Applied GeoSystems, Inc.
A RESNA Company

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
Fax: (408) 264-2435

91 AUG 31 AM 8:45

TRANSMITTAL

TO: MR. LARRY SETO
ACHCSA
DEPT. OF ENVIRONMENTAL HEALTH
80 SWAN WAY, ROOM 200
OAKLAND, CA 94621

FROM: JOEL COFFMAN
TITLE: PROJECT GEOLOGIST

DATE: 8/29/91
PROJECT NUMBER: 61035.01
SUBJECT: WORK PLAN

WE ARE SENDING YOU [XX] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [XX] Reports [ ] Specifications

[ ] Letters [ ] Change Orders [ ] _____

COPIES	DATED	NO.	DESCRIPTION
1	8/29/91	61035.01	WORK PLAN FOR INITIAL SUBSURFACE INVESTIGATION RELATED TO FORMER WASTE-OIL TANK AT ARCO STATION 6148, 5131 SHATTUCK AVENUE, OAKLAND, CA.

THESE ARE TRANSMITTED as checked below:

[ ] For review and comment [ ] Approved as submitted [ ] Resubmit ___ copies for approval

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Copies: 1 to AGS project file no. 61035.01

SAN JOSE READER'S FILE

*Revision Date: 10/15/90
*File Name: TRANSMT.PRJ

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WORK PLAN
for
INITIAL SUBSURFACE INVESTIGATION RELATED TO FORMER WASTE-OIL TANK
at
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

61035.01

Prepared for
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

by
RESNA

Joel Coffman
Project Geologist

Greg Barclay
General Manager

Joan E. Tiernan Ph.D., P.E.
Engineering Manager

REGISTERED PROFESSIONAL ENGINEER
JOAN E. TIERNAN
No. C 044600
Exp. 3-31-94
CIVIL
STATE OF CALIFORNIA

August 30, 1991

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WORK PLAN
for
INITIAL SUBSURFACE INVESTIGATION
RELATED TO FORMER
WASTE-OIL TANK
at
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

INTRODUCTION

This Work Plan summarizes previous work performed by Crosby & Overton (C & O), and describes the work proposed to investigate the presence and extent of hydrocarbon-impacted soil related to the former underground waste-oil tank at the subject site. This work plan was initiated after it was discovered that C&O reported 210 ppm motor oil in the soil below the former waste-oil tank at a depth of 20 feet during the tank removed in June 1987. ARCO Products Company (ARCO) requested that RESNA prepare this Work Plan for submittal to the Regional Water Quality Control Board (RWQCB), and the Alameda County Health Care Services Agency (ACHCSA).

SITE DESCRIPTION AND BACKGROUND

The site is an operating gasoline station located on the southwest corner of the intersection of 52nd Street and Shattuck Avenue in Oakland, California. The site location is shown on the Site Vicinity Map (Plate 1). The site is on a relatively flat lot at an elevation of approximately 105 feet mean sea level.

Presently, according to information provided by ARCO, there are three 12,000 gallon underground gasoline-storage tanks located on the western portion of the site. The locations of the underground gasoline-storage tanks and pertinent site features are shown on the Generalized Site Plan (Plate 2).

REGIONAL AND LOCAL HYDROGEOLOGY

ARCO Station 6148 is located west of the East Bay Hills. This area lies within the Berkeley Alluvial Plain, which is a subarea of the East Bay Alluvial Plain. Soils in this area are mapped as older alluvium that consists of a heterogeneous mixture of poorly consolidated to unconsolidated clay, silt, sand, and gravel units (Helley, 1979). The sediments were derived mainly from the hills to the east and southeast and represent successive coalescing alluvial fans deposited during the Pleistocene epoch.

The sediments found beneath the East Bay Alluvial Plain are believed to be about 200 feet thick in the Berkeley area and are the major ground water source in the region. Water-yielding capabilities are highly variable. Generally, high yields come only from wells that extend through several of the sand and gravel beds. Ground water in the East Bay Plain occurs predominantly under confined conditions and tends to flow toward the San Francisco Bay to the west and southwest (Hickenbottom and Muir, 1988).

PREVIOUS WORK

Previous work performed at the site included removal of a waste-oil tank and laboratory analysis of a soil sample from the bottom of the waste-oil tank pit on June 1, 1987, additional excavation and laboratory analysis of soil from the waste-oil tank pit on June 3,

1987 and June 10, 1987. Soil excavated from the waste-oil tank pit was transported to the Class I landfill in Casmalia, California on June 10, 1987 by Erico Construction and Crosby & Overton (C&O).

Results of laboratory analyses of soil samples collected on June 1, and June 3, 1987, from depths of approximately 9 feet and 14 feet, respectively, were not available at the time of this work plan preparation. The waste-oil tank pit was extended to a depth of approximately 20 feet on June 10, 1987. Results of laboratory analyses of soil samples collected on June 10, from a depth of approximately 20 feet 210 ppm motor oil. (Anatec Laboratories, June 1987). Copies of laboratory analytical results with chain of custody forms are presented in Appendix A.

PROPOSED WORK

RESNA recommends the following work at the site based on previous investigations:

Step 1: Prepare a Site Safety Plan, and obtain permits for borings at the site.

Step 2: Drill and obtain soil samples for soil classification and laboratory analysis from four onsite soil borings (B-1 through B-4) as shown on Plate 2, Generalized Site Plan. Drill borings B-1 through B-4 until ground water is encountered (total depths of approximately 20 to 30 feet below the ground surface). Collect and describe relatively undisturbed soil samples at 5-foot intervals or less from the ground surface to the total depths of the borings. The purpose of these proposed borings is to investigate the presence and extent of waste-oil hydrocarbons in the soil beneath the location of the former

waste-oil tank where the highest concentration (40,000 ppm) of motor oil hydrocarbons were previously reported and in the surrounding area of the former waste-oil tank at the site.

Step 3: Submit selected soil samples from borings B-1 through B-4 to a State-certified laboratory for analysis for total oil and grease (TOG) using EPA Method 5520, total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) analyses for BTEX and TPHg using modified Environmental Protection Agency (EPA) methods 8020 and 5030/8015, and for the metals cadmium (Cd), chromium (Cr), lead (Pb), and zinc (Zn) by EPA methods 7130, 7190, 7420, and 7450, respectively. Up to two soil samples from borings B-1 through B-4 will be analyzed for volatile organic compounds (VOCs) by EPA method 8010.

Step 4 Prepare a report to include results of the investigation and our conclusions.

Field work proposed in this Work Plan will be performed according to the Field Methods included in Appendix B of this Work Plan. Subsequent Work Plans will be prepared and submitted to ARCO and appropriate regulatory agencies as necessary to describe future work proposed at the site.

SCHEDULE OF OPERATIONS

Preliminary time schedules to perform additional phases of work will be included with the additional work plans presented for regulatory review as, necessary. 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, (Task 1 through Task 4), is approximately two to three months from date of regulatory approval and depicted in Plate 3, Preliminary Time Schedule.

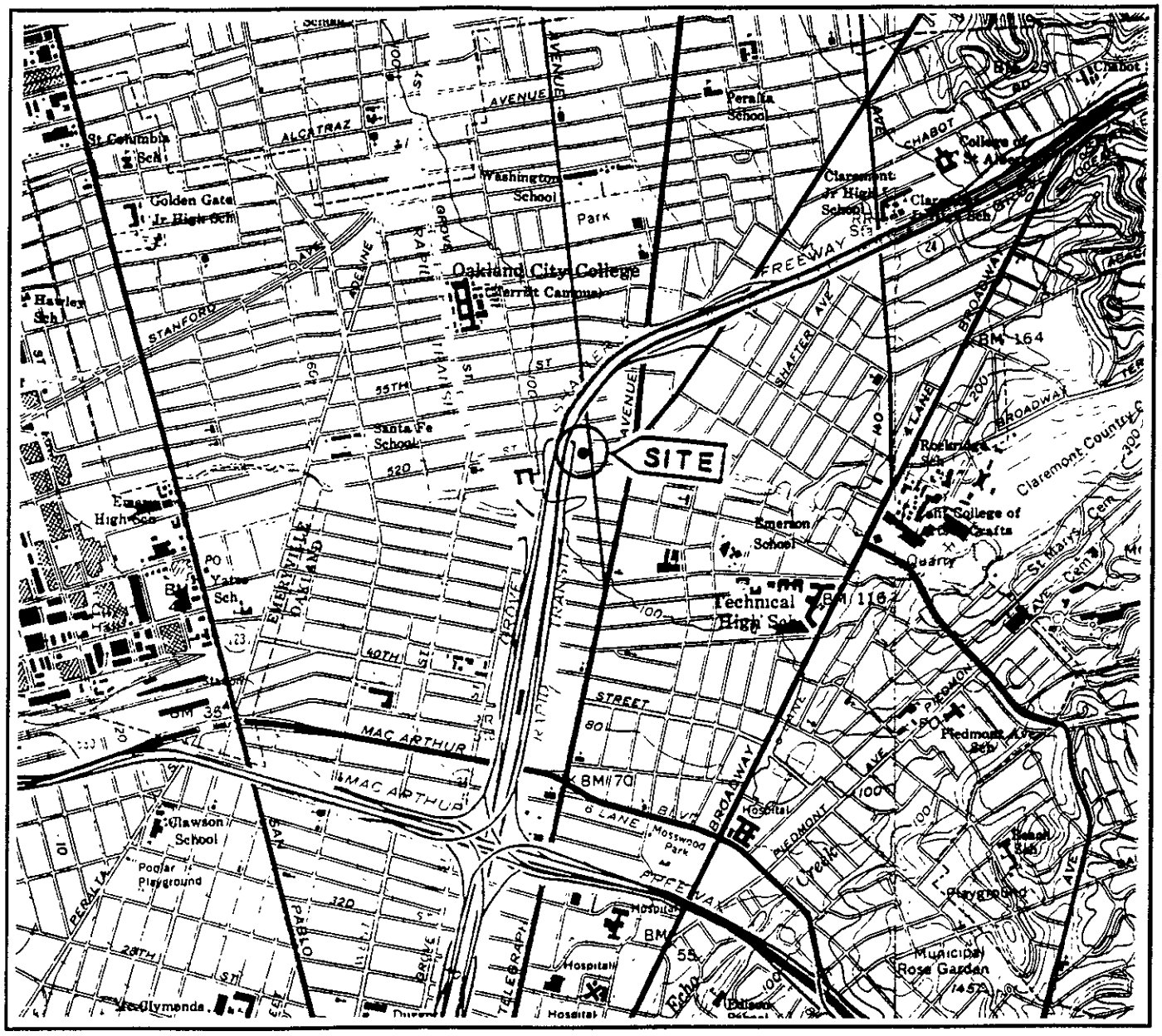
PROJECT STAFF

Dr. 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. Joel Coffman, 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 assist with the project.

REFERENCES

Helley, E.S., K.R. Lajoie, W.E. Spangle, and M.L. Blair. 1979. Flatland deposits of the San Francisco Bay Region, California. U.S. Geological Survey Professional Paper 943.

Hickenbottom, K. and Muir, K. 1988. Geohydrology And Groundwater-Quality Overview, East Bay Plain Area, Alameda County, California 205(J) Report. Alameda County Flood Control and Water Conservation District, California.



Source: U.S. Geological Survey
7.5-Minute Quadrangles
Oakland East/
Oakland West, California
Photorevised 1980

N

Approximate Scale

2000 1000 0 2000 4000

feet

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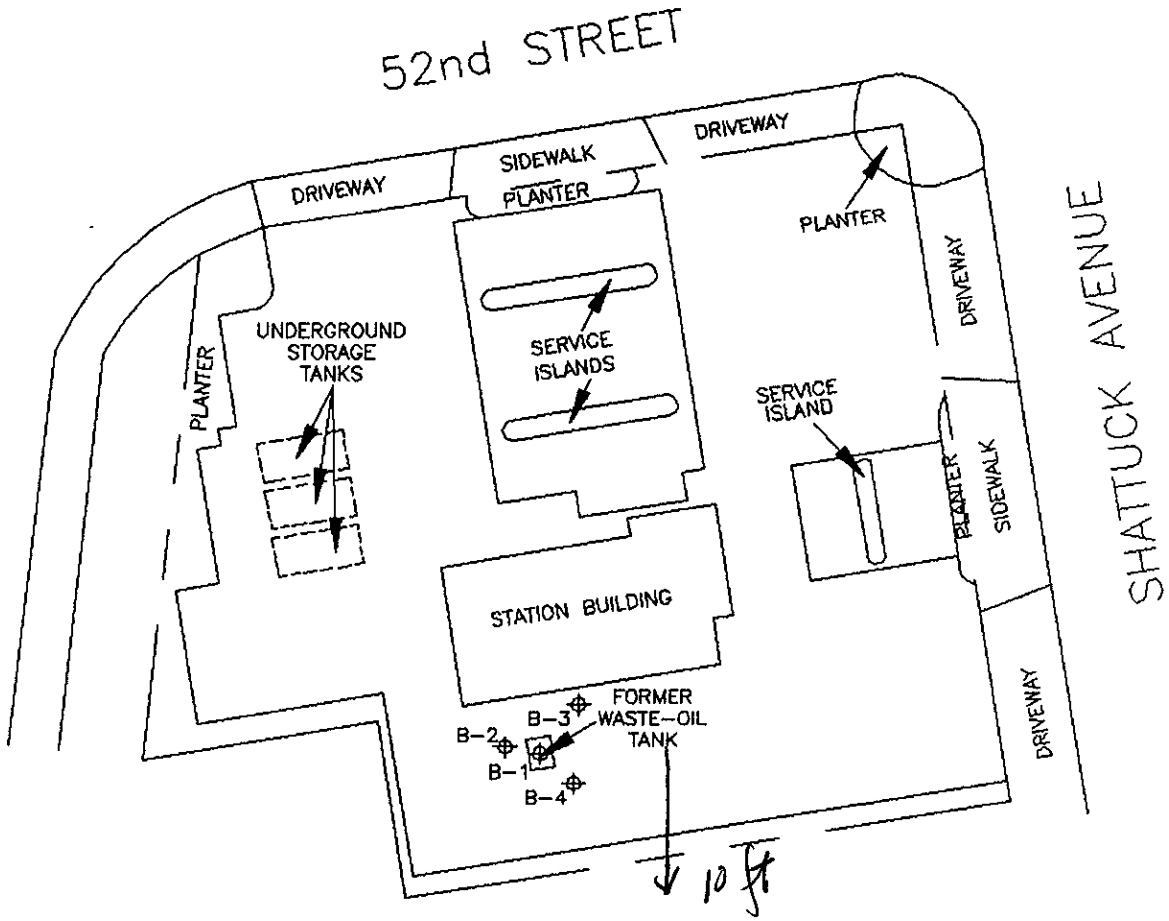
PROJECT 61035.01

SITE VICINITY MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE

1



EXPLANATION

B-4 ⊕ = Proposed boring

N

Approximate Scale

40 20 0 40 80

feet

Source: Based on ARCO Site Plan dated 1980.

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PROJECT 61035.01

GENERALIZED SITE PLAN
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

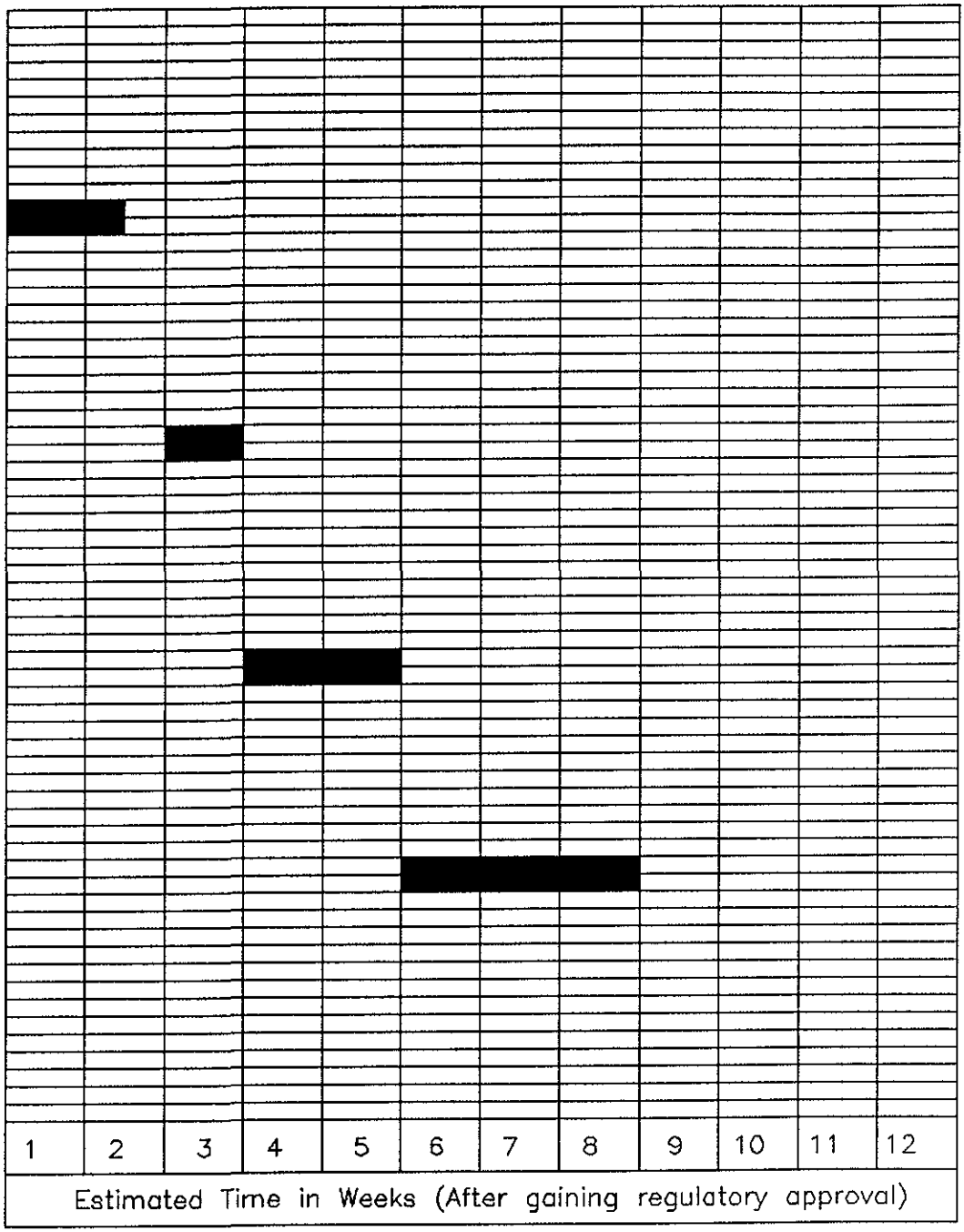
PLATE
2

STEP 1:
Prepare Site Safety Plan & Permitting

STEP 2:
Drill and sample borings

STEP 3:
Submit soil samples for a laboratory analysis and obtain results

STEP 4:
Report Preparation



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PROJECT 61035.01

PRELIMINARY TIME SCHEDULE
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
3

APPENDIX A

ANALYTICAL REPORTS

ANATEC
LABORATORIES
INC.

435 Tesconi Circle • Santa Rosa, California 95401 • 707-526-7200

Scott Klopf
Crosby & Overton
8430 Amelia Street
Oakland, CA 94621

June 22, 1987
ANATEC Log No. 9513 (-1)
Series No: 356/012
Client Ref: PO 3800

Subject: Analysis of One Soil Sample Identified as "ARCO Station 5131 Shattuck, Oak, CA Job #BA767 20' Depth from Bottom of Excavation 6/9 1400 SK" Received on June 11, 1987.

Dear Mr. Klopf:

Analysis of the sample referenced above has been completed. This report is written to confirm results transmitted verbally on June 22, 1987.

On receipt at the laboratory, sample custody was transferred to ANATEC sample control personnel who subsequently documented receipt and condition of the sample and placed it in secured storage at 4°C until analysis commenced.

The sample was prepared for extractable hydrocarbons measurements by thorough mixing and subsequent extraction with methylene chloride; extraction, aided by sonication, was performed three successive times for each sample. Extracts were then combined, dried over sodium sulfate and concentrated in Kuderna-Danish apparatus.

Extracts were then analyzed by capillary column gas chromatography with flame ionization detection. Preparation and analysis of samples was accompanied by similar treatment of a method blank and a motor oil-fortified sample. Response of the chromatographic system to calibration standards prepared with commercial motor oil was compared with system response to samples for purposes of qualitative and quantitative interpretation.

Details of the analytical methodology are consistent with requirements specified in "Guidelines for Addressing Fuel Leaks," Regional Water Quality Control Board, San Francisco Bay Region, revised 1986; the preparation procedures used are described in detail in "Sonication Extraction," Method 3550, in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," U.S. EPA, SW-846, 2nd edition, revised 1984.

Results of analyses are summarized in Table 1. Attached are the sample custody document and site diagram. Please feel welcome to contact us should you have questions regarding procedures or results.

Submitted by:

Susan Joy Griffin
Project Chemist

Approved by:

Greg Anderson, Director
Analytical Laboratories

Enc: Custody Document
Site Diagram

TABLE 1. SUMMARIZED RESULTS FOR "ARCO STATION 5131 SHATTUCK, OAK CA JOB #BA767 20' DEPTH FROM BOTTOM OF EXCAVATION 6/9 1400 SK"

Parameter	Results (mg/Kg)[1]
Motor oil	210

[1]mg/Kg--Data are expressed in units of milligrams analyte per kilogram sample, as-received basis.

ENVIRONMENTAL MANAGEMENT, INC.
1610 WEST 17th STREET LONG BEACH, CALIFORNIA 90813

CHAIN OF CUSTODY RECORD

LOCATION OF SAMPLING: ✓ PRODUCER ____ HAULER ____ DISPOSAL SITE

____ OTHER: WASTE OIL SAMPLE

SHIPPER NAME: CROSBY & OVERTON

ADDRESS: 8430 AMELIA (NUMBER) (STREET) OAKLAND (CITY) CA (STATE) 94621 (ZIP)

COLLECTOR'S NAME Scott Kluft (SIGNATURE) TELEPHONE: (415) 633 0336

DATE SAMPLED 6/9/87 TIME SAMPLES 1400 HOURS ____

TYPE OF PROCESS PRODUCING WASTE ____

FIELD INFORMATION 20' DEPTH FROM BOTTOM OF EXCAVATION

"ARCO" STATION @ ~~5131~~ "5131" SHATTUCK OAK. CA.

SAMPLE RECEIVER:

1. ANATEC 435 TESCONI CIRCLE SANTA ROSA
-NAME AND ADDRESS OF ORGANIZATION RECEIVING SAMPLE-

2. ____

3. ____

CHAIN OF POSSESSION:

1. T. Tim Perkins (SIGNATURE)	DRIVER - ANATEC (TITLE)	6/11-FT-1450 (INCLUSIVE DATES)	Relinquished
2. Judy Ruffley (SIGNATURE)	Sample control Anatec (TITLE)	6/11/87 2050 (INCLUSIVE DATES)	
3. ____ (SIGNATURE)	____ (TITLE)	____ (INCLUSIVE DATES)	

F08.4
-BA76
P.O.#3

9513

FIGURE C.0-3 COLLECTOR'S SAMPLE NO. ____

EXAMPLE OF CHAIN OF CUSTODY RECORD

APPENDIX B

FIELD PROTOCOL

FIELD PROTOCOL

The following presents RESNA' protocol for a typical site investigation involving hydrocarbon-impacted soil and/or ground water.

Site Safety Plan

The Site Safety Plan describes the safety requirements for the evaluation of waste-oil hydrocarbons in soil 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 Borings

Prior to the drilling of borings 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.

Drill Cuttings

Drill cuttings subjectively evaluated as having hydrocarbon contamination at levels greater than 100 parts per million (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, plastic caps, and aluminized duct tape. 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.

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.