

42501 Albrae Street
Fremont, CA 94538
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T R A N S M I T T A L

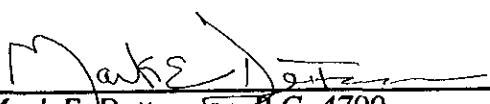
DATE: December 18, 1992
PROJECT NO.: F1587.00
TO: Ms. Pamela Evans
Alameda County
Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621-1439
SUBJECT: Groundwater Monitoring Report

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	11/20/92	May 1992 Quarterly Groundwater Monitoring Report, 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



Mark E. Dettermän, R.G. 4799
Project Manager

**MAY 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
November 1992**

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

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-

42501 Albrae Street
Fremont, CA 94538
Phone: (510) 440-3300
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November 20, 1992
Project No. F1587-00

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

Attention: Mr. Richard C. Ernest

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

Dear Mr. Ernest:

RESNA Industries Inc. has completed the May quarterly groundwater monitoring at the subject site in the City of San Lorenzo, Alameda County, California (Plate 1). Quarterly groundwater sampling of monitoring well MW-2 was conducted on May 21, 1992, as part of the ongoing quarterly monitoring program. Beginning this quarter, the sampling frequency for well MW-8 is reduced to annually as approved by the Alameda County Health Services Agency. During quarterly monitoring, water level measurements were collected from all on-site monitoring wells except MW-1 and MW-8 due to accessibility problems. 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 and limits access to the well. However, a sample was collected from the remediation system influent from well RW-1. Sample collection from 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 (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, (Plate 2) reveals a shallow groundwater gradient in the area of investigation for May 21, 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 0.003 to 0.007 to the south southwest.

Laboratory Analyses and Results

The groundwater samples were analyzed by Sequoia Analytical, 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 petroleum hydrocarbons were detected in well MW-2 and the remediation system influent. Copies of the laboratory report and chain-of-custody documents are found in Appendix B. The concentrations reported by Sequoia were as follows:

Compound	MW-2 (05/21/92)	RW-1 Influent (05/21/92)
TPHG	790	57
Benzene	26	20
Toluene	5.4	<0.50
Ethyl benzene	<1.0	1.7
Total Xylenes	<1.0	0.85

< 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:

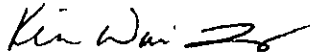
1. The observations by field personnel.
2. The results of laboratory analyses performed by a state-certified laboratory.
3. Our understanding of the regulations of the State of California and Alameda County and/or the City of San Lorenzo.

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.

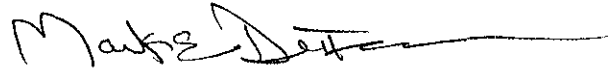
The service performed by RESNA has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the San Lorenzo area. Please note that contamination of soil and groundwater must be reported to 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/lr

cc: Mr. James Lewis, Pacific International Steel

RESNA Industries, Inc.
 Project No. F1587.00
 November 20, 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	BDL	BDL	BDL	—	BDL	8.86	7.56
	11/24/87	BDL	BDL	BDL	—	9.0		7.51
	2/29/88	BDL	BDL	BDL	—	BDL		7.18
	5/25/88	BDL	BDL	BDL	—	BDL		7.40
	8/10/88	ND	ND	ND	ND	ND		7.85
	11/29/88	ND	ND	ND	ND	ND		7.86
	2/7/89	ND	ND	ND	ND	ND		7.43
	5/12/89	ND	1.4	ND	ND	ND		7.23
	8/4/89	ND	ND	ND	ND	ND		8.17
	11/14/89	ND	ND	ND	—	—		7.93
	1/3/90	—	—	—	—	—		7.77
	2/22/90	ND	ND	ND	ND	ND		7.28
	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	—	—	—	—	—	—		
MW-2	7/14/87	110	1.2	1.9	—	2.0	9.17	7.79
	11/24/87	3,600	82	47	—	13		7.73
	2/29/88	800	BDL	BDL	—	BDL		7.26
	5/25/88	250	ND	ND	—	ND		7.45
	8/10/88	260	ND	ND	ND	ND		7.90

RESNA Industries, Inc.
 Project No. F1587.00
 November 20, 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-2 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	
MW-3	7/14/87	260	BDL	1.0	—	2.0	8.54	7.09
	11/24/87	8,900	1,700	3.0	—	12		7.11
	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
	8/4/89	2,900	800	7.5	96	ND		7.38
	11/14/89	Destroyed in August 1989						

RESNA Industries, Inc.
 Project No. F1587.00
 November 20, 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-4	7/14/87	BDL	BDL	BDL	—	BDL	8.48	7.25
	11/24/87	60	BDL	0.65	—	7.6		6.97
	2/29/88	BDL	BDL	BDL	—	BDL		6.54
	5/25/88	BDL	BDL	BDL	—	BDL		6.36
	8/10/88	—	—	—	—	—		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		6.67
	5/17/90	ND	—	—	—	—		—
	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		
MW-5	7/14/87		BDL	BDL	—	BDL	9.11	7.06
	11/24/87	BDL	BDL	BDL	—	7.2		7.24
	2/29/88	BDL	BDL	BDL	—	BDL		6.75
	5/25/88	BDL	—	—	—	—		—
	8/10/88	—	ND	ND	ND	ND		7.35
	11/29/88	ND	ND	ND	ND	ND		—

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-5 (Con't)	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		6.85
	5/17/90	ND	—	—	—	—		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
MW-6	7/14/87	BDL	BDL	BDL	—	BDL	9.19	—
	11/24/87	—	—	—	—	—		—
	1/5/88	BDL	BDL	BDL	—	BDL		—
	2/29/88	BDL	BDL	BDL	—	BDL		7.19
	5/25/88	BDL	BDL	BDL	ND	BDL		7.33
	8/10/88	BDL	ND	ND	ND	ND		7.50
	11/29/88	ND	ND	ND	ND	ND		7.93
	2/7/89	ND	ND	ND	ND	ND		7.56
	5/12/89	ND	ND	ND	ND	ND		7.16
	8/4/89	ND	ND	ND	ND	ND		7.94
	11/14/89	ND	ND	ND	ND	ND		8.92

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)	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
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
	8/8/91	—	—	—	—	—		7.15
	11/15/91	—	—	—	—	—		7.20
	2/12/92	—	—	—	—	—		6.73
5/21/92	—	—	—	—	—		6.67	

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-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	—	—	—	—	—		—
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	—	—
	5/21/92	57	20	ND	1.7	0.85	—	—
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	—	—

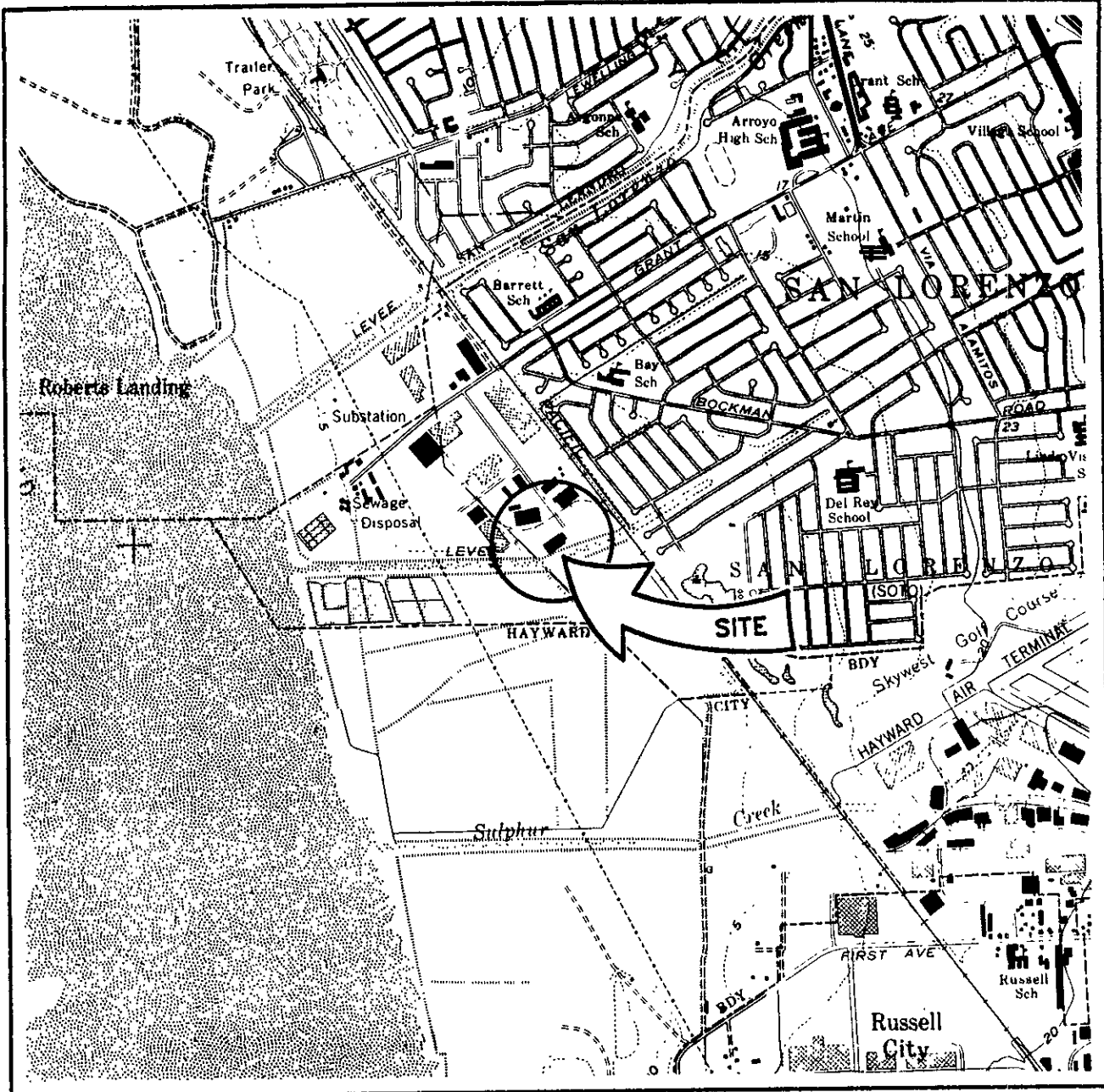
TABLE 1

SUMMARY OF GROUNDWATER ANALYSES DATA

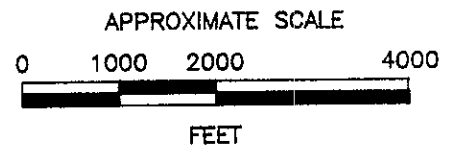
Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft above MSL)	Depth to Water (ft)
BB-1	8/8/91	ND	ND	ND	ND	ND	—	—
Con't	11/15/91	ND	ND	ND	ND	ND	—	—
	2/12/92	—	—	—	—	—	—	—
	5/21/92	—	—	—	—	—	—	—

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

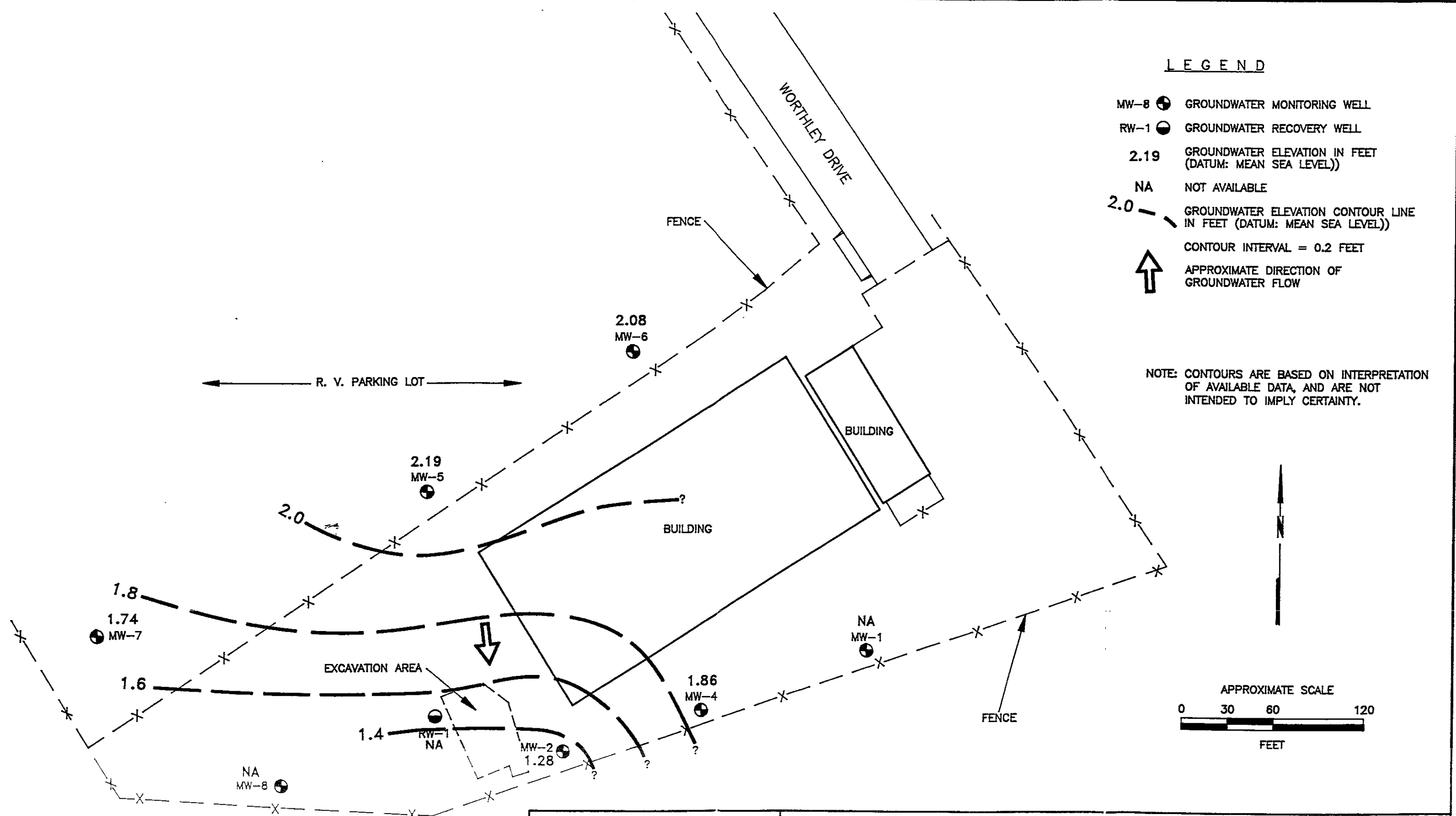


RESNA	SITE LOCATION MAP	PLATE 1
	CROWN METAL MFG. — PACIFIC INTL' STEEL	
	16525 WORTHLEY DRIVE	
	SAN LORENZO, CALIFORNIA	
PROJECT NO. F1587.00		

LEGEND

- MW-8 GROUNDWATER MONITORING WELL
- RW-1 GROUNDWATER RECOVERY WELL
- 2.19 GROUNDWATER ELEVATION IN FEET (DATUM: MEAN SEA LEVEL))
- NA NOT AVAILABLE
- 2.0 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.



RESNA	GROUNDWATER SURFACE CONTOUR MAP (5/21/92)		PLATE 2
	CROWN METAL MFG. - PACIFIC INTL' STEEL		
PROJECT NO. F1587.00	16525 WORTHLEY DRIVE		
	SAN LORENZO, CALIFORNIA		

F1587-E3

APPENDIX A

GROUNDWATER SAMPLING PROTOCOL

GROUNDWATER SAMPLING PROTOCOL

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

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

Equipment Cleaning and Decontamination

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

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

Water Level Measurements

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

Bailer Sheen Check

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

Groundwater Sampling

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

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

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

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

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

Chain-of-Custody

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

Sample Storage

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

Quality Assurance/Quality Control Objectives

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

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

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

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

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

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

Shallow Groundwater Survey

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

APPENDIX B

**FIELD SAMPLING LOG,
LABORATORY REPORT AND
CHAIN-OF-CUSTODY RECORD**

Job Name: CROWN METAL Date: 5-21-92
 Job No.: 1547 6 Sampled by: R. Adair
 Phase: Motly Laboratory: Sequoia
 Wells Secure: Yes No If no, then comment: _____
 Drums at Site: Full 1/2 Empty Aprox 10

Well No.	Depth to Water (ft)	Well Depth (ft)	Time (W'L)	Purge Volume (gal)	Temp. (°C)	Cond. (umho/cm)	pH	Observations
1			2:00					cap Jammed on PVC.
2	7.89'	25.60'	2:10	30 6.0 9.0 SAMPLE	72.8 70.0 68.6 73.0	1840 1858 1862 1136	6.81 6.69 6.67 7.17	clear ~ cloudy No Odor No Sheen 7.89' at Sample
4	6.62'		2:20					clear - No Odor No Sheen
5	6.92'		2:25					clear No Odor No Sheen
6	Fill		2:30					clear - No Odor No Sheen

Job Name: CROWN METAL Date: 5-21-92
 Job No.: 1547 G Sampled by: R. Adair
 Phase: Mntly 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
7	667		2:35					clear - No Odor No Screen
8	N/A							I had an old map at time of well sampling. I could not find this well. I will stop by 5-27-92 to re-tag. (PA)

Job Name: Down Metals Date: 5-21-92
 Job No.: 1547 G Sampled by: R. Adair
 Phase: Matly 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
142L-02R-12H-250C-12H			1:10		72.3	over 2000	6.96	clear No Odor No Sheen
142L-02R-12H-250C-12H			1:15		73.6	over 2000	6.80	clear No Odor No Sheen
142L-02R-12H-250C-12H			1:25		70.1	over 2000	7.00	clear No Odor No Sheen
142L-02R-12H-250C-12H								
FLOWMETER READING								0272694



SEQUOIA ANALYTICAL

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

RESNA	Client Project ID: 1587-26, Crown Metal	Sampled: May 21, 1992
42501 Albrae Street, Suite 100	Matrix Descript: Water	Received: May 22, 1992
Fremont, CA 94538	Analysis Method: EPA 5030/8015/8020	Analyzed: Jun 4, 1992
Attention: Jim Rubin	First Sample #: 205-4589	Reported: Jun 8, 1992

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

Sample Number	Sample Description	Low/Medium B.P.	Benzene	Toluene	Ethyl Benzene	Xylenes
		Hydrocarbons				
		$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)
205-4589	MW-2	790	26	5.4	N.D.	N.D.

Detection Limits:	100	1.0	1.0	1.0	1.0
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Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard. Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Marla Lee
 Marla Lee
 Project Manager

Please Note:
 The above sample does not appear to contain gasoline.



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: Jim Rubin

Client Project ID: 3462-2, Crown Metal-San Lorenzo
Matrix Descript: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 205-4244

Sampled: May 21, 1992
Received: May 22, 1992
Analyzed: 5/29-31/92
Reported: Jun 10, 1992

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

Sample Number	Sample Description	Low/Medium B.P.	Benzene	Toluene	Ethyl Benzene	Xylenes
		Hydrocarbons µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
205-4244	Effluent Influent <i>ql</i>	N.D.	N.D.	N.D.	N.D.	N.D.
205-4245	Intermediate	N.D.	N.D.	N.D.	N.D.	N.D.
205-4246	Influent Effluent <i>ql</i>	57	20	N.D.	1.7	0.85

Detection Limits:	50	0.50	0.50	0.50	0.50
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Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maria Lee
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 94538
Attention: Jim Rubin

Client Project ID: 3462-2, Crown Metal-San Lorenzo
Sample Descript: Water, Effluent
Lab Number: 205-4246

Sampled: May 21, 1992
Received: May 22, 1992
Analyzed: 5/26-6/3/92
Reported: Jun 10, 1992

LABORATORY ANALYSIS

Analyte	Detection Limit mg/L	Sample Results mg/L
Arsenic.....	0.0050	0.018
Chemical Oxygen Demand.....	20	890
Suspended Solids.....	1.0	100

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

SEQUOIA ANALYTICAL

Maria Lee
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 94538
Attention: Jim Rublin

Client Project ID: 1587-26, Crown Metal

QC Sample Group: 205-4589

Reported: Jun 8, 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:	Jun 4, 1992	Jun 4, 1992	Jun 4, 1992	Jun 4, 1992
QC Sample #:	GBLK060492 MS/MSD	GBLK060492 MS/MSD	GBLK060492 MS/MSD	GBLK060492 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	32
Matrix Spike % Recovery:	100	100	100	107
Conc. Matrix Spike Dup.:	11	11	11	32
Matrix Spike Duplicate % Recovery:	110	110	110	107
Relative % Difference:	9.5	9.5	9.5	0.0

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 34162-2		PROJECT NAME / SITE 16525 WORTHELLEY, San Lorenzo CREOSOTE METAL						ANALYSIS REQUESTED										P.O. #		
SAMPLERS (SIGN) Peter C. Adams		(PRINT) Robin A. Adams						NO CONTAINERS	SAMPLE TYPE	<div style="display: flex; justify-content: space-between;"> BTEX (602/8020) TPH9 (8015) TPHd (8015) TOG 418 1/5520 601/8010 624/8240 625/8270 COD SS Arsenic </div>										REMARKS
SAMPLE IDENTIFICATION	DATE	TIME	COMP	GRAB	PRES USED	ICED	BTEX			TPH9	TPHd	TOG	601	624	625	COD	SS	Arsenic		
Influent Sample Port 2054044	5-21-92	1:15			HCl	Y	3	X	X									Detec Limit of 50 mg/l TPH9		
Intermediate Sample Port 2054045		1:20			HCl	Y	3	X	X									Detec Limit of 0.5 mg/l BTEX		
Effluent Sample Port 2054046		1:30			HCl	Y	3	X	X											
Effluent Sample Port		1:35			11	Y	24							X	/			Pres upon Receipt		
" " "		1:45				Y	24							X				Pres. upon Receipt		
" " "		1:55				Y	14								X			Pres. upon Receipt		
RELINQUISHED BY Peter C. Adams		DATE 5/22/92	TIME	RECEIVED BY:				LABORATORY Sequoia										PLEASE SEND RESULTS TO: Jim Rubin (Resna)		
RELINQUISHED BY		DATE	TIME	RECEIVED BY				REQUESTED TURNAROUND TIME NORMAL												
RELINQUISHED BY		DATE	TIME	RECEIVED BY				RECEIPT CONDITION good / cool												
RELINQUISHED BY		DATE	TIME	RECEIVED BY LABORATORY NAN 5/22/92				PROJECT MANAGER												