



Crown METAL MFG. CO.

5925 SOUTH LOWE AVENUE, CHICAGO, ILLINOIS 60621-2896 • TELEPHONE 312/873-3833

March 6, 1990

County of Alameda
Division of Hazardous Materials
80 Swan Way
Oakland, CA 94621
Attention: Mr. Larry Seto

RE: 16525 Worthley Drive
San Lorenzo, CA

Dear Mr. Seto:

Enclosed please find a November Quarterly Sampling of the site at 16525 Worthley Drive. This is being forwarded to your attention as requested by our environmental service - Ensco Environmental.

Should you have any questions on the contents of this report, I suggest you contact Ensco directly.

Regards,

A handwritten signature in cursive script, appearing to read "Richard C. Ernest".

Richard C. Ernest
President

RCE/meb
Enc.

cc: Mr. Britt Von Thaden
Project Geologist
Ensco Environmental Services, Inc.
41674 Christy Street
Fremont, CA 94538-3114

LOWNEY ASSOCIATES
Environmental / Geotechnical / Engineering Services

9/21/94

94 S.

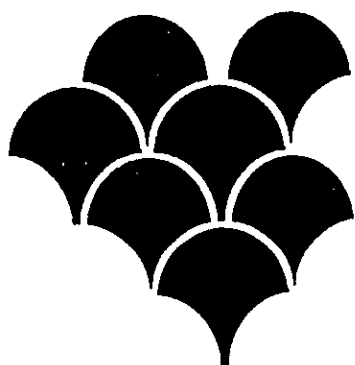
Dear Ms. Shin,

As requested enclosed is a
copy of extraction well RW-1
installation. If you have any
questions please call myself
or Stason Foster.

Thank You,

Bridget Bayter





ensco
environmental
services, inc.

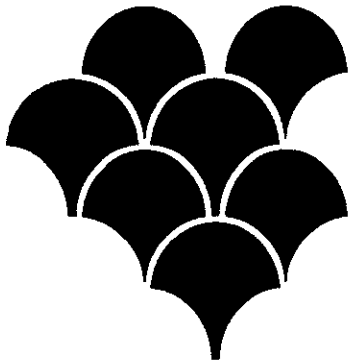
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TP 22 E1110: 42

**NOVEMBER QUARTERLY SAMPLING
SUPPLEMENTAL SOIL AND
GROUNDWATER INVESTIGATION FOR
CROWN METAL MANUFACTURING**

AT

**PACIFIC INTERNATIONAL
STEEL FACILITY
16525 WORTHLEY DRIVE
SAN LORENZO, CALIFORNIA**

**Project No. 1587-2G
February 1990**



ensco
environmental
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**PACIFIC INTERNATIONAL
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SAN LORENZO, CALIFORNIA**

**Project No. 1587-2G
February 1990**



February 19, 1990

Crown Metal Manufacturing
5925 S. Lowe Avenue
Chicago, IL 60621-2896

Attention: Mr. Richard Ernest

Subject: November Quarterly Sampling
Supplemental Soil and Groundwater Investigation
Pacific International Steel Facility
16525 Worthley Drive, San Lorenzo, California
EES Project No. 1587-2G

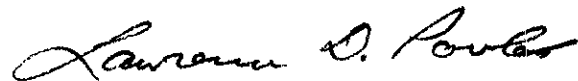
Dear Mr. Ernest:

This report presents the results from the November quarterly groundwater sampling and laboratory analysis at the subject site in San Lorenzo, California. It also presents the details relating to the installation of an additional groundwater monitoring well and a groundwater recovery well.

If you have any questions regarding this report, please call.

Very truly yours,
Ensco Environmental Services, Inc.

Britt Von Thaden
Britt Von Thaden
Project Geologist



Lawrence D. Pavlak, C.E.G. 1187
Senior Program Geologist

BVT/LDP/sr
Enclosure

cc: Mr. James Lewis, Pacific International Steel

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SUPPLEMENTAL SOIL AND GROUNDWATER INVESTIGATION FOR CROWN METAL MANUFACTURING

AT

PACIFIC INTERNATIONAL STEEL FACILITY
16525 WORTHLEY DRIVE
SAN LORENZO, CALIFORNIA

At the request of Crown Metal Manufacturing, Ensco Environmental Services, Inc. (EES) has completed the supplemental soil and groundwater investigation at the Pacific International Steel facility in San Lorenzo, California (Figure 1). This report presents the available background information, the scope of work, a description of the field investigation and sample analyses, findings, and discussion.

SITE BACKGROUND

The site area is zoned for commercial use and the site itself was formerly occupied by an aircraft engine maintenance facility. Its operations included the use of underground fuel storage tanks that were removed because of suspected leakage.

~~at the site~~
In July 1987, EES installed six groundwater monitoring wells at the site to quantify contamination and evaluate its presence across the site. Laboratory results revealed petroleum hydrocarbon contamination in the groundwater from two of the wells and in the soil adjacent to all of the wells. A quarterly groundwater monitoring program was then initiated.

→ report?
In April 1988, EES conducted a soil gas survey (SGS) to further delineate the extent of the soil contamination. The SGS revealed two contamination "hot spot" areas. EES conducted soil sampling in August 1988 to confirm the results of the SGS. Laboratory analyses of the samples generally supported the SGS study.

→ report?
EES excavated the "hot spot" areas adjacent to well MW-3 in November 1988 and aerated the soils on the site. The excavation was approximately 40 by 60 by 10 feet and was backfilled in August 1989 after the quarterly sampling. Well MW-3 was damaged during soil removal because it was so close to the excavation. The entire well casing and sand pack were then removed.

In September 1989, EES conducted a shallow groundwater investigation (SGI) to determine the approximate outer limits of the petroleum hydrocarbon plume before installing an additional monitoring well. Emphasis for the SGI was placed on the western portion of

the subject site, as shown in Figure 2, where contaminant concentrations were relatively unknown. The SGI revealed contaminant concentrations that were, for the most part, detected at levels just above the equipment detection limits. However, three samples, WS-2, WS-3, and WS-4, contained concentrations that were elevated above the rest. The highest concentrations were detected in sample WS-2, which had been taken at the northwest corner of the fenced perimeter. Permission to expand the SGI onto the adjacent property to the west was denied by its owner.

SCOPE OF WORK

EES conducted the November quarterly groundwater sampling and laboratory analysis for the purposes of monitoring groundwater conditions and determining groundwater quality beneath the site. The program objectives are the following:

- Plot the groundwater contour surface.
- Investigate for the presence of a petroleum hydrocarbon plume and determine its concentration.
- Compare current and past data.

EES also conducted a supplemental investigation to assess subsurface soil and groundwater conditions in an area upgradient from the source area. One groundwater monitoring well (MW-7) and a groundwater recovery well (RW-1) were installed during the investigation. The new recovery well will be used in future remediation efforts at the site.

FIELD INVESTIGATION

EES conducted field work at the subject site during the months of November and December 1989, and January 1990. The work included conducting the quarterly groundwater sampling, drilling two exploratory borings, and collecting soil samples from the borings. One of the borings was converted to a groundwater monitoring well (MW-7), the other to groundwater recovery well ((RW-1) which were then developed and sampled. The elevations of the tops of the well casings were surveyed and groundwater level measurements were taken.

Quarterly Groundwater Sampling

EES sampled four of the five groundwater monitoring wells for the November quarterly report on November 14, 1989. Well MW-4 was not accessible at the time of sampling because it was covered by a debris pile.

Before sampling, EES measured the depth to groundwater using an electric sounding tape and checked for the presence of floating product using a clear acrylic bailer at each well: none was detected. After the field check, each well was purged until pH, conductivity, and temperature readings stabilized. Approximately four well-casing volumes of groundwater were removed from each well.

Samples were collected with a clean teflon bailer and preserved in the appropriate laboratory-supplied bottles, labeled with a unique sample number, logged on a chain-of-custody form, and stored in a chilled ice chest for shipment to the laboratory. Groundwater removed from the wells and equipment rinse water was placed in drums approved by the Department of Transportation (DOT) and left on-site pending the laboratory analytical results. EES groundwater sampling and laboratory procedures protocols are included in Appendix A.

Exploratory Drilling and Soil Sampling

EES drilled the exploratory borings at the site on November 28, 1989 at the locations shown in Figure 3. They ranged in depth from 16 to 20 feet. The borings were drilled with an EES truck-mounted B-61 drill rig using 8-inch outside diameter (O.D.) by 4-1/4-inch inside diameter (I.D.) and 10-inch O.D. by 6-5/8-inch I.D. continuous flight hollow-stem augers for the monitoring and recovery wells, respectively.

An EES geologist logged the borings with soil descriptions classified according to the Unified Soil Classification System and Munsell Soil Color Charts. Before drilling began at the site, all drilling and sampling equipment was steam cleaned to reduce the potential for cross-contamination. During drilling and between soil sampling intervals, the soil sampler was scrubbed and washed with trisodium phosphate and rinsed with potable water.

Soil samples were collected at approximately 5-foot depth intervals through the hollow stem auger to minimize cross-contamination and sampling of slough. A modified California split-spoon sampler, equipped with three brass liners, each 6 inches long and 2 inches in diameter, was used to collect and retain the samples. The sampler was advanced 18 inches into the relatively undisturbed soils ahead of the auger by driving it with a 140-pound, rig-operated hammer. After the recovery from the borehole and the sampler, the lowermost sample liner was preserved for laboratory analysis. The ends of the liner were covered with aluminum foil and plastic caps. It was then labeled with a unique sample number and pertinent sample information, placed in a plastic "Ziploc" bag, entered onto a chain-of-custody form, and packed in a chilled ice chest. The soil in the remaining liners was visually characterized and logged.

The soil cuttings generated from the drilling of the exploratory borings were placed in DOT-approved drums and left on-site pending the laboratory analytical results. Details of the subsurface conditions encountered are shown on the boring logs included in Appendix B. Appendix A includes EES protocols for soil sampling and laboratory analyses.

Groundwater Monitoring and Recovery Well Construction

Upon completion, one exploratory borehole was converted to a groundwater monitoring well and the other to a groundwater recovery well. Two-inch-diameter, schedule 40 polyvinyl chloride (PVC) blank and factory-slotted (0.010 inch) casing was used for the monitoring well. Six-inch-diameter, schedule 40 PVC blank and stainless steel wire wrap (0.015 inch) casing was used for the recovery well. Below the screened section of the recovery well, a 3-foot section of blank PVC was added as a silt trap. Flush-threaded couplings connected each casing section, and no-solvents or cements were used during the construction of either well. An EES geologist determined the placement of the screened interval in the field. The wells were installed in the uppermost water-bearing zone.

After the PVC casing was installed, the augers were removed and No. 2/12 silica sand was poured down the annular space between the casing and the wall of the borehole to make the desired sand pack. Sand filled the annular space to approximately 1-foot above the screened interval for both wells. Bentonite pellets, approximately 1-foot in thickness for the monitoring well and one-half foot for the recovery well, were placed upon the top of the sand and hydrated. A cement grout was then placed in the annulus up to the ground surface. To protect the PVC wellhead of the monitoring well, EES installed a steel casing with locking cover and lock in a traffic-rated vault box. A concrete surface seal, approximately at grade, completed the installation. The recovery well was set with the casing extending approximately 2 feet above the surface as a temporary completion method. Appendix B contains construction details for each well and each is located after its respective boring log.

Surveying

Ron Archer Civil Engineer, Inc. surveyed the elevations of the top of the PVC casings of wells MW-7 and RW-1 to the nearest 0.01 foot. The elevation was taken from a benchmark found in the northwest corner of the northerly concrete abutment, field control line "N," Zone 2, south of the corner of a chain link fence and east of the centerline of the Southern Pacific Railroad tracks. The survey elevations used in this report were transcribed from the final survey report attached in Appendix C.

Well Development

After construction, wells MW-7 and RW-1 were developed to improve the hydraulic conductivity between each well and the natural formation. The development was conducted on December 15, 1989 using a surge-and-purge method. A surge block was used to surge the water in and out of the screen and sand pack. Sediment brought into the well was then manually bailed. Development of each well continued until the well produced sediment-free water or until no further improvement was attainable. Approximately 28.5 well-casing volumes of groundwater were removed from the monitoring well and 10 well-casing

volumes from the recovery well. All groundwater removed from the wells during their development was placed in DOT-approved drums and left at the site pending laboratory analytical results.

Groundwater Sampling

After development, each well was allowed to recharge before sampling. Groundwater samples were collected from wells MW-7 and RW-1 on January 9, 1990. Before sampling, EES measured the depth to groundwater using an electric sounding tape and checked for the presence of floating product using a clear acrylic bailer at each well. None was detected. After the field check, each well was purged until pH, conductivity, and temperature readings stabilized. Approximately three to four well-casing volumes of groundwater were removed from each well.

Samples were collected and preserved following the methods described in the quarterly groundwater sampling section. Groundwater removed from the wells and equipment rinse water was placed in DOT-approved drums and left on-site pending the laboratory analytical results.

HYDROGEOLOGY

The Groundwater Surface Contour Map (Figure 3), reveals a shallow groundwater gradient in the area of investigation for January 3, 1990. The contours indicate that the gradient is gently inclined and that the flow direction is variable but maintains an overall direction towards the south. The average calculated gradient is approximately 0.5 percent.

LABORATORY ANALYSES

Sequoia Analytical Laboratory, located in Redwood City, California, analyzed groundwater samples from the November quarterly sampling, and soil and groundwater samples from the installation of wells MW-7 and RW-1. Each sample was analyzed for the presence of total petroleum hydrocarbons as gasoline (TPHG) and benzene, toluene, ethyl benzene, and total xylenes (BTEX) using Environmental Protection Agency (EPA) test methods 5030/8015/8020.

SUMMARY OF LABORATORY RESULTS

The following subsections describe the analytical results for soil and groundwater samples obtained at the site.

Soil Analysis

Two soil samples, one from each boring, were submitted for analyses. Both samples were obtained from a depth of 5 feet below the ground surface. The laboratory analysis of the samples revealed that a concentration of 3.2 milligrams per kilogram TPHG was present in sample RW-1-1. BTEX were not detected in this sample, nor were TPHG or BTEX detected in sample MW-7-1 at or above the applicable detection limits.

Groundwater Analyses

Laboratory analyses of the groundwater samples revealed petroleum hydrocarbons in two of the six sampled wells. As reported by the laboratory, well MW-2 contained TPHG at a concentration of 85 micrograms per liter ($\mu\text{g/l}$), toluene at 3.5 $\mu\text{g/l}$, ethyl benzene at 0.36 $\mu\text{g/l}$, and xylenes at 2.5 $\mu\text{g/l}$. The other well having petroleum hydrocarbon contamination was RW-1. Concentrations detected at RW-1 were 1,300 $\mu\text{g/l}$ TPHG, 150 $\mu\text{g/l}$ benzene, 15 $\mu\text{g/l}$ toluene, 100 $\mu\text{g/l}$ ethyl benzene, and 170 $\mu\text{g/l}$ xylenes. Samples from wells MW-1, MW-5, MW-6, and MW-7 were reported by the laboratory as not detected for TPHG or BTEX compounds at or above the applicable detection limits. Figure 4 shows the maximum hydrocarbon contamination detected in the groundwater samples from each well.

DISCUSSION

The SGI conducted in September 1989 assisted in determining the placement of an additional monitoring well upgradient from the excavated "hot spot" area. During the course of the SGI sample point WS-2, located in the northwest corner of the fenced perimeter, was found to contain petroleum hydrocarbon concentrations that clearly exceeded the other samples. The concentration detected at WS-2 appears to be anomalous with respect to the petroleum hydrocarbon contamination originating from the former source area. Review of the groundwater surface contour maps that have been constructed quarterly since November 1987 show that the predominant groundwater flow direction across the site is towards the south, into the canal that borders the southern boundary of the property. The location of WS-2 has been consistently upgradient of the source area, and the concentrations detected may suggest an off-site source.

Groundwater at the site was measured in January at depths ranging from 7.42 to 9.81 feet below the existing ground surface. These depths correspond to elevations of approximately 0.84 to 2.18 feet above mean sea level, based upon available survey data. The groundwater surface has dropped an average of approximately 0.2 feet since the previous sampling. Groundwater contours show a gently inclined gradient with variable flow directions.

The analytical results from the November 1989 and January 1990 sampling rounds revealed petroleum hydrocarbon contamination in wells MW-2 and RW-1. In MW-2, the TPHG concentration decreased; toluene, ethyl benzene, and xylenes increased; and benzene

remained non-detectable. RW-1 was recently installed and the laboratory results obtained were from the initial sampling of the well. Figures 5 through 8 show graphical representations of current and past data from those wells that have been sampled more than once and those that were sampled for this report.

The State of California Department of Health Services (DHS) maintains standards (maximum contaminant levels [MCL] and action levels [AL]) for petroleum hydrocarbon compounds in water of beneficial use. The following is a list of the current DHS standards for BTEX:

<u>Compound</u>	<u>Concentrations</u>
Benzene	1.0 µg/l MCL
Toluene	100 µg/l AL
Ethyl Benzene	680 µg/l MCL
Total Xylenes	1,750 µg/l MCL

The groundwater sample from monitoring well RW-1 contained a benzene concentration that exceeded the current DHS standard. The remaining concentrations detected in RW-1 and those detected in MW-2 are below the current DHS standards.

The next quarterly sampling is scheduled for February 1990.

REPORTING REQUIREMENTS

A copy of this report should be forwarded by Crown Metals, Inc. to the following agencies in a timely manner:

County of Alameda
Division of Hazardous Materials
80 Swan Way
Oakland, California 94621
Attention: Mr. Larry Seto

California Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street, Suite 700
Oakland, California 94612-3429
Attention: Mr. Lisa McCann

LIMITATIONS

The discussion and recommendations presented in this report are based on the following:

1. The exploratory test borings drilled at the site.
2. The observations by field personnel.
3. The results of laboratory analyses performed by a state-certified laboratory.

4. 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 and 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 EES 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.

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

EnSCO Environmental Services, Inc.
 Project No. 1587-2G
 February 21, 1990

Crown Metal Manufacturing
 Pacific International Steel Facility
 San Lorenzo, CA

TABLE 1
 SUMMARY OF GROUNDWATER ANALYSES DATA

Well	Date Sampled	TPHG (ug/l)	Benzene (ug/l)	Toluene (ug/l)	Ethyl Benzene (ug/l)	Total Xylenes (ug/l)	Well Elevation (ft.)	Depth to Water (ft.)	Floating Product (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	---		
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	---
	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	---		
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	---

EnSCO Environmental Services, Inc.
 Project No. 1587-2G
 February 21, 1990

Crown Metal Manufacturing
 Pacific International Steel Facility
 San Lorenzo, CA

TABLE 1 (cont.)

Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl Benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft.)	Depth to Water (ft.)	Floating Product (ft.)
MW-3 (Cont.)	8/10/88	4,600	23	4.8	140	3.0	8.54	7.20	---
	11/29/88	16,000	3,900	11	600	40		7.41	---
	2/7/89	---	---	---	---	---		NA	---
	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							
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	---	---	---	---	---		NA	---
	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	---	---	---	---	---		NA	---
	11/14/89	---	---	---	---	---		---	---
MW-5	7/14/87	BDL	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	---	---	---	---	---		---	---
	8/10/88	ND	ND	ND	ND	ND		7.35	---
	11/29/88	ND	ND	ND	ND	ND		---	---
	2/7/89	ND	ND	ND	ND	ND		7.02	---
	5/12/89	ND	ND	ND	ND	0.84		6.69	---
	8/4/89	ND	ND	ND	ND	ND		7.52	---
	11/14/89	ND	ND	ND	ND	ND		7.51	---
	1/3/90	---	---	---	---	---		7.42	---

EnSCO Environmental Services, Inc.
 Project No. 1587-2G
 February 21, 1990

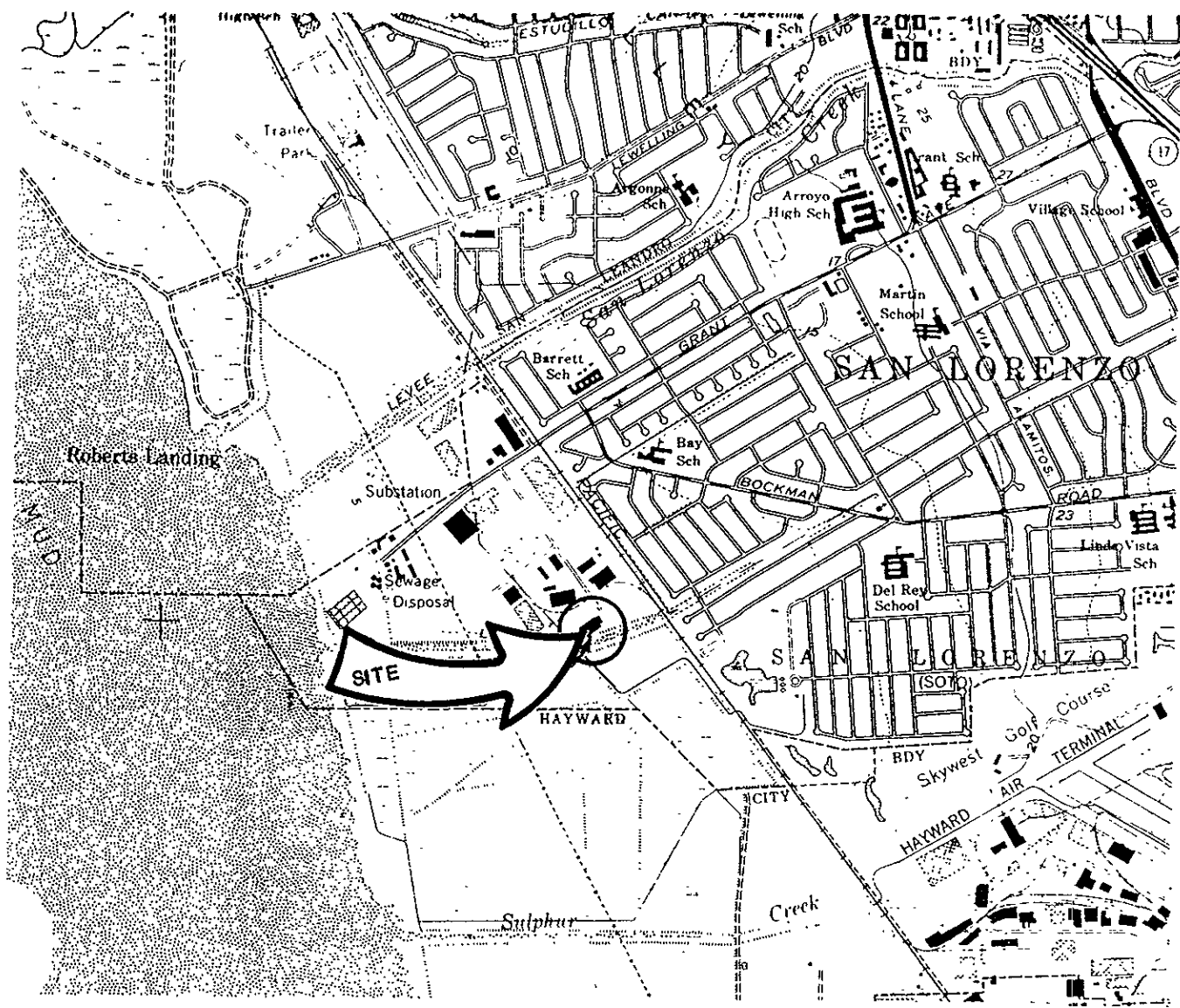
Crown Metal Manufacturing
 Pacific International Steel Facility
 San Lorenzo, CA

TABLE 1 (cont.)

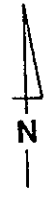
Well	Date Sampled	TPHG (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl Benzene (µg/l)	Total Xylenes (µg/l)	Well Elevation (ft.)	Depth to Water (ft.)	Floating Product (ft.)
MW-6	7/14/87	BDL	BDL	BDL	---	BDL	9.19	---	---
	11/24/87	---	---	---	---	---		---	---
	1/5/88	BDL	BDL	BDL	---	BDL		---	---
	2/29/88	BDL	BDL	BDL	---	BDL		7.19	---
	5/25/88	BDL	BDL	BDL	ND	BDL		7.33	---
	8/10/88	ND	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	---		
1/3/90	---	---	---	---	---	7.89	---		
MW-7	1/3/90	---	---	---	---	---	8.41	8.06	---
	1/9/90	ND	ND	ND	ND	ND		8.42	---
RW-1	1/3/90	---	---	---	---	---	11.02	9.81	---
	1/9/90	1,300	150	15	100	170		9.75	---
Bailer Blank	1/9/90	ND	ND	ND	ND	ND	---	---	---

TPHG Total petroleum hydrocarbons as gasoline
 ND Not detected at or above the method detection limit
 --- No data obtained
 µg/l Micrograms per liter
 BB Bailer blank

**Department of Health Services Current
 Drinking Water and/or Health Standards**
 Benzene 1.0 µg/l Maximum Contaminant Level (MCL)
 Toluene 100 µg/l Action Level
 Total Xylenes 1,750 µg/l (MCL)
 Ethyl Benzene 680 µg/l (MCL)
 Note: Subject to change as reviewed by DHS





LEGEND

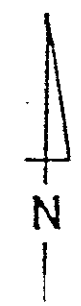
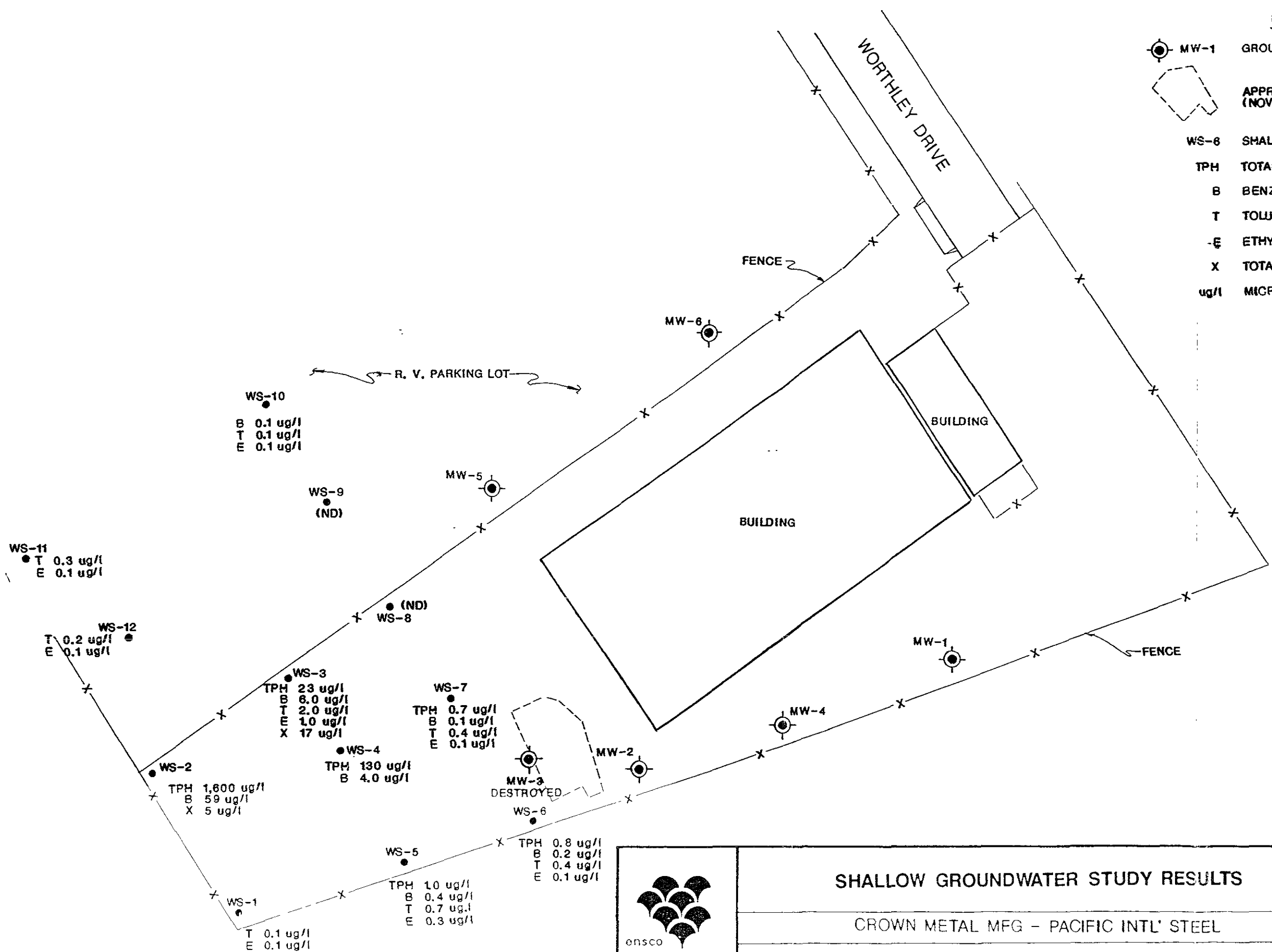


USGS 7.5 MINUTE SAN LEANDRO QUADRANGLE 1980

	SITE LOCATION MAP	
	CROWN METAL MFG-PACIFIC INT'L STEEL	
	16525 WORTHLEY DRIVE	
	SAN LORENZO, CALIFORNIA	
	JOB #. 1587	
	SCALE: 1:24000	DRAWN BY:
	DATE: 6/6/87	DRAWING #: FIG. 1



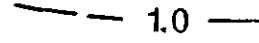


LEGEND

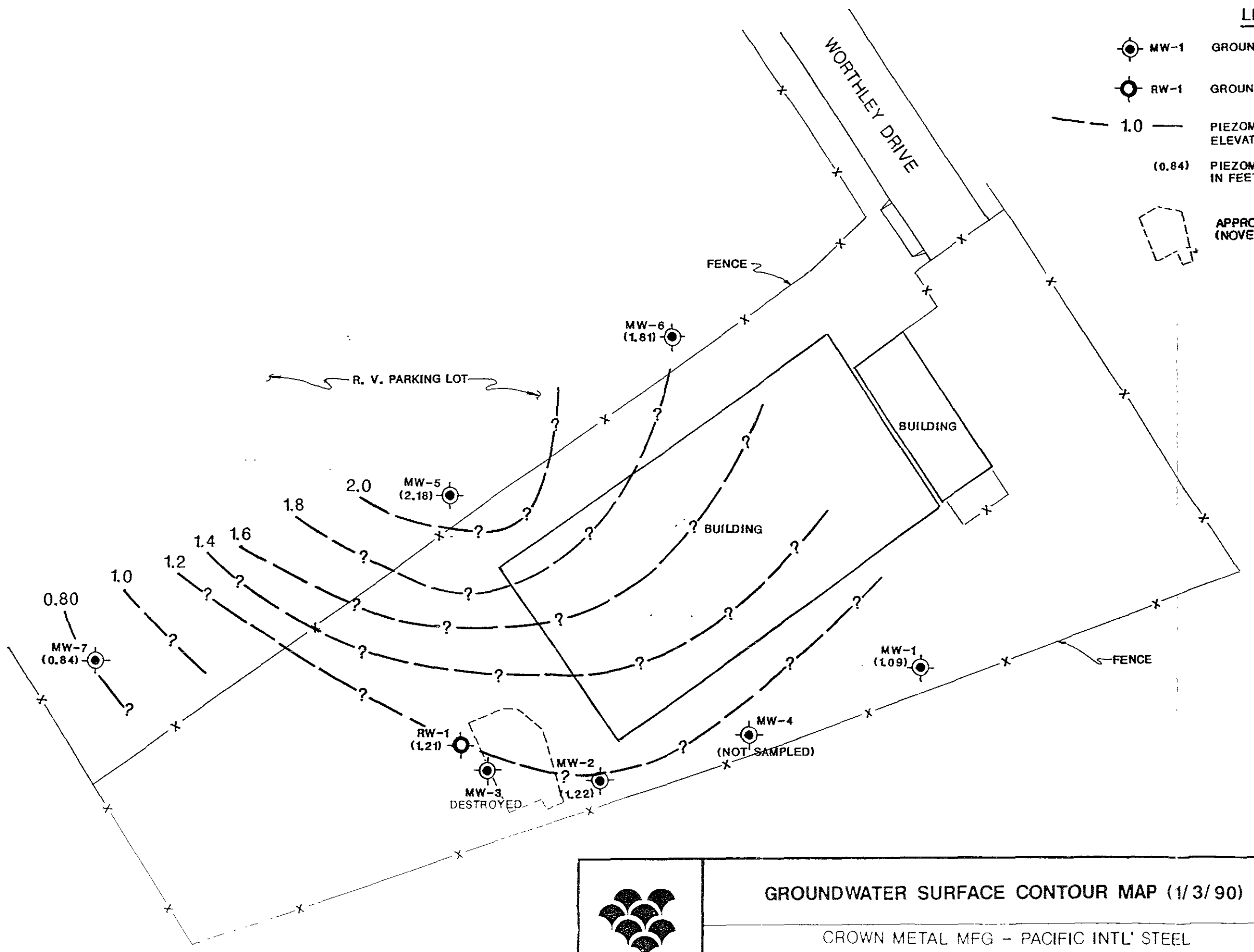
-  MW-1 GROUNDWATER MONITORING WELL
-  APPROXIMATE BOUNDARY OF SOIL EXCAVATION (NOVEMBER 1988)
- WS-6 SHALLOW GROUNDWATER SAMPLE LOCATION
- TPH TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- B BENZENE
- T TOLUENE
- E ETHYL BENZENE
- X TOTAL XYLENES
- ug/l MICROGRAMS PER LITER


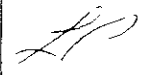


SHALLOW GROUNDWATER STUDY RESULTS		REVIEWED BY: BVT	APPROVED BY: <i>[Signature]</i>
CROWN METAL MFG - PACIFIC INTL' STEEL		DESIGNED BY:	DATE:
16525 WORTHLEY DRIVE		JOB #: 1587-2G	DRAWN BY: SLS
SAN LORENZO, CALIFORNIA		DATE: 1/11/90	DRAWING #: FIG. 2




LEGEND

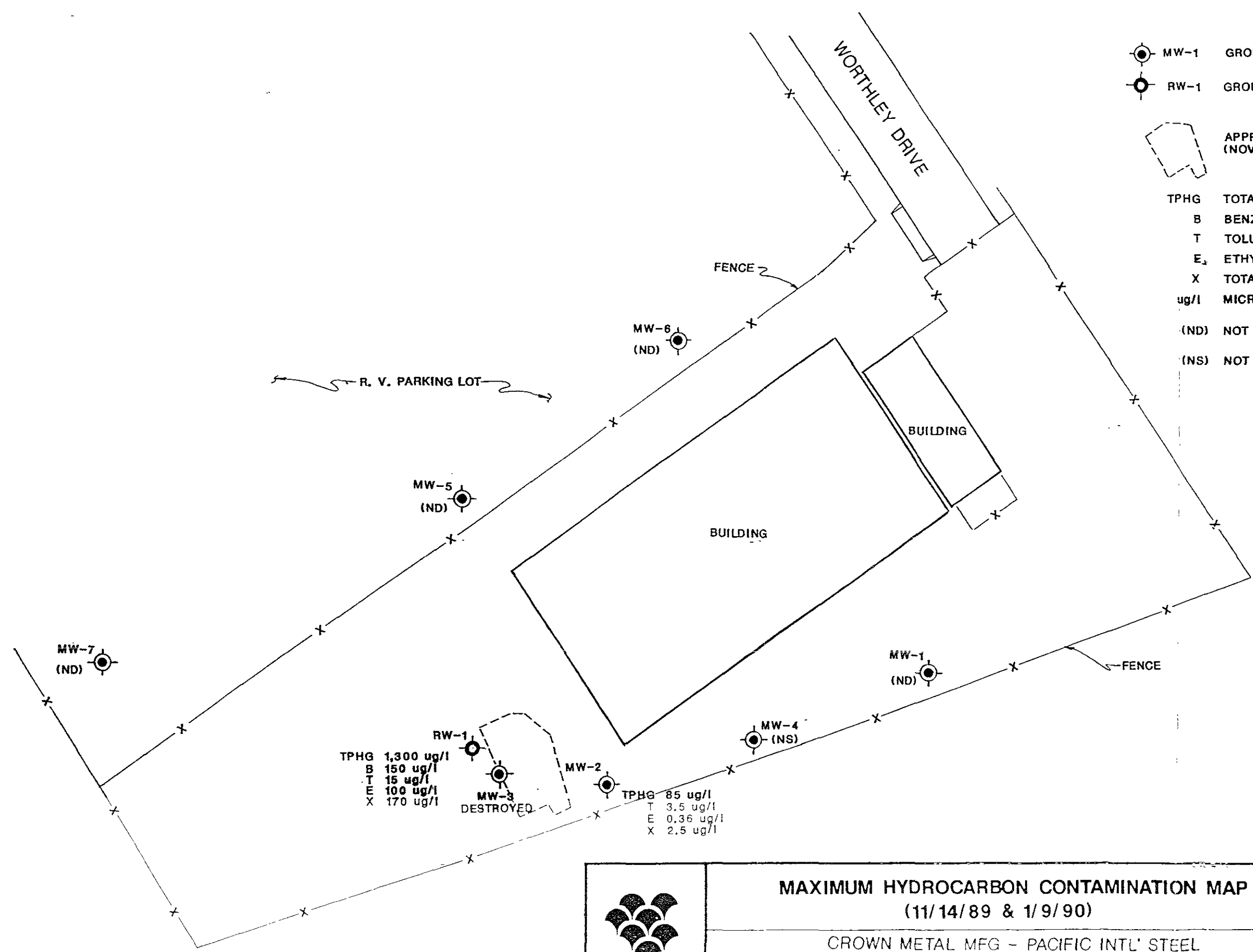
-  MW-1 GROUNDWATER MONITORING WELL
-  RW-1 GROUNDWATER RECOVERY WELL
-  1.0 ——— PIEZOMETRIC GROUNDWATER SURFACE CONTOUR ELEVATION IN FEET (DATUM: MEAN SEA LEVEL)
-  (0.84) ——— PIEZOMETRIC GROUNDWATER SURFACE ELEVATION IN FEET (DATUM: MEAN SEA LEVEL)
-  APPROXIMATE BOUNDARY OF SOIL EXCAVATION (NOVEMBER 1988)



 <p>onsco environmental services, inc.</p>	GROUNDWATER SURFACE CONTOUR MAP (1/3/90)		REVIEWED BY:	APPROVED BY:
	CROWN METAL MFG - PACIFIC INTL' STEEL		BVT	
	16525 WORTHLEY DRIVE		DESIGNED BY:	DATE:
	SAN LORENZO, CALIFORNIA		JOB #: 1587-2G	DRAWN BY: SLS
			DATE: 1/4/90	DRAWING #: FIG. 3

LEGEND

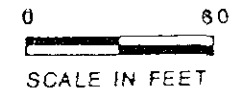
-  MW-1 GROUNDWATER MONITORING WELL
-  RW-1 GROUNDWATER RECOVERY WELL
-  APPROXIMATE BOUNDARY OF SOIL EXCAVATION. (NOVEMBER 1988)
- TPHG TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- B BENZENE
- T TOLUENE
- E_x ETHYL BENZENE
- X TOTAL XYLENES
- ug/l MICROGRAMS PER LITER
- (ND) NOT DETECTED
- (NS) NOT SAMPLED





TPHG 1,300 ug/l
 B 150 ug/l
 T 15 ug/l
 E 100 ug/l
 X 170 ug/l

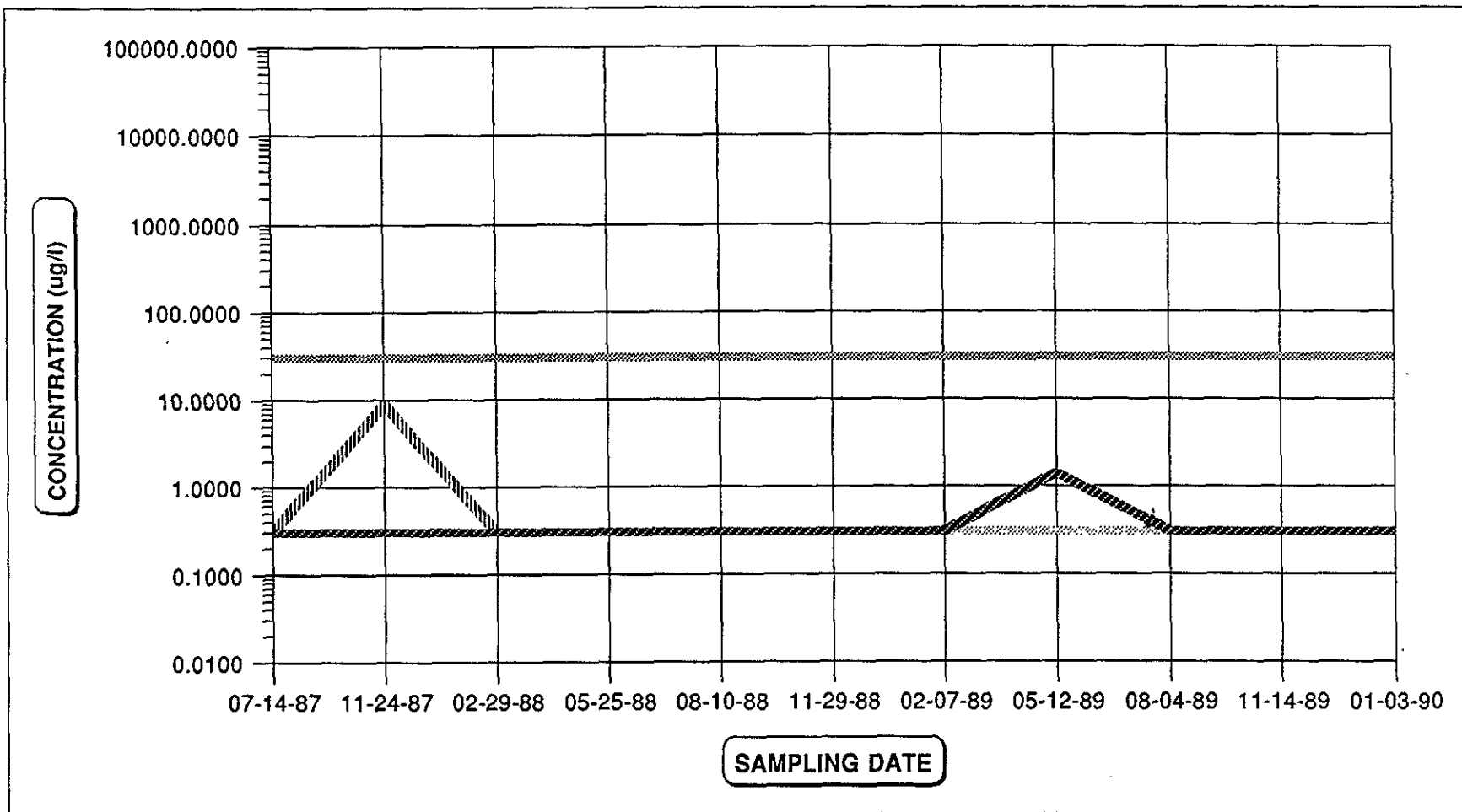
MW-3 DESTROYED

TPHG 85 ug/l
 T 3.5 ug/l
 E 0.36 ug/l
 X 2.5 ug/l



 onsko environmental services, Inc.	MAXIMUM HYDROCARBON CONTAMINATION MAP (11/14/89 & 1/9/90)		REVIEWED BY:	APPROVED BY:
	CROWN METAL MFG - PACIFIC INTL' STEEL		BVT	
	16525 WORTHLEY DRIVE		DESIGNED BY:	DATE:
	SAN LORENZO, CALIFORNIA		JOB #: 1587G	DRAWN BY: SLS
			DATE: 2/1/90	DRAWING #: FIG. 4

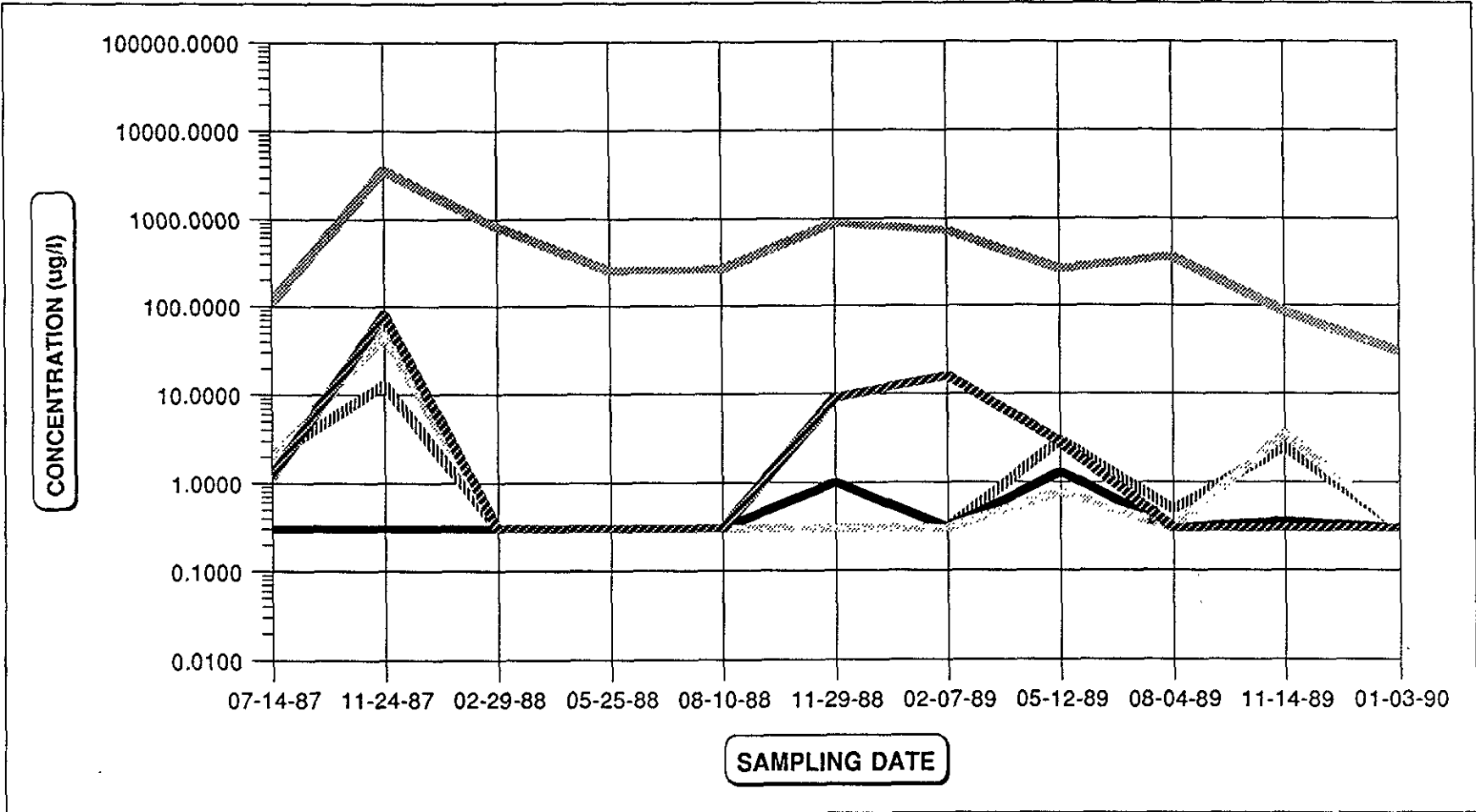
MW-1 GROUNDWATER ANALYSES DATA



TPHG
 BENZENE
 TOLUENE
 ETHYL BENZENE
 XYLENES

NOTE: Minimum value plotted is the laboratory detection or reporting limit. For analytical results, refer to appended laboratory reports.

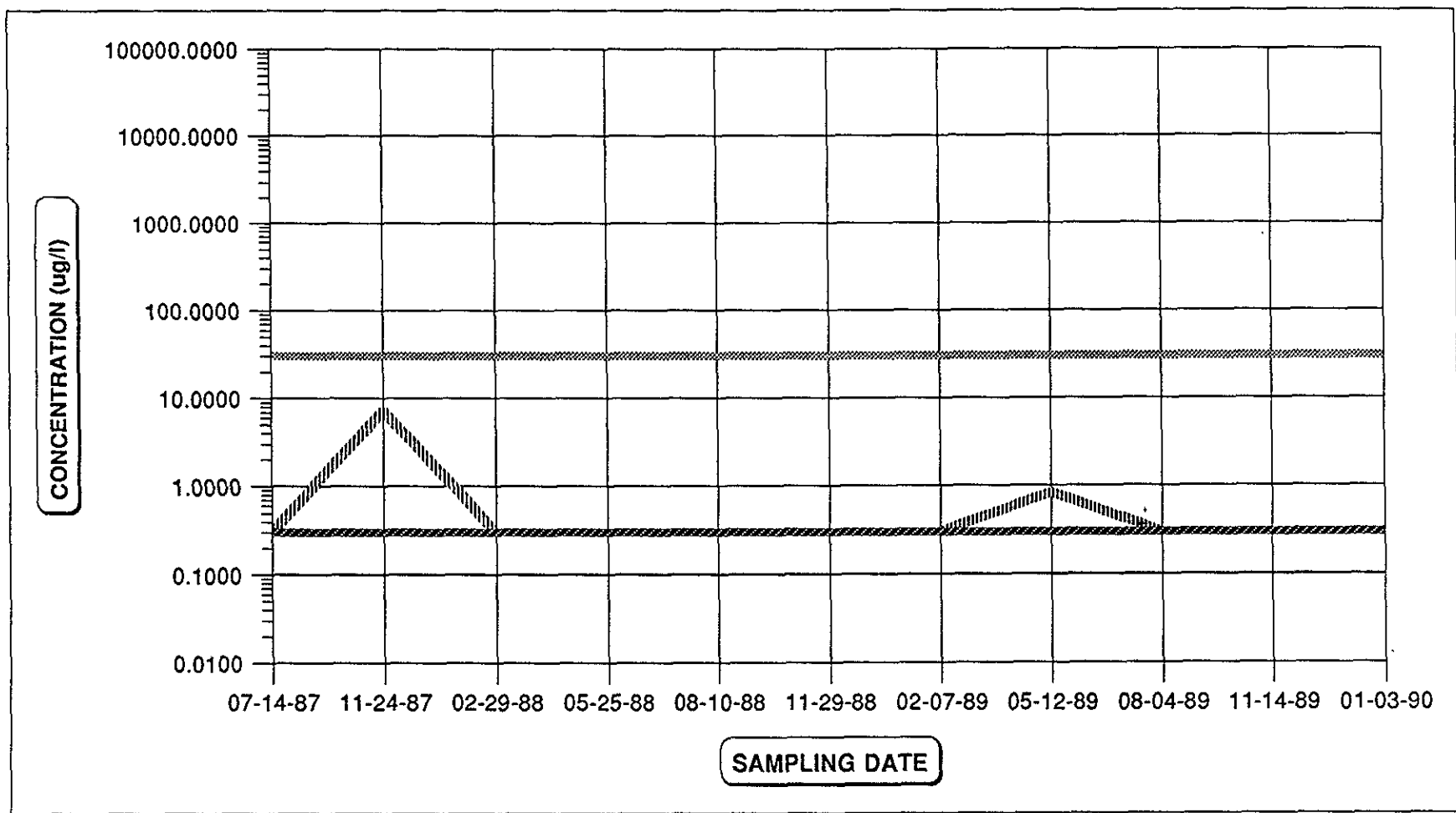
MW-2 GROUNDWATER ANALYSES DATA



TPHG
 BENZENE
 TOLUENE
 ETHYLBENZENE
 XYLENES

NOTE: Minimum value plotted is the laboratory detection or reporting limit. For analytical results, refer to appended laboratory reports.

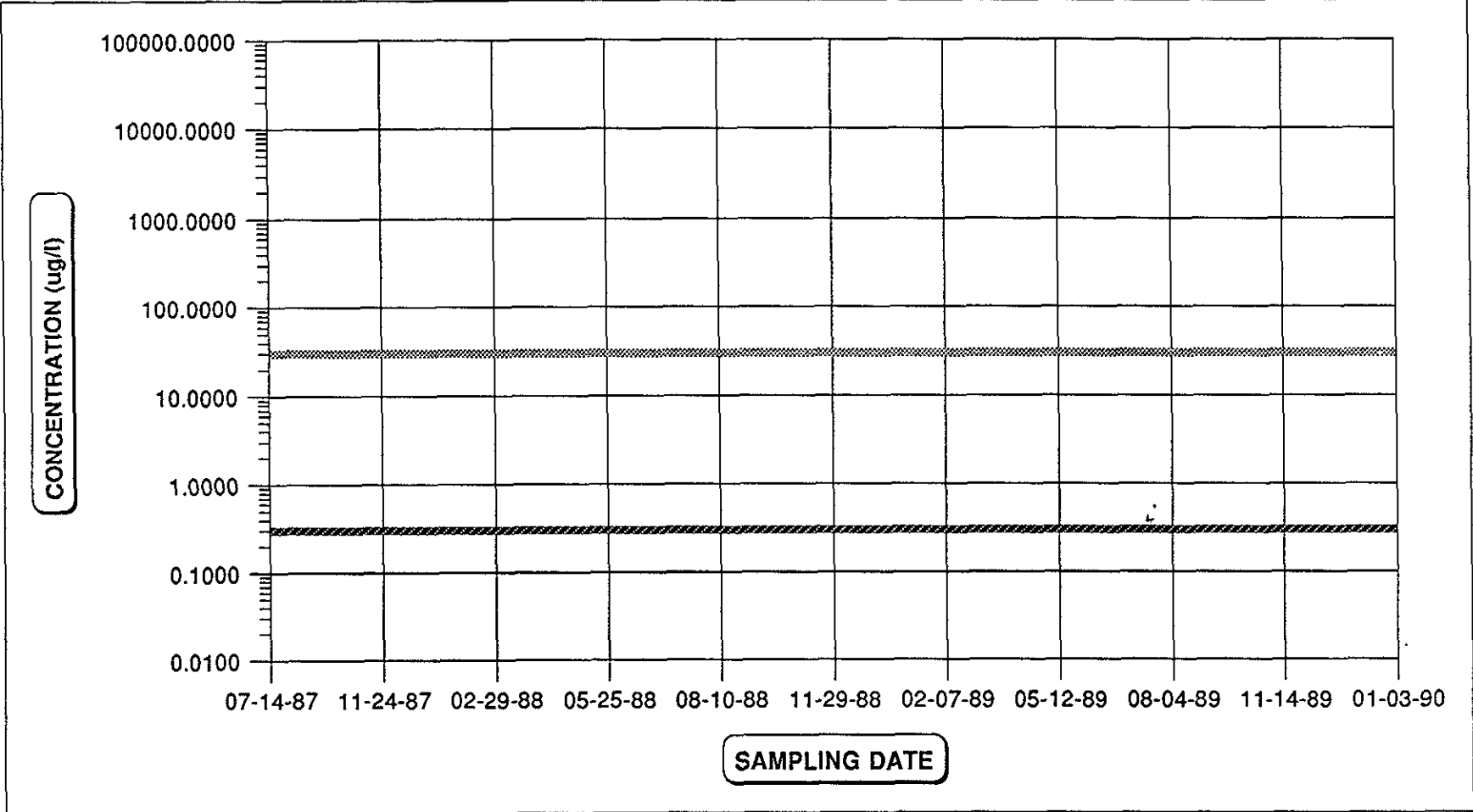
MW-5 GROUNDWATER ANALYSES DATA



TPHG
 BENZENE
 TOLUENE
 ETHYLBENZENE
 XYLENES

NOTE: Minimum value plotted is the laboratory detection or reporting limit. For analytical results, refer to appended laboratory reports.

MW-6 GROUNDWATER ANALYSES DATA



Legend:
●●●●● TPHG ●●●● BENZENE ●●●● TOLUENE ■■■■ ETHYL BENZENE ■■■■ XYLENES

NOTE: Minimum value plotted is the laboratory detection or reporting limit. For analytical results, refer to appended laboratory reports.

APPENDIX A

**GROUNDWATER AND SOIL
SAMPLING PROTOCOL**

ENSCO ENVIRONMENTAL SERVICES, INC.

GROUNDWATER SAMPLING PROTOCOL

GROUNDWATER SAMPLING PROCEDURES

Equipment Cleaning

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 well or groundwater is thoroughly cleaned with a trisodium phosphate (TSP) solution and rinsed with deionized or distilled water before use at the site. This cleaning procedure is followed between each well sampled. Wells are sampled in approximate order of increasing contamination. 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.

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, an optical interface probe is used to measure the hydrocarbon thickness and groundwater level. Measurements are collected and recorded to the nearest 0.01 foot.

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. Any observed film as well as odor and color of the water is recorded.

GROUNDWATER SAMPLING PROTOCOL

Sampling of groundwater is performed by Ensco Environmental Services, Inc. (EES) sampling technicians. Summarized field sampling procedures are as follows:

1. Measurements of liquid surface in the well and depth of monitoring well.
2. Field check for presence of floating product.
3. Purge well prior to collecting samples.
4. Monitor groundwater for temperature, pH, and specific conductance during purging.
5. Collect samples using Environmental Protection Agency (EPA) approved sample collection devices, i.e., teflon or stainless steel bailers or pumps.
6. Transfer samples into laboratory-supplied EPA-approved containers.
7. Label samples and log onto chain-of-custody form.
8. Store samples in a chilled ice chest for shipment to a state-certified analytical laboratory.

GROUNDWATER SAMPLING PROCEDURES

Equipment Cleaning

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 well or groundwater is thoroughly cleaned with a trisodium phosphate (TSP) solution and rinsed with deionized or distilled water before use at the site. This cleaning procedure is followed between each well sampled. Wells are sampled in approximate order of increasing contamination. 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.

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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. Any observed film as well as odor and color of the water is recorded.

ENSCO ENVIRONMENTAL SERVICES, INC.

SOIL SAMPLING PROTOCOL

SOIL SAMPLING PROTOCOL

I. SOIL SAMPLING BY DRILLING RIG

- 1) Review site proposal for boring locations and special instructions. Confirm boring locations in field with client. Have Underground Service Alert (USA) mark utilities in area prior to drilling.
- 2) Prior to initiating an exploratory boring, all equipment to be used during drilling and sampling operation is steam cleaned. Such equipment includes, but is not limited to, augers, bits, drilling rod, samplers, and brass sampler liners. Additionally, between sampling intervals, the sampler is thoroughly cleaned with a dilute trisodium phosphate solution and rinsed with clean tap water or distilled water.
- 3) Each exploratory boring is drilled with a truck-mounted drilling rig using either solid flight or hollow stem augers. The boring is advanced to the desired sampling depth and the sampler is lowered to the bottom of the hole. The sampler is driven a maximum of 18 inches into the undisturbed soils ahead of the auger by a 140-pound, rig-operated hammer falling 30 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the boring log. When necessary, the sampler may be pushed by the drill rig hydraulics. In this case, the pressure exerted (in pounds per square inch) is recorded. After the sampler has penetrated the full depth, it is retrieved to the surface.
- 4) The samplers commonly used are either a California modified sampler (3 inch or 2.5 inch O.D.) or a standard penetrometer (2 inch O.D.). The standard penetrometer does not contain sample liners and is used to determine soil strength characteristics and visually characterize the subsurface materials. If samples are collected for laboratory analysis the

California modified sampler, equipped with brass liners, is used except when the analysis will include copper or zinc. In this instance, the sample should be taken with the standard penetrometer and placed in a labeled plastic bag.

Upon retrieval, the sampler is disassembled into its component parts. One or more of the liners is selected for chemical analysis. The ends of the selected liner(s) are sealed with aluminum foil or teflon tape, capped with plastic caps, labeled, logged on chain-of-custody forms and stored in a chilled ice chest for preservation in the field and during transport to the analytical laboratory. All labels are pre-written with indelible ink to minimize handling time.

- 5) Samples are checked for the presence of contamination in the field by the geologist. Any discoloration or odor is noted on the boring log. Each sample is classified in the field by a geologist using the Unified Soil Classification System and a Munsell soil color chart. In addition, samples may also be field-screened with a photo ionization detector (calibrated daily) or threshold limit value sniffer. In either case, the instrument probe is held adjacent to freshly crumbled soil and the stabilized reading value is recorded on the log. Other visual screening techniques include examination of the sample under hand-lens magnification as-well-as floating sheen inspection resulting from immersion in water.
- 6) Samples are held in the possession of Ensco Environmental Services personnel until transferred to the analytical laboratory. Transfer to the laboratory is accomplished with either delivery by Ensco Environmental Services personnel, pick-up by laboratory personnel, or transfer by a personal delivery service. Each transfer of responsibility is recorded on a chain-of-custody log that accompanies the sample.

II. SOIL SAMPLING BY HAND

- 1) Some situations require that samples be collected by hand without the assistance of a drill rig (e.g., soil stock piles, excavation sidewall sampling, etc.). When possible, soil samples will be collected using a steel core sampler equipped with clean brass liners which is advanced into the soil with a slide hammer. In other cases, the outer surface of the soil is removed and a brass liner is driven into the soil by hand or with a hammer. To avoid damaging the liner, a block of wood is held next to the liner so that the hammer strikes the block rather than the liner. The liner is removed and handled as described above. In deep excavations where safety factors preclude the direct sampling of the bottom or side wall, soil is retrieved by a backhoe bucket and this soil is sampled.

APPENDIX B

**EXPLORATORY BORING LOGS
WELL CONSTRUCTION DETAILS**

EXPLORATORY BORING LOG



**ensco
environmental
services, inc.**

PROJECT NAME: Crown Metal Manufacturing
(Pacific International Steel)
San Lorenzo, California

BORING NO. MW-7
DATE DRILLED: 11/28/89

PROJECT NUMBER: 1587-2G

LOGGED BY: J.K.R.

DEPTH (ft.)	SAMPLE No	BLOWS / FOOT	UNIFIED SOIL CLASSIFICATION	SOIL DESCRIPTION	WATER LEVEL
1	MW-7-1	11	CL	SILTY CLAY, greenish gray (5G 5/1) mottled with dark gray (N4/), 10-15% very fine sand, medium stiff, moderate plasticity, moist	
2					
3					
4					
5					
6	MW-7-2	5	CH	CLAY, dark gray (N4/), roots, stiff, high plasticity, moist	
7					
8					
9					
10					
11	MW-7-3	18	CL	SILTY CLAY, greenish gray (5GY 5/1), trace very fine sand, roots and rootholes, stiff, moderate plasticity, moist	
12					
13					
14					
15					
16	Bottom of Boring = 16 feet				
17					
18					
19					
20					
21					

Monitoring Well Detail

PROJECT NUMBER 1587-2G
 PROJECT NAME Crown Metals - San Lorenzo
 COUNTY Alameda

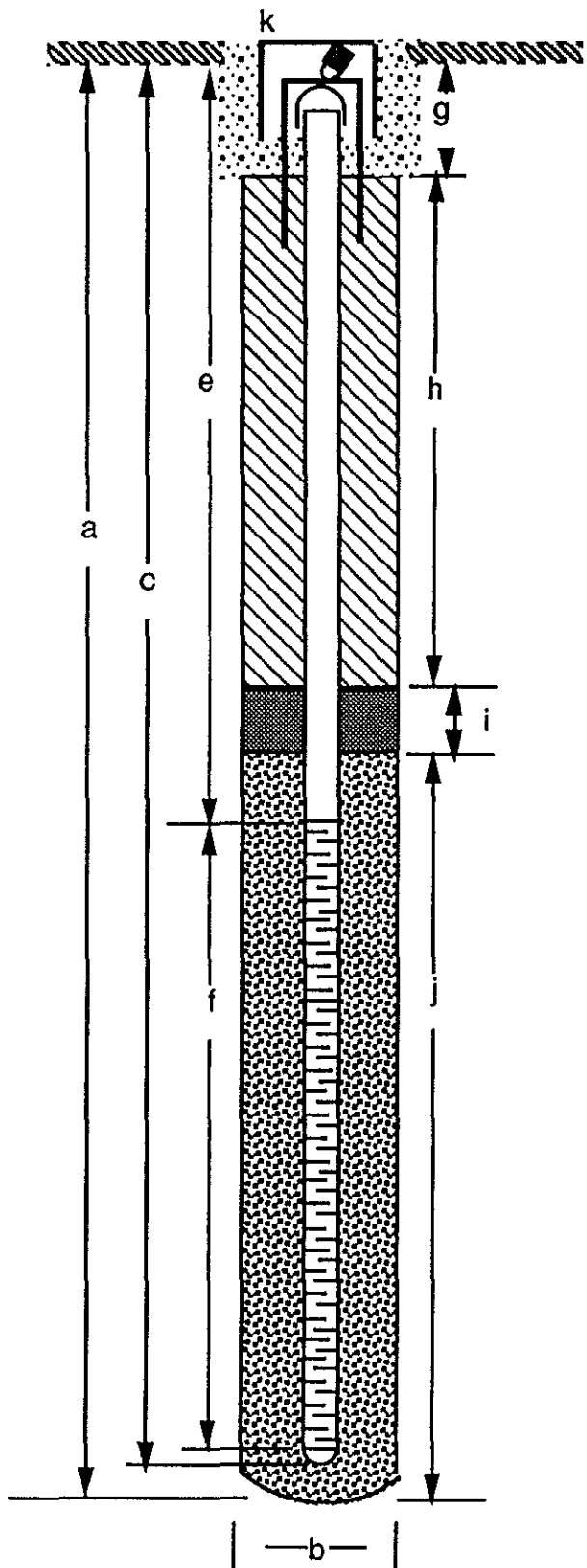
BORING / WELL NO. MW-7
 TOP OF CASING ELEV. 8.41
 GROUND SURFACE ELEV. 8.90
 DATUM Mean Sea Level

EXPLORATORY BORING

- a. Total Depth 16 ft.
 b. Diameter 8 in.
 Drilling method Hollow Stem Auger

WELL CONSTRUCTION

- c. Casing length 16 ft.
 Material Schedule 40 PVC
 d. Diameter 2 in.
 e. Depth to top perforations 6 ft.
 f. Perforated length 10 ft.
 Perforated interval from 6 to 16 ft.
 Perforation type machine slot
 Perforation size 0.01 in.
 g. Surface seal 1 ft.
 Seal Material Concrete
 h. Backfill 3 ft.
 Backfill material Neat Cement Grout
 i. Seal 1 ft.
 Seal Material Bentonite Pellets
 j. Gravel pack 11 ft.
 Pack material #2/12 Silica Sand
 k. Well Head Completion Traffic rated vault
box and locking steel protective cover.



ensco
 environmental
 services, inc.

EXPLORATORY BORING LOG



ensco
environmental
services, inc.

PROJECT NAME: Crown Metal Manufacturing
(Pacific International Steel)
San Lorenzo, California

BORING NO. RW-1

DATE DRILLED: 11/28/89

PROJECT NUMBER: 1587-2G

LOGGED BY: J.K.R.

DEPTH (ft.)	SAMPLE No	BLOWS/FOOT	UNIFIED SOIL CLASSIFICATION	SOIL DESCRIPTION	WATER LEVEL	
1	RW-1-1	11		FILL: reddish brown sandy gravel		
2			ML	CLAYEY SILT, very dark gray (10YR 3/1), 30-40% clay, roots, stiff, moderate plasticity, moist		
3						
4						
5						
6						
7						
8						
9						
10			3	CH		CLAY, greenish gray (5G 5/1), roots, soft, high plasticity, moist
11						
12						
13						
14			14	CL		SILTY CLAY, greenish gray (5GY 5/1), trace very fine sand, roots and rootholes, stiff, high plasticity, moist
15						
16						
17						
18						
19						
20			8	ML		SANDY SILT, yellowish brown (10YR 5/4), 40-50% very fine sand, stiff, wet
21						
Bottom of Boring = 20 feet						

Monitoring Well Detail

PROJECT NUMBER 1587-2G
 PROJECT NAME Crown Metals - San Lorenzo
 COUNTY Alameda

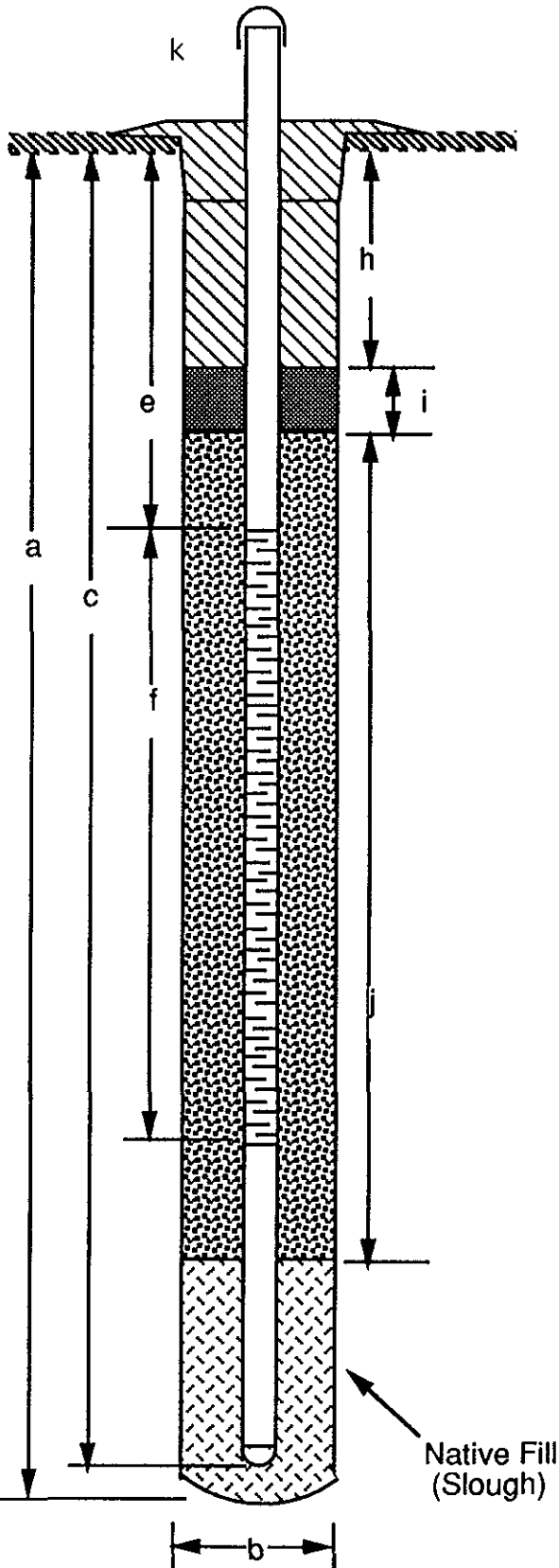
BORING / WELL NO. RW-1
 TOP OF CASING ELEV. 11.02
 GROUND SURFACE ELEV. ---
 DATUM Mean Sea Level

EXPLORATORY BORING

- a. Total Depth 20 ft.
 b. Diameter 11 in.
 Drilling method Hollow Stem Auger

WELL CONSTRUCTION

- c. Casing length 18 ft.
 Material Schedule 40 PVC
 d. Diameter 6 in.
 e. Depth to top perforations 3 ft.
 f. Perforated length 10 ft.
 Perforated interval from 3 to 13 ft.
 Perforation type Stainless Steel Wire Wrap
 Perforation size 0.015 in.
 g. Surface seal 0 ft.
 Seal Material None
 h. Backfill 1.5 ft.
 Backfill material Neat Cement Grout
 i. Seal .5 ft.
 Seal Material Bentonite Pellets
 j. Gravel pack 13 ft.
 Pack material #2/12 Silica Sand
 k. Well Head Completion 2 Foot PVC Stick Up



ensco
 environmental
 services, inc.

APPENDIX C
SURVEY DATA

RON ARCHER

CIVIL ENGINEER, INC.

CONSULTING • PLANNING • DESIGN • SURVEYING

4133 Mohr Ave., Suite E • Pleasanton, CA 94566
(415) 462-9372



DECEMBER 20, 1989

JOB NO. 1366

ELEVATIONS OF EXISTING MONITOR WELLS AT CROWM METAL MFG.-PACIFIC INTERNATIONAL STEEL CORPORATION, LOCATED AT 16525 WORTHLEY DRIVE, CITY OF SAN LORENZO, ALAMEDA COUNTY CALIFORNIA.

FOR ENSCO ENVIRONMENTAL SERVICES.
PROJECT NO. 1587G

BENCHMARK:

A FOUND CHISLED "T" IN THE NORTHWEST CORNER OF THE NORTHERLY CONCRETE ABUTMENT. FIELD CONTROL LINE "N", ZONE 2, 14.3 FEET SOUTH OF THE CORNER OF A CHAIN LINK FENCE AND 75 FEET EAST OF THE CENTERLINE OF S.P.R.R. TRACKS. ELEVATION TAKEN AS 9.007 N.G.S. DATUM.

MONITOR WELL DATA TABLE

WELL DESIGNATION	ELEVATION	DESCRIPTION
* MW1	8.86 9.40	TOP OF PVC CASING TOP OF BOX
* MW2	9.17 9.59	TOP OF PVC CASING TOP OF BOX
* MW3	8.54 9.05	TOP OF PVC CASING TOP OF BOX
* MW4	8.48 8.92	TOP OF PVC CASING TOP OF BOX
* MW5	----- 9.6	TOP OF PVC CASING TOP OF BOX
* MW6	----- 9.7	TOP OF PVC CASING TOP OF BOX
MW7	8.41 8.90	TOP OF PVC CASING TOP OF BOX
RW-1	11.02	TOP OF PVC CASING

* NOTE: MONITOR WELLS 1 THROUGH 6 ARE FROM PREVIOUS SURVEY FOR EXCELTECH ON JULY 22, 1987

APPENDIX D

**LABORATORY DATA
CHAIN OR CUSTODY FORMS**



SEQUOIA ANALYTICAL

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

EnSCO Environmental Services 41674 Christy Street Fremont, CA 94538 Attention: Gary Mulkey	Client Project ID: #1587-2G, Crown Metals/Pacific Steel Matrix Descript: Soil P.O. #16310 Analysis Method: EPA 5030/8015/8020 First Sample #: 912-0324	Sampled: Nov 28, 1989 Received: Dec 5, 1989 Analyzed: Dec 12, 1989 Reported: Dec 21, 1989
---	---	--

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
912-0324	MW-7-1	N.D.	N.D.	N.D.	N.D.	N.D.
912-0325	RW-1-1	3.2	N.D.	N.D.	N.D.	N.D.

Detection Limits:	1.0	0.05	0.1	0.1	0.1
-------------------	-----	------	-----	-----	-----

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

Vickie Tague
Project Manager



SEQUOIA ANALYTICAL

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

Enesco Environmental Services
41674 Christy Street
Fremont, CA 94538
Attention: Ken Rike

Client Project ID: 1587G, Crown Metal, P.O. #16125
Matrix Descript: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 911-1850 A

Sampled: Nov 14, 1989
Received: Nov 15, 1989
Analyzed: Nov 22, 1989
Reported: Nov 30, 1989

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

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons	Benzene	Toluene	Ethyl Benzene	Xylenes
		$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)
9111850 A	MW1	N.D.	N.D.	N.D.	N.D.	N.D.
9111851 A	MW2	85	N.D.	3.5	0.36	2.5
9111852 A	MW5	N.D.	N.D.	N.D.	N.D.	N.D.
9111853 A	MW6	N.D.	N.D.	N.D.	N.D.	N.D.

Detection Limits:

30.0

0.3

0.3

0.3

0.3

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

Vickie Tague
Project Manager



SEQUOIA ANALYTICAL

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

Exceltech
41674 Christy Street
Fremont, CA 94538
Attention: Britt Von Thaden

Client Project ID: #1587-G, Crown Metals, PO #16678
Matrix Descript: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 001-1185 A

Sampled: Jan 9, 1990
Received: Jan 10, 1990
Analyzed: Jan 11, 1990
Reported: Jan 18, 1990

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)
0011185 A	BB-1	N.D.	N.D.	N.D.	N.D.	N.D.
0011186 A	RW-1	1,300	150	15	100	170
0011187 A	MW-7	N.D.	N.D.	N.D.	N.D.	N.D.

Detection Limits:	30.0	0.3	0.3	0.3	0.3
-------------------	------	-----	-----	-----	-----

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

V. Tague
Vickie Tague
Project Manager

