



**Crown METAL MFG. CO.**

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

July 5, 1989

Alemeda County  
Division of Environmental Health  
470 Twenty Seventh Street  
Room 324  
Oakland, CA 94612

Attention: Mr. Ariu Levi

RE: 16525 Worthley Drive  
San Lorenzo, California

Dear Mr. Levi:

Under advice of our consultant, Ensco Environmental Services Inc., enclosed you will find a copy of the May Quarterly Ground Water Sampling and Analysis for 16525 Worthley Drive.

I am forwarding a copy of this report for your file.

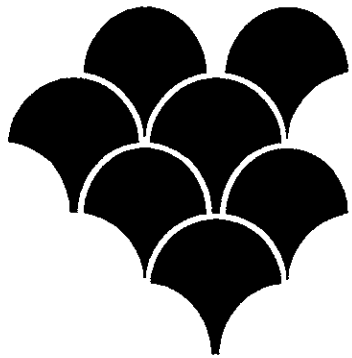
Regards,

Richard C. Ernest  
President

RCE/meb  
Enc.

cc: Ensco Environmental Services, Inc.  
Mr. Britt Von Thaden

ALAMEDA COUNTY  
DEPT. OF ENVIRONMENTAL HEALTH  
HAZARDOUS MATERIALS



**ensco**  
**environmental**  
**services, inc.**

**CROWN METAL MANUFACTURING  
MAY QUARTERLY  
GROUNDWATER  
SAMPLING AND ANALYSIS**

**FOR**

**PACIFIC INTERNATIONAL STEEL  
16525 WORTHLEY DRIVE  
SAN LORENZO, CALIFORNIA**

**Project No. 1587G  
June 1989**



a subsidiary of environmental system company

June 26, 1989

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

Attention: Mr. Richard C. Ernest

Subject: May Quarterly Groundwater Sampling and Laboratory Analysis  
Pacific International Steel Facility, San Lorenzo, California  
EES Project No. 1587G

Dear Mr. Ernest:

This comprehensive report presents the results of the May monthly 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

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

BVT/LDP/sw

4 cc: enclosed

1 cc: Mr. James Lewis, Pacific International Steel

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**CROWN METAL MANUFACTURING  
MAY QUARTERLY  
GROUNDWATER SAMPLING AND ANALYSIS**

**FOR**

**PACIFIC INTERNATIONAL STEEL  
16525 WORTHLEY DRIVE  
SAN LORENZO, CALIFORNIA**

**INTRODUCTION**

EnSCO Environmental Services, Inc. (EES) has completed the May 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 were collected on May 12, 1989. 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 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 (TPH) as well as benzene, toluene, ethyl benzene, and total xylenes (BTEX).

### **SITE BACKGROUND**

The site was formerly occupied by an aircraft engine facility. Its operations included the use of underground fuel storage tanks which were removed because of suspected leakage.

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 study (SGS) to further delineate the soil contamination. The SGS revealed two contamination "hot spot" areas. EES conducted soil sampling in August 1988, to confirm the "hot spot" areas. Laboratory analyses of the samples validated 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, which remains open, is approximately 40 x 40 x 10 feet.

### **FIELD OPERATIONS**

Before sampling, EES measured the depth to groundwater in all of the wells. In addition, each well was checked for the presence of free-floating product using a clear acrylic bailer: none was detected. Groundwater samples were then collected from each well following the procedures outlined in our groundwater sampling protocol (Appendix A).

### HYDROGEOLOGY

The groundwater elevation map presented in Figure 2 generally indicates that the surface of the shallow aquifer is nearly flat and flows toward the south and east. There appears to be a slight groundwater high located between monitoring wells MW-4 and MW-5 which directs the flow toward the east in the eastern portion of the site and toward the south in the southern portion of the site. The groundwater flow direction is different from previous quarterly reports and may be influenced by the excavation. The groundwater elevations in the wells on site have risen slightly since the last quarterly report.

### LABORATORY RESULTS

The results of the laboratory analyses of the groundwater samples collected for this report revealed that five of the six wells sampled contain hydrocarbon contamination. TPH and BTEX were not detected (ND) in well MW-6. TPH was detected at concentrations of 2,500 parts per billion (ppb) in MW-3 and 260 ppb in MW-2. According to the laboratory, the hydrocarbon contamination from well MW-3 did not appear to be from gasoline. The laboratory stated that the concentration peak arrived before a gasoline peak and that the compound was not distinguishable through the TPH/BTEX scan.

Benzene was detected at concentrations of 2.8 ppb in MW-2 and 1.4 ppb in MW-1. Toluene, ethyl benzene and/or xylenes were detected at trace concentrations in all wells except MW-1 and MW-6. EES' laboratory procedure protocol is attached as Appendix B. The complete report from Sequoia Analytical Laboratory is in Appendix C, and the cumulative data for all sampling conducted at the site is presented in Table 1.

### **DISCUSSION**

The results of the sampling and analyses revealed that contaminant concentrations have decreased in monitoring wells MW-2 and MW-3 since the last quarterly report was issued. Groundwater will be monitored at the site to determine whether the soil excavation program will reduce the contaminant levels in the groundwater. Because MW-3 was covered by the excavated soil, it was not sampled for the previous quarterly report. MW-3 is now accessible which allowed it to be sampled for this quarterly report.

The benzene concentrations detected at wells MW-2 (2.8 ppb) and MW-1 (1.4 ppm) exceed the current State of California Department of Health Services (DHS) drinking water standard of 1.0 ppb.

Trace concentrations of xylenes were detected in all wells except MW-1 and MW-6. The concentrations of these compounds were well below the DHS maximum contaminant levels for drinking water. For wells MW-4 and MW-5, the occurrence of xylene appears anomalous, as it is the only compound detected, and had not been detected during previous sampling and analyses of these wells since November, 1987. Current and past data from wells which contain concentrations of hydrocarbons are shown by means of graphical representation in Figures 5 through 9.

### **CONCLUSIONS AND RECOMMENDATIONS**

1. Groundwater elevations at the site were measured at approximate elevations of 1.63 to 2.42 feet above mean sea level for the current report. Groundwater contours developed from these data show a nearly flat gradient with apparent easterly and southerly flow components. The gradient appears to have been modified by the excavation of soil in the vicinity of MW-3 in November, 1988.



2. Comparisons with the previous sampling and analysis report indicate that TPH and BTEX concentrations have remained ND at monitoring well MW-6. Concentrations of benzene decreased in wells MW-2 and MW-3, but was detected for the first time in MW-1 at 1.4 ppb. Xylenes were detected at low concentrations in wells MW-4 and MW-5 for the first time since November 1987. The remainder of the chemical constituents detected in the wells did not change significantly from previous reported values.
3. No free-floating product was noted in any of the six monitoring wells sampled.
4. Benzene concentrations detected at MW-1 and MW-2 exceed the DHS current maximum contaminant level of 1.0 ppb in drinking water.
5. EES recommends that Crown Metal continue quarterly groundwater monitoring and sampling to document groundwater flow direction and hydrocarbon plume concentrations. The next quarterly sampling is scheduled for August, 1989.

### REPORTING REQUIREMENTS

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

California Regional Water Quality  
Control Board  
San Francisco Bay Region  
1111 Jackson Street  
Oakland, California 94607  
Attn: Ms. Lisa McCann

Alameda County  
Division of Environmental Health  
470 27th Street, Room 324  
Oakland, California 94612  
Attn: Mr. Ariu Levi

### REFERENCE

Exceltech, 1987, "Soil and Groundwater Investigation" unpublished report for Crown Metals Manufacturing.

### 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. Referenced Document.
4. 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 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 analyses are performed according to procedures suggested by the U.S. EPA and State of California. EES is not responsible for laboratory errors in procedure or result reporting.

TABLE 1  
GROUNDWATER ANALYSES DATA

| WELL | DATE     | TVH<br>(ppb) | BENZENE<br>(ppb) | TOLUENE<br>(ppb) | ETHYL BENZENE<br>(ppb) | XYLENES<br>(ppb) | WELL ELEV.<br>(ft.) | DEPTH TO<br>WATER (ft.) | FLOATING<br>PRODUCT (ft.) |
|------|----------|--------------|------------------|------------------|------------------------|------------------|---------------------|-------------------------|---------------------------|
| MW-1 | 7/14/87  | BDL          | BDL              | BDL              | ---                    | BDL              | 8.86                | 7.56                    | ---                       |
|      | 11/24/87 | BDL          | BDL              | BDL              | ---                    | 9                |                     | 7.51                    | ---                       |
|      | 2/29/88  | BDL          | BDL              | BDL              | ---                    | BDL              |                     | 7.18                    | ---                       |
|      | 5/25/88  | BDL          | BDL              | BDL              | ---                    | BDL              |                     | 7.4                     | ---                       |
|      | 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                    | ---                       |
| MW-2 | 7/14/87  | 110          | 1.2              | 1.9              | ---                    | 2                | 9.17                | 7.79                    | ---                       |
|      | 11/24/87 | 3600         | 82               | 47               | ---                    | 13               |                     | 7.73                    | ---                       |
|      | 2/29/88  | 800          | BDL              | BDL              | ---                    | BDL              |                     | 7.26                    | ---                       |
|      | 5/25/88  | 250          | NA               | NA               | ---                    | NA               |                     | 7.45                    | ---                       |
|      | 8/10/88  | 260          | ND               | ND               | ND                     | ND               |                     | 7.9                     | ---                       |
|      | 11/29/88 | 870          | 9                | ND               | 1                      | 1                |                     | 8.2                     | ---                       |
|      | 2/7/89   | 710          | 16               | ND               | ND                     | ND               |                     | 7.47                    | ---                       |
|      | 5/12/89  | 260          | 2.8              | 0.76             | 1.3                    | 3                |                     | 7.27                    | ---                       |
| MW-3 | 7/14/87  | 260          | BDL              | 1                | ---                    | 2                | 8.54                | 7.09                    | ---                       |
|      | 11/24/87 | 8900         | 1700             | 3                | ---                    | 12               |                     | 7.11                    | ---                       |
|      | 2/29/88  | 9300         | 1600             | 93               | ---                    | 99               |                     | 6.57                    | ---                       |
|      | 5/25/88  | 11000        | 140              | 16               | ---                    | 34               |                     | 6.8                     | ---                       |
|      | 8/10/88  | 4600         | 23               | 4.8              | 140                    | 3                |                     | 7.2                     | ---                       |
|      | 11/29/88 | 16000        | 3900             | 11               | 600                    | 40               |                     | 7.41                    | ---                       |
|      | 2/7/89   | NA           | NA               | NA               | NA                     | NA               |                     | NA                      | NA                        |
|      | 5/12/89  | 2500         | ND               | 5.6              | ND                     | 2.7              |                     | 6.64                    | ---                       |
| MW-4 | 7/14/87  | BDL          | BDL              | BDL              | ---                    | BDL              | 8.84                | 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           | NA               | NA               | ND                     | NA               |                     | NA                      | ---                       |
|      | 11/29/88 | ND           | 0.9              | NA               | ND                     | NA               |                     | 6.85                    | ---                       |
|      | 2/7/89   | ND           | ND               | ND               | ND                     | ND               |                     | 6.26                    | ---                       |
|      | 5/12/89  | ND           | ND               | ND               | ND                     | 0.76             |                     | 6.55                    | ---                       |

**TABLE 1 (CONT.)  
GROUNDWATER ANALYSES DATA**

| WELL    | DATE     | TVH<br>(ppb) | BENZENE<br>(ppb) | TOLUENE<br>(ppb) | ETHYL BENZENE<br>(ppb) | XYLENES<br>(ppb) | WELL ELEV.<br>(ft.) | DEPTH TO<br>WATER (ft.) | FLOATING<br>PRODUCT (ft.) |
|---------|----------|--------------|------------------|------------------|------------------------|------------------|---------------------|-------------------------|---------------------------|
| MW-5    | 7/14/87  | BDL          | BDL              | BDL              | ---                    | BDL              | 9.11                | 7.06                    | ---                       |
|         | 11/24/87 | BDL          | BDL              | BDL              | ---                    | 7                |                     | 7.24                    | ---                       |
|         | 2/29/88  | BDL          | BDL              | BDL              | ---                    | BDL              |                     | 6.75                    | ---                       |
|         | 5/25/88  | NA           | NA               | NA               | ---                    | NA               |                     | ---                     | ---                       |
|         | 8/10/88  | NA           | NA               | NA               | ND                     | NA               |                     | 7.35                    | ---                       |
|         | 11/29/88 | NA           | NA               | NA               | NA                     | NA               |                     | NA                      | ---                       |
|         | 2/7/89   | ND           | ND               | ND               | ND                     | ND               |                     | 7.02                    | ---                       |
|         | 5/12/89  | ND           | ND               | ND               | ND                     | 0.84             |                     | 6.69                    | ---                       |
| 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              | ---                    | BDL              |                     | 7.33                    | ---                       |
|         | 8/10/88  | ND           | ND               | ND               | ND                     | ND               |                     | NA                      | ---                       |
|         | 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             | ---                 |                         |                           |

TVH = Total Volatile Hydrocarbons as Gasoline

ppb = parts per billion

BDL = Below Detection Limit

NA = Not Analyzed

ND = Not Detected

NR = Not Reported

Note: For detection limits, refer to laboratory reports

**Current Department of Health Services Drinking Water Standards**

Benzene 1.0 ppb (MCL)

Toluene 100 ppb (AL)

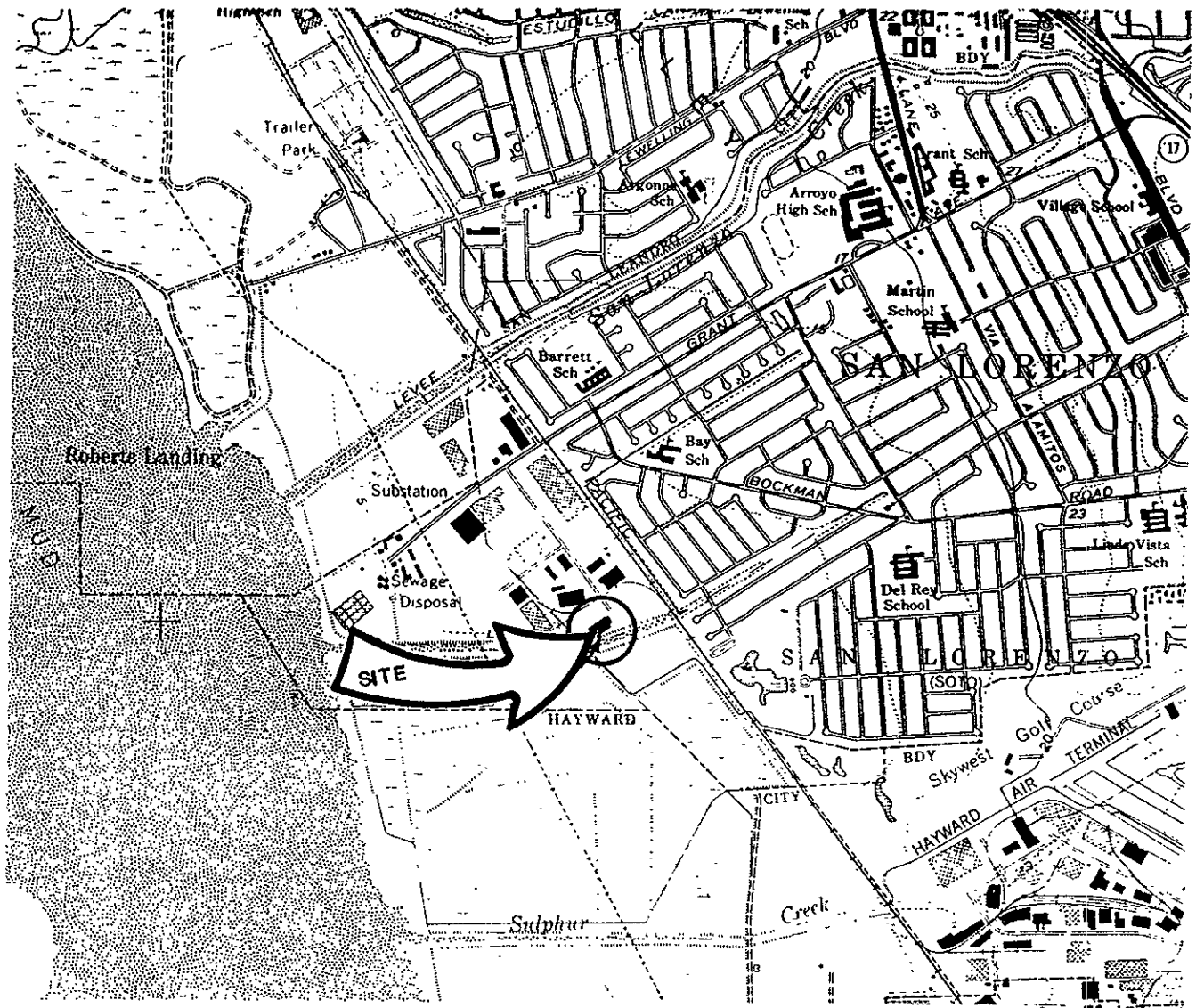
Ethyl Benzene 680 ppb (MCL)

Xylenes 1750 ppb (MCL)

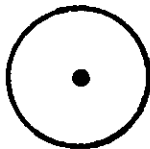
Note: Subject to change as reviewed by Department of Health Services

MCL = Maximum contaminant level

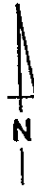
AL = Action Level



**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

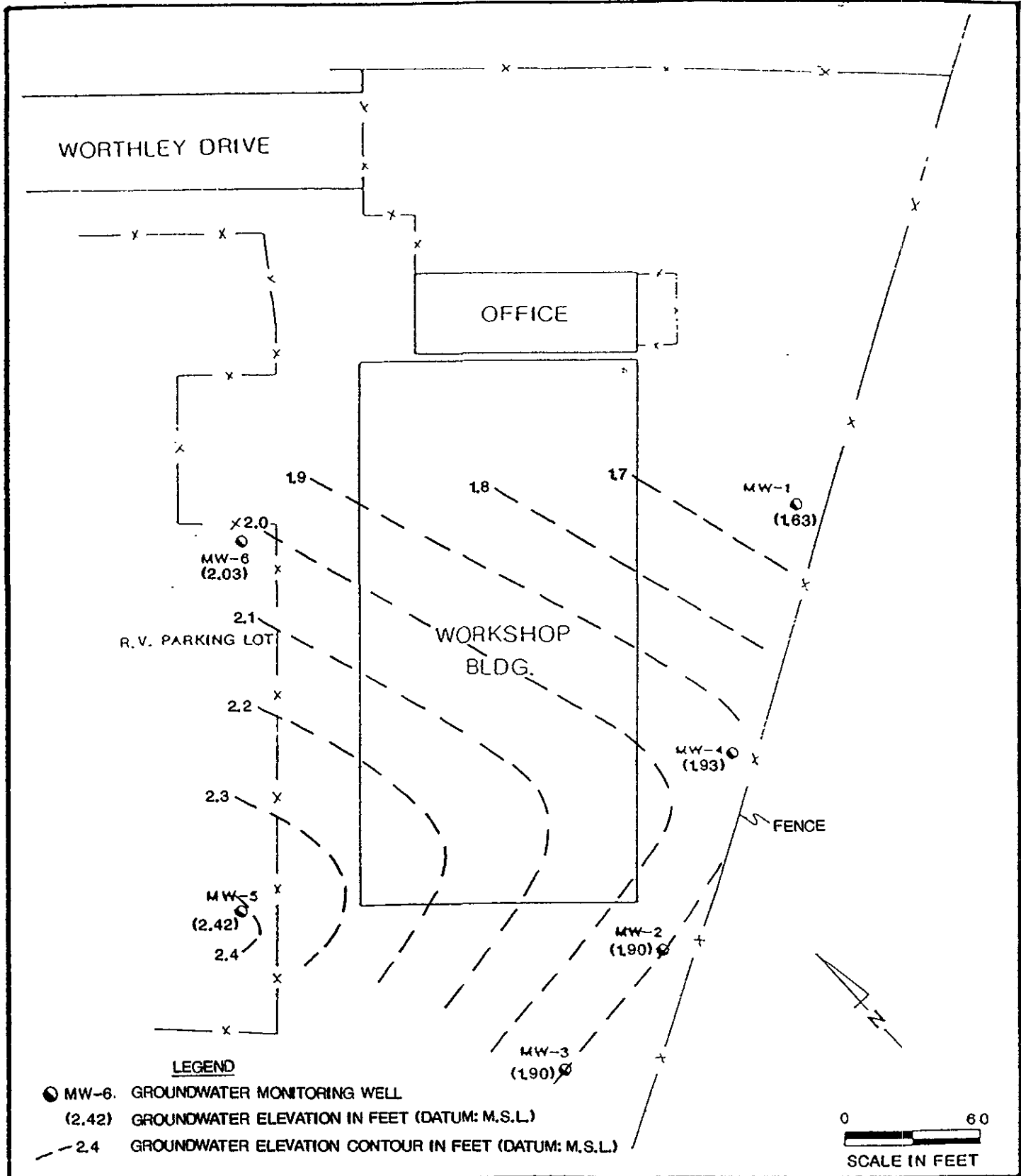
JOB #: 1587

SCALE:  
1:24000

DATE:  
6/6/87

DRAWN BY:

DRAWING #:  
FIG. 1



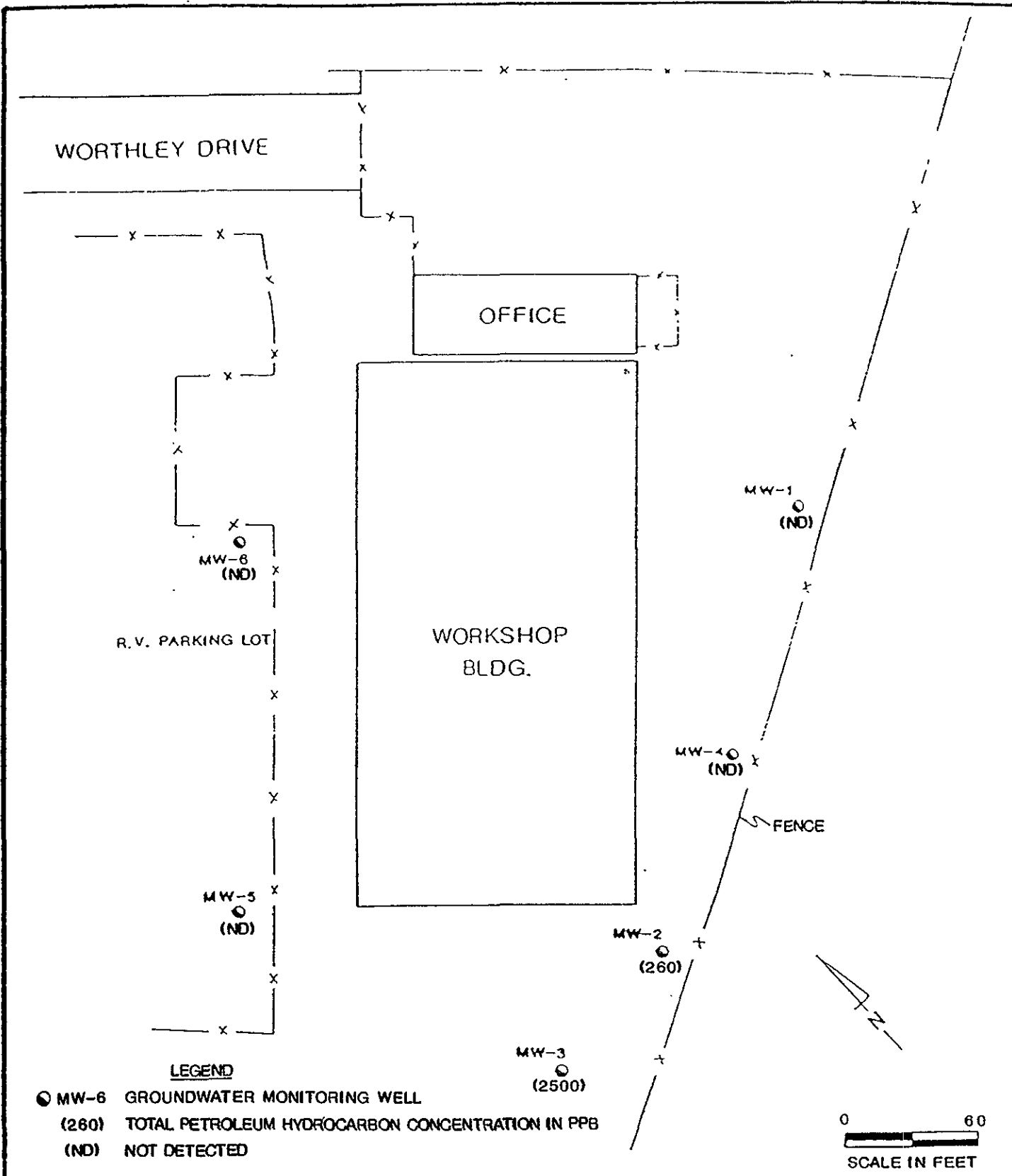
**LEGEND**


- MW-6. GROUNDWATER MONITORING WELL
- (2.42) GROUNDWATER ELEVATION IN FEET (DATUM: M.S.L.)
- - - 2.4 GROUNDWATER ELEVATION CONTOUR IN FEET (DATUM: M.S.L.)

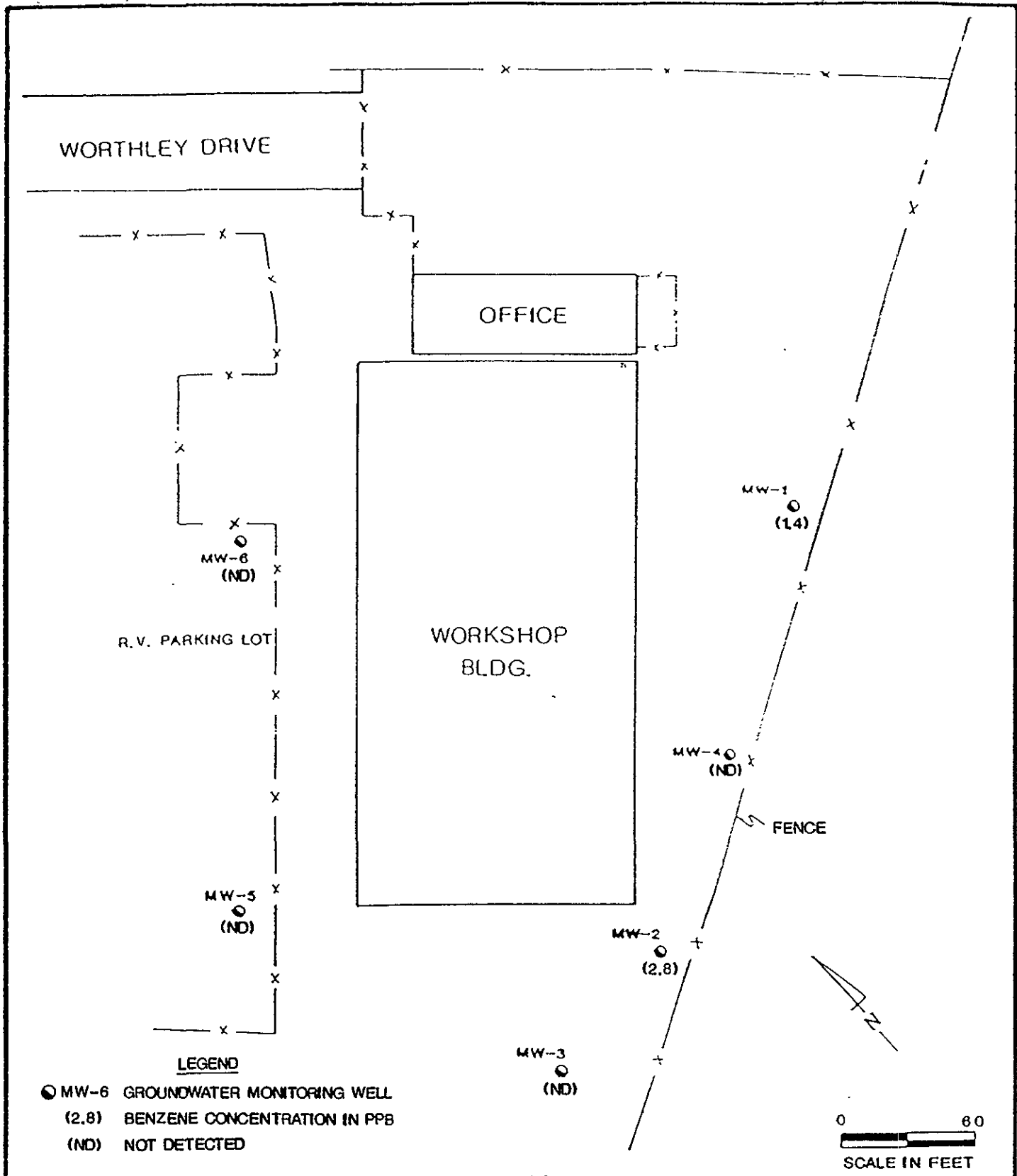


**GROUNDWATER ELEVATION MAP (5/12/89)**

|                                       |  |                  |                     |
|---------------------------------------|--|------------------|---------------------|
| CROWN METAL MFG - PACIFIC INTL' STEEL |  | REVIEWED BY.     | APPROVED BY.        |
| 16525 WORTHLEY DRIVE                  |  | JCH<br>1587G     | DRAWN BY<br>S.S.    |
| SAN LORENZO, CALIFORNIA               |  | DATE:<br>6/15/89 | DRAWING #<br>FIG. 2 |



|   |  |  |             |             |
|---|--|--|-------------|-------------|
|  | <b>HYDROCARBON CONCENTRATION MAP (5/12/89)</b> |  |             |             |
|   | CROWN METAL MFG - PACIFIC INTL' STEEL          |  | REVIEWED BY | APPROVED BY |
|   | 16525 WORTHLEY DRIVE                           |  | API #       | DRAWN BY    |
|   | SAN LORENZO, CALIFORNIA                        |  | DATE        | DRAWING #   |
|   |  |  | 1587G       | S.S.        |
|   |  |  | 6/15/89     | FIG. 3      |



### BENZENE CONCENTRATION MAP (5/12/89)



CROWN METAL MFG - PACIFIC INTL' STEEL

16525 WORTHLEY DRIVE

SAN LORENZO, CALIFORNIA

REVIEWED BY:

1587G

DATE  
6/15/89

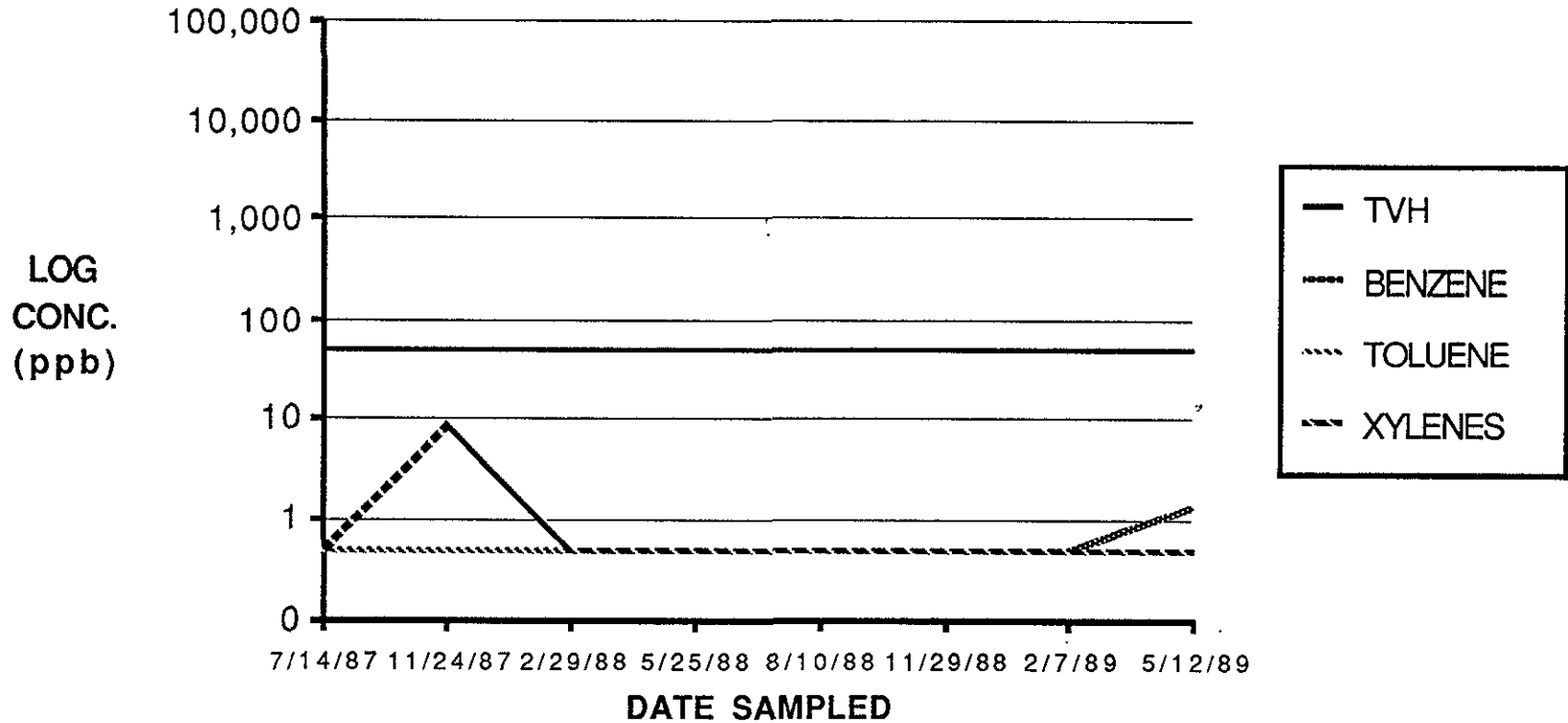
APPROVED BY:

DRAWN BY  
S.S.

DRAWING #  
FIG. 4



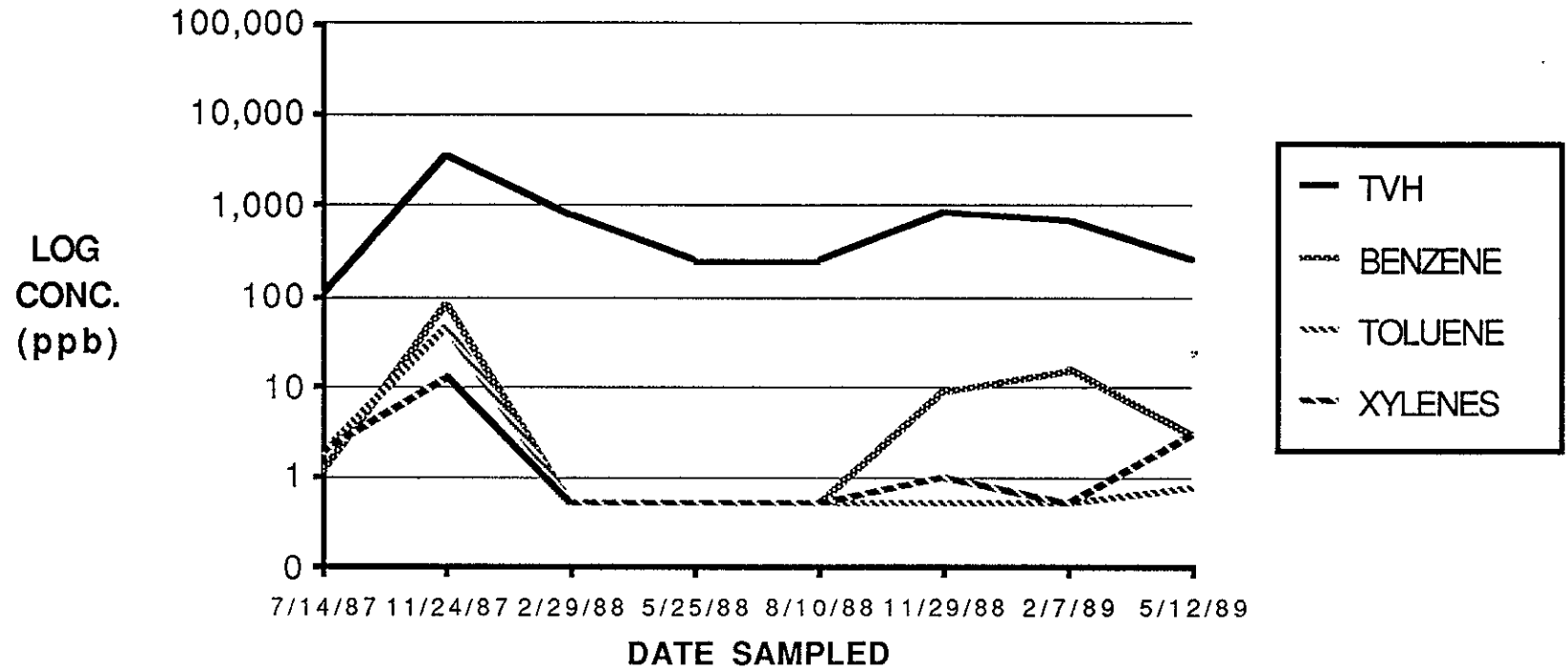
### MW-1 GROUNDWATER ANALYSES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 5

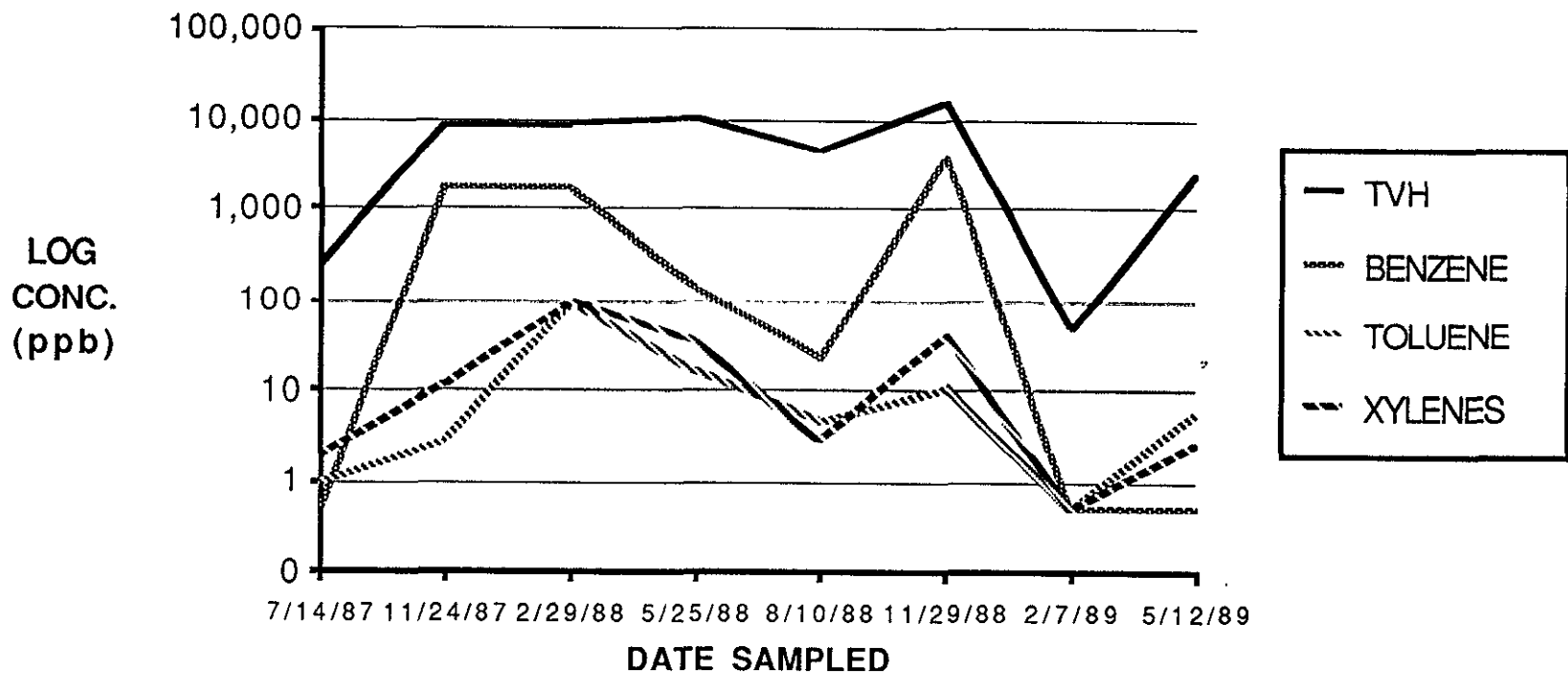
### MW-2 GROUNDWATER ANALYSES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 6

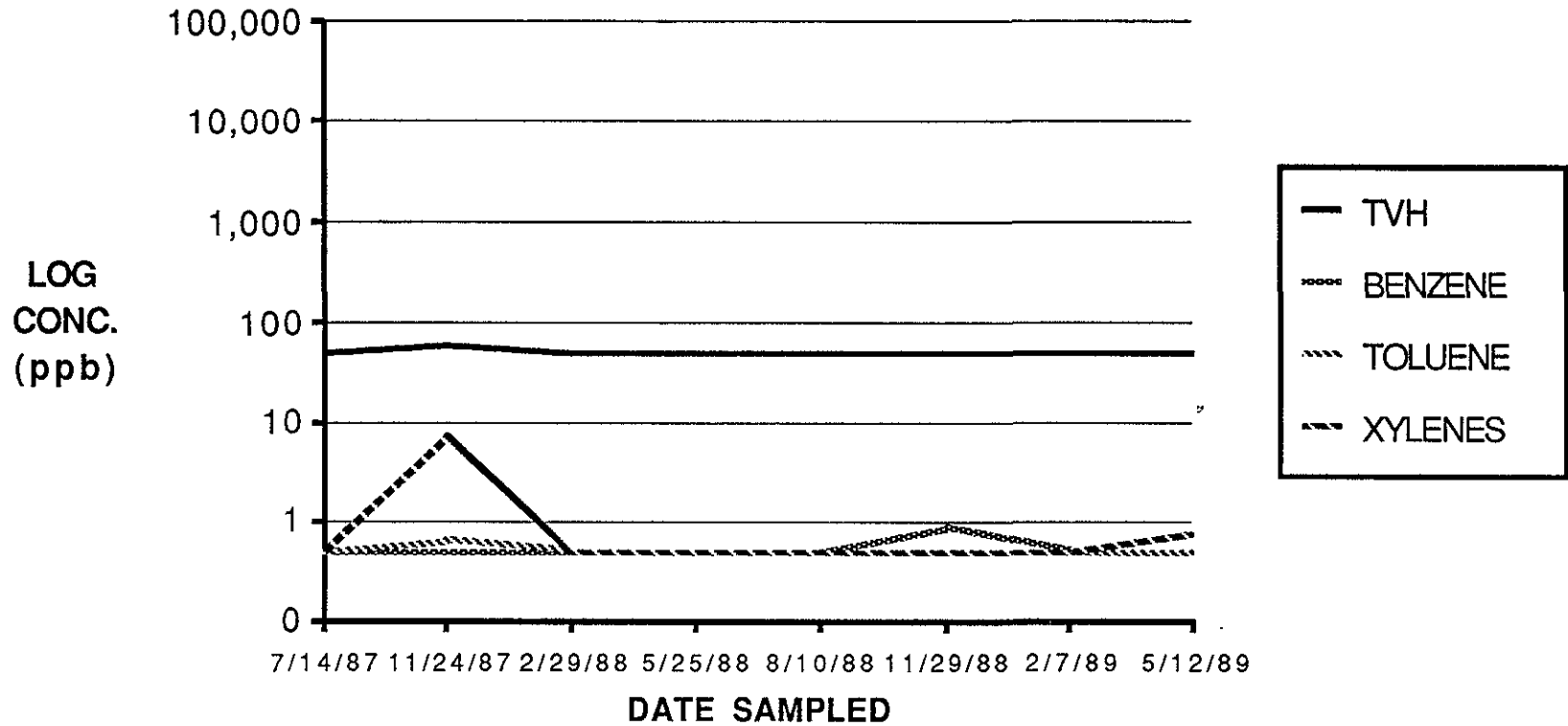
### MW-3 GROUNDWATER ANALYSES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 7

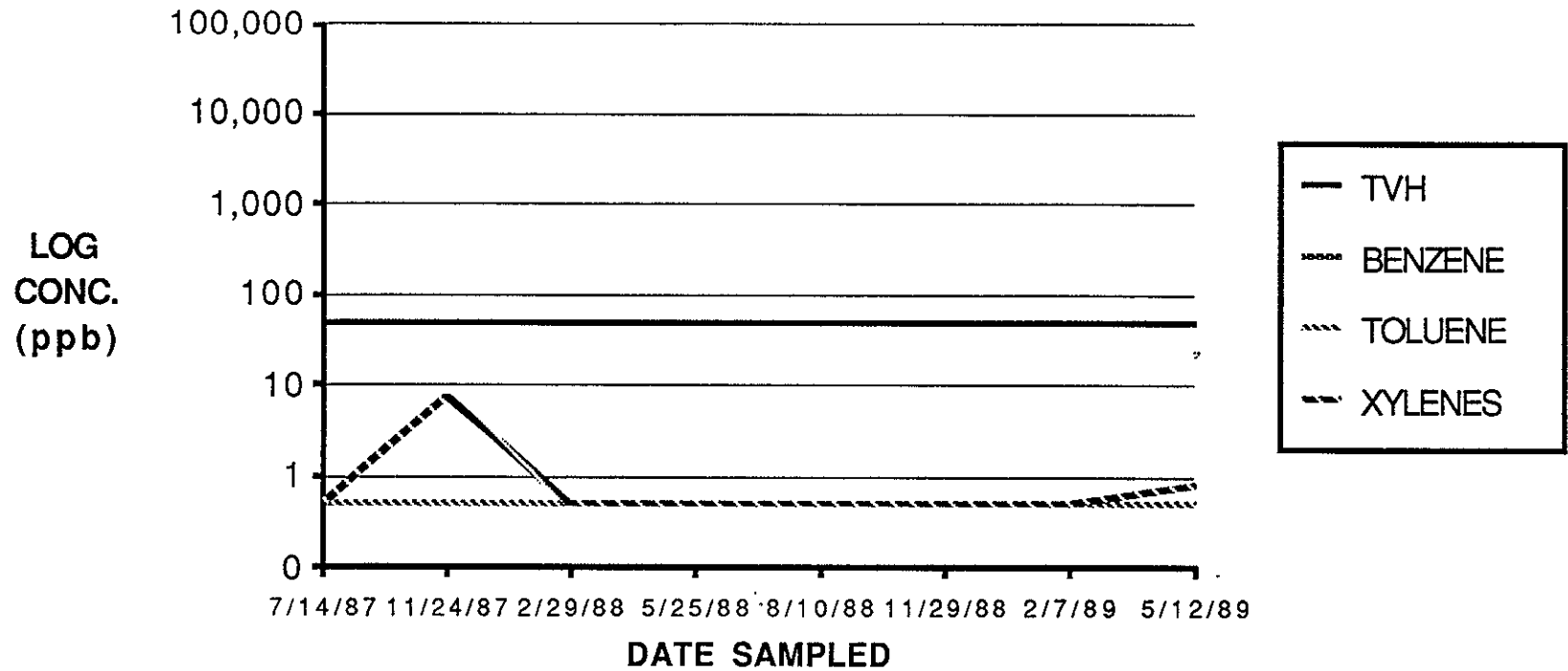
### MW-4 GROUNDWATER ANALYSES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 8

### MW-5 GROUNDWATER ANALYSES DATA



NOTE: Graphed results may display higher laboratory equipment detection or reporting limits. For exact analytical results, refer to appended laboratory reports.

Figure # 9

**APPENDIX A**

**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.

**APPENDIX B**

**LABORATORY PROCEDURES PROTOCOL**

# 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 C**

**LABORATORY REPORTS  
CHAIN-OF-CUSTODY FORMS**



# SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063  
(415) 364-9800 • FAX (415) 364-9233

|                              |  |                        |
|------------------------------|--|------------------------|
| EnSCO Environmental Services | Client Project ID: #1587G, Crown Metals, PO #13523 | Sampled: May 12, 1989  |
| 41874 Christy Street         | Matrix Descript: Water                             | Received: May 15, 1989 |
| Fremont, CA 94538            | Analysis Method: EPA 5030/8015/8020                | Analyzed: May 26, 1989 |
| Attention: Gary Mulkey       | First Sample #: 905-1720                           | Reported: May 31, 1989 |

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

| Sample Number | Sample Description | Low/Medium B.P. Hydrocarbons | Benzene               | Toluene               | Ethyl Benzene         | Xylenes               |
|---------------|--------------------|------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|               |                    | $\mu\text{g/L}$ (ppb)        | $\mu\text{g/L}$ (ppb) | $\mu\text{g/L}$ (ppb) | $\mu\text{g/L}$ (ppb) | $\mu\text{g/L}$ (ppb) |
| 905-1720      | MW-1               | N.D.                         | 1.4                   | N.D.                  | N.D.                  | N.D.                  |
| 905-1721      | MW-2               | 260                          | 2.8                   | 0.76                  | 1.3                   | 3.0                   |
| 905-1722      | MW-3               | 2500*                        | N.D.                  | 5.6                   | N.D.                  | 2.7                   |
| 905-1723      | MW-4               | N.D.                         | N.D.                  | N.D.                  | N.D.                  | 0.76                  |
| 905-1724      | MW-5               | N.D.                         | N.D.                  | N.D.                  | N.D.                  | 0.84                  |
| 905-1725      | MW-6               | N.D.                         | N.D.                  | N.D.                  | N.D.                  | N.D.                  |

### Detection Limits:

|      |     |     |     |     |
|------|-----|-----|-----|-----|
| 30.0 | 0.3 | 0.3 | 0.3 | 0.3 |
|------|-----|-----|-----|-----|

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

Arthur G. Burton  
Laboratory Director

### Please Note:

\* This result does not appear to be due to Gasoline.

Sequoia

CHAIN OF CUSTODY RECORD


P.O. # 13523

| PROJECT NO<br>1587 G                  |         | PROJECT NAME<br>Crown Metals |       |      |                      | TEST REQUESTED |  |  |  |   |  |  |  |  |  | REMARKS<br>Normal<br>T.A.T. |  |  |                     |
|---------------------------------------|---------|------------------------------|-------|------|----------------------|----------------|--|--|--|---|--|--|--|--|--|-----------------------------|--|--|---------------------|
| SAMPLERS: (Signature)<br>Cyndi Stroth |         |                              |       |      |                      | TMA-BTX        |  |  |  |   |  |  |  |  |  |                             |  |  |                     |
| NO                                    | DATE    | TIME                         | DRIVE | GRAB | STATION AND LOCATION |                |  |  |  |   |  |  |  |  |  |                             |  |  |                     |
| MW-1                                  | 5/12/89 | 11:25                        |       |      | 2 preserved vials    |                |  |  |  | X |  |  |  |  |  |                             |  |  |                     |
| MW-2                                  | "       | 12:26                        |       |      | " " "                |                |  |  |  | X |  |  |  |  |  |                             |  |  |                     |
| MW-4                                  |         | 1:14                         |       |      | " " "                |                |  |  |  | X |  |  |  |  |  |                             |  |  |                     |
| MW-5                                  |         | 2:05                         |       |      | " " "                |                |  |  |  | X |  |  |  |  |  |                             |  |  |                     |
| MW-6                                  |         | 2:40                         |       |      | " " "                |                |  |  |  | X |  |  |  |  |  |                             |  |  |                     |
| MW-3                                  |         | 3:42                         |       |      | " " "                |                |  |  |  | X |  |  |  |  |  |                             |  |  |                     |
| BB-1                                  |         | 10:00                        |       |      |                      |                |  |  |  | X |  |  |  |  |  |                             |  |  | hold unless request |

|                                 |      |      |             |                 |      |      |             |
|---------------------------------|------|------|-------------|-----------------|------|------|-------------|
| RELINQUISHED BY<br>Cyndi Stroth | DATE | TIME | RECEIVED BY | RELINQUISHED BY | DATE | TIME | RECEIVED BY |
| RELINQUISHED BY                 | DATE | TIME | RECEIVED BY | RELINQUISHED BY | DATE | TIME | RECEIVED BY |
|                                 |      |      |             |                 | 5-15 | 3:40 | Pat Coe     |

REMARKS report to Gary Mulkey

DISTRIBUTION



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