3R - 106

REPORTS

DATE:
1999

CROSS TIMBERS OIL COMPANY

GROUNDWATER REMEDIATION REPORT

1999

RECEIVED
APR 27 2000
ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

BRUINGTON GC #1
(E) SECTION 14, T29N, R11W, NMPM
SAN JUAN COUNTY, NEW MEXICO

PREPARED FOR:
MR. WILLIAM C. OLSON
NEW MEXICO OIL CONSERVATION DIVISION

FEBRUARY 2000

PREPARD BY:
BLAGG ENGINEERING, INC.

Consulting Petroleum / Reclamation Services
P.O. Box 87
Bloomfield, New Mexico 87413

Cross Timbers Oil Company
Bruington GC # 1 - Blow Pit
Sw/4 Nw/4 Sec. 14, T29N, R11W

Groundwater Monitor Well Sampling Procedures:

Groundwater samples were collected from site monitor wells (MW's) following USEPA: SW-846 protocol. The samples were collected using new disposable bailers and placed in new laboratory supplied 40 ml glass vials with teflon septa caps. Samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) per USEPA Method 8021. Additional groundwater was collected and place in laboratory supplied 500 ml plastic containers and analyzed for general water quality per USEPA Method 600/4-79-020. The samples were preserved cool (BTEX samples also preserved with mercuric chloride) and hand delivered to a qualified laboratory for testing. Waste generated during monitor well sampling and development was disposed of utilizing the separator tank pit located on the well site.

Water Quality Information:

The BTEX and general chemistry results for 1999 are summarized in the following tables along with the previous sampling events. MW #1R and #3 disclosed a profound increase in all BTEX constituents as compared to the June 12, 1998 sampling event, whereas MW #2R decreased dramatically. The general chemistry results reveal the following scenarios in relations to the June 7, 1996 sampling event; 1) total dissolved solids and sulfate levels in respective MW's remain relatively compatible, and 2) chloride levels, again respectively, has displayed a sharp decrease in all MW's, especially in MW #2R and #3.

Summary and/or Recommendations:

Based on the enclosed documentation and addressing the previous year recommendations, it is highly probable that groundwater contamination has dispersed in all directions with the exception of the southeast quadrant during the height of the irrigation season. Blagg Engineering, Inc. (BEI) continues to suspect the extent of groundwater contamination is limited to the blow pit area based on the pit closure documentation revealing sandstone bedrock shelves in most of the perimeter of the pit. The groundwater flow direction has apparently shifted to the northeast direction during the May 5, 1999 annual sampling event (refer to Figures 2), but it is still postulated that the nearby ditch located to the west of the blow pit is the influencing factor in groundwater fluctuation and flow. BEI recommends to investigate the perimeter of the blow pit, but maintains that in all likelihood, sandstone will be encountered prior to reaching groundwater if the investigation is conducted outside of the height of the irrigation season.

CROSS TIMBERS OIL CO. GROUNDWATER MONITOR WELL LAB RESULT

SUBMITTED BY BLAGG ENGINEERING, INC.

BRUINGTON GC # 1 - BLOW PIT
UNIT E, SEC. 14, T29N, R11W

REVISED DATE: May 25, 1999
FILENAME: (BR-2Q-99.WK4) NJV

								BTEX EPA METHOD 8020 (PPB)			
SAMPLE DATE	MONITOR WELL No:	D.T.W. (ft)	T.D. (ft)	TDS mg/L	COND. umhos	pH	PRODUCT (in)	Benzene	Toluene	Ethyl Benzene	Total Xylene
07-Jun-96	MW #1	7.00	20.36	5,570	3,200	7.1	-	ND	ND	ND	ND
05-May-99	MW #1R	10.55	20.00	3,830	7,670	7.0	-	16.5	26.0	8.1	78.2
07-Jun-96	MW #2	10.12	21.74	7,980	5,500	6.7	-	347	28.5	156	1580
27-Jun-97		12.65	14.47		4,800	6.9	-	429	67.9	46.1	402.4
12-Jun-98	MW #2R	11.00	20.95		3,500	7.6	-	13440	13330	1030	6040
05-May-99		10.78		7,950	16,000	7.1	-	1020	554	175	679
07-Jun-96	MW #3	13.05	21.17	10,300	6,500	6.7	-	ND	1.8	ND	ND
05-May-99		13.64	18.08	11,100	22,250	7.2	-	73.2	38.3	31.2	200.1

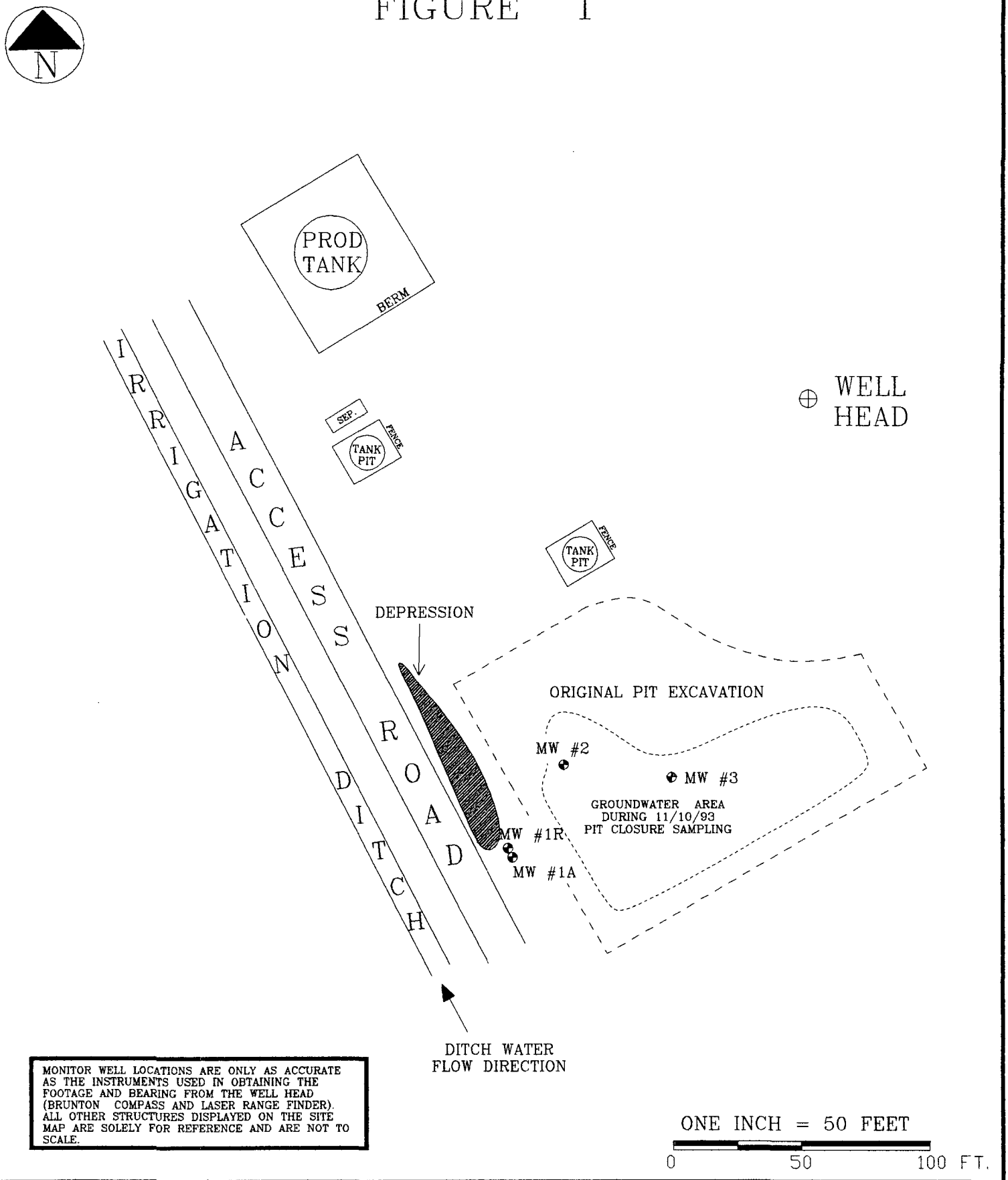
GENERAL WATER QUALITY
CROSS TIMBERS OIL COMPANY
BRUINGTON GC # 1
SAMPLE DATE : May 25, 1999

PARAMETERS	MW # 1R	MW # 2R	MW # 3	Units
LAB pH	6.95	7.07	7.23	s. u.
LAB CONDUCTIVITY @ 25 C	7,670	16,000	22,250	umhos / cm
TOTAL DISSOLVED SOLIDS @ 180 C	3,830	7,950	11,100	mg / L
TOTAL DISSOLVED SOLIDS (Calc)	3,819	7,930	11,029	mg / L
SODIUM ABSORPTION RATIO	5.9	16.2	34.2	ratio
TOTAL ALKALINITY AS CaCO3	564	3,280	1,060	mg / L
TOTAL HARDNESS AS CaCO3	1,630	1,575	1,470	mg / L
BICARBONATE as HCO3	564	3,280	1,060	mg / L
CARBONATE AS CO3	< 1	< 1	< 1	mg / L
HYDROXIDE AS OH	< 1	< 1	< 1	mg / L
NITRATE NITROGEN	0.6	1.3	0.8	mg / L
NITRITE NITROGEN	< 0.001	0.254	< 0.001	mg / L
CHLORIDE	16.0	6.4	90.5	mg / L
FLUORIDE	1.46	1.57	7.00	mg / L
PHOSPHATE	13.0	26.8	< 0.1	mg / L
SULFATE	2,260	3,310	6,740	mg / L
IRON	17.1	0.397	44.6	mg / L
CALCIUM	520	598	430	mg / L
MAGNESIUM	80.6	195	96.5	mg / L
POTASSIUM	40.0	20.0	11.0	mg / L
SODIUM	545	1,780	3,010	mg / L
CATION / ANION DIFFERENCE	0.11	0.02	0.01	%

GENERAL WATER QUALITY
AMOCO PRODUCTION COMPANY
BRUINGTON GC # 1
SAMPLE DATE : JUNE 7, 1996

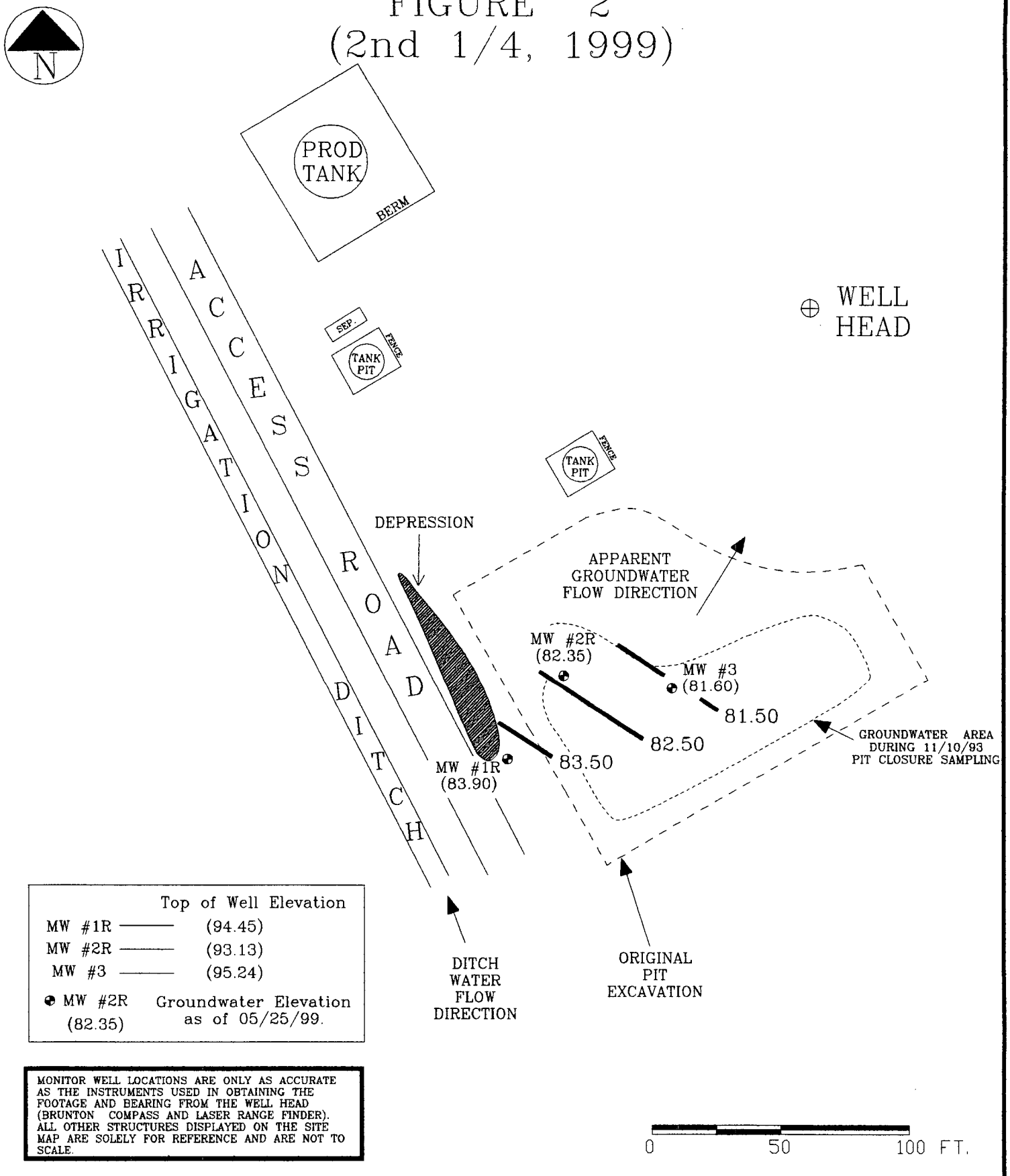
PARAMETERS		MW # 1	MW # 2	MW # 3	Units
GENERAL	LAB pH	7.6	7.2	7.2	s. u.
	LAB CONDUCTIVITY (25 DEG. CELCIUS)	4,110	8,270	10,400	umhos cm
	TOTAL DISSOLVED SOLIDS (180 DEG. CELCIUS)	5,570	7,980	10,300	mg / L
	TOTAL DISSOLVED SOLIDS (CALCULATED)	5,240	7,710	10,000	mg / L
ANIONS	TOTAL ALKALINITY AS CaCO3	201	430	501	mg / L
	BICARBONATE ALKALINITY (AS CaCO3)	201	430	501	mg / L
	CARBONATE ALKALINITY (AS CaCO3)	NA	NA	NA	mg / L
	HYDROXIDE ALKALINITY (AS CaCO3)	NA	NA	NA	mg / L
	CHLORIDE	82.5	147	295	mg / L
	SULFATE	3,430	4,730	5,990	mg / L
	NITRATE + NITRITE - N	NA	NA	NA	
	NITRATE - N	NA	NA	NA	
	NITRITE - N	NA	NA	NA	
CATIONS	TOTAL HARDNESS AS CaCO3	1,540	939	1,210	mg / L
	CALCIUM	575	366	672	mg / L
	MAGNESIUM	24.6	6.16	<0.1	mg / L
	POTASSIUM	<5.0	<5.0	6.00	mg / L
	SODIUM	1,000	2,200	2,900	mg / L
DATA VALIDATION					ACCEPTANCE LEVEL
	CATION/ANION DIFFERENCE	2.34	1.47	2.21	+/- 5 %
	TDS (180):TDS (CALCULATED)	1.1	1.0	1.0	1.0 - 1.2

FIGURE 1



AMOCO PRODUCTION COMPANY BRUINGTON GC 1 SW/4 NW/4 SEC. 14, T29N, R11W SAN JUAN COUNTY, NEW MEXICO	BLAGG ENGINEERING, INC. CONSULTING PETROLEUM / RECLAMATION SERVICES P.O. BOX 87 BLOOMFIELD, NEW MEXICO 87413 PHONE: (505) 632-1199	PROJECT: Annual Samp. DRAWN BY: NJV FILENAME: 05-25-SM.SKD REVISED: 02/02/00 NJV	SITE MAP 05/99

FIGURE 2
(2nd 1/4, 1999)



AMOCO PRODUCTION COMPANY BRUINGTON GC 1 SW/4 NW/4 SEC. 14, T29N, R11W SAN JUAN COUNTY, NEW MEXICO	BLAGG ENGINEERING, INC. CONSULTING PETROLEUM / RECLAMATION SERVICES P.O. BOX 87 BLOOMFIELD, NEW MEXICO 87413 PHONE: (505) 632-1199	PROJECT: Annual Samp. DRAWN BY: NJV FILENAME: 05-25-GW.SKD REVISED: 02/02/00 NJV	GROUNDWATER GRADIENT MAP 05/99

BLAGG ENGINEERING, INC.

MONITOR WELL SAMPLING DATA

CLIENT : AMOCO PRODUCTION CO.

CHAIN-OF-CUSTODY # : 6683

BRUINGTON GC # 1 - BLOW PIT
UNIT E, SEC. 14, T29N, R11W

LABORATORY (S) USED : ENVIROTECH, INC.

Date : May 25, 1999

Filename : 05-25-99.WK4

SAMPLER : N J V

PROJECT MANAGER : N J V

WELL #	WELL ELEV. (ft)	WATER ELEV. (ft)	DEPTH TO WATER (ft)	TOTAL DEPTH (ft)	SAMPLING TIME	pH	CONDUCT (umhos)	VOLUME PURGED (gal.)	FREE PRODUCT (ft)
1R	94.45	83.90	10.55	20.00	1140	-	-	4.75	-
2R	93.13	82.35	10.78	20.95	1210	-	-	5.00	-
3	95.24	81.60	13.64	18.08	1240	-	-	2.25	-

NOTES : Volume of water purged from well prior to sampling: V = pi X r2 X h X 7.48 gal./ft3) X 3 (wellbores).

(i.e. 2" MW r = (1/12) ft. h = 1 ft.) (i.e. 4" MW r = (2/12) ft. h = 1 ft.)

Ideally a minimum of three (3) wellbore volumes:

1.25 " well diameter = 0.19 gallons per foot of water (or 24 oz.).

2 bails per foot - small teflon bailer.

3 bails per foot - 3 / 4 " teflon bailer.

2.00 " well diameter = 0.49 gallons per foot of water.

4.00 " well diameter = 1.95 gallons per foot of water.

Comments or note well diameter if not standard 2 ".

Collected BTEX and anion / cation samples for all MW's listed above .

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA METHOD 8021
AROMATIC VOLATILE ORGANICS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW # 1R	Date Reported:	05-26-99
Chain of Custody:	6683	Date Sampled:	05-25-99
Laboratory Number:	F389	Date Received:	05-25-99
Sample Matrix:	Water	Date Analyzed:	05-26-99
Preservative:	HgCl2 & Cool	Analysis Requested:	BTEX
Condition:	Cool & Intact		

Parameter	Concentration (ug/L)	Dilution Factor	Det. Limit (ug/L)
Benzene	**16.5**	**1**	**0.2**
Toluene	**26.0**	**1**	**0.2**
Ethylbenzene	**8.1**	**1**	**0.2**
p,m-Xylene	**53.0**	**1**	**0.2**
o-Xylene	**25.2**	**1**	**0.1**
Total BTEX	**129**		

ND - Parameter not detected at the stated detection limit.

Surrogate Recoveries:	Parameter	Percent Recovery
	Trifluorotoluene	**98 %**
	Bromofluorobenzene	**98 %**

References: Method 5030B, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, December 1996.

Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, USEPA December 1996.

Comments: **Bruington GC #1.**

Analyst

Review

5796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA METHOD 8021
AROMATIC VOLATILE ORGANICS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW # 2R	Date Reported:	05-26-99
Chain of Custody:	6683	Date Sampled:	05-25-99
Laboratory Number:	F390	Date Received:	05-25-99
Sample Matrix:	Water	Date Analyzed:	05-26-99
Preservative:	HgCl2 & Cool	Analysis Requested:	BTEX
Condition:	Cool & Intact		

Parameter	Concentration (ug/L)	Dilution Factor	Det. Limit (ug/L)
Benzene	**1,020**	**10**	**1.8**
Toluene	**554**	**10**	**1.7**
Ethylbenzene	**175**	**10**	**1.5**
p,m-Xylene	**497**	**10**	**2.2**
o-Xylene	**182**	**10**	**1.0**
Total BTEX	**2,430**		

ND - Parameter not detected at the stated detection limit.

Surrogate Recoveries:	Parameter	Percent Recovery
	Trifluorotoluene	**100 %**
	Bromofluorobenzene	**100 %**

References: Method 5030B, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, December 1996.

Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, USEPA December 1996.

Comments: **Bruington GC #1.**

Analyst

Review

5796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA METHOD 8021
AROMATIC VOLATILE ORGANICS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW # 3	Date Reported:	05-26-99
Chain of Custody:	6683	Date Sampled:	05-25-99
Laboratory Number:	F391	Date Received:	05-25-99
Sample Matrix:	Water	Date Analyzed:	05-26-99
Preservative:	HgCl2 & Cool	Analysis Requested:	BTEX
Condition:	Cool & Intact		

Parameter	Concentration (ug/L)	Dilution Factor	Det. Limit (ug/L)
Benzene	**73.2**	**1**	**0.2**
Toluene	**38.3**	**1**	**0.2**
Ethylbenzene	**31.2**	**1**	**0.2**
p,m-Xylene	**172**	**1**	**0.2**
o-Xylene	**28.1**	**1**	**0.1**
Total BTEX	**343**		

ND - Parameter not detected at the stated detection limit.

Surrogate Recoveries:	Parameter	Percent Recovery
	Trifluorotoluene	**97 %**
	Bromofluorobenzene	**97 %**

References: Method 5030B, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, December 1996.

Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, USEPA December 1996.

Comments: **Bruington GC #1.**

Analyst

Review

5796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

CATION / ANION ANALYSIS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW #1R	Date Reported:	05-27-99
Laboratory Number:	F389	Date Sampled:	05-25-99
Chain of Custody:	6683	Date Received:	05-25-99
Sample Matrix:	Water	Date Extracted:	N/A
Preservative:	Cool	Date Analyzed:	05-26-99
Condition:	Cool & Intact		

Parameter	Analytical Result	Units		Units
pH	**6.95**	s.u.		
Conductivity @ 25° C	**7,670**	umhos/cm		
Total Dissolved Solids @ 180C	**3,830**	mg/L		
Total Dissolved Solids (Calc)	**3,819**	mg/L		
SAR	**5.9**	ratio		
Total Alkalinity as CaCO3	**564**	mg/L		
Total Hardness as CaCO3	**1,630**	mg/L		
Bicarbonate as HCO3	**564**	mg/L	9.24	meq/L
Carbonate as CO3	**<1**	mg/L	0.00	meq/L
Hydroxide as OH	**<1**	mg/L	0.00	meq/L
Nitrate Nitrogen	**0.6**	mg/L	0.01	meq/L
Nitrite Nitrogen	**<0.001**	mg/L	0.00	meq/L
Chloride	**16.0**	mg/L	0.45	meq/L
Fluoride	**1.46**	mg/L	0.08	meq/L
Phosphate	**13.0**	mg/L	0.41	meq/L
Sulfate	**2,260**	mg/L	47.05	meq/L
Iron	**17.1**	mg/L		
Calcium	**520**	mg/L	25.95	meq/L
Magnesium	**80.6**	mg/L	6.63	meq/L
Potassium	**40.0**	mg/L	1.02	meq/L
Sodium	**545**	mg/L	23.71	meq/L
Cations			57.31	meq/L
Anions			57.25	meq/L
Cation/Anion Difference			**0.11%**	

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983. Water And Waste Water", 18th ed., 1992.

Comments: **Bruington GC #1.**

Analyst

Review

796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

CATION / ANION ANALYSIS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW #2R	Date Reported:	05-27-99
Laboratory Number:	F390	Date Sampled:	05-25-99
Chain of Custody:	6683	Date Received:	05-25-99
Sample Matrix:	Water	Date Extracted:	N/A
Preservative:	Cool	Date Analyzed:	05-26-99
Condition:	Cool & Intact		

Parameter	Analytical Result	Units		Units
pH	**7.07**	s.u.		
Conductivity @ 25° C	**16,000**	umhos/cm		
Total Dissolved Solids @ 180C	**7,950**	mg/L		
Total Dissolved Solids (Calc)	**7,930**	mg/L		
SAR	**16.2**	ratio		
Total Alkalinity as CaCO3	**3,280**	mg/L		
Total Hardness as CaCO3	**1,575**	mg/L		
Bicarbonate as HCO3	**3,280**	mg/L	53.76	meq/L
Carbonate as CO3	**<1**	mg/L	0.00	meq/L
Hydroxide as OH	**<1**	mg/L	0.00	meq/L
Nitrate Nitrogen	**1.3**	mg/L	0.02	meq/L
Nitrite Nitrogen	**0.254**	mg/L	0.01	meq/L
Chloride	**6.4**	mg/L	0.18	meq/L
Fluoride	**1.57**	mg/L	0.08	meq/L
Phosphate	**26.8**	mg/L	0.85	meq/L
Sulfate	**3,310**	mg/L	68.91	meq/L
Iron	**0.397**	mg/L		
Calcium	**598**	mg/L	29.84	meq/L
Magnesium	**195**	mg/L	16.05	meq/L
Potassium	**20.0**	mg/L	0.51	meq/L
Sodium	**1,780**	mg/L	77.43	meq/L
Cations			123.83	meq/L
Anions			123.81	meq/L
Cation/Anion Difference			**0.02%**	

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983. Water And Waste Water", 18th ed., 1992.

Comments: **Bruington GC #1.**

Analyst

Review

796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

CATION / ANION ANALYSIS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW #3	Date Reported:	05-27-99
Laboratory Number:	F391	Date Sampled:	05-25-99
Chain of Custody:	6683	Date Received:	05-25-99
Sample Matrix:	Water	Date Extracted:	N/A
Preservative:	Cool	Date Analyzed:	05-26-99
Condition:	Cool & Intact		

Parameter	Analytical Result	Units		Units
pH	**7.23**	s.u.		
Conductivity @ 25° C	**22,250**	umhos/cm		
Total Dissolved Solids @ 180C	**11,100**	mg/L		
Total Dissolved Solids (Calc)	**11,029**	mg/L		
SAR	**34.2**	ratio		
Total Alkalinity as CaCO3	**1,060**	mg/L		
Total Hardness as CaCO3	**1,470**	mg/L		
Bicarbonate as HCO3	**1,060**	mg/L	17.37	meq/L
Carbonate as CO3	**<1**	mg/L	0.00	meq/L
Hydroxide as OH	**<1**	mg/L	0.00	meq/L
Nitrate Nitrogen	**0.8**	mg/L	0.01	meq/L
Nitrite Nitrogen	**<0.001**	mg/L	0.00	meq/L
Chloride	**90.5**	mg/L	2.55	meq/L
Fluoride	**7.00**	mg/L	0.37	meq/L
Phosphate	**<0.1**	mg/L	0.00	meq/L
Sulfate	**6,740**	mg/L	140.33	meq/L
Iron	**44.6**	mg/L		
Calcium	**430**	mg/L	21.46	meq/L
Magnesium	**96.5**	mg/L	7.94	meq/L
Potassium	**11.0**	mg/L	0.28	meq/L
Sodium	**3,010**	mg/L	130.94	meq/L
Cations			160.61	meq/L
Anions			160.63	meq/L
Cation/Anion Difference			**0.01%**	

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983. Water And Waste Water", 18th ed., 1992.

Comments: **Bruington GC #1.**

Analyst

Review

5796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

CHAIN OF CUSTODY RECORD

6683

Client / Project Name	Project Location	ANALYSIS / PARAMETERS
BLAGG / CROSS TIMBERS	BRUINGTON GC #1	
Sampler: NJV	Client No. 403410	

Sample No./ Identification	Sample Date	Sample Time	Lab Number	Sample Matrix	No. of Containers	BTEX (8021)	ANION CATION					Remarks
												ANION/CATION PRESERV. - COOL
MW #1R	5/25/99	1140	F389	WATER	3	✓	✓					
												BTEX SAMPLES
MW #2R	5/25/99	1210	F390	WATER	3	✓	✓					PRESERV. - $HgCl_2$
												& COOL
MW #3	5/25/99	1240	F391	WATER	3	✓	✓					

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Nelson Velez	5/25/99	1313	Christine Walla	5.25.99	13:13
Relinquished by: (Signature)			Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		

ENVIROTECH INC.

5796 U.S. Highway 64
Farmington, New Mexico 87401
(505) 632-0615

Sample Receipt	Y	N	N/A
Received Intact	✓		
Cool - Ice/Blue Ice	✓		

ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

EPA METHOD 8021
AROMATIC VOLATILE ORGANICS
QUALITY ASSURANCE REPORT

Client:	N/A	Project #:	N/A
Sample ID:	05-26-BTEX QA/QC	Date Reported:	05-26-99
Laboratory Number:	F389	Date Sampled:	N/A
Sample Matrix:	Water	Date Received:	N/A
Preservative:	N/A	Date Analyzed:	05-26-99
Condition:	N/A	Analysis:	BTEX

Calibration and Detection Limits (ug/L)	I-Cal RF:	C-Cal RF:	%Diff. Accept. Range 0 - 15%	Blank Conc	Detect. Limit
Benzene	1.6360E-002	1.6412E-002	0.32%	ND	0.2
Toluene	1.7563E-002	1.7566E-002	0.02%	ND	0.2
Ethylbenzene	7.1313E-003	7.1398E-003	0.12%	ND	0.2
p,m-Xylene	8.5740E-003	8.5758E-003	0.02%	ND	0.2
o-Xylene	7.9281E-003	7.9520E-003	0.30%	ND	0.1

Duplicate Conc. (ug/L)	Sample	Duplicate	%Diff.	Accept Limit
Benzene	16.5	16.7	1.2%	0 - 30%
Toluene	26.0	26.5	1.9%	0 - 30%
Ethylbenzene	8.1	8.3	2.5%	0 - 30%
p,m-Xylene	53.0	55.9	5.5%	0 - 30%
o-Xylene	25.2	25.7	2.0%	0 - 30%

Spike Conc. (ug/L)	Sample	Amount Spiked	Spiked Sample	% Recovery	Accept Limits
Benzene	16.5	50.0	66.5	100%	39 - 150
Toluene	26.0	50.0	76.4	101%	46 - 148
Ethylbenzene	8.1	50.0	58.2	100%	32 - 160
p,m-Xylene	53.0	100.0	153	100%	46 - 148
o-Xylene	25.2	50.0	75.5	100%	46 - 148

ND - Parameter not detected at the stated detection limit.

* - Administrative Limits set at 80 - 120%.

References: Method 5030B, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, December 1996.
Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, USEPA December 1996.

Comments: **QA/QC for samples F389 - F391.**

Analyst

Review

5796 U.S. Highway 64 • Farmington, NM 87401 • Tel 505 • 632 • 0615 • Fax 505 • 632 • 1865

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

April 21, 1999

CERTIFIED MAIL
RETURN RECEIPT NO: Z-274-520-641

Ms. Nina Hutton
Cross Timbers Oil Company
810 Houston St., Suite 2000
Fort Worth, Texas 76102-6298

RE: SAN JUAN BASIN GROUND WATER MONITORING REPORTS

Dear Ms. Hutton:

The New Mexico Oil Conservation Division (OCD) has reviewed Cross Timbers Oil Company's (CTOC) February 11, 1999 "CROSS TIMBERS OIL CO. GROUNDWATER MONITORING (AMOCO) 1996-1998 REPORTS, SAN JUAN COUNTY, NEW MEXICO" which was submitted on behalf of CTOC by their consultant Blagg Engineering, Inc. This document contains the results of CTOC's investigation, remediation and monitoring of ground water contamination related to the disposal of oilfield wastes in unlined pits at 7 sites in the San Juan Basin.

Based upon a review of the above referenced documents, the OCD has the following comments and requirements:

1. The downgradient and/or lateral extent of chloride and/or total dissolved solids contamination at the sites listed below has not been completely defined. The OCD requires that CTOC completely define the extent of these contaminants at each site pursuant to the previously approved ground water management plan for these sites.

   - Bergin GC #1E — Unit F, Sec. 21, T29N, R11W
   - Rowland GC #1 — Unit P, Sec. 25, T30N, R12W
   - State GC BS #1 — Unit F, Sec. 21, T29N, R11W
   - Sullivan GC D#1 — Unit B, Sec. 26, T29N, R11W

2. The downgradient and/or lateral extent of benzene, toluene, ethylbenzene, xylene (BTEX), chloride and/or total dissolved solids contamination at the sites listed below has not been completely defined. The OCD requires that CTOC completely define the extent of these contaminants at each site pursuant to the previously approved ground water management plan for these sites.

   - Bruington GC #1 — Unit E, Sec. 14, T29N, R11W
   - Valdez A #1E — Unit G, Sec. 24, T29N, R11W

3. A review of the sampling data shows that during some samplings only ground water from the monitor wells at the source is sampled and there is no downgradient monitoring to show that contaminated ground water is contained. In order to effectively monitor contaminant migration, the OCD requires that the ground water monitoring plan be modified to include additional ground water sampling of all monitor wells at each site on an annual basis. During the annual sampling event ground water from all monitor wells will be sampled and analyzed for BTEX, TDS, polynuclear aromatic hydrocarbons (PAH) and New Mexico Water Quality Control Commission (WQCC) cations and anions and metals using EPA approved methods and quality assurance/quality control procedures. Specific analytes may be dropped from the annual sampling event for certain sites if that analyte has not been found to be above WQCC standard in the sites source areas and the reasons for dropping those analytes are included in the annual reports. This sampling requirement will also be added to the ground water monitoring plan for all future ground water sampling at all CTOC sites with contaminated ground water.

4. CTOC recently purchased a number of well sites in the San Juan Basin from Amoco. Some of these sites were found to have ground water contamination which was discovered by Amoco during pit closure activities. The OCD does not have a listing of status of these sites. Please provide the OCD with a listing of all CTOC well sites in the San Juan Basin at which the presence of ground water was discovered during pit assessment or closure activities and the status of each site.

If you have any questions, please contact me at (505) 827-7154.

Sincerely,

William C. Olson
Hydrologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office
Nelson Velez, Blagg Engineering, Inc.