at the site presented in the third quarter monitoring report showed a broad high in the central portion of the site with steep gradients toward both High Street and Coliseum Way. This water table configuration suggests unusual discharge or recharge affects, possibly due to water or sewer lines in the area.

Laboratory Results

Soil Analyses

Results of laboratory analyses of soil samples are summarized in Cumulative Results of Laboratory Analysis of Soil Samples (Table 4). Copies of laboratory reports and Chain of Custody documents for soil samples obtained during this investigation are included in Appendix F.

Laboratory analysis of soil samples collected from borings B-35 through B-37 indicated:

- BTEX were detected in samples collected from depths of 3-½ to 9 feet deep in boring B-35 at concentrations ranging from nondetectable (<0.005 ppm) to 89 ppm, TPHg was detected in samples collected from depths of 6-½ to 9 feet in this boring at concentrations ranging from 120 ppm to 950 ppm, and TPHd was detected in

samples collected from depths of 6.5 to 9 feet deep in this boring at concentrations ranging from 6.3 ppm to 30 ppm.

- BTEX were detected in samples collected from depths of 4 to 9 feet deep in boring B-36 at concentrations ranging from nondetectable (<0.005 ppm) to 5.2 ppm, TPHg was detected in samples collected from depths of 4 and 9-½ feet in this boring at concentrations of 1.7 ppm and 160 ppm, respectively, and TPHd was not detected in samples collected from depths of 4 to 9 feet in this boring.

- BTEX were detected in samples collected from depths of 4 to 7-½ feet deep in boring B-37 at concentrations ranging from 0.750 ppm to 21 ppm, TPHg was detected in samples collected from depths of 4 to 7-½ feet in this boring at concentrations of 92 and 220 ppm, and TPHd was detected in samples collected from depths of 4 to 7-½ feet in this boring at concentrations ranging from 5.8 to 21 ppm.

- TOG was detected in the soil sample collected from 7-½ feet deep in boring B-35 at a concentration of 460 ppm.

Soil Stockpile Analyses

Laboratory analysis of the composited soil sample from the stockpile indicated concentrations of BTEX ranging from nondetectable (<0.005 ppm) ppm to 0.0057 ppm, concentrations of TPHg ranging from nondetectable (<1 ppm) to 2.9 ppm, and concentrations of TPHd ranging from 8.3 ppm to 130 ppm.

Water Analyses

Results of laboratory analyses of groundwater samples are summarized in Table 5, Cumulative Results of Laboratory Analyses of Groundwater Samples. Copies of laboratory reports and Chain of Custody documents for water samples obtained during this investigation are included in Appendix F. Graphic distributions of TPHg, TPHd, and

benzene concentrations in the local groundwater for the First Quarter 1993 monitoring are shown on Plate 13, TPHg/TPHd/Benzene Concentrations in Groundwater.

First quarter 1993 analytical results of water samples from monitoring wells MW-1, MW-7, MW-9, MW-10, MW-11, and MW-14 indicate that:

- TPHg and BTEX concentrations were nondetectable in wells MW-1, MW-9, MW-10, and MW-11;
- TPHg was detected at concentrations of 3.5 parts per million (ppm) in well MW-7 and 0.410 ppm in well MW-14;
- TPHd was detected at concentrations of 0.14 ppm in well MW-1, 0.24 ppm in well MW-11, 0.64 ppm in well MW-7, and was nondetectable in wells MW-9, MW-10, and MW-14;
- benzene was detected at a concentrations of 0.160 ppm in well MW-7, which is greater than the California Department of Health Services (DHS) Maximum Contaminant Level (MCL) of 0.001 ppm benzene in drinking water;
- toluene, ethylbenzene, and total xylenes were detected in well MW-7 (according to modified EPA method 5030/8020) at concentrations of 0.0062 ppm, 0.022 ppm, and 0.019 ppm, respectively, which are less than the DHS Drinking Water Action Level (DWAL) of 0.100 ppm toluene, and MCLs of 0.680 ppm ethylbenzene and 1.750 ppm total xylenes in drinking water;

Additional laboratory analyses for metals, inorganics, organics in groundwater from MW-7 indicate:

- volatile organic compounds were all nondetectable except BTEX and 0.27 ppm naphthalene;
- iron, manganese, and arsenic concentrations were detected at 1.6 ppm, 1.4 ppm, and 0.016 ppm, respectively. The reported concentrations of iron and manganese are greater than the MCLs of 0.3 ppm iron and 0.05 ppm manganese;

- o pH was 7.0 which is within acceptable limits;
- o total dissolved solids were detected at a concentration of 400 ppm which is less than the MCL of 500 ppm;
- o the hardness value is 260 ppm as $CaCO_3$ which is considered to be hard water. In general, water with this hardness would not be used as a drinking water source (Clark, 1977).

Vapor Analyses

Laboratory results for the air samples collected during the VET are summarized in Table 6, Results of Laboratory Analyses of Vapor Samples. Based upon analytical results, the wellhead air samples contained reported TPHg concentrations ranging from less than 50 (nondetectable) to 4,200 milligrams per cubic meter (mg/m^3), and benzene concentrations ranging from less than 0.5 (nondetectable) to 210 mg/m^3. Individual laboratory reports and chain of custody records are contained in Appendix F.

DISCUSSION OF VAPOR EXTRACTION TEST

71 ppm = $\frac{mg/m^3 \ (24.5)}{MV = 72}$

TWA = 10

VET Air Flow Rate Results

Relatively high applied vacuums (50 to 100 inches WC) were required at wells VW-1 through VW-3 to generate air flow rates ranging from 19 to 51 SCFM (see Table 2). For vapor wells VW-2 and VW-3, air flow was induced only after an applied vacuum of 80 inches WC was applied to the wellhead. The large amount of applied vacuum may reflect the low permeability of the soils beneath the site.

Percent oxygen measurements of the extracted vapor stream were equivalent to atmospheric conditions (21%). Considering this high oxygen content and the relatively short operation time for each well, these results suggest that air may be short-circuiting from the surface or more permeable zones (man-made fill or naturally occurring).

Radius of Influence Results

No significant induced vacuum response was observed at the observation wells during both the short-term and long-term testing. Since induced vacuum is generally considered a

secondary indicator of subsurface air flow, the effective radius of influence for the vapor wells cannot be evaluated. Considering that the vapor wells were typically completed within silty clayey soils, and that the presence of relatively high groundwater levels has reduced the length of available well screen, it is likely the effective radius of influence in these soils would be small.

VET Hydrocarbon Removal Rate Estimates

Initial hydrocarbon removal rates were estimated from well-head flow rate and vapor concentration data obtained during the VET. Based upon vapor-phase TPHg concentrations of less than 50 to 4,200 mg/m^3, and corresponding well-head air flow rates of 43 to 51 SCFM, initial TPHg removal rates from wells VW-1, VW-2, and VW-3 were projected to range from less than 0.2 to 16 pounds per day (roughly 0.03 to 2.6 gallons per day, respectively). These initial removal rates typically decrease rapidly with time, depending on site-specific conditions.

DISCUSSION AND CONCLUSIONS

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

Soil Investigation

- Concentrations of TPHg in subsurface soil greater than 100 ppm were encountered at depths between 3 and 5 feet along the southwestern property boundary, as shown on Plate 14. At depths between 7-1/2 and 10 feet, concentrations of TPHg in subsurface soil greater than 100 ppm were encountered along the southwestern property boundary, in the southwestern corner of the property, near the former onsite used-oil tank, and at the northeastern property boundary adjacent to the former excavation at Ed's Auto Parts, as shown on Plate 15.

- Concentrations of TPHd greater than 100 ppm were encountered at depths between 3 to 5 feet in the southwestern portion of the property, south of the former main dispenser island, as shown on Plate 16. At depths between 7-1/2 and 10 feet, TPHd concentrations greater than 100 ppm were encountered in the southwestern corner of the property, adjacent to the former used-oil UST, and at the northern property line adjacent to the former UST excavation at Ed's Auto Parts, as shown on Plate 17.

Groundwater Investigation

- Groundwater is encountered at the site at an average depth of 4 to 6 feet below grade. The direction of the groundwater flow is towards the southwest with a gradient of approximately 0.02. The western portion of the site is suspected to be underlain by groundwater that is unconfined; whereas in other parts of the site, the groundwater is believed to be semi-confined or confined (Applied GeoSystems, October 10, 1991). The highest concentrations of dissolved TPHg and TPHd were detected in groundwater in the western part of the site. Free-phase petroleum hydrocarbons appear to be limited to the southwestern and western porions of the property (Plate 13). Gasoline or diesel hydrocarbons were not detected in the groundwater at the northern and eastern site perimeters.

- The lateral extent of gasoline and diesel hydrocarbons in the first encountered groundwater appears to be delineated to 0.05 ppm TPHg, 0.05 ppm TPHd, and 0.0005 ppm benzene in the northern and eastern corners of the site.

- The lateral extent of gasoline and diesel hydrocarbons in the first encountered groundwater has not been delineated in the southern, southeastern, southwestern (downgradient), and northeastern (upgradient) portions of the site. The distribution of the TPHg and TPHd concentrations in groundwater suggest that gasoline and diesel hydrocarbons have migrated to the southern and southwestern site boundaries.

- The highest concentrations of gasoline and diesel hydrocarbons detected in the first encountered groundwater appears to be adjacent to the former underground storage tanks (USTs) in the southern portion of the site, and downgradient of the northern service islands in the western portion of the site.

- The presence of TPHg in monitoring well MW-14 (located upgradient of the former USTs) suggests a possible offsite source for gasoline and diesel hydrocarbons at the site.

- Additional laboratory analyses for secondary drinking water standards on groundwater samples from MW-7 may indicate that the first encountered groundwater is not a potential drinking water source.

Vapor Extraction Test

- Vapor extraction appears to be a technically feasible method for remediating gasoline hydrocarbons from on-site soils, however, the effectiveness of the vapor extraction process appears to be limited by the following:

  (1) The existing vapor-extraction wells could only be screened within the upper silty clayey soils, due to the presence of a semi-confined or confined water-bearing zone within the more permeable clayey sand and clayey gravels located below. As a result, air must flow through the less permeable soils, resulting in relatively high applied vacuums ranging from 80 to 100 inches WC.

  (2) The presence of groundwater in the vapor extraction wells has reduced available well screen lengths to ½ to 2.0 feet, between the depths of 4 and 6 feet. This reduced screened interval may limit the depth of the subsurface flow lines and increase the potential for air to short-circuit to the surface.

  (3) The calculated initial hydrocarbon removal rates from vapor wells VW-1 and VW-2 were minimal, and the initial hydrocarbon removal rate from vapor well VW-3 was only 16 pounds per day. Considering that vapor-phase concentrations typically decrease rapidly with time (depending on site-specific conditions), it appears that hydrocarbon removal rates would decrease even further over time.

  (4) The effective radius of influence for the existing wells could not be estimated for the vapor extraction wells since no significant induced vacuum responses were measured at observation wells located 24 to 40 feet from the extraction well. It is estimated that the effective radius of influence from the wells will likely be small, based upon soil type, the presence of groundwater in the wells, and the proximity of exposed well screen to the surface and other artificial fill areas.

Pumping Test

- The water-bearing zone beneath the site between depths of approximately 5 and 30 feet below grade appears to be heterogeneous, anisotropic, and unconfined.

- The average estimated transmissivity of this zone is approximately 0.11 ft^2/min and the average unconfined storativity is approximately 0.008.

- Groundwater flow in the shallow water-bearing zone appears to be occurring largely within thin higher permeability strata, probably in gravels noted between depths of 10 and 15 feet in several of the wells.

- The pumping well showed low non-linear flow losses at an estimated sustainable pumping rate between 0.1 and 0.2 gpm.

- For a maximum estimated sustainable pumping rate between 0.1 and 0.2 gpm, the limit of a hypothetical steady state capture zone downgradient of the pumping well is approximately 1 foot. However, this calculation should be considered approximate and preliminary due to the formation heterogeneity and as indicated by irregular groundwater gradient configuration at the site.

- The relatively low estimated long term sustainable pumping rate for well MW-13 appears to indicate that the water bearing zone would not meet the average, sustained yield of 200 gallons per day definition for a beneficial source of drinking water (California Regional Water Quality Control Board, October 22, 1992).

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 with respect to gasoline and diesel-related hydrocarbons previously detected at the site. Evaluation of the soil for used-oil related hydrocarbons was not part of this investigation. No soil engineering or geotechnical references are implied or should be inferred. Evaluation of the geologic conditions at 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 Exxon Company, U.S.A. and any reliance on this report by third parties shall be at such party's sole risk.

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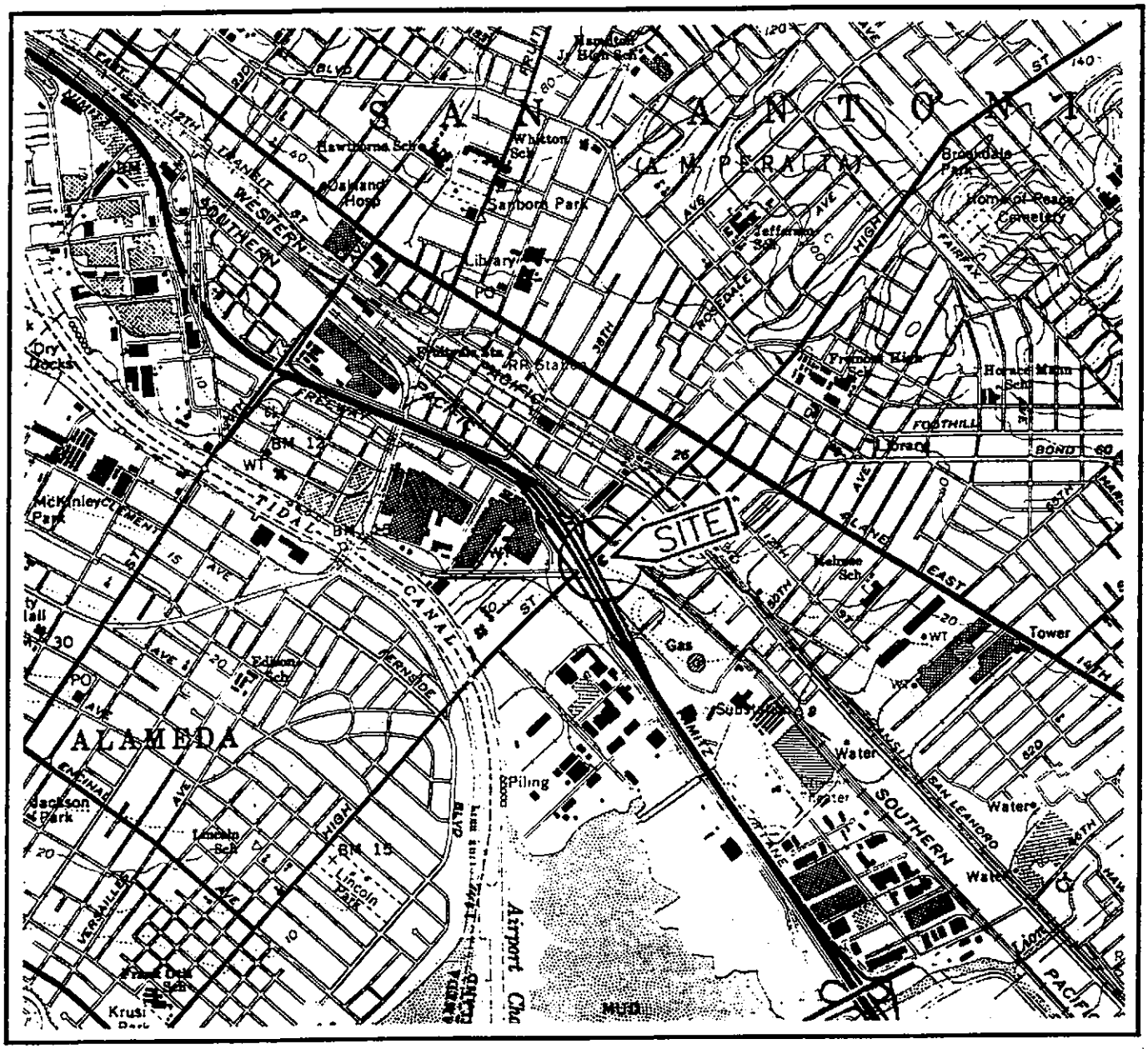


Base: U.S. Geological Survey
7.5–Minute Quadrangles
Oakland East, California.
Photorevised 1980

N

LEGEND

◉ = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

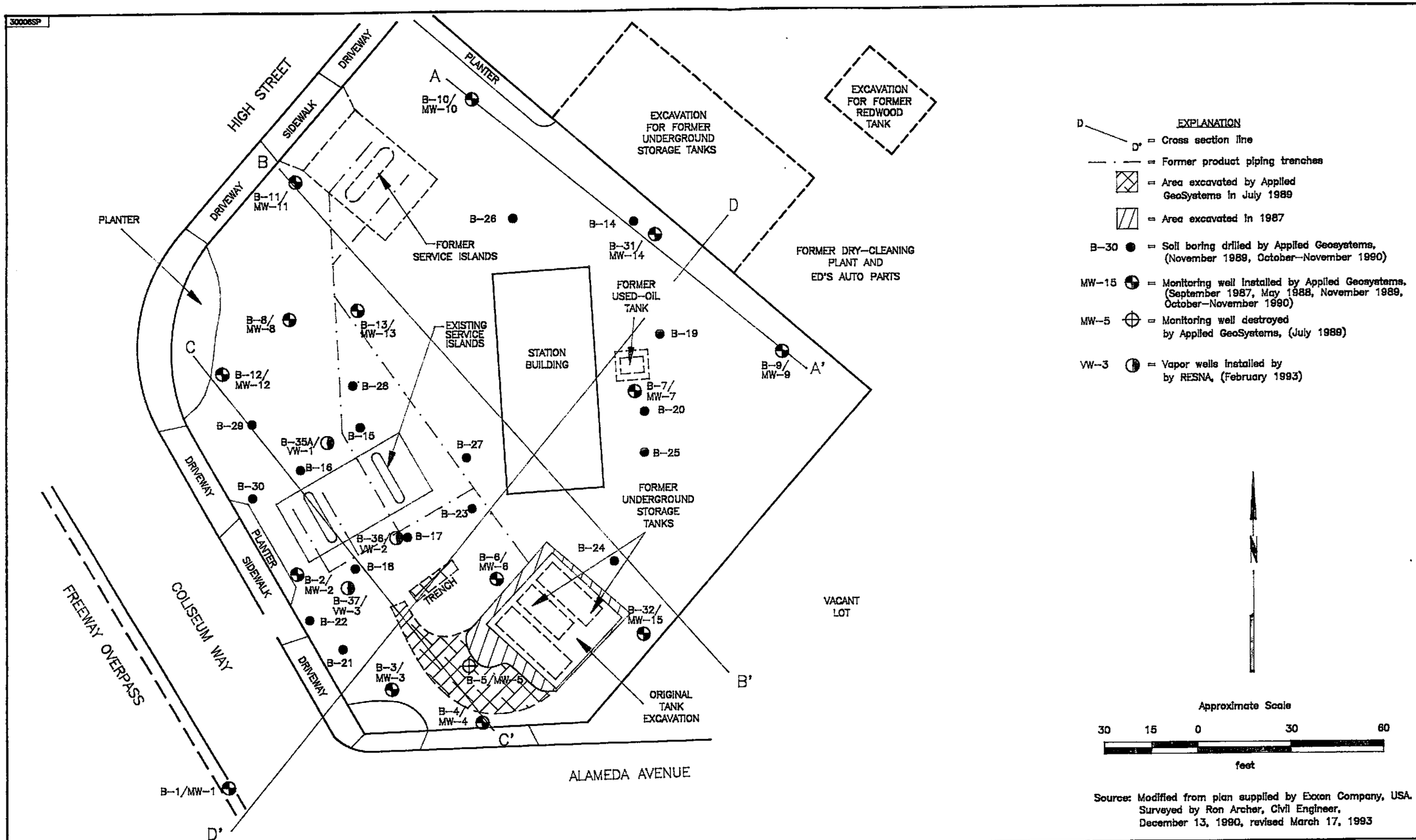
RESNA
Working to Restore Nature

PROJECT 130006.02

SITE VICINITY MAP
Former Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
1

30006SP



EXPLANATION

- D — D' = Cross section line
- = Former product piping trenches
- = Area excavated by Applied GeoSystems in July 1989
- = Area excavated in 1987
- B-30 = Soil boring drilled by Applied Geosystems, (November 1989, October–November 1990)
- MW-15 = Monitoring well installed by Applied Geosystems, (September 1987, May 1988, November 1989, October–November 1990)
- MW-5 = Monitoring well destroyed by Applied GeoSystems, (July 1989)
- VW-3 = Vapor wells installed by by RESNA, (February 1993)

N

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by Exxon Company, USA. Surveyed by Ron Archer, Civil Engineer, December 13, 1990, revised March 17, 1993

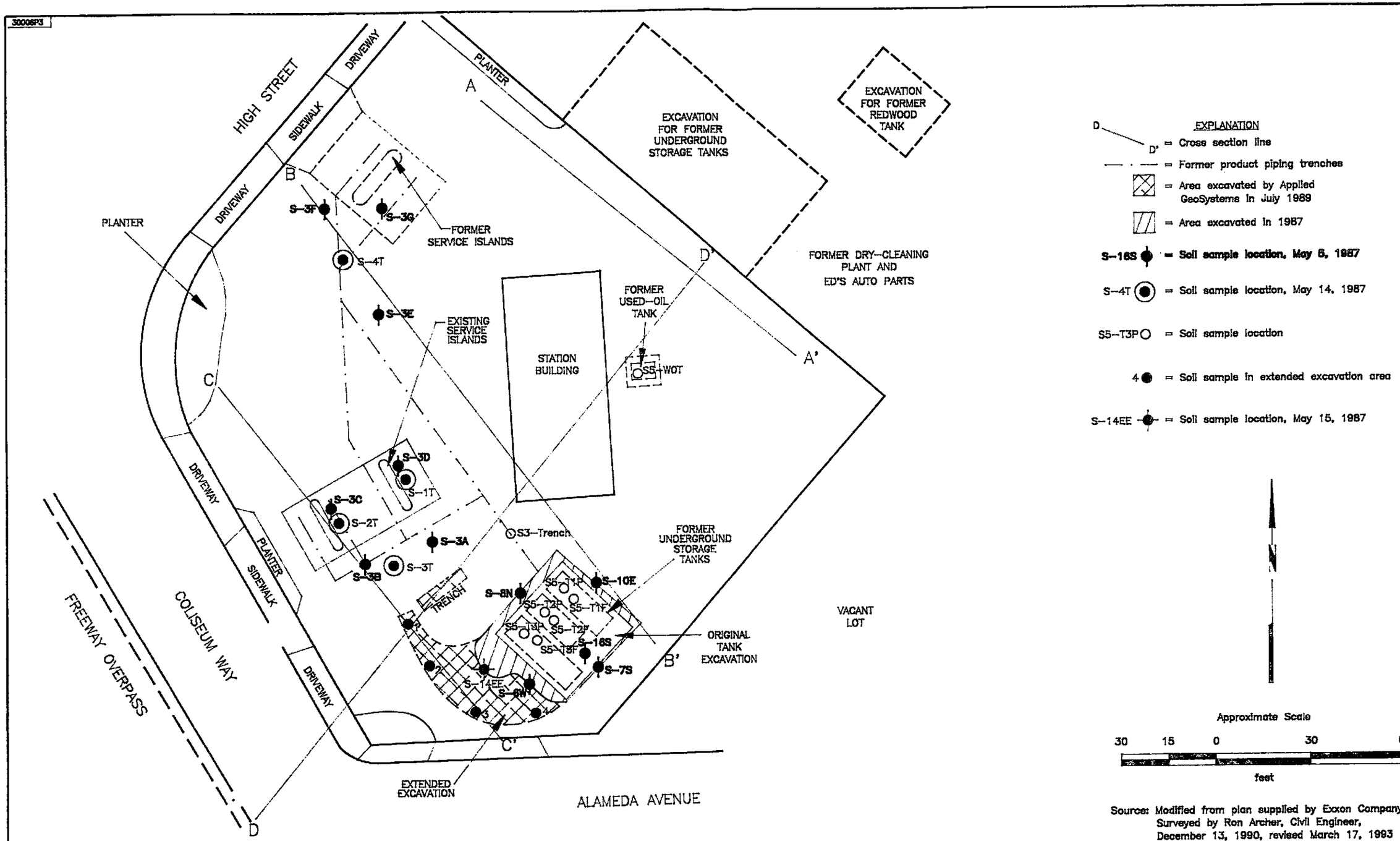
RESNA
Working to Restore Nature

PROJECT NO. 130006.02

GENERALIZED SITE PLAN
Former Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
2

30006P3



EXPLANATION

D — D' = Cross section line

= Former product piping trenches

= Area excavated by Applied GeoSystems in July 1989

= Area excavated in 1987

S-16S = **Soil sample location, May 5, 1987**

S-4T = Soil sample location, May 14, 1987

S5-T3P = Soil sample location

4 = Soil sample in extended excavation area

S-14EE = Soil sample location, May 15, 1987

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by Exxon Company, USA. Surveyed by Ron Archer, Civil Engineer, December 13, 1990, revised March 17, 1993

RESNA
Working to Restore Nature

PROJECT NO. 130006.02

GENERALIZED SITE PLAN-EXCAVATION SOIL SAMPLE LOCATIONS
Former Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
3

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 Clayey 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, Gravel-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

N.T. Not tested using 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.

DASHED 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.

RESNA
Working to Restore Nature

PROJECT **130006.02**

UNIFIED SOIL CLASSIFICATION SYSTEM AND SYMBOL KEY
Former Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
4

Depth of boring: 9 1/2 feet Diameter of boring: 8 inches Date drilled: 2/11/93

Well depth: N/A Material type: N/A Casing diameter: N/A

Screen interval: N/A Slot size: N/A

Drilling Company: Exploration GeoServices Driller: John Collins

Method Used: Hollow-Stem Auger Field Geologist: J. Buckthal

Signature of Registered Professional:

Registration No.: CEG 1483 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
					Asphalt	
0					Asphalt (2 inches)	
				SW	Gravelly sand, fine- to coarse-grained sand, fine gravel, orange brown, moist, dense; fill.	
2				CL	Silty clay trace sand and gravel, black, moist, low plasticity, stiff; fine- to coarse-grained sand, fine gravel.	
				SC	Clayey sand, fine- to coarse-grained sand, brown, wet, dense; possible perched zone.	
4	S-3.5	7 21 27	292			
		18 29 34	254	CL	Silty clay, orange brown, moist, low plasticity, very stiff; hydrocarbon odor dark brown, damp	
6	S-6.5	21 23	OR	CL	orange brown with green-blue mottling, moist, hard; strong hydrocarbon odor	
	S-7.5	30 22				
8		31	OR	SW-SC	Sandy clay with gravel, orange brown with green-gray mottling, damp with some wet pockets around gravels; low plasticity, very stiff; strong hydrocarbon odor.	
	S-9	31 50-6"	OR	▽	Gravelly sand, fine- to coarse-grained sand, fine gravel, brown, moist, dense wet.	
10					Total depth = 9 1/2 feet.	
12						
14						
16						
18						
20						

RESNA
Working to Restore Nature

PROJECT: 130006.02

LOG OF BORING B-35
Former Exxon Station 7-3006
720 High Street
Oakland, California

PLATE 5

Depth of boring: 8 feet Diameter of boring: 12 inches Date drilled: 2/11/93

Well depth: 7 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 4 to 7 feet Slot size: 0.10-inch

Drilling Company: Exploration Geoservices Driller: John Collins

Method Used: Hollow-Stem Auger Field Geologist: J. Buckthal

Signature of Registered Professional:

Registration No.: **CEG 1463** State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
	**		**		Asphalt	
0					Asphalt (2 inches).	
				SW	Gravelly sand, fine- to coarse-grained sand, fine gravel, orange brown, moist, dense; fill.	
2				CL	Silty clay, trace sand and gravel, black, moist, low plasticity, stiff; fine- to coarse-grained sand, fine gravel.	
				SC	Clayey sand, fine- to coarse-grained sand, brown, wet, medium stiff; possible perched zone	
4				CL	Silty clay, orange brown, moist, low plasticity, very stiff; hydrocarbon odor.	
6					Dark brown, damp.	
				CL	Orange brown, with green-blue mottling, moist, hard; strong hydrocarbon odor.	
8				SW-SC	Sandy clay with gravel, orange brown, with gray-green mottling, damp with wet pockets around gravels, low plasticity, very stiff; strong hydrocarbon odor.	
					Gravelly sand, fine- to coarse-grained sand, fine gravel, brown, moist, dense.	
10					Total depth = 8 feet.	
12						
14					** = Soil samples were not collected or screened. - See text	
16						
18						
20						

RESNA
Working to Restore Nature

PROJECT: 130006.02

LOG OF BORING B-35A/VW-1
Exxon Service Station 7-3006
720 High Street
Oakland, California

PLATE 6

Depth of boring: 10 feet Diameter of boring: 12 inches Date drilled: 2/11/93

Well depth: 10 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 5 to 10 feet Slot size: 0.10-inch

Drilling Company: Exploration Geoservices Driller: John Collins

Method Used: Hollow-Stem Auger Field Geologist: J. Buckthal

Signature of Registered Professional:

Registration No.: CEG 1463 State: CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt	
					Asphalt (2 inches).	
				GW-GM	Sandy gravel with silt, fine- to coarse-grained gravel, (up to 5" in diameter), fine- to coarse-grained sand, dark orange brown, damp, medium dense; fill.	
2				CL	Silty clay, gray, damp, low plasticity, very stiff; root holes.	
4	S-4	7 13 16		CL		
6	S-7	14 19 27			green-gray, hard; fine root holes.	
8		26 35 31			trace fine gravel.	
	S-9.5	37 40				
10				CL	Gravelly clay, green-gray, moist, low plasticity, hard; bottom of shoe wet; fine to coarse gravel (up to 2" in diameter).	
					Total depth = 10 feet.	
12						
14						
16						
18						
20						

RESNA
Working to Restore Nature

PROJECT: 130006.02

LOG OF BORING B-36/VW-2
Exxon Service Station 7-3006
720 High Street
Oakland, California

PLATE 7

Depth of boring: 8 feet Diameter of boring: 12 inches Date drilled: 2/11/93

Well depth: 8 feet Material type: Sch 40 PVC Casing diameter: 4 inches

Screen interval: 5 to 8 feet Slot size: 0.10-inch

Drilling Company: Exploration Geoservices Driller: John Collins

Method Used: Hollow-Stem Auger Field Geologist: J. Buckthal

Signature of Registered Professional:

Registration No.: CEG 1463 State: CA

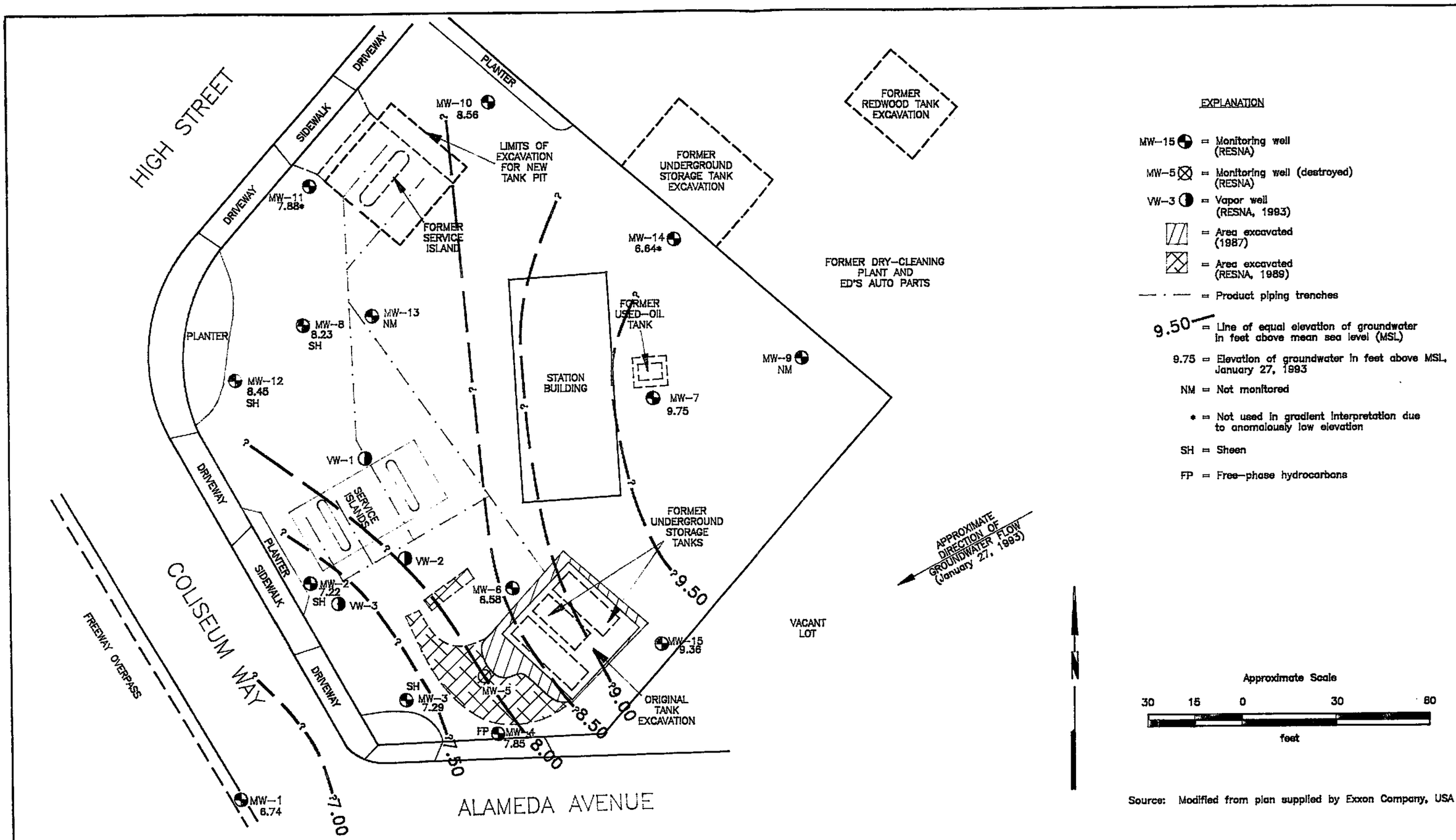
Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
					Asphalt	
0					Asphalt (2 inches).	
				GW-GC	Sandy gravel with clay, fine to coarse gravel, fine- to coarse-grained sand, dark greenish brown, damp, dense; strong diesel odor: fill.	
2					Sandy clay with gravel, gray, wet, low plasticity, stiff: possible perched zone.	
				CL		
	S-4	6 12 14	371	CL	Sandy clay with silt, dark brown, moist, low plasticity, very stiff; diesel odor, medium- to coarse-grained sand.	
4				CL		
				CL	Silty clay, green-gray, damp, low plasticity, firm; hydrocarbon odor.	
	S-6	6 12 15	OR	CL	Gravelly clay with silt, green-gray, wet, low plasticity, stiff; hydrocarbon odor: possible perched zone.	
6						
	S-7.5	21 33	OR	SC	Silty clay, green-gray, damp, low plasticity, very stiff; hydrocarbon odor.	
8					Sandy clay with gravel, fine- to coarse-grained sand, fine gravel, green-gray, damp, very dense; gasoline odor.	
					Total depth = 8 feet.	
10						
12						
14						
16						
18						
20						

RESNA
Working to Restore Nature

PROJECT: 130006.02

LOG OF BORING B-37/VW-3
Exxon Service Station 7-3006
720 High Street
Oakland, California

PLATE
8



EXPLANATION

- MW-15 = Monitoring well (RESNA)
- MW-5 = Monitoring well (destroyed) (RESNA)
- VW-3 = Vapor well (RESNA, 1993)
- = Area excavated (1987)
- = Area excavated (RESNA, 1989)
- = Product piping trenches
- 9.50 = Line of equal elevation of groundwater in feet above mean sea level (MSL)
- 9.75 = Elevation of groundwater in feet above MSL, January 27, 1993
- NM = Not monitored
- * = Not used in gradient interpretation due to anomalously low elevation
- SH = Sheen
- FP = Free-phase hydrocarbons

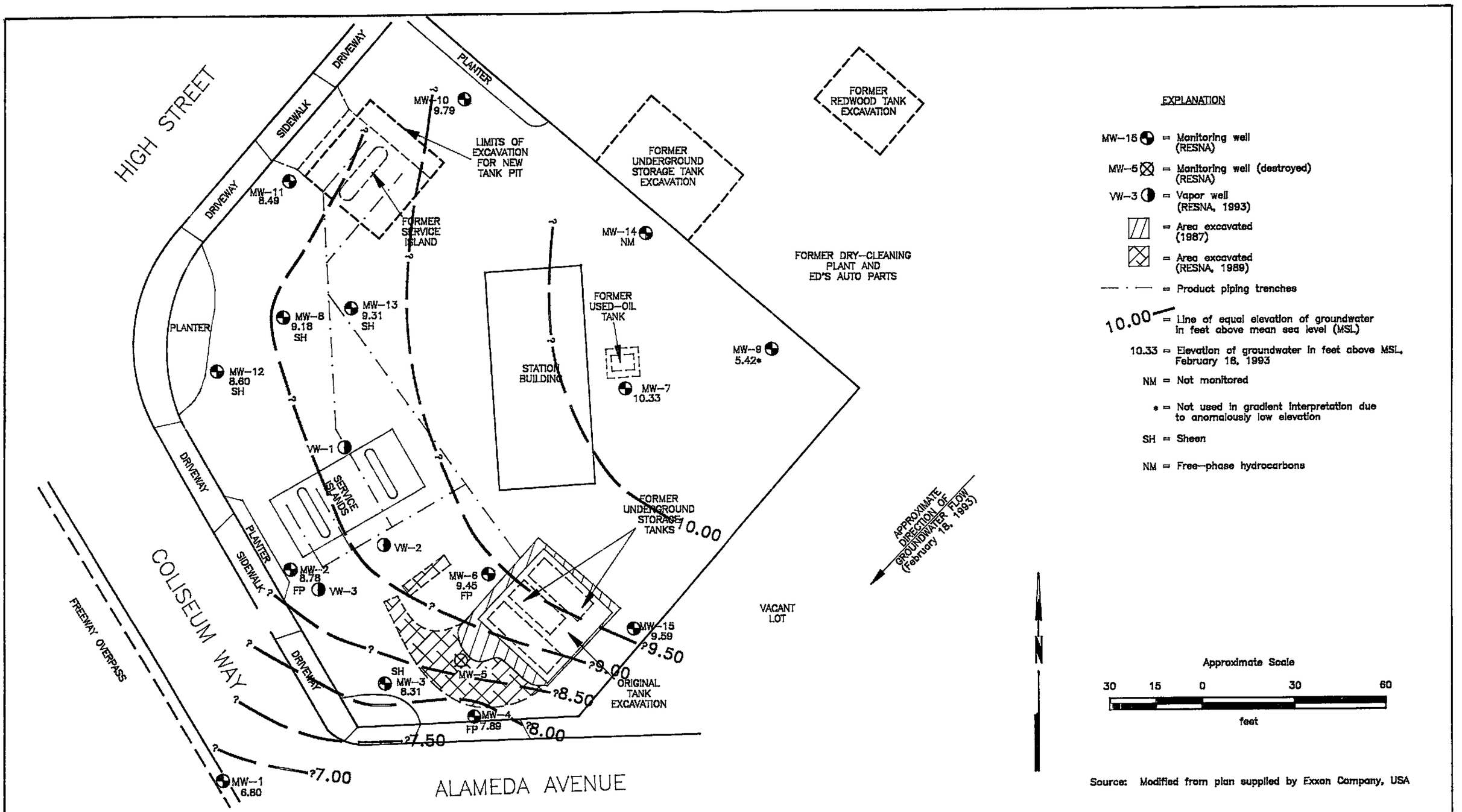
Source: Modified from plan supplied by Exxon Company, USA

RESNA
Working to Restore Nature

PROJECT 130006.02

GROUNDWATER GRADIENT MAP
January 27, 1993
Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
10



Source: Modified from plan supplied by Exxon Company, USA

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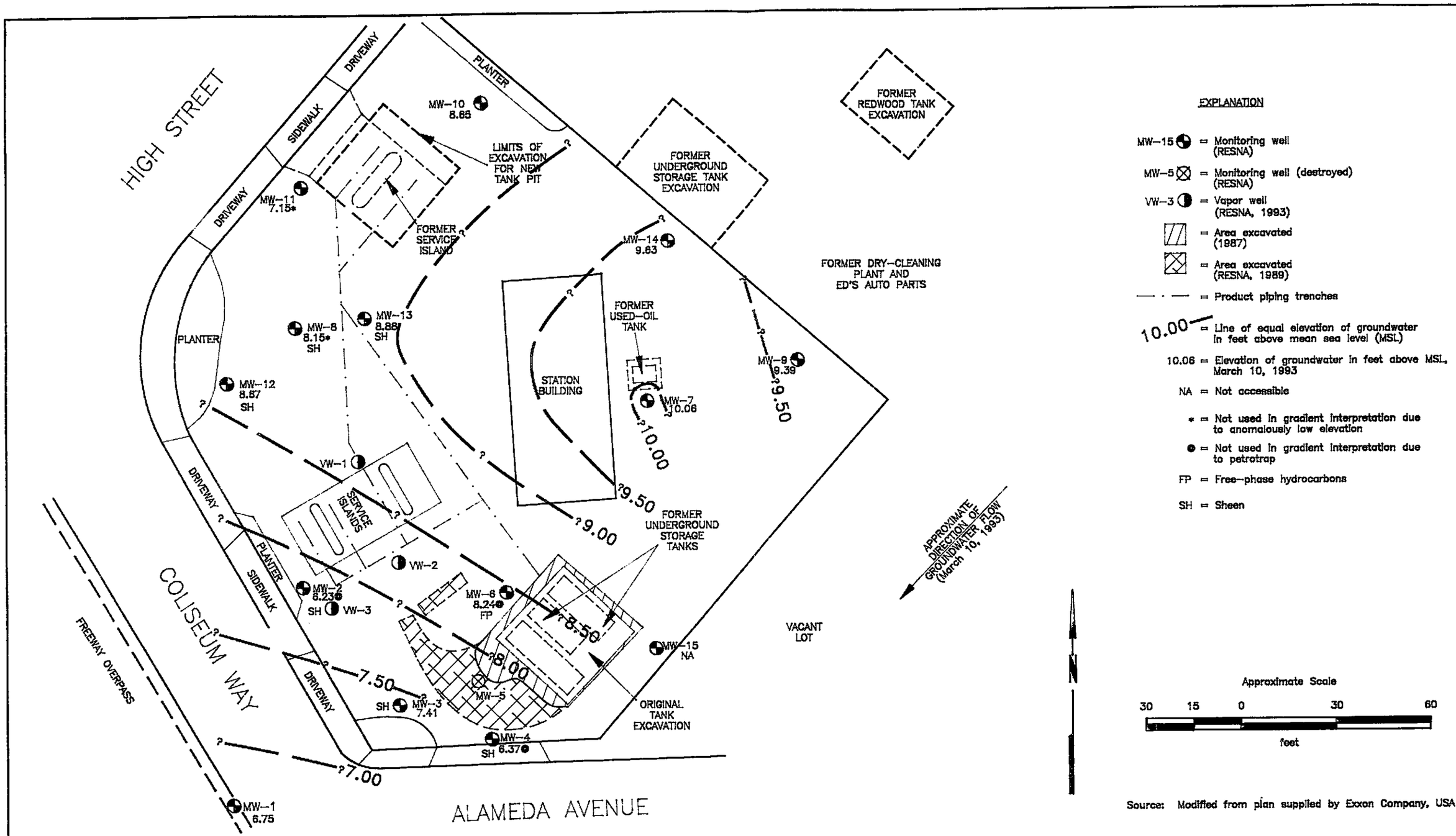
PROJECT 130006.02

GROUNDWATER GRADIENT MAP
February 18, 1993
Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
11



Source: Modified from plan supplied by Exxon Company, USA

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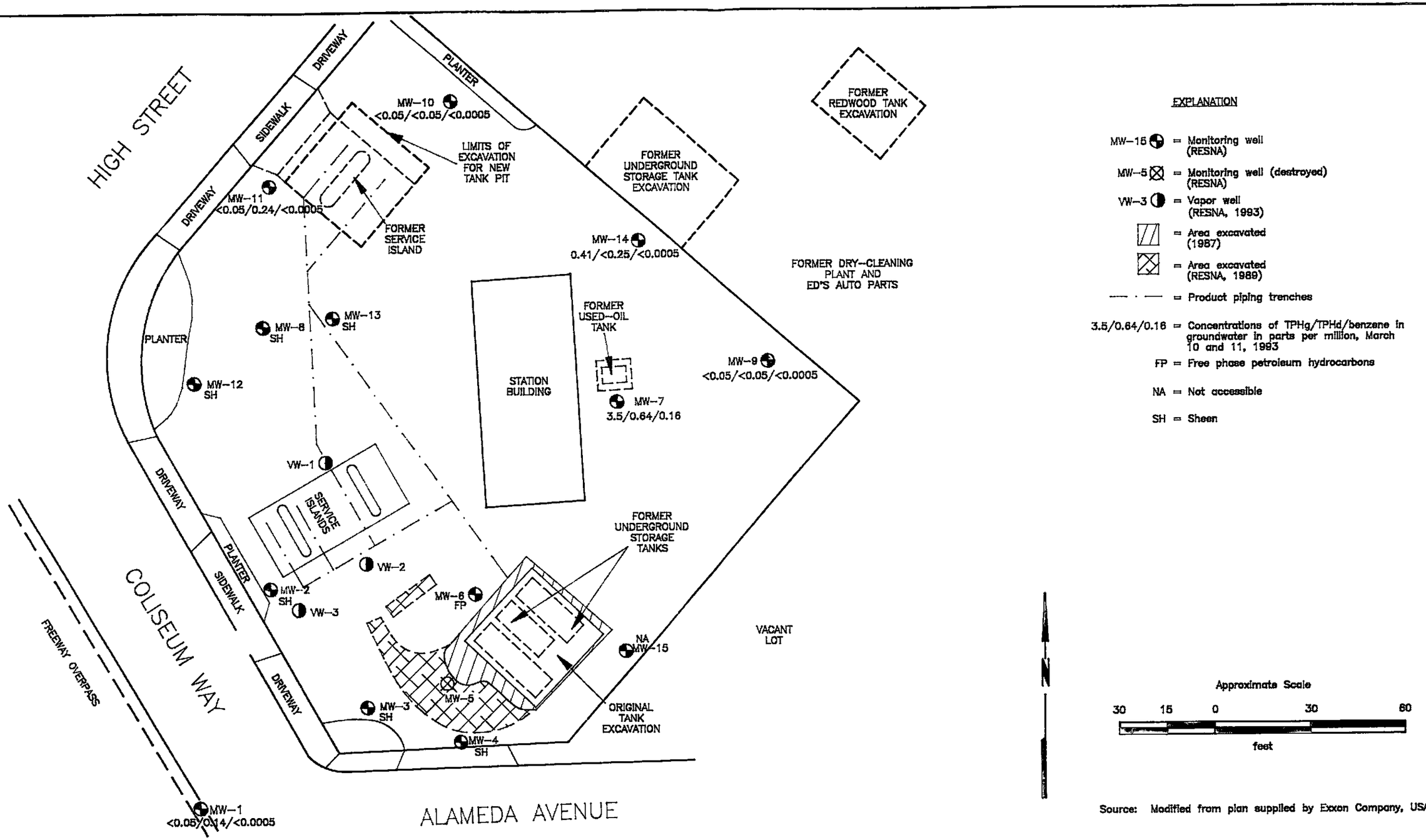
PROJECT 130006.02

GROUNDWATER GRADIENT MAP
March 10, 1993
Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
12



Source: Modified from plan supplied by Exxon Company, USA

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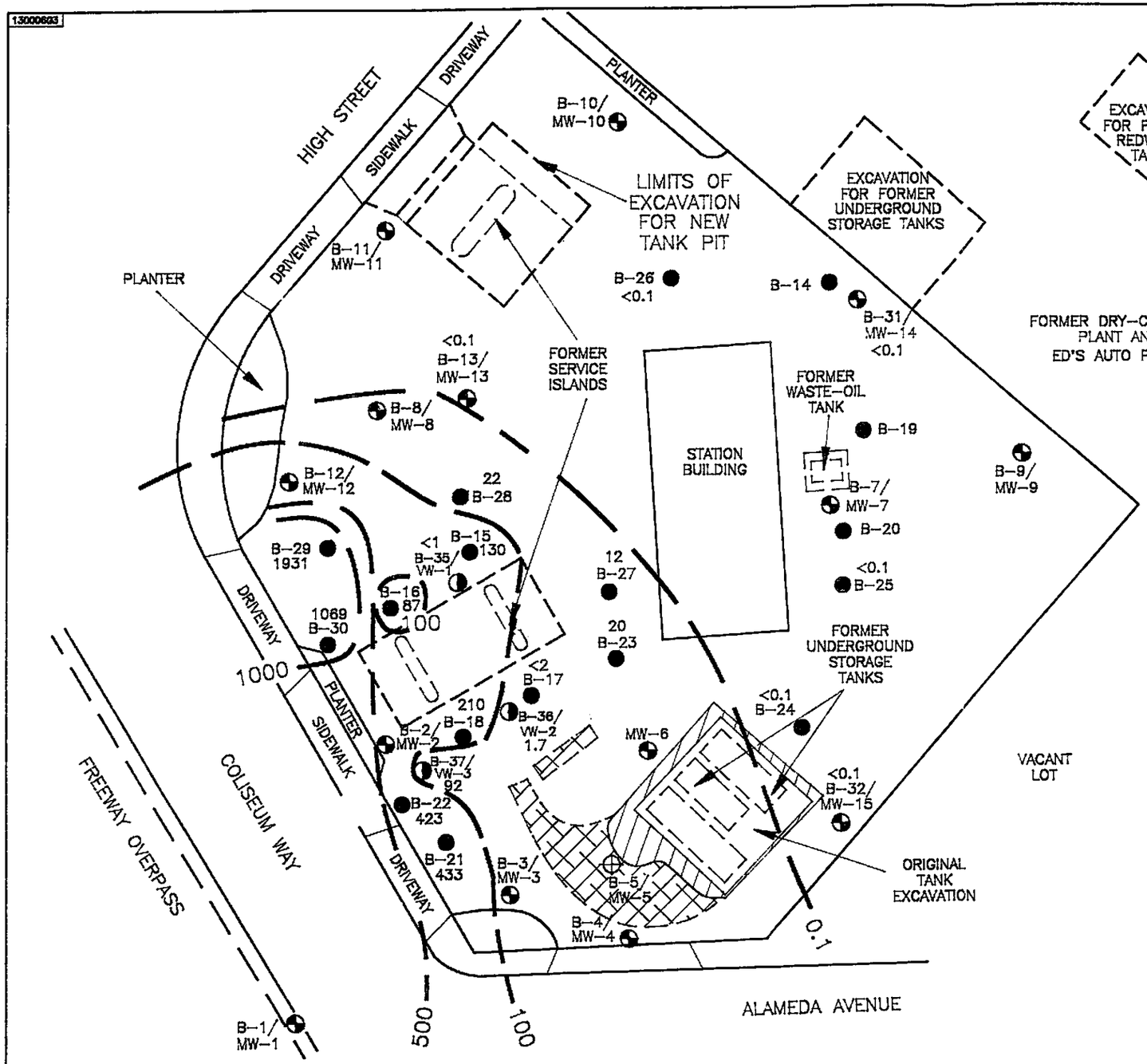
PROJECT 130006.02

TPHg/TPHd/BENZENE CONCENTRATIONS IN GROUNDWATER
Exxon Station 7-3006
720 High Street
Oakland, California

PLATE 13

13000603



1000 — = Line of equal concentration of TPHg in soil in parts per million

1931 = Concentration of TPHg in soil in parts per million

= Area excavated by Applied GeoSystems in July 1989

= Area further excavated in 1987

B–30 ● = Soil boring drilled by Applied GeoSystems

B–32/MW–15 ◔ = Monitoring well installed by Applied GeoSystems

B–37/VW–3 ◑ = Vadose well (RESNA, 1993)

B–5/MW–5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems

N

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by Exxon Company, USA

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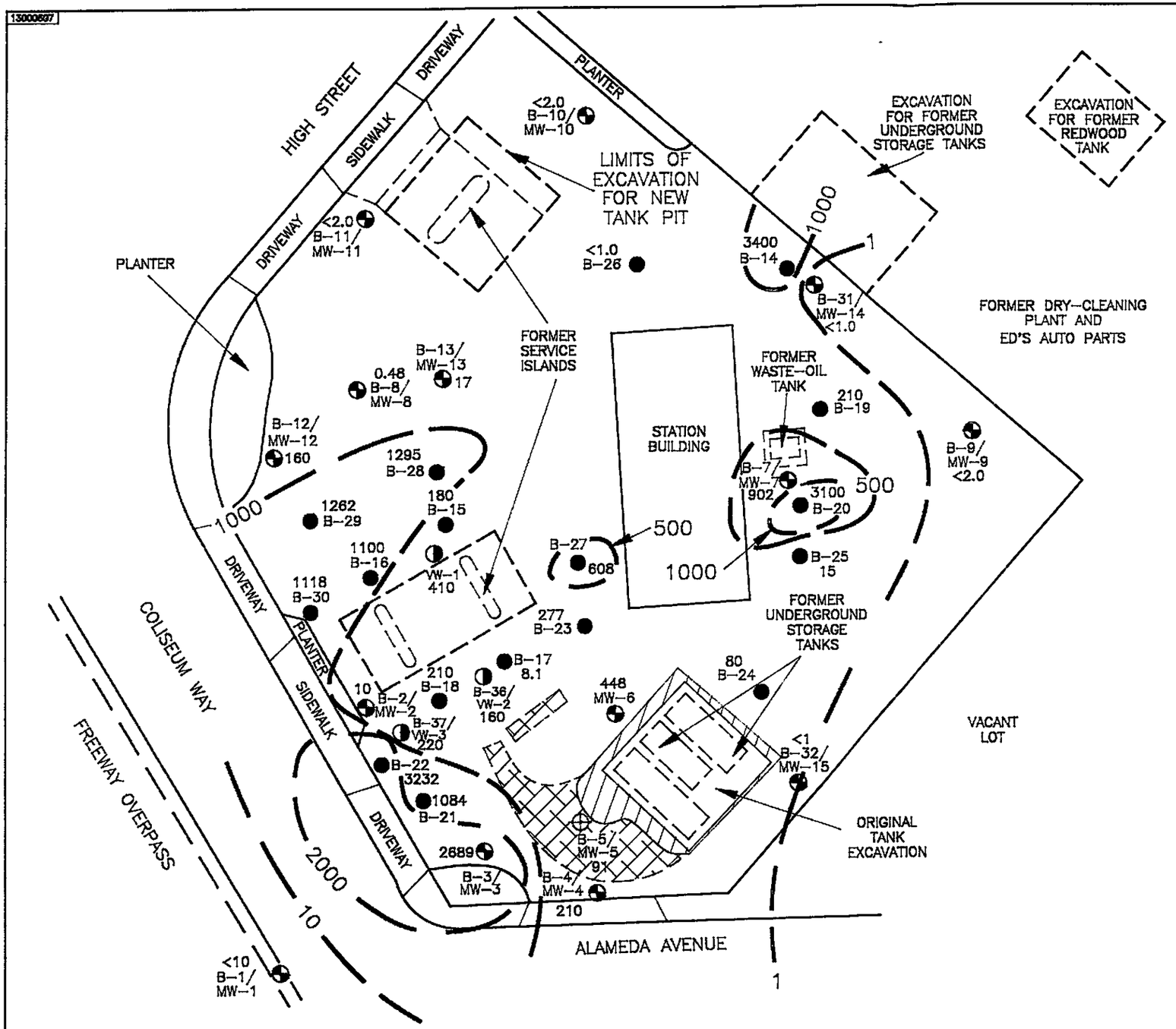
PROJECT 130006.02

CONCENTRATION OF TPHg IN SOIL
BETWEEN 3 AN 5 FEET
Exxon Station No. 7-3006
720 High Street
Oakland, California

PLATE
14

130006.02



2000 = Line of equal concentration of TPHg in soil in parts per million

3400 = Concentration of TPHg in soil in parts per million

= Area excavated by Applied GeoSystems in July 1989

= Area further excavated in 1987

B-30 = Soil boring drilled by Applied GeoSystems

B-32/MW-15 = Monitoring well installed by Applied GeoSystems

B-37/VW-3 = Vadose well (RESNA, 1993)

B-5/MW-5 = Monitoring well (destroyed) installed by Applied GeoSystems

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by Exxon Company, USA

RESNA
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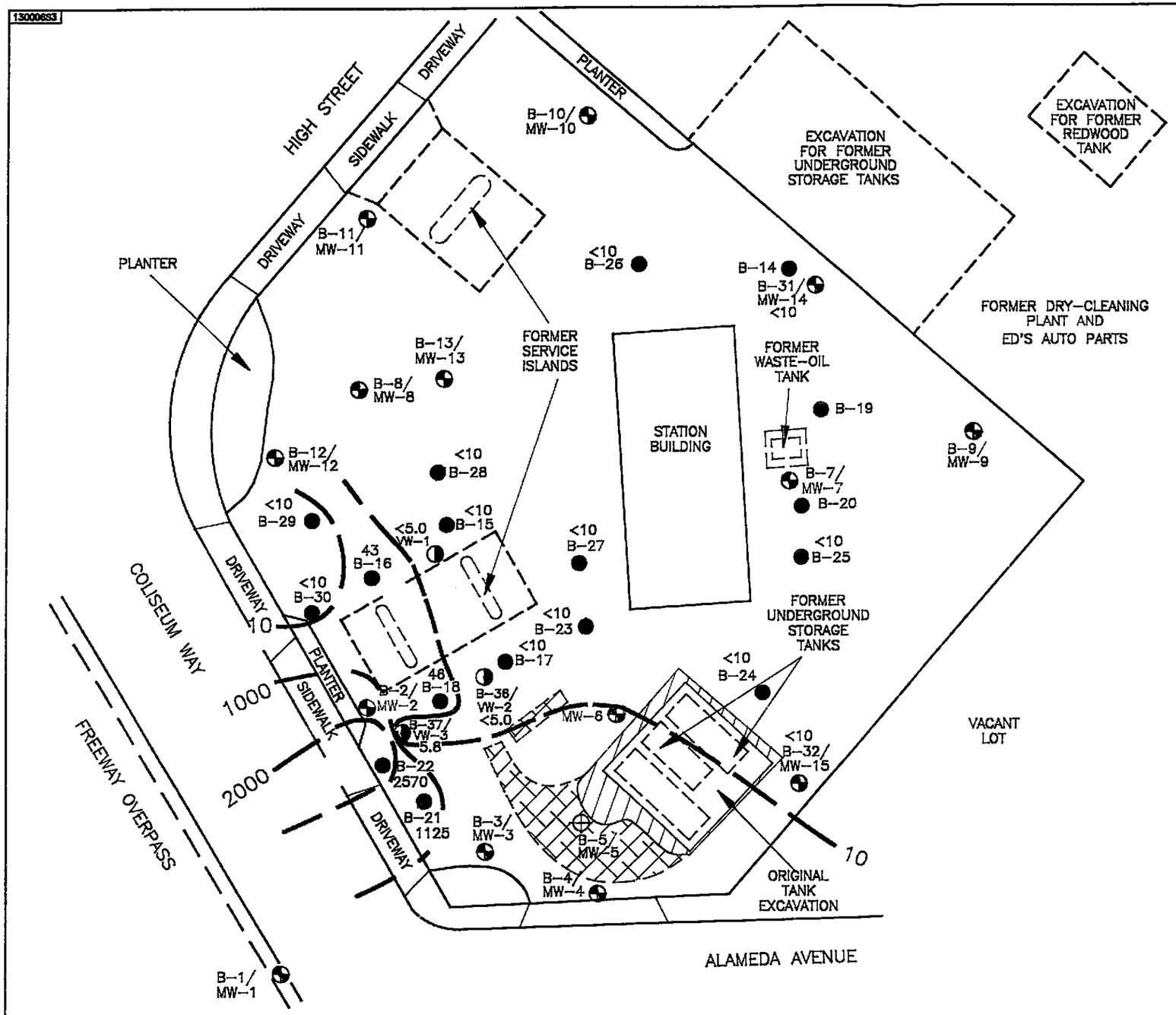
PROJECT 130006.02

CONCENTRATION OF TPHg IN SOIL
BETWEEN 7 AND 10 FEET
Exxon Station No. 7-3006
720 High Street
Oakland, California

PLATE
15



2000 = Line of equal concentration of TPHd in soil in parts per million

2570 = Concentration of TPHd in soil in parts per million

ND = Nondetectable of TPHd in soil

= Area excavated by Applied GeoSystems in July 1989

= Area further excavated in 1987

B–30 = Soil boring drilled by Applied GeoSystems

B–32/MW–15 = Monitoring well installed by Applied GeoSystems

B–37/VW–3 = Vadose well (RESNA, 1993)

B–5/MW–5 = Monitoring well (destroyed) installed by Applied GeoSystems

N

Approximate Scale

30 15 0 30 60

feet

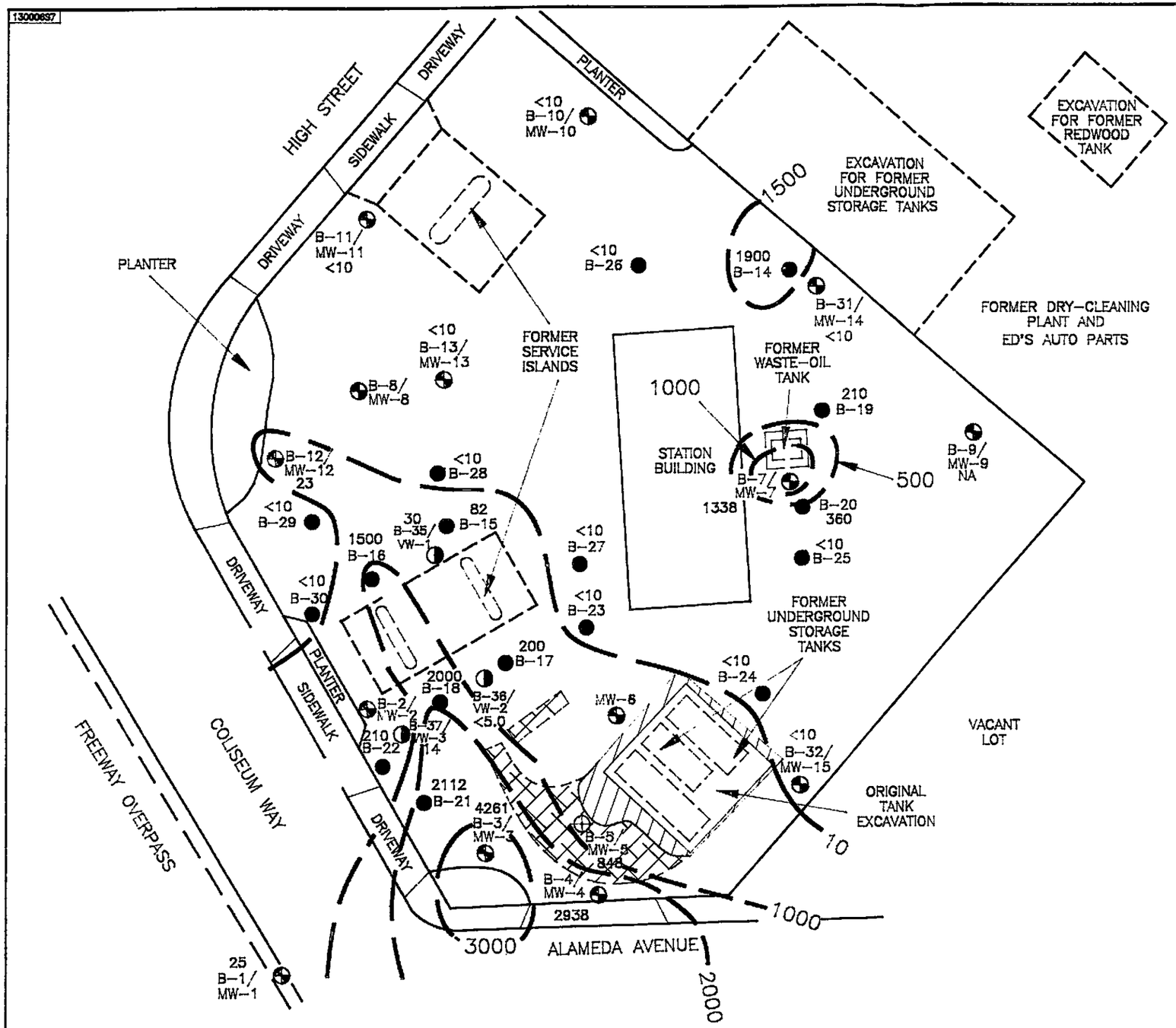
Source: Modified from plan supplied by Exxon Company, USA

RESNA
Working to Restore Nature

PROJECT NO. 130006.02

CONCENTRATION OF TPHd IN SOIL
BETWEEN 3 and 6 feet
Exxon Station No. 7-3006
720 High Street
Oakland, California

PLATE
16



3000 = Line of equal concentration of TPHd in soil in parts per million

4261 = Concentration of TPHd in soil in parts per million

NA = Not analyzed

= Area excavated by Applied GeoSystems in July 1989

= Area further excavated in 1987

B–30 = Soil boring drilled by Applied GeoSystems

B–32/MW–15 = Monitoring well installed by Applied GeoSystems

B–37/VW–3 = Vadose well (RESNA, 1993)

B–5/MW–5 = Monitoring well (destroyed) installed by Applied GeoSystems

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by Exxon Company, USA

RESNA
Working to Restore Nature

PROJECT 130006.02

CONCENTRATION OF TPHd IN SOIL BETWEEN 7 AND 10 FEET
Exxon Station No. 7-3006
720 High Street
Oakland, California

PLATE
17

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
Oakland, California

See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
MW-1					
04/25/89	12.87	7.55	NP	5.32	None
04/27/89		10.16	Sheen	2.71	None
09/06/89		10.88	Sheen	1.99	None
09/22/89		11.06	NP	1.81	None
11/01/89		10.82	NP	2.05	None
11/15/89		11.07	NP	1.80	None
12/06/89		10.33	NP	2.54	None
02/20/90		8.81	NP	4.06	None
04/19/90		9.33	NP	3.54	None
07/03/90		8.44	NP	4.43	None
07/26/90		8.99	NP	3.88	None
08/20/90		9.50	NP	3.37	None
09/19/90		9.99	NP	2.88	None
11/27/90		10.62	NP	2.25	None
01/17/91		10.31	NP	2.56	None
03/26/91		7.79	NP	5.08	None
05/02/91		8.88	NP	3.99	None
06/20/91		9.62	NP	3.25	None
08/07/91		10.20	NP	2.67	None
09/17/91		10.40	NP	2.47	None
11/13/91		10.20	NP	2.67	None
12/10/91		10.23	NP	2.64	None
01/21/92		9.32	NP	3.55	None
03/25/92		9.30	NP	3.57	None
06/22/92		8.46	NP	4.41	None
09/24/92		9.61	NP	3.26	None
10/14/92		9.85	NP	3.02	None
11/16/92		9.65	NP	3.22	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
Oakland, California

See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
12/08/92		9.30	NP	3.57	None
01/27/93		6.13	NP	6.74	None
02/18/93		6.07	NP	6.80	None
03/10/93		6.12	NP	6.75	None
MW-2					
04/25/89	12.98	9.27	2.16	5.44*	NR
07/19/89		10.81	1.56	3.42*	NR
07/27/89		10.18	0.13	2.90*	NR
09/06/89		10.89	0.09	2.16*	NR
09/22/89		11.56	0.56	1.87*	NR
11/01/89		10.85	0.09	2.20*	NR
11/15/89		11.05	0.07	1.99*	NR
12/06/89		10.23	0.13	2.85*	NR
02/20/90		8.86	0.29	4.35*	NR
04/19/90		9.09	0.10	3.97*	NR
07/03/90		8.75	0.05	4.27*	NR
07/26/90		8.71	0.10	4.35*	NR
08/20/90		9.25	0.02	3.75*	NR
09/19/90		9.79	0.02	3.21*	NR
11/27/90		10.40	0.07	2.64*	NR
01/17/91		10.03	0.05	2.99*	NR
03/26/91		8.98	0.08	4.06*	NR
05/02/91		8.73	0.02	4.27*	NR
06/20/91		9.11	0.02	3.89*	NR
08/07/91		10.00	0.04	3.01*	NR
09/17/91		10.11	0.02	2.89*	NR
11/13/91		9.88	0.02	3.12*	NR
12/10/91		9.02	0.03	3.98*	NR
01/21/92		9.08	0.03	3.92*	NR

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
Oakland, California
Page 3 of 15
See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
03/25/92		6.00	0.03	7.00*	NR
06/22/92		8.46	0.01	4.53*	1/2 cup
09/24/92		9.08	Sheen	3.90	NR
10/14/92		9.34	0.02	3.66*	1/2 cup
11/16/92		9.16	0.02	3.84*	1/2 cup
12/08/92		8.93	0.02	4.07*	1/2 cup
01/27/93		5.76	Sheen	7.22	None
02/18/93		4.21	0.01	8.78*	None
			Petrotrap Installed		
03/10/93		6.75	Sheen	6.23	None
MW-3					
04/25/89	12.94	7.57	0.08	5.43*	NR
07/19/89		10.33	0.66	3.14*	NR
07/27/89			Not Accessible		
09/06/89		11.22	0.07	1.78*	NR
09/22/89		11.38	0.28	1.78*	NR
11/01/89		10.90	0.01	2.05*	NR
11/15/89		11.18	0.11	1.85*	NR
12/06/89		10.29	Sheen	2.65	None
02/20/90		8.73	0.04	4.24*	NR
04/19/90		9.20	0.09	3.81*	NR
07/03/90		8.50	0.03	4.46*	NR
07/26/90		8.58	0.04	4.39*	NR
08/20/90		9.21	0.01	3.74*	NR
09/19/90		10.02	0.35	3.20*	NR
11/27/90		10.72	0.42	2.56*	NR
01/17/91		10.05	0.10	2.97*	NR
03/26/91		7.65	0.10	5.37*	NR
05/02/91		8.54	0.03	4.42*	NR

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
Oakland, California

See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
06/20/91		8.89	0.03	4.07*	NR
08/07/91		9.99	0.03	2.97*	NR
09/17/91		10.32	0.22	2.80*	NR
11/13/91		10.14	0.24	2.99*	NR
12/10/91		10.10	0.11	2.93*	NR
01/21/92		9.07	0.06	3.92*	NR
03/25/92		5.96	0.04	7.01*	NR
06/22/92		8.07	0.02	4.89*	1/2 cup
09/24/92		9.29	Sheen	3.65	None
10/14/92		9.49	0.02	3.47*	1/2 cup
11/16/92		9.29	0.02	3.67*	1/2 cup
12/08/92		9.08	0.02	3.88*	1/2 cup
01/27/93		5.65	Sheen	7.29	None
02/18/93		4.63	Sheen	8.31	None
03/10/93		5.53	Sheen	7.41	None
MW-4					
04/25/89	12.77	7.26	0.16	5.64*	NR
07/19/89		10.32	0.72	3.03*	NR
07/27/89		Not Accessible			
09/06/89		11.40	0.07	1.43*	NR
09/22/89		11.64	0.19	1.28*	NR
11/01/89		11.00	Sheen	1.77	None
11/15/89		11.18	0.10	1.67*	NR
12/06/89		10.25	Sheen	2.52	None
02/20/90		8.40	NP	4.37	None
04/19/90		9.04	0.03	3.75*	NR
07/03/90		8.00	Sheen	4.77	None
07/26/90		8.57	0.04	4.23*	NR
08/20/90		9.08	0.01	3.70*	NR

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
Oakland, California

See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
09/19/90		9.76	0.03	3.03*	NR
11/27/90		10.83	0.09	2.01*	NR
01/17/91		9.96	0.20	2.97*	NR
03/26/91		6.20	0.09	6.64*	NR
05/02/91		7.50	0.04	5.30*	NR
06/20/91		7.79	0.04	5.01*	NR
08/07/91		9.81	0.05	3.00*	NR
09/17/91		10.02	0.10	2.83*	NR
11/13/91		9.90	0.12	2.97*	NR
12/10/91		9.92	0.10	2.93*	NR
01/21/92		9.50	0.08	3.33*	NR
03/25/92		5.01	0.03	7.78*	NR
06/22/92		7.34	0.02	5.45*	1/2 cup
09/24/92		9.03	Sheen	3.74	None
10/14/92		9.27	0.02	3.52*	1/2 cup
11/16/92		9.09	0.02	3.70*	1/2 cup
12/08/92		10.24	0.02	2.55*	1/2 cup
01/27/93		4.95	0.04	7.85*	None
02/18/93		4.89	0.01	7.89*	None
			Petrotrap Installed		
03/10/93		6.40	Sheen	6.37	1/8 cup
MW-5					
04/25/89	8.38	8.06	NP	0.32	None
07/18/89		Well Destroyed			
MW-6					
04/25/89	14.27	8.02	NP	6.25	None
09/06/89		13.64	0.08	0.69*	NR
09/22/89		13.79	0.07	0.54*	NR
11/01/89		12.78	Sheen	1.49	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
Oakland, California
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See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
11/15/89		12.91	Sheen	1.36	None
12/06/89		11.84	NP	2.43	None
02/20/90		9.08	NP	5.19	None
04/19/90		9.72	NP	4.55	None
07/03/90		8.00	NP	6.27	None
07/26/90		8.70	NP	5.57	None
08/20/90		9.62	NP	4.65	None
09/19/90		10.25	Sheen	4.02	None
11/27/90		10.82	Sheen	3.45	None
01/17/91		9.93	NP	4.34	None
03/26/91		8.45	NP	5.82	None
05/02/91		8.90	NP	5.37	None
06/20/91		9.47	Sheen	4.80	None
08/07/91		10.10	Sheen	4.17	None
09/17/91		10.21	Sheen	4.06	None
11/13/91		9.62	Sheen	4.65	None
12/10/91		9.59	Sheen	4.68	None
01/21/92		9.25	Sheen	5.02	None
03/25/92		6.88	NP	7.39	None
06/22/92		7.38	NP	6.89	None
09/24/92		8.70	NP	5.57	None
10/14/92		8.91	Sheen	5.36	None
11/16/92		8.75	NP	5.52	None
12/08/92		8.51	Sheen	5.76	None
01/27/93		5.69	NP	8.58	None
02/18/93		4.90	0.10	9.45*	1/8 cup
			Petrotrap Installed		
03/10/93		6.07	0.05	8.24*	1/4 cup

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
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See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
MW-7					
04/25/89	14.84	8.66	NP	6.18	None
09/06/89		11.72	Sheen	3.12	None
09/22/89		11.89	NP	2.95	None
12/06/89		10.46	NP	4.38	None
02/20/90		8.44	NP	6.40	None
04/19/90		9.54	NP	5.30	None
07/03/90		7.45	NP	7.39	None
07/26/90		8.08	NP	6.76	None
08/20/90		8.82	NP	6.02	None
09/19/90		9.01	NP	5.83	None
11/27/90		9.54	NP	5.30	None
01/17/91		8.50	NP	6.34	None
03/26/91		5.92	NP	8.92	None
05/02/91		7.72	NP	7.12	None
06/20/91		8.19	NP	6.65	None
08/07/91		8.70	NP	6.14	None
09/17/91		8.77	NP	6.07	None
11/13/91		8.51	NP	6.33	None
12/10/91		8.58	NP	6.26	None
01/21/92		8.32	NP	6.52	None
03/25/92		9.27	NP	5.57	None
06/22/92		6.97	NP	7.87	None
09/24/92		8.00	NP	6.84	None
10/14/92		8.15	NP	6.69	None
11/16/92		7.92	NP	6.92	None
12/08/92		7.75	NP	7.09	None
01/27/93		5.09	NP	9.75	None
02/18/93		4.51	NP	10.33	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
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See notes on page 15

WELL / DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
03/10/93		4.78	NP	10.06	None
MW-8					
04/25/89	13.45	8.31	0.66	5.67*	NR
07/19/89		10.97	1.25	3.48*	NR
07/27/89		10.34	0.08	3.17*	NR
09/06/89		11.09	0.17	2.50*	NR
09/22/89		11.58	0.36	2.16*	NR
11/01/89		11.03	NP	2.42	None
11/15/89		11.25	0.01	2.21*	NR
12/06/89		10.30	Sheen	3.15	None
02/20/90		8.00	0.01	5.46*	NR
04/19/90		8.50	NP	4.95	None
07/03/90		7.55	NP	5.90	None
07/26/90		7.86	NP	5.59	None
08/20/90		8.92	NP	4.53	None
09/19/90		9.55	NP	3.90	None
11/27/90		10.29	0.01	3.17*	NR
01/17/91		9.97	Sheen	3.48	None
03/26/91		8.45	Sheen	5.00	None
05/02/91		8.85	Sheen	4.60	None
06/20/91		9.45	Sheen	4.00	None
08/07/91		10.00	Sheen	3.45	None
09/17/91		10.11	Sheen	3.34	None
11/13/91		9.63	Sheen	3.82	None
12/10/91		9.66	Sheen	3.79	None
01/21/92		9.35	Sheen	4.10	None
03/25/92		8.02	Sheen	5.43	None
06/22/92		7.01	Sheen	6.44	None
09/24/92		8.33	Sheen	5.12	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
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See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
10/14/92		8.65	Sheen	4.80	None
11/16/92		8.27	Sheen	5.18	None
12/08/92		8.25	Sheen	5.20	None
01/27/93		5.22	Sheen	8.23	None
02/18/93		4.27	Sheen	9.18	None
03/10/93		5.30	Sheen	8.15	None
MW-9					
04/25/89	14.64	8.25	NP	6.39	None
09/06/89		Not Accessible			
09/22/89		Not Accessible			
12/06/89		10.12	NP	4.52	None
02/20/90		9.38	NP	5.26	None
04/19/90		9.40	NP	5.24	None
07/03/90		8.79	NP	5.85	None
07/26/90		8.70	NP	5.94	None
08/20/90		9.09	NP	5.55	None
09/19/90		9.52	NP	5.12	None
11/27/90		9.89	NP	4.75	None
01/17/91		Not Accessible			
03/26/91		Not Accessible			
05/02/91		9.10	NP	5.54	None
06/20/91		8.76	NP	5.88	None
08/07/91		9.37	NP	5.27	None
09/17/91		9.57	NP	5.07	None
11/13/91		9.46	NP	5.18	None
12/10/91		9.30	NP	5.34	None
01/21/92		9.68	NP	4.96	None
03/25/92		8.93	NP	5.71	None
06/22/92		7.45	NP	7.19	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
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See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
09/24/92		8.69	NP	5.95	None
10/14/92		8.83	NP	5.81	None
11/16/92		8.80	NP	5.84	None
12/08/92		8.70	NP	5.94	None
01/27/93		Not Monitored			
02/18/93		9.22	NP	5.42	None
03/10/93		5.25	NP	9.39	None
MW-10					None
12/06/89	14.05	10.46	NP	3.59	None
02/20/90		8.12	NP	5.93	None
04/19/90		8.54	NP	5.51	None
07/03/90		7.88	NP	6.17	None
07/26/90		8.19	NP	5.86	None
08/20/90		10.33	NP	3.72	None
09/19/90		9.49	NP	4.56	None
11/27/90		9.89	NP	4.16	None
01/17/91		9.19	NP	4.86	None
03/26/91		7.48	NP	6.57	None
05/02/91		8.16	NP	5.89	None
06/20/91		8.75	NP	5.30	None
08/07/91		9.53	NP	4.52	None
09/17/91		9.72	NP	4.33	None
11/13/91		10.02	NP	4.03	None
12/10/91		9.12	NP	4.93	None
01/21/92		8.31	NP	5.74	None
03/25/92		5.70	NP	8.35	None
06/22/92		7.50	NP	6.55	None
09/24/92		8.68	NP	5.37	None
10/14/92		8.88	NP	5.17	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
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See notes on page 15

WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
11/16/92		8.70	NP	5.35	None
12/08/92		8.31	NP	5.74	None
01/27/93		5.49	NP	8.56	None
02/18/93		4.26	NP	9.79	None
03/10/93		5.40	NP	8.65	None
MW-11					
12/06/89	13.55	10.62	NP	2.93	None
02/20/90		9.20	NP	4.35	None
04/19/90		9.80	NP	3.75	None
07/03/90		8.90	NP	4.65	None
07/26/90		9.36	NP	4.19	None
08/20/90		9.90	NP	3.65	None
09/19/90		10.39	NP	3.16	None
11/27/90		10.97	NP	2.58	None
01/17/91		10.76	NP	2.79	None
03/26/91		8.80	NP	4.75	None
05/02/91		9.38	NP	4.17	None
06/20/91		10.16	NP	3.39	None
08/07/91		10.69	NP	2.86	None
09/17/91		10.80	NP	2.75	None
11/13/91		10.44	NP	3.11	None
12/10/91		10.48	NP	3.07	None
01/21/92		10.10	NP	3.45	None
03/25/92		7.30	NP	6.25	None
06/22/92		9.02	NP	4.53	None
09/24/92		9.91	NP	3.64	None
10/14/92		10.11	NP	3.44	None
11/16/92		9.79	NP	3.76	None
12/08/92		9.77	NP	3.78	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
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WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
01/27/93		5.67	NP	7.88	None
02/18/93		5.06	NP	8.49	None
03/10/93		6.40	NP	7.15	None
MW-12					
12/06/89	12.61	8.00	NP	4.61	None
02/20/90		6.33	NP	6.28	None
04/19/90		7.18	NP	5.43	None
07/03/90		7.41	NP	5.20	None
07/26/90		6.54	NP	6.07	None
08/20/90		7.23	NP	5.38	None
09/19/90		7.77	NP	4.84	None
11/27/90		8.15	NP	4.46	None
01/17/91		8.06	NP	4.55	None
03/26/91		7.21	NP	5.40	None
05/02/91		7.60	Sheen	5.01	None
06/20/91		8.02	Sheen	4.59	None
08/07/91		8.25	Sheen	4.36	None
09/17/91		8.20	Sheen	4.41	None
11/13/91		7.77	Sheen	4.84	None
12/10/91		7.75	Sheen	4.86	None
01/21/92		7.08	Sheen	5.53	None
03/25/92		4.93	Sheen	7.68	None
06/22/92		6.04	Sheen	6.57	None
09/24/92		6.94	NP	5.67	None
10/14/92		7.21	Sheen	5.40	None
11/16/92		7.00	Sheen	5.61	None
12/08/92		6.70	Sheen	5.91	None
01/27/93		4.16	Sheen	8.45	None
02/18/93		4.01	Sheen	8.60	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
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WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
03/10/93		3.94	Sheen	8.67	None
MW-13					
12/06/89	14.20	9.35	NP	4.85	None
02/20/90		7.73	NP	6.47	None
04/19/90		8.68	NP	5.52	None
07/03/90		8.00	NP	6.20	None
07/26/90		7.95	NP	6.25	None
08/20/90		8.66	NP	5.54	None
09/19/90		9.13	NP	5.07	None
11/27/90		9.49	NP	4.71	None
01/17/91		9.61	NP	4.59	None
03/26/91		9.25	NP	4.95	None
05/02/91		9.31	NP	4.89	None
06/20/91		9.73	NP	4.47	None
08/07/91			Not Accessible		
09/17/91		9.72	NP	4.48	None
11/13/91		9.06	NP	5.14	None
12/10/91		9.04	NP	5.16	None
01/21/92		8.41	NP	5.79	None
03/25/92		5.72	Sheen	8.48	None
06/22/92		7.31	Sheen	6.89	None
09/24/92		8.30	NP	5.90	None
10/14/92		8.56	Sheen	5.64	None
11/16/92		8.36	Sheen	5.84	None
12/08/92		8.10	Sheen	6.10	None
01/27/93			Not Monitored		
02/18/93		4.89	Sheen	9.31	None
03/10/93		5.32	Sheen	8.88	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
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WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
MW-14					
11/27/90	15.18	9.88	NP	5.30	None
01/17/91		9.13	NP	6.05	None
03/26/91		8.51	NP	6.67	None
05/02/91		8.45	NP	6.73	None
06/20/91		8.38	NP	6.80	None
08/07/91		9.04	NP	6.14	None
09/17/91		9.14	NP	6.04	None
11/13/91		8.83	NP	6.35	None
12/10/91		8.90	NP	6.28	None
01/21/92		8.58	NP	6.60	None
03/25/92		6.15	NP	9.03	None
06/22/92		7.70	NP	7.48	None
09/24/92		9.34	NP	5.84	None
10/14/92		9.40	NP	5.78	None
11/16/92		9.17	NP	6.01	None
12/08/92		8.89	NP	6.29	None
01/27/93		8.54	NP	6.64	None
02/18/93		Not Monitored			
03/10/93		5.55	NP	9.63	None
MW-15					
11/27/90	13.73	8.67	NP	5.06	None
01/17/91		8.03	NP	5.70	None
03/26/91		Not Accessible			
05/02/91		7.09	NP	6.64	None
06/20/91		7.06	NP	6.67	None
08/07/91		7.59	NP	6.14	None
09/17/91		7.89	NP	5.84	None
11/13/91		9.07	NP	4.66	None

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
Former Exxon Station 7-3006
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WELL DATE	WELL ELEVATION	DEPTH TO WATER	PRODUCT THICKNESS	GROUNDWATER ELEVATION	PRODUCT REMOVED
12/10/91		8.60	NP	5.13	None
01/21/92		9.15	NP	4.58	None
03/25/92		8.10	NP	5.63	None
06/22/92		5.80	NP	7.93	None
09/24/92		7.21	NP	6.52	None
10/14/92		7.40	NP	6.33	None
11/16/92		7.55	NP	6.18	None
12/08/92		7.42	NP	6.31	None
01/27/93		4.37	NP	9.36	None
02/18/93		4.14	Sheen	9.59	None
03/10/93		Not Accessible			
VW-1					
02/18/93		4.52	NP		None
03/10/93		5.25	NP		None
VW-2					
02/18/93	NM	4.41	NP	NA	None
03/10/93		5.17	NP	NA	None
VW-3					
02/18/93	NM	4.62	NP	NA	None
03/10/93		4.74	NP	NA	None

Well elevations relative to Mean Sea Level (MSL).
Measurements in feet.
* : Groundwater elevation corrected for presence of free-phase petroleum hydrocarbons. See appendix A.
NR : Not Recorded
NM : Not Measured
NA : Not Applicable
NP : No Free-phase petroleum hydrocarbons

TABLE 2
VAPOR EXTRACTION TEST MONITORING DATA
Former Exxon Service Station 7-3006
Oakland, California
(Page 1 of 2)

EXTRACTION WELL VW-3					OBSERVATION WELLS	
Air Flow [SCFM]	Applied Vacuum [in. WC]	Concentration [ppmv]	%O2 [%]	Elapsed Time [min.]	VW-2 Induced Vacuum [in. WC]	VW-1 Induced Vacuum [in. WC]
43	100	250	21%	20	<0.01	<0.01
21	80	nm	nm	nm	nm	nm
0	60	nm	nm	nm	nm	nm
Distance from Well VW-3 (ft):					24	50
Screened Interval[1] (ft BGS): 5 to 8					5-8	4-7
Depth-to-Water[2] (ft): 5.54'					6.48	6.02
Approximate Exposed Well Screen: 5-5.54'(Δ≈0.5')					5-6.5	4-6

EXTRACTION WELL VW-2					OBSERVATION WELLS	
Air Flow [SCFM]	Applied Vacuum [in. WC]	Concentration [ppmv]	%O2 [%]	Elapsed Time [min.]	VW-3 Induced Vacuum [in WC]	VW-1 Induced [in WC]
49	100	200	21%	20	0.25*	<0.01
42	80	nm	nm	nm	nm	nm
0	50	nm	nm	nm	nm	nm
Distance from Well VW-2 (ft):					24	40
Screened Interval[1] (ft BGS): 5 to 8					5-8	4-7
Depth-to-Water[2] (ft): 6.48					5.54	6.02
Approximate Exposed Well Screen: 5-6.48 (Δ≈1.5)					5-5.5	4-6

See notes on page 2 of 2.

TABLE 2
VAPOR EXTRACTION TEST MONITORING DATA
Former Exxon Service Station 7-3006
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(Page 2 of 2)

EXTRACTION WELL VW-1					OBSERVATION WELLS	
Air Flow [SCFM]	Applied Vacuum [in. WC]	Concentration [ppmv]	%O2 [%]	Elapsed Time [min.]	VW-2 Induced Vacuum [in WC]	VW-3 Induced Vacuum [in WC]
51	100	100	21%	60	0.01	0.20*
46	80	nm	nm	nm	nm	nm
30	60	nm	nm	nm	nm	nm
19	50	nm	nm	nm	nm	nm
0	40	nm	nm	nm	nm	nm
Distance from Well VW-1 (ft):					40	50
Screened Interval[1] (ft BGS): 4-7					5-8	5-8
Depth-to-Water[2] (ft): 6.02					6.48	5.54
Approximate Exposed Well Screen: 4-6 ($\Delta \approx 2$)					5-6.48	5-5.54

Notes:

*	:	Suspect data: Possible vacuum gauge error or residual vacuum from previous VET operation.
SCFM	:	Standard Cubic Feet per Minute.
in. WC	:	Inches Water Column.
nm	:	Not Measured.
ppmv	:	Parts per million by volume.

1Screened intervals measured in feet from below grade surface (BGS).
[2]Depth-to-Water (DTW) measured in feet from top of casing.
[3]Approximate exposed well screen refers to the length of well screen above the potentiometric water surface. Values are approximate since

DTW is referenced from top of casing and screened intervals are referenced from grade.
Concentrations measured using a portable combustible gas meter, calibrated to methane.
Combustible gas meter concentrations reported as parts per million by volume (ppmv).

TABLE 3
CALCULATED AQUIFER HYDRAULIC PARAMETERS
Former Exxon Service Station 7-3006
720 High Street
Oakland, California

Well	Analytical Method	T	S
MW-6	CJ	0.19	0.008
MW-8 early	CJ	0.08	0.01
MW-8 late	CJ	0.05	na
MW-12	CJ	0.14	0.003
MW-2,6,8,12	CJr	0.09	0.009

T : Transmissivity (ft^2/min)
S : Unconfined storativity
CJ : Cooper - Jacob drawdown versus time method (1946)
CJr : Cooper - Jacob drawdown versus distance method (1946)
na : data not analyzable for S

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
Former Exxon Service Station 7-3006
720 High Street
Oakland, California
(page 1 of 7)

Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
September 10, 1987								
S-10-B2**	9.97	4.14	0.09	1.09	0.38	--	--	--
S-10-B3	2689	126.0	17.0	41.0	131.0	4261	--	--
S-10-B4	209.9	14.9	0.5	6.4	11.1	2938	--	--
S-10-B5	90.83	9.27	0.24	1.45	6.62	848	--	--
S-10-B6	448.0	5.7	3.7	14.1	63.2	--	--	--
S-10-B7	901.6	26.4	5.3	41.4	54.2	1338	--	--
S-10-B8	0.48	<0.05	<0.05	<0.05	<0.05	--	--	--
May 12, 1988								
S-9-B9	<2	<0.05	<0.05	<0.05	<0.05	--	--	--
May 21, 1988								
S-7.5-B1	<10	<0.05	<0.05	<0.15	<0.15	25	<10	
November 27-28, 1989								
S-10-B10	<2	<0.05	<0.05	<0.05	<0.05	<10	--	
S-10-B11	<2	0.064	0.11	<0.05	0.076	<10	--	

See notes on page 7 of 7.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
Former Exxon Service Station 7-3006
720 High Street
Oakland, California
(page 2 of 7)

Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
November 27-28, 1989								
S-7.5-B12	160	1.2	3.1	3.4	14	23	--	--
S-10-B12	3.1	0.86	0.090	0.18	0.17	16	--	--
S-7.5-B13	<2	<0.05	0.12	<0.05	0.10	<10	--	--
S-10-B13	17	<0.05	0.14	0.33	1.2	<10	--	--
S-10-B14	3400	<0.5*	<0.5*	1.2*	1.2*	1900	820	ND
S-5-B15	130	2.2	7.2	2.2	11	<10	--	--
S-7.5-B15	98	0.97	3.9	1.8	9.8	28	--	--
S-10-B15	180	1.4	4.4	3.6	16	82	--	--
S-5-B16	87	2.2	4.4	1.7	7.6	43	--	--
S-7.5-B16	1100	9.0	60	23	109	1500	--	--
S-10-B16	380	4.2	11	8.4	35	110	--	--

See notes on page 7 of 7.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
Former Exxon Service Station 7-3006
720 High Street
Oakland, California
(page 3 of 7)

Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
S-5-B17	<2	<0.050	<0.050	<0.050	<0.050	<10	--	--
S-7.5-B17	8.1	0.085	<0.050	0.19	0.24	--	--	--
S-10-B17	7.1	0.091	<0.050	0.20	0.25	200	--	--
S-5-B18	210	1.6	0.71	3.9	12	46	--	--
S-7.5-B18	210	2.4	0.50	4.8	20	270	--	--
S-10-B18	130	0.93	0.36	2.8	11	2000	--	--
S-10-B19	210	<0.5*	<0.5*	1.7*	<0.5*	210	<300	ND
S-10-B20	3100	<5.0*	<5.0*	64.0*	120.0*	360	73	87▲
S-1128-ABCD**	160	--	--	--	--	160	<50	--
October 31 and November 1, 1990								
S-3-MW14	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	
S-8-MW14	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	
S-18-MW14	837	0.10	1.6	6.0	34	<10	--	

See notes on page 7 of 7.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
Former Exxon Service Station 7-3006
720 High Street
Oakland, California
(page 4 of 7)

Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
S-6-MW15	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	--
S-8.5-MW15	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	--
S-13.5-MW15	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	--
S-3-B21	433	9.0	0.90	7.5	13	1,125	--	--
S-8-B21	1,084	22	3.5	31	100	2,112	--	--
S-5.5-B22	423	6.9	1.0	19	18	2,570	--	--
S-8-B22	3,232	31	123	137	493	210	--	--
S-3-B23	20	0.50	0.08	0.41	0.70	<10	--	--
S-8-B23	277	2.4	3.5	7.2	28	<10	--	--
S-5.5-B24	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	
S-8-B24	80	0.70	0.26	<0.005	0.70	<10	--	
S-5.5-B25	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	
S-8-B25	15	0.27	0.05	0.17	0.75	<10	--	

See notes on page 7 of 7.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
Former Exxon Service Station 7-3006
720 High Street
Oakland, California
(page 5 of 7)

Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
S-5.5-B26	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	--
S-8-B26	<1.0	<0.005	<0.005	<0.005	<0.007	<10	--	--
S-5.5-B27	12	0.17	0.05	1.7	0.91	<10	--	--
S-8-B27	608	8.1	2.7	19	30	<10	--	--
S-3-B28	22	1.0	1.0	0.43	2.5	<10	--	--
S-8-B28	1,295	10	45	52	150	<10	--	--
S-5.5-B29	1,931	31	122	84	240	<10	--	--
S-8-B29	1,262	14	68	49	153	<10	--	--
S-5.5-B30	1,069	20	39	44	116	<10	--	--
S-8-B30	1,118	9.3	62	47	143	<10	--	--

See notes on page 7 of 7.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
Former Exxon Service Station 7-3006
720 High Street
Oakland, California
(page 6 of 7)

Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
February 11, 1993								
S-3.5-B35	<1.000	0.033	<0.0050	<0.0050	0.0062	<5.0	--	--
S-6.5-B35	120.000	2.000	3.200	1.800	7.300	6.3	--	--
S-7.5-B35	410.000	3.700	9.600	8.200	35.000	30	460	--
S-9-B35	950.000	7.600	28.000	21.000	89.000	12	--	--
S-4-B36	1.700	0.023	<0.0050	<0.0050	0.021	<5.0	--	--
S-7-B36	<1.000	0.0054	<0.0050	<0.0050	<0.0050	<5.0	--	--
S-9.5-B36	160.000	0.650	0.340	2.300	5.200	<5.0	--	--
S-4-B37	92	2.100	0.750	2.400	7.900	5.8	--	--
S-6-B37	220	2.000	5.600	5.800	21.000	21	--	--
S-7.5-B37	220	1.700	2.900	4.900	21.000	14	--	--
P-1A	<1.000	0.0054	<0.0050	<0.0050	<0.0050	9.2	--	--
P-1B	<1.000	0.0054	<0.0050	<0.0050	<0.0050	130	--	--
P-2A	<1.000	0.0054	<0.0050	<0.0050	<0.0050	8.3	--	--
P-2B	2.900	0.0054	<0.0050	<0.0050	0.0057	9.3	--	--

See notes on page 7 of 7.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF SOIL SAMPLES
Former Exxon Service Station 7-3006
720 High Street
Oakland, California
(page 7 of 7)

**	:	S-10-B2 = soil sample - depth - boring number
S-1128-ABCD	:	soil sample - date - samples composited
<	:	Not detected at method detection level
*	:	From VOC analysis
–	:	Not analyzed
ND	:	No VOC detected other than BTEX
▲	:	Acetone

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California
Page 1 of 14
See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
MW-1								
05/88	0.24	0.090	0.005	0.015	0.025	NA	NA	ND
12/89	0.63	0.012	0.0056	0.0037	0.025	0.24	NA	NA
04/90	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
07/90	0.13	0.006	<0.0005	<0.0005	<0.0005	0.16	NA	NA
11/90	<0.05	0.0007	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
03/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
06/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
09/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	NA	NA	NA
12/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
03/92	<0.05	0.0015	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
06/92	0.11	0.0049	0.0079	0.0037	0.021	0.075	NA	NA
09/92	<0.05	<0.0005	0.0006	<0.0005	<0.0005	<0.05	NA	NA
12/92	0.17	0.010	<0.0005	<0.0005	0.0006	0.051	NA	NA
03/93	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.14	NA	NA
MW-2								
09/87	1.445	0.233	0.81	0.056	0.209	NA	NA	NA

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California

See notes on page 14

WELL / DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
05/88	Free-phase petroleum hydrocarbons							
12/89	Free-phase petroleum hydrocarbons							
04/90	Free-phase petroleum hydrocarbons							
07/90	Free-phase petroleum hydrocarbons							
11/90	Free-phase petroleum hydrocarbons							
03/91	Free-phase petroleum hydrocarbons							
06/91	Free-phase petroleum hydrocarbons							
09/91	Free-phase petroleum hydrocarbons							
12/91	Free-phase petroleum hydrocarbons							
03/92	Free-phase petroleum hydrocarbons							
06/92	Free-phase petroleum hydrocarbons							
09/92	Sheen							
12/92	Free-phase petroleum hydrocarbons							
03/93	Sheen							
MW-3								
09/87	2.101	0.360	1.062	0.068	0.298	0.66	NA	NA
05/88	8.70	3.98	0.28	0.24	0.60	NA	NA	NA

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California
Page 3 of 14
See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL- BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
12/89	Free-phase petroleum hydrocarbons							
04/90	Free-phase petroleum hydrocarbons							
07/90	Free-phase petroleum hydrocarbons							
11/90	Free-phase petroleum hydrocarbons							
03/91	Free-phase petroleum hydrocarbons							
06/91	Free-phase petroleum hydrocarbons							
09/91	Free-phase petroleum hydrocarbons							
12/91	Free-phase petroleum hydrocarbons							
03/92	Free-phase petroleum hydrocarbons							
06/92	Free-phase petroleum hydrocarbons							
09/92	Sheen							
12/92	Free-phase petroleum hydrocarbons							
03/93	Sheen							
MW-4								
09/87	0.925	0.070	0.007	0.010	0.016	0.74	NA	NA
05/88	Free-phase petroleum hydrocarbons							
12/89	Free-phase petroleum hydrocarbons							

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TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California

See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
04/90	Free-phase petroleum hydrocarbons							
07/90	Emulsion							
11/90	Free-phase petroleum hydrocarbons							
03/91	Free-phase petroleum hydrocarbons							
06/91	Free-phase petroleum hydrocarbons							
09/91	Free-phase petroleum hydrocarbons							
12/91	Free-phase petroleum hydrocarbons							
03/92	Free-phase petroleum hydrocarbons							
06/92	Free-phase petroleum hydrocarbons							
09/92	Sheen							
12/92	Free-phase petroleum hydrocarbons							
03/93	Free-phase petroleum hydrocarbons							
MW-5								
09/87	26.66	0.56	1.71	1.58	7.15	37.22	NA	NA
05/88	Free-phase petroleum hydrocarbons							
07/89	Well Destroyed							

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TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California

See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
MW-6								
05/88	29.3	12.82	0.55	1.44	5.50	NA	NA	NA
12/89	9.0	0.37	0.013	0.0026	0.43	4.8	NA	NA
04/90	27	3.0	0.12	0.49	2.1	26	NA	NA
07/90	30	5.5	1.4	1.2	3.1	13	NA	NA
11/90	15	4.4	0.12	0.8	2.3	7.6	NA	NA
03/91	55	10	0.38	1.6	6.9	<0.10	NA	NA
06/91	Sheen							
09/91	17	4.5	0.16	0.89	3.1	NA	NA	NA
12/91	32	6.0	0.29	1.4	4.7	1.2	NA	NA
03/92	21	8.0	0.25	1.7	5.0	2.7	NA	NA
06/92	43	11	0.15	2.1	5.0	1.7	NA	NA
09/92	45	9.8	0.27	1.7	3.6	2.0	NA	NA
12/92	Sheen							
03/93	Free-phase petroleum hydrocarbons							
MW-7								
09/87	1.531	0.258	0.002	<0.002	0.042	2.79	NA	ND

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TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California

See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL- BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
05/88	NA	0.30*	<0.01*	<0.01*	<0.01*	0.019	NA	ND
12/89	1.7	0.22	0.0053	0.005	0.0086	2.5	<5	ND
04/90	2.7	0.22	0.0086	0.007	0.020	3.5	NA	ND
07/90	2.5	0.38	0.013	0.016	0.035	0.91	NA	ND
11/90	2.3	0.63	0.016	0.032	0.029	1.3	NA	0.0024[1]
03/91	3.5	0.42	0.018	0.017	0.027	<0.10	NA	ND
06/91	3.1	0.27	0.0088	0.033	0.019	<0.10	NA	NA
09/91	2.4	0.39	0.01	0.015	0.018	NA	NA	NA
12/91	1.7	0.29	0.0053	0.0071	<0.0005	0.53	NA	NA
03/92	1.5	0.32	0.0072	0.016	0.019	0.76	NA	NA
06/92	3.1	0.26	0.0058	0.021	0.027	0.83	NA	NA
09/92	3.9	0.16	0.0046	0.0037	0.013	0.66	NA	NA
12/92	17	1.1	0.035	0.077	0.046	0.54	NA	NA
03/93	3.5	0.16	0.0062	0.022	0.019	0.64	<5.0	**
MW-8								
09/87	1.325	0.081	0.074	0.042	0.182	NA	NA	NA
05/88	Free-phase petroleum hydrocarbons.							

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TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California
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See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL- BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
12/89	42	2.6	0.63	0.21	3.7	34	NA	NA
04/90	49	2.1	0.82	1.1	4.8	53	NA	NA
07/90	44	4.0	1.5	2.0	6.3	32	NA	NA
11/90	Free-phase petroleum hydrocarbons							
03/91	Sheen							
06/91	Sheen							
09/91	57	14	7.8	3.1	12	NA	NA	NA
12/91	66	9.5	5.0	3.1	12	1.4	NA	NA
03/92	Sheen							
06/92	Sheen							
09/92	Sheen							
12/92	Sheen							
03/93	Sheen							
MW-9								
05/88	<0.05	<0.0005	0.001	<0.001	<0.001	NA	NA	ND
12/89	0.1	0.0018	0.0037	0.0014	0.0088	0.11	<5	ND
04/90	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	ND

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California

See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
07/90	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	ND
11/90	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	ND
03/91	Not Accessible							
06/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
09/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	NA	NA	NA
12/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.052	NA	NA
03/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
06/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
09/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
12/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
03/93	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
MW-10								
12/89	0.32	0.0037	0.014	0.0056	0.032	<0.10	NA	NA
04/90	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	ND
07/90	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
11/90	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
03/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California

See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
06/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
09/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
12/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
03/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
06/92	<0.05	<0.0005	0.0006	<0.0005	0.0008	<0.05	NA	NA
09/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
12/92	<0.05	<0.0005	<0.0005	<0.0005	0.0009	<0.05	NA	NA
03/93	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
MW-11								
12/89	0.078	0.0059	0.0063	<0.0005	48	<0.10	NA	NA
04/90	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
07/90	<0.02	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
11/90	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
03/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
06/91	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	NA	NA
09/91	<0.05	<0.0005	0.0007	<0.0005	<0.0005	NA	NA	NA
12/91	<0.05	0.0007	<0.0005	<0.0005	<0.0005	<0.05	NA	NA

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California
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See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
03/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
06/92	0.084	0.0015	0.0031	0.0014	0.0096	0.057	NA	NA
09/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.05	NA	NA
12/92	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.31	NA	NA
03/93	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.24	NA	NA
MW-12								
12/89	85	6.7	6.3	1.8	7.8	40	NA	NA
04/90	110	6.6	7.4	1.8	11	97	NA	NA
07/90	92	11	11	3.1	13	50	NA	NA
11/90	69	11	10	3.1	12	31	NA	NA
03/91	100	15	16	2.4	11	<0.10	NA	NA
06/91				Sheen				
09/91	82	22	18	3.9	16	NA	NA	NA
12/91	99	18	16	3	11	1.7	NA	NA
03/92				Sheen				
06/92				Sheen				
09/92	570	62	46	15	57	3.1	NA	NA

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TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California
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See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
12/92	Sheen							
03/93	Sheen							
MW-13								
12/89	52	2.1	2.0	1.4	6.1	31	NA	NA
04/90	59	1.8	1.5	1.4	7.2	54	NA	NA
07/90	53	4.5	3.1	2.2	7.8	26	NA	NA
11/90	20	4.5	1.1	0.88	3.3	1.6	NA	NA
03/91	72	10	8.3	1.7	6.9	<0.10	NA	NA
06/91	44	5.6	3.1	0.75	2.6	<0.10	NA	NA
09/91	40	11	6.5	2.4	8.1	NA	NA	NA
12/91	72	11	7.4	2.5	9.4	3.7	NA	NA
03/92	Sheen							
06/92	Sheen							
09/92	86	9.5	6.1	2.4	10	2.9	NA	NA
12/92	Sheen							
03/93	Sheen							

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California
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See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
MW-14								
11/90	0.39	<0.0005	<0.0005	0.0036	0.0037	0.12	NA	NA
03/91	0.20	<0.0005	0.0015	0.0008	0.0036	<0.10	NA	NA
06/91	0.11	<0.0005	<0.0005	<.0005	<0.0005	<0.10	NA	NA
09/91	0.45	<0.0005	<0.0005	0.0032	0.0023	NA	NA	NA
12/91	0.071	0.0005	<0.0005	<0.0005	<0.0005	0.28	NA	NA
03/92	0.061	<0.0005	<0.0005	0.0011	<0.0005	0.64	NA	NA
06/92	0.140	<0.0005	<0.0005	0.0006	0.0020	0.35	NA	NA
09/92	0.075	<0.0005	<0.0005	<0.0005	<0.0005	0.30	NA	NA
12/92	0.35	0.0025	0.0010	0.0015	0.0081	0.22	NA	NA
03/93	0.41	<0.0005	<0.0005	0.0009	0.0016	<0.25[2]	NA	NA
MW-15								
11/90	2.7	0.21	0.0055	0.6	0.25	0.34	NA	NA
03/91	Not Accessible							
06/91	0.38	<0.0005	<0.0005	<0.0005	0.0013	<0.10	NA	NA
09/91	0.49	0.0029	0.0017	0.033	0.0013	NA	NA	NA
12/91	1.6	0.014	0.0011	0.066	0.0098	0.30	NA	NA

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TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Former Exxon Station 7-3006
Oakland, California
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See notes on page 14

WELL DATE	TPHg	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPHd	TOG	VOCs
MW-15								
03/92	3.4	0.15	0.013	0.690	0.250	1.4	NA	NA
06/92	6.6	0.099	<0.0005	0.670	0.180	0.86	NA	NA
09/92	3.6	0.120	0.007	0.480	0.047	0.74	NA	NA
12/92	1.6	0.043	0.0016	0.170	0.023	0.43	NA	NA
03/93	Not Accessible							
	MCLs	0.001	---	0.680	1.750	---	---	---
	DWAL	---	0.100	---	---	---	---	---

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TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF GROUNDWATER SAMPLES
Exxon Station 7-3006
Oakland, California
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Results in parts per million (ppm).		
<	:	Less than the laboratory detection limit.
NA	:	Not Analyzed
ND	:	Nondetectable
---	:	Not applicable
TPHg	:	Total petroleum hydrocarbons as gasoline using modified EPA method 5030/8015.
BTEX	:	Analyzed using modified EPA method 5030/8020.
TPHd	:	Total petroleum hydrocarbons as diesel using EPA method 3510/8015.
TOG	:	Total Oil and Grease by Standard Method 5520 B/F.
VOC	:	Volatile Organic Compounds analyzed by EPA method 5030/8010.
**	:	See Table 3
*	:	Analyzed by EPA method 624 (volatile organic compounds).
1	:	Chloromethane
2	:	Analyzed for Stoddard Solvent using EPA method 3510/8015.
MCLs	:	Maximum Contaminant Levels in drinking water, DHS (October 1990).
DWAL	:	Drinking Water Action Level, DHS (October 1990).

TABLE 6
RESULTS OF ADDITIONAL LABORATORY ANALYSES OF
GROUNDWATER SAMPLES FROM WELL MW-7 on March 11, 1993
Former Exxon Station 7-3006
Oakland, California
Page 1 of 2
(See notes on page 2)

PARAMETER	CONCENTRATION	MCL	EPA METHOD
INORGANIC ANALYSES			
Total Alkalinity, as $CaCO_3$	360	—	
Bicarbonate Alkalinity, as $CaCO_3$	360	—	
Carbonate Alkalinity, as $CaCO_3$	<10	—	
Hydroxide Alkalinity, as $CaCO_3$	<10	—	
Antimony	<0.06	—	6010/200.7, ICP
Arsenic	0.016	0.05	7060, Furnace AAS
Beryllium	<0.01	—	6010/200.7, ICP
Cadmium	<0.005	0.01	6010/200.7, ICP
Calcium	28	—	6010/200.7, ICP
Chloride	11	250	SM 407A
Chromium	<0.01	0.05	6010/200.7, ICP
Copper	<0.01	1.0	6010/200.7, ICP
Cyanides	<0.005	—	
Iron	1.6	0.3	6010/200.7, ICP
Lead	<0.1	0.05	6010/200.7, ICP
Magnesium	47	—	6010/200.7, ICP
Manganese	1.4	0.05	6010/200.7, ICP
Mercury	0.0004	0.002	7470, Cold Vapor AA
Nickel	<0.02	—	6010/200.7, ICP
Selenium	<0.005	0.01	7740, Furnace AAS
Silver	<0.01	0.05	6010/200.7, ICP
Sodium	63	—	6010, ICP
Sulfate	<1.0	250	375.4
Thallium	<0.2	—	6010/200.7, ICP
Zinc	0.02	5.0	6010/200.7, ICP
pH, at 25°C	7.0	—	—

TABLE 6
RESULTS OF ADDITIONAL LABORATORY ANALYSES OF
GROUNDWATER SAMPLES FROM WELL MW-7 on March 11, 1993
Former Exxon Station 7-3006
Oakland, California
Page 2 of 2
(See notes on page 2)

PARAMETER	CONCENTRATION	MCL	EPA METHOD
Specific Conductance, umhos/cm at 25°C	600	900	—
Total Dissolved Solids	400	500	160.1
Total Hardness, as $CaCO_3$	260	—	—
ORGANIC ANALYSES*			
Organic Lead, as Pb	<0.1	—	DHS Method 338
Benzene	0.18	0.001	624
Toluene	0.006	0.100	624
Ethylbenzene	0.016	0.680	624
Total Xylenes	0.010	1.75	624
Naphthalene	0.027	—	625

Results in parts per million (ppm) unless otherwise noted.

MCL : Maximum Contaminant Level for drinking water standards recommended by the California State Department of Health Services (October 1990).

— : Not Applicable

* : All other compounds were nondetectable.

DHS : Department of Health Services

TABLE 7
RESULTS OF LABORATORY ANALYSES OF VAPOR SAMPLES
Former Exxon Service Station 7-3006
Oakland, California
(Page 1 of 1)

Sample ID	Sample Location	Elapsed Time	TPHg	B	T	E	X
A-VW3-20	VW-3	20 min.	4,200	210	72	21	60
A-VW2-20	VW-2	20 min.	140	2.5	1.4	1.0	4.2
A-VW1-20	VW-1	20 min.	<50	3.6	3.7	0.9	5.6
A-VW1-60	VW-1	60 min.	<50	<0.5	<0.5	<0.5	0.9

Concentrations reported in milligrams per cubic meter (mg/m^3), which is equivalent to ($\mu g/\ell$).

TPHg : total petroleum hydrocarbons as gasoline (analyzed by modified EPA Method 8015). Results reported as equivalent n-octane.

B: benzene, T: toluene, E: ethylbenzene, X: total xylene isomers

BTEX : Analyzed by modified EPA Method 8015/8020

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APPENDIX A

FIELD PROTOCOL

FIELD PROTOCOL

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

Site Safety Plan

The Site Safety Plan describes the safety requirements for the evaluation of gasoline hydrocarbons in soil, groundwater, and the vadose-zone at the site. The site Safety Plan is applicable to personnel of RESNA Industries, Inc. (RESNA) and its subcontractors. RESNA personnel and subcontractors of RESNA scheduled to perform the work at the site 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 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 Service 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, solid-stem or hollow-stem augers. Other methods such as rotary or casing hammer may be used if special conditions are encountered. The augers, sampling equipment and other equipment that comes into contact with the soil are steam-cleaned prior to drilling each boring to minimize the possibility of cross-contamination. Sampling equipment is cleaned with a trisodium phosphate solution and rinsed with clean water between samples. 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 texture, 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. (A standard penetrometer, which does not contain liners, may be used to collect samples when laboratory analysis for volatile components is not an issue. 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. When necessary, the sampler may be pushed by the drill rig hydraulics. In this case, the pressure exerted (in pounds per square inch) is recorded.

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.

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 plastic zip-lock bags or aluminized duct tape; labeled; and promptly placed in iced storage for transport to the laboratory, where compositing is performed.

Monitoring Well Construction

Monitoring wells are constructed in selected borings using clean 2- or 4-inch-diameter, thread-jointed, Schedule 40 polyvinyl chloride (PVC) casing. No chemical cements, glues, or solvents are used in well construction. Each casing bottom is sealed with a threaded end-plug, and each casing top with a locking plug. The screened portions of the wells are constructed of machine-slotted PVC casing with 0.020-inch-wide (typical) slots for initial site wells. Slot size for subsequent wells may be based on sieve analysis and/or well development data. The screened sections in groundwater monitoring wells are placed to allow monitoring during seasonal fluctuations of groundwater levels.

The annular space of each well is backfilled with No. 2 by 12 sand or similar sorted sand (groundwater monitoring wells), or pea gravel (vapor extraction wells) to approximately two feet above the top of the screened casing for initial site wells. The sand pack grain size for subsequent wells may be based on sieve analysis and/or well development data. A 1- to 2-foot-thick bentonite plug is placed above the sand as a seal against cement entering the filter pack. The remaining annulus is then backfilled with a slurry of water, neat cement, and bentonite to approximately one foot below the ground surface.

An aluminum utility box with a PVC apron is placed over each wellhead and set in concrete placed flush with the surrounding ground surface. Each wellhead cover has a seal to protect the monitoring well 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 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 depth of each well is also measured. 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, sediment, and clarity. Obvious product odor is recorded if noted. 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.

Groundwater samples from the wells are collected in approximate order of increasing product concentration, as best known or estimated. Wells which do not contain floating product are purged using a submersible pump. Equipment which comes in contact with the interior of the well or the groundwater is cleaned with Alconox® and deionized or distilled 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. These parameters are measured to the nearest 0.1 pH unit, 0.1 degree F, and 10 umhos/cm, respectively, using portable meters calibrated daily to a buffer and conductivity standard, according to the manufacturer's specifications. A minimum of four well volumes is purged from each well. If the well becomes dewatered, the water level is allowed to recover to at least 80 percent of the initial water level. When recovery of the water level has not reached at least 80 percent of the static water level after two hours, a groundwater sample will be collected when sufficient volume is available to fill the sample container. 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). Sample containers remain sealed until usage at the site. A sample method blank is collected by pouring distilled water into the bailer and then into sample vials. Method blanks are analyzed periodically to verify effective cleaning procedures. 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), sealed with Teflon®-lined caps, and inspected for air bubbles to check for headspace, which would allow volatilization to occur. If a bubble is evident, the cap is removed, more sample is added, and the bottle resealed. The samples are then labeled and promptly placed in iced storage, and the wellhead is secured. A field log documenting sampling 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 Monitoring and Vapor Well Purging

Vapor readings are made with a field-calibrated OVM, which has a lower detection limit of 0.1 ppm. After the OVM is turned on, it is allowed sufficient warm-up time for stabilization. Prior to purging each vadose-zone monitoring well, a well cap with a hose barb drilled and tapped into the well cap is secured to the well. The inlet of the vacuum pump is connected to the hose barb with tubing. OVM readings are taken from the exhaust port of the vacuum pump as the well is purged. Each well is purged for approximately 2 to 5 minutes or until about five well volumes of air have been removed. Ambient readings of the air at the site are taken with the OVM after each well is purged.

Air Sampling

The vacuum pump is first purged with ambient air. Vadose-zone monitoring is then performed as described above. A new Tedlar sample bag is then placed on the outlet port of the vacuum pump with the valve closed. The valve is then opened to allow filling of the bag with an air sample. The valve is closed when the sample bag is 3/4-full (to allow for expansion of gas due to temperature changes), and the bag is removed. The sample pump is purged with ambient air after each sample is taken. A field log documenting sampling procedures is maintained. The samples are transported to the laboratory without exposure to sunlight or cooling, for analysis with 72-hour turnaround.

Sample Labeling and Handling

Sample containers are labeled in the field with the job number, unique sample location, 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.

Aquifer Testing

The initial water levels in wells to be used during the test are measured prior to commencement of pumping. The flow rate of the pump is adjusted to the desired pumping rate, and water levels allowed to recover to initial levels. Pumping then begins, and the starting time of pumping is recorded. Drawdowns in observation wells are recorded at intervals throughout pumping using pressure transducers and manual methods. Evacuated water is stored in a storage tank at the site and remains the responsibility of the client. After the pump is shut off, recovery measurements are taken in the wells until recovery is at least 80 percent of the initial water level. Barometric pressure and tidal information (if appropriate) are collected for the time interval of the pumping test to allow evaluation of possible effects of atmospheric pressure and tidal fluctuations on the groundwater levels.

Quality Assurance/Quality Control

The sampling and analysis procedures employed by RESNA for groundwater sampling and monitoring follow regulatory guidance for quality assurance/quality control (QA/QC). Quality control is maintained by site-specific field protocols and quality control checks performed by the laboratory. Laboratory and field handling of samples may be monitored by including QC samples for analysis. QC samples may include any combination of the following. The number and types of QC samples are selected and analyzed on a project-specific basis.

Trip blanks - Trip blanks are sent to the project site, and travel with project site samples. They are not opened, and are returned from a project site with the samples for analysis.

Field blank - Prepared in the field using organic-free water. Field blanks accompany project site samples to the laboratory and are analyzed periodically for specific chemical compounds present at the project site where they were prepared.

Duplicates - Duplicate samples are collected from a selected well and project site. They are analyzed at two different laboratories, or at the same laboratory under different labels.

Equipment blank - Periodic QC samples are collected from field equipment rinsate to verify adequate cleaning procedures.

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APPENDIX B

PREVIOUS ENVIRONMENTAL WORK

PREVIOUS SITE ENVIRONMENTAL WORK

Excavation of USTs -1987

In April 1987, four USTs (6,000-, 10,000-, 8,000-, and 1000-gallons) that stored extra-unleaded, regular unleaded, regular leaded gasoline, and used-oil, respectively, were removed by Exxon's contractor. The gasoline USTs were located in the southeast corner of the site and the used-oil tank was located behind the station building. Soil samples collected after tank removal indicated the presence of total volatile hydrocarbons in concentrations greater than 1,000 parts per million (ppm) in the gasoline UST pit (AGS Report No. 87042-1, May 13, 1987). A sample collected from soil excavated from the waste-oil UST pit contained no detectable total extractable hydrocarbons (TEH).

Removal of the product piping lead to the exposure of a black soil layer in the trenches that appeared to contain relatively high hydrocarbon concentrations. The layer was sampled and laboratory results indicated the presence of 434 ppm of TEH.

Initial Soil Excavation - 1987

In May, 1987, AGS observed the over-excavation of the gasoline UST pit and product line trenches. A black soil lens that appeared to contain hydrocarbons was noticed at approximately 14 feet below the ground surface in the southwestern wall of the pit, and free-phase product was later observed seeping into the pit from this lens. The excavation indicated that this lens became larger southwest of the tank pit (AGS Report No. 87042-2, July 10, 1987).

Soil Vapor Survey - 1987

In June 1987, Exxon contracted with EA Engineering, Science, and Technology, Inc., of Lafayette, California, to perform a soil-vapor survey. The results of the survey indicated that the highest hydrocarbon-vapor concentrations were between the former gasoline UST pit and the southern pump islands, and extended southwest towards Coliseum Way.

Initial Site Investigation - 1987 to 1988

In September 1987 and May 1988, nine groundwater monitoring wells, MW-1 through MW-9 were installed. The wells were installed to evaluate the impact of hydrocarbons on groundwater. Soil samples from the borings for wells MW-1 through MW-9 contained up to 2,689 ppm of total petroleum hydrocarbons as gasoline (TPHg) and up to 4,261 ppm of total petroleum hydrocarbons as diesel (TPHd). Soon after the wells were installed, free-phase product was measured in wells MW-2, MW-4, and MW-5 in the area of the former gasoline USTs and in well MW-8 in the former area of the former product piping (AGS Report No. 87042-5, August 5, 1988).

Additional Soil Excavation - 1989

In May 1989, Exxon contracted with AGS to excavate additional soil from the southern part of the existing gasoline UST pit (AGS Report No. 87042-6, October 16, 1989). On July 1989, well MW-5 was properly destroyed to start excavating the southern boundary of the gasoline pit to a maximum depth of about 10 feet (just above the ground-water level). Soil with debris (bricks, lumber, etc.) was found in the southern part of the pit, and soil in this area contained the most evidence of hydrocarbons. In addition, two metal pipes were exposed in the southern wall of the excavation that appeared to be former product lines. The pipes appeared to run west toward Coliseum Way. Soil was excavated from the southern and southwestern sides of the pit as far towards Coliseum Way as possible.

On the northwestern side of the pit, two exploratory trenches were excavated to evaluate the extent of hydrocarbons while minimizing the volume of excavated soil. Moderate organic vapor meter (OVM) readings (200 to 500 ppm) were taken from the soil along both trenches. Four samples from the trenches and southern walls of the excavation were collected from just above the groundwater (9 feet below grade). The laboratory results showed 3.8 to 290 ppm TPHg. One sample from 9 feet below grade in the southern part of the pit was analyzed for TPHd and contained 4,200 ppm.

An estimated 300 cubic yards of soil were excavated and stockpiled on the site. Analytical results of six composite samples showed 63 to 330 ppm TPHg and 250 to 3,800 ppm TPHd. Exxon subsequently arranged to have the soil hauled to an appropriate disposal facility.

Additional Site Investigation - 1989

To delineate the extent of diesel and gasoline in the soil and groundwater, AGS drilled 11 borings and installed four additional groundwater monitoring wells (MW-10 through MW-13) in November 1989. In soil analyzed from the borings, the highest concentrations of TPHd (up to 4,000 ppm) were found in the southwestern part of the site, and the highest concentrations of TPHg (3,400 ppm) were found adjacent to the excavation at Ed's Auto Parts, which is adjacent to the northeastern property line of the Exxon site (AGS Report 87042-6R, January 30, 1990).

Additional Site Investigation - 1990

Based on the results of previous investigations, AGS drilled 12 shallow soil borings and two deeper borings in which monitoring wells were installed. The soil borings (B-21 through B-30) were drilled to delineate the extent of diesel and gasoline hydrocarbons in the subsurface soil. Concentrations of TPHg in the collected soil samples ranged from nondetectable to 3,232 ppm; TPHd concentrations ranged from nondetectable to 2,115 ppm. Monitoring well MW-14 was installed adjacent to the excavation at Ed's Auto Parts to evaluate offsite sources of hydrocarbons. Well MW-15 was installed east of the location of the former USTs to delineate hydrocarbons in

the groundwater. Low concentrations of TPHg, TPHd, and BTEX were detected in MW-14 and MW-15 (AGS Report No. 87042-9R, May 21, 1991).

Limited Records Search - 1993

As requested by Exxon, RESNA conducted a records search on the area surrounding Former Exxon Station 7-3006. The search was limited to available information from the files of the Alameda County Department of Environmental Health (ACDEH), the California Regional Water Quality Control Board (CRWQCB), and the City of Oakland Fire Department (OFD). RESNA's search focused on historical usage of the surrounding area and any previous environmental work performed in the vicinity of the site.

Based on the results of the record search and previous investigations at the subject site, RESNA concluded the following: results of soil sampling at the adjacent Ed's Auto Parts (Hatton property) suggests that USTs on that property appear to have released high-boiling-point hydrocarbons used for dry cleaning (Stoddard Solution); because diesel hydrocarbons (TPHd) have been detected in groundwater beneath the upgradient portion (in well MW-14) of the subject site, it appears that a diesel hydrocarbon plume exists that may have migrated from an offsite source. A potential upgradient diesel hydrocarbon and Stoddard Solution source appears to be Ed's Auto Parts (Hatton) property; because TPHd have been detected in soil in the downgradient portion (in boring B-3) of the subject site, it appears that the diesel hydrocarbons may have come from a previous onsite source. Potential diesel hydrocarbon sources at the subject site (previous to occupation by Exxon) include the former Standard Oil Company storage facility and the Ed's Auto Parts (Hatton) property; because the onsite upgradient portion of the diesel plume appears to be limited to the vicinity of the northeastern portion of the site (in the vicinity of well MW-14 and boring B-14) and gasoline hydrocarbons (TPHg) were detected only in an unsaturated confining clay layer beneath the shallowest water-bearing zone in the northeastern portion of the site (in the vicinity of well MW-14) and in the possible capillary fringe/water bearing unit in boring B-14, it appears that petroleum hydrocarbons may have migrated from the former tank pit on the adjoining Ed's Auto Parts (Hatton) property.

RESNA
Working To Restore Nature

APPENDIX C

WELL CONSTRUCTION PERMITS

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

4 February 1993

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

Gentlemen:

Enclosed is drilling permit 93052 for a monitoring well construction project at 720 High Street in Oakland for Exxon.

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 Wyman Hong or me at 484-2600.

Very truly yours,

Craig A. Mayfield

Craig A. Mayfield
Water Resources Engineer III

WH:mm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94588 ♦ (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT Exxon Station
720 High Street
Oakland, CA 94601

CLIENT
Name Exxon Company USA
Address P.O. Box 4416 Phone (713) 656-7755
City Houston, TX Zip 77210-4415

APPLICANT
Name RESNA Industries Inc
3315 Almaden Exp., Suite 34
Address Phone (800) 926-0815
City San Jose, CA Zip 95118

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection		General	
Water Supply		Contamination	X
Monitoring	X	Well Destruction	

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other ___
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. 489288

WELL PROJECTS
Drill Hole Diameter 12 in. Maximum
Casing Diameter 4 in. Depth 10 ft.
Surface Seal Depth 2 ft. Number 3

GEOTECHNICAL PROJECTS
Number of Borings 1 Maximum
Hole Diameter ___ in. Depth ___ ft.

ESTIMATED STARTING DATE Feb. 11, 1993
ESTIMATED COMPLETION DATE Mar. 11, 1993

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

APPLICANT'S SIGNATURE Joanne Buckstad / RESNA Date 2/1/93

FOR OFFICE USE

PERMIT NUMBER 93052
LOCATION NUMBER ___

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. 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 drilling logs and location sketch for geotechnical projects.
3. 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.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

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

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 2 Feb 93
Wyman Hong

121989

APPENDIX D

WELLHEAD SURVEY

RON ARCHER
CIVIL ENGINEER, INC.

CONSULTING • PLANNING • DESIGN • SURVEYING

4133 Mohr Ave., Suite E • Pleasanton, CA 94566
(510) 462-9372

MAR 1993

REGISTERED PROFESSIONAL ENGINEER
RONALD R. ARCHER
No. 23721
EXP 12/31/93
CIVIL
STATE OF CALIFORNIA

JOB NO. 1632

DECEMBER 13, 1990
* REVISED MARCH 17, 1993

ELEVATIONS OF EXISTING MONITOR WELLS AT THE FORMER EXXON GAS STATION NØ. 7-3006 (NOW COAST GASOLINE), LOCATED AT 720 HIGH STREET AT COLISEUM WAY, CITY OF OAKLAND, ALAMEDA COUNTY CALIFORNIA.

FOR: RESNA INDUSTRIES INC.
PROJECT NO. 130006.02

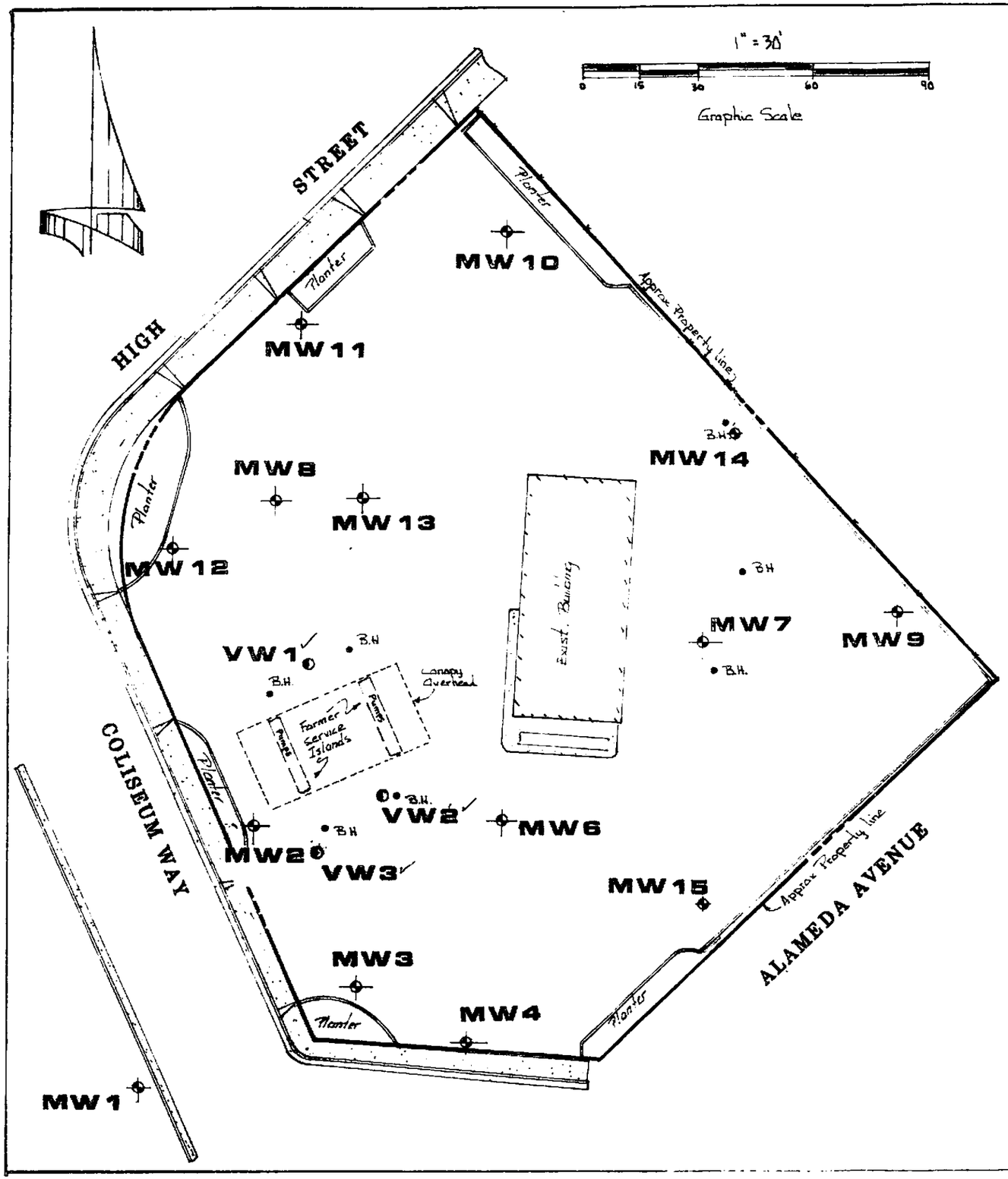
BENCHMARK: NØ. 20-G
TOP OF BRASS DISC SET IN A STANDARD MONUMENT CASING AT THE EASTERLY EDGE OF A.C. WALKWAY OF HIGH STREET ABOUT 12 FEET SOUTHERLY OF SOUTHERN MOST RAIL OF THE SOUTHERN PACIFIC RAILROAD TRACKS, 9.8 FEET EAST OF EASTERLY CURBLINE ON HIGH STREET. ELEVATION TAKEN AS 16.757 M.S.L.

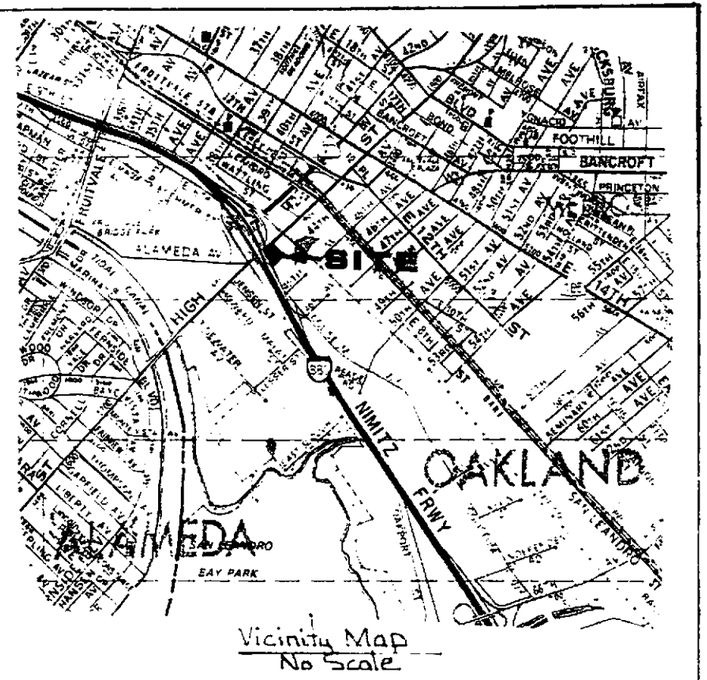
MONITOR WELL DATA TABLE

WELL DESIGNATION	ELEV	DESCRIPTION
MW1	12.87	TOP OF PVC CASING
	13.05	TOP OF BOX
MW2	12.98	TOP OF PVC CASING
	13.58	TOP OF BOX
MW3	12.94	TOP OF PVC CASING
	13.37	TOP OF BOX
MW4	12.77	TOP OF PVC CASING
	13.22	TOP OF BOX
MW5	-----	DESTROYED
MW6	14.27	TOP OF PVC CASING
	14.76	TOP OF BOX

MONITOR WELL DATA TABLE

WELL DESIGNATION	ELEV	DESCRIPTION
MW7	14.84	TOP OF PVC CASING
	15.40	TOP OF BOX
MW8	13.45	TOP OF PVC CASING
	13.99	TOP OF BOX
MW9	14.64	TOP OF PVC CASING
	15.07	TOP OF BOX
MW10	14.05	TOP OF PVC CASING
	14.66	TOP OF BOX
MW11	13.55	TOP OF PVC CASING
	13.91	TOP OF BOX
MW12	12.61	TOP OF PVC CASING
	13.17	TOP OF BOX
MW13	14.20	TOP OF PVC CASING
	14.55	TOP OF BOX
MW14	15.18	TOP OF PVC CASING
	15.72	TOP OF BOX
MW15	13.73	TOP OF PVC CASING
	14.42	TOP OF BOX
* VW1	14.01	TOP OF PVC CASING
	14.25	TOP OF BOX
* VW2	14.09	TOP OF PVC CASING
	14.42	TOP OF BOX
* VW3	13.37	TOP OF PVC CASING
	13.74	TOP OF BOX





Vicinity Map
No Scale

DECEMBER 13. 1990 JOB NO. 1632
* REVISED MARCH 17. 1993

PLAT SHOWING EXISTING MONITOR WELLS AT THE FORMER EXXON GAS STATION NO. 7-3006 (NOW COAST GASOLINE). LOCATED AT 720 HIGH STREET AT COLISEUM WAY. CITY OF OAKLAND. ALAMEDA COUNTY CALIFORNIA.

FOR: RESNA INDUSTRIES INC.
PROJECT NO. 130006.02

REGISTERED PROFESSIONAL ENGINEER
RONALD R. ARCHER
No. 23721
EXP. 12/31/93
CIVIL
STATE OF CALIFORNIA

RON ARCHER
CIVIL ENGINEER, INC.
CONSULTING • PLANNING • DESIGN • SURVEYING
4133 Mohr Ave., Suite E • Pleasanton, CA 94566
462 9372

APPENDIX E

FIGURES OF PUMPING TEST DATA

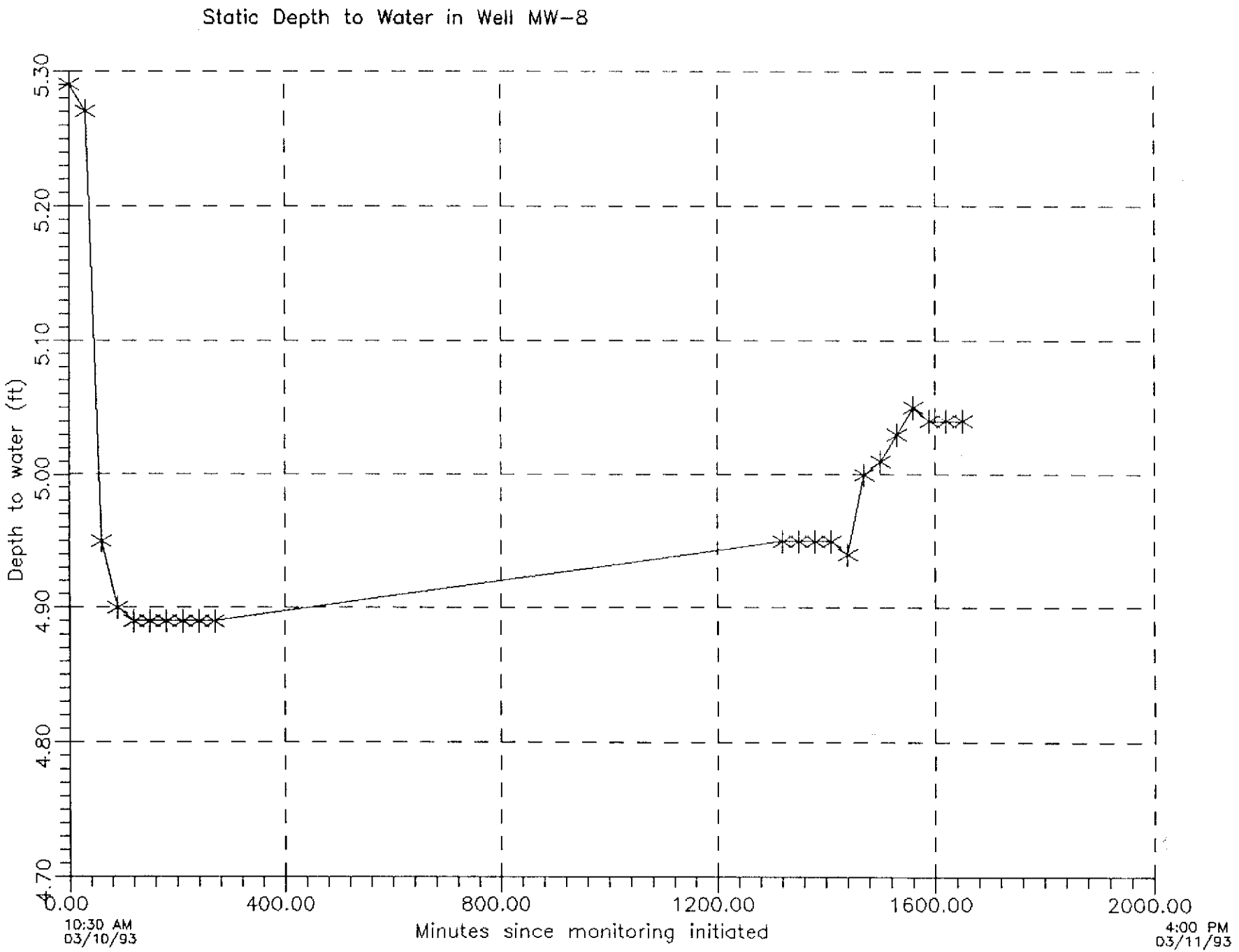

Static Depth to Water in Well MW-8
Depth to water (ft)
5.30
5.20
5.10
5.00
4.90
4.80
4.70
0.00
400.00
800.00
1200.00
1600.00
2000.00
10:30 AM
03/10/93
Minutes since monitoring initiated
4:00 PM
03/11/93

PLATE 1E

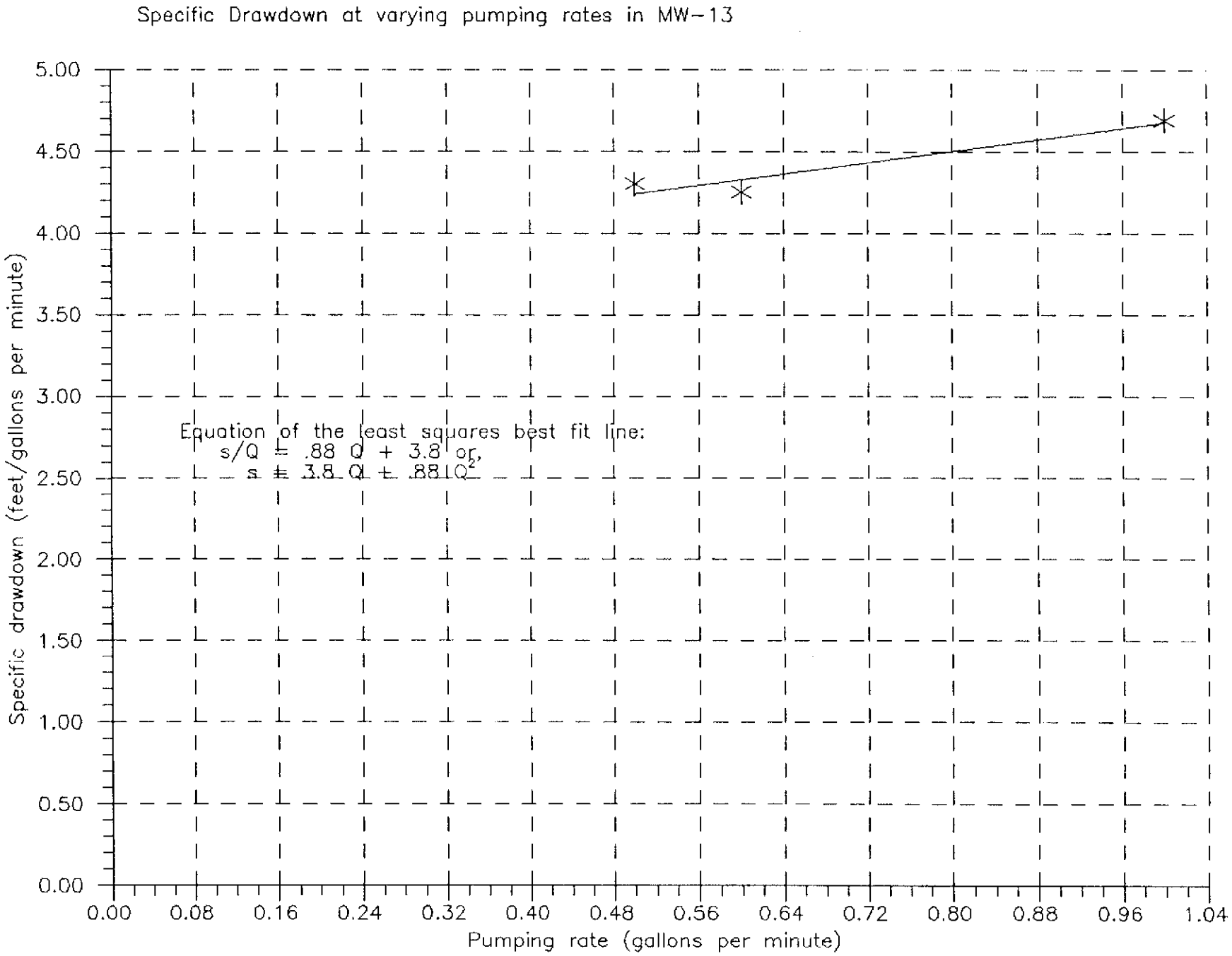
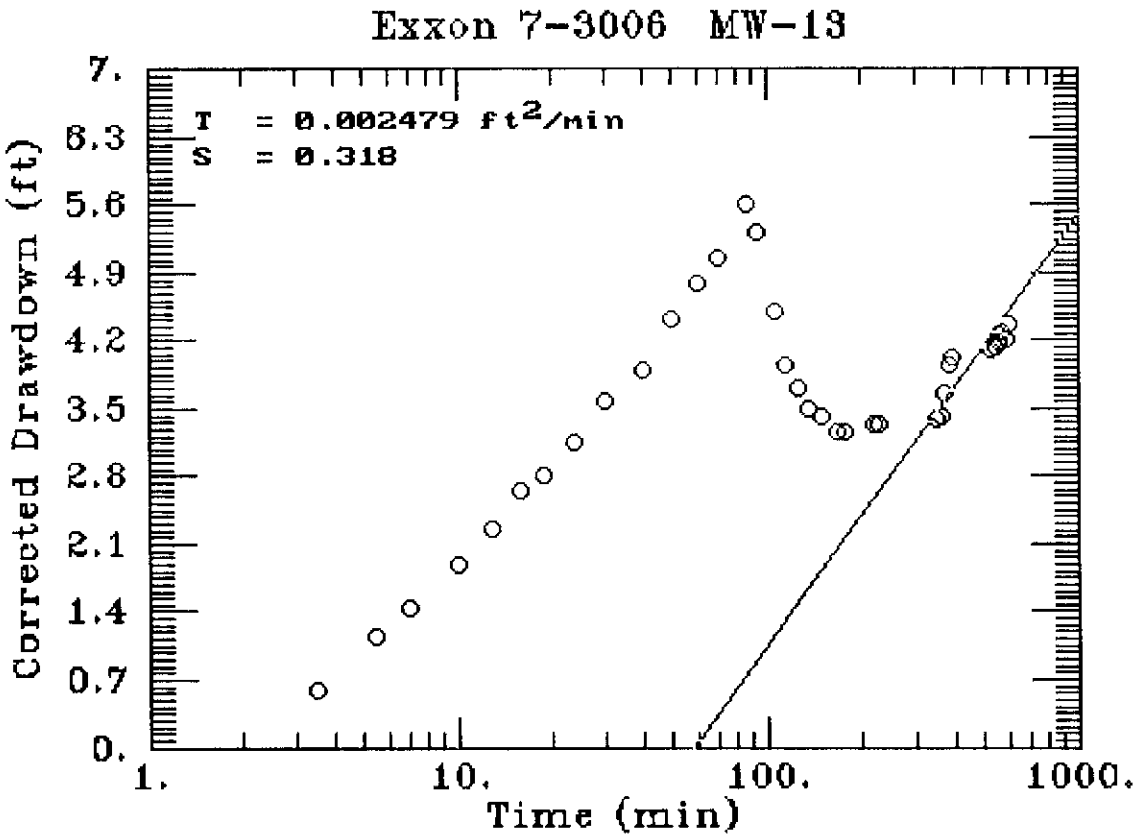

Specific Drawdown at varying pumping rates in MW-13
Specific drawdown (feet/gallons per minute)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Equation of the least squares best fit line:
s/Q = .88 Q + 3.8 or,
s = 3.8 Q + .88 Q²
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
0.64
0.72
0.80
0.88
0.96
1.04
Pumping rate (gallons per minute)

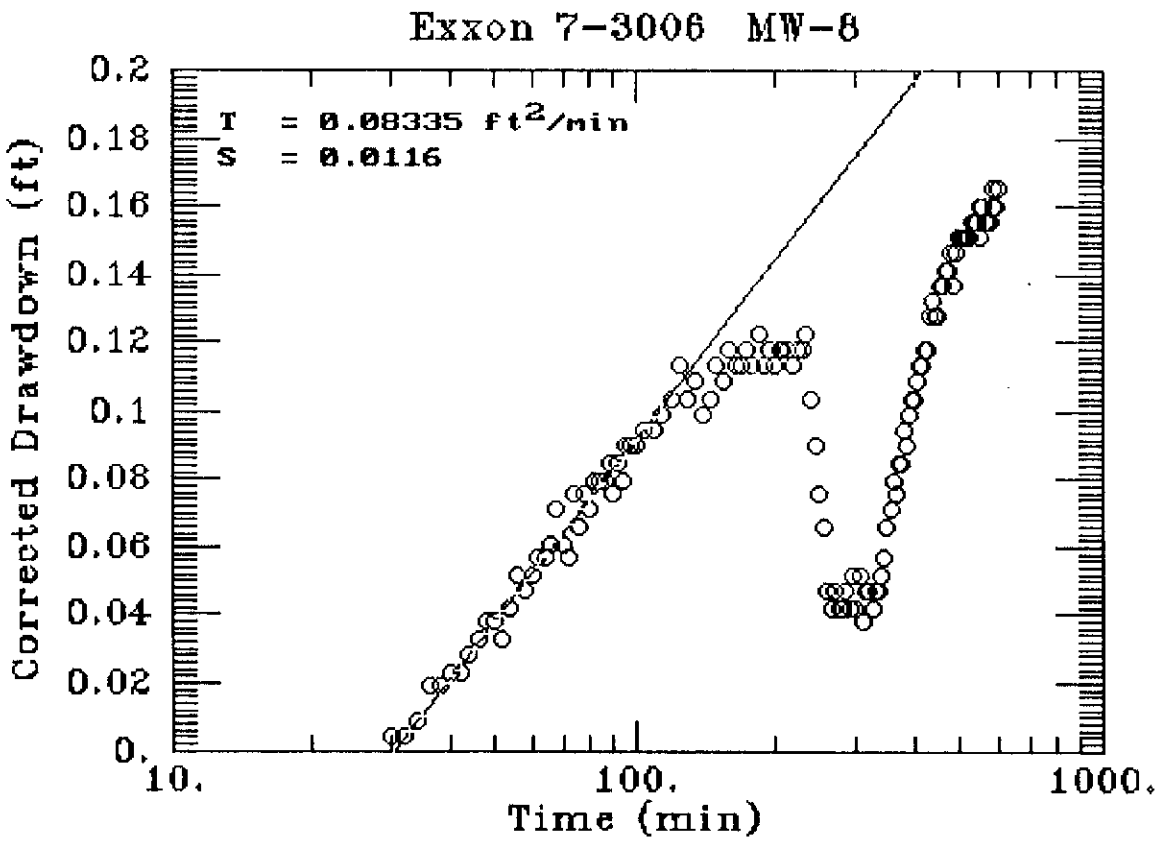
PLATE 2E



AQTESOLV

GERAGHTY & MILLER, INC.
Modeling Group

PLATE 3E

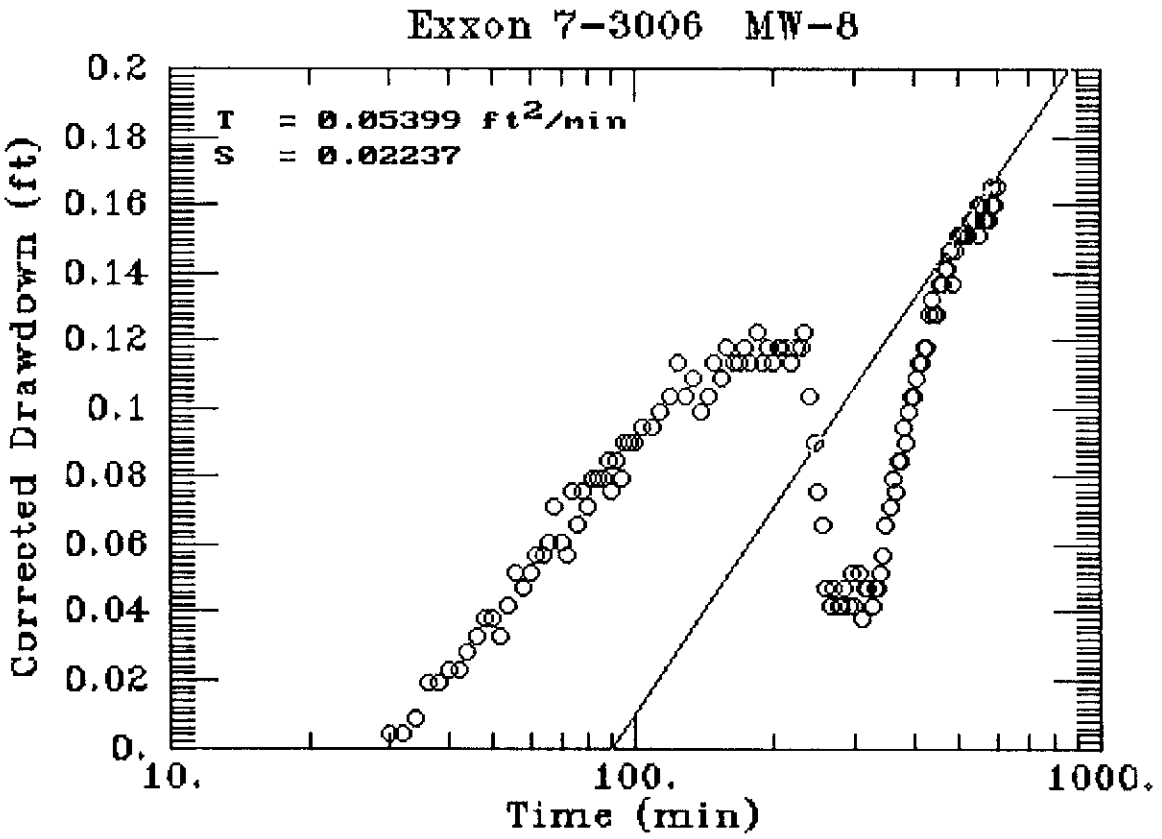


AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

PLATE 4E

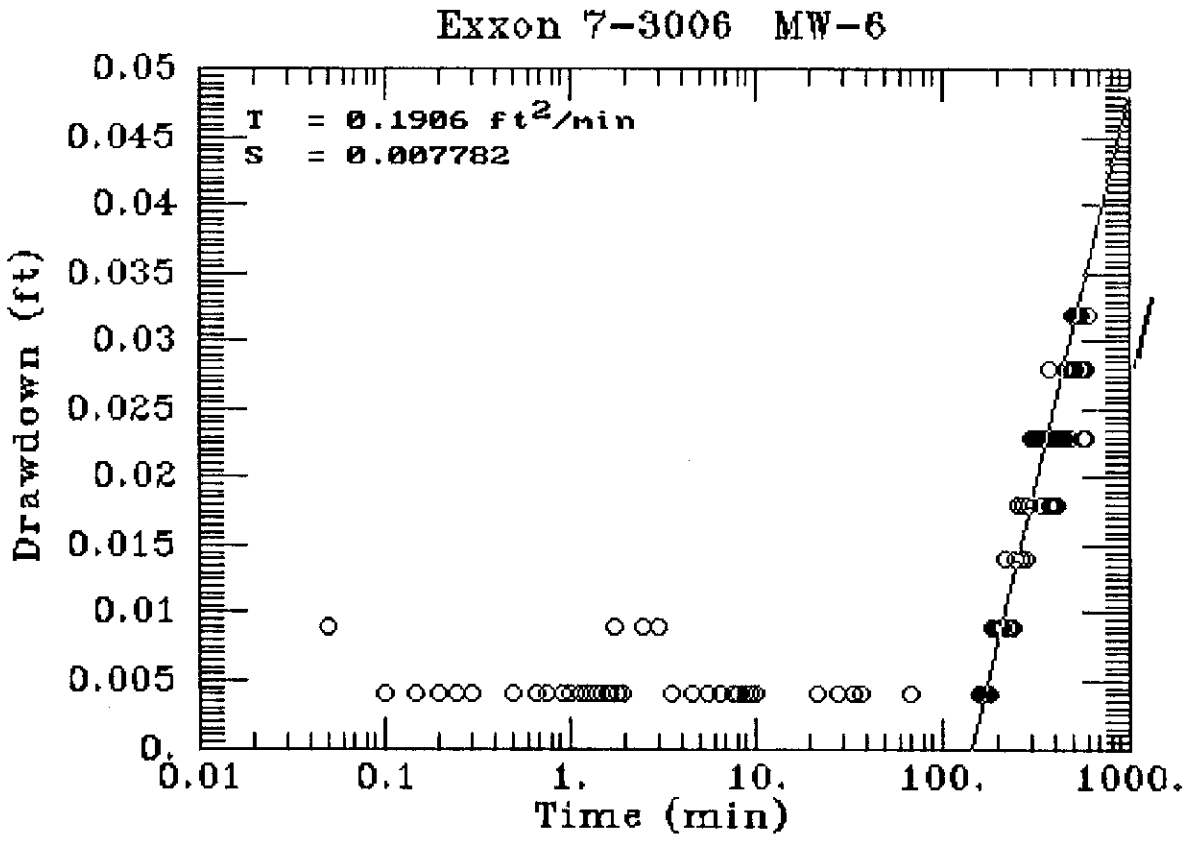


AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

PLATE 5E

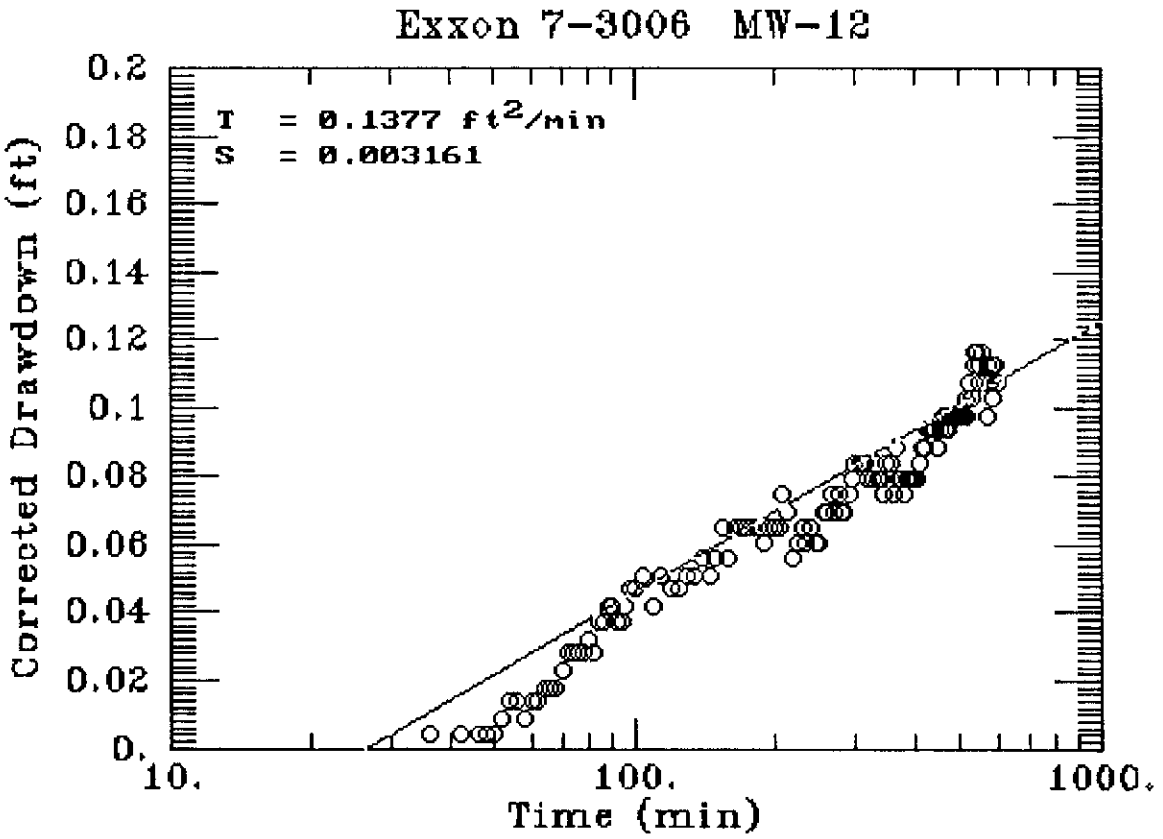


AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

PLATE 6E

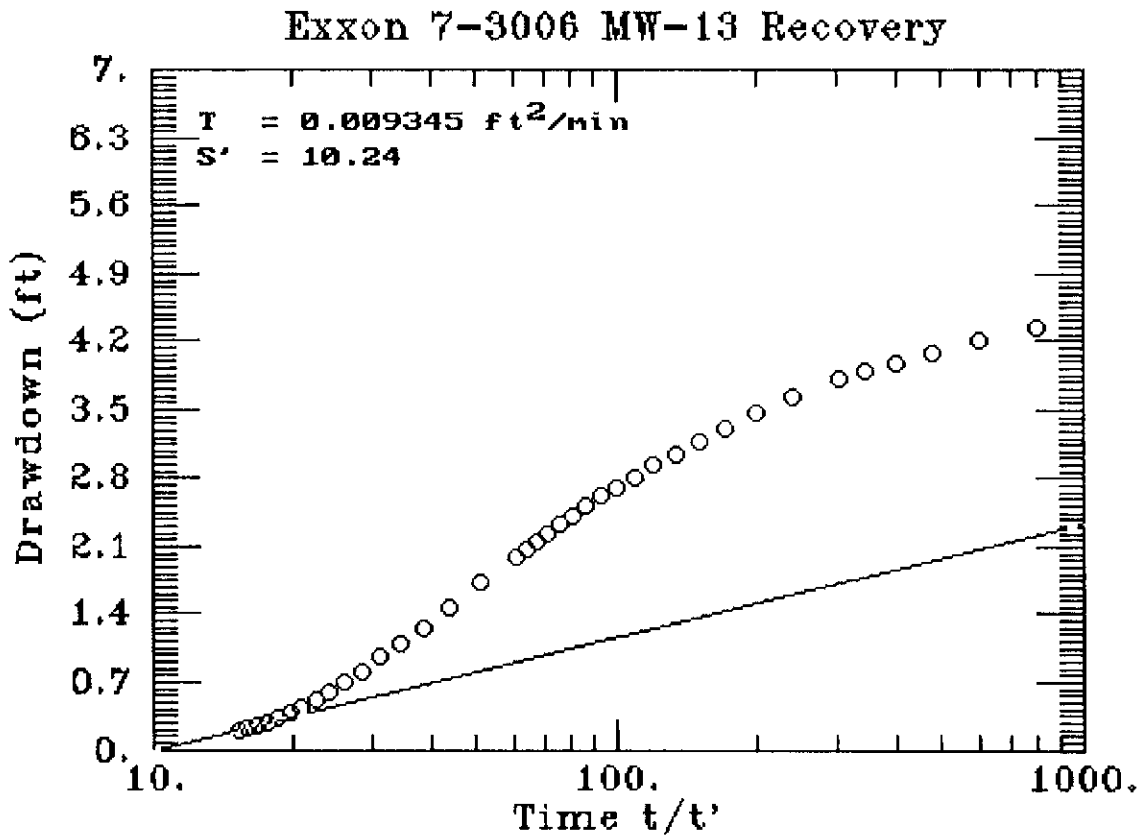


AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

PLATE 7E



AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

PLATE 8E

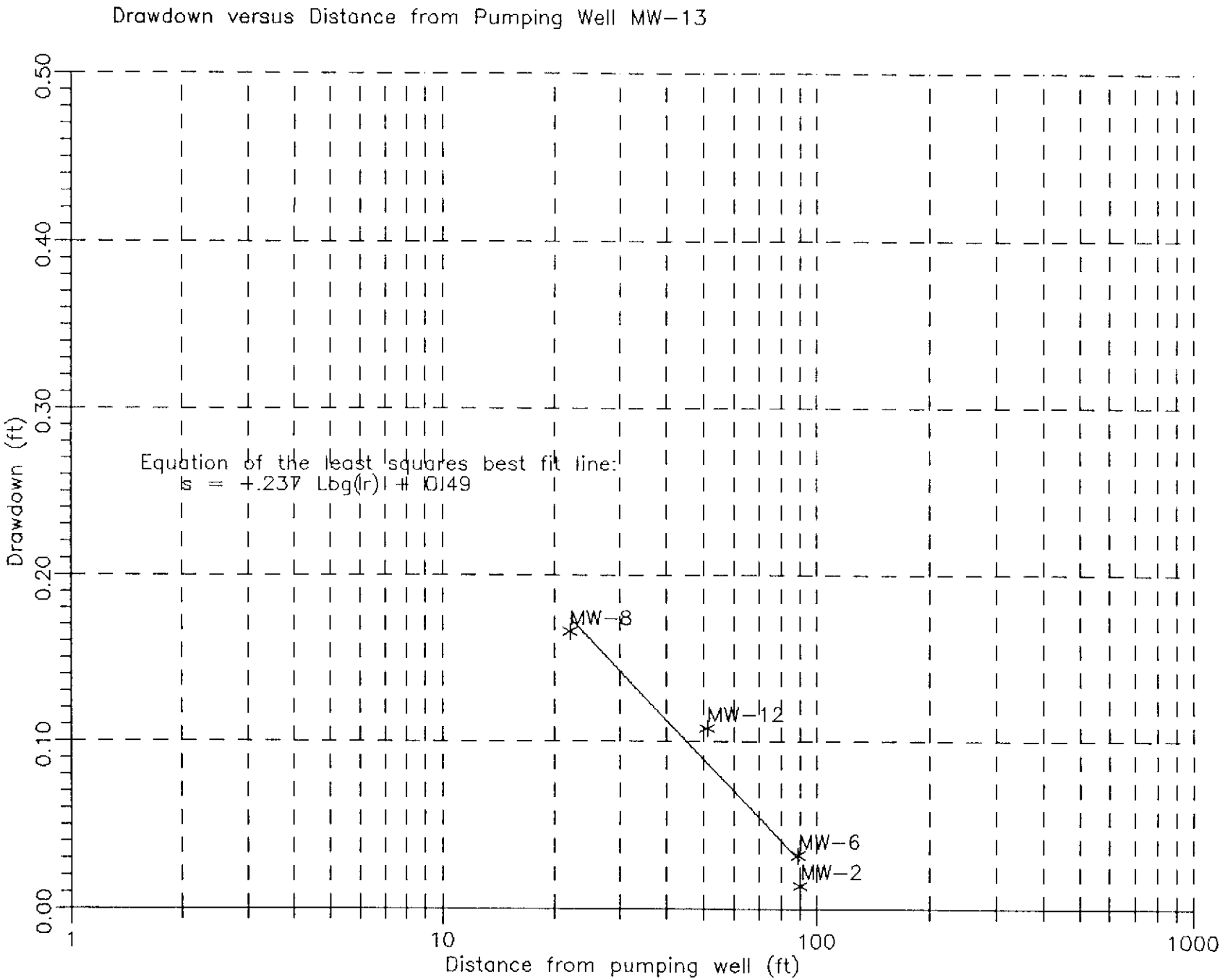

Drawdown versus Distance from Pumping Well MW-13
Drawdown (ft)
0.00
0.10
0.20
0.30
0.40
0.50
Equation of the least squares best fit line:
s = +.237 Log(r) + .0149
MW-8
MW-12
MW-6
MW-2
1
10
100
1000
Distance from pumping well (ft)

PLATE 9E

APPENDIX F

LABORATORY ANALYSIS REPORTS AND CHAIN OF CUSTODY RECORDS

130006.02

pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

FEB 2 4 1993

February 19, 1993

Mr. Dave Higgins
Resna/Applied Geosystems
3315 Almaden Expressway Suite 34
San Jose, CA 95118

RE: PACE Project No. 430212.520
Client Reference: Exxon 7-3006 (EE)

Dear Mr. Higgins:

Enclosed is the report of laboratory analyses for samples received February 12, 1993.

Footnotes are given at the end of the report.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

for Stephanie Matzo
Project Manager

Enclosures

11 Digital Drive
Novato, CA 94949
TEL: 415-883-6100
FAX: 415-883-2673

pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Resna/Applied Geosystems
3315 Almaden Expressway Suite 34
San Jose, CA 95118

February 19, 1993
PACE Project Number: 430212520

Attn: Mr. Dave Higgins

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009308	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-3.5-B35	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	5.0	33	02/17/93
Toluene	ug/kg wet	5.0	ND	02/17/93
Ethylbenzene	ug/kg wet	5.0	ND	02/17/93
Xylenes, Total	ug/kg wet	5.0	6.2	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	02/17/93
Date Extracted			02/15/93	

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FAX: 415-883-2673

REPORT OF LABORATORY ANALYSIS

Mr. Dave Higgins
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February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009316	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-6.5-B35	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	10000	120000	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	50	2000	02/17/93
Toluene	ug/kg wet	50	3200	02/17/93
Ethylbenzene	ug/kg wet	50	1800	02/17/93
Xylenes, Total	ug/kg wet	50	7300	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	6.3	02/16/93
Date Extracted			02/15/93	

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Novato, CA 94949
TEL: 415-883-6100
FAX: 415-883-2673

REPORT OF LABORATORY ANALYSIS

Mr. Dave Higgins
Page 3

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009324	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-7.5-B35	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	20000	410000	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	100	3700	02/17/93
Toluene	ug/kg wet	100	9600	02/17/93
Ethylbenzene	ug/kg wet	100	8200	02/17/93
Xylenes, Total	ug/kg wet	100	35000	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	30(H)	02/17/93
Date Extracted			02/15/93	

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pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Dave Higgins
Page 4

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009332	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-9-B35	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	40000	950000	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	200	7600	02/17/93
Toluene	ug/kg wet	200	28000	02/17/93
Ethylbenzene	ug/kg wet	200	21000	02/17/93
Xylenes, Total	ug/kg wet	200	89000	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	12	02/16/93
Date Extracted			02/15/93	

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FAX: 415-883-2673

REPORT OF LABORATORY ANALYSIS

Mr. Dave Higgins
Page 5

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009340	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-4-B36	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	1700	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	5.0	23	02/17/93
Toluene	ug/kg wet	5.0	ND	02/17/93
Ethylbenzene	ug/kg wet	5.0	ND	02/17/93
Xylenes, Total	ug/kg wet	5.0	21	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	02/16/93
Date Extracted			02/15/93	

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TEL: 415-883-6100
FAX: 415-883-2573

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Dave Higgins
Page 6

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009359	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-7-B36	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/16/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	02/16/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/16/93
Benzene	ug/kg wet	5.0	5.4	02/16/93
Toluene	ug/kg wet	5.0	ND	02/16/93
Ethylbenzene	ug/kg wet	5.0	ND	02/16/93
Xylenes, Total	ug/kg wet	5.0	ND	02/16/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	02/16/93
Date Extracted			02/15/93	

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Mr. Dave Higgins
Page 7

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009367	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-9.5-B36	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	4000	160000	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	20	650	02/17/93
Toluene	ug/kg wet	20	340	02/17/93
Ethylbenzene	ug/kg wet	20	2300	02/17/93
Xylenes, Total	ug/kg wet	20	5200	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	02/16/93
Date Extracted			02/15/93	

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Mr. Dave Higgins
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February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009375	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-4-B37	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	4000	92000	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	20	2100	02/17/93
Toluene	ug/kg wet	20	750	02/17/93
Ethylbenzene	ug/kg wet	20	2400	02/17/93
Xylenes, Total	ug/kg wet	20	7900	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	5.8	02/16/93
Date Extracted			02/15/93	

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REPORT OF LABORATORY ANALYSIS

Mr. Dave Higgins
Page 9

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009383	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-6-B37	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	10000	220000	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	50	2000	02/17/93
Toluene	ug/kg wet	50	5600	02/17/93
Ethylbenzene	ug/kg wet	50	5800	02/17/93
Xylenes, Total	ug/kg wet	50	21000	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	21	02/17/93
Date Extracted			02/15/93	

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Mr. Dave Higgins
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FOOTNOTES
for pages 1 through 10

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

MDL	Method Detection Limit
ND	Not detected at or above the MDL.
(H)	Hydrocarbons greater than C22 were detected.

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REPORT OF LABORATORY ANALYSIS

Mr. Dave Higgins
Page 10

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0009391	
Date Collected:			02/11/93	
Date Received:			02/12/93	
Client Sample ID:			S-7.5-B37	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	02/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	10000	220000	02/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	02/17/93
Benzene	ug/kg wet	50	1700	02/17/93
Toluene	ug/kg wet	50	2900	02/17/93
Ethylbenzene	ug/kg wet	50	4900	02/17/93
Xylenes, Total	ug/kg wet	50	21000	02/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	14	02/17/93
Date Extracted			02/15/93	

These data have been reviewed and are approved for release.

Darrell C. Cain
Regional Director

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REPORT OF LABORATORY ANALYSIS

QUALITY CONTROL DATA

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

EXTRACTABLE FUELS EPA 3550/8015
Batch: 70 18806
Samples: 70 0009308, 70 0009316, 70 0009324, 70 0009332, 70 0009340
70 0009359, 70 0009367, 70 0009375, 70 0009383, 70 0009391

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Extractable Fuels, as Diesel	mg/kg	5.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Extractable Fuels, as Diesel	mg/kg	5.0	33.3	79%	70%	12%

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Mr. Dave Higgins
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QUALITY CONTROL DATA

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

PURGEABLE FUELS AND AROMATICS
Batch: 70 18731
Samples: 70 0009308, 70 0009316, 70 0009324, 70 0009332, 70 0009340
70 0009359, 70 0009367, 70 0009375, 70 0009383, 70 0009391

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/kg wet	1.0	ND
Toluene	ug/kg wet	1.0	ND
Ethylbenzene	ug/kg wet	1.0	ND
Xylenes, Total	ug/kg wet	1.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	1000	91%	87%	4%
Benzene	ug/kg wet	1.0	40.0	108%	108%	0%
Toluene	ug/kg wet	1.0	40.0	104%	104%	0%
Ethylbenzene	ug/kg wet	1.0	40.0	102%	102%	0%
Xylenes, Total	ug/kg wet	1.0	120	106%	106%	0%

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Mr. Dave Higgins
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FOOTNOTES
for pages 12 through 13

February 19, 1993
PACE Project Number: 430212520

Client Reference: Exxon 7-3006 (EE)

MDL	Method Detection Limit
ND	Not detected at or above the MDL.
RPD	Relative Percent Difference

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☐ Huntington Beach, CA, 5702 Bolsa Avenue, 92649 (714) 892-2565

Consultant's Name: RESNA Industries

Address: 3315 Almaden Exp. #34, San Jose, CA 95118

Site Location: 720 High St.

Project #:

Consultant Project #: 130006.02

Consultant Work Release #:

Project Contact: Dave Higgins

Phone #: (408) 264-7723 Fax #: 264-7345

Laboratory Work Release #: 093C0303 CC #

EXXON Contact: Harla Gruensler ☐ EE ☐ C&M

Phone #: (510) 246-8776 Fax #:

EXXON RAS #: 7-3006

Sampled by (print): Jeanne Buckthal

Sampler's Signature: Jeanne Buckthal

Shipment Method: Courier

Air Bill #:

Shipment Date: 2/12/93

TAT: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Standard (5 day)

ANALYSIS REQUIRED

Sample Condition as Received
Temperature °C: PACE
Cooler #: COURIER
Inbound Seal Yes No
Outbound Seal Yes No

Sample Description	Collection Date/Time	Matrix Soil/Water	Prsv	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	TRPH EPA 418.1	COMMENTS
S-3½-B35	2-11-93 9:55	soil	—	1	930.8	X	X		
S-6½-B35	10:10		—	1	31.6	X	X		
S-7½-B35	10:20		—	1	32.4	X	X		
S-9-B35	10:40		—	1	33.2	X	X		
S-4-B36	12:30		—	1	34.0	X	X		
S-7-B36	12:40		—	1	35.9	X	X		
S-9½-B36	1:10		—	1	36.7	X	X		
S-4-B37	4:40		—	1	37.5	X	X		
S-6-B37	5:00		—	1	38.3	X	X		
S-7½-B37	5:10		—	1	39.1	X	X		

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time
Jeanne Buckthal / RESNA	2-12-93	8:30	Donald Zakarski Pace	2/12/93	1345
Donald Zakarski Pace	2-12-93	1645	J. Dep / Pace	2/12/93	1647

Additional Comments:

Distribution: White - Original Yellow - Exxon Pink - Lab Goldenrod - Consultant Field Staff

130006.02

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REPORT OF LABORATORY ANALYSIS

February 24, 1993

Mr. Marc Briggs
Resna/Applied Geosystems
3315 Almaden Expressway Suite 34
San Jose, CA 95118

RE: PACE Project No. 430218.510
Client Reference: Exxon 7-3006 (EE)

Dear Mr. Briggs:

Enclosed is the report of laboratory analyses for samples received February 18, 1993.

Footnotes are given at the end of the report.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Stephanie Matzo

Stephanie Matzo
Project Manager

Enclosures

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Novato, CA 94949
TEL: 415-883-6100
FAX: 415-883-2673

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REPORT OF LABORATORY ANALYSIS

Resna/Applied Geosystems
3315 Almaden Expressway Suite 34
San Jose, CA 95118

February 24, 1993
PACE Project Number: 430218510

Attn: Mr. Marc Briggs

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0012198	
Date Collected:			02/18/93	
Date Received:			02/18/93	
			A-VW3-20	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
GASOLINE AND AROMATICS-AIR (M8015/8020)				
Non-Methane Hydrocarbons, as n-octane	ug/L	250	4200	02/19/93
Volatile Aromatic Compounds (EPA M8020)			-	02/19/93
Benzene	ug/L	1.0	210	02/19/93
Toluene	ug/L	1.0	72	02/19/93
Ethylbenzene	ug/L	1.0	21	02/19/93
Xylenes, Total	ug/L	1.0	60	02/19/93

REPORT OF LABORATORY ANALYSIS

February 24, 1993
PACE Project Number: 430218510

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0012201	
Date Collected:			02/18/93	
Date Received:			02/18/93	
Client Sample ID:			A-VW2-20	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
GASOLINE AND AROMATICS-AIR (M8015/8020)				
Non-Methane Hydrocarbons, as n-octane	ug/L	50	140	02/19/93
Volatile Aromatic Compounds (EPA M8020)			-	02/19/93
Benzene	ug/L	0.5	2.5	02/19/93
Toluene	ug/L	0.5	1.4	02/19/93
Ethylbenzene	ug/L	0.5	1.0	02/19/93
Xylenes, Total	ug/L	0.5	4.2	02/19/93

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Briggs
Page 3

February 24, 1993
PACE Project Number: 430218510

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0012210	
Date Collected:			02/18/93	
Date Received:			02/18/93	
Client Sample ID:			A-VW1-20	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
GASOLINE AND AROMATICS-AIR (M8015/8020)				
Non-Methane Hydrocarbons, as n-octane	ug/L	50	ND	02/19/93
Volatile Aromatic Compounds (EPA M8020)			-	02/19/93
Benzene	ug/L	0.5	3.6	02/19/93
Toluene	ug/L	0.5	3.7	02/19/93
Ethylbenzene	ug/L	0.5	0.9	02/19/93
Xylenes, Total	ug/L	0.5	5.6	02/19/93

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REPORT OF LABORATORY ANALYSIS

Mr. Marc Briggs
Page 4

February 24, 1993
PACE Project Number: 430218510

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0012228	
Date Collected:			02/18/93	
Date Received:			02/18/93	
Client Sample ID:			A-VW1-60	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
GASOLINE AND AROMATICS-AIR (M8015/8020)				
Non-Methane Hydrocarbons, as n-octane	ug/L	50	ND	02/19/93
Volatile Aromatic Compounds (EPA M8020)			-	02/19/93
Benzene	ug/L	0.5	ND	02/19/93
Toluene	ug/L	0.5	ND	02/19/93
Ethylbenzene	ug/L	0.5	ND	02/19/93
Xylenes, Total	ug/L	0.5	0.9	02/19/93

These data have been reviewed and are approved for release.

Darrell C. Cain
Regional Director

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FAX: 415-883-2673

Client Reference: Exxon 7-3006 (EE)

MDL Method Detection Limit
ND Not detected at or above the MDL.

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Mr. Marc Briggs
Page 6

QUALITY CONTROL DATA

February 24, 1993
PACE Project Number: 430218510

Client Reference: Exxon 7-3006 (EE)

GASOLINE AND AROMATICS-AIR (M8015/8020)
Batch: 70 18672
Samples: 70 0012198, 70 0012201, 70 0012210, 70 0012228

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Non-Methane Hydrocarbons, as n-octane	ug/L	50	ND
Volatile Aromatic Compounds (EPA M8020)			--
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Non-Methane Hydrocarbons, as n-octane	ug/L	50	972	100%	105%	4%
Benzene	ug/L	0.5	129	113%	111%	1%
Toluene	ug/L	0.5	149	115%	113%	1%
Ethylbenzene	ug/L	0.5	172	115%	115%	0%
Xylenes, Total	ug/L	0.5	521	113%	114%	0%

Mr. Marc Briggs
Page 7

FOOTNOTES
for page 6

February 24, 1993
PACE Project Number: 430218510

Client Reference: Exxon 7-3006 (EE)

MDL Method Detection Limit
ND Not detected at or above the MDL.
RPD Relative Percent Difference

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Consultant's Name: RESNA

Page ____ of ____

Address: 3315 Arrowpoint Expressway #34 San Jose, CA. 95117

Site Location: 720 High St. Oakland

Project #: 13886.02

Consultant Project #:

Consultant Work Release #: 09300303 Col

Project Contact: Marc Briggs

Phone #: (408) 264-7723 Fax #: 264-2485

Laboratory Work Release #:

EXXON Contact: Maria Gueguler ☑ EE ☐ C&M

Phone #: Fax #:

EXXON RAS #: 7-3006

Sampled by (print): Patricia Camp

Sampler's Signature:

Shipment Method: Pace Courier

Air Bill #:

Shipment Date: 2/18/93

TAT: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☐ Standard (5 day)

ANALYSIS REQUIRED

Sample Condition as Received
Temperature ° C: ____
Cooler #: ____
Inbound Seal Yes No PACE Courier
Outbound Seal Yes No

Sample Description	Collection Date/Time	Matrix Soil/Water	Prsv	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	TRPH EPA 418.1	COMMENTS
A-VW3-20	2/18/93 1350	A	None	1	1219.8	X			
A-VW2-20	1420			1	1220.1	X			
A-VW1-20	1510			1	1221.0	X			
A-VW1-60	1540			1	1222.8	X			

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time
	2/18/93	1545		2/18/93	1545
	2/18	1631	Fed Ex Pace	2/18/93	1635

Additional Comments: analyses for GBTEX per Jean (2/19 JO)

Distribution: White - Original Yellow - Exxon Pink - Lab Goldenrod - Consultant Field Staff

for MC/2

130006.01

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REPORT OF LABORATORY ANALYSIS

March 03, 1993

MAR [illegible]

Mr. Dave Higgins
Resna/Applied Geosystems
3315 Almaden Expressway Suite 34
San Jose, CA 95118

RE: PACE Project No. 430226.505
Client Reference: Exxon 7-3006 (EE)

Dear Mr. Higgins:

Enclosed is the report of laboratory analyses for samples received February 26, 1993.

Footnotes are given at the end of the report.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Stephanie Matzo

Stephanie Matzo
Project Manager

Enclosures

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REPORT OF LABORATORY ANALYSIS

Resna/Applied Geosystems
3315 Almaden Expressway Suite 34
San Jose, CA 95118

March 03, 1993
PACE Project Number: 430226505

Attn: Mr. Dave Higgins

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0016690	
Date Collected:			02/11/93	
Date Received:			02/26/93	
Client Sample ID:			S-7.5-B35	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
OIL AND GREASE, SILICA GEL (LUFT)				
Oil and Grease, Gravimetric (SM5520)	mg/kg wet	50	460	03/02/93
Date Extracted			03/01/93	

These data have been reviewed and are approved for release.

Darrell C. Cain
Regional Director

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Mr. Dave Higgins
Page 2

FOOTNOTES
for page 1

March 03, 1993
PACE Project Number: 430226505

Client Reference: Exxon 7-3006 (EE)

MDL Method Detection Limit

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Mr. Dave Higgins
Page 3

QUALITY CONTROL DATA

March 03, 1993
PACE Project Number: 430226505

Client Reference: Exxon 7-3006 (EE)

OIL AND GREASE, SILICA GEL (LUFT)
Batch: 70 19091
Samples: 70 0016690

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Oil and Grease, Gravimetric (SM5520)	mg/kg wet	50	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Oil and Grease, Gravimetric (SM5520)	mg/kg wet	50	667	99%	100%	1%

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Mr. Dave Higgins
Page 4

FOOTNOTES
for page 3

March 03, 1993
PACE Project Number: 430226505

Client Reference: Exxon 7-3006 (EE)

MDL	Method Detection Limit
ND	Not detected at or above the MDL.
RPD	Relative Percent Difference

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4/209 11.405

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Page 1 of 1

Consultant's Name: Resna

Address: 3315 Almaden Exp. #34, San Jose CA 95118

Site Location: 720 High Street

Project #:

Consultant Project #:

Consultant Work Release #: 093003030 C#1

Project Contact: Dave Higgins

Phone #: Fax #:

Laboratory Work Release #:

EXXON Contact: Marla Guenster ☐ EE ☐ C&M

Phone #: Fax #:

EXXON RAS #: 7-3006

Sampled by (print): Jeanne Buckthal

Sampler's Signature:

Shipment Method:

Air Bill #:

Shipment Date:

TAT: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Standard (5 day)

ANALYSIS REQUIRED

Sample Condition as Received
Temperature ° C: _____
Cooler #: _____
Inbound Seal Yes No
Outbound Seal Yes No

Sample Description	Collection Date/Time	Matrix Soil/Water	Prsv	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	TRPH EPA 418.1	OIL & Grease 5520								COMMENTS
S-7½-B35	2/11/93	Soil	—	1	16690				X								AKA 932.4

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time
			Theresa Stover/Pace	2/12/93	1575

Additional Comments: Previously logged on job 430212.520

Distribution: 3/2 White - Original Yellow - Exxon Pink - Lab Goldenrod - Consultant Field Staff

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130006.01

REPORT OF LABORATORY ANALYSIS

March 29, 1993

Ms. Jeanne Buckthal
Resna Industries
3315 Almaden Expwy., Ste. 34
San Jose, CA 95118

RE: PACE Project No. 430312.519
Client Reference: Exxon 7-3006 (EE)

Dear Ms. Buckthal:

Enclosed is the report of laboratory analyses for samples received March 12 - 16, 1993.

Please note PACE received a request to run your sample W-5.5 MW14 (PACE #70 0027349) for stoddard solvent after the sample had been batched and extracted for diesel (as had been indicated on the chain of custody for this sample). The laboratory ran additional QC for this sample on 3/25, and recovered 48% of the stoddard solvent spike on the LCS and 52% of the spike on the LCS duplicate.

Footnotes are given at the end of the report.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Stephanie Matzo

Stephanie Matzo
Project Manager

Enclosures

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FAX: 415-883-2673

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0027349	
Date Collected:			03/11/93	
Date Received:			03/16/93	
Client Sample ID:			W-5.5 MW14	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	03/18/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	410	03/18/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	03/18/93
Benzene	ug/L	0.5	ND	03/18/93
Toluene	ug/L	0.5	ND	03/18/93
Ethylbenzene	ug/L	0.5	0.9	03/18/93
Xylenes, Total	ug/L	0.5	1.6	03/18/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Stoddard Solvent	mg/L	0.25	ND	03/25/93
Date Extracted			03/18/93	

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REPORT OF LABORATORY ANALYSIS

Resna Industries
3315 Almaden Expwy., Ste. 34
San Jose, CA 95118

March 29, 1993
PACE Project Number: 430312519

Attn: Ms. Jeanne Buckthal

Client Reference: Exxon 7-3006 (EE)

Parameter	Units	MDL		DATE ANALYZED
PACE Sample Number:			70 0026920	
Date Collected:			03/11/93	
Date Received:			03/12/93	
Client Sample ID:			W-5.0-MW7	
INORGANIC ANALYSIS				
INDIVIDUAL PARAMETERS				
Arsenic (EPA Method 7060, Furnace AAS)	mg/L	0.005	0.016	03/19/93
Calcium (EPA Method 6010/200.7, ICP)	mg/L	0.05	28	03/17/93
Chloride (Argentometric, SM 407A)	mg/L	1	11	03/22/93
Hardness, Total, as CaCO3	mg/L	10	260	03/17/93
Iron (EPA Method 6010/200.7, ICP)	mg/L	0.02	1.6	03/17/93
Magnesium (EPA Method 6010/200.7, ICP)	mg/L	0.05	47	03/17/93
Manganese (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.4	03/17/93
Mercury (EPA Method 7470, Cold Vapor AA)	mg/L	0.0002	0.0004	03/16/93
Selenium (EPA Method 7740, Furnace AAS)	mg/L	0.005	ND	03/18/93
Sodium (EPA Method 6010, ICP)	mg/L	1.0	63	03/17/93
Solids, Total Dissolved (EPA 160.1)	mg/L	5	400	03/19/93
Specific Conductance, umhos/cm @ 25oC	umhos/cm	3.0	600	03/26/93
Sulfate (EPA 375.4)	mg/L	1	ND	03/25/93
pH (Units at 25 Degrees Celsius)	Units	0.1	7.0	03/15/93
ORGANIC LEAD IN WATER; DHS METHOD #338				
Organic Lead, as Pb	mg/L	0.1	ND	03/25/93
CYANIDES IN WATER				
Cyanides, total	mg/L	0.005	ND	03/26/93
Date of Distillation, Cyanides	n/a		3/25/93	03/26/93
METALS IN AQUEOUS MATRIX, ICP SCAN				
Antimony (EPA Method 6010/200.7, ICP)	mg/L	0.06	ND	03/17/93
Beryllium (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND	03/17/93
Cadmium (EPA Method 6010/200.7, ICP)	mg/L	0.005	ND	03/17/93
Chromium (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND	03/17/93
Copper (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND	03/17/93
Lead (EPA Method 6010/200.7, ICP)	mg/L	0.1	ND	03/17/93
Nickel (EPA Method 6010/200.7, ICP)	mg/L	0.02	ND	03/17/93

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Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0026920	
Date Collected:			03/11/93	
Date Received:			03/12/93	
Client Sample ID:			W-5.0-MW7	
Parameter	Units	MDL		DATE ANALYZED
INORGANIC ANALYSIS				
METALS IN AQUEOUS MATRIX, ICP SCAN				
Silver (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND	03/17/93
Thallium (EPA Method 6010/200.7, ICP)	mg/L	0.2	ND	03/17/93
Zinc (EPA Method 6010/200.7, ICP)	mg/L	0.01	0.02	03/17/93
ALKALINITY SERIES:				
Total Alkalinity, as CaCO3	mg/L	10	360	03/25/93
Bicarbonate Alkalinity, as CaCO3	mg/L	10	360	03/25/93
Carbonate Alkalinity, as CaCO3	mg/L	10	ND	03/25/93
Hydroxide Alkalinity, as CaCO3	mg/L	10	ND	03/25/93
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	03/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	3500	03/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	03/17/93
Benzene	ug/L	0.5	160	03/17/93
Toluene	ug/L	0.5	6.2	03/17/93
Ethylbenzene	ug/L	0.5	22	03/17/93
Xylenes, Total	ug/L	0.5	19	03/17/93
VOLATILE ORGANICS, EPA METHOD 624 GC/MS				
Chloromethane	ug/L	10	ND	03/15/93
Vinyl Chloride	ug/L	10	ND	03/15/93
Bromomethane	ug/L	10	ND	03/15/93
Chloroethane	ug/L	10	ND	03/15/93
Trichlorofluoromethane	ug/L	5	ND	03/15/93
1,1,2-Trichlor-1,2,2-trifluoroethane	ug/L	5	ND	03/15/93
2-Butanone (MEK)	ug/L	50	ND	03/15/93
1,1-Dichloroethene	ug/L	5	ND	03/15/93
Carbon Disulfide	ug/L	5	ND	03/15/93
Acetone	ug/L	50	ND	03/15/93
Methylene Chloride	ug/L	10	ND	03/15/93
trans-1,2-Dichloroethene	ug/L	5	ND	03/15/93

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Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0026920	
Date Collected:			03/11/93	
Date Received:			03/12/93	
Client Sample ID:			W-5.0-MW7	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
VOLATILE ORGANICS, EPA METHOD 624 GC/MS				
1,1-Dichloroethane	ug/L	5	ND	03/15/93
Chloroform	ug/L	5	ND	03/15/93
1,1,1-Trichloroethane	ug/L	5	ND	03/15/93
1,2-Dichloroethane	ug/L	5	ND	03/15/93
cis-1,2-Dichlorethene	ug/L	5	ND	03/15/93
Carbon Tetrachloride	ug/L	5	ND	03/15/93
Benzene	ug/L	5	180	03/15/93
1,2-Dichloropropane	ug/L	5	ND	03/15/93
Trichloroethene (TCE)	ug/L	5	ND	03/15/93
Bromodichloromethane	ug/L	5	ND	03/15/93
trans-1,3-Dichloropropene	ug/L	5	ND	03/15/93
4-Methyl-2-pentanone (MIBK)	ug/L	50	ND	03/15/93
Toluene	ug/L	5	6	03/15/93
cis-1,3-Dichloropropene	ug/L	5	ND	03/15/93
1,1,2-Trichloroethane	ug/L	5	ND	03/15/93
Dibromochloromethane	ug/L	5	ND	03/15/93
2-Hexanone	ug/L	50	ND	03/15/93
Tetrachloroethene	ug/L	5	ND	03/15/93
Chlorobenzene	ug/L	5	ND	03/15/93
Ethylbenzene	ug/L	5	16	03/15/93
Bromoform	ug/L	5	ND	03/15/93
Xylene(s) Total	ug/L	5	10	03/15/93
Styrene	ug/L	5	ND	03/15/93
1,1,2,2,-Tetrachloroethane	ug/L	5	ND	03/15/93
1,3-Dichlorobenzene	ug/L	5	ND	03/15/93
1,4-Dichlorobenzene	ug/L	5	ND	03/15/93
1,2-Dichlorobenzene	ug/L	5	ND	03/15/93
1,2-Dichloroethane-d4 (Surrog. Recovery)			99%	03/15/93
Toluene-d8 (Surrogate Recovery)			102%	03/15/93
4-Bromofluorobenzene (Surrog.Recovery)			96%	03/15/93

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Parameter	Units	MDL		DATE ANALYZED
PACE Sample Number:			70 0026920	
Date Collected:			03/11/93	
Date Received:			03/12/93	
Client Sample ID:			W-5.0-MW7	
ORGANIC ANALYSIS				
OIL AND GREASE, SILICA GEL (LUFT)				
Oil and Grease, Gravimetric (SM5520)	mg/L	5.0	ND	03/17/93
Date Extracted			03/16/93	
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	0.64	03/19/93
Date Extracted			03/16/93	
EXTRACTABLE ORGANICS BY EPA 625 (GC/MS)				
N-Nitrosodimethylamine	ug/L	10	ND	03/17/93
Bis(2-chloroethyl) ether	ug/L	10	ND	03/17/93
1,3-Dichlorobenzene	ug/L	10	ND	03/17/93
1,4-Dichlorobenzene	ug/L	10	ND	03/17/93
Benzyl Alcohol	ug/L	10	ND	03/17/93
1,2-Dichlorobenzene	ug/L	10	ND	03/17/93
Bis(2-chloroisopropyl) ether	ug/L	10	ND	03/17/93
N-Nitroso-di-n-propylamine	ug/L	10	ND	03/17/93
Hexachloroethane	ug/L	10	ND	03/17/93
Nitrobenzene	ug/L	10	ND	03/17/93
Bis(2-chloroethoxy)methane	ug/L	10	ND	03/17/93
1,2,4-Trichlorobenzene	ug/L	10	ND	03/17/93
Naphthalene	ug/L	10	27	03/17/93
Hexachlorobutadiene	ug/L	10	ND	03/17/93
2-Methylnaphthalene	ug/L	10	ND	03/17/93
Hexachlorocyclopentadiene	ug/L	10	ND	03/17/93
2-Chloronaphthalene	ug/L	10	ND	03/17/93
Dimethylphthalate	ug/L	10	ND	03/17/93
Acenaphthylene	ug/L	10	ND	03/17/93
2,6-Dinitrotoluene	ug/L	10	ND	03/17/93
Acenaphthene	ug/L	10	ND	03/17/93
Dibenzofuran	ug/L	10	ND	03/17/93
2,4-Dinitrotoluene	ug/L	10	ND	03/17/93
Diethyl phthalate	ug/L	10	ND	03/17/93
Fluorene	ug/L	10	ND	03/17/93

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0026920	
Date Collected:			03/11/93	
Date Received:			03/12/93	
Client Sample ID:			W-5.0-MW7	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
EXTRACTABLE ORGANICS BY EPA 625 (GC/MS)				
4-Chlorophenylphenyl ether	ug/L	10	ND	03/17/93
N-Nitrosodiphenyl amine	ug/L	10	ND	03/17/93
1,2-Diphenylhydrazine	ug/L	10	ND	03/17/93
4-Bromophenylphenyl ether	ug/L	10	ND	03/17/93
Hexachlorobenzene	ug/L	10	ND	03/17/93
Phenanthrene	ug/L	10	ND	03/17/93
Anthracene	ug/L	10	ND	03/17/93
Di-n-butyl phthalate	ug/L	10	ND	03/17/93
Fluoranthene	ug/L	10	ND	03/17/93
Pyrene	ug/L	10	ND	03/17/93
Butylbenzyl phthalate	ug/L	10	ND	03/17/93
Benzo(a)anthracene	ug/L	10	ND	03/17/93
3,3'-Dichlorobenzidine	ug/L	20	ND	03/17/93
Chrysene	ug/L	10	ND	03/17/93
Bis(2-ethylhexyl) phthalate	ug/L	10	ND	03/17/93
Di-n-octyl phthalate	ug/L	10	ND	03/17/93
Benzo(b)fluoranthene	ug/L	10	ND	03/17/93
Benzo(k)fluoranthene	ug/L	10	ND	03/17/93
Benzo(a)pyrene	ug/L	10	ND	03/17/93
Indeno(1,2,3-cd)pyrene	ug/L	10	ND	03/17/93
Dibenz(a,h)anthracene	ug/L	10	ND	03/17/93
Benzo(g,h,i)perylene	ug/L	10	ND	03/17/93
Phenol	ug/L	10	ND	03/17/93
2-Chlorophenol	ug/L	10	ND	03/17/93
2-Methylphenol	ug/L	10	ND	03/17/93
4-Methylphenol	ug/L	10	ND	03/17/93
2-Nitrophenol	ug/L	10	ND	03/17/93
2,4-Dimethylphenol	ug/L	10	ND	03/17/93
Benzoic Acid	ug/L	50	ND	03/17/93
2,4-Dichlorophenol	ug/L	10	ND	03/17/93
4-Chloro-3-methylphenol	ug/L	10	ND	03/17/93

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Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0026920	
Date Collected:			03/11/93	
Date Received:			03/12/93	
Client Sample ID:			W-5.0-MW7	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
EXTRACTABLE ORGANICS BY EPA 625 (GC/MS)				
2,4,6-Trichlorophenol	ug/L	10	ND	03/17/93
2,4,5-Trichlorophenol	ug/L	10	ND	03/17/93
2,4-Dinitrophenol	ug/L	50	ND	03/17/93
4-Nitrophenol	ug/L	50	ND	03/17/93
4,6-Dinitro-2-methylphenol	ug/L	50	ND	03/17/93
Pentachlorophenol	ug/L	50	ND	03/17/93
Nitrobenzene-d5 (Surrogate Recovery)			59%	03/17/93
2-Fluorobiphenyl (Surrogate Recovery)			62%	03/17/93
Terphenyl-d14 (Surrogate Recovery)			46%	03/17/93
2-Fluorophenol (Surrogate Recovery)			16%	03/17/93
Phenol-d6 (Surrogate Recovery)			14%	03/17/93
2,4,6-Tribromophenol(Surrogate Recovery)			32%	03/17/93
Date Extracted			03/16/93	

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0027357	
Date Collected:			03/11/93	
Date Received:			03/16/93	
Client Sample ID:			BB1	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	03/18/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	03/18/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	03/18/93
Benzene	ug/L	0.5	ND	03/18/93
Toluene	ug/L	0.5	ND	03/18/93
Ethylbenzene	ug/L	0.5	ND	03/18/93
Xylenes, Total	ug/L	0.5	ND	03/18/93

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0027365	
Date Collected:			03/10/93	
Date Received:			03/16/93	
Client Sample ID:			W-5.5-MW9	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	03/18/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	03/18/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	03/18/93
Benzene	ug/L	0.5	ND	03/18/93
Toluene	ug/L	0.5	ND	03/18/93
Ethylbenzene	ug/L	0.5	ND	03/18/93
Xylenes, Total	ug/L	0.5	ND	03/18/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	ND	03/19/93
Date Extracted			03/17/93	

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Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0027373	
Date Collected:			03/10/93	
Date Received:			03/16/93	
Client Sample ID:			W-5.5-MW10	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	03/18/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	03/18/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	03/18/93
Benzene	ug/L	0.5	ND	03/18/93
Toluene	ug/L	0.5	ND	03/18/93
Ethylbenzene	ug/L	0.5	ND	03/18/93
Xylenes, Total	ug/L	0.5	ND	03/18/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	ND	03/19/93
Date Extracted			03/17/93	

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0027381	
Date Collected:			03/11/93	
Date Received:			03/16/93	
Client Sample ID:			W-6.5-MW11	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	03/18/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	03/18/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	03/18/93
Benzene	ug/L	0.5	ND	03/18/93
Toluene	ug/L	0.5	ND	03/18/93
Ethylbenzene	ug/L	0.5	ND	03/18/93
Xylenes, Total	ug/L	0.5	ND	03/18/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	0.24	03/19/93
Date Extracted			03/18/93	

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

PACE Sample Number:			70 0027390	
Date Collected:			03/11/93	
Date Received:			03/16/93	
Client Sample ID:			W-6.0-MW1	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	03/18/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	03/18/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	03/18/93
Benzene	ug/L	0.5	ND	03/18/93
Toluene	ug/L	0.5	ND	03/18/93
Ethylbenzene	ug/L	0.5	ND	03/18/93
Xylenes, Total	ug/L	0.5	ND	03/18/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	0.14	03/19/93
Date Extracted			03/18/93	

These data have been reviewed and are approved for release.

Darrell Cain

Darrell C. Cain
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FOOTNOTES
for pages 1 through 12

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

MDL Method Detection Limit
ND Not detected at or above the MDL.

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Arsenic (EPA Method 7060, Furnace AAS)
Batch: 70 19538
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Arsenic (EPA Method 7060, Furnace AAS)	mg/L	0.005	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Arsenic (EPA Method 7060, Furnace AAS)	mg/L	0.005	0.050	92%	88%	4%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Chloride (Argentometric, SM 407A)
Batch: 70 19565
Samples: 70 0026920

METHOD BLANK AND SAMPLE DUPLICATE:

Parameter	Units	MDL	Method Blank	700024307	Duplicate of 70 0024307	RPD
Chloride (Argentometric, SM 407A)	mg/L	1	ND			
Chloride (Argentometric, SM 407A)	mg/L	100		7300	7300	0%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Chloride (Argentometric, SM 407A)	mg/L	1	500	100%	100%	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Mercury (EPA Method 7470, Cold Vapor AA)
Batch: 70 19436
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Mercury (EPA Method 7470, Cold Vapor AA	mg/L	0.0002	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Mercury (EPA Method 7470, Cold Vapor AA	mg/L	0.0002	0.01	96%	96%	0%

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Client Reference: Exxon 7-3006 (EE)

Organic Lead, as Pb
Batch: 70 19712
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Organic Lead, as Pb	mg/L	0.1	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Organic Lead, as Pb	mg/L	0.1	1.25	112%	112%	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Selenium (EPA Method 7740, Furnace AAS)
Batch: 70 19503
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Selenium (EPA Method 7740, Furnace AAS)	mg/L	0.005	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Selenium (EPA Method 7740, Furnace AAS)	mg/L	0.005	0.050	98%	98%	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Solids, Total Dissolved (EPA 160.1)
Batch: 70 19537
Samples: 70 0026920

METHOD BLANK AND SAMPLE DUPLICATE:

Parameter	Units	MDL	Method Blank	700024307	Duplicate of 70 0024307	RPD
Solids, Total Dissolved (EPA 160.1)	mg/L	5	ND	17000	17000	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Specific Conductance, umhos/cm @ 25oC
Batch: 70 19696
Samples: 70 0026920

METHOD BLANK AND SAMPLE DUPLICATE:

Parameter	Units	MDL	Method Blank	700023750	Duplicate of 70 0023750	RPD
Specific Conductance, umhos/cm @ 25oC	umhos/cm	3.0	ND	580	580	0%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Specific Conductance, umhos/cm @ 25oC	umhos/cm	3.0	1400	100%	100%	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

Sulfate (EPA 375.4)
Batch: 70 19714
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Sulfate (EPA 375.4)	mg/L	1	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Sulfate (EPA 375.4)	mg/L	1	20	100%	100%	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

pH (Units at 25 Degrees Celsius)
Batch: 70 19409
Samples: 70 0026920

SAMPLE DUPLICATE:

Parameter	Units	MDL	700027055	Duplicate of 70 0027055	RPD
pH (Units at 25 Degrees Celsius)	Units	0.1	7.3	7.3	0%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
pH (Units at 25 Degrees Celsius)	Units	0.1	7.0	100%	100%	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

ALKALINITY SERIES:
Batch: 70 19674
Samples: 70 0026920

METHOD BLANK AND SAMPLE DUPLICATE:

Parameter	Units	MDL	Method Blank	700023750	Duplicate of 70 0023750	RPD
Total Alkalinity, as CaCO3	mg/L	10	ND	250	240	4%
Bicarbonate Alkalinity, as CaCO3	mg/L	10	ND	250	240	4%
Carbonate Alkalinity, as CaCO3	mg/L	10	ND	ND	ND	NC
Hydroxide Alkalinity, as CaCO3	mg/L	10	ND	ND	ND	NC

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Total Alkalinity, as CaCO3	mg/L	10	236	100%	100%	0%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

CAM METALS IN AQUEOUS MATRIX, ICP SCAN
Batch: 70 19477
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
INDIVIDUAL PARAMETERS			
Boron (EPA Method 6010/200.7, ICP)	mg/L	0.1	ND
Calcium (EPA Method 6010/200.7, ICP)	mg/L	0.05	ND
Iron (EPA Method 6010/200.7, ICP)	mg/L	0.02	ND
Magnesium (EPA Method 6010/200.7, ICP)	mg/L	0.05	ND
Manganese (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Potassium (EPA Method 6010, ICP)	mg/L	0.5	ND
CAM METALS IN AQUEOUS MATRIX, ICP SCAN			
Antimony (EPA Method 6010/200.7, ICP)	mg/L	0.06	ND
Barium (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Beryllium (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Cadmium (EPA Method 6010/200.7, ICP)	mg/L	0.005	ND
Chromium (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Cobalt (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Copper (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Lead (EPA Method 6010/200.7, ICP)	mg/L	0.1	ND
Molybdenum (EPA Method 6010/200.7, ICP)	mg/L	0.02	ND
Nickel (EPA Method 6010/200.7, ICP)	mg/L	0.02	ND
Silver (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Thallium (EPA Method 6010/200.7, ICP)	mg/L	0.2	ND
Vanadium (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND
Zinc (EPA Method 6010/200.7, ICP)	mg/L	0.01	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
INDIVIDUAL PARAMETERS						
Boron (EPA Method 6010/200.7, ICP)	mg/L	0.1	1.00	93%	95%	2%
Calcium (EPA Method 6010/200.7, ICP)	mg/L	0.05	10.0	107%	109%	1%
Iron (EPA Method 6010/200.7, ICP)	mg/L	0.02	10.0	100%	102%	1%
Magnesium (EPA Method 6010/200.7, ICP)	mg/L	0.05	1.00	104%	107%	2%

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QUALITY CONTROL DATA

March 29, 1993
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Client Reference: Exxon 7-3006 (EE)

CAM METALS IN AQUEOUS MATRIX, ICP SCAN
Batch: 70 19477
Samples: 70 0026920

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
INDIVIDUAL PARAMETERS						
Manganese (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	103%	105%	1%
Potassium (EPA Method 6010, ICP)	mg/L	0.5	10.0	99%	100%	1%
CAM METALS IN AQUEOUS MATRIX, ICP SCAN						
Antimony (EPA Method 6010/200.7, ICP)	mg/L	0.06	1.00	107%	105%	1%
Barium (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	109%	111%	1%
Beryllium (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	98%	99%	1%
Cadmium (EPA Method 6010/200.7, ICP)	mg/L	0.005	1.00	109%	111%	1%
Chromium (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	93%	94%	1%
Cobalt (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	108%	109%	0%
Copper (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	100%	101%	0%
Lead (EPA Method 6010/200.7, ICP)	mg/L	0.1	1.00	115%	116%	0%
Molybdenum (EPA Method 6010/200.7, ICP)	mg/L	0.02	1.00	119%	120%	0%
Nickel (EPA Method 6010/200.7, ICP)	mg/L	0.02	1.00	99%	102%	2%
Silver (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	92%	91%	1%
Thallium (EPA Method 6010/200.7, ICP)	mg/L	0.2	1.00	102%	101%	0%
Vanadium (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	99%	100%	1%
Zinc (EPA Method 6010/200.7, ICP)	mg/L	0.01	1.00	112%	114%	1%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

CYANIDES IN WATER
Batch: 70 19697
Samples: 70 0026920

METHOD BLANK AND SAMPLE DUPLICATE:

Parameter	Units	MDL	Method Blank	700026920 W-5.0-MW7	Duplicate of 70 0026920	RPD
Cyanides, total	mg/L	0.005	ND	ND	ND	NC
Date of Distillation, Cyanides	n/a		3/25/93	3/25/93	3/25/93	

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Cyanides, total	mg/L	0.005	0.1	95%	91%	4%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

EXTRACTABLE FUELS EPA 3510/8015
Batch: 70 19544
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Extractable Fuels, as Diesel	mg/L	0.05	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Extractable Fuels, as Diesel	mg/L	0.05	1.00	68%	63%	7%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

EXTRACTABLE FUELS EPA 3510/8015
Batch: 70 19576
Samples: 70 0027365, 70 0027373

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Extractable Fuels, as Diesel	mg/L	0.05	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Extractable Fuels, as Diesel	mg/L	0.05	1.00	81%	85%	4%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

EXTRACTABLE FUELS EPA 3510/8015
Batch: 70 19578
Samples: 70 0027349, 70 0027381, 70 0027390

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Extractable Fuels, as Diesel	mg/L	0.05	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Extractable Fuels, as Diesel	mg/L	0.05	1.00	83%	86%	3%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

EXTRACTABLE ORGANICS BY EPA 625 (GC/MS)
Batch: 70 19478
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
N-Nitrosodimethylamine	ug/L	10	ND
Bis(2-chloroethyl) ether	ug/L	10	ND
1,3-Dichlorobenzene	ug/L	10	ND
1,4-Dichlorobenzene	ug/L	10	ND
Benzyl Alcohol	ug/L	10	ND
1,2-Dichlorobenzene	ug/L	10	ND
Bis(2-chloroisopropyl) ether	ug/L	10	ND
N-Nitroso-di-n-propylamine	ug/L	10	ND
Hexachloroethane	ug/L	10	ND
Nitrobenzene	ug/L	10	ND
Bis(2-chloroethoxy)methane	ug/L	10	ND
1,2,4-Trichlorobenzene	ug/L	10	ND
Naphthalene	ug/L	10	ND
Hexachlorobutadiene	ug/L	10	ND
2-Methylnaphthalene	ug/L	10	ND
Hexachlorocyclopentadiene	ug/L	10	ND
2-Chloronaphthalene	ug/L	10	ND
Dimethylphthalate	ug/L	10	ND
Acenaphthylene	ug/L	10	ND
2,6-Dinitrotoluene	ug/L	10	ND
Acenaphthene	ug/L	10	ND
Dibenzofuran	ug/L	10	ND
2,4-Dinitrotoluene	ug/L	10	ND
Diethyl phthalate	ug/L	10	ND
Fluorene	ug/L	10	ND
4-Chlorophenylphenyl ether	ug/L	10	ND
N-Nitrosodiphenyl amine	ug/L	10	ND
1,2-Diphenylhydrazine	ug/L	10	ND
4-Bromophenylphenyl ether	ug/L	10	ND
Hexachlorobenzene	ug/L	10	ND
Phenanthrene	ug/L	10	ND
Anthracene	ug/L	10	ND

Client Reference: Exxon 7-3006 (EE)

EXTRACTABLE ORGANICS BY EPA 625 (GC/MS)
Batch: 70 19478
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Di-n-butyl phthalate	ug/L	10	ND
Fluoranthene	ug/L	10	ND
Pyrene	ug/L	10	ND
Butylbenzyl phthalate	ug/L	10	ND
Benzo(a)anthracene	ug/L	10	ND
3,3'-Dichlorobenzidine	ug/L	20	ND
Chrysene	ug/L	10	ND
Bis(2-ethylhexyl) phthalate	ug/L	10	ND
Di-n-octyl phthalate	ug/L	10	ND
Benzo(b)fluoranthene	ug/L	10	ND
Benzo(k)fluoranthene	ug/L	10	ND
Benzo(a)pyrene	ug/L	10	ND
Indeno(1,2,3-cd)pyrene	ug/L	10	ND
Dibenz(a,h)anthracene	ug/L	10	ND
Benzo(g,h,i)perylene	ug/L	10	ND
Phenol	ug/L	10	ND
2-Chlorophenol	ug/L	10	ND
2-Methylphenol	ug/L	10	ND
4-Methylphenol	ug/L	10	ND
2-Nitrophenol	ug/L	10	ND
2,4-Dimethylphenol	ug/L	10	ND
Benzoic Acid	ug/L	50	ND
2,4-Dichlorophenol	ug/L	10	ND
4-Chloro-3-methylphenol	ug/L	10	ND
2,4,6-Trichlorophenol	ug/L	10	ND
2,4,5-Trichlorophenol	ug/L	10	ND
2,4-Dinitrophenol	ug/L	50	ND
4-Nitrophenol	ug/L	50	ND
4,6-Dinitro-2-methylphenol	ug/L	50	ND
Pentachlorophenol	ug/L	50	ND
Nitrobenzene-d5 (Surrogate Recovery)			69%
2-Fluorobiphenyl (Surrogate Recovery)			63%

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QUALITY CONTROL DATA

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Client Reference: Exxon 7-3006 (EE)

EXTRACTABLE ORGANICS BY EPA 625 (GC/MS)
Batch: 70 19478
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Terphenyl-d14 (Surrogate Recovery)			33%
2-Fluorophenol (Surrogate Recovery)			32%
Phenol-d6 (Surrogate Recovery)			24%
2,4,6-Tribromophenol(Surrogate Recovery			70%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
1,4-Dichlorobenzene	ug/L	10	100	71%	64%	10%
N-Nitroso-di-n-propylamine	ug/L	10	100	78%	69%	12%
1,2,4-Trichlorobenzene	ug/L	10	100	73%	68%	7%
Acenaphthene	ug/L	10	100	72%	68%	5%
2,4-Dinitrotoluene	ug/L	10	100	73%	66%	10%
Pyrene	ug/L	10	100	58%	53%	9%
Phenol	ug/L	10	200	27%	26%	3%
2-Chlorophenol	ug/L	10	200	67%	68%	1%
4-Chloro-3-methylphenol	ug/L	10	200	67%	70%	4%
4-Nitrophenol	ug/L	50	200	38%	41%	7%
Pentachlorophenol	ug/L	50	200	96%	100%	4%

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Client Reference: Exxon 7-3006 (EE)

PURGEABLE FUELS AND AROMATICS
Batch: 70 19527
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND
Methyl tert-butyl ether	ug/L	5.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl. Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	1000	102%	99%	2%
Benzene	ug/L	0.5	40.0	107%	110%	2%
Toluene	ug/L	0.5	40.0	105%	106%	0%
Ethylbenzene	ug/L	0.5	40.0	105%	103%	1%
Xylenes, Total	ug/L	0.5	120	107%	108%	0%
Methyl tert-butyl ether	ug/L	5.0	40.0	97%	98%	1%

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Client Reference: Exxon 7-3006 (EE)

PURGEABLE FUELS AND AROMATICS
Batch: 70 19535
Samples: 70 0027349, 70 0027357, 70 0027365, 70 0027373, 70 0027381
70 0027390

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	1000	104%	102%	1%
Benzene	ug/L	0.5	100	107%	111%	3%
Toluene	ug/L	0.5	100	108%	113%	4%
Ethylbenzene	ug/L	0.5	100	107%	111%	3%
Xylenes, Total	ug/L	0.5	300	105%	110%	4%

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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

TOTAL OIL AND GREASE (SM 5520)
Batch: 70 19465
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Total Oil and Grease (Freon Extractable	mg/L	1.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Total Oil and Grease (Freon Extractable	mg/L	1.0	20.0	95%	95%	0%

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REPORT OF LABORATORY ANALYSIS

Ms. Jeanne Buckthal
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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

VOLATILE ORGANICS, EPA METHOD 624 GC/MS
Batch: 70 19417
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Chloromethane	ug/L	10	ND
Vinyl Chloride	ug/L	10	ND
Bromomethane	ug/L	10	ND
Chloroethane	ug/L	10	ND
Trichlorofluoromethane	ug/L	5	ND
1,1,2-Trichlor-1,2,2-trifluoroethane	ug/L	5	ND
2-Butanone (MEK)	ug/L	50	ND
1,1-Dichloroethene	ug/L	5	ND
Carbon Disulfide	ug/L	5	ND
Acetone	ug/L	50	ND
Methylene Chloride	ug/L	10	ND
trans-1,2-Dichloroethene	ug/L	5	ND
1,1-Dichloroethane	ug/L	5	ND
Chloroform	ug/L	5	ND
1,1,1-Trichloroethane	ug/L	5	ND
1,2-Dichloroethane	ug/L	5	ND
cis-1,2-Dichlorethene	ug/L	5	ND
Carbon Tetrachloride	ug/L	5	ND
Benzene	ug/L	5	ND
1,2-Dichloropropane	ug/L	5	ND
Trichloroethene (TCE)	ug/L	5	ND
Bromodichloromethane	ug/L	5	ND
trans-1,3-Dichloropropene	ug/L	5	ND
4-Methyl-2-pentanone (MIBK)	ug/L	50	ND
Toluene	ug/L	5	ND
cis-1,3-Dichloropropene	ug/L	5	ND
1,1,2-Trichloroethane	ug/L	5	ND
Dibromochloromethane	ug/L	5	ND
2-Hexanone	ug/L	50	ND
Tetrachloroethene	ug/L	5	ND
Chlorobenzene	ug/L	5	ND
Ethylbenzene	ug/L	5	ND

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Ms. Jeanne Buckthal
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QUALITY CONTROL DATA

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

VOLATILE ORGANICS, EPA METHOD 624 GC/MS
Batch: 70 19417
Samples: 70 0026920

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Bromoform	ug/L	5	ND
Xylene(s) Total	ug/L	5	ND
Styrene	ug/L	5	ND
1,1,2,2,-Tetrachloroethane	ug/L	5	ND
1,3-Dichlorobenzene	ug/L	5	ND
1,4-Dichlorobenzene	ug/L	5	ND
1,2-Dichlorobenzene	ug/L	5	ND
1,2-Dichloroethane-d4 (Surrog. Recovery			95%
Toluene-d8 (Surrogate Recovery)			96%
4-Bromofluorobenzene (Surrog.Recovery)			93%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
1,1-Dichloroethene	ug/L	5	50	78%	78%	0%
Benzene	ug/L	5	50	86%	84%	2%
Trichloroethene (TCE)	ug/L	5	50	82%	82%	0%
Toluene	ug/L	5	50	86%	86%	0%
Chlorobenzene	ug/L	5	50	84%	84%	0%

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FOOTNOTES
for pages 14 through 37

March 29, 1993
PACE Project Number: 430312519

Client Reference: Exxon 7-3006 (EE)

MDL	Method Detection Limit
NC	No calculation due to value below detection limit.
ND	Not detected at or above the MDL.
RPD	Relative Percent Difference

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430310.514

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EXXON COMPANY, U.S.A.

P.O. Box 4415, Houston, TX 77210-4415

CHAIN OF CUSTODY

[X] Novato, CA, 11 Digital Drive, 94949 (415) 883-6100

[ ] Huntington Beach, CA, 5702 Bolsa Avenue, 92649 (714) 892-2565

Consultant's Name: Reema Industries		Page 1 of 2
Address: 42501 Albrae St Fremont, CA 94538		Site Location: 720 High St Oakland
Project #:	Consultant Project #: 13000601	Consultant Work Release #: 09300303 (H2O) 09300302 (Soil)
Project Contact: Jeanne Buckthal	Phone #: 1-800-926-0815 Fax #:	Laboratory Work Release #:
EXXON Contact: Marla Guensler [ ] EE [ ] C&M	Phone #: Fax #:	EXXON RAS #: 7-3006
Sampled by (print): Robin A. Adair	Sampler's Signature: Robin A. Adair	
Shipment Method: Cooler	Air Bill #:	Shipment Date:

TAT: [ ] 24 hr [ ] 48 hr [ ] 72 hr [X] Standard (5 day)

ANALYSIS REQUIRED — for soil sample results, see PACE Job # 430316.501 (SAM)

Sample Condition as Received: Temperature °C: ____ Cooler #: ____ Inbound Seal Yes No Outbound Seal Yes No ~~Pace Courier~~

Sample Description	Collection Date/Time	Matrix Soil/Water	Prsv	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	TRPH EPA 418.1	COMMENTS
P1-A	3-10-93	Soil		1		✓	✓		Rel # 09300302
P1-B	3:30 PM	↓		1		✓	✓		For soil samples
P2-A	↓	↓		1		✓	✓		
P2-B	↓	↓		1		✓	✓		
									Rel # 09300303
BB1	3-10-93 5:00	H_2O	HCL	2	2735.7	✓			For H_2O samples
W-5.5-MW9	5:45		~~HCL~~	~~3~~ 1	36.5	✓	✓		
W-5.5-MW10	5:35		~~HCL~~	~~3~~ 1	37.3	✓	✓		
W-6.5-MW11	3-11-93 2:45		~~HCL~~	~~3~~ 1	38.1	✓	✓		
W-6.0-MW1	3-11-93 3:00	↓	~~HCL~~	~~3~~ 1	39.0	✓	✓		

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time
Robin A. Adair Reema	3-11-93	7:15 PM	~~Ed Hatty Pace~~	3/12	1400
~~Ed Hatty Pace~~	3/12	1830	Therese Grover Pace	3/12	1830
via BAE			Therese Grover Pace	3/16	1000

Additional Comments:
* 3-15-93 Did not receive any of these samples. Client will send to us. (SAM)
(SAM) 3-16-93 Client sent samples. P1A, P1B, P2-A, P2-B was made a separate project per SAM (TG)
BAE Airbill # 178 279 783

Distribution: White - Original Yellow - Exxon Pink - Lab Goldenrod - Consultant Field Staff

9/1, B/2

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Consultant's Name: [illegible]

Page 2 of 2

Address: [illegible] Site Location: [illegible]

Project #: Consultant Project #: Consultant Work Release #:

Project Contact: Phone #: Fax #: Laboratory Work Release #:

EXXON Contact: ☐ EE ☐ C&M Phone #: Fax #: EXXON RAS #:

Sampled by (print): Sampler's Signature:

Shipment Method: Air Bill #: Shipment Date:

TAT: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Standard (5 day)

ANALYSIS REQUIRED

Sample Condition as Received
Temperature °C:
Cooler #:
Inbound Seal Yes No
Outbound Seal Yes No
Hand Courier

Sample Description	Collection Date/Time	Matrix Soil/Water	Prsv	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	TRPH EPA 418.1	624								COMMENTS
[illegible] MW4	[illegible]	H2O	HCl	3	27349	✓	✓		Received via BAE by [illegible] 3/11 1000								Did not receive 3-15-93
[illegible] MW7	[illegible]	H2O	HCl HCl	3 3		✓			✓								
[illegible] MW7		H2O	H2SO4	1 1						✓	✓						
[illegible] MW7		H2O		1 1	26920							✓	✓				
[illegible] MW7		H2O	NaOH	1										✓			
[illegible] MW7		H2O	HNO3	1											✓		
[illegible] MW7		H2O		1												✓	
9/L, M/L, BL2																	

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time
[illegible]	3-11-93	715	[illegible]	3/12	1400
[illegible]	3/12	1830	[illegible]	3/12	1880

Additional Comments: MW-3,5-MW14
Rec'd BAE # 178 270 783
0.1°C
Custody seal not intact

Distribution: White - Original Yellow - Exxon Pink - Lab Goldenrod - Consultant Field Staff