

3R - 348

REPORTS

DATE:

1997



April 15, 1997

Mr. William Olson
Hydrogeologist
Oil Conservation Division
2040 So. Pacheco
Santa Fe, New Mexico 87505



RE: 1997 SAN JUAN BASIN ANNUAL GROUNDWATER REPORT

Dear Bill:

PNM is pleased to submit the 1997 Annual Groundwater Report on Unlined Surface Impoundments in the San Juan Basin. Pursuant to PNM's Groundwater Management Program for Unlined Surface Impoundment Closures, the report details the ongoing investigation/remedial activities at unlined surface impoundments having groundwater contamination as identified by PNM. A list of groundwater sites reported in this document is provided below.

Cozzens B1
Florance 32A
Florance 40
Florance 44
Florance 47X
Florance 124
Hampton 4M
Honolulu Loop-Line Drip
Jacques 2A
Kaufmann 1
Mangum 1E
McClanahan A2E
McClanahan 22
McCoy A1A
Reid 16 Drip
Templeton 1E
~~Zachry 18E~~

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APR 16 1997

Environmental Bureau
Oil Conservation Division

PNM plans to request closure of two of the above sites, the Florance 124 and the Templeton 1E, in our April 30, 1997 filing of the San Juan Pit Closure Reports to the OCD Santa Fe office. We did not report on our newest groundwater site, the Sammons 2, since this was discovered in the second quarter of 1997. If you have any questions regarding the contents of the report, please contact me at (505) 241-2974.

Sincerely,

Maureen Gannon
Project Manager

Attachment

cc: Denver Bearden, PNMGS
Denny Foust, OCD-Aztec Office
Robin Prisk, WFS

**PNM 1997 San Juan Basin Groundwater Report
April 15, 1997**

Prepared for:

**New Mexico Oil Conservation Division
2040 South Pacheco
Santa Fe, New Mexico 87505**

Prepared by:

**Public Service Company of New Mexico
Environmental Services Department
Alvarado Square - MS 0408
Albuquerque, New Mexico 87158**

PNMGS Well Site: Zachry 18E

Groundwater Site Summary Report

Quarter/Year: 4/96 & 1/97

Copies: WFS(1)
Operator (1)
NMOCD District Office (1)
NMOCD Santa Fe (1)

Operator: Burlington Resources
Sec: 11 Twn: 28 N R: 10W Unit: O
Canyon: Armenta

Vulnerable Class: Original
OCD Ranking: 40
Lead Agency: NMOCD

Topo Map: previously submitted
Well Completion Diagram: Figure 1
Site Map with Analytical Results: Figure 2
Groundwater Contour Map: Figure 3 (December 1996)
Groundwater Contour Map: Figure 4 (March 1997)
Hydrograph: Figure 5
Full-suite of Groundwater Sampling Results: Table 1
Analytical Results: attached

Activities for Previous Two Quarters (Oct. - Dec. 1996 & Jan. - Mar. 1997):

On December 18, 1997, PNM performed quarterly sampling of groundwater monitoring wells at the site. Water and product levels were measured in each of the five wells. At that time, 0.5 feet of free product was discovered in MW-4, a well down-gradient from PNM's former pit location. PNM conducted groundwater sampling of MW-1, MW-2, MW-3 and MW-5. Groundwater in these wells were sampled for benzene, toluene, ethylbenzene, and xylenes (BTEX). In addition, the field crew sampled these same four wells for water quality parameters, and MW-1 and MW-2 for Water Quality Control Commission (WQCC) dissolved metals. Sampling was performed in strict compliance with EPA protocol.

On March 11, 1997, PNM again performed quarterly sampling of groundwater monitoring wells. Water levels/product levels were measured in each well. Depth of free product in MW-4 was found to be 0.02 feet. PNM sampled MW-1, MW-2, MW-3 and MW-5 for BTEX. Sampling was performed in strict compliance with EPA protocol.

In all instances, PNM delivered the samples to OnSite Technologies, Farmington, New Mexico. The samples were analyzed using the following methods:

- BTEX using EPA Method 8020
- major cations/anions using various EPA methods
- WQCC metals- filtered (As, Ba, Cd, Cr, Pb, Se, and Ag using inductively coupled plasma (ICP) for heavy metals and atomic absorption spectroscopy (AAS) for Hg and Se).

Results:

Figure 1 presents the Zachry 18E site map with BTEX analytical results to date. Table 1 is a summary of the groundwater sampling results collected during the December 12 sampling event. The up-gradient well, MW-1, is clean. In MW-2, the source well, the benzene concentration has decreased from 35.2 ppb to 8.9 ppb over the last two quarters. All other down-gradient wells (with the exception of MW-4) show BTEX concentrations in groundwater below WQCC standards or non-detectable. Water quality analysis of samples taken at the site on December 18, 1996, reveal somewhat high TDS concentrations, particularly in MW-3 with a TDS of 10422 ppm. Metals analysis of groundwater samples taken from MW-1 and MW-2 show metals to be below WQCC standards or non-detectable.

Public Service Company of New Mexico - Gas Services

Environmental Services Division - Alvarado Square, MS-0408
Albuquerque, NM 87158

Contact: Maureen Gannon

Telephone: 505-241-2974

PNMGS Well Site: Zachry 18E

Figures 2 and 3 provide groundwater contour maps for December 1996 and March 1997, respectively. Groundwater flow is in a northwest direction beneath the site. Figure 4 presents a hydrograph of the site. Groundwater elevation has risen over the period between January and March due to increased precipitation.

Future Actions:

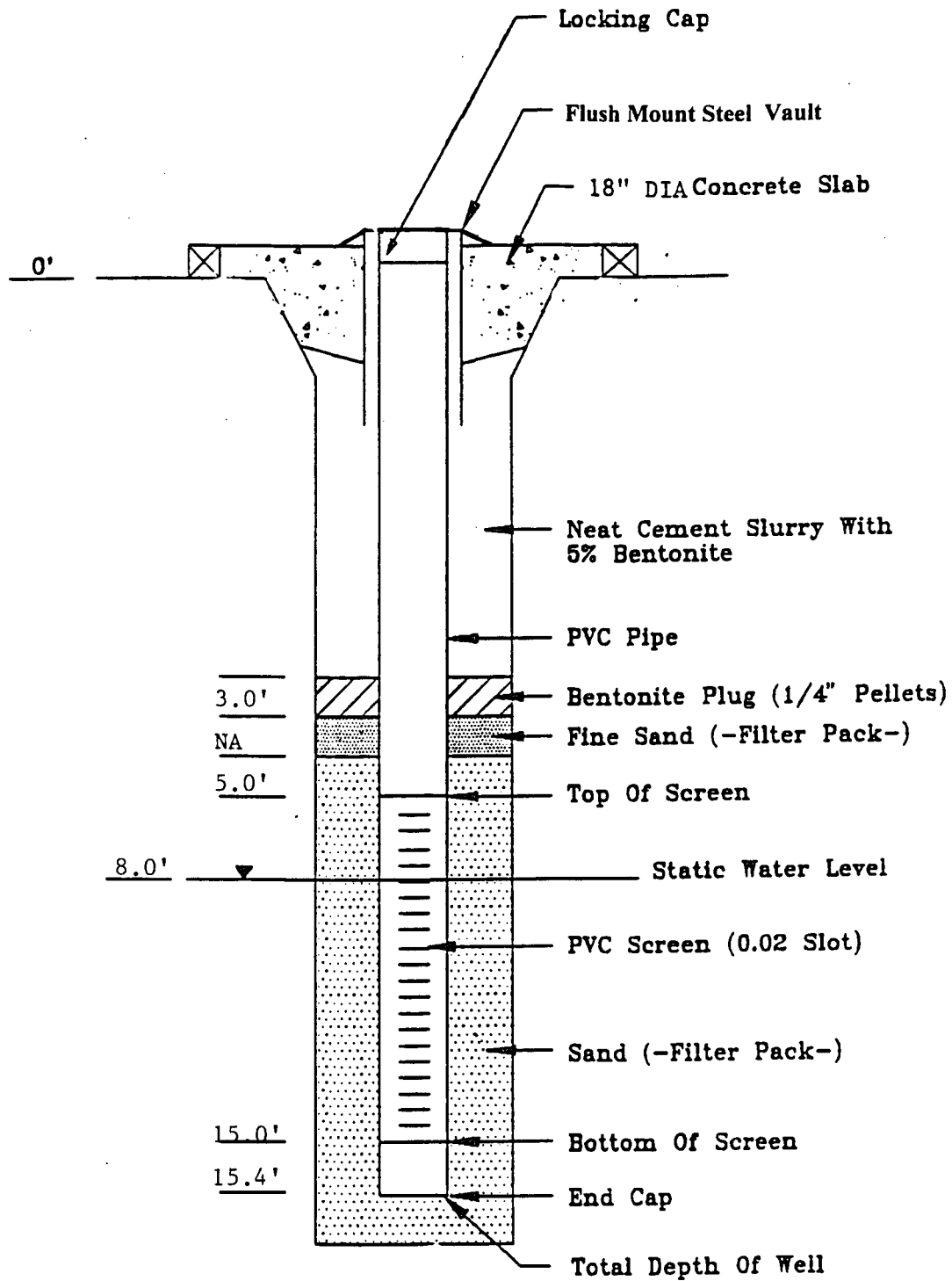
MW-4 is experiencing a decrease in product depth. Other wells are showing similar signs of remediation of dissolved BTEX contamination. PNM will continue to monitor groundwater gradient, collect water and product level measurements in each well and perform quarterly sampling at the Zachry 18E. At this time, we will perform only monitoring of free product at MW-4 unless the product depth should increase.

Public Service Company of New Mexico - Gas Services

Environmental Services Division - Alvarado Square, MS-0408
Albuquerque, NM 87158

Contact: Maureen Gannon

Telephone: 505-241-2974



CLIENT: PNM	
DATE:	REV. NO.: 0
AUTHOR: M.D.G.	DRAWN BY: M.P.
CK'D BY: M.D.G.	FILE: .DWG

Figure 1
Well Completion Diagram

Figure 2. Zachry 18E Site Map With Analytical Results
(Concentrations in ppb)

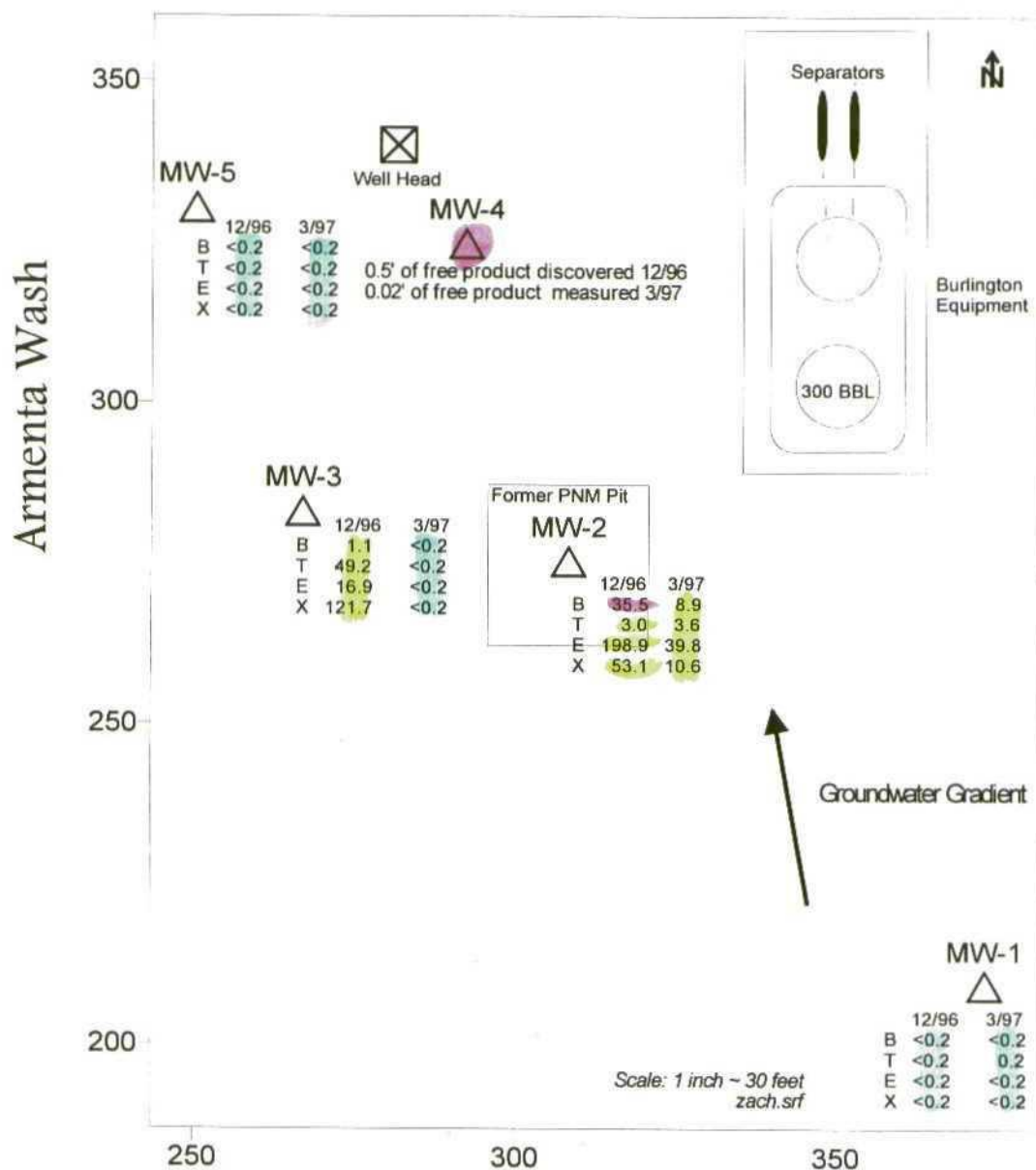


Figure 3. Zachry 18E Groundwater Contour Map (January 1997)

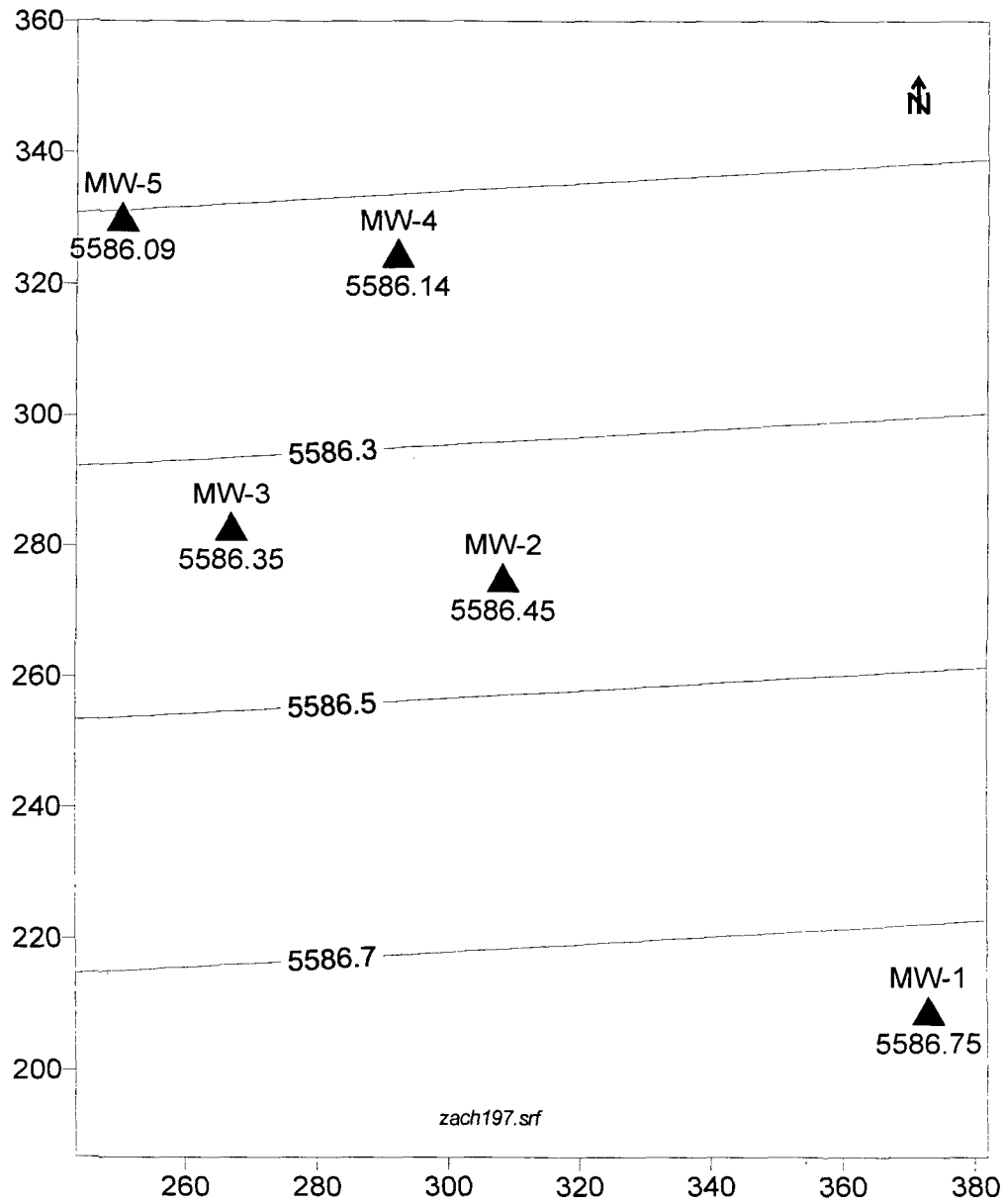


Figure 4. Zachry 18E Groundwater Contour Map (March 1997)

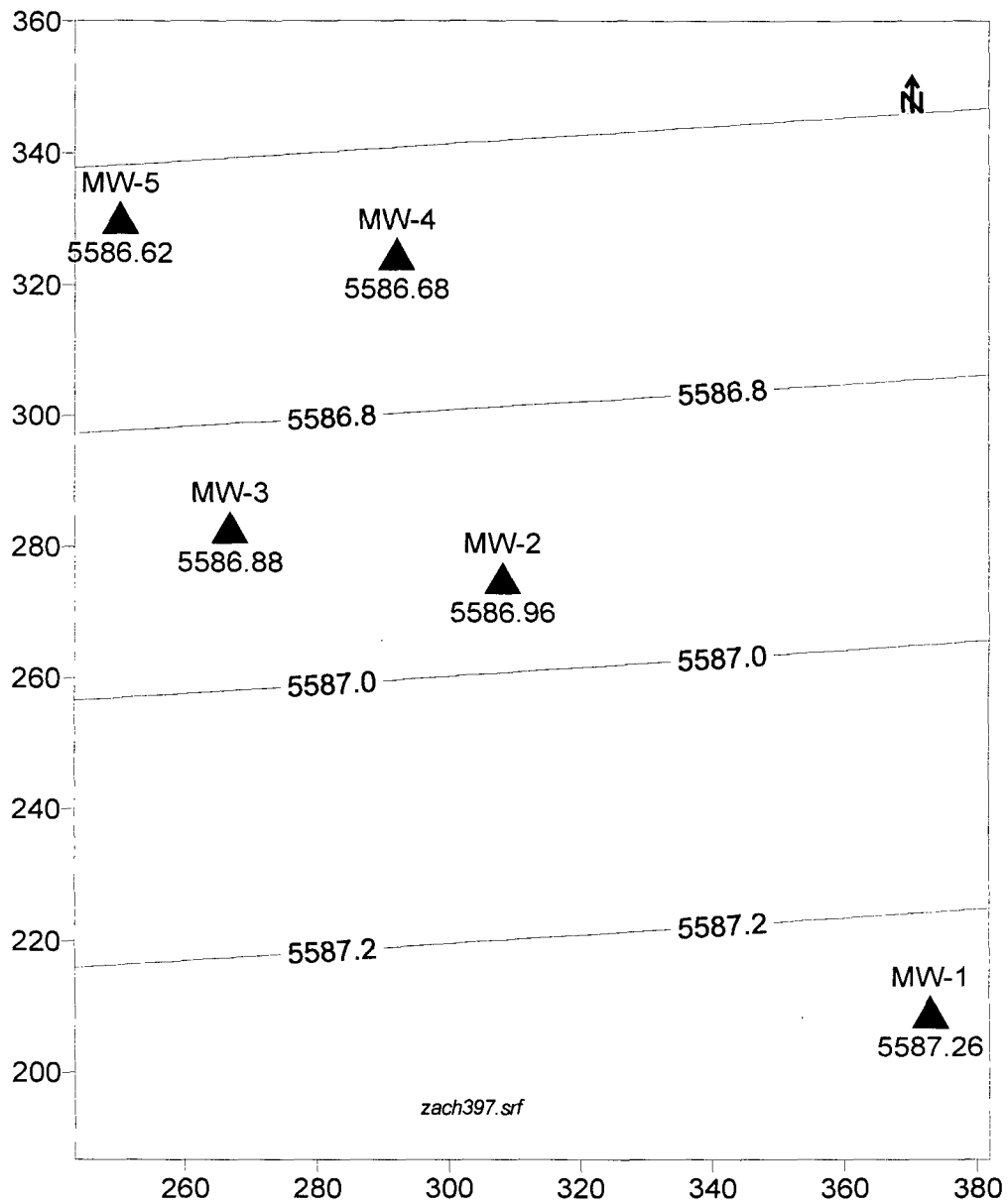


Figure 5. Zachry 18E Hydrograph
(Time vs. Water Level)

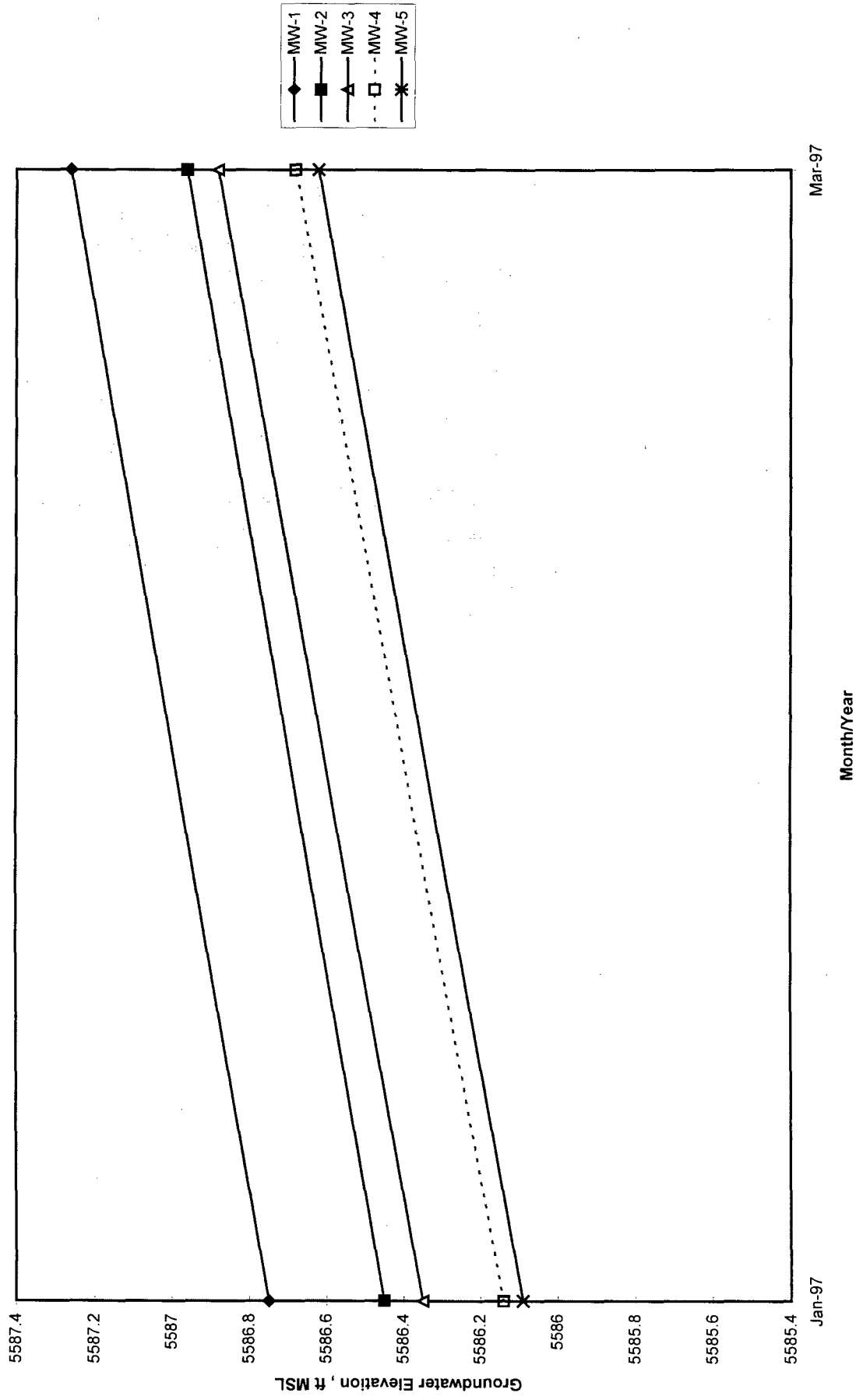


Table 1. Zachry 18E GROUNDWATER SAMPLING RESULTS, mg/l (12/18/96)

Constituent	WQCC Stds.	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6 (MW- 3 duplicate)
<i>B</i>	0.01	<0.0002	0.0352	0.0011	P	<0.0002	0.003
<i>T</i>	0.75	<0.0002	0.0039	0.0492	P	<0.0002	0.0127
<i>E</i>	0.75	<0.0002	0.1989	0.0169	P	<0.0002	0.0026
<i>X</i>	0.62	<0.0002	0.0531	0.1217	P	<0.0002	0.0332
<i>PAHs</i>	0.03	NA	NA	NA	NA	NA	NA
<i>Metals</i>							
As	0.1	<0.030	<0.030	NA	NA	NA	NA
Ba	1	0.066	0.077	NA	NA	NA	NA
Cd	0.01	<0.004	<0.004	NA	NA	NA	NA
Cr	0.05	<0.010	<0.010	NA	NA	NA	NA
Pb	0.05	<0.040	<0.040	NA	NA	NA	NA
Se	0.05	0.004	0.006	NA	NA	NA	NA
Ag	0.05	<0.006	<0.006	NA	NA	NA	NA
Hg	0.002	0.0001	0.0001	NA	NA	NA	NA
<i>Cations/Anions</i>							
Na	NA	2150	2010	2730	NA	NA	2840
Ca	NA	387	423	367	NA	NA	384
Mg	NA	77.0	70.0	100.0	NA	NA	104.0
K	NA	14.9	17.9	17.0	NA	NA	19.6
Cl	NA	37	54	47	NA	NA	48
SO4	NA	5715	4989	6721	NA	NA	6936
CO3	NA	<1	<1	<1	NA	NA	<1
HCO3	NA	338	734	440	NA	NA	465
OH	NA	<1	<1	<1	NA	NA	<1
<i>Cation/Anion Balance</i>							
Difference Cation- Anion	NA	6.02	2.66	2.74	2.92	NA	1.62
Total Cation-Anion	NA	245.12	232.18	294.19	108.73	NA	305.13
% Difference	NA	2.5	1.1	0.9	2.7	NA	0.5
TDS, calc	NA	8719	8298	10422	3790	NA	10797
TDS, meas	NA	8710	8344	10564	3650	NA	10794
Hardness as CaCO3	NA	1283	1344	1328	1797	NA	1387

NA: Not Applicable
 BDL: Below Detection Limit
 NS: Not Sampled
 Bold: Concentration Above WQCC Standard
 **: Out of Acceptable Range, % Diff. +/-5
 P: Free Product

OFF: (505) 325-5667



LAB: (505) 325-1556

21 January 1997

*Denver Bearden
PNM Gas Services
603 W. Elm Street
Farmington, NM 87401*

Reference:

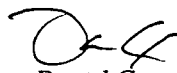
*Project Name: Zachry 18E
Project Loc.: MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6
On Site ID: COC No.5711*

Dear Denver,

Enclosed please find the analytical results for your project referenced above. Should you have any questions please feel free to call me at your convenience, (505) 325-2432.

Thank you once again for your consideration.

Sincerely,


*David Cox
Laboratory Manager*

Attachments (3)

cc: Maureen Gannon, PNM Gas Services

OFF: (505) 325-5667



LAB: (505) 325-1556

AROMATIC VOLATILE ORGANICS

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *19-Dec-96*
COC No.: *5711*
Sample No.: *13174*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9612181000; MW-1*
Sampled by: *MG* Date: *18-Dec-96* Time: *10:00*
Analyzed by: *DC* Date: *19-Dec-96*
Sample Matrix: *Water*

Laboratory Analysis

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i><0.2</i>	<i>ug/L</i>		

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved by: *[Signature]*
Date: *12/19/96*

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

AROMATIC VOLATILE ORGANICS

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *19-Dec-96*
COC No.: *5711*
Sample No.: *13175*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9612181030; MW-2*
Sampled by: *MG*
Analyzed by: *DC*
Sample Matrix: *Water*

Date: *18-Dec-96* Time: *10:30*
Date: *19-Dec-96*

Laboratory Analysis

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i>35.5</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i>3.9</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i>198.9</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i>52.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i>0.9</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
	<i>TOTAL</i>	<i>291.3</i>		<i>ug/L</i>

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved by: *[Signature]*
Date: *12/19/96*

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OFF: (505) 325-5667



LAB: (505) 325-1556

AROMATIC VOLATILE ORGANICS

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *19-Dec-96*
COC No.: *5711*
Sample No.: *13176*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9612181100; MW-3*
Sampled by: *MG*
Analyzed by: *DC*
Sample Matrix: *Water*

Date: *18-Dec-96* Time: *11:00*
Date: *19-Dec-96*

Laboratory Analysis

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i>1.1</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i>49.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i>16.9</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i>99.8</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i>21.9</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i>188.9</i>	<i>ug/L</i>		

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved by: *[Signature]*
Date: *12/19/96*

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

AROMATIC VOLATILE ORGANICS

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *19-Dec-96*
COC No.: *5711*
Sample No.: *13178*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9612181200; MW-5*
Sampled by: *MG*
Analyzed by: *DC*
Sample Matrix: *Water*

Date: *18-Dec-96* Time: *12:00*
Date: *19-Dec-96*

Laboratory Analysis

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i><0.2</i>	<i>ug/L</i>		

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved by: *[Signature]*
Date: *12/19/96*

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

AROMATIC VOLATILE ORGANICS

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *19-Dec-96*
COC No.: *5711*
Sample No.: *13179*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9612181115; MW-6*
Sampled by: *MG*
Analyzed by: *DC*
Sample Matrix: *Water*

Date: *18-Dec-96* Time: *11:15*
Date: *19-Dec-96*

Laboratory Analysis

Parameter	Result	Unit of Measure	Detection Limit	Unit of Measure
<i>Benzene</i>	<i>0.3</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i>12.7</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i>2.6</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i>27.4</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i>5.8</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
	<i>TOTAL</i>	<i>48.8</i>		<i>ug/L</i>

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved by: *[Signature]*
Date: *12/19/96*

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- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

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QUALITY ASSURANCE REPORT for EPA Method 8020

Date Analyzed: 19-Dec-96

Internal QC No.: 0515-QC

Surrogate QC No.: 0516-QC

Reference Standard QC No.: 0417-QC

Method Blank

Parameter	Result	Unit of Measure
Average Amount of All Analytes In Blank	<0.2	ppb

Calibration Check

Parameter	Unit of Measure	True Value	Analyzed Value	% Diff	Limit
Benzene	ppb	20.0	18.9	5	15%
Toluene	ppb	20.0	19.6	2	15%
Ethylbenzene	ppb	20.0	19.8	1	15%
m,p-Xylene	ppb	40.0	38.8	3	15%
o-Xylene	ppb	20.0	19.6	2	15%

Matrix Spike

Parameter	1 - Percent Recovered	2 - Percent Recovered	Limit	%RSD	Limit
Benzene	93	93	(39-150)	0	20%
Toluene	97	97	(46-148)	0	20%
Ethylbenzene	98	98	(32-160)	0	20%
m,p-Xylene	96	96	(35-145)	0	20%
o-Xylene	97	98	(35-145)	0	20%

Surrogate Recoveries

Laboratory Identification	S1 Percent Recovered	S2 Percent Recovered
Limit Percent Recovered	(70-130)	
13174-5711	94	
13175-5711	90	
13176-5711	93	
13178-5711	94	
13179-5711	93	

S1: Fluorobenzene

(Pc)

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
 Company: *PNM Gas Services*
 Address: *603 W. Elm*
 City, State: *Farmington, NM 87401*

Date: *30-Dec-96*
 COC No.: *5711*
 Sample ID: *13174*
 Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
 Project Location: *9612181000; MW-1*
 Sampled by: *MG*
 Analyzed by: *HR*

Date: *18-Dec-96* Time: *10:00*
 Date: *24-Dec-96*

Laboratory Analysis

Parameter	Result	Unit of Measure		Result	Unit of Measure	
Cations						
Sodium <i>Na</i>	2150	mg/L		93.52	me/L	
Calcium <i>Ca</i>	387	mg/L		19.31	me/L	
Magnesium <i>Mg</i>	77.0	mg/L		6.34	me/L	
Potassium <i>K</i>	14.9	mg/L		0.38	me/L	
Anions						
Chloride <i>Cl</i>	37	mg/L		1.04	me/L	
Sulfate <i>SO4</i>	5715	mg/L		118.98	me/L	
Carbonate <i>CO3 as CaCO3</i>	<1	mg/L		<0.01	me/L	
Bicarbonate <i>HCO3 as CaCO3</i>	338	mg/L		5.54	me/L	
Hydroxide <i>OH as CaCO3</i>	<1	mg/L		<0.01	me/L	
Total Dissolved Solids			Cation-Anion Balance 6.02 Difference Cation-Anion, me/L 245.12 Total Cation-Anion, me/L 2.5 % Difference Cation-Anion Comments			
Calculated, Sum of Cation/Anion	8719	mg/L				
Total Dissolved Solids						
Dried @ 180 C	8710	mg/L				
pH	7.18					
Conductivity @ 25 C	9620	uS/cm				
Total Hardness as CaCO3	1283	mg/L				

Approved by: *[Signature]*
 Date: *12/30/96*

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
 Company: *PNM Gas Services*
 Address: *603 W. Elm*
 City, State: *Farmington, NM 87401*

Date: *30-Dec-96*
 COC No.: *5711*
 Sample ID: *13175*
 Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*Project Location: *9612181030; MW-2*Sampled by: *MG*Date: *18-Dec-96* Time: *10:30*Analyzed by: *HR*Date: *24-Dec-96***Laboratory Analysis**

Parameter	Result	Unit of Measure		Result	Unit of Measure	
Cations						
Sodium <i>Na</i>	2010	mg/L		87.43	me/L	
Calcium <i>Ca</i>	423	mg/L		21.11	me/L	
Magnesium <i>Mg</i>	70.0	mg/L		5.76	me/L	
Potassium <i>K</i>	17.9	mg/L		0.46	me/L	
Anions						
Chloride <i>Cl</i>	54	mg/L		1.52	me/L	
Sulfate <i>SO4</i>	4989	mg/L		103.87	me/L	
Carbonate <i>CO3 as CaCO3</i>	<1	mg/L		<0.01	me/L	
Bicarbonate <i>HCO3 as CaCO3</i>	734	mg/L		12.03	me/L	
Hydroxide <i>OH as CaCO3</i>	<1	mg/L		<0.01	me/L	
Total Dissolved Solids						
Calculated, Sum of Cation/Anion	8298	mg/L		Cation-Anion Balance 2.66 Difference Cation-Anion, me/L 232.18 Total Cation-Anion, me/L 1.1 % Difference Cation-Anion Comments		
Total Dissolved Solids						
Dried @ 180 C	8344	mg/L				
pH	7.03					
Conductivity @ 25 C	8840	uS/cm				
Total Hardness as CaCO3	1344	mg/L				

Approved by: *[Signature]*
 Date: *12/30/96*

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: **Denver Bearden**
 Company: **PNM Gas Services**
 Address: **603 W. Elm**
 City, State: **Farmington, NM 87401**

Date: **30-Dec-96**
 COC No.: **5711**
 Sample ID: **13176**
 Job No.: **2-1000**

Project Name: **PNM Gas Services - Zachry 18E**
 Project Location: **9612181100; MW-3**

Sampled by: **MG** Date: **18-Dec-96** Time: **11:00**
 Analyzed by: **HR** Date: **24-Dec-96**

Laboratory Analysis

Parameter	Result	Unit of Measure		Result	Unit of Measure	
Cations						
Sodium Na	2730	mg/L		118.75	me/L	
Calcium Ca	367	mg/L		18.31	me/L	
Magnesium Mg	100.0	mg/L		8.23	me/L	
Potassium K	17.0	mg/L		0.43	me/L	
Anions						
Chloride Cl	47	mg/L		1.33	me/L	
Sulfate SO ₄	6721	mg/L		139.93	me/L	
Carbonate CO ₃ as CaCO ₃	<1	mg/L		<0.01	me/L	
Bicarbonate HCO ₃ as CaCO ₃	440	mg/L		7.21	me/L	
Hydroxide OH as CaCO ₃	<1	mg/L		<0.01	me/L	
Total Dissolved Solids			Cation-Anion Balance 2.74 Difference Cation-Anion, me/L 294.19 Total Cation-Anion, me/L 0.9 % Difference Cation-Anion Comments			
Calculated, Sum of Cation/Anion	10422	mg/L				
Total Dissolved Solids						
Dried @ 180 C	10564	mg/L				
pH	7.27					
Conductivity @ 25 C	11500	uS/cm				
Total Hardness as CaCO ₃	1328	mg/L				

Approved by: 
 Date: **12/30/96**

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
 Company: *PNM Gas Services*
 Address: *603 W. Elm*
 City, State: *Farmington, NM 87401*

Date: *30-Dec-96*
 COC No.: *5711*
 Sample ID: *13178*
 Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
 Project Location: *9612181200; MW-5*
 Sampled by: *MG*
 Analyzed by: *HR*

Date: *18-Dec-96* Time: *12:00*
 Date: *24-Dec-96*

Laboratory Analysis

Parameter	Result	Unit of Measure	Result	Unit of Measure
Cations				
Sodium <i>Na</i>	2840	mg/L	123.53	me/L
Calcium <i>Ca</i>	384	mg/L	19.16	me/L
Magnesium <i>Mg</i>	104.0	mg/L	8.56	me/L
Potassium <i>K</i>	19.6	mg/L	0.50	me/L
Anions				
Chloride <i>Cl</i>	48	mg/L	1.35	me/L
Sulfate <i>SO4</i>	6936	mg/L	144.40	me/L
Carbonate <i>CO3 as CaCO3</i>	< 1	mg/L	< 0.01	me/L
Bicarbonate <i>HCO3 as CaCO3</i>	465	mg/L	7.62	me/L
Hydroxide <i>OH as CaCO3</i>	< 1	mg/L	< 0.01	me/L
Total Dissolved Solids				
Calculated, Sum of Cation/Anion	10797	mg/L	Cation-Anion Balance 1.62 Difference Cation-Anion, me/L 305.13 Total Cation-Anion, me/L 0.5 % Difference Cation-Anion Comments	
Total Dissolved Solids				
Dried @ 180 C	10794	mg/L		
pH	7.35			
Conductivity @ 25 C	11890	uS/cm		
Total Hardness as CaCO3	1387	mg/L		

Approved by: *DAE*Date: *12/30/96*

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

QUALITY ASSURANCE REPORT*Cation/Anion Balance***Date: 24-Dec-96****Quality Control Sample**

Parameter	Laboratory Identification	True Value	Analyzed Value	Unit of Measure	% Diff	Limit % Diff
Sodium, Na	0522-QC	3.16	3.28	mg/L	4	10
Calcium, Ca	0462-QC	2.18	2.12	mg/L	-3	10
Magnesium, Mg	0462-QC	2.29	2.29	mg/L	0	10
Potassium, K	0509-QC	2.92	2.94	mg/L	1	10
Chloride, Cl	0437-QC	50	52	mg/L	4	10
Sulfate, SO ₄	0509-QC	116	119	mg/L	3	10
Alkalinity	0509-QC	174	188	mg/L	8	10
pH	0509-QC	9.05	9.16		1	10
Conductivity	0509-QC	1210	1188	uS/cm	-2	15
Total Dissolved Solids, 180C	0509-QC	905	858	uS/cm	-5	15

Matrix Spike

Parameter	Laboratory Identification	Analyzed Value	Matrix Spike	Spike Value	Unit of Measure	Spike Recovery
Sodium, Na	13178-5711	1.42	0.50	1.98	mg/L	103%
Calcium, Ca	13178-5711	1.92	0.50	2.44	mg/L	101%
Magnesium, Mg	13178-5711	0.52	1.00	1.53	mg/L	101%
Potassium, K	13169-5710	0.60	1.00	1.32	mg/L	83%

Method Blank

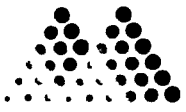
Parameter	Laboratory Identification	Analyzed Value	Unit of Measure
Sodium, Na	LF-Blank	<0.2	mg/L
Calcium, Ca	LF-Blank	<0.05	mg/L
Magnesium, Mg	LF-Blank	<0.05	mg/L
Potassium, K	LF-Blank	<0.05	mg/L
Chloride, Cl	LF-Blank	<3 X DL	mg/L
Sulfate, SO ₄	LF-Blank	<1	mg/L
Conductivity	LF-Blank	<2	uS/cm

(22)

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ELITE -

RECEIVED JAN 8 1997



Mountain States Analytical

The Quality Solution

January 3, 1997

Mr. David Cox
On Site Technologies, Ltd.
612 E Murray Drive
Farmington, NM 87401

Reference:

Project: Zachry 18E
Project No.: PNM 1002
MSAI Group: 14758

Dear Mr. Cox:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

13174-5711 (Dissolved)

13175-5711 (Dissolved)

All holding times were met for the tests performed on these samples.

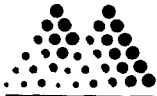
If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Mountain States Analytical, Inc. to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

With Regards,

Rolf E. Larsen
Project Manager



Mountain States Analytical

The Quality Solution

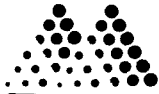
On Site Technologies, Ltd.
612 E Murray Drive
Farmington, NM 87401

Attn: Mr. David Cox
Project: Zachry 18E

Sample ID: 13174-5711 (Dissolved) ^(PC) 9612181000; MW1-1
Matrix: Waste Water

MSAI Sample: 57187
MSAI Group: 14758
Date Reported: 01/03/97
Discard Date: 02/02/97
Date Submitted: 12/24/96
Date Sampled: 12/18/96
Collected by: RD
Purchase Order: 5711
Project No.: PNM 1002

Test Analysis	Results as Received	Units	Method Detection Limit
0249D Cadmium by ICP, Dissolved w/ww Method: SW-846 6010A	ND	mg/l	0.004
0251F Chromium by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.010
0255F Lead by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.040
0259F Mercury by CVAA, w/ww Diss, 245.1 Method: SW-846 245.1	0.0001 ^{0.002}	mg/l	0.0001
0266D Silver by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.006
0392I Flame/ICP Prep for Metals, Waters Method: SW-846 3005A	Complete		
0392M Mercury Prep CVAA, Waters Method: SW-846 7470	Complete		
0401 Prep for HAA, ww Method: SW-846 7061A	Complete		
1045I Arsenic by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.030
1450 Selenium by HAA, ww Diss, 7741 Method: SW-846 7741	0.004 ^{0.05}	mg/l	0.003
2541B Barium by ICP, Dissolved Method: SW-846 6010A	0.066 ^{1.0}	mg/l	0.003



Mountain States Analytical

The Quality Solution

On Site Technologies, Ltd.

Sample ID: 13174-5711 (Dissolved)

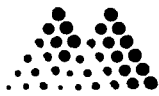
Page 2

MSAI Sample: 57187
MSAI Group: 14758

Test	Analysis	Results as Received	Units	Method Detection Limit
----	-----	-----	-----	-----
0939	Sample Filtering Method: MSAI IN-HOUSE	Complete		

Respectfully Submitted,
Reviewed and Approved by:


Rolf E. Larsen
Project Manager



Mountain States Analytical

The Quality Solution

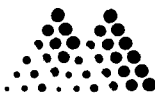
On Site Technologies, Ltd.
612 E Murray Drive
Farmington, NM 87401

Attn: Mr. David Cox
Project: Zachry 18E

Sample ID: 13175-5711 (Dissolved) 9612181030; mul-2
Matrix: Waste Water

MSAI Sample: 57188
MSAI Group: 14758
Date Reported: 01/03/97
Discard Date: 02/02/97
Date Submitted: 12/24/96
Date Sampled: 12/18/96
Collected by: RD
Purchase Order: 5711
Project No.: PNM 1002

Test	Analysis	Results as Received	Units	Method Detection Limit
0249D	Cadmium by ICP, Dissolved w/ww Method: SW-846 6010A	ND	mg/l	0.004
0251F	Chromium by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.010
0255F	Lead by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.040
0259F	Mercury by CVAA, w/ww Diss, 245.1 Method: SW-846 245.1	0.0001	0.002 mg/l	0.0001
0266D	Silver by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.006
0392I	Flame/ICP Prep for Metals, Waters Method: SW-846 3005A	Complete		
0392M	Mercury Prep CVAA, Waters Method: SW-846 7470	Complete		
0401	Prep for HAA, ww Method: SW-846 7061A	Complete		
1045I	Arsenic by ICP, Dissolved Method: SW-846 6010A	ND	mg/l	0.030
1450	Selenium by HAA, ww Diss, 7741 Method: SW-846 7741	0.006	0.05 mg/l	0.003
2541B	Barium by ICP, Dissolved Method: SW-846 6010A	0.077	1.0 mg/l	0.003



Mountain States Analytical

The Quality Solution

On Site Technologies, Ltd.

Sample ID: 13175-5711 (Dissolved)

Page 2

MSAI Sample: 57188
MSAI Group: 14758

Test	Analysis	Results as Received	Units	Method Detection Limit
----	-----	-----	-----	-----
0939	Sample Filtering Method: MSAI IN-HOUSE	Complete		

Respectfully Submitted,
Reviewed and Approved by:

Rolf E. Larsen
Project Manager

Mountain States Analytical, Inc.
Daily QC Batching Data
Data Released for Reporting

01/03/97
10:10:02
Group: 14758

Analysis Batch Number: 0259T-01/01/97-107 -1

Test Identification : 0259T-Mercury by CVAA, TCLP

Sequence : DAAA001

Number of Samples : 18

Batch Data-Date/Time : 01/02/97 / 07:38:44

BLANK#	ANALYTE	CONC FOUND #	CONC LIMIT
PBW1-830	Mercury	0.0765	0.5000
PBW2-830-2	Mercury	0.0365	0.5000

SPIKE		QC LIMITS				
SAMPLE#	ANALYTE	CONC ADDED	CONC SAMPLE	CONC SPIKE	% REC #	LOWER UPPER
14762-57193	Mercury	1.0000	0.1376	1.1593	102.2	80.0 120.0

MSD		QC LIMITS				
SAMPLE#	ANALYTE	CONC ADDED	CONC SAMPLE	RESULT 2	%REC2 #	LOWER UPPER RPD # LIMIT
14762-57193	Mercury	1.0000	0.1376	1.1860	104.8	80.0 120.0 2.5 20.0

DUPLICATE		RESULT 1	RESULT 2	RPD #	LIMIT	DILUTION
SAMPLE#	ANALYTE					
14762-57193	Mercury	0.1376	0.1298	5.8	20.0	1.00

CONTROL		QC LIMITS		
SAMPLE#	ANALYTE	CONC FOUND	CONC KNOWN	% REC # LOWER UPPER
LCSW-830	Mercury	2.4219	2.5000	96.9 80.0 120.0

CCV #		QC LIMITS		
ANALYTE	TRUE VALUE	BATCH READ	% REC #	LOWER UPPER
ICV-	Mercury	3.0000	2.8401	94.7 90.0 110.0
CCV1--2	Mercury	5.0000	5.0539	101.1 80.0 120.0
CCV2--3	Mercury	5.0000	5.0179	100.4 80.0 120.0
CCV3--4	Mercury	5.0000	5.2537	105.1 80.0 120.0
CCV4--5	Mercury	5.0000	5.2691	105.4 80.0 120.0

ICB#	ANALYTE	CONC FOUND #	CONC LIMIT
ICB-	Mercury	-0.0478	0.5000
ICB1-	Mercury	-0.0839	0.5000
ICB2-	Mercury	0.0712	0.5000
ICB3-	Mercury	0.0839	0.5000
ICB4-	Mercury	-0.0439	0.5000

Groups & Samples

14757-57185	14757-57186	14758-57187	14758-57188	14760-57190	14761-57192	14762-57193	14762-57194
14762-57195	14762-57196	14762-57197	14762-57198	14762-57199	14762-57200	14762-57201	14772-57235
14780-57258							

Mountain States Analytical, Inc.
Daily QC Batching Data
Data Released for Reporting

01/03/97
10:10:08
Group: 14758

Analysis Batch Number: 1450 -12/30/96-001 -1

Test Identification : 1450 -Selenium by HAA, ww Diss, 7741

Sequence : DAAA365

Number of Samples : 6

Batch Data-Date/Time : 12/30/96 / 10:39:22

BLANK#	ANALYTE	CONC FOUND #	CONC LIMIT
PBW1-823	Selenium	ND	0.0030

						QC LIMITS	
SAMPLE#	ANALYTE	CONC ADDED	CONC SAMPLE	CONC SPIKE	% REC #	LOWER	UPPER
14757-57185	Selenium	0.0400	0.0000	0.0409	102.3	80.0	120.0

						QC LIMITS			
SAMPLE#	ANALYTE	CONC ADDED	CONC SAMPLE	RESULT 2	%REC2 #	LOWER	UPPER	RPD #	LIMIT
14757-57185	Selenium	0.0400	0.0000	0.0335	83.8	80.0	120.0	19.9	20.0

DUPLICATE						
SAMPLE#	ANALYTE	RESULT 1	RESULT 2	RPD #	LIMIT	DILUTION
14757-57185	Selenium	-0.0088	0.0000	200.0(11)	20.0	1.00

						QC LIMITS	
SAMPLE#	ANALYTE	CONC FOUND	CONC KNOWN	% REC #	LOWER	UPPER	
LCSW-823	Selenium	0.0438	0.0400	109.5	80.0	120.0	

						QC LIMITS	
CCV #	ANALYTE	TRUE VALUE	BATCH READ	% REC #	LOWER	UPPER	
ICV-	Selenium	0.0500	0.0538	107.6	90.0	110.0	
CCV--2	Selenium	0.0500	0.0521	104.2	80.0	120.0	
CCV--3	Selenium	0.0500	0.0585	117.0	80.0	120.0	

CCB#	ANALYTE	CONC FOUND #	CONC LIMIT
ICB-	Selenium	0.0035	0.0050
ICB-	Selenium	ND	0.0050
ICB-	Selenium	0.0013	0.0050

----- Result Footnotes -----

(11) - Both Duplicate results are less than the LOQ.

Groups & Samples

14757-57185 14757-57186 14758-57187 14758-57188 14759-57189 14760-57190

Analysis Batch Number: ICPWA-01/03/97-001 -1

Test Identification : ICPWA-Metals by ICP

Sequence : DATA003

Number of Samples : 6

Batch Data-Date/Time : 01/03/97 / 10:00:48

BLANK#	ANALYTE	CONC FOUND #	CONC LIMIT
PBW-829	Silver	ND	0.0060
	Arsenic	ND	0.0300
	Barium	0.0007	0.0030
	Cadmium	ND	0.0040
	Chromium	ND	0.0100
	Lead	ND	0.0400

SPIKE							QC LIMITS	
SAMPLE#	ANALYTE	CONC ADDED	CONC SAMPLE	CONC SPIKE	% REC #		LOWER	UPPER
14757-57186	Silver	0.0500	-0.0034	0.0423	91.4		80.0	120.0
	Arsenic	2.0000	-0.0082	1.9994	100.4		80.0	120.0
	Barium	2.0000	0.0760	1.6771	80.1		80.0	120.0
	Cadmium	0.0500	0.0001	0.0457	91.2		80.0	120.0
	Chromium	0.2000	0.0028	0.1827	90.0		80.0	120.0
	Lead	0.5000	0.0012	0.4557	90.9		80.0	120.0

4SD									
SAMPLE#	ANALYTE	CONC ADDED	CONC SAMPLE	RESULT 2	%REC2 #	LOWER	UPPER	RPD #	LIMIT
14757-57186	Silver	0.0500	-0.0034	0.0422	91.2	80.0	120.0	0.2	20.0
	Arsenic	2.0000	-0.0082	2.0351	102.2	80.0	120.0	1.8	20.0
	Barium	2.0000	0.0760	1.7705	84.7	80.0	120.0	5.6	20.0
	Cadmium	0.0500	0.0001	0.0480	95.8	80.0	120.0	4.9	20.0
	Chromium	0.2000	0.0028	0.1803	88.8	80.0	120.0	1.3	20.0
	Lead	0.5000	0.0012	0.4579	91.3	80.0	120.0	0.4	20.0

DUPLICATE						
SAMPLE#	ANALYTE	RESULT 1	RESULT 2	RPD #	LIMIT	DILUTION
4757-57186	Silver	-0.0034	0.0000	200.0(11)	20.0	1.00
	Arsenic	-0.0082	0.0000	200.0(11)	20.0	1.00
	Barium	0.0760	0.0769	1.2	20.0	1.00
	Cadmium	0.0001	0.0035	188.9(11)	20.0	1.00
	Chromium	0.0028	0.0030	6.9	20.0	1.00
	Lead	0.0012	0.0061	134.2(11)	20.0	1.00

CONTROL						
SAMPLE#	ANALYTE	CONC FOUND	CONC KNOWN	% REC #	QC LIMITS	
CSW-829	Silver	0.0466	0.0500	93.2	80.0	120.0
	Arsenic	2.0163	2.0000	100.8	80.0	120.0
	Barium	1.9226	2.0000	96.1	80.0	120.0
	Cadmium	0.0471	0.0500	94.2	80.0	120.0
	Chromium	0.1983	0.2000	99.1	80.0	120.0
	Lead	0.4922	0.5000	98.4	80.0	120.0

V #	ANALYTE	TRUE VALUE	BATCH READ	% REC #	QC LIMITS	
V-	Silver	0.4000	0.3931	98.3	90.0	110.0
	Arsenic	1.6000	1.6331	102.1	90.0	110.0
	Barium	4.0000	3.8393	96.0	90.0	110.0
	Cadmium	4.0000	3.9732	99.3	90.0	110.0
	Chromium	4.0000	3.9833	99.6	90.0	110.0

Mountain States Analytical, Inc.
Daily QC Batching Data
Data Released for Reporting

01/03/97
10:10:17
Group: 14758

Analysis Batch Number: ICPWA-01/03/97-001 -1

Test Identification : ICPWA-Metals by ICP

Sequence : DATA003

Number of Samples : 6

Batch Data-Date/Time : 01/03/97 / 10:00:48

CCV #	ANALYTE	TRUE VALUE	BATCH READ	% REC #	QC LIMITS	
					LOWER	UPPER
ICV-	Lead	20.0000	19.6061	98.0	90.0	110.0
CCV1--2	Silver	0.4000	0.3907	97.7	90.0	110.0
	Arsenic	1.6000	1.6278	101.7	90.0	110.0
	Barium	4.0000	3.8829	97.1	90.0	110.0
	Cadmium	4.0000	3.9701	99.3	90.0	110.0
	Chromium	4.0000	3.9682	99.2	90.0	110.0
	Lead	20.0000	19.4771	97.4	90.0	110.0
CCV2--3	Silver	0.4000	0.3867	96.7	90.0	110.0
	Arsenic	1.6000	1.6076	100.5	90.0	110.0
	Barium	4.0000	3.8010	95.0	90.0	110.0
	Cadmium	4.0000	3.9598	99.0	90.0	110.0
	Chromium	4.0000	3.9479	98.7	90.0	110.0
	Lead	20.0000	19.4210	97.1	90.0	110.0
CCV3--4	Silver	0.4000	0.3909	97.7	90.0	110.0
	Arsenic	1.6000	1.6262	101.6	90.0	110.0
	Barium	4.0000	3.7730	94.3	90.0	110.0
	Cadmium	4.0000	4.0133	100.3	90.0	110.0
	Chromium	4.0000	3.9857	99.6	90.0	110.0
	Lead	20.0000	19.6642	98.3	90.0	110.0

ICB#	ANALYTE	CONC FOUND #	CONC LIMIT
ICB-	Silver	ND	0.0060
	Arsenic	ND	0.0300
	Barium	ND	0.0030
	Cadmium	0.0016	0.0040
	Chromium	ND	0.0100
	Lead	ND	0.0400
	Lead	ND	0.0400
ICB1-	Silver	ND	0.0060
	Arsenic	ND	0.0300
	Barium	ND	0.0030
	Cadmium	0.0003	0.0040
	Chromium	ND	0.0100
	Lead	0.0003	0.0400
	Lead	0.0003	0.0400
CB2-	Silver	ND	0.0060
	Arsenic	0.0001	0.0300
	Barium	ND	0.0030
	Cadmium	ND	0.0040
	Chromium	ND	0.0100
	Lead	ND	0.0400
	Lead	ND	0.0400
CB3-	Silver	ND	0.0060
	Arsenic	ND	0.0300
	Barium	ND	0.0030
	Cadmium	0.0014	0.0040
	Chromium	ND	0.0100
	Lead	0.0032	0.0400
	Lead	0.0032	0.0400

----- Result Footnotes -----

1) - Both Duplicate results are less than the LOQ.

Mountain States Analytical, Inc.
Daily QC Batching Data
Data Released for Reporting

01/03/97
10:10:21
Group: 14758

Analysis Batch Number: ICPWA-01/03/97-001 -1
Test Identification : ICPWA-Metals by ICP
Number of Samples : 6
Batch Data-Date/Time : 01/03/97 / 10:00:48

Sequence : DATA003

Groups & Samples

14757-57185 14757-57186 14758-57187 14758-57188 14759-57189 14760-57190



CHAIN OF CUSTODY RECORD

6241

Date: 12/15/96 Page 1 of 1

6524W-Maple • P. O. Box 2606 • Farmington NM 87499
LAB: (505) 325-5667 • FAX: (505) 325-6256

Purchase Order No.: 5711		Job No. PM-1002	
Name: ACCOUNTS PAYABLE		Dept.	
Company: ON SITE		Address	
City, State, Zip		City, State, Zip	
Sampling Location: ZACHRY 18E		Sampling Location: ZACHRY 18E	
Sampler: mg		Sampler: mg	
SEND INVOICE TO		SEND INVOICE TO	
Name: DAVID COX		Title	
Company: ON SITE		Company	
Mailing Address: 612 E MURRAY		Mailing Address	
City, State, Zip: FARMINGTON, NM 87401		City, State, Zip	
Telephone No. 505-325-2432		Telephone No.	
Telefax No.		Telefax No.	
ANALYSIS REQUESTED		ANALYSIS REQUESTED	
RESULTS TO REPORT TO		RESULTS TO REPORT TO	
Number of Containers		Number of Containers	
LAB ID		LAB ID	
13174-6241		13174-6241	
13175-5711		13175-5711	
WACC METALS		WACC METALS	
DISSOLVED		DISSOLVED	
Received by: David Cox		Received by: David Cox	
Date/Time: 12/15/96		Date/Time: 12/15/96	
Received by:		Received by:	
Date/Time:		Date/Time:	
Received by:		Received by:	
Date/Time:		Date/Time:	
Rush		Rush	
24-48 Hours		24-48 Hours	
10 Working Days		10 Working Days	
Special Instructions: PLEASE ANALYZE PER DETECTION LIMITS ATTACHED		Special Instructions: PLEASE ANALYZE PER DETECTION LIMITS ATTACHED	
Relinquished by:		Relinquished by:	
Date/Time: 12/15/96		Date/Time: 12/15/96	
Relinquished by:		Relinquished by:	
Date/Time:		Date/Time:	
Relinquished by:		Relinquished by:	
Date/Time:		Date/Time:	
Method of Shipment:		Method of Shipment:	
Authorized by:		Authorized by:	
Date: 12/15/96		Date: 12/15/96	
(Client Signature Must Accompany Request)		(Client Signature Must Accompany Request)	

Distribution: White - On Site Yellow - LAB Pink - Sampler Goldenrod - Client



RECEIVED JAN 16 1997

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

January 9, 1996

On Site Technologies
612 East Murray
Farmington, NM 87401

Attn: David Cox

Reference: Fingerprinting

Sir;

All three of the samples, 13189-5422, 13188-5422 and 13177-5711, are low quality gasoline probably from a pipeline drip mixed with some refinery cracking product (see Olefin content).

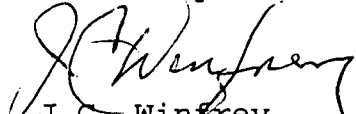
The Zachery 18E MW-4 is different;

- a. Lower Iso-paraffins (23.755%)
- b. Higher Aromatics (11.953%)
- c. Higher Olefins (3.461%)
- d. Contains traces of diesel range hydrocarbons
(C17 & C18, pristane and phytane)

All of the fuels are of very low quality. Each has a low 60's Research Octane number. They are similar in composition and may be from blend components from the same source.

If Southern Petroleum Labs, Inc. can be of further assistance to you, please feel free to give us a call at (713) 660-0901.

Sincerely,


J.C. Winfrey
Consultant

JC/ah



CHAIN OF CUSTODY RECORD

6242

Date: 12/19/96 Page 1 of 1

557 W. Maple • P. O. Box 2606 • Farmington NM 87499
LAB: (505) 325-5667 • FAX: (505) 325-6256

Purchase Order No.: 5711		Job No. PAM1002	
Name ACCOUNTS PAYABLE		Title	
Company ON SITE	Dept.	Company ON SITE	
Address		Mailing Address 612 E MURRAY	
City, State, Zip		City, State, Zip FARMINGTON, NM 87401	
Sampling Location: ZACHRY 18E		Telephone No. 505-325-2432	
Sampler: NG		Telefax No.	
SEND INVOICE TO		ANALYSIS REQUESTED	
Name		Name DAVID COX	
Company		Company	
Address		Address	
City, State, Zip		City, State, Zip	
Telephone No.		Telephone No.	
Telefax No.		Telefax No.	
Number of Containers		LAB ID	
1		13177-5711	
SAMPLE IDENTIFICATION		DATE TIME	
ZACHRY 18E 9612181130 MM-4		12/18 1130 PRESENT 10E	
DATE TIME		DATE TIME	
12/18 1130		12/19/96 1500	
MATRIX		MATRIX	
PRES.		PRES.	
Received by:		Received by:	
Date/Time		Date/Time	
12/19/96 1500		12/24/96 0915	
Relinquished by:		Relinquished by:	
Date/Time		Date/Time	
Relinquished by:		Relinquished by:	
Date/Time		Date/Time	
Method of Shipment:		Special Instructions:	
Authorized by:		10 Working Days	
Date 12/19/96		24-48 Hours	
Client Signature Must Accompany Request		Rush	
Distribution: White - On Site Yellow - LAB Pink - Sampler Goldenrod - Client			



HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9612C50-01

On Site Technologies
612 East Murray
Farmington, NM 87401
ATTN: David Cox

P.O.#

5711

DATE: 01/08/97

PROJECT: Fingerprint Analysis
SITE: Zachry 18E
SAMPLED BY: On Site Technologies *MS*
SAMPLE ID: 9612181130 MW-4

PROJECT NO: PMN1002
MATRIX: PRODUCT
DATE SAMPLED: 12/18/96 11:30:00
DATE RECEIVED: 12/24/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Detection of leaded gasoline additive GC METHOD Analyzed by: JL Date: 12/26/96	N.D.		ppm/Wt
Biodegradation, Ageing, matching fuels GC METHOD Analyzed by: JL Date: 12/27/96	ENCLOSURE		
Oxygenates ASTM D4815 Analyzed by: JH Date: 12/26/96	NO MTBE		

ND - Not detected.
NOMTBE - Defined in COMMENTS below.

ENCLOSURE - Defined in COMMENTS below

Notes:

COMMENTS: 13177-5711 Lab ID

QUALITY ASSURANCE: These analyses are performed in accordance with ASTM, UOP, or GPA guidelines for quality assurance.

Fred DeAngelo

Fred DeAngelo, Laboratory Manager



HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9612C50-01

On Site Technologies
612 East Murray
Farmington, NM 87401
ATTN: David Cox

P.O.#
5711

DATE: 01/08/97

PROJECT: Fingerprint Analysis
SITE: Zachry 18E
SAMPLED BY: On Site Technologies *MS* *MS*
SAMPLE ID: 9612181130 MW-4

PROJECT NO: PMN1002
MATRIX: PRODUCT
DATE SAMPLED: 12/18/96 11:30:00
DATE RECEIVED: 12/24/96

ANALYTICAL DATA				
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Miscellaneous		Comments		no units
METHOD ASTM				
Analyzed by: AH				
Date: 01/08/97				

COMMENTS - Defined in COMMENTS below.

Notes:

COMMENTS: 13177-5711 Lab ID

QUALITY ASSURANCE: These analyses are performed in accordance with ASTM, UOP, or GPA guidelines for quality assurance.

Fred DeAngelo, Laboratory Manager



HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. 9612C50-01A

Company: On Site Technologies, Inc.
ID: 9612181130 MW-4 Zachry 18E
13177-5711
Date: 12/18/96 @ 11:30
ATTN: Mr. David Cox

COLOR: Light Straw
SP. GR. 0.7498
@ 60 F

ODOR: Gasoline
API 57.22
@ 60 F

CARBON RANGE $C_5 - C_{24}$
PARAFFIN 22.690 Wt.%
ISOPARAFFINS 23.753 Wt.%
NAPHTHENICS 38.005 Wt.%
AROMATICS 11.953 Wt.%
OLEFINS 3.461 Wt.%
UNKNOWN 0.138 Wt.%
2,2,4-TRI ND
METHYLPENTANE

MAJOR RANGE $C_6 - C_9$
N-HEXANE 3.686 Wt.%
BENZENE 0.244 Wt.%
ETHYL BENZENE 0.575 Wt.%
TOLUENE 3.773 Wt.%
META XYLENE 3.818 Wt.%
PARA XYLENE 1.493 Wt.%
ORTHO XYLENE 0.986 Wt.%
XYLENES 6.297 Wt.%

RESEARCH OCTANE 63.11
LEAD N/A
MTBE ND
 C_{17} 0.027 Wt.%
PRISTANE 0.028 Wt.%
NAPHTHALENE 0.016 Wt.%
1-METHYL 0.024 Wt.%
NAPHTHALENE

EDB ND
EDC ND
ETHANOL ND
 C_{18} 0.016 Wt.%
PHYTANE 0.005 Wt.%
2-METHYL 0.006 Wt.%
NAPHTHALENE

___ GASOLINE RANGE: $C_4 - C_{13}$ INDICATORS: 2,2,4-TMP; MTBE; OLEFINS,
LEAD
___ DIESEL RANGE: $C_7 - C_{20}$ INDICATORS: NO OLEFINS, PRISTANE,
PHYTANE
___ CONDENSATE RANGE: $C_2 - C_{25} +$ INDICATORS: NO OLEFINS, LIGHT & HEAVIES
___ HEAVY OIL: $C_{20} +$

COMMENTS: Sample appears to be mostly Natural Gasoline. This sample has higher Toluene, Xylene (Aromatics) and higher Olefins than SPL sample numbers 9612C51-01A and 9612C51-02A.

Paul M. Angelo

5711

Page 1 of 1

TECHNOLOGIES, LTD.

Distribution:	White – On Site	Yellow – LAB	Pink – Sampler	Goldenrod – Client
---------------	-----------------	--------------	----------------	--------------------

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *18-Mar-97*
COC No.: *5749*
Sample No.: *13871*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9703111630; MW-1*
Sampled by: *MS/MG* Date: *11-Mar-97* Time: *16:30*
Analyzed by: *DC* Date: *17-Mar-97*
Sample Matrix: *Liquid*

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i>0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i>0.2</i>	<i>ug/L</i>		

Method - *SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography*

Approved By: *[Signature]*
Date: *3/18/97*

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *18-Mar-97*
COC No.: *5749*
Sample No.: *13872*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9703111700; MW-2*
Sampled by: *MS/MG*
Analyzed by: *DC*
Sample Matrix: *Liquid*

Date: *11-Mar-97* Time: *17:00*
Date: *17-Mar-97*

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i>8.9</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i>3.6</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i>39.8</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i>9.9</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i>0.7</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i>62.9</i>	<i>ug/L</i>		

Method - *SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography*

Approved By: *[Signature]*
Date: *3/18/97*

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *18-Mar-97*
COC No.: *5749*
Sample No.: *13873*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9703111730; MW-3*
Sampled by: *MS/MG*
Analyzed by: *DC*
Sample Matrix: *Liquid*

Date: *11-Mar-97* Time: *17:30*
Date: *17-Mar-97*

Parameter	Result	Unit of Measure	Detection Limit	Unit of Measure
<i>Benzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i><0.2</i>	<i>ug/L</i>		

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved By: *[Signature]*
Date: *3/18/97*

P.O. BOX 2606 • FARMINGTON, NM 87499

TECHNOLOGY BLENDING INDUSTRY WITH THE FARMINGTON COMMUNITY

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *18-Mar-97*
COC No.: *5749*
Sample No.: *13874*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9703111800; MW-5*
Sampled by: *MS/MG*
Analyzed by: *DC*
Sample Matrix: *Liquid*

Date: *11-Mar-97* Time: *18:00*
Date: *17-Mar-97*

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i><0.2</i>	<i>ug/L</i>		

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved By: *[Signature]*
Date: *3/18/97*

P.O. BOX 2606 • FARMINGTON, NM 87499

- RELIABLE FOR BLENDING INDUSTRIES WITH THE ENVIRONMENT

OFF: (505) 325-5667



LAB: (505) 325-1556

ANALYTICAL REPORT

Attn: *Denver Bearden*
Company: *PNM Gas Services*
Address: *603 W. Elm*
City, State: *Farmington, NM 87401*

Date: *18-Mar-97*
COC No.: *5749*
Sample No.: *13875*
Job No.: *2-1000*

Project Name: *PNM Gas Services - Zachry 18E*
Project Location: *9703111830; MW-6*
Sampled by: *MS/MG*
Analyzed by: *DC*
Sample Matrix: *Liquid*

Date: *11-Mar-97* Time: *18:30*
Date: *17-Mar-97*

<i>Parameter</i>	<i>Result</i>	<i>Unit of Measure</i>	<i>Detection Limit</i>	<i>Unit of Measure</i>
<i>Benzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Toluene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>Ethylbenzene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>m,p-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>o-Xylene</i>	<i><0.2</i>	<i>ug/L</i>	<i>0.2</i>	<i>ug/L</i>
<i>TOTAL</i>	<i><0.2</i>	<i>ug/L</i>		

Method - SW-846 EPA Method 8020 Aromatic Volatile Organics by Gas Chromatography

Approved By: *[Signature]*
Date: *3/18/97*

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE ENVIRONMENT -

OFF: (505) 325-5667



LAB: (505) 325-1556

QUALITY ASSURANCE REPORT*for EPA Method 8020***Date Analyzed:** 17-Mar-97**Internal QC No.:** 0527-STD**Surrogate QC No.:** 0528-STD**Reference Standard QC No.:** 0529/30-QC**Method Blank**

Parameter	Result	Unit of Measure
Average Amount of All Analytes In Blank	<0.2	ppb

Calibration Check

Parameter	Unit of Measure	True Value	Analyzed Value	% Diff	Limit
Benzene	ppb	20.0	19.7	1	15%
Toluene	ppb	20.0	20.1	0	15%
Ethylbenzene	ppb	20.0	20.5	2	15%
m,p-Xylene	ppb	40.0	39.2	2	15%
o-Xylene	ppb	20.0	20.1	0	15%

Matrix Spike

Parameter	1- Percent Recovered	2 - Percent Recovered	Limit	%RSD	Limit
Benzene	95	89	(39-150)	4	20%
Toluene	98	92	(46-148)	4	20%
Ethylbenzene	100	94	(32-160)	4	20%
m,p-Xylene	98	90	(35-145)	6	20%
o-Xylene	98	92	(35-145)	4	20%

Surrogate Recoveries

Laboratory Identification	S1 Percent Recovered	S2 Percent Recovered	Laboratory Identification	S1 Percent Recovered	S2 Percent Recovered
Limit Percent Recovered	(70-130)		Limit Percent Recovered	(70-130)	
13871-5749	97				
13872-5749	98				
13873-5749	96				
13874-5749	97				
13875-5749	95				

S1: Fluorobenzene

pc

P.O. BOX 2606 • FARMINGTON, NM 87499

- TECHNOLOGY BLENDING INDUSTRY WITH THE QUALITY OF SERVICE

657 W. Maple • P. O. Box 2606 • Farmington NM 87499
LAB: (505) 325-5667 • FAX: (505) 325-6256

CHAIN OF CUSTODY RECORD

[illegible]