TETRA TECH

APR – 3 2009

April 1 2009

Mr. Mike Bratcher
NMOCD District II
1301 W. Grand Avenue
Artesia, New Mexico 88210

Re: Groundwater Investigation for Pit Closure on the Unit Petroleum Company, Gourley Federal #3 Well, Unit H, Section 28, T-22-S, R-28-E, Eddy County, New Mexico

Mr. Bratcher:

Tetra Tech Inc. (Tetra Tech) submits the following Groundwater Investigation for Pit Closure on the Unit Petroleum Company, Gourley Federal #3 Well, located at Unit H, Section 28, T-22-S, R-28-E in Eddy County, New Mexico. This report details the installation and sampling of one up-gradient monitor well at the site and the sampling of one off-site abandoned 18" water well located approximately 1-mile southwest of the site. Figures 1 and 2 details the site location.

Background

In June 2007, Sweatt Construction was contracted to perform a pit closure at the above referenced facility. The site was excavated to maximum depth of 20 feet below ground surface (bgs) and sampled in the field for chlorides. Select confirmation samples were collected for verification, and submitted to Trace Analysis, Inc. of Lubbock, Texas for analysis of chlorides utilizing EPA Method 300.0E.

In January 2009, Tetra Tech was contacted by Unit Petroleum Company to perform confirmation sampling on the open pit. Details of the findings can be found in the report entitled "*Additional Information for Pit Closure Procedure on the Unit Corporation, Gourley Federal # 3 Well*", dated and submitted to the NMOCD on January 19, 2009.

Monitor Well Installation

At the request of the NMOCD, Tetra Tech, Inc. was onsite February 19, 2009 to oversee the installation of a 2" monitor well up-gradient of the pit. The monitor well was drilled to a depth of 60' below ground surface (bgs) and installed with 30' of 0.02" slotted

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PVC at the bottom of the well boring. The remainder of the well boring from approximately 30' bgs to the surface was completed with blank PVC casing. A filtration pack of graded silica sand was placed in the well bore to approximately 3 feet above the screen (25' bgs). A layer of bentonite pellets, approximately 3 feet thick was placed in the borehole above the sand. The remainder of the borehole was filled with a 5% bentonite/concrete slurry and brought up to surface grade. The surface was completed with a monument style locking steel protector with a 3' by 3' concrete pad. Groundwater was encountered at approximately 48' bgs. See Figure 3 for monitor well location. See Appendix A for monitor well construction diagram and soil boring log.

Following installation, the well was developed by using a pump to remove the fine grain sediments, disturbed during drilling, and to ensure collection of representative groundwater samples. Water removed from the monitor well was placed in a 55-gallon drum located adjacent to the monitor well.

On February 25, 2009, Tetra Tech personnel were onsite to purge and sample both the newly installed monitor well MW-1 and the abandoned 18" water well located approximately 1-mile southwest of the site. Prior to sampling, both of the wells were gauged and approximately three casing volumes of water were purged. The pump and associated tubing were decontaminated with a laboratory grade detergent and rinsed with deionized water. Groundwater samples were collected as soon as possible after the groundwater returned to its static level. Groundwater samples were collected using clean disposable polyethylene bailers and disposable line. The samples were transferred into labeled containers provided by the laboratory. The samples were delivered under proper chain-of-custody control to Trace Analysis, Inc. of Midland, Texas. The groundwater samples were analyzed for major anions by EPA methods 310.1, 9253, and 375.4, major cations by method 6010B, and Total Dissolved Solids (TDS) by method 160.1. Copies of the laboratory reports are enclosed in Appendix B.

Monitor Well Sample Results

The chloride concentration for the abandoned 18" water well located approximately 1-mile southwest of the site is 284 mg/L, while the up-gradient monitor well MW-1, has a chloride concentration of 3,220 mg/L. Total dissolve solids (TDS) concentrations for the abandoned 18" water well is 2,630 mg/L, while MW-1 had a TDS of 7,800 mg/L. Groundwater analytical results are summarized in Table 1.

Stiff diagrams for both monitor well MW-1 and the 18" abandoned water well were created based on the analytical results for the sampling event. The stiff diagrams for both wells are relatively uniform with no skewing. This indicates the chloride concentrations at the sites are relatively natural. The naturally elevated chloride concentration in monitor well MW-1 is indicative of groundwater associated with the Rustler Formation which is the predominant groundwater west and east of the Pecos River. Stiff diagrams are enclosed in Appendix C.

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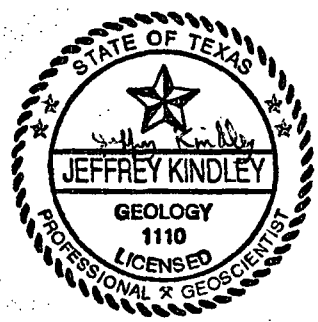
Conclusions

1. Up-gradient monitor well MW-1 had chloride concentrations of 3,220 mg/L, while the 18" abandoned water well located approximately 1-mile southwest of the site is 284 mg/L.

2. The Stiff diagrams for both MW-1 and the 18" abandoned water well is relatively uniform with no skewing indicating the chloride concentration in the groundwater is relatively natural. The naturally elevated chloride concentration in monitor well MW-1 is indicative of groundwater associated with the Rustler Formation which is the predominant groundwater west and east of the Pecos River.

Since it appears the groundwater at the site is naturally elevated with chlorides, Unit Petroleum Company respectfully requests that the NMOCD consider releasing Unit from further sampling at the site.



Respectfully Submitted,
Tetra Tech, Inc.

Jeffrey. W. Kindley, P.G.
Senior Project Manager

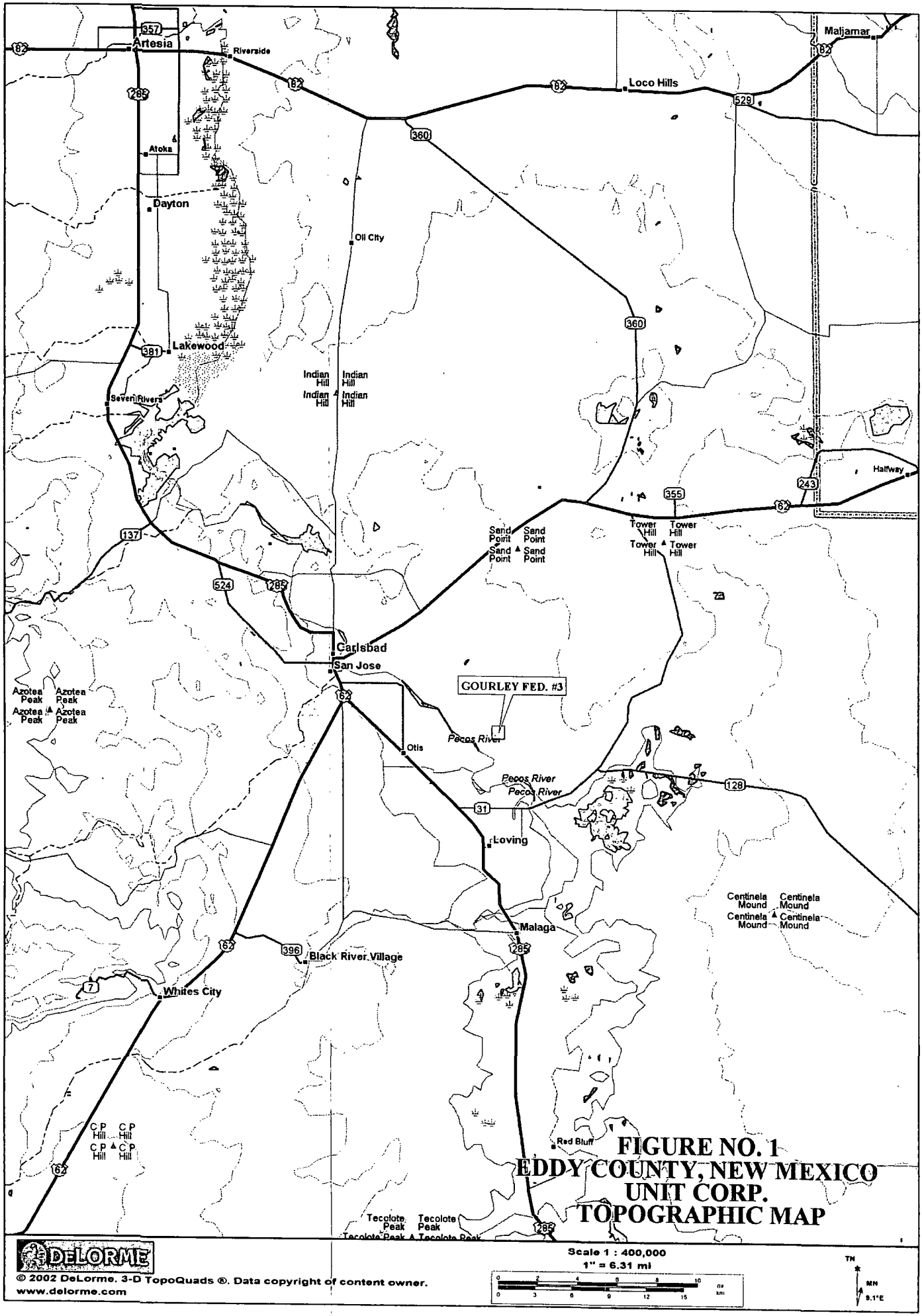


FIGURE NO. 1
EDDY COUNTY, NEW MEXICO
UNIT CORP.
TOPOGRAPHIC MAP

Scale 1 : 400,000
1" = 6.31 mi

TN
MN
9.1°E

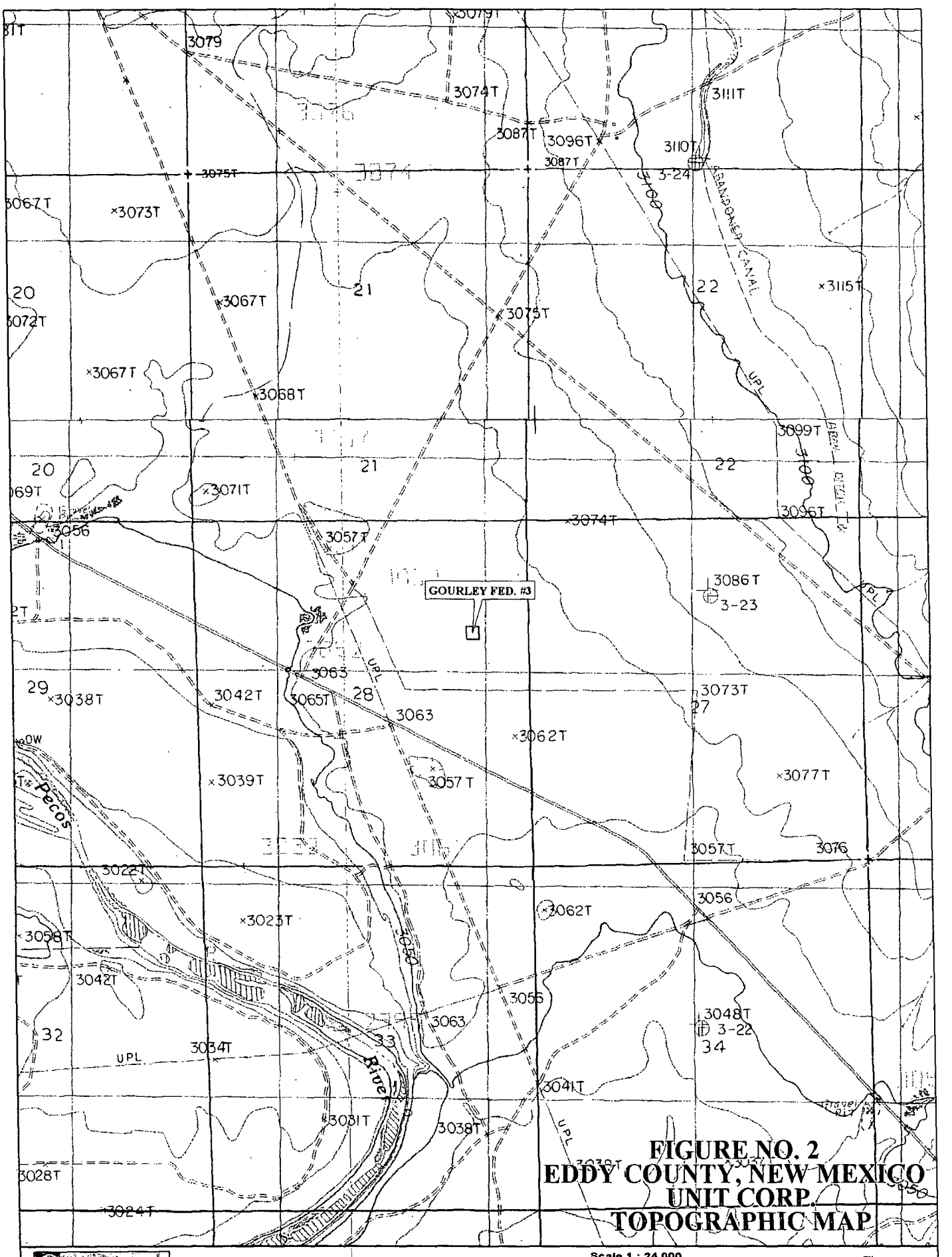
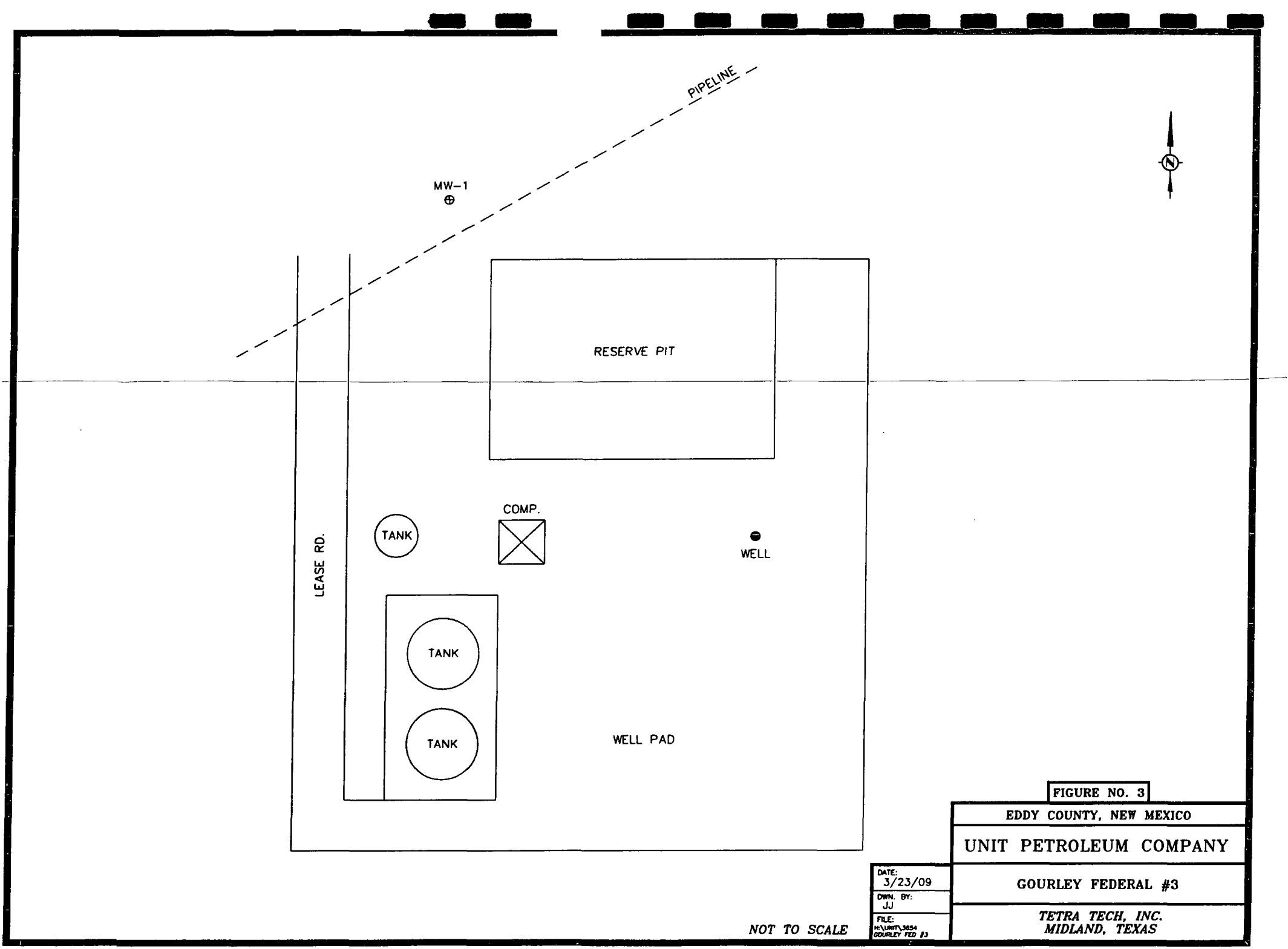


FIGURE NO. 2
EDDY COUNTY, NEW MEXICO
UNIT CORP.
TOPOGRAPHIC MAP



NOT TO SCALE

FIGURE NO. 3

EDDY COUNTY, NEW MEXICO

UNIT PETROLEUM COMPANY

GOURLEY FEDERAL #3

TETRA TECH, INC.
MIDLAND, TEXAS

DATE: 3/23/09
DWN. BY: JJ
FILE: H:\UNIT\3654 GOURLEY FED #3

TABLE

Table 1

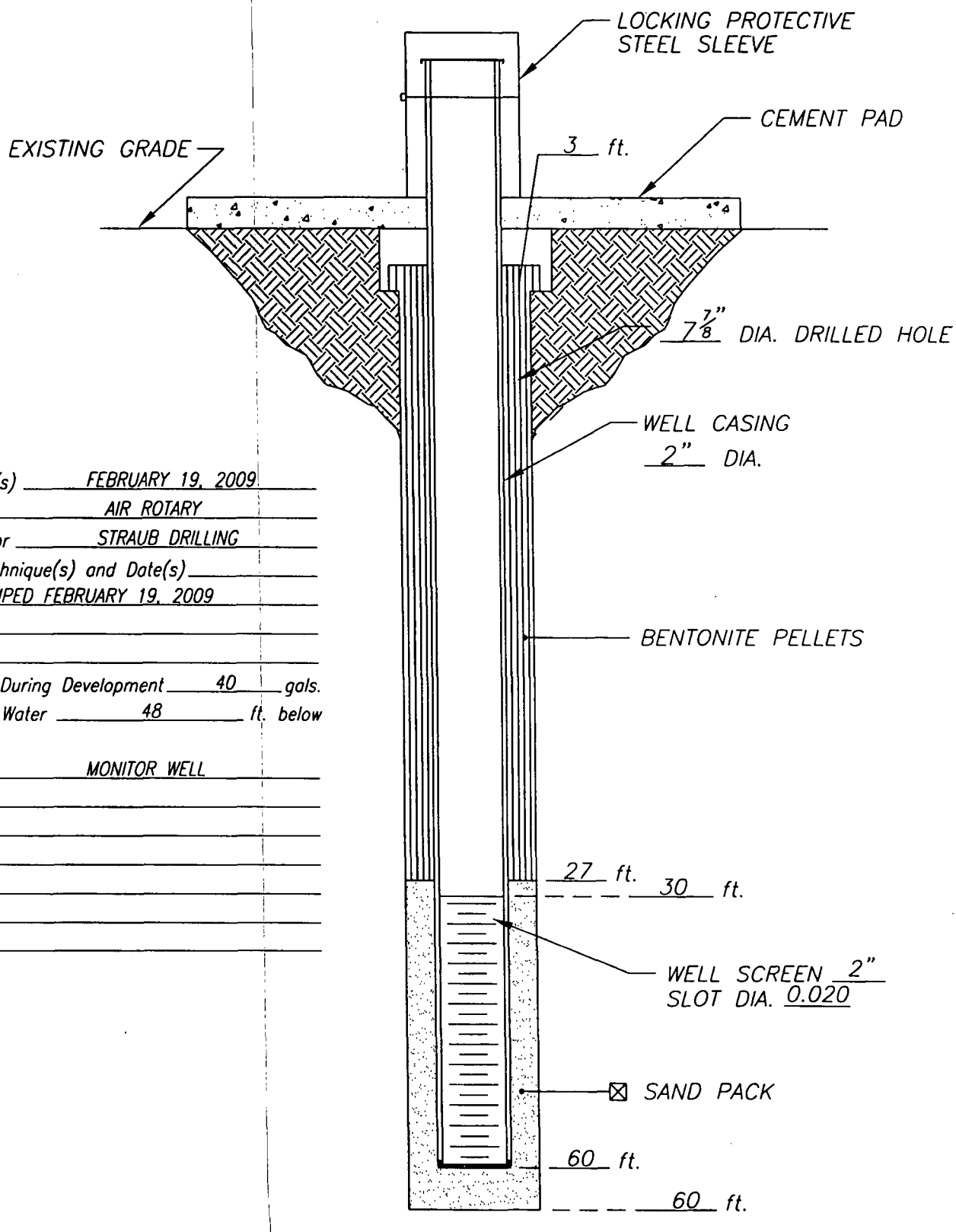
Unit Petroleum Company Gourley #3

Groundwater Analytical Results

Eddy County, New Mexico

Monitor Well	Date Sampled	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Potassium (mg/L)	Hydroxide Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Alkalinity (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
MW-1	02/25/09	1,340	473	1,190	16.0	<1.00	<1.00	94	94	1,800	3,220	7,800	5,290	7.26
18" Abandoned Well	02/25/09	482	160	275	10.2	<1.00	<1.00	140	140	1,390	284	2,630	1,860	7.62

WELL CONSTRUCTION LOG



Installation Date(s) FEBRUARY 19, 2009
Drilling Method AIR ROTARY
Drilling Contractor STRAUB DRILLING
Development Technique(s) and Date(s)
PUMPED FEBRUARY 19, 2009

Water Removed During Development 40 gals.
Static Depth to Water 48 ft. below Ground Level
Well Purpose MONITOR WELL

Remarks

DATE: FEBRUARY 19, 2009	CLIENT: UNIT PETROLEUM COMPANY	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: GOURLEY FEDERAL #3	MW-1
	LOCATION: EDDY COUNTY, NEW MEXICO	

SAMPLE LOG

Boring/Well: **MW-1**
Project Number: **3654**
Client: **Unit Petroleum Company**
Site Location: **Gourley Federal #3**
Location: **Eddy County, New Mexico**
Total Depth **60**
Date Installed: **02/19/09**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	--	Hard buff caliche
5-10	--	Hard buff/tan calcareous fine grain sand
10-15	--	Tan medium grain sand with caliche intermixed
15-20	--	Tan/brown medium grain sand
20-25	--	Tan/brown medium grain sand
25-30	--	Tan/brown medium grain sand
30-35	--	Tan/brown medium to coarse grain sand
35-40	--	Tan/brown medium to coarse grain sand
40-45	--	Tan/brown medium to coarse grain sand
45-50	--	Tan/brown medium to coarse grain sand
50-55	--	Tan/brown medium to coarse grain sand
55-60	--	Tan/brown medium to coarse grain sand
60-66	--	Tan sandy clay intermixed with red clay

Total Depth is 60 feet Groundwater encountered at 48 feet

APPENDIX B
LABORATORY ANALYTICAL

Summary Report

Jeff Kindley
Tetra Tech
1910 N. Big Spring Street
Midland, TX 79705

Report Date: March 16, 2009

Work Order: 9022610

Project Location: Eddy Co., NM
Project Name: Unit Corp/Gourley #3
Project Number: 115-6403654

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
188487	MW-1	water	2009-02-25	13:45	2009-02-26

Sample: 188487 - MW-1

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**94.0**	mg/L as CaCo3	4.00
Total Alkalinity		**94.0**	mg/L as CaCo3	4.00
Dissolved Calcium		**1340**	mg/L	1.00
Dissolved Potassium		**16.0**	mg/L	1.00
Dissolved Magnesium		**473**	mg/L	1.00
Dissolved Sodium		**1190**	mg/L	1.00
Chloride		**3220**	mg/L	2.50
Hardness (by ICP)		**5290**	mg eq CaCO3/L	0.00
pH		**7.26**	s.u.	0.00
Sulfate		**1800**	mg/L	2.50
Total Dissolved Solids		**7800**	mg/L	10.0

Summary Report

Jeff Kindley
Tetra Tech
1910 N. Big Spring Street
Midland, TX 79705

Report Date: March 16, 2009

Work Order: 9022607

Project Location: Eddy County, NM
Project Name: Unit Corp/Abandoned Well-Unit K, Sec. 28, T22SR28E
Project Number: 115-6403654

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
188485	Abandoned Well 18 in.	water	2009-02-25	11:20	2009-02-26

Sample: 188485 - Abandoned Well 18 in.

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**140**	mg/L as CaCo3	4.00
Total Alkalinity		**140**	mg/L as CaCo3	4.00
Dissolved Calcium		**482**	mg/L	1.00
Dissolved Potassium		**10.2**	mg/L	1.00
Dissolved Magnesium		**160**	mg/L	1.00
Dissolved Sodium		**275**	mg/L	1.00
Chloride		**284**	mg/L	2.50
Hardness (by ICP)		**1860**	mg eq CaCO3/L	0.00
pH		**7.62**	s.u.	0.00
Sulfate		**1390**	mg/L	2.50
Total Dissolved Solids		**2630**	mg/L	10.0

APPENDIX C
STIFF DIAGRAMS

Major ions

Project Name: Unit Petroleum Company, Gourley #3

County: Eddy County, New Mexico 2/25/2009

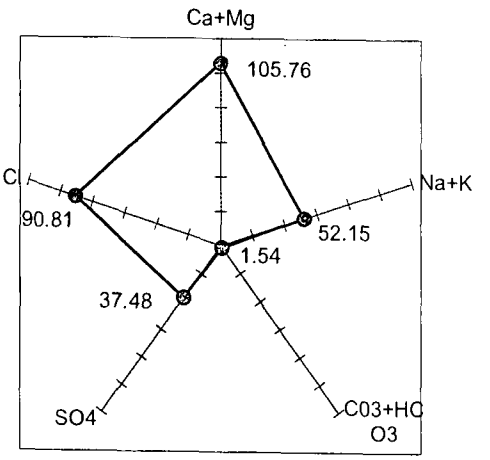
Concentrations in mg/l and me/l

Cations	Anions	Equivalant Weight	MW-1		Abandoned 18 inch well	
			mg/l	me/l	mg/l	me/l
Ca		20.04	1340	66.87	482	24.05
Mg		12.16	473	38.90	160	13.16
Na		23.00	1,190	51.74	275	11.96
K		39.10	16	0.41	10.2	0.26
	CO_3	30.00	0	0.00	0	0.00
	HCO_3	61.02	94	1.54	140	2.29
	SO_4	48.03	1800	37.48	140	2.91
	Cl	35.46	3,220	90.81	284	8.01
	NO_3	62.01	0	0.00	0	0.00
	F	19.00	0	0.00	0	0.00
Cation (sum)				157.91		49.43
Anion (sum)				129.82		13.22
Cation/Anion difference in %				19.52		115.60

	MW-1		
Ca	66.87		
Mg	38.90	Ca+Mg	105.76
Na	51.74	Na+K	52.15
K	0.41	C03+HCO3	1.54
CO3	0.00	SO4	37.48
HCO3	1.54	Cl	90.81
SO4	37.48		
Cl	90.81		
NO3	0.00		
F	0.00		

Stiff Diagram for MW-1
Unit Petroleum Company - Gourley #3
Eddy County, New Mexico
February 25, 2009

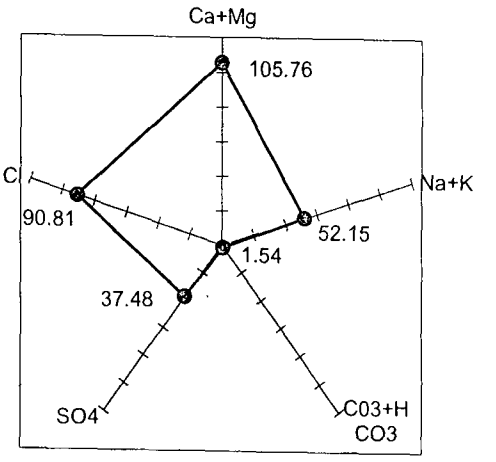
Values in meq/l



	MW-1		
Ca	66.87		
Mg	38.90	Ca+Mg	105.76
Na	51.74	Na+K	52.15
K	0.41	C03+HCO3	1.54
CO3	0.00	SO4	37.48
HCO3	1.54	Cl	90.81
SO4	37.48		
Cl	90.81		
NO3	0.00		
F	0.00		

Stiff Diagram for MW-1
Unit Petroleum Company - Gourley #3
Eddy County, New Mexico
February 25, 2009

Values in meq/l



	Abandoned 18 inch well		
Ca	24.05		
Mg	13.16	Ca+Mg	37.21
Na	11.96	Na+K	12.22
K	0.26	C03+HCO3	2.29
CO3	0.00	SO4	2.91
HCO3	2.29	Cl	8.01
SO4	2.91		
Cl	8.01		
NO3	0.00		
F	0.00		

Stiff Diagram Abandoned 18 inch well
Unit Petroleum Company - Gourley #3
Eddy County, New Mexico
February 25, 2009

Values in meq/l