# FEBRUARY 1993 QUARTERLY GROUNDWATER MONITORING REPORT AT PACIFIC INTERNATIONAL STEEL FACILITY

## FOR

## CROWN METAL MANUFACTURING
## 765 SOUTH STATE ROUTE 83
## ELMHURST, ILLINOIS

**Project No. F1587.33**
**April 1993**

RESNA
42501 Albrae Street
Fremont, California 94538
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RESNA
Working To Restore Nature

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April 5, 1993
Project No. F1587.33

Crown Metal Manufacturing
765 South State Route 83
Elmhurst, IL 60126-4700

Attention: Mr. Richard C. Ernest

Subject: February 1993 Quarterly Groundwater Monitoring Report
Pacific International Steel Facility
16525 Worthley Drive, San Lorenzo, California

Dear Mr. Ernest:

At the request of Crown Metal Manufacturing, RESNA Industries Inc. (RESNA) has completed the February quarterly groundwater monitoring at the subject site in the City of San Lorenzo, Alameda County, California (see Plate 1). Quarterly groundwater sampling of monitoring wells MW-2 and MW-8 was conducted on February 24, 1993, as part of the ongoing quarterly monitoring program. During this quarterly monitoring event, water level measurements were collected from all on-site monitoring wells. A water level was not obtained nor was a sample collected directly from the recovery well RW-1, because the pump for the remediation system was in place which limits access to the well. However, water samples were collected from the remediation system influent from well RW-1 during monthly sampling on January 8 and 29, 1993. Sample collection from other monitoring wells MW-1, MW-4, MW-5, MW-6, and MW-7 was suspended as previously approved by the Alameda County Health Services Agency. Monitoring well MW-3 was destroyed in August 1989.

## Groundwater Sampling

Before sampling, RESNA measured the depth to groundwater in well MW-2 and MW-8 with an electric sounding tape and checked for the presence of free-phase hydrocarbons using a clear acrylic bailer. No free-phase hydrocarbons were detected. Groundwater samples were collected in accordance with RESNA's groundwater sampling protocol (see Appendix A). Equipment rinse water and groundwater removed from the wells were placed in drums approved by the Department of Transportation and left at the site pending receipt of the analytical results. Copies of the field sampling logs are included in Appendix B.

## Hydrogeology

The groundwater surface contour map, developed from the depth to groundwater measurements at the site, (see Plate 2) reveals the shallow groundwater gradient in the area of investigation for February 24, 1992. The contours indicate that the piezometric surface is apparently highest in the general vicinity of well MW-4 and the apparent gradient ranged from approximately 0.002 to 0.009 to the east and southwest.

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## Laboratory Analyses and Results

The groundwater samples were analyzed by Sequoia Analytical (Sequoia), a state-certified laboratory located in Redwood City, California. Sequoia analyzed the samples for the presence of total petroleum hydrocarbons as gasoline (TPHG), benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency Methods 5030/8015/8020, as well as total dissolved solids (TDS).

Sequoia reported that a non-gasoline mixture of petroleum hydrocarbons with carbon chain range of less than C8 was detected in well MW-2. Additional analysis is recommended to identify the constituent. Results of TDS analysis will be discussed under separate cover. Copies of the laboratory report and chain-of-custody documents are found in Appendix B. The complete results of the remediation system sampling are reported in the monthly sampling reports submitted to the Oro Loma Sanitary District.

The sample concentrations reported by Sequoia for the February 1993 quarterly monitoring were as follows:

| Compound | MW-2 (2/24/93) | MW-8 (2/24/93) | RW-1 (1/8/93) | Influent (1/29/93) |
|---|---|---|---|---|
| | (µg/L) | (µg/L) | (µg/L) | (µg/L) |
| TPHG | 400 | <50 | <50 | 64 |
| Benzene | 17 | <0.50 | 8 | 22 |
| Toluene | <0.50 | <0.50 | <0.50 | <0.50 |
| Ethyl benzene | <0.50 | <0.50 | 0.78 | 4.8 |
| Total Xylenes | <0.50 | <0.50 | 0.59 | 3.7 |
| | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| Total Dissolved Solids | 14,000 | 39,000 | NS | NS |

Since last sampling ↑

< Not detected at or above the indicated method detection limit.
NS Not sampled

## 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
2101 Webster Street, Suite 500
Oakland, California 94612-3429
Attention: Mr. Richard Hiett

Alameda County
Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621-1439
Attention: Ms. Pamela Evans

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## 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 RESNA 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.

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

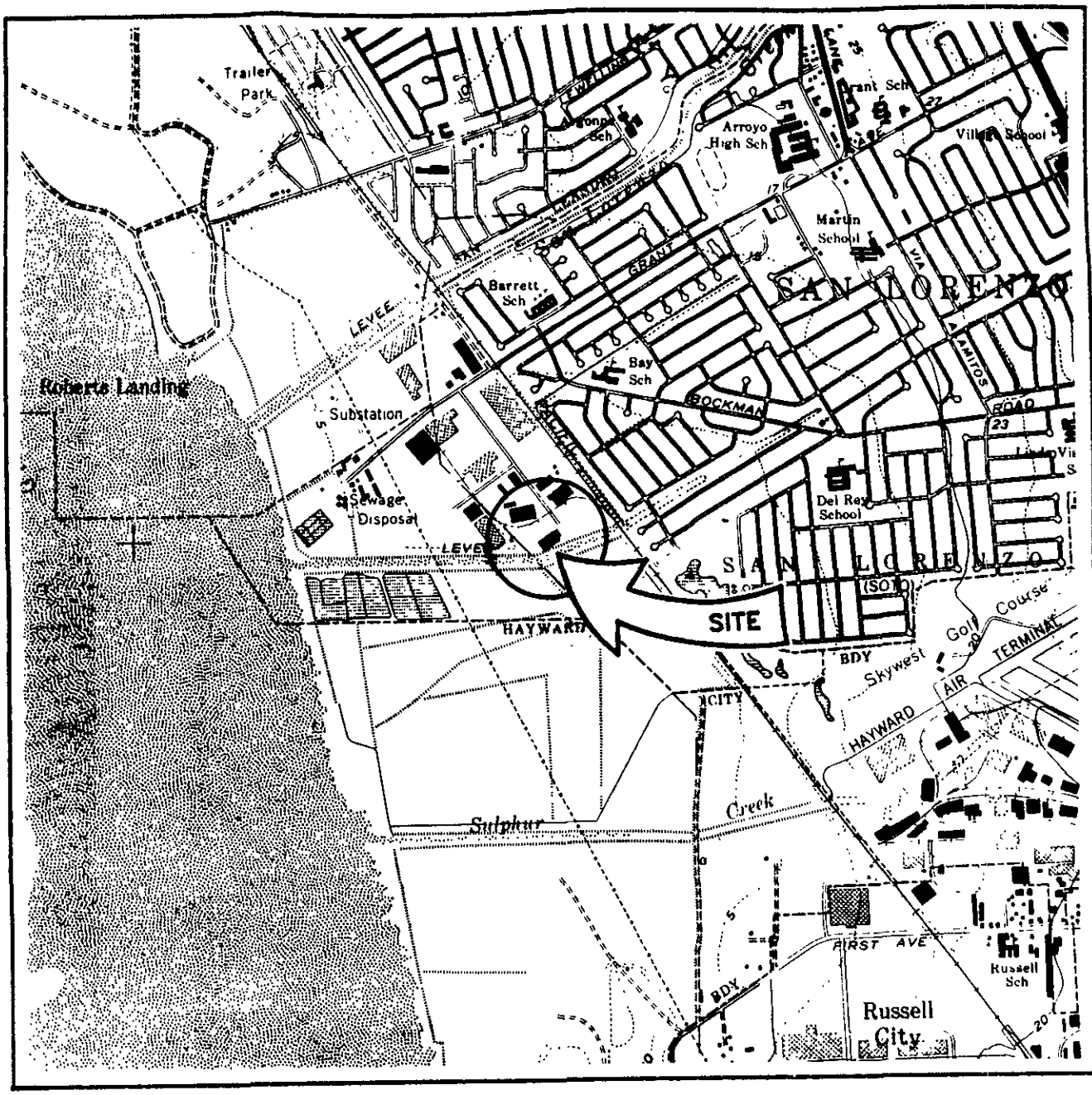
Sincerely,
RESNA Industries Inc.

Kin W. Leung
Staff Engineer

Mark E. Detterman, C.E.G. 1788
Project Manager

KWL/MED/kwl

cc: Mr. James Lewis, Pacific International Steel




SOURCE: U.S. GEOLOGICAL SURVEY
7.5-MINUTE QUADRANGLE
SAN LEANDRO, CALIFORNIA
PHOTOREVISED 1980

N

APPROXIMATE SCALE

0 1000 2000 4000

FEET

| | | |
|---|---|---|
| RESNA | **SITE LOCATION MAP** | PLATE |
| | CROWN METAL MFG. – PACIFIC INTL' STEEL | 1 |
| | 16525 WORTHLEY DRIVE | |
| PROJECT NO. F1587.00 | SAN LORENZO, CALIFORNIA | |

**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 above MSL) | Depth to Water (ft) |
|---|---|---|---|---|---|---|---|---|
| MW-1 | 7/14/87 | ND | ND | ND | — | ND | 8.86 | 7.56 |
| | 11/24/87 | ND | ND | ND | — | 9.0 | | 7.51 |
| | 2/29/88 | ND | ND | ND | — | ND | | 7.18 |
| | 5/25/88 | ND | ND | ND | — | ND | | 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 |
| | 5/17/90 | — | — | — | — | — | | 7.62 |
| | 8/17/90 | — | — | — | — | — | | 7.91 |
| | 11/6/90 | — | — | — | — | — | | 8.01 |
| | 2/1/91 | ND | ND | ND | ND | ND | | 8.00 |
| | 5/1/91 | — | — | — | — | — | | 7.36 |
| | 8/8/91 | — | — | — | — | — | | 8.17 |
| | 11/15/91 | — | — | — | — | — | | 8.17 |
| | 2/12/92 | — | — | — | — | — | | 6.75 |
| | 5/21/92 | — | — | — | — | — | | — |
| | 11/13/92 | — | — | — | — | — | | 8.00 |
| | 2/24/93 | — | — | — | — | — | | 5.74 |
| 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 | ND | ND | — | ND | | 7.26 |
| | 5/25/88 | 250 | ND | ND | — | ND | | 7.45 |

**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 above MSL) | Depth to Water (ft) |
|---|---|---|---|---|---|---|---|---|
| MW-2 | 8/10/88 | 260 | ND | ND | ND | ND | | 7.90 |
| (Con't) | 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 |
| | 5/17/90 | 240 | ND | ND | ND | ND | | 7.70 |
| | 8/17/90 | 130 | ND | 2.9 | 1.2 | 0.68 | | 8.00 |
| | 11/6/90 | 170 | 0.37 | 1.2 | 2.0 | 1.5 | | 8.30 |
| | 2/1/91 | 57 | ND | ND | ND | 0.73 | | 8.15 |
| | 5/1/91 | 220 | 1.5 | 0.42 | 0.53 | 0.54 | | 7.56 |
| | 8/8/91 | 710 | 4.1 | 0.84 | ND | 0.71 | | 8.95 |
| | 11/15/91 | 630 | 2.3 | ND | 3.1 | 0.86 | | 8.26 |
| | 2/12/92 | 580 | 5.9 | 1.2 | 0.52 | ND | | 7.02 |
| | 5/21/92 | 790 | 26 | 5.4 | ND | ND | | 7.89 |
| | 11/13/92 | 230 | ND | ND | ND | ND | | 8.29 |
| | 2/24/93 | 400 | 17 | ND | ND | ND | | 5.75 |
| MW-3 | 7/14/87 | 260 | ND | 1.0 | — | 2.0 | 8.54 | 7.09 |
| | 11/24/87 | 8,900 | 1,700 | 3.0 | — | 12 | | 7.11 |
| | 2/29/88 | 9,300 | 1,600 | 93 | — | 99 | | 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 | — | — | — | — | — | | N A |
| | 5/12/89 | 2,500 | ND | 5.6 | ND | 2.7 | | 6.64 |

**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 above MSL) | Depth to Water (ft) |
|---|---|---|---|---|---|---|---|---|
| MW-3 | 8/4/89 | 2,900 | 800 | 7.5 | 96 | ND | | 7.38 |
| (Con't) | 11/14/89 | Destroyed in August 1989 | | | | | | |
| MW-4 | 7/14/87 | ND | ND | ND | — | ND | 8.48 | 7.25 |
| | 11/24/87 | 60 | ND | 0.65 | — | 7.6 | | 6.97 |
| | 2/29/88 | ND | ND | ND | — | ND | | 6.54 |
| | 5/25/88 | ND | ND | ND | — | ND | | 6.36 |
| | 8/10/88 | — | — | — | — | — | | N A |
| | 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 | — | — | — | — | — | | N A |
| | 11/14/89 | — | — | — | — | — | | — |
| | 2/22/90 | ND | ND | ND | ND | ND | | 6.67 |
| | 5/17/90 | — | — | — | — | — | | — |
| | 8/17/90 | — | — | — | — | — | | 7.30 |
| | 11/6/90 | — | — | — | — | — | | 7.15 |
| | 2/1/91 | ND | ND | ND | ND | ND | | 6.85 |
| | 5/1/91 | — | — | — | — | — | | 6.73 |
| | 8/8/91 | — | — | — | — | — | | — |
| | 11/15/91 | — | — | — | — | — | | 7.45 |
| | 2/12/92 | — | — | — | — | — | | 6.55 |
| | 5/21/92 | — | — | — | — | — | | 6.62 |
| | 11/13/92 | — | — | — | — | — | | 7.45 |
| | 2/24/93 | — | — | — | — | — | | 4.28 |
| MW-5 | 7/14/87 | ND | ND | ND | — | ND | 9.11 | 7.06 |
| | 11/24/87 | ND | ND | ND | — | 7.2 | | 7.24 |

**TABLE 1**

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| Well | Date Sampled | TPHG (µg/l) | Benzene (µg/l) | Toluene (µg/l) | Ethyl-benzene (µg/l) | Total Xylenes (µg/l) | Well Elevation (ft above MSL) | Depth to Water (ft) |
|---|---|---|---|---|---|---|---|---|
| MW-5 | 2/29/88 | ND | ND | ND | — | ND | | 6.75 |
| (Con't) | 5/25/88 | ND | — | — | — | — | | — |
| | 8/10/88 | — | 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 |
| | 1/3/90 | ND | — | — | — | — | | 7.42 |
| | 2/21/90 | ND | ND | ND | ND | ND | | 6.85 |
| | 5/17/90 | — | — | — | — | — | | 7.09 |
| | 8/17/90 | — | — | — | — | — | | 7.36 |
| | 11/6/90 | — | — | — | — | — | | 7.65 |
| | 2/1/91 | ND | ND | ND | ND | ND | | 7.63 |
| | 5/1/91 | — | — | — | — | — | | 6.68 |
| | 8/8/91 | — | — | — | — | — | | 7.65 |
| | 11/15/91 | — | — | — | — | — | | 7.52 |
| | 2/12/92 | — | — | — | — | — | | 6.43 |
| | 5/21/92 | — | — | — | — | — | | 6.92 |
| | 11/13/92 | — | — | — | — | — | | 7.63 |
| | 2/24/93 | — | — | — | — | — | | 5.15 |
| MW-6 | 7/14/87 | ND | ND | ND | — | ND | 9.19 | — |
| | 11/24/87 | — | — | — | — | — | | — |
| | 1/5/88 | ND | ND | ND | — | ND | | — |
| | 2/29/88 | ND | ND | ND | — | ND | | 7.19 |
| | 5/25/88 | ND | ND | ND | ND | ND | | 7.33 |
| | 8/10/88 | ND | ND | ND | ND | ND | | 7.50 |

**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 above MSL) | Depth to Water (ft) |
|---|---|---|---|---|---|---|---|---|
| MW-6 (Con't) | 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 | ND | — | — | — | — | | 7.89 |
| | 2/21/90 | — | ND | ND | ND | ND | | 7.28 |
| | 5/17/90 | ND | — | — | — | — | | 8.62 |
| | 8/17/90 | — | — | — | — | — | | 7.68 |
| | 11/6/90 | — | — | — | — | — | | 8.05 |
| | 2/1/91 | ND | ND | ND | ND | ND | | 7.87 |
| | 5/1/91 | — | — | — | — | — | | 6.95 |
| | 8/8/91 | — | — | — | — | — | | 7.97 |
| | 11/15/91 | — | — | — | — | — | | 7.92 |
| | 2/12/92 | — | — | — | — | — | | 6.92 |
| | 5/21/92 | — | — | — | — | — | | 7.11 |
| | 11/13/92 | — | — | — | — | — | | 7.98 |
| | 2/24/93 | — | — | — | — | — | | 5.61 |
| 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 |
| | 5/17/90 | ND | ND | ND | ND | ND | | 6.81 |
| | 8/17/90 | 48 | ND | ND | ND | ND | | 7.13 |
| | 11/6/90 | ND | ND | 0.55 | ND | 0.32 | | 7.29 |
| | 2/1/91 | ND | ND | ND | ND | ND | | 7.20 |
| | 5/1/91 | — | — | — | — | — | | 6.80 |

**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 above MSL) | Depth to Water (ft) |
|---|---|---|---|---|---|---|---|---|
| MW-7 (Cont.) | 8/8/91 | — | — | — | — | — | | 7.15 |
| | 11/15/91 | — | — | — | — | — | | 7.20 |
| | 2/12/92 | — | — | — | — | — | | 6.73 |
| | 5/21/92 | — | — | — | — | — | | 6.67 |
| | 11/13/92 | — | — | — | — | — | | 7.03 |
| | 2/24/93 | — | — | — | — | — | | 5.26 |
| MW-8 | 5/1/91 | ND | ND | ND | ND | ND | 8.52 | 7.67 |
| | 8/8/91 | ND | ND | ND | ND | ND | | 8.15 |
| | 11/15/91 | ND | ND | ND | ND | ND | | 7.94 |
| | 2/12/92 | ND | ND | ND | ND | ND | | 7.29 |
| | 5/21/92 | — | — | — | — | — | | — |
| | 11/13/92 | — | — | — | — | — | | 8.02 |
| | 2/24/93 | ND | ND | ND | ND | ND | | 5.47 |
| 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 |
| | 5/17/90 | 1,400 | 52 | 1.0 | 20 | 12 | | 9.55 |
| | 8/17/90 | 1,800 | 410 | 7.8 | 160 | 65 | | 9.84 |
| | 11/6/90 | — | — | — | — | — | | 10.15 |
| | 10/25/91 | 420 | 79 | 1.8 | 2.5 | 14 | | 10.20 |
| RW-1 System Influent | 1/16/91 | 78 | 17 | 2.7 | 7.7 | 1.3 | — | — |
| | 5/1/91 | 160 | 40 | 0.79 | 14 | 6.1 | — | — |
| | 8/8/91 | 89 | 41 | 0.31 | 4.6 | 0.73 | — | — |
| | 11/15/91 | 140 | 41 | ND | 1.3 | 0.44 | — | — |
| | 2/12/92 | 260 | 78 | 0.73 | 6.6 | 8.2 | — | — |

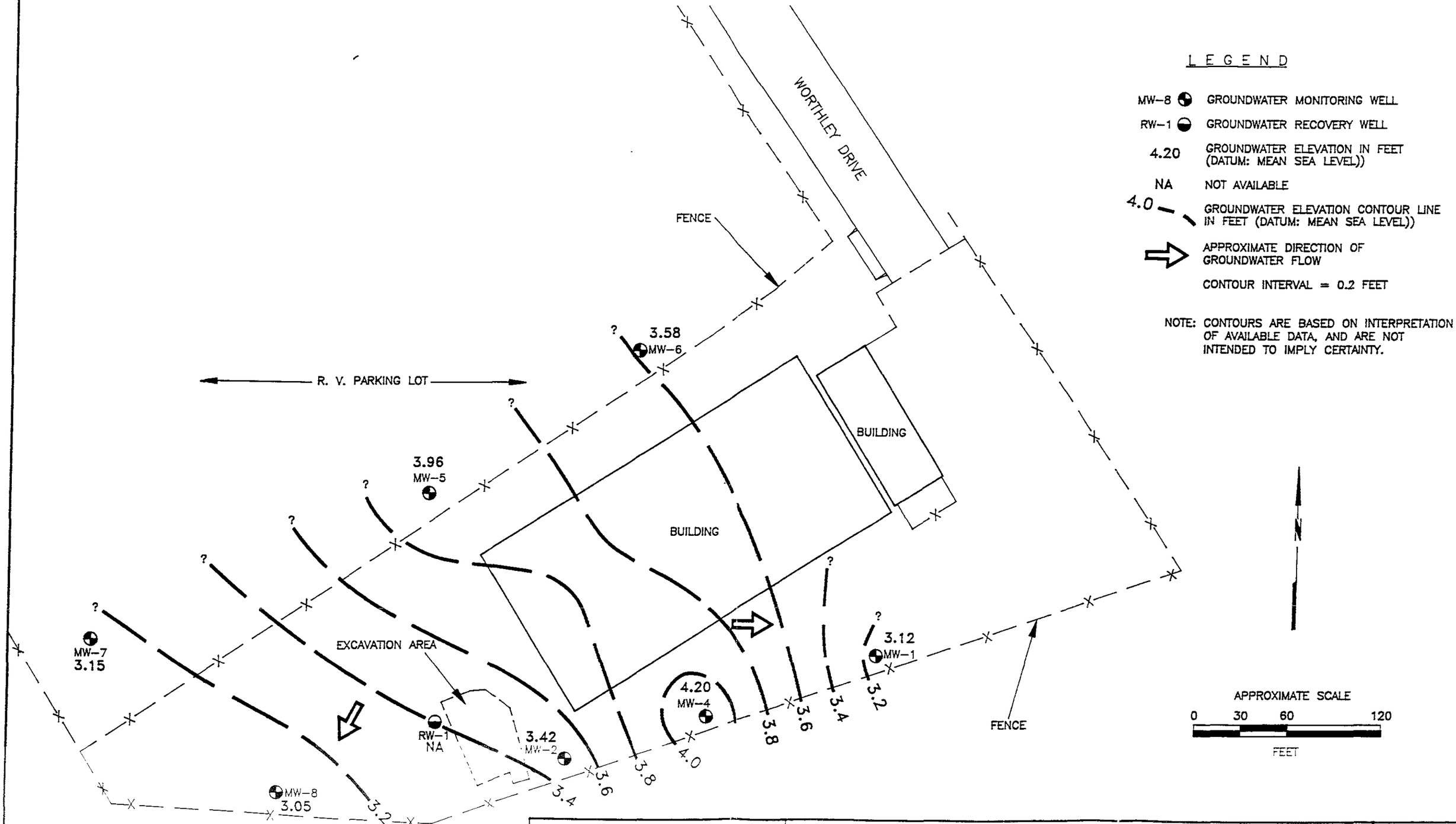
**TABLE 1**

**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 above MSL) | Depth to Water (ft) |
|---|---|---|---|---|---|---|---|---|
| RW-1 System | 5/21/92 | 57 | 20 | ND | 1.7 | 0.85 | — | — |
| Influent (Cont. | 11/13/92 | ND | ND | ND | ND | ND | — | — |
| | 1/8/93 | ND | 8 | ND | 0.78 | 0.59 | — | — |
| | 1/29/93 | 64 | 22 | ND | 4.8 | 3.7 | — | — |
| BB-1 | 1/9/90 | ND | ND | ND | ND | ND | — | — |
| | 5/17/90 | ND | ND | ND | ND | ND | — | — |
| | 11/6/90 | ND | ND | ND | ND | ND | | |
| | 2/1/91 | ND | ND | ND | ND | ND | — | — |
| | 5/1/91 | ND | ND | ND | ND | ND | — | — |
| | 8/8/91 | ND | ND | ND | ND | ND | — | — |
| | 11/15/91 | ND | ND | ND | ND | ND | — | — |
| | 2/12/92 | — | — | — | — | — | — | — |
| | 5/21/92 | — | — | — | — | — | — | — |
| | 11/13/92 | — | — | — | — | — | — | — |
| | 2/24/93 | ND | ND | ND | ND | ND | — | — |

TPHG Total petroleum hydrocarbons as gasoline
ND Not detected at or above the method detection limit
— No data obtained

µg/l Micrograms per liter (parts-per-billion)
BB-1 Bailer blank
ft Feet
MSL Mean sea level




| | | |
|---|---|---|
| RESNA | GROUNDWATER SURFACE CONTOUR MAP (2/24/93) | PLATE |
| | CROWN METAL MFG. – PACIFIC INTL' STEEL | 2 |
| PROJECT NO. F1587.33 | 16525 WORTHLEY DRIVE | |
| | SAN LORENZO, CALIFORNIA | |

F1587-E2

# APPENDIX A

# GROUNDWATER SAMPLING PROTOCOL

# FIELD PROTOCOL

The following presents RESNA Industries' field protocol for a typical site investigation involving gasoline hydrocarbon-impacted soil and/or groundwater.

## Site Safety Plan

The Site Safety Plan describes the safety requirements for the evaluation of gasoline hydrocarbons in soil, groundwater, and the vadose-zone at the site. The site Safety Plan is applicable to personnel of RESNA Industries and its subcontractors. RESNA Industries personnel and subcontractors of RESNA Industries scheduled to perform the work at the site are briefed on the contents of the Site Safety Plan before work begins. A copy of the Site Safety Plan is available for reference by appropriate parties during the work. A site Safety Officer is assigned to the project.

## Soil Excavation

Permits are acquired prior to the commencement of work at the site. Excavated soil is evaluated using a field calibrated (using isobutylene) Thermo-Environmental Instruments Model 580 Organic Vapor Meter (OVM). This evaluation is done upon arrival of the soil at the ground surface in the excavator bucket by removing the top portion of soil from the bucket, and then placing the intake probe of the OVM against the surface of the soil in the bucket. Field instruments such as the OVM are useful for measuring relative concentrations of vapor content, but cannot be used to measure levels of gasoline hydrocarbons with the accuracy of laboratory analysis. Samples are taken from the soil in the bucket by driving laboratory-cleaned brass sleeves into the soil. The samples are sealed in the sleeves using aluminum foil, plastic caps, and plastic zip-lock bags or aluminized duct tape; labeled; and promptly placed in iced storage. If field subjective analyses suggest the presence of gasoline hydrocarbons in the soil, additional excavation and soil sampling is performed, using similar methods. If groundwater is encountered in the excavation, groundwater samples are collected from the excavation using a clean Teflon® bailer. The groundwater samples are collected as described below under "Groundwater Sampling". The excavation is backfilled or fenced prior to departure from the site.

## Sampling of Stockpiled Soil

One composite soil sample is collected for each 50 cubic yards of stockpiled soil, and for each individual stockpile composed of less than 50 cubic yards. Composite soil samples are obtained by first evaluating relatively high, average, and low areas of hydrocarbon concentration by digging approximately one to two feet into the stockpile and placing the

intake probe of a field calibrated OVM against the surface of the soil; and then collecting one sample from the "high" reading area, and three samples from the "average" areas. Samples are collected by removing the top one to two feet of soil, then driving laboratory-cleaned brass sleeves into the soil. The samples are sealed in the sleeves using aluminum foil, plastic caps, and plastic zip-lock bags or aluminized duct tape; labeled; and promptly placed in iced storage for transport to the laboratory, where compositing is performed.

## Soil Borings

Prior to the drilling of borings and construction of monitoring wells, permits are acquired from the appropriate regulatory agency. In addition to the above-mentioned permits, encroachment permits from the City or State are acquired if drilling of borings offsite on City or State property is necessary. Copies of the permits are included in the appendix of the project report. Prior to drilling, Underground Service Alert (USA) is notified of our intent to drill, and known underground utility lines and structures are approximately marked.

The borings are drilled by a truck-mounted drill rig equipped with 8- or 10-inch-diameter, solid-stem or hollow-stem augers. Other methods such as rotary or casing hammer may be used if special conditions are encountered. The augers, sampling equipment and other equipment that comes into contact with the soil are steam-cleaned prior to drilling each boring to minimize the possibility of cross-contamination. Sampling equipment is cleaned with a trisodium phosphate solution and rinsed with clean water between samples. After drilling the borings, monitoring wells are constructed in the borings, or neat-cement grout with bentonite is used to backfill the borings to the ground surface.

Borings for groundwater monitoring wells are drilled to a depth of no more than 20 feet below the depth at which a saturated zone is first encountered, or a short distance into a stratum beneath the saturated zone which is of sufficient texture, moisture, and consistency to be judged as a perching layer by the field geologist, whichever is shallower. Drilling into a deeper aquifer below the shallowest aquifer is begun only after a conductor casing is properly installed and allowed to set, to seal the shallow aquifer.

## Drill Cuttings

Drill cuttings subjectively evaluated as containing gasoline hydrocarbons at levels greater than 100 parts per million (ppm) are separated from those subjectively evaluated as containing gasoline hydrocarbons at levels less than 100 ppm. Evaluation is based either on subjective evidence of soil discoloration, or on measurements made using a field calibrated OVM. Readings are taken by placing a soil sample into a ziplock-type plastic bag and allowing volatilization to occur. The intake probe of the OVM is then inserted into the

headspace created in the plastic bag immediately after opening it. The drill cuttings from the borings are placed in labeled 55-gallon drums approved by the Department of Transportation, or on plastic at the site, and covered with plastic. The cuttings remain the responsibility of the client.

## Soil Sampling in Borings

Soil samples are collected at no greater than 5-foot intervals from the ground surface to the total depth of the borings. The soil samples are collected by advancing the boring to a point immediately above the sampling depth, and then driving a California-modified, split-spoon sampler containing brass sleeves through the hollow center of the auger into the soil. (A standard penetrometer, which does not contain liners, may be used to collect samples when laboratory analysis for volatile components is not an issue. The sampler and brass sleeves are laboratory-cleaned, steam-cleaned, or washed thoroughly with Alconox® and water, prior to each use. The sampler is driven with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows to drive the sampler each successive six inches are counted and recorded to evaluate the relative consistency of the soil. When necessary, the sampler may be pushed by the drill rig hydraulics. In this case, the pressure exerted (in pounds per square inch) is recorded.

The samples selected for laboratory analysis are removed from the sampler and quickly sealed in their brass sleeves with aluminum foil, plastic caps, and plastic zip-lock bags or aluminized duct tape. The samples are then labeled, promptly placed in iced storage, and delivered to a laboratory certified by the State of California to perform the analyses requested.

One of the samples in brass sleeves not selected for laboratory analysis at each sampling interval is tested in the field using an OVM that is field calibrated at the beginning of each day it is used. This testing is performed by inserting the intake probe of the OVM into the headspace in the plastic bag containing the soil sample as described in the Drill Cuttings section above. The OVM readings are presented in Logs of Borings included in the project report.

## Logging of Borings

A geologist is present to log the soil cuttings and samples using the Unified Soil Classification System. Samples not selected for chemical analysis, and the soil in the sampler shoe, are extruded in the field for inspection. Logs include texture, color, moisture, plasticity, consistency, blow counts, and any other characteristics noted. Logs also include

subjective evidence for the presence of gasoline hydrocarbons, such as soil staining, noticeable or obvious product odor, and OVM readings.

## Monitoring Well Construction

Monitoring wells are constructed in selected borings using clean 2- or 4-inch-diameter, thread-jointed, Schedule 40 polyvinyl chloride (PVC) casing. No chemical cements, glues, or solvents are used in well construction. Each casing bottom is sealed with a threaded end-plug, and each casing top with a locking plug. The screened portions of the wells are constructed of machine-slotted PVC casing with 0.020-inch-wide (typical) slots for initial site wells. Slot size for subsequent wells may be based on sieve analysis and/or well development data. The screened sections in groundwater monitoring wells are placed to allow monitoring during seasonal fluctuations of groundwater levels.

The annular space of each well is backfilled with No. 2 by 12 sand or similar sorted sand (groundwater monitoring wells), or pea gravel (vapor extraction wells) to approximately two feet above the top of the screened casing for initial site wells. The sand pack grain size for subsequent wells may be based on sieve analysis and/or well development data. A 1- to 2-foot-thick bentonite plug is placed above the sand as a seal against cement entering the filter pack. The remaining annulus is then backfilled with a slurry of water, neat cement, and bentonite to approximately one foot below the ground surface.

An aluminum utility box with a PVC apron is placed over each wellhead and set in concrete placed flush with the surrounding ground surface. Each wellhead cover has a seal to protect the monitoring well against surface-water infiltration and requires a special wrench to open. The design discourages vandalism and reduces the possibility of accidental disturbance of the well.

## Groundwater Monitoring Well Development

The monitoring wells are developed by bailing or over-pumping and surge-block techniques. The wells are either bailed or pumped, allowed to recharge, and bailed or pumped again until the water removed from the wells is determined to be clear. Turbidity measurements (in NTUs) are recorded during well development and are used in evaluating well development. The development method used, initial turbidity measurement, volume of water removed, final turbidity measurement, and other pertinent field data and observations are recorded. The wells are allowed to equilibrate for at least 48 hours after development prior to sampling. Water generated by well development is stored in 17E Department of Transportation (DOT) 55-gallon drums on site, and remains the responsibility of the client.

## Groundwater Sampling

The static water level in each well is measured to the nearest 0.01-foot using a Solinst® electric water-level sounder or oil/water interface probe (if the wells contain floating product) cleaned with Alconox® and water before use in each well. The depth of each well is also measured. The liquid in the wells is examined for visual evidence of gasoline hydrocarbons by gently lowering approximately half the length of a Teflon® bailer (cleaned with Alconox® and water) past the air/water interface. The sample is then retrieved and inspected for floating product, sheen, emulsion, color, sediment, and clarity. Obvious product odor is recorded if noted. If floating product is present in the well, the thickness of floating product is measured using an oil/water interface probe and is recorded to the nearest 0.01 foot. Floating product is removed from wells on site visits.

Groundwater samples from the wells are collected in approximate order of increasing product concentration, as best known or estimated. Wells which do not contain floating product are purged using a submersible pump. Equipment which comes in contact with the interior of the well or the groundwater is cleaned with Alconox® and deionized or distilled water prior to use in each well. The wells are purged until withdrawal is of sufficient duration to result in stabilized pH, temperature, and electrical conductivity of the water. These parameters are measured to the nearest 0.1 pH unit, 0.1 degree F, and 10 umhos/cm, respectively, using portable meters calibrated daily to a buffer and conductivity standard, according to the manufacturer's specifications. A minimum of four well volumes is purged from each well. If the well becomes dewatered, the water level is allowed to recover to at least 80 percent of the initial water level. When recovery of the water level has not reached at least 80 percent of the static water level after two hours, a groundwater sample will be collected when sufficient volume is available to fill the sample container. Prior to the collection of each groundwater sample, the Teflon® bailer is cleaned with Alconox® and rinsed with tap water and deionized water, and the latex gloves worn by the sampler changed. Hydrochloric acid is added to the sample vials as a preservative (when applicable). Sample containers remain sealed until usage at the site. A sample method blank is collected by pouring distilled water into the bailer and then into sample vials. Method blanks are analyzed periodically to verify effective cleaning procedures. A sample of the formation water is then collected from the surface of the water in each of the wells using the Teflon® bailer. The water samples are then gently poured into laboratory-cleaned, 40-milliliter (ml) glass vials, 500 ml plastic bottles or 1-liter glass bottles (as required for specific laboratory analysis), sealed with Teflon®-lined caps, and inspected for air bubbles to check for headspace, which would allow volatilization to occur. If a bubble is evident, the cap is removed, more sample is added, and the bottle resealed. The samples are then labeled and promptly placed in iced storage, and the wellhead is secured. A field log documenting sampling procedures and parameter monitoring is maintained. Water generated by the purging of wells is stored in 17E DOT

55-gallon drums, and floating product bailed from the wells is stored in double containment onsite; this water and product remains the responsibility of the client.

## Vadose-Zone Monitoring and Vapor Well Purging

Vapor readings are made with a field-calibrated OVM, which has a lower detection limit of 0.1 ppm. After the OVM is turned on, it is allowed sufficient warm-up time for stabilization. Prior to purging each vadose-zone monitoring well, a well cap with a hose barb drilled and tapped into the well cap is secured to the well. The inlet of the vacuum pump is connected to the hose barb with tubing. OVM readings are taken from the exhaust port of the vacuum pump as the well is purged. Each well is purged for approximately 2 to 5 minutes or until about five well volumes of air have been removed. Ambient readings of the air at the site are taken with the OVM after each well is purged.

## Air Sampling

The vacuum pump is first purged with ambient air. Vadose-zone monitoring is then performed as described above. A new Tedlar sample bag is then placed on the outlet port of the vacuum pump with the valve closed. The valve is then opened to allow filling of the bag with an air sample. The valve is closed when the sample bag is 3/4-full (to allow for expansion of gas due to temperature changes), and the bag is removed. The sample pump is purged with ambient air after each sample is taken. A field log documenting sampling procedures is maintained. The samples are transported to the laboratory without exposure to sunlight or cooling, for analysis with 72-hour turnaround.

## Sample Labeling and Handling

Sample containers are labeled in the field with the job number, unique sample location, depth, and date, and promptly placed in iced storage for transport to the laboratory. A Chain of Custody Record is initiated by the field geologist and updated throughout handling of the samples, and accompanies the samples to a laboratory certified by the State of California for the analyses requested. Samples are transported to the laboratory promptly to help ensure that recommended sample holding times are not exceeded. Samples are properly disposed of after their useful life has expired.

## Aquifer Testing

The initial water levels in wells to be used during the test are measured prior to commencement of pumping. The flow rate of the pump is adjusted to the desired pumping rate, and water levels allowed to recover to initial levels. Pumping then begins, and the

starting time of pumping is recorded. Drawdowns in observation wells are recorded at intervals throughout pumping using pressure transducers and manual methods. Evacuated water is stored in a storage tank at the site and remains the responsibility of the client. After the pump is shut off, recovery measurements are taken in the wells until recovery is at least 80 percent of the initial water level. Barometric pressure and tidal information (if appropriate) are collected for the time interval of the pumping test to allow evaluation of possible effects of atmospheric pressure and tidal fluctuations on the groundwater levels.

## Quality Assurance/Quality Control

The sampling and analysis procedures employed by RESNA for groundwater sampling and monitoring follow regulatory guidance for quality assurance/quality control (QA/QC). Quality control is maintained by site-specific field protocols and quality control checks performed by the laboratory. Laboratory and field handling of samples may be monitored by including QC samples for analysis. QC samples may include any combination of the following. The number and types of QC samples are selected and analyzed on a project-specific basis.

Trip blanks - Trip blanks are sent to the project site, and travel with project site samples. They are not opened, and are returned from a project site with the 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 periodically for specific chemical compounds present at the project site where they were prepared.

Duplicates - Duplicate samples are collected from a selected well and project site. They are analyzed at two different laboratories, or at the same laboratory under different labels.

Equipment blank - Periodic QC samples are collected from field equipment rinsate to verify adequate cleaning procedures.

# APPENDIX B

# FIELD SAMPLING LOGS, LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

RESNA

# SAMPLING LOG

Job Name: Crown Metals  Date: 2-24-93

Job No.: 1587.00  Sampled by: RSutherland

Phase: #Q  Laboratory: Sequoia

Wells Secure: ☒ Yes ☐ No  If no, then comment: _____

Drums at Site: Full _____  Empty _____

| Well No. | Depth to Water (ft) | Well Depth (ft) | Time (W*L) | Purge Volume (gal) | Temp. (°C) | Cond. (umho/cm) | pH | Observations |
|---|---|---|---|---|---|---|---|---|
| MW-1 | 5.74 | | | | | | | |
| MW-2 | 5.75 | 25.50 | | 3.2 6<br>9<br>12 | 56.9<br>57.8<br>59.2 | 17100<br>18900<br>O.R. over Range | | NO odor<br>NO Sheen<br>Cloudy |
| MW-3 | Couldn't Locate | | | | | | | |
| MW-4 | 4.28 | | | | | | | |
| MW-5 | 5.15 | | | | | | | |

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Fremont, California 94538
(510) 440-3300

RESNA

# SAMPLING LOG

Job Name: Crown Metals  Date: 2-24-93

Job No.: 1587.00  Sampled by: R Sutherland

Phase: Q  Laboratory: Sequoia

Wells Secure: ☒ Yes ☐ No  If no, then comment:

Drums at Site: Full  Empty

| Well No. | Depth to Water (ft) | Well Depth (ft) | Time (W*L) | Purge Volume (gal) | Temp. (°C) | Cond. (umho/cm) | pH | Observations |
|---|---|---|---|---|---|---|---|---|
| MW-6 | 5.61 | | | | | | | |
| MW-7 | 5.26 | | | | | | | |
| MW-8 | 5.47 | 16.35 | | 1.8<br>2<br>4<br>6 | 52.3<br>57.9<br>58.9 | | | |
| | | | | | | | | |
| | | | | | | | | |

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

# SEQUOIA ANALYTICAL

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


RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: F1587.00, Crown Metals
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 3BB5601

Sampled: Feb 24, 1993
Received: Feb 25, 1993
Reported: Mar 11, 1993

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

| Analyte | Reporting Limit µg/L | Sample I.D. 3BB5601 BB-1 | Sample I.D. 3BB5602 MW-2 | Sample I.D. 3BB5603 MW-8 |
|---|---|---|---|---|
| Purgeable Hydrocarbons | 50 | N.D. | 400 | N.D. |
| Benzene | 0.50 | N.D. | 17 | N.D. |
| Toluene | 0.50 | N.D. | N.D. | N.D. |
| Ethyl Benzene | 0.50 | N.D. | N.D. | N.D. |
| Total Xylenes | 0.50 | N.D. | N.D. | N.D. |
| Chromatogram Pattern: | | -- | Non-gas mix < C8 | -- |

**Quality Control Data**

| | | | |
|---|---|---|---|
| Report Limit Multiplication Factor: | 1.0 | 1.0 | 1.0 |
| Date Analyzed: | 3/9/93 | 3/9/93 | 3/9/93 |
| Instrument Identification: | GCHP-2 | GCHP-3 | GCHP-2 |
| Surrogate Recovery, %: (QC Limits = 70-130%) | 108 | 121 | 113 |

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

**SEQUOIA ANALYTICAL**

Maria Lee
Project Manager

# SEQUOIA ANALYTICAL

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RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: F1587.00, Crown Metals
Sample Descript: Water
Analysis for: Total Dissolved Solids
First Sample #: 3BB5602

Sampled: Feb 24, 1993
Received: Feb 25, 1993

Analyzed: Mar 2, 8, 1993
Reported: Mar 11, 1993

## LABORATORY ANALYSIS FOR: Total Dissolved Solids

| Sample Number | Sample Description | Detection Limit mg/L | Sample Result mg/L |
|---|---|---|---|
| 3BB5602 | MW-2 | 1.0 | 14,000 |
| 3BB5603 | MW-8 | 1.0 | 39,000 |

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

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Maria Lee
Project Manager

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RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: F1587.00, Crown Metals

QC Sample Group: 3BB5601-03

Reported: Mar 11, 1993

## QUALITY CONTROL DATA REPORT

| ANALYTE | Benzene | Toluene | Ethyl-Benzene | Xylenes |
|---|---|---|---|---|
| Method: | EPA 8020 | EPA 8020 | EPA 8020 | EPA 8020 |
| Analyst: | M. Nipp | M. Nipp | M. Nipp | M. Nipp |
| Reporting Units: | µg/L | µg/L | µg/L | µg/L |
| Date Analyzed: | Mar 9, 1993 | Mar 9, 1993 | Mar 9, 1993 | Mar 9, 1993 |
| QC Sample #: | G9302B56 01 | G9302B56 01 | G9302B56 01 | G9302B56 01 |
| **Sample Conc.:** | N.D. | N.D. | N.D. | N.D. |
| **Spike Conc. Added:** | 10 | 10 | 10 | 30 |
| **Conc. Matrix Spike:** | 8.0 | 8.0 | 8.1 | 24 |
| **Matrix Spike % Recovery:** | 80 | 80 | 81 | 80 |
| **Conc. Matrix Spike Dup.:** | 9.3 | 9.3 | 9.5 | 28 |
| **Matrix Spike Duplicate % Recovery:** | 93 | 93 | 95 | 93 |
| **Relative % Difference:** | 15 | 15 | 16 | 15 |

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Maria Lee
Project Manager

$$\%\ \text{Recovery:} = \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} = \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

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RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: F1587.00, Crown Metals

QC Sample Group: 3BB5601-03

Reported: Mar 11, 1993

## QUALITY CONTROL DATA REPORT

| ANALYTE | Benzene | Toluene | Ethyl-Benzene | Xylenes |
|---|---|---|---|---|
| Method: | EPA 8020 | EPA 8020 | EPA 8020 | EPA 8020 |
| Analyst: | M. Nipp | M. Nipp | M. Nipp | M. Nipp |
| Reporting Units: | µg/L | µg/L | µg/L | µg/L |
| Date Analyzed: | Mar 9, 1993 | Mar 9, 1993 | Mar 9, 1993 | Mar 9, 1993 |
| QC Sample #: | G9302B56 01 | G9302B56 01 | G9302B56 01 | G9302B56 01 |
| **Sample Conc.:** | N.D. | N.D. | N.D. | N.D. |
| **Spike Conc. Added:** | 10 | 10 | 10 | 30 |
| **Conc. Matrix Spike:** | 10 | 10 | 10 | 31 |
| **Matrix Spike % Recovery:** | 100 | 100 | 100 | 103 |
| **Conc. Matrix Spike Dup.:** | 9.8 | 9.9 | 9.8 | 30 |
| **Matrix Spike Duplicate % Recovery:** | 98 | 99 | 98 | 100 |
| **Relative % Difference:** | 2.0 | 1.0 | 2.0 | 3.3 |

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Maria Lee
Project Manager

$$\text{\% Recovery:} \quad \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

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RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: F1587.00, Crown Metals

QC Sample Group: 3BB5602-03

Reported: Mar 11, 1993

## QUALITY CONTROL DATA REPORT

| ANALYTE | Total Dissolved Solids | Total Dissolved Solids |
|---|---|---|
| Method: | EPA 160.1 | EPA 160.1 |
| Analyst: | Y. Arteaga | Y. Arteaga |
| Reporting Units: | mg/L | mg/L |
| Date Analyzed: | Mar 8, 1993 | Mar 2, 1993 |
| QC Sample #: | 9303194-01 | 9302C18-19 |
| **Sample Conc.:** | 160 | 110 |
| **Spike Conc. Added:** | 250 | 250 |
| **Conc. Matrix Spike:** | 420 | 350 |
| **Matrix Spike % Recovery:** | 104 | 96 |
| **Conc. Matrix Spike Dup.:** | 410 | 370 |
| **Matrix Spike Duplicate % Recovery:** | 100 | 104 |
| **Relative % Difference:** | 2.4 | 5.6 |

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Maria Lee
Project Manager

| | | |
|---|---|---|
| % Recovery: | Conc. of M.S. - Conc. of Sample / Spike Conc. Added | x 100 |
| Relative % Difference: | Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2 | x 100 |

# RESRA

## CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO: F1587.00

PROJECT NAME/SITE: Crown Metals
16525 Worthley Dr San Leandro

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

PO #:

ANALYSIS REQUESTED: BTEX (602/8020); TPHg (8015); TPHd (8015); TOG 418.1/5520; 601/8010; 624/8240; 625/8270; Total Dissolved Solids

| SAMPLE IDENTIFICATION | DATE | TIME | COMP | GRAB | PRES USED | ICED | NO CONTAINERS | SAMPLE TYPE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| BB-1 | 2-24-93 | 14:00 | | X | HCL | Y | 2 | W | 9302B56-01 |
| MW-2 | ↓ | 15:00 | | ↓ | ↓ | ↓ | 3 | ↓ | 02 |
| MW-8 | ↓ | 16:00 | | ↓ | ↓ | ↓ | 3 | ↓ | 03 |

| | DATE | TIME | | |
|---|---|---|---|---|
| RELINQUISHED BY: [signature] | 2/25/93 | 10:15 | RECEIVED BY: [signature] | LABORATORY: Sequoia |
| RELINQUISHED BY: [signature] | 2/25/93 | 1055 | RECEIVED BY | REQUESTED TURNAROUND TIME: Normal |
| RELINQUISHED BY | DATE | TIME | RECEIVED BY | RECEIPT CONDITION |
| RELINQUISHED BY | DATE | TIME | RECEIVED BY LABORATORY: A. Nazer. | PROJECT MANAGER |

PLEASE SEND RESULTS TO:
Kin Leung
42501 Albrae St
Fremont, CA
94538

# SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233


RESNA -
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 301-1211

Sampled: Jan 8, 1993
Received: Jan 12, 1993
Reported: Jan 25, 1993

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

| Analyte | Reporting Limit µg/L | Sample I.D. 301-1211 Inf | Sample I.D. 301-1212 Int | Sample I.D. 301-1213 Eff |
|---|---|---|---|---|
| Purgeable Hydrocarbons | 50 | N.D. | N.D. | N.D. |
| Benzene | 0.50 | 8.0 | N.D. | N.D. |
| Toluene | 0.50 | N.D. | N.D. | N.D. |
| Ethyl Benzene | 0.50 | 0.78 | N.D. | N.D. |
| Total Xylenes | 0.50 | 0.59 | N.D. | N.D. |
| Chromatogram Pattern: | | -- | -- | -- |

**Quality Control Data**

| | | | |
|---|---|---|---|
| Report Limit Multiplication Factor: | 1.0 | 1.0 | 1.0 |
| Date Analyzed: | 1/13/93 | 1/12/93 | 1/12/93 |
| Instrument Identification: | GCHP-2 | GCHP-3 | GCHP-3 |
| Surrogate Recovery, %: (QC Limits = 70-130%) | 76 | 86 | 94 |

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

**SEQUOIA ANALYTICAL**

Maria Lee

Maria Lee
Project Manager

# SEQUOIA ANALYTICAL

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RESNA -
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals
Sample Descript: Water

Lab Number: 301-1213

Sampled: Jan 8, 1993
Received: Jan 12, 1993
Analyzed: see below
Reported: Jan 25, 1993

## LABORATORY ANALYSIS

| Analyte | Date Analyzed | Detection Limit mg/L | Sample Result mg/L |
|---|---|---|---|
| Arsenic | 1/20/93 | 0.010 | N.D. |
| Total Suspended Solids | 1/13/93 | 1.0 | 110 |
| Chemical Oxygen Demand | 1/13/93 | 20 | 2,500 |

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

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Maria Lee

Maria Lee
Project Manager

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RESNA -
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals

QC Sample Group: 3011211-13

Reported: Jan 25, 1993

## QUALITY CONTROL DATA REPORT

| ANALYTE | Benzene | Toluene | Ethyl-Benzene | Xylenes |
|---|---|---|---|---|
| Method: | EPA 8020 | EPA 8020 | EPA 8020 | EPA 8020 |
| Analyst: | M. Nipp | M. Nipp | M. Nipp | M. Nipp |
| Reporting Units: | µg/L | µg/L | µg/L | µg/L |
| Date Analyzed: | Jan 12, 1993 | Jan 12, 1993 | Jan 12, 1993 | Jan 12, 1993 |
| QC Sample #: | GBLK011293 | GBLK011293 | GBLK011293 | GBLK011293 |
| **Sample Conc.:** | N.D. | N.D. | N.D. | N.D. |
| **Spike Conc. Added:** | 10 | 10 | 10 | 30 |
| **Conc. Matrix Spike:** | 9.0 | 9.5 | 9.2 | 29 |
| **Matrix Spike % Recovery:** | 90 | 95 | 92 | 97 |
| **Conc. Matrix Spike Dup.:** | 9.2 | 9.2 | 9.1 | 27 |
| **Matrix Spike Duplicate % Recovery:** | 92 | 92 | 91 | 90 |
| **Relative % Difference:** | 2.2 | 3.2 | 1.1 | 7.1 |

**SEQUOIA ANALYTICAL**

Maria Lee
Project Manager

| | | |
|---|---|---|
| % Recovery: | Conc. of M.S. - Conc. of Sample / Spike Conc. Added | x 100 |
| Relative % Difference: | Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2 | x 100 |

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


RESNA -
42501 Albrae Street, Suite 100
Fremont, CA 94538
Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals

QC Sample Group: 3011211-13

Reported: Jan 25, 1993

## QUALITY CONTROL DATA REPORT

| ANALYTE | Benzene | Toluene | Ethyl-Benzene | Xylenes |
|---|---|---|---|---|
| Method: | EPA 8020 | EPA 8020 | EPA 8020 | EPA 8020 |
| Analyst: | M. Nipp | M. Nipp | M. Nipp | M. Nipp |
| Reporting Units: | µg/L | µg/L | µg/L | µg/L |
| Date Analyzed: | Jan 13, 1993 | Jan 13, 1993 | Jan 13, 1993 | Jan 13, 1993 |
| QC Sample #: | G3011267 | G3011267 | G3011267 | G3011267 |
| **Sample Conc.:** | N.D. | N.D. | N.D. | N.D. |
| **Spike Conc. Added:** | 10 | 10 | 10 | 30 |
| **Conc. Matrix Spike:** | 7.3 | 7.4 | 7.4 | 22 |
| **Matrix Spike % Recovery:** | 73 | 74 | 74 | 73 |
| **Conc. Matrix Spike Dup.:** | 7.7 | 7.9 | 7.9 | 24 |
| **Matrix Spike Duplicate % Recovery:** | 77 | 79 | 79 | 80 |
| **Relative % Difference:** | 5.3 | 6.5 | 6.5 | 8.7 |

**SEQUOIA ANALYTICAL**

Maria Lee
Project Manager

| | | |
|---|---|---|
| % Recovery: | $\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$ | x 100 |
| Relative % Difference: | $\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$ | x 100 |

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Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals

QC Sample Group: 3011211-13

Reported: Jan 25, 1993

## QUALITY CONTROL DATA REPORT

| ANALYTE | Arsenic | Chemical Oxygen Demand | Total Suspended Solids |
|---|---|---|---|
| Method: | EPA 206.2 | EPA 140.4 | EPA 160.2 |
| Analyst: | F. Contreras | Y. Arteaga | Y. Arteaga |
| Reporting Units: | mg/L | mg/L | mg/L |
| Date Analyzed: | Jan 20, 1993 | Jan 13, 1993 | Jan 13, 1993 |
| QC Sample #: | BLK011593 | 301-0861 | 301-1256 |
| **Sample Conc.:** | N.D. | 46 | N.D. |
| **Spike Conc. Added:** | 0.050 | 75 | N.A. |
| **Conc. Matrix Spike:** | 0.050 | 130 | N.A. |
| **Matrix Spike % Recovery:** | 116 | 112 | N.A. |
| **Conc. Matrix Spike Dup.:** | 0.052 | 130 | N.D. |
| **Matrix Spike Duplicate % Recovery:** | 104 | 112 | N.A. |
| **Relative % Difference:** | 11 | 0.0 | 0.0 |

**SEQUOIA ANALYTICAL**

Maria Lee
Project Manager

| | | |
|---|---|---|
| % Recovery: | $\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$ | x 100 |
| Relative % Difference: | $\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$ | x 100 |

RESNA

# CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

| PROJECT NO | PROJECT NAME/SITE | PO # |
|---|---|---|
| 3462-2 | Crown Metals 16525 Worthley Dr, San Leandro | |

SAMPLERS (SIGN) John Sutherland / (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 | Arsenic | COD | SS Solids | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inf | 1-8-93 | 7:00 | | X | HCl | Y | 2 | W | X | X | | | | 3 | 1 | 1 | | | *Please preserve. Metals* |
| Int | | 7:30 | | X | | | 2 | W | X | X | | | | | | 1 | | | |
| Eff | | 8:00 | | X | | | 5 | W | X | X | | | | | | 1 | X | X | |

| RELINQUISHED BY | DATE | TIME | RECEIVED BY |
|---|---|---|---|
| [signature] | 1-12-93 | 8:15 | [signature] |
| RELINQUISHED BY | DATE | TIME | RECEIVED BY |
| [signature] | 1/12/93 | 1015 | [signature] |
| RELINQUISHED BY | DATE | TIME | RECEIVED BY |
| [signature] | 1/12/93 | 1210 | |
| RELINQUISHED BY | DATE | TIME | RECEIVED BY LABORATORY |
| | | | [signature] |

LABORATORY: sequoia

REQUESTED TURNAROUND TIME: Normal

RECEIPT CONDITION: 1-12-93 1210

PLEASE SEND RESULTS TO: Kin Leung

PROJECT MANAGER:

# SEQUOIA ANALYTICAL

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


RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94539
Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 3B04601

Sampled: Jan 29, 1993
Received: Feb 2, 1993
Reported: Feb 16, 1993

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

| Analyte | Reporting Limit µg/L | Sample I.D. 3B04601 INF | Sample I.D. 3B04602 INT | Sample I.D. 3B04603 EFF | Sample I.D. | Sample I.D. | Sample I.D. |
|---|---|---|---|---|---|---|---|
| Purgeable Hydrocarbons | 50 | 64 | N.D. | N.D. | | | |
| Benzene | 0.50 | 22 | N.D. | N.D. | | | |
| Toluene | 0.50 | N.D. | N.D. | N.D. | | | |
| Ethyl Benzene | 0.50 | 4.8 | N.D. | N.D. | | | |
| Total Xylenes | 0.50 | 3.7 | N.D. | N.D. | | | |
| Chromatogram Pattern: | | Gas | -- | -- | | | |

**Quality Control Data**

| | | | |
|---|---|---|---|
| Report Limit Multiplication Factor: | 1.0 | 1.0 | 1.0 |
| Date Analyzed: | 2/9/93 | 2/9/93 | 2/9/93 |
| Instrument Identification: | GCHP-7 | GCHP-7 | GCHP-7 |
| Surrogate Recovery, %: (QC Limits = 70-130%) | 79 | 72 | 71 |

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

**SEQUOIA ANALYTICAL**

Maria Lee
Project Manager

# SEQUOIA ANALYTICAL

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


RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94539
Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals
Sample Descript: Water, EFF

Lab Number: 3B04603

Sampled: Jan 29, 1993
Received: Feb 2, 1993
Analyzed: see below
Reported: Feb 17, 1993

## LABORATORY ANALYSIS

| Analyte | Date Analyzed | Detection Limit mg/L | Sample Result mg/L |
|---|---|---|---|
| Arsenic | 2/12/93 | 0.010 | N.D. |
| Chemical Oxygen | 2/5/93 | 20 | 1,300 |
| Total Suspended Solids | 2/3/93 | 1.0 | 93 |

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

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

# SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233


RESNA
42501 Albrae Street, Suite 100
Fremont, CA 94539
Attention: Kin Leung

Client Project ID: 3462-2, Crown Metals

QC Sample Group: 3B04601-03

Reported: Feb 17, 1993

## QUALITY CONTROL DATA REPORT

| ANALYTE | Benzene | Toluene | Ethyl-Benzene | Xylenes | Arsenic | Chemical Oxyg Demand | Total Suspended Solids |
|---|---|---|---|---|---|---|---|
| Method: | EPA 8020 | EPA 8020 | EPA 8020 | EPA 8020 | EPA 206.2 | EPA 410.4 | EPA 160.2 |
| Analyst: | A. Miraftab | A. Miraftab | A. Miraftab | A. Miraftab | F. Contreras | Y. Arteaga | Y. Arteaga |
| Reporting Units: | µg/L | µg/L | µg/L | µg/L | mg/L | mg/L | mg/L |
| Date Analyzed: | Feb 9, 1993 | Feb 9, 1993 | Feb 9, 1993 | Feb 9, 1993 | Feb 12, 1993 | Feb 5, 1993 | Feb 3, 1993 |
| QC Sample #: | 3B05403 | 3B05403 | 3B05403 | 3B05403 | BLK020393 | 930-1532 | 3B07202 |
| **Sample Conc.:** | N.D. | N.D. | N.D. | N.D. | N.D. | 28 | 1.0 |
| **Spike Conc. Added:** | 10 | 10 | 10 | 30 | 0.050 | 75 | N.A. |
| **Conc. Matrix Spike:** | 10 | 10 | 10 | 30 | 0.041 | 100 | N.A. |
| **Matrix Spike % Recovery:** | 100 | 100 | 100 | 100 | 82 | 96 | N.A. |
| **Conc. Matrix Spike Dup.:** | 10 | 10 | 10 | 31 | 0.041 | 110 | 1.0 |
| **Matrix Spike Duplicate % Recovery:** | 100 | 100 | 100 | 103 | 82 | 109 | N.A. |
| **Relative % Difference:** | 0.0 | 0.0 | 0.0 | 3.3 | 0.0 | 9.5 | 0.0 |

**SEQUOIA ANALYTICAL**

Maria Lee
Project Manager

| | | |
|---|---|---|
| % Recovery: | $\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$ | x 100 |
| Relative % Difference: | $\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$ | x 100 |

PROJECT NO: 34622

PROJECT NAME/SITE: Crown Metals Mfg
16525 Worthley Dr, San Leandro

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 | Arsenic | COD | SVS Solids | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inf | 1-29-93 | 12:00 | | X | Hcl | ✓ | 2 | W | X | X | | | | 01 | | | | | Please Preserve |
| Int | ↓ | 12:15 | | ↓ | ↓ | ↓ | 2 | ↓ | X | X | | | | 02 | | | | | Arsenic |
| Eff | ↓ | 12:30 | | ↓ | ↓ | ↓ | 5 | ↓ | X | X | | | ↓ | 03 | | X | X | X | |

| RELINQUISHED BY | DATE | TIME | RECEIVED BY | LABORATORY |
|---|---|---|---|---|
| [signature] | 2-2-93 | 2:00 | [signature] 930 | Sequoia |
| RELINQUISHED BY: [signature] | DATE: 2/2/93 | TIME: 1025 | RECEIVED BY | REQUESTED TURNAROUND TIME |
| RELINQUISHED BY | DATE | TIME | RECEIVED BY | |
| RELINQUISHED BY | DATE | TIME | RECEIVED BY LABORATORY: [signature] | RECEIPT CONDITION: good |

PLEASE SEND RESULTS TO: Kin Leung

PROJECT MANAGER