CDM Camp Dresser & McKee

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Report

JULY 1998
QUARTERLY SAMPLING REPORT
PHIBRO-TECH, INC.

Santa Fe Springs, California

September 10, 1998

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Prepared for:

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CDM Project No. 2279-11463-111.REP.REPT

PHIBRO-TECH, INC.

September 16, 1998

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Dear Messrs. Ross, Leach and Kou:

Enclosed is the Third Quarter 1998, Quarterly Groundwater Monitoring Report for Phibro-Tech, Inc., Santa Fe Springs facility. The Report includes analytical results and physical measurements obtained July 13-15, 1998 from selected monitoring wells at Phibro-Tech. Since this Report includes portions of the RCRA Facility Investigation (USEPA Docket No. RCRA 09-89-0001), this Report is also submitted to EPA.

Based on a technical review by our consultant, Camp Dresser and McKee, a groundwater monitoring program is included which was implemented beginning with the April 1991 groundwater monitoring. Additional wells and parameters changed at the request of EPA are included in this Groundwater Monitoring Report. The changes are described in the Report. Please contact me if you have any questions or comments concerning this Report.

Very truly yours,

E E Vigil

E. E. Vigil
Environmental and Safety Manager

EEV/kn/rwqcbqtgw
Enclosure

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Section 1
Introduction

This report summarizes the 49th RCRA quarterly groundwater monitoring sampling and analyses period at the Phibro-Tech, Inc. (PTI), Santa Fe Springs, California facility (formerly referred to as Southern California Chemical). Contained herein are the results of laboratory analyses of groundwater samples and water level measurements obtained during the period of July 14 to July 16, 1998.

The purpose of the groundwater sampling program, which began in March 1985, is to determine if hazardous waste constituents are migrating from the facility to the groundwater beneath the site. This is accomplished through the comparison of background or upgradient water quality and groundwater quality beneath the site. Statistically-significant increases in contaminant concentrations between known areas of groundwater contamination and downgradient wells would indicate that migration is occurring. In the past, statistical analysis was performed annually and was included in the July quarterly monitoring reports. Statistical analysis is now conducted each quarter and is included in the corresponding monitoring report. The July 1998 statistical analysis is contained in Appendix E of this report.

To date, three types of contaminants have generally been detected in the groundwater beneath the site: soluble metals (primarily chromium and cadmium), purgeable aromatic organic compounds (toluene, ethylbenzene and total xylenes) and purgeable halogenated organic compounds (i.e., solvents, primarily trichloroethene [TCE]). Groundwater modeling completed in January 1993, and groundwater monitoring conducted since 1985, indicate that the purgeable aromatic plume originated upgradient from the PTI facility. The distribution of TCE appears to be ubiquitous, however, somewhat elevated concentrations exist in the vicinity of Pond 1, a RCRA-regulated former surface impoundment area. Elevated concentrations of soluble metals have also been consistently detected in the vicinity of Pond 1. Soluble metal concentrations at the downgradient property line and in deeper wells, however, continue to be negligible to non-detect.

More than 10 years of quarterly groundwater monitoring at the PTI facility has indicated a general lack of hexavalent chromium migration. During groundwater modeling performed by CDM in 1993, a retardation factor of 50 was selected based on the observed distribution of hexavalent chromium in the groundwater. Previous data analysis indicated that the most likely basis for the relatively high (but within the range of reasonable and appropriate values) retardation factor would be the existence of reducing conditions in the saturated zone, promoting the conversion of hexavalent chromium to trivalent chromium (Cr^{3+}). Trivalent chromium, having a very low solubility in water, would tend to precipitate and sorb to the soil, limiting migration. During four quarterly sampling events conducted in 1996, additional laboratory analyses (iron and redox potential) were performed on groundwater samples collected from wells MW-04, MW-09, and MW-14S. These additional data, along with the pH, total chromium, and hexavalent chromium data, provided a better understanding of the mechanisms controlling chromium migration in groundwater underlying the facility and supported the above hypothesis. Please refer to Section 6.4 (Chromium Fate and Transport) of the October 1996 Quarterly Sampling Report for a detailed discussion of this conclusion.

In addition to the data obtained during the July 1998 sampling, this report contains tables listing detection limits of the parameters analyzed (Appendix A). Copies of the original laboratory results are included in Appendix B. Chain-of-custody records for the July 1998 sampling are included in Appendix C. Appendix D contains background groundwater concentrations of contaminants for the Santa Fe Springs area for the year 1996. Appendix E contains the complete quarterly statistical analysis.

Prior to October 1993, quarterly reports have included analytical result summary tables from all previous sampling rounds. Starting with the October 1993 quarterly report, historical water quality data tables are no longer included in the report as an appendix. Please refer to Appendix B in the July 1993 Quarterly Sampling Report for a summary of historical groundwater analytical data. A summary table of key historical results since January 1989 is provided as Table 6-1 in this report.

Section 2
Monitoring Well Sampling

Groundwater sampling, utilizing existing on-site monitoring wells, was conducted by CDM personnel during the period of July 14 to July 16, 1998. Field activities were performed in general accordance with the groundwater sampling protocol as outlined in Section 4.3.3 of the approved RCRA Facility Investigation (RFI) Work Plan (CDM, June 1990). Prior to the submittal of the RFI Work Plan for regulatory agency review and approval, the J.H. Kleinfelder and Associates (Kleinfelder) Quality Assurance Project Plan (QAPP, May 1988) was used as the primary groundwater sampling guidance document. Proposed deviations from the RFI Work Plan (i.e., well purging using a submersible pump and sample collection using disposable bailers) were discussed in October 1994 correspondence to the DTSC. These changes were implemented during the October 1994 and all subsequent sampling events.

Twenty-four monitoring wells exist on-site. The locations of these wells are shown on Figure 2-1. One well, MW-06A, historically has not been sampled for groundwater analysis because it is screened in the Gage Aquifer, which is unsaturated below the PTI facility. The remaining wells are screened in the Hollydale Aquifer; 16 in the upper portion and seven in the lower portion of the aquifer.

Beginning in February 1985, Kleinfelder initiated groundwater sampling, utilizing monitoring wells MW-01 through MW-06B. Six additional wells (MW-04A and MW-07 through MW-11) were installed at the site in July 1985, thereby increasing the total number of active wells to 12. Quarterly sampling of the 12 wells was initiated in March 1986.

Commencing with the January 1989 sampling event, CDM has been responsible for all groundwater monitoring activities at the facility. Ten wells (MW-01D, MW-06D, MW-12S, MW-12D, MW-13S, MW-13D, MW-14S, MW-14D, MW-15S and MW-15D) were constructed as part of the first phase of the RFI program and were first sampled during the October 1990 sampling round.

Groundwater analysis of the 22 wells which existed during the RFI program from October 1990 to January 1991, indicated that the number of wells sampled could be reduced and yield comparable results to sampling all the wells. During the April, July, and October 1991, and January 1992 sampling rounds, the 11 wells sampled included 8 wells (MW-01S, MW-03, MW-04, MW-07, MW-09, MW-11, MW-14S, and MW-15S) screened in the upper portion of the Hollydale Aquifer and three wells (MW-01D, MW-04A, and MW-15D) screened in the lower portion of the Hollydale Aquifer.

Beginning with the April 1992 sampling round, three additional wells (MW-06B, MW-06D, and MW-16) were included in the quarterly monitoring program, bringing the total number of sampled wells to 14. A new well, MW-16, constructed in March 1992 as part of the Phase II RFI program, was sampled for the first time during the April 1992 sampling round. The same 14 wells have been sampled during all subsequent sampling rounds. On several occasions, additional laboratory analyses have been performed and additional wells included in quarterly sampling, at the request of the U.S. EPA. Additional analyses and wells are noted in the comments column of Table 2-1, which summarizes the groundwater monitoring program at the site.

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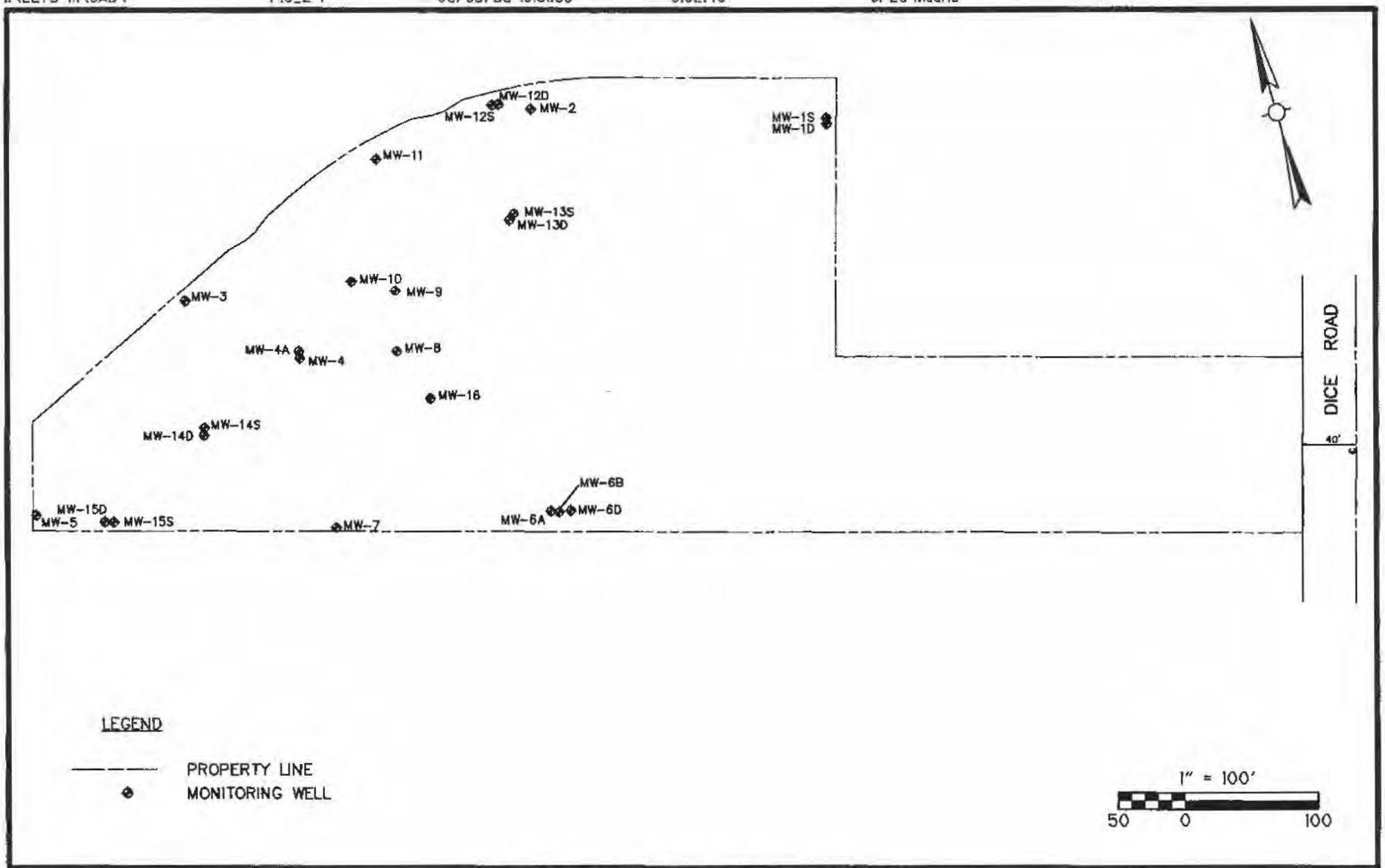


PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

CDM
environmental engineers, scientists, planners, & management consultants

MONITORING WELL LOCATION MAP

Figure 2-1

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
3/85	Quad	Cu & Zn	X	X	X	--	--	Sampled wells MW-1, 2, 3, 4, 5, & 6B. Sulfide, nickel, copper and zinc requested by DOHS and RWQCB. Also Appendix III parameters and water quality parameters (see footnote).
7/85	Quad	Cd, Cr	X	--	X	--	--	Sampled wells MW-4A, 7, 8, 10 and 11
3/86	Quad	Cu & Zn	X	X	X	--	--	Sampled 12 wells (MW1, 2, 3, 4, 4A, 5, 6B, 7, 8, 9, 10 & 11). Also Appendix III parameters and water quality parameters (see footnote).
7/86	Quad	Cd, Cr, Cu, Zn	X	X	X	624	--	Sampled all 12 wells (as previous)
9/86	Quad	Cd, Cr, Cu, Zn	X	X	X	624	--	Sampled all 12 wells (as previous)
12/86	Quad	Cd, Cr, Cu, Zn	X	X	X	624	--	Sampled all 12 wells (as previous)
3/87	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Sampled 11 wells, not 4A
7/87	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After July 1987, all 12 wells were sampled during each event
10/87	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After July 1987, all 12 wells were sampled during each event

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
2/88	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After July 1987, all 12 wells were sampled during each event
6/88	X (not Quad)	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis (t-test) on Indicator Parameters (IPs).
9/88	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	IPs & volatile organics from MW1, 2, 4A, 5, 6, 7 analyzed semi-annually in June/Dec.
1/89	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After Jan. 1989, volatile organics analyzed for all 12 wells.
4/89	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
7/89	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis of Jan. thru July 1989 data (IPs, total and hexavalent chromium).
10/89	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
1/90	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
4/90	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
7/90	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis of Jan. 1989 data (IPs, total and hexavalent chromium).
10/90	--	Cd, Cr, Cu, Fe, Ni, Pb, Zn	X	X	X	601/602	X	Sampled 22 wells, Appendix IX parameters analyses were performed on wells 4, 4A, 6B, 6D, 12S, 12D, 15S, 15D, plus a duplicate of 4.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/91	Quad	Cd, Cr, Cu, Fe, Ni, Pb, Zn	X	X	X	601/602	–	Sampled 22 wells.
4/91	pH	Cd, Cr, Cu	X	–	–	601/602	–	New sampling program was initiated. Sampled 11 wells including wells MW-01S, MW-01D, -03, -04, -04A, -07, -09, -11, -14S, -15S, -15D.
7/91	pH	Cd, Cr, Cu	X	–	–	601/602	–	Performed annual statistical analysis.
10/91	pH	Cd, Cr, Cu	X	–	–	601/602	–	
1/92	pH only (all) TOC only (MW-01 & -04)	Cd, Cr, Cu	X	–	Ammonia as nitrogen (MW-01 & -04)	601/602	–	Ammonia & TOC analyses added at MW-01S and MW-04.
4/92	pH only TOC only (MW-01 , -04, -09, -14S)	Cd, Cr, Cu-all see coments	X	–	Ammonia as nitrogen (MW-01, -04, -09, -14S)	601/602	EDB (MW-04) TPH (W-16)	Sampled 14 wells including Wells MW-01S, -01D, -03, -04, -04A, -06B, -06D, -07, -09, -11, -14S, -15S, -15D, -16. Additional analysis as part of Phase II RFI; unfiltered metals on MW-04S and -14S. Pb and Ni on wells 1, 4, 14S, 15S, 16; Fe, Zn on well 16.
7/92	pH	Cd, Cr, Cu	X	–	–	601/602	–	Sampled 14 wells. Performed annual statistical analysis.
10/92	pH	Cd, Cr, Cu	X	–	–	601/602	–	Sampled 14 wells.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells.
4/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells.
7/93	pH	Cd, Cr, Cu	X	--	--	8010/8020 (TVPH, TEPH)	--	Sampled 15 wells. (MW-13S was added) TVPH and TEPH analysis on MW-09, 13S, and 16 only. Performed annual statistical analysis.
10/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 15 wells (MW-13S not analyzed for metals and pH) TVPH & TEPH analysis on MW-04, 07, 09, 13S, and 16 only. Performed statistical analysis.
1/94	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
4/94	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis
7/94	pH	Cd, Cr, Cu	X	See comment	--	8010/8020	--	Sampled 14 wells, chloride and sulfate analyses on MW-04, MW-09, MW-14S, MW-15S, MW-15D, and MW-16. Performed statistical analysis
10/94	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
4/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
7/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
10/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
1/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis. 1995 Annual Report included as Appendix F.
4/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
7/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
10/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis. 1996 Annual Report included as Appendix F.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/97	pH	Cd, Cr, Cu	X	--	--	8260, MTBE	--	Sampled 14 wells Performed statiscal analysis.
4/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.
7/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.
10/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis. 1997 Annual Report included as Appendix F.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/98	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis. Hexavalent Chromium by Method 7196 in all wells; and by Method 218.6 in wells MW-4A, MW-14S, MW-15S, and MW-15D.
4/98	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.
7/98	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.

Appendix III Parameters - As, Ba, Cd, Cr, F, Pb, Hg, N, Se, Ag, Endrin, Lindane, Methoxychlor, Toxaphene, 2,4-D, 2,4,5-TP (Silvex), Radium, Gross Alpha & Beta, Turbidity, coliform bacteria.
Water Quality Parameters - Cl, Fe, Mn, Phenols, Na, SO4
Indicator Parameters (IP) - TOX, TOC, pH, EC (quadruplicate)
624 - Volatile organics analysis
601/602 - Purgeable halocarbons/aromatics analysis
8010/8020 - Purgeable halocarbons/aromatic analysis
8260 - Purgeable halocarbons/aromatic analysis
MTBE - Methyl tertiary butyl ether
Appendix IX Parameters - See Appendix F in the October 1990 Quarterly Sampling Report for a complete listing of parameters.

The 14 wells currently included in quarterly sampling are MW-01S, MW-01D, MW-03, MW-04, MW-04A, MW-06B, MW-06D, MW-07, MW-09, MW-11, MW-14S, MW-15S, MW-15D, and MW-16. Ten shallow and four deep wells are analyzed for pH, metals (cadmium, chromium, and copper using EPA Method 6010A; and hexavalent chromium using EPA Method 7196), and purgeable halogenated/aromatic organic compounds (EPA Method 8260). A detailed listing of analytical parameters per sampling event is provided in Table 2-1.

Beginning with the July 1993 sampling event, the 14 wells have generally been purged and sampled in the following order: MW-01, MW-01D, MW-03, MW-11, MW-06B, MW-06D, MW-07, MW-04A, MW-04, MW-14S, MW-15S, MW-15D, MW-16, and MW-09.

2.1 Sampling Procedure

Field sampling was conducted in general accordance with procedures detailed in the RFI Work Plan. Sampling practices included efforts to detect floating product and hydrocarbon vapors at each well, measurement of the static water level and total depth of each well for calculating pre-sampling evacuation volumes, purging and sampling of groundwater for laboratory analysis, decontamination of sampling equipment, and handling of sample-filled containers in accordance with Section 4.3.3.5 of the RFI Work Plan. In general, these procedures were consistent with previous quarterly sampling by Kleinfelder. Details of previous procedures have been discussed in prior Quarterly Sampling Reports.

2.1.1 Organic Vapor Check

Standard field procedures include checking the interior of each well with a photoionization detector (PID) (equipped with a 10.0 eV lamp) for the presence of organic vapors whenever the well casing is opened. With the sampling team members standing upwind of the well, the well cap was opened slightly, allowing for the insertion of the PID probe tip inside the well. Readings were monitored until they stabilized, which was usually at zero parts per million (ppm). The final reading, as well as the peak reading, were recorded in the field log book. The cap was then removed and the well allowed to vent for a short period of time prior to measuring the static water level. The maximum PID readings taken during the collection of water level measurements are shown in Table 5-1 in Section 5.

2.1.2 Detection of Immiscible Layers

In order to detect the presence of floating, immiscible layers on top of the groundwater surface, a clear bailer was lowered approximately one-half the length of the bailer below the surface of the water in each well. The bailer was removed from the well and its contents checked for immiscible layers or iridescence. The PID probe was also inserted inside the bailer to check for volatile emissions. If immiscible fluids had been detected, a sample would have been collected for laboratory analysis of purgeable halocarbons and aromatics (EPA Method 8260) and total petroleum hydrocarbons (California Department of Health Services [CA DHS] Method). The bailer was decontaminated and the sampling line discarded after each use. Immiscible layers have never been noted during CDM quarterly groundwater sampling at the PTI facility.

2.1.3 Static Water Level/Well Depth Measurement

On July 14, 1998, prior to the initiation of on-site well pumping, the static water level at 22 of the 24 on-site wells was measured three times at each well location with a decontaminated electric water level indicator (sounder) and recorded. The measurements collected in the wells were identical, therefore, there was no need to collect additional measurements or average the data of these wells. The results of these measurements are shown in Table 5-1 and discussed in Section 5. One well (MW-06A) was dry, and MW-02 was not measured due to its proximity to MW-12S.

The water level in each well was also measured immediately prior to initiating well evacuation procedures for calculation of well purge volume. During measurement, the measuring (reference) point used was noted (i.e., the top of the steel casing), and the depth to water below the reference point was measured to the nearest 0.01 foot and recorded in the field log book. Well head elevation data was used with depth to water measurements to calculate groundwater elevation at each well location.

The bottom of each well sampled was also measured with the sounder to the nearest 0.1 foot. The amount of fill material in the bottom of the well was calculated from well construction data and noted in the log book. Prior to first use, the sounder was calibrated and the meter response checked. The sounder probe and line were decontaminated after each use.

2.1.4 Purge Volume Determination/Well Evacuation

Saturated casing volume was calculated at each well by using the depth to water and bottom sounding measurements obtained immediately prior to purging, to calculate the amount (height) of the saturated well casing. The inside diameter of the casing was then measured, and the following formula applied:

$$\text{Volume} = \pi \text{ radius}^2 \times \text{height}$$

A minimum of three saturated casing volumes of water were evacuated from each well prior to collecting a groundwater sample for laboratory analysis.

During the July 1998 sampling round, all 14 of the wells currently monitored were purged using a Grundfos 2-inch diameter submersible pump, and each well was sampled using a new disposable bailer.

For measurement of field parameters during well evacuation, a LeMotte Model 2020 turbidity meter, a Hanna pH/temperature meter, and a YSI Model 33 electrical conductivity (EC) meter were used. The instruments were calibrated or field checked prior to use with standard solutions in accordance with manufacturer's directions. The meters are used to determine the stability of discharge water field parameters prior to collection of a sample for laboratory analysis.

Periodically during well evacuation, the field parameters of the discharge water were measured and recorded in the log book. The physical appearance of the water (turbidity, color, sediment content, etc.) was also noted and recorded. Initial field turbidity measurements generally ranged from 3 to 40 NTUs (nephelometric turbidity units) at the start of well evacuation. At the end of well

evacuation, measurements were generally less than 10 NTUs. Higher turbidity at the start of purging seems to be related to agitating the water column and resuspending material from the bottom of the well during pump installation. After a minimum of three saturated casing volumes of water were evacuated from each well and the field parameters stabilized (change between readings of less than 5 to 10 percent), a sample for laboratory analysis was collected.

All purge water collected from each well was discharged directly into 55-gallon barrels for treatment by PTI in the facility's wastewater treatment system.

2.1.5 Sample Collection and Handling

Groundwater samples were collected with a disposable bailer from the approximate middle of the perforated section, and poured directly into previously-labeled sample bottles. During sample collection, the bailer was carefully and gently lowered past the air/water interface to minimize agitation and aeration of water during sample collection. The sample bottles were placed inside plastic zip-lock bags and then placed immediately into an ice-cooled chest. Prior to shipment, the bottles were cushioned with bubble wrap or plastic bags to avoid breakage. Samples collected for total metals analysis were field filtered using a 0.45 micron filter. Filters were discarded after each use.

The July 1998 groundwater samples were collected for laboratory analysis of the following parameters:

- Halogenated/Aromatic Volatile Organic Compounds by EPA method 8260
- Metals (Cd, Cu, and Cr)
- Hexavalent Chromium (Cr^{+6})
- pH

Groundwater sample bottles were numbered using the following format:
(eg.) PTI-MW-01S-040

Where:

PTI	-	designates site acronym
MW01S	-	designates sample location number (MW = Monitoring Well)
EB	-	designates equipment blank sample
TB	-	designates travel blank sample
040	-	designates sequential sample number (per sampling event)

This was the 39th round of sampling conducted by CDM, however, due to a previous labeling inconsistency, a 040 sequence number was assigned to all groundwater samples collected during this round. Sample label information included date and time of sampling, CDM sample number, and analytical parameters.

All filled sample containers that were collected from each well were accompanied by chain-of-custody forms that indicated the label information as well as the responsible person during each step of the transportation process. All samples were sent by courier to Quanterra Laboratories in

Santa Ana, California on the day that they were collected, and a copy of the chain-of-custody form for that day was retained by CDM field personnel. Copies of completed chain-of-custody forms are included in Appendix C. The laboratory was notified at the time of delivery that one or more hexavalent chromium (Cr^{+6}) sample(s) were contained in the shipment to ensure that the samples would be analyzed within the prescribed 24-hour holding period.

2.2 Equipment Decontamination Procedures

The following sections describe the procedures utilized to decontaminate groundwater sampling equipment.

2.2.1 Sampling Pump/Lines Decontamination

The submersible pump and discharge tubing used for well purging were decontaminated to reduce the possibility of cross-contamination between monitoring wells. The first step in the decontamination procedure was to submerge the pump into a decontaminated 5-gallon bucket containing a soap (Alconox, a laboratory-grade detergent) and water mixture, and pump at least five gallons of the solution through the system. The pump assembly was then submerged in another 5-gallon bucket filled with tap water and at least 10 gallons were pumped through the system. The final decontamination step was accomplished by submerging the pump into a decontaminated 5-gallon bucket containing deionized (DI) water and pumping approximately five gallons of DI water through the system.

The exterior of the pump and discharge tubing was steam cleaned, as well as the exterior of the reel holding the tubing. The decontamination of the exterior pump line was performed over a plastic waterproof tarp. The tarp was placed on a gently sloping surface and bermed up at the edges, allowing the decontamination water to flow away from the equipment being cleaned. The spent water was recovered and stored in 55-gallon drums for treatment by PTI in the facility's wastewater treatment system.

2.2.2 Accessory Sampling Equipment Decontamination

Accessory sampling equipment such as the metals filter apparatus, bailer, and water level sounder were also decontaminated to minimize the possibility of cross-contamination between the monitoring wells. The filter apparatus, bailer, and sounder were decontaminated first by washing in a bucket of soap and water, followed by a tap water rinse, followed by a final DI water rinse. Bailers used to test for an immiscible layer were decontaminated and reused. The bailers and nylon rope that were used to sample wells were discarded immediately after use.

Section 3
Laboratory Testing

Analytical and duplicate testing of groundwater samples collected during July 1998 monitoring was provided by Quanterra Laboratories of Santa Ana, California. During the July 1998 quarterly sampling event, a total of 21 water samples were submitted for laboratory analysis. Fourteen monitoring well samples and two blind duplicate samples from MW-04 and MW-9 were collected and submitted to Quanterra for analysis of purgeable halocarbons/aromatics (EPA Method 8260), cadmium, total and hexavalent chromium, copper, and pH. In addition, two equipment blank samples were submitted for analysis of the above parameters. Three travel blanks (TB) were also submitted to Quanterra for analysis of purgeable halogenated/aromatic organics.

The July 1998 groundwater analytical results are discussed in Section 6 and summarized in Tables 6-1 through 6-4. Quality assurance analytical results (duplicates, equipment blanks, and travel blanks) are discussed in Section 4.0 and summarized in Tables 4-1 through 4-4. Individual analytical reports for July 1998 are contained in Appendix B.

Section 4
Quality Assurance

To verify the accuracy and validity of analytical data, certain quality assurance procedures were implemented. The field and laboratory quality assurance results were checked for deviations from the Quality Assurance (QA) guidelines discussed in the RFI Work Plan.

4.1 Field Quality Assurance

The field QA procedures included the use of duplicate samples, equipment blanks, travel blanks, and the use of chain-of-custody forms. The results of the QA analyses have been compiled by type of parameter: purgeable halogenated organics, purgeable aromatic organics, and inorganics, in Tables 4-1 through 4-3, respectively. Table 4-4 lists quality assurance results which are outside the ranges specified in the RFI Work Plan. Detection limits of parameters analyzed are shown in the analytical reports contained in Appendix B.

4.1.1 Duplicate Samples

Standard accepted practice is to submit one duplicate sample for analysis for approximately every tenth sample collected, a ratio of 1 to 10. During the July 1998 round of sampling, duplicate samples were collected from monitoring wells MW-04 and MW-9. The duplicate samples were submitted to the analytical laboratory as blind samples, and were designated MW-35 and MW-37, respectively, on the chain of custody forms. Monitoring wells MW-04 and MW-9 were selected due to elevated concentrations of certain contaminants detected during previous sampling rounds. Analytical results for the duplicate samples for July 1998 are shown in Tables 4-1, 4-2, and 4-3.

Duplicate results which deviate greater than 20% from the original results are shown in Table 4-4. All duplicate analytical results were within 20% of the original sample results.

4.1.2 Equipment Blanks

Analytical results for the equipment blanks collected during July 1998 are shown in Tables 4-1, 4-2 and 4-3.

Equipment blank EB-01 was obtained by allowing deionized water to run through a new, precleaned, disposable bailer. The other equipment blank (EB-02) was obtained by pouring deionized water over the submersible pump after decontamination. The samples were collected in the appropriate containers and submitted for laboratory analysis. Sample EB-01 was collected to evaluate the effectiveness of the factory cleaning process. Sample EB-02 was collected following pump decontamination after sampling well MW-16. The equipment blanks were submitted to the laboratory for analysis of purgeable halogenated/aromatic volatile compounds (EPA Method 8260), cadmium, chromium (total and hexavalent), copper, and pH. The analytical results did not show any detections above the method detection limits in samples EB-01 and EB-02.

TABLE 4-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Purgeable Halogenated Organic Analytical Results
(ug/L)

Sample Identification	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	1,1-Dichloro-ethene (1,1-DCE)	1,1-Dichloro-ethane (1,1-DCA)	1,2-Dichloro-ethane (1,2-DCA)	1,1,1-Trichloro-ethane (1,1,1-TCA)	Chloroform (CHCL3)	Methylene chloride (CH2CL2)
PTI-EB01	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-EB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-MW04	ND <25	**120**	ND <25	**28**	ND <25	ND <25	ND <25	**28**
PTI-MW04-DUP	ND <25	**120**	**27**	**31**	ND <25	ND <25	ND <25	**29**
PTI-MW9	**30**	**1300**	**380**	**1200**	**60**	**220**	**150**	**86**
PTI-MW9-DUP	**27**	**1300**	**360**	**1100**	**56**	**220**	**150**	**84**
PTI-TB01	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-TB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-TB03	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
TB = Travel Blank

TABLE 4-2
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Purgeable Aromatic Organic Analytical Results
(µg/L)

Sample Identification	Benzene	Toluene	Ethyl-benzene	Xylenes (Total)
PTI-EB01	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-EB02	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-MW04	ND <12	ND <25	**1,200**	**300**
PTI-MW04-DUP	ND <12	ND <25	**1,300**	**320**
PTI-MW9	ND <12	ND <25	**73**	ND <25
PTI-MW9-DUP	ND <12	ND <25	**70**	ND <25
PTI-TB01	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-TB02	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-TB03	ND <0.50	ND <1.0	ND <1.0	ND <1.0

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected.
NA = Parameter not analyzed.
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
TB = Travel Blank

TABLE 4-3
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Inorganic Analytical Results
(mg/L)

Well Identification	Cadmium EPA- 6010-L	Chromium (Hexavalent) EPA- 7196	Chromium (Total) EPA-6010-L	Copper EPA-6010-L	pH EPA-9040
PTI-EB01	ND <0.0050	ND <0.020	ND <0.010	ND <0.020	**7.4**
PTI-EB02	ND <0.0050	ND <0.020	ND <0.010	ND <0.020	**7.4**
PTI-MW04	**0.32**	**16.3**	**18.9**	ND < 0.020	**7.0**
PTI-MW04-DUP	**0.32**	**16.3**	**19**	ND < 0.020	**7.0**
PTI-MW9	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**6.7**
PTI-MW9-DUP	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**6.7**

ND = Analytical parameter not detected.
NA = Parameter not analyzed.
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.

TABLE 4-4
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Quality Assurance Deviations

Quality Assurance Criteria	Cadmium (mg/l)	Chromium, Hexavalent (mg/l)	Chromium, Total (mg/l)	Copper (mg/l)	Benzene (ug/l)	Toluene (ug/L)	Ethyl-Benzene (ug/l)	Xylenes, Total (ug/l)	Halogenated Volatile Organic Compounds (ug/l)
Equipment Blanks									
PTI-EB01- 040									
PTI-EB02- 040									
Travel Blanks									
PTI-TB01- 040									
PTI-TB02- 040									
PTI-TB03- 040									
Laboratory Blanks									
Method Blank									
Duplicate Deviation (>20%)									
PTI-MW04- 040									
PTI-MW09- 040									
Holding Time Exceedance									

0.01/0.01 = Concentration/Detection Limit
MW - DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
TB = Travel Blank

Note: There were no QA exceedances during the July 1998 sampling event.

4.1.3 Travel Blanks

The detection of compounds in travel blanks is generally indicative of systematic contamination from sample transport, laboratory glassware cleaning, laboratory storage, or analytical procedures. During the July 1998 sampling event, three laboratory-prepared travel blanks (TB01 through TB03) consisting of organic-free water were labeled and submitted to the lab for purgeable halocarbon and aromatic volatile organic analysis by EPA Method 8260. Each travel blank was stored with the day's samples, to be analyzed for volatile organic compounds. Tables 4-1 and 4-2 show the results of the travel blank analyses. The analytical results from the three travel blanks did not show any detections above the method detection limits.

4.1.4 Sample Control

All sample containers were labeled immediately prior to sampling with the sample identification information completed with a waterproof pen. Samples were transported under chain-of-custody and hand delivered by courier to the laboratory in ice-cooled chests. Copies of the chain-of-custody records are included in Appendix C.

4.2 Laboratory Quality Assurance

General QA procedures for Quanterra Laboratory, which performed laboratory analysis on all monitor well and quality assurance samples, are discussed in the RFI report. Quanterra provides internal laboratory QA/QC results with each sample analytical report. Matrix spike, matrix spike duplicate, method blank, and duplicate control sample results are noted in the QA/QC reports. In addition, surrogate recoveries are also noted for volatile organics analyses. The laboratory QA/QC results were within acceptable limits for the July 1998 sampling. The laboratory control sample results were also within acceptable limits.

Section 5
Groundwater Elevation

On July 14, 1998, prior to the initiation of well evacuation procedures, the depth to groundwater was measured in 22 of the 24 on-site monitoring wells. Groundwater elevations were calculated by subtracting the depth to static water level from the surveyed elevation of the corresponding monitoring well.

All of the monitoring well casing elevations were surveyed during the RFI and three wells (MW-04, MW-09, and MW-10) were resurveyed in January 1996 following wellhead repair. In July 1998, wellhead repairs were performed on wells MW-03, MW-06A, MW-06B, MW-06D, MW-08, MW-11, MW-12S, MW-12D, MW-13S, MW-13D, and MW-16. These wells were resurveyed during the July 1998 monitoring event.

During the July 1998 groundwater sampling round, water level measurements were taken at shallow wells MW-01S, MW-03, MW-04, MW-05, MW-06B, MW-07, MW-08, MW-09, MW-10, MW-11, MW-12S, MW-13S, MW-14S, MW-15S, and MW-16. Water level measurements were also taken at deep wells MW-01D, MW-04A, MW-06D, MW-12D, MW-13D, MW-14D, and MW-15D. These wells were measured in order to evaluate the direction and gradient of groundwater flow underlying the facility and to help characterize the shallow and deep aquifer interaction. Well MW-02 was not measured due to its proximity to MW-12S. Well MW-06A was measured and found to be dry.

Table 5-1 lists the depths to water and groundwater elevations for each well sampled. Figure 5-1 shows the approximate groundwater surface elevation of the upper Hollydale Aquifer for wells screened in the shallow interval (45 to 77 feet below ground surface) using data collected during the July 1998 sampling round. The contours shown in Figures 5-1 and 5-2 were generated by D.C.A., a surface contouring software developed by Softdisk, which is commonly used in conjunction with CADD (Computer Aided Drafting and Design) to produce contour maps and other graphics.

The direction of groundwater flow as observed in the shallow monitoring wells is approximately S 40° W at an average gradient of 0.32 foot per 100 feet in the western portion of the facility, where the majority of the monitoring wells are located. The gradient has slightly decreased from the April 1998 gradient of 0.36 foot per 100 feet and the flow direction has an increased southward component from that obtained in April 1998 (S 44° W).

Figure 5-2 shows the approximate groundwater elevation of the lower Hollydale Aquifer for wells screened in the deeper interval (78.3 to 123.5 feet below ground surface). Groundwater contours for the deeper wells follow the same general trend as those of the shallow wells. The direction of groundwater flow is approximately S 41°W at an average gradient of 0.34 foot per 100 feet. As observed in the shallow wells, the gradient has slightly decreased from the April 1998 gradient of 0.36 foot per 100 feet and the flow direction has an increased southwardcomponent from that obtained in April 1998 (S 46°W) in the deep wells.

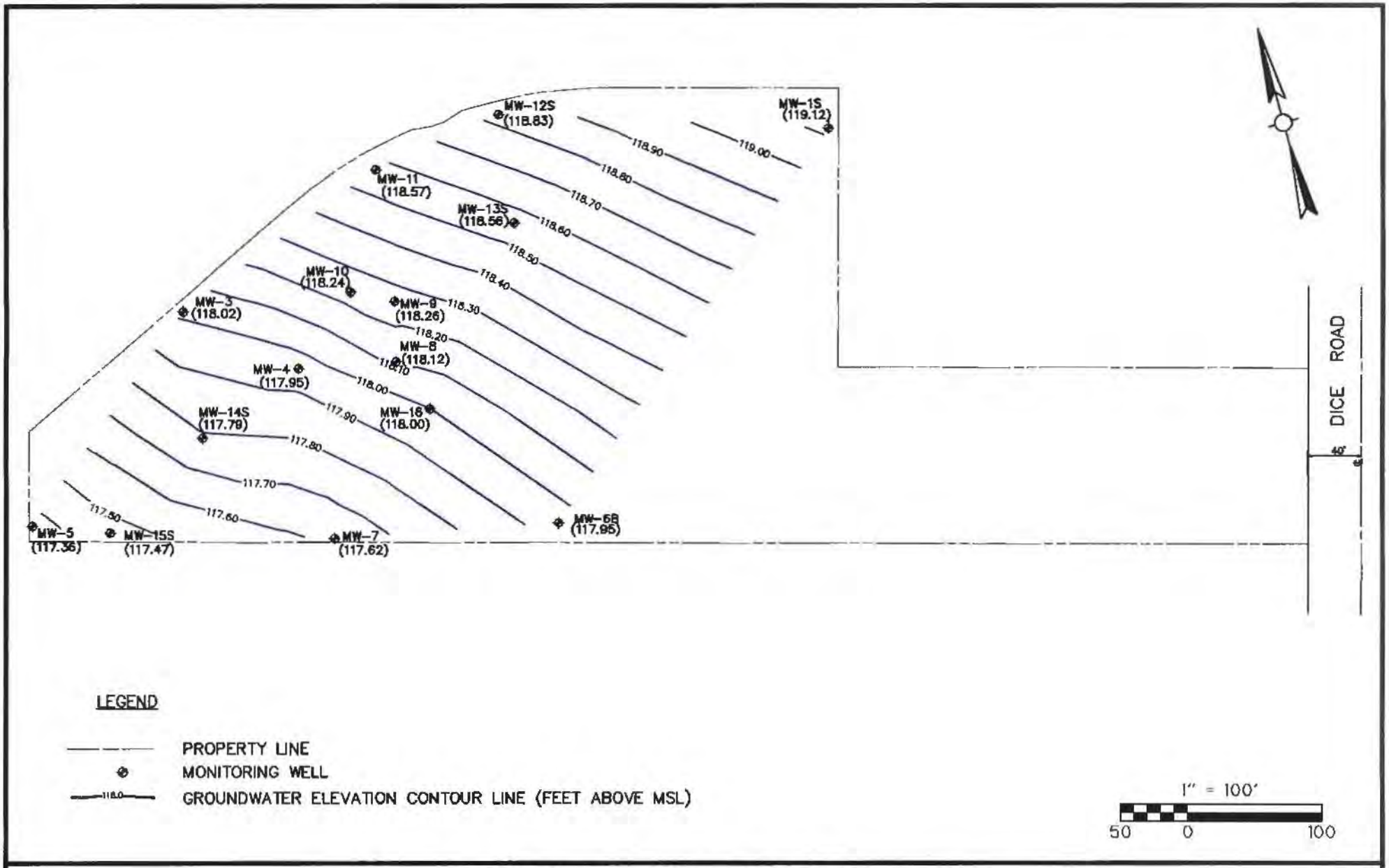
With the 22 wells measured for water levels during the July 1998 sampling round, there were seven locations where a deep well was measured adjacent to a shallow well. Shallow wells are screened

TABLE 5-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Groundwater Elevation Data

Well No.	Well Headspace* (ppm)	Total Depth Constructed (ft)	Total Depth Measured (ft)	Perforated Intervals (ft)	Calculated Casing Fill (ft)	M.P. Elevation (ft)	Depth to Water (ft below MP)	G.W. Elevation (ft above MSL)
1S	0.1 / 0.0	62.5	62.5	47-62.5	0.0	152.63	33.51	119.12
1D	0.0 / 0.0	94.8	95.9	79.5-94.5	---	152.60	33.40	119.20
3	13.0 / 0.0	74.1	73.5	45-75	0.6	154.75	36.73	118.02
4	0.9 / 0.0	67.5	67.8	45-75	---	152.37	34.42	117.95
4A	0.0 / 0.0	107.0	105.7	87-107	1.3	152.46	34.42	118.04
5	0.0 / 0.0	75.0	---	45-75	---	153.26	35.90	117.36
6A	51.0 / 0.0	---	---	10-30	---	---	DRY	---
6B	0.0 / 0.0	77.6	77.1	45-75	0.5	149.53	31.58	117.95
6D	0.0 / 0.0	95.5	93.9	79-94	1.6	150.13	32.16	117.97
7	0.0 / 0.0	71.5	71.4	45-75	0.0	149.42	31.80	117.62
8	20.3 / 0.0	71.0	---	41-71	---	150.17	32.05	118.12
9	27.5 / 0.0	73.5	73.6	44-77	---	152.96	34.70	118.26
10	66.0 / 0.0	75.0	---	45-75	---	153.89	35.65	118.24
11	4.0 / 0.0	75.5	74.1	55-75	1.5	155.76	37.19	118.57
12S	0 / 0.0	72.0	---	51-72	---	155.79	36.96	118.83
12D	0.4 / 0.0	101.0	---	84.5-100	---	155.72	36.93	118.79
13S	2.4 / 0.0	70.3	---	50.3-70.3	---	151.72	33.16	118.56
13D	0.8 / 0.0	93.3	---	78.3-93.3	---	151.68	33.14	118.54
14S	0.1 / 0.0	71.5	70.8	46-72	0.7	150.50	32.71	117.79
14D	0.0 / 0.0	109.0	---	88-103	---	150.56	32.78	117.78
15S	0.0 / 0.0	71.5	71.4	51.5-71.5	---	151.01	33.54	117.47
15D	0.0 / 0.0	123.8	123.8	108.5-123.5	0.0	150.96	33.63	117.33
16	5.0 / 0.4	62.5	62.0	42-62	0.5	150.27	32.27	118.00

M.P. = Measuring point (top of steel casing)
G.W. = Groundwater
— = Not measured or not calculated.

MSL = mean sea level
* = Measured with PID prior to sampling (wellhead/casing)
Note: Depth to water measurements collected on July 14, 1998 prior to purging/sampling on-site wells.



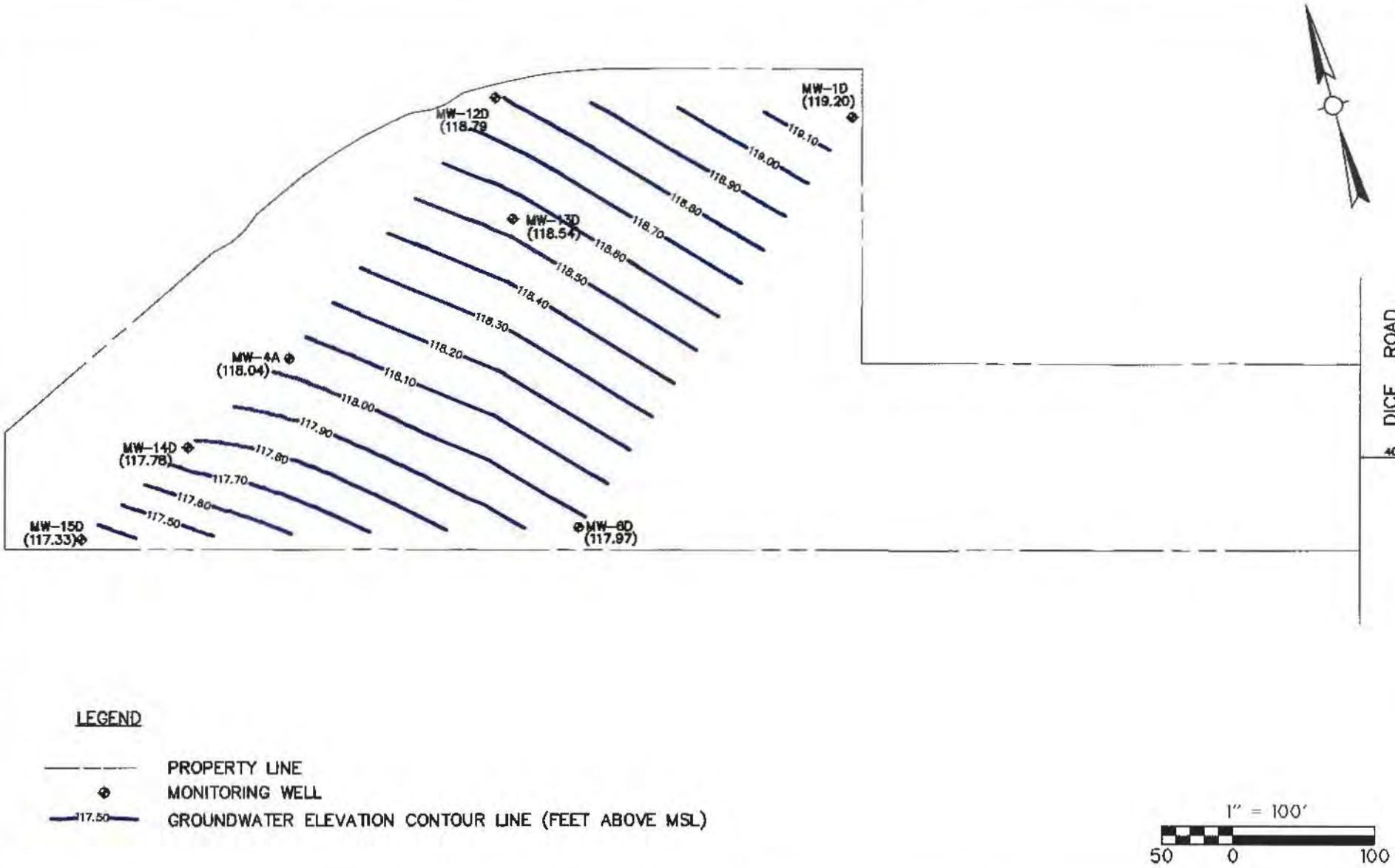
PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

GROUNDWATER ELEVATION CONTOURS – SHALLOW WELLS
JULY 1998

CDM
environmental engineers, scientists, planners, & management consultants

FIGURE 5-1

O:\PHIB-TEC\JULY-98\ FIG5-1 08/11/98 11:45:09 2:24:55 225



PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

GROUNDWATER ELEVATION CONTOURS – DEEP WELLS
JULY 1998

CDM
environmental engineers, scientists, planners, & management consultants

FIGURE 5-2

O:\PHIB-TEC\JULY-98\ FIG5-2 08/11/98 15:36:08 5:22:23 223

within the interval of 45 to 77 feet. Deep wells are screened within the interval of 78.3 to 107 feet, with the exception of MW-15D which is screened from 108.5 to 123.5 feet. Of the well pairs, groundwater elevations at deep wells MW-12D, MW-13D, MW-14D, and MW-15D were slightly lower (0.01 to 0.14 feet) than the corresponding shallow well elevations. The groundwater elevations at deep wells MW-1D, MW-4A, and MW-06D were slightly higher (0.02 and 0.09 feet) than the corresponding shallow well elevation. Based on these and past groundwater elevation comparisons among shallow and deep well pairs, it does not appear that a well-defined vertical gradient between shallow and deep intervals exists.

In general, groundwater elevations during the July 1998 sampling event increased from the previous quarter. Water level increases ranged from a minimum of 0.87 feet at well MW-13S, to a maximum of 1.42 feet at MW-05 and MW-15S.

Section 6
Groundwater Quality

In order to compare the analytical data from the previous sampling events (1989 through January 1998 quarterly events) with the July 1998 data, Table 6-1 was compiled. This table compares groundwater analytical parameters (hexavalent and total chromium, cadmium, copper, purgeable aromatics and trichloroethene), and groundwater elevations at shallow well locations which were sampled during July 1998. Laboratory analytical reports from all wells sampled during the July 1998 sampling round are located in Appendix B.

Consistent with the results of laboratory testing performed on the groundwater samples collected since January 1989 from the on-site monitoring wells, three contaminant plumes in the Hollydale Aquifer were identified. Historically, these plumes have been present at varying concentrations and lateral extent. One small plume, consisting primarily of site-specific metals parameters, has been aligned in a northeasterly to southwesterly direction in the vicinity of wells MW-04 and MW-14S. The second, consisting of purgeable aromatics, has also been aligned in a northeasterly to southwesterly direction with the highest concentrations generally found in wells MW-04 and MW-09. The third plume consists of trichloroethene and related parameters with highest concentrations generally detected in wells MW-04, MW-09, MW-11, and MW-14S.

6.1 Purgeable Halogenated Organic Compounds

Table 6-2 shows the analytical results for purgeable halogenated organic compounds in deep and shallow wells during July 1998. Trichloroethene was the primary compound detected, with miscellaneous other halogenated organics also detected. The table also shows, for comparison purposes, maximum contaminant limits (MCLs) and concentrations for water supply wells in the Santa Fe Springs area. The supply wells, however, are likely screened much deeper than the wells at PTI. The City of Santa Fe Springs Annual Water Quality Report for 1996 is contained in Appendix D of this document.

Trichloroethene

Trichloroethene (TCE) was detected in all 14 of the groundwater monitoring wells sampled during July 1998. The highest concentration of TCE detected in July 1998 was 1300 µg/L in well MW-9, an increase from the result of 390 µg/L in April 1998. The second highest concentration of TCE detected was 150 µg/L in well MW-11, a slight decrease from the result of 180 µg/L in April 1998. The third highest concentration of TCE detected was 120 µg/L in well MW-04, an increase from the result of 92 µg/L in April 1998.

Detected concentrations of TCE in the remainder of the shallow wells in July 1998 did not change substantially from April 1998, and ranged in concentration from 3.4 µg/L in MW-15S to 53 µg/L in MW-07. Deep well detections also did not change substantially, and ranged from 1.9 µg/L in MW-01D to 9.2 µg/L in MW-04A. Concentrations for TCE detected in shallow and deep wells are shown in Figures 6-1 and 6-2, respectively.

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 1S										
Jan-89	96.74	ND 0.01	0.014	ND 0.003	ND 0.009	ND 0.01	ND 0.01	ND 0.01	ND 0.01	19
Apr-89	100.45	ND 0.05	0.1	ND 0.01	ND 0.02	ND 0.7	ND 1	ND 1	3	23
Jul-89	99.00	ND 0.05	0.06	0.01	0.03	ND 0.7	ND 1	ND 1	ND 1	13
Oct-89	96.76	ND 0.05	ND 0.02	ND 0.01	ND 0.05	ND 0.5	ND 1	ND 1	ND 1	12
Jan-90	97.73	ND 0.02	ND 0.01	ND 0.01	ND 0.02	ND 0.5	ND 0.5	ND 0.5	ND 1	16
Apr-90	99.30	ND 0.02	0.02	ND 0.005	0.02	ND 2.5	ND 2.5	ND 2.5	ND 5	20
Jul-90	100.83	ND 0.02	ND 0.01	ND 0.01	0.03	ND 0.5	ND 0.5	ND 0.5	ND 1	18
Oct-90	99.81	ND 0.02	ND 0.01	ND 0.005	0.023	ND 0.5	ND 1	ND 1	ND 1	18
Jan-91	99.19	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	26
Apr-91	101.95	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	22
Jul-91	102.94	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	17
Oct-91	102.33	ND 0.02	0.01	ND 0.005	0.02	ND 0.5	ND 1	ND 1	ND 1	14
Jan-92	104.60	0.10	ND 0.0081	ND 0.0027	0.04	ND 1	1.5	1.2	4.3	13
Apr-92	107.28	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 0.5	ND 0.5	ND 0.5	9.9
Jul-92	107.87	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	10
Oct-92	105.53	ND 0.02	ND 0.01	ND 0.005	0.035	0.95	ND 1	ND 1	ND 1	11
Jan-93	109.82	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	2.2	1.3	5.6	9.2
Apr-93	116.01	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	5.7
Jul-93	116.59	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	1.7	1.7	4	11
Oct-93	116.50	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	2.2	4.3	14
Jan-94	116.60	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	9.3
Apr-94	117.10	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	14
Jul-94	117.80	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	7.9
Oct-94	112.23	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	5.8	13
Jan-95	113.59	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	5.2
Apr-95	118.78	ND 0.02	0.0029	ND 0.001	ND 0.02	ND 0.5	ND 1	1.3	1	4.4
Jul-95	120.06	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	1.2	3.5	6.1	6.2
Oct-95	116.48	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	1.7	3.9	15
Jan-96	114.84	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	1.7	5.1	8.4
Apr-96	118.03	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	3.4	4.9	2.9
Jul-96	117.42	ND 0.01	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	2.2	3.7	9.7
Oct-96	113.85	ND 0.01	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	2.1	2.8	16
Jan-97	115.73	ND 0.02	ND 0.01	ND 0.005	0.022	ND 0.5	ND 1	ND 1	2.0	6.0
Apr-97	118.21	ND 0.02	ND 0.01	ND 0.005	ND 0.020	ND 0.5	ND 1	1.4	1.2	15
Jul-97	118.18	ND 0.02	ND 0.01	ND 0.005	ND 0.020	ND 0.5	ND 1	ND 1	ND 1	14
Oct-97	114.82	ND 0.02	ND 0.01	ND 0.005	0.023	ND 0.5	ND 1	ND 1	ND 1	12
Jan-98	113.23	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	12
Apr-98	118.16	ND 0.02	ND 0.01	ND 0.005	0.021	ND 0.5	ND 1	ND 1	ND 1	14
Jul-98	119.12	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	14

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS Hexavalent Chromium (mg/L)	METALS Total Chromium (mg/L)	METALS Cadmium (mg/L)	METALS Copper (mg/L)	PURGEABLE AROMATICS Benzene (ug/L)	PURGEABLE AROMATICS Toluene (ug/L)	PURGEABLE AROMATICS Ethyl-Benzene (ug/L)	PURGEABLE AROMATICS Total Xylenes (ug/L)	PURGEABLE HALOCARBONS Trichloroethene (ug/L)
MW - 3										
Jan-89	95.02	ND 0.01	ND 0.014	ND 0.003	ND 0.009	7.4	17	4,900	1,500	74
Apr-89	99.29	ND 0.05	0.07	ND 0.01	ND 0.02	ND 50	ND 50	1,200	60	110
Jul-89	98.21	ND 0.05	0.06	ND 0.01	ND 0.02	ND 7	ND 10	ND 10	ND 10	120
Oct-89	94.75	ND 0.05	ND 0.02	ND 0.01	ND 0.05	ND 50	ND 100	1,600	150	ND 100
Jan-90	95.98	ND 0.02	ND 0.01	ND 0.01	ND 0.02	ND 5	ND 5	110	ND 10	65
Apr-90	97.72	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 50	ND 50	2,100	720	74
Jul-90	99.27	ND 0.02	ND 0.01	ND 0.01	ND 0.02	ND 5	ND 5	ND 5	ND 10	130
Oct-90	97.29	ND 0.02	ND 0.01	ND 0.005	ND 0.02	9	2	ND 1	ND 1	130
Jan-91	97.69	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	38
Apr-91	99.81	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	27
Jul-91	101.63	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	28
Oct-91	100.99	ND 0.02	ND 0.01	ND 0.005	0.03	ND 0.5	ND 1	ND 1	ND 1	71
Jan-92	103.44	ND 0.05	ND 0.0081	ND 0.0027	0.02	ND 1	ND 1	ND 1	4	76
Apr-92	106.04	ND 0.02	ND 0.02	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 0.5	25
Jul-92	106.61	ND 0.02	0.02	ND 0.005	0.13	ND 0.5	ND 1	ND 1	ND 1	76
Oct-92	103.93	ND 0.02	ND 0.02	ND 0.005	0.038	0.52	ND 1	ND 1	ND 1	130
Jan-93	107.28	ND 0.02	ND 0.01	ND 0.005	0.096	ND 2.5	ND 5	ND 5	ND 5	84
Apr-93	115.17	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	12
Jul-93	115.92	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	3.3	2.6	5.9	16
Oct-93	115.67	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	2.6	4.8	17
Jan-94	115.59	ND 0.02/0.4**	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	10
Apr-94	116.33	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	15
Jul-94	116.91	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	26
Oct-94	110.85	ND 0.02	ND 0.01	ND 0.005	ND 0.02	1.2	3.5	1.5	12	76
Jan-95	111.83	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	72
Apr-95	117.83	ND 0.02	0.0023	ND 0.001	ND 0.02	ND 0.5	ND 1	1.3	ND 1	57
Jul-95	119.20	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	2.0	5.2	8.8	9.5
Oct-95	115.45	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	1.7	3.3	30
Jan-96	113.41	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	5.1	26
Apr-96	116.73	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	2.6	3.6	46
Jul-96	116.33	ND 0.01	ND 0.01	ND 0.005	ND 0.02	ND 0.5	1.8	9.0	12	17
Oct-96	112.45	ND 0.01	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	5.4	6.2	21
Jan-97	114.19	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	2.6	1.1	4.2	28
Apr-97	117.13	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	4.3	2.1	3.0	13
Jul-97	117.18	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1.0	2.5	3.7	13
Oct-97	113.60	ND 0.02	ND 0.01	ND 0.005	ND 0.02	0.57	ND 1.0	1.7	1.2	24
Jan-98	111.68	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	1.3	ND 1	25
Apr-98	116.82	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	18
Jul-98	118.02	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	25

** Hexavalent chromium sample or result for MW03 likely switched with MW30 (dup. of MW04). Laboratory reported MW03 res
MW30 result of ND at a detection limit of 0.02 mg/L.

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS Hexavalent Chromium (mg/L)	METALS Total Chromium (mg/L)	METALS Cadmium (mg/L)	METALS Copper (mg/L)	PURGEABLE AROMATICS Benzene (ug/L)	PURGEABLE AROMATICS Toluene (ug/L)	PURGEABLE AROMATICS Ethyl-Benzene (ug/L)	PURGEABLE AROMATICS Total Xylenes (ug/L)	PURGEABLE HALOCARBONS Trichloroethene (ug/L)
MW - 4										
Jan-89	95.21	33.0	400.0	0.028	N D 0.009	N D 0.5	10	15	29	120
Apr-89	99.19	43.0	100.0	0.05	0.02	N D 5	23	15	50	280
Jul-89	98.19	120.0	98.0	0.08	0.06	N D 14	N D 20	140	40	290
Oct-89	94.92	110.0	120.0	0.07	N D 0.05	N D 0.5	N D 1	N D 1	N D 1	250
Jan-90	95.87	109.0	95.1	0.12	N D 0.02	N D 12	N D 12	N D 12	N D 25	220
Apr-90	97.50	81.7	80.7	0.13	0.02	N D 10	N D 10	N D 10	N D 20	280
Jul-90	99.20	100.0	101.0	0.35	N D 0.02	N D 50	N D 50	1,600	170	320
Oct-90	98.33	58.9	48.4	0.23	0.022	N D 0.5	17	230	650	250
Jan-91	97.68	49.4	65.3	0.26	N D 0.02	N D 0.5	N D 1	N D 1	1,200	180
Apr-91	100.50	23.8	18.4	0.076	N D 0.02	N D 0.5	N D 1	730	N D 1	170
Jul-91	101.47	39.1	78.5	0.61	N D 0.02	N D 0.5	16,000	6,700	18,000	190
Oct-91	100.91	42.0	40.8	0.21	N D 0.01	N D 0.5	6,900	4,100	10,000	N D 400
Jan-92	103.33	41.0	34.0	0.47	0.045	N D 250	18,000	10,000	17,200	N D 250
Apr-92	105.94	32.2	29.2	0.84	0.053	6.7	7.2	960	1,010	280
Jul-92	106.5	79.9	59.7	0.86	N D 0.02	N D 5	N D 10	200	280	280
Oct-92	103.92	21.6	27.1	0.32	N D 0.02	71	N D 10	1,300	230	230
Jan-93	107.13	16.4	27.4	0.28	N D 0.02	N D 130	10,000	10,000	19,000	N D 250
Apr-93	115	1.8	2.2	N D 0.005	N D 0.02	N D 0.5	N D 1	88	13	25
Jul-93	115.52	21.0	23.2	0.2	0.056	0.6	2.0	1.8	11	100
Oct-93	115.76	* 35.5/99.2	80.3	0.71	N D 0.2	1.3	N D 1	N D 1	40	290
Jan-94	115.42	0.36	36.0	0.23	N D 0.02	0.81	N D 1	8.3	14	130
Apr-94	116.20	26.9	26.4	0.33	N D 0.02	N D 0.5	N D 1	4	6.5	190
Jul-94	116.76	59.0	41.4	0.20	0.038	0.58	N D 1	N D 1	4.2	340
Oct-94	110.86	60.7	52.8	0.45	N D 0.02	N D 5	N D 10	270	39	390
Jan-95	111.88	28.8	34.3	0.13	0.026	N D 5	N D 10	350	130	190
Apr-95	117.69	8.6	9.1	0.21	0.052	N D 100	1600	1700	2900	67
Jul-95	119.05	* 28.1/20.8	29.6	0.27	*.10/ND<.02	N D 10	* 270/410	* 260/380	* 890/1300	90
Oct-95	115.35	**30.8	28.9	0.38	N D 0.02	N D 2.5	N D 5	75	21	150
Jan-96	113.37	25.7	32.4	0.19	N D 0.02	N D 50	100	2,100	1,400	160
Apr-96	116.65	* 32.2/24.6	38.0	0.60	N D 0.02	N D 25	680	1,300	1,400	130
Jul-96	116.17	50	58.9	0.28	N D 0.02	N D 50	ND 100	1,000	270	140
Oct-96	112.38	63.8	75.7	0.46	N D 0.04	N D 50	380	1,100	1,900	310
Jan-97	114.07	*45.9/34.9	34.5	0.54	0.02	N D 6.2	ND 12	1,100	ND 12	330
Apr-97	116.86	27.3	18.8	0.53	N D 0.02	N D 12	35	1,300	620	150
Jul-97	117.04	36.0	35.2	0.62	N D 0.02	ND 5	ND 10	810	110	150
Oct-97	113.46	73.8	85.3	0.64	ND 0.08	ND 5	ND 10	460	31	230
Jan-98	111.66	39.2	44.0	0.53	ND 0.02	ND 5	ND 10	530	420	180
Apr-98	116.69	7.2	14.1	0.43	ND 0.02	2.9	ND 5	320	ND 5	92
Jul-98	117.95	16.3	18.9	0.32	ND 0.02	ND 12	ND 25	1,200	300	120

* 35.5/99.2 = original sample/duplicate sample (both results presented because duplicate result deviation is >20%)

** Analyzed after holding time had expired.

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 6B																		
Jan-89	95.12	N D	0.01	N D	0.014	N D	0.003	N D	0.009	N D	0.01	N D	0.01	N D	0.01	N D	0.01	57
Apr-89	99.11	N D	0.05		0.06	N D	0.01	N D	0.02	N D	0.7	N D	1	N D	1	N D	1	37
Jul-89	98.39	N D	0.05		0.04	N D	0.01	N D	0.02	N D	0.7	N D	1	N D	1	N D	1	29
Oct-89	95.35	N D	0.05	N D	0.02	N D	0.01	N D	0.05	N D	0.5	N D	1	N D	1	N D	1	29
Jan-90	96.1	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	1	48
Apr-90	97.76	N D	0.02		0.02	N D	0.005	N D	0.02	N D	2.5	N D	2.5	N D	2.5	N D	5	61
Jul-90	99.28	N D	0.02		0.02	N D	0.01	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	1	51
Oct-90	98.45	N D	0.02		0.012	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	52
Jan-91	97.87	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	59
Apr-92	105.86	N D	0.02		0.014	N D	0.005	N D	0.02	N D	0.5	N D	0.5		1.1		0.82	19
Jul-92	106.57	N D	0.02		0.019	N D	0.005		0.054	N D	0.5	N D	0.5	N D	1	N D	1	10
Oct-92	104.12	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		12		2.9		13	9.3
Jan-93	107.23	N D	0.02		0.011	N D	0.005		0.038	N D	0.5	N D	1	N D	1	N D	1	6.9
Apr-93	114.64	N D	0.02		0.014	N D	0.005	N D	0.02	N D	0.5		64		26.0		88	2.6
Jul-93	115.34	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.2		2.0		5.5	2.7
Oct-93	115.46	N D	0.02		0.011	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	5.9
Jan-94	115.37	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	2.7
Apr-94	116.15	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	2.0
Jul-94	116.67	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.1	N D	1		1.9	2.9
Oct-94	111.13	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.5	N D	1		8.2	1.5
Jan-95	112.19	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		110		89		110	8.6
Apr-95	117.42	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.6		9.1		6.2	2.3
Jul-95	118.93	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.1		4.0		5.1	8.8
Oct-95	115.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1		1.0	2.6
Jan-96	113.47	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		28		27		53	14
Apr-96	116.65	N D	0.02		0.011	N D	0.005	N D	0.02	N D	1		4.2		37		50	2.9
Jul-96	116.18	N D	0.01	ND	0.01	N D	0.005	N D	0.02	N D	0.5	ND	1		2.3		3.5	2.3
Oct-96	112.66	N D	0.01	ND	0.01	N D	0.005	N D	0.02	N D	0.5		1.0		2.1		2.8	6.1
Jan-97	114.20	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		4.3		4.3		6.4	5.0
Apr-97	116.95	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		3.6		1.7	N D	1	5.2
Jul-97	117.01	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	ND	1	N D	1	6.6
Oct-97	113.71	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	ND	1	N D	1	6.4
Jan-98	112.06	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		15		32		39	17.0
Apr-98	116.76	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		1.6		4.2		6	7.7
Jul-98	117.95	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	ND	1	N D	1	4.3

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 7										
Jan-89	89.47	ND 0.01	ND 0.014	ND 0.003	ND 0.009	ND 0.5	1.4	1.2	3.6	35
Apr-89	98.83	ND 0.05	0.02	ND 0.01	ND 0.02	ND 0.7	ND 1	ND 1	ND 1	47
Jul-89	97.90	ND 0.05	0.03	ND 0.01	ND 0.05	ND 0.7	ND 1	ND 1	ND 1	25
Oct-89	94.72	ND 0.05	ND 0.02	ND 0.01	ND 0.05	ND 0.5	ND 1	ND 1	ND 1	44
Jan-90	95.58	ND 0.02	ND 0.01	ND 0.01	ND 0.02	ND 2.5	ND 2.5	ND 2.5	ND 5	39
Apr-90	97.32	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 2.5	ND 2.5	ND 2.5	ND 5	46
Jul-90	98.85	ND 0.02	ND 0.01	ND 0.01	ND 0.02	ND 1	ND 1	ND 1	ND 2	34
Oct-90	98.02	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	19
Jan-91	97.41	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	1.8
Apr-91	100.06	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	30
Jul-91	101.20	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	53
Oct-91	100.62	ND 0.02	ND 0.01	ND 0.005	0.01	ND 0.5	ND 1	ND 1	ND 1	54
Jan-92	102.90	0.07	ND 0.0081	ND 0.0027	0.14	ND 1	ND 1	ND 1	ND 1	120
Apr-92	105.54	ND 0.02	0.013	ND 0.005	0.032	ND 0.5	ND 1	ND 1	ND 1	55
Jul-92	103.13	ND 0.02	0.095	ND 0.005	0.21	ND 1	ND 2	ND 2	ND 2	53
Oct-92	103.68	ND 0.02	0.063	ND 0.005	0.65	ND 0.5	ND 1	ND 1	ND 1	98
Jan-93	106.82	ND 0.02	0.033	ND 0.005	0.19	ND 0.5	ND 1	ND 1	ND 1	73
Apr-93	114.54	ND 0.02	0.011	ND 0.005	ND 0.02	ND 1.2	ND 2.5	90	5.6	23
Jul-93	115.14	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 5	ND 10	210	ND 10	43
Oct-93	115.23	ND 0.2	ND 0.01	ND 0.005	0.02	0.82	ND 1	7.2	ND 1	44
Jan-94	115.08	ND 0.02	ND 0.01	ND 0.005	ND 0.02	1.4	ND 1	33	ND 1	53
Apr-94	115.88	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 2.5	ND 5	200	ND 5	96
Jul-94	116.44	ND 0.02	ND 0.01	ND 0.005	0.023	0.88	ND 1	7.7	1.2	140
Oct-94	110.69	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	5.1	5.5	98
Jan-95	111.59	ND 0.02	ND 0.01	ND 0.005	0.026	ND 0.5	7.0	8.7	10	170
Apr-95	117.24	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	1.3	ND 1	26
Jul-95	118.63	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	2.1	3.4	53
Oct-95	115.08	ND 0.02	0.014	ND 0.005	0.079	0.74	ND 1	3.8	1.4	98
Jan-96	112.98	ND 0.02	ND 0.01	ND 0.005	0.043	1.0	4.2	4.9	10	85
Apr-96	116.39	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	1.3	11	14	37
Jul-96	115.83	ND 0.01	ND 0.01	ND 0.005	ND 0.02	1.0	ND 1	1.6	2.7	87
Oct-96	112.17	ND 0.01	ND 0.01	ND 0.005	0.036	0.96	ND 1	1.4	1.5	150
Jan-97	113.76	ND 0.02	ND 0.01	ND 0.005	0.029	ND 0.5	ND 1	1.7	2.8	95
Apr-97	116.62	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	1.1	1.2	ND 1	63
Jul-97	116.74	ND 0.02	ND 0.01	ND 0.005	ND 0.02	0.56	ND 1.0	ND 1	ND 1	54
Oct-97	111.27	ND 0.02	ND 0.01	ND 0.005	0.025	ND 0.5	ND 1.0	ND 1	ND 1	85
Jan-98	111.47	ND 0.02	0.01	ND 0.005	0.044	ND 0.5	2.2	5.2	6.8	97
Apr-98	116.38	ND 0.02	0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	1.6	1.8	23
Jul-98	117.62	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	53

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW-9										
Jan-89	95.55	0.45	0.33	ND 0.003	ND 0.009	ND 0.5	ND 0.5	ND 0.5	ND 1	55
Apr-89	99.67	ND 0.02	0.06	ND 0.01	ND 0.02	ND 0.7	ND 1	ND 1	ND 1	24
Jul-89	98.77	ND 0.05	0.17	ND 0.01	0.02	ND 0.7	ND 1	ND 1	ND 1	57
Oct-89	95.62	2.5	1.8	ND 0.01	ND 0.05	ND 0.5	ND 1	ND 1	ND 1	110
Jan-90	96.44	2.28	2.2	ND 0.01	ND 0.02	ND 2.5	ND 2.5	ND 2.5	ND 5	100
Apr-90	98.26	0.8	0.81	ND 0.005	ND 0.02	ND 2.5	ND 2.5	ND 2.5	ND 5	150
Jul-90	99.78	0.03	0.04	ND 0.01	ND 0.02	ND 2.5	ND 2.5	ND 2.5	ND 5	64
Oct-90	98.69	0.25	0.19	ND 0.005	0.062	ND 0.5	ND 1	ND 1	ND 1	17
Jan-91	98.04	0.124	0.085	ND 0.005	ND 0.02	ND 0.5	6.6	1.4	9	26
Apr-91	100.83	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	26
Jul-91	101.88	ND 0.02	0.027	ND 0.005	ND 0.02	ND 0.5	ND 1	99	ND 1	41
Oct-91	101.30	0.05	0.07	ND 0.005	ND 0.01	ND 0.5	ND 1	94	ND 1	120
Jan-92	103.62	ND 0.05	ND 0.0081	ND 0.0027	0.031	ND 1	ND 1	1,220	92	45
Apr-92	106.27	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.05	2,800	3,600	6,190	52
Jul-92	106.93	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.05	34,000	7,900	24,000	ND 1000
Oct-92	104.3	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 1000	83,000	13,000	58,000	ND 1000
Jan-93	107.56	ND 0.02	0.057	ND 0.005	0.053	ND 50	400	3,900	5,300	ND 100
Apr-93	115.26	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 50	5,100	4,000	9,200	110
Jul-93	115.81	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 16	ND 33	160	74	1100
Oct-93	115.79	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 2.5	ND 5	120	45	390
Jan-94	115.76	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 10	48	290	220	230
Apr-94	116.51	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 500	17000	12000	32000	270
Jul-94	117.03	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 1000	56000	15000	40000	200
Oct-94	111.17	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 500	57000	11000	34000	350
Jan-95	112.25	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 250	8200	9800	2000	310
Apr-95	117.92	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 50	ND 100	650	480	670
Jul-95	119.31	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 10	69	780	340	540
Oct-95	115.67	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 25	110	670	1900	320
Jan-96	113.73	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 50	100	4,300	6,100	500
Apr-96	117.00	ND 0.02	ND 0.01	ND 0.005	ND 0.02	3.3	5.5	24	22	580
Jul-96	116.49	ND 0.01	ND 0.01	ND 0.005	ND 0.02	4.6	ND 2	42	4.3	570
Oct-96	112.73	ND 0.01	ND 0.01	ND 0.005	ND 0.02	ND 50	ND 100	2,900	350	470
Jan-97	114.46	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 2.5	ND 5	ND 5	ND 5	400
Apr-97	117.29	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 5	ND 10	18	ND 10	770
Jul-97	117.34	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 25	ND 50	2,500	860	850
Oct-97	113.75	ND 0.02	0.048	ND 0.005	ND 0.02	ND 25	150	1,900	4800	ND 50
Jan-98	112.06	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 5	ND 10	690	260	270
Apr-98	117.07	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 5	ND 10	23	ND 10	390
Jul-98	118.26	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 12	ND 25	73	ND 25	1300

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 11										
Jan-89	95.97	N D 0.01	N D 0.014	N D 0.003	N D 0.009	N D 0.5	N D 0.5	43	1.5	34
Apr-89	99.85	N D 0.02	0.04	N D 0.01	N D 0.02	N D 500	7,500	2,600	11,000	39
Jul-89	98.95	N D 0.05	N D 0.02	N D 0.01	0.13	N D 7	N D 10	N D 10	90	29
Oct-89	95.77	N D 0.05	N D 0.02	N D 0.01	N D 0.05	N D 5	N D 10	200	N D 10	35
Jan-90	96.72	N D 0.02	N D 0.01	N D 0.01	N D 0.02	N D 5	N D 5	83	N D 10	46
Apr-90	98.44	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 2.5	3	370	150	33
Jul-90	100.00	N D 0.02	N D 0.01	N D 0.01	0.03	N D 25	440	1,000	760	65
Oct-90	98.97	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	15,000	3,000	10,000	N D 1
Jan-91	98.29	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	15,000	4,700	12,000	N D 1
Apr-91	101.17	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	8,500	3,300	7,500	63
Jul-91	102.19	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	57	520	220	61
Oct-91	101.61	N D 0.02	N D 0.01	N D 0.005	N D 0.01	N D 0.5	140	2,000	660	110
Jan-92	104.09	0.10	N D 0.0081	N D 0.0027	0.02	N D 1	7.3	230	26	85
Apr-92	106.61	N D 0.02	N D 0.01	N D 0.005	N D 0.01	N D 0.05	1.7	130	2.3	70
Jul-92	107.12	N D 0.02	0.02	N D 0.005	0.09	N D 0.05	N D 0.05	17	N D 0.05	160
Oct-92	104.55	N D 0.02	0.011	N D 0.005	N D 0.01	N D 0.05	N D 0.05	11	N D 0.05	160
Jan-93	108.27	N D 0.02	0.013	N D 0.005	0.088	N D 1.2	N D 2.5	110	N D 2.5	86
Apr-93	115.6	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.05	N D 1	2	N D 1	59
Jul-93	116.07	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.05	2.5	1.8	6.4	230
Oct-93	116.01	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	2.1	3.1	150
Jan-94	116.03	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	2.5	2.8	190
Apr-94	116.83	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	N D 1.0	N D 1.0	80
Jul-94	117.23	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	N D 1.0	1.6	180
Oct-94	111.30	N D 0.02	0.011	N D 0.005	N D 0.02	N D 0.5	N D 1	4.5	N D 1.0	360
Jan-95	112.53	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 10	660	850	1100	660
Apr-95	118.26	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 50	N D 100	1900	1000	74
Jul-95	119.51	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 2.5	N D 5	160	37	140
Oct-95	115.80	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	5.8	2.2	180
Jan-96	113.98	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 25	520	460	1,000	620
Apr-96	117.37	N D 0.02	N D 0.01	N D 0.005	0.023	N D 25	160	1,100	1,400	240
Jul-96	116.75	N D 0.01	N D 0.01	N D 0.005	ND 0.02	N D 10	ND 20	460	290	220
Oct-96	112.95	N D 0.01	N D 0.01	N D 0.005	ND 0.02	N D 0.5	1.9	20	8.0	250
Jan-97	114.78	N D 0.02	N D 0.01	N D 0.005	0.029	N D 0.5	9.4	84	88	160
Apr-97	117.60	N D 0.02	N D 0.01	N D 0.005	ND 0.02	N D 2.5	ND 5	120	8.2	370
Jul-97	117.61	N D 0.02	N D 0.01	N D 0.005	0.15	N D 2.5	ND 5	8.3	ND 5.0	240
Oct-97	114.02	N D 0.02	N D 0.01	N D 0.005	0.1	N D 2.5	ND 5	ND 5	ND 5.0	350
Jan-98	112.23	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 12	770	1800	2200	390
Apr-98	117.36	N D 0.02	N D 0.01	N D 0.005	0.077	N D 1.2	63	150	210	180
Jul-98	118.57	N D 0.02	N D 0.01	N D 0.005	0.077	N D 1.2	ND 2.5	41	5	150

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 14S										
Oct-90	98.07	3.2	2.2	0.018	5.3	N D 0.5	N D 1	1,750	N D 1	180
Jan-91	97.38	0.4	0.94	0.007	1	N D 0.5	N D 1	2,800	5,900	108
Apr-91	99.26	0.39	0.41	0.005	0.15	N D 0.5	N D 1	4,100	N D 1	84
Jul-91	101.27	0.02	0.31	0.005	0.11	N D 0.5	N D 1	31	N D 1	55
Oct-91	100.66	0.13	0.23	N D 0.005	0.05	N D 0.5	N D 1	680	N D 1	81
Jan-92	103.08	0.27	0.15	N D 0.0027	0.093	N D 1	N D 1	N D 1	N D 1	59
Apr-92	105.70	0.13	0.16	N D 0.005	0.04	N D 0.5	N D 0.5	N D 0.5	N D 0.5	56
Jul-92	106.38	0.1	0.33	N D 0.005	0.56	0.6	N D 1	N D 1	N D 1	44
Oct-92	103.72	0.16	0.54	N D 0.005	0.72	N D 1	N D 1	N D 1	N D 1	71
Jan-93	107.00	0.056	0.24	N D 0.005	0.33	N D 0.5	N D 1	N D 1	N D 1	56
Apr-93	114.80	N D 0.02	0.018	N D 0.005	0.032	N D 0.5	24	40	55	18
Jul-93	115.36	N D 0.02	0.20	N D 0.005	0.023	N D 0.5	1.3	1.2	3.8	25
Oct-93	115.42	N D 0.02	0.01	N D 0.005	0.021	N D 0.5	ND 1	2.1	3.7	25
Jan-94	115.28	N D 0.02	0.015	N D 0.005	0.022	N D 0.5	ND 1	3.2	1.4	21
Apr-94	116.06	N D 0.02	0.022	N D 0.005	N D 0.020	N D 0.5	ND 1	ND 1.0	ND 1.0	29
Jul-94	116.64	N D 0.02	0.016	N D 0.005	N D 0.020	N D 0.5	ND 1	ND 1.0	ND 1.0	15
Oct-94	110.70	0.035	0.064	N D 0.005	N D 0.020	0.53	ND 1	ND 1.0	ND 1.0	58
Feb-95	113.10	N D 0.02	0.016	N D 0.005	0.020	N D 50	ND 100	3000	690	50
Apr-95	117.50	N D 0.02	N D 0.01	N D 0.005	N D 0.020	N D 5	76	120	190	20
Jul-95	118.93	N D 0.02	N D 0.01	0.0055	N D 0.020	N D 0.5	2.8	26	12	22
Oct-95	115.25	0.022	0.046	N D 0.005	N D 0.020	N D 0.5	ND 1	2.1	2.0	35
Jan-96	113.13	N D 0.02	0.034	N D 0.005	0.024	N D 1	4.7	87	58	42
Apr-96	116.52	0.021	0.028	N D 0.005	N D 0.020	N D 2.5	54	120	110	51
Jul-96	116.04	ND 0.01	0.069	N D 0.005	N D 0.020	0.58	ND 1	20	10	37
Oct-96	112.22	0.052	0.082	N D 0.005	N D 0.020	N D 0.5	ND 1	13	2.9	61
Jan-97	113.85	0.024	0.031	N D 0.005	N D 0.020	N D 2.5	ND 5	470	ND 5	90
Apr-97	116.82	N D 0.02	0.032	0.0053	N D 0.020	0.58	2.9	91	36	45
Jul-97	117.21	N D 0.02	0.016	ND 0.005	ND 0.020	ND 5	ND 1	14	1	35
Oct-97	113.39	0.1	0.013	ND 0.005	ND 0.020	ND 0.5	ND 1	20	1.8	57
Jan-98	111.43	* N D/0.0103	0.018	ND 0.005	0.020	ND 0.5	1.1	19	5.0	50
Apr-98	116.47	N D 0.02	0.018	ND 0.005	0.023	ND 12	ND 25	1500	150.0	38
Jul-98	117.79	N D 0.02	ND 0.01	ND 0.005	ND 0.020	0.51	ND 1	18	8.4	18

* ND/10.3 = EPA method 7196/EPA Method 218.6 (Sample was analyzed for hexavalent chromium by two methods.)

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 15S										
Oct-90	97.71	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	21
Jan-91	97.10	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	4	1.6	4	13
Apr-91	99.71	ND 0.02	ND 0.01	0.011	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	28
Jul-91	100.94	ND 0.02	ND 0.01	0.014	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	17
Oct-91	100.35	ND 0.02	0.01	0.02	0.06	ND 0.5	ND 1	ND 1	ND 1	13
Jan-92	102.72	ND 0.051	ND 0.0081	0.008	0.01	ND 1	ND 1	ND 1	ND 1	15
Apr-92	105.29	ND 0.02	ND 0.01	ND 0.005	ND 0.01	ND 0.5	ND 0.5	ND 0.5	ND 0.5	4.1
Jul-92	105.95	ND 0.02	0.04	0.005	0.27	ND 0.5	ND 0.5	ND 0.5	ND 0.5	2.9
Oct-92	103.37	ND 0.02	ND 0.02	0.0073	0.047	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND 1
Jan-93	106.58	ND 0.02	0.014	0.0085	0.1	ND 0.5	ND 1	ND 1	ND 1	9.0
Apr-93	114.41	ND 0.02	0.013	ND 0.005	ND 0.02	ND 0.5	14	10	22	4.6
Jul-93	115.01	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	1.2	ND 1	2.4	2.4
Oct-93	115.07	ND 0.04	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	3.2
Jan-94	114.90	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	1.9
Apr-94	115.72	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	3.1
Jul-94	116.31	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	2.1
Oct-94	110.42	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	ND 1	ND 1	6.0
Jan-95	111.14	0.048	0.044	ND 0.005	ND 0.02	ND 1	4.0	64	27	3.7
Apr-95	117.15	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 2.5	60	82	130	2.8
Jul-95	118.61	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	2.5	18	12	5.2
Oct-95	114.45	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	1.0	ND 1	3.9
Jan-96	112.69	ND 0.02	0.012	ND 0.005	ND 0.02	ND 0.5	1.8	25	22	3.8
Apr-96	116.09	ND 0.02	0.015	ND 0.005	ND 0.02	ND 0.5	13	40	45	2.8
Jul-96	115.69	ND 0.01	0.014	ND 0.005	ND 0.02	ND 0.5	ND 1	9.7	5.4	3.2
Oct-96	111.81	ND 0.01	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	2.9	2.6	5.3
Jan-97	113.42	ND 0.02	0.01	ND 0.005	ND 0.02	ND 0.5	5.5	69	1.0	5.1
Apr-97	116.35	ND 0.02	0.01	ND 0.005	ND 0.02	ND 0.5	9.3	21	8.5	3.3
Jul-97	118.60	ND 0.02	0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	8.2	1.3	4.1
Oct-97	113.08	ND 0.02	0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	17.0	1.7	5.2
Jan-98	111.06	* ND/0.0177	0.021	ND 0.005	ND 0.02	ND 0.5	ND 1	12	3.7	5.0
Apr-98	116.05	ND 0.02	ND 0.01	ND 0.005	ND 0.02	ND 0.5	ND 1	60	7.2	3.1
Jul-98	117.47	ND 0.02	0.014	ND 0.005	ND 0.02	ND 0.5	ND 1	10	2.9	3.4

* ND/17.7 = EPA method 7196/EPA Method 218.6 (Sample was analyzed for hexavalent chromium by two methods.)

TABLE 6-1
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 16										
Apr-92	105.99	N D 0.02	N D 0.01	N D 0.005	N D 0.01	N D 0.5	0.69	1	1.6	52
Jul-92	106.7	N D 0.02	0.03	N D 0.02	0.35	N D 0.5	N D 1	N D 1	N D 1	35
Oct-92	104.07	N D 0.02	0.011	N D 0.005	0.15	N D 0.5	N D 1	N D 1	N D 1	72
Jan-93	107.3	N D 0.02	N D 0.01	N D 0.005	0.44	N D 1.2	N D 2.5	N D 2.5	N D 2.5	51
Apr-93	114.9	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 25	55	2,300	1,200	42
Jul-93	115.54	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 50	N D 100	3,100	2,000	15
Oct-93	115.51	N D 0.04	N D 0.01	N D 0.005	N D 0.02	N D 5.0	N D 10	340	N D 10	24
Jan-94	115.46	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.02	N D 20	1,000	N D 20	22
Apr-94	116.25	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 10	N D 20	820	ND 20	37
Jul-94	116.78	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 25	N D 50	1300	730	76
Oct-94	111.02	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	1.5	2.4	9.7	91
Jan-95	112.08	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	N D 1	N D 1	17
Apr-95	117.60	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 5	16	36	55	34
Jul-95	118.99	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 10	N D 20	* 540/370	N D 20	67
Oct-95	115.45	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	1.8	1.3	60
Jan-96	113.49	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	11	9.7	26
Apr-96	116.72	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	9.8	30	33	36
Jul-96	116.24	N D 0.01	N D 0.01	N D 0.005	N D 0.02	N D 0.5	N D 1	6.6	3.6	110
Oct-96	112.59	N D 0.01	N D 0.01	N D 0.005	N D 0.02	N D 5	49	130	230	73
Jan-97	114.18	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 1	4.6	23	ND 2	32
Apr-97	117.01	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 1	N D 2	7.2	2.4	31
Jul-97	117.12	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 1.2	ND 2.5	6.5	ND 2.5	30
Oct-97	113.66	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 2.5	ND 5	8.2	ND 5	53
Jan-98	111.92	N D 0.02	N D 0.01	N D 0.005	N D 0.02	N D 0.5	ND 1	12	ND 3.8	29
Apr-98	116.79	N D 0.02	N D 0.01	N D 0.005	0.023	N D 0.5	ND 1	28	2.7	29
Jul-98	118.00	N D 0.02	N D 0.01	N D 0.005	0.031	N D 0.5	ND 1	6	1.8	28

ND = Below detection limit as noted

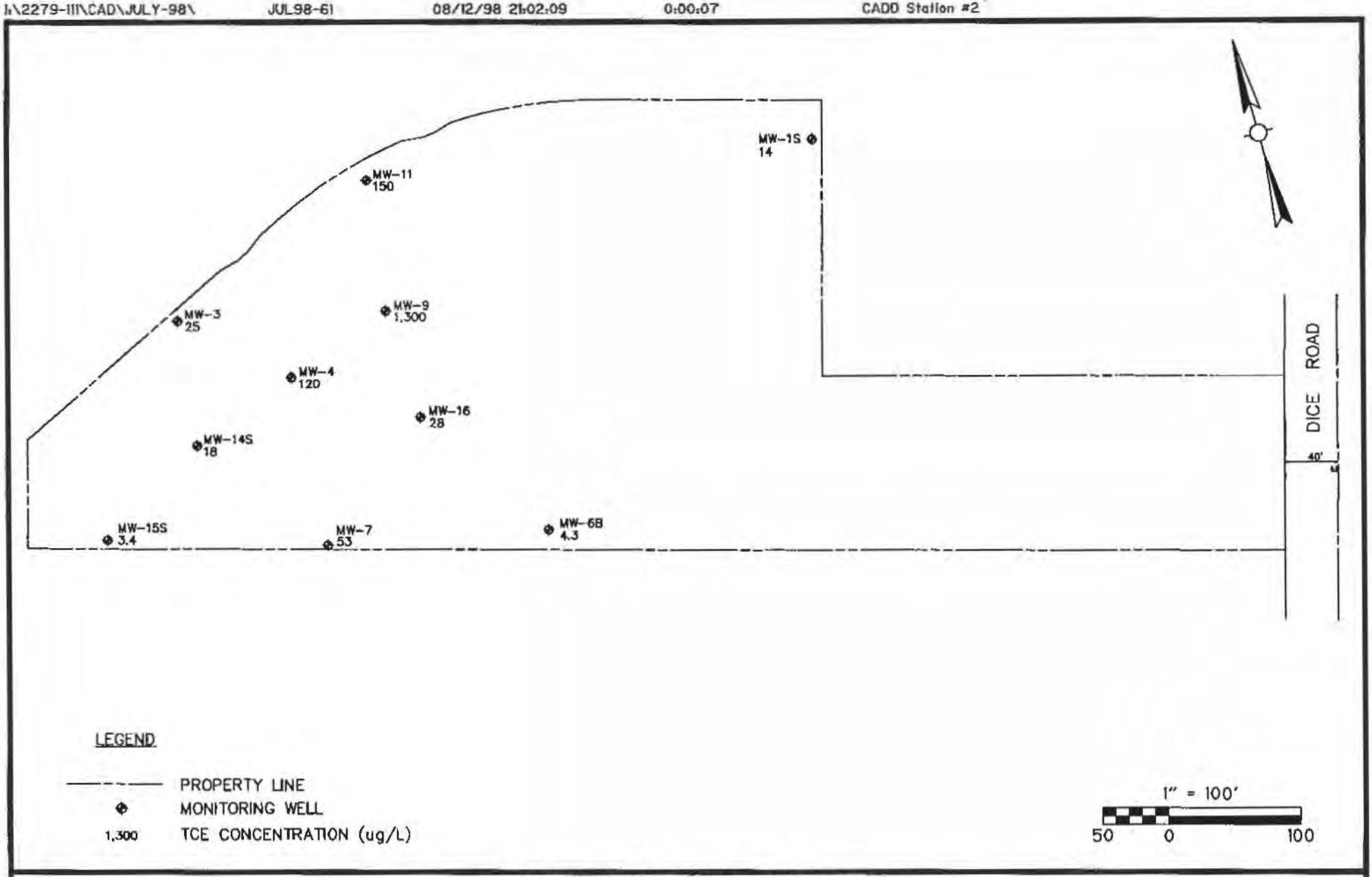
MSL = Mean Sea Level

* 540/370 = original sample/duplicate sample (both results presented because duplicate result deviation is >20%)

TABLE 6-2
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Purgeable Halogenated Organic Analytical Results
(µg/L)

Well Identification	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	1,1-Dichloro-ethene (1,1-DCE)	1,1-Dichloro-ethane (1,1-DCA)	1,2-Dichloro-ethane (1,2-DCA)	Carbon Tetrachloride (CCL4)	1,1,1-Trichloro-ethane (1,1,1-TCA)	Chloroform (CHCL3)	trans-1,2-Dichloro-ethene (trans-1,2-DCE)	Methylene Chloride (CH2CL2)
PTI- MW01S	ND <1.0	14	ND <1.0	1.7	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW01D	ND <1.0	1.9	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW03	2.2	25	3.6	2.8	ND <1.0	42	ND <1.0	36	ND <1.0	ND <1.0
PTI- MW04	ND <25	120	ND <25	28	ND <25	ND <25	ND <25	ND <25	ND <25	28
PTI- MW04A	1.2	9.2	1.8	5.8	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW06B	ND <1.0	4.3	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW06D	ND <1.0	8.1	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW07	ND <1.0	53	5.9	41	32	ND <1.0	ND <1.0	1.0	1.8	ND <1.0
PTI- MW09	30	1300	380	1200	60	ND <25	220	150	26	86
PTI- MW11	ND <2.5	150	12	29	4.2	ND <2.5	ND <2.5	5.8	ND <2.5	ND <2.5
PTI- MW14S	ND <1.0	18	5.8	5.5	12	3.7	ND <1.0	9.2	ND < 1.0	1.4
PTI- MW15S	ND < 1.0	3.4	ND <1.0	ND <1.0	8.6	ND <1.0	ND <1.0	2.6	ND <1.0	ND <1.0
PTI- MW15D	ND < 1.0	2.7	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW16	ND < 1.0	28	6.8	61	57	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
MCL	5.0	5.0	6.0	5.0	0.5	0.5	200	—	10	—
SGV GW	ND-4.8	ND-1.2	ND	ND	ND	ND	ND	—	ND	—

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area during the year 1996.



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TCE CONCENTRATIONS – SHALLOW WELLS
JULY 1998

Figure 6-1

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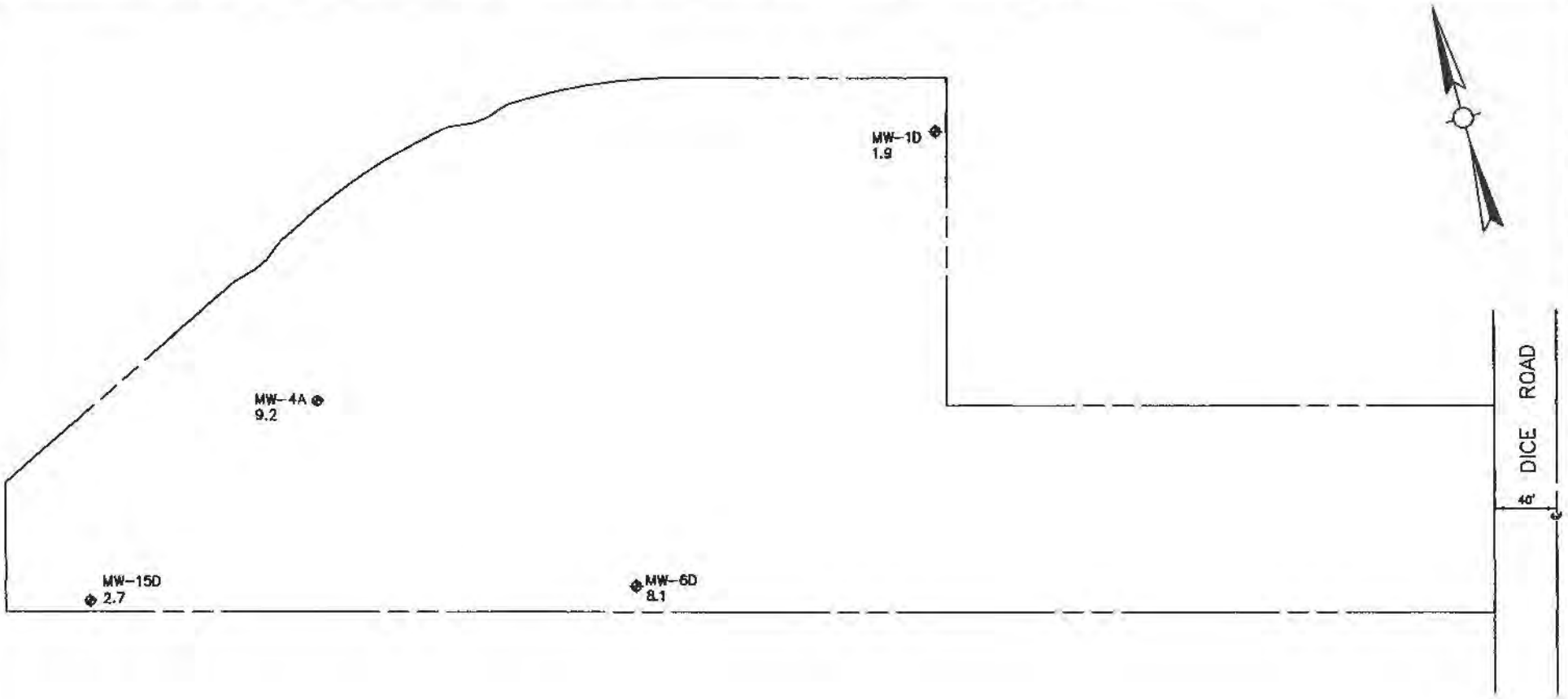

LEGEND

PROPERTY LINE

MONITORING WELL

9.2 TCE CONCENTRATION (ug/L)

1" = 100'

50 0 100

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TCE CONCENTRATIONS – DEEP WELLS
JULY 1998

Figure 6-2

A review of the analytical results contained in Table 6-1 reveals that, with minor exceptions, TCE has historically been detected in all on-site monitoring wells, including the upgradient wells. Past discussions with Department of Health Services (now Cal EPA Department of Toxic Substances Control) and Regional Water Quality Control Board staff indicate that TCE is generally recognized as a regional groundwater contaminant.

Other Halogenated Organics

During the July 1998 sampling, other purgeable halocarbon compounds were detected in most of the on-site wells at concentrations ranging from 1.0 µg/L chloroform (MW-07) to 1200 µg/L 1, 1-dichloroethane (MW-09). The compounds tetrachloroethene; 1,1-dichloroethene; 1,2-dichloroethane; carbon tetrachloride; trans-1,2-dichloroethene; and methylene chloride were also detected in several wells. The compound 1,1,1-trichloroethane was detected in one well (MW-09). Detections of these other chlorinated organic compounds are assumed to be related to the TCE plume.

6.2 Purgeable Aromatic Organic Compounds

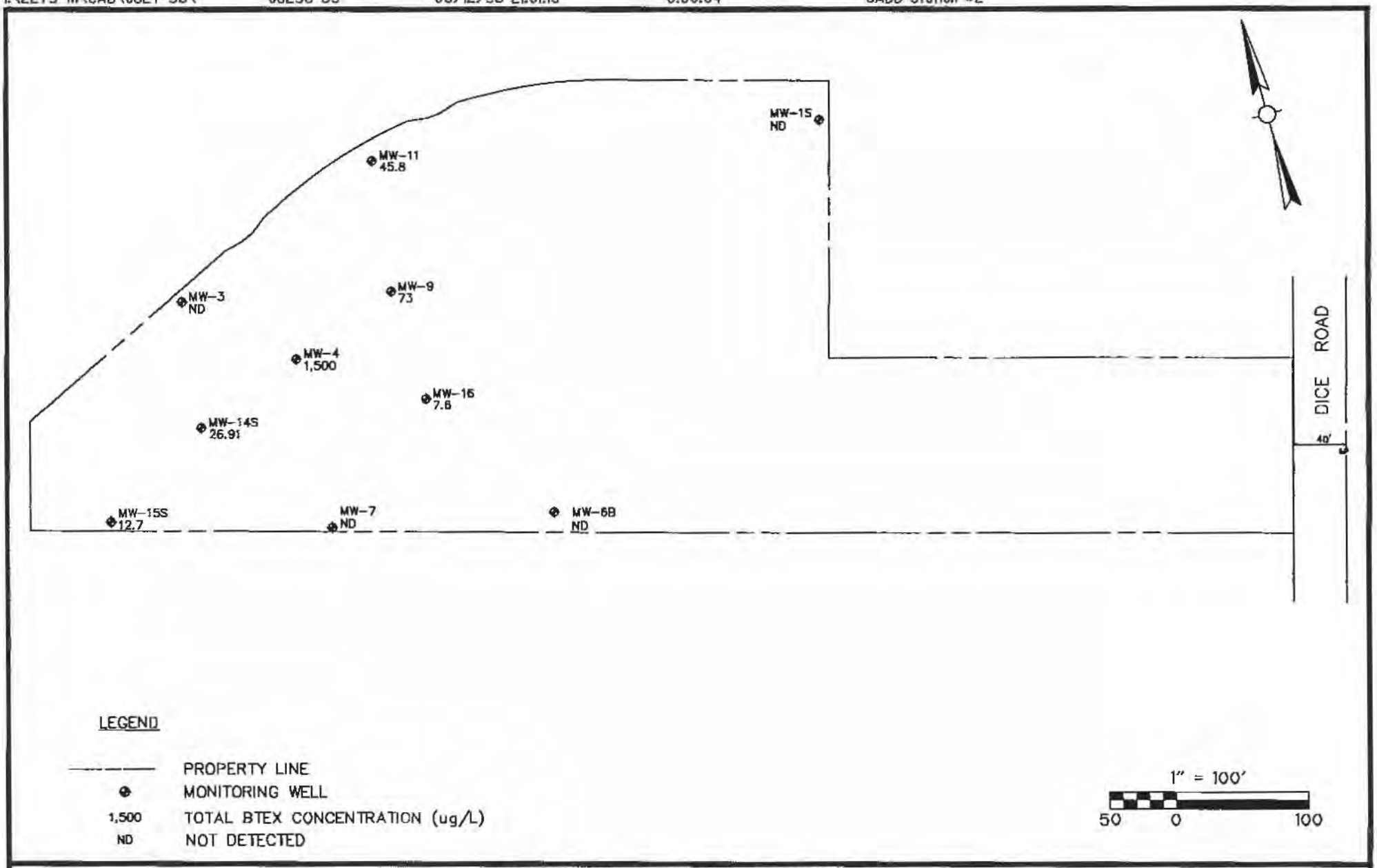
According to PTI personnel, organic chemicals have not historically been used on-site in any of the production processes. Two 10,000 gallon underground storage tanks (diesel and gasoline), however, were located in the approximate center of the facility, due east of the drum wash area. During tank removal operations in July 1989, petroleum hydrocarbon contamination was discovered in the tank excavation. The RFI report indicated that petroleum hydrocarbon contamination was not detected at depths below 30 feet near the former tank locations. Although they have not been used on-site, purgeable aromatic compounds have been historically detected in groundwater underlying the facility. The primary organic compounds of concern are toluene, ethylbenzene and total xylenes, which vary in both concentration and lateral extent. The RFI report indicated that these compounds appeared to be migrating onto the subject property from the property to the north. According to Los Angeles County Department of Public Works files, leaks from tanks containing purgeable aromatic compounds with subsequent groundwater contamination are known to have occurred at the property to the north of PTI.

Purgeable aromatic compound results for July 1998 are presented in Table 6-3. Concentrations of total aromatic compounds for the shallow wells are illustrated on Figure 6-3. Historic sampling results indicate that purgeable aromatic contamination originated off-site to the north and has migrated onto the subject property. During previous sampling events, elevated concentrations of toluene, ethylbenzene and xylenes were detected in MW-11 and MW-3 along the northern perimeter of the property. Since approximately July 1991, elevated concentrations of these compounds have been detected in well MW-04, indicating that the plume may be migrating downgradient. In addition, since January 1992 high concentrations have also been detected in well MW-09. The results of the July 1998 sampling show that the highest concentrations of total purgeable aromatics (BTEX) were detected in MW-14S (Figure 6-3), which had an ethylbenzene concentration of 1,500 µg/L. The second highest total BTEX concentration was detected in well MW-11 (423 µg/L).

TABLE 6-3
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Purgeable Aromatic Organic Analytical Results
(µg/L)

Well Identification	Benzene	Toluene	Ethylbenzene	Xylenes (Total)
PTI- MW01S	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI- MW01D	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI- MW03	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI- MW04	ND <12	ND <25	**1,200**	**300**
PTI- MW04A	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI- MW06B	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI- MW06D	ND <0.50	ND <1.0	**1.2**	**1.0**
PTI- MW07	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI- MW09	ND <12	ND <25	**73**	ND <25
PTI- MW11	ND <1.2	ND <2.5	**41**	**4.8**
PTI- MW14S	**0.51**	ND <1.0	**18**	**8.4**
PTI- MW15S	ND <0.50	ND <1.0	**9.8**	**2.9**
PTI- MW15D	ND <0.50	ND <1.0	**7.8**	**2.4**
PTI- MW16	ND <0.50	ND <1.0	**5.8**	**1.8**
MCL	**1**	**150**	**700**	**1,750**
SGV GW	ND	ND	ND	ND

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area during the year 1996.



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TOTAL BTEX CONCENTRATIONS – SHALLOW WELLS
JULY 1998

Figure 6-3

Benzene

During the July 1998 sampling, benzene was detected in only one well (MW-14S) at a concentration of 0.51 µg/L. During the April 1998 sampling event, benzene was detected in well MW-04 at a concentration of 2.9 µg/L. Historical evidence indicates that benzene is not a contaminant of concern for the facility.

Toluene

Toluene was not detected in any of the monitoring wells during the July 1998 sampling event. During the April 1998 sampling event, toluene was detected in three wells at concentrations ranging from 1 µg/L to 63 µg/L.

Significant toluene concentrations were detected during July 1990 to July 1991 (MW-11), April 1991 to January 1992 (MW-04), April 1992 to April 1993 (MW-09), and April 1994 to January 1995 (MW-09). Concentrations were also detected at location MW-04 during January 1993. Elevated ethylbenzene and total xylene concentrations are generally associated with elevated toluene concentrations.

Ethylbenzene

During the July 1998 sampling round, ethylbenzene was detected in 8 of the 14 wells at generally lower concentrations than in April 1998, with the exception of wells MW-4 and MW-9, which showed increased concentrations. Well MW-04 had the highest concentration of 1,200 µg/L, a significant increase from 320 µg/L reported in April 1998. Well MW-09 had the second highest concentration of 73 µg/L, an increase from 23 µg/L detected in April 1998. Well MW-11 had the third highest concentration of 41 µg/L, a decrease from 150 µg/L detected in April 1998. The remaining wells with ethylbenzene detections had relatively low concentrations ranging from 1.2 µg/L in MW-06D to 18 µg/L in MW-14S.

Total Xylenes

During the July 1998 sampling round, total xylenes were detected in 7 of the 14 wells at generally lower concentrations than in April 1998, with the exception of well MW-04 which showed an increase in concentration. The highest concentration of 300 µg/L was detected in well MW-04, a significant increase from nondetect concentration reported in April 1998. Well MW-14S had the second highest concentration of 8.4 µg/L, a decrease from 150 µg/L detected in April 1998. The remaining wells with xylene detections had relatively low concentrations ranging from 1.0 µg/L in MW-06D to 4.8 µg/L in MW-11.

6.3 Inorganic and Miscellaneous Parameters

Table 6-4 shows the analytical results for inorganic parameters (cadmium, total and hexavalent chromium, copper, and pH) during the July 1998 sampling event.

Hexavalent Chromium (Cr^{+6})

During the July 1998 sampling, hexavalent chromium was detected in one on-site well. Well MW-04 had a concentration of 16.3 mg/L, an increase from the April 1998 result (7.2 mg/L). Figure 6-4 shows the concentration of hexavalent chromium detected in the shallow wells during the July 1998 sampling. The water purged from MW-04 has typically been bright yellow in color since CDM began sampling the wells on a quarterly basis in January 1989. During the July 1998 sampling round, the color of water from MW-04 was again noted as yellow. Figure 6-5 shows the concentrations of hexavalent chromium and groundwater elevations in MW-04 over time.

The concentrations of hexavalent chromium at MW-04 generally decreased from July 1989 (120 mg/L) to April 1993 (1.8 mg/L), while groundwater elevations increased. Since April 1993, hexavalent chromium concentrations have fluctuated up and down while groundwater elevations have remained fairly constant. Historically, hexavalent chromium has been detected in two wells other than MW-04, although the highest concentration has always been detected at MW-04. At MW-14S from October 1990 to January 1993, hexavalent chromium concentrations generally decreased, with analytical non-detections reported for the last six sampling rounds previous to October 1994 and seven of the 13 sampling rounds since then. In MW-09, hexavalent chromium concentrations decreased between October 1989 and January 1991 and except for a trace amount detected in October 1991, hexavalent chromium concentrations have been below detection limits ever since. A trace level (i.e., approximately 2.5 times the method detection limit) of hexavalent chromium was detected in MW-15S for the first time during the January 1995 sampling event. Because hexavalent chromium was not detected in well MW-15S during subsequent sampling events, nor during 17 sampling events previous to January 1995, the low concentration detected during January 1995 is probably anomalous.

Total Chromium (Cr[T])

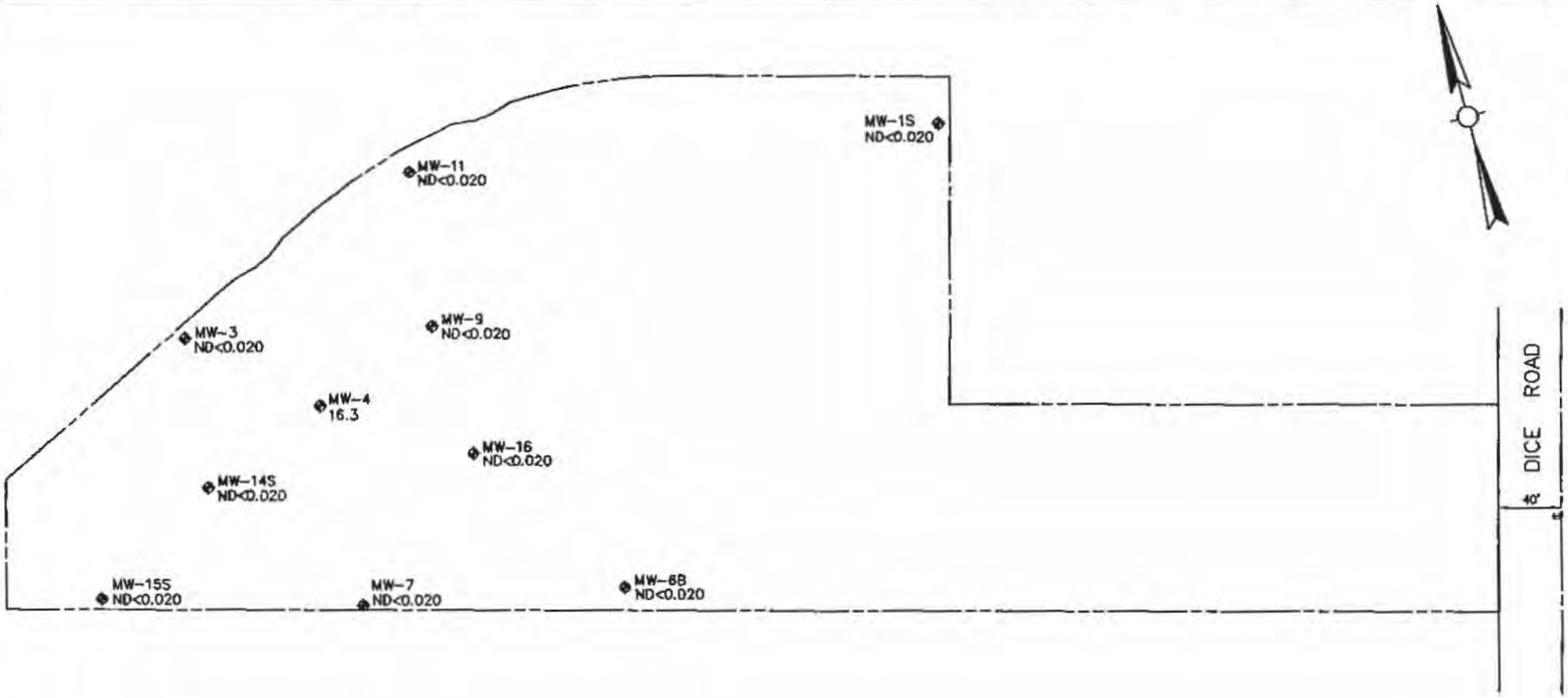
Total chromium was detected above the detection limit in three monitoring wells during the July 1998 sampling event. The highest concentration detected was 18.9 mg/L in MW-04. Wells MW-04A and MW-15S had concentrations of 0.010 mg/L and 0.014 mg/L, respectively. Figure 6-6 shows the concentrations of total chromium detected in shallow monitoring wells during July 1998. Figure 6-7 shows the concentrations of total chromium and corresponding groundwater elevations in MW-04 over time.

Comparison of historical total chromium data with present data (Table 6-1) indicates that total chromium concentrations, like those of hexavalent chromium, generally decreased from January 1989 to April 1993, and have fluctuated up and down since April 1993. Historically, the highest total chromium concentrations have been detected in MW-04. Sporadic detections of total chromium close to the detection limit have occurred historically in nearly all shallow wells on site.

TABLE 6-4
PHIBRO-TECH, INC.
July 1998 Quarterly Monitoring Well Sampling
Inorganic Analytical Results
(mg/L)

Well Identification	Cadmium	Chromium (Hexavalent)	Chromium (Total)	Copper	pH
	EPA- 6010-A	EPA- 7196	EPA- 6010-A	EPA- 6010-A	EPA- 9040
PTI- MW01S	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**6.6**
PTI- MW01D	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**7.5**
PTI- MW03	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**7.3**
PTI- MW04	**0.32**	**16.3**	**18.9**	ND < 0.020	**7.0**
PTI- MW04A	ND < 0.0050	ND < 0.020	**0.010**	ND < 0.020	**7.5**
PTI- MW06B	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**7.4**
PTI- MW06D	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**7.4**
PTI- MW07	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**6.7**
PTI- MW09	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**6.7**
PTI- MW11	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**7.2**
PTI- MW14S	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**7.3**
PTI- MW15S	ND < 0.0050	ND < 0.020	**0.014**	ND < 0.020	**7.5**
PTI- MW15D	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**7.6**
PTI- MW16	ND < 0.0050	ND < 0.020	ND < 0.010	**0.031**	**7.2**
MCL	**0.005**	—	**0.05**	**1**	—
SGV GW	ND	ND	ND	ND-0.467	**7.9-8.5**

ND = Analytical parameter not detected.
NA = Parameter not analyzed
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area in the year 1996.



LEGEND

———	PROPERTY LINE
◆	MONITORING WELL
16.3	Cr^{+6} CONCENTRATION–METHOD 7196 (mg/L)
ND	NOT DETECTED

1" = 100'

50 0 100

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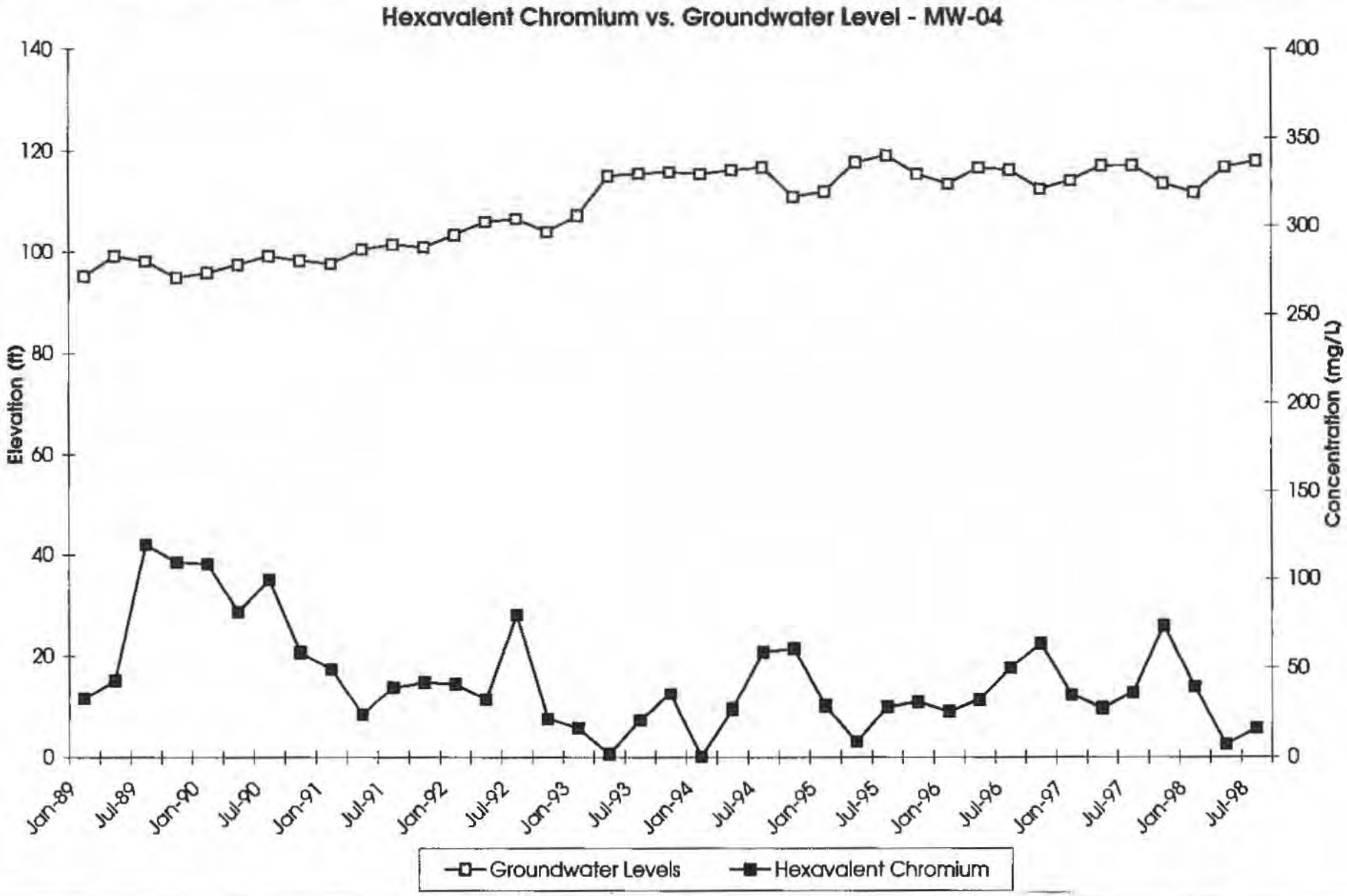
HEXAVALENT CHROMIUM CONCENTRATIONS – SHALLOW WELLS
JULY 1998

Figure 6-4



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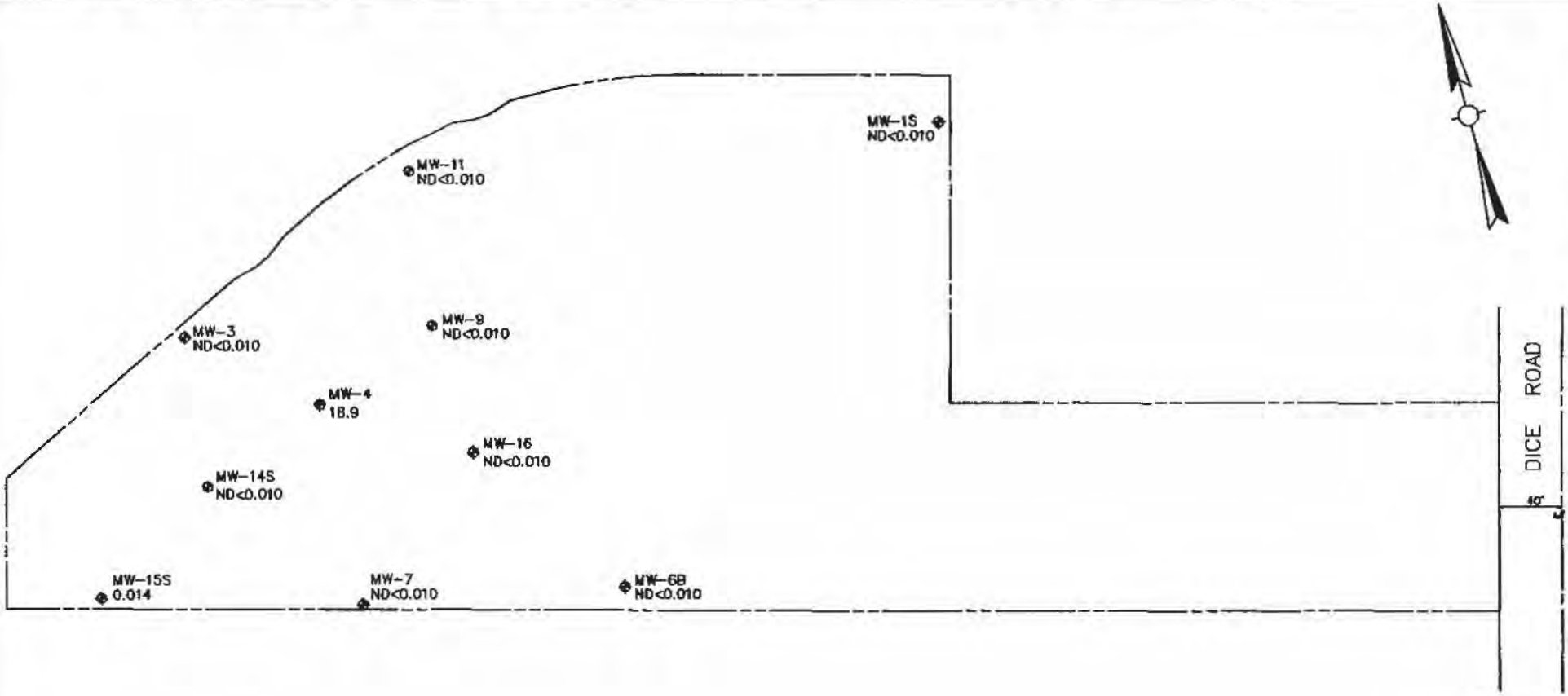
HEXAVALENT CHROMUIM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW–04
JANUARY 1989 – JULY 1998

Figure 6-5



LEGEND

———	PROPERTY LINE
◆	MONITORING WELL
18.9	CADMIUM CONCENTRATION (mg/L)
ND	NOT DETECTED

1" = 100'

50 0 100

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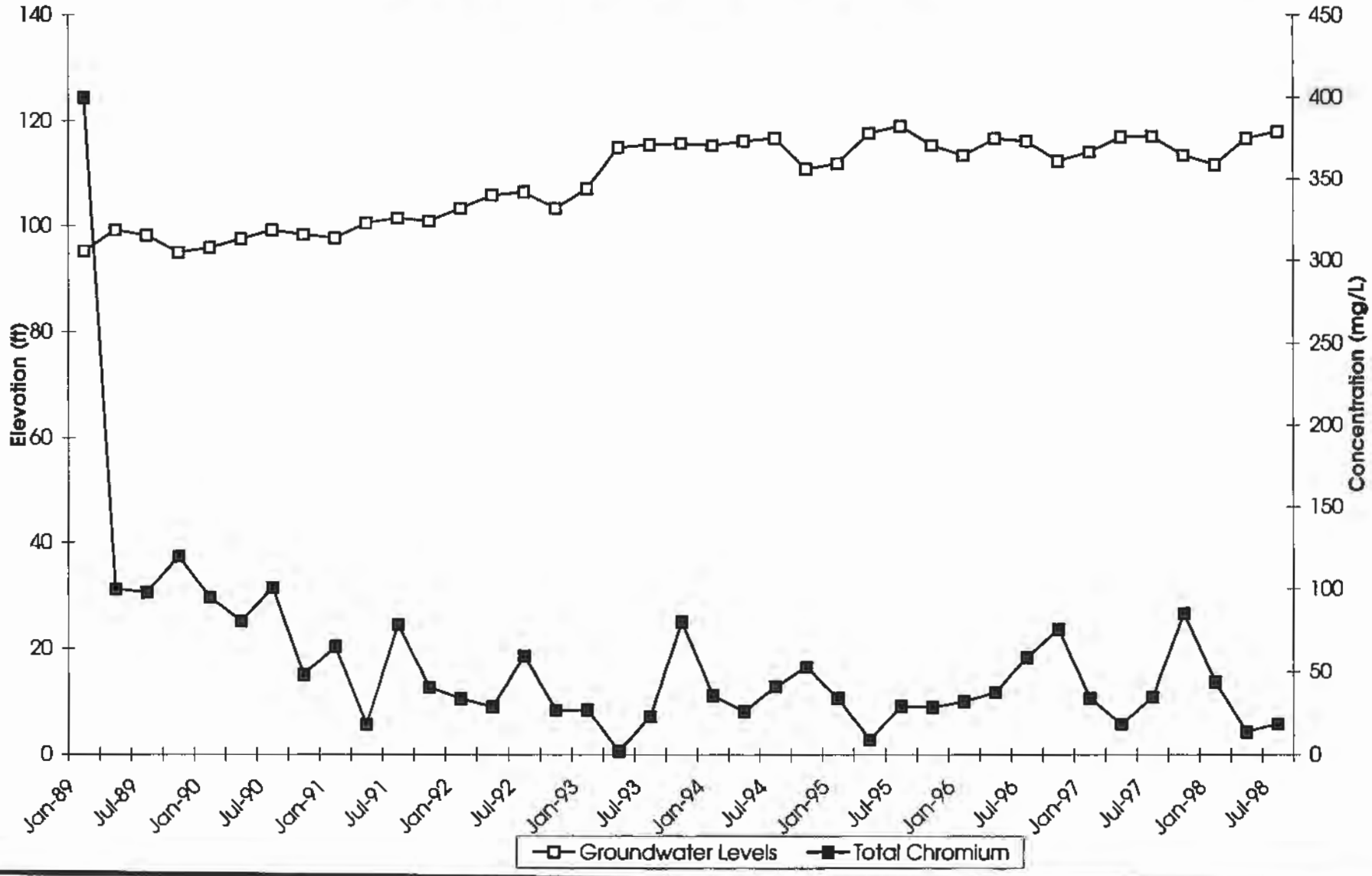
TOTAL CHROMIUM CONCENTRATIONS – SHALLOW WELLS
JULY 1998

Figure 6-6



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TOTAL CHROMUIM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW–04
JANUARY 1989 – JULY 1998

Figure 6-7

Cadmium (Cd)

During the July 1998 sampling event, cadmium was detected in one on-site well. Well MW-04 had a concentration of 0.32 mg/L, a slight decrease from April 1998 (0.43 mg/L). Previous concentrations in MW-04 have ranged from 0.028 mg/L in January 1989 to 0.86 mg/L in July 1992. Figure 6-8 shows the cadmium concentrations detected in the on-site wells during July 1998. Figure 6-9 shows the concentrations of cadmium and corresponding groundwater elevations in MW-04 over time. As groundwater elevations have generally increased since January 1989, cadmium concentrations have also generally increased. As shown on the figure, cadmium concentrations have fluctuated considerably (i.e., from non-detectable at a detection limit of 0.005 mg/L during April 1993 to 0.86 mg/L during July 1992) since April 1990. Cadmium concentrations have consistently declined since January 1998.

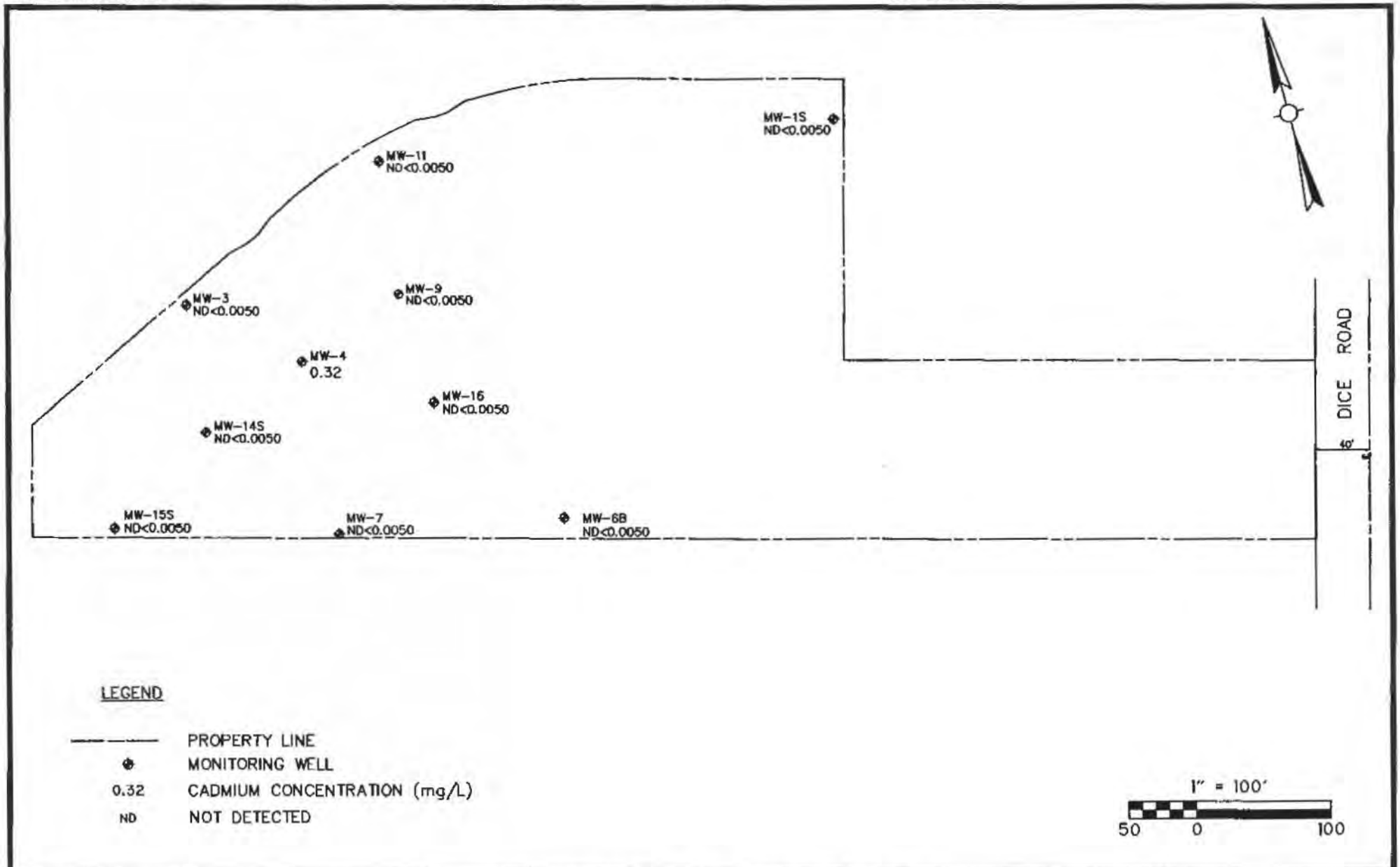
Cadmium has been detected historically only in well MW-04, with the exceptions of 0.01 mg/L in MW-01 during July 1989, 0.005 to 0.018 mg/L in MW-14S during October 1990 through July 1991, 0.0055 mg/L in MW-14S during July 1995, and in MW-15S at low concentrations close to the detection limit from April 1991 to January 1993. Detected concentrations in MW-15S have ranged from 0.005 mg/L in July 1992 to 0.02 mg/L during October 1991.

Copper (Cu)

Copper was detected at one location during the July 1998 sampling event (0.031 mg/L at MW-16). During the April 1998 event, copper concentrations up to 0.077 mg/kg were detected in four on-site wells (MW-01D, MW-11, and MW-14S). Historically, with the exception of well MW-14S, elevated concentrations of copper above the MCL of 1.0 mg/L have not been detected in on-site monitoring wells.

pH

Groundwater samples from all wells were measured for pH in the field during purging activities and also by the analytical laboratory on the samples submitted for analysis. Field pH measurements were recorded in the field log book during well purging. In July 1998, the field measurements of pH generally correlated with the values shown in Table 6-4, which range from 6.6 to 7.6.



PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

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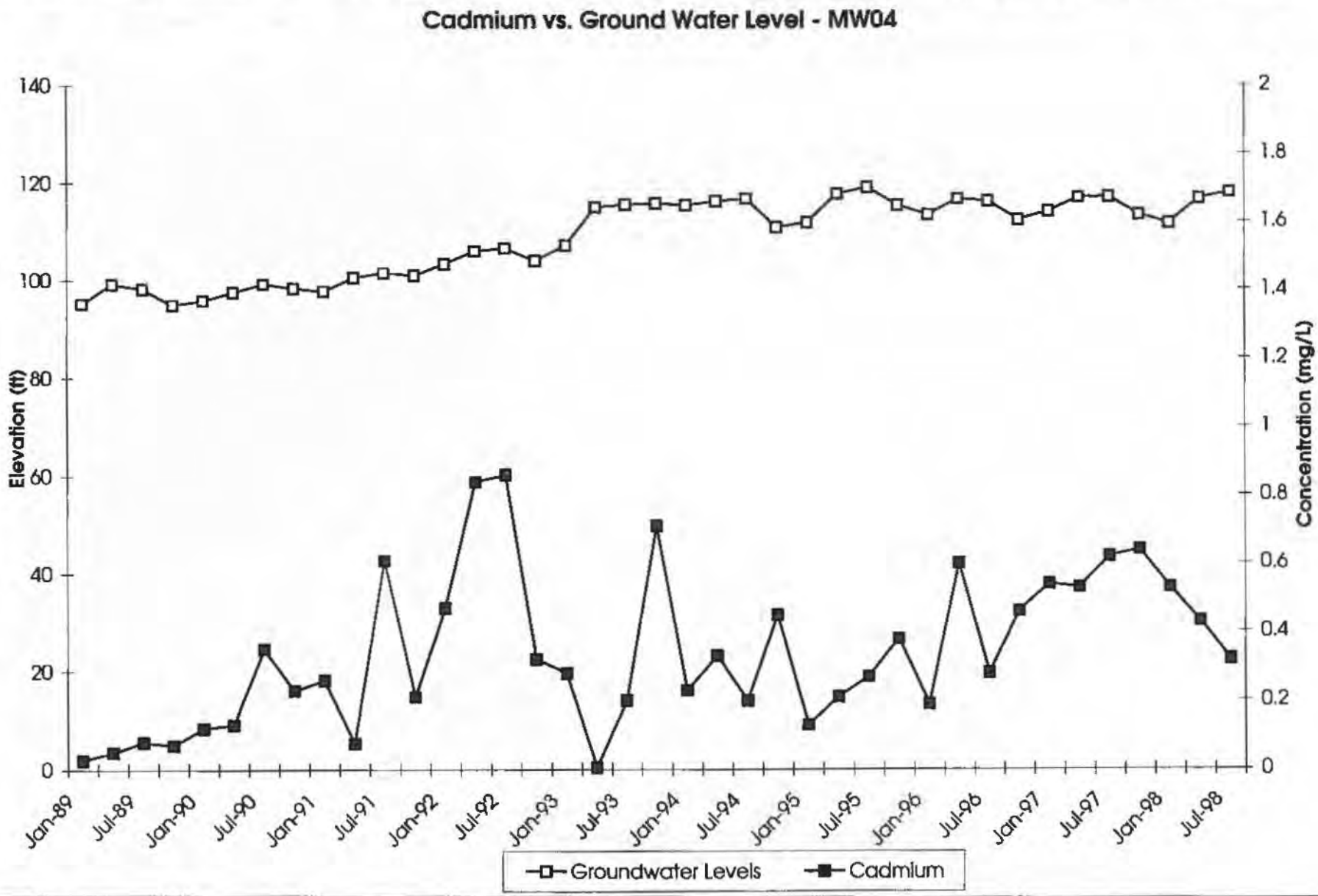
CADMIUM CONCENTRATIONS – SHALLOW WELLS
JULY 1998

Figure 6-8



PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

CADMIUM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW–04
JANUARY 1989 – JULY 1998

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Figure 6-9

Section 7
Statistical Evaluation

The following sections contain a statistical treatment of the monitoring data designed to determine if onsite wells have been impacted by metals, BTEX compounds (benzene, toluene, ethylbenzene, xylenes) or TCE (trichloroethene). The procedures used are based on the recommendations provided in the 1989 EPA Guidance document, *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities - Interim Final Guidance* and in the 1992 Addendum document. In some instances, methods which have not been recommended in the documents cited above were used. However, unrecommended techniques were only used to supplement the recommended procedures. When statistical methods outlined in the 1989 guidance document were superseded by the 1992 Addendum, the more recent recommendations were followed.

7.1 Determination of Background Upper Tolerance Limit

Overview

The upper tolerance limit (UTL) is a method that is typically used in compliance monitoring to compare downgradient wells to established maximum contaminant levels (MCLs) or alternate contaminant levels (ACLs). In short, the UTL represents the upper end of the tolerance interval, which is calculated at a specified confidence level and coverage. For instance, a UTL with 95 percent coverage and a 95 percent confidence level represents a value which, with 95 percent confidence, will be exceeded less than 5 percent of the time.

In the present evaluation, we have calculated UTLs for the background well (MW-1S) and compared this value to each individual downgradient analytical result using a confidence level and coverage of 95 percent. When onsite wells exceed the background UTL consistently, it suggests that a significant difference from background may exist. While this is not a recommended technique for detection monitoring, we have applied background UTLs as a screening tool and as a supplement to the more rigorous statistical comparisons that follow.

Methods

Inherent in the calculation of a parametric UTL is the assumption of a normal (or log normal) data distribution. One of the tests for normality recommended in the 1992 Addendum to the EPA guidance document is the probability plot. When a data set is normally distributed, the corresponding probability plot is linear. However, for the background well, the analyses have a high percentage of non-detects for most parameters. Therefore, the probability plots appear to be non-linear (see Appendix E-3). Fortunately, several methods are available to adjust the mean and standard deviation (used in the calculation of the UTL) based on various treatment of non-detects that allow the use of a parametric UTL. In a parametric UTL, the magnitude of the analyses are considered, while in a nonparametric analysis, the data is ranked from highest to lowest and the UTL is calculated from the ranks. The choice of method depends on the percentage of non-detects in the population and on comparison of special probability plots designed to test the assumptions built into each model. Parametric methods for determination of the UTL are described below. When the percentage of non-detects is above 90 percent, the UTL is calculated using a nonparametric method employing the Poisson model. In the Poisson model, detected values are treated as "rare events," such that the probability of occurrence is low, but constant. The model

takes into account both the frequency of occurrence of detected values as well as the magnitude. Since the Poisson model is nonparametric, a normal or log normal data distribution is not required.

When the frequency of detect is greater than 10 percent and data are normally or log normally distributed, either the Atchison or Cohen adjustment is recommended. In the Atchison method, non-detects are assumed to equal zero, and therefore are not considered in the data distribution. In the Cohen adjustment, non-detects are assumed to have finite values between zero and the detection limit. Experience at EPA and USGS (EPA 1992) have shown that, in general, when the frequency of detect (FOD) is between 10 and 50 percent, Atchison's method is more valid; while between 50 and 90 percent FOD, Cohen's method is more valid. However, this is only a rule of thumb that should be verified periodically using the detects-only and censored probability plot method described above.

Results

The frequencies of detection for each parameter in the background well (MW-1S) is provided in Table 7-1 of the October 1997 report. For hexavalent chromium, cadmium, and benzene, the FOD was less than 10 percent and the Poisson nonparametric method was used to calculate the UTL. Total chromium, copper, toluene, ethylbenzene, and total xylenes analyses were all between 10 and 50 percent FOD, suggesting that the Atchison adjustment should be employed before calculating the UTL. For trichloroethene (TCE), the data were log normally distributed (see Appendices E-2 and E-3 of the October 1997 report) and the FOD was 100 percent; therefore, no adjustment was required, and the UTL was calculated directly.

The results of the UTL calculations and the comparison with each onsite well are presented in Table 7-2. Based on the number of analyses above the UTL for each onsite well, MW-3, MW-4, MW-7, MW-9, and MW-11 appear to differ from background with respect to the BTEX compounds. MW-4, MW-9, and MW-14S also appear to differ from background with respect to total chromium and copper. Note that the comparison of background UTLs to onsite wells described above is not definitive and will only be used in conjunction with the more in-depth statistical approaches that follow.

7.2 Comparison of Background and Onsite Wells

Overview

The recommended method for comparing onsite wells to background is the analysis of variance (ANOVA). There are two types of ANOVA — parametric and nonparametric. In order to use the parametric ANOVA, the data set must be normally or log normally distributed and the group variances must be equal. For the nonparametric approach, neither normality or equal variances are required, however, slightly larger datasets are needed to use a nonparametric method compared to the parametric ANOVA. The minimum number of analyses for the nonparametric test is 9, while for the parametric test, only 6 are required (EPA 1989).

The first assumption (normal or log normal distribution) should be tested using either the Shapiro-Wilk or probability plot method when the sample size is 50 or less. In general, the Shapiro-Wilk test is much more stringent than the probability plot since the method tends to focus on the "tails" of the

Table 7-1
Percent of Total Samples in Shallow Wells Reported Above the Detection Limit
Quarterly Data: January 1989 to July 1998 at Philbro-Tech, Inc.

Parameter	MW-1S	MW-3	MW-4	MW-6B	MW-7	MW-9	MW-11	MW-14S	MW-15S	MW-16
Number Samples (n)	39	39	39	35	39	38	39	31	32	26
Metals (mg/L) (%)										
Hexavalent chromium	2.6	2.6	100.0	0	2.6	20.5	2.6	48.4	3.1	0
Total chromium	12.8	7.7	97.4	31.4	23.1	33.3	12.8	83.9	34.4	7.7
Cadmium	2.6	0	97.4	0	2.6	2.6	0	19.3	21.9	0
Copper	25.6	12.8	33.3	5.7	38.5	10.3	25.6	54.8	15.6	19.2
Aromatics (µg/L) (%)										
Benzene	2.6	12.8	18.0	0	20.5	5.1	0	16.1	0	0
Toluene	10.5	18.4	39.5	41.2	15.8	42.1	44.7	23.3	32.3	24.0
Ethylbenzene	30.8	51.3	84.6	42.9	46.2	71.8	89.7	74.2	53.1	80.8
Total xylenes	35.9	46.2	84.6	48.6	35.9	61.5	74.4	61.3	53.1	57.7
Halocarbons (µg/L) (%)										
Trichloroethene	100.0	97.4	92.3	100.0	100.0	92.3	94.9	100.0	96.9	100.0

% = Percent detected

Table 7-2
Definition of Upper Tolerance Levels in Background Shallow Wells
Quarterly Data: January 1989 to July 1998 at Philbro-Tech, Inc.

Parameter	% Detected in Bkgd [1]	Tolerance Limit Method	Upper Tolerance Limit [2]	Upper Tolerance Limit Exceeded								
				MW-3 32 [3]	MW-4 38	MW-6B 34	MW-7 38	MW-9 38	MW-11 38	MW-14S 30	MW-15S 31	MW-16 25
Metals (mg/L)												
Hexavalent chromium	2.6	P	0.24	1	39 [4]	–	–	5	–	4	–	–
Total chromium	12.8	A	0.048	2	39 (1)	1	2	10	–	14 (1)	–	–
Cadmium	2.6	P	0.16	–	30	–	–	–	–	–	–	–
Copper	25.6	A	0.04	4 (1)	10 (3)	3 (1)	10 (2)	3 (1)	7 (1)	10	4	3
Aromatics (µg/L)												
Benzene	2.6	P	1.33	9 (7) [5]	25 (22)	1 (1)	5 (4)	26 (24)	16 (16)	4 (4)	1 (1)	9 (9)
Toluene	10.5	A	1.47	14 (7)	30 (15)	12 (1)	9 (6)	29 (13)	29 (12)	7 (2)	9	15 (10)
Ethylbenzene	30.8	A	1.97	16 (3)	34 (2)	14 (1)	16 (4)	31 (4)	36 (2)	22	15	21 (2)
Total xylenes	35.9	A	7.39	10 (3)	34 (3)	7	4 (1)	26 (3)	23 (2)	10	7	12 (4)
Halocarbons (µg/L)												
Trichloroethene	100.0	T	17.85	30 (1)	39 (3)	10	38	38 (3)	37	30	2	24

1 MW-1S is background shallow well, n = 39
2 In ppm or ppb, as noted for groups
3 Number of samples collected at corresponding well
4 Number of samples that exceed upper tolerance level at corresponding well
5 (6) number of samples exceeding limit that are reported as ND
– = None of samples exceeded the upper tolerance limit
P = Poisson
A = Atchison adjusted
T = Unadjusted limit

distribution. The Lillifors, while not recommended in the Addendum, was suggested in the Interim Final Guidance (EPA 1989) and has been included for comparative purposes.

The test for equal group variances suggested in the Addendum to the Interim Final Guidance (EPA 1992) is the box plot. In a box plot, the extent of each box represent the 25th and 75th percentiles of the data set. Therefore, a long box tends to represent a larger variance than a short box. EPA (1992) recommends using a nonparametric ANOVA if the length of the largest box is equal to or greater than three times that of the smallest box. Another suggested criteria for a parametric ANOVA is a combined FOD, for both the background and the onsite well under consideration, of greater than 50 percent.

Methods

Normality tests were performed only for TCE, since for the other parameters, the combined FOD was <50 percent, precluding the use of the parametric ANOVA method. Results of the probability plot, and Shapiro-Wilk tests are presented in the October 1997 report in Table 7-3, while the raw data are in Appendices E-2 and E-3, respectively. Due to the stringent nature of the Shapiro-Wilk test, less weight was given to this test than the probability plots when conflicting results were obtained. Based on Table 7-3 of the October 1997 report, TCE data are log normal in all wells except MW-3, MW-6B, and MW-11. The log normal data distribution is typical of environmental datasets where various degrees of dilution have occurred. The lack or normality or log normality precluded the use of a parametric ANOVA for wells MW-3 MW-4, and MW-9.

In order to test the equal group variances assumption, box plots were constructed for TCE in each well (see Appendix E-4 of the October 1997 report). The results indicate that the background box is less than ⅓ the length of the box for well MW-6B, indicating that this well cannot be compared to background using a parametric ANOVA. However, all other wells met the equal variance requirement.

A summary of the ANOVA method used is as follows:

- MW-4, MW-7, MW-11, MW-14S, MW-15S, and MW-16 for TCE — parametric ANOVA using ½ D.L. for non-detects
- All other parameters and wells — Nonparametric, Kruskal Wallis Mann Whitney U Test

Note that ½ D.L. was used when the FOD was greater than 85 percent in a single well.

Results

The results of the nonparametric and parametric ANOVA tests are included in Appendices E-2 and E-3, respectively, while a summary is provided in Table 7-3. An " R" indicates that the null hypothesis was rejected, or that the two wells are not the same, while an "A" indicates the null hypothesis was accepted. In general, the results are similar to the UTL comparisons; except well MW-16 appears to differ from background with respect to the BTEX compounds. The results for TCE were obtained using both the normal and log normal assumptions for comparative purposes. The results indicate that, regardless of the data distribution, only well MW-6B was the same as background with respect to TCE. Since last quarter, well MW-14S is no longer statistically equivalent to background with respect to total xylenes (see Table 7-3).

Table 7-3
Comparison of Background and Onsite Shallow Wells
Quarterly Data: January 1989 to July 1998 at Phibro-Tech, Inc.

Parameter	*MW-3*	*MW-4*	*MW-6B*	*MW-7*	*MW-9*	*MW-11*	*MW-14S*	*MW-15S*	*MW-16*
Metals (mg/L)									
Hexavalent chromium [1]	A	R	A	A	A	A	R	A	A
Total chromium [1]	A	R	R	A	R	A	R	A	A
Cadmium [1]	A	R	A	A	A	A	A	A	A
Copper [1]	A	A	A	A	A	A	R	A	A
Aromatics (µg/L)									
Benzene [1]	R	R	A	R	R	R	R	A	R
Toluene [1]	R	R	R	R	R	R	R	A	R
Ethylbenzene [1]	R	R	A	R	R	R	R	R	R
Total xylenes [1]	R	R	A	A	R	R	R	A	R
Halocarbons (µg/L)									
Trichloroethene [2]	R [3]	R [4]/R [5]	A [3]	R [3]	R/R	R [3]	R/R	R/R	R/R

[1] Background to onsite comparison by Mann Whitney U Method, using D.L. for ND, at 95 percent confidence level
[2] Background to onsite comparison by one way ANOVA Method using ½ D.L. for ND
[3] Nonparametric comparison used for TCE
[4] Normal Distribution used in comparison
[5] Log normal Distribution used in comparison
A Null Hypothesis, that means are equal, is accepted
R Null Hypothesis, that means are equal, is rejected
R/R Null Hypothesis, rejected using parametric (top letter) and nonparametric (bottom letter) tests

Section 8
Assessment of Quarterly Groundwater Monitoring Program Status

In the October 1990 groundwater monitoring report, changes in the quarterly groundwater sampling program were proposed. These changes were first implemented during the April 1991 sampling event and included reducing the number of wells sampled and parameters analyzed in each well. The current groundwater sampling program will only be used as an interim groundwater sampling program, until a remediation alternative from the Corrective Measures Study (CMS) has been selected by EPA.

The analytical parameters for the July 1998 quarterly monitoring were as follows:

Wells	*Purgeable Halogenated/ Aromatic Organics (EPA 8260)*	*Chromium, Cadmium, Copper*	*Hexavalent Chromium*	*pH*
MW-01S, MW-01D	X	X	X	X
MW-03, MW-04A	X	X	X	X
MW-11 MW-06B	X	X	X	X
MW-06D, MW-07	X	X	X	X
MW-09, MW-04	X	X	X	X
MW-14S, MW-15S	X	X	X	X
MW-15D, MW-16	X	X	X	X

Beginning with the January 1997 sampling event, EPA Method 8010/8020 was replaced with EPA Method 8260. This change was requested by the analytical laboratory, which no longer performs 8010/8020 analysis. Methyl tertiary butyl ether (MTBE) analysis was performed once, in January 1997. Since there were no detections of MTBE in any of the groundwater samples, this analysis was discontinued.

Statistical analysis has been conducted annually. Beginning with the October 1993 sampling event, statistical analysis has been performed on a quarterly basis, as requested by DTSC.

The proposed October 1998 quarterly monitoring includes sampling the 14 wells for purgeable halogenated/aromatic organics using EPA Method 8260, chromium, cadmium, copper, hexavalent chromium, and pH. The water levels at the 14 wells sampled, in addition to the remaining unsampled wells, will also be measured.

Section 9
References

Camp Dresser & McKee Inc., Groundwater Modeling Study, Southern California Chemical, January 1993.

_____, RCRA Facility Investigation Work Plan Addendum, Southern California Chemical, February 13, 1992, Revised March 6, 1992.

_____, RCRA Facility Investigation Report, Southern California Chemical, December 6, 1991.

_____, RCRA Facility Investigation Work Plan, Southern California Chemical, June 26, 1990.

_____, Current Conditions Report, Southern California Chemical, June 8, 1990.

City of Santa Fe Springs, 1996 Annual Water Quality Report, 1996.

J.H. Kleinfelder & Associates, Quality Assurance Project Plan, Southern California Chemical, May 1988.

_____, Draft Environmental Assessment, Southern California Chemical, January 1986.

Appendix A
General Analytical Detection Limits

TABLE A-1
PHIBRO-TECH, INC.
HEAVY METALS AND INORGANICS ANALYSIS
Typical Detection Limits

Method Number	Analytical Parameter	Detection Limit	Units
EPA 6010-L	Antimony	0.06	mg/L
EPA 6010-L	Barium	0.01	mg/L
EPA 6010-L	Beryllium	0.002	mg/L
EPA 6010-L	Cadmium	0.005	mg/L
EPA 6010-L	Chromium	0.01	mg/L
EPA 6010-L	Cobalt	0.01	mg/L
EPA 6010-L	Copper	0.02	mg/L
EPA 6010-L	Lead	0.05	mg/L
EPA 6010-L	Molybdenum	0.02	mg/L
EPA 6010-L	Nickel	0.04	mg/L
EPA 6010-L	Silver	0.01	mg/L
EPA 6010-L	Thallium	0.5	mg/L
EPA 6010-L	Tin	0.1	mg/L
EPA 6010-L	Vanadium	0.01	mg/L
EPA 6010-L	Zinc	0.02	mg/L
EPA 7196	Chromium, Hexaval	0.02	mg/L
EPA 7061-L	Arsenic	0.005	mg/L
EPA 9012	Cyanide, Total	0.01	mg/L
EPA 7470	Mercury	0.001	mg/L
EPA 300.0	Chloride	5	mg/L
EPA 300.0	Nitrate	0.2	mg/L
EPA 7741-L	Selenium	0.1	mg/L
EPA 376.2	Sulfide, as Sulfur	1.2	mg/L

TABLE A-2
PHIBRO-TECH, INC.
VOLATILE ORGANIC COMPOUNDS
Typical Detection Limits

Method Number	Analytical Parameter	Detection Limit	Units
EPA 8260	Benzene	0.5	µg/L
EPA 8260	Toluene	1.0	µg/L
EPA 8260	Ethylbenzene	1.0	µg/L
EPA 8260	Xylenes, Total	1.0	µg/L
EPA 8260	Chloromethane	1.0	µg/L
EPA 8260	Bromomethane	1.0	µg/L
EPA 8260	Vinyl Chloride	1.0	µg/L
EPA 8260	Chloroethane	1.0	µg/L
EPA 8260	Methylene Chloride	1.0	µg/L
EPA 8260	Trichlorofluoromethane	1.0	µg/L
EPA 8260	1,1-Dichloroethene	1.0	µg/L
EPA 8260	1,1-Dichloroethane	1.0	µg/L
EPA 8260	trans-1,2-Dichloroethene	1.0	µg/L
EPA 8260	Chloroform	1.0	µg/L
EPA 8260	1,2-Dichloroethane	1.0	µg/L
EPA 8260	1,1,1-Trichloroethane	1.0	µg/L
EPA 8260	Carbon Tetrachloride	1.0	µg/L
EPA 8260	Bromodichloromethane	1.0	µg/L
EPA 8260	1,2-Dichloropropane	1.0	µg/L
EPA 8260	trans-1,3-Dichloropropen	1.0	µg/L
EPA 8260	Trichloroethene	1.0	µg/L
EPA 8260	Dibromochloromethane	1.0	µg/L
EPA 8260	1,1,2-Trichloroethane	1.0	µg/L
EPA 8260	cis-1,3-Dichloropropene	1.0	µg/L
EPA 8260	2-Chloroethylvinyl ether	1.0	µg/L
EPA 8260	Bromoform	1.0	µg/L
EPA 8260	Tetrachloroethene	1.0	µg/L
EPA 8260	1,1,2,2-Tetrachloroethan	1.0	µg/L
EPA 8260	Chlorobenzene	1.0	µg/L
EPA 8260	1,2-Dichlorobenzene	1.0	µg/L
EPA 8260	1,3-Dichlorobenzene	1.0	µg/L
EPA 8260	1,4-Dichlorobenzene	1.0	µg/L

Appendix B
Quanterra Analytical Reports

Quanterra Incorporated
1721 South Grand Avenue
Santa Ana, California 92705

714 258-8610 Telephone
714 258-0921 Fax

Quanterra Environmental Services

August 6, 1998

QUANTERRA INCORPORATED PROJECT NUMBER: 133055
PO/CONTRACT: 01992; 1Q97

Sharon Wallin
Phibro-Tech, Inc.
18881 Von Karman, Suite 650
Irvine, CA 92612

Dear Ms. Wallin,

This report contains the analytical results for the two samples received under chain of custody by Quanterra Incorporated on July 14, 1998. These samples are associated with your Phibro-Tech project.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Keith Aleckson
Project Manager

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QUANTERRA INCORPORATED PROJECT NUMBER 133055

Case Narrative

Quanterra's Quality Assurance Program

Chain of Custody Documentation

Sample Description Information

VOCs
Sample Data Sheets
Method Blank Reports
Laboratory QC Reports

Metals
Sample Data Sheets
Method Blank Reports
Laboratory QC Reports

General Chemistry
Sample Data Sheets
Method Blank Reports
Laboratory QC Reports

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 133055

All applicable internal quality control analyses including calibrations and calibration verifications, calibration (instrument) and method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD), and other QC met method-specified acceptance criteria. Any matrix-related anomalies are indicated using footnotes within the report. Any other anomalies are reported within the narrative. There were no anomalies associated with this project.

Quanterra Environmental Services - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

QUANTERRA INCORPORATED - SANTA ANA

Project Receipt Checklist

Project #: 133055 Date: 7/14/98

Client Name: ~~R. MARTIN~~ Phibro Tech Project Name:

Received By : R MARTIN Date/Time Received: 7/14 1700

Delivered By: [ ] Airborne [ ] Fedex [✓] DHL [ ] Express-It [ ] SCM

[ ] Client [ ] ATD [✓] Rey B. [ ] Others: _____ **Travel Time:** _____ **Hrs**

****

Initial/Date

Custody Seal Status: [ ] Intact [ ] Broken [✓] None..... RM 7/14

Custody Seal #(s): _____ [✓] No Seal #.....

Sample Container(s): [ ] Quanterra [ ] Client [ ] N/A.....

Temperature(s) (Cooler/Blank) in °C: 4.0 .....

Samples : [✓] Intact [ ] Broken [ ] Others: _____ .....

Anomalies: [✓] None [ ] Yes (See Anoms) _____ .....

Sample(s) Labeled By:.. .....

Sample(s) Labeling Checked By: .....

****

Short-Hold Notification: [✓] pH [✓] Wet Chem [ ] Metals(Filter/Pres) [ ] N/A.. RM 7/14

Rush Notification: [✓] N/A [ ] Extractions [ ] LUFT [ ] Wet Chem [ ] Metals

[ ] MS/Voa [ ] MS/SVoa [ ] GC/Voa [ ] GC/SVoa.....

Outside Analysis(es) (Test/Lab/Date Sent-Out):

N/A .....

**********LEAVE NO BLANK SPACES; USE N/A**********

****

Containers:

Fraction:	-1	-2							pH
VOAh /*	3	1							N/A
500 PBn	1								C2
250 PB	1								N/A

h: HCL s: H2SO4 na: Sodium Hydroxide znna: Zinc Acetate + Sodium Hydroxide n: HNO3 n/f: HNO3/Filtered

* Number VOA's with air bubbles present n/fl: HNO3/Filtered by Lab

Logged By/Date : RM 7/14/98 Reviewed By/Date: _____

PRC.Vers.2 090397

C006319

SAMPLE DESCRIPTION INFORMATION
for
Phibro-Tech, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
133055-0001-SA	PTI-MW01S-040	AQUEOUS	14 JUL 98	15:00	14 JUL 98
133055-0002-TB	PTI-TB01-040	AQUEOUS	14 JUL 98		14 JUL 98

VOCs

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW01S-040		
LAB ID:	133055-0001-SA		
Matrix:	AQUEOUS	Sampled: 14 JUL 98	Received: 14 JUL 98
Authorized:	14 JUL 98	Prepared: 24 JUL 98	Analyzed: 24 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	1.7		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	14		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	105	%	80 - 125
Toluene-d8	124	%	80 - 125
Bromofluorobenzene	119	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-TB01-040		
LAB ID:	133055-0002-TB		
Matrix:	AQUEOUS	Sampled: 14 JUL 98	Received: 14 JUL 98
Authorized:	14 JUL 98	Prepared: 24 JUL 98	Analyzed: 24 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	95	%	80 - 125
Toluene-d8	101	%	80 - 125
Bromofluorobenzene	94	%	80 - 125

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133055-0001-SA	AQUEOUS	Q8260-A		23 JUL 98-BCX	17 JUL 98-BC
133055-0002-TB	AQUEOUS	Q8260-A		24 JUL 98-AHX	17 JUL 98-BC

METHOD BLANK REPORT
Volatile Organics by GC/MS
Project: 133055

Test: Q8260-DW-AP Method SW8260B - Volatile Organics - 25 mL
Matrix: AQUEOUS
QC Run: 23 JUL 98-BCX Date Analyzed: 23 JUL 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	81	80 -125
Toluene-d8	107	80 -125
Bromofluorobenzene	99	80 -125

ND = Not Detected

METHOD BLANK REPORT (cont.)
Volatile Organics by GC/MS
Project: 133055

Test: Q8260-DW-AP Method SW8260B - Volatile Organics - 25 mL (cont.)
Matrix: AQUEOUS

QC Run: 24 JUL 98-AHX Date Analyzed: 24 JUL 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	94	80 -125
Toluene-d8	96	80 -125
Bromofluorobenzene	92	80 -125

ND = Not Detected

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS
Project: 133055

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 24 JUL 98
QC Run: 24 JUL 98-AHX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	9.29	93	70-135
Trichloroethene	10.0	9.89	99	70-130
Benzene	10.0	9.53	95	80-120
Toluene	10.0	9.38	94	80-120
Chlorobenzene	10.0	9.84	98	80-120

Surrogates	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	10.0	9.40	94	80-125
Bromofluorobenzene	10.0	9.42	94	80-125
Toluene-d8	10.0	9.66	97	80-125

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 23 JUL 98
QC Run: 23 JUL 98-BCX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	12.7	127	70-135
Trichloroethene	10.0	11.0	110	70-130
Benzene	10.0	9.48	95	80-120
Toluene	10.0	10.5	105	80-120
Chlorobenzene	10.0	10.3	103	80-120

Surrogates	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	10.0	8.83	88	80-125
Bromofluorobenzene	10.0	10.4	104	80-125
Toluene-d8	10.0	11.0	110	80-125

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Volatile Organics by GC/MS
Project: 133055

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS
Sample: 132975-0012
MS Run: 17 JUL 98-BC
Units: ug/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
1,1-Dichloroethene	17000	53300	58100	50000	73	82	8.6	70-135	25
Trichloroethene	ND	49600	49500	50000	99	99	0.2	70-130	25
Benzene	ND	42300	40500	50000	85	81	4.5	80-120	25
Toluene	ND	51700	50600	50000	103	101	2.3	80-120	25
Chlorobenzene	ND	52600	51400	50000	105	103	2.4	80-120	25

Surrogates	Sample %Recovery	%Recovery MS	%Recovery MSD	Acceptance Limit Recovery
1,2-Dichloroethane-d4	114	88	87	80-125
Bromofluorobenzene	102	101	102	80-125
Toluene-d8	99	101	100	80-125

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Metals

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW01S-040
LAB ID: 133055-0001-SA
Matrix: AQUEOUS
Authorized: 14 JUL 98

Sampled: 14 JUL 98
Prepared: See Below

Received: 14 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	15 JUL 98	16 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	15 JUL 98	16 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	15 JUL 98	16 JUL 98

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133055-0001-SA	AQUEOUS	QICP-A		15 JUL 98-PX	15 JUL 98-PA

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 133055

Test: Q-ICP-AR Method 6010B - ICP Metals
Matrix: AQUEOUS
QC Run: 15 JUL 98-PX Date Analyzed: 16 JUL 98

Analyte	Result	Units	Reporting Limit
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Copper	ND	mg/L	0.020

ND = Not Detected

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 133055

Category: QICP-A Method 6010B - ICP Metals
Matrix: AQUEOUS Date Analyzed: 16 JUL 98
QC Run: 15 JUL 98-PX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Cadmium	0.0500	0.0492	98	80-120
Chromium	0.200	0.197	98	80-115
Copper	0.250	0.254	102	85-115

Calculationa are performed before rounding to avoid round-off errors in calculated resulta.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 133055

Category: QICP-A Method 6010B - ICP Metals
Matrix: AQUEOUS
Sample: 133055-0001
MS Run: 15 JUL 98-PA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Cadmium	ND	0.0462	0.0398	0.0500	92	80	15	80-120	20
Chromium	ND	0.181	0.184	0.200	91	92	1.8	80-115	20
Copper	0.0100 J	0.260	0.256	0.250	100	98	1.8	85-115	20

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

General Chemistry

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW01S-040
LAB ID: 133055-0001-SA
Matrix: AQUEOUS — Sampled: 14 JUL 98 — Received: 14 JUL 98
Authorized: 14 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	6.6		1.0	NA	units	SW9040	NA	14 JUL 98

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133055-0001-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation
Project: 133055

Test: Q-CR6-A Method SW7196 - Chromium, Hexavalent
Matrix: AQUEOUS
QC Run: 15 JUL 98-AX Date Analyzed: 15 JUL 98

Analyte	Result	Units	Reporting Limit
Chromium, Hexavalent	ND	mg/L	0.020

ND = Not Detected

LABORATORY CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation
Project: 133055

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS Date Analyzed: 15 JUL 98
QC Run: 15 JUL 98-AX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Chromium, Hexavalent	0.0500	0.0509	102	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Wet Chemistry Analysis and Preparation
Project: 133055

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS
Sample: 133055-0001
MS Run: 15 JUL 98-AA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Chromium, Hexavalent	ND	0.0509	0.0487	0.0500	102	97	4.4	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT - MS QC
GC/MS Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133055-0001-SA	AQUEOUS	PH-A		14 JUL 98-AX	14 JUL 98-AB

LABORATORY CONTROL SAMPLE REPORT
GC/MS Preparation
Project: 133055

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS Date Analyzed: 14 JUL 98
QC Run: 14 JUL 98-AX
Concentration Units: units

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
pH	9.18	9.14	100	98-102

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX DUPLICATE QC REPORT
GC/MS Preparation
Project: 133055

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
Sample: 133055-0001
MS Run: 14 JUL 98-AB
Units: units

Analyte	Concentration Sample	Concentration Duplicate	%RPD SA-DU	Acceptance Limit
pH	6.60	6.60	0.0	30

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

Quanterra Incorporated
1721 South Grand Avenue
Santa Ana, California 92705

714 258-8610 Telephone
714 258-0921 Fax

August 6, 1998

QUANTERRA INCORPORATED PROJECT NUMBER: 133076
PO/CONTRACT: 01992; 1Q97

Sharon Wallin
Phibro-Tech, Inc.
18881 Von Karman, Suite 650
Irvine, CA 92612

Dear Ms. Wallin,

This report contains the analytical results for the eleven samples received under chain of custody by Quanterra Incorporated on July 15, 1998. These samples are associated with your Phibro-Tech project.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Keith Aleckson
Project Manager

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Case Narrative

Quanterra's Quality Assurance Program

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Laboratory QC Reports

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Method Blank Reports
Laboratory QC Reports

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 133076

All applicable internal quality control analyses including calibrations and calibration verifications, calibration (instrument) and method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD), and other QC met method-specified acceptance criteria. Any matrix-related anomalies are indicated using footnotes within the report. Any other anomalies are reported within the narrative. There were no anomalies associated with this project.

Quanterra Environmental Services - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

QUANTERRA INCORPORATED - SANTA ANA

Project Receipt Checklist

Project #: 133076 Date: 7/15/98
Client Name: CDM Project Name: PHIBRO, TECH
Received By: K FREITAG Date/Time Received: 7/15/98 1715
Delivered By: [ ] Airborne [ ] Fedex [ ] DHL [ ] Express-It [ ] SCM
[ ] Client [ ] ATD [X] Rey B. [ ] Others:______ **Travel Time:**______ **Hrs**

****

Initial/Date

Custody Seal Status: [ ] Intact [ ] Broken [X] None.................. (KF) 7/15/98
Custody Seal #(s):______ [X] No Seal #..........
Sample Container(s): [X] Quanterra [ ] Client [ ] N/A..................
Temperature(s) (Cooler/Blank) in °C: 4.0 ....
Samples: [X] Intact [ ] Broken [ ] Others: ....
Anomalies: [X] None [ ] Yes (See Anoms) ....
Sample(s) Labeled By:..........
Sample(s) Labeling Checked By:..........

****

Short-Hold Notification: [X] pH [X] Wet Chem (Cr6) [ ] Metals(Filter/Pres) [ ] N/A.... (KF) 7/15/98
Rush Notification: [ ] N/A [ ] Extractions [ ] LUFT [ ] Wet Chem [ ] Metals
[ ] MS/Voa [ ] MS/SVoa [ ] GC/Voa [ ] GC/SVoa......
Outside Analysis(es) (Test/Lab/Date Sent-Out):
N/A ....

***************LEAVE NO BLANK SPACES; USE N/A****************

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Containers:

Fraction:	1/8,10,11	9								**pH**
VOAh /*	3	3								N/A
250 PB	1									N/A
500 PBn	1									< 2

h: HCL s: H2SO4 na: Sodium Hydroxide zna: Zinc Acetate + Sodium Hydroxide n: HNO3 n/f: HNO3/Filtered
* Number VOA's with air bubbles present n/fl: HNO3/Filtered by Lab

Logged By/Date: (RW) 7/17/98 Reviewed By/Date: ______

PRC.Vers.2 090397

C006319

SAMPLE DESCRIPTION INFORMATION
for
Phibro-Tech, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
133076-0001-SA	PTI-MW01D-040	AQUEOUS	15 JUL 98	08:30	15 JUL 98
133076-0002-SA	PTI-MW03-040	AQUEOUS	15 JUL 98	10:00	15 JUL 98
133076-0003-SA	PTI-MW11-040	AQUEOUS	15 JUL 98	10:40	15 JUL 98
133076-0004-SA	PTI-MW06D-040	AQUEOUS	15 JUL 98	11:45	15 JUL 98
133076-0005-SA	PTI-MW06B-040	AQUEOUS	15 JUL 98	12:30	15 JUL 98
133076-0006-SA	PTI-MW07-040	AQUEOUS	15 JUL 98	13:45	15 JUL 98
133076-0007-SA	PTI-MW04A-040	AQUEOUS	15 JUL 98	15:00	15 JUL 98
133076-0008-EB	PTI-EB01-040	WATER-QA	15 JUL 98	14:30	15 JUL 98
133076-0009-TB	PTI-TB02-040	WATER-QA	15 JUL 98		15 JUL 98
133076-0010-SA	PTI-MW04-040	AQUEOUS	15 JUL 98	15:50	15 JUL 98
133076-0011-SA	PTI-MW35-040	AQUEOUS	15 JUL 98	16:00	15 JUL 98

VOCs

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW03-040		
LAB ID:	133076-0002-SA		
Matrix:	AQUEOUS	Sampled: 15 JUL 98	Received: 15 JUL 98
Authorized:	15 JUL 98	Prepared: 29 JUL 98	Analyzed: 29 JUL 98
Instrument:	GC/MS-MH	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	42		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	36		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	2.8		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	3.6		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	2.2		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	25		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	92	%	80 - 125
Toluene-d8	97	%	80 - 125
Bromofluorobenzene	89	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW01D-040		
LAB ID:	133076-0001-SA		
Matrix:	AQUEOUS	Sampled: 15 JUL 98	Received: 15 JUL 98
Authorized:	15 JUL 98	Prepared: 27 JUL 98	Analyzed: 27 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	1.9		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	88	%	80 - 125
Toluene-d8	100	%	80 - 125
Bromofluorobenzene	95	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW11-040		
LAB ID:	133076-0003-SA		
Matrix:	AQUEOUS	Sampled: 15 JUL 98	Received: 15 JUL 98
Authorized:	15 JUL 98	Prepared: 27 JUL 98	Analyzed: 27 JUL 98
Instrument:	GC/MS-MC	Dilution: 2.5	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		1.2	ug/L
Bromodichloromethane	ND		2.5	ug/L
Bromoform	ND		2.5	ug/L
Bromomethane	ND		2.5	ug/L
Carbon tetrachloride	ND		2.5	ug/L
Chlorobenzene	ND		2.5	ug/L
Chloroethane	ND		2.5	ug/L
Chloroform	5.8		2.5	ug/L
Chloromethane	ND		2.5	ug/L
Dibromochloromethane	ND		2.5	ug/L
1,2-Dichlorobenzene	ND		2.5	ug/L
1,3-Dichlorobenzene	ND		2.5	ug/L
1,4-Dichlorobenzene	ND		2.5	ug/L
1,1-Dichloroethane	29		2.5	ug/L
1,2-Dichloroethane	4.2		2.5	ug/L
1,1-Dichloroethene	12		2.5	ug/L
trans-1,2-Dichloroethene	ND		2.5	ug/L
1,2-Dichloropropane	ND		2.5	ug/L
cis-1,3-Dichloropropene	ND		2.5	ug/L
trans-1,3-Dichloropropene	ND		2.5	ug/L
Ethylbenzene	41		2.5	ug/L
Methylene chloride	ND		2.5	ug/L
1,1,2,2-Tetrachloroethane	ND		2.5	ug/L
Tetrachloroethene	ND		2.5	ug/L
Toluene	ND		2.5	ug/L
1,1,1-Trichloroethane	ND		2.5	ug/L
1,1,2-Trichloroethane	ND		2.5	ug/L
Trichloroethene	150		2.5	ug/L
Trichlorofluoromethane	ND		2.5	ug/L
Vinyl chloride	ND		2.5	ug/L
Xylenes (total)	4.8		2.5	ug/L
2-Chloroethyl vinyl ether	ND		2.5	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	80	%	80 - 125
Toluene-d8	106	%	80 - 125
Bromofluorobenzene	101	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06D-040
LAB ID: 133076-0004-SA
Matrix: AQUEOUS Sampled: 15 JUL 98 Received: 15 JUL 98
Authorized: 15 JUL 98 Prepared: 29 JUL 98 Analyzed: 29 JUL 98
Instrument: GC/MS-MH Dilution: 1.0

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	1.2		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	8.1		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	1.0		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	95	%	80 - 125
Toluene-d8	94	%	80 - 125
Bromofluorobenzene	90	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW06B-040		
LAB ID:	133076-0005-SA		
Matrix:	AQUEOUS	Sampled: 15 JUL 98	Received: 15 JUL 98
Authorized:	15 JUL 98	Prepared: 28 JUL 98	Analyzed: 28 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	4.3		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	87	%	80 - 125
Toluene-d8	116	%	80 - 125
Bromofluorobenzene	109	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW07-040		
LAB ID:	133076-0006-SA		
Matrix:	AQUEOUS	Sampled: 15 JUL 98	Received: 15 JUL 98
Authorized:	15 JUL 98	Prepared: 28 JUL 98	Analyzed: 28 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	1.0		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	41		1.0	ug/L
1,2-Dichloroethane	32		1.0	ug/L
1,1-Dichloroethene	5.9		1.0	ug/L
trans-1,2-Dichloroethene	1.8		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	53		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	96	%	80 - 125
Toluene-d8	98	%	80 - 125
Bromofluorobenzene	97	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04A-040
LAB ID: 133076-0007-SA
Matrix: AQUEOUS Sampled: 15 JUL 98 Received: 15 JUL 98
Authorized: 15 JUL 98 Prepared: 28 JUL 98 Analyzed: 28 JUL 98
Instrument: GC/MS-MC Dilution: 1.0

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	5.8		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	1.8		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.2		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	9.2		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	85	%	80 - 125
Toluene-d8	117	%	80 - 125
Bromofluorobenzene	108	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB01-040
LAB ID: 133076-0008-EB
Matrix: WATER-QA Sampled: 15 JUL 98 Received: 15 JUL 98
Authorized: 15 JUL 98 Prepared: 27 JUL 98 Analyzed: 27 JUL 98
Instrument: GC/MS-MH Dilution: 1.0

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ethar	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	85	%	80 - 125
Toluene-d8	98	%	80 - 125
Bromofluorobenzene	94	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-TB02-040		
LAB ID:	133076-0009-TB		
Matrix:	WATER-QA	Sampled: 15 JUL 98	Received: 15 JUL 98
Authorized:	15 JUL 98	Prepared: 27 JUL 98	Analyzed: 27 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	82	%	80 - 125
Toluene-d8	98	%	80 - 125
Bromofluorobenzene	96	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04-040
LAB ID: 133076-0010-SA
Matrix: AQUEOUS Sampled: 15 JUL 98 Received: 15 JUL 98
Authorized: 15 JUL 98 Prepared: 28 JUL 98 Analyzed: 28 JUL 98
Instrument: GC/MS-MC Dilution: 25

Parameter	Result	Qualifier	RL	Units
Benzene	ND		12	ug/L
Bromodichloromethane	ND		25	ug/L
Bromoform	ND		25	ug/L
Bromomethane	ND		25	ug/L
Carbon tetrachloride	ND		25	ug/L
Chlorobenzene	ND		25	ug/L
Chloroethane	ND		25	ug/L
Chloroform	ND		25	ug/L
Chloromethane	ND		25	ug/L
Dibromochloromethane	ND		25	ug/L
1,2-Dichlorobenzene	ND		25	ug/L
1,3-Dichlorobenzene	ND		25	ug/L
1,4-Dichlorobenzene	ND		25	ug/L
1,1-Dichloroethane	28		25	ug/L
1,2-Dichloroethane	ND		25	ug/L
1,1-Dichloroethene	ND		25	ug/L
trans-1,2-Dichloroethene	ND		25	ug/L
1,2-Dichloropropane	ND		25	ug/L
cis-1,3-Dichloropropene	ND		25	ug/L
trans-1,3-Dichloropropene	ND		25	ug/L
Ethylbenzene	1200		25	ug/L
Methylene chloride	28		25	ug/L
1,1,2,2-Tetrachloroethane	ND		25	ug/L
Tetrachloroethene	ND		25	ug/L
Toluene	ND		25	ug/L
1,1,1-Trichloroethane	ND		25	ug/L
1,1,2-Trichloroethane	ND		25	ug/L
Trichloroethene	120		25	ug/L
Trichlorofluoromethane	ND		25	ug/L
Vinyl chloride	ND		25	ug/L
Xylenes (total)	300		25	ug/L
2-Chloroethyl vinyl ether	ND		25	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	84	%	80 - 125
Toluene-d8	117	%	80 - 125
Bromofluorobenzene	109	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW35-040		
LAB ID:	133076-0011-SA		
Matrix:	AQUEOUS	Sampled: 15 JUL 98	Received: 15 JUL 98
Authorized:	15 JUL 98	Prepared: 28 JUL 98	Analyzed: 28 JUL 98
Instrument:	GC/MS-MC	Dilution: 25	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		12	ug/L
Bromodichloromethane	ND		25	ug/L
Bromoform	ND		25	ug/L
Bromomethane	ND		25	ug/L
Carbon tetrachloride	ND		25	ug/L
Chlorobenzene	ND		25	ug/L
Chloroethane	ND		25	ug/L
Chloroform	ND		25	ug/L
Chloromethane	ND		25	ug/L
Dibromochloromethane	ND		25	ug/L
1,2-Dichlorobenzene	ND		25	ug/L
1,3-Dichlorobenzene	ND		25	ug/L
1,4-Dichlorobenzene	ND		25	ug/L
1,1-Dichloroethane	31		25	ug/L
1,2-Dichloroethane	ND		25	ug/L
1,1-Dichloroethene	27		25	ug/L
trans-1,2-Dichloroethene	ND		25	ug/L
1,2-Dichloropropane	ND		25	ug/L
cis-1,3-Dichloropropene	ND		25	ug/L
trans-1,3-Dichloropropene	ND		25	ug/L
Ethylbenzene	1300		25	ug/L
Methylene chloride	29		25	ug/L
1,1,2,2-Tetrachloroethane	ND		25	ug/L
Tetrachloroethene	ND		25	ug/L
Toluene	ND		25	ug/L
1,1,1-Trichloroethane	ND		25	ug/L
1,1,2-Trichloroethane	ND		25	ug/L
Trichloroethene	120		25	ug/L
Trichlorofluoromethane	ND		25	ug/L
Vinyl chloride	ND		25	ug/L
Xylenes (total)	320		25	ug/L
2-Chloroethyl vinyl ether	ND		25	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	84	%	80 - 125
Toluene-d8	116	%	80 - 125
Bromofluorobenzene	110	%	80 - 125

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133076-0001-SA	AQUEOUS	Q8260-A		27 JUL 98-BCX	26 JUL 98-AH
133076-0002-SA	AQUEOUS	Q8260-A		28 JUL 98-BHX	26 JUL 98-AH
133076-0003-SA	AQUEOUS	Q8260-A		27 JUL 98-BCX	26 JUL 98-AH
133076-0004-SA	AQUEOUS	Q8260-A		28 JUL 98-BHX	26 JUL 98-AH
133076-0005-SA	AQUEOUS	Q8260-A		28 JUL 98-ACX	26 JUL 98-AH
133076-0006-SA	AQUEOUS	Q8260-A		27 JUL 98-BCX	26 JUL 98-AH
133076-0007-SA	AQUEOUS	Q8260-A		28 JUL 98-ACX	26 JUL 98-AH
133076-0008-EB	AQUEOUS	Q8260-A		27 JUL 98-BCX	26 JUL 98-AH
133076-0009-TB	AQUEOUS	Q8260-A		27 JUL 98-BCX	26 JUL 98-AH
133076-0010-SA	AQUEOUS	Q8260-A		28 JUL 98-ACX	26 JUL 98-AH
133076-0011-SA	AQUEOUS	Q8260-A		28 JUL 98-ACX	26 JUL 98-AH

METHOD BLANK REPORT
Volatile Organics by GC/MS
Project: 133076

Test: Q8260-DW-AP Method SW8260B - Volatile Organics - 25 mL
Matrix: AQUEOUS
QC Run: 27 JUL 98-BCX Date Analyzed: 27 JUL 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	96	80 -125
Toluene-d8	98	80 -125
Bromofluorobenzene	97	80 -125

ND = Not Detected

METHOD BLANK REPORT (cont.)
Volatile Organics by GC/MS
Project: 133076

Test: Q8260-DW-AP Method SW8260B - Volatile Organics - 25 mL (cont.)
Matrix: AQUEOUS

QC Run: 28 JUL 98-BHX Date Analyzed: 28 JUL 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	83	80 -125
Toluene-d8	98	80 -125
Bromofluorobenzene	89	80 -125

ND = Not Detected

METHOD BLANK REPORT (cont.)
Volatile Organics by GC/MS
Project: 133076

Test: Q8260-DW-AP Method SW8260B - Volatile Organics - 25 mL (cont.)
Matrix: AQUEOUS

QC Run: 28 JUL 98-ACX Date Analyzed: 28 JUL 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	86	80 -125
Toluene-d8	109	80 -125
Bromofluorobenzene	103	80 -125

ND = Not Detected

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS
Project: 133076

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 28 JUL 98
QC Run: 28 JUL 98-BHX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	8.10	81	70-135
Trichloroethene	10.0	9.79	98	70-130
Benzene	10.0	9.23	92	80-120
Toluene	10.0	9.78	98	80-120
Chlorobenzene	10.0	10.7	107	80-120

Surrogates	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	10.0	8.81	88	80-125
Bromofluorobenzene	10.0	9.05	90	80-125
Toluene-d8	10.0	9.74	97	80-125

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 28 JUL 98
QC Run: 28 JUL 98-ACX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	8.79	88	70-135
Trichloroethene	10.0	10.7	107	70-130
Benzene	10.0	11.1	111	80-120
Toluene	10.0	10.5	105	80-120
Chlorobenzene	10.0	11.9	119	80-120

Surrogates	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	10.0	10.7	107	80-125
Bromofluorobenzene	10.0	11.0	110	80-125
Toluene-d8	10.0	11.6	116	80-125

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 27 JUL 98
QC Run: 27 JUL 98-BCX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	8.56	86	70-135
Trichloroethene	10.0	12.3	123	70-130
Benzene	10.0	8.68	87	80-120
Toluene	10.0	9.83	98	80-120
Chlorobenzene	10.0	10.4	104	80-120

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS (cont.)
Project: 133076

Surrogates	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	10.0	8.02	80	80-125
Bromofluorobenzene	10.0	10.2	102	80-125
Toluene-d8	10.0	10.4	104	80-125

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Volatile Organics by GC/MS
Project: 133076

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS
Sample: 133125-0002
MS Run: 26 JUL 98-AH
Units: ug/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
1,1-Dichloroethene	ND	10.2	10.0	10.0	102	100	1.5	70-135	25
Trichloroethene	6.80	16.7	14.8	10.0	99	80	12	70-130	25
Benzene	ND	10.7	10.5	10.0	107	105	2.0	80-120	25
Toluene	ND	9.39	8.98	10.0	94	90	4.5	80-120	25
Chlorobenzene	ND	9.69	9.25	10.0	97	92	4.6	80-120	25

Surrogates	Sample %Recovery	%Recovery MS	%Recovery MSD	Acceptance Limit Recovery
1,2-Dichloroethane-d4	100	107	104	80-125
Bromofluorobenzene	89	95	87	80-125
Toluene-d8	96	97	92	80-125

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Metals

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW01D-040
LAB ID: 133076-0001-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	16 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	16 JUL 98	16 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	16 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW03-040
LAB ID: 133076-0002-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	16 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	16 JUL 98	16 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	16 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW11-040
LAB ID: 133076-0003-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	16 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	16 JUL 98	16 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	16 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06D-040
LAB ID: 133076-0004-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	16 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	16 JUL 98	16 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	16 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06B-040
LAB ID: 133076-0005-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	17 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	16 JUL 98	17 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	17 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW07-040
LAB ID: 133076-0006-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	17 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	16 JUL 98	17 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	17 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04A-040
LAB ID: 133076-0007-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	17 JUL 98
Chromium	0.010		1.0	0.010	mg/L	6010B	16 JUL 98	17 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	17 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB01-040
LAB ID: 133076-0008-EB
Matrix: WATER-QA
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	16 JUL 98	17 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	16 JUL 98	17 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	17 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04-040
LAB ID: 133076-0010-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	0.32		1.0	0.0050	mg/L	6010B	16 JUL 98	17 JUL 98
Chromium	18.9		1.0	0.010	mg/L	6010B	16 JUL 98	17 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	17 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW35-040
LAB ID: 133076-0011-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	0.32		1.0	0.0050	mg/L	6010B	16 JUL 98	17 JUL 98
Chromium	19.0		1.0	0.010	mg/L	6010B	16 JUL 98	17 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	16 JUL 98	17 JUL 98

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133076-0001-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0002-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0003-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0004-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0005-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0006-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0007-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0008-EB	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0010-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA
133076-0011-SA	AQUEOUS	QICP-A		16 JUL 98-QX	16 JUL 98-QA

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 133076

Test: Q-ICP-AR Method 6010B - ICP Metals
Matrix: AQUEOUS
QC Run: 16 JUL 98-QX Date Analyzed: 16 JUL 98

Analyte	Result	Units	Reporting Limit
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Copper	ND	mg/L	0.020

ND = Not Detected

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 133076

Category: QICP-A Method 6010B - ICP Metals
Matrix: AQUEOUS Date Analyzed: 16 JUL 98
QC Run: 16 JUL 98-QX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Cadmium	0.0500	0.0459	92	80-120
Chromium	0.200	0.200	100	80-115
Copper	0.250	0.260	104	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 133076

Category: QICP-A Method 6010B - ICP Metals
Matrix: AQUEOUS
Sample: 131860-0017
MS Run: 16 JUL 98-QA
Units: mg/L

Analyte	Sample Result	MS Result	MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
	Concentration								
Cadmium	ND	0.0480	0.0485	0.0500	96	97	1.2	80-120	20
Chromium	0.0484	0.231	0.235	0.200	91	94	1.8	80-115	20
Copper	0.0518	0.298	0.303	0.250	99	100	1.5	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

General Chemistry

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW01D-040
LAB ID: 133076-0001-SA
Matrix: AQUEOUS Sampled: 15 JUL 98 Received: 15 JUL 98
Authorized: 15 JUL 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	7.5		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW03-040
LAB ID: 133076-0002-SA
Matrix: AQUEOUS — Sampled: 15 JUL 98 — Received: 15 JUL 98
Authorized: 15 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	7.3		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW11-040
LAB ID: 133076-0003-SA
Matrix: AQUEOUS — Sampled: 15 JUL 98 — Received: 15 JUL 98
Authorized: 15 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	7.2		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06D-040
LAB ID: 133076-0004-SA
Matrix: AQUEOUS
Authorized: 15 JUL 98

Sampled: 15 JUL 98
Prepared: See Below

Received: 15 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	7.4		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06B-040
LAB ID: 133076-0005-SA
Matrix: AQUEOUS Sampled: 15 JUL 98 Received: 15 JUL 98
Authorized: 15 JUL 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	7.4		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW07-040
LAB ID: 133076-0006-SA
Matrix: AQUEOUS — Sampled: 15 JUL 98 — Received: 15 JUL 98
Authorized: 15 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	6.7		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04A-040
LAB ID: 133076-0007-SA
Matrix: AQUEOUS — Sampled: 15 JUL 98 — Received: 15 JUL 98
Authorized: 15 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	7.5		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB01-040
LAB ID: 133076-0008-EB
Matrix: WATER-QA — Sampled: 15 JUL 98 — Received: 15 JUL 98
Authorized: 15 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JUL 98
pH	7.4		1.0	NA	units	SW9040	NA	15 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04-040
LAB ID: 133076-0010-SA
Matrix: AQUEOUS — Sampled: 15 JUL 98 — Received: 15 JUL 98
Authorized: 15 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	16.3		200	4.0	mg/L	SW7196	NA	15 JUL 98
pH	7.0		1.0	NA	units	SW9040	NA	15 JUL 98

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW35-040
LAB ID: 133076-0011-SA
Matrix: AQUEOUS — Sampled: 15 JUL 98 — Received: 15 JUL 98
Authorized: 15 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	16.3		200	4.0	mg/L	SW7196	NA	15 JUL 98
pH	7.0		1.0	NA	units	SW9040	NA	15 JUL 98

QC LOT ASSIGNMENT REPORT - MS QC
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133076-0001-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0002-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0003-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0004-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0005-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0006-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0007-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0008-EB	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0010-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA
133076-0011-SA	AQUEOUS	QCR6-A		15 JUL 98-AX	15 JUL 98-AA

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation
Project: 133076

Test: Q-CR6-A Method SW7196 - Chromium, Hexavalent
Matrix: AQUEOUS
QC Run: 15 JUL 98-AX Date Analyzed: 15 JUL 98

Analyte	Result	Units	Reporting Limit
Chromium, Hexavalent	ND	mg/L	0.020

ND = Not Detected

LABORATORY CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation
Project: 133076

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS Date Analyzed: 15 JUL 98
QC Run: 15 JUL 98-AX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Chromium, Hexavalent	0.0500	0.0509	102	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Wet Chemistry Analysis and Preparation
Project: 133076

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS
Sample: 133055-0001
MS Run: 15 JUL 98-AA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Chromium, Hexavalent	ND	0.0509	0.0487	0.0500	102	97	4.4	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT - MS QC
GC/MS Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133076-0001-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0002-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0003-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0004-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0005-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0006-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0007-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0008-EB	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0010-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC
133076-0011-SA	AQUEOUS	PH-A		15 JUL 98-AX	15 JUL 98-AC

LABORATORY CONTROL SAMPLE REPORT
GC/MS Preparation
Project: 133076

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS Date Analyzed: 15 JUL 98
QC Run: 15 JUL 98-AX
Concentration Units: units

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
pH	9.18	9.12	99	98-102

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX DUPLICATE QC REPORT
GC/MS Preparation
Project: 133076

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
Sample: 133076-0001
MS Run: 15 JUL 98-AC
Units: units

Analyte	Concentration Sample	Concentration Duplicate	%RPD SA-DU	Acceptance Limit
pH	7.50	7.50	0.0	30

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra Incorporated
1721 South Grand Avenue
Santa Ana, California 92705

714 258-8610 Telephone
714 258-0921 Fax

Quanterra Environmental Services

August 4, 1998

QUANTERRA INCORPORATED PROJECT NUMBER: 133106
PO/CONTRACT: 01992; 1Q97

Sharon Wallin
Camp, Dresser & Mckee (Phibro-Tech)
18881 Von Karman, Suite 650
Irvine, CA 92612

Dear Ms. Wallin,

This report contains the analytical results for the eight samples received under chain of custody by Quanterra Incorporated on July 16, 1998. These samples are associated with your Phibro-Tech project.

The case narrative is an integral part of this report.

Preliminary results were sent via facsimile on July 29, 1998.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Keith Aleckson
Project Manager

CC: Project File

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Case Narrative

Quanterra's Quality Assurance Program

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- Laboratory QC Reports

Metals
- Sample Data Sheets
- Method Blank Reports
- Laboratory QC Reports

General Chemistry
- Sample Data Sheets
- Method Blank Reports
- Laboratory QC Reports

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 133106

All applicable internal quality control analyses including calibrations and calibration verifications, calibration (instrument) and method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD), and other QC met project-specified acceptance criteria. There were no anomalies associated with this project.

Quanterra Environmental Services - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

QUANTERRA INCORPORATED - SANTA ANA

Project Receipt Checklist

Project #: 133106 Date: 7/16/98

Client Name: CDM Project Name: Phibrotech

Received By: R MARTIN Date/Time Received:

Delivered By: [ ] Airborne [ ] Fedex [ ] DHL [ ] Express-It [ ] SCM
[ ] Client [ ] ATD [ ] Rey B. [ ] Others: _____ **Travel Time:** _____ **Hrs**

****

Initial/Date

Custody Seal Status: [✓] Intact [ ] Broken [ ] None..... RM 7/16/98

Custody Seal #(s): _____ [✓] No Seal #.....

Sample Container(s): [✓] Quanterra [ ] Client [ ] N/A.....

Temperature(s) (Cooler/Blank) in °C: 4.0 .....

Samples: [✓] Intact [ ] Broken [ ] Others: _____ .....

Anomalies: [✓] None [ ] Yes (See Anoms) _____ .....

Sample(s) Labeled By:.. .....

Sample(s) Labeling Checked By: .....

****

Short-Hold Notification: [✓] pH [✓] Wet Chem [ ] Metals(Filter/Pres) [ ] N/A. RM 7/16/98

Rush Notification: [✓] N/A [ ] Extractions [ ] LUFT [ ] Wet Chem [ ] Metals
[ ] MS/Voa [ ] MS/SVoa [ ] GC/Voa [ ] GC/SVoa.....

Outside Analysis(es) (Test/Lab/Date Sent-Out):
N/A .....

**********LEAVE NO BLANK SPACES; USE N/A**********

****

Containers:

Fraction:	1/6	-7	-8						pH
VOAh /*	3	3	3						N/A
1LPB	1		1						N/A
500PBn	1		1						<2

h: HCL s: H2SO4 na: Sodium Hydroxide zna: Zinc Acetate + Sodium Hydroxide n: HNO3 n/f: HNO3/Filtered
* Number VOA's with air bubbles present n/fl: HNO3/Filtered by Lab

Logged By/Date: RM 7/16/98 Reviewed By/Date: _____

PRC.Vers.2 090397

C06340

SAMPLE DESCRIPTION INFORMATION
for
Phibro-Tech, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
133106-0001-SA	PTI-MW14S-040	AQUEOUS	16 JUL 98	09:00	16 JUL 98
133106-0002-SA	PTI-MW15S-040	AQUEOUS	16 JUL 98	09:50	16 JUL 98
133106-0003-SA	PTI-MW15D-040	AQUEOUS	16 JUL 98	10:40	16 JUL 98
133106-0004-SA	PTI-MW16-040	AQUEOUS	16 JUL 98	11:15	16 JUL 98
133106-0005-SA	PTI-MW09-040	AQUEOUS	16 JUL 98	13:00	16 JUL 98
133106-0006-SA	PTI-MW37-040	AQUEOUS	16 JUL 98	12:00	16 JUL 98
133106-0007-TB	PTI-TB03-040	WATER-QA	16 JUL 98		16 JUL 98
133106-0008-EB	PTI-EB02-040	WATER-QA	16 JUL 98	11:40	16 JUL 98

Method SW8260B

Volatile Organic Compounds
Method SW8260B

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW14S-040
LAB ID: 133106-0001-SA
Matrix: AQUEOUS Sampled: 16 JUL 98 Received: 16 JUL 98
Authorized: 16 JUL 98 Prepared: 25 JUL 98 Analyzed: 25 JUL 98
Instrument: GC/MS-MC Dilution: 1.0

Parameter	Result	Qualifier	RL	Units
Benzene	0.51		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	3.7		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	9.2		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	5.5		1.0	ug/L
1,2-Dichloroethane	12		1.0	ug/L
1,1-Dichloroethene	5.8		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	18		1.0	ug/L
Methylene chloride	1.4		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	18		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	8.4		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	93	%	80 - 125
Toluene-d8	106	%	80 - 125
Bromofluorobenzene	100	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260B

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW15S-040		
LAB ID:	133106-0002-SA		
Matrix:	AQUEOUS	Sampled: 16 JUL 98	Received: 16 JUL 98
Authorized:	16 JUL 98	Prepared: 25 JUL 98	Analyzed: 25 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	2.6		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	8.6		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	9.8		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	3.4		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	2.9		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	92	%	80 - 125
Toluene-d8	105	%	80 - 125
Bromofluorobenzene	100	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260B

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW15D-040		
LAB ID:	133106-0003-SA		
Matrix:	AQUEOUS	Sampled: 16 JUL 98	Received: 16 JUL 98
Authorized:	16 JUL 98	Prepared: 25 JUL 98	Analyzed: 25 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	7.8		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	2.7		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	2.4		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	85	%	80 - 125
Toluene-d8	105	%	80 - 125
Bromofluorobenzene	101	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260B

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW16-040		
LAB ID:	133106-0004-SA		
Matrix:	AQUEOUS	Sampled: 16 JUL 98	Received: 16 JUL 98
Authorized:	16 JUL 98	Prepared: 25 JUL 98	Analyzed: 25 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	61		1.0	ug/L
1,2-Dichloroethane	57		1.0	ug/L
1,1-Dichloroethene	6.8		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	5.8		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	28		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	1.8		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	80	%	80 - 125
Toluene-d8	109	%	80 - 125
Bromofluorobenzene	104	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260B

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW09-040		
LAB ID:	133106-0005-SA		
Matrix:	AQUEOUS	Sampled: 16 JUL 98	Received: 16 JUL 98
Authorized:	16 JUL 98	Prepared: 25 JUL 98	Analyzed: 25 JUL 98
Instrument:	GC/MS-MC	Dilution: 25	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		12	ug/L
Bromodichloromethane	ND		25	ug/L
Bromoform	ND		25	ug/L
Bromomethane	ND		25	ug/L
Carbon tetrachloride	ND		25	ug/L
Chlorobenzene	ND		25	ug/L
Chloroethane	36		25	ug/L
Chloroform	150		25	ug/L
Chloromethane	ND		25	ug/L
Dibromochloromethane	ND		25	ug/L
1,2-Dichlorobenzene	ND		25	ug/L
1,3-Dichlorobenzene	ND		25	ug/L
1,4-Dichlorobenzene	ND		25	ug/L
1,1-Dichloroethane	1200		25	ug/L
1,2-Dichloroethane	60		25	ug/L
1,1-Dichloroethene	380		25	ug/L
trans-1,2-Dichloroethene	26		25	ug/L
1,2-Dichloropropane	ND		25	ug/L
cis-1,3-Dichloropropene	ND		25	ug/L
trans-1,3-Dichloropropene	ND		25	ug/L
Ethylbenzene	73		25	ug/L
Methylene chloride	86		25	ug/L
1,1,2,2-Tetrachloroethane	ND		25	ug/L
Tetrachloroethene	30		25	ug/L
Toluene	ND		25	ug/L
1,1,1-Trichloroethane	220		25	ug/L
1,1,2-Trichloroethane	ND		25	ug/L
Trichloroethene	1300		25	ug/L
Trichlorofluoromethane	ND		25	ug/L
Vinyl chloride	ND		25	ug/L
Xylenes (total)	ND		25	ug/L
2-Chloroethyl vinyl ether	ND		25	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	93	%	80 - 125
Toluene-d8	111	%	80 - 125
Bromofluorobenzene	104	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260B

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW37-040		
LAB ID:	133106-0006-SA		
Matrix:	AQUEOUS	Sampled: 16 JUL 98	Received: 16 JUL 98
Authorized:	16 JUL 98	Prepared: 25 JUL 98	Analyzed: 25 JUL 98
Instrument:	GC/MS-MC	Dilution: 25	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		12	ug/L
Bromodichloromethane	ND		25	ug/L
Bromoform	ND		25	ug/L
Bromomethane	ND		25	ug/L
Carbon tetrachloride	ND		25	ug/L
Chlorobenzene	ND		25	ug/L
Chloroethane	38		25	ug/L
Chloroform	150		25	ug/L
Chloromethane	ND		25	ug/L
Dibromochloromethane	ND		25	ug/L
1,2-Dichlorobenzene	ND		25	ug/L
1,3-Dichlorobenzene	ND		25	ug/L
1,4-Dichlorobenzene	ND		25	ug/L
1,1-Dichloroethane	1100		25	ug/L
1,2-Dichloroethane	56		25	ug/L
1,1-Dichloroethene	360		25	ug/L
trans-1,2-Dichloroethene	ND		25	ug/L
1,2-Dichloropropane	ND		25	ug/L
cis-1,3-Dichloropropene	ND		25	ug/L
trans-1,3-Dichloropropene	ND		25	ug/L
Ethylbenzene	70		25	ug/L
Methylene chloride	84		25	ug/L
1,1,2,2-Tetrachloroethane	ND		25	ug/L
Tetrachloroethene	27		25	ug/L
Toluene	ND		25	ug/L
1,1,1-Trichloroethane	220		25	ug/L
1,1,2-Trichloroethane	ND		25	ug/L
Trichloroethene	1300		25	ug/L
Trichlorofluoromethane	ND		25	ug/L
Vinyl chloride	ND		25	ug/L
Xylenes (total)	ND		25	ug/L
2-Chloroethyl vinyl ether	ND		25	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	90	%	80 - 125
Toluene-d8	111	%	80 - 125
Bromofluorobenzene	105	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260B

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-TB03-040		
LAB ID:	133106-0007-TB		
Matrix:	WATER-QA	Sampled: 16 JUL 98	Received: 16 JUL 98
Authorized:	16 JUL 98	Prepared: 16 JUL 98	Analyzed: 25 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	81	%	80 - 125
Toluene-d8	104	%	80 - 125
Bromofluorobenzene	99	%	80 - 125

ND = Not Detected

Volatile Organic Compounds
Method SW8260B

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-EB02-040		
LAB ID:	133106-0008-EB		
Matrix:	WATER-QA	Sampled: 16 JUL 98	Received: 16 JUL 98
Authorized:	16 JUL 98	Prepared: 16 JUL 98	Analyzed: 25 JUL 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	84	%	80 - 125
Toluene-d8	102	%	80 - 125
Bromofluorobenzene	97	%	80 - 125

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Volatile Organice by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133106-0001-SA	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC
133106-0002-SA	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC
133106-0003-SA	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC
133106-0004-SA	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC
133106-0005-SA	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC
133106-0006-SA	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC
133106-0007-TB	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC
133106-0008-EB	AQUEOUS	Q8260-A		24 JUL 98-BCX	24 JUL 98-BC

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS
Project: 133106

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 24 JUL 98
QC Run: 24 JUL 98-BCX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	12.0	120	70-135
Trichloroethene	10.0	10.5	105	70-130
Benzene	10.0	9.37	94	80-120
Toluene	10.0	10.4	104	80-120
Chlorobenzene	10.0	9.94	99	80-120

Surrogates	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,2-Dichloroethane-d4	10.0	8.31	83	80-125
Bromofluorobenzene	10.0	10.1	101	80-125
Toluene-d8	10.0	10.6	106	80-125

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Volatile Organics by GC/MS
Project: 133106

Category: Q8260-A Method SW8260B - Volatile Organics
Matrix: AQUEOUS
Sample: 133047-0002
MS Run: 24 JUL 98-BC
Units: ug/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
1,1-Dichloroethene	ND	12.4	12.2	10.0	124	122	1.3	70-135	25
Trichloroethene	1.49	11.6	13.0	10.0	101	115	12	70-130	25
Benzene	ND	9.41	9.48	10.0	94	95	0.7	80-120	25
Toluene	0.449 J	10.6	10.8	10.0	101	103	1.8	80-120	25
Chlorobenzene	ND	9.87	10.1	10.0	99	101	2.2	80-120	25

Surrogates	Sample %Recovery	%Recovery MS	%Recovery MSD	Acceptance Limit Recovery
1,2-Dichloroethane-d4	90	92	90	80-125
Bromofluorobenzene	101	109	107	80-125
Toluene-d8	107	114	113	80-125

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS
Project: 133106

Test: Q8260-DW-AP Method SW8260B - Volatile Organics - 25 mL
Matrix: AQUEOUS
QC Run: 24 JUL 98-BCX Date Analyzed: 24 JUL 98

Analyte	Result		Units	Reporting Limit
Benzene	ND		ug/L	0.50
Bromodichloromethane	ND		ug/L	1.0
Bromoform	ND		ug/L	1.0
Bromomethane	ND		ug/L	1.0
Carbon tetrachloride	ND		ug/L	1.0
Chlorobenzene	ND		ug/L	1.0
Chloroethane	ND		ug/L	1.0
Chloroform	ND		ug/L	1.0
Chloromethane	ND		ug/L	1.0
Dibromochloromethane	ND		ug/L	1.0
1,2-Dichlorobenzene	ND		ug/L	1.0
1,3-Dichlorobenzene	ND		ug/L	1.0
1,4-Dichlorobenzene	ND		ug/L	1.0
1,1-Dichloroethane	ND		ug/L	1.0
1,2-Dichloroethane	ND		ug/L	1.0
1,1-Dichloroethene	ND		ug/L	1.0
trans-1,2-Dichloroethene	ND		ug/L	1.0
1,2-Dichloropropane	ND		ug/L	1.0
cis-1,3-Dichloropropene	ND		ug/L	1.0
trans-1,3-Dichloropropene	ND		ug/L	1.0
Ethylbenzene	ND		ug/L	1.0
Methylene chloride	0.38	J	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND		ug/L	1.0
Tetrachloroethene	ND		ug/L	1.0
Toluene	ND		ug/L	1.0
1,1,1-Trichloroethane	ND		ug/L	1.0
1,1,2-Trichloroethane	ND		ug/L	1.0
Trichloroethene	ND		ug/L	1.0
Trichlorofluoromethane	ND		ug/L	1.0
Vinyl chloride	ND		ug/L	1.0
Xylenes (total)	ND		ug/L	1.0
2-Chloroethyl vinyl ether	ND		ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	83	80 -125
Toluene-d8	107	80 -125
Bromofluorobenzene	96	80 -125

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Metals

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW14S-040
LAB ID: 133106-0001-SA
Matrix: AQUEOUS
Authorized: 16 JUL 98

Sampled: 16 JUL 98
Prepared: See Below

Received: 16 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	21 JUL 98	22 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	21 JUL 98	22 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	21 JUL 98	22 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15S-040
LAB ID: 133106-0002-SA
Matrix: AQUEOUS
Authorized: 16 JUL 98

Sampled: 16 JUL 98
Prepared: See Below

Received: 16 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	21 JUL 98	22 JUL 98
Chromium	0.014		1.0	0.010	mg/L	6010B	21 JUL 98	22 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	21 JUL 98	22 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15D-040
LAB ID: 133106-0003-SA
Matrix: AQUEOUS
Authorized: 16 JUL 98

Sampled: 16 JUL 98
Prepared: See Below

Received: 16 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	21 JUL 98	22 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	21 JUL 98	22 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	21 JUL 98	22 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW16-040
LAB ID: 133106-0004-SA
Matrix: AQUEOUS — Sampled: 16 JUL 98 — Received: 16 JUL 98
Authorized: 16 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	21 JUL 98	22 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	21 JUL 98	22 JUL 98
Copper	0.031		1.0	0.020	mg/L	6010B	21 JUL 98	22 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW09-040
LAB ID: 133106-0005-SA
Matrix: AQUEOUS
Authorized: 16 JUL 98

Sampled: 16 JUL 98
Prepared: See Below

Received: 16 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	21 JUL 98	22 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	21 JUL 98	22 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	21 JUL 98	22 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW37-040
LAB ID: 133106-0006-SA
Matrix: AQUEOUS
Authorized: 16 JUL 98

Sampled: 16 JUL 98
Prepared: See Below

Received: 16 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	21 JUL 98	22 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	21 JUL 98	22 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	21 JUL 98	22 JUL 98

ND = Not Detected

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB02-040
LAB ID: 133106-0008-EB
Matrix: WATER-QA
Authorized: 16 JUL 98

Sampled: 16 JUL 98
Prepared: See Below

Received: 16 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010B	21 JUL 98	22 JUL 98
Chromium	ND		1.0	0.010	mg/L	6010B	21 JUL 98	22 JUL 98
Copper	ND		1.0	0.020	mg/L	6010B	21 JUL 98	22 JUL 98

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133106-0001-SA	AQUEOUS	QICP-A		21 JUL 98-QX	21 JUL 98-QA
133106-0002-SA	AQUEOUS	QICP-A		21 JUL 98-QX	21 JUL 98-QA
133106-0003-SA	AQUEOUS	QICP-A		21 JUL 98-QX	21 JUL 98-QA
133106-0004-SA	AQUEOUS	QICP-A		21 JUL 98-QX	21 JUL 98-QA
133106-0005-SA	AQUEOUS	QICP-A		21 JUL 98-QX	21 JUL 98-QA
133106-0006-SA	AQUEOUS	QICP-A		21 JUL 98-QX	21 JUL 98-QA
133106-0008-EB	AQUEOUS	QICP-A		21 JUL 98-QX	21 JUL 98-QA

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 133106

Category: QICP-A Method 6010B - ICP Metals
Matrix: AQUEOUS Date Analyzed: 22 JUL 98
QC Run: 21 JUL 98-QX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Cadmium	0.0500	0.0485	97	80-120
Chromium	0.200	0.207	103	80-115
Copper	0.250	0.266	107	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 133106

Category: QICP-A Method 6010B - ICP Metals
Matrix: AQUEOUS
Sample: 133106-0001
MS Run: 21 JUL 98-QA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Cadmium	ND	0.0486	0.0480	0.0500	97	96	1.1	80-120	20
Chromium	ND	0.204	0.209	0.200	102	105	2.8	80-115	20
Copper	0.00760 J	0.263	0.269	0.250	102	105	2.6	85-115	20

J = Result is detected below the reporting limit or is an estimated concentration.
ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 133106

Test: Q-ICP-AR Method 6010B - ICP Metals
Matrix: AQUEOUS
QC Run: 21 JUL 98-QX Date Analyzed: 22 JUL 98

Analyte	Result	Units	Reporting Limit
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Copper	ND	mg/L	0.020

ND = Not Detected

General Chemistry

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW14S-040
LAB ID: 133106-0001-SA
Matrix: AQUEOUS — Sampled: 16 JUL 98 — Received: 16 JUL 98
Authorized: 16 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	17 JUL 98
pH	7.3		1.0	NA	units	SW9040	NA	16 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15S-040
LAB ID: 133106-0002-SA
Matrix: AQUEOUS — Sampled: 16 JUL 98 — Received: 16 JUL 98
Authorized: 16 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	17 JUL 98
pH	7.5		1.0	NA	units	SW9040	NA	16 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15D-040
LAB ID: 133106-0003-SA
Matrix: AQUEOUS Sampled: 16 JUL 98 Received: 16 JUL 98
Authorized: 16 JUL 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	17 JUL 98
pH	7.6		1.0	NA	units	SW9040	NA	16 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW16-040
LAB ID: 133106-0004-SA
Matrix: AQUEOUS — Sampled: 16 JUL 98 — Received: 16 JUL 98
Authorized: 16 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	17 JUL 98
pH	7.2		1.0	NA	units	SW9040	NA	16 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW09-040
LAB ID: 133106-0005-SA
Matrix: AQUEOUS — Sampled: 16 JUL 98 — Received: 16 JUL 98
Authorized: 16 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	17 JUL 98
pH	6.7		1.0	NA	units	SW9040	NA	16 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW37-040
LAB ID: 133106-0006-SA
Matrix: AQUEOUS — Sampled: 16 JUL 98 — Received: 16 JUL 98
Authorized: 16 JUL 98 — Prepared: See Below — Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	17 JUL 98
pH	6.7		1.0	NA	units	SW9040	NA	16 JUL 98

ND = Not Detected

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB02-040
LAB ID: 133106-0008-EB
Matrix: WATER-QA
Authorized: 16 JUL 98

Sampled: 16 JUL 98
Prepared: See Below

Received: 16 JUL 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	17 JUL 98
pH	7.4		1.0	NA	units	SW9040	NA	16 JUL 98

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133106-0001-SA	AQUEOUS	QCR6-A		17 JUL 98-AX	17 JUL 98-AA
133106-0002-SA	AQUEOUS	QCR6-A		17 JUL 98-AX	17 JUL 98-AA
133106-0003-SA	AQUEOUS	QCR6-A		17 JUL 98-AX	17 JUL 98-AA
133106-0004-SA	AQUEOUS	QCR6-A		17 JUL 98-AX	17 JUL 98-AA
133106-0005-SA	AQUEOUS	QCR6-A		17 JUL 98-AX	17 JUL 98-AA
133106-0006-SA	AQUEOUS	QCR6-A		17 JUL 98-AX	17 JUL 98-AA
133106-0008-EB	AQUEOUS	QCR6-A		17 JUL 98-AX	17 JUL 98-AA

LABORATORY CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation
Project: 133106

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS Date Analyzed: 17 JUL 98
QC Run: 17 JUL 98-AX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Chromium, Hexavalent	0.0500	0.0512	102	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Wet Chemistry Analysis and Preparation
Project: 133106

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS
Sample: 133106-0001
MS Run: 17 JUL 98-AA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Chromium, Hexavalent	ND	0.0490	0.0468	0.0500	98	94	4.6	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation
Project: 133106

Test: Q-CR6-A Method SW7196 - Chromium, Hexavalent
Matrix: AQUEOUS
QC Run: 17 JUL 98-AX Date Analyzed: 17 JUL 98

Analyte	Result	Units	Reporting Limit
Chromium, Hexavalent	ND	mg/L	0.020

ND = Not Detected

QC LOT ASSIGNMENT REPORT - MS QC
GC/MS Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
133106-0001-SA	AQUEOUS	PH-A		16 JUL 98-AX	16 JUL 98-AB
133106-0002-SA	AQUEOUS	PH-A		16 JUL 98-AX	16 JUL 98-AB
133106-0003-SA	AQUEOUS	PH-A		16 JUL 98-AX	16 JUL 98-AB
133106-0004-SA	AQUEOUS	PH-A		16 JUL 98-AX	16 JUL 98-AB
133106-0005-SA	AQUEOUS	PH-A		16 JUL 98-AX	16 JUL 98-AB
133106-0006-SA	AQUEOUS	PH-A		16 JUL 98-AX	16 JUL 98-AB
133106-0008-EB	AQUEOUS	PH-A		16 JUL 98-AX	16 JUL 98-AB

LABORATORY CONTROL SAMPLE REPORT
GC/MS Preparation
Project: 133106

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS Date Analyzed: 16 JUL 98
QC Run: 16 JUL 98-AX
Concentration Units: units

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
pH	9.18	9.12	99	98-102

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX DUPLICATE QC REPORT
GC/MS Preparation
Project: 133106

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
Sample: 133106-0001
MS Run: 16 JUL 98-AB
Units: units

Analyte	Concentration Sample	Concentration Duplicate	%RPD SA-DU	Acceptance Limit
pH	7.30	7.30	0.0	30

Calculations are performed before rounding to avoid round-off errors in calculated results.

Appendix C
Completed COC Forms

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
Camp Dresser + McKee	Sharon Wallin	7-14-98	62544
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	
18881 Von Karman #650	949-752-5452 949-752-1307		Page 1 of 1

City	State	Zip Code	Site Contact	Lab Contact
Irvine	CA	92612	Ed Vigil	Diane Suzuki

Project Name: Phibro-Tech

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.: 2279-11462-FLD. FIEL

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cu, Cd, Cr	pH, Cr+6	Special Instructions/ Conditions of Receipt
PTI-MW01S-040	7-14-98	15:00	X							X			X			
↓	↓	↓							X					X		Field Filtered
↓	↓	↓					X								X	24 hr. HOLD time
PTI-TB01-040	↓	—								X			X			

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☒ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: [signature]	7-14-98	15:15	1. Received By: [signature]	7/14/98	1515
2. Relinquished By: [signature]	7/14/98	1700	2. Received By: [signature]	7/14/98	1700
3. Relinquished By			3. Received By		

Comments:

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
Camp Dresser + McKee	Sharon Wallin	7-15-98	66793
Address	Telephone Number (Area Code)/Fax Number: 949-752-5452 949-752-1307	Lab Number	Page 1 of 3
City / State / Zip Code	Site Contact: Ed Vigil	Lab Contact: Diane Suzuki	
Project Name: Phibro-Tech	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.: 2279-11462-FLD-FIEL			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cd,Cr,Cu	Cr+6, pH	Special Instructions/ Conditions of Receipt
PTI-MW01D-040	7-15-98	8:30							X			X			
↓	↓	↓	↓					X					X		Field filtered
↓	↓	↓	↓			X								X	24 hr. HOLD time
PTI-MW03-040		10:00							X			X			
↓	↓	↓	↓					X					X		Field filtered
↓	↓	↓	↓			X								X	24 hr. HOLD time
PTI-MW11-040		10:40							X			X			
↓	↓	↓	↓					X					X		Field filtered
↓	↓	↓	↓			X								X	24 hr HOLD
PTI-MW06D-040		11:45							X			X			
↓	↓	↓	↓					X					X		Field filtered
↓	↓	↓	↓			X								X	24 hr HOLD

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☑ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

Relinquished By	Date	Time	Received By	Date	Time
1. Leslie Dybsel	7-15-98	16:18	1. [signature]	7-15-98	16:18
2. [signature]	7-15-98	1715	2. [signature]	7/15/98	1715
3.			3.		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
CDM		7-15-98	66794
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page 2 of 3

City	State	Zip Code	Site Contact	Lab Contact

Project Name: Phibro-Tech

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cd, Cr, Cu	Cr+6, pH	Special Instructions/ Conditions of Receipt
~~MW~~ PTI--MW06B-040	7-15-98	12:30							X			X			
↓	↓	↓	↓					X					X		Field filtered
						X								X	24 hr HOLD
PTI-MW07-040		13:45							X			X			
								X					X		field filtered
↓		↓				X								X	24 hr HOLD
PTI-MW04A-040		15:00							X			X			
								X					X		field filtered
↓		↓				X								X	24 hr-HOLD
PTI-EB01-040		14:30							X			X			
								X					X		
↓	↓	↓	↓			X								X	24 hr. HOLD

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☒ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: Leslie Dybel	7-15-98	16:18	1. Received By: P Bautista	7-15-98	1618
2. Relinquished By: P Bautista	7-15-98	1715	2. Received By: [signature]	7/15/98	1715
3. Relinquished By:			3. Received By:		

Comments:

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
CDM		7-15-98	66795
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 3 of 3**

City	State	Zip Code	Site Contact	Lab Contact

Project Name: Phibro-Tech

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.:

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		Analysis (Attach list if more space is needed): 8260	Cd Cr Cu	Cl+6 pH	Special Instructions/ Conditions of Receipt
PTI-TB02-040	7-15-98		X							X				X			
PTI-MW04-040		15:50							X	X				X			
									X						X		Field filtered
							X									X	24 hr hold
PTI-MW35-040		16:00								X				X			
									X						X		Field filtered
							X									X	24 hr HOLD

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☑ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: Leslie Dybel	7-15-98	16:18	1. Received By: P Bautista	7-15-98	1618
2. Relinquished By: P Bautista	7-15-98	17 15	2. Received By: [signature]	7/15/98	
3. Relinquished By			3. Received By		

Comments:

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client: Camp Dresser & McKee	Project Manager: Sharon Wallin	Date: 7-16-98	Chain Of Custody Number: 66796
Address: 1888 L Von Karman	Telephone Number (Area Code)/Fax Number: 949-752-5452	Lab Number:	Page 1 of 2
City: Irvine; State: CA; Zip Code: 92612	Site Contact: Ed Vigil	Lab Contact: Suzuki	
Project Name: Phibro-Tech	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.: 2279-11462-111. FLD. FIEL			

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cd, Cr, Cu	Cr+6, pH	Special Instructions/ Conditions of Receipt
PTI-MW14S-040	7-16-98	9:00							X			X			*EDD requested.
↓		↓						X					X		field filtered
						X								X	24 hr. hold time
PTI-MW15S-040		9:50							X			X			
↓		↓						X					X		field filtered
						X								X	24 hr hold time
PTI-MW15D-040		10:40							X			X			
↓		↓						X					X		field filtered
						X								X	24 hr hold time
PTI-MW16-040		11:15							X			X			
↓	↓	↓	↓					X					X		field filtered
						X								X	24 hr hold time

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☑ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: J Dybel	7-16-98	13:40	1. Received By: R Bautista	7-16-98	1340
2. Relinquished By: R Bautista	7-16-98	1735	2. Received By: [illegible]	7/16/98	1735
3. Relinquished By:			3. Received By:		

Comments:

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client: CDM	Project Manager:	Date: 7-16-98	Chain Of Custody Number: 66797
Address:	Telephone Number (Area Code)/Fax Number:	Lab Number:	Page 2 of 2
City: / State: / Zip Code:	Site Contact:	Lab Contact:	
Project Name: Phibro-Tech	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.:			

Analysis (Attach list if more space is needed): 8260; Cd, Cr, Cu; Cr+6, pH

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cd, Cr, Cu	Cr+6, pH	Special Instructions/ Conditions of Receipt
PTI-MW09-040	7-16-98	13:00							X			X			* EDD requested.
↓	↓	↓						X					X		field filtered
↓						X								X	24 hr hold time
PTI-MW37-040		12:00							X			X			
↓		↓						X					X		field filtered
↓						X								X	24 hr hold
PTI-TB03-040		—							X			X			
PTI-EB02-040		11:40							X			X			
↓	↓	↓						X					X		
↓						X								X	24 hr hold time

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☒ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify):

1. Relinquished By: L Dybel	Date: 7-16-98	Time: 13:40	1. Received By: P Baulista	Date: 7-16-98	Time: 1340
2. Relinquished By: P Baulista	Date: 7-16-98	Time: 1735	2. Received By: Rodyaque Fort	Date: 7/16/98	Time: 1735
3. Relinquished By:	Date:	Time:	3. Received By:	Date:	Time:

Comments:

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Appendix D
Background Groundwater Concentrations

CITY OF SANTA FE SPRINGS

1996 ANNUAL WATER QUALITY REPORT

The City of Santa Fe Springs is pleased to provide the following Water Quality Report. Upon review, it should be obvious that water provided by the Santa Fe Springs Water Utility is safe, drinkable, and of good quality.

MONITORING PROGRAM

The City of Santa Fe Springs receives its water from two sources, the Metropolitan Water District (MWD) and local wells. Water from the MWD is imported from throughout the State and is regulated by the California Department of Health Services, and the Central Basin Municipal Water District (CBMWD) regulates groundwater. The City of Santa Fe Springs works with both agencies to test and monitor each source. Together, the MWD, CBMWD and City provide the safest water possible.

SANTA FE SPRINGS CITY COUNCIL

George Minnehan, Mayor
Donald S. Kemes, Mayor Pro Tem
Louie Gonzalez, Councilmember
Betty Putnam, Councilmember
Alfred L. Stump, Councilmember

CITY OF SANTA FE SPRINGS
WATER QUALITY REPORT

SAFETY STANDARDS

There are two types of standards that protect your water supply. Primary standards address contaminants that could affect our health. Secondary standards regulate chemicals that affect the aesthetic qualities of water, such as taste, odor and appearance. Regulations establish a Maximum Contaminant Level (MCL) for each. Santa Fe Springs sees to it that MCLs are met, and corrected if they are exceeded. Not all chemicals are regulated with MCLs, but many more chemicals are being added to the compliance list each year by the Department of Health Services and the U.S. Environmental Protection Agency. California also requires monitoring of unregulated chemicals.

Water treatment procedures have all but eliminated water-borne diseases. Media reports of cryptosporidium in water have been over exaggerated and there is little if any chance of it being present.

While the public is not at risk, cryptosporidium can prove life-threatening to people with compromised immune systems - such as chemotherapy patients, organ and bone marrow recipients or people infected with HIV or AIDS. As a precaution, people with such conditions should consult their doctor or health care provider to prevent infection from all potential sources. They may also boil their water for five minutes before consumption as a further precaution.

UNDERSTANDING THE WATER QUALITY REPORT

The information on the chart shows the results of various water quality analysis conducted during the year. When reading the list, you will note that Santa Fe Springs' water supply is of better quality than required by Federal and State standards.

This report is an important part of the City of Santa Fe Springs' ongoing water quality effort as required by the California Department of Health Services. If you have any questions about this information, please call 868-0511.

LEGEND

mg/l	=	MILLIGRAMS PER LITER (Parts per million)
ug/l	=	MICROGRAMS PER LITER (Parts per billion)
umhos/cm	=	MICROMHOS PER CENTIMETER
MCL	=	MAXIMUM CONTAMINANT LEVEL
MFL	=	MILLION FIBERS PER LITER (Longer than 10 um)
ND	=	NONE DETECTED
pCi/l	=	picoCuries PER LITER
NR	=	NOT ANALYZED
NR	=	NOT REQUIRED FOR COMPLIANCE PURPOSES
NC	=	NOT COLLECTED
W	=	MONITORING IS WAIVED (Based on vulnerability assessment, historic data and source susceptibility)

(a) Monitoring was completed for unregulated organics in addition to the regulated constituents listed. Results for all constituents were below detection levels unless otherwise noted.
(b) Fluoride results and MCL's are temperature dependent.
(c) Samples for this constituent were collected from points in the distribution system.
(d) The Metropolitan Water District of Southern California, which supplies the surface water, has developed a more accurate method to detect odors. This information is available upon request from the Metropolitan Water District.
(e) Action level based on sample results at customer tap.
(f) Secondary MCL indicated in parentheses.

CONSTITUENTS(a)	GROUNDWATER AVERAGE	GROUNDWATER RANGE	SURFACE WATER AVERAGE	SURFACE WATER RANGE	MCL (b)
GENERAL MINERAL - mg/l					
TOTAL HARDNESS	249	37-334	286	249-327	—
CALCIUM	72	13-99	69	60-80	—
MAGNESIUM	19	ND-35	23	34-32	—
SODIUM	75	39-126	97	88-112	—
POTASSIUM	3.1	1.4-4.2	4.5	3.9-5.1	—
TOTAL ALKALINITY (as CaCO3)	163	104-185	116	103-132	—
SULFATE	154	59-250	346	256-284	250-600 (f)
CHLORIDE	55	16-88	81	80-102	250-600 (f)
NITRATE (as NO3)	3.3	ND-12.0	.95	ND-1.63	45
NITRITE (as N)	ND	ND	ND	ND	1
FLUORIDE	0.47(b)	0.26-1.20	0.23	0.17-0.28	1.4-2.4
COPPER	0.13	ND-0.447	ND	ND	1 (e)
IRON	0.121	ND-0.525	ND	ND	0.3 (f)
MANGANESE	0.008	ND-0.051	ND	ND	0.05 (f)
ZINC	ND	ND	ND	ND	5 (f)
FOAMING AGENT (MBAS)	ND	ND	ND	ND	0.5 (f)
TOTAL DISSOLVED SOLIDS	500	258-729	617	541-715	500-1000(f)
GENERAL PHYSICAL					
pH (pH unit)	8.0	7.9-8.3	8.04	8.00-8.09	6.5-8.5 (f)
SPECIFIC CONDUCTANCE (umhos/cm)	771	250-1130	891	858-1114	900-2200(f)
UNITS OF COLOR	ND (c)	ND-8	2.5	1.8-4.0	15 (f)
THRESHOLD ODOR NO. (TON)	1 (c)	1-2	(d)	(d)	3 (f)
TURBIDITY (nu)	0.14(c)	0.10-0.30	0.08	0.06-0.10	5 (f)
RADIOLOGICAL - pCi/l					
GROSS ALPHA	1.6	ND-6.3	8.8	ND-11.7	15
URANIUM	5.3	4.0-8.0	4.8	3.3-5.7	20
GROSS BETA	NR	NR	7.3	1.2-11.2	50
INORGANICS - mg/l					
ANTIMONY	ND	ND	ND	ND	0.006
ARSENIC	ND	ND-0.002	0.002	ND-0.003	0.05
ASBESTOS	W	W	ND	ND	7 MFL
BARIUM	0.013	ND-0.110	0.12	0.11-0.13	1
BERYLLIUM	ND	ND	ND	ND	0.004
CADMIUM	ND	ND	ND	ND	0.005
CHROMIUM	ND	ND	ND	ND	0.05
CYANIDE	W	W	ND	ND	0.2
LEAD	ND	ND-0.008	ND	ND	0.015 (e)
MERCURY	ND	ND	ND	ND	0.002
NICKEL	ND	ND	0.004	0.003-0.008	0.1
SELENIUM	ND	ND	ND	ND	0.05
SILVER	ND	ND	ND	ND	0.1
THALLIUM	ND	ND	ND	ND	0.002
ALUMINUM	ND	ND	0.165	0.093-0.214	1 (0.2) (f)
ORGANICS - ug/l					
2, 4-D	ND	ND	ND	ND	70
2, 4, 5-TP SILVEX	W	W	NA	NA	50
ALACHLOR	W	W	ND	ND	2
ATRAZINE	ND	ND	ND	ND	3
SIMAZINE	ND	ND	ND	ND	4
BENTAZON	W	W	ND	ND	18
PICLORAM	W	W	ND	ND	0.2
CARBARYL	ND	ND	NA	NA	
CARBOFURAN	W	W	ND	ND	18
CHLORDANE	ND	ND	ND	ND	0.1
DALAPON	W	W	ND	ND	200
DINOSEB	W	W	ND	ND	7
DICAMBA	ND	ND	ND	ND	30
Di(2-ethylhexyl)adipate (DEHA)	W	W	ND	ND	400
Di(2-ethylhexyl)phthalate (DEHP)	W	W	ND	ND	4
ETHYLENE DIBROMIDE (EDB)	W	W	ND	ND	0.05
1, 2, DibromO-3-CHLOROPROPANE (DBCP)	W	W	ND	ND	0.2
ENDOTHALL	W	W	ND	ND	100
ENDRIN	W	W	ND	ND	2
GLYPHOSATE	ND	ND	ND	ND	700
HEPTACHLOR	W	W	ND	ND	0.01
HEPTACHLOR EPOXIDE	W	W	ND	ND	0.01
HEXACHLOROBENZENE	W	W	ND	ND	60
HEXACHLOROCYCLOPENTADIENE	W	W	ND	ND	50
LINDANE	W	W	ND	ND	0.2
METHOXYCHLOR	W	W	ND	ND	40
MOLINATE	W	W	ND	ND	20
OXAMYL (VYDATE)	W	W	ND	ND	200
PENTACHLOROPHENOL	W	W	ND	ND	1
PICLORAM	W	W	ND	ND	500
POLYCHLORINATED BIPHENYLS (PCB's)	W	W	ND	ND	0.5
THIOBENCARB	W	W	ND	ND	70
TOXAPHENE	W	W	ND	ND	3
2,3,7,8-TCDD (Dioxin)	W	W	ND	ND	3x10-8
TRIHALOMETHANES, TOTAL - TTHMS (c)	37.4	ND-86.8	38.5	30.5-84.6	100
BENZENE	ND	ND	ND	ND	1
CARBON TETRACHLORIDE	ND	ND	ND	ND	0.5
DICHLOROMETHANE	ND	ND	ND	ND	5
MONOCHLOROBENZENE	ND	ND	ND	ND	30
1,4-DICHLOROBENZENE	ND	ND	ND	ND	5
1,1-DICHLOROETHANE - 11DCA	ND	ND	ND	ND	5
1,2-DICHLOROETHANE - 12DCA	ND	ND	ND	ND	0.5
1,1-DICHLOROETHENE - 11DCE	ND	ND	ND	ND	6
cis-1,3-DICHLOROETHENE	ND	ND	ND	ND	6
trans-1,2-DICHLOROETHENE	ND	ND	ND	ND	10
1,2-DICHLOROPROPANE	ND	ND	ND	ND	5
1,3-DICHLOROPROPENE	ND	ND	ND	ND	0.5
ETHYLBENZENE	ND	ND	ND	ND	700
FLUOROTRICHLOROMETHANE - FREON 11	ND	ND	ND	ND	150
STYRENE	ND	ND	ND	ND	100
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	1
TETRACHLOROETHENE - PCE	1.1	ND-4.8	ND	ND	5
1,2,4-TRICHLOROBENZENE	ND	ND	ND	ND	70
TOLUENE	ND	ND	ND	ND	150
1,1,1-TRICHLOROETHANE -1,1,1TCA	ND	ND	ND	ND	200
1,1,2-TRICHLOROETHANE -1,1,2TCA	ND	ND	ND	ND	5
TRICHLOROETHENE - TCE	0.3	ND-1.2	ND	ND	5
TRICHLOROTRIFLUOROETHANE - FREON 113	ND	ND	ND	ND	1,200
VINYL CHLORIDE	ND	ND	ND	ND	0.5
XYLENES, TOTAL (m, p & o)	ND	ND	ND	ND	1750
COLIFORM BACTERIA (c)					
COLIFORM BACTERIA PA % POSITIVE	0	0	NA	NA	5
COLIFORM BACTERIA MF CFU/100ml	ND	ND	0.12	0-1.1	1
NO. OF ACUTE VIOLATIONS	0	0	0	0	0

Appendix E
Statistical Analysis

Appendix E-1
Calculation of Upper Tolerance Limits for Background

SUMMARY OF UPPER TOLERANCE LEVEL CALCULATIONS
Quarterly Background Data: January 1989 to July 1998
Southern California Chemical

POISSON DISTRIBUTED UPPER TOLERANCE LEVEL

COMPOUND	Hexa Chromium	Total Chromium	Cadmium	Copper	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Trichloroethene
Percent Detected	2.6	10.3	2.6	23.1	2.6	10.3	30.8	35.9	NOT
Sample number(n)	39	39	39	39	39	39	39	39	CALC.
Tn	0.5055	0.3781	0.1109	0.5635	11.6550	23.6050	36.7050	70.4550	
2Tn+2	3.01	2.76	2.22	3.13	25.31	49.21	75.41	142.91	
Chi Squared @95% of di	7.87	7.42	6.43	8.07	38.38	67.04	96.38	166.74	
lamda Tn	0.101	0.095	0.082	0.103	0.492	0.859	1.236	2.138	
Two time Lamda Tn	0.202	0.190	0.165	0.207	0.984	1.719	2.471	4.275	
Beta cov. @95%, deg fr.	2.48	2.43	2.32	2.51	4.66	6.23	7.60	10.38	
k, from 2k+2 deg fr.	0.24	0.22	0.16	0.25	1.33	2.12	2.80	4.19	

AITCHISON ADJUSTMENT AND CALCULATION OF UPPER TOLERANCE LEVELS

Number of ND(d)	NOT	35	NOT	30	NOT	35	27	25	NO ADJ. REQ.
Number of values(n)	CALC.	39	CALC.	39	CALC.	39	39	39	
Mean of det values		0.0485		0.028		1.800	1.400	4.925	
STD of det values		0.040		0.008		0.361	0.265	0.907	
Atch. Adj. mean/mean(1)		0.005		0.007		0.185	0.431	1.768	12.326
Atch. Adj. std./std. (1)		0.019		0.013		0.562	0.670	2.451	5.524
K for Tolerance Limit		2.292		2.292		2.292	2.292	2.292	1.000
Adjusted Tol. Limit		0.048		0.035		1.474	1.986	7.387	
Unadjusted Tol. Limit									17.849

(1) Unadjusted mean and std. used to compute upper tolerance level for TCE

Appendix E-2
Nonparametric ANOVA Results

Nonparametric

```
NPAR
>USE 'O:\2279-111\JUL98\1-11.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
     WELL$        PARAMID$          VALUE         LNVALUE        HDVALUE
  HDLNVALU

>BY PARAMID$

KRUSKAL VALUE * WELL$


UN 8/23/98 6:07:52 PM   O:\2279-111\JUL98\1-11.SYS

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = BEN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS    VALUE
  GROUPING VARIABLE IS     WELL$

    GROUP       COUNT   RANK SUM

  MW-11           39    1766.000
  MW-1S           39    1315.000


MANN-WHITNEY U TEST STATISTIC =     986.000
PROBABILITY IS        0.011
CHI-SQUARE APPROXIMATION =       6.508 WITH    1 DF          R


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = CD


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS    VALUE
  GROUPING VARIABLE IS     WELL$

    GROUP       COUNT   RANK SUM

  MW-11           39    1504.500
  MW-1S           39    1576.500


MANN-WHITNEY U TEST STATISTIC =     724.500
PROBABILITY IS        0.625
CHI-SQUARE APPROXIMATION =       0.239 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = CU


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS    VALUE
  GROUPING VARIABLE IS     WELL$

    GROUP       COUNT   RANK SUM

  MW-11           39    1545.500
  MW-1S           39    1535.500


MANN-WHITNEY U TEST STATISTIC =     765.500
PROBABILITY IS        0.951
CHI-SQUARE APPROXIMATION =       0.004 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = EBN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
```

```
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

   GROUP        COUNT   RANK SUM

MW-11            39     2233.000
MW-1S            39      848.000

MANN-WHITNEY U TEST STATISTIC =     1453.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       49.335 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP        COUNT   RANK SUM

MW-11            39     1523.000
MW-1S            39     1558.000

MANN-WHITNEY U TEST STATISTIC =      743.000
PROBABILITY IS        0.787
CHI-SQUARE APPROXIMATION =        0.073 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP        COUNT   RANK SUM

MW-11            39     2223.000
MW-1S            39      858.000

MANN-WHITNEY U TEST STATISTIC =     1443.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       46.553 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP        COUNT   RANK SUM

MW-11            39     1534.500
MW-1S            39     1546.500

MANN-WHITNEY U TEST STATISTIC =      754.500
PROBABILITY IS        0.935
CHI-SQUARE APPROXIMATION =        0.007 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TOL
```

```
KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  76 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-11           38    1952.500
  MW-1S           38     973.500

MANN-WHITNEY U TEST STATISTIC =     1211.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      28.676 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-11           39    2041.500
  MW-1S           39    1039.500

MANN-WHITNEY U TEST STATISTIC =     1261.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      25.922 WITH    1 DF
```

R

```
SUN 8/23/98 6:09:55 PM   O:\2279-111\JUL98\1-14S.SYS

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 628 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

  MW-14S        278   95816.500
  MW-1S         350  101689.500

MANN-WHITNEY U TEST STATISTIC =    57035.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      13.955 WITH    1 DF
```

R

```
BY PARAMID$

>KRUSKAL VALUE * WELL$

ON 8/23/98 6:10:12 PM   O:\2279-111\JUL98\1-14S.SYS

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

  MW-14S         31    1266.000
  MW-1S          39    1219.000

MANN-WHITNEY U TEST STATISTIC =     770.000
PROBABILITY IS        0.011
CHI-SQUARE APPROXIMATION =       6.492 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

  MW-14S         31    1119.500
  MW-1S          39    1365.500

MANN-WHITNEY U TEST STATISTIC =     623.500
PROBABILITY IS        0.740
CHI-SQUARE APPROXIMATION =       0.110 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

  MW-14S         31    1314.500
```

```
 MW-1S          39    1170.500

MANN-WHITNEY U TEST STATISTIC =     818.500
PROBABILITY IS        0.004
CHI-SQUARE APPROXIMATION =       8.520 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-14S          31    1475.000
  MW-1S           39    1010.000

MANN-WHITNEY U TEST STATISTIC =     979.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      21.115 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-14S          31    1348.500
  MW-1S           39    1136.500

MANN-WHITNEY U TEST STATISTIC =     852.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      12.335 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-14S          31    1671.000
  MW-1S           39     814.000

MANN-WHITNEY U TEST STATISTIC =    1175.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      45.551 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM
```

```
MW-14S          31     1576.000
MW-1S           39      909.000

MANN-WHITNEY U TEST STATISTIC =     1080.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       37.088 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  68 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT    RANK SUM

  MW-14S          30     1170.500
  MW-1S           38     1175.500

MANN-WHITNEY U TEST STATISTIC =      705.500
PROBABILITY IS        0.034
CHI-SQUARE APPROXIMATION =        4.476 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  70 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT    RANK SUM

  MW-14S          31     1272.500
  MW-1S           39     1212.500

MANN-WHITNEY U TEST STATISTIC =      776.500
PROBABILITY IS        0.031
CHI-SQUARE APPROXIMATION =        4.671 WITH    1 DF
```

R

```
NPAR
USE 'O:\2279-111\JUL98\1-15S.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
      WELL$        PARAMID$          VALUE         LNVALUE         HDVALUE
  HDLNVALU

>BY PARAMID$

KRUSKAL VALUE * WELL$

SUN 8/23/98 6:11:40 PM   O:\2279-111\JUL98\1-15S.SYS

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-15S          32    1149.000
  MW-1S           39    1407.000

MANN-WHITNEY U TEST STATISTIC =      621.000
PROBABILITY IS        0.952
CHI-SQUARE APPROXIMATION =        0.004 WITH    1 DF          A

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-15S          32    1228.000
  MW-1S           39    1328.000

MANN-WHITNEY U TEST STATISTIC =      700.000
PROBABILITY IS        0.206
CHI-SQUARE APPROXIMATION =        1.599 WITH    1 DF          A

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-15S          32    1088.000
  MW-1S           39    1468.000

MANN-WHITNEY U TEST STATISTIC =      560.000
PROBABILITY IS        0.312
CHI-SQUARE APPROXIMATION =        1.022 WITH    1 DF          A

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
  DEPENDENT VARIABLE IS     VALUE
```

```
GROUPING VARIABLE IS     WELL$

   GROUP       COUNT   RANK SUM

MW-15S          32     1343.500
MW-1S           39     1212.500

MANN-WHITNEY U TEST STATISTIC =      815.500
PROBABILITY IS        0.018
CHI-SQUARE APPROXIMATION =        5.568 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

MW-15S          32     1152.000
MW-1S           39     1404.000

MANN-WHITNEY U TEST STATISTIC =      624.000
PROBABILITY IS        1.000
CHI-SQUARE APPROXIMATION =        0.000 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

MW-15S          32      739.500
MW-1S           39     1816.500

MANN-WHITNEY U TEST STATISTIC =      211.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       22.753 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

MW-15S          32     1249.500
MW-1S           39     1306.500

MANN-WHITNEY U TEST STATISTIC =      721.500
PROBABILITY IS        0.132
CHI-SQUARE APPROXIMATION =        2.268 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  69 CASES
```

```
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

  GROUP        COUNT    RANK SUM

MW-15S          31     1209.500
MW-1S           38     1205.500

MANN-WHITNEY U TEST STATISTIC =      713.500
PROBABILITY IS        0.069
CHI-SQUARE APPROXIMATION =       3.301 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  71 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

  GROUP        COUNT    RANK SUM

MW-15S          32     1237.500
MW-1S           39     1318.500

MANN-WHITNEY U TEST STATISTIC =      709.500
PROBABILITY IS        0.292
CHI-SQUARE APPROXIMATION =       1.109 WITH    1 DF
```

A

```
)PAR
>USE 'O:\2279-111\JUL98\1-16.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
     WELL$        PARAMID$          VALUE          LNVALUE          HDVALUE
 HDLNVALU

>BY PARAMID$

RUSKAL VALUE * WELL$


N 8/23/98 6:13:18 PM   O:\2279-111\JUL98\1-16.SYS

HE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN


RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

  MW-16          26    1080.000
  MW-1S          39    1065.000


MANN-WHITNEY U TEST STATISTIC =      729.000
ROBABILITY IS        0.000
HI-SQUARE APPROXIMATION =       13.693 WITH    1 DF          R


HE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD


RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

  MW-16          26     852.500
  MW-1S          39    1292.500


ANN-WHITNEY U TEST STATISTIC =      501.500
PROBABILITY IS        0.902
CHI-SQUARE APPROXIMATION =        0.015 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

  MW-16          26     848.000
  MW-1S          39    1297.000


ANN-WHITNEY U TEST STATISTIC =      497.000
ROBABILITY IS        0.859
CHI-SQUARE APPROXIMATION =        0.031 WITH    1 DF          A


HE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN


RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
```

```
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

   GROUP        COUNT    RANK SUM

MW-16            26     1257.500
MW-1S            39      887.500

MANN-WHITNEY U TEST STATISTIC =      906.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       30.580 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

   GROUP        COUNT    RANK SUM

MW-16            26      826.000
MW-1S            39     1319.000

MANN-WHITNEY U TEST STATISTIC =      475.000
PROBABILITY IS        0.495
CHI-SQUARE APPROXIMATION =        0.466 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

   GROUP        COUNT    RANK SUM

MW-16            26     1342.500
MW-1S            39      802.500

MANN-WHITNEY U TEST STATISTIC =      991.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       42.141 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

   GROUP        COUNT    RANK SUM

MW-16            26      842.000
MW-1S            39     1303.000

MANN-WHITNEY U TEST STATISTIC =      491.000
PROBABILITY IS        0.707
CHI-SQUARE APPROXIMATION =        0.141 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TOL
```

```
KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  63 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-16           25    1062.500
  MW-1S           38     953.500


MANN-WHITNEY U TEST STATISTIC =      737.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      17.428 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  65 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-16           26    1154.000
  MW-1S           39     991.000


MANN-WHITNEY U TEST STATISTIC =      803.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      16.660 WITH    1 DF
```

R

```
BY PARAMID$

>KRUSKAL VALUE * WELL$


SUN 8/23/98 6:14:41 PM   O:\2279-111\JUL98\1-3.SYS

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1352.000
  MW-3            39    1729.000


MANN-WHITNEY U TEST STATISTIC =      572.000
PROBABILITY IS        0.012
CHI-SQUARE APPROXIMATION =        6.257 WITH    1 DF          R


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1540.500
  MW-3            39    1540.500


MANN-WHITNEY U TEST STATISTIC =      760.500
PROBABILITY IS        1.000
CHI-SQUARE APPROXIMATION =        0.000 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1600.500
  MW-3            39    1480.500


MANN-WHITNEY U TEST STATISTIC =      820.500
PROBABILITY IS        0.395
CHI-SQUARE APPROXIMATION =        0.722 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1243.000
```

```
 MW-3            39    1838.000

MANN-WHITNEY U TEST STATISTIC =      463.000
PROBABILITY IS        0.002
CHI-SQUARE APPROXIMATION =      10.000 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1522.500
  MW-3            39    1558.500

MANN-WHITNEY U TEST STATISTIC =      742.500
PROBABILITY IS        0.793
CHI-SQUARE APPROXIMATION =       0.069 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39     946.000
  MW-3            39    2135.000

MANN-WHITNEY U TEST STATISTIC =      166.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      35.341 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1504.000
  MW-3            39    1577.000

MANN-WHITNEY U TEST STATISTIC =      724.000
PROBABILITY IS        0.585
CHI-SQUARE APPROXIMATION =       0.298 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  76 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM
```

MW-1S	38	1215.000
MW-3	38	1711.000

MANN-WHITNEY U TEST STATISTIC = 474.000
PROBABILITY IS 0.002
CHI-SQUARE APPROXIMATION = 10.045 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 78 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	39	1323.000
MW-3	39	1758.000

MANN-WHITNEY U TEST STATISTIC = 543.000
PROBABILITY IS 0.021
CHI-SQUARE APPROXIMATION = 5.343 WITH 1 DF R

```
USE 'O:\2279-111\JUL98\1-4.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
      WELL$        PARAMID$          VALUE          LNVALUE          HDVALUE
  HDLNVALU

BY PARAMID$

>KRUSKAL VALUE * WELL$


SUN 8/23/98 6:16:01 PM   O:\2279-111\JUL98\1-4.SYS

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1009.500
  MW-4            39    2071.500


MANN-WHITNEY U TEST STATISTIC =      229.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       33.858 WITH    1 DF          R


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39     800.500
  MW-4            39    2280.500


MANN-WHITNEY U TEST STATISTIC =       20.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       58.762 WITH    1 DF          R


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1460.000
  MW-4            39    1621.000


MANN-WHITNEY U TEST STATISTIC =      680.000
PROBABILITY IS        0.325
CHI-SQUARE APPROXIMATION =        0.969 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$
```

```
   GROUP        COUNT   RANK SUM

  MW-1S          39     882.000
  MW-4           39    2199.000

MANN-WHITNEY U TEST STATISTIC =      102.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       44.979 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP        COUNT   RANK SUM

  MW-1S          39     780.000
  MW-4           39    2301.000

MANN-WHITNEY U TEST STATISTIC =        0.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       62.047 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP        COUNT   RANK SUM

  MW-1S          39     781.000
  MW-4           39    2300.000

MANN-WHITNEY U TEST STATISTIC =        1.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       57.666 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP        COUNT   RANK SUM

  MW-1S          39     780.000
  MW-4           39    2301.000

MANN-WHITNEY U TEST STATISTIC =        0.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       62.489 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  76 CASES
  DEPENDENT VARIABLE IS     VALUE
```

```
GROUPING VARIABLE IS     WELL$

   GROUP       COUNT   RANK SUM

MW-1S           38     899.000
MW-4            38    2027.000

MANN-WHITNEY U TEST STATISTIC =      158.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      38.861 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

MW-1S           39     844.500
MW-4            39    2236.500

MANN-WHITNEY U TEST STATISTIC =       64.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      49.830 WITH    1 DF
```

R

```
NPAR
USE 'O:\2279-111\JUL98\1-6B.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
      WELL$        PARAMID$          VALUE         LNVALUE         HDVALUE
  HDLNVALU

>BY PARAMID$

KRUSKAL VALUE * WELL$


SUN 8/23/98 6:17:35 PM   O:\2279-111\JUL98\1-6B.SYS

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

  MW-1S           39     1433.500
  MW-6B           35     1341.500


MANN-WHITNEY U TEST STATISTIC =      653.500
PROBABILITY IS        0.636
CHI-SQUARE APPROXIMATION =        0.224 WITH    1 DF


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

  MW-1S           39     1423.500
  MW-6B           35     1351.500


MANN-WHITNEY U TEST STATISTIC =      643.500
PROBABILITY IS        0.536
CHI-SQUARE APPROXIMATION =        0.384 WITH    1 DF


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

  MW-1S           39     1549.500
  MW-6B           35     1225.500


MANN-WHITNEY U TEST STATISTIC =      769.500
PROBABILITY IS        0.168
CHI-SQUARE APPROXIMATION =        1.900 WITH    1 DF


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
  DEPENDENT VARIABLE IS     VALUE
```

```
GROUPING VARIABLE IS     WELL$

   GROUP       COUNT   RANK SUM

MW-1S           39    1315.000
MW-6B           35    1460.000

MANN-WHITNEY U TEST STATISTIC =      535.000
PROBABILITY IS        0.086
CHI-SQUARE APPROXIMATION =       2.951 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

MW-1S           39    1480.000
MW-6B           35    1295.000

MANN-WHITNEY U TEST STATISTIC =      700.000
PROBABILITY IS        0.775
CHI-SQUARE APPROXIMATION =       0.082 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

MW-1S           39    1626.500
MW-6B           35    1148.500

MANN-WHITNEY U TEST STATISTIC =      846.500
PROBABILITY IS        0.076
CHI-SQUARE APPROXIMATION =       3.156 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT   RANK SUM

MW-1S           39    1303.000
MW-6B           35    1472.000

MANN-WHITNEY U TEST STATISTIC =      523.000
PROBABILITY IS        0.024
CHI-SQUARE APPROXIMATION =       5.063 WITH    1 DF
```

P

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  72 CASES
```

```
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

   GROUP        COUNT    RANK SUM

MW-1S            38     1231.000
MW-6B            34     1397.000


MANN-WHITNEY U TEST STATISTIC =      490.000
PROBABILITY IS        0.045
CHI-SQUARE APPROXIMATION =        4.017 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
         PARAMID$     = TX


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

   GROUP        COUNT    RANK SUM

MW-1S            39     1347.000
MW-6B            35     1428.000


MANN-WHITNEY U TEST STATISTIC =      567.000
PROBABILITY IS        0.176
CHI-SQUARE APPROXIMATION =        1.832 WITH    1 DF
```

A

```
MANN-WHITNEY U TEST STATISTIC =      742.500
PROBABILITY IS        0.793
CHI-SQUARE APPROXIMATION =        0.069 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT    RANK SUM

  MW-1S          39     1402.500
  MW-7           39     1678.500

MANN-WHITNEY U TEST STATISTIC =      622.500
PROBABILITY IS        0.104
CHI-SQUARE APPROXIMATION =        2.640 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT    RANK SUM

  MW-1S          39     1266.500
  MW-7           39     1814.500

MANN-WHITNEY U TEST STATISTIC =      486.500
PROBABILITY IS        0.003
CHI-SQUARE APPROXIMATION =        8.572 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT    RANK SUM

  MW-1S          39     1521.000
  MW-7           39     1560.000

MANN-WHITNEY U TEST STATISTIC =      741.000
PROBABILITY IS        0.777
CHI-SQUARE APPROXIMATION =        0.080 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

   GROUP       COUNT    RANK SUM

  MW-1S          39      828.000
  MW-7           39     2253.000
```

```
MANN-WHITNEY U TEST STATISTIC =      48.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      50.750 WITH    1 DF


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1451.500
  MW-7            39    1629.500

MANN-WHITNEY U TEST STATISTIC =     671.500
PROBABILITY IS        0.218
CHI-SQUARE APPROXIMATION =       1.517 WITH    1 DF        A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  76 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           38    1266.000
  MW-7            38    1660.000

MANN-WHITNEY U TEST STATISTIC =     525.000
PROBABILITY IS        0.009
CHI-SQUARE APPROXIMATION =       6.746 WITH    1 DF        R


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1424.000
  MW-7            39    1657.000

MANN-WHITNEY U TEST STATISTIC =     644.000
PROBABILITY IS        0.208
CHI-SQUARE APPROXIMATION =       1.586 WITH    1 DF        A
```

```
NPAR
>USE 'O:\2279-111\JUL98\1-9.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
      WELL$        PARAMID$          VALUE         LNVALUE        HDVALUE
  HDLNVALU

>BY PARAMID$

KRUSKAL VALUE * WELL$


ON 8/23/98 6:20:30 PM   O:\2279-111\JUL98\1-9.SYS

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1040.000
  MW-9            39    2041.000


MANN-WHITNEY U TEST STATISTIC =      260.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       29.298 WITH    1 DF          R


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1522.500
  MW-9            39    1558.500


MANN-WHITNEY U TEST STATISTIC =      742.500
PROBABILITY IS        0.793
CHI-SQUARE APPROXIMATION =        0.069 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1635.500
  MW-9            39    1445.500


MANN-WHITNEY U TEST STATISTIC =      855.500
PROBABILITY IS        0.178
CHI-SQUARE APPROXIMATION =        1.811 WITH    1 DF          A


THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = EBN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
```

```
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

  GROUP        COUNT    RANK SUM

MW-1S           39      977.500
MW-9            39     2103.500

MANN-WHITNEY U TEST STATISTIC =      197.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       33.200 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

  GROUP        COUNT    RANK SUM

MW-1S           39     1406.500
MW-9            39     1674.500

MANN-WHITNEY U TEST STATISTIC =      626.500
PROBABILITY IS        0.075
CHI-SQUARE APPROXIMATION =        3.165 WITH    1 DF
```

A

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

  GROUP        COUNT    RANK SUM

MW-1S           39      789.500
MW-9            39     2291.500

MANN-WHITNEY U TEST STATISTIC =        9.500
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =       56.366 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
DEPENDENT VARIABLE IS     VALUE
GROUPING VARIABLE IS      WELL$

  GROUP        COUNT    RANK SUM

MW-1S           39     1367.500
MW-9            39     1713.500

MANN-WHITNEY U TEST STATISTIC =      587.500
PROBABILITY IS        0.024
CHI-SQUARE APPROXIMATION =        5.076 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
        PARAMID$     = TOL
```

```
KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  76 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           38     936.000
  MW-9            38    1990.000


MANN-WHITNEY U TEST STATISTIC =      195.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      33.897 WITH    1 DF
```

R

```
THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = TX


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  78 CASES
  DEPENDENT VARIABLE IS     VALUE
  GROUPING VARIABLE IS      WELL$

    GROUP       COUNT   RANK SUM

  MW-1S           39    1013.000
  MW-9            39    2068.000


MANN-WHITNEY U TEST STATISTIC =      233.000
PROBABILITY IS        0.000
CHI-SQUARE APPROXIMATION =      29.473 WITH    1 DF
```

R

Appendix E-3
Parametric ANOVA Results

Parametric

```
JGLH
CATEGORY WELL$
>COVAR
>ANOVA HDVALUE
RINT=MEDIUM
STIMATE

N 8/23/98 5:53:05 PM   O:\2279-111\JUL98\1-11.SYS
EVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-11        MW-1S

EP VAR: HDVALUE      N:      78  MULTIPLE R: 0.589  SQUARED MULTIPLE R: 0.347

                      ANALYSIS OF VARIANCE

OURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$           469138.726    1   469138.726      40.397       0.000

RROR            882610.552   76    11613.297

EAST SQUARES MEANS.

                                  LS MEAN          SE      N
     WELL$   =MW-11               167.949       17.256     39

     WELL$   =MW-1S                12.841       17.256     39

RINT=SHORT

>CATEGORY WELL$
>COVAR
NOVA HDLNVALU
RINT=MEDIUM
>STIMATE

N 8/23/98 5:53:20 PM   O:\2279-111\JUL98\1-11.SYS
EVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-11        MW-1S

EP VAR:HDLNVALU      N:      78  MULTIPLE R: 0.696  SQUARED MULTIPLE R: 0.484

                      ANALYSIS OF VARIANCE

OURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$               86.459    1       86.459      71.257       0.000

RROR                92.215   76        1.213

EAST SQUARES MEANS.

                                  LS MEAN          SE      N
     WELL$   =MW-11                 4.563        0.176     39

     WELL$   =MW-1S                 2.458        0.176     39

RINT=SHORT
```

```
CATEGORY WELL$
>COVAR
>ANOVA HDVALUE
PRINT=MEDIUM
ESTIMATE

UN 8/23/98 5:57:01 PM   O:\2279-111\JUL98\1-14S.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-14S       MW-1S


DEP VAR: HDVALUE      N:      70  MULTIPLE R: 0.653  SQUARED MULTIPLE R: 0.426

                        ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$            25362.103     1    25362.103      50.423       0.000

ERROR            34203.348    68      502.990


LEAST SQUARES MEANS.

                                   LS MEAN          SE       N
     WELL$   =MW-14S               51.161        4.028      31

     WELL$   =MW-1S                12.841        3.591      39


PRINT=SHORT

>CATEGORY WELL$
>COVAR
ANOVA HDLNVALU
PRINT=MEDIUM
ESTIMATE

N 8/23/98 5:57:30 PM   O:\2279-111\JUL98\1-14S.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-14S       MW-1S


DEP VAR:HDLNVALU      N:      70  MULTIPLE R: 0.783  SQUARED MULTIPLE R: 0.613

                        ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$                29.605     1       29.605     107.654       0.000

ERROR                18.700    68        0.275


LEAST SQUARES MEANS.

                                   LS MEAN          SE       N
     WELL$   =MW-14S                3.767        0.094      31

     WELL$   =MW-1S                 2.458        0.084      39


PRINT=SHORT
```

```
CATEGORY WELL$
>COVAR
>ANOVA HDVALUE
PRINT=MEDIUM
ESTIMATE

ON 8/23/98 5:58:44 PM   O:\2279-111\JUL98\1-15S.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-15S       MW-1S


DEP VAR: HDVALUE      N:      71  MULTIPLE R: 0.493  SQUARED MULTIPLE R: 0.244

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$              715.850     1      715.850      22.214       0.000

ERROR             2223.572    69       32.226


LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
     WELL$   =MW-15S                 6.459       1.004     32

     WELL$   =MW-1S                 12.841       0.909     39


PRINT=SHORT

>CATEGORY WELL$
>COVAR
ANOVA HDLNVALU
PRINT=MEDIUM
ESTIMATE

ON 8/23/98 5:58:52 PM   O:\2279-111\JUL98\1-15S.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-15S       MW-1S


DEP VAR:HDLNVALU      N:      71  MULTIPLE R: 0.586  SQUARED MULTIPLE R: 0.344

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$               14.787     1       14.787      36.119       0.000

ERROR               28.249    69        0.409


LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
     WELL$   =MW-15S                 1.540       0.113     32

     WELL$   =MW-1S                  2.458       0.102     39
```

R

R

```
UN 8/23/98 5:59:51 PM   O:\2279-111\JUL98\1-16.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-16        MW-1S


DEP VAR: HDVALUE      N:      65  MULTIPLE R: 0.715  SQUARED MULTIPLE R: 0.511

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$            16210.788     1    16210.788      65.944       0.000

ERROR            15487.001    63      245.825


LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
      WELL$   =MW-16                45.077        3.075     26

      WELL$   =MW-1S                12.841        2.511     39


PRINT=SHORT

>CATEGORY WELL$
COVAR
ANOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE


SUN 8/23/98 6:00:00 PM   O:\2279-111\JUL98\1-16.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-16        MW-1S


DEP VAR:HDLNVALU      N:      65  MULTIPLE R: 0.780  SQUARED MULTIPLE R: 0.609

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$                23.360    1       23.360      97.996       0.000

ERROR                15.018   63        0.238


LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
      WELL$   =MW-16                3.681        0.096     26

      WELL$   =MW-1S                2.458        0.078     39


>PRINT=SHORT
```

```
USE 'O:\2279-111\JUL98\1-3.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
      WELL$        PARAMID$          VALUE         LNVALUE        HDVALUE
  HDLNVALU

>SELECT PARAMID$ ="TCE"

CATEGORY WELL$
COVAR
>ANOVA HDVALUE
>PRINT=MEDIUM
>ESTIMATE


SUN 8/23/98 6:00:44 PM   O:\2279-111\JUL98\1-3.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
MW-1S        MW-3


DEP VAR: HDVALUE      N:      78  MULTIPLE R: 0.565  SQUARED MULTIPLE R: 0.319

                        ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO        P

WELL$             25261.201    1    25261.201      35.671       0.000          R

ERROR             53821.321   76      708.175


LEAST SQUARES MEANS.

                                   LS MEAN           SE       N
     WELL$   =MW-1S                 12.841        4.261      39

     WELL$   =MW-3                  48.833        4.261      39


>PRINT=SHORT

CATEGORY WELL$
COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
ESTIMATE


SUN 8/23/98 6:00:53 PM   O:\2279-111\JUL98\1-3.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
MW-1S        MW-3


DEP VAR:HDLNVALU      N:      78  MULTIPLE R: 0.663  SQUARED MULTIPLE R: 0.439

                        ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO        P

WELL$               25.247    1       25.247      59.502       0.000          R

ERROR               32.248   76        0.424


LEAST SQUARES MEANS.

                                   LS MEAN           SE       N
     WELL$   =MW-1S                  2.458        0.104      39
```

```
    WELL$   =MW-3                3.595        0.104     39

PRINT=SHORT
```

```
SUN 8/23/98 6:01:53 PM   O:\2279-111\JUL98\1-4.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
MW-1S        MW-4


DEP VAR: HDVALUE      N:      78  MULTIPLE R: 0.840  SQUARED MULTIPLE R: 0.706

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$            672614.695    1   672614.695     182.775       0.000

ERROR            279680.744   76     3680.010

LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
     WELL$   =MW-1S                 12.841       9.714     39

     WELL$   =MW-4                 198.564       9.714     39

>PRINT=SHORT

CATEGORY WELL$
COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
ESTIMATE

SUN 8/23/98 6:02:03 PM   O:\2279-111\JUL98\1-4.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
MW-1S        MW-4


DEP VAR:HDLNVALU      N:      78  MULTIPLE R: 0.939  SQUARED MULTIPLE R: 0.882

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$             144.254    1      144.254     570.252       0.000

ERROR              19.225   76        0.253

LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
     WELL$   =MW-1S                  2.458       0.081     39

     WELL$   =MW-4                   5.177       0.081     39

>PRINT=SHORT
```

```
CATEGORY WELL$
>COVAR
>ANOVA HDVALUE
PRINT=MEDIUM
ESTIMATE

UN 8/23/98 6:02:58 PM   O:\2279-111\JUL98\1-6B.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-1S        MW-6B

DEP VAR: HDVALUE      N:      74  MULTIPLE R: 0.142  SQUARED MULTIPLE R: 0.020

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$              282.062     1      282.062       1.481       0.228

ERROR            13714.402    72      190.478

LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
     WELL$   =MW-1S                 12.841       2.210     39

     WELL$   =MW-6B                 16.751       2.333     35

PRINT=SHORT

>CATEGORY WELL$
>COVAR
ANOVA HDLNVALU
PRINT=MEDIUM
ESTIMATE

N 8/23/98 6:03:07 PM   O:\2279-111\JUL98\1-6B.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-1S        MW-6B

DEP VAR:HDLNVALU      N:      74  MULTIPLE R: 0.160  SQUARED MULTIPLE R: 0.026

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO       P

WELL$               1.400     1        1.400       1.891       0.173

ERROR              53.295    72        0.740

LEAST SQUARES MEANS.

                                   LS MEAN          SE      N
     WELL$   =MW-1S                  2.458       0.138     39

     WELL$   =MW-6B                  2.182       0.145     35

PRINT=SHORT
```

```
USE 'O:\2279-111\JUL98\1-7.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
      WELL$        PARAMID$          VALUE         LNVALUE         HDVALUE
  HDLNVALU

>CATEGORY WELL$
>COVAR
>ANOVA HDVALUE
>PRINT=MEDIUM
>ESTIMATE


JN 8/23/98 6:03:57 PM   O:\2279-111\JUL98\1-7.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-1S        MW-7


DEP VAR: HDVALUE      N:     700  MULTIPLE R: 0.181  SQUARED MULTIPLE R: 0.033

                         ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO        P

WELL$              8425.278    1     8425.278      23.605       0.000

ERROR            249139.427  698      356.933


LEAST SQUARES MEANS.

                                   LS MEAN           SE       N
      WELL$    =MW-1S                1.841        1.010     350

      WELL$    =MW-7                 8.779        1.010     350


PRINT=SHORT

>CATEGORY WELL$
>COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE

JN 8/23/98 6:04:07 PM   O:\2279-111\JUL98\1-7.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-1S        MW-7


DEP VAR:HDLNVALU      N:     700  MULTIPLE R: 0.082  SQUARED MULTIPLE R: 0.007

                         ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO        P

WELL$                42.798    1       42.798       4.754       0.030

ERROR              6283.904  698        9.003


LEAST SQUARES MEANS.

                                   LS MEAN           SE       N
      WELL$    =MW-1S               -2.232        0.160     350

      WELL$    =MW-7                -1.738        0.160     350
```

```
>PRINT=SHORT
```

```
USE 'O:\2279-111\JUL98\1-9.SYS'
VARIABLES IN SYSTAT RECT FILE ARE:
      WELL$        PARAMID$          VALUE         LNVALUE         HDVALUE
   HDLNVALU

SELECT PARAMID$ ="TCE"

>CATEGORY WELL$
COVAR
ANOVA HDVALUE
>PRINT=MEDIUM
>ESTIMATE

SUN 8/23/98 6:04:46 PM   O:\2279-111\JUL98\1-9.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-1S        MW-9


DEP VAR: HDVALUE      N:      78  MULTIPLE R: 0.599  SQUARED MULTIPLE R: 0.359

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO        P

WELLS           2043858.031     1  2043858.031      42.590       0.000          R

ERROR           3647216.590    76    47989.692


LEAST SQUARES MEANS.

                                        LS MEAN          SE       N
     WELL$    =MW-1S                     12.841      35.079      39

     WELL$    =MW-9                     336.590      35.079      39


>PRINT=SHORT

>CATEGORY WELL$
>COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE

SUN 8/23/98 6:04:55 PM   O:\2279-111\JUL98\1-9.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
 MW-1S        MW-9


DEP VAR:HDLNVALU      N:      78  MULTIPLE R: 0.841  SQUARED MULTIPLE R: 0.707

                      ANALYSIS OF VARIANCE

SOURCE        SUM-OF-SQUARES   DF  MEAN-SQUARE     F-RATIO        P

WELL$             153.910     1      153.910     183.818       0.000          R

ERROR              63.634    76        0.837


LEAST SQUARES MEANS.

                                        LS MEAN          SE       N
     WELL$    =MW-1S                      2.458       0.147      39
```

```
WELL$   =MW-9                5.267        0.147      39

RINT=SHORT
```