



a subsidiary of environmental system company

February 2, 1989

O.I. Glass Container Division, S.T.S.
3600 Alameda Avenue
Oakland, CA 94601

Attn: Mr. Robert Barber

Re: December Quarterly Ground-Water Sampling and Analysis
Owens Illinois Facility, Oakland, California
EES Project No. 1467G

Dear Mr. Barber:

This comprehensive report presents the results of the December quarterly ground-water sampling and laboratory analysis at the Owens Illinois facility located in Oakland, California. It includes the current and past analytical data acquired during the course of this investigation.

If you have any questions, please call.

Sincerely,
Ensco Environmental Services, Inc..

A handwritten signature in black ink, appearing to read "Jim Kirschner".

Jim Kirschner
Staff Geologist

A handwritten signature in black ink, appearing to read "Christopher M. Palmer".

Christopher M. Palmer, C.E.G. 1262, R.E.A. 285
Senior Program Manager

JK/CMP/sr
Enclosure

**DECEMBER QUARTERLY
GROUND-WATER SAMPLING AND ANALYSIS**

FOR

**O.I. GLASS CONTAINER DIVISION, S.T.S.
3600 ALAMEDA AVENUE
OAKLAND, CALIFORNIA**

INTRODUCTION

Ensco Environmental Services, Inc. (EES) has completed the December quarterly sampling program to ascertain the ground-water conditions beneath the O.I. Glass Container facility located in the city of Oakland, Alameda County, California. Ground-water sampling was performed on December 29, 1988. This information is used to ascertain water quality as requested by the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region. The sample program objectives are:

- Plot the ground-water contour surface and inferred flow direction.
- Investigate for the presence of hydrocarbon contamination by; 1) checking floating product thickness and; 2) Performing laboratory analyses of ground-water samples for the presence of either total volatile hydrocarbons (TVH) and the compounds benzene, toluene and xylenes (BTX), or total extractable hydrocarbons (TEH), or both.
- Ascertain the extent and concentrations of the hydrocarbon.
- Compare current and past data.

Eighteen ground-water monitoring wells (MW-1 through MW-18) and one recovery well (R-1) exist in the project area as shown on Figure 1. This map also presents the ground-water surface contours at the site based on data collected on December 29, 1988. The recovery system, utilizing one recovery

well, was taken out of service during remodeling at the plant and is not currently in operation. Prior to sampling each well, ground-water elevations were recorded and each well was checked for the presence of floating product. All ground water removed from each well was placed in properly labeled drums and left on the site. Analytical results of water samples collected in December are summarized in Table 1 along with past results. EES in-house sampling and laboratory procedures are attached in Appendices A and B, respectively. Laboratory reports with chain-of-custody are attached in Appendix C.

DISCUSSION

Ground-Water Occurrence

Ground-water beneath the site is tidally influenced daily due to its proximity to the Alameda Channel and San Francisco Bay. Past observations of the ground-water surface revealed fluctuations which varied from 0.1 to 6.0 feet. A ground-water elevation map for December 29, 1988 is attached (see Figure 1).

Ground-Water Sampling and Analysis

All monitoring wells except MW-1, MW-2, MW-3, and MW-9 were sampled during this round of monitoring. Access to wells MW-1, and MW-2 was obstructed. Wells MW-3 and MW-9 were not sampled due to the presence of floating product.

The wells were first checked for the presence of floating product. If less than 1/4 inch of floating product was measured on the ground water in a well, samples were collected and analyzed for TVH with BTX distinction and/or TEH. Wells were preselected for individual analyses given their proximity to the known contaminants (i.e., TVH and TEH in the vicinity of the power and forming building, where gasoline and diesel fuels spilled, TEH near the southwestern corner of the site where No. 2 oil was the contaminant). The results are presented on Table 1 and the laboratory analytical reports are attached in Appendix C.

Analytical Results

The results of the chemical analyses showed that concentrations of TEH were found in most of the sampled wells and ranged from Below Detection Limits (BDL) in wells MW-4, MW-8, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15 and MW-16 to 42,000 parts-per-billion (ppb) in MW-6. The highest concentrations of TEH were detected in the southwestern corner of the site. Well MW-17 was found to contain concentrations of TEH (4,700 ppb) as well as TVH (1,100 ppb) also concentrations of benzene (150 ppb) and total xylenes (140 ppb) were found.

Analytical results of the current sampling round are presented in Table 1 along with past available data. TEH analytical data from selected wells that have been sampled for several sampling rounds are presented graphically in Figures 2-9. The graphs show that the concentrations of TEH have decreased in all of the wells since the September quarterly sampling. Overall, the concentrations of TEH in these wells have fluctuated during the last year but are currently at approximately the same levels as they were in December of 1987.

Contaminant Plume Movement

Floating oil was observed during the current sampling in wells MW-9 and MW-3, which is consistent with past observations. The concentrations of dissolved contaminants in MW-5, MW-6 and MW-7, have remained high over the last few quarterly monitoring rounds. Relatively small amounts of hydrocarbons (TEH) have been detected in the upgradient wells MW-12 and MW-4.

CONCLUSIONS AND RECOMMENDATIONS

1. The product recovery system should be reactivated and an additional recovery well should be installed in the vicinity of well MW-2.
2. The monitoring of floating product and dissolved constituents should continue on a quarterly basis, as requested by the RWQCB.
3. The RWQCB requires that the responsible party initiate cleanup operations prior to notification from the regulators.

Reporting Requirements

This report should be forwarded by the client in a timely manner to the following agency:

California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street
Oakland, California, 94607
Attn: Underground Leaking Tanks Section

LIMITATIONS

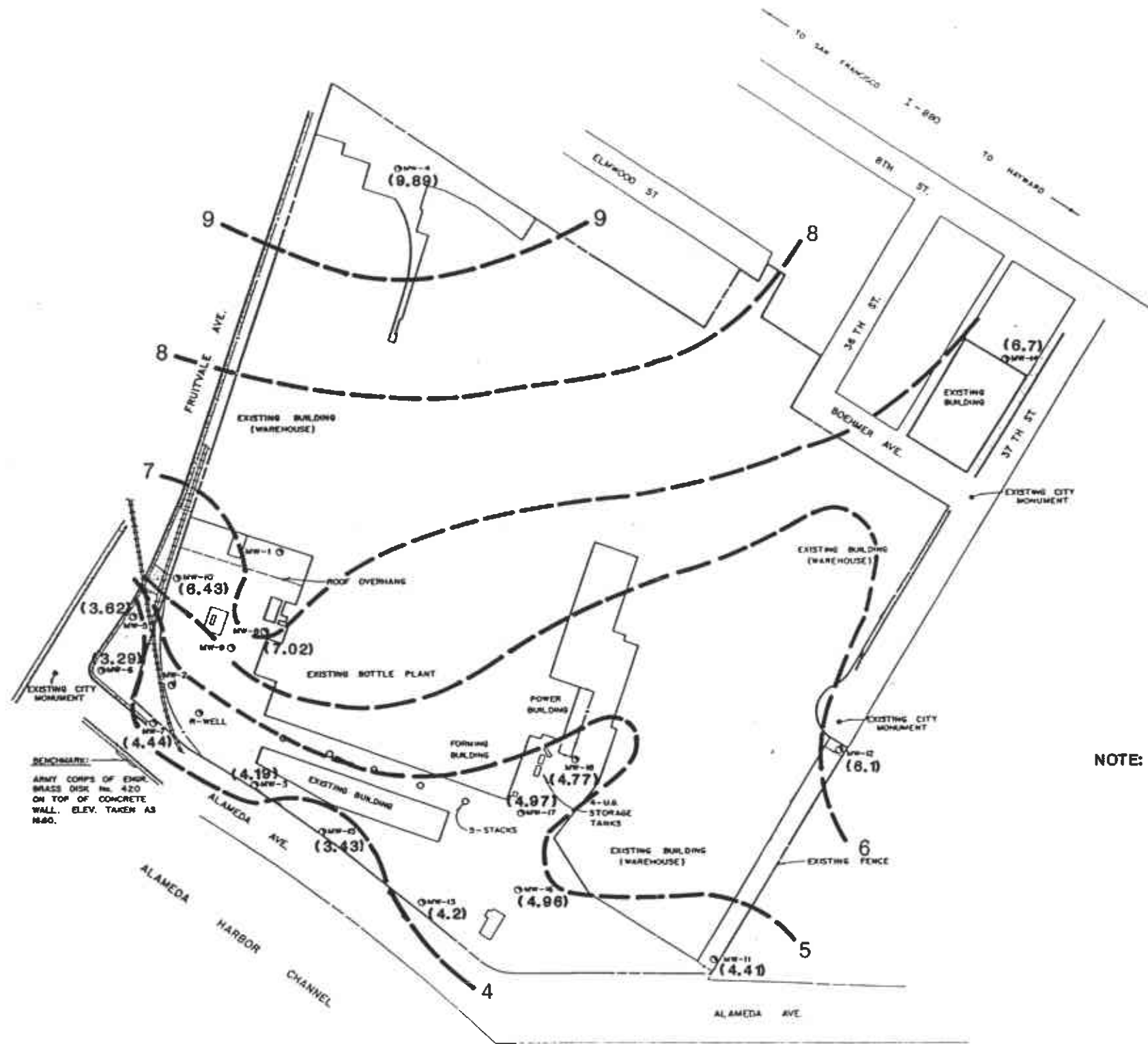
The discussion and recommendations presented in this report are based on the following:

1. Existing monitoring wells on-site.
2. The observations of field personnel.
3. The results of laboratory analyses performed by a state-certified laboratory.
4. Referenced documents.
5. Our understanding of the regulations of the State of California and Alameda County.

It is possible that variations in the soil or ground water conditions could exist beyond the points explored in this investigation. Also, changes in the ground water conditions could occur at sometime in the future due to variations in rainfall, temperature, regional water usage or other factors.

The service performed by Ensco Environmental Services, Inc. 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 Alameda County area. Please note that contamination of soil and ground water must be reported to the appropriate agencies in a timely manner. No other warranty, expressed or implied, is made.

The chemical analytical data included in this report have been obtained from a state-certified laboratory. The analytical methods employed by the laboratory were in accordance with procedures suggested by the U.S. EPA and the State of California. EES is not responsible for laboratory errors in procedure or result reporting.



BENCHMARK:
ARMY CORPS OF ENG.
BRASS DISK NO. 420
ON TOP OF CONCRETE
WALL. ELEV. TAKEN AS
M.S.L.

- LEGEND**
- MW-2 MONITORING WELL LOCATION
 - (6.1) GROUND-WATER SURFACE ELEVATION IN FEET (DATUM: M.S.L.)
 - - - 6 GROUND-WATER SURFACE ELEVATION CONTOUR LINE IN FEET (DATUM: M.S.L.)

NOTE: GROUND-WATER ELEVATIONS ARE INFLUENCED BY DAILY, MONTHLY AND YEARLY TIDAL FLUCTUATIONS.

SCALE 1"=200'

BASE MAP: ENSCO ENVIRONMENTAL SERVICES, INC.



SITE PLAN		REVIEWED BY:	APPROVED BY:
GROUND-WATER SURFACE ELEVATION MAP (12/29/88)			
OWENS-ILLINOIS GLASS CONTAINER DIVISION		JOB # 1467G	DRAWN BY: J.C.
OAKLAND, CALIFORNIA		DATE: 2-1-89	DRAWING # FIG. 1

TABLE 1
GROUND-WATER ANALYSES DATA

Owens Illinois; #1467G.

WELL NUMBER	DATE SAMPLED	TEH (ppb)	TVH (ppb)	BENZENE (ppb)	TOLUENE (ppb)	XYLENES (ppb)	WELL ELEV. (ft.)	DEPTH TO WATER (ft)	PRODUCT THICKNESS (ft.)
MW-1	4/9/87	NA	BDL	BDL	BDL	BDL	16.02	8.98	0.005
	9/16/87	NOT SAMPLED		COVERED BY GLASS	---	---		---	---
	12/1/87	NOT SAMPLED		COVERED BY GLASS	---	---		---	---
	3/7/88	NOT SAMPLED		COVERED BY GLASS	---	---		---	---
	6/8/88	NOT SAMPLED		COVERED BY GLASS	---	---		---	---
	9/14/88	NOT SAMPLED		COVERED BY GLASS	---	---		---	---
	12/29/88	NOT SAMPLED		COVERED BY GLASS	---	---		---	---
MW-2	4/9/87	NOT SAMPLED	---	---	---	---	17.11	---	3.85
	9/16/87	NOT SAMPLED	---	---	---	---		---	---
	12/1/87	NOT SAMPLED	---	---	---	---		20.19	8.49
	3/7/88	NOT SAMPLED		COVERED BY DUMPSTER	---	---		---	---
	6/8/88	NOT SAMPLED		COVERED BY DUMPSTER	---	---		---	---
	9/14/88	NOT SAMPLED		COVERED BY TRAILER	---	---		---	---
	12/29/88	NOT SAMPLED	---	---	---	---		---	---
MW-3	4/9/87	NA	370	BDL	BDL	BDL	15.66	10.53	---
	9/16/87	NOT SAMPLED	---	---	---	---		11.44	0.04
	12/1/87	NOT SAMPLED	---	---	---	---		12.73	0.25
	3/9/88	190,000	NA	NA	NA	NA		15.22	0.71
	6/9/88	16,000	---	---	---	---		14.78	0.70
	9/14/88	NOT SAMPLED	---	---	---	---		---	0.43
	12/29/88	NOT SAMPLED	---	---	---	---		---	2.00
MW-4	4/9/87	NA	BDL	BDL	BDL	BDL	18.05	8.73	---
	9/16/87	66	1.3	BDL	BDL	BDL		10.53	---
	12/1/87	100	BDL	BDL	BDL	8.9		9.08	---
	3/7/88	BDL	BDL	BDL	BDL	BDL		9.05	---
	6/8/88	BDL	BDL	BDL	BDL	BDL		9.25	---
	9/14/88	100	BDL	BDL	BDL	BDL		10.47	---
	12/29/88	BDL	BDL	BDL	BDL	BDL		8.16	---

TABLE 1 (Cont.)
GROUND-WATER ANALYSES DATA

Owens Illinois; #1467G.

WELL NUMBER	DATE SAMPLED	TEH (ppb)	TVH (ppb)	BENZENE (ppb)	TOLUENE (ppb)	XYLENES (ppb)	WELL ELEV. (ft.)	DEPTH TO WATER (ft)	PRODUCT THICKNESS (ft.)
MW-5	4/9/87	NA	54	BDL	BDL	BDL	16.19	12.02	---
	9/16/87	96,000	NA	NA	NA	NA		11.77	---
	12/1/87	2,000	NA	NA	NA	NA		11.37	Film
	3/9/88	BDL	NA	NA	NA	NA		13.06	---
	6/9/88	12,000	NA	NA	NA	NA		12.74	Film
	9/14/88	6,300	NA	NA	NA	NA		13.38	Film
	12/29/88	5,300	NA	NA	NA	NA		12.57	Film
MW-6	4/9/87	NOT SAMPLED	---	---	---	---	17.48	13.28	0.59
	9/16/87	400,000	NA	NA	NA	NA		13.40	Film
	12/1/87	30,000	NA	NA	NA	NA		13.04	Film
	3/9/88	9,800	NA	NA	NA	NA		15.00	---
	6/9/88	63,000	NA	NA	NA	NA		14.56	Film
	9/14/88	140,000	NA	NA	NA	NA		14.90	Film
	12/29/88	42,000	NA	NA	NA	NA		14.19	Film
MW-7	4/9/87	NOT SAMPLED	---	---	---	---	15.76	12.13	Film
	9/16/87	790,000	NA	NA	NA	NA		12.29	Film
	12/1/87	5,300	NA	NA	NA	NA		11.24	Film
	3/9/88	BDL	NA	NA	NA	NA		11.85	---
	6/9/88	12,000	NA	NA	NA	NA		12.46	Film
	9/14/88	67,000	NA	NA	NA	NA		12.97	Film
	12/29/88	6,100	NA	NA	NA	NA		11.32	Film
MW-8	4/9/87	NA	73	BDL	BDL	BDL	16.57	10.35	Film
	9/16/87	NOT SAMPLED	---	---	---	---		10.71	---
	12/1/87	630	NA	NA	NA	NA		9.89	---
	3/8/88	2,600	NA	NA	NA	NA		9.61	---
	6/9/88	1,700	NA	NA	NA	NA		9.96	---
	9/14/88	150	NA	NA	NA	NA		10.71	Sheen
	12/29/88	BDL	NA	NA	NA	NA		9.55	Sheen

TABLE 1 (Cont.)
GROUND-WATER ANALYSES DATA

Owens Illinois; #1467G.

WELL NUMBER	DATE SAMPLED	TEH (ppb)	TVH (ppb)	BENZENE (ppb)	TOLUENE (ppb)	XYLENES (ppb)	WELL ELEV. (ft.)	DEPTH TO WATER (ft)	PRODUCT THICKNESS (ft.)
MW-9	4/9/87	NOT SAMPLED	---	---	---	---	---	---	----
	9/16/87	1,300	NA	NA	NA	NA		---	---
	12/1/87	18,000	NA	NA	NA	NA		6.83	---
	3/9/88	47,000	NA	NA	NA	NA		6.44	0.06
	6/8/88	NOT SAMPLED		ACCESS RESTRICTED				---	---
	9/14/88	NOT SAMPLED	NA	NA	NA	NA		7.70	1.5
	12/29/88	NOT SAMPLED	---	---	---	---		---	TOTAL
MW-10	4/9/87	NA	300	BDL	BDL	BDL	15.96	10.29	Film
	9/16/87	3,800	NA	NA	NA	NA		11.19	Film
	12/1/87	590	NA	NA	NA	NA		10.08	Film
	3/8/88	BDL	NA	NA	NA	NA		10.36	---
	6/8/88	3,800	NA	NA	NA	NA		10.89	Film
	9/14/88	570	NA	NA	NA	NA		11.34	---
	12/29/88	BDL	NA	NA	NA	NA		9.53	Sheen
MW-11	4/9/87	NA	BDL	BDL	BDL	BDL	13.99	9.02	---
	9/16/87	NA	BDL	BDL	BDL	BDL		9.96	---
	12/1/87	NA	BDL	0.8	BDL	10		9.44	---
	3/7/88	BDL	BDL	BDL	BDL	BDL		9.31	---
	6/8/88	BDL	BDL	BDL	BDL	BDL		9.42	---
	9/14/88	100	BDL	BDL	BDL	BDL		9.10	---
	12/29/88	BDL	BDL	BDL	BDL	BDL		9.58	---
MW-12	4/9/87	NA	BDL	BDL	BDL	BDL	13.83	6.83	---
	9/16/87	NA	BDL	BDL	BDL	BDL		7.80	---
	12/1/87	NA	BDL	BDL	BDL	13		7.59	---
	3/7/88	BDL	BDL	BDL	BDL	BDL		7.02	---
	6/8/88	BDL	BDL	BDL	BDL	BDL		7.38	---
	9/14/88	120	BDL	BDL	BDL	BDL		8.14	---
	12/29/88	BDL	BDL	BDL	BDL	BDL		7.73	---

TABLE 1 (Cont.)
GROUND-WATER ANALYSES DATA

Owens Illinois; #1467G.

WELL NUMBER	DATE SAMPLED	TEH (ppb)	TVH (ppb)	BENZENE (ppb)	TOLUENE (ppb)	XYLENES (ppb)	WELL ELEV. (ft.)	DEPTH TO WATER (ft)	PRODUCT THICKNESS (ft.)	
MW-13	4/9/87	NA	BDL	BDL	BDL	BDL	13.98	10.79	---	
	9/16/87	NA	BDL	BDL	BDL	BDL		10.98	---	
	12/1/87	NA	BDL	1.6	BDL	12		10.21	---	
	3/8/88	BDL	7.7	BDL	BDL	BDL		10.51	---	
	6/8/88	BDL	BDL	BDL	BDL	BDL		10.85	---	
	9/14/88	130	BDL	BDL	BDL	BDL		10.93	---	
	12/29/88	BDL	BDL	BDL	BDL	BDL		9.78	---	
MW-14	4/9/87	NA	BDL	BDL	BDL	BDL	14.78	7.17	---	
	9/16/87	56	1.7	BDL	BDL	BDL		8.78	---	
	12/1/87	66	BDL	1.2	4	10		8.26	---	
	3/7/88	BDL	20	BDL	BDL	BDL		7.26	---	
	6/8/88	NOT SAMPLED		WELL INACCESSIBLE				---	---	---
	9/14/88	NOT SAMPLED		WELL INACCESSIBLE				---	---	---
	12/29/88	BDL	BDL	BDL	BDL	BDL		8.08	---	
MW-15	4/9/87	NA	BDL	BDL	BDL	BDL	15.16	11.88	---	
	9/16/87	BDL	8.4	BDL	BDL	BDL		11.77	---	
	12/1/87	NA	BDL	3.3	0.84	14		11.25	---	
	3/8/88	BDL	90	0.8	BDL	BDL		11.24	---	
	6/9/88	BDL	53	BDL	BDL	BDL		12.15	---	
	9/14/88	100	NA	NA	NA	NA		12.34	---	
	12/29/88	BDL	NA	NA	NA	NA		11.73	---	
MW-16	4/9/87	NA	BDL	BDL	BDL	BDL	13.48	9.47	---	
	9/16/87	64	BDL	BDL	BDL	BDL		10.07	---	
	12/1/87	150	120	1	0.37	9.1		9.23	---	
	3/8/88	BDL	10	0.5	BDL	BDL		9.46	---	
	6/8/88	BDL	BDL	BDL	BDL	BDL		9.56	---	
	9/14/88	190	BDL	BDL	BDL	BDL		9.99	---	
	12/29/88	BDL	BDL	BDL	BDL	BDL		8.52	---	

TABLE 1 (Cont.) Owens Illinois; #1467G.
GROUND-WATER ANALYSES DATA

WELL NUMBER	DATE SAMPLED	TEH (ppb)	TVH (ppb)	BENZENE (ppb)	TOLUENE (ppb)	XYLENES (ppb)	WELL ELEV. (ft.)	DEPTH TO WATER (ft)	PRODUCT THICKNESS (ft.)
MW-17	4/9/87	NA	BDL	BDL	BDL	BDL	14.17	9.95	0.005
	9/16/87	680	44	BDL	BDL	0.55		10.59	Film
	12/1/87	1,300	540	7.8	2.4	28		9.87	Film
	3/8/88	3,800	4,300	83	BDL	46		10.10	---
	6/8/88	NOT SAMPLED	COVERED BY DUMPSTER					---	---
	9/14/88	64,000	54,000	BDL	BDL	BDL		10.58	Film
	12/29/88	4,700	1,100	150	BDL	140		9.20	Film
MW-18	4/9/87	NA	BDL	BDL	BDL	BDL	14.89	9.91	---
	9/16/87	480	BDL	BDL	BDL	BDL		10.37	---
	12/1/87	18	BDL	BDL	BDL	6.6		10.19	---
	3/7/88	BDL	BDL	BDL	BDL	BDL		9.60	---
	6/8/88	BDL	BDL	BDL	BDL	BDL		10.01	---
	9/14/88	190	BDL	BDL	BDL	BDL		10.82	---
	12/29/88	170	BDL	BDL	BDL	BDL		10.12	---

TEH = Total Extractable Hydrocarbons As Diesel
 TVH = Total Volatile Hydrocarbons as Gasoline
 ppb = parts per billion
 BDL = Below Detection Limit
 NA = Not Analyzed

**Current Department of Health Services Action Levels
 In Drinking Water**

Benzene 0.7 ppb
 Toluene 100 ppb
 Xylenes 620 ppb

Note: For detection limits, refer to laboratory reports

Note: Subject to change as reviewed by Department of Health Services

MW-5 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

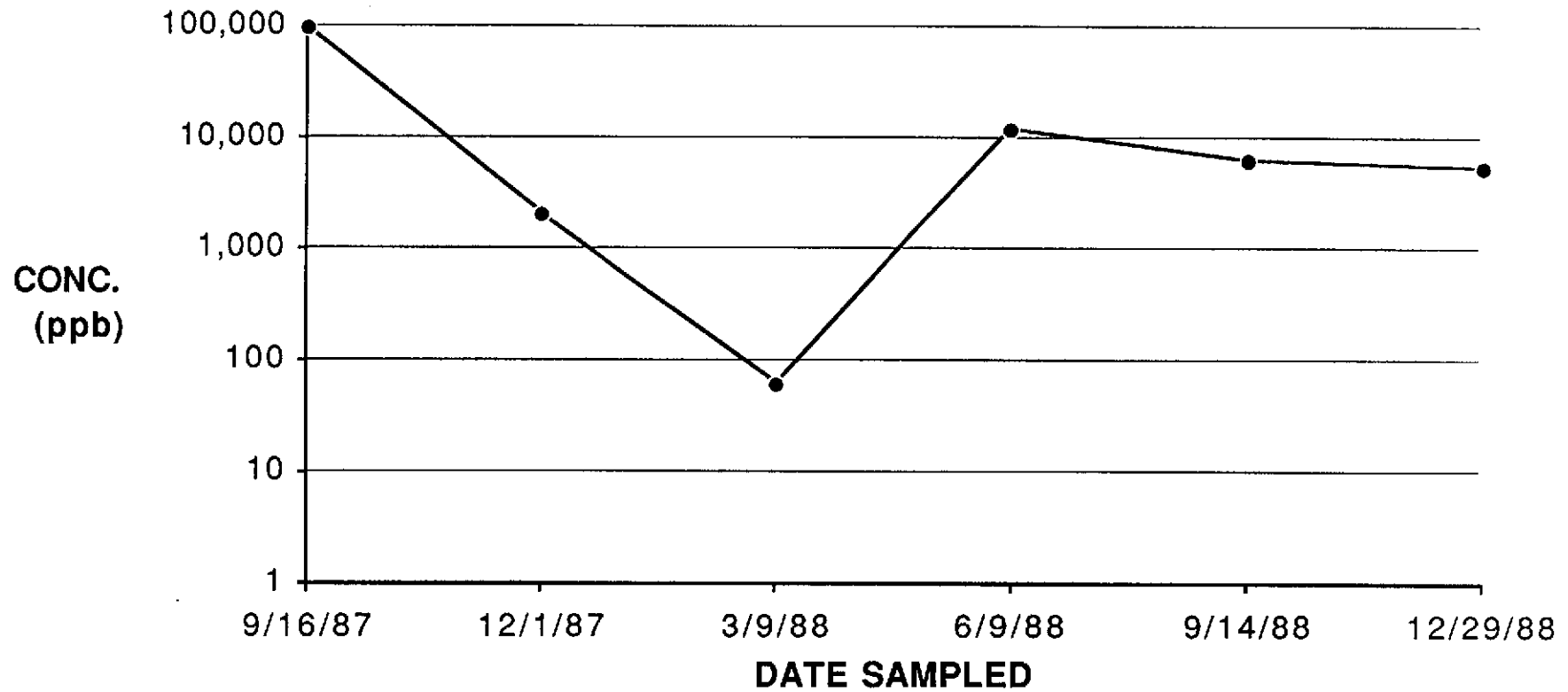


Figure # 2

MW-6 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

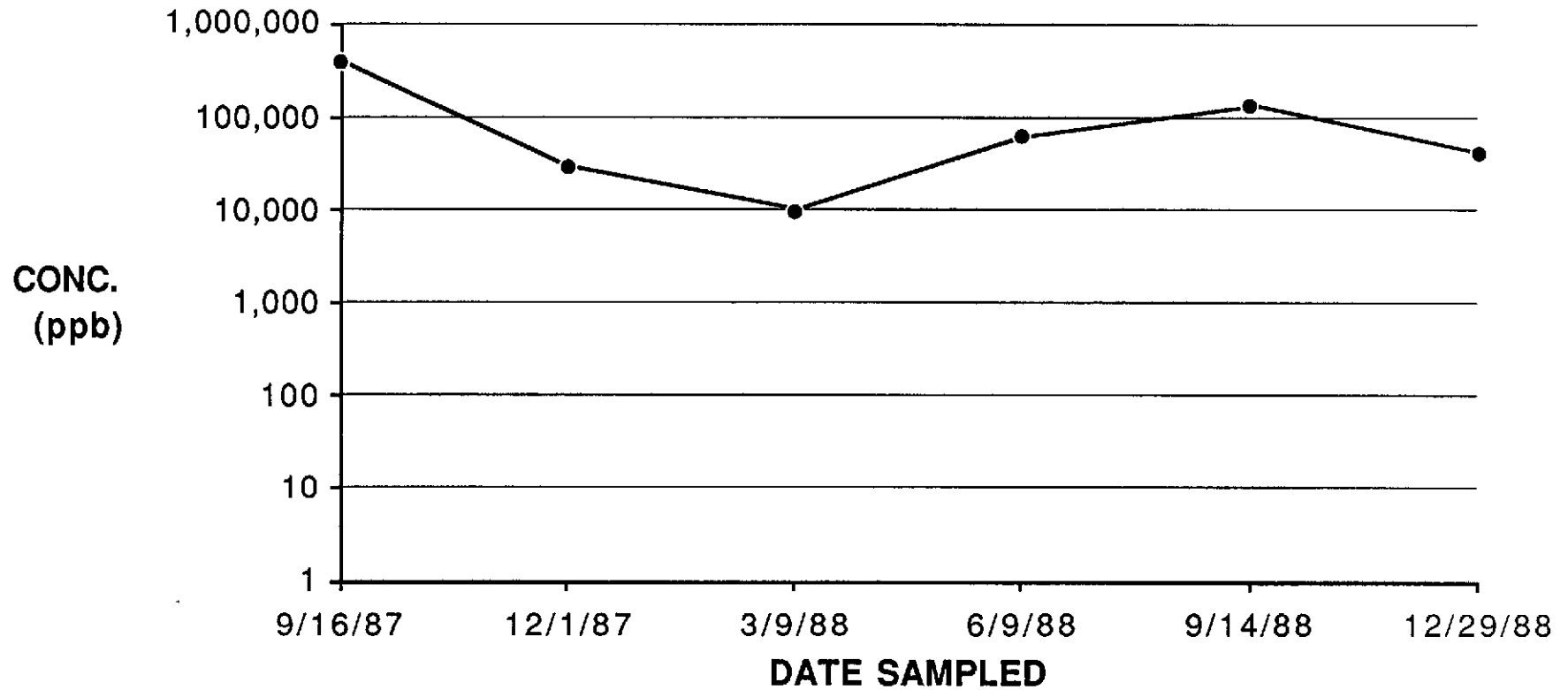


Figure # 3

MW-7 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

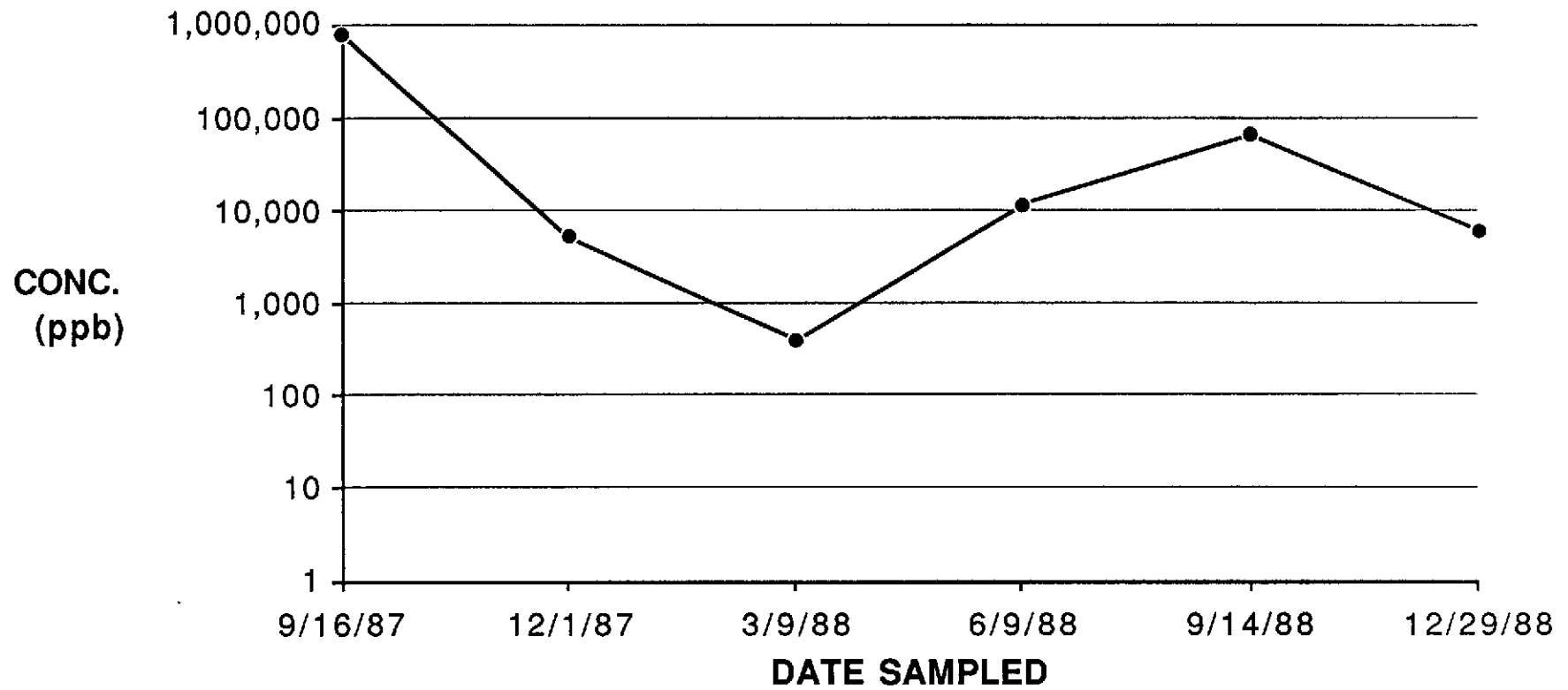


Figure # 4

MW-8 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

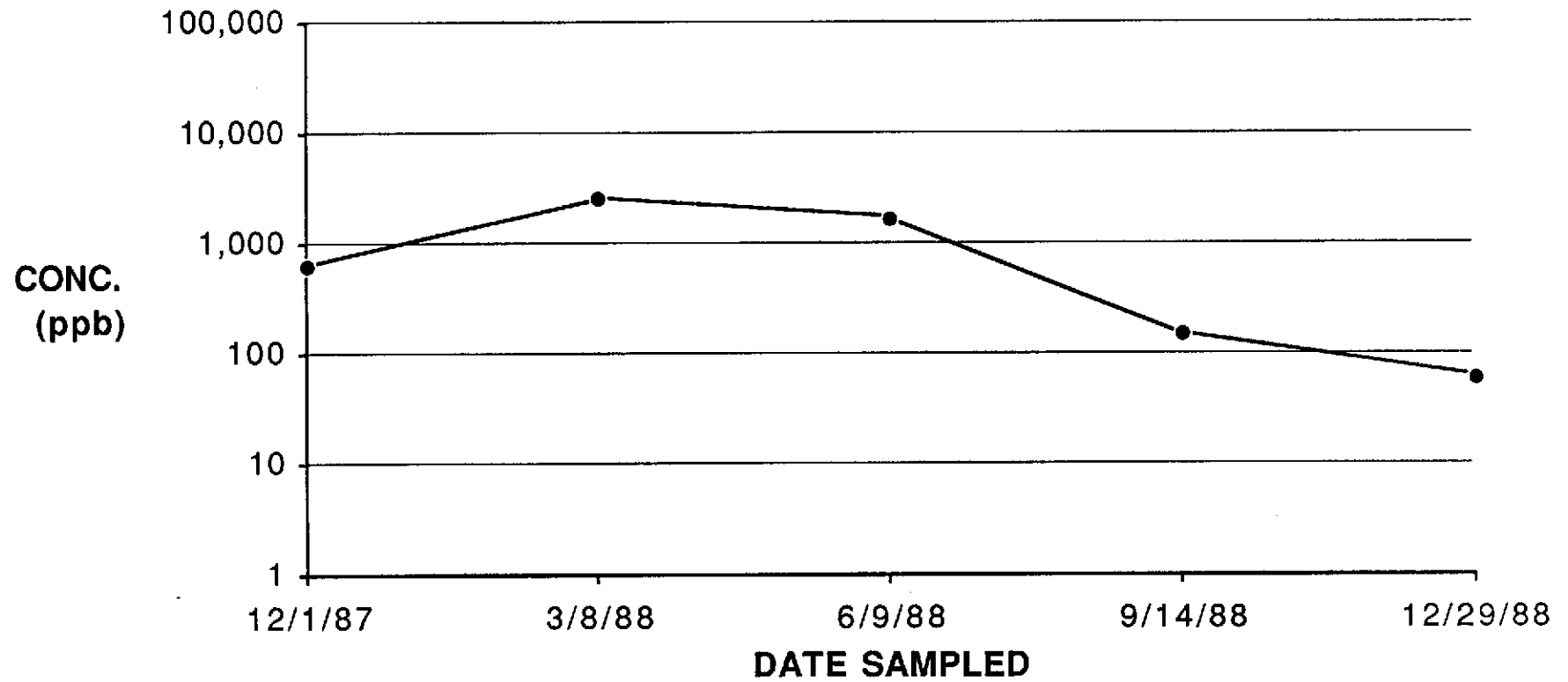


Figure # 5

MW-10 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

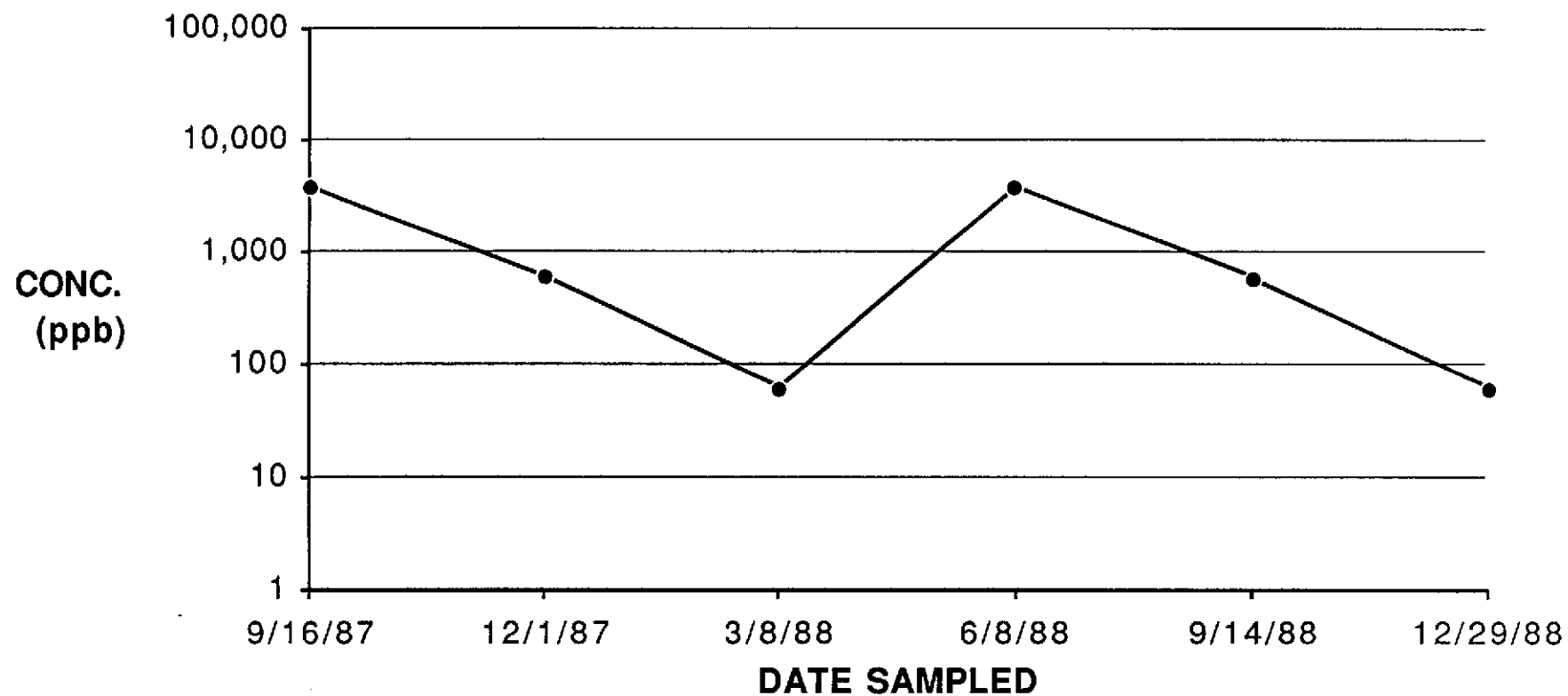


Figure # 6

MW-16 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

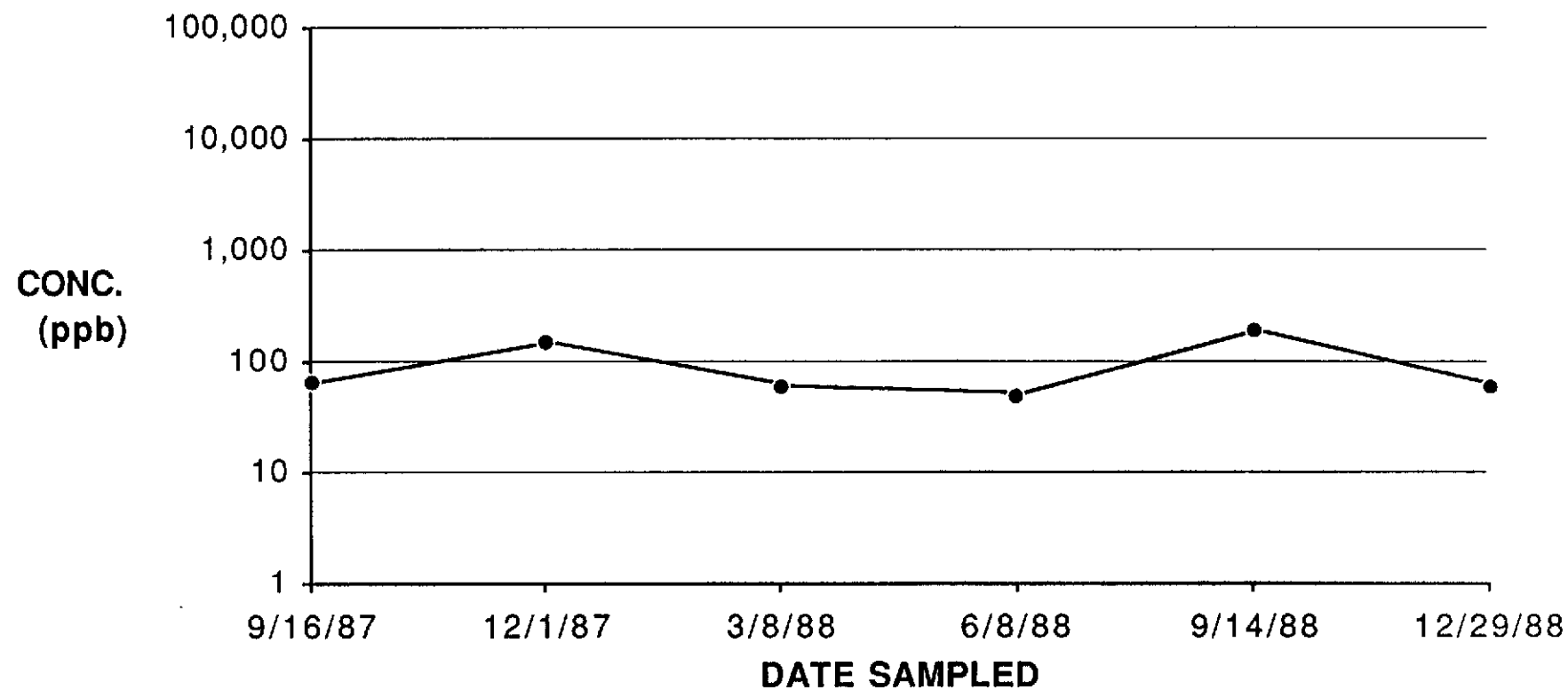


Figure # 7

MW-17 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

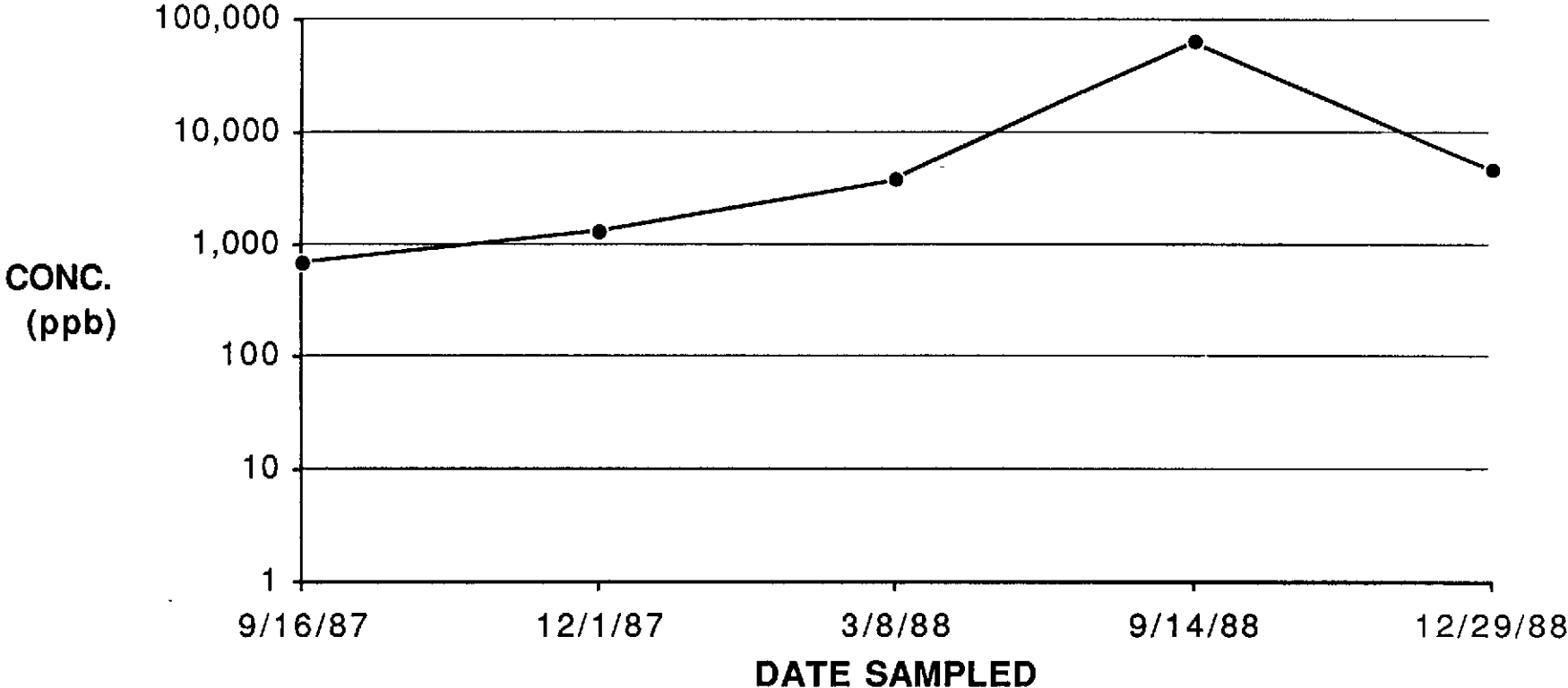


Figure # 8

MW-18 GROUND-WATER ANALYSES DATA
Total Extractable Hydrocarbons

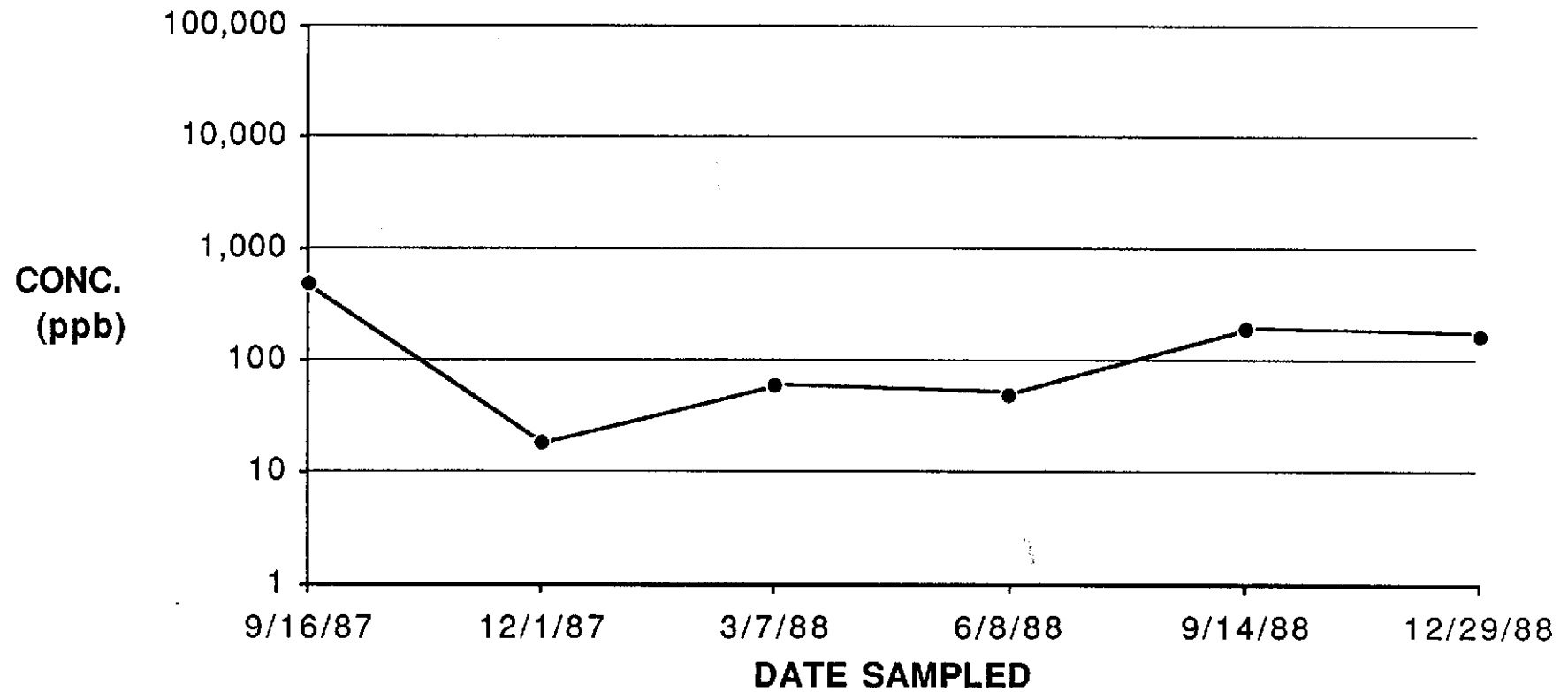


Figure # 9

APPENDIX A

Water Sampling Protocol

WATER SAMPLING PROTOCOL

Sampling of monitoring wells is performed by Ensco Environmental Services technicians. Field sampling procedures are as follows:

1. Measurement of liquid surface elevation and depth of monitoring well.
2. Field check for presence of floating product.
3. If measurement of floating product is $<1/4$ inch, a ground water sample is taken.
4. Prior to sampling a minimum of four well casings volumes of water is removed.
5. During purging, water is monitored for temperature, pH, and specific conductance.
6. Samples for analysis are placed in EPA-approved containers.
7. Samples are immediately put in a chilled cooler for transportation to a state-certified analytical laboratory.
8. Appropriate documentation accompanies the sample at all times.

ENSCO ENVIRONMENTAL SERVICES, INC.

Water Sampling Protocol

Latest Revision: May 12, 1988

SAMPLING PROCEDURES

Equipment Cleaning - All water samples are placed in precleaned laboratory supplied glassware. Sample bottles and caps remain sealed until actual usage at the site. Before use at the site, all equipment which comes in contact with the well or ground water is thoroughly cleaned with trisodium phosphate and rinsed with deionized or distilled water. This procedure is followed between each well sampled, and wells are sampled in approximate order of increasing contamination. A pump blank is collected prior to all sampling. Pump blanks are analyzed periodically to ensure proper cleaning.

Water Level Measurements - Prior to checking for floating product, purging of the well, and sampling, the depth to water is measured in each well using a sealed sounding tape or a scaled electric sounder. Water levels are recorded in the field log book to the nearest 0.01 foot.

Floating Product Thickness - A field check for floating product is made with a clear acrylic or teflon bailer. Thickness of floating product is measured to the nearest 1/32 of an inch. Any observed film as-well-as odor and color of the water is recorded. 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.

Water Sampling Procedures

Immediately prior to sampling of the ground water, four well-casing volumes of water are removed. Water is removed by either bailer or submersible nitrogen-driven bladder pump. During the purging operation, purged water is monitored for temperature, pH and specific conductance. If the well is dewatered during purging, and recovery to 80% is estimated or observed to exceed a two hour duration, a sample will be collected when sufficient volume is available for the sampling parameter.

ENSCO ENVIRONMENTAL SERVICES, INC.

Water Sampling Protocol

Latest Revision: May 12, 1988

After the wells are purged and the temperature, pH, and specific conductance of the water stabilize, a water sample is collected. Samples for volatile organic and gasoline analyses are placed in EPA-approved 40-ml containers with teflon-septa caps. Sample bottles are completely filled with water with no observed air bubbles present within the bottle. Samples for acid, base and neutral organics, pesticides and heavy metals analysis are placed in appropriate laboratory prepared containers. Water sample containers are labeled with the appropriate sample number, location, project name and number, time, and date of collection. All samples are placed in an iced cooler and transported to a state-certified analytical laboratory.

In cases where very oily contaminants are encountered teflon bailers may be substituted with stainless steel bailers. This will be done to minimize cross contamination.

Chain-of-custody forms are logged and signed and accompany the samples to the laboratory. One travel blank accompanies the samples and is held by the lab for possible analysis.

All sample containers issued by the laboratory are properly prepared by the laboratory for the requested analysis.

- Total Volatile Hydrocarbons and/or benzene, toluene and xylenes - 2 40-milliliter bottles
- Total Lead - 1 500-milliliter bottle
- Ethylene Dibromide - 1 500-milliliter bottle
- Metals - 1 500-milliliter bottle
- Pesticides/Herbicides - 2 2-liter bottles
- Acid Base Neutral Organics - 2 1-liter bottles
- Halogenated Volatile Organics - 2 40-milliliter bottles
- Aromatic Volatile Organics - 2 40-milliliter bottles (preserved)
- Total Phenolics - 1 1-liter bottle (preserved)

APPENDIX B

Laboratory Procedures

LABORATORY PROCEDURES

Selection of the Laboratory

The laboratories selected to perform the analytical work are certified by the California State Department of Health Services as being qualified to perform the selected analyses. The selected laboratories are reviewed by Ensco Environmental Services, Inc. to ensure that an adequate quality control program is in place and certified by the State of California.

Chain-of-Custody Control

The following procedures are used during sampling and analytical activities to provide chain-of-custody control during transfer of samples from collection through delivery to the laboratories. Record keeping activities used to achieve chain-of-custody control are:

- Contact made by sampling organization with facility supervisor and laboratory prior to sampling to alert them of dates of sampling and sample delivery.
- Well location map with well identification number prominently displayed.
- Field log book for documenting sampling activities in the field.
- Labels for identifying individual samples.
- Chain-of-custody record for documenting transfer and possession of samples.
- Laboratory analysis request sheet for documenting analyses to be performed.

Field Filtration of Samples

Samplers will refrain from filtering TOC, TOX or other organic compound samples as the increased handling required may result in the loss of chemical constituents of interest. Allowing the samples to settle prior to analysis followed by decanting the sample is preferable to filtration of these instances. If filtration is necessary for the determination of extractable organic compounds, the filtration should be performed in the laboratory. It may be necessary to run parallel sets of filtered and unfiltered samples with standards to establish the recovery of hydrophobic compounds when sample must be filtered. All the materials' precautions used in the construction of the sampling train should be observed for filtration apparatus. Vacuum filtration of ground water samples is not recommended.

Water samples for dissolved inorganic chemical constituents (e.g., metals, alkalinity and anionic species) will be filtered in the field.

Sample Containers

Sample containers vary with each type of analytical parameter. Selected container types and materials are non-reactive with the sample and the particular analytical parameter being tested. Appropriate containers for volatile organics are glass bottles of at least 40 milliliters in size fitted with teflon-faced silicon septa. Sample containers are properly cleaned and sterilized by the certified laboratory according to the EPA protocol for the individual analysis.

Sample Preservation and Shipment

Various preservatives are used by the certified laboratory to retard changes in samples. Sample shipment from Ensco Environmental Services to laboratories performing the selected analyses routinely occurs within 24 hours of sample collection.

Analytical Procedures

The analysis of ground water samples is conducted in accordance with accepted quantitative analytical procedures. The following four publications are considered the primary references for ground water sample analysis, and the contracts with the laboratories analyzing the samples stipulate that the methods set out in these publications be used. Please note that procedures used are periodically updated by federal and state agencies, and the certified laboratories amend analysis as required by the update.

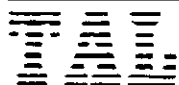
- Standard Methods for the Examination of Water and Wastewater, 16th Ed., American Public Health Association, et al., 1985.
- Methods for Chemical Analysis of Water and Wastes, U.S. EPA, 600/4-79-020, March 1979.
- Test Methods for Evaluation of Solid Waste: Physical/Chemical Methods, U.S. EPA SW-846, 1982.
- Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA, 600/4-82-057, 1982.
- Practical Guide for Ground water Sampling, EPA, 600/2-85/104, September 1985.
- RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, EPA, September 1986.

Analytical Methods

The analytical methods used by the selected laboratories are those required by the type of analysis (fuels, metals, etc.). These methods are those currently approved by the State Regional Water Quality Control Board.

APPENDIX C

**Laboratory Reports
Chain-of-Custody Forms**



DATE: 1/19/89
 LOG NO.: 6854
 DATE SAMPLED: 12/29/88
 DATE RECEIVED: 12/29/88

CUSTOMER: ENSCO Environmental Services, Inc.
 REQUESTER: Kay Pannell
 PROJECT: No. 1467G, Owens - Illinois

Sample Type: Water

Method and Constituent	Units	MW - 4		MW - 5		MW - 6	
		Concentration	Detection Limit	Concentration	Detection Limit	Concentration	Detection Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	< 60	60	5,300	60	42,000	60
Total Petroleum Hydrocarbons as Gasoline	ug/l	< 2	2				
Modified EPA Method 8020:							
Benzene	ug/l	< 0.3	0.3				
Toluene	ug/l	< 0.3	0.3				
Xylenes	ug/l	< 0.5	0.5				
ethyl Benzene	ug/l	< 0.4	0.4				

DATE: 1/19/89
 LOG NO.: 6854
 DATE SAMPLED: 12/29/88
 DATE RECEIVED: 12/29/88
 PAGE: Three

Sample Type: Water

Method and Constituent	Units	MW - 14		MW - 15		MW - 16	
		Concentration	Detection Limit	Concentration	Detection Limit	Concentration	Detection Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	< 60	60	< 60	60	< 60	60
Total Petroleum Hydrocarbons as Gasoline	ug/l	< 2	2			< 2	2
Modified EPA Method 8020:							
Benzene	ug/l	< 0.3	0.3			< 0.3	0.3
Toluene	ug/l	< 0.3	0.3			< 0.3	0.3
Xylenes	ug/l	< 0.5	0.5			< 0.5	0.5
Ethyl Benzene	ug/l	< 0.4	0.4			< 0.4	0.4

Method and Constituent	Units	MW - 17		MW - 18	
		Concentration	Detection Limit	Concentration	Detection Limit
DHS Method:					
Total Petroleum Hydrocarbons as Diesel	ug/l	4,700	60	170	60
Total Petroleum Hydrocarbons as Gasoline	ug/l	1,100	20	< 2	2
Modified EPA Method 8020:					
Benzene	ug/l	150	3	< 0.3	0.3
Toluene	ug/l	< 3	3	< 0.3	0.3
Xylenes	ug/l	140	5	< 0.5	0.5
Ethyl Benzene	ug/l	< 4	4	< 0.4	0.4

Hugh R. McLean
 Hugh R. McLean
 Supervisory Chemist

DATE: 1/19/89
 LOG NO.: 6854
 DATE SAMPLED: 12/29/88
 DATE RECEIVED: 12/29/88
 PAGE: Two

Sample Type: Water

Method and Constituent	Units	MW - 7		MW - 8		MW - 10	
		Concentration	Detection Limit	Concentration	Detection Limit	Concentration	Detection Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	6,100	60	< 60	60	< 60	60
<hr/>							
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	< 60	60	< 60	60	< 60	60
Total Petroleum Hydrocarbons as Gasoline	ug/l	< 2	2	< 2	2	< 2	2
Modified EPA Method 8020:							
Benzene	ug/l	< 0.3	0.3	< 0.3	0.3	< 0.3	0.3
Toluene	ug/l	< 0.3	0.3	< 0.3	0.3	< 0.3	0.3
Xylenes	ug/l	< 0.5	0.5	< 0.5	0.5	< 0.5	0.5
Ethyl Benzene	ug/l	< 0.4	0.4	< 0.4	0.4	< 0.4	0.4

Trace Analysis

CHAIN OF CUSTODY RECORD

P.O.# 11936

PROJECT NO		PROJECT NAME				TEST REQUESTED										REMARKS
14676		Owens - Illinois														
SAMPLERS (Signature)																
John C. Borrego																
NO	DATE	TIME	DRIVE	GRAB	STATION AND LOCATION										REMARKS	
MW-15	3/19/88	10:25A			1 Ambu litre											normal T.A.T.
MW-13	"	11:15														
MW-17	"	12:25			12 presmilled VOA's											
MW-18	"	1:15														
MW-16	"	2:20														

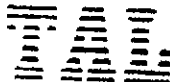
RELINQUISHED BY: John Borrego	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
				TRACE ANALYSIS LABORATORY			
				12/29/88 4:26 PM			
				John Borrego			

REMARKS
Report to Kay Dannel.

DISTRIBUTION



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 41674 Christy Street
 Fremont, CA 94538-3114
 (415) 659-0404
 Fax (415) 651-4672
 Cont. Lic. No. 464324



CHAIN OF CUSTODY RECORD

P.O.# 11936

PROJ. NO.		PROJECT NAME				NO. OF CONTAINERS				REMARKS	
1467 G		Owens Illinois									
SAMPLERS: (Signature) John C. Bueger & T. Kirchhoff											
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION						
MW-12	29 Dec				2 preserved VOAs; 1 Anal	3	X	X			normal T.A.T.
MW-14	"				" "	3	X	X			
MW-11	"				" "	3	X	X			
MW-4	"				" "	3	X	X			
MW-5	"				" "	1	X				
MW-7	"				" "	1	X				
MW-6	"				" "	1	X				
MW-8	"				" "	1	X				
MW-10	"				" "	1	X				
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time		Remarks			
				Louis Davidson		12/29/88 4:36 PM		Report to Kay Pannell			

TRACE ANALYSIS LABORATORY
3423 INVESTMENT BLVD., UNIT 8
HAYWARD, CA 94545
(415) 783-6960