Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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June 14, 1988

WORK PLAN
SUBSURFACE
ENVIRONMENTAL INVESTIGATION
at
UNOCAL Service Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

AGS Job No. 018061-1P

Prepared for

UNOCAL Corporation
2175 North California Boulevard
Suite 650
Walnut Creek, California 94596

by
Applied GeoSystems

Andrew J. Gilpin
Senior Staff Geologist

Gillian E. Holmes
Gillian Holmes
G.E. 2023

June 14, 1988

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June 14, 1988
86061-1P

Mr. Tim Ross
UNOCAL Corporation
2175 North California Boulavard
Suite 650
Walnut Creek, California 94596

Subject: Executive Summary of Work Plan No. 86061-1P regarding a Subsurface Environmental Investigation at UNOCAL Service Station No. 5484, 18950 Lake Chabot Road, Castro Valley, California.

Mr. Ross:

This Work Plan details a proposed subsurface environmental investigation to be performed at the above-referenced site. UNOCAL requested this proposal after the failure of precision tests conducted on the unleaded gasoline tank at the site. The proposed work will be performed to evaluate the vertical and horizontal extent of subsurface hydrocarbon contamination of soil and ground water in the area around the tanks.

The work will include drilling a minimum of three soil borings on the station property, collecting soil samples from the borings for laboratory analyses, constructing 2-inch-diameter ground-water monitoring wells in these borings, developing the wells, collecting water samples for laboratory analyses, and evaluating the ground-water gradient at the site. We will also prepare a report that documents field methodology and presents our findings, conclusions, and recommendations from both stages of work. In our opinion, this work is necessary to evaluate the lateral and vertical extent of the contamination, if any, and the potential impact of contaminants on local ground-water resources.

We recommend that a copy of this Work Plan be sent to

Mr. Larry Seto
Hazardous Materials Specialist
Alameda County Health Care Services
470 27th Street, Third Floor
Oakland, California 94612

Please do not hesitate to call if you have any questions regarding the content of this Work Plan.

Sincerely,
Applied GeoSystems

Andrew J. Gilpin
Senior Staff
Geologist

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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WORK PLAN
SUBSURFACE
ENVIRONMENTAL INVESTIGATION
at
UNOCAL Service Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

INTRODUCTION

This Work Plan outlines a subsurface environmental investigation for UNOCAL Service Station No. 5484, located at 18950 Lake Chabot Road, Castro Valley, California. The purpose of our recommended work is to evaluate and delineate hydrocarbon contamination which may have occurred at the site.

A Work Plan was requested by the Alameda County Health Care Services, Hazardous Materials Division, after leaks were detected in the fiberglass adapter and the sub-pump swing joint of the underground unleaded product tank during precision tank testing. The proposed work includes 1) researching local records for the presence of domestic, industrial, or municipal water wells within a 1/2-mile radius of the site; 2) drilling and sampling three soil borings at the subject property; 3) analyzing up to two soil

samples from each boring for hydrocarbon contaminants; 4) constructing 2-inch-diameter monitoring wells in the borings; 5) developing the wells and collecting and analyzing ground-water samples for hydrocarbon contaminants; 6) measuring the ground-water gradient and direction of flow; and 7) preparing a report documenting field methodology and presenting our findings, conclusions, and recommendations.

BACKGROUND

UNOCAL Service Station No. 5484 is located south of Quail Avenue on Lake Chabot Road in Castro Valley, California, as shown on the Site Vicinity Map, Plate P-1. The locations of two 10,000-gallon product tanks and dispensers and other pertinent site features are shown on the Generalized Site Plan, Plate P-2. The north storage tank is used to store regular unleaded gasoline, and the south tank is used to store premium unleaded gasoline for retail sale. The site is bounded on the north, south, and east by residential properties and there are several commercial businesses to the west across Lake Chabot Road.

INFERRENCE OF GROUND-WATER FLOW DIRECTION

The site is located on the east side of a small, moderately to steeply sloping valley in the southern portion of the San Leandro Hills. A small, south-southwesterly flowing creek is located approximately 200 yards west of service station. Based on the topography of the site and surrounding area and the flow-direction of the adjacent creek, we have inferred that the ground-water flow beneath the site is to the south-southwest.

PROPOSED FIELD WORK

Site Assessment

We propose to drill three borings: one immediately adjacent to the locations of the suspected leaks and two in the inferred downgradient direction from the tanks and near the boundary of the property. These borings will be used to gather data on the type and distribution of soil underlying the site and evaluate the extent of hydrocarbon contamination in the soil.

A 2-inch-diameter ground-water monitoring well will be constructed in each of the borings. The ground-water monitoring

wells will be used to evaluate hydrocarbon contamination, if present, in the ground water and measure the ground-water gradient and direction of flow.

The proposed work for this phase of the project includes the following tasks, which are described in greater detail below:

1) Acquire the appropriate permits for installing the monitoring wells.

2) Formulate and implement a site safety plan, including the use of proper safety equipment.

3) Observe the drilling of the necessary soil borings, each to a depth approximately 20 feet below the top of the shallowest subsurface aquifer or to bedrock, if encountered.

4) Collect and classify relatively undisturbed soil samples taken at 5-foot intervals from the surface to the total depths of the borings.

5) Construct ground-water monitoring wells in the boreholes with 2-inch-inside-diameter, polyvinyl chloride (PVC) casing.

6) Develop the wells and collect ground-water samples.

7) Analyze selected soil and ground-water samples for total hydrocarbons and gasoline constituents in a state-certified laboratory.

9) Measure the local ground-water gradient by surveying the top of each well casing; measure static ground-water depths proposed wells; calculate the relative elevation of the ground-water surface in each well; and calculate the approximate ground-water gradient and direction of flow across the site.

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

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

12) Prepare a site assessment report summarizing our findings, conclusions, and recommendations.

Drilling and Sampling Soil

The soil borings will be drilled using 8-inch-diameter, continuous-flight, hollow-stem augers and a Mobile B-61 (or similar) drill rig. The auger flights will be steam-cleaned prior to use to minimize the possibility of downhole or crosshole contamination. The drilling will be performed under the guidance of a field geologist, and the earth materials in each boring will be logged as drilled. The boring logs in our assessment report will show both the name of the geologist who described and sampled the soil and the signature of the Certified Engineering Geologist or Geotechnical Engineer in overall charge of the project.

During drilling, soil samples will be collected at 5-foot intervals using a California-modified, split-spoon sampler (2.5-inch inside-diameter) equipped with 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 required to drive the sampler each successive 6 inches will be counted and recorded to give an indication of soil consistency. Copies of a Field Boring Log and a Log of Boring plate used in our final report are included in the Appendix to this Work Plan. Each soil sample will be analyzed in the field with an organic vapor analyzer (OVA) or equivalent field instrument; these data will be recorded on the boring logs.

Soil samples collected for possible chemical analyses will be sealed with aluminum foil, plastic end caps, and airtight tape. The samples will then be labeled and immediately placed in iced storage for transport to a laboratory that is certified to perform the required chemical analyses. A Chain of Custody Record will be initiated in the field and will accompany the samples to the laboratory. A copy of the Chain of Custody Record, an example of which is included in the Appendix to this Work Plan, will be included in the final report.

Disposal of Cuttings

Relative hydrocarbon contamination of the cuttings will be characterized during drilling with an OVA or equivalent

instrument, and this characterization will be verified in the laboratory by analyses of soil samples collected during drilling. Measurements from instruments such as an OVA indicate relative organic vapor concentrations exuded from soil but cannot assess the absolute concentrations of hydrocarbon contaminants present.

Soil cuttings will be stockpiled at the site on plastic sheeting for future aeration or treatment (if necessary). Cuttings generated during drilling will remain the responsibility of UNOCAL. Applied GeoSystems can arrange to have the soil aerated or treated (if necessary) and removed to an appropriate disposal facility with UNOCAL's authorization.

Construction of Monitoring Wells

The monitoring wells will be constructed of flush threaded, 2-inch-inside-diameter, Schedule 40 PVC casing. No chemical cements, glues, or solvents will be used in well construction. The screened portion of the well will consist of factory-perforated casing with 0.020-inch-wide slots. The well screen will extend from the total depth of the well to approximately 10 feet above the static water level. The annulus adjacent to the screened section will be packed with sorted sand. A bentonite plug will be placed above the sand as a seal against cement

entering the sand pack. The remaining annulus will be backfilled with a slurry of neat cement and 5 percent bentonite to a few inches below grade.

A well cap and padlock will be secured over the well head and a traffic-rated, cast-aluminum utility box with PVC apron will also be placed over each well and secured with concrete set flush with the surrounding station pad. This box has a watertight seal to protect against surface-water infiltration and requires a specially designed wrench to open. This design reduces the possibility of either vandalism to or accidental disturbance of the well.

The well will be developed before collecting water samples by surge pumping or another suitable method. The well will be pumped until the discharge is relatively clean and free of suspended sediment.

Ground-Water Sampling

Ground water will be allowed time to recover to static conditions in the wells and an initial water-level measurement will be made. A clean bailer will then be used to obtain a sample from the surface of the water in the well. Any subjective evidence of

product detected in the well 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 a well, a sample of the formation water will be collected after the well is purged. The well will be purged of at least three well volumes of water and samples collected using a Teflon bailer that is cleaned with Alconox and rinsed with tap water and deionized water.

The water samples will be sealed in laboratory-cleaned, 40-milliliter glass vials with Teflon-lined lids. They will then be labeled and immediately placed in iced storage. A Chain of Custody Record will be initiated by the sampler and will accompany the samples to a laboratory certified by the State of California for the types of analyses requested. A copy of the Chain of Custody Record will be included in our final report.

Laboratory Analyses

One soil sample from each boring will collected near and above the water table for laboratory analysis of total petroleum hydrocarbons (TPH) and the aromatic hydrocarbons benzene, ethylbenzene, toluene, and total xylene isomers (BETX) by Environmental Protection Agency (EPA) Methods 8015 and 8020,

respectively. Water samples will be analyzed for TPH and BETX by EPA Methods 8015 and 602, respectively. Detection limits suitable for the soil and water tests requested and concentrations present will be stated on the laboratory report. Copies of the laboratory reports will be included in our final report.

Measurement of Ground-Water Gradient and Direction of Flow

The ground-water gradient will be measured, and the direction of local ground-water flow will be estimated. The tops of the well casings will be surveyed using a leveling instrument. The instrument will be used to measure the differences (to the nearest 0.001-foot) in elevation between the instrument and the top of the well casings. Elevation differences of the wells will be combined with depth-to-static-water measurements (to the nearest 0.01-foot) in the wells to calculate the differences in water-level elevations. The calculations will be used to prepare a ground-water potentiometric surface map for the site.

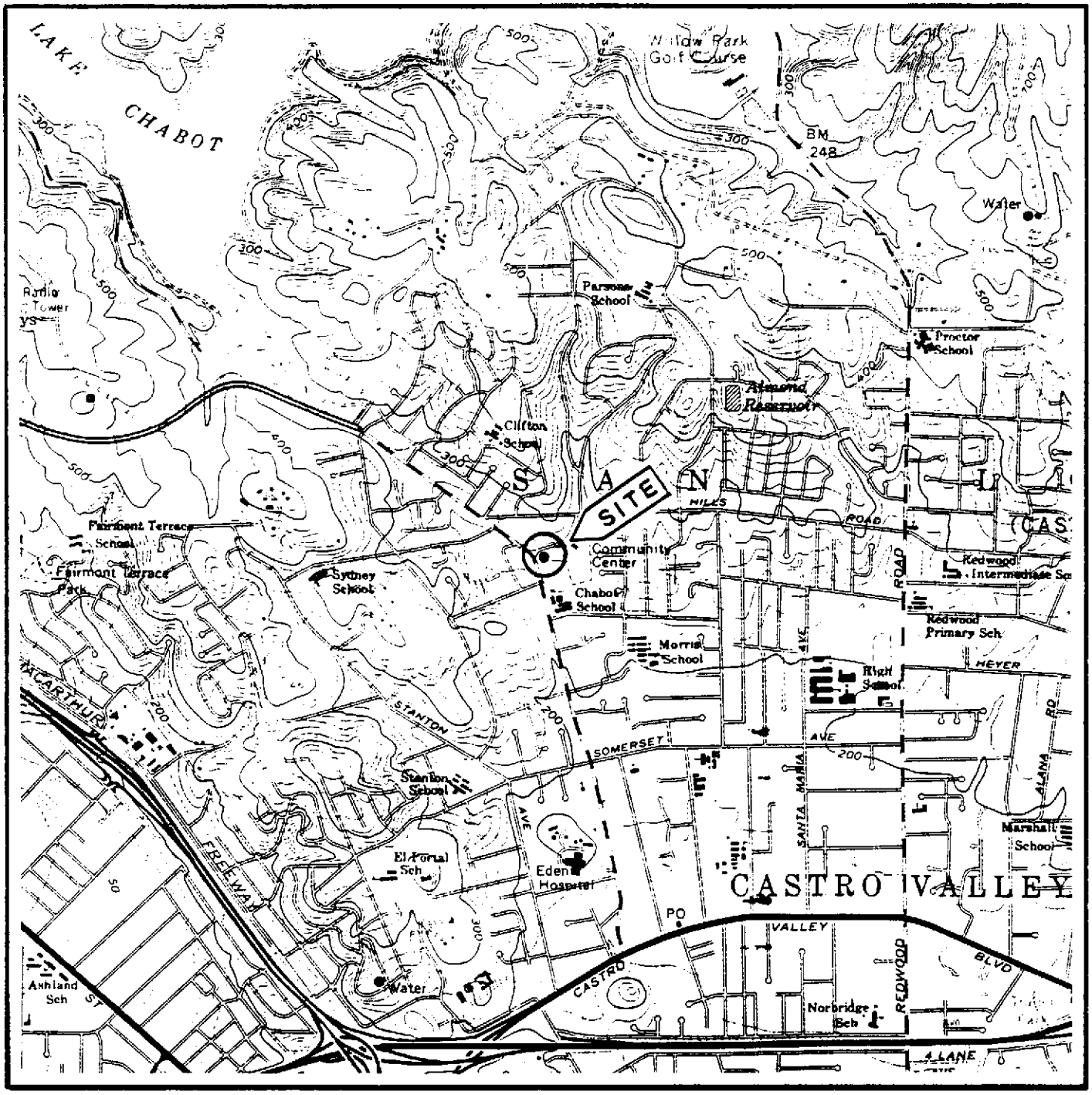
Report Preparation

A final report summarizing the soil stratigraphy, field and laboratory procedures, well-construction details, laboratory

results, ground-water gradient, and recommendations for further work will be supplied to UNOCAL approximately 30 days after field work is completed. All information gathered during the study will be considered confidential and will be released only with the authorization of UNOCAL.

PROJECT STAFF

Ms. Gillian S. Holmes, a Registered Geotechnical Engineer (G.E. 2023) and Registered Civil Engineer (C.E. 34812) in California will be in overall charge of this project. Mr. Andrew J. Gilpin, Senior Staff Geologist, will manage field and office operations of the project. Applied GeoSystems employs a staff of geologists and technicians who will be used as needed to see the project to completion.



Source: U.S. Geological Survey
7.5-Minute Quadrangle
Hayward, California
Photorevised 1980

N

Approximate Scale

2000 1000 0 2000 4000

feet

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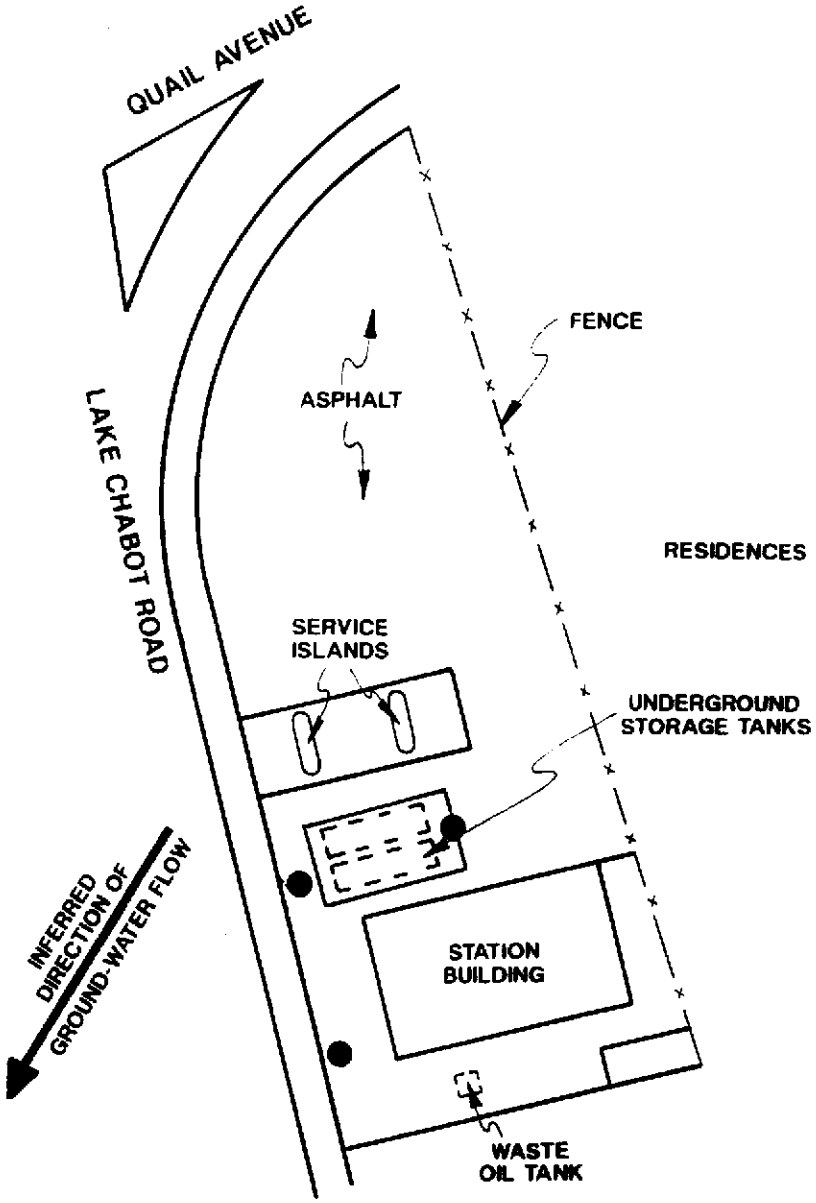
PROJECT NO. 018061-1P

SITE VICINITY MAP
UNOCAL Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

PLATE
P - 1



● = Approximate location of proposed boring and monitoring well

Source: Measured by tape and compass

Inferred ground-water flow direction based on local topography

N

Approximate Scale

40 20 0 40 80

feet

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PROJECT NO. 018061-1P

GENERALIZED SITE PLAN
UNOCAL Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

PLATE
P - 2

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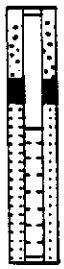

Job No:	Client:	Location:
Drilling Method:		Boring No.:
Drilling Company:		Sheet No.:
Drilling Crew:		
Geologist:		Drilling Time:
Sampling Method:		Start / Finish
Water Level:		Time / Time
Time:		
Date:		Date: / Date:
Casing Depth		

Datum: Elevation:

Recovery	Sample Type	Sample Depth	Blows Per 6in.	Moisture Content	Product Odor	Depth in Feet	USCS Code	Surface Conditions:
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

FIELD BOREHOLE LOG

Blows/ Ft.	Sample No.	USCS	DESCRIPTION	WELL CONST.
			REPORT BOREHOLE LOG	

DEPTH IN FEET

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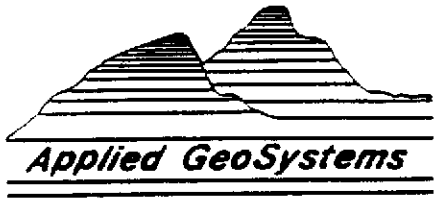
LOG OF BORING

PLATE

PROJECT NO.

CHAIN OF CUSTODY RECORD



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

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