SEMI-ANNUAL GROUNDWATER SAMPLING AND ANALYSIS MARCH 1993

FOR

THREE CITY OF ALAMEDA FACILITIES ALAMEDA, CALIFORNIA

Project No. 11010.11
April 1993

RESNA
42501 Albrae Street
Fremont, California 94538
(510) 440-3300

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
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April 21, 1993
Project No. 11010.11

City of Alameda
Maintenance Service Center
1616 Fortmann Way
Alameda, California 94501

Attention: Mr. Jerry Eichelberger

Subject: Semi-Annual Groundwater Sampling and Analysis — March 1993
Three City of Alameda Facilities
Alameda County, California

Dear Mr. Eichelberger:

RESNA Industries, Inc. has completed the semi-annual sampling and analysis of six groundwater monitoring wells located at three City of Alameda facilities (Plate 1). Groundwater sampling was conducted on March 11, 1993 to satisfy the underground fuel storage compliance requirements of the County of Alameda. The six wells sampled are located at the following locations: Fire Station No. 2 (FS2-MW-1), Fire Station No. 3 (FS3-MW1, FS3-MW2) City Hall (CH-MW1, CH-MW2), and the Police Station (PS-MW1). The site plan for each facility is shown in Plate 2 through Plate 4.

Groundwater samples were collected in accordance with RESNA's groundwater sampling protocol (see Appendix A). Prior to sampling, the wells were checked for the presence of free-floating product with a clear acrylic bailer: none was observed. Each well was then purged of approximately four well-casing volumes of water before sampling. Groundwater samples were collected in a clean teflon bailer, preserved in laboratory-supplied bottles, and stored in a chilled ice chest for shipment to a state-certified laboratory following proper chain-of-custody procedures.

The groundwater samples were analyzed following EPA-approved methods for the presence of either total petroleum hydrocarbons as diesel (TPHD), total petroleum hydrocarbons as gasoline (TPHG) with a benzene, toluene, ethylbenzene, and total xylenes (BTEX) distinction, or both. The type of analysis performed by the laboratory on each sample depended on the type of fuel stored at each City of Alameda facility.

Laboratory results indicated that no TPHD, TPHG, and BTEX were detected in any sample. A summary of groundwater analysis data from all sampling events is shown in Table 1.

RESNA
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A copy of this report should be forwarded by the City of Alameda to the following agency in a timely manner:

Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94612
Attention: Ms. Pamela Evans

Copies of the laboratory report and chain-of-custody record for the March 1993 sampling event are presented in Appendix B.

If you have any questions or comments, please call us at (408) 264-7723.

Sincerely,
RESNA Industries Inc.

Zbigniew L. Ignatowicz
Staff Geologist

Mark E. Detterman, C.E.G. 1788
Senior Project Geologist

ZI/MED/sw

Enclosures: Table 1: Summary of Groundwater Analyses Data

Plate 1: Site Location Map
Plate 2: Site Plan, Fire Station No. 2
Plate 3: Site Plan, Fire Station No. 3
Plate 4: Site Plan, City Hall and Police Station

Appendix A: Groundwater Sampling Protocol
Appendix B: Certified Laboratory Reports and Chain-of-Custody Record

TABLE 1

SUMMARY OF GROUNDWATER ANALYSES DATA
at
Various City Facilities
Alameda, California

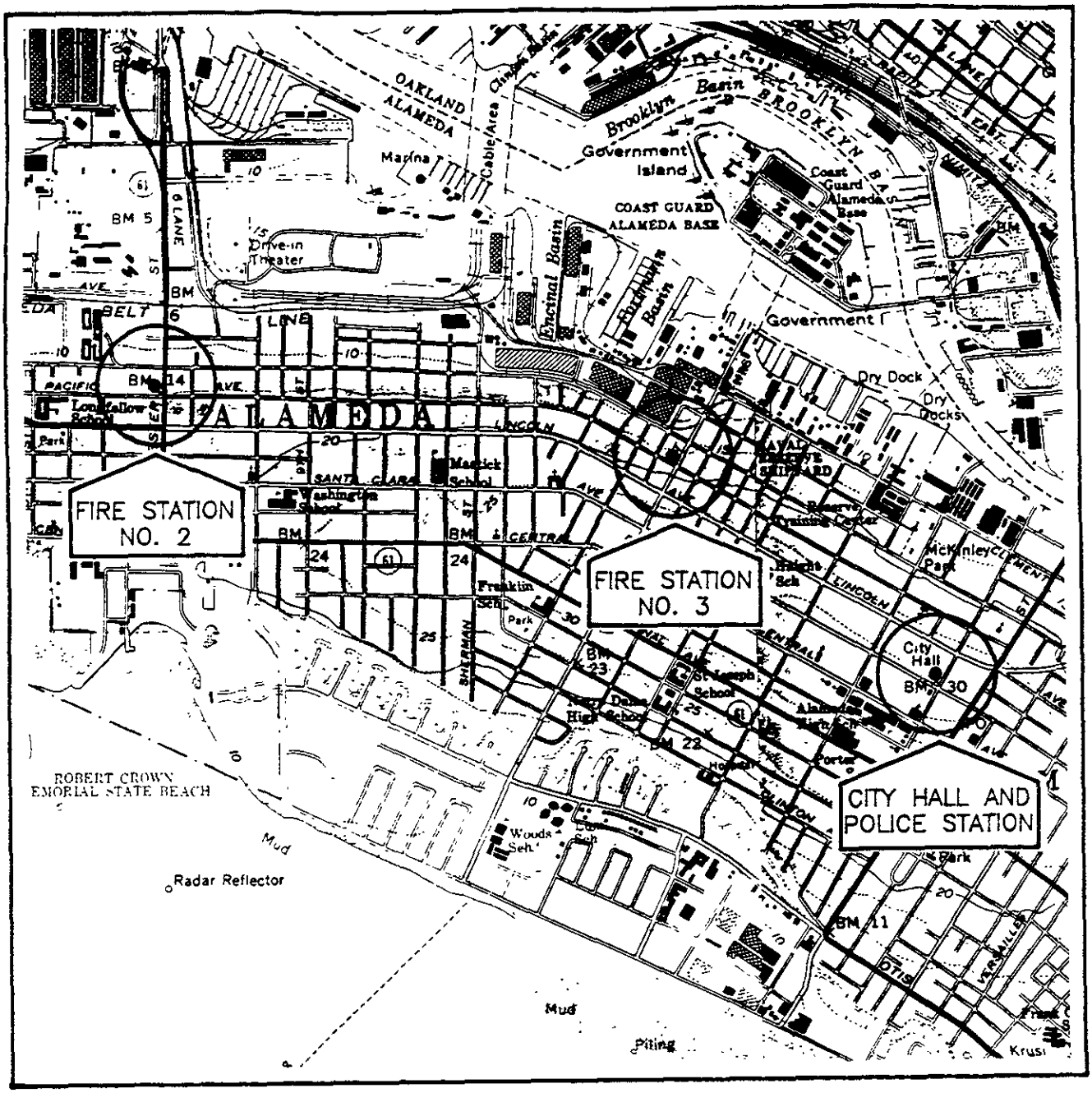
Sample Number	Date Sampled	TPHG (ppb)	TPHD (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl benzene (ppb)	Total Xylenes (ppb)
FS2-MW1	08/05/87	NA	120	NA	NA	NA	NA
	02/16/88	NA	<50	NA	NA	NA	NA
	08/24/88	NA	<60	NA	NA	NA	NA
	02/08/89	NA	<50	NA	NA	NA	NA
	08/07/89	NA	<50	NA	NA	NA	NA
	02/06/90	NA	<50	NA	NA	NA	NA
	08/28/90	NA	<50	NA	NA	NA	NA
	02/08/91	NA	<50	NA	NA	NA	NA
	03/04/92	NA	<100	NA	NA	NA	NA
	09/08/92	NA	<50	NA	NA	NA	NA
	03/11/93	NA	<50	NA	NA	NA	NA
FS3-MW1	08/05/87	<20	NA	<0.7	<0.7	<0.7	<0.7
	02/16/88	<50	NA	<0.5	<0.5	<0.5	<0.5
	08/24/88	36	NA	<0.1	<0.1	<0.1	<0.2
	02/08/89	<50	NA	<0.5	<0.5	0.86	<0.5
	08/07/89	93	NA	3.0	<0.3	<0.3	0.38
	02/06/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	08/28/90	<30	<50	<0.3	<0.3	<0.3	<0.3
	02/08/91	<30	NA	<0.3	<0.3	<0.3	<0.3
	03/04/92	<50	NA	<0.5	<0.5	<0.5	<0.5
	09/08/92	<50	NA	NA	NA	NA	NA
	03/11/93	<50	NA	<0.5	<0.5	<0.5	<0.5
FS3-MW2	08/05/87	NA	<10	NA	NA	NA	NA
	02/16/88	NA	<50	NA	NA	NA	NA
	08/24/88	NA	<60	NA	NA	NA	NA
	02/08/89	NA	<50	NA	NA	NA	NA
	08/07/89	NA	<50	NA	NA	NA	NA
	02/06/90	<30	<50	<0.3	<0.3	<0.3	<0.3
	08/28/90	<30	<50	<0.3	<0.3	<0.3	<0.3
	02/08/91	NA	<50	NA	NA	NA	NA
	03/04/92	<50	<100	<0.5	<0.5	<0.5	<0.5
	09/08/92	<50	<50	NA	NA	NA	NA
	03/11/93	<50	<50	<0.5	<0.5	<0.5	<0.5

TABLE 1

SUMMARY OF GROUNDWATER ANALYSES DATA
at
Various City Facilities
Alameda, California

Sample Number	Date Sampled	TPHG (ppb)	TPHD (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl benzene (ppb)	Total Xylenes (ppb)
CH-MW1	08/05/87	<20	NA	<0.4	<0.4	NA	<0.4
	02/16/88	<50	NA	<0.5	<0.5	NA	<0.5
	08/24/88	<7	NA	<0.1	<0.1	<0.1	<0.2
	02/08/89	<50	NA	<0.5	<0.5	<0.5	<0.5
	08/07/89	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/09/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	08/28/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/08/91	<30	NA	<0.3	<0.3	<0.3	<0.3
	03/04/92	<50	NA	<0.5	<0.5	<0.5	<0.5
	09/08/92	<50	NA	NA	NA	NA	NA
	03/11/93	<50	NA	<0.5	<0.5	<0.5	<0.5
CH-MW2	08/05/87	<20	NA	<0.4	<0.4	NA	<0.4
	02/16/88	<50	NA	<0.5	<0.5	NA	<0.5
	08/24/88	36	NA	<0.1	<0.1	<0.1	<0.2
	02/08/89	<50	NA	0.55	<0.5	<0.5	<0.5
	08/07/89	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/09/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	08/28/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/08/91	<30	NA	<0.3	<0.3	<0.3	<0.3
	03/04/92	<50	NA	<0.5	<0.5	<0.5	<0.5
	09/08/92	<50	NA	NA	NA	NA	NA
	03/11/93	<50	NA	<0.5	<0.5	<0.5	<0.5
PS-MW1	08/05/87	NA	160	NA	NA	NA	NA
	02/16/88	NA	<50	NA	NA	NA	NA
	08/24/88	NA	<60	NA	NA	NA	NA
	02/08/89	NA	<50	NA	NA	NA	NA
	08/07/89	NA	<50	NA	NA	NA	NA
	02/09/90	NA	<50	NA	NA	NA	NA
	08/28/90	NA	<50	NA	NA	NA	NA
	02/08/91	NA	NA	NA	NA	NA	NA
	03/04/92	NA	<100	NA	NA	NA	NA
	09/08/92	NA	57	NA	NA	NA	NA
	03/11/93	NA	<50	NA	NA	NA	NA

TPHG Total petroleum hydrocarbons as gasoline
TPHD Total petroleum hydrocarbons as diesel
ppb Parts per billion
< Below the indicated detection limit
NA Not sampled/not analyzed



SOURCE: U.S. GEOLOGICAL SURVEY
7.5-MINUTE QUADRANGLES
OAKLAND EAST/OAKLAND WEST, CALIFORNIA
PHOTOREVISED 1980

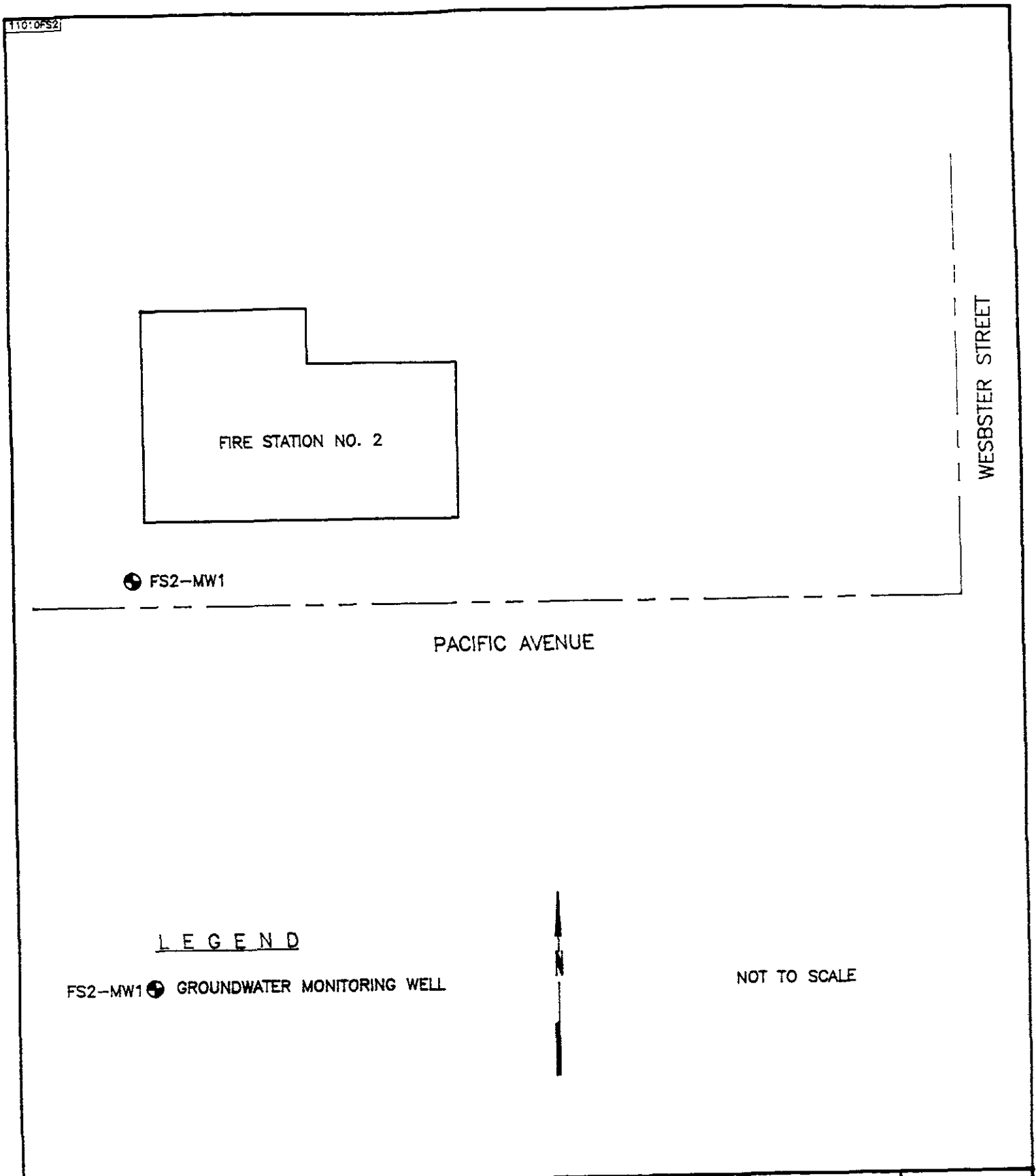
N

APPROXIMATE SCALE

0 1000 2000 4000

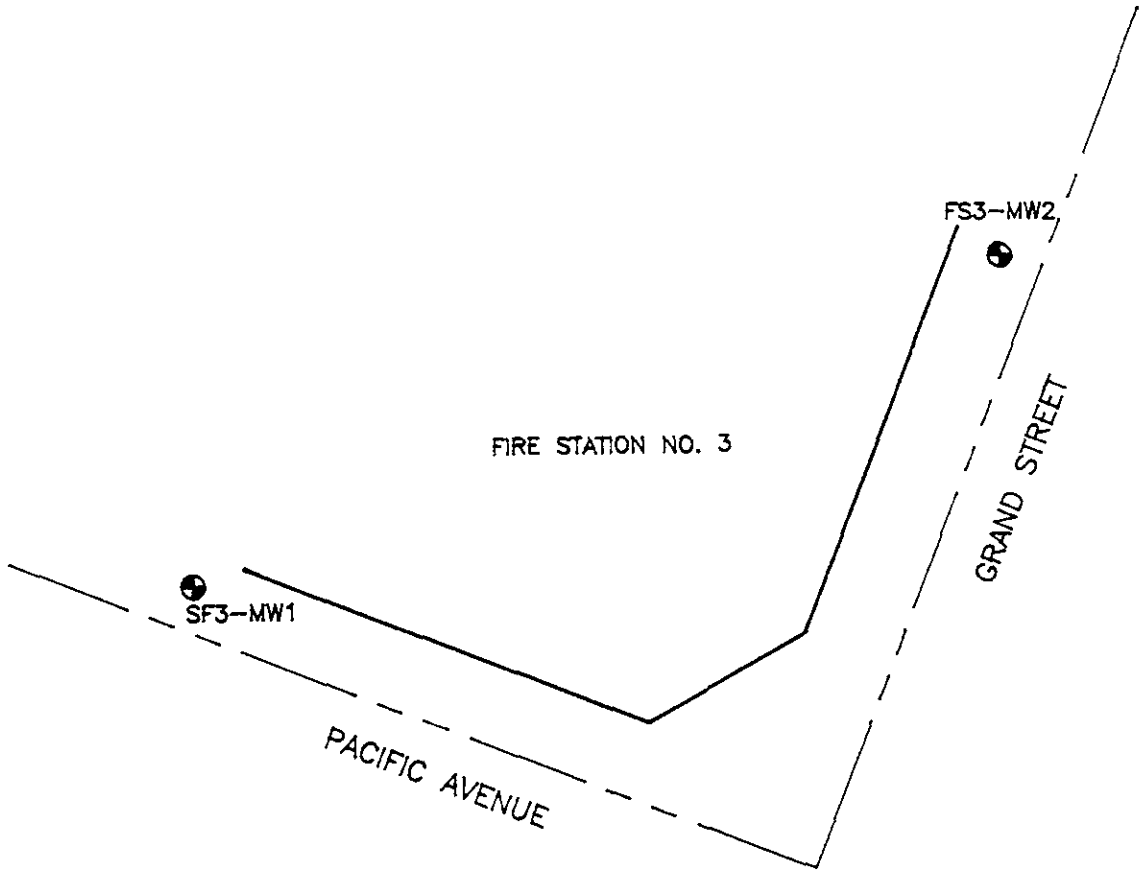
FEET

RESNA	**SITE LOCATION MAP**	PLATE
	CITY HALL, POLICE STATION,	1
	FIRE STATION NO. 2, AND NO. 3	
PROJECT NO. 11010.11	ALAMEDA, CALIFORNIA	



RESNA	SITE PLAN FIRE STATION NO. 2 636 PACIFIC AVENUE ALAMEDA, CALIFORNIA	PLATE 2
PROJECT NO. 11010.11		

11010FS3



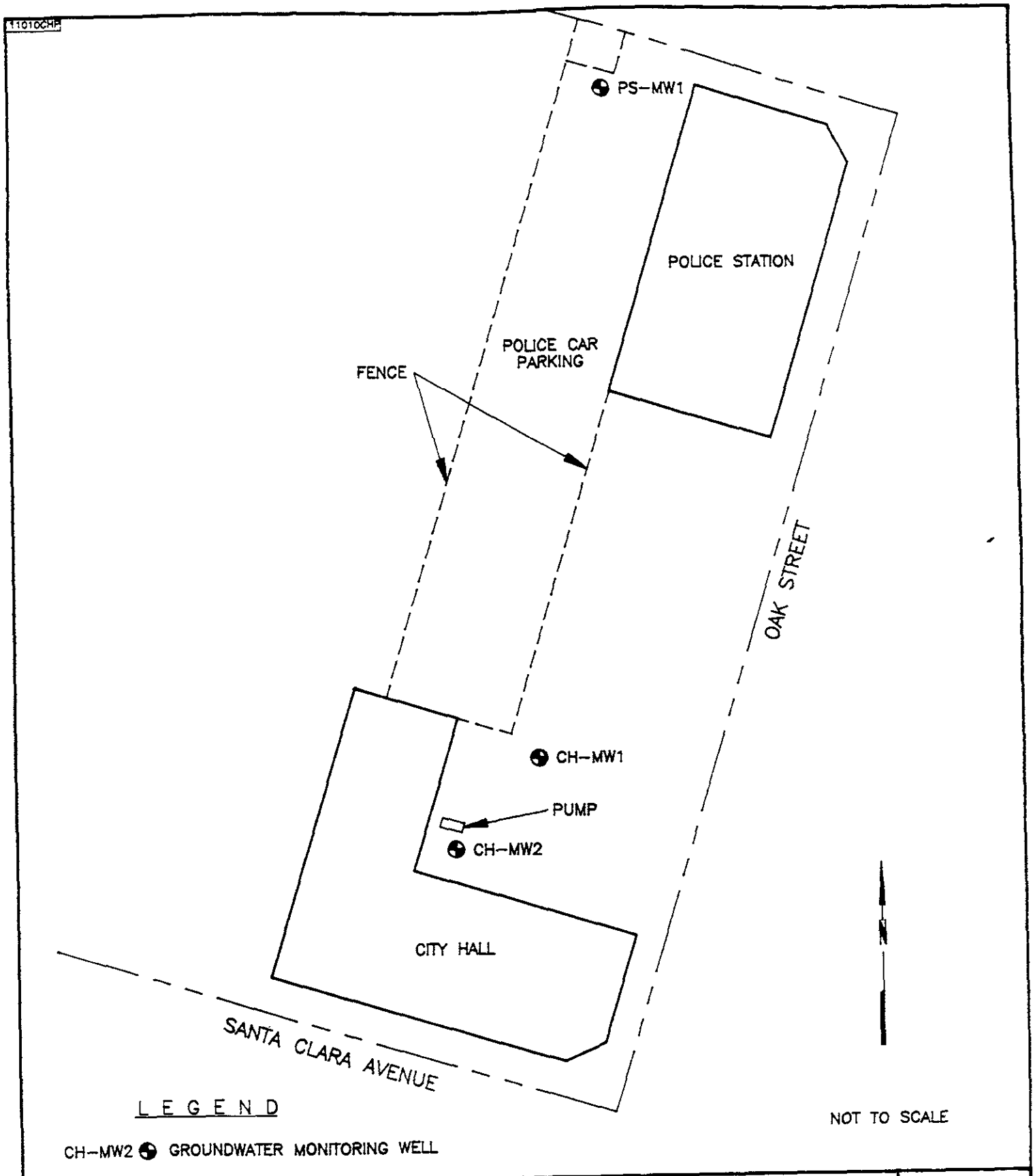
L E G E N D

FS3–MW2 ⊕ GROUNDWATER MONITORING WELL

N

NOT TO SCALE

RESNA	**SITE PLAN**	PLATE
	FIRE STATION NO. 3	3
	1703 GRAND STREET	
PROJECT NO. 11010.11	ALAMEDA, CALIFORNIA	



RESNA	**SITE PLAN**	PLATE
	CITY HALL AND POLICE STATION	4
PROJECT NO. 11010.11	2263 SANTA CLARA AVENUE	
	ALAMEDA, CALIFORNIA	

APPENDIX A

GROUNDWATER SAMPLING PROTOCOL

RESNA

Groundwater Sampling Protocol

GROUNDWATER SAMPLING PROTOCOL

Sampling of groundwater is performed by RESNA Industries, Inc. sampling technicians. Monitoring well sampling procedures are summarized as follows:

1. Wells are sampled in approximate order of increasing contamination.
2. Proceed to first well with clean and decontaminated equipment.
3. Measurements depths to liquid surface(s) in the well, and total depth of monitoring well. Note presence of sediment.
4. Field check for presence of floating product; measure apparent thickness.
5. Calculate minimum purge volume (well volumes) then purge well.
6. Monitor groundwater for temperature, pH, and specific conductance during purging. Following stabilization of parameters and removal of minimum volume, allow well to recover adequately.
7. Collect samples using Environmental Protection Agency (EPA) approved sample collection devices, i.e., teflon or stainless steel bailers or pumps.
8. Transfer samples into laboratory-supplied EPA-approved containers.
9. Label samples and log onto chain-of-custody form.
10. Store samples in a chilled ice chest for shipment to a state-certified analytical laboratory.
11. Secure wellhead.
12. Decontaminate equipment prior to sampling next well.

Equipment Cleaning and Decontamination

All water samples are placed in precleaned laboratory-supplied bottles. Sample bottles and caps remain sealed until actual usage at the site. All equipment which comes in contact with the interior of the well or groundwater is thoroughly cleaned with either a steam cleaner, a trisodium phosphate (TSP) solution or an Alconox™ solution and rinsed with deionized or distilled water before use at the site. This cleaning procedure is followed between each well sampled. If a teflon cord is used, the cord is cleaned. If a nylon or cotton cord is used, a new cord is used in each well.

All equipment blanks are collected prior to sampling. The blanks are analyzed periodically to ensure proper cleaning procedures are used.

Water Level Measurements

Depth to groundwater is measured in each well using a sealed sampling tape or scaled electric sounder prior to purging or sampling. If the well is known or suspected of containing free-phase petroleum hydrocarbons, either an optical interface probe or a bailer is used to measure the hydrocarbon thickness. Measurements are collected and recorded to the nearest 0.01 foot. Each monitoring well's total depth will be measured; this will allow a relative judgement of well sedimentation and need for redevelopment to be made.

Bailer Sheen Check

If no measurable free-phase petroleum hydrocarbons are detected, a clear acrylic bailer is used to determine the presence of a sheen. The color of the water and any film or obvious odor are recorded.

Groundwater Sampling

Prior to groundwater sampling, each well is purged of "standing" groundwater. Either a bailer, hand pump, or submersible pump is used to purge the well. The amount of purging is dependent on the well hydraulics. Samples will be collected when temperature, pH, and specific conductance stabilize and a minimum of three well-casing volumes of water have been removed. Field measurements will be taken after purging each well volume. Physical parameter measurements (temperature, pH, and specific conductance) are closely monitored throughout the well purging process and are used as

indicators for assessing sufficient purging. The purging parameters are measured to observe stabilization to a range of values typical for that aquifer and well. Stable field parameters are recognized as indicative of groundwater aquifer chemistry entering the well. Specific conductance (conductivity) meters are read to the nearest ±10 umhos/cm and are calibrated daily. pH meters are read to the nearest ±0.1 pH units and are calibrated daily. Temperature is read to the nearest 0.1 °F. Calibration of physical parameter meters will follow manufacturer's specifications. Collected field data during purging activities will be entered on the Well Sampling Field Data Sheet.

Following purging, the well is allowed to recharge prior to sampling. When recovery to 80% of the static water level is estimated or observed to exceed two hours, a sample will be collected when sufficient volume is available to fill all sample containers. The well will be purged slowly enough to minimize the volatilization of organic contaminants during well recharge.

In wells where free-phase hydrocarbons are detected, the free-phase portion will be bailed from the well and its volume recorded. Generally, if free-phase hydrocarbons persist through bailing, a groundwater sample will not be collected unless requested by the client.

Volatile organic groundwater samples are collected so that air passage through the sample does not occur or is minimal (to prevent volatiles from being stripped from the samples). Sample bottles are filled by slowly running the sample down the side of the bottle until there is a positive convex meniscus over the mouth of the bottle. The teflon side of the septum (in cap) is then positioned against the meniscus, the cap is screwed on tightly, the sample is inverted, and the bottle is lightly tapped. If a bubble is evident, the cap is removed, more sample is added, and the bottle is resealed.

Chain-of-Custody

Groundwater sample containers are labeled with a unique sample number, location, and date of collection. All samples are logged into a chain-of-custody form and placed in a secure, chilled ice chest for shipment to a laboratory certified by the State of California.

Sample Storage

Groundwater samples collected in the field are stored in an ice chest cooled to approximately 4 °C while in transit to the office or analytical laboratory. Samples are stored in a refrigerator overnight and during weekends and holidays. The refrigerator is set to 4 °C and is locked with access controlled by a designated sample custodian.

Quality Assurance/Quality Control Objectives

The sampling and analysis procedures employed by RESNA for groundwater sampling and monitoring follow regulatory guidance for quality assurance/quality control (QA/QC). Quality assurance objectives have been established to develop and implement procedures for obtaining and evaluating water quality and field data in an accurate, precise, and complete manner. In this way, sampling procedures and field measurements provide information that is comparable and representative of actual field conditions. Quality control (QC) is maintained by site-specific field protocols and by requiring the analytical laboratory to perform internal and external QC checks. The goal is to provide data that are accurate, precise, complete, comparable, and representative. The definitions as developed by overseeing federal, state, and local agency guidance documents for accuracy, precision, completeness, comparability, and representativeness are:

- **Accuracy** — the degree of agreement of a measurement with an accepted reference or true value.
- **Precision** — a measure of agreement among individual measurements under similar conditions. Usually expressed in terms of the standard deviation.
- **Completeness** — the amount of valid data obtained from a measurement system compared to the amount that was expected to meet the project data goals.
- **Comparability** — express the confidence with which one data set can be compared to another.
- **Representativeness** — a sample or group of samples that reflect the characteristics of the media at the sampling point.

Laboratory and field handling procedures of samples may be monitored by including QC samples for analysis. QC samples may include any combination of the following:

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

- **Field Blank:** Prepared in the field using organic-free water. Field blanks accompany project site samples to the laboratory and are analyzed for specific chemical parameters unique to the project site where they were prepared.

- **Duplicates:** Duplicated samples are collected "second samples" from a selected well and project site. They are collected as either split samples or second-run samples collected from the same well.

- **Equipment Blank:** Periodic QC samples collected from field equipment rinseate to verify decontamination procedures.

The number and types of QC samples are determined and analyzed on a project-specific basis.

Shallow Groundwater Survey

A shallow groundwater survey employs reconnaissance field sampling and chemical analysis for rapid plume mapping. A state-certified mobile laboratory may be used. The subcontractor would sample for analysis at locations marked by the RESNA field geologist. The thin-diameter probes from which groundwater is collected are advanced to the water bearing stratum and a groundwater sample is withdrawn to the surface, and analyzed immediately thereafter. Probe holes are backfilled with a grout slurry or as the local permitting agency requires. The contractor will report the details and results sampling, purging, and chemical analysis to RESNA. RESNA considers this type of shallow probe mapping (together with shallow groundwater sampling) to be a reconnaissance technique only.

APPENDIX B

CERTIFIED LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORD

ANALYSIS REPORT

Attention:	Kin Leung	Date Sampled:	03-11-93
	RESNA	Date Received:	03-12-93
	42501 Albrae Street	BTEX Analyzed:	03-25-93
	Fremont, California 94538	TPHg Analyzed:	03-25-93
Project:	11030.0L, Project 11010.11	TPHd Analyzed:	03-18-93
	City of Alameda	Matrix:	Water

	Benzene	Toluene	Ethyl Benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.5	0.5	0.5	0.5	50	50
SAMPLE Laboratory Identification						
BB-1 W1303178	ND	ND	ND	ND	ND	NR
P-MW1 W1303179	NR	NR	NR	NR	NR	ND
CH-MW1 W1303180	ND	ND	ND	ND	ND	NR
CH-MW2 W1303181	ND	ND	ND	ND	ND	NR
F-2-MW1 W1303182	NR	NR	NR	NR	NR	ND

ppb = parts per billion = ug/L = micrograms per liter
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX: Benzene, toluene ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg: Total petroleum hydrocarbons as gasoline (low to medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd: Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

MM Tague
Laboratory Representative

March 30, 1993
Date Reported

RESNA ENVIRONMENTAL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. 1211)

ANALYSIS REPORT

Attention:	Kin Leung	Date Sampled:	03-11-93
	RESNA	Date Received:	03-12-93
	42501 Albrae Street	BTEX Analyzed:	03-25-93
	Fremont, California 94538	TPHg Analyzed:	03-25-93
Project:	11030.0L, Project 11010.11	TPHd Analyzed:	03-18-93
	City of Alameda	Matrix:	Water

	Benzene	Toluene	Ethyl Benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.5	0.5	0.5	0.5	50	50
SAMPLE Laboratory Identification						
F-3-MW1 W1303183	ND	ND	ND	ND	ND	NR
F-3-MW2 W1303184	ND	ND	ND	ND	ND	ND

ppb = parts per billion = ug/L = micrograms per liter
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX: Benzene, toluene ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg: Total petroleum hydrocarbons as gasoline (low to medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd: Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

March 30, 1993
Date Reported

RESNA ENVIRONMENTAL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. 1211)

RESNA

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST 96085

PROJECT NO	PROJECT NAME /SITE	PO #
110.10.11	City of Alameda	

SAMPLERS (SIGN) [signature] (PRINT) Robin Sutherland

SAMPLE IDENTIFICATION	DATE	TIME	COMP	GRAB	PRES USED	ICED	NO CONTAINERS	SAMPLE TYPE	BTEX (602/8020)	TPHg (8015)	TPHd (8015)	TOG 418.1/5520	601/8010	624/8240	625/8270	REMARKS
BB-1	3-1-93	8:00		X	HCl	Y	2	W	X	X						W1303178
P. MW-1		9:00					2				X					179
CH MW-1		10:00					2		X	X						180
CH MW-2		11:00					2		X	X						181
F-2 MW-1		12:00					2				X					182
F-3 MW-1		13:00					2		X	X						183
F-3 MW-2		14:00					2		X	X	X					184

RELINQUISHED BY	DATE	TIME	RECEIVED BY
RELINQUISHED BY	DATE	TIME	RECEIVED BY
RELINQUISHED BY	DATE	TIME	RECEIVED BY
RELINQUISHED BY [signature]	DATE 3-12-93	TIME 8:30	RECEIVED BY LABORATORY [signature]

LABORATORY: Resna

REQUESTED TURNAROUND TIME: Normal

RECEIPT CONDITION:

PLEASE SEND RESULTS TO: Kin Leung

PROJECT MANAGER: