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REPORTS

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GPM GAS CORPORATION
4044 PENBROOK
ODESSA, TX 79762

September 21, 1996

Mr. William Olson - Hydrogeologist
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
2040 South Pacheco
State Land Office Building
Santa Fe, New Mexico 87505

RE: SECOND QUARTER 1996 SAMPLING EVENT - ANNUAL REPORT
MONUMENT BOOSTER STATION
LEA COUNTY, NEW MEXICO

Dear Mr. Olson:

GPM Gas Corporation (GPM) has completed the second quarter 1996 groundwater sampling and monitoring operations at the above-referenced site in accordance with the requirements specified in your letters dated August 24, 1995 and October 25, 1995. This annual report documents the previous four quarterly sampling events conducted at the site. Sampling and monitoring activities were performed by Geoscience Consultants, Ltd. (GCL).

Procedures

Prior to sampling, the monitoring wells at the Monument Booster Station (MW-1 through MW-7) were gauged for depth to groundwater on April 24, 1996 using an electronic water level indicator or an oil/water interface probe if free product (condensate; phase-separated hydrocarbons) was present. Immediately prior to collecting groundwater samples, each monitoring well was purged of a minimum of three well casing volumes of development water using clean, decontaminated PVC bailers. A total of approximately 117 gallons of water was purged from monitoring wells MW-1D, MW-2, MW-3, MW-4, MW-6, and MW-7. Groundwater samples were obtained using a new, decontaminated, disposable bailer for each well after purging. Groundwater parameters, including conductivity, temperature, and dissolved oxygen were measured during purging operations, and prior to obtaining groundwater samples.

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 total benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020. The next set of water samples were transferred into appropriately preserved containers for analysis of major cations/anions and total dissolved solids (TDS). A third set of samples were transferred into acid preserved plastic containers with a decontaminated, pressurized, disposable bailer after being filtered through a filter cartridge (45 μm element) for metals analysis. Additional groundwater samples were collected from monitoring wells MW-1D, MW-6, and MW-7 and sent to the laboratory for analysis of nitrate (NO_3), sulfate (SO_4), total aerobic heterotrophic plate count (HPC), and total hydrocarbon utilizing bacteria (HUB), to assess the efficacy of intrinsic bioremedial activity currently taking place. Chain-of-custody (COC) forms documenting sample identification numbers, collection times, and delivery times to the laboratory 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.

Groundwater Gradient

Based on the gauging measurements conducted on April 24, 1996, the water table elevation has not fluctuated significantly since the previous measurement obtained in January 1996. Over the course of the last year, groundwater elevations have fluctuated by approximately 0.19 to 0.83 feet. Depth to groundwater occurs at approximately 22 to 29 feet below ground surface across the site. The direction of flow is to the southeast with a hydraulic gradient of approximately 0.006 ft/ft, which is consistent with determinations made from previous gauging events.

Groundwater elevations for the current and previous monitoring events are summarized in Table 1 (Attachment A). A map that depicts the elevation of the potentiometric surface (groundwater table) and direction of groundwater flow is illustrated in Figure 1 (Attachment B).

Approximately 2.09 feet and 0.79 feet of condensate (phase-separated hydrocarbons) was observed in monitoring wells MW-1 and MW-5, respectively, during sampling activities on April 24, 1996. Assuming a hydraulic conductivity of 26 to 50 feet/day (McAda, 1984), a hydraulic gradient of approximately 0.006 ft/ft, and an estimated effective porosity of 0.25, the average linear velocity of groundwater flow on site varies from approximately 230 to 440 feet/year.

Analytical Results

Groundwater sample analytical results for the current and previous sampling events are presented in Tables 2 through 6. The WQCC standards are presented in Tables 2 through 5 for comparison. Constituents with concentrations above the WQCC standards are highlighted in boldface type. The laboratory reports and COC documentation are included in Attachment C. The most recent total dissolved BTEX concentrations are depicted graphically on Figure 2 Attachment B).

BTEX concentrations have remained relatively consistent compared to the previous sampling events. The groundwater samples obtained from monitoring wells MW-1D, MW-2, MW-3, MW-4, and MW-6 during the latest sampling event had dissolved BTEX concentrations below the laboratory detection limits (Table 2) and below New Mexico Water Quality Control Commission (WQCC) standards. A benzene concentration of 0.585 mg/l in MW-7 exceeded the WQCC standards of 0.010 mg/l.

Due to suspected cross-contamination of samples from MW-2 and MW-4 from the submersible well purging pump during the November 15, 1995 sampling event, the wells were purged by using clean, decontaminated PVC bailers during the January 1996 sampling event. After hand bailing, samples were obtained using a new, decontaminated, disposable bailer for each well after purging. To further evaluate QA/QC between the laboratories and field sampling methods, three duplicate samples for MW-2, MW-6, and MW-7 were sent to Trace Analysis, Inc. and Inchcape Testing Services in Richardson, Texas for BTEX analysis. The BTEX results for all duplicate samples are summarized in Table 3. Based on the results of the duplicate analyses and different purging methodology (hand bailing versus submersible pump), GPM concludes that the elevated BTEX concentrations observed in MW-2 and MW-4 during the November 15, 1995 sampling event reflect cross-contamination from the submersible pump. Based on the current results and laboratory trends, BTEX concentrations in those wells should have been close to or below the method detection limits during the previous (November 1995) sampling event.

During the initial sampling event in May 1995, the metal samples were not filtered, therefore the metal analyses indicate total metal concentrations (dissolved and undissolved) and many constituents exceeded WQCC standards. Because the samples were not filtered, the major fraction of the metal ions are more representative of the soil chemistry versus the dissolved groundwater chemistry. In contrast, the results

for metals analyses (Table 4) during the annual sampling event in April 1996 indicate no constituents exceeded the WQCC standards with the exception of manganese in MW-1D, MW-6, and MW-7, and iron and fluoride in MW-7.

The elevated levels of manganese in MW-1D (0.37 mg/l) and MW-7 (0.38 mg/l), and iron in MW-7 (1,42 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-non-impacted wells MW-2, MW-3, and MW-4 have no detectable concentrations of manganese. 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 results for major cation and anion analyses (Table 5) during the annual sampling event indicate no constituents exceeded the WQCC standards with the exception of fluoride in MW-7 (1.8 mg/l) and, chloride in MW-2 (314 mg/l), and TDS in MW-2 (1,318 mg/l). 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. Elevated fluoride levels are a common natural occurrence in southeast New Mexico and parts of west Texas. Furthermore, fluoride is not a constituent for the natural gas production process on site, therefore, a remedial response to the fluoride levels in the groundwater is not warranted.

Chloride and 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 chloride and TDS levels probably originated from an upgradient, off-site source or are an insignificant aberration from background levels.

Intrinsic Bioremediation Assessment

The evaluation of intrinsic bioremediation as a hydrocarbon removal mechanism requires evaluation of electron acceptor availability and use patterns, the enumeration of microorganisms with the capability to degrade the contaminant of concern, and the groundwater conditions that allow for electron acceptor and nutrient transport.

Electron acceptors that can be used by in situ microorganisms to achieve significant hydrocarbon degradation include oxygen, nitrogen, and sulfate, in relative order of preference. Often, more than one degradation process is operative during intrinsic bioremediation and the key lies in determining whether or not sufficient electron acceptors are available to arrest contaminant migration and/or attain remediation. The results for dissolved oxygen (DO), nitrate (NO_3), sulfate (SO_4), total aerobic heterotrophic plate count (HPC), total hydrocarbon utilizing bacteria (HUB) are summarized in Table 6.

Hydrocarbon-impacted wells (MW-1D, MW-5, 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. An overall decrease in nitrate and sulfate concentrations since May 1995 is evident in most 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 fluctuated over the last year and further monitoring is necessary to make more conclusive interpretations of aerobic biodegradation conditions.

Enumeration of bacterial populations (colony forming units) have been performed on hydrocarbon-impacted wells MW-1D and MW-7, upgradient well MW-2, and downgradient well MW-6 to assess if

hydrocarbon-degrading bacteria were stimulated to grow in the presence of hydrocarbons. The confirmed presence of total aerobic bacteria and hydrocarbon utilizing bacteria with populations numbering between 10^4 and 10^6, indicates active aerobic biodegradation conditions; however the populations have fluctuated significantly over the last year and further monitoring is necessary to make more conclusive interpretations of aerobic biodegradation conditions.

The relative concentrations of electron acceptors in wells impacted by hydrocarbons and the small size of the plume when evaluated with predicted groundwater velocity and the age of the plume suggest that natural processes, such as bacteria, have been and are actively degrading hydrocarbons. The rate of aerobic biodegradation is likely limited by the availability of the electron acceptors (primarily oxygen) within the zone of hydrocarbon impact. As indicated by current water quality in downgradient wells MW-3, MW-4, and MW-6, the electron acceptor concentrations may be sufficient to permit natural biodegradation to contain contaminant migration in a downgradient direction and thereby stabilize the spreading of hydrocarbons in groundwater. Although it has not been evaluated during this project, anaerobic biodegradation can be another significant factor in the biodegradation of hydrocarbons in the groundwater.

Although a linear groundwater flow velocity of 230 to 440 feet/year is estimated for the site there has been no increase of BTEX concentrations over detection limits in downgradient monitoring wells MW-3, MW-4 and MW-6. These observations are strong evidence that support the fact that natural attenuation processes have kept the plume from migrating. Continued 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.

Product Recovery

To date, approximately 37 gallons of free product have been removed from monitoring well MW-1 using a combination of gravity siphoning and hand bailing. An additional 1½ gallons of free product has been recovered from MW-5 by hand bailing. GPM has elected to implement a more aggressive remediation system utilizing a pneumatic product recovery system that will recover the free product (condensate) from monitoring wells MW-1 and MW-5. Our consultant, GCL, is in the process of designing and procuring the necessary equipment for this system. We anticipate that the system will be installed in early October 1996. Results of the system recovery operations will be documented during the quarterly monitoring and sampling events.

Conclusions

- Benzene was the only BTEX constituent that exceeded the New Mexico Water Quality Control Commission standards (WQCC) of 0.010 mg/l, in MW-7.

- A total of 39 gallons of free product (condensate) has been recovered from monitoring wells MW-1 and MW-5 to date. GPM plans to install a pneumatic product recovery system to continuously recover free product from monitoring wells MW-1 and MW-5 during the next sampling event.

- 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.

- According to the analytical and groundwater gradient data, the hydrocarbon-impacted

groundwater has not migrated off site, and remains well within the boundaries of the facility.

Recommendations and Remedial Response

GPM requests approval from the OCD to conduct sampling and monitoring operations on a semi-annual basis for the next year and annual sampling thereafter. GPM will provide the OCD with an annual report in August 1997 that documents site conditions over the period from May 1996 to May 1997. Since the groundwater in the site area is not impacted with dissolved metals, GPM requests OCD approval to suspend sampling operations for metal constituents. We will implement a product recovery system for MW-1 and MW-5 and continue sampling the on-site monitoring wells for BTEX and biological parameters until natural attenuation processes reduce BTEX levels to WQCC standards. If you have any questions regarding this project please call me at 915-368-1142.

Sincerely,

Scott Seeby
Environmental Engineer
New Mexico Region

Attachments

cc: Tony Canfield, Oil Center, NM
Jerry Sexton, OCD-Hobbs, NM
Gilbert J. Van Deventer, GCL-Midland,TX

ATTACHMENTS

ATTACHMENT A

TABLES

Table 1
Summary of Groundwater Elevations
Monument Booster Station

Well	Date	Relative Ground Surface Elevations (feet)*	Relative Top of Casing Elevation (feet)*	Depth to Groundwater Below Top of Casing (feet)	Corrected Relative Groundwater Elevation (feet)**	Phase-Separated Hydrocarbon Thickness (feet)
MW-1	05-16-95	3588.85	3591.15	28.05	3565.17	2.52
	11-21-95	3588.85	3591.15	27.03	3565.65	1.86
	01-18-96	3588.85	3591.15	27.62	3565.32	2.18
	04-24-96	3588.85	3591.15	27.39	3565.47	2.09
MW-1D	05-16-95	3589.06	3591.31	26.04	3565.27	0.00
	11-21-95	3589.06	3591.31	25.54	3565.77	0.00
	01-18-96	3589.06	3591.31	25.89	3565.42	0.00
	04-24-96	3589.06	3591.31	25.70	3565.61	0.00
MW-2	05-16-95	3594.13	3596.30	29.28	3567.02	0.00
	11-21-95	3594.13	3596.30	29.09	3567.21	0.00
	01-18-96	3594.13	3596.30	29.15	3567.15	0.00
	04-24-96	3594.13	3596.30	29.10	3567.20	0.00
MW-3	05-16-95	3581.46	3583.86	22.72	3561.14	0.00
	11-21-95	3581.46	3583.86	22.12	3561.74	0.00
	01-18-96	3581.46	3583.86	22.25	3561.61	0.00
	04-24-96	3581.46	3583.86	22.25	3561.61	0.00
MW-4	05-16-95	3586.10	3588.77	26.45	3562.32	0.00
	11-21-95	3586.10	3588.77	25.79	3562.98	0.00
	01-18-96	3586.10	3588.77	25.90	3562.87	0.00
	04-24-96	3586.10	3588.77	25.98	3562.79	0.00
MW-5	05-16-95	3589.62	3592.16	28.10	3564.06	0.00
	11-21-95	3589.62	3592.16	28.24	3564.54	0.76
	01-18-96	3589.62	3592.16	28.45	3564.33	0.75
	04-24-96	3589.62	3592.16	28.41	3564.40	0.79
MW-6	11-21-95	3586.15	3587.93	24.71	3563.22	0.00
	01-18-96	3586.15	3587.93	24.11	3563.82	0.00
	04-24-96	3586.15	3587.93	24.94	3562.99	0.00
MW-7	11-21-95	3588.06	3589.40	25.16	3564.24	0.00
	01-18-96	3588.06	3589.40	25.48	3563.92	0.00
	04-24-96	3588.06	3589.40	25.33	3564.07	0.00

* Elevations initially surveyed by John W. West Engineering Company of Hobbs, New Mexico. The monitor well casings were marked on the north side to provide consistent reference points for future gauging operations.
** Correction Equation for Phase-Separated Hydrocarbons: Corrected Relative Groundwater Elevation = Top of Casing Elevation - [Depth to Groundwater Below Top of Casing - (SG) (PSH Thickness)]
Specific Gravity (SG) = 0.82 for condensate.
PSH indicates phase separated hydrocarbons (condensate).

Table 2
Summary of Dissolved BTEX Analytical Results
Monument Booster Station

Constituent	Date	Monitoring Well Numbers								WQCC Standards (mg/l)
		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)	
Benzene	05-16-95	NA	**0.018**	<0.001	<0.001	<0.001	**0.265**	---	---	0.010
	11-15-95	NA	0.003	**0.044***	<0.001	**0.045***	NA	0.003	**0.465**	
	01-18-96	NA	0.004	<0.001	<0.001	0.003	NA	0.002	**1.130**	
	04-24-96	NA	<0.001	<0.001	<0.001	<0.002	NA	<0.001	**0.585**	
Toluene	05-16-95	NA	0.006	<0.001	<0.001	<0.001	0.009	---	---	0.75
	11-15-95	NA	<0.001	0.002*	<0.001	0.002*	NA	<0.001	<0.001	
	01-18-96	NA	<0.001	<0.001	0.001	<0.001	NA	<0.001	0.003	
	04-24-96	NA	<0.001	<0.001	<0.001	<0.002	NA	<0.001	<0.002	
Ethylbenzene	05-16-95	NA	0.015	<0.001	<0.001	<0.001	0.261	---	---	0.75
	11-15-95	NA	0.002	0.006*	<0.001	0.006*	NA	0.001	0.205	
	01-18-96	NA	0.003	<0.001	<0.001	<0.001	NA	<0.001	0.476	
	04-24-96	NA	<0.001	<0.001	<0.001	<0.002	NA	<0.001	0.251	
Xylenes (Total)	05-16-95	NA	0.016	<0.001	<0.001	<0.001	0.050	---	---	0.62
	11-15-95	NA	0.001	0.009*	<0.001	0.010*	NA	0.003	0.163	
	01-18-96	NA	0.009	<0.001	<0.001	<0.001	NA	<0.001	0.365	
	04-24-96	NA	<0.001	<0.001	<0.001	<0.002	NA	<0.001	0.013	

Analyses performed by Trace Analysis, Inc., Lubbock, Texas.
All samples analyzed for BTEX using EPA Method 8020 except for samples obtained on May 17, 1995 (analyzed using EPA Method 8240).
New Mexico Water Quality Control Commission (WQCC) Standards are listed as specified in Regulation 3-103.
Values in **boldface** type indicate concentrations exceed WQCC groundwater standards.
NA indicates monitoring well was not analyzed (due to presence of free phase floating product).
* Indicates BTEX cross-contamination suspected on samples obtained from monitoring wells MW-2 and MW-4 for the November 15, 1995 sampling event.
--- Indicates monitoring well was installed after this sampling date.

Table 3
Summary of Dissolved BTEX Analytical Results for Duplicate Samples
Monument Booster Station

Constituent	Date	MW-2 (mg/l)	MW-6 (mg/l)	MW-7 (mg/l)	WQCC Standards (mg/l)
Benzene	01-18-96[1]	NA	NA	1.050	0.010
	01-18-96[2]	<0.001	0.001	1.040	
	04-24-96[1]	NA	NA	0.602	
Toluene	01-18-96[1]	NA	NA	0.003	0.75
	01-18-96[2]	<0.001	<0.001	<0.01	
	04-24-96[1]	NA	NA	<0.002	
Ethylbenzene	01-18-96[1]	NA	NA	0.431	0.75
	01-18-96[2]	<0.001	<0.001	0.459	
	04-24-96[1]	NA	NA	0.267	
Xylenes (Total)	01-18-96[1]	NA	NA	0.353	0.62
	01-18-96[2]	<0.001	<0.001	0.355	
	04-24-96[1]	NA	NA	0.014	

All samples analyzed for BTEX using EPA Method 8020.
1 Duplicate sample analyzed by Trace Analysis, Inc.
2 Duplicate sample analyzed by Inchcape Testing Services.
NA Not analyzed.
New Mexico Water Quality Control Commission (WQCC) Standards are listed as specified in Section 3-103.
Values in **boldface** type indicate concentrations exceed WQCC groundwater standards.

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 04-24-96	0.55 NA	1.34 0.2	**13.10** <0.2	0.88 <0.2	**8.04** <0.2	0.24 NA	--- 0.2	--- 0.3	5
Arsenic (As)	05-16-96 04-24-96	<0.1 NA	<0.1 <0.012	<0.1 0.011	<0.1 0.019	<0.1 0.008	<0.1 NA	--- **0.238**	--- 0.004	0.1
Barium (Ba)	05-16-96 04-24-96	0.13 NA	0.12 <0.2	0.08 <0.2	0.05 <0.2	0.10 <0.2	0.14 NA	--- 0.2	--- 0.3	1
Boron (B)	05-16-96 04-24-96	**0.85** NA	0.22 0.11	0.37 0.38	0.09 <0.03	0.14 0.06	0.39 NA	--- 0.22	--- 0.60	0.75
Cadmium (Cd)	05-16-96 04-24-96	0.01 NA	<0.01 <0.02	0.01 <0.02	<0.01 <0.02	<0.01 <0.02	<0.01 NA	--- <0.02	--- <0.02	0.01
Cobalt (Co)	05-16-96 04-24-96	<0.05 NA	<0.05 <0.03	<0.05 0.03	<0.05 <0.03	<0.05 <0.03	<0.05 NA	--- <0.03	--- <0.03	0.05
Copper (Cu)	05-16-96 04-24-96	<0.05 NA	<0.05 <0.02	<0.05 <0.02	<0.05 <0.02	<0.05 <0.02	<0.05 NA	--- <0.02	--- <0.02	1
Chromium (Cr)	05-16-96 04-24-96	0.01 NA	<0.01 <0.05	0.02 **0.06**	0.01 <0.05	0.02 <0.05	0.02 NA	--- **0.06**	--- <0.05	0.05
Iron (Fe)	05-16-96 04-24-96	**25.58** NA	**4.6** 0.06	**5.82** 0.07	0.53 0.17	**4.68** 0.08	**1.75** NA	--- 0.15	--- <0.03	1
Lead (Pb)	05-16-96 04-24-96	<0.1 NA	<0.1 <.0001	<0.1 0.005	<0.1 <0.001	<0.1 <0.001	<0.1 NA	--- <0.001	--- <0.001	0.05
Manganese (Mn)	05-16-96 04-24-96	**0.67** NA	**0.31** **0.37**	0.12 <0.01	0.08 <0.01	0.11 <0.01	**0.58** NA	--- **0.28**	--- **0.38**	0.2

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

Mercury (Hg)	05-16-96 04-24-96	<0.001 NA	<0.001 <0.001	<0.001 <0.001	<0.001 <0.001	<0.001 <0.001	<0.001 NA	--- <0.001	--- <0.001	0.002
Molybdenum (Mo)	05-16-96 04-24-96	0.07 NA	0.09 <0.1	0.05 <0.1	0.07 <0.1	0.07 <0.1	0.07 NA	--- <0.1	--- <0.1	1
Nickel (Ni)	05-16-96 04-24-96	<0.05 NA	<0.05 <0.2	<0.05 <0.2	<0.05 <0.2	<0.05 <0.2	<0.05 NA	--- <0.2	--- <0.2	0.2
Selenium (Se)	05-16-96 04-24-96	<0.2 NA	<0.2 <0.05	<0.2 <0.05	<0.2 <0.05	<0.2 <0.05	<0.2 NA	--- <0.05	--- <0.05	0.05
Silver (Ag)	05-16-96 04-24-96	<0.01 NA	<0.01 <0.01	<0.01 <0.01	<0.01 <0.01	<0.01 <0.01	<0.01 NA	--- <0.01	--- <0.01	0.05
Zinc (Zn)	05-16-96 04-24-96	0.03 NA	0.06 <0.02	0.05 <0.02	0.04 0.03	0.05 <0.02	0.04 NA	--- <0.02	--- <0.02	10

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 (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 μm element on 04-24-96, therefore results indicate dissolved metal concentrations.

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 04-24-96	NA NA	634 702	**1,478** **1,318**	516 598	716 759	692 NA	--- 929	--- 828	1,000
Calcium (Ca)	05-16-95 04-24-96	12.8 NA	123 125	315 246	99.7 103	160 149	122 NA	--- 174	--- 109	NS
Fluoride (F)	05-16-95 04-24-96	NA NA	**1.8** 1.6	1.1 1.1	**1.8** 1.5	1.2 1.1	1.4 NA	--- 0.9	--- **1.8**	1.6
Magnesium (Mg)	05-16-95 04-24-96	1.6 NA	46.2 31.8	72.0 51.5	25.0 23.6	37.2 31.6	52.9 NA	--- 37.2	--- 47.3	NS
Sodium (Na)	05-16-95 04-24-96	14.5 NA	79.1 78.8	154.5 166	76.1 75.8	82.5 85.8	110.7 NA	--- 113	--- 178	NS
Bicarbonate (HCO_3)	05-16-95 04-24-96	NA NA	333 297	197 222	166 286	277 288	532 NA	--- 484	--- 5.2	NS
Chloride (Cl)	05-16-95 04-24-96	NA NA	77 124	**812** **314**	188 134	152 167	80 NA	--- 186	--- 143	250
Nitrate (NO_3-N)	05-16-95 04-24-96	NA NA	1.37 <0.1	7.42 0.3	5.62 0.3	3.69 0.1	0.56 NA	--- <0.1	--- <0.1	10.0
Sulfate (SO_4)	05-16-95 04-24-96	NA NA	174 169	509 443	115 95	136 115	67 NA	--- 70	--- 149	600

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 (due to presence of free product).
NS Indicates no standard established or applicable.
Values in **boldface** type indicate concentrations exceed WQCC groundwater standards.

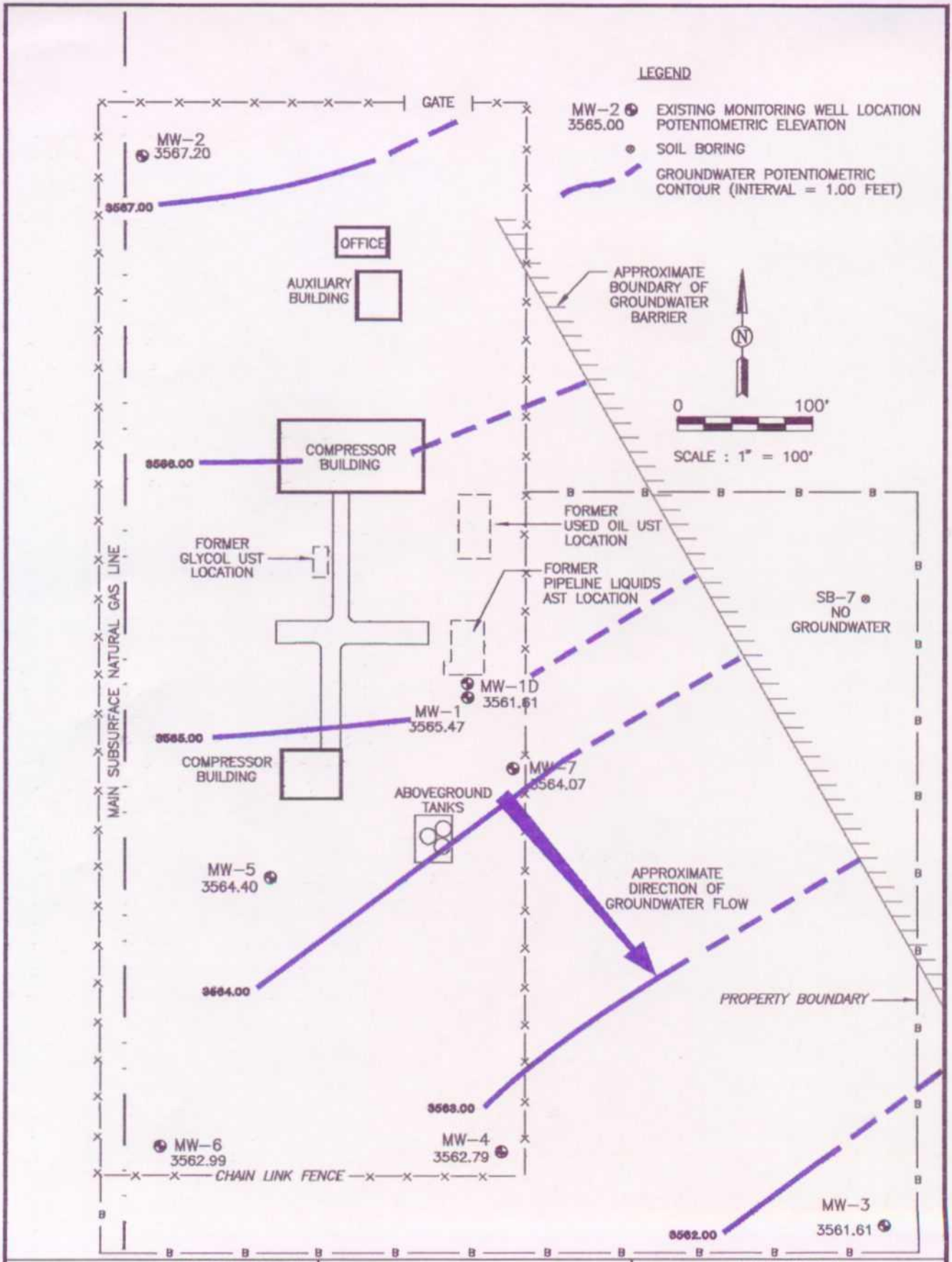
Table 6
Summary of Bacterial Activity Analytical Results
Monument Booster Station

Constituent	Date	MW-1D (cfu/ml)	MW-2 (cfu/ml)	MW-3 (cfu/ml)	MW-4 (cfu/ml)	MW-5 (cfu/ml)	MW-6 (cfu/ml)	MW-7 (cfu/ml)
Total Aerobic Bacterial Populations	05-16-95	900,000	34,000	NA	NA	1,550,000	---	---
	11-15-95	35,000	NA	NA	NA	NA	41,000	44,000
	01-18-96	1,020,000	NA	NA	NA	NA	11,900	63,300
	04-24-96	513,000	NA	NA	NA	NA	213,000	127,000
Total Hydrocarbon Degraders	05-16-95	61,000	28,000	NA	NA	24,500	---	---
	11-15-95	3,000	NA	NA	NA	NA	1,100	990
	01-18-96	481,000	NA	NA	NA	NA	852,000	38,400
	04-24-96	40,700	NA	NA	NA	NA	30,700	88,300
Dissolved Oxygen (DO)	05-16-95	1.05	6.48	6.85	4.85	1.10	---	---
	11-15-95	1.26	6.13	1.29	1.30	NA	5.4	1.60
	01-18-96	4.8	6.2	4.9	4.0	NA	4.1	4.8
	04-24-96	2.6	1.5	1.0	1.9	NA	1.7	2.1
Nitrate (NO_3)	05-16-95	1.37	7.42	5.62	3.69	0.56	---	---
	11-15-95	<0.01	NA	NA	NA	NA	0.06	0.03
	01-18-96	0.6	NA	NA	NA	NA	<0.05	<0.05
	04-24-96	<0.1	0.3	0.3	0.1	NA	<0.1	<0.1
Sulfate (SO_4)	05-16-95	174	509	115	136	67	---	---
	11-15-95	119	NA	NA	NA	NA	233	418
	01-18-96	168	NA	NA	NA	NA	93	180
	04-24-96	169	443	95	115	NA	70	149

Total Aerobic Bacterial Populations equivalent to Total Aerobic Heterotrophic Plate Count.
Total Hydrocarbon Degraders equivalent to Total Hydrocarbon Utilizing Bacteria.
Analyses performed by Trace Analysis, Inc. with assistance from the Biological Sciences Department of Texas Tech University using modified standard plate count methods (Appendix D).
Units reported in colony forming units per milliliter (cfu/ml).
NA indicates sample was not analyzed for this constituent.
--- Indicates monitoring well was installed after this sampling date.

ATTACHMENT B

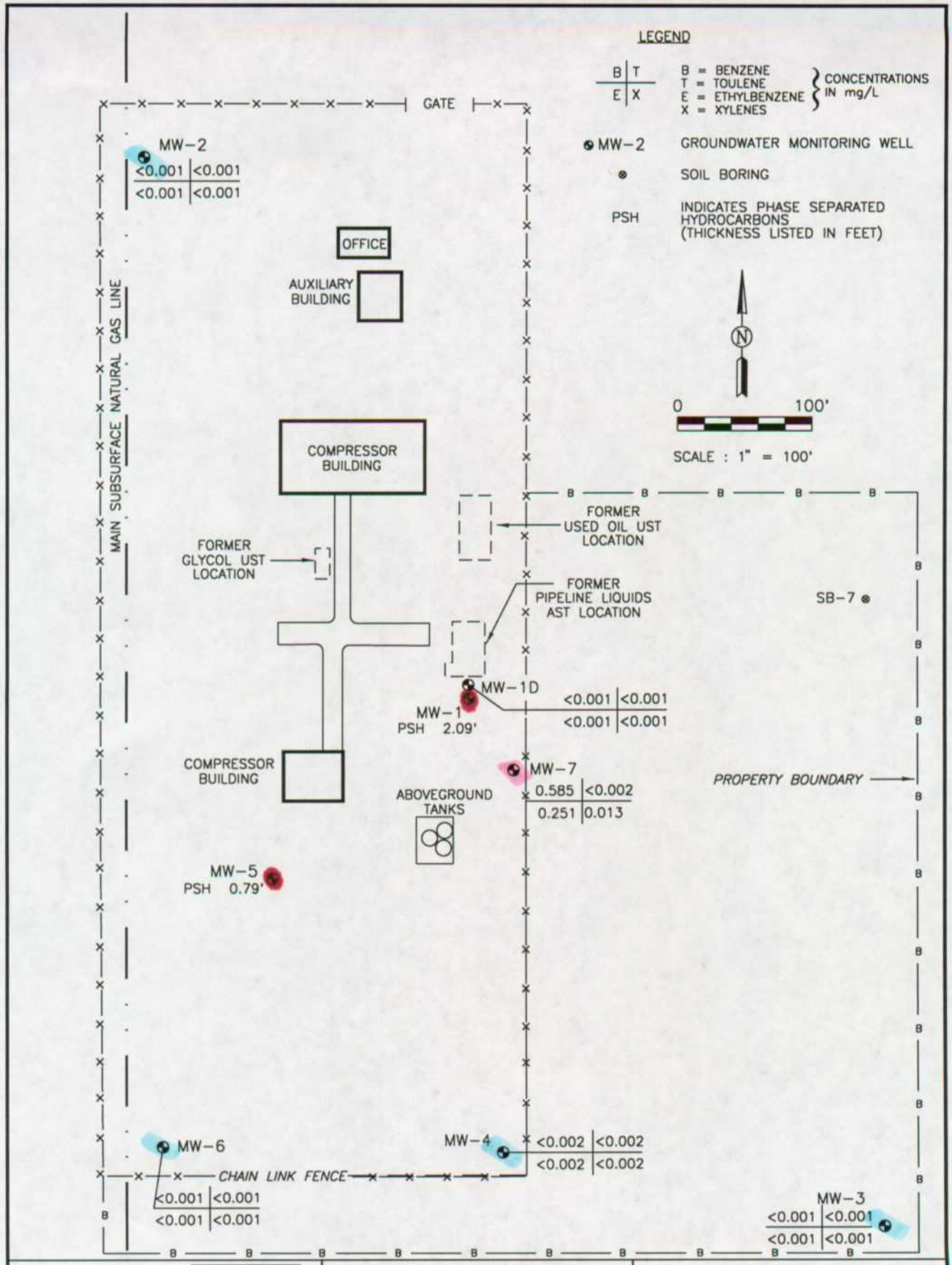
FIGURES



GCL

CLIENT: GPM GAS CORPORATION	
DATE: 04/24/96	REV. NO.: 0
AUTHOR: GJV	DRN BY:RG061896
CK'D BY: LJM	FILE: MNUMNT01

FIGURE 1
MONUMENT BOOSTER STATION
POTENTIOMETRIC SURFACE MAP



GCL

CLIENT: GPM GAS CORPORATION	
DATE: 4/24/96	REV. NO.: 0
AUTHOR: GJV	DRN BY:RG061896
CK'D BY: RTH	FILE: MNUMNT03

FIGURE 2
MONUMENT BOOSTER STATION
BTEX CONCENTRATION MAP

ATTACHMENT C

LABORATORY ANALYTICAL REPORTS

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

ANALYTICAL RESULTS FOR
GCL ENVIRONMENTAL
Attention: Annette Montoya
505 Marquette NW, Suit 1100
Albuquerque, NM 87102

April 29, 1996
Receiving Date: 04/26/96
Sample Type: Water
Charge Code No: LRMONU20300
Project Location: NA
COC #10169

Prep Date: 04/28/96
Analysis Date: 04/28/96
Sampling Date: 04/24/96
Sample Condition: I & C
Sample Received by: SH
Project Name: Monument Booster

TA#	FIELD CODE		BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL-BENZENE (ug/L)	M,P,O XYLENE (ug/L)	TOTAL BTEX (ug/L)
T51637	9604241440	MW - 2	<1	<1	<1	<1	<1
T51638	9604241530	MW - 4	<2	<2	<2	<2	<2
T51639	9604241615	MW - 3	<1	<1	<1	<1	<1
T51640	9604241645	MW - 6	<1	<1	<1	<1	<1
T51641	9604241730	MW - 7	585	<2	251	13	849
T51642	9604241800	MW - 12	602	<2	267	14	892
T51643	9604241845	MW - 1d	<1	<1	<1	<1	<1
T51644	9604241900	Trip Blank	<1	<1	<1	<1	<1
QC	Quality Control		102	101	99	189	
Reporting Limit			1	1	1	1	
RPD			4	4	4	4	
% Extraction Accuracy			102	100	99	95	
% Instrument Accuracy			102	101	99	95	

METHODS: EPA SW 846-5030, 8020.
CHEMIST: McD
BTEX SPIKE AND QC: 100 ug/L BTEX.

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

4-29-96
Date

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

ANALYTICAL RESULTS FOR
GCL ENVIRONMENTAL
Attention: Anette Montoya
505 Marquette NW, Suite 1100
Albuquerque, NM 87102

July 10, 1996
Receiving Date: 04/26/96
Sample Type: Water
Charge Code: LRMONU20300
Project Location: NA
COC# 10169

Extraction Date: 04/30/96
Analysis Date: 04/30/96
Sampling Date: 04/24/96
Sample Condition: I & C
Sample Received by: SH
Project Name: Monument Booster

DISSOLVED METALS (mg/L)

TA#	Field Code	B	Mo	As	Se	Cd	Cr	Co	Cu	Fe	Mn	Ni	Zn	Hg	Al	Ba	Pb	Ag
T51637	9604241440 MW-2	0.38	<0.1	0.011	<0.05	<0.01	<0.01	0.03	<0.02	0.07	<0.01	<0.1	<0.02	<0.001	<0.2	<0.2	0.005	<0.0
T51638	9604241530 MW-4	0.06	<0.1	0.008	<0.05	<0.01	<0.01	<0.03	<0.02	0.08	<0.01	<0.1	<0.02	<0.001	<0.2	<0.2	<0.001	<0.0
T51639	9604241615 MW-3	<0.03	<0.1	0.019	<0.05	<0.01	<0.01	<0.03	<0.02	0.17	<0.01	<0.1	0.03	<0.001	<0.2	<0.2	<0.001	<0.0
T51640	9604241645 MW-6	0.22	<0.1	0.238	<0.05	<0.01	<0.01	<0.03	<0.02	0.15	0.28	<0.1	<0.02	<0.001	0.5	0.2	<0.001	<0.0
T51641	9604241730 MW-7	0.60	<0.1	0.004	<0.05	<0.01	<0.01	<0.03	<0.02	<0.03	0.38	<0.1	<0.02	<0.001	<0.2	0.3	<0.001	<0.0
T51643	9604241845 MW-1d	0.11	<0.1	0.012	<0.05	<0.01	<0.01	<0.03	<0.02	0.06	0.37	<0.1	<0.02	<0.001	0.2	<0.2	<0.001	<0.0
QC	Quality Control	4.2	4.6	0.102	2.1	0.06	0.23	0.56	0.26	1.03	0.51	0.025	0.51	0.0050	2.22	2.1	0.023	0.0
Reporting Limit		0.03	0.1	0.001	0.05	0.01	0.01	0.03	0.02	0.03	0.01	0.1	0.02	0.001	0.2	0.2	0.001	0.0
RPD		2	8	8	2	3	0	1	0	6	1	10	1	6	1	1	10	1
% Extraction Accuracy		84	91	102	101	114	115	104	102	102	101	115	101	97	112	105	100	119
% Instrument Accuracy		84	93	100	105	111	113	112	104	103	102	100	102	100	111	105	96	129

METHODS: EPA SW 846-3005, 6010, 7470, 7521, 7060.
CHEMIST: B,Mo,As,Se,Cd,Cr,Co,Cu,Fe,Mn,Ni,Zn,Al,Ba,Pb,Ag: RR Hg: CB/RC
TOTAL METALS SPIKE: 0.0050 mg/L Hg; 8.0 mg/L Se, Ba, Al; 0.2 mg/L Cd, Ag; 0.8 mg/L Cr; 2.0 mg/L Pb, Co, Mn, Ni, Zn, B, Mo; 100 mg/L Ca, K, Mg, Na; 1.0 mg/L Cu; 4.0 mg/L Fe; 0.050 mg/L As.
TOTAL METALS QC: 0.0050 mg/L Hg; 2.0 mg/L Se, Ba, Al; 0.05 mg/L Cd, Ag; 0.2 mg/L Cr; 0.5 mg/L Pb, Co, Mn, Ni, Zn; 5.0 mg/L Ca, K, Mg, Na, B, Mo; 0.25 mg/L Cu; 1.0 mg/L Fe; 0.100 mg/L As.

Director, Dr. Blair Leftwic
Director, Dr. Bruce McDonell

7.11.96
Date

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

ANALYTICAL RESULTS FOR
GCL ENVIRONMENTAL
Attention: Annette Montoya
505 Marquette NW, Suite 1100
Albuquerque, NM 87102

May 17, 1996
Receiving Date: 04/26/96
Sample Type: Water
Project No: LR<PMI20300
Project Location: NA
COC #10169

Prep Date: 04/30/96
Analysis Date: 04/30/96
Sampling Date: 04/24/96
Sample Condition: Intact & Cool
Sample Received by: SH
Project Name: Monument Booster

TA#	Field Code	POTASSIUM (mg/L)	MAGNESIUM (mg/L)	CALCIUM (mg/L)	SODIUM (mg/L)
T51637	9604241440 MW-2	2.6	51.5	246	166
T51638	9604241530 MW-4	4.5	31.6	149	85.8
T51639	9604241615 MW-3	4.6	23.6	103	75.8
T51640	9604241645 MW-6	3.7	37.2	174	113
T51641	9604241730 MW-7	1.8	47.3	109	178
T51643	9604241845 MW-1D	3.7	31.8	125	78.8
QC	Quality Control	4.98	5.14	5.56	5.84
Reporting Limit		0.3	0.01	0.01	0.4
RPD		0	1	0	1
% Extraction Accuracy		110	101	105	104
% Instrument Accuracy		100	103	111	117

METHODS: EPA 200.7.
SPIKE: 100.0 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.
QC: 5.0 mg/L POTASSIUM, MAGNESIUM, CALCIUM, SODIUM.

BL

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

5-17-96

Date

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

ANALYTICAL RESULTS FOR
GCL ENVIRONMENTAL
Attention: Anette Montoya
505 Marquette NW, Suite 1100
Albuquerque, NM 87102

May 16, 1996
Receiving Date: 04/26/96
Sample Type: Water
Charge Code: LRMONU20300
Project Location: NA
COC# 10169

Extraction Date: 04/27/96
Analysis Date: 04/27/96
Sampling Date: 04/24/96
Sample Condition: I & C
Sample Received by: SH
Project Name: Monument Booster

TA#	FIELD CODE	CHLORIDE (mg/L)	SULFATE (mg/L)	TDS (mg/L)	FLUORIDE (mg/L)	(NO3-NO2)-N (mg/L)	SPECIFIC CONDUCTANCE (uMHOS/cm)	ALKALINITY (mg/L as CaCo3) HCO3	CO3
T51637	9604241440 MW-2	314	443	1,318	1.1	0.3	1,914	222	0
T51638	9604241530 MW-4	167	115	759	1.1	0.1	1,155	288	0
T51639	9604241615 MW-3	134	95	598	1.5	0.3	927	286	0
T51640	9604241645 MW-6	186	70	929	0.9	<0.1	1,409	484	0
T51641	9604241730 MW-7	143	149	828	1.8	<0.1	1,374	512	0
T51643	9604241845 MW-10	124	169	702	1.6	<0.1	1,094	297	0
QC	Quality Control	500	9.4	---	0.97	1.05	1,417	---	---
REPORTING LIMIT		0.5	1.0	---	0.1	0.1	---	---	---
RPD		1	3	5	6	5	0	1	1
% Extraction Accuracy		98	111	---	104	107	---	---	---
% Instrument Accuracy		100	95	---	97	105	101	---	---

METHODS: EPA SM 4500 Cl-B, 375.4, 160.1, 340.2, 353.3, 310.1, 120.1.
CHEMIST: Chloride: JT Sulfate, Specific Conductance: MS Fluoride: MS/MB
(NO3-NO2)-N: MS/RCD Alkalinity: RCD TDS: RP
CHLORIDE SPIKE AND QC: 500 mg/L CHLORIDE.
SULFATE SPIKE: 500 mg/L SULFATE.
SULFATE QC: 10.0 mg/L SULFATE.
FLUORIDE SPIKE AND QC: 1.0 mg/L FLUORIDE.
(NO3-NO2)-N SPIKE: 1.33 mg/L (NO3-NO2)-N.
(NO3-NO2)-N QC: 1.0 mg/L (NO3-NO2)-N.

5-16-96

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

DATE

TRACE ANALYSIS, INC.
A Laboratory for Advanced Environmental Research and Analysis

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

ANALYTICAL RESULTS FOR
GCL ENVIRONMENTAL
Attention: Annette Montoya
505 Marquette NW, Suite 1100
Albuquerque, NM 87102

May 28, 1996
Receiving Date: 04/26/96
Sample Type: Water
Charge Code No: LRMONU20300
Project Location: NA
COC# 10169

Prep Date: 05/21/96
Analysis Date: 05/21/96
Sampling Date: 04/24/96
Sample Condition: I & C
Sample Received by: SH
Project Name: Monument Booster

TA#	FIELD CODE		HPC (CFU/ml)	HUB (CFU/ml)
T51640	9604241645	MW-6	2.13 x 10E5	3.07 x 10E4
T51641	9604241730	MW-7	1.27 x 10E5	8.83 x 10E4
T51643	9604241845	MW-10	5.13 x 10E5	4.07 x 10E4

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

5-28-96
DATE

5163-47 ME

DISK

117AC

117AC

№ 10169

Chain of Custody

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

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(301) 459-9677
FAX: (301) 459-3064

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

Na Ca Mg K alk SO4 Cl F

Date 4/24/96 Page 1 Of 1

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

Samplers (SIGNATURES) D. Nee

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)~~ Dissolved metals	Priority Pollutant Metals (13)	CAM Metals (18) TTLC/STLC	Flash Point	Corrosivity	Reactivity	Oil & Grease	Cyanide Total/Amenable	Chemical Oxygen Demand (COD)	Hub/HPC	NO3	Major cations & Anions + TDS EC Sat		Number of Containers
51637	9604241440	H2O	MW-2		2												1										1	1		5
38	9604241530	H2O	MW-4		2												1										1	1		5
39	9604241615	H2O	MW-3		2												1										1	1		5
40	9604241645	H2O	MW-6		2												1									1	1	1		6
41	96042417~~15~~30	H2O	MW-7		2												1									1	1	1		6
42	9604241800	H2O	MW-12		2																									2
43	9604241845	H2O	MW-1d		2												1									1	1	1		6
44	9604241900	H2O	Trip Blank		1																									1

Project Information
Project: Monument Booster
Project Director: Van Deventer
Charge Code No.: LRMONU20300
Shipping ID. No.:
Via: Greyhound

Sample Receipt

Total No. of Containers	36
Chain of Custody Seals	✓
Rec'd Good Condition/Cold	✓
Conforms to Record	✓
Lab No.	

Relinquished By 1.	Relinquished By 2.	Relinquished By 3.
(Signature) D. Nee (Time) 0630	(Signature) (Time)	(Signature) (Time)
(Printed Name) DAVID NEE (Date) 4/25/96	(Printed Name) (Date)	(Printed Name) (Date)
(Company) GCL	(Company)	(Company)

Received By 1.	Received By 2.	Received By (Laboratory) 3.
(Signature) (Time)	(Signature) (Time)	(Signature) (Time) 10:15A
(Printed Name) (Date)	(Printed Name) (Date) Fexed 5/28	(Printed Name) Shawn Havranek (Date) 4-26-96
(Company)	(Company)	(Laboratory) Trace Analysis

Special Instructions/Comments: Fax Results to GCL Midland 915 682 0028

INVOICE GPM Direct (Scott Seeby)

GCL BTX37.XCS

Distribution: White, Canary-Laboratory • Pink, GCL

Dissolved Metals (GCL Ltd) ... (3481) ...