RESNA
Working To Restore Nature

93 JUL 28 PM 2:23

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

TRANSMITTAL

TO: Ms. Pamela Evans
Alameda County Health Care
Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94612

DATE: July 20, 1993
PROJECT NUMBER: F1587.33
SUBJECT: Pacific Steel Facility

FROM: Mark E. Detterman
TITLE: Senior Project Geologist

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	July 23, 1993	May 1993 Quarterly Groundwater Monitoring Report, Pacific International Steel Facility, 16526 Worthley Drive, San Lorenzo, California.

THESE ARE TRANSMITTED as checked below:

[ ] For review and comment	[ ] Approved as submitted	[ ] Resubmit ___ copies for approval
[ ] As requested	[ ] Approved as noted	[ ] Submit___ copies for distribution
[ ] For approval	[ ] Return for corrections	[ ] Return ___ corrected prints
[X] For your files	[ ] For distribution to regulatory agencies	

REMARKS:
Copies: 1 to RESNA project file.

Mark E. Detterman, Senior Project Geologist

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

MAY 1993 QUARTERLY GROUNDWATER MONITORING REPORT AT PACIFIC STEEL FACILITY 16525 WORTHLEY DRIVE SAN LORENZO, CALIFORNIA

FOR

CROWN METAL MANUFACTURING
765 SOUTH STATE ROUTE 83
ELMHURST, ILLINOIS

Project No. F1587.33
July 1993

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

TRANSMITTAL

DATE: April 28, 1993
PROJECT NO.: F1587.33

TO: Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94612-1439

ATTENTION: Ms. Pamela Evans

SUBJECT: Pacific International Steel Facility

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	4/5/93	February 1993 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. Detterman, C.E.G. 1788
Project Manager

RESNA
Working to Restore Nature

TABLE OF CONTENTS

PLATES

TABLES

APPENDICES

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

July 23, 1993
RESNA Job No. F1587.33

Mr. Richard C. Ernest
Crown Metal Manufacturing
765 South State Route 83
Elmhurst, IL 60126-4700

Subject: May 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 May 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 May 28, 1993, as part of the ongoing quarterly monitoring program. During this quarterly monitoring event, water level measurements were collected from all accessible 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 March 18, April 22, and May 28, 1993. Groundwater samples were not obtained from monitoring wells MW-1, MW-4 MW-5, MW-6 and MW-7 as approved by the Alameda County Health Care Services Agency (ACHCSA) (ACHCSA, March 25, 1991). A groundwater sample was not obtained from monitoring well MW-8 as approved by ACHCSA (ACHCSA, May 8, 1992). Annual sampling of this monitoring well is conducted every February. In addition, debris prevented access to monitoring well MW-4. Monitoring well MW-3 was destroyed in August 1989.

Groundwater Sampling

Before sampling, RESNA measured the depth of 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 well was placed in drums approved by the Department of Transportation. Copies of the field sampling log are located 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 May 28, 1993. The contours indicate that the piezometric surface is highest along the northwestern boundary of the site and the apparent gradient is to the south-southeast at a gradient of approximately 0.005.

Laboratory Analyses and Results

The groundwater samples were analyzed by Sequoia Analytical, a state-certified laboratory located in Redwood City, California. The samples were analyzed for the presence of total petroleum hydrocarbons as gasoline (TPHG), benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency Method 5030/8015/8020. TPHG was detected at a concentration of 110 parts per billion (ppb) on May 28, 1993. No other gasoline constituents were detected. Copies of the laboratory report and chain-of-custody documents are found in Appendix B.

The sample concentrations reported by the laboratory for the listed dates were as follows:

Compound	MW-2 (05/28/93)	RW-1 Influent (04/22/93)	RW-1 Influent (05/28/93)
	(ppb)	(ppb)	(ppb)
TPHG	110	<50	<50
Benzene	<0.50	13	0.76
Toluene	<0.50	<0.50	<0.50
Ethylbenzene	<0.50	1.5	<0.50
Total Xylenes	<0.50	<0.50	<0.50

< Not detected at or above the indicated method detection limit.
ppb Parts per billion (μg/l)

Reporting Requirements

At your request, a copy of this report has been forwarded by RESNA to the following agencies:

- Mr. Richard Heitt
  California Regional Water Quality Control Board
  San Francisco Bay Region
  2101 Webster Street, Suite 500
  Oakland, California 94612-3429

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

References

Alameda County Health Care Services Agency, March 25, 1991, Letter from Pamela J. Evans, Hazardous Materials Specialist to Mr. Richard Earnest, Crown Metals Manufacturing Company, at Pacific International Steel, 16525 Worthley Avenue, San Lorenzo, California 94580.

_____, May 8, 1992, Letter from Scott O. Seery, CHMM, Senior Hazardous Materials Specialist, to Mr. Richard Earnest, Crown Metals Manufacturing Company at Pacific International Steel, 16525 Worthley Avenue, San Lorenzo, California 94580.

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, 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 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.

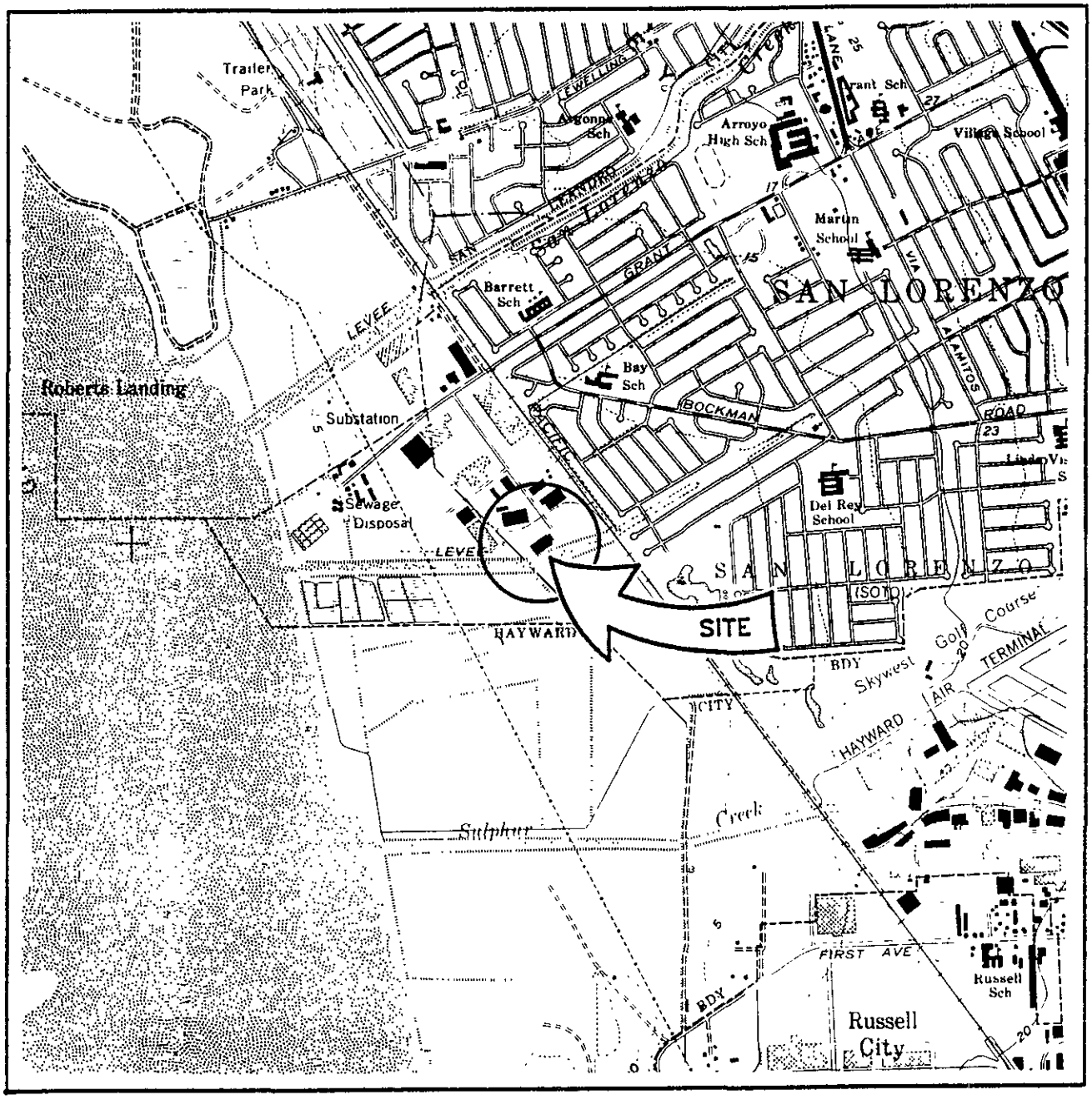
Sincerely,
RESNA Industries Inc.

Richard A. Garlow
(E.G.)
Richard A. Garlow
Senior Project Geologist

Mark E. Detterman, C.E.G. 1788
Program Geologist

RAG/MED/lr
Enclosures

cc: Mr. James Lewis, Pacific International Steel
Mr. Richard Heitt, California Regional Water Quality Control Board
Ms. Pamela Evans, Alameda County Health Care Services Agency



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

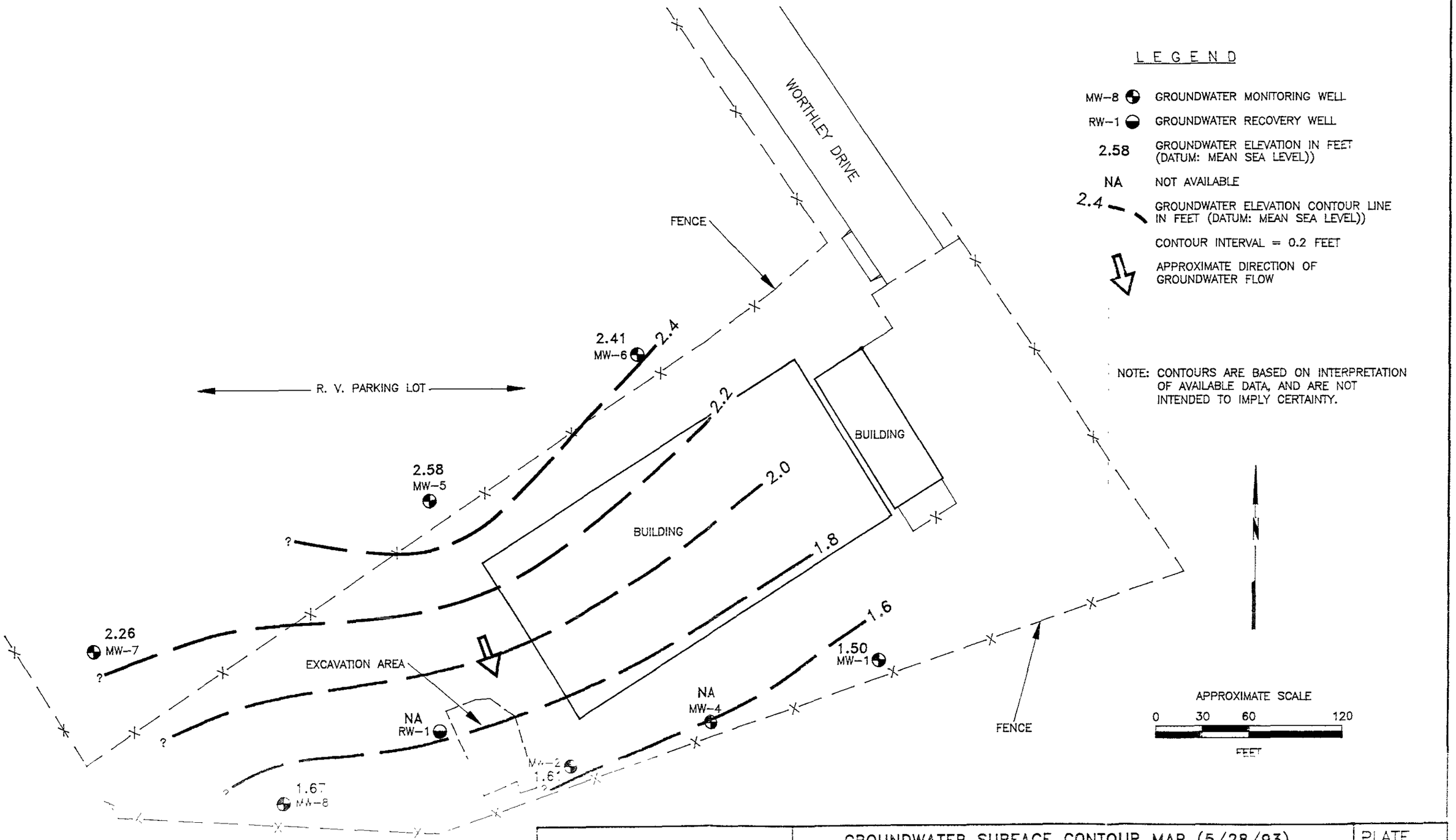
N

APPROXIMATE SCALE

0 1000 2000 4000

FEET

RESNA	**SITE LOCATION MAP**	PLATE
	CROWN METAL MFG. – PACIFIC INTL' STEEL	1
	16525 WORTHLEY DRIVE	
PROJECT NO. F1587.33	SAN LORENZO, CALIFORNIA	



RESNA
Working to Restore Nature

PROJECT NO. F1587.33

F1587E5

GROUNDWATER SURFACE CONTOUR MAP (5/28/93)

CROWN METAL MFG. - PACIFIC INT'L STEEL

16525 WORTHLEY DRIVE

SAN LORENZO, CALIFORNIA

PLATE 2

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-1	07/14/87	ND	ND	ND	---	ND	8.86	7.56
	11/24/87	ND	ND	ND	---	9.0		7.51
	02/29/88	ND	ND	ND	---	ND		7.18
	05/25/88	ND	ND	ND	---	ND		7.40
	08/10/88	ND	ND	ND	ND	ND		7.85
	11/29/88	ND	ND	ND	ND	ND		7.86
	02/07/89	ND	ND	ND	ND	ND		7.43
	05/12/89	ND	1.4	ND	ND	ND		7.23
	08/04/89	ND	ND	ND	ND	ND		8.17
	11/14/89	ND	ND	ND	---	---		7.93
	01/03/90	---	---	---	---	---		7.77
	02/22/90	ND	ND	ND	ND	ND		7.28
	05/17/90	---	---	---	---	---		7.62
	08/17/90	---	---	---	---	---		7.91
	11/06/90	---	---	---	---	---		8.01
	02/01/91	ND	ND	ND	ND	ND		8.00
	05/01/91	---	---	---	---	---		7.36
	08/08/91	---	---	---	---	---		8.17
	11/15/91	---	---	---	---	---		8.17

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-1 (Con't)	02/12/92	---	---	---	---	---	8.86	6.75
	05/21/92	---	---	---	---	---		---
	11/13/92	---	---	---	---	---		8.00
	02/24/93	---	---	---	---	---		5.74
	05/28/93	---	---	---	---	---		7.36
MW-2	07/14/87	110	1.2	1.9	---	2.0	9.17	7.79
	11/24/87	3,600	82	47	---	13		7.73
	02/29/88	800	ND	ND	---	ND		7.26
	05/25/88	250	ND	ND	---	ND		7.45
	08/10/88	260	ND	ND	ND	ND		7.90
	11/29/88	870	9.0	ND	1.0	1.0		8.20
	02/07/89	710	16	ND	ND	ND		7.47
	05/12/89	260	2.8	0.76	1.3	3.0		7.27
	08/04/89	360	ND	ND	ND	0.48		8.23
	11/14/89	85	ND	3.5	0.36	2.5		8.08
	01/03/90	---	---	---	---	---		7.95
	02/22/90	120	ND	ND	1.5	0.55		7.47
	05/17/90	240	ND	ND	ND	ND		7.70

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-2	08/17/90	130	ND	2.9	1.2	0.68	9.17	8.00
(Con't)	11/06/90	170	0.37	1.2	2.0	1.5.		8.30
	02/01/91	57	ND	ND	ND	0.73		8.15
	05/01/91	220	1.5	0.42	0.53	0.54		7.56
	08/08/91	710	4.1	0.84	ND	0.71		8.95
	11/15/91	630	2.3	ND	3.1	0.86		8.26
	02/12/92	580	5.9	1.2	0.52	ND		7.02
	05/21/92	790	26	5.4	ND	ND		7.89
	11/13/92	230	ND	ND	ND	ND		8.29
	02/24/93	400	17	ND	ND	ND		5.75
	05/28/93	110	<0.50	<0.50	<0.50	<0.50		7.56
MW-3	07/14/87	260	ND	1.0	---	2.0	8.54	7.09
	11/24/87	8,900	1,700	3.0	---	12		7.11
	02/29/88	9,300	1,600	93	---	99		6.57
	05/25/88	11,000	140	16	---	34		6.80
	08/10/88	4,600	23	4.8	140	3.0		7.20
	11/29/88	16,000	3,900	11	600	40		7.41
	02/07/89	---	---	---	---	---		NA

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-3	05/12/89	2,500	ND	5.6	ND	2.7	8.54	6.64
(Con't)	08/04/89	2,900	800	7.5	96	ND		7.38
	11/14/89	Well Destroyed in August 1989						
MW-4	07/14/87	ND	ND	ND	---	ND	8.48	7.25
	11/24/87	60	ND	0.65	---	7.6		6.97
	02/29/88	ND	ND	ND	---	ND		6.54
	05/25/88	ND	ND	ND	---	ND		6.36
	08/10/88	---	---	---	---	---		NA
	11/29/88	ND	0.87	ND	ND	ND		6.85
	02/07/89	ND	ND	ND	ND	ND		6.26
	05/12/89	ND	ND	ND	ND	0.76		6.55
	08/04/89	---	---	---	---	---		NA
	11/14/89	---	---	---	---	---		---
	02/22/90	ND	ND	ND	ND	ND		6.67
	05/17/90	---	---	---	---	---		---
	08/17/90	---	---	---	---	---		7.30
	11/06/90	---	---	---	---	---		7.15
	02/01/91	ND	ND	ND	ND	ND		6.85

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-4	05/01/91	---	---	---	---	---	8.48	6.73
(Con't)	08/08/91	---	---	---	---	---		---
	11/15/91	---	---	---	---	---		7.45
	02/12/92	---	---	---	---	---		6.55
	05/21/92	---	---	---	---	---		6.62
	11/13/92	---	---	---	---	---		7.45
	02/24/93	---	---	---	---	---		4.28
	05/28/93	---	---	---	---	---		---
MW-5	07/14/87	ND	ND	ND	---	ND	9.11	7.06
	11/24/87	ND	ND	ND	---	7.2		7.24
	02/29/88	ND	ND	ND	---	ND		6.75
	05/25/88	ND	---	---	---	---		---
	08/10/88	---	ND	ND	ND	ND		7.35
	11/29/88	ND	ND	ND	ND	ND		---
	02/07/89	ND	ND	ND	ND	ND		7.02
	05/12/89	ND	ND	ND	ND	0.84		6.69
	08/04/89	ND	ND	ND	ND	ND		7.52
	11/14/89	ND	ND	ND	ND	ND		7.51

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-5	01/03/90	ND	---	---	---	---	9.11	7.42
(Con't)	02/21/90	ND	ND	ND	ND	ND		6.85
	05/17/90	---	---	---	---	---		7.09
	08/17/90	---	---	---	---	---		7.36
	11/06/90	---	---	---	---	---		7.65
	02/01/91	ND	ND	ND	ND	ND		7.63
	05/10/91	---	---	---	---	---		6.68
	08/08/91	---	---	---	---	---		7.65
	11/15/91	---	---	---	---	---		7.52
	02/12/92	---	---	---	---	---		6.43
	05/21/92	---	---	---	---	---		6.92
	11/13/92	---	---	---	---	---		7.63
	02/24/93	---	---	---	---	---		5.15
	05/28/93	---	---	---	---	---		6.53
MW-6	07/14/87	ND	ND	ND	---	ND	9.19	---
	11/24/87	---	---	---	---	---		---
	01/05/88	ND	ND	ND	---	ND		---
	02/29/88	ND	ND	ND	---	ND		7.19

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-6 (Con't)	05/25/88	ND	ND	ND	ND	ND	9.19	7.33
	08/10/88	ND	ND	ND	ND	ND		7.50
	11/29/88	ND	ND	ND	ND	ND		7.93
	02/07/89	ND	ND	ND	ND	ND		7.56
	05/12/89	ND	ND	ND	ND	ND		7.16
	08/04/89	ND	ND	ND	ND	ND		7.94
	11/14/89	ND	ND	ND	ND	ND		8.92
	01/03/90	ND	---	---	---	---		7.89
	02/21/90	---	ND	ND	ND	ND		7.28
	05/17/90	ND	---	---	---	---		7.89
	08/17/90	---	---	---	---	---		7.68
	11/06/90	---	---	---	---	---		8.05
	02/01/90	ND	ND	ND	ND	ND		7.87
	05/01/90	---	---	---	---	---		6.95
	08/08/91	---	---	---	---	---		7.97
	11/15/91	---	---	---	---	---		7.92
	02/12/92	---	---	---	---	---		6.92
	05/21/92	---	---	---	---	---		7.11
	11/13/92	---	---	---	---	---		7.98

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-6	02/24/93	---	---	---	---	---	9.19	5.61
(Con't)	05/28/93	---	---	---	---	---		6.78
MW-7	01/03/90	---	---	---	---	---	8.41	8.06
	01/09/90	ND	ND	ND	ND	ND		8.42
	02/21/90	ND	ND	ND	ND	ND		6.63
	05/17/90	ND	ND	ND	ND	ND		6.81
	08/17/90	48	ND	ND	ND	ND		7.13
	11/06/90	ND	ND	ND	ND	0.32		7.29
	02/01/91	ND	ND	ND	ND	ND		7.20
	05/01/91	---	---	---	---	---		6.80
	08/08/91	---	---	---	---	---		7.15
	11/15/91	---	---	---	---	---		7.20
	02/12/92	---	---	---	---	---		6.73
	05/21/92	---	---	---	---	---		6.67
	11/13/92	---	---	---	---	---		7.03
	02/24/93	---	---	---	---	---		5.26
	05/28/93	---	---	---	---	---		6.15

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
MW-8	05/01/91	ND	ND	ND	ND	ND	8.52	7.67
	08/08/91	ND	ND	ND	ND	ND		8.15
	11/15/91	ND	ND	ND	ND	ND		7.94
	02/12/92	ND	ND	ND	ND	ND		7.29
	05/21/92	---	---	---	---	---		---
	11/13/92	---	---	---	---	---		8.02
	02/24/93	ND	ND	ND	ND	ND		5.47
	05/28/93	---	---	---	---	---		6.85
RW-1	01/03/90	---	---	---	---	---	11.02	9.81
	01/09/90	1,300	150	15	100	170		9.75
	03/01/90	440	9.4	1.3	16	25		9.34
	05/17/90	1,400	52	1.0	20	12		9.55
	08/17/90	1,800	410	7.8	160	65		9.84
	11/06/90	---	---	---	---	---		10.15
	10/25/91	420	79	1.8	2.5	14		10.20

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
RW-1 System Influent	01/16/91	78	17	2.7	7.7	1.3	---	---
	05/01/91	160	40	0.79	14	6.1	---	---
	08/08/91	89	41	0.31	4.6	0.73	---	---
	11/15/91	140	41	ND	1.3	0.44	---	---
	02/12/92	260	78	0.73	6.6	8.2	---	---
	05/21/92	57	20	ND	1.7	0.85	---	---
	11/13/92	ND	ND	ND	ND	ND	---	---
	01/08/93	ND	8	ND	0.78	0.59	---	---
	01/29/93	64	22	ND	4.8	3.7	---	---
	03/18/93	2,400	330	3.3	51	17	---	---
	04/22/93	<50	13	<0.50	1.5	<0.50	---	---
	05/28/93	<50	0.76	<0.50	<0.50	<0.50	---	---
BB-1	01/09/90	ND	ND	ND	ND	ND	---	---
	05/17/90	ND	ND	ND	ND	ND	---	---
	11/06/90	ND	ND	ND	ND	ND	---	---
	02/01/91	ND	ND	ND	ND	ND	---	---
	05/01/90	ND	ND	ND	ND	ND	---	---
	08/08/91	ND	ND	ND	ND	ND	---	---

TABLE 1
SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES DATA

Well	Date Sampled	TPHG (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (feet above MSL)	Depth to Water (feet)
BB-1	11/15/91	ND	ND	ND	ND	ND	---	---
(Con't)	02/12/92	---	---	---	---	---	---	---
	05/21/92	---	---	---	---	---	---	---
	11/13/92	---	---	---	---	---	---	---
	02/24/93	ND	ND	ND	ND	ND	---	---

Notes:

TPHG	Total petroleum hydrocarbons as gasoline	ppb	Parts per billion (µg/l)
ND	Not detected at or above the method detection limit (see laboratory reports for detection limits)	BB-1	Bailer Bank
		MSL	Mean sea level
---	No data obtained		

APPENDIX A

GROUNDWATER SAMPLING PROTOCOL

RESNA

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. If free-phase hydrocarbons persist through bailing, a groundwater sample will not be collected.

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 LOGS, LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

RESNA

SAMPLING LOG

Job Name: Crown Metals **Date:** 5-28-93

Job No.: F1582.33 **Sampled by:** Robin S

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	7.36							
MW-2	7.56	25.55		3 6 9 12	72.3 70.1 69.7	1010 1100 1130	7.21 7.18 7.15	NO odor NO sheen clear/cloudy
MW-4	Couldn't Locate							
MW-5	6.53							
MW-6	6.78							

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

RESNA

SAMPLING LOG

Job Name: Crown Metals Date: 5-28-93

Job No.: F1587.33 Sampled by: Robin S

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-7	6.15							
MW-8	6.85							

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

Sheet ___ of ___

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	F1587.33, Crown Metals	Sampled:	May 28, 1993
3315 Almaden Expwy., Suite 34	Sample Matrix:	Water	Received:	May 28, 1993
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jun 11, 1993
Attention: Kin Leung	First Sample #:	3ED2001		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 3ED2001 MW-2
Purgeable Hydrocarbons	50	110
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Total Xylenes	0.50	N.D.

Chromatogram Pattern: Discrete Peaks

Quality Control Data

Report Limit Multiplication Factor:	1.0
Date Analyzed:	6/10/93
Instrument Identification:	GCHP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	108

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

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

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

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Kin Leung

Client Project ID: F1587.33, Crown Metals
Matrix: Water

QC Sample Group: 3ED2001

Reported: Jun 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
Conc. Spiked:	10	10	10	30
Units:	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	BLK061093	BLK061093	BLK061093	BLK061093
Date Prepared:	N/A	N/A	N/A	N/A
Date Analyzed:	6/10/93	6/10/93	6/10/93	6/10/93
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
LCS % Recovery:	86	86	86	87
Control Limits:	80-120	80-120	80-120	80-120
MS/MSD Batch #:	3F32911	3F32911	3F32911	3F32911
Date Prepared:	N/A	N/A	N/A	N/A
Date Analyzed:	6/10/93	6/10/93	6/10/93	6/10/93
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Matrix Spike % Recovery:	100	100	110	103
Matrix Spike Duplicate % Recovery:	110	110	110	103
Relative % Difference:	9.5	9.5	0.0	0.0

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation and analytical methods employed for the samples. The LCS % recovery data is used for validation of sample batch results. Due to matrix effects, the QC limits for MS/MSD's are advisory only and are not used to accept or reject batch results.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
F1587.33	Crown Metals

SAMPLERS (Signature)

NO.	DATE	TIME	SAMPLE DESCRIPTION	TEST REQUESTED: TPH/G/BTEX
MW-2	5-28-93	16:00	2 pres VOAs	X

P.O. #

LAB Sequoia

TURN AROUND TIME Normal

REMARKS

9305020

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	5-28-93	15:00	
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	5-28-93	3:40	5/13
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:
	5-28-93	3:40pm	

REMARKS:

REPORT TO: Kin Leung / Resna San Jose

EXCELTECH
41674 Christy Street
Fremont, C.A. 94538-3114
(415) 659-0404
Fax (415) 651-4677
Contr. Lic. No. 550205

FORM DATED 3-27-90