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**T R A N S M I T T A L**

DATE: February 2, 1993  
PROJECT NO.: F1587.00  
TO: Alameda County Health Care Services Agency  
Department of Environmental Health  
80 Swan Way, Room 200  
Oakland, California 94621-1439  
ATTENTION: Ms. Pamela Evans  
SUBJECT: Pacific International Steel Facility


WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	12/15/92	November 1992 Quarterly Groundwater Monitoring Report at Pacific International Steel Facility, 16525 Worthley Drive, San Lorenzo, California.

THESE ARE TRANSMITTED as checked below:

For review and comment     As requested     For your files     For approval

REMARKS:

  
\_\_\_\_\_  
Mark E. Dettelman, R.G. 4799  
Project Manager

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**NOVEMBER 1992 QUARTERLY  
GROUNDWATER MONITORING REPORT  
AT PACIFIC INTERNATIONAL STEEL  
FACILITY**

**FOR**

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

**Project No. F1587.00  
December 1992**

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

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42501 Albrae Street  
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December 15, 1992  
Project No. F1587.00

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

Attention: Mr. Richard C. Ernest

Subject: November 1992 Quarterly Groundwater Monitoring Report  
Pacific International Steel Facility  
16525 Worthley Drive, San Lorenzo, California

Dear Mr. Ernest:

RESNA Industries Inc. has completed the November quarterly groundwater monitoring at the subject site in the City of San Lorenzo, Alameda County, California (see Plate 1). Quarterly groundwater sampling of monitoring well MW-2 was conducted on November 13, 1992, as part of the ongoing quarterly monitoring program. Since the sampling frequency for monitoring well MW-8 has been reduced to annually as approved by the Alameda County Health Services Agency, no sample was collected from MW-8 this quarter. During November quarterly monitoring, 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, a sample was collected from the remediation system influent from well RW-1. 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.

### **Groundwater Sampling**

Before sampling, RESNA measured the depth to groundwater in well MW-2 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.

### **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 November 13, 1992. The contours indicate that the piezometric surface is apparently highest in the general vicinity of well MW-5 and the apparent gradient ranged from approximately 0.002 to 0.007 to the south-southwest and southeast.

### 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), as well as benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency Methods 5030/8015/8020.

Sequoia reported that a non-gasoline mixture of petroleum hydrocarbons with carbon chain range of less than C<sub>8</sub> was detected in well MW-2. Additional analysis is recommended to identify the constituent. The remediation system influent from well RW-1 had nondetected concentrations of TPHG and BTEX. 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 elsewhere.

The concentrations reported by Sequoia for the November quarterly monitoring were as follows:

Compound	MW-2 (11/13/92)	RW-1 Influent (11/13/92)
TPHG	230	<50
Benzene	<0.50	<0.50
Toluene	<0.50	<0.50
Ethyl benzene	<0.50	<0.50
Total Xylenes	<0.50	<0.50

< Not detected at or above the indicated method detection limit.  
Results in micrograms per liter (parts per billion).

### 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 Hiatt

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

### 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, R.G. 4799  
Project Manager

KWL/MED/kwl

cc: Mr. James Lewis, Pacific International Steel

RESNA Industries, Inc.  
 Project No. F1587.00  
 December 15, 1992

Crown Metal Manufacturing  
 Pacific International Steel Facility  
 San Lorenzo, CA

TABLE 1

SUMMARY OF GROUNDWATER ANALYSES DATA

Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft 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		
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

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MW-2 (Con't)	8/10/88	260	ND	ND	ND	ND		7.90
	11/29/88	870	9.0	ND	1.0	1.0		8.20
	2/7/89	710	16	ND	ND	ND		7.47
	5/12/89	260	2.8	0.76	1.3	3.0		7.27
	8/4/89	360	ND	ND	ND	0.48		8.23
	11/14/89	85	ND	3.5	0.36	2.5		8.08
	1/3/90	—	—	—	—	—		7.95
	2/22/90	120	ND	ND	1.5	0.55		7.47
	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	
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

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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-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
MW-5	7/14/87	ND	ND	ND	—	ND	9.11	7.06
	11/24/87	ND	ND	ND	—	7.2		7.24

RESNA Industries, Inc.  
 Project No. F1587.00  
 December 15, 1992

Crown Metal Manufacturing  
 Pacific International Steel Facility  
 San Lorenzo, CA

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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 (Con't)	2/29/88	ND	ND	ND	—	ND		6.75
	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
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

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 December 15, 1992

Crown Metal Manufacturing  
 Pacific International Steel Facility  
 San Lorenzo, CA

TABLE 1

SUMMARY OF GROUNDWATER ANALYSES DATA

Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft 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	
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
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
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	—	—

RESNA Industries, Inc.  
 Project No. F1587.00  
 December 15, 1992

Crown Metal Manufacturing  
 Pacific International Steel Facility  
 San Lorenzo, CA

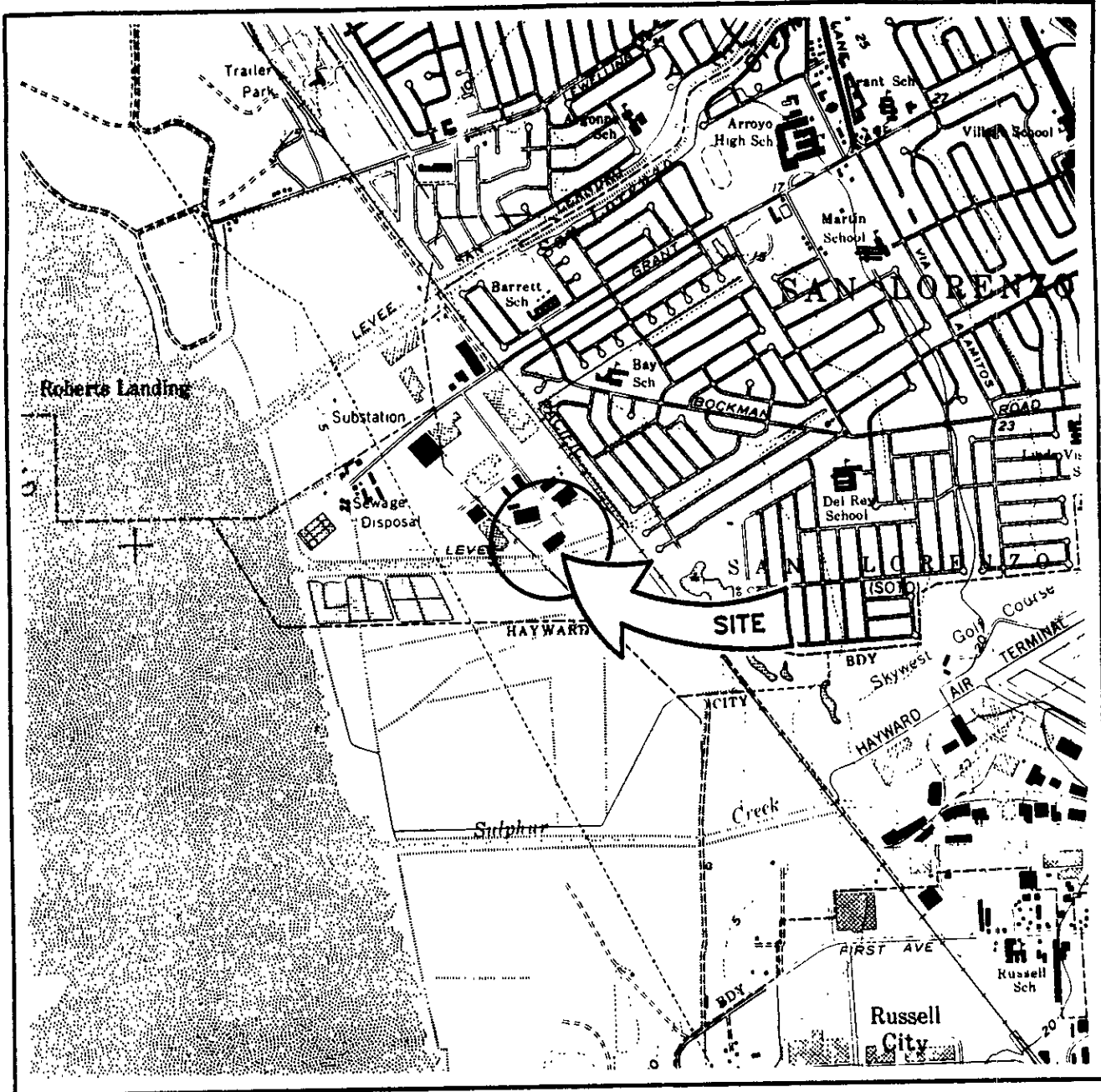
TABLE 1

SUMMARY OF GROUNDWATER ANALYSES DATA

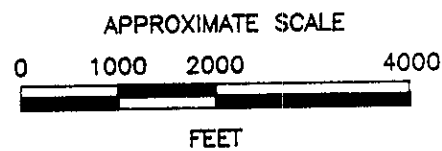
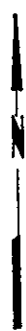
Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft above MSL)	Depth to Water (ft)
RW-1 System Influent (Cont.)	5/21/92	57	20	ND	1.7	0.85	—	—
	11/13/92	ND	ND	ND	ND	ND	—	—
BB-1	1/9/90	ND	ND	ND	ND	ND	—	—
	5/17/90	ND	ND	ND	ND	ND	—	—
	11/6/90	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	—	—	—	—	—	—	—

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



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

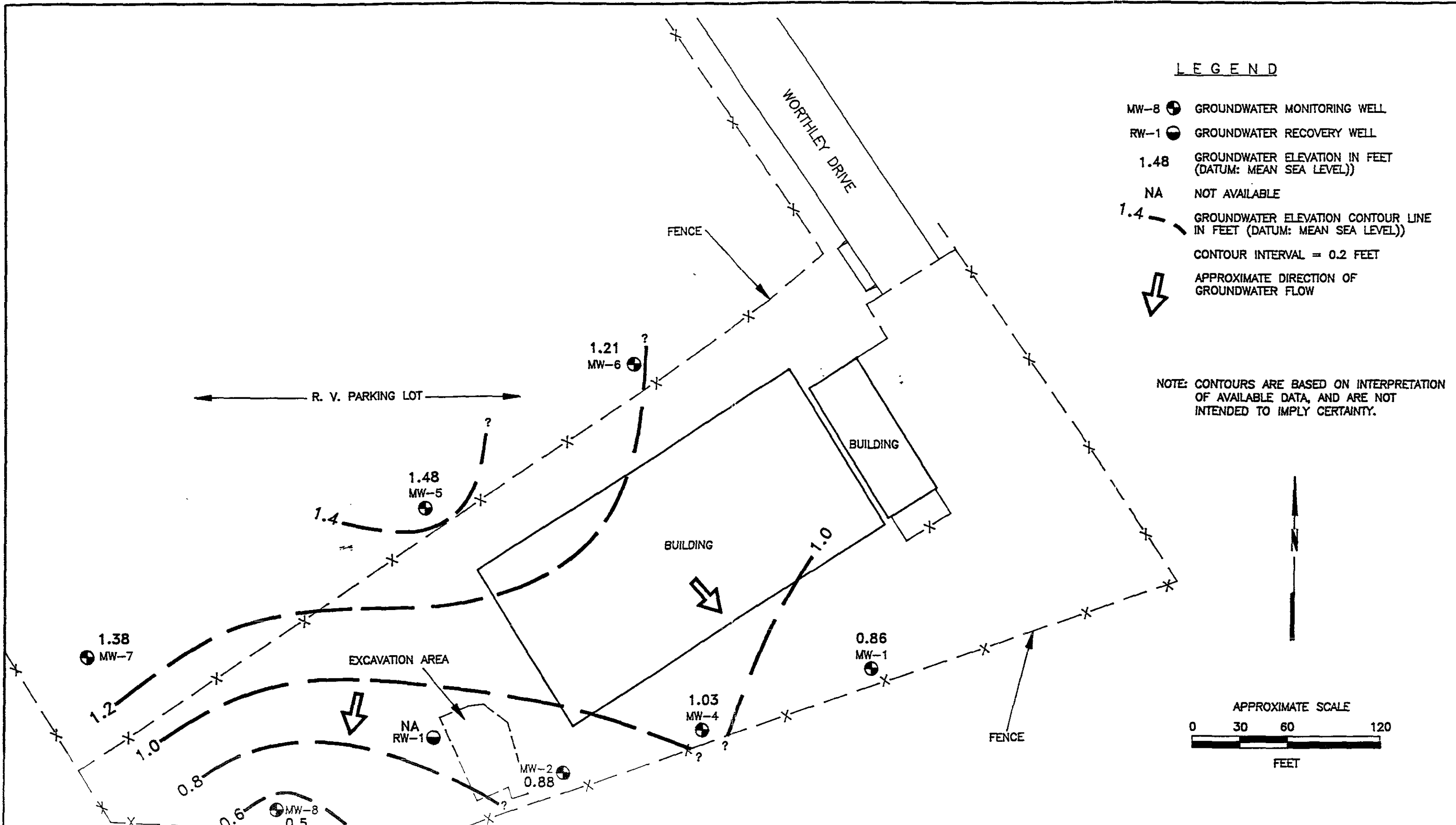


<b>RESNA</b>	<b>SITE LOCATION MAP</b>	PLATE  1
	CROWN METAL MFG. — PACIFIC INTL' STEEL	
	16525 WORTHLEY DRIVE	
PROJECT NO. F1587.00	SAN LORENZO, CALIFORNIA	

**LEGEND**

- MW-8 ● GROUNDWATER MONITORING WELL
- RW-1 ● GROUNDWATER RECOVERY WELL
- 1.48 GROUNDWATER ELEVATION IN FEET (DATUM: MEAN SEA LEVEL)
- NA NOT AVAILABLE
- 1.4 - - - GROUNDWATER ELEVATION CONTOUR LINE IN FEET (DATUM: MEAN SEA LEVEL)
- CONTOUR INTERVAL = 0.2 FEET
- ↓ APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: CONTOURS ARE BASED ON INTERPRETATION OF AVAILABLE DATA, AND ARE NOT INTENDED TO IMPLY CERTAINTY.



<b>RESNA</b>	<b>GROUNDWATER SURFACE CONTOUR MAP (11/13/92)</b>	PLATE  2
	CROWN METAL MFG. - PACIFIC INTL' STEEL	
PROJECT NO. F1587.00	16525 WORTHLEY DRIVE	
	SAN LORENZO, CALIFORNIA	

F1587E11

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**APPENDIX A**

**GROUNDWATER SAMPLING PROTOCOL**

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## **GROUNDWATER SAMPLING PROTOCOL**

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

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

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## **Equipment Cleaning and Decontamination**

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

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

## **Water Level Measurements**

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

## **Bailer Sheen Check**

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

## **Groundwater Sampling**

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

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

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

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

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

### **Chain-of-Custody**

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

### **Sample Storage**

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

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## Quality Assurance/Quality Control Objectives

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

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

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

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

- 
- **Field Blank:** Prepared in the field using organic-free water. Field blanks accompany project site samples to the laboratory and are analyzed for specific chemical parameters unique to the project site where they were prepared.
  - **Duplicates:** Duplicated samples are collected "second samples" from a selected well and project site. They are collected as either split samples or second-run samples collected from the same well.
  - **Equipment Blank:** Periodic QC samples collected from field equipment rinseate to verify decontamination procedures.

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

### **Shallow Groundwater Survey**

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

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**APPENDIX B**

**FIELD SAMPLING LOG,  
LABORATORY REPORTS AND  
CHAIN-OF-CUSTODY RECORDS**

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Job Name: Crown Metals Date: 11-13-92

Job No.: F1587-~~02~~02 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. <sup>F</sup> <del>°C</del>	Cond. (umho/cm)	pH	Observations
MW-1	8.00							
MW-2	8.29	25.65		2.9 6 9 12	63.9 62.2 62.4	18310 over range O.R.	6.94 6.95 6.89	NO odor NO sheen cloudy
MW-3	could not locate							
MW-4	7.45							
MW-5	7.63							

Job Name: Crown Metals Date: 11-13-92  
Job No.: 1587-2G 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	7.98							
MW-7	7.03							
MW-8	8.02							





# SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID: 1587-2G, Crown Metals-San Lorenzo	Sampled: Nov 13, 1992
42501 Albrae Street, Suite 100	Sample Matrix: Water	Received: Nov 13, 1992
Fremont, CA 94538	Analysis Method: EPA 5030/8015/8020	Reported: Nov 25, 1992
Attention: Mark Detterman	First Sample #: 211-2376	

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 211-2376 MW-2
Purgeable Hydrocarbons	50	230
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Total Xylenes	0.50	N.D.

Chromatogram Pattern:

Non-Gas Mix  
< C8

### Quality Control Data

Report Limit Multiplication Factor:	1.0
Date Analyzed:	11/20/92
Instrument Identification:	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	109

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

2112376.ENS <1>



# SEQUOIA ANALYTICAL

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RESNA

Client Project ID: 1587-2G, Crown Metals-San Lorenzo

42501 Albrae Street, Suite 100  
Fremont, CA 94538

Attention: Mark Detterman

QC Sample Group: 211-2376

Reported: Nov 25, 1992

## 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:	Nov 20, 1992	Nov 20, 1992	Nov 20, 1992	Nov 20, 1992
QC Sample #:	GBLK112092 MS/MSD	GBLK112092 MS/MSD	GBLK112092 MS/MSD	GBLK112092 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	10	10	10	30
Matrix Spike % Recovery:	100	100	100	100
Conc. Matrix Spike Dup.:	10	10	10	31
Matrix Spike Duplicate % Recovery:	100	100	100	103
Relative % Difference:	0.0	0.0	0.0	3.3

SEQUOIA ANALYTICAL

Maria Lee  
Project Manager

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





# SEQUOIA ANALYTICAL

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RESNA	Client Project ID: 3462-2/Crown Metals, San Lorenzo	Sampled: Nov 13, 1992
42501 Albrae Street, Suite 100	Sample Matrix: Water	Received: Nov 13, 1992
Fremont, CA 94538	Analysis Method: EPA 5030/8015/8020	Reported: Dec 1, 1992
Attention: Kin Leung	First Sample #: 211-2373	

## TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D.	Sample I.D.	Sample I.D.
		211-2373 Influent	211-2374 Intermediate	211-2375 Effluent
Purgeable Hydrocarbons	50	N.D.	N.D.	N.D.
Benzene	0.50	N.D.	N.D.	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:		--	--	--

### Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0
Date Analyzed:	11/20/92	11/19/92	11/20/92
Instrument Identification:	GCHP-3	GCHP-6	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	113	98	92

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	Client Project ID: 3462-2/Crown Metals, San Lorenzo	Sampled: Nov 13, 1992
42501 Albrae Street, Suite 100	Sample Descript: Water, Effluent	Received: Nov 13, 1992
Fremont, CA 94538		Analyzed: see below
Attention: Kin Leung	Lab Number: 211-2375	Reported: Dec 1, 1992

## LABORATORY ANALYSIS

Analyte	Date Analyzed	Detection Limit mg/L	Sample Result mg/L
Chemical Oxygen Demand	11/16/92	20	1,200
Total Suspended Solids	11/16/92	1.0	110
Arsenic	11/25/92	0.0050	0.0076

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, San Lorenzo

QC Sample Group: 2112373, 75

Reported: Dec 1, 1992

## 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:	Nov 20, 1992	Nov 20, 1992	Nov 20, 1992	Nov 20, 1992
QC Sample #:	GBLK112092 MS/MSD	GBLK112092 MS/MSD	GBLK112092 MS/MSD	GBLK112092 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	10	10	10	30
Matrix Spike % Recovery:	100	100	100	100
Conc. Matrix Spike Dup.:	10	10	10	31
Matrix Spike Duplicate % Recovery:	100	100	100	103
Relative % Difference:	0.0	0.0	0.0	3.3

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

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, San Lorenzo

QC Sample Group: 211-2374

Reported: Dec 1, 1992

## QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl- benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Lee	R. Lee	R. Lee	R. Lee
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Nov 19, 1992	Nov 19, 1992	Nov 19, 1992	Nov 19, 1992
QC Sample #:	GBLK111992A	GBLK111992A	GBLK111992A	GBLK111992A
Sample Conc.:	N.A.	N.A.	N.A.	N.A.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	9.6	9.8	9.3	29
Matrix Spike % Recovery:	96	98	93	97
Conc. Matrix Spike Dup.:	10	11	10	32
Matrix Spike Duplicate % Recovery:	100	110	100	107
Relative % Difference:	4.1	12	7.2	9.8

SEQUOIA ANALYTICAL

*Maria Lee*  
Maria Lee  
Project Manager

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



# 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, San Lorenzo

QC Sample Group: 2112373-5

Reported: Dec 1, 1992

## QUALITY CONTROL DATA REPORT

ANALYTE	Chemical Oxygen Demand	Total Suspended Solids	Arsenic
Method:	EPA 410.4	EPA 160.2	EPA 206.2
Analyst:	Y. Arteaga	Y. Arteaga	F. Contreras
Reporting Units:	mg/L	mg/L	mg/L
Date Analyzed:	Nov 16, 1992	Nov 16, 1992	Nov 25, 1992
QC Sample #:	211-0496	211-2375	BLK112392
Sample Conc.:	28	110	N.D.
Spike Conc. Added:	100	N.A.	0.050
Conc. Matrix Spike:	130	N.A.	0.052
Matrix Spike % Recovery:	102	N.A.	104
Conc. Matrix Spike Dup.:	120	110	0.051
Matrix Spike Duplicate % Recovery:	92	N.A.	102
Relative % Difference:	8.0	0.0	1.9

SEQUOIA ANALYTICAL

*Maria Lee*  
# Maria Lee  
Project Manager

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





### CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO.		PROJECT NAME/SITE		ANALYSIS REQUESTED										P.O. #:
3462-2		Crown Metals 16525 Wortley Dr, San Lorenzo		BTX (602/8020) TPH (8015) TPHd (8015) TOG 418 1/5520 601/8010 624/8240 623/8270 ARSENIC COD Suspended Solids										
SAMPLERS (SIGN)		(PRINT)												NO. CONTAINERS
SAMPLE IDENTIFICATION		DATE	TIME	COMP	GRAB	PRES. USED	ICED							
Influent		11-13-92	9:30		X	HOL	Y	3	W	XX		2112373		
Intermediate		↓	9:35		X		↓	3	↓	XX		↓ 74		
Effluent		↓	9:40		X	↓	↓	6	Y	XX	XXX	↓ 75		
COPY														

RELINQUISHED BY: <i>[Signature]</i>	DATE 11/13/92	TIME 11:00	RECEIVED BY: <i>[Signature]</i>	LABORATORY: Sequoia	PLEASE SEND RESULTS TO: Kin Leung 42501 Albroe St Fremont CA 94538
RELINQUISHED BY: <i>[Signature]</i>	DATE 11/13/92	TIME 1400	RECEIVED BY: <i>[Signature]</i>	REQUESTED TURNAROUND TIME: Normal	
RELINQUISHED BY: <i>[Signature]</i>	DATE 11/13/92	TIME 1505	RECEIVED BY: <i>[Signature]</i>	RECEIPT CONDITION: good / cool	PROJECT MANAGER: