Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

WORK PLAN - PHASE THREE
SUBSURFACE ENVIRONMENTAL INVESTIGATION
AND CONTAMINATION EVALUATION
OF SOIL AND GROUND WATER
AND LINING OF EXCAVATED TANK PIT
at
Exxon Service Station No. 7-3006
720 High Street
Oakland, California

7/31/87 HAZ MAT

AGS Job No. 87042-3

Prepared for

Exxon Company, U.S.A.
1646 N. California Blvd., Suite 210
Walnut Creek, California

by

Charles L. Ard
Project Geologist

FOR
Michael N. Clark
C.E.G. #1264

May 15, 1985

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

July 31, 1987
87042-3

Mr. Kent Sanderson
Exxon Company, U.S.A.
1646 N. California Blvd., Suite 210
Walnut Creek, California 94607

Subject: Transmittal of work plan for Phase III - Subsurface Environmental Investigation and Contamination Evaluation of Soil and Ground Water, and Lining of the Excavated Tank Pit at Exxon Service Station No. 7-3006, 720 High Street, Oakland, California.

Mr Sanderson:

As requested by Exxon Company, U.S.A., we are submitting our work plan for the above referenced site, for your review, prior to submittal to the San Francisco Regional Water Quality Control Board. The scope of the following Phase III proposal is limited to an assessment of the vertical and lateral extent of potential contamination using data from eight soil borings/ground water monitoring wells, and lining the excavated gasoline tank pit. The proposed work is based on our previous knowledge of the site, the background information supplied by Exxon Company, U.S.A. personnel, and the guidelines of the San Francisco Bay Regional Water Quality Control Board. If there are any other factors that should be considered with respect to this work plan, please notify us so that we can make appropriate changes. Your earliest response to our proposal would be appreciated. We would like to begin the work as soon as possible.

Sincerely,
Applied GeoSystems

Charles L. Ard
Project Geologist

cc: Jim Kerr

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

July 31, 1987
87042-3

California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6040
Oakland, California 94607

Subject: Transmittal of work plan for Phase III - Subsurface Environmental Investigation and Contamination Evaluation of Soil and Ground Water, and Lining of the Excavated Tank Pit at Exxon Service Station No. 7-3006, 720 High Street, Oakland, California.

Dear Sirs:

As requested by Exxon Company, U.S.A, we are submitting our work plan to evaluate possible petroleum product contamination in the soil and/or ground water at the above-referenced site. The scope of the following Phase III proposal is limited to an assessment of the vertical and lateral extent of potential contamination using data from eight soil borings/ground water monitoring wells, and lining the excavated gasoline tank pit. The proposed work is based on our previous knowledge of the site, the background information supplied by Exxon Company, U.S.A. personnel, and the guidelines of the San Francisco Bay Regional Water Quality Control Board. If there are any other factors that should be considered with respect to this work plan, please notify us so that we can make appropriate changes. Your earliest response to our proposal would be appreciated. We would like to begin the work as soon as possible.

Sincerely,
Applied GeoSystems

Charles L. Ard
Project Geologist

Applied GeoSystems 43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

WORK PLAN - PHASE III
SUBSURFACE ENVIRONMENTAL INVESTIGATION AND CONTAMINATION EVALUATION OF SOIL AND GROUND WATER AND LINING OF EXCAVATED TANK PIT
at the Exxon Service Station No. 7-3006
720 High Street
Oakland, California
For: Exxon Company, U.S.A.

INTRODUCTION

The following work plan outlines a subsurface environmental investigation to evaluate the presence (and levels) or absence of petroleum product contamination in the soil and/or ground water at the above-referenced Exxon service station. This phase of the project will also include the lining of the excavated gasoline tank pit with high-density polyethylene by a contractor prior to installation of new storage tanks. The specific objectives of the proposed investigation are to: 1) line the excavated gasoline tank pit, 2) collect and describe soil and ground water samples from soil borings and monitoring wells at the site, 3) interpret the collected data to evaluate whether the presence of possible contaminants pose an adverse impact to the soil and local ground

water, and 4) if needed, recommend a course of further soil and/or ground water investigation or contamination mitigation.

Included with this work plan are: 1) a discussion of results from previous contaminated soil investigations conducted by Applied GeoSystems and E. A. Engineering, Science, and Technology, Inc., 2) a Site Vicinity Map, Plate P-1, showing the location of the site, 3) a Generalized Site Plan, Plate P-2, showing the approximate locations of existing structures, removed underground storage tanks, excavated tank pit, vapor recovery and product lines, and proposed onsite monitoring well locations, 4) A Soil Hydrocarbon Vapor Level Contour Map, Plate P-3, and 5) examples of Field and Report Boring Logs and a Chain of Custody form, Plates P-4 through P-6.

BACKGROUND

The Exxon service station is located in Oakland, California at 720 High Street, as shown on the Site Vicinity Map (Plate P-1). Four underground storage tanks were located on the site. Three tanks were positioned in a single tank cluster in the southern portion of the site. The tanks were of 8,000-, 6,000-, and 10,000-gallon capacity, and were used to store regular, super

unleaded, and unleaded gasoline, respectively. One 1000-gallon tank located behind the station building was used to store waste oil. These four tanks were excavated and removed from the site on April 29, 1987. The approximate location of the removed underground storage tanks are shown on the Generalized Site Plan (Plate P-2). Applied GeoSystems was not involved in the tank removal inspection, or soil sampling under the tanks after removal. We have no information regarding the condition of the tanks or soil in the tank pits at the time of tank removal.

HYDROGEOLOGY

The Exxon service station site is located less than one-half mile from a San Francisco Bay tidal canal. The earth materials at the site are Quaternary bay deposits composed of silty clay and clay, with discontinuous fluvial lenses of silty, gravelly sand. The aquifer system beneath this site appears to be under the influence of regional tidal fluctuations. The depth to first ground water fluctuates between approximately 14 and 16 feet. According to Peter Johnson of the San Francisco Bay Regional Water Quality Control Board (R.W.Q.C.B.), this site is located in a low-sensitivity water use area. The ground water beneath this site presently is not used as a municipal supply.

PREVIOUS INVESTIGATIONS

Applied GeoSystems conducted a first phase soil contamination evaluation on April 28, 1987. The purpose of the investigation was to evaluate the potential hydrocarbon product contamination in soil in the two partially excavated tank pit cavities at the site. Six soil samples were collected from selected locations in the gasoline tank pit. Five samples contained total volatile hydrocarbon concentrations greater than 1000 parts per million (ppm) which is the R.W.Q.C.B.'s recommended contamination level at which soil should be removed and the contamination mitigated. Based on these results, we recommended further excavation and sampling of the backfill and native soil after the tanks were removed (in letter report AGS 87042-1). Laboratory analysis of the sample collected from excavated soil above the waste oil tank revealed non-detectable total extractable petroleum hydrocarbons (TEH).

Excavation and removal of the underground storage tanks, and sampling of the soil beneath the tanks was conducted by Pacific Southwest Construction and Service on April 29, 1987. Laboratory

analyses on these samples were performed by Scientific Environmental.

Trenches were excavated by Exxon's contractor around vapor recovery and product lines. Applied GeoSystems personnel conducted a field evaluation of soil in the trenches using an Organic Vapor Analyzer (OVA), and found areas of relatively high qualitative OVA readings. A black, potentially contaminated soil layer was exposed in the trenches and gasoline tank pit at a depth of 2 to 3 feet. Petroleum hydrocarbon contamination in a soil sample taken from this layer was analyzed to be below 1000 ppm (434 ppm). We recommended conducting further sampling and analyses of soil in the trenches where the OVA readings were high.

As requested by Exxon, Applied GeoSystems conducted a second phase of soil contamination evaluation of the backfill and native soil in the gasoline tank pit, and in the soil present beneath the product and vapor recovery lines. Applied GeoSystems was also requested to work with Pacific Southwest Construction and Service in aerating and sampling the contaminated excavated soil on site. During this phase, soil contaminated with petroleum

hydrocarbon concentrations greater than 1000 ppm was excavated from the gasoline product tank pit using a trackhoe, and from the vapor recovery and product line trenches using a backhoe and hand digging. An Organic Vapor Analyzer was used in the field and soil samples were analyzed in our laboratory to evaluate Total Volatile Hydrocarbon concentrations greater than and less than 1000 ppm. The site was permitted for soil aeration by the San Francisco Air Quality Management District and contaminated soil was aerated on site until field evaluation and laboratory analyses on selected soil samples indicated that petroleum hydrocarbon concentrations were below 100 ppm. Once petroleum hydrocarbon concentrations in the soil were evaluated to be lower than 100 ppm, the soil was stockpiled, to be removed later by Exxon's contractor.

Further excavation in the southwestern wall of the tank pit was conducted on May 15, 1987 in order to remove what subjectively (strong petroleum odor, black oily appearance) appeared to be a pocket of petroleum product contaminated soil at a depth of approximately 14 feet. Excavation of approximately 70 cu yds of soil revealed that the contamination increased in both the horizontal and vertical directions (up to within 5 feet of the

surface), away from the tank pit. suggesting the presence of a contamination source not related to the gasoline tank pit.

On May 14, 1987, our field geologist was informed by local workers that hazardous waste containing heavy metals had been introduced to the soil and ground water at a nearby industrial site, and that the Exxon site had at one time been used as a disposal facility. This information prompted Applied GeoSystems to request authorization from Exxon to conduct further investigation on potential hazardous waste that may have been disposed of on the Exxon site and the historic use of this site as a disposal facility.

Information provided by Exxon personnel confirmed the presence of a dump site that operated prior to 1970 on the subject property. To our knowledge, there is no current available information on what was dumped at this site. Dumping appears to have been unsupervised. Ownership histories were reconstructed for properties within one quarter mile of the project site in order to: 1) determine what industries were previously or are currently located in the area, and 2) identify potential waste products and/or contaminants that may have been previously dumped at the site. City of Oakland records indicate that several industries

located close to the previous dump site produce or utilize potentially hazardous chemicals or by-products. Efforts were also made to contact residents in the vicinity of the old dump site prior to conversion to its current use as a service station by The Humble Oil And Refining Company (Exxon) in 1970. Telephone conversations with these residents, when they could be located, disclosed that while many of the nearby residents remembered the dump, none had knowledge of anything other than trash or rubbish being dumped there. Due to the concern of possible hazardous waste contamination, a soil sample taken from the southwestern wall of the secondary excavation was analyzed for Total Threshold Limit Concentrations of heavy metals, purgeable organics, and oil and grease. These analyses revealed that the concentrations of metals and purgeable organics in this sample appear to be non-hazardous. The concentration of total oil and grease hydrocarbons (520 ppm) was below the recommended 1000 ppm action level for excavation.

On June 3, 1987, an Applied GeoSystems geologist observed the seepage of an oily viscous fluid resembling liquid hydrocarbon at a depth of approximately 12 feet from the southwestern wall of the secondary excavation. This oily seepage was collecting on

top of the ground water in the southwestern section of the tank pit.

On June 19,1987, field engineers from E. A. Engineering, Science, and Technology, Inc. conducted a Soil Vapor Contaminant Assessment (SVCA). The investigation was a preliminary attempt to delineate hydrocarbon contamination patterns at the site. Partial results of the SVCA were made available to Applied GeoSystems to facilitate placement of the ground water monitoring wells. Qualitative results of hydrocarbon vapor levels (lighter than benzene) detected in the soil are shown on the Soil Hydrocarbon Vapor Level Contour Map, Plate P-3. Proposed water monitoring well placement is also shown on Plate P-3.

At present we do not have sufficient data to define the type of contamination present in the subsurface at the site, contamination source, or its lateral and vertical extent.

PROJECT PROPOSAL

The proposed investigation is designed to examine the extent and concentrations of petroleum hydrocarbon contamination migration on-site based on data from eight soil borings/ground water

monitoring wells, and to line the gasoline tank pit with high-density polyethylene. Eight 35-feet deep soil borings will be drilled and monitoring wells MW-1 through MW-8 will be constructed in the borings. These borings will be located downgradient from the excavated tank pits and trenches where petroleum product contamination greater than 1000 ppm was found. MW-1 is located either across Coliseum Street and under the freeway overpass (if available clearance permits drilling operations), or on the west side of Coliseum as close as practicable to the overpass. The location of MW-1 was selected to evaluate off-site hydrocarbon contamination levels in the inferred downgradient direction, and is situated in an area indicated by the SVCA to have relatively high hydrocarbon vapor levels present in the soil (see Plate P-3). The locations of MW-2, MW-3, and MW-4 were selected to evaluate levels of hydrocarbon contamination (if present) in the soil and ground water in the downgradient direction from the tank pits, at the edge of the property. MW-5 is located southwest of, within 10 feet, and in the inferred downgradient direction from the tank pit cavity, and a zone of highly hydrocarbon contaminated soil. MW-6 is located northwest, and within 10 feet of the tank pit cavity in an area indicated by the SVCA to have high soil hydrocarbon vapor levels. MW-7 is located within 10 feet of, and in the inferred

downgradient direction from the waste oil tank cavity. MW-8 is located in the inferred downgradient direction from the northwest service island and associated product lines.

The following work elements for this phase of the project are proposed:

1) Line the excavated tank pit with high-density polyethylene liner (dimensions of the pit are approximately 38' long by 35' wide by 14' deep).

2) Drill eight soil borings to a depth of approximately 35 feet. The borings will be used for the installation of monitoring wells. The borings will be located approximately as shown on the Generalized Site Plan (Plate P-2).

3) Collect and classify relatively undisturbed soil samples taken at 5 foot intervals in the soil borings.

4) Describe subsurface conditions at the site as revealed in the borings.

5) Construct eight monitoring wells with 4-inch diameter PVC casing in the 35-foot boreholes.

6) Develop the wells, by air jetting water surging, or other suitable means. Collect water samples using chain of custody protocol after purging the well of 3-4 well volumes and allowing the well to return to static conditions.

7) Analyze selected soil and water samples for gasoline product constituents in a California State certified laboratory.

8) Evaluate local ground water gradient by surveying static ground water elevations in the proposed wells.

9) Prepare ground water contour maps.

10) Interpret field and laboratory data to evaluate the extent of potential contamination.

11) Prepare a final report summarizing our findings, conclusions, and recommendations.

The following sections address these work elements.

TANK PIT LINING

Lining of the gasoline tank pit will be the responsibility of Exxon Company USA. The purpose of the tank pit lining is to minimize potential for migration of pre-existing contamination present onsite into the tank pit cavity, and to prevent potential future leakage or spillage of petroleum product in the gasoline tank pit from migrating into the native soil and groundwater. The tank pit lining will consist of 16-Mil high-density polyethylene material and will be placed in the tank pit when the native soil on the sides of the pit is properly smoothed.

SOIL BORING/SAMPLING

The soil borings will be drilled using 8- and 10-inch diameter continuous flight, hollow stem augers and a Mobile B-61, or similar type, drill rig. Auger flights will be steam cleaned

between each boring to minimize the possibility of downhole or cross contamination.

The drilling operation will be observed by an Applied GeoSystems field geologist and the earth materials in the boring will be logged as drilled. During drilling, soil samples will be collected at 5-foot intervals using a California modified split spoon sampler equipped with laboratory-cleaned brass sleeves. Samples will be collected by advancing the boring to a point immediately above the sampling depth, then driving the sampler into the native soil through the hollow center of the auger. The sampler will be driven 18 inches with a standard 140 pound hammer dropped 30 inches. The number of blows to drive the sampler each successive 6 inches will be counted and recorded to give an indication of soil consistency. Copies of Field Boring Logs, as well as the Boring Log Plate used in our final report, are included with this proposal. Samples collected for possible chemical analyses will be sealed with aluminum foil, plastic caps, and air-tight tape, then labeled and immediately placed in iced storage for transport to Applied GeoSystems' analytical laboratory for testing.

The soil borings will be drilled to a depth of approximately 35 feet (approximately 20 feet below the upper zone of saturation), or 5 feet into any saturated clay layer (aquitard) encountered. If an aquitard is encountered, the borings will be terminated and backfilled with 5 feet of neat cement before installing monitoring wells.

All drill cuttings generated during drilling will stored at the site, and aereated if necessary, until Applied GeoSystems can arrange to have the soil removed to an appropriate class III disposal facility.

Applied GeoSystems will contact Underground Services Alert (USA) to delineate public utility lines at the site before we begin drilling. Exxon Company, U.S.A. will have a representative on site before or during drilling to advise or confirm the location of soil borings with respect to underground utilities and other structures. Applied GeoSystems will not be responsible for underground facilities not so located.

MONITORING WELL CONSTRUCTION

The ground water wells will be constructed of thread-jointed 4-inch diameter PVC casing. No chemical cements, glues, or solvents will be used in well construction. The screened portion of the wells will consist of factory-perforated 0.020-inch slotted casing. The well screen will extend from total depth of the well to approximately 5 feet above the upper zone of saturation to allow for seasonal fluctuation of ground water.

Backfilling the annulus of the monitoring well will be done in a manner that will minimize the possibility of caving. The PVC casing will be set through the auger stem. Augers will be raised from the bottom of the drill hole as sand is poured down the annular space. Each boring will be packed with sorted sand to approximately 2 feet above perforations. A 1- to 2-foot thick bentonite plug will be placed above the sand through the auger stem as a seal against cement entering the sand pack. The annulus will be backfilled through the auger stem with a neat cement/bentonite slurry or neat cement at 5-foot intervals.

An aluminum utility vault (manufactured by Diversified Well Products) with PVC apron will be placed over each well and

concreted into place flush with the surrounding station pad. This box has a water-tight seal to protect against surface water infiltration and requires a specially-designed wrench to open which reduces the possibility of well vandalism or accidental disturbance.

MONITORING WELL SAMPLING

The wells will be developed prior to water sampling by air jetting, surge pumping, or other suitable method. Following ground water recovery to static conditions and an initial water level measurement, the wells will be purged and sampled using a teflon bailer cleaned with Alconox and deionized water. The bailer will be used first to obtain a sample from the surface of the water in the well prior to purging. Any subjective evidence of product detected in the wells will be recorded. If floating product is encountered in a well, the well will not be purged or sampled. If no floating product is observed in the wells, a formation water sample will be collected after purging operations. Approximately three to four well volumes of water will be purged from the wells prior to sampling.

The water samples will be sealed in 40 ml laboratory-cleaned glass Volatile Organic Analysis (VOA) vials with teflon-lined lids, labeled, and immediately placed in iced storage. A Chain of Custody form will be initiated by the sampler and will accompany the samples to Applied GeoSystems' analytical laboratory. A copy of the Chain of Custody form will be included in our final report.

LABORATORY ANALYSES

Two samples will be selected from the 35-foot boring/monitoring well (MW-7) adjacent to the removed waste oil tank, the samples will be analyzed for TEH, a water sample will be analyzed by EPA Method 8015 for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, and Xylenes (BTX), and by Method 624 for Purgeable Organics. Soil samples selected for testing from the seven other 35-foot borings will be analyzed by EPA Method 8020 for Total Volatile Hydrocarbons (TVH). Water samples from the seven monitoring wells will be analyzed by EPA Method 602 for TVH, and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX); water samples will also be tested for Organic Lead. Detection limits suitable for the tests requested and concentrations present will be stated on the laboratory report. Analyses will be facilitated through

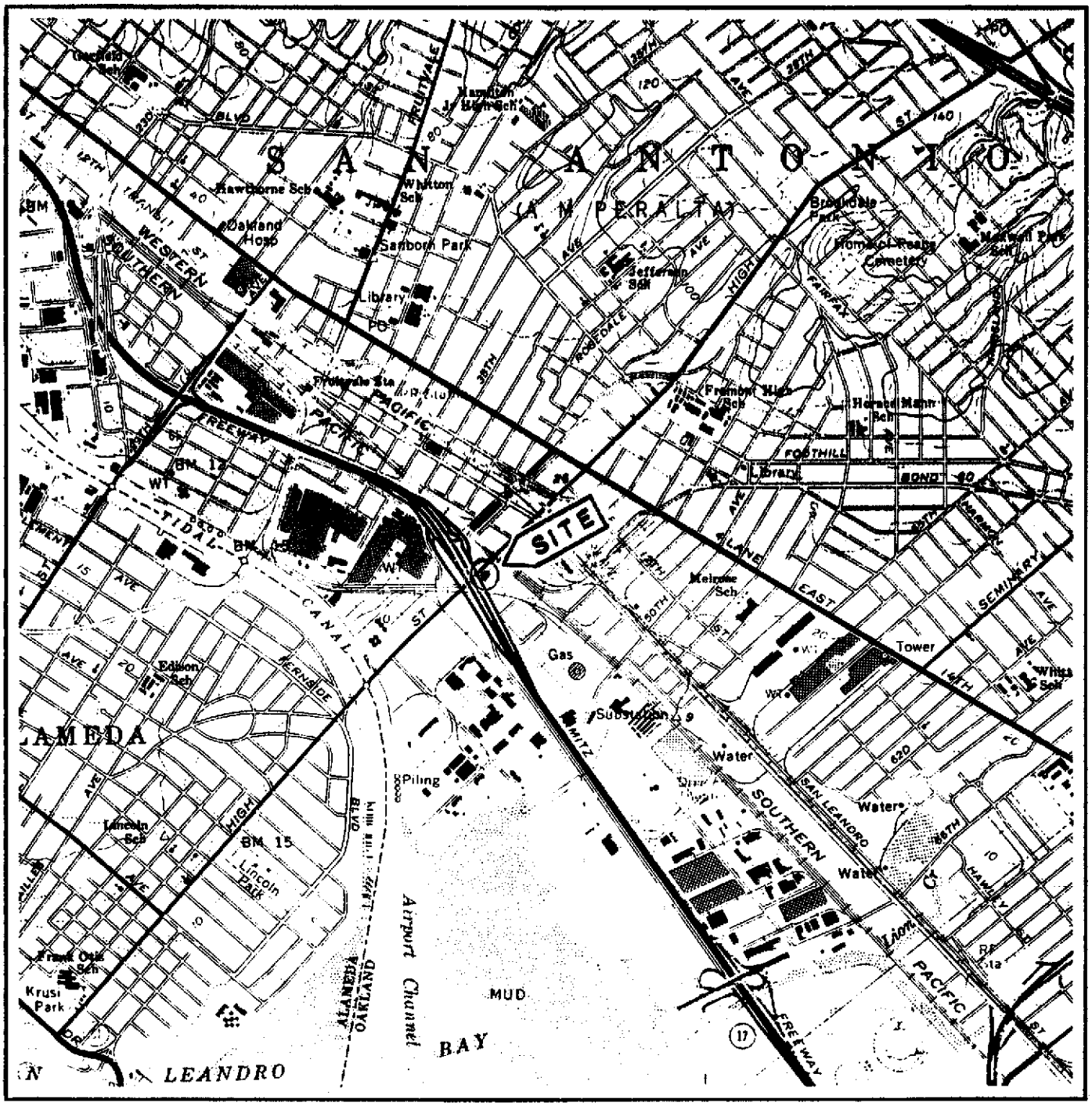
solvent extraction, mass spectrometry, gas chromatography separation, and photo- and flame-ionization detection.

REPORT PREPARATION

A final report summarizing the soil stratigraphy, field and laboratory procedures, well construction details, laboratory results, and if needed, recommendations for further work will be supplied to Exxon Company, U.S.A.. All information gathered during the study will be considered confidential and released only upon authorization of Exxon Oil Company, U.S.A..

PROJECT STAFF

Mr. Michael N. Clark, a Registered Geologist (RG 3868) and Certified Engineering Geologist (CEG 1264) in the state of California, will be in overall charge of this project. Mr. Charles Ard, project geologist, will manage field and office operations of the project. Applied GeoSystems employs a staff of geologists and technicians who will additionally be used to see the project to completion.



Source: U.S. Geological Survey
Oakland East
7.5 Minute Quadrangle

N

Approximate Scale

2000 1000 0 2000 4000

feet

Applied GeoSystems
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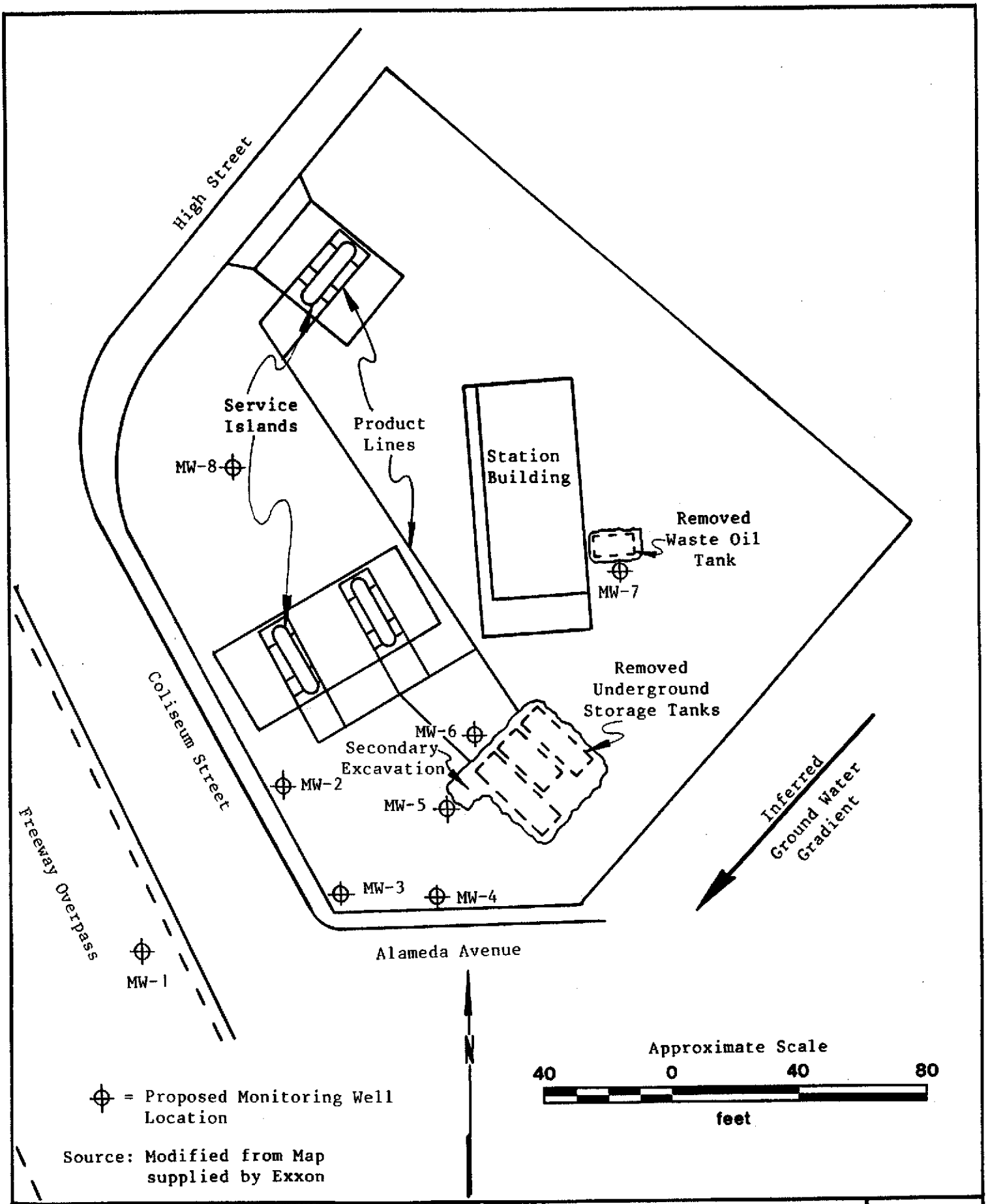
PROJECT NO. 87042-2

SITE VICINITY MAP
EXXON Station #7-3006
720 High Street
Oakland, California

PLATE

P-1



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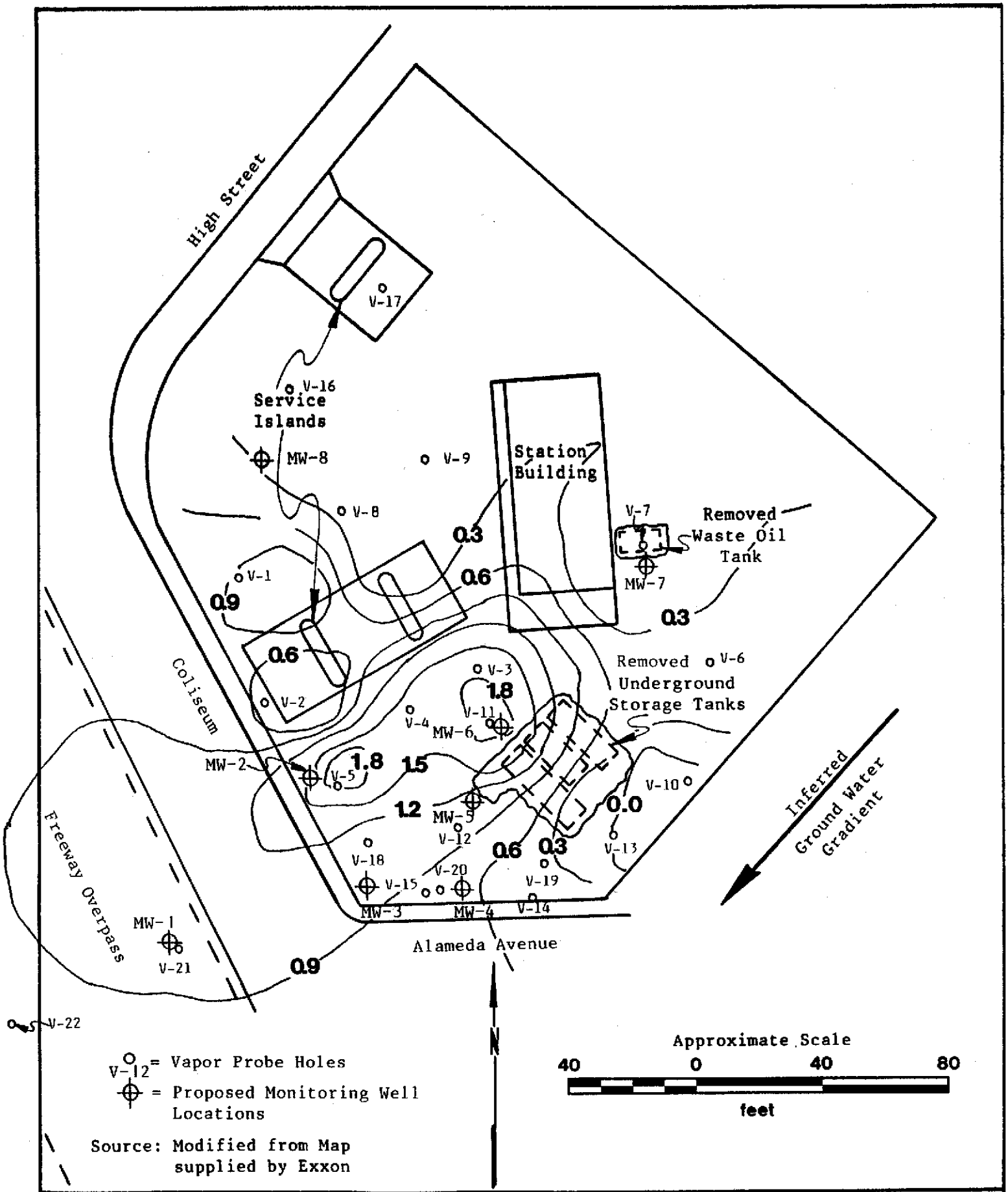
PROJECT NO. 87042-3

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

PLATE
P-2



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PROJECT NO. 87042-3

SOIL HYDROCARBON (PRE BENZENE)
VAPOR LEVEL CONTOUR MAP
Exxon Station #7-3006
720 High Street
Oakland, California

PLATE
P-3

Blows/ Ft.	Sample No.	USCS	DESCRIPTION	WELL CONST.

DEPTH IN FEET

REPORT BOREHOLE LOG
SAMPLE

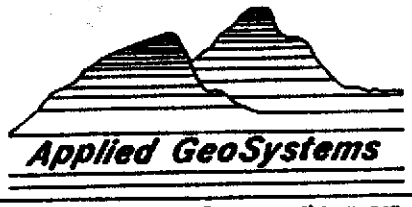
Applied GeoSystems

LOG OF BORING

PLATE
P-4

PROJECT NO.

CHAIN OF CUSTODY RECORD



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SAMPLER (signature):

Phone:

LABORATORY:

TURNAROUND TIME:

Attention:

Phone No.

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
	Received for laboratory by:		

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt

SAMPLE

JOB No. | CLIENT | LOCATION

DRILLING METHOD

BORING NO. P-5

SHEET

SAMPLING METHOD

DRILLING

					START TIME	FINISH TIME
WATER LEVEL						
TIME						
DATE					DATE	DATE
CASING DEPTH						

DATUM _____ ELEVATION _____

RECOVERY	SAMPLE TYPE	SAMPLE DEPTH	BLOWS PER 6 in.	MOISTURE CONTENT	PRODUCT ODOR	DEPTH IN FEET	USCS CODE
						0	
						1	
						2	
						3	
						4	
						5	
						6	
						7	
						8	
						9	
						10	
						11	
						12	
						13	
						14	
						15	
						16	
						17	
						18	
						19	
						20	

SURFACE CONDITIONS:

FIELD BOREHOLE LOG SAMPLE