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Working To Restore Nature

93 OCT 14 PM 12:16

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

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

DATE: October 8, 1993
PROJECT NUMBER: F1587.33
SUBJECT: Pacific Steel Facility

FROM: Richard A. Garlow
TITLE: Senior Project Geologist

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	October 8, 1993	Third Quarter 1993, Quarterly Groundwater Monitoring Report, Pacific International Steel Facility, 16526 Worthley Drive, San Lorenzo, California.

THESE ARE TRANSMITTED as checked below:

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REMARKS:
Copies: 1 to RESNA project file.

Richard A. Garlow, Senior Project Geologist

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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
Third Quarter 1993
at
Pacific International Steel Facility
16525 Worthley Drive
San Lorenzo, California

For

Crown Metal Manufacturing
765 South State Route 83
Elmhurst, Illinois

Project No. F1587.33
October 1993

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October 8, 1993
Project No. F1587.33

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

Subject: Quarterly Groundwater Monitoring, Third Quarter 1993, 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 this report of the results of Third Quarter 1993 quarterly groundwater monitoring at the subject site in the City of San Lorenzo, Alameda County, California (see Plate 1). Quarterly groundwater sampling of monitoring wells MW-2 and RW-1 was conducted on August 20, 1993, as part of ongoing quarterly monitoring program. During this quarterly monitoring event, depth to groundwater levels were measured in all existing monitoring wells (MW-1, MW-2, MW-4, MW-5, MW-6, MW-7 and MW-8). Monitoring well MW-3 was destroyed in August 1989. A depth to groundwater level was also measured in recovery well RW-1. Recovery well RW-1 is part of a groundwater remediation system installed by Resna and put into operation in January 1991. The groundwater remediation system consists of pumping the groundwater from RW-1 through two 55-gallon drums containing activated carbon and then discharging the treated groundwater into the sanitary sewer. Monthly monitoring of this groundwater remediation system is discussed in a separate report. In June 1993 analytical results of the groundwater remediation system effluent indicated a benzene break through in the groundwater remediation system carbon drums. The system was therefore shut down on June 14, 1993.

Subsequent problems including delays in obtaining replacement carbon and necessary repairs to the system pump delayed restart of the groundwater remediation system. After necessary repairs were made the groundwater remediation system was started up on September 15, 1993, for the purpose of obtaining water samples. Analytical results of the water samples indicated that benzene was present in the recovery well water at a concentration of 1.5 parts per billion (ppb) but was not detected (<0.50 ppb) after the water

passed through the activated carbon drums. After discussing these results with Ms. Susan Keach of the Oro Loma Sanitary District on Spetember 21, 1993, RESNA was granted permission to restart the groundwater remediation system. On September 23, 1993 the groundwater remediation system was restarted.

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 (MW-8) is conducted during the first quarter.

Groundwater Sampling

Before sampling, RESNA measured the depth to groundwater levels in wells RW-1 and 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 observed. Groundwater samples were collected in accordance with RESNA's field 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 well purge data sheets are included in Appendix B.

Hydrogeology

Depth to groundwater level measurements indicate that the groundwater surface dropped an average of 0.57 foot since last quarter (May 28, 1993). Based on August 20, 1993 depth to groundwater levels, interpreted groundwater elevation contours shown on Plate 2, indicate that the groundwater flow direction is to the south-southeast with a gradient of approximately 0.005.

Laboratory Analyses and Results

The groundwater samples from wells RW-1 and MW-2 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), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency Method 5030/8015/8020. The results of these analyses are shown in Table 1. Copies of the laboratory analytical report and chain-of-custody record are included in Appendix B.

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 94612

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.

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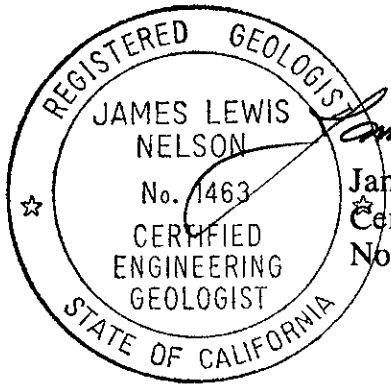
Third Quarter 1993 Quarterly Report — October 8, 1993
Pacific International Steel Facility, San Lorenzo, California — F1587.33

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
Senior Project Geologist



James L. Nelson
Certified Engineeringm Geologist
No. 1463

RAG/JLN/lr
Enclosures:

Plate 1: Site Vicinity Map
Plate 2: Groundwater Elevation Contour Map (08/20/93)

Table 1: Cumulative Results of Groundwater Sampling and Analyses

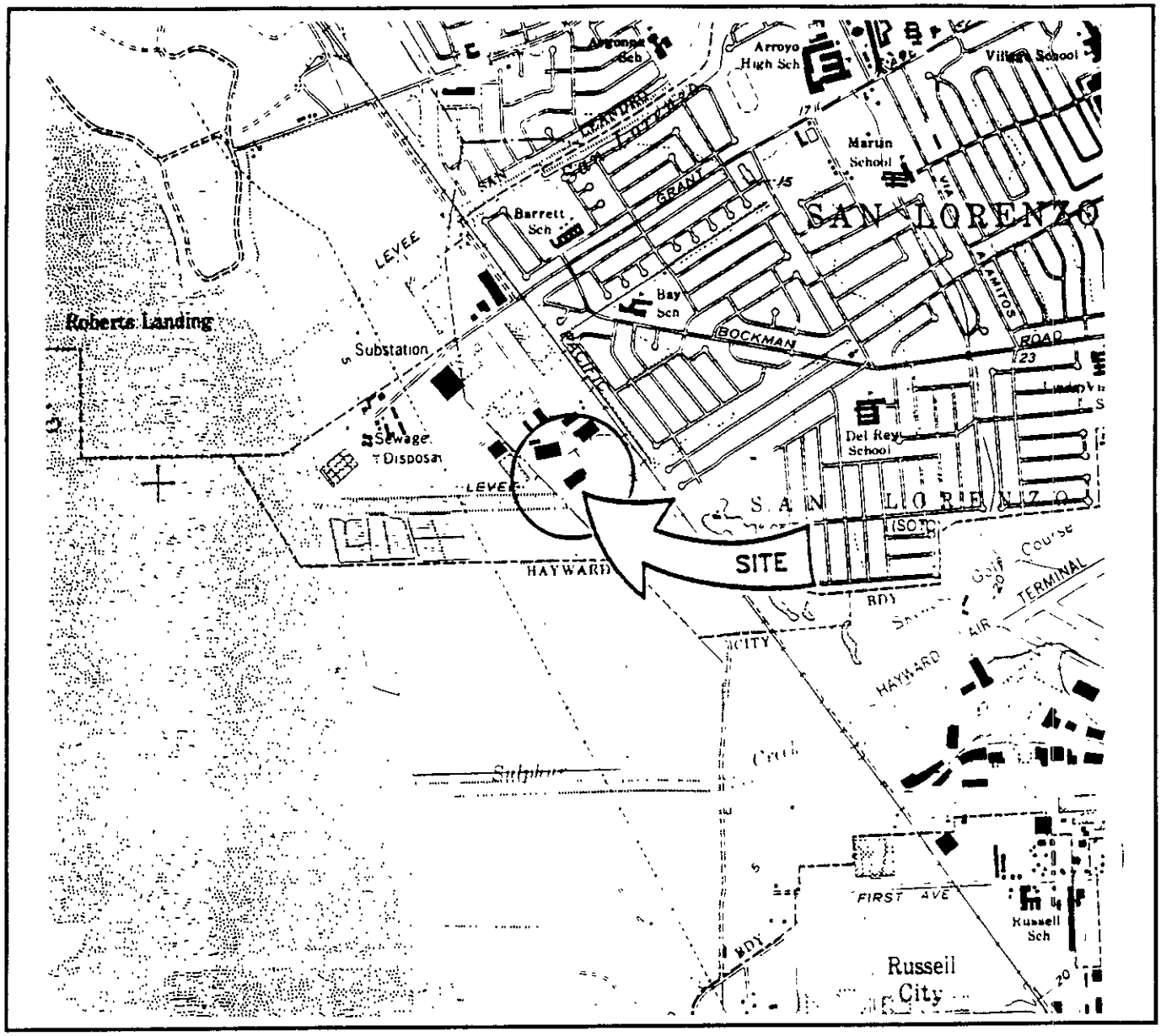
Appendix A: Field Protocol
Appendix B: Well Purge Data Sheets, Laboratory Reports and Chain-of-Custody Records

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

References

Alameda County Health Care Services Agency, March 25, 1991, Letter from Ms. 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 Mr. 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.



Base: U.S. Geological Survey
7.5-Minute Quadrangles
San Leandro, California.
Photorevised 1980

LEGEND

⊙ = Site Location

N

Approximate Scale

2000 1000 0 2000 4000

feet

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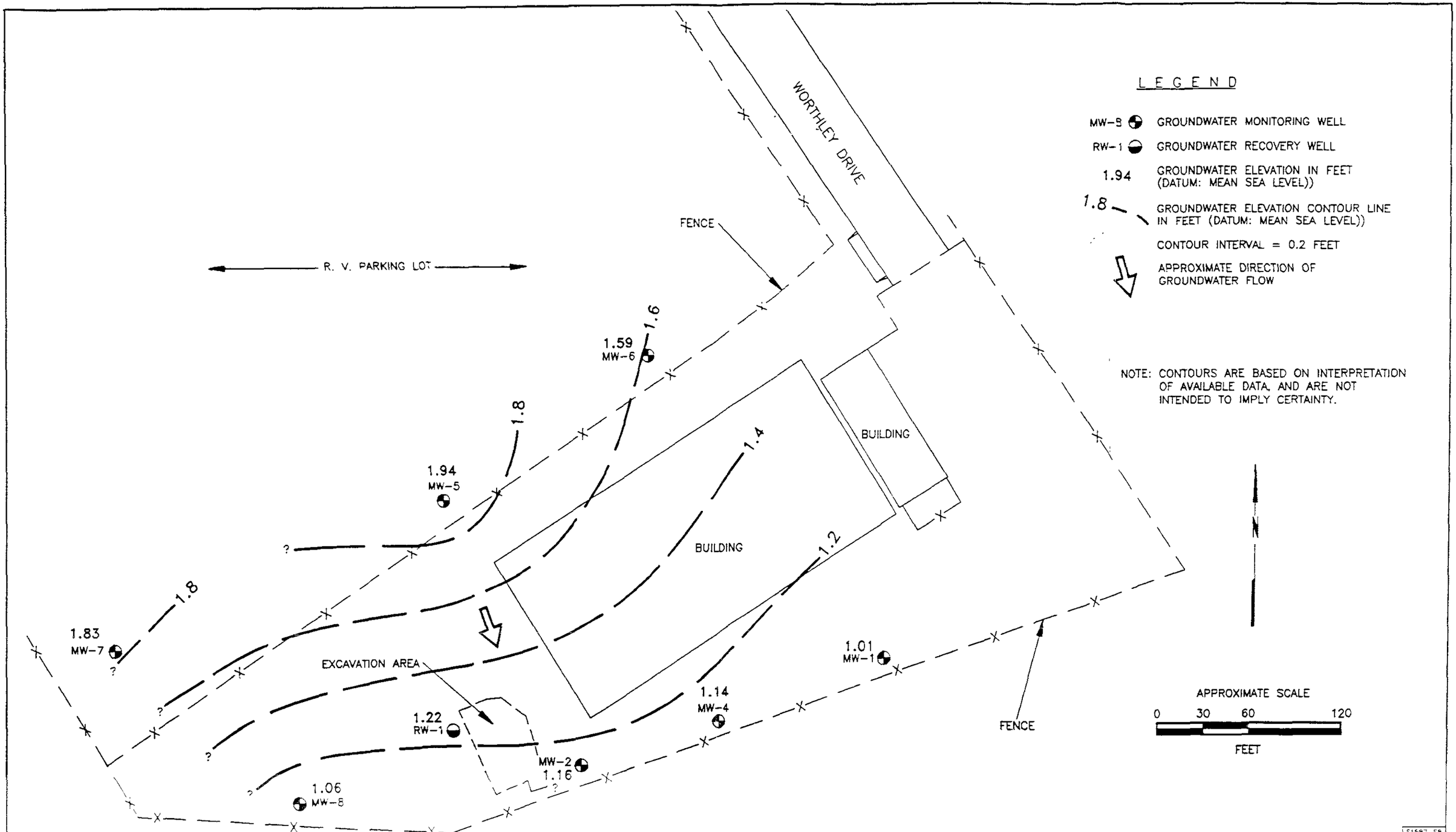
PROJECT F1587.33

SITE VICINITY MAP
Crown Metal Mfg. - Pacific Intl' Steel
16525 Worthley Drive
San Leandro, California

PLATE
1



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PROJECT F1587.33

GROUNDWATER ELEVATION CONTOUR MAP (8/20/93)
Crown Metal Mfg. - Pacific Intl' Steel
16525 Worthley Drive
San Lorenzo, California

PLATE
2

TABLE 1
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
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	
	02/12/92	---	---	---	---	---		6.75	
	05/21/92	---	---	---	---	---		---	
	11/13/92	---	---	---	---	---		8.00	
	02/24/93	---	---	---	---	---		5.74	
	05/28/93	---	---	---	---	---		7.36	
	08/20/93	---	---	---	---	---		7.85	1.01

TABLE 1
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
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	
	08/17/90	130	ND	2.9	1.2	0.68		8.00	
	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	
	08/20/93	1,000	<0.50	0.75	1.1	5.4		8.01	1.16
	11/30/93	590	<0.50	<0.50	3.8	2.3		8.20	
	04/28/94	480	5.2	<0.50	<0.50	<0.50		7.26	
	08/08/94	330	<0.50	<0.50	<0.50	<0.50		7.53	
	08/23/95	160	<0.50	0.68	<0.50	0.98		7.72	
	04/17/96	56	0.84	3.0	0.61	2.9		6.66	

TABLE 1
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
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	
	05/12/89	2,500	ND	5.6	ND	2.7		6.64	
	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	

TABLE 1
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
MW-4 (con't)	02/01/91	ND	ND	ND	ND	ND	8.48	6.85	
	05/01/91	---	---	---	---	---		6.73	
	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	---	---	---	---	---		---	
	08/20/93	---	---	---	---	---		7.34	1.14
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	
	01/03/90	ND	---	---	---	---		7.42	
	02/21/90	ND	ND	ND	ND	ND		6.85	
	05/17/90	---	---	---	---	---		7.09	
	08/17/90	---	---	---	---	---		7.36	

TABLE 1
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
MW-5 (con't)	11/06/90	---	---	---	---	---	9.11	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	
	08/20/93	---	---	---	---	---		7.17	1.94
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	
	05/25/88	ND	ND	ND	ND	ND		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	

TABLE 1
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
MW-6 (con't)	05/17/90	ND	---	---	---	---	9.19	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	
	02/24/93	---	---	---	---	---		5.61	
	05/28/93	---	---	---	---	---		6.78	
	08/20/93	---	---	---	---	---		7.60	1.59
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	

TABLE 1
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
MW-7 (con't)	05/21/92	---	---	---	---	---	8.41	6.67	
	11/13/92	---	---	---	---	---		7.03	
	02/24/93	---	---	---	---	---		5.26	
	05/28/93	---	---	---	---	---		6.15	
	08/20/93	---	---	---	---	---		6.58	1.83
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	
	08/20/93	---	---	---	---	---		7.46	1.06
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
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to / Water (feet)	Groundwater Elevation (ft above MSL)
RW-1 System Influent	01/16/91	78	17	2.7	7.7	1.3	11.02	---	
	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		7 ---	
	08/20/93	57	16	<0.50	0.70	1.9		9.80	1.22
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
CUMULATIVE RESULTS OF GROUNDWATER SAMPLING AND ANALYSES

Well	Date Sampled	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	Well Elevation (ft above MSL)	Depth to Water (feet)	Groundwater Elevation (ft above MSL)
BB-1 (con't)	11/15/91	ND	ND	ND	ND	ND			
	02/12/92	---	---	---	---	---			
	05/21/92	---	---	---	---	---			
	11/13/92	---	---	---	---	---			
	02/24/93	ND	ND	ND	ND	ND			
	05/28/93	---	---	---	---	---			
	08/20/93	<50	<0.50	<0.50	<0.50	<0.50			

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
		ft	feet
---	No data obtained	MSL	Mean sea level

APPENDIX A

FIELD PROTOCOL

RESNA

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FIELD PROTOCOL

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

Site Safety Plan

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

Soil Excavation

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

Sampling of Stockpiled Soil

One composite soil sample is collected for each 50 cubic yards of stockpiled soil, and for each individual stockpile composed of less than 50 cubic yards. Composite soil samples are obtained by first evaluating relatively high, average, and low areas of hydrocarbon concentration by digging approximately one to two feet into the stockpile and placing the intake probe of a field calibrated OVM against the surface of the soil; and then collecting one sample from the "high" reading area, and three samples from the "average" areas. Samples are collected by removing the top one to two feet of soil, then driving laboratory-cleaned brass sleeves into the soil. The samples are sealed in the sleeves using aluminum foil, plastic caps, and aluminized duct tape; labeled; and promptly placed in iced storage for transport to the laboratory, where compositing will be performed.

Soil Borings

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

The borings are drilled by a truck-mounted drill rig equipped with 8- or 10-inch-diameter, hollow-stem augers. The augers are steam-cleaned prior to drilling each boring to minimize the possibility of cross-contamination. After drilling the borings, monitoring wells are constructed in the borings, or neat-cement grout with bentonite is used to backfill the borings to the ground surface.

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

Drill Cuttings

Drill cuttings subjectively evaluated as having hydrocarbon contamination at levels greater than 100 parts per million (ppm) are separated from those subjectively evaluated as having hydrocarbon contamination levels less than 100 ppm. Evaluation is based either on subjective evidence of soil discoloration, or on measurements made using a field calibrated OVM. Readings are taken by placing a soil sample into a ziplock type plastic bag and allowing volatilization to occur. The intake probe of the OVM is then inserted into the headspace created in the plastic bag immediately after opening it. The drill cuttings from the borings are placed in labeled 55-gallon drums approved by the Department of Transportation; or on plastic at the site, and covered with plastic. The cuttings remain the responsibility of the client.

Soil Sampling in Borings

Soil samples are collected at no greater than 5-foot intervals from the ground surface to the total depth of the borings. The soil samples are collected by advancing the boring to a point immediately above the sampling depth, and then driving a California-modified, split-spoon sampler containing brass sleeves through the hollow center of the auger into the soil. The sampler and brass sleeves are laboratory-cleaned, steam-cleaned, or washed thoroughly with Alconox® and water, prior to each use. The sampler is driven with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows to drive the sampler each successive six inches are counted and recorded to evaluate the relative consistency of the soil.

The samples selected for laboratory analysis are removed from the sampler and quickly sealed in their brass sleeves with aluminum soil, plastic caps, and aluminized duct tape. The samples

are then be labeled, promptly placed in iced storage, and delivered to a laboratory certified by the State of California to perform the analyses requested.

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

Logging of Borings

A geologist is present to log the soil cuttings and samples using the Unified Soil Classification System. Samples not selected for chemical analysis, and the soil in the sampler shoe, are extruded in the field for inspection. Logs include texture, color, moisture, plasticity, consistency, blow counts, and any other characteristics noted. Logs also include subjective evidence for the presence of hydrocarbons, such as soil staining, noticeable or obvious product odor, and OVM readings.

Monitoring Well Construction

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

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

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

Groundwater Monitoring Well Development

The monitoring wells are developed by bailing or over-pumping and surge-block techniques. The wells are either bailed or pumped, allowed to recharge, and bailed or pumped again until the water removed from the wells is determined to be clear. Turbidity measurements (in

NTU's) are recorded during well development and are used in evaluating well development. The development method used, initial turbidity measurement, volume of water removed, final turbidity measurement, and other pertinent field data and observations are included in reports. The wells are allowed to equilibrate for at least 48 hours after development prior to sampling. Water generated by well development will be stored in 17E Department of Transportation (DOT) 55-gallon drums on site and will remain the responsibility of the client.

Groundwater Sampling

The static water level in each well is measured to the nearest 0.01-foot using a Solinst® electric water-level sounder or oil/water interface probe (if the wells contain floating product) cleaned with Alconox® and water before use in each well. The liquid in the onsite wells is examined for visual evidence of hydrocarbons by gently lowering approximately half the length of a Teflon® bailer (cleaned with Alconox® and water) past the air/water interface. The sample is then retrieved and inspected for floating product, sheen, emulsion, color, and clarity. The thickness of floating product detected is recorded to the nearest 1/8-inch.

Wells which do not contain floating product are purged using a submersible pump. The pump, cables, and hoses are cleaned with Alconox® and water prior to use in each well. The wells are purged until withdrawal is of sufficient duration to result in stabilized pH, temperature, and electrical conductivity of the water, as measured using portable meters calibrated to a standard buffer and conductivity standard. If the well becomes dewatered, the water level is allowed to recover to at least 80 percent of the initial water level. Prior to the collection of each ground water sample, the Teflon® bailer is cleaned with Alconox® and rinsed with tap water and deionized water, and the latex gloves worn by the sampler changed. Hydrochloric acid is added to the sample vials as a preservative (when applicable). A sample method blank is collected by pouring distilled water into the bailer and then into sample vials. A sample of the formation water is then collected from the surface of the water in each of the wells using the Teflon® bailer. The water samples are then gently poured into laboratory-cleaned, 40-milliliter (ml) glass vials, 500 ml plastic bottles or 1-liter glass bottles (as required for specific laboratory analysis) and sealed with Teflon®-lined caps, and inspected for air bubbles to check for headspace, which would allow volatilization to occur. The samples are then labeled and promptly placed in iced storage. A field log of well evacuation procedures and parameter monitoring is maintained. Water generated by the purging of wells is stored in 17E DOT 55-gallon drums onsite and remains the responsibility of the client.

Vadose-Zone Sampling

Vapor readings are made with a field calibrated OVM, which has a lower detection limit of 0.1 ppm. Prior to purging each vadose-zone monitoring well, an initial reading is taken inside the well by connecting the tubing of the OVM to a tight fitting at the top of the well. Each vadose-zone monitoring well is then purged for approximately 60 seconds using an electric vacuum pump connected to the tight fitting. Ambient readings of the air at the site are taken with the OVM after each well is purged. The OVM is then connected to the well fitting, and the reading recorded. The well is then again purged for approximately 30 seconds, and again measured using the OVM. These purging and measuring procedures are repeated until two consecutive OVM readings are within ten percent of each other.

Sample Labeling and Handling

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

Aquifer Testing

Bailer Test

The initial water level is measured in the test well, and water bailed from the test well using a Teflon® bailer and cable cleaned with Alconox® and water. Pressure transducers are used to measure water levels in the test well during drawdown and partial recovery phases, over a minimum period of approximately one to two hours. The bailing rate for the designated test well is recorded.

Pumping Test

The initial water levels in wells to be used during the test are measured prior to commencement of pumping. The flow rate of the pump is adjusted to the desired pumping rate, and water levels allowed to recover to initial levels. Pumping then begins, and the starting time of pumping is recorded. Drawdowns in observation wells are recorded at intervals throughout pumping using pressure transducers. Evacuated water is stored in a storage tank at the site and remains the responsibility of the client. After the pump is shut off, recovery measurements are taken in the wells until recovery is at least 80 percent of the initial water level. Barometric pressure and tidal information are collected for the time interval of the pumping test to allow screening of possible effects of atmospheric pressure and tidal fluctuations on the ground water levels.

APPENDIX B

WELL PURGE DATA SHEETS, LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

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WELL PURGE DATA SHEET

Project Name: Crown Metals Manufacturing — Job No. F1587.33

Date: 08/20/93 — Page 1 of 1

Well No. RW-1 — Time Started 13:30

TIME (hr)	GALLONS (cum.)	TEMP. (F)	pH	CONDUCT. (micromho)	TURBIDITY (NTU)
13:30	Start purging RW-1				
13:30	0	76.1	6.65	>200	7.2
13:40	14	73.8	6.75	>200	7.4
13:50	28	72.9	6.57	>200	1.7
14:03	42	71.6	6.55	>200	.8
14:15	56	69.9	6.59	>200	.7
14:15	Stop purging RW-1				

Notes:

Well Diameter (inches) : 6
Depth to Bottom (feet) : 19.40
Depth to Water - initial (feet) : 9.80
Depth to Water - final (feet) : 10.01
% recovery : 98
Time Sampled : 15:25
Gallons per Well Casing Volume : 14
Gallons Purged : 56
Well Casing Volume Purged : 4
Approximate Pumping Rate (gpm) : 1.2

RESNA
Working to Restore Nature

WELL PURGE DATA SHEET

Project Name: Crown Metals Manufacturing — Job No. F1587.33

Date: 08/20/93 — Page 1 of 1

Well No. MW-2 — Time Started 14:30

TIME (hr)	GALLONS (cum.)	TEMP. (F)	pH	CONDUCT. (micromho)	TURBIDITY (NTU)
14:30	Start purging MW-2				
14:30	0	72.8	6.61	>200	>200
14:36	3	69.9	6.56	>200	178
14:41	6	69.0	6.56	>200	39.1
14:45	9	69.3	6.57	>200	18.5
14:49	11.5	70.3	6.60	>200	12.7
14:49	Stop purging MW-2				

Notes:

Well Diameter (inches) : 2
Depth to Bottom (feet) : 25.0
Depth to Water - initial (feet) : 8.01
Depth to Water - final (feet) : 8.06
% recovery : 99
Time Sampled : 15:45
Gallons per Well Casing Volume : 2.8
Gallons Purged : 11.5
Well Casing Volume Purged : 4.1
Approximate Pumping Rate (gpm) : 0.6

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: Mark Detterman

Client Project ID: F1587.33, Crown Metals
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 3HC2601

Sampled: Aug 20, 1993
Received: Aug 23, 1993
Reported: Sep 1, 1993

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 3HC2601 BB1	Sample I.D. 3HC2602 RW-1	Sample I.D. 3HC2603 MW-2
Purgeable Hydrocarbons	50	N.D.	57	1,000
Benzene	0.50	N.D.	16	N.D.
Toluene	0.50	N.D.	N.D.	0.75
Ethyl Benzene	0.50	N.D.	0.70	1.1
Total Xylenes	0.50	N.D.	1.9	5.4
Chromatogram Pattern:		--	Weathered Gas	Gas

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	2.0
Date Analyzed:	8/26/93	8/26/93	8/26/93
Instrument Identification:	GCHP-18	GCHP-18	GCHP-7
Surrogate Recovery, %: (QC Limits = 70-130%)	102	105	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

Vickie Tague
Project Manager

SEQUOIA ANALYTICAL

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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Mark Detterman

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

QC Sample Group: 3HC2601-2

Reported: Sep 1, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Geckler	R. Geckler	R. Geckler	R. Geckler
Conc. Spiked:	10	10	10	30
Units:	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	BLK082693	BLK082693	BLK082693	BLK082693
Date Prepared:	8/26/93	8/26/93	8/26/93	8/26/93
Date Analyzed:	8/26/93	8/26/93	8/26/93	8/26/93
Instrument I.D.#:	GCHP-18	GCHP-18	GCHP-18	GCHP-18
LCS % Recovery:	100	100	100	100
Control Limits:	80-120	80-120	80-120	80-120
MS/MSD Batch #:	3HC3601	3HC3601	3HC3601	3HC3601
Date Prepared:	-	-	-	-
Date Analyzed:	8/26/93	8/26/93	8/26/93	8/26/93
Instrument I.D.#:	GCHP-18	GCHP-18	GCHP-18	GCHP-18
Matrix Spike % Recovery:	110	110	110	103
Matrix Spike Duplicate % Recovery:	100	100	100	100
Relative % Difference:	9.5	9.5	9.5	3.0

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.

SEQUOIA ANALYTICAL

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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Mark Detterman

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

QC Sample Group: 3HC2603

Reported: Sep 1, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	E. Cunanan	E. Cunanan	E. Cunanan	E. Cunanan
Conc. Spiked:	10	10	10	10
Units:	µg/L	µg/L	µg/L	µg/L
LCS Batch#:	BLK082693	BLK082693	BLK082693	BLK082693
Date Prepared:	8/26/93	8/26/93	8/26/93	8/26/93
Date Analyzed:	8/26/93	8/26/93	8/26/93	8/26/93
Instrument I.D.#:	GCHP-7	GCHP-7	GCHP-7	GCHP-7
LCS % Recovery:	94	95	93	95
Control Limits:	80-120	80-120	80-120	80-120
MS/MSD Batch #:	3HC3604	3HC3604	3HC3604	3HC3604
Date Prepared:	-	-	-	-
Date Analyzed:	8/26/93	8/26/93	8/26/93	8/26/93
Instrument I.D.#:	GCHP-7	GCHP-7	GCHP-7	GCHP-7
Matrix Spike % Recovery:	98	98	97	97
Matrix Spike Duplicate % Recovery:	95	96	93	93
Relative % Difference:	3.1	2.1	4.2	4.2

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.

RESNA

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO.	PROJECT NAME/SITE
F1587.33	Crown Metals

SAMPLERS (SIGN) Chris Allen / (PRINT) Chris Allen

P.O. # 9308C26

SAMPLE IDENTIFICATION	DATE	TIME	COMP	GRAB	PRES. USED	ICED	NO. CONTAINERS	SAMPLE TYPE	BTEX (602/8020)	TPHg (8015)	TPHd (8015)	TOG 418.1/5520	601/8010	624/8240	625/8270	REMARKS
BB1	8/20				HCl	✓	3	W	X	X						1
RW-1	8/20 2.25	3:25			HCL	✓	3	W	X	X						2
MW-2	8/20	3.45			—	✓	3	W	X	X						3

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
Chris Allen	8/20	3.35	Cyndi Vrooman
Cyndi Vrooman	8/23	9:50am	[signature] 8/23/93 9:50
[signature]	8/23/93	10:40	[signature]
RELINQUISHED BY:	DATE	TIME	RECEIVED BY LABORATORY:

LABORATORY: Sequoia

REQUESTED TURNAROUND TIME: 10 day

RECEIPT CONDITION: Good

PLEASE SEND RESULTS TO: RESNA (San Jose) Mark Petterman

PROJECT MANAGER: