EXXON COMPANY, U.S.A.

POST OFFICE BOX 4032 . CONCORD, CA 94524-2032

ENVIRONMENTAL ENGINEERING

MARLA D. GUENSLER
SENIOR ENVIRONMENTAL ENGINEER
(510) 246-8776

February 9, 1993

Mr. Rick Mueller
City of Pleasanton Fire Department
4444 Railroad Street
Pleasanton, California 94566-0802

RE: EXXON RAS #7-7003, 349 MAIN STREET, PLEASANTON, CA

Dear Mr. Mueller:

Attached for your review and comment is the Work Plan For Subsurface Investigations And Remediation for the above referenced site. Also enclosed is a letter Addendum 1 to the Work Plan for the site. This report and letter, prepared by RESNA, of San Jose, California, details proposed activities to be completed at the site to evaluate the lateral and vertical extent of hydrocarbon impacted soil.

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
Senior Environmental Engineer

MDG/pdp

2450E.4

Attachment

cc: w/attachment:
Mr. L. Feldman - San Francisco Bay Region Water Quality Control Board

w/o attachment:
Mr. M. Briggs - RESNA, San Jose

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
Fax: (408) 264-2345

November 30, 1992
0910mgue
19025.04A

Ms. Marla D. Guensler
Exxon Company, U.S.A.
P.O. Box 4032
2300 Clayton Road
Concord, California 94520

Subject: Addendum One to Work Plan to Perform an Interim Remediation Environmental Investigation at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California.

Ms. Guensler:

As requested by Exxon Company, U.S.A. (Exxon), this letter is being prepared to serve as Addendum One to Work Plan for the subject site. RESNA Industries Inc. (RESNA), formerly Applied GeoSystems (AGS), performed and environmental investigation related to the removal and replacement of three underground gasoline-storage tanks (USTs) and one used-oil UST in August 1989 (AGS, October 1, 1989), and an environmental investigation between January and June 1990 that included drilling 13 boreholes around the former gasoline UST locations and adjacent to the used-oil UST, installing groundwater monitoring wells MW-1 through MW-5 in five of the boreholes, and directing analyses of soil and groundwater samples (AGS, August 1, 1990). AGS drilled six boreholes north and northwest of the former gasoline USTs and installed groundwater monitoring wells MW-6 and MW-7, and vapor extraction well VE-1 between February and March 1991 (AGS, October 24, 1991). Quarterly monitoring at the site was initiated in the first quarter of 1990 (AGS, August 1, 1990) and is continuing.

Based on the findings of our previous site investigations, RESNA proposes the following work to be performed at this site:

Task 1: After acquiring the proper Alameda County Water District Well Construction Permit, drill one boring [redacted]pgradient of the former gasoline underground storage tanks to delineate further the vertical and lateral extent of gasoline hydrocarbons and the potential subsurface pathways beneath the site. Soil samples from the exploratory boring will be submitted for laboratory analysis for the gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total petroleum hydrocarbons as gasoline (TPHg). The exploratory boring will be drilled to a maximum depth of 40 feet below the ground surface (approximately 10 feet below first encountered groundwater, which is approximately 30 feet). Soil samples collected from the boring during drilling will be subjectively analyzed in the field by a RESNA geologist for the presence of gasoline hydrocarbons, using visual observations and an organic vapor meter (OVM). Subsequent to the completion of this boring, a four-inch diameter polyvinyl chloride (PVC) groundwater monitoring well [redacted] will be constructed in the boring. The proposed boring location is shown on Plate A, Proposed Boring/Well Location.

VE-2
VE-3

After acquiring the proper Alameda County Water District Well Construction Permit, drill two borings: one [redacted] in the vicinity of boring B-5 (where TPHg was detected in the soil at a concentration of 1,400 parts per million [ppm] at 21 feet), and one [redacted] downgradient of the former USTs, to delineate further the lateral extent of gasoline hydrocarbons in soil and the potential subsurface pathways beneath the site. Soil samples from the borings will be submitted for laboratory analysis for the gasoline constituents BTEX and TPHg. Each exploratory boring will be drilled to first encountered groundwater (approximately 30 feet below the ground surface). Soil samples collected from the borings during drilling will be subjectively analyzed in the field by a RESNA geologist for the presence of gasoline hydrocarbons, using visual observations and an OVM. Subsequent to the completion of the borings, a four-inch diameter PVC vapor extraction well (VE-2 and VE-3) will be constructed in the borings. The proposed locations for the borings are shown on Plate A, Proposed Boring/Well Locations.

Upon completion of the drilling, selected soil samples collected from each boring will be delivered with chain of custody records to an Exxon approved state-certified contract laboratory. Laboratory costs are not included in this proposal and will be directly billed to Exxon by the laboratory. Subsequent to well installation, the well locations will be surveyed by a licensed surveyor for wellhead elevation and other site features for accurate site depiction.

Task 2: Perform a vapor extraction test to evaluate the efficiency and practicality of vapor-extraction as a soil remediation alternative, and to select the most appropriate off-gas treatment alternative. Air samples from the vapor extraction test will be submitted for laboratory analysis for BTEX and TPHg.

Task 3: Perform a step-drawdown and a 24-hour pumping and recovery test on monitoring well MW-1 to evaluate sustainable pumping rates and capture radii for design of a groundwater remediation system. Water generated during testing will be stored in a Baker tank (size to be determined after step-drawdown test is performed). Upon completion of the testing, the pumping test equipment and water will be removed from the site.

Task 4: Upon completion of this part of the subsurface investigation, RESNA will prepare an Interim Remediation Environmental Investigation Report summarizing our methods, data, findings, and conclusions.

Task 5: Upon completion of the drilling episode, RESNA will arrange for proper disposal of the soil cuttings and purge water.

A Preliminary Time Schedule for the proposed work is presented on Plate B. Please find the enclosed Estimated Budget for the proposed work.

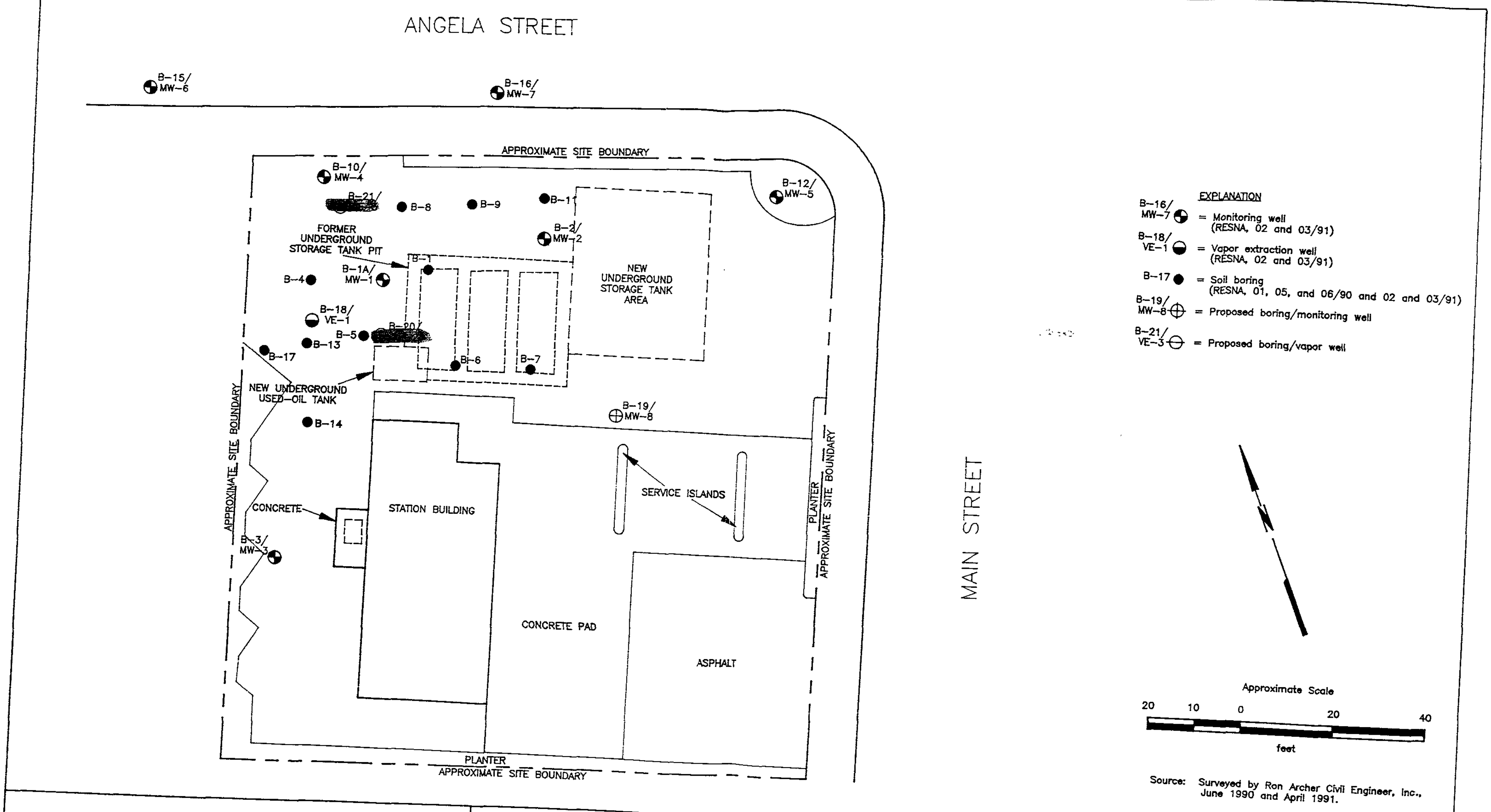
Please call us at (408) 264-7723 or (800) 926-0815 if you have any questions regarding these recommendations.

Sincerely,
RESNA Industries Inc.

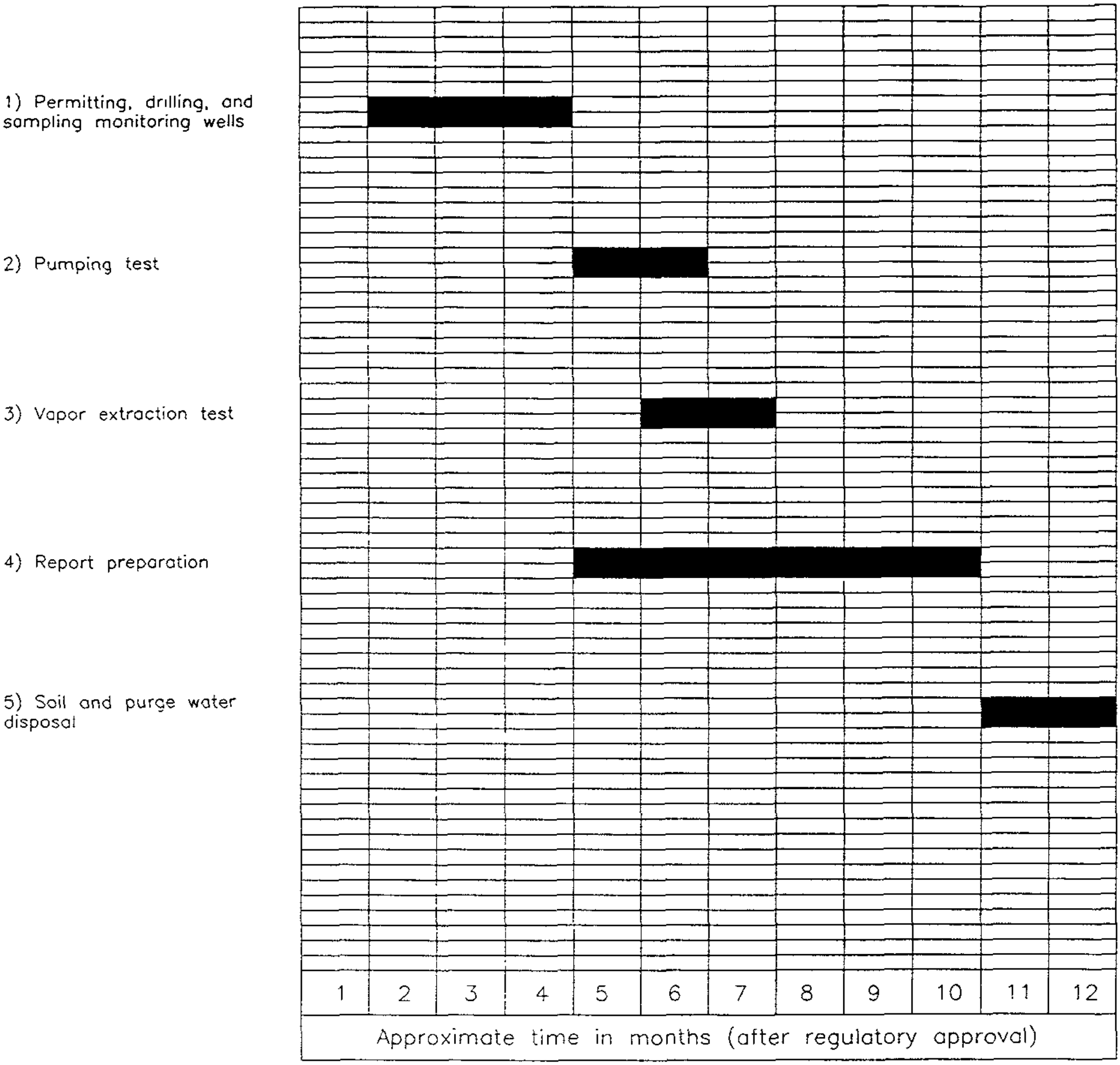
Marc A Briggs

Marc A. Briggs
Assistant Project Geologist

Enclosures: Plate A, Proposed Offsite Well Locations
Plate B, Preliminary Time Schedule



PROJECT	19025.04A	**PROPOSED BORING/WELL LOCATIONS** **Exxon Service Station 7-7003** **349 Main Street** **Pleasanton, California**	PLATE **A**



RESNA
Working to Restore Nature

PROJECT 19025.04A

PRELIMINARY TIME SCHEDULE
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE
B

RESNA

Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
Fax: (408) 264-2345

WORK PLAN
for
SUBSURFACE INVESTIGATIONS AND REMEDIATION
at
Exxon Station 7-7003
349 Main Street
Pleasanton, California

19025.04W

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

Marc A. Briggs
Assistant Project Geologist

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

Diane M. Barclay
C.E.G. 1366

November 30, 1992

Working To Restore Nature

CONTENTS

PLATES

CONTENTS
(Continued)

TABLES

APPENDICES

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
Fax: (408) 264-2345

WORK PLAN
for
SUBSURFACE INVESTIGATIONS AND REMEDIATION
at
Exxon Station No. 7-7003
349 Main Street
Pleasanton, California
for
Exxon Company, U.S.A.

INTRODUCTION

This Work Plan summarizes work previously preformed by RESNA Industries Inc. (RESNA), formerly Applied GeoSystems (AGS), and others, and describes the project tasks proposed to evaluate and remediate the lateral and vertical extent of gasoline hydrocarbons in the soil and groundwater at the subject site. Exxon Company U.S.A. (Exxon) requested that RESNA prepare this work plan for submittal to the California Regional Water Quality Control Board (CRWQCB) and City of Pleasanton Fire Department (CPFD).

The proposed work includes the following tasks:

TASK 1: drill and sample soil borings:

TASK 2: drill step-out borings to further delineate the extent of gasoline hydrocarbons in soil (as necessary);

TASK 3: prepare a soil remediation feasibility study and addendum to work plan (if necessary);

TASK 4: design and construct soil remediation facilities (if necessary);

TASK 5: install, develop, and sample groundwater monitoring wells, and laboratory analyze water samples from the wells;

TASK 6: conduct hydrogeologic tests and research (as necessary);

TASK 7: install, develop, and sample offsite wells (if necessary);

TASK 8: prepare a groundwater remediation feasibility study and addendum to work plan (if necessary);

TASK 9: design and construct groundwater remediation facilities (if necessary);

TASK 10: prepare and implement site closure plan.

This Work Plan is intended to serve as a general technical guide to approach site closure. Specified work descriptions for each project phase, and any necessary modifications to these tasks, will be included in addendums to this Work Plan which will be submitted prior to performing each phase of site work. Field tasks described above will be performed in accordance with RESNA Field Protocol in Appendix A. The work plan addendums, investigation report(s), remediation feasibility study(ies), remediation plan(s), and a site closure plan will be submitted (if necessary) as separate documents. These documents will also be submitted to the CRWQCB and CPFD for their review and approval prior to continuing work at the site.

SITE DESCRIPTION AND GEOLOGY

General

The subject site is located at 349 Main Street on the southwestern corner of Angela and Main Streets in Pleasanton, California, Site Vicinity Map (Plate 1). The site is a relatively flat, predominately asphalt- and concrete-covered lot at an elevation of approximately 343 feet mean sea level (MSL) and is located in a commercial and residential area.

Local Geology and Hydrogeology

The site is in the north-central portion of the Livermore Valley, within the Coast Ranges Geomorphic Province of Northern California. The Livermore Valley is approximately 13 miles long oriented in an east-west direction, approximately 4 miles wide, and surrounded by hills of the Diablo Range (California Department of Water Resources, 1974). The valley slopes gently toward the west. The principal streams in the area are the Arroyo Valley Creek and Arroyo Mocho Creek, which flow toward the western end of the valley. Arroyo Mocho Creek is approximately 2 miles north of the site, and Arroyo Valley Creek is approximately ½-mile north of the site.

Livermore Valley is underlain by sediments, water-bearing rocks, and non-water-bearing rocks. The sediments and water-bearing units comprise the Livermore Valley groundwater basin and include valley-fill materials, the Tassajara Formation, and the Livermore Formation (California Department of Water Resources, 1966, 1974). The Livermore Valley groundwater basin is divided into sub-basins on the basis of fault traces or other hydrologic discontinuities (California Department of Water Resources, 1974). The groundwater system in Livermore Valley is a multilayered system with an unconfined aquifer overlying a sequence of leaky or semiconfined aquifers. Groundwater in the basin flows downslope toward the east-west-trending axis of the valley and then flows generally to the west (Alameda County Flood Control and Water Conservation District - Zone 7, 1990). Local groundwater flow is to the northwest based on groundwater monitoring data collected at the site (RESNA, September 10, 1992).

PREVIOUS WORK

June 1989

In June 1989, at the request of Exxon, AGS performed a soil-vapor survey to evaluate the concentrations of gasoline hydrocarbons in the soil prior to the removal and replacement of the gasoline and used-oil underground storage tanks (USTs). Vapor samples were collected at eight locations near the service islands, the product lines, and the former USTs, at depths of 15 feet and between 23 and 28 feet below grade. The sample locations are shown on the Generalized Site Plan (Plate 2). Data from this survey indicated detectable levels of hydrocarbons in the soil around the former gasoline USTs and west of the used-oil UST. The highest readings were found on the western side of the former USTs (AGS, July 20, 1989). The results of the soil-vapor survey are summarized in Table 1.

July and August 1989

In July 1989, three 8,000-gallon steel gasoline USTs and a used-oil UST were removed from the site. The gasoline USTs were used to store unleaded, premium unleaded, and leaded gasoline. Examination of the steel tanks after removal indicated no signs of leakage, holes, pitting, or areas of weakness. After removal of the USTs, a total of 22 soil samples were collected for laboratory analysis. Of these samples, 14 were from the excavation at depths of 14 and 23 feet below grade, one from the used-oil UST excavation at a depth of 7 feet, one from near the new tank pit at a depth of 13 feet, and 6 from near the product lines at a depth of 3 feet (AGS, October 25, 1989). In August 1989, new fiberglass gasoline USTs were installed east of the former gasoline UST pit, and a new fiberglass used-oil UST was installed northeast of the old used-oil UST pit.

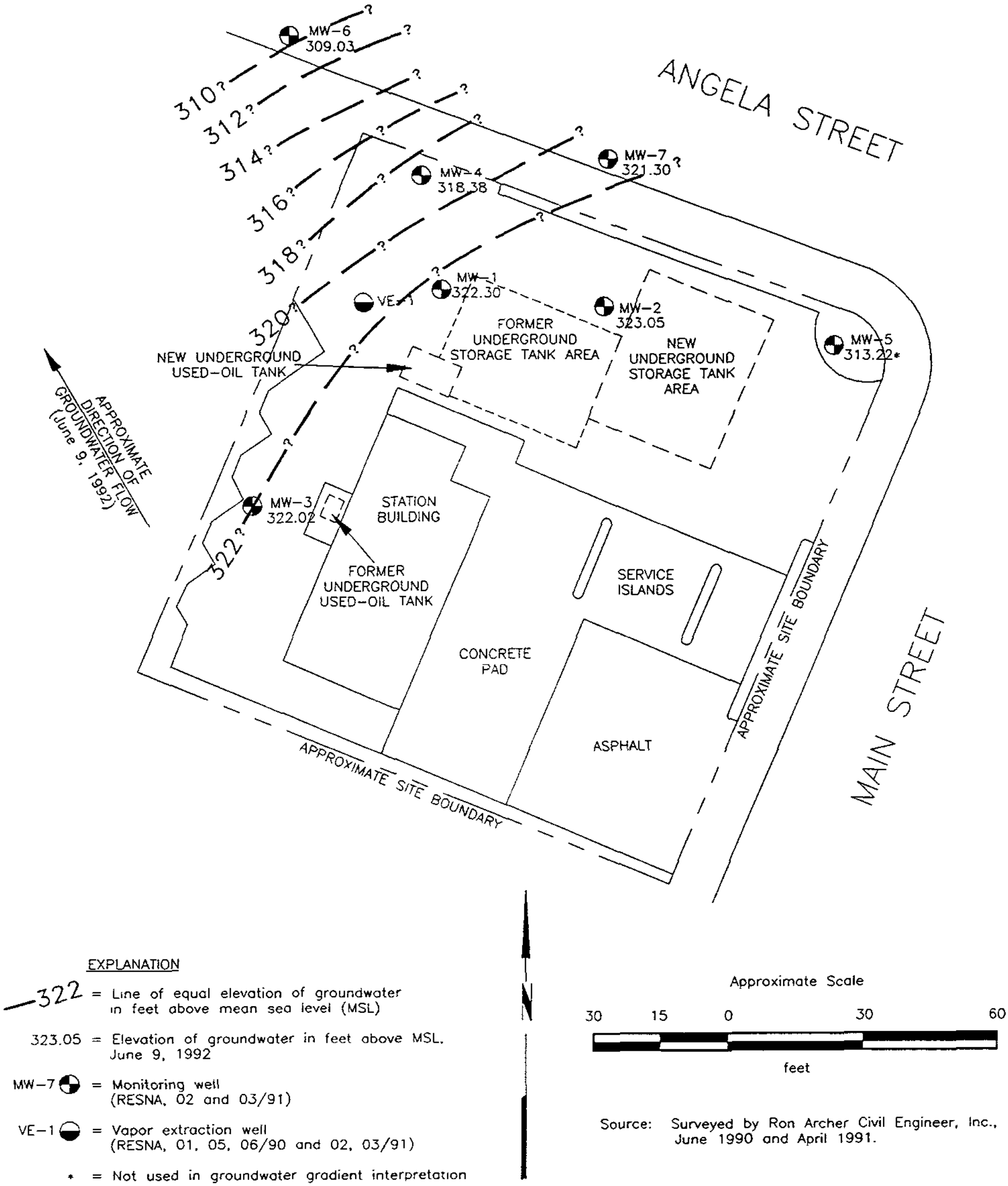
Results of the laboratory analysis indicated nondetectable gasoline hydrocarbon levels in the areas near the product line trench, the new tank pit floor, and at a depth of approximately 14 feet near the southern side and the center of the old tank pit. However, the results from the samples collected at approximate depths of 23 feet near the northern side of the tank pit indicated levels of up to 150 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg). An additional foot of soil was excavated in this area (to a depth of 24 feet), and samples from this depth contained up to 40 ppm TPHg. The results of analyses of the sample from near the used-oil UST showed no detectable TPHg, total petroleum hydrocarbons as diesel (TPHd), total oil and grease (TOG), or volatile organic compounds (VOCs). Low concentrations of chromium, zinc, and lead were detected in the sample. Results of laboratory analysis of soil samples are summarized in Table 2, Cumulative Results of Laboratory Analyses of Soil Samples.

Based on the results of this investigation, AGS recommended the installation of three groundwater monitoring wells to assess the impact of gasoline hydrocarbons on the groundwater beneath the site.

January through June 1990

An initial subsurface investigation was conducted by AGS in two phases. The investigation included drilling 13 soil borings in the vicinity of the former USTs, installing groundwater monitoring wells MW-1 through MW-5 in five of the borings, evaluating the concentrations of gasoline hydrocarbons in the soil and groundwater beneath the site, evaluating the groundwater gradient at the site, and conducting a records review of wells within ½-mile radius of the site. The first phase was performed between January 13 and 15, 1990 (AGS, August 1, 1990). Borings B-1, B-1A, B-2, and B-3 were drilled and soil sampled at 2-½ to 5 foot intervals. Groundwater was encountered at 30 to 33 feet below grade and groundwater monitoring wells MW-1, MW-2, and MW-3 were installed in borings B-1A, B-2, and B-3, respectively. The second phase was conducted between May 29 and June 4, 1990, in which borings B-4 through B-12 were drilled and sampled. Groundwater was encountered in B-10 at 32 feet and in B-12 at 42 feet, and monitoring wells MW-4 and MW-5 were installed in B-10 and B-12, respectively. Analytical results of soil samples showed that levels of TPHg were present at concentrations up to 1,400 ppm southwest of the former gasoline USTs. Total lead concentrations did not exceed 14 ppm and the highest values were found southwest of the UST pit (see Table 2).

Quarterly groundwater monitoring data indicated a groundwater flow direction to the west to northwest with a gradient of approximately 0.007 in February 1990 to 0.008 in June 1990. Cumulative groundwater monitoring data is presented on Table 3. Groundwater analyses showed



EXPLANATION

322 = Line of equal elevation of groundwater in feet above mean sea level (MSL)

323.05 = Elevation of groundwater in feet above MSL, June 9, 1992

MW-7 = Monitoring well (RESNA, 02 and 03/91)

VE-1 = Vapor extraction well (RESNA, 01, 05, 06/90 and 02, 03/91)

* = Not used in groundwater gradient interpretation

Source: Surveyed by Ron Archer Civil Engineer, Inc., June 1990 and April 1991.

RESNA
Working to Restore Nature

PROJECT 19025.04W

GROUNDWATER GRADIENT MAP
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE
7

that concentrations of TPHg were found in the groundwater beneath the site northwest of the former UST pit. Cumulative results of laboratory analysis of groundwater samples are shown in Tables 4 and 5. In June 1990, the highest gasoline hydrocarbon concentrations were present in MW-1. Total lead was not detectable except in the sample from MW-5, which contained 0.06 ppm.

A review of available well records from the Alameda County Flood Control and Water Conservation District (ACFCWCD), Zone 7, in Pleasanton, California, revealed there were 10 wells within ½-mile of the site. Of these, only one well was an active water supply well, located ½-mile northeast of the site.

Based on the results of this investigation, AGS concluded: monitoring wells MW-1 through MW-3 and MW-5 appeared to be screened in a shallow, laterally discontinuous saturated zone, and monitoring well MW-4 was screened in a deeper saturated zone; groundwater use in the vicinity of the site appeared to be limited; the direction of groundwater flow in the shallower zone appeared to be to the northwest at a gradient of approximately 0.007 to 0.008. Hydrocarbons in soil appeared to be adequately delineated north, east, and south of the former USTs. Results of groundwater analyses indicated the presence of gasoline hydrocarbons in the groundwater beneath the site, with the highest concentrations in MW-1, west (approximately downgradient) of the former USTs. The dissolved hydrocarbon plume was not delineated offsite west and north of the former gasoline USTs.

February and March 1991

A supplemental subsurface investigation was conducted by AGS that included drilling 6 soil borings in the vicinity of the former USTs, installing groundwater monitoring wells MW-6 and MW-7 and vapor well VE-1 in three of the borings, evaluating the concentrations of gasoline hydrocarbons in the soil and groundwater beneath the site, and evaluating the groundwater gradient at the site (AGS, October 24, 1991. Geologic cross sections generated during this phase of work are reproduced on Plates 3 through 6. The highest concentration of TPHg (580 ppm) was detected in a soil sample from 23 feet deep (above groundwater) in boring B-13. Groundwater analyses showed the highest TPHg concentration (4,500 parts per billion [ppb]) was detected in the groundwater sample from MW-1. AGS concluded that the groundwater in the shallowest saturated zone beneath the site appeared to be semiconfined, and had a flow direction to the northwest with a gradient of 0.125. The steep gradient was thought to be related to steep- sloping sand and gravel units. Soil with TPHg concentrations greater than 100 ppm appeared to be limited to an area generally west of the former USTs at depths between 21 and 26 feet below grade. Gasoline hydrocarbons in the soil appear to be delineated north, south, east, and west of the former USTs. The results of groundwater analyses indicate the presence of gasoline hydrocarbons in the groundwater beneath the site, with the highest concentrations in MW-1 to the west (approximately downgradient) of the former USTs. The dissolved hydrocarbon plume was thought to extend offsite to the north and possibly west of the former USTs. The extent of gasoline hydrocarbons in the groundwater was approximately delineated.

<u>December 1990-June 1992</u>

An AGS/RESNA geologist performed quarterly monitoring of wells at the site on December 18, 1990, June 27 and September 26, 1991; and January 10, March 12, and June 9, 1992 (AGS, February 26, October 24, October 31, and December 5, 1991; RESNA, March 30, May 28 and September 10, 1992). Groundwater was sampled for laboratory analysis from wells MW-1 through MW-7 (as applicable). The DTW measurements, wellhead elevations, and groundwater elevations are presented in Table 3, Cumulative Groundwater Monitoring Data. The laboratory results of this monitoring are included in Tables 4 and 5. The groundwater gradient interpreted during these monitoring episodes was consistent with the previously interpreted groundwater gradients for this site.

PROJECT TASKS

RESNA proposes the following project Tasks 1 through 10 listed below as a method of approach to work to delineate the vertical and horizontal extent of gasoline hydrocarbons and to remediate gasoline hydrocarbons in soil and groundwater at the site. Field work involved with the following project tasks will be performed in accordance with the attached RESNA Field Protocol in Appendix A. Plate 10, Project Tasks Decision Tree for Tasks 1 through 10, graphically presents RESNA investigative site approach. The tasks shown in Plate 10 are discussed in detail below. A Remediation Options Decision Tree (Plate 11) is also attached and depicts potential remediation alternatives for soil and groundwater at this site.

TASK 1

Additional soil borings will be drilled and sampled as necessary to evaluate the lateral and vertical extent of gasoline hydrocarbons at the site. Specific locations of these soil borings will be selected and presented as needed for regulatory review. Soil samples will be submitted for laboratory analyses for BTEX and TPHg using modified Environmental Protection Agency (EPA) methods 5030/8015/8020. These laboratory analyses will be performed at a State-certified laboratory.

TASK 2

Additional step-out borings will be drilled and soil samples tested (if necessary) to further delineate the extent of gasoline hydrocarbons in the soil at the site (and offsite, if necessary).

TASK 3

If it is found that remediation of the soil is necessary at the site, a Feasibility Study and addendum to Work Plan will be prepared to evaluate clean-up levels and corrective actions for gasoline hydrocarbons in soil. This study will include remediation options and recommendations for the apparent best remediation alternative to be implemented. Plate 11 lists some of the typical soil remediation options which might be applicable to this site. Two or three disposal or treatment and disposal alternatives would be selected to find the most appropriate.

TASK 4

After regulatory approval of the recommended remediation alternative and addendum to Work Plan for the site, construction Plans and Specifications will be prepared as needed. In some instances, simple excavation and disposal of contaminated soil to an appropriate landfill may be adequate, with clean backfill used to replace the excavated soil. If construction of treatment facilities is necessary, construction permits and operating permits will be obtained and Plan and

Specification approval will be secured from the local Public Works Department, if necessary. A soil remediation system will then be installed and soil remediation will be performed.

TASK 5

Onsite groundwater monitoring wells will be installed, developed, and sampled to delineate the lateral and vertical extent of gasoline hydrocarbons in groundwater, if necessary. Groundwater samples will be submitted for laboratory analysis for BTEX and TPHg using the EPA methods discussed in Task 1 above at a State-certified laboratory.

TASK 6

Hydrogeologic tests and research will be performed, if necessary, to evaluate the potential migration of gasoline hydrocarbons, potential beneficial use of groundwater, and general hydrogeologic characteristics as they pertain to possible groundwater remediation.

TASK 7

If necessary, and after regulatory approval of an offsite groundwater investigation plan (addendum to Work Plan), offsite wells will be installed, developed, and sampled as described in Task 5 above.

TASK 8

If necessary, a groundwater remediation Feasibility Study and addendum to Work Plan will be prepared to evaluate corrective actions for gasoline hydrocarbons in groundwater. Task 8 can be conducted in conjunction with Task 3, the soil remediation Feasibility Study and Work Plan. Clean-up levels and corrective action of gasoline hydrocarbons in groundwater, including two to three alternatives for treatment and two to three alternatives for treated groundwater disposal, would be analyzed for technical and cost-effectiveness feasibility. Plate 11 lists some typical groundwater remediation alternatives which may be applicable to this site.

TASK 9

After regulatory approval of the remediation Feasibility Study (if necessary) and addendum to Work Plan, a groundwater remediation system will be designed and installed; the necessary permits will be obtained; and groundwater remediation will be performed and monitored.

TASK 10

After soil and groundwater remediation has been performed to clean-up levels, a site closure plan will be prepared for regulatory review and approval.

SCHEDULE OF OPERATIONS

Preliminary time schedules to perform additional phases of work will be included with the addendums to work plans presented for regulatory review. RESNA can initiate work at the site within one week after receiving authorization to proceed. A preliminary estimate to perform the tasks described in this Work Plan, including remediation (Task 1 through Task 10), is approximately two to five years.

PROJECT STAFF

Ms. Diane Barclay, a Certified Engineering Geologist (C.E.G. 1366) in the State of California, will be in overall charge of hydrogeologic facets, and Ms. Joan E. Tiernan, Ph.D., a Registered Civil Engineer (C.E. 044600) will be in overall charge of engineering facets of this project. Mr. Greg Barclay, General Manager, will provide supervision of field and office operations of the project. Mr. Dave Higgins, Project Manager, and Mr. Marc Briggs, Assistant Project Geologist, will be responsible for the day-to-day field and office operations of the project. RESNA employs a staff of geologists and technicians who will help complete the project.

REFERENCES

Alameda County Flood Control and Water Conservation District (Zone 7). 1986. Water Level Contours Map. Water Resources Engineering.

Alameda County Flood Control and Water Conservation District - Zone 7, January 16, 1991. Fall 1990 Groundwater Level Report.

Applied GeoSystems. July 20, 1989. Report on Soil Vapor Survey at Exxon Station No. 7 -7003, 349 Main Street, Pleasanton, California. Job No. 19025-1V.

Applied GeoSystems. October 25, 1989. Report on Limited Subsurface Environmental Investigation at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. Job No. 19025-1.

Applied GeoSystems. August 1, 1990. Report on Supplemental Subsurface Environmental Investigation at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. Job No. 19025-2.

Applied GeoSystems. February 26, 1991. Letter Report Fourth Quarter 1990 Groundwater Monitoring at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. AGS Job No. 19025-3.

Applied GeoSystems. October 24, 1991. Report on Supplemental Subsurface Environmental Investigation and Quarterly Monitoring at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California Job No. 19025-3.

Applied GeoSystems. October 31, 1991. Letter Report Second Quarter 1991 Groundwater Monitoring at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. Job No. 19025.03.

Applied GeoSystems. December 5, 1991. Letter Report Third Quarter 1991 Groundwater Monitoring at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. Job No. 19025.03.

California Department of Water Resources. 1966. Evaluation of Groundwater Resources, Livermore and Sunol Valleys, Appendix A: Geology. Bulletin No. 118-2.

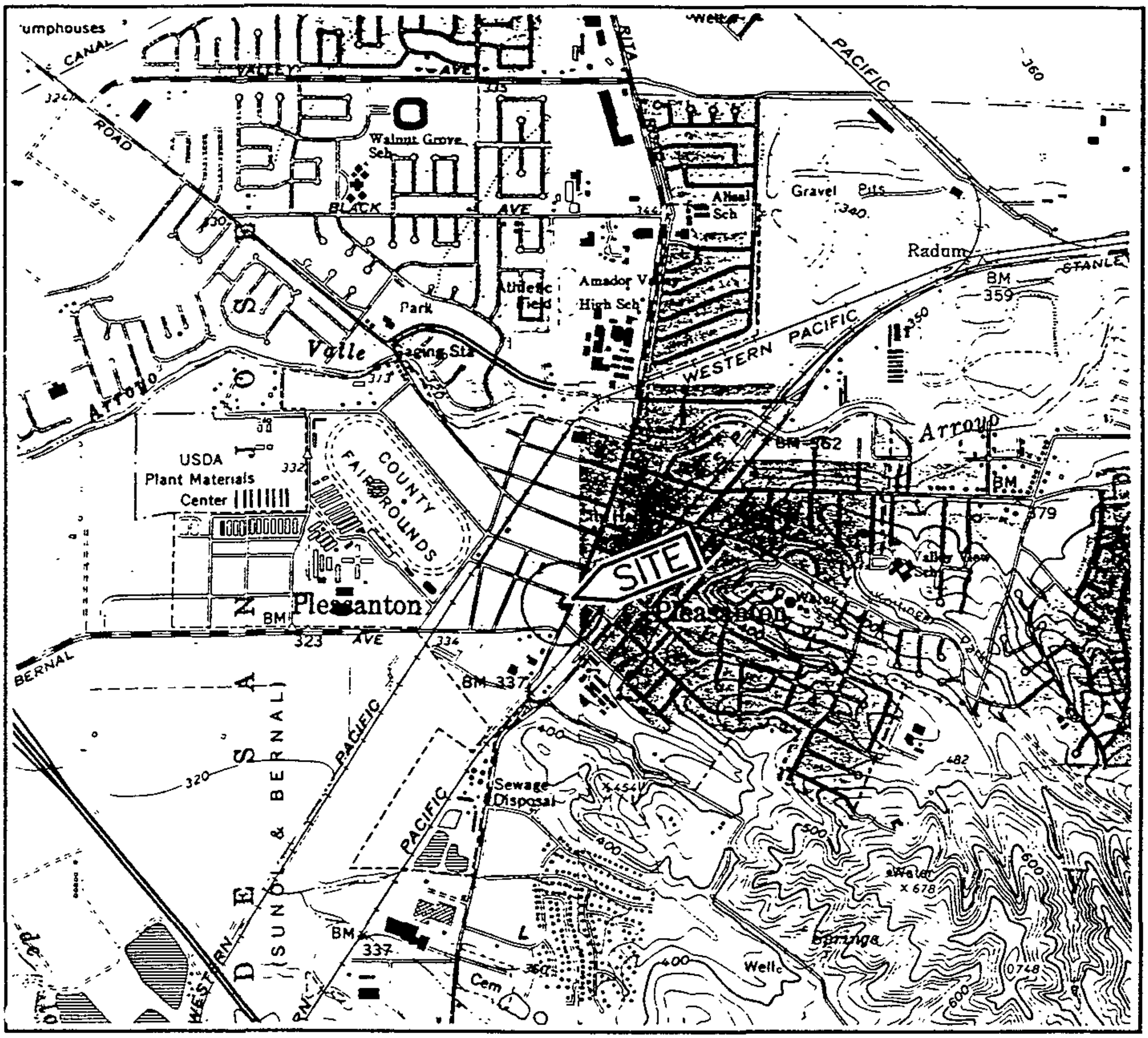
REFERENCES

California Department of Water Resources. 1974. Evaluation of Groundwater Resources, Livermore and Sunol Valleys. Bulletin No. 118-2, page 153.

RESNA Industries Inc. March 30, 1992. Letter Report Fourth Quarter 1991 Groundwater Monitoring at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. Job No. 19025.03.

RESNA Industries Inc. May 28, 1992. Letter Report First Quarter 1992 Groundwater Monitoring at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. Job No. 19025.05.

RESNA Industries Inc. September 10, 1992. Letter Report Second Quarter 1992 Groundwater Monitoring at Exxon Station No. 7-7003, 349 Main Street, Pleasanton, California. Job No. 19025.05.



Base: U.S. Geological Survey
7.5-Minute Quadrangles
Dublin/Livermore, California.
Photorevised 1980

N

LEGEND

(•) = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

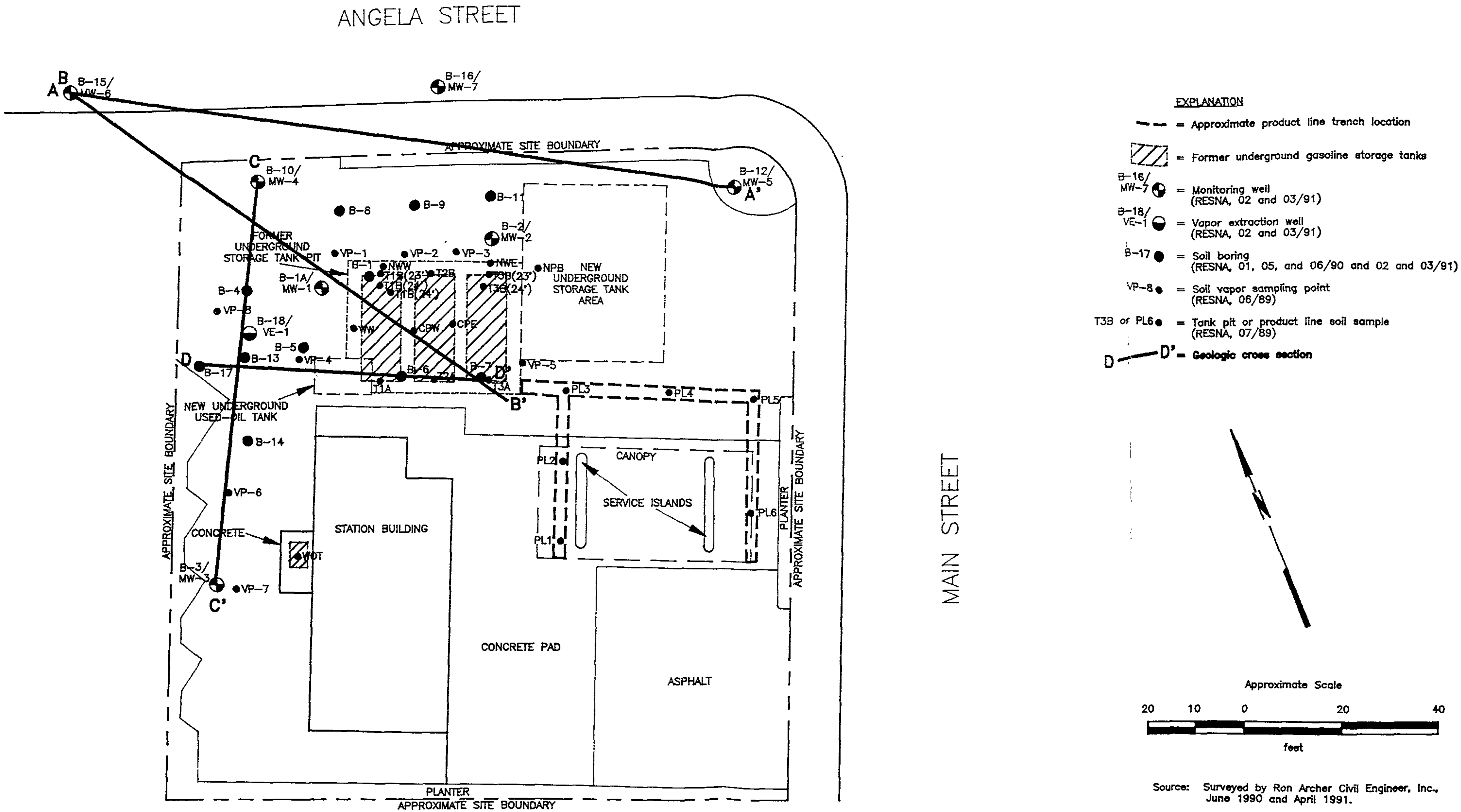
RESNA
Working to Restore Nature

PROJECT 19025.04W

SITE VICINITY MAP
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE

1

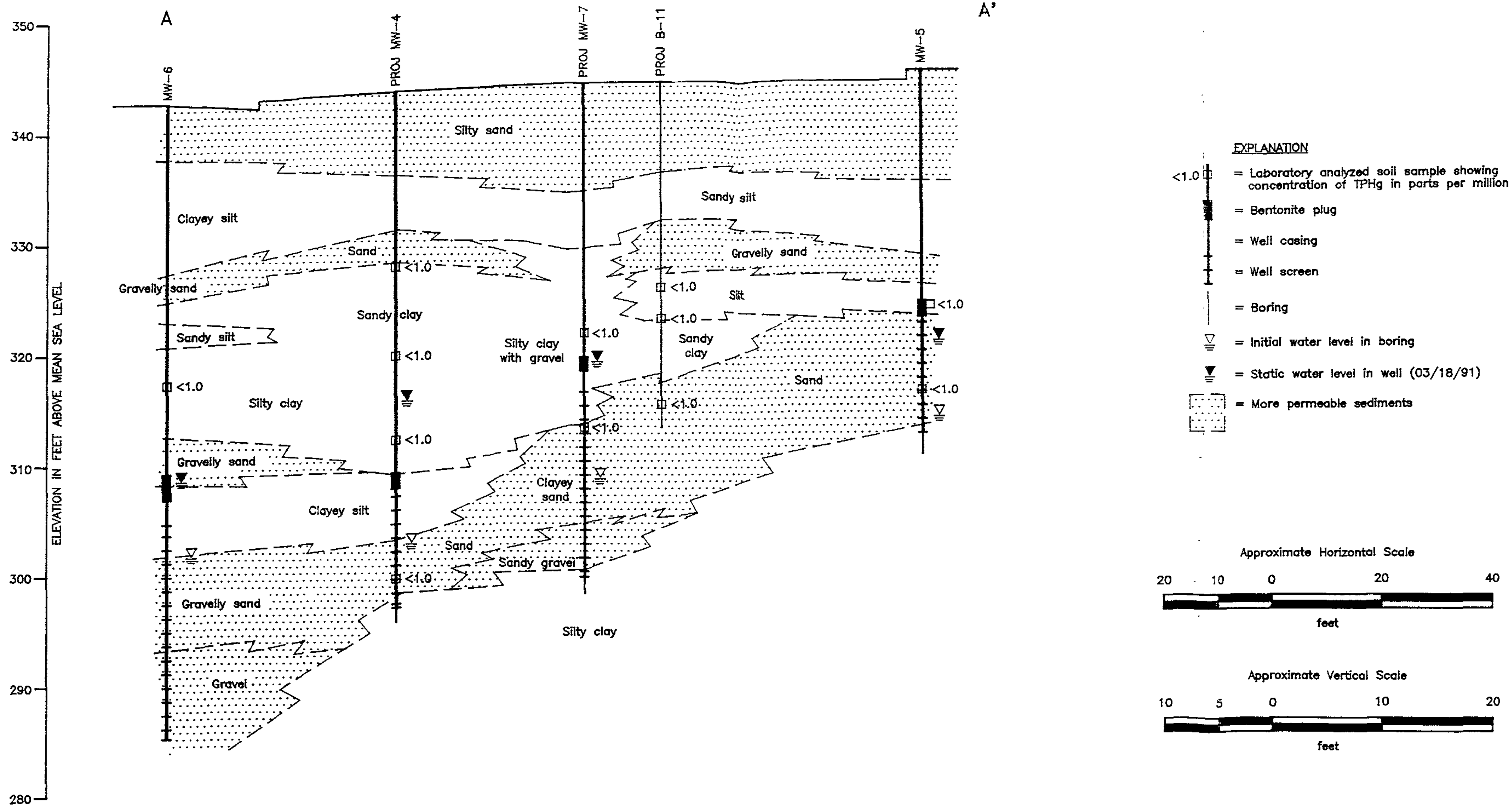


RESNA
Working to Restore Nature

PROJECT 19025.04W

GENERALIZED SITE PLAN
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE 2

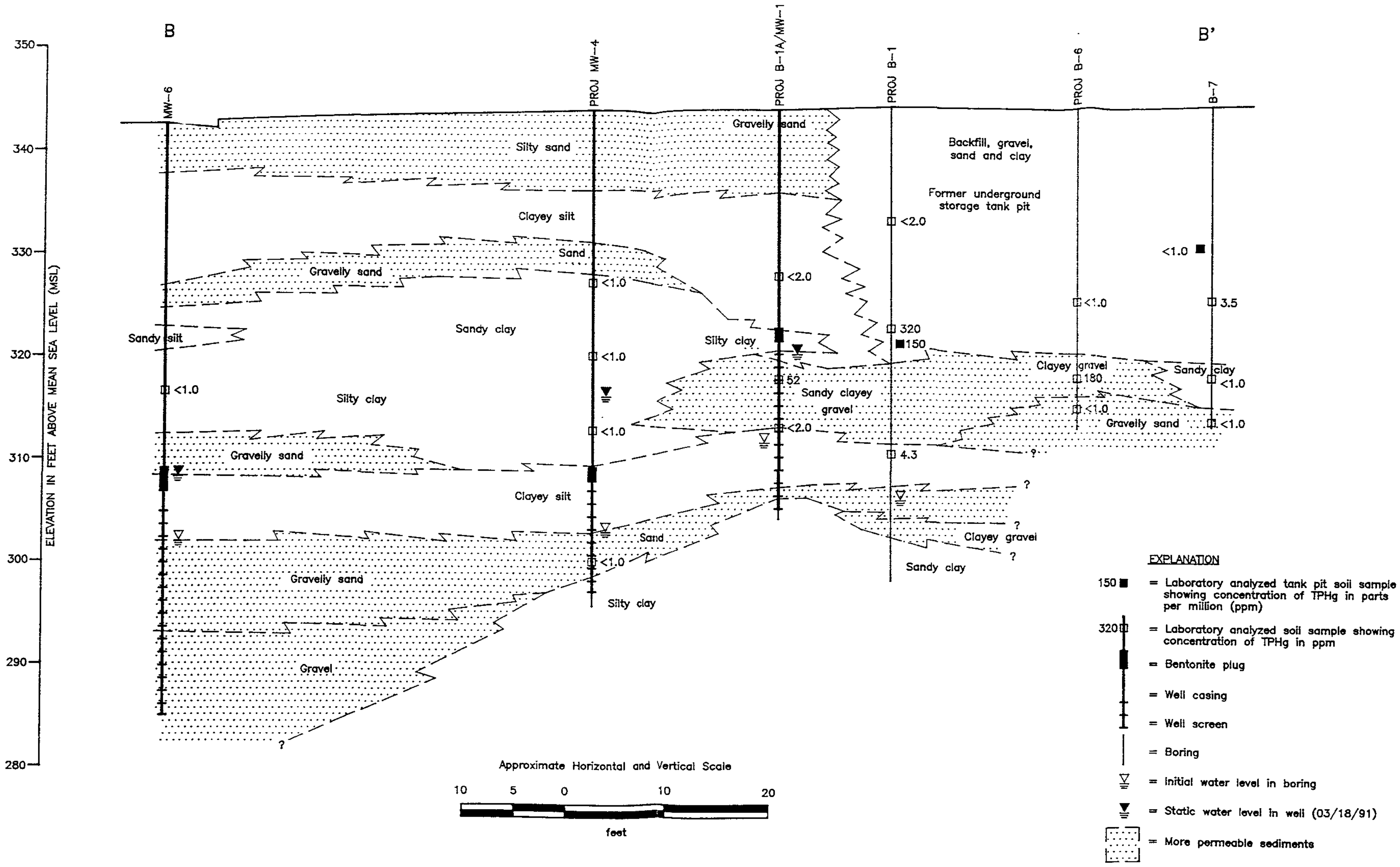


RESNA
Working to Restore Nature

PROJECT **19025.04W**

GEOLOGIC CROSS SECTION A-A'
Exxon Station 7-7003
349 Main Street
Pleasanton, California

PLATE
3

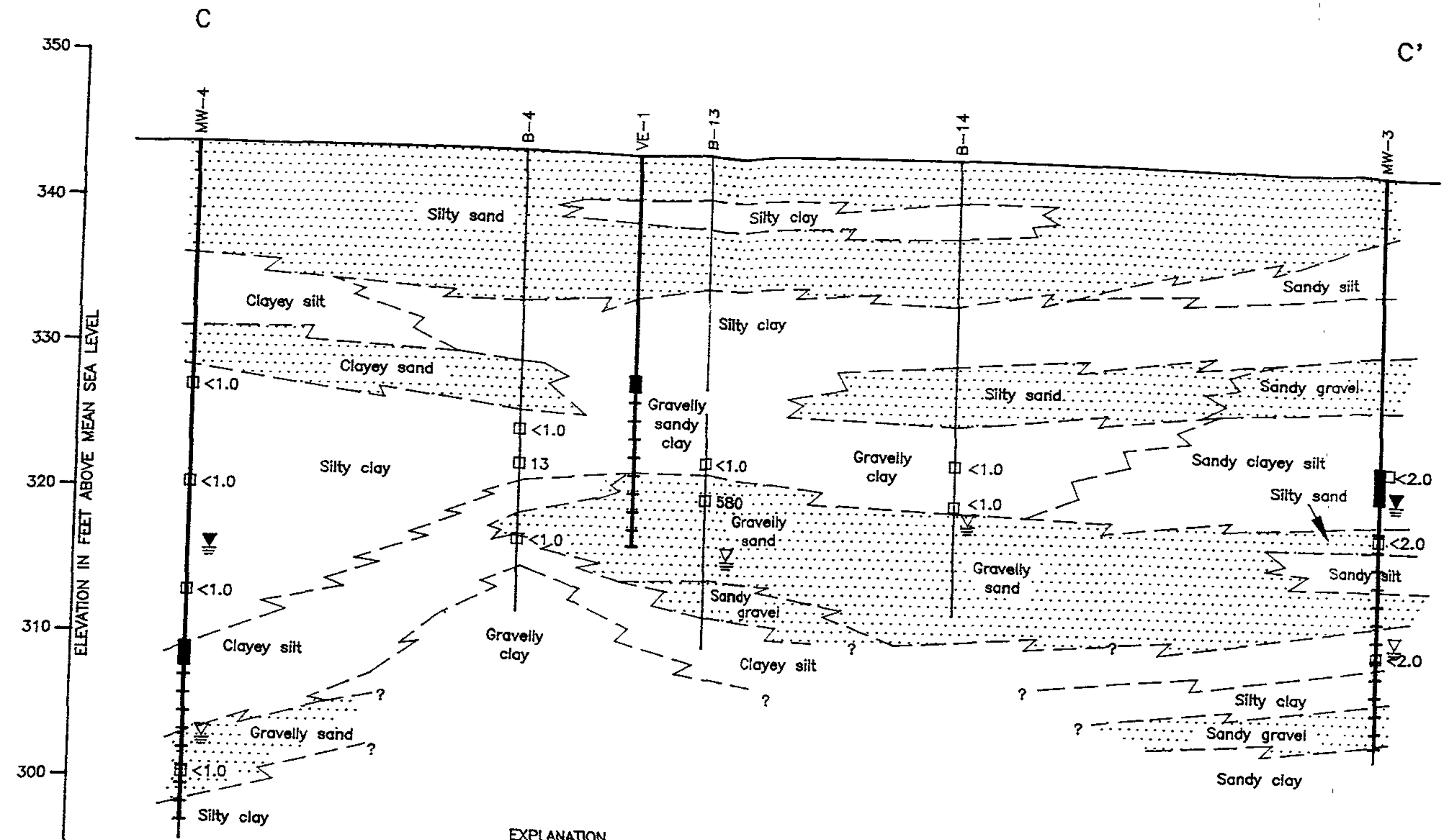


RESNA
Working to Restore Nature

PROJECT	19025.04W

GEOLOGIC CROSS SECTION B-B'
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE
4



EXPLANATION

- = Laboratory analyzed soil sample showing concentration of TPHg in parts per million
- = Bentonite plug
- = Well casing
- = Well screen
- = Boring
- = Initial water level in boring
- = Static water level in well (03/18/91)
- = More permeable sediments

Approximate Horizontal and Vertical Scale

10 5 0 10 20

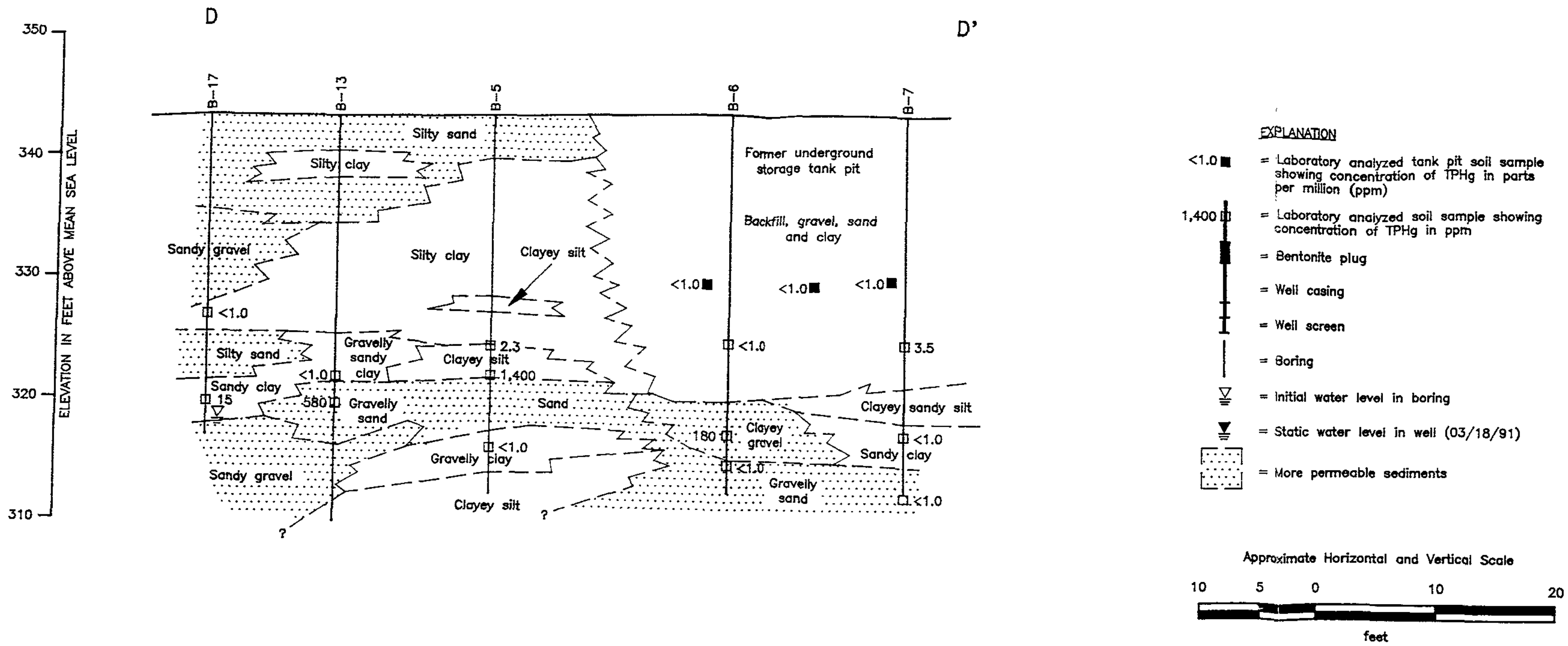
feet

RESNA
Working to Restore Nature

PROJECT 19025.04W

GEOLOGIC CROSS SECTION C-C'
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE 5

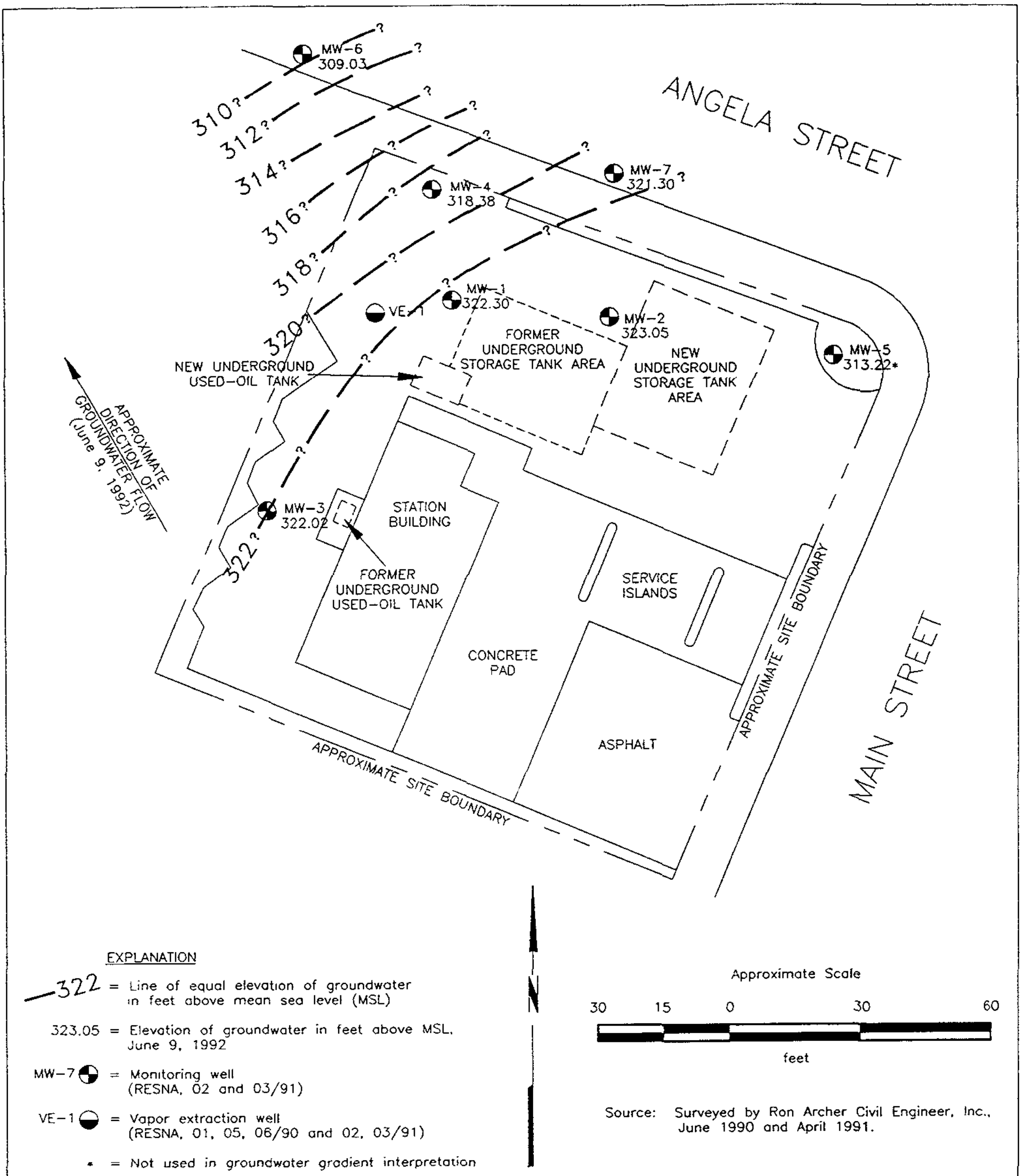


RESNA
Working to Restore Nature

PROJECT 19025.04W

GEOLOGIC CROSS SECTION D-D'
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE
6

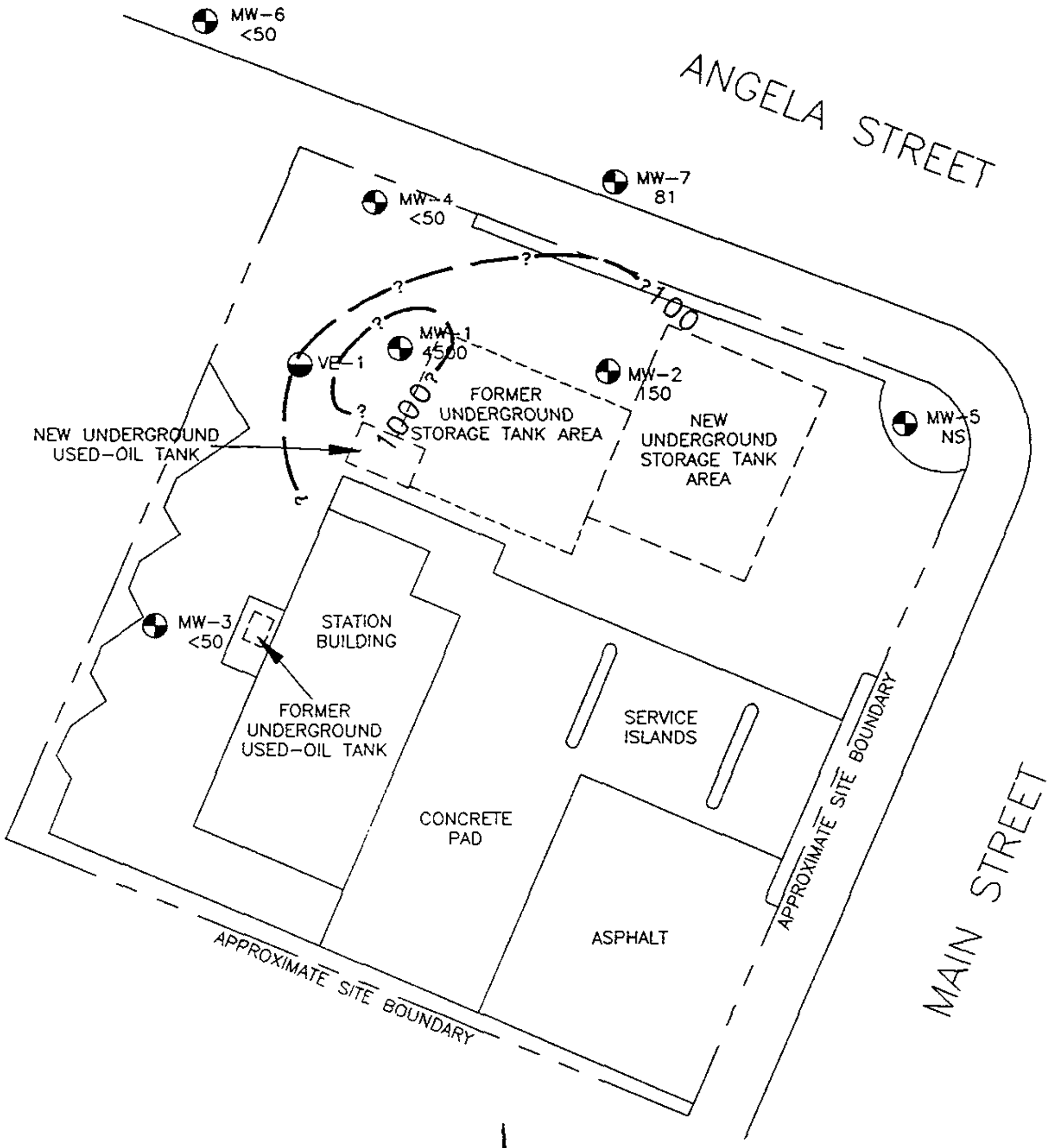


RESNA
Working to Restore Nature

PROJECT 19025.04W

GROUNDWATER GRADIENT MAP
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE 7



EXPLANATION

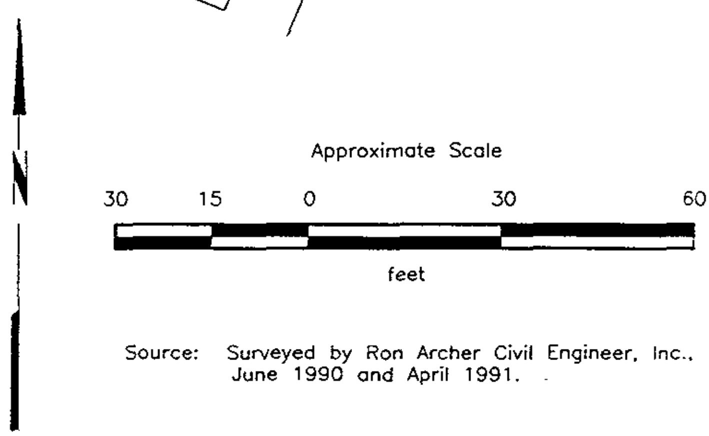
—1000 = Line of equal concentration of TPHg in groundwater in parts per billion (ppb)

4500 = Concentration of TPHg in groundwater in ppb, June 9, 1992

MW-7 = Monitoring well (RESNA, 02 and 03/91)

VE-1 = Vapor extraction well (RESNA, 01, 05, 06/90 and 02, 03/91)

NS = Not sampled (see text)



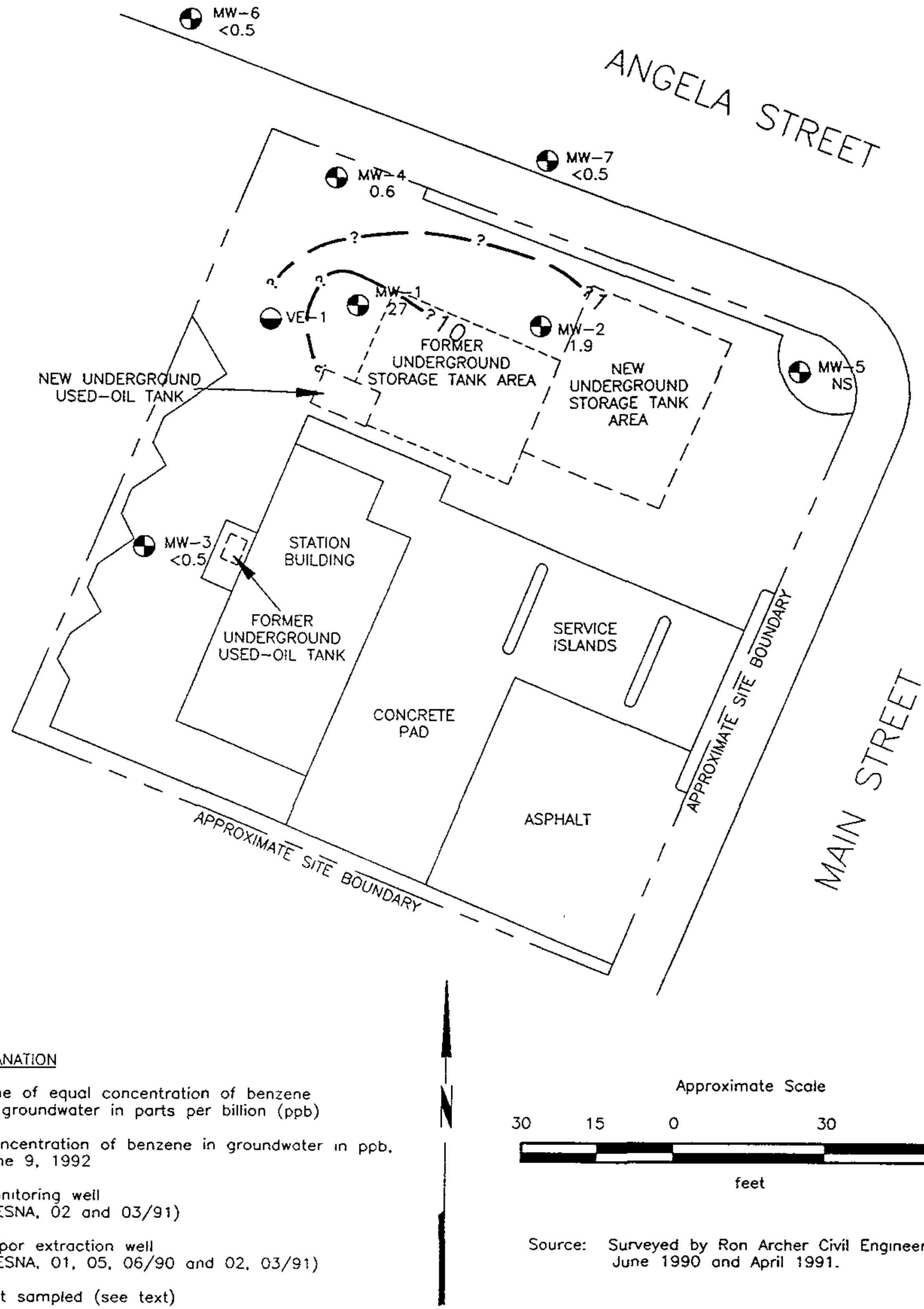
Source: Surveyed by Ron Archer Civil Engineer, Inc., June 1990 and April 1991.

RESNA
Working to Restore Nature

PROJECT **19025.04W**

TPHg CONCENTRATIONS IN GROUNDWATER
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE
8



EXPLANATION

—10 = Line of equal concentration of benzene in groundwater in parts per billion (ppb)

27 = Concentration of benzene in groundwater in ppb, June 9, 1992

MW-7 = Monitoring well (RESNA, 02 and 03/91)

VE-1 = Vapor extraction well (RESNA, 01, 05, 06/90 and 02, 03/91)

NS = Not sampled (see text)

Approximate Scale

30 15 0 30 60

feet

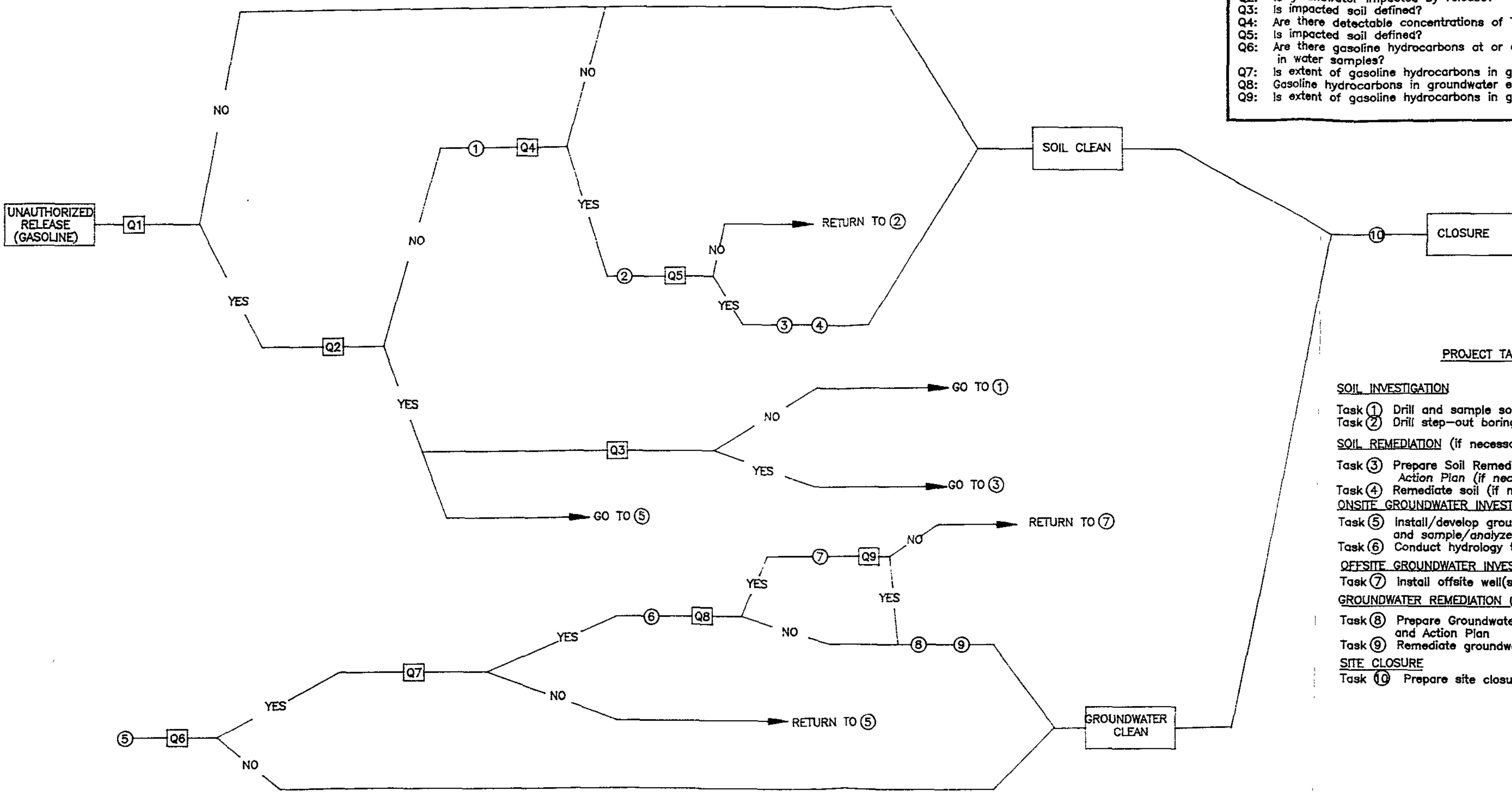
Source: Surveyed by Ron Archer Civil Engineer, Inc., June 1990 and April 1991.

RESNA
Working to Restore Nature

PROJECT 19025.04W

BENZENE CONCENTRATIONS IN GROUNDWATER
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE
9



QUESTION

Q1: Is soil impacted by release?
Q2: Is groundwater impacted by release?
Q3: Is impacted soil defined?
Q4: Are there detectable concentrations of TPHg in the soil?
Q5: Is impacted soil defined?
Q6: Are there gasoline hydrocarbons at or above detectable concentrations in water samples?
Q7: Is extent of gasoline hydrocarbons in groundwater characterized onsite
Q8: Gasoline hydrocarbons in groundwater extend offsite?
Q9: Is extent of gasoline hydrocarbons in groundwater characterized offsite

PROJECT TASKS

SOIL INVESTIGATION

Task ① Drill and sample soil borings
Task ② Drill step-out borings

SOIL REMEDIATION (if necessary)

Task ③ Prepare Soil Remediation Feasibility Study and *Action Plan (if necessary)*
Task ④ Remediate soil (if necessary)

ONSITE GROUNDWATER INVESTIGATION

Task ⑤ Install/develop groundwater monitoring wells and sample/analyze groundwater
Task ⑥ Conduct hydrology tests and research

OFFSITE GROUNDWATER INVESTIGATION (if necessary)

Task ⑦ Install offsite well(s), sample/analyze

GROUNDWATER REMEDIATION (if necessary)

Task ⑧ Prepare Groundwater Remediation Feasibility Study and Action Plan
Task ⑨ Remediate groundwater

SITE CLOSURE

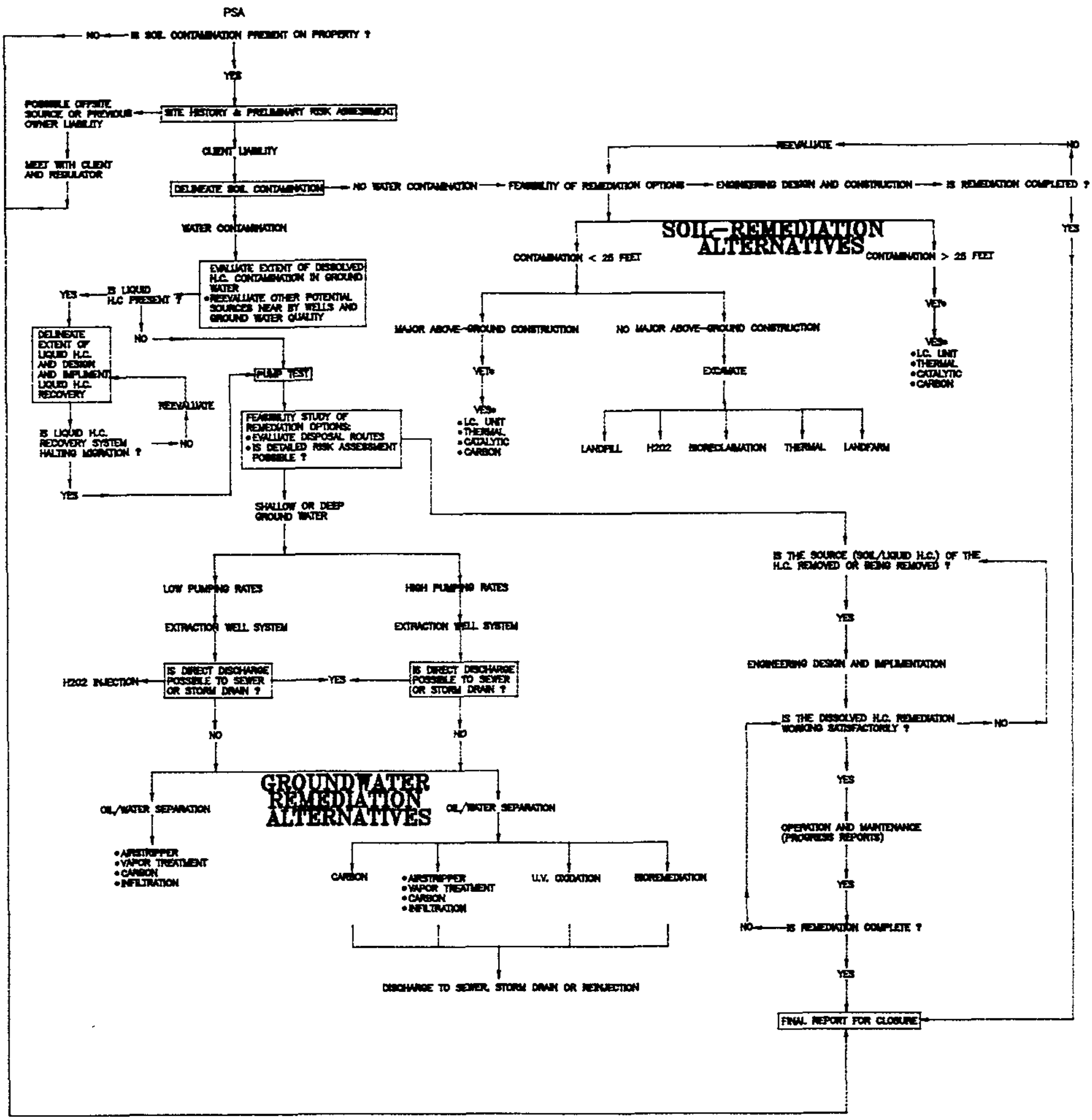
Task ⑩ Prepare site closure plan

RESNA
Working to Restore Nature

PROJECT 19025.04W

PROJECT TASK DECISION TREE
Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE
10



VET* = Vapor Extraction Test

VES* = Vapor Extraction System

RESNA

Working to Restore Nature

PROJECT 19025.04W

REMEDIATION OPTIONS DECISION TREE

Exxon Service Station 7-7003
349 Main Street
Pleasanton, California

PLATE

11

TABLE 1
RESULTS OF SOIL-VAPOR SURVEY
Exxon Station 7-7003
Pleasanton, California

Sample ID	Depth	B	T	X
June 1989				
VP-1	15	<1	<1	<1
VP-1	25	<1	<1	<1
VP-2	15	<1	<1	<1
VP-2	26	NS	NS	NS
VP-3	15	<1	<1	<1
VP-3	25	<1	2	<1
VP-4	15	<1	<1	<1
VP-4	28	<1	724	24
VP-5	15	<1	5	<1
VP-5	24	<1	<1	<1
VP-6	15	<1	3	<1
VP-6	23	<1	<1	<1
VP-7	15	<1	3	<1
VP-7	25	<1	<1	<1
VP-8	15	2	<1	<1
VP-8	25	NS	NS	NS

Sample depths are measured in feet
Measurements made with a Photovac 10S70
< : less than the detection limit
NS : No sample recovered

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
Exxon Station 7-7003
Pleasanton, California
(Page 1 of 5)

Sample ID	TPHg	B	T	E	X	Pb
<u>August 1989</u>						
Tank Pit Excavation						
August 1, 1989						
S-14-T1A	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-14-T2A	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-14-T3A	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-23-T1B	150	0.5	<0.1	<0.1	<0.1	NA
S-21-T2B	2.2	<0.1	<0.1	<0.1	<0.1	NA
S-23-T3B	130	0.3	0.2	<0.1	<0.1	NA
S-20-NWE	1.3	<0.1	<0.1	<0.1	<0.1	NA
S-20-NWW	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-20-WW	15	<0.1	<0.1	4.5	1.4	NA
August 2, 1989						
S-15-CPE	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-15-CPW	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-24-TIB	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-24-T3B	40	2.7	<0.1	15	2.8	NA
August 3, 1989						
S-24-T1B	4.3	<0.1	<0.1	<0.1	0.1	NA
	Additional analysis: <5 ppm TPHd					
Used-Oil Tank						
August 1, 1989						
S-7-WOT	<1.0	<0.1	<0.1	<0.1	<0.1	13
	Additional analysis: 10 ppm TPHd, <50 ppm TOG, <0.1 ppm Cadmium, 42 ppm Chromium, 44 ppm Zinc					
New Tank Pit						
August 4, 1989						
S-13-NPB	<1.0	<0.1	<0.1	<0.1	<0.1	NA
	Additional analysis: 10 ppm TPHd					
Product lines						
August 8, 1989						
S-3-PL1	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-3-PL2	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-3-PL3	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-3-PL4	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-3-PL5	<1.0	<0.1	<0.1	<0.1	<0.1	NA
S-3-PL6	<1.0	<0.1	<0.1	<0.1	<0.1	NA

See notes on Page 4 of 5 and 5 of 5

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
Exxon Station 7-7003
Pleasanton, California
(Page 2 of 5)

Sample ID	TPHg	B	T	E	X	Pb
Composite Sample						
August 1, 1989						
S-0801-1A-1D	1.1	<0.1	<0.1	<0.1	<0.1	9
S-0801-2A-2D	1.1	<0.1	<0.1	<0.1	<0.1	6
S-0801-3A-3D	<1.0	<0.1	<0.1	<0.1	<0.1	11
S-0801-4A-4D	<1.0	<0.1	<0.1	<0.1	<0.1	10
August 2, 1989						
S-0802-5A-5D	2.0	<0.1	<0.1	<0.1	<0.1	7
S-0802-6A-6D	1.4	<0.1	<0.1	<0.1	<0.1	5
August 3, 1989						
S-0803-2E	75	<0.1	<0.1	<0.1	0.4	NA
	Additional analysis: 11 ppm TPHd					
August 18, 1989						
S-0802-1A-1D	<5 ppm TPHd					
S-0818-2A-2D	<5 ppm TPHd					
<u>January 1990</u>						
S-11-B1	<2.0	<0.050	<0.050	<0.050	<0.050	NA
S-21-B1	320.0	0.061	0.32	9.7	17	6.4*
S-33-B1	4.3	<0.050	<0.050	<0.050	0.20	NA
S-16-B1A	<2.0	<0.050	<0.050	<0.050	<0.050	NA
S-25.5-B1A	52.0	<0.050	<0.050	0.94	1.3	8.3*
S-30.5-B1A	<2.0	<0.050	<0.050	<0.050	<0.050	NA
S-20-B2	<2.0	<0.050	<0.050	<0.050	<0.050	NA
S-25.5-B2	<2.0	<0.050	<0.050	<0.050	<0.050	5.2*
S-30.5-B2	17.0	0.086	0.30	0.066	0.40	NA
S-20-B3	<2.0	<0.050	<0.050	<0.050	<0.050	NA
S-25-B3	<2.0	<0.050	<0.050	<0.050	<0.050	6.8*
S-33-B3	<2.0	<0.050	<0.050	<0.050	<0.050	NA
<u>May and June 1990</u>						
S-18.5-B4	<1.0	<0.0050	<0.0067	<0.0050	<0.0050	NA
S-21-B4	13	0.020	0.016	0.066	1.1	6.4*
S-26-B4	<1.0	<0.0050	0.018	<0.0050	<0.0050	NA

See notes on Page 4 of 5 and 5 of 5

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
Exxon Station 7-7003
Pleasanton, California
(Page 3 of 5)

Sample ID	TPHg	B	T	E	X	Pb
S-18.5-B5	2.3	<0.0050	0.025	<0.0050	<0.0050	NA
S-21-B5	1,400	5.5	5.3	33	35	14*
S-26.5-B5	<1.0	<0.0050	0.0088	<0.0050	<1.0	NA
S-18.5-B6	<1.0	<0.0050	0.054	<0.0050	<0.0050	NA
S-26-B6	180	2.1	0.55	1.2	0.86	12*
S-28.5-B6	<1.0	0.0054	0.018	0.0039	<0.0050	NA
S-18.5-B7	3.5	0.0073	0.029	0.0090	0.020	NA
S-26-B7	<1.0	0.011	0.050	0.042	0.018	14*
S-31.5-B7	<1.0	0.0081	0.028	<0.0050	0.015	NA
S-18.5-B8	<1.0	<0.0050	0.027	<0.0050	<0.0050	NA
S-26-B8	<1.0	0.0058	0.011	<0.0050	<0.0050	5.7*
S-31-B8	<1.0	0.018	0.038	<0.0050	<0.0050	NA
S-21-B9	<1.0	<0.0050	0.014	<0.0050	0.0058	NA
S-26-B9	<1.0	<0.0050	0.012	<0.0050	<0.0050	4.9*
S-31-B9	<1.0	<0.0050	0.034	<0.0050	0.0057	NA
S-16-B10	<1.0	<0.0050	<0.0050	<0.0050	0.013	NA
S-23.5-B10	<1.0	0.0055	<0.0050	<0.0050	<0.0050	7.2*
S-31-B10	<1.0	0.0050	0.033	<0.0050	0.014	NA
S-43.5-B10	<1.0	<0.0050	0.036	<0.0050	0.0062	NA
S-18.5-B11	<1.0	<0.0050	0.022	<0.0050	<0.0050	NA
S-21-B11	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	5.5*
S-28.5-B11	<1.0	<0.0050	0.014	<0.0050	<0.0050	NA
S-21-B12	<1.0	<0.0050	<0.0050	<0.0050	0.026	3.8*
S-28.5-B12	<1.0	<0.0050	<0.0050	<0.0050	0.015	NA
Stockpile						
S-0605-1ABCD	<1.0	<0.0050	<0.0050	<0.0050	0.021	4.9*
<u>February and March 1991</u>						
S-21-B13	<1.0	<0.005	<0.005	<0.005	<0.005	<0.5
S-22.5-B13	580	<0.005	<0.005	5.3	3.9	<0.5
S-21-B14	<1.0	<0.005	<0.005	<0.005	<0.005	<0.5
S-23.5-B14	<1.0	<0.005	<0.005	<0.005	<0.005	<0.5

See notes on Page 4 of 5 and 5 of 5

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
Exxon Station 7-7003
Pleasanton, California
(Page 4 of 5)

Sample ID	TPHg	B	T	E	X	Pb
S-25.5-B15	<1.0	<0.005	<0.005	<0.005	<0.007	<0.5
S-22.5-B16	<1.0	<0.005	<0.005	<0.005	<0.005	<0.5
S-30.5-B16	<1.0	<0.005	<0.005	<0.005	<0.005	<0.5
S-16-B17	<1.0	<0.005	<0.005	<0.005	0.011	<0.5
S-23-B17	15	0.041	0.075	0.041	0.053	<0.5
Stockpile S-0307-SP1(A-D)	<1.0	<0.005	<0.005	<0.005	0.008	5.4*

Results in milligrams/kilogram (mg/kg), or parts per million (ppm)
TPHg : Total petroleum hydrocarbons as gasoline
TPHd : Total petroleum hydrocarbons as diesel
TOG : Total Oil and Grease
Pb : Lead
B: benzene, T: toluene, E: ethylbenzene, X: total xylene isomers
BTEX : Analyzed by EPA Method 8020
NA : Not Analyzed
* : Total Lead

Sample designation:
Tanks:
S-13.5-T53SE
- T53SE: Tank Sample Number and Location
- 13.5: Sample Depth in feet
- S: Soil Sample

Product Line:
S-3-PL8
- PL8: Product Line Sample Number
- 3: Sample Depth in feet
- S: Soil sample

Soil Sample:
S-23-B17
- B17: Boring Number
- 23: Sample Depth in feet
- S: Soil sample

See notes on Page 5 of 5.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF SOIL SAMPLES
Exxon Station 7-7003
Pleasanton, California
(Page 5 of 5)

Soil Sample:

```
S-23-B17
 |  |  └── Boring number
 |  └──── Sample depth in feet
 └────── Soil sample
```

TABLE 3
CUMULATIVE GROUNDWATER MONITORING DATA
Exxon Service Station 7-7003
Pleasanton, California
(page 1 of 2)

Date	Depth to Water (ft)	Groundwater Elevation (ft)	Product Thickness (ft)	Sheen
MW-1 (Wellhead Elevation = 343.83 ft)				
02/23/90	26.08	317.75	None	None
06/15/90	26.49	317.34	None	None
08/90	26.47	317.36	None	None
12/18/90	28.00	315.83	None	None
03/19/91	23.63	320.20	None	None
06/27/91	22.11	321.72	None	None
09/26/91	27.75	316.08	None	None
01/10/92	25.61	318.22	None	None
03/12/92	22.52	321.31	None	None
06/09/92	21.53	322.30	None	None
MW-2 (Wellhead Elevation = 344.22 ft)				
02/23/90	26.31	317.31	None	None
06/15/90	26.25	317.97	None	None
08/90	26.15	318.07	None	None
12/18/90	27.94	316.28	None	None
03/19/91	23.41	320.81	None	None
06/27/91	21.63	322.59	None	None
09/26/91	27.19	317.03	None	None
01/10/92	25.67	318.55	None	None
03/12/92	22.28	321.94	None	None
06/09/92	21.17	323.05	None	None
MW-3 (Wellhead Elevation = 342.90 ft)				
02/23/90	24.78	318.12	None	None
06/15/90	25.29	317.61	None	None
08/90	25.40	317.50	None	None
12/18/90	26.84	316.06	None	None
03/19/91	22.13	320.77	None	None
06/27/91	21.04	322.86	None	None
09/26/91	26.63	316.27	None	None
01/10/92	24.26	318.64	None	None
03/12/92	21.60	321.30	None	None
06/09/92	20.88	322.02	None	None

See notes on page 2 of 2

TABLE 3
CUMULATIVE GROUNDWATER MONITORING DATA
Exxon Service Station 7-7003
Pleasanton, California
(page 2 of 2)

Date	Depth to Water (ft)	Groundwater Elevation (ft)	Product Thickness (ft)	Sheen
MW-4 (Wellhead Elevation = 343.38 ft)				
06/15/90	30.94	312.44	None	None
08/90	31.21	312.17	None	None
12/18/90	32.86	310.52	None	None
03/19/91	26.76	316.62	None	None
06/27/91	25.91	317.47	None	None
09/26/91	32.29	311.09	None	None
01/10/92	29.06	314.32	None	None
03/12/92	24.25	319.13	None	None
06/09/92	25.00	318.38	None	None
MW-5 (Wellhead Elevation = 345.20 ft)				
06/15/90	26.94	318.26	None	None
08/90	26.90	318.30	None	None
12/18/90	28.31	316.89	None	None
03/19/91	23.98	321.22	None	None
06/27/91	22.41	322.79	None	None
09/26/91	27.77	317.43	None	None
01/10/92	26.38	318.82	None	None
03/12/92	22.08	323.12	None	None
06/09/92	31.98	313.22	None	None
MW-6 (Wellhead Elevation = 342.25 ft)				
03/19/91	34.42	307.83	None	None
06/27/91	35.01	307.24	None	None
09/26/91	40.34	301.91	None	None
01/10/92	36.20	306.05	None	None
03/12/92	31.95	310.30	None	None
06/09/92	33.22	309.03	None	None
MW-7 (Wellhead Elevation = 343.62 ft)				
03/19/91	24.68	318.94	None	None
06/27/91	23.10	320.52	None	None
09/26/91	Not accessible			
01/10/92	26.98	316.64	None	None
03/12/92	21.85	321.77	None	None
06/09/92	22.32	321.30	None	None

Elevations relative to mean sea level datum. (Surveyed by Ron Archer Civil Engineer, Inc.)
Depth to water measured from top of wellhead casing

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER
SAMPLES FOR GASOLINE HYDROCARBON COMPOUNDS (ppb)
Exxon Service Station 7-7003
Pleasanton, California
(Page 1 of 3)

Well/ Sample Number	Date	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-1						
W-28-MW1	03/90	3,300	21	9.2	59	19
W-27-MW1	06/90	1,300	7.9	5.9	32	58
W-29-MW1	08/90	2,500	77	280	50	250
W-28-MW1	12/90	390	9	2	43	400
W-23-MW1	03/19/91	4,500	45	12	240	300
W-22-MW1	06/27/91	710	5.4	2.6	29	34
W-28-MW1	09/26/91	290	1.9	<0.5	0.6	0.6
W-25-MW1	01/10/92*	5,400	52	15	690	496
MW1	03/92	14,000	87	22	1200	1000
W-21.5-MW1	06/09/92	4,500	27	5.9	400	300
MW-2						
W-29-MW2	03/90	650	3	2	0.98	6.5
W-27-MW2	06/90	670	<0.5	2.6	<0.5	<0.5
W-28-MW2	08/90	1,300	24	130	37	170
W-28-MW2	12/90	470	<0.3	0.5	1	3
W-23-MW2	03/19/91	700	10	3.4	6.1	3.8
W-21-MW2	06/27/91	1,400	8.7	2.1	8.8	33
W-27-MW2	09/26/91	300	<0.5	0.6	0.6	3.9
W-25-MW2	01/10/92*	800	9.3	1.0	2.4	3.2
MW2	03/92	350	<0.5	0.6	3.0	1.0
W-21-MW2	06/09/92	150	1.9	2.5	1.1	5.1
MW-3						
W-27-MW3	03/90	<20	<0.5	<0.5	<0.5	<0.5
W-27-MW3	06/90	200	<0.5	<0.5	<0.5	<0.5
W-27-MW3	08/90	3,200	54	380	23	400
W-27-MW3	12/90	200	8	12	6	24
W-22-MW3	03/19/91	<50	<0.5	<0.5	<0.5	<0.5
W-21-MW3	06/27/91	<50	<0.5	<0.5	<0.5	<0.5
W-27-MW3	09/26/91	<50	<0.5	<0.5	<0.5	<0.5
W-24-MW3	01/10/92*	<50	<0.5	<0.5	<0.5	<0.5
MW3	03/92	<50	<0.5	<0.5	<0.5	<0.5
W-21-MW3	06/09/92	<50	<0.5	<0.5	<0.5	<0.5

See notes on page 3 of 3

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES FOR GASOLINE HYDROCARBON COMPOUNDS (ppb)
Exxon Service Station 7-7003
Pleasanton, California
(Page 2 of 3)

Well/ Sample Number	Date	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-4						
W-34-MW4	06/90	<20	<0.5	<0.5	<0.5	<0.5
W-33-MW4	08/90	120	5.2	5.4	5.4	9.9
W-33-MW4	12/90	50	7	1	<0.3	2
W-26-MW4	03/19/91	160	1.8	0.8	2.2	11
W-25-MW4	06/27/91	<50	<0.5	<0.5	<0.5	<0.5
W-32-MW4	09/26/91	<50	<0.5	<0.5	<0.5	<0.5
W-29-MW4	01/10/92*	98	0.9	<0.5	7.6	4.4
MW4	03/92	82	1.2	<0.5	5.3	4.3
W-25-MW4	06/09/92	<50	0.6	1.0	<0.5	2.5
MW-5						
W-26-MW5	06/90	<20	<0.5	<0.5	<0.5	<0.5
W-28-MW5	08/90	210	9.7	12	7.6	17
W-28-MW5	12/90	190	2	3.5	2	8
W-23-MW5	03/19/91	<50	<0.5	<0.5	<0.5	<0.5
W-22-MW5	06/27/91	<50	<0.5	<0.5	<0.5	<0.5
W-28-MW5	09/26/91	<50	<0.5	<0.5	<0.5	<0.5
W-26-MW5	01/10/92*	<50	<0.5	<0.5	<0.5	0.6
MW5	03/92	<50	<0.5	<0.5	<0.5	<0.5
	06/09/92	Not Sampled-Insufficient Water				
MW-6						
W-34-MW6	03/19/91	<50	<0.5	<0.5	<0.5	<0.5
W-35-MW6	06/27/91	<50	2.6	1.8	0.8	<0.30
W-40-MW6	09/26/91	<50	<0.5	<0.5	<0.5	<0.5
W-36-MW6	01/10/92*	<50	<0.5	<0.5	<0.5	<0.5
MW6	03/92	<50	<0.5	<0.5	<0.5	<0.5
W-33-MW6	06/09/92	<50	<0.5	<0.5	<0.5	<0.5

See notes on page 3 of 3

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER
SAMPLES FOR GASOLINE HYDROCARBON COMPOUNDS (ppb)
Exxon Service Station 7-7003
Pleasanton, California
(Page 3 of 3)

Well/ Sample Number	Date	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-7						
W-24-MW7	03/19/91	140	<0.5	<0.5	<0.5	<0.5
W-23-MW7	06/27/91	100	5.2	5.6	3.9	16
	09/26/91	Inaccessible				
W-26-MW7	01/10/92*	<50	<0.5	<0.5	<0.5	<0.5
MW7	03/92	120	<0.5	<0.5	<0.5	<0.5
W-22-MW7	06/09/92	81	<0.5	0.5	<0.5	<0.5

TPHg : total petroleum hydrocarbons.
ppb : parts per billion
< : below the detection limits of the analysis
(No. following < indicates applicable detection limit)
* : sample collected for fourth quarter 1991 monitoring

Sample designation:
W-22-MW7
- └ Well number.
- └ Sample depth in feet.
- └ Water sample.

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES FOR LEAD, TOG, AND VOCs
Exxon Service Station 7-7003
Pleasanton, California
(Page 1 of 3)

Sample Number	Date	Lead ppm	TOG ppm	VOCs ppb
MW-1				
W-28-MW1	03/90	0.01	—	—
W-27-MW1	06/90	<0.05	—	—
W-29-MW1	08/90	<0.05	—	—
W-28-MW1	12/90	<0.1*	—	—
W-23-MW1	03/19/91	<0.1*	—	12.0[1]
W-22-MW1	06/27/91	<0.1*	—	ND
W-28-MW1	09/26/91	<0.1*	—	ND
W-25-MW1	01/10/92	<0.1*	—	6.1[2]
MW1	03/92			2.1[5] 14[1] 1.2[4] 0.5[6] 0.8[3]
W-21.5-MW1	06/09/92	<0.1*	—	ND
MW-2				
W-29-MW2	03/90	0.008	—	—
W-27-MW2	06/90	<0.05	—	—
W-28-MW2	08/90	<0.05	—	—
W-28-MW2	12/90	<0.1*	—	—
W-23-MW2	03/19/91	<0.1*	—	ND
W-21-MW2	06/27/91	<0.1*	—	ND
W-27-MW2	09/26/91	<0.1*	—	ND
W-25-MW2	01/10/92	<0.1*	—	ND
MW2	03/92		—	ND
W-21-MW2	06/09/92	<0.1*	—	ND
MW-3				
W-27-MW3	03/90	0.01	—	—
W-27-MW3	06/90	<0.05	—	—
W-27-MW3	08/90	<0.05	—	—
W-27-MW3	12/90	<0.1*	<5.0	4.1[3]
W-22-MW3	03/19/91	<0.1*	<5.0	ND
W-21-MW3	06/27/91	<0.1*	<5.0	ND
W-27-MW3	09/26/91	<0.1*	<5.0	ND
W-24-MW3	01/10/92	<0.1*	5.1	ND
MW3	03/92		5.0	ND
W-21-MW3	06/09/92	<0.1*	<5.0	ND

See notes on page 3 of 3

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER
SAMPLES FOR LEAD, TOG, AND VOCs
Exxon Service Station 7-7003
Pleasanton, California
(Page 2 of 3)

Sample Number	Date	Lead ppm	TOG ppm	VOCs ppb
MW-4				
W-34-MW4	06/90	<0.05	—	—
W-33-MW4	08/90	<0.05	—	—
W-33-MW4	12/90	<0.1*	—	—
W-26-MW4	03/19/91	<0.1*	—	ND
W-25-MW4	06/27/91	<0.1*	—	ND
W-32-MW4	09/26/91	<0.1*	—	1.0[4]
W-29-MW4	01/10/92	<0.1*	—	1.0[4]
MW4	03/92		—	ND
W-25-MW4	06/09/92	<0.1*	—	0.7[4]
MW-5				
W-26-MW5	06/90	0.06	—	—
W-28-MW5	08/90	<0.05	—	—
W-28-MW5	12/90	<0.1*	—	—
W-23-MW5	03/19/91	<0.1*	—	0.5[1] 1.0[2]
W-22-MW5	06/27/91	<0.1*	—	ND
W-28-MW5	09/26/91	<0.1*	—	ND
W-26-MW5	01/10/92	<0.1*	—	ND
MW5	03/92		—	ND
	06/09/92	Not Sampled-Insufficient Water		
MW-6				
W-34-MW6	03/19/91	<0.1*	—	ND
W-35-MW6	06/27/91	<0.1*	—	ND
W-40-MW6	09/26/91	<0.1*	—	ND
W-36-MW6	01/10/92	<0.1*	—	ND
MW6	03/92		—	ND
W-33-MW6	06/09/92	<0.1*	—	ND

See notes on page 3 of 3

TABLE 5
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES FOR LEAD, TOG, AND VOCs
Exxon Service Station 7-7003
Pleasanton, California
(Page 3 of 3)

Sample Number	Date	Lead ppm	TOG ppm	VOCs ppb
MW-7				
W-24-MW7	03/19/91	<0.1*	—	0.7[1] 0.8[2]
W-23-MW7	06/27/91	<0.1*	—	ND
	09/26/91 Inaccessible			
W-26-MW7	01/10/92	<0.1*	—	ND
MW7	03/92		—	ND
W-22-MW7	06/09/92	<0.1*	—	ND

ppm : parts per million
ppb : parts per billion
TOG : Total oil and grease
VOCs : Volatile organic compounds (EPA Method 601)
* : Organic lead
1 : Chloroform
2 : Bromodichloromethane
3 : Tetrachloroethene
4 : 1,2-Dichloroethane
5 : Methylene Chloride
6 : Trichloroethene
ND : Compounds not detected; see laboratory report for method detection limit
< : Below the detection limits of the analysis.
(No. following < indicates applicable detection limit)
— : Not analyzed

Sample designation:
W-22-MW7
- MW7 — Well number.
- 22 — Sample depth in feet.
- W — Water sample.

APPENDIX A

FIELD PROTOCOL

FIELD PROTOCOL

The following presents RESNA Industries Inc. (RESNA) protocol for a typical site investigation involving gasoline 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 and its subcontractors. RESNA personnel and subcontractors of RESNA scheduled to perform the work at the site are be briefed on the contents of the Site Safety Plan before work begins. A copy of the Site Safety Plan is available for reference by appropriate parties during the work. A site Safety Officer is assigned to the project.

Soil Excavation

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

Sampling of Stockpiled Soil

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

Soil Borings

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

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

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

Drill Cuttings

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

Soil Sampling in Borings

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

The samples selected for laboratory analysis are removed from the sampler and quickly sealed in their brass sleeves with aluminum soil and plastic caps, and placed in zip-lock plastic bags. The samples are then be 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 created 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 hydrocarbons, such as soil staining, noticeable or obvious product odor, and OVM readings.

Monitoring Well Construction

Monitoring wells are constructed in selected borings using clean 2- or 4-inch-diameter, thread-jointed, Schedule 40 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, 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 Monitoring Well Development

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

Groundwater Sampling

The static water level in each well is measured to the nearest 0.01-foot using a Solinst® electric water-level sounder or oil/water interface probe (if the wells contain floating product) cleaned with Alconox® and water before use in each well. The liquid in the onsite wells is examined for visual evidence of hydrocarbons by gently lowering approximately half the length of a Teflon® bailer (cleaned with Alconox® and water) past the air/water interface. The sample is then retrieved and inspected for floating product, sheen, emulsion, color, and clarity. The thickness of floating product detected is recorded to the nearest 1/8-inch.

Wells which do not contain floating product are purged using a submersible pump. The pump, cables, and hoses are cleaned with Alconox® and water prior to use in each well. The wells are purged until withdrawal is of sufficient duration to result in stabilized pH, temperature, and electrical conductivity of the water, as measured using portable meters calibrated to a standard buffer and conductivity standard. If the well becomes dewatered, the water level is allowed to recover to at least 80 percent of the initial water level. Prior to the collection of each groundwater sample, the Teflon® bailer is cleaned with Alconox® and rinsed with tap water and deionized water, and the latex gloves worn by the sampler changed. Hydrochloric acid is added to the sample vials as a preservative (when applicable). A sample method blank is collected by pouring distilled water into the bailer and then into sample vials. A sample of the formation water is then collected from the surface of the water in each of the wells using the Teflon® bailer. The water samples are then gently poured into laboratory-cleaned, 40-milliliter (ml) glass vials, 500 ml plastic bottles or 1-liter glass bottles (as required for specific laboratory analysis) and sealed with Teflon®-lined caps, and inspected for air bubbles to check for headspace, which would allow volatilization to occur. The samples are then labeled and promptly placed in iced storage. A field log of well evacuation procedures and parameter monitoring is maintained. Water generated by the purging of wells is stored in 17E DOT 55-gallon drums onsite and remains the responsibility of the client.

Vadose-Zone Sampling

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

Sample Labeling and Handling

Sample containers are labeled in the field with the job number, sample location and depth, and date, and promptly placed in iced storage for transport to the laboratory. A Chain of

Custody Record is initiated by the field geologist and updated throughout handling of the samples, and accompanies the samples to a laboratory certified by the State of California for the analyses requested. Samples are transported to the laboratory promptly to help ensure that recommended sample holding times are not exceeded. Samples are properly disposed of after their useful life has expired.

Aquifer Testing

Bailer Test

The initial water level is measured in the test well, and water bailed from the test well using a Teflon® bailer and cable cleaned with Alconox® and water. Pressure transducers are used to measure water levels in the test well during drawdown and partial recovery phases, over a minimum period of approximately one to two hours. The bailing rate for the designated test well is recorded.

Pumping Test

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. 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 are collected for the time interval of the pumping test to allow screening of possible effects of atmospheric pressure and tidal fluctuations on the groundwater levels.