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REPORTS

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1997 Annual Groundwater Monitoring and Sampling Report
GPM - Monument Booster Station
Lea County, New Mexico

DECEMBER 1, 1997

Prepared For:

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GPM - Monument Booster Station
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12-1-97

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12/1/97

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Senior Program Director

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1.0 Executive Summary

BDM International, Inc. (BDM) was retained by GPM Gas Corporation (GPM) to perform the sampling and monitoring operations at the Monument Booster Station. This 1997 annual report documents the two semi-annual sampling events performed by BDM at the GPM Monument Booster Station on January 22, 1997 and August 11, 1997. The report also contains the historical groundwater elevation and analytical data since the beginning of the project in May 1995. This monitoring and sampling program was conducted in accordance with the guidelines specified by Mr. Bill Olson of the New Mexico Oil Conservation Division (OCD) as specified in his letter dated January 31, 1997.

Based on the sampling and monitoring data to date, the following conclusions relevant to groundwater conditions and remediation system performance at the Monument Booster Station are evident:

- BTEX concentrations in all of the sampled monitoring wells were non-detectable and below New Mexico Water Quality Control Commission (WQCC) standards with the exception of benzene in MW-7 (0.317 mg/l).
- Benzene concentrations in MW-7 fluctuate over time but have declined from a high of 1.130 mg/l on January 17, 1996 to a concentration of 0.317 mg/l on August 11, 1997.
- As of August 11, 1997, a total of approximately 73 gallons of free product (condensate) has been removed from monitoring wells MW-1 and MW-5 using a combination of gravity siphoning, hand bailing and pneumatic pump recovery methods. Free product thicknesses have been less than 0.01 feet since the installation of pneumatic product recovery pumps in MW-1 and MW-5 on January 27, 1997.
- The dissolved-phase hydrocarbons in groundwater are contained within the boundaries of the facility.
- The fact that there has been no increase of BTEX concentrations over detection limits in downgradient monitoring wells MW-3, MW-4 and MW-6 is strong evidence that natural attenuation processes have kept the plume from migrating.
- Continued semi-annual monitoring is necessary to demonstrate that the plume is maintaining a steady state or receding condition and to evaluate the effectiveness of intrinsic bioremediation in limiting the migration or elimination of the dissolved hydrocarbon plume.

The following recommendations are suggested for the remediation system and monitoring operations at the Monument Booster Station.

- Continue free product recovery operations since the present system has been effective in recovering free product from MW-1 and MW-5.
- Continue the sampling and monitoring program on a semi-annual basis. The next sampling event is scheduled during the first quarter of 1998.
- Since the groundwater is not adversely impacted with inorganic constituents, as reported throughout the previous two years, analysis of dissolved metals and major ions is an

unnecessary expense. Further analysis of the WQCC metals and major ions should be discontinued with the exception of manganese, chloride, sulfate, nitrate, fluoride and TDS.

2.0 Chronology of Events

July 1992	Benge Construction Company of Lovington, New Mexico removed three underground storage tanks (USTs) near the main compressor building for ENRON at the Hobbs Compressor Station #2). The USTs formally contained used oil and pipeline liquids (oil and/or natural gas liquid condensate). Hydrocarbon-impacted soils were removed from the used oil and pipeline liquids UST tank holds.
February 4, 1994	Geoscience Consultants Ltd (GCL) installed two monitoring wells (MW-1 and MW-2) during a subsurface investigation for ENRON. Hydrocarbon-impacted groundwater was confirmed in MW-1.
May 17, 1994	Benge Construction Company returned during a subsurface investigation conducted by Daniel B. Stevens and Associates (DBS&A) and removed an additional amount of hydrocarbon-impacted soils from the pipeline liquids and used oil UST tank holds. The amount of hydrocarbon-impacted soils removed from the used oil and pipeline liquids UST tank holds in 1992 and 1994 was not well documented, however it was estimated by DBS&A that a total of 1,064 cubic yards were excavated from the two tank holds based on the amount of backfill required to fill the excavations.
May 16-19, 1994	Six soil borings (SB-1 through SB-6) were completed as temporary drive point wells for ENRON by DBS&A to delineate the horizontal extent of hydrocarbon-impacted soils and groundwater.
October 7, 1994	The OCD requested ENRON to provide a work plan to completely define the extent of groundwater contamination at the Hobbs Compressor Station #2 site.
November 1994	GPM Gas Corporation (GPM) acquired ownership and operation of the Monument Booster Station (formerly Hobbs Compressor Station #2) from ENRON.
February 23, 1995	GPM submitted a subsurface investigation work plan to the OCD to address the groundwater conditions at Monument Booster Station.
April 5, 1995	The OCD approved the subsurface investigation work plan for Monument Booster Station.
May 8-10, 1995	GCL completed a subsurface investigation for GPM to delineate the extent of the hydrocarbon-impacted groundwater. The investigation included the installation and sampling of four monitoring wells (MW-1D, MW-3, MW-4, and MW-5) and one soil boring (SB-7).
July 28, 1995	GPM submitted the *Subsurface Investigation and Preliminary Remedial Response* report for the Monument Booster Station to the OCD.
August 24, 1995	The OCD approved GPM's recommendations for remedial action. The OCD requested a work plan for an additional monitoring well, new recovery well and product recovery system.

September 29, 1995	GPM submitted the *Remediation and Monitoring Work Plan for the Monument Booster Station* to the OCD.
October 25, 1995	The OCD approved the remediation and monitoring work plan for Monument Booster Station.
November 14-16, 1995	GCL installed two additional monitoring wells (MW-6 and MW-7) and conducted the fourth quarter 1995 sampling event at Monument Booster Station.
January 18, 1996	GCL conducted the first quarter 1996 sampling event at Monument Booster Station.
April 24, 1996	GCL conducted the annual (second quarter 1996) sampling event at Monument Booster Station. The annual report included recommendations to the OCD for remedial response.
January 22, 1997	BDM International, Inc. (formerly GCL) conducted the first quarter 1997 sampling event at Monument Booster Station.
January 31, 1997	The OCD completed the review of the annual report for the second quarter 1996 sampling event and approved the groundwater monitoring modifications for Monument Booster Station.
January 31, 1997	BDM International, Inc. (BDM) and GPM installed an automated pneumatic product recovery pump system in monitoring wells MW-1 and MW-5 to replace the hand bailing and gravity siphoning techniques used previously.
August 11, 1997	BDM conducted the annual (third quarter 1997) sampling event at Monument Booster Station.

3.0 Procedures

Prior to sampling, the on-site monitoring wells (MW-1 through MW-7) were gauged for depth to groundwater using a Keck Model KIR-96 oil/water interface probe. Immediately prior to collecting groundwater samples, each monitoring well was purged of a minimum of three well casing volumes of water using clean, decontaminated PVC bailers. A total of 129 gallons and 119 gallons of water was purged from monitoring wells MW-1D, MW-2, MW-3, MW-4, MW-6, and MW-7 during the January 22, 1997 and August 11, 1997 sampling events, respectively. Groundwater samples were obtained using a new, decontaminated, disposable bailer for each well after purging. Groundwater parameters, including pH, conductivity, temperature, and dissolved oxygen (DO) were measured after purging using a Hydac Model 910 pH/conductivity meter and a YSI Model 51B DO meter.

The first set of water samples were transferred into air-tight, septum-sealed, 40-ml glass VOA sample vials with zero head space for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020. A duplicate sample of MW-7 was collected during both sampling events. The next set of water samples were transferred into appropriately preserved containers for analysis of nitrate (NO_3) and sulfate (SO_4), to assess the efficacy of intrinsic bioremedial activity currently taking place. During the annual sampling event on August 11, 1997, a third and fourth set of water samples were transferred into appropriately preserved containers for analysis of major ions and WQCC metals. A summary of purging and sampling methods is provided in Table 1 below. Chain-of-custody (COC) forms documenting sample identification numbers, collection times, and delivery times to the laboratories were completed for each set of samples. The water samples were placed in an ice-filled cooler immediately after collection and shipped to Trace Analysis, Inc. of Lubbock, Texas for laboratory analysis.

Table 1
Summary of Purging and Sampling Methods

Monitoring Well No.	Sample Date	Purge Method	Purge Volume (gallons)	Sampling Method	Groundwater Analytes
MW-1D	1/22/97	Bailer	4	Disposable bailer	BTEX and Bio-indicators
	8/11/97	Bailer	9	Disposable bailer	BTEX, Metals, Ions, Bio-indicators
MW-2	1/22/97	Bailer	25	Disposable bailer	BTEX and Bio-indicators
	8/11/97	Bailer	25	Disposable bailer	BTEX, Metals, Ions, Bio-indicators
MW-3	1/22/97	Bailer	25	Disposable bailer	BTEX and Bio-indicators
	8/11/97	Bailer	18	Disposable bailer	BTEX, Metals, Ions, Bio-indicators
MW-4	1/22/97	Bailer	25	Disposable bailer	BTEX and Bio-indicators
	8/11/97	Bailer	15	Disposable bailer	BTEX, Metals, Ions, Bio-indicators
MW-6	1/22/97	Bailer	25	Disposable bailer	BTEX and Bio-indicators
	8/11/97	Bailer	25	Disposable bailer	BTEX, Metals, Ions, Bio-indicators
MW-7	1/22/97	Bailer	25	Disposable bailer	BTEX and Bio-indicators
	8/11/97	Bailer	25	Disposable bailer	BTEX, Metals, Ions, Bio-indicators

BTEX - benzene, toluene, ethylbenzene, xylenes
WQCC Metals - Ag, Al, As, B, Ba, Cd, Co, Cu, Cr, Fe, Hg, Pb, Mn, Mo, Ni, Se, and Zn
Major ions - TDS, Ca, Na, Mg, F, Cl, HCO_3, SO_4
Bio-indicatoras - DO, NO_3, SO_4
MW-1 and MW-5 not sampled due to presence of product.

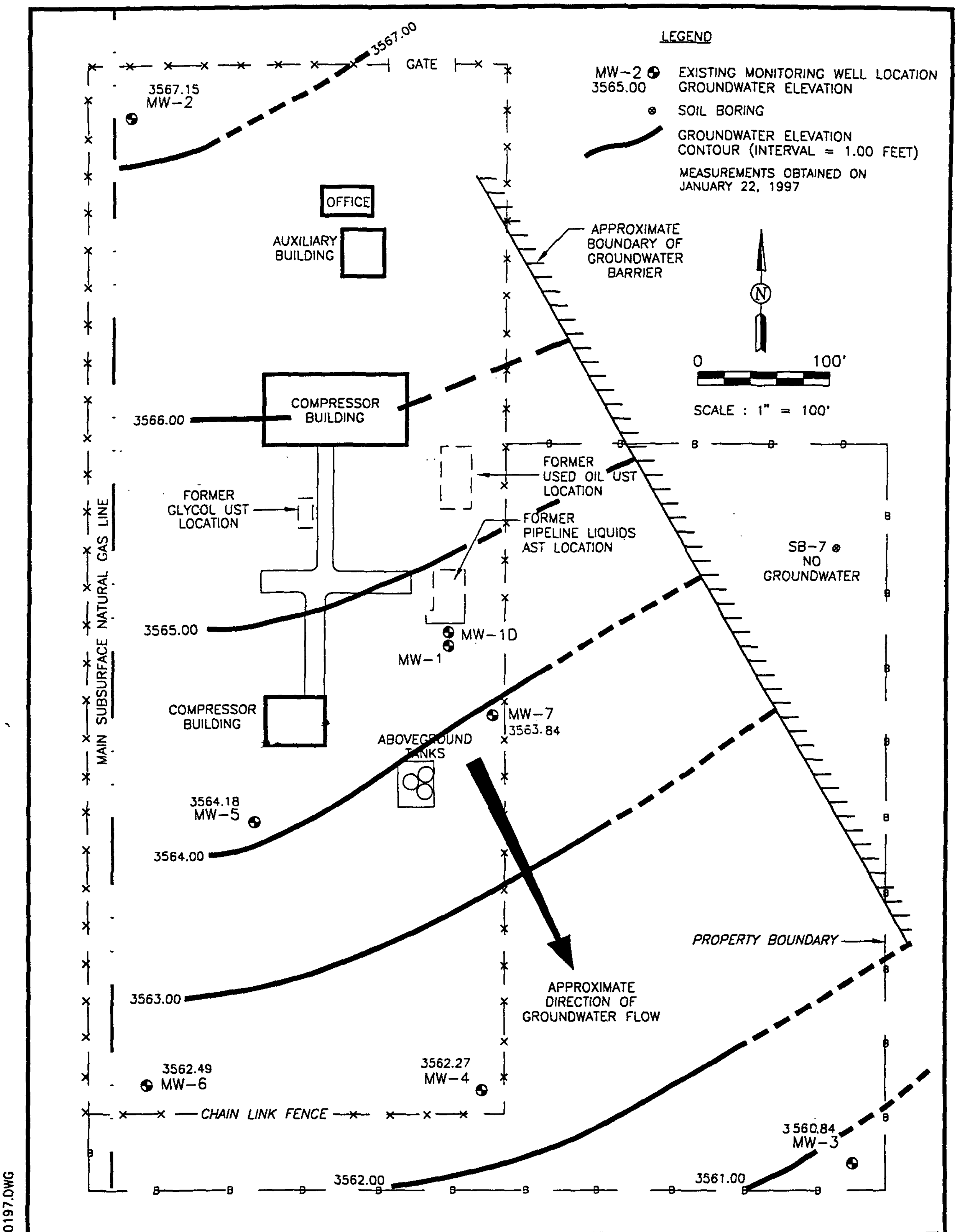
4.0 Groundwater Elevations, Hydraulic Gradient and Flow Direction

Based on the most recent gauging data collected by BDM on August 11, 1997, the groundwater conditions at the Monument Booster Station are characterized below.

- The depth to the water table across the site varies from approximately 22 to 29 feet below ground surface
- The hydraulic gradient is approximately 0.007 feet/foot
- The direction of groundwater flow is to the southeast

The direction of groundwater flow and hydraulic gradient have remained consistent for the past two and a half years. Groundwater elevation maps depicting the water table elevation and direction of groundwater flow using the gauging data obtained during the two 1997 sampling events are presented in Figure 1a (January 22, 1997) and Figure 1b (August 11, 1997). Gauging data for monitoring wells MW-1 and MW-1D were not incorporated into the water table elevation maps due to the presence of product in MW-1 and nonconformity of the data for MW-1D.

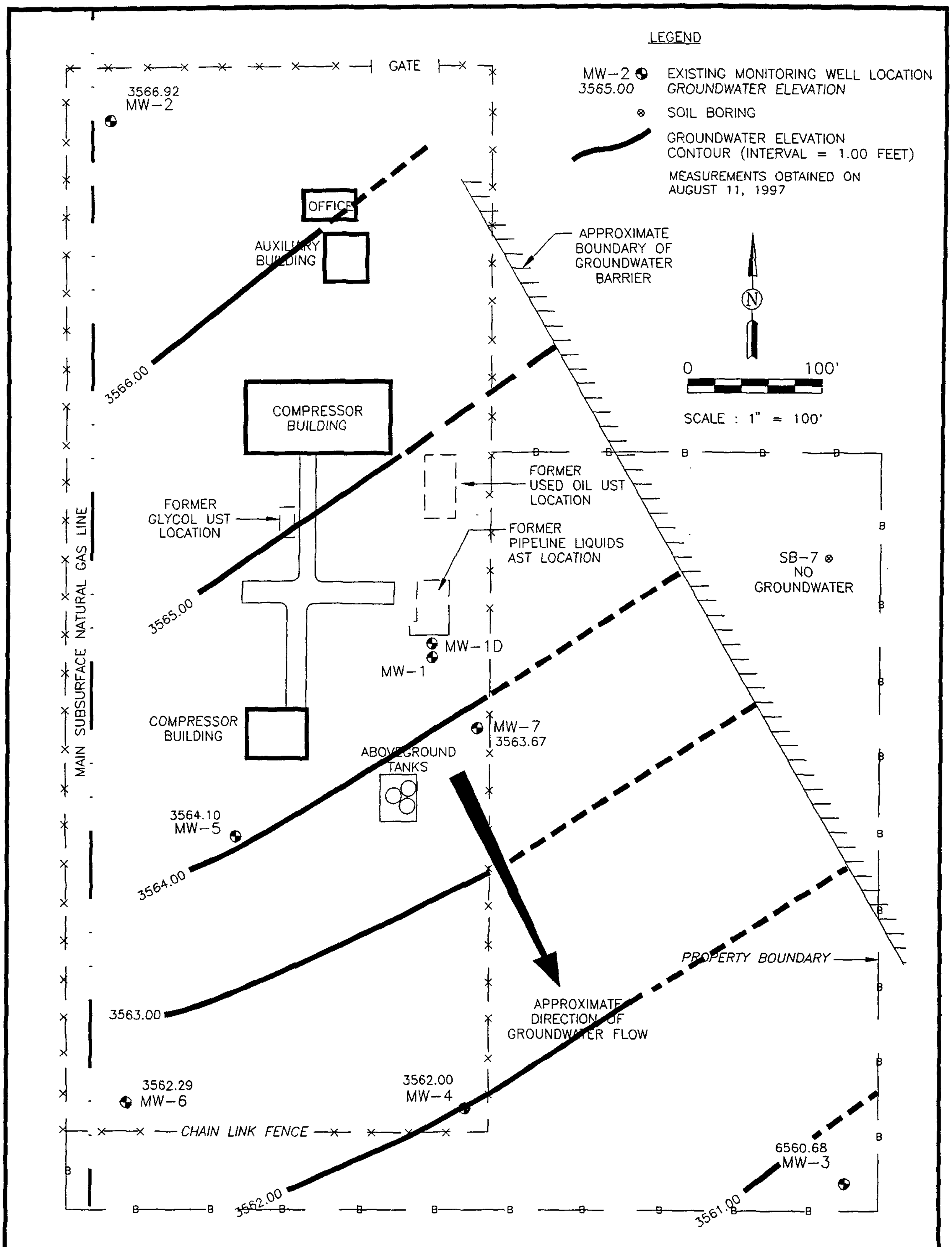
Figure 2 depicts the changes in groundwater elevations in monitoring wells MW-1 through MW-7 with time. Historical groundwater elevations and depth to water measurements are summarized in Table 2.



BDM

CLIENT: GPM GAS CORPORATION	
DATE: 2/5/97	REV. NO.: 0
AUTHOR: GJV	DRN BY: FJG
CK'D BY: MWS	FILE: GWEL0197

FIGURE 1a
MONUMENT BOOSTER STATION GROUNDWATER ELEVATION MAP



BDM	CLIENT: GPM GAS CORPORATION		FIGURE 1b MONUMENT BOOSTER STATION GROUNDWATER ELEVATION MAP
	DATE: 08/11/97	REV. NO.:	
	AUTHOR: CJV	DRN BY: DAG	
	CK'D BY: MWS	FILE: GWEL0897	

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FIGURE 2

GROUNDWATER ELEVATION VS. TIME

GPM - Monument Booster Station

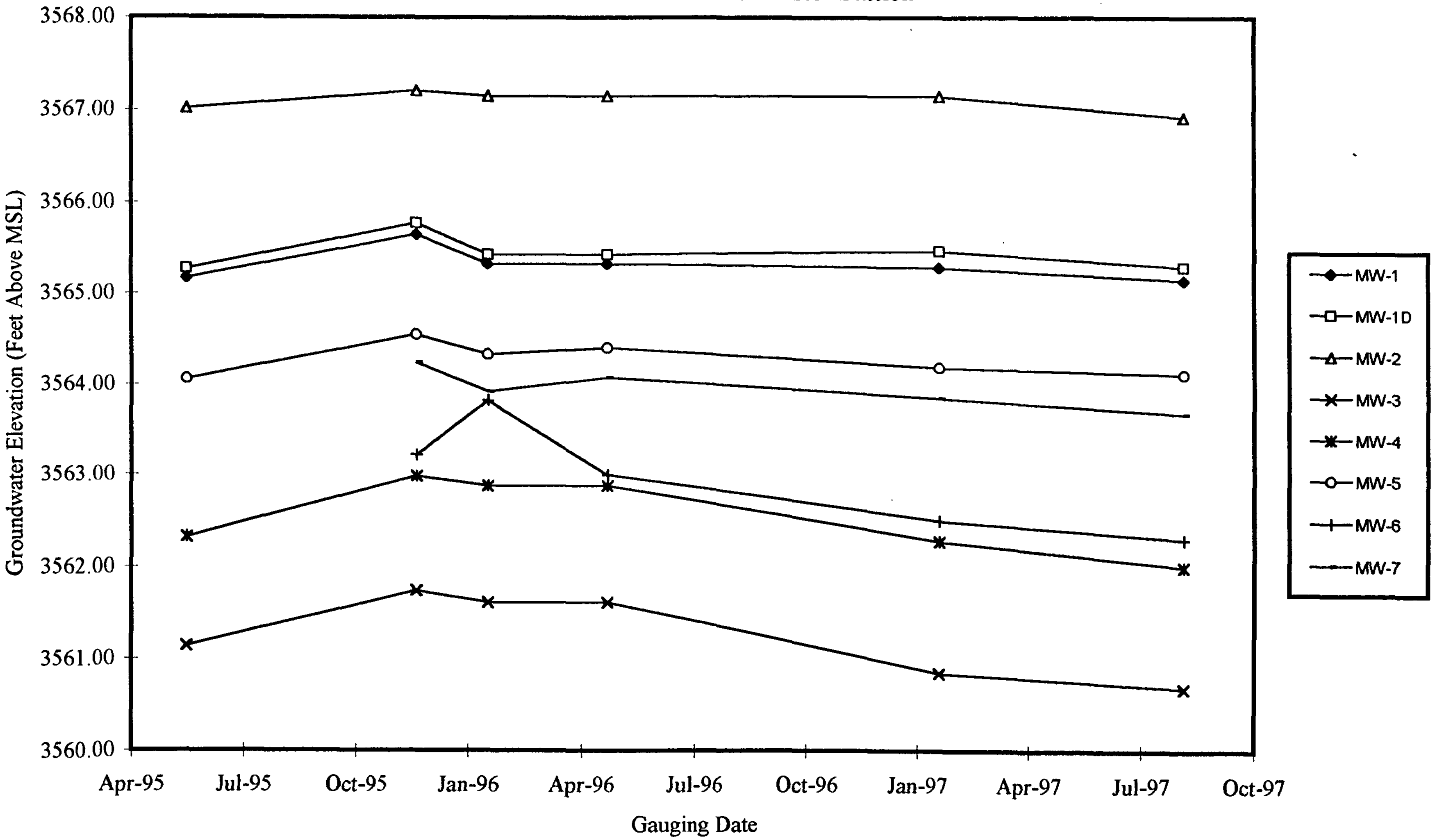


Table 2 Summary of Groundwater Elevations Monument Booster Station						
Monitoring Well Number	Gauging Date	Ground Surface Elevations (Feet)	Top of Casing Elevations (Feet)	Groundwater Depth Below Top of Casing (Feet)	Groundwater Elevation (Feet)	PSH Thickness (Feet)
MW-1	5/16/95	3588.85	3591.15	28.05	3565.17	2.52
	11/21/95	3588.85	3591.15	27.03	3565.65	1.86
	1/18/96	3588.85	3591.15	27.62	3565.32	2.18
	4/24/96	3588.85	3591.15	27.39	3565.47	2.09
	1/22/97	3588.85	3591.15	27.68	3565.27	2.20
	8/11/97	3588.85	3591.15	26.03	3565.14	0.02
MW-1D	5/16/95	3589.06	3591.31	26.04	3565.27	0.00
	11/21/95	3589.06	3591.31	25.54	3565.77	0.00
	1/18/96	3589.06	3591.31	25.89	3565.42	0.00
	4/24/96	3589.06	3591.31	25.70	3565.61	0.00
	1/22/97	3589.06	3591.31	25.85	3565.46	0.00
	8/11/97	3589.06	3591.31	26.03	3565.28	0.00
MW-2	5/16/95	3594.13	3596.30	29.28	3567.02	0.00
	11/21/95	3594.13	3596.30	29.09	3567.21	0.00
	1/18/96	3594.13	3596.30	29.15	3567.15	0.00
	4/24/96	3594.13	3596.30	29.10	3567.20	0.00
	1/22/97	3594.13	3596.30	29.15	3567.15	0.00
	8/11/97	3594.13	3596.30	29.38	3566.92	0.00
MW-3	5/16/95	3581.46	3583.86	22.72	3561.14	0.00
	11/21/95	3581.46	3583.86	22.12	3561.74	0.00
	1/18/96	3581.46	3583.86	22.25	3561.61	0.00
	4/24/96	3581.46	3583.86	22.25	3561.61	0.00
	1/22/97	3581.46	3583.86	23.02	3560.84	0.00
	8/11/97	3581.46	3583.86	23.18	3560.68	0.00
MW-4	5/16/95	3586.10	3588.77	26.45	3562.32	0.00
	11/21/95	3586.10	3588.77	25.79	3562.98	0.00
	1/18/96	3586.10	3588.77	25.90	3562.87	0.00
	4/24/96	3586.10	3588.77	25.98	3562.79	0.00
	1/22/97	3586.10	3588.77	26.50	3562.27	0.00
	8/11/97	3586.10	3588.77	26.77	3562.00	0.00
MW-5	5/16/95	3589.62	3592.16	28.10	3564.06	0.00
	11/21/95	3589.62	3592.16	28.24	3564.54	0.76
	1/18/96	3589.62	3592.16	28.45	3564.33	0.75
	4/24/96	3589.62	3592.16	28.41	3564.40	0.79
	1/22/97	3589.62	3592.16	28.45	3564.18	0.57
	8/11/97	3589.62	3592.16	28.13	3564.10	0.09

* Elevations initially surveyed by John W. West Engineering Company of Hobbs, NM.

The monitoring well casings were marked on the north side to provide consistent reference points for future gauging operations.

** Groundwater Elevation Corrected for phase-separated hydrocarbons (PSH) = Top of Casing Elevation - [Groundwater Depth - (SG x PSH Thickness)].

Groundwater direction is to the southeast with a hydraulic gradient of approximately 0.007 feet/foot.

Table 2 (Continued) Summary of Groundwater Elevations Monument Booster Station						
Monitoring Well Number	Gauging Date	Ground Surface Elevations (Feet)	Top of Casing Elevations (Feet)	Groundwater Depth Below Top of Casing (Feet)	Groundwater Elevation (Feet)	PSH Thickness (Feet)
MW-6	11/16/95	3586.15	3587.93	24.71	3563.22	0.00
	1/18/96	3586.15	3587.93	24.11	3563.82	0.00
	4/24/96	3586.15	3587.93	24.94	3562.99	0.00
	1/22/97	3586.15	3587.93	25.44	3562.49	0.00
	8/11/97	3586.15	3587.93	25.64	3562.29	0.00
MW-7	11/21/95	3588.06	3589.40	25.16	3564.24	0.00
	1/18/96	3588.06	3589.40	25.48	3563.92	0.00
	4/24/96	3588.06	3589.40	25.33	3564.07	0.00
	1/22/97	3588.06	3589.40	25.56	3563.84	0.00
	8/11/97	3588.06	3589.40	25.73	3563.67	0.00

* Elevations initially surveyed by John W. West Engineering Company of Hobbs, NM.

The monitoring well casings were marked on the north side to provide consistent reference points for future gauging operations.

** Groundwater Elevation Corrected for phase-separated hydrocarbons (PSH) = Top of Casing Elevation - [Groundwater Depth - (SG x PSH Thickness)].

Groundwater direction is to the southeast with a hydraulic gradient of approximately 0.007 feet/foot.

5.0 Groundwater Quality Conditions

5.1 Distribution of Hydrocarbons in Groundwater

A historical listing of benzene, toluene, ethylbenzene and xylene (BTEX) concentrations obtained from the on site monitoring wells is summarized in Table 3. Hydrocarbon concentration maps depicting the BTEX concentrations for the two 1997 sampling events are presented in Figure 3a (January 22, 1997) and Figure 3b (August 11, 1997). Figure 4 depicts benzene concentrations versus time in groundwater from May 1995 to August 11, 1997 for the on site monitoring wells.

Based on the most recent analytical data for samples collected by BDM on August 11, 1997, the distribution of hydrocarbons at the Monument Booster Station is described below.

- BTEX concentrations in all of the sampled monitoring wells were non-detectable and below New Mexico Water Quality Control Commission (WQCC) standards with the exception of benzene in MW-7 (0.317 mg/l).

- Benzene concentrations in MW-7 fluctuate over time but have declined from a high of 1.130 mg/l on January 17, 1996 to a concentration of 0.317 mg/l on August 11, 1997.

5.2 Distribution of Dissolved Metals and Major Ions in Groundwater

Historical groundwater sample analytical results for New Mexico Water Quality Control Commission (WQCC) metals and major ions are presented in Tables 4 and 5, respectively. The WQCC standards are also listed in the tables for comparison. Constituents with concentrations above the WQCC standards are highlighted in boldface type. The laboratory reports and COC documentation are included in Appendix A.

As with the 1996 annual sampling event, the WQCC metal results for the 1997 annual sampling event indicate no constituents exceeded the WQCC standards with the exception of manganese in MW-1D, MW-6, and MW-7, and boron in MW-6.

The elevated levels of manganese in MW-1D (0.35 mg/l), MW-6 (0.3 mg/l) and MW-7 (0.37 mg/l) may be due to the reduced chemical environment caused by the presence of dissolved hydrocarbons. Under this condition, certain metal ions (particularly manganese and iron) have a greater affinity to go into the dissolved state resulting in higher concentrations. In contrast, non-impacted wells MW-2, MW-3, and MW-4 have no detectable concentrations of manganese. A boron concentration of 0.79 mg/l in MW-6 slightly exceeds the WQCC standard for irrigation use of 0.75 mg/l. Small amounts of boron (< 1 mg/l) in agricultural water are essential to plant growth and boron concentrations of a few tenths of a mg/l are common (USGS Water-Supply Paper 2254, 1989, pg.129). Since boron is not a constituent for the gas processing activities on site, its presence is likely due to natural conditions. Based on the results of the metal analyses during the annual sampling event the groundwater in the site area is not adversely affected or impacted with dissolved metals.

The major cation and anion analyses for the annual 1997 sampling event indicate no constituents exceeded the WQCC standards with the exception of fluoride in MW-7 (1.8 mg/l) and TDS in MW-2 (1,100 mg/l).

Table 3
Summary of Dissolved BTEX Concentrations
Monument Booster Station

Monitoring Well	Sampling Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)
MW-1D	5/16/95	**0.018**	0.006	0.015	0.016
	11/15/95	0.003	< 0.001	0.002	0.001
	1/18/96	0.004	< 0.001	0.003	0.009
	4/24/96	< 0.001	< 0.001	< 0.001	< 0.001
	1/22/97	0.001	< 0.001	0.001	< 0.001
	8/11/97	<0.001	< 0.001	<0.001	< 0.001
MW-2	5/16/95	< 0.001	< 0.001	< 0.001	< 0.001
	11/15/95	**0.044***	0.002*	0.006*	0.009*
	1/18/96	< 0.001	< 0.001	< 0.001	< 0.001
	4/24/96	< 0.001	< 0.001	< 0.001	< 0.001
	1/22/97	< 0.001	< 0.001	< 0.001	< 0.001
	8/11/97	< 0.001	< 0.001	< 0.001	< 0.001
MW-3	5/16/95	< 0.001	< 0.001	< 0.001	< 0.001
	11/15/95	< 0.001	< 0.001	< 0.001	< 0.001
	1/18/96	< 0.001	< 0.001	< 0.001	< 0.001
	4/24/96	< 0.001	< 0.001	< 0.001	< 0.001
	1/22/97	< 0.001	< 0.001	< 0.001	< 0.001
	8/11/97	< 0.001	< 0.001	< 0.001	< 0.001
MW-4	5/16/95	< 0.001	< 0.001	< 0.001	< 0.001
	11/15/95	**0.045***	0.002*	0.006*	0.010*
	1/18/96	0.003	< 0.001	< 0.001	< 0.001
	4/24/96	< 0.002	< 0.002	< 0.002	< 0.002
	1/22/97	0.002	< 0.001	< 0.001	< 0.001
	8/11/97	0.001	< 0.001	< 0.001	< 0.001
MW-5	5/16/95	**0.265**	0.009	0.261	0.050
MW-6	11/16/95	0.003	< 0.001	0.001	0.003
	1/17/96	0.002	< 0.001	< 0.001	< 0.001
	4/24/96	< 0.001	< 0.001	< 0.001	< 0.001
	1/22/97	0.001	< 0.001	< 0.001	< 0.001
	8/11/97	<0.001	< 0.001	< 0.001	0.001
MW-7	11/15/95	**0.465**	< 0.001	0.205	0.163
	1/17/96	**1.130**	0.003	0.476	0.365
	4/24/96	**0.585**	< 0.002	0.251	0.013
	1/22/97	**0.896**	< 0.005	0.240	0.330
	8/11/97	**0.317**	0.020	0.155	0.049
WQCC Standards		0.010	0.75	0.75	0.62

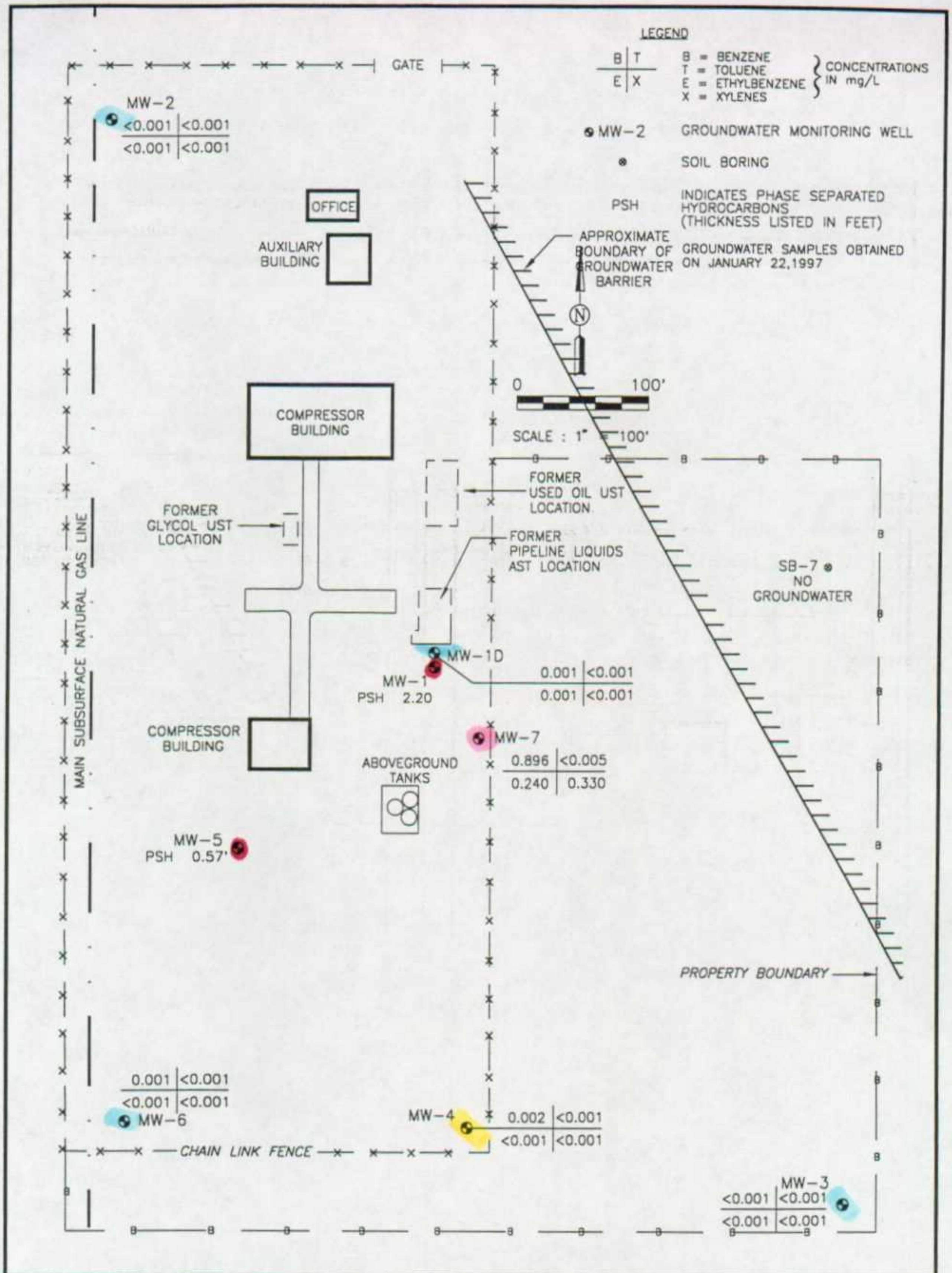
Analyses performed by Trace Analysis, Inc., Lubbock, Texas.

All samples analyzed for BTEX using EPA Method 8020 except for samples obtained on May 16, 1995 (EPA Method 8240).

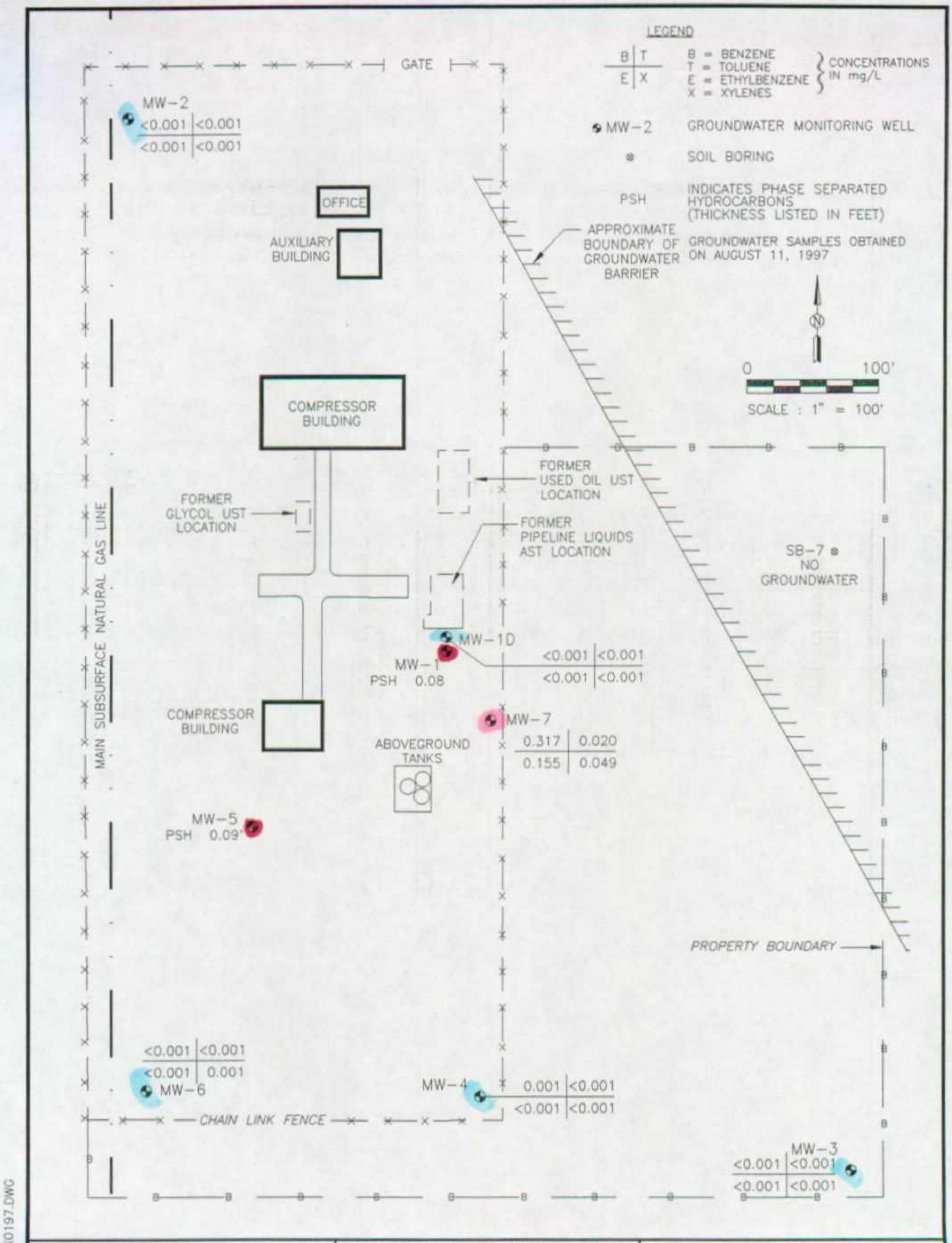
Values listed in **boldface** type indicate concentrations exceed New Mexico Water Quality Control Commission (WQCC) standards.

Monitoring wells MW-1 and MW-5 (after May 16, 1995) were not sampled (due to presence of phase-separated hydrocarbons).

* BTEX cross-contamination occurred on samples obtained from monitoring wells MW-2 and MW-4 during the November 15, 1995 sampling event.



BDM	CLIENT: GPM GAS CORPORATION		FIGURE 3a MONUMENT BOOSTER STATION BTEX CONCENTRATION MAP
	DATE: 2/5/97	REV. NO.: 0	
	AUTHOR: GJV	DRN BY: FJG	
	CK'D BY: MWS	FILE: BTEX0197	



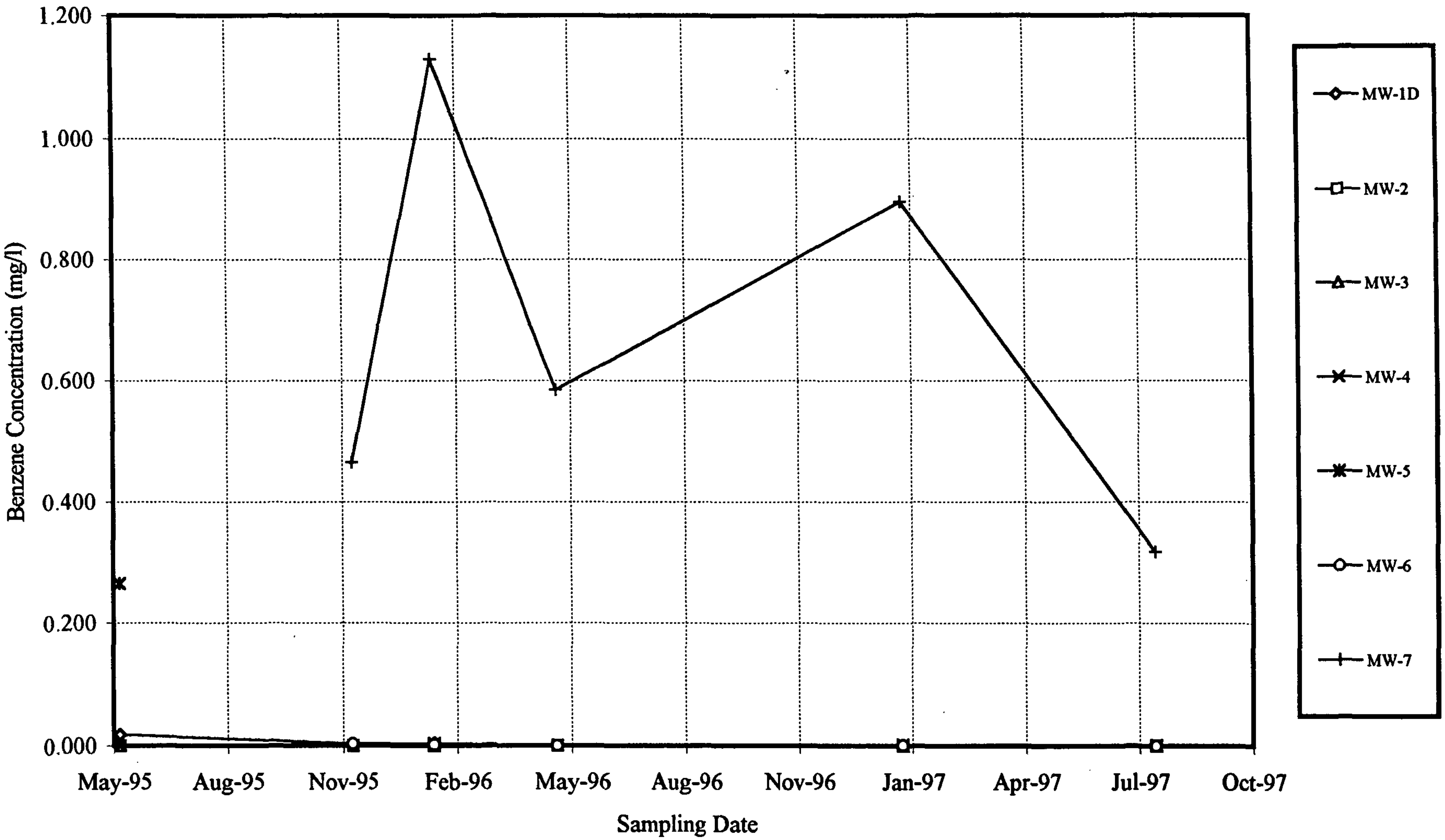
BDM

CLIENT: GPM GAS CORPORATION	
DATE: 08/11/97	REV. NO.:
AUTHOR: GJV	DRN BY: DAG
CK'D BY: MWS	FILE:BTEX0897

FIGURE 3b
MONUMENT BOOSTER STATION BTEX CONCENTRATION MAP

FIGURE 4

BENZENE VERSUS TIME



Fluoride concentrations during the annual sampling event remain near or slightly above the WQCC standard of 1.6 mg/l as compared to the initial sampling event in May 1995. Since fluoride is not a constituent for the gas processing activities on site , its presence is likely due to natural conditions as it is a common natural occurrence in groundwater (USGS Water-Supply Paper 2254, 1989, pgs.120-123.

TDS concentrations continue to be exceeded only in monitoring well MW-2. Based on the extensive oil and gas production in the area and the upgradient location of MW-2, the elevated TDS levels probably originated from an upgradient, off-site source or are an insignificant aberration from background levels.

Table 4
Summary of Metal Analytical Results
Monument Booster Station

Constituent	Date	MW-1 (mg/l)	MW-1D (mg/l)	MW-2 (mg/l)	MW-3 (mg/l)	MW-4 (mg/l)	MW-5 (mg/l)	MW-6 (mg/l)	MW-7 (mg/l)	WQCC Standards (mg/l)
Aluminum (Al)	05-16-96	0.55	1.34	13.10	0.88	8.04	0.24	---	---	5
	04-24-96	NA	0.2	<0.2	<0.2	<0.2	NA	0.2	0.3	
	08-11-97	NA	<0.2	0.32	<0.2	<0.2	NA	0.23	<0.2	
Arsenic (As)	05-16-96	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	0.1
	04-24-96	NA	<0.012	0.011	0.019	0.008	NA	0.238	0.004	
	08-11-97	NA	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	
Barium (Ba)	05-16-96	0.13	0.12	0.08	0.05	0.10	0.14	---	---	1
	04-24-96	NA	<0.2	<0.2	<0.2	<0.2	NA	0.2	0.3	
	08-11-97	NA	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.2	
Boron (B)	05-16-96	0.85	0.22	0.37	0.09	0.14	0.39	---	---	0.75
	04-24-96	NA	0.11	0.38	<0.03	0.06	NA	0.22	0.6	
	08-11-97	NA	<0.2	<0.2	<0.2	<0.2	NA	0.79	<0.2	
Cadmium (Cd)	05-16-96	0.01	<0.01	0.01	<0.01	<0.01	<0.01	---	---	0.01
	04-24-96	NA	<0.02	<0.02	<0.02	<0.02	NA	<0.02	<0.02	
	08-11-97	NA	<0.002	<0.002	<0.002	<0.002	NA	<0.002	<0.002	
Cobalt (Co)	05-16-96	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	---	---	0.05
	04-24-96	NA	<0.03	0.03	<0.03	<0.03	NA	<0.03	<0.0	
	08-11-97	NA	<0.02	<0.02	<0.02	<0.02	NA	<0.02	<0.02	
Copper (Cu)	05-16-96	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	---	---	1
	04-24-96	NA	<0.02	<0.02	<0.02	<0.02	NA	<0.02	<0.02	
	08-11-97	NA	0.15	0.20	0.26	0.22	NA	0.22	0.18	
Chromium (Cr)	05-16-96	0.01	<0.01	0.02	0.01	0.02	0.02	---	---	0.05
	04-24-96	NA	<0.05	0.06	<0.05	<0.05	NA	0.06	<0.05	
	08-11-97	NA	<0.05	NA	<0.05	<0.05	NA	<0.05	<0.05	
Iron (Fe)	05-16-96	25.58	4.6	5.82	0.53	4.68	1.75	---	---	1
	04-24-96	NA	0.06	0.07	0.17	0.08	NA	0.15	<0.03	
	08-11-97	NA	0.28	0.24	0.14	0.08	NA	0.21	0.43	
Lead (Pb)	05-16-96	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	0.05
	04-24-96	NA	<.0001	0.005	<0.001	<0.001	NA	<0.001	<0.001	
	08-11-97	NA	<0.005	<0.005	<0.005	<0.005	NA	<0.005	<0.005	
Manganese (Mn)	05-16-96	0.67	0.31	0.12	0.08	0.11	0.58	---	---	0.2
	04-24-96	NA	0.37	<0.01	<0.01	<0.01	NA	0.28	0.38	
	08-11-97	NA	0.35	<0.01	<0.01	<0.01	NA	0.30	0.37	

Table 4 (continued)
Summary of Metal Analytical Results
Monument Booster Station

Constituent	Date	MW-1 (mg/l)	MW-1D (mg/l)	MW-2 (mg/l)	MW-3 (mg/l)	MW-4 (mg/l)	MW-5 (mg/l)	MW-6 (mg/l)	MW-7 (mg/l)	WQCC Standards (mg/l)
Mercury (Hg)	05-16-96	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	0.002
	04-24-96	NA	<0.001	<0.001	<0.001	<0.001	NA	<0.001	<0.001	
	08-11-97	NA	<0.001	<0.001	<0.001	<0.001	NA	<0.001	<0.001	
Molybdenum (Mo)	05-16-96	0.07	0.09	0.05	0.07	0.07	0.07	---	---	1
	04-24-96	NA	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	
	08-11-97	NA	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	
Nickel (Ni)	05-16-96	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	---	---	0.2
	04-24-96	NA	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.2	
	08-11-97	NA	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.2	
Selenium (Se)	05-16-96	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	---	---	0.05
	04-24-96	NA	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	
	08-11-97	NA	<0.01	0.018	0.015	0.024	NA	0.027	<0.01	
Silver (Ag)	05-16-96	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	---	0.05
	04-24-96	NA	<0.01	<0.01	<0.01	<0.01	NA	<0.01	<0.01	
	08-11-97	NA	<0.01	<0.01	<0.01	<0.01	NA	<0.01	<0.01	
Zinc (Zn)	05-16-96	0.03	0.06	0.05	0.04	0.05	0.04	---	---	10
	04-24-96	NA	<0.02	<0.02	0.03	<0.02	NA	<0.02	<0.02	
	08-11-97	NA	0.07	0.18	0.04	0.23	NA	0.12	0.06	

Analyses performed by Trace Analysis, Inc. using EPA Methods 200.7, 239.2, 270.2, and 272.2
New Mexico Water Quality Control Commission (WQCC) Standards are listed as specified in Regulation 3-103.
Bold values indicate concentrations exceed WQCC groundwater standards.
NA Indicates monitoring well was not sampled (due to presence of free product).
--- Indicates monitoring well was installed after this sampling date.
Samples were not filtered on 05-17-95, therefore results indicate total (dissolved and undissolved) metal concentrations.
Samples were filtered with a 45 mm element on 04-24-96, therefore results indicate dissolved metal concentrations.
Dissolved oxygen readings measured using a YSI Model 51B or comparable model dissolved oxygen meter.

Table 5
Summary of Major Cation and Anion Analytical Results
Monument Booster Station

Constituent	Date	MW-1 (mg/l)	MW-1D (mg/l)	MW-2 (mg/l)	MW-3 (mg/l)	MW-4 (mg/l)	MW-5 (mg/l)	MW-6 (mg/l)	MW-7 (mg/l)	WQCC Standards (mg/l)
Total Dissolved Solids (TDS)	05-16-95	NA	634	**1,478**	516	716	692	—	—	1,000
	04-24-96	NA	702	**1,318**	598	759	NA	929	828	
	08-11-97	NA	770	**1,100**	670	800	NA	810	860	
Calcium (Ca)	05-16-95	12.8	123	315	99.7	160	122	—	—	NS
	04-24-96	NA	125	246	103	149	NA	174	109	
	08-11-97	NA	120	170	100	140	NA	150	100	
Fluoride (F)	05-16-95	NA	**1.8**	1.1	**1.8**	1.2	1.4	—	—	1.6
	04-24-96	NA	1.6	1.1	1.5	1.1	NA	0.9	**1.8**	
	08-11-97	NA	1.9	1.3	1.5	1.1	NA	0.85	**1.8**	
Magnesium (Mg)	05-16-95	1.6	46.2	72.0	25.0	37.2	52.9	—	—	NS
	04-24-96	NA	31.8	51.5	23.6	31.6	NA	37.2	47.3	
	08-11-97	NA	29	35	22	29	NA	33	44	
Sodium (Na)	05-16-95	14.5	79.1	154.5	76.1	82.5	110.7	—	—	NS
	04-24-96	NA	78.8	166	75.8	85.8	NA	113	178	
	08-11-97	NA	69	120	69	80	NA	110	120	
Bicarbonate (HCO_3)	05-16-95	NA	333	197	166	277	532	—	—	NS
	04-24-96	NA	297	222	286	288	NA	484	5.2	
	08-11-97	NA	260	190	200	310	NA	500	410	
Chloride (Cl)	05-16-95	NA	77	**812**	188	152	80	—	—	250
	04-24-96	NA	124	**314**	134	167	NA	186	143	
	08-11-97	NA	180	200	140	140	NA	160	180	
Nitrate (NO_3-N)	05-16-95	NA	1.37	7.42	5.62	3.69	0.56	—	—	10.0
	04-24-96	NA	<0.1	0.3	0.3	0.1	NA	<0.1	<0.1	
	08-11-97	NA	<1.0	9	9.4	<1.0	NA	<1.0	<1.0	
Sulfate (SO_4)	05-16-95	NA	174	509	115	136	67	—	—	600
	04-24-96	NA	169	443	95	115	NA	70	149	
	08-11-97	NA	110	290	75	96	NA	37	76	

Analyses performed by Trace Analysis, Inc. using EPA Methods 160.1, 200.7, 340.2, 375.4, 353.3, 4500 C1-B, and 310.1
New Mexico Water Quality Control Commission (WQCC) Standards are listed as specified in Regulation 3-103.
--- Indicates monitoring well was installed after this sampling date.
NA Indicates monitoring well was not sampled (due to presence of free product).
NS Indicates no standard established or applicable.
Values in **boldface** type indicate concentrations exceed WQCC groundwater standards.

6.0 Intrinsic Bioremediation Assessment

Electron acceptors can be used by in situ microorganisms to achieve significant hydrocarbon degradation, therefore our suite of analytes included dissolved oxygen, (DO), sulfate (SO_4) and nitrate as nitrogen(NO_3). Electron acceptor results (biological parameters) are summarized in Table 6. Changes in dissolved oxygen, nitrate and sulfate concentrations with time are depicted in Figures 5, 6, and 7, respectively.

Hydrocarbon-impacted wells (MW-1D and MW-7) are compared against non-impacted wells (MW-2, MW-3, MW-4, and MW-6) to observe whether or not significant differences are observed in electron acceptor concentrations that may be related to subsurface biodegradation. The following trends in the electron acceptor data are observed:

- An overall decrease in nitrate and sulfate concentrations since May 1995 is evident in all of the monitoring wells which may indicate the use of these receptors by micro-organisms in the course of hydrocarbon degradation.

- Generally, dissolved oxygen levels have been lower within the hydrocarbon-impacted plume area compared to the downgradient and upgradient wells indicating active aerobic biodegradation conditions.

- Dissolved oxygen concentrations have increased significantly during the January 22, 1997 and August 11, 1997 sampling events compared to previous sampling events.

Since the determination of the presence of an adequate population of total aerobic bacteria and hydrocarbon degrading bacteria has been made, continued monitoring of bacteria populations is not being conducted. This change in procedure was discussed with and approved by Bill Olson (OCD) on February 12, 1997 (personal communication with Gilbert Van Deventer, BDM).

Table 6

Summary of Biological Parameter Results

Monument Booster Station

Monitoring Well	Sampling Date	Dissolved Oxygen (mg/L)	Nitrate - NO_3 (mg/L)	Sulfate - SO_4 (mg/L)
MW-1D	5/16/95	1.05	1.37	174
	11/15/95	1.26	< 0.01	119
	1/18/96	4.8	0.6	168
	4/24/96	2.6	< 0.1	169
	1/22/97	7.0	< 0.1	83
	8/11/97	3.6	< 0.1	110
MW-2	5/16/95	6.48	7.42	509
	11/15/95	6.13	NA	NA
	1/18/96	6.2	NA	NA
	4/24/96	1.5	0.3	443
	1/22/97	9.0	2.1	310
	8/11/97	7.6	9.0	290
MW-3	5/16/95	6.85	5.62	115
	11/15/95	1.29	NA	NA
	1/18/96	4.9	NA	NA
	4/24/96	1.0	0.3	95
	1/22/97	8.75	2.7	76
	8/11/97	9.20	9.4	75
MW-4	5/16/95	4.85	3.69	136
	11/15/95	1.30	NA	NA
	1/18/96	4.0	NA	NA
	4/24/96	1.9	0.1	115
	1/22/97	9.0	< 0.1	100
	8/11/97	3.5	< 0.1	96
MW-6	11/16/95	5.40	0.06	233
	1/18/96	4.1	< 0.05	93
	4/24/96	1.7	< 0.1	70
	1/22/97	11.0	< 0.1	37
	8/11/97	3.7	< 0.1	37
MW-7	11/15/95	1.6	5.00	418
	1/18/96	4.8	6.54	180
	4/24/96	2.1	0.2	149
	1/22/97	13.2	< 0.1	25
	8/11/97	3.0	< 0.1	76

Analyses performed by Trace Analysis, Inc., Lubbock, Texas.

Dissolved oxygen (DO) readings obtained with ICM Model 31250 and YSI Model 51B DO meters.

Monitoring wells MW-6 and MW-7 installed on November 15, 1995.

Figure 5
Dissolved Oxygen Concentrations Versus Time

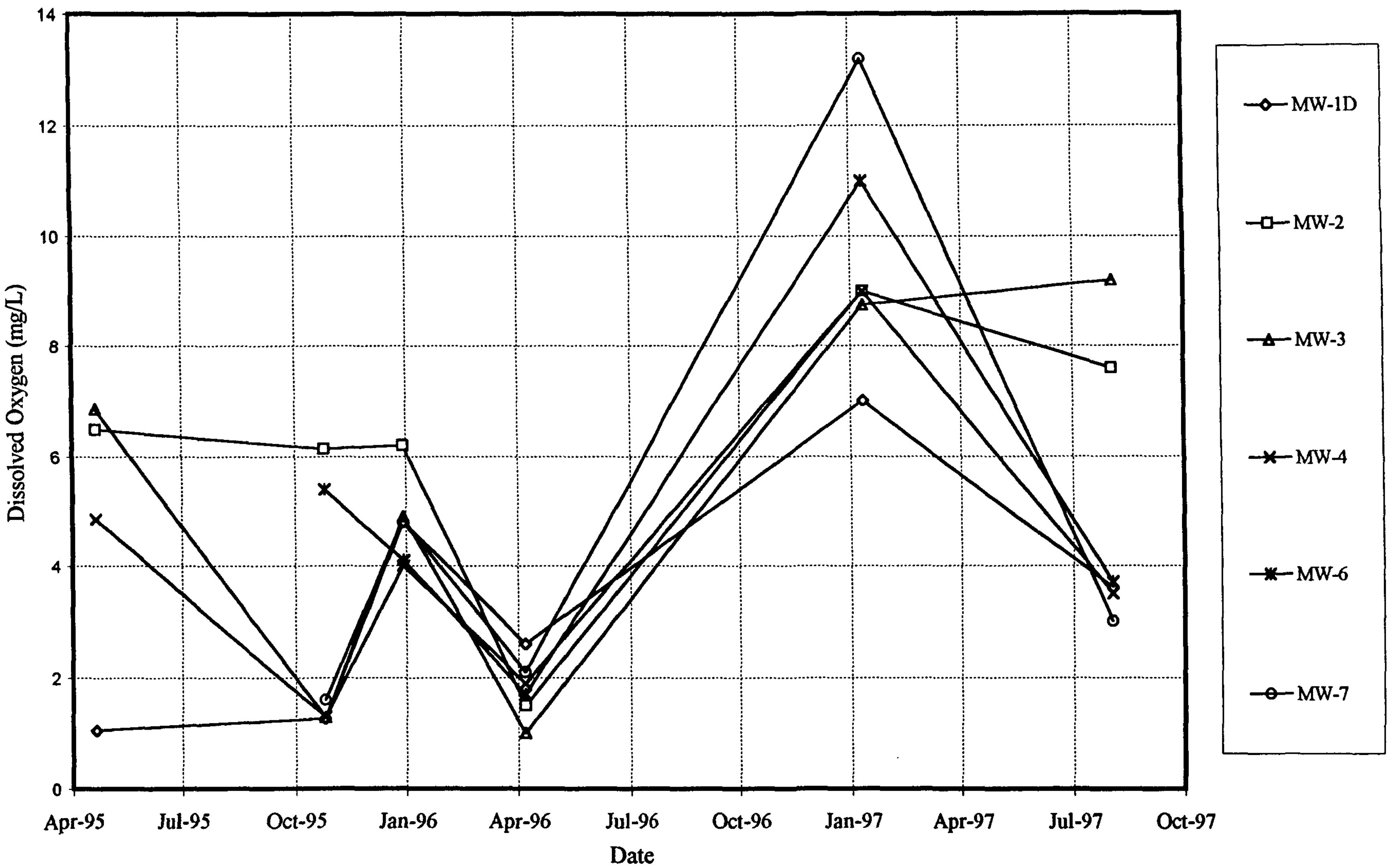


Figure 6
Nitrate Concentrations Versus Time

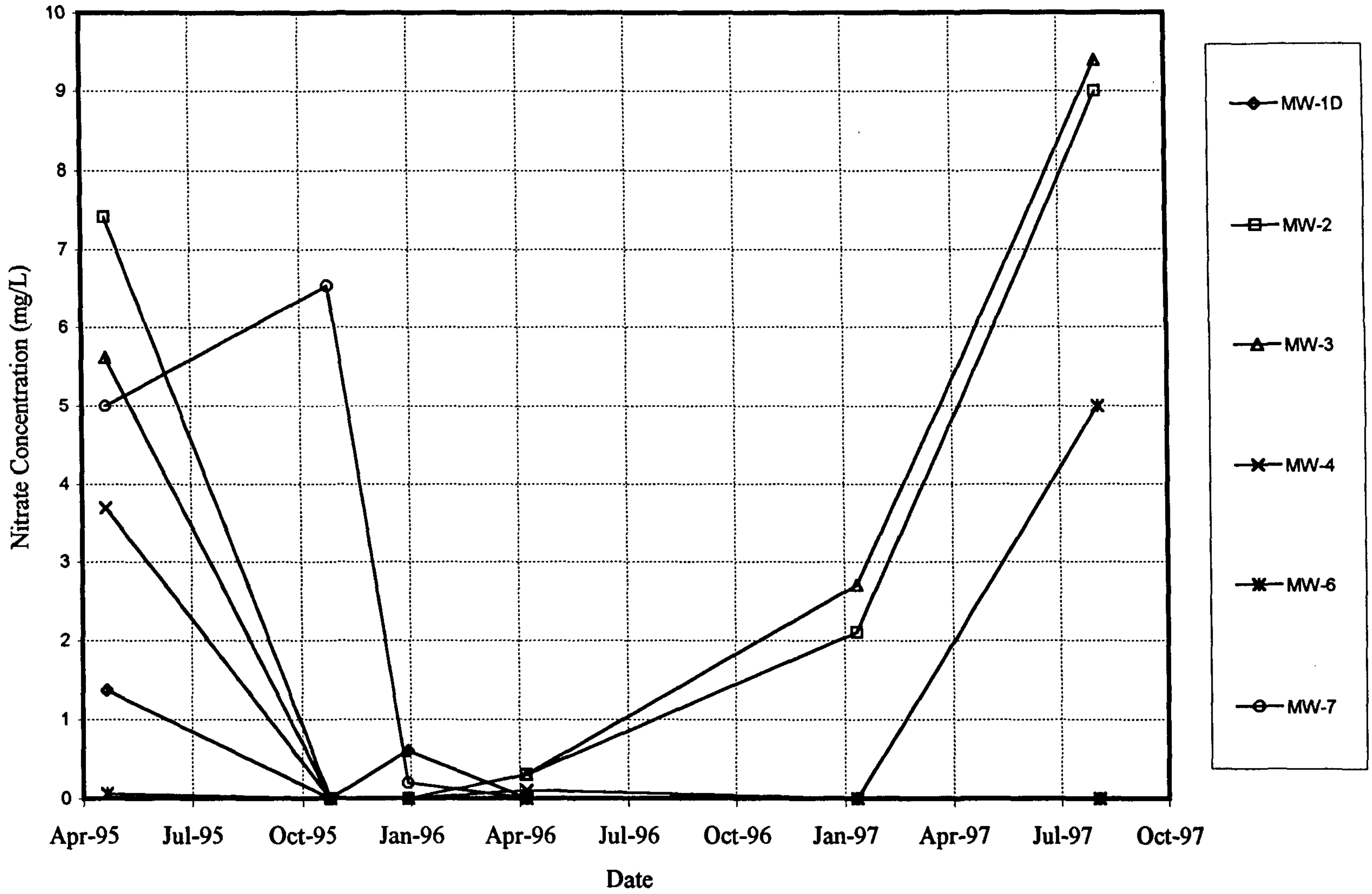
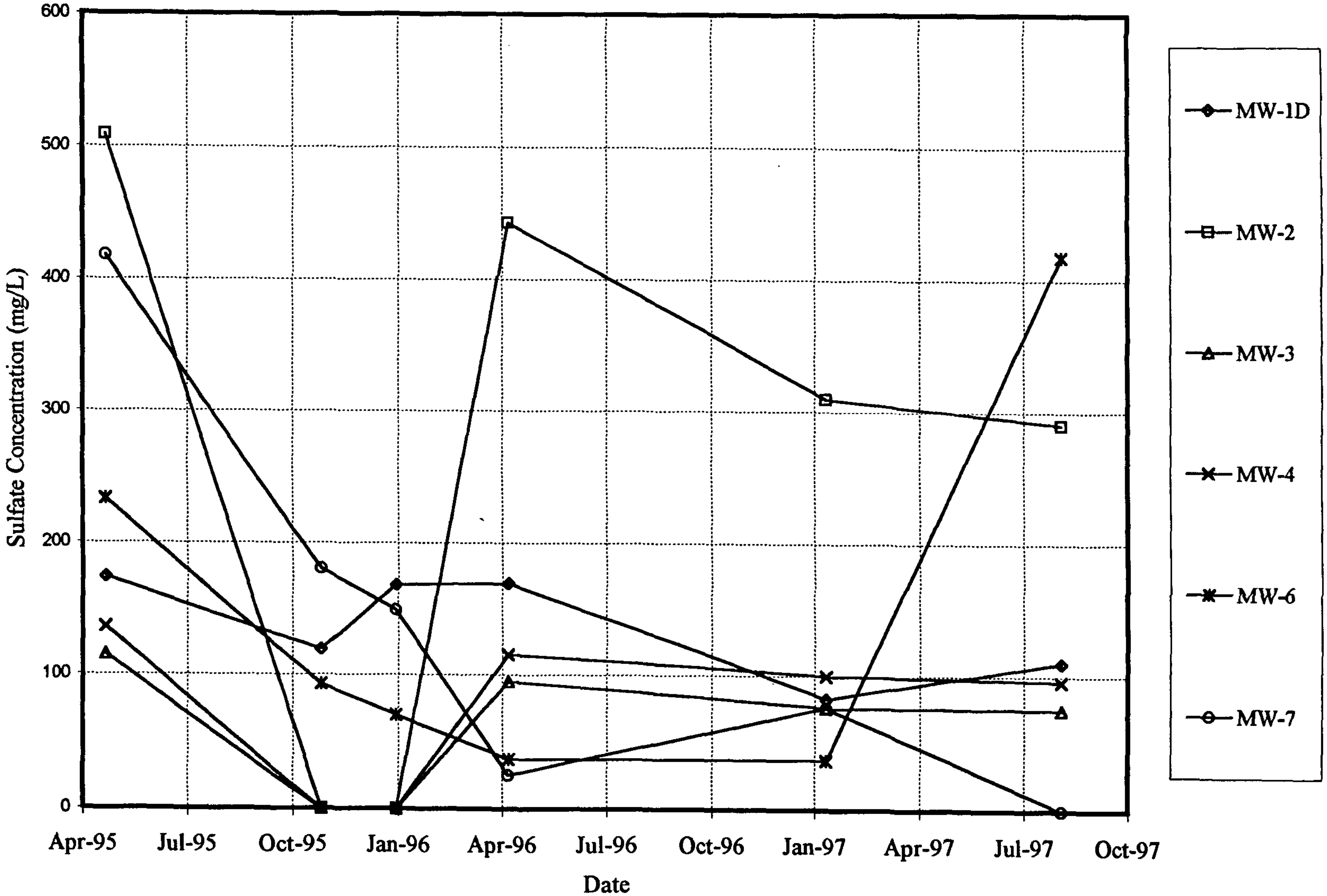


Figure 7
Sulfate Concentration Versus Time



7.0 Remediation System Performance

The remediation system at the Monument Booster Station consists of two Xitech pneumatic product recovery systems. The product recovery pumps were installed in monitoring wells MW-1 and MW-5 on January 31, 1997 to replace the hand bailing and gravity siphoning techniques used previously. As of August 11, 1997, a total of approximately 73 gallons of free product (condensate) have been removed from monitoring wells MW-1 and MW-5. Product recovery volumes are listed in Table 7.

Table 7

Product Recovery Volumes

GPM - Monument Booster Station

Date	Product Recovery Method	Product Recovered (Gallons)	Cumulative Product Recovered (Gallons)
MW-1			
7/24/95	Bail	10	10
7/25/95	SWAP	1	11
7/27/95	SWAP	1	12
3/8/96	Pump	12	24
1/27/97	Pump	4	28
1/31/97	Pump	2	30
2/7/97	Pump	2	32
2/19/97	Pump	10	42
8/11/97	Pump	23	65
MW-5			
2/7/97	Pump	2	2
2/19/97	Pump	0	2
8/11/97	Pump	6	8
Total Volume of Product Recovered On Site:			**73**

Product recovery methods used:
- Bail: Hand bailing using PVC bailer
- SWAP: Gravity siphon demonstration
- Pump: Xitech ADJ 1000 Smart Skimmer (Product Recovery System)

Product thicknesses in monitoring wells MW-1 and MW-5 are currently < 0.01 feet.

8.0 Conclusions

Conclusions relevant to groundwater conditions and the remediation performance at the Monument Booster Station are presented below.

- A benzene concentration of 0.317 mg/l in MW-7 was the only occurrence in which WQCC standards were exceeded.
- Benzene concentrations in MW-7 fluctuate over time but have declined from a high of 1.130 mg/l on January 17, 1996 to a concentration of 0.317 mg/l on August 11, 1997.
- Based on the results of the metal analyses during the annual sampling event, the groundwater in the site area is not adversely affected or impacted with dissolved metals.
- As of August 11, 1997, a total of approximately 73 gallons of free product (condensate) have been removed from monitoring wells MW-1 and MW-5 using a combination of gravity siphoning, hand bailing and pneumatic pump recovery methods.
- Since the installation of the pneumatic product recovery system in monitoring wells MW-1 and MW-5 on January 31, 1997, free product thicknesses have been maintained at less than 0.01 feet.
- The dissolved-phase hydrocarbons in groundwater are contained within the boundaries of the facility.
- The fact that there has been no increase of BTEX concentrations over detection limits in downgradient monitoring wells MW-3, MW-4 and MW-6 is strong evidence that natural attenuation processes have kept the plume from migrating
- Continued semi-annual monitoring is necessary to demonstrate that the plume is maintaining a steady state or receding condition and to evaluate the effectiveness of intrinsic bioremediation in limiting the migration or elimination of the dissolved hydrocarbon plume.

9.0 Recommendations

The following recommendations are proposed for the remediation system and monitoring operations at the Monument Booster Station.

- Continue free product recovery operations since the present system has been effective in recovering free product from MW-1 and MW-5.

- Continue the sampling and monitoring program on a semi-annual basis. The next sampling event is scheduled during the first quarter of 1998.

- Since the groundwater is not adversely impacted with inorganic constituents, as reported throughout the previous two years, analysis of dissolved metals and major ions is an unnecessary expense. Further analysis of the WQCC metals and major ions should be discontinued with the exception of manganese, chloride, sulfate, nitrate, fluoride and TDS.

APPENDIX A

LABORATORY ANALYTICAL REPORTS

AND CHAIN OF CUSTODY DOCUMENTATION

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
BDM International
Attention Gil VanDeVenter
415 W. Wall, Suite 1818
Midland TX 79701

Date: Sep 03, 1997
Date Rec: 8/13/97
Project: N/A
Proj Name: GPM Monument Booster
Proj Loc: N/A

Lab Receiving # : 9708000228
Sampling Date: 8/12/97
Sample Condition: Intact and Cool
Sample Received By: JH

TA#	Field Code	MATRIX	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	M,P,O XYLENE (mg/L)	TOTAL BTEX (mg/L)
T79483	MW-6	Water	<0.001	<0.001	<0.001	0.001	0.001
T79484	MW-3	Water	<0.001	<0.001	<0.001	<0.001	<0.001
T79485	MW-4	Water	0.001	<0.001	<0.001	<0.001	0.001
T79486	MW-2	Water	<0.001	<0.001	<0.001	<0.001	<0.001
T79487	MW-7	Water	0.317	0.020	0.155	0.049	0.541
T79488	MW-1d	Water	<0.001	<0.001	<0.001	<0.001	<0.001
T79489	MW-7d	Water	0.279	<0.005	0.148	0.021	0.448
Method Blank			<0.001	<0.001	<0.001	<0.001	
Reporting Limit			0.001	0.001	0.001	0.001	
QC			0.099	0.101	0.100	0.314	
RPD			0	1	0	1	
% Extraction Accuracy			98	102	100	107	
% Instrument Accuracy			99	101	100	105	

TEST	PREP METHOD	PREP DATE	ANALYSIS METHOD	ANALYSIS COMPLETED	CHEMIST	QC: (mg/L)	SPIKE: (mg/L)
BTEX	EPA 5030	8/18/97	EPA 602	8/18/97	AG	0.100 ea	0.1 ea

Director, Dr. Blair Leftwich

03 Sep 97
Date

TRACEANALYSIS, INC.
6701 Aberdeen Avenue   Lubbock, Texas 79424   806•794•1296   FAX 806•794•1298

September 02, 1997
Receiving Date: 08/13/97
Sample Type: Water
Charge Code No.: 2398/4L
Project Location: NA
COC# 13178

ANALYTICAL RESULTS FOR
BDM
Attention: Gil Van Deventer
415 West Wall, Suite 1818
Midland, TX 79701

Prep Date: 08/14/97
Analysis Date: 08/18/97
Sampling Date: 08/11/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project: GPM - Monument Booster

DISSOLVED METALS

TA#	FIELD CODE	Ca (mg/L)	Mg (mg/L)	Na (mg/L)	Hg (mg/L)	As (mg/L)	Cr (mg/L)	Ag (mg/L)	Ba (mg/L)	Al (mg/L)	Cu (mg/L)	Fe (mg/L)
T79483	9708111315 MW-6	150	33	110	<0.001	<0.10	<0.05	<0.01	<0.20	0.23	0.22	0.21
T79484	9708111330 MW-3	100	22	69	<0.001	<0.10	<0.05	<0.01	<0.20	<0.20	0.26	0.14
T79485	9708111415 MW-4	140	29	80	<0.001	<0.10	<0.05	<0.01	<0.20	<0.20	0.22	0.08
T79486	9708111535 MW-2	170	35	120	<0.001	<0.10	<0.05	<0.01	<0.20	0.32	0.20	0.24
T79487	9708111600 MW-7	100	44	120	<0.001	<0.10	<0.05	<0.01	<0.20	<0.20	0.18	0.43
T79488	9708111300 MW-1d	120	29	69	<0.001	<0.10	<0.05	<0.01	<0.20	<0.20	0.15	0.28
QC	Quality Control	51	47	48	0.0042	5.3	5.1	1.0	5.1	5.2	5.2	5.1
REPORTING LIMIT		0.01	0.01	0.40	0.001	0.10	0.05	0.01	0.20	0.20	0.02	0.03
RPD		2	3	3	21	7	1	2	1	8	0	4
% Extraction Accuracy		94	96	101	85	125	95	88	88	81	86	109
% Instrument Accuracy		101	94	95	83	106	101	100	102	103	103	101

TA#	FIELD CODE	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Zn (mg/L)	B (mg/L)	Se (mg/L)	Cd (mg/L)	Pb (mg/L)	Co (mg/L)	Be (mg/L)	V (mg/L)	U (mg/L)
T79483	9708111315 MW-6	0.30	<0.10	<0.20	0.12	0.79	0.027	<0.002	<0.005	<0.02	<0.01	<0.05	<1.0
T79484	9708111330 MW-3	<0.01	<0.10	<0.20	0.04	<0.20	0.015	<0.002	<0.005	<0.02	<0.01	<0.05	<1.0
T79485	9708111415 MW-4	<0.01	<0.10	<0.20	0.23	<0.20	0.024	<0.002	<0.005	<0.02	<0.01	<0.05	<1.0
T79486	9708111535 MW-2	<0.01	<0.10	<0.20	0.18	<0.20	0.021	<0.002	<0.005	<0.02	<0.01	<0.05	<1.0
T79487	9708111600 MW-7	0.37	<0.10	<0.20	0.06	<0.20	<0.010	<0.002	<0.005	<0.02	<0.01	<0.05	<1.0
T79488	9708111300 MW-1d	0.35	<0.10	<0.20	0.07	<0.20	0.018	<0.002	<0.005	<0.02	<0.01	<0.05	<1.0
QC	Quality Control	5.1	5.1	5.0	5.2	5.5	5.2	4.9	5.1	5.1	5.1	5.2	4.9
REPORTING LIMIT		0.01	0.10	0.20	0.02	0.20	0.01	0.002	0.005	0.02	0.01	0.05	1.0
RPD		1	0	0	1	3	1	0	2	1	1	2	14
% Extraction Accuracy		95	96	89	91	91	95	90	83	93	101	91	110
% Instrument Accuracy		101	101	100	103	110	103	98	102	102	102	101	98

METHODS: EPA SW 846-3005, 6010B, 7470.
CHEMIST: Ca, Mg, Na, As, Cr, Ag, Ba, Al, Cu, Fe, Mn, Mo, Ni, Zn, B, Se, Cd, Pb, Co, U: RR   Hg: HC
TOTAL METALS SPIKE: 100 mg/L Ca, Mg, Na; 0.005 mg/L Hg; 2.0 mg/L As, Cr, Ba, Al, Fe, Mn, Mo, Ni, Zn, Se, Cd, Pb, Co, Be, V, U; 0.4 mg/L Ag; 1.0 mg/L Cu, B.
TOTAL METALS QC: 50 mg/L Ca, Mg, Na; 0.005 mg/L Hg; 5.0 mg/L As, Cr, Ba, Al, Cu, Fe, Mn, Mo, Ni, Zn, B, Se, Cd, Pb, Co, Be, V, U; 1.0 mg/L Ag.

Director, Dr. Blair Leftwich   DATE 9-2-97

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
BDM
Attention: Gil Van Deventer
415 West Wall, Suite 1818
Midland, TX 79701

August 27, 1997
Receiving Date: 08/13/97
Sample Type: Water
Charge Code No.: 2398/4L
Project Location: NA
COC# 13178

Prep Date: 08/14/97
Analysis Date: 08/14/97
Sampling Date: 08/11/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project: GPM - Monument Booster

TA#	FIELD CODE	CHLORIDE (mg/L)	NITRATE-N (mg/L)	SULFATE (mg/L)	FLUORIDE (mg/L)	TDS (mg/L)	ALKALINITY (mg/L as CaCo3) HC03	C03
T79483	9708111315 MW-6	160	<1.0	37	0.85	810	500	<1.0
T79484	9708111330 MW-3	140	9.4	75	1.5	670	200	<1.0
T79485	9708111415 MW-4	140	<1.0	96	1.1	800	310	<1.0
T79486	9708111430 MW-2	200	9.0	290	1.3	1,100	190	<1.0
T79487	9708111535 MW-7	180	<1.0	76	1.8	860	410	<1.0
T79488	9708111600 MW-1d	180	<1.0	110	1.9	770	260	<1.0
QC	Quality Control	24	10	25	1.1	—	—	—
RPD		4	2	1	1	0	0	0
% Extraction Accuracy		97	100	102	99	—	—	—
% Instrument Accuracy		95	99	101	106	—	—	—
REPORTING LIMIT		10	1.0	10	0.1	—	1.0	1.0

METHODS: EPA 300.0, 340.2, 160.1, 310.1.
CHEMIST: CHLORIDE/NITRATE-N/SULFATE: RC FLUORIDE/TDS/ALKALINITY: JS
CHLORIDE SPIKE: 25 mg/L CHLORIDE.
NITRATE-N SPIKE: 10 mg/L NITRATE-N.
SULFATE SPIKE: 25 mg/L SULFATE.
FLUORIDE SPIKE: 0.5 mg/L FLUORIDE.
CHLORIDE QC: 24 mg/L CHLORIDE.
NITRATE-N QC: 10 mg/L NITRATE-N.
SULFATE QC: 25 mg/L SULFATE.
FLUORIDE QC: 1.0 mg/L FLUORIDE.

Director, Dr. Blair Leftwich

8-27-97
Date

79483-89

228

BDM

BDM International, Inc.
415 West Wall
Suite 1818
Midland, TX 79701
(915) 682-0008
FAX: (915) 682-0028

13178

Chain of Custody

Date 8-12-97 Page 1 Of 1

Lab Name Trace Analysis Inc
Address 6701 Aberdeen
Lubbock, Tx 79424
Telephone 800 378-1296

Samplers (SIGNATURES) G. Van Deventer

Analysis Request

Sample Number	Matrix	Location	Halogenated Volatiles 601/8010	Aromatic Volatiles 602/8020	Phenols, Sub Phenols 604/8040	Pesticides/PCB 608/8080	Polynuclear Aromatic Hydrocarbons 610/8310	Volatile Compounds GC/MS 624/8240	Base/Neu/Acid Compounds GC/MS 625/8270	Total Organic Carbon (TOC) 415/9060	Total Organic Halides (TOX) 9020	Petroleum Hydrocarbons 418.1	TPH/BTEX Modified 8015	TCLP- Vol. Semi-Vol. Herbicides, Pesticides	TCLP- Metals	RCRA Metals(8)	Priority Pollutant Metals (13)	CAM Metals (18) TTLC/STLC	Flash Point	Corrosivity	Reactivity	Oil & Grease	Cyanide Total/Amenable	Chemical Oxygen Demand (COD)	NO_3, SO_4	Ca, Mg, Na, F, Cl, HCO_3	Metals*	TDS per GV 8/15/97	Number of Containers
970811 1315	Water	MW-6		✓				79	4	83															✓	✓	✓	✓	5
970811 1330	Water	MW-3		✓						84															✓	✓	✓	✓	5
970811 1415	Water	MW-4		✓						85															✓	✓	✓	✓	5
970811 1430	Water	MW-2		✓						86															✓	✓	✓	✓	5
970811 ~~1530~~ 1535	Water	MW-7		✓						87															✓	✓	✓	✓	5
970811 1600	Water	MW-1d		✓						88															✓	✓	✓	✓	5
970811 1300	Water	MW-7d		✓						89																			2

Project Information

Project GPM- Monument Booster
Project Director G. Van Deventer
Charge Code No. 2392/4C
Shipping ID. No.
Via:

Sample Receipt

Total No. of Containers	32
Chain of Custody Seals	✓
Rec'd Good Condition/Cold	C/✓
Conforms to Record	✓
Lab No.	

Special Instructions/Comments: * Total dissolved metals: Al, As, Ba, B, Cd, Co, Cu, Cr, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Zn (samples must be filtered in lab). Be V U

Relinquished By 1.	Relinquished By 2.	Relinquished By 3.
(Signature) G. Van Deventer (Time) 0825	(Signature) (Time)	(Signature) (Time)
(Printed Name) Gil Van Deventer (Date) 8-12-97	(Printed Name) (Date)	(Printed Name) (Date)
(Company) BDM Environmental Services	(Company)	(Company)

Received By 1.	Received By 2.	Received By (Laboratory) 3.
(Signature) (Time)	(Signature) (Time)	(Signature) JO Hardell (Time) 10:00
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) JO Hardell (Date) 8/13/97
(Company)	(Company)	(Laboratory) Trace Analysis

4044 Peabody 79762

Greyhound 901 712 773 B -1°C 225 AH

Distribution: White, Canary-Laboratory • Pink, BDM

BDM

BDM International, Inc.
415 West Wall
Suite 1818
Midland, TX 79701
(915) 682-0008
FAX: (915) 682-0028

13178

Chain of Custody

Date 8-12-97 Page 1 Of 1

Lab Name Trace Analysis Inc
Address 6701 Aberdeen
Lubbock, Tx 79424
Telephone 800 378-1296

Samplers (SIGNATURES) [signature]

Analysis Request

Sample Number	Matrix	Location	Halogenated Volatiles 601/8010	Aromatic Volatiles 602/8020	Phenols, Sub Phenols 604/8040	Pesticides/PCB 608/8080	Polynuclear Aromatic Hydrocarbons 610/8310	Volatile Compounds GC/MS 624/8240	Base/Neu/Acid Compounds GC/MS 625/8270	Total Organic Carbon (TOC) 415/9060	Total Organic Halides (TOX) 9020	Petroleum Hydrocarbons 418.1	TPH/BTEX Modified 8015	TCLP- Vol., Semi-Vol. Herbicides, Pesticides	TCLP- Metals	RCRA Metals(8)	Priority Pollutant Metals (13)	CAM Metals (18) TTLC/STLC	Flash Point	Corrosivity	Reactivity	Oil & Grease	Cyanide Total/Amenable	Chemical Oxygen Demand (COD)	NO_3 & SO_4	TDS Ca, Mg, Na, F, Cl, HCO_3	Metals *		Number of Containers
970811 1315	Water	MW-6		✓																					✓	✓	✓		5
970811 1330	Water	MW-3		✓																					✓	✓	✓		5
970811 1415	Water	MW-4		✓																					✓	✓	✓		5
970811 1430	Water	MW-2		✓																					✓	✓	✓		5
970811 1535	Water	MW-7		✓																					✓	✓	✓		5
970811 1600	Water	MW-1d		✓																					✓	✓	✓		5
970811 1500	Water	MW-7d		✓	Duplicate of MW-7																								2

Project Information	
Project	GPM. Monument Booster
Project Director	G. Van Deventer
Charge Code No.	2348/4C
Shipping ID. No.	901 742 773 8
Via:	Greyhound TNM&O

Sample Receipt	
Total No. of Containers	
Chain of Custody Seals	
Rec'd Good Condition/Cold	
Conforms to Record	
Lab No.	

	1.	2.	3.
Relinquished By	[signature] 0825		
(Signature) (Time)			
(Printed Name) (Date)	Gil Van Deventer 8-12-97		
(Company)	BDM Environmental Services		
Received By			Received By (Laboratory)
(Signature) (Time)			
(Printed Name) (Date)			
(Company)			(Laboratory)

Special Instructions/Comments: * Total dissolved metals: Al, As, Ba, B, Cd, Co, Cu, Cr, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, Zn (samples must be filtered in lab).

Bill

Distribution: White, Canary-Laboratory • Pink, BDM

TRACEANALYSIS, INC.
6701 Aberdeen Avenue Lubbock, Texas 79424 806•794•1296 FAX 806•794•1298

ANALYTICAL RESULTS FOR
BDM INTERNATIONAL, INC.
Attention: Gil VanDeventer
415 W. Wall, Suite 1818
Midland, TX 79701

January 27, 1997
Receiving Date: 01/23/97
Sample Type: Water
Charge Code No: P/2398/11
Project Location: Monument Booster Station
COC# 10291

Prep Date: 01/24/97
Analysis Date: 01/24/97
Sampling Date: 01/22/97
Sample Condition: I & C
Sample Received by: JH
Project Name: GPM

TA#	FIELD CODE		BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	M,P,O XYLENE (mg/L)	TOTAL BTEX (mg/L)
T66166	9701221530	MW-2	<0.001	<0.001	<0.001	<0.001	<0.001
T66167	9701221610	MW-3	<0.001	<0.001	<0.001	<0.001	<0.001
T66168	9701221700	MW-4	0.002	<0.001	<0.001	<0.001	0.002
T66169	9701221730	MW-6	0.001	<0.001	<0.001	<0.001	0.001
T66170	9701221800	MW-1d	0.001	<0.001	0.001	<0.001	0.002
T66171	9701221830	MW-7	0.896	<0.005	0.240	0.330	1.47
T66172	9701221855	MW-7d	0.911	<0.005	0.219	0.350	1.48
T66173	9701221900	Trip Blank	<0.001	<0.001	<0.001	<0.001	<0.001
QC	Quality Control		0.097	0.098	0.099	0.301	
Reporting Limit			0.001	0.001	0.001	0.001	
RPD			1	1	0	1	
% Extraction Accuracy			104	105	106	106	
% Instrument Accuracy			97	98	99	100	

METHODS: EPA SW 846-5030, 8020.
CHEMIST: RW
BTEX SPIKE AND QC: 0.100 mg/L BTEX.

BS

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

1-27-97
Date

6701 Aberdeen Avenue
Lubbock, Texas 79424
806•794•1296
FAX 806•794•1298

ANALYTICAL RESULTS FOR
BDM INTERNATIONAL. INC.
Attention: Gil Vandeventer
505 Marquette NW, Suite 1100
Albuquerque, NM 87102

January 28, 1997
Receiving Date: 01/23/97
Sample Type: Water
Charge Code No: P/2398/11
Project Location: Monument Booster Station
COC #10291

Prep Date: 01/23/97
Analysis Date: 01/23/97
Sampling Date: 01/23/97
Sample Condition: Intact & Cool
Sample Received by: JH
Project: GPM

TA#	FIELD CODE	NITRATE-N (mg/L)	SULFATE (mg/L)
T66166	9701221530 MW-2	2.1	310
T66167	9701221610 MW-3	2.7	76
T66168	9701221700 MW-4	<1.0	100
T66169	9701221730 MW-6	<1.0	37
T66170	9701221800 MW-1d	<1.0	83
T66171	9701221830 MW-7	<1.0	18
QC	Quality Control	9.8	25
	REPORTING LIMIT	1.0	1.0
	RPD	5	0
	% Extraction Accuracy	103	103
	% Instrument Accuracy	100	100

METHODS: EPA 300.0.
CHEMIST: MS
NITRATE-N SPIKE: 200 mg/L Nitrate-N.
NITRATE-N QC: 10 mg/L Nitrate-N.
SULFATE SPIKE: 500 mg/L Sulfate.
SULFATE QC: 25 mg/L Sulfate.

1-28-97

Director, Dr. Blair Leftwich
Director, Dr. Bruce McDonell

DATE

TRACEANALYSIS, INC.
A Laboratory for Advanced Environmental Research and Analysis

DISK II 68

Nº 10291

GCL Environmental Science and Engineering
A BDM International Company

☑ Albuquerque
505 Marquette NW, Ste. 1100
Albuquerque, NM 87102
(505) 842-0001
FAX: (505) 842-0595

☐ Mid Atlantic Region
4221 Forbes Blvd., Ste. 240
Lanham, MD 20706-4325
(301) 459-9677
FAX: (301) 459-3064

☐ NASA-WSTF
PO Drawer MM
Las Cruces, NM 88004
(505) 524-5353
FAX: (505) 524-5315

Chain of Custody

Date 1/22/97 Page 1 Of 1

Lab Name TRACE ANALYSIS
Address 6701 ABERDEENE AVENUE
LUBBOCK TX 79424
Telephone (806) 794-1296

Samplers (SIGNATURES) D. Nez

Analysis Request

	Sample Number	Matrix	Location	Halogenated Volatiles 601/8010	Aromatic Volatiles 602/8020 BTEX	Phenols, Sub Phenols 604/8040	Pesticides/PCB 608/8080	Polynuclear Aromatic Hydrocarbons 610/8310	Volatile Compounds GC/MS 624/8240	Base/Neu/Acid Compounds GC/MS 625/8270	Total Organic Carbon (TOC) 415/9060	Total Organic Halides (TOX) 9020	Petroleum Hydrocarbons 418.1	TPH/BTEX Modified 8015	TCLP- Vol., Semi-Vol., Herbicides, Pesticides	TCLP- Metals	RCRA Metals(8)	Priority Pollutant Metals (13)	CAM Metals (18) TTLC/STLC	Flash Point	Corrosivity	Reactivity	Oil & Grease	Cyanide Total/Amenable	Chemical Oxygen Demand (COD)	[illegible]				Number of Containers
166	9701221530	H2O	MW-2		2																					1				
167	9701221610	H2O	MW-3		2																					1				
168	9701221700	H2O	MW-4		2																					1				
169	9701221730	H2O	MW-6		2																					1				
170	9701221800	H2O	MW-1d		2																					1				
171	9701221830	H2O	MW-7		2																					1				
172	9701221855	H2O	MW-7d		2																									
173	9701221900	H2O	[illegible]		2																									

Project Information
Project CPM-Monument Booster Sta.
Project Director G. Van Deventer
Charge Code No. 3100-008
Shipping ID. No.
Via Greyhound

Sample Receipt
Total No. of Containers 22
Chain of Custody Seals Y
Rec'd Good Condition/Cold Y
Conforms to Record Y
Lab No.

Special Instructions/Comments:

Relinquished By 1.
(Signature) D. Nez (Time) 1910
(Printed Name) DAVID NEZ (Date) 1/22/97
(Company) BDM

Relinquished By 2.
(Signature) (Time)
(Printed Name) (Date)
(Company)

Relinquished By 3.
(Signature) (Time)
(Printed Name) (Date)
(Company)

Received By 1.
(Signature) (Time)
(Printed Name) (Date)
(Company)

Received By 2.
(Signature) (Time)
(Printed Name) (Date)
(Company)

Received By (Laboratory) 3.
(Signature) J. O'Neill (Time) 9:30
(Printed Name) Jennifer O'Neill (Date) 1/23/97
(Laboratory) Trace Analysis

Distribution: White, Canary-Laboratory • Pink, GCL

C/T

GCL
Environmental Science and Engineering
A BDM International Company

☑ Albuquerque
505 Marquette NW, Ste. 1100
Albuquerque, NM 87102
(505) 842-0001
FAX: (505) 842-0595

❑ Mid Atlantic Region
4221 Forbes Blvd., Ste. 240
Lanham, MD 20706-4325
(301) 459-9677
FAX: (301) 459-3064

❑ NASA-WSTF
PO Drawer MM
Las Cruces, NM 88004
(505) 524-5353
FAX: (505) 524-5315

№ 10291

Chain of Custody

Date 1/22/97 Page 1 Of 1

Lab Name TRACE ANALYSIS
Address 6701 ABERDEENE AVENUE
LUBBOCK TX 79424
Telephone (806) 794-1296

Samplers (SIGNATURES) D. Nez

Analysis Request

Sample Number	Matrix	Location	Halogenated Volatiles 601/8010	Aromatic Volatiles 602/8020 BTEX	Phenols, Sub Phenols 604/8040	Pesticides/PCB 608/8080	Polynuclear Aromatic Hydrocarbons 610/8310	Volatile Compounds GC/MS 624/8240	Base/Neu/Acid Compounds GC/MS 625/8270	Total Organic Carbon (TOC) 415/9060	Total Organic Halides (TOX) 9020	Petroleum Hydrocarbons 418.1	TPH/BTEX Modified 8015	TCLP- Vol., Semi-Vol. Herbicides, Pesticides	TCLP- Metals	RCRA Metals(8)	Priority Pollutant Metals (13)	CAM Metals (18) TTLC/STLC	Flash Point	Corrosivity	Reactivity	Oil & Grease	Cyanide Total/Amenable	Chemical Oxygen Demand (COD)	[illegible]				Number of Containers
9701221530	H_2O	MW-2		2																					1				
9701221610	H_2O	MW-3		2																					1				
9701221700	H_2O	MW-4		2																					1				
9701221730	H_2O	MW-6		2																					1				
9701221800	H_2O	MW-1d		2																					1				
9701221830	H_2O	MW-7		2																					1				
9701221855	H_2O	MW-7d		2		duplicate of MW-7																							
9701221400	H_2O	[illegible] Blank		2																									

Project Information	
Project	GPM-Monument Booster Stat.
Project Director	Gil Van Deventer
Charge Code No.	3100-008
Shipping ID. No.	
Via:	Greyhound

Special Instructions/Comments:

Sample Receipt	
Total No. of Containers	
Chain of Custody Seals	
Rec'd Good Condition/Cold	
Conforms to Record	
Lab No.	

Relinquished By 1.	Relinquished By 2.	Relinquished By 3.
D. Nez 1910 (Signature) (Time)	(Signature) (Time)	(Signature) (Time)
David Nez 1/22/97 (Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
BDM (Company)	(Company)	(Company)

Received By 1.	Received By 2.	Received By (Laboratory) 3.
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
(Company)	(Company)	(Laboratory)

Distribution: White, Canary-Laboratory • Pink, GCL