



Crown METAL MFG. CO.

5925 SOUTH LOWE AVENUE, CHICAGO, ILLINOIS 60621-2896 • TELEPHONE 312/873-3833

May 15, 1990

Alameda County
Division of Environmental Health
80 Swan Way
Oakland, CA 94621

Attention: Mr. Larry Seto

RE: 16525 Worthley Drive/San Lorenzo

Dear Mr. Seto:

At the suggestion of our environmental consultant, *Ensco Environmental Services, Inc.*, we are forwarding to your attention a report entitled "February Quarterly Groundwater Sampling And Analyses" for the site above-referenced.

Please make this part and parcel of your file. We are continuing our remediation efforts as a result of this report.

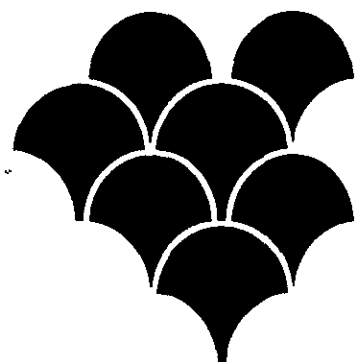
Should you have any further questions please feel free to contact our environmental consultant, Mr. Britt Von Thaden, Project Geologist, at *Ensco Environmental Services* (415/659-0404).

Regards,

Richard C. Ernest
President

RCE/meb
Enc.

cc: Mr. Britt Von Thaden
Project Geologist
Ensco Environmental Services, inc.
41674 Christy Street
Fremont, CA 94538-3114



ensco
environmental
services, inc.

**FEBRUARY QUARTERLY
GROUNDWATER
SAMPLING AND ANALYSES**

FOR

**CROWN METAL MANUFACTURING
AT
PACIFIC INTERNATIONAL
STEEL FACILITY
16525 WORTHLEY DRIVE
SAN LORENZO, CALIFORNIA**

**Project No. 1587-2G
April 1990**



April 25, 1990

Crown Metal Manufacturing
5925 S. Lowe Avenue
Chicago, IL 60621-2896

Attention: Mr. Richard C. Ernest

Subject: February Quarterly Groundwater Sampling and Analysis
Pacific International Steel Facility
16525 Worthley Drive, San Lorenzo, California
EES Project No. 1587-2G

Dear Mr. Ernest:

This report presents the results of the February quarterly groundwater sampling and analysis at the site noted above. It includes all current and past analytical data acquired during the course of this ongoing investigation.

If you have any questions, please call.

Sincerely,
Ensco Environmental Services, Inc.

Britt Von Thaden

Britt Von Thaden
Project Geologist

BVT/LDP/sw



Lawrence D. Pavlak, C.E.G. 1187
Senior Program Geologist

C O N T E N T S

Section	Page
Introduction	1
Site Background	1
Field Operations	3
Hydrogeology	3
Laboratory Results	3
Discussion	4
Reporting Requirements	5
Limitations	5

Table

- 1 Summary of Groundwater Analyses Data

Figures

- 1 Site Location Map
2 Groundwater Elevation Contour Map (2/21/90)
3 Maximum Hydrocarbon Contamination
Map (2/22-3/1/90)
4 MW-2 Groundwater Analyses Data
5 RW-1 Groundwater Analyses Data

Appendices

- A EES Groundwater Sampling Protocol and
EES Laboratory Procedures
B Laboratory Reports
Chain of Custody Record
-



A N N O U N C E M E N T

Ensco Environmental Services, Inc. (EES) announces the return of its original name:

Exceltech.

Exceltech (ET) had been our firm's name from its inception in 1983 until its purchase by Environmental Systems Company (ENSCO) in 1987. **Beginning with this report, we are issuing all documents and correspondence under our new name, Exceltech.**

By restoring the Exceltech name, we are attempting to distinguish ourselves as an environmental remediation and consulting company with a much broader range of services than our parent company, ENSCO, a firm primarily associated with large-scale hazardous waste incineration. The new Exceltech will maintain its reputation as a results-oriented company. More than ever, we are committed to providing our clients with high quality work and innovative solutions for environmental concerns.

**FEBRUARY QUARTERLY
GROUNDWATER SAMPLING AND ANALYSIS**

FOR

**CROWN METAL MANUFACTURING
AT
PACIFIC INTERNATIONAL STEEL FACILITY
16525 WORTHLEY DRIVE
SAN LORENZO, CALIFORNIA**

INTRODUCTION

Ensco Environmental Services, Inc. (EES) has completed the February quarterly sampling to ascertain groundwater conditions beneath the Pacific International Steel facility located at 16525 Worthley Drive in the City of San Lorenzo, Alameda County, California (Figure 1). Groundwater samples from six monitoring wells and one recovery well were collected on February 21-22 and March 1, 1990. The quarterly sampling program is required by the Regional Water Quality Control Board, San Francisco Bay Region. The purposes of the program are to monitor groundwater conditions and determine groundwater quality beneath the site. The program objectives are the following:

- Plot the groundwater contour surface.
- Investigate for the presence of a petroleum hydrocarbon plume and determine its concentration.
- Compare current and past data.

The existence and degree of hydrocarbon contamination in the groundwater is determined by (1) checking for the presence of free-floating product and (2) performing laboratory analyses on groundwater samples to determine concentrations of total petroleum hydrocarbons as gasoline (TPHG) as well as benzene, toluene, ethyl benzene, and total xylenes (BTEX). In addition, samples were collected from wells MW-2 and RW-1 and analyzed for total dissolved solids (TDS) to determine the potability of the groundwater underlying the site.

SITE BACKGROUND

The site was formerly occupied by an aircraft engine maintenance facility. Its operations included the use of underground fuel storage tanks which were removed at the request of Crown Metals as part of the property purchase agreement. It is our understanding that petroleum hydrocarbons were spilled during the tank removal operation.

In July 1987, EES installed six groundwater monitoring wells at the site to quantify contamination and evaluate its presence across the site. Laboratory results revealed petroleum hydrocarbon contamination in the groundwater from two of the wells and in the soil adjacent to all of the wells. A quarterly groundwater monitoring program was then initiated.

In April 1988, EES conducted a soil gas survey (SGS) to further delineate the extent of the soil contamination. The SGS revealed two contamination "hot spot" areas. EES conducted soil sampling in August 1988 to confirm the results of the findings of the SGS. Laboratory analyses of the samples generally supported the findings of the SGS study.

EES excavated the "hot spot" areas adjacent to well MW-3 in November 1988 and aerated the soils on the site. The excavation was approximately 40 x 40 x 10 feet and was backfilled in August 1989 after the last sampling. Well MW-3 was damaged during the soil removal operation due to its proximity to the resulting excavation. The entire well casing and sand pack was then removed.

In September 1989, EES conducted a shallow groundwater investigation (SGI) to determine the approximate outer limits of the petroleum hydrocarbon plume before installing an additional monitoring well. Emphasis for the SGI was placed on the western portion of the subject site, where contaminant concentrations were relatively unknown. The SGI revealed contaminant concentrations that were, for the most part, just above the equipment detection limits. However, three samples, WS-2, WS-3, and WS-4, contained concentrations that were elevated above the rest. The highest concentrations were detected in sample WS-2, which had been taken at the northwest corner of the fenced perimeter. Permission to expand the SGI onto the adjacent property to the west was denied by its owner.

In November 1989, an additional groundwater monitoring well (MW-7) and a groundwater recovery well (RW-1) were installed, respectively, in an area upgradient from the source area and adjacent to the source area. Laboratory analyses of groundwater samples collected from these wells revealed detectable petroleum hydrocarbons in the RW-1 sample but not the MW-7 sample. Contaminant concentrations detected in RW-1 were 1,300 micrograms per liter ($\mu\text{g/l}$) total petroleum hydrocarbons as gasoline, 150 $\mu\text{g/l}$ benzene, 15 $\mu\text{g/l}$ toluene, 100 $\mu\text{g/l}$ ethyl benzene, and 170 $\mu\text{g/l}$ xylenes.

Following the recovery well installation, a limited aquifer pump test was conducted in February 1990. Background data acquired for approximately one week prior to pumping revealed that tidal fluctuations influenced on-site groundwater levels approximately one-half to three-fourths of a foot daily. A step-drawdown test revealed a well yield of approximately one gallon per minute and this yield was sustained through a 24 hour constant-discharge test.

FIELD OPERATIONS

EES measured the depth to groundwater using an electric sounding tape and checked for the presence of floating product using a clear acrylic bailer at each well: none was detected. After the field check, each well was purged until pH, conductivity, and temperature readings stabilized. Approximately three well-casing volumes of groundwater were removed from each well.

Samples were collected with a clean teflon bailer and transferred to the appropriate laboratory-supplied bottles. They were then labeled with a unique sample number, logged on a chain-of-custody form, and stored in a chilled ice chest for shipment to the laboratory. Groundwater removed from the wells and equipment rinse water were placed in Department of Transportation-approved drums and left on-site pending the laboratory analytical results. EES groundwater sampling and laboratory procedures protocols are included in Appendix A.

HYDROGEOLOGY

The Groundwater Surface Contour Map (Figure 2), reveals a shallow groundwater gradient in the area of investigation for February 21, 1990. The contours indicate that the gradient is gently inclined and that the flow direction is variable but maintains an overall direction towards the southeast. The average calculated gradient is approximately 0.3 percent.

LABORATORY RESULTS

The groundwater samples were analyzed at Sequoia Analytical, a state-certified laboratory located in Redwood City, California. A summary of past and present analytical results is presented in Table 1. The analytical reports from the February sampling are attached in Appendix B. Laboratory analyses revealed hydrocarbon contamination in the groundwater from wells MW-2 and RW-1 and both wells also contained high TDS concentrations. Analytical results from the groundwater samples from these two wells were reported as follows:

Compound	MW-2	RW-1
TPHG ($\mu\text{g/l}$)	120	440
Benzene ($\mu\text{g/l}$)	<0.3	9.4
Toluene ($\mu\text{g/l}$)	<0.3	1.3
Ethyl Benzene ($\mu\text{g/l}$)	1.5	16
Total Xylenes ($\mu\text{g/l}$)	0.55	25
Total Dissolved Solids (mg/l)	45,000	36,000

TPHG = Total petroleum hydrocarbons as gasoline

$\mu\text{g/l}$ = Micrograms per liter (parts per billion)

mg/l = Milligrams per liter (parts per million)

<0.3 = Not detected at or above the laboratory method detection limit

Figure 3 shows the maximum hydrocarbon contamination detected in the groundwater samples from each well.

DISCUSSION

Groundwater at the site was measured in February at depths ranging from 6.63 to 9.34 feet below the existing ground surface. These depths correspond to elevations of approximately 1.58 to 2.26 feet above mean sea level based upon available survey data. The groundwater surface has risen an average of approximately 0.71 feet since the previous sampling. Groundwater contours show a gently inclined gradient with a general flow direction to the southeast.

Groundwater sampling for the February quarterly report revealed that petroleum hydrocarbon contamination remains in wells MW-2 and RW-1. The concentrations detected have decreased in both wells since the last sampling (MW-2, November 1989 and RW-1, January 1990). Figures 4 and 5 show graphical representations of current and past hydrocarbon data from wells MW-2 and RW-1. The concentration of TDS detected in the wells is equivalent to that of seawater.

The State of California Department of Health Services (DHS) maintains standards (maximum contaminant levels [MCL] and action levels [AL]) for petroleum hydrocarbon compounds in water of beneficial use. The following is a list of the current DHS standards for BTEX:

<u>Compound</u>	<u>Concentrations</u>
Benzene	1.0 µg/l MCL
Toluene	100 µg/l AL
Ethyl Benzene	680 µg/l MCL
Total Xylenes	1,750 µg/l MCL

The groundwater sample from monitoring well RW-1 contained a benzene concentration that exceeded the current DHS standard. The remaining concentrations detected in RW-1 and those detected in MW-2 are below the current DHS standards.

The next quarterly sampling is scheduled for May 1990.

REPORTING REQUIREMENTS

A copy of this report should be forwarded by Crown Metal Manufacturing to the following agencies in a timely manner:

California Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street, Suite 700
Oakland, California 94621
Attention: Mr. Lester Feldman

Alameda County
Division of Environmental Health
80 Swan Way
Oakland, California 94621
Attention: Mr. Larry Seto

LIMITATIONS

The discussion and recommendations presented in this report are based on the following:

1. The observations by field personnel.
2. The results of laboratory analyses performed by a state-certified laboratory.
3. Our understanding of the regulations of the State of California and Alameda County and/or the City of San Lorenzo.

It is possible that variations in the soil or groundwater conditions could exist beyond the points explored in this investigation. Also, changes in the groundwater conditions could occur at some time in the future due to variations in rainfall, temperature, regional water usage, or other factors.

The service performed by EES has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the San Lorenzo area. Please note that contamination of soil and groundwater must be reported to the appropriate agencies in a timely manner. No other warranty, expressed or implied, is made.

EES includes in this report chemical analytical data from a state-certified laboratory. The analytical results are performed according to procedures suggested by the U.S. EPA and State of California. EES is not responsible for laboratory errors in procedures or result reporting.

EnSCO Environmental Services, Inc.
 Project No. 1587-2G
 April 4, 1990

Crown Metal Manufacturing
 Pacific International Steel Facility
 San Lorenzo, CA

TABLE 1
 SUMMARY OF GROUNDWATER ANALYSES DATA

Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl Benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft.)	Depth to Water (ft.)	Floating Product (ft.)
MW-1	7/14/87	BDL	BDL	BDL	---	BDL	8.86	7.56	---
	11/24/87	BDL	BDL	BDL	---	9.0		7.51	---
	2/29/88	BDL	BDL	BDL	---	BDL		7.18	---
	5/25/88	BDL	BDL	BDL	---	BDL		7.40	---
	8/10/88	ND	ND	ND	ND	ND		7.85	---
	11/29/88	ND	ND	ND	ND	ND		7.86	---
	2/7/89	ND	ND	ND	ND	ND		7.43	---
	5/12/89	ND	1.4	ND	ND	ND		7.23	---
	8/4/89	ND	ND	ND	ND	ND		8.17	---
	11/14/89	ND	ND	ND	---	---		7.93	---
	1/3/90	---	---	---	---	---		7.77	---
	2/22/90	ND	ND	ND	ND	ND		7.28	---
MW-2	7/14/87	110	1.2	1.9	---	2.0	9.17	7.79	---
	11/24/87	3,600	82	47	---	13		7.73	---
	2/29/88	800	BDL	BDL	---	BDL		7.26	---
	5/25/88	250	ND	ND	---	ND		7.45	---
	8/10/88	260	ND	ND	ND	ND		7.90	---
	11/29/88	870	9.0	ND	1.0	1.0		8.20	---
	2/7/89	710	16	ND	ND	ND		7.47	---
	5/12/89	260	2.8	0.76	1.3	3.0		7.27	---
	8/4/89	360	ND	ND	ND	0.48		8.23	---
	11/14/89	85	ND	3.5	0.36	2.5		8.08	---
	1/3/90	---	---	---	---	---		7.95	---
	2/22/90	120	ND	ND	1.5	0.55		7.47	---
MW-3	7/14/87	260	BDL	1.0	---	2.0	8.54	7.09	---
	11/24/87	8,900	1,700	3.0	---	12		7.11	---

EnSCO Environmental Services, Inc.
 Project No. 1587-2G
 April 4, 1990

Crown Metal Manufacturing
 Pacific International Steel Facility
 San Lorenzo, CA

TABLE 1 (cont.)

Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl Benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft.)	Depth to Water (ft.)	Floating Product (ft.)
MW-3 (Cont.)	2/29/88	9,300	1,600	93	---	99	8.54	6.57	---
	5/25/88	11,000	140	16	---	34		6.80	---
	8/10/88	4,600	23	4.8	140	3.0		7.20	---
	11/29/88	16,000	3,900	11	600	40		7.41	---
	2/7/89	---	---	---	---	---		NA	---
	5/12/89	2,500	ND	5.6	ND	2.7		6.64	---
	8/4/89	2,900	800	7.5	96	ND		7.38	---
	11/14/89	Destroyed in August 1989							
MW-4	7/14/87	BDL	BDL	BDL	---	BDL	8.48	7.25	---
	11/24/87	60	BDL	0.65	---	7.6		6.97	---
	2/29/88	BDL	BDL	BDL	---	BDL		6.54	---
	5/25/88	BDL	BDL	BDL	---	BDL		6.36	---
	8/10/88	---	---	---	---	---		NA	---
	11/29/88	ND	0.87	ND	ND	ND		6.85	---
	2/7/89	ND	ND	ND	ND	ND		6.26	---
	5/12/89	ND	ND	ND	ND	0.76		6.55	---
	8/4/89	---	---	---	---	---		NA	---
	11/14/89	---	---	---	---	---		---	---
2/22/90	ND	ND	ND	ND	ND	6.67	---		
MW-5	7/14/87	BDL	BDL	BDL	---	BDL	9.11	7.06	---
	11/24/87	BDL	BDL	BDL	---	7.2		7.24	---
	2/29/88	BDL	BDL	BDL	---	BDL		6.75	---
	5/25/88	---	---	---	---	---		---	---
	8/10/88	ND	ND	ND	ND	ND		7.35	---
	11/29/88	ND	ND	ND	ND	ND		---	---
	2/7/89	ND	ND	ND	ND	ND		7.02	---
	5/12/89	ND	ND	ND	ND	0.84		6.69	---
	8/4/89	ND	ND	ND	ND	ND		7.52	---
	11/14/89	ND	ND	ND	ND	ND		7.51	---

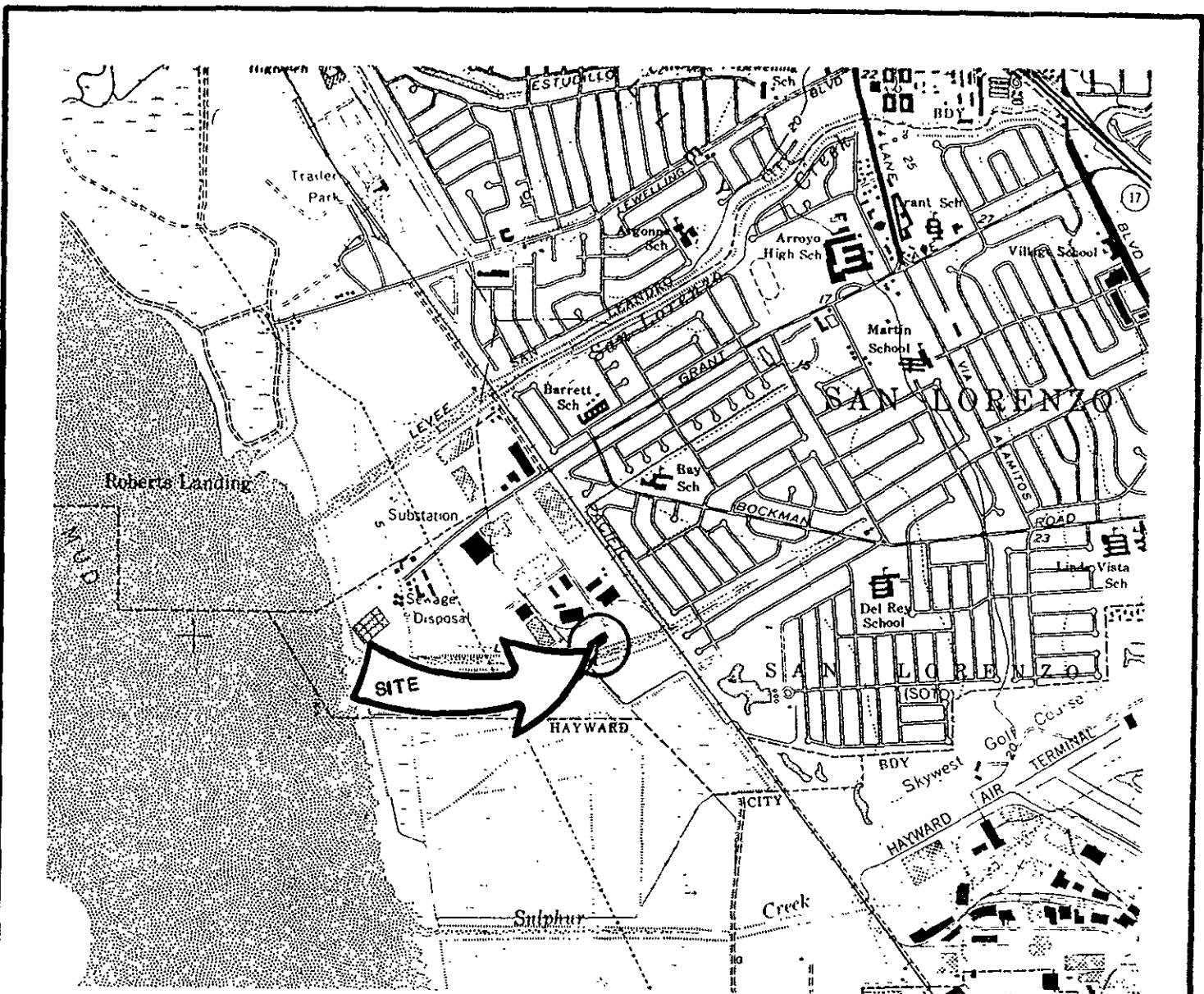
EnSCO Environmental Services, Inc.
 Project No. 1587-2G
 April 4, 1990

Crown Metal Manufacturing
 Pacific International Steel Facility
 San Lorenzo, CA

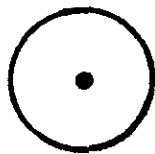
TABLE 1 (cont.)

Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl Benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft.)	Depth to Water (ft.)	Floating Product (ft.)
MW-5	1/3/90	---	---	---	---	---	9.11	7.42	---
(Cont.)	2/21/90	ND	ND	ND	ND	ND		6.85	---
MW-6	7/14/87	BDL	BDL	BDL	---	BDL	9.19	---	---
	11/24/87	---	---	---	---	---		---	---
	1/5/88	BDL	BDL	BDL	---	BDL		---	---
	2/29/88	BDL	BDL	BDL	---	BDL		7.19	---
	5/25/88	BDL	BDL	BDL	ND	BDL		7.33	---
	8/10/88	ND	ND	ND	ND	ND		7.50	---
	11/29/88	ND	ND	ND	ND	ND		7.93	---
	2/7/89	ND	ND	ND	ND	ND		7.56	---
	5/12/89	ND	ND	ND	ND	ND		7.16	---
	8/4/89	ND	ND	ND	ND	ND		7.94	---
	11/14/89	ND	ND	ND	ND	ND		8.92	---
	1/3/90	---	---	---	---	---		7.89	---
	2/21/90	ND	ND	ND	ND	ND		7.28	---
MW-7	1/3/90	---	---	---	---	---	8.41	8.06	---
	1/9/90	ND	ND	ND	ND	ND		8.42	---
	2/21/90	ND	ND	ND	ND	ND		6.63	---
RW-1	1/3/90	---	---	---	---	---	11.02	9.81	---
	1/9/90	1,300	150	15	100	170		9.75	---
	3/1/90	440	9.4	1.3	16	25		9.34	---
BB	1/9/90	ND	ND	ND	ND	ND	---	---	---

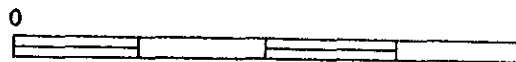
TPHG Total petroleum hydrocarbons as gasoline µg/l Micrograms per liter (parts-per-billion)
 ND Not detected at or above the method detection limit BB Bailer blank
 --- No data obtained



LEGEND



SITE LOCATION



SCALE IN MILES

USGS 7.5 MINUTE SAN LEANDRO QUADRANGLE 1980



ensco
environmental
services, Inc.

SITE LOCATION MAP

CROWN METAL MFG-PACIFIC INT'L STEEL

16525 WORTHLEY DRIVE

SAN LORENZO, CALIFORNIA

JOB #: 1587






SCALE:
1:24000

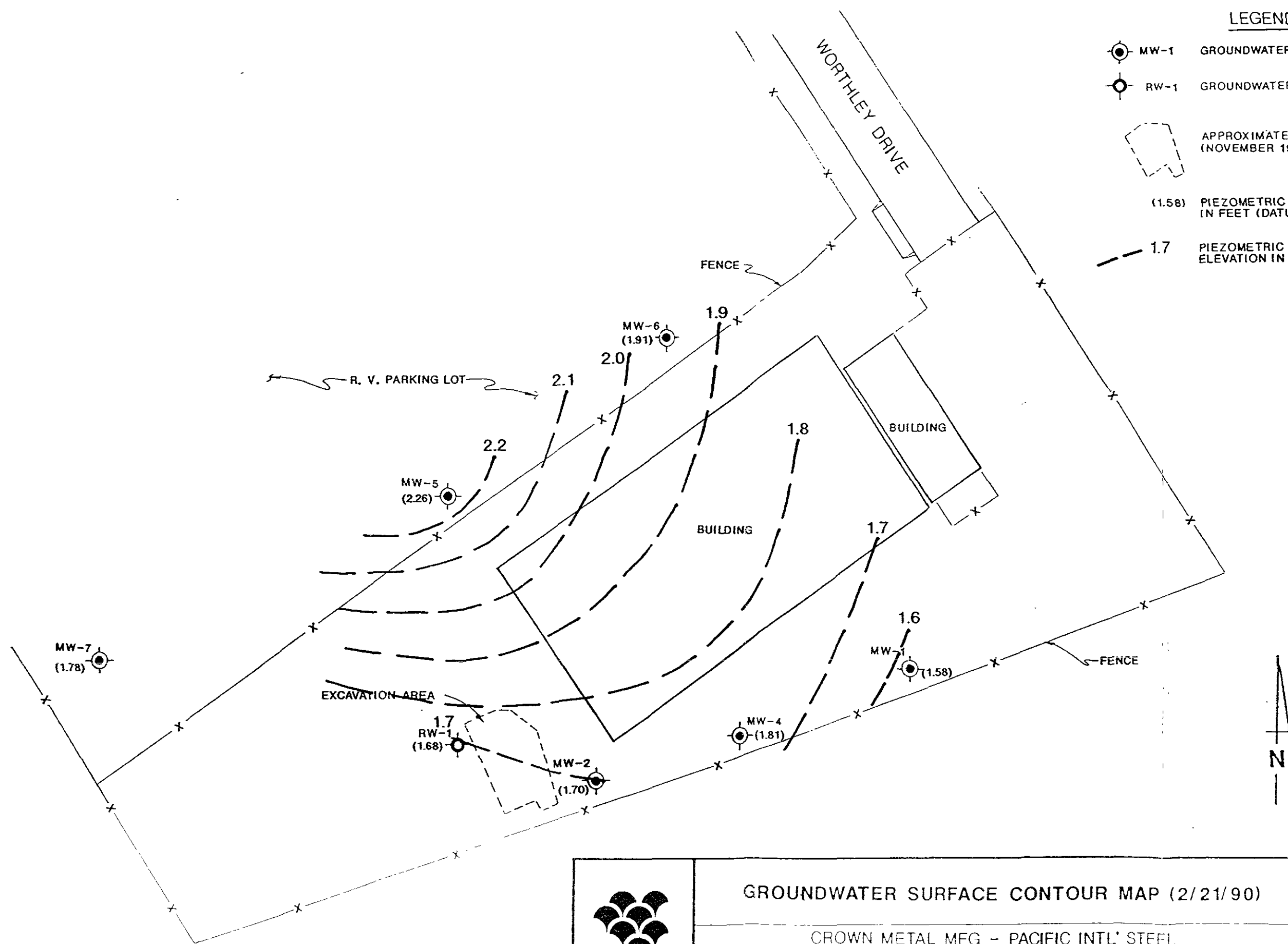
DATE:
6/6/87

DRAWN BY:

DRAWING #:
FIG. 1

LEGEND

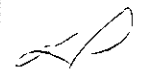
-  MW-1 GROUNDWATER MONITORING WELL
-  RW-1 GROUNDWATER RECOVERY WELL
-  APPROXIMATE BOUNDARY OF SOIL EXCAVATION (NOVEMBER 1988)
-  (1.58) PIEZOMETRIC GROUNDWATER SURFACE ELEVATION IN FEET (DATUM M.S.L.)
-  1.7 PIEZOMETRIC GROUNDWATER SURFACE CONTOUR ELEVATION IN FEET (DATUM M.S.L.)






GROUNDWATER SURFACE CONTOUR MAP (2/21/90)

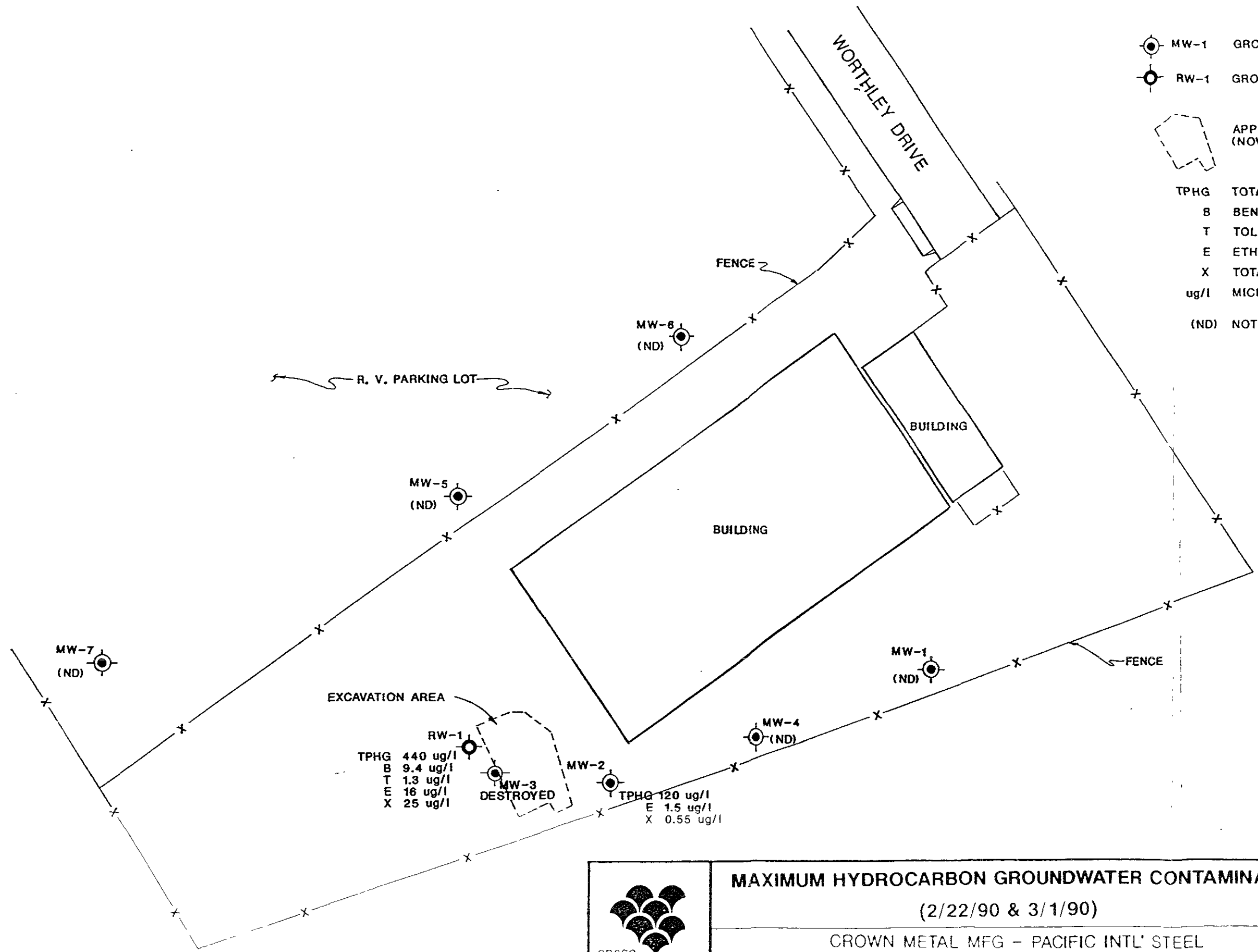
CROWN METAL MFG - PACIFIC INTL' STEEL

16525 WORTHLEY DRIVE
SAN LORENZO, CALIFORNIA

REVIEWED BY:	APPROVED BY:
BVT	
DESIGNED BY:	DATE:
JOB #:	DRAWN BY:
1587G	SLS
DATE:	DRAWING #:
1/4/90	FIG. 2

LEGEND

-  MW-1 GROUNDWATER MONITORING WELL
-  RW-1 GROUNDWATER RECOVERY WELL
-  APPROXIMATE BOUNDARY OF SOIL EXCAVATION (NOVEMBER 1988)
- TPHG TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- B BENZENE
- T TOLUENE
- E ETHYL BENZENE
- X TOTAL XYLENES
- ug/l MICROGRAMS PER LITER
- (ND) NOT DETECTED



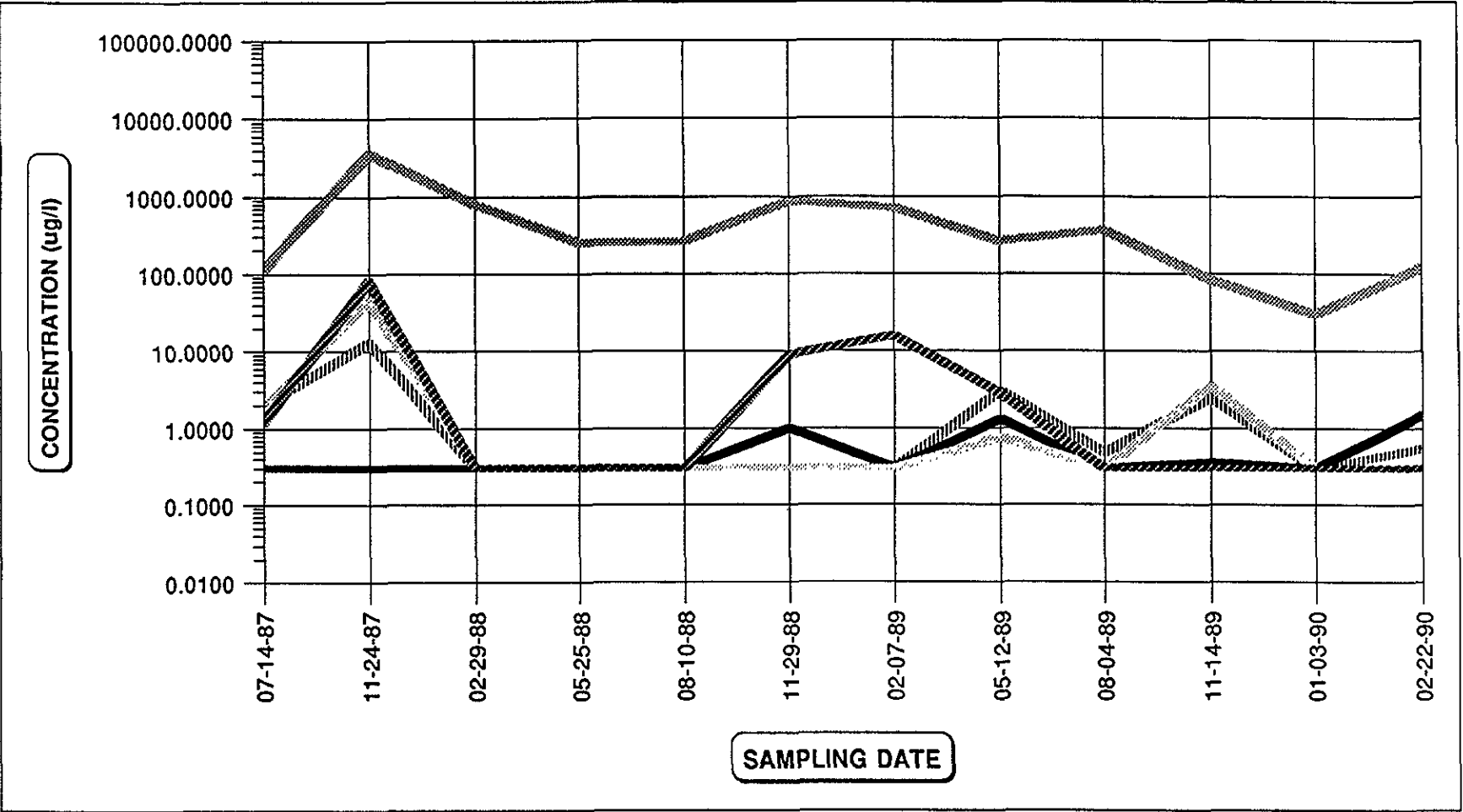
TPHG	440 ug/l
B	9.4 ug/l
T	1.3 ug/l
E	16 ug/l
X	25 ug/l

TPHG	120 ug/l
E	1.5 ug/l
X	0.55 ug/l



MAXIMUM HYDROCARBON GROUNDWATER CONTAMINATION MAP		
(2/22/90 & 3/1/90)		
CROWN METAL MFG - PACIFIC INTL' STEEL		DESIGNED BY: BVT
16525 WORTHLEY DRIVE		DATE: 4/10/90
SAN LORENZO, CALIFORNIA		DRAWN BY: SLS
		DRAWING #: FIG. 3

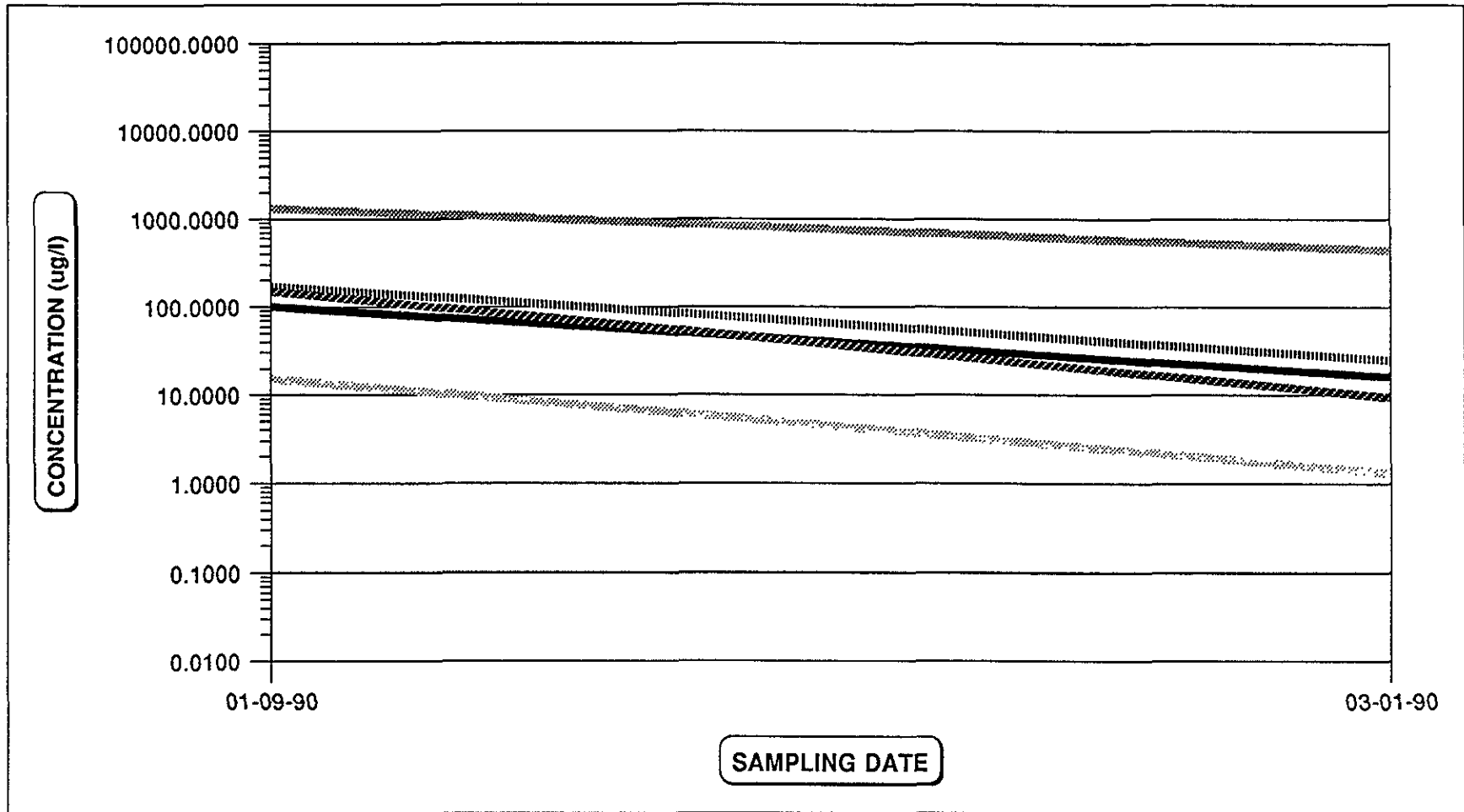
MW-2 GROUNDWATER ANALYSES DATA



TPHG
 BENZENE
 TOLUENE
 ETHYL BENZENE
 XYLENES

NOTE: Minimum value plotted is the laboratory detection or reporting limit. For analytical results, refer to appended laboratory reports.

RW-1 GROUNDWATER ANALYSES DATA



TPHG BENZENE TOLUENE ETHYL BENZENE XYLENES

NOTE: Minimum value plotted is the laboratory detection or reporting limit. For analytical results, refer to appended laboratory reports.

APPENDIX A

**GROUNDWATER SAMPLING PROTOCOL
AND
LABORATORY PROCEDURES**

ENSCO ENVIRONMENTAL SERVICES, INC.

GROUNDWATER SAMPLING PROTOCOL

GROUNDWATER SAMPLING PROTOCOL

Sampling of groundwater is performed by Ensco Environmental Services, Inc. (EES) sampling technicians. Summarized field sampling procedures are as follows:

1. Measurements of liquid surface in the well and depth of monitoring well.
2. Field check for presence of floating product.
3. Purge well prior to collecting samples.
4. Monitor groundwater for temperature, pH, and specific conductance during purging.
5. Collect samples using Environmental Protection Agency (EPA) approved sample collection devices, i.e., teflon or stainless steel bailers or pumps.
6. Transfer samples into laboratory-supplied EPA-approved containers.
7. Label samples and log onto chain-of-custody form.
8. Store samples in a chilled ice chest for shipment to a state-certified analytical laboratory.

GROUNDWATER SAMPLING PROCEDURES

Equipment Cleaning

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 well or groundwater is thoroughly cleaned with a trisodium phosphate (TSP) solution and rinsed with deionized or distilled water before use at the site. This cleaning procedure is followed between each well sampled. Wells are sampled in approximate order of increasing contamination. 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.

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, an optical interface probe is used to measure the hydrocarbon thickness and groundwater level. Measurements are collected and recorded to the nearest 0.01 foot.

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. Any observed film as well as odor and color of the water is 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 yield. In a high yield formation, samples will be collected when normal field measurement, including temperature, pH, and specific conductance stabilize, provided a minimum of three well-casing volumes of water have been removed. Field measurements will be taken after purging each well volume. In low yield formations, the well is purged such that the "standing" water is removed and the well is allowed to recharge. (Normal field measurements will be periodically recorded during the purging process.) In situations where recovery to 80% of static water level is estimated, or observed to exceed a two hour duration, a sample will be collected when sufficient volume is available for a sample for each parameter. At no time will the well be purged dry so that the recharge rate causes the formation water to cascade into the well.

In wells where free-phase hydrocarbons are detected, the free-phase portion will be bailed from the well and the volume removed recorded. A groundwater sample will be collected if bailing reduces the amount of free-phase hydrocarbons to the point where they are not present in the well. Well sampling will be conducted using one of the aforementioned methods depending on the formation yield. However, if free-phase hydrocarbons persist throughout bailing, then groundwater samples will not be collected.

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

ENSCO ENVIRONMENTAL SERVICES, INC.

LABORATORY PROCEDURES

LABORATORY PROCEDURES

Selection of the Laboratory

The laboratories selected to perform the analytical work are certified by the California State Department of Health Services as being qualified to perform the selected analyses. The selected laboratories are reviewed by Ensco Environmental Services, Inc. to ensure that they are certified by the State of California and maintain an adequate quality control program

Chain-of-Custody Control

The following procedures are used during sampling and analytical activities to provide chain-of-custody control during transfer of samples from collection through delivery to the laboratories. Record keeping activities used to achieve chain-of-custody control are:

- Contact made by sampling organization with facility supervisor and laboratory prior to sampling to alert them of dates of sampling and sample delivery.
- Well location map with well identification number(s) prominently displayed.
- Field log book for documenting sampling activities in the field.
- Labels for identifying individual samples.
- Chain-of-custody record for documenting transfer and possession of samples.
- Laboratory analysis request sheet for documenting analyses to be performed.

Field Filtration of Samples

Samplers will refrain from filtering TOC, TOX or other organic compound samples as the increased handling required may result in the loss of chemical constituents of interest. Allowing the samples to settle prior to analysis followed by decanting the sample is preferable to filtration of these substances. If filtration is necessary for the determination of extractable organic compounds, the filtration should be performed in the laboratory. It may be necessary to run parallel sets of filtered and unfiltered samples with standards to establish the recovery of hydrophobic compounds when sample must be filtered. All the materials' precautions used in the construction of the sampling train should be observed for filtration apparatus. Vacuum filtration of groundwater samples is not recommended.

Water samples for dissolved inorganic chemical constituents (e.g., metals, alkalinity and anionic species) will be filtered in the field.

Sample Containers

Sample containers vary with each type of analytical parameter. Selected container types and materials are non-reactive with the sample and the particular analytical parameter being tested. Appropriate containers for volatile organics are glass bottles of at least 40 milliliters in size fitted with teflon-faced silicon septa. Sample containers are properly cleaned and sterilized by the certified laboratory according to the EPA protocol for the individual analysis.

Sample Preservation and Shipment

Various preservatives are used by the certified laboratory to retard changes in samples. Sample shipment from Ensco Environmental Services to laboratories performing the selected analyses routinely occurs within 24 hours of sample collection.

Analytical Procedures

The analysis of groundwater samples is conducted in accordance with accepted quantitative analytical procedures. The following four publications are considered the primary references for groundwater sample analysis, and the contracts with the laboratories analyzing the samples stipulate that the methods set out in these publications be used. Please note that procedures used are periodically updated by federal and state agencies, and the certified laboratories amend analysis as required by the update.

- Standard Methods for the Examination of Water and Wastewater, 16th Ed., American Public Health Association, et al., 1985.
- Methods for Chemical Analysis of Water and Wastes, U.S. EPA, 600/4-79-020, March 1979.
- Test Methods for Evaluation of Solid Waste: Physical/Chemical Methods, U.S. EPA SW-846, 1982.
- Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA, 600/4-82-057, 1982.
- Practical Guide for Groundwater Sampling, EPA, 600/2-85/104, September 1985.
- RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, EPA, September 1986.

Analytical Methods

The analytical methods used by the selected laboratories are those required by the type of analysis (fuels, metals, etc.). These methods are those currently approved by the State Regional Water Quality Control Board.

APPENDIX B

**LABORATORY REPORTS
AND
CHAIN-OF-CUSTODY RECORD**



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Exceltech
41674 Christy Street
Fremont, CA 94538
Attention: Britt VonThaden

Client Project ID: 1587/Crown Metal
Matrix Descript: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 002-3542

Sampled: Feb 21-22, 1990
Received: Feb 26, 1990
Analyzed: Mar 1, 1990
Reported: Mar 9, 1990

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P.	Benzene	Toluene	Ethyl Benzene	Xylenes
		Hydrocarbons				
		$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)
0023542 A	MW-7	N.D.	N.D.	N.D.	N.D.	N.D.
0023543 A	MW-6	N.D.	N.D.	N.D.	N.D.	N.D.
0023544 A	MW-5	N.D.	N.D.	N.D.	N.D.	N.D.
0023545 A	MW-1	N.D.	N.D.	N.D.	N.D.	N.D.
0023546 A	MW-4	N.D.	N.D.	N.D.	N.D.	N.D.
0023547 A	MW-2	120	N.D.	N.D.	1.5	0.55


Detection Limits:	30	0.30	0.30	0.30	0.30
-------------------	----	------	------	------	------

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL


Vickie Tague
Project Manager

CHAIN OF CUSTODY RECORD

PROJECT NO: 1587		PROJECT NAME: Crown Metal / Granite Interment Site				TEST REQUESTED				P.O. # 17267		
SAMPLERS - (Signature) <i>James G. ...</i>										LAB Tucson, AZ		
										TURN AROUND TIME 1 hour		
										REMARKS		
NO.	DATE	TIME	STATION AND LOCATION		TRIG							
BB1	2-21-90	11:36	2 preserved VOA (HCL)									
mw 7	"	12:02	"		X							
mw 6	"	12:58	"		X							
mw 5	"	1:50	"		X							
mw 1	2-22-90	10:21	"		X							
mw 4	"	11:09	"		X							
mw 2	"	11:47	"		X							
mw 3					X							
RELINQUISHED BY: <i>Day R. ...</i> <i>James G. ...</i>					DATE: TIME: <i>March 1:00</i>		RECEIVED BY: <i>Joe L. ...</i>		RELINQUISHED BY:		DATE: TIME: RECEIVED BY:	
RELINQUISHED BY:					DATE: TIME:		RECEIVED BY:		RELINQUISHED BY:		DATE: TIME: RECEIVED BY:	
REMARKS:					 ensco environmental services, inc. 41674 Christy Street Fremont, C.A 94538-3114 (415) 653-0404 Fax (415) 651-4677 Copy to 415 550205							
REPORT TO: <i>Britt Von Thaden</i>												



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Exceltech	Client Project ID: #1587G, Crown Metal, PO #17308	Sampled: Mar 1, 1990
41674 Christy Street	Sample Descript.: Water, RW1	Received: Mar 1, 1990
Fremont, CA 94538	Analysis Method: EPA 5030/ 8015/8020	Analyzed: Mar 5, 1990
Attention: Britt Von Thaden	Lab Number: 003-0010 A-B	Reported: Mar 23, 1990

TOTAL PETROLEUM FUEL HYDROCARBONS WITH BTEX DISTINCTION (EPA 8015/8020)

Analyte	Detection Limit $\mu\text{g/L}$ (ppb)	Sample Results $\mu\text{g/L}$ (ppb)
Low to Medium Boiling Point Hydrocarbons	30	440
Benzene	0.30	0.4
Toluene	0.30	1.3
Ethyl Benzene	0.30	16
Xylenes	0.30	25

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager



SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Excelltech
41674 Christy Street
Fremont, CA 94538
Attention: Britt Von Thaden

Client Project ID: #1587G, Crown Metal, PO #17308
Sample Descript: Water
Analysis for: Total Dissolved Solids
First Sample #: 003-0009

Sampled: Mar 1, 1990
Received: Mar 1, 1990
Analyzed: Mar 7, 1990
Reported: Mar 23, 1990

LABORATORY ANALYSIS FOR: Total Dissolved Solids

Sample Number	Sample Description	Detection Limit mg/L	Sample Result mg/L
003-0009	MW2	1.0	45,000
003-0010	RW1	1.0	36,000

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL


Vickie Tague
Project Manager

