GW - 22

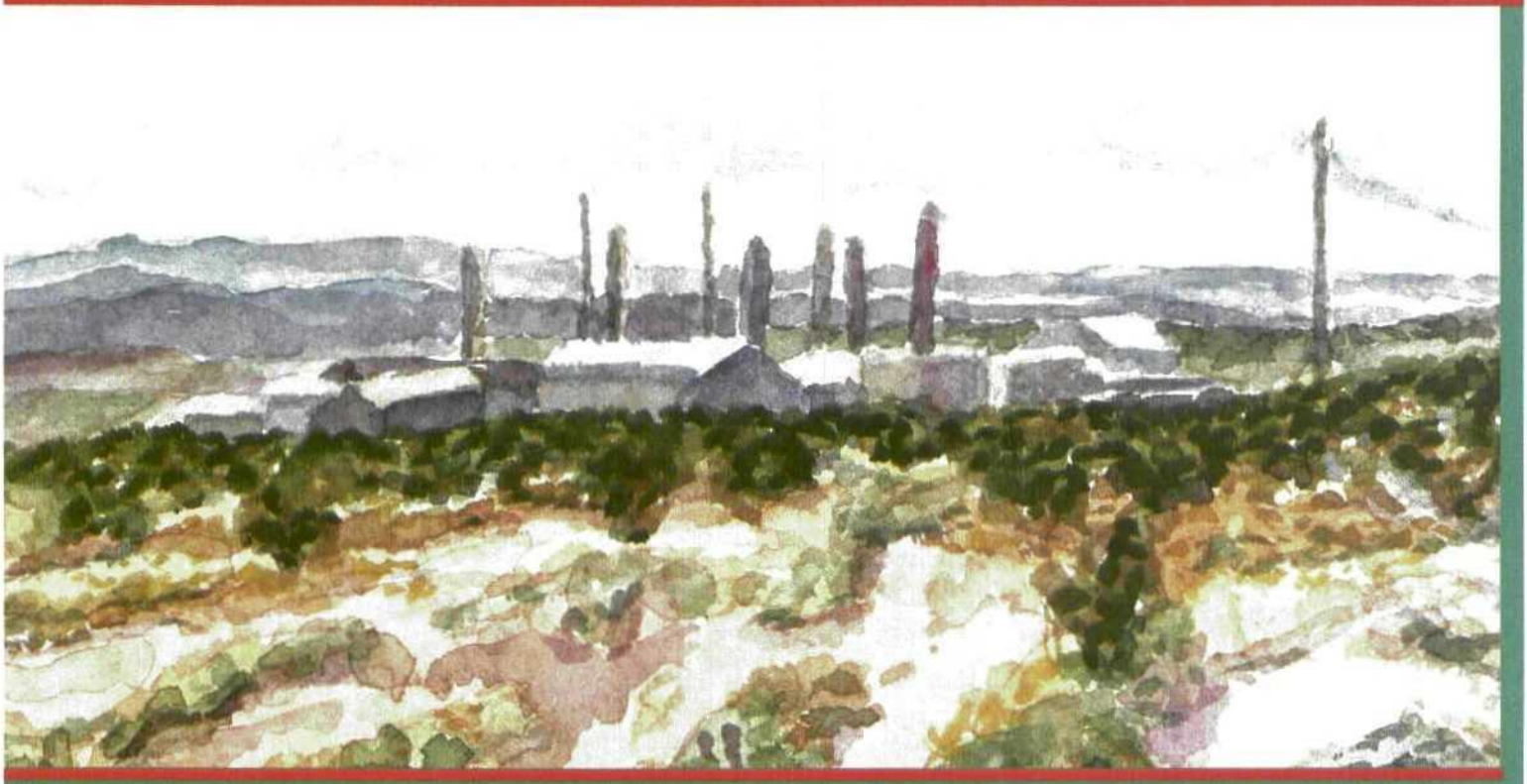
MONITORING REPORTS

DATE:

2005-2001

January 2005

2004 EAGP Annual Sampling Report



Empire Abo Gasoline Plant
Artesia, New Mexico

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142, Albuquerque, NM 87104

R. T. HICKS CONSULTANTS, LTD.
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

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FEB 2005

January 31, 2005

Mr. Jack Ford
New Mexico Oil Conservation Division
1220 South St. Francis
Santa Fe, New Mexico

Oil Conservation Division
1220 S. Saint Francis Drive
Santa Fe, NM 87505

VIA Electronic Format

RE: Empire Abo Gas Plant 2004 Annual Sampling and Monitoring Report

Dear Mr. Ford:

On the behalf of BP America Production Company (BP), R.T. Hicks Consultants, Ltd. is pleased to submit the 2004 Annual Sampling and Monitoring Report for the Empire Abo Gas Plant (EAGP) located near Artesia, New Mexico.

This document summarizes perched-water data collected during March 2004 and serves as BP's 2004 Groundwater Monitoring Report. The annual water monitoring and annual report are part of the New Mexico Oil Conservation Division (NMOCD) Groundwater Discharge Permit (GW-22) requirements for EAGP, as amended via personal communications with Mr. Jack Ford of NMOCD.

Sincerely,
R.T. Hicks Consultants, Ltd.

Andrew Parker
Staff Scientist

Copy: Mike McKinley – BP
Michael Hagood - BP

EMPIRE ABO GASOLINE PLANT:

2004 WATER MONITORING REPORT

January 31, 2005

Prepared for:

BP AMERICA PRODUCTION COMPANY
501 WestLake Park Blvd.
Houston, Texas 77079

R. T. Hicks Consultants, Ltd.
901 Rio Grande Blvd. NW Suite F-142
Albuquerque, NM 87104

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Executive Summary

BP America Production Company (BP) has contracted R. T. Hicks Consultants (Hicks Consultants) to sample perched water beneath the Empire Abo Gas Plant (EAGP) and to prepare annual monitoring reports based on results. This document summarizes perched-water data collected during March 2004 and serves as BP's 2004 Groundwater Monitoring Report. The annual water monitoring and annual report are part of the New Mexico Oil Conservation Division (NMOCD) Groundwater Discharge Permit (GW-22) requirements for EAGP, as amended via personal communications with Mr. Jack Ford of NMOCD.

In March 2004, Hicks Consultants collected water samples from MW-02, MW-02-03, MW-02-12, MW-02-13, MW-02-14, MW-02-15, MW-02-16, MW-2-18, MW-03-01, MW-03-02, MW-03-03, MW-08, and MW-09 and measured depth to water and separate phase hydrocarbon (SPH) thickness at all EAGP monitoring wells to support a Stage I/II Abatement Plan. This report addresses only compliance with the existing Ground Water Discharge Permit, specifically presentation of the results from sampling monitoring wells MW-02, MW-02-08, MW-02-14, MW-02-15, MW-03-2, MW-03-3, and MW-08. Because MW-02-08 was destroyed, we sampled MW-03-01 in its place. We submitted all samples to Assaigai Analytical Laboratories, Inc. for chemical analysis. Appendix A provides Assaigai's analytical reports.

Site Background

Amoco, the previous owner of the EAGP, initiated a subsurface investigation at the facility in 1991 in order to assess the impact of petroleum releases on water beneath the plant. As part of their investigation, they drilled 31 borings, completing 27 of the borings as monitoring wells. In addition to using these monitoring wells to assess changes in water chemistry and Separate Phased Hydrocarbon (SPH) thickness, Amoco installed petroleum and fluid recovery pumps in many of the monitoring wells to remove petroleum from the subsurface. In 1996, ARCO Permian purchased the gas plant from Amoco. In 2000 BP acquired EAGP from ARCO.

In 1998, ARCO submitted a discharge plan renewal application. Data and analysis in this renewal application demonstrate that subsurface hydrocarbons pose no threat to human health or the environment. The data were sufficient to permit BP to remove the inefficient recovery pumps from the monitoring wells. However, the approved discharge plan required ARCO to continue monitoring perched-water chemistry and changes in SPH thickness and perched-water elevations. The discharge plan mandated that ARCO remove SPH from monitoring wells showing more than half a foot of SPH.

Perched Water and SPH Thickness

Figures 1 through 3 show SPH and perched-water elevation data from 1991 through March 2004 for several monitoring wells. Many of these monitoring wells show a significant increase in water elevation after 1998, the year that the continual fluid recovery program ended. Table 1 presents perched-water and SPH elevation data collected from 1992 through March 2004.

Because the total fluid recovery program was replaced in 1998 with a semi-annual separate-phase removal program, we compared March 2004 fluid level data to December 1998 fluid level data, as we first did in the 2000 Monitoring Report. Results of this comparison, which are summarized in Figure 4 and Table 1, are similar to those reported for 2000. Figure 4 is a bar graph showing the number of monitoring wells with increasing or decreasing water elevations. Since 1998, water levels have risen more than 10 feet in 48% of 25 gauged monitoring wells. Twenty percent of the monitoring wells show an increase between 5 and 10 feet, and another 28% display an increase of less than 5 feet. MW-2-13 shows a water elevation decline since 1998.

Table 2 summarizes changes in SPH thickness and water elevations between 1998 vs. 2004. The table also provides the elevation to the top of the casing and to the top of the screen for each monitoring well and identifies monitoring wells with a water level above the top of the screen. In December 1998, water elevation was above the top of the screen in eight monitoring wells. In November 2000, this number increased to 19 and the decreased to 16 in December 2001. As of March 2004, fluid levels in 18 wells above the top of the screen.

As stated in our past reports, monitoring wells with water elevation above the top of the screen are of limited use in assessing changes in SPH thickness because SPH is less dense than water and hence floats atop the water table. In wells where the water table is above the top of the screen, SPH does not generally enter the monitoring well. Due to this limitation, we cannot assess changes in SPH for 18 of the 25 monitoring wells. In Table 2, these locations are identified by an "above screen" entry in the "Change in SPH Thickness" column.

Of the seven wells with fluid levels below the top of the screen, five show SPH in 2004. These wells are MW-02-11, MW-2-13, MW-03-04, MW-04, and MW-06. Since 1998, the SPH thickness increased in all of these wells. The following three wells show no SPH and the fluid level is below the top of the screen: MW-02, MW-02-04, and MW-03-03.

Perched-Water Chemistry

The Groundwater Discharge Permit (GW-22) requires EAGP to sample the following wells provided that SPH is not evident in the well:

> MW-02, MW-02-08, MW-02-14, MW-02-15, MW-03-2, MW-03-3, and MW-08.

With the exception of MW-02-08, in March 2004 we collected water samples from the required monitoring wells listed. Because MW-02-08 was destroyed, we sampled MW-03-01 in its place.

Table 3 presents benzene, toluene, ethylbenzene, total xylene (BTEX), total dissolved solids (TDS), chloride, and sulfate data for water samples collected in 2004. Appendix A contains a complete chemical analysis of each water sample.

BTEX was below detection limits at MW-02, which we consider a background well. MW-03-03 continues to show the highest benzene concentration, 3.2 ppm, however, benzene concentrations are decreasing over time. This monitoring well is located northeast of the welding shop. Wells MW-02, MW-02-14, MW-03-02, and MW-08 exhibit benzene concentrations below New Mexico Ground Water Standards (benzene < 0.01 ppm).

Recent data show a decline in benzene concentration at monitoring wells MW-02-14, MW-02-15, MW-03-02, and MW-03-03. This apparent decline of benzene concentration since 1998 is most likely a consequence of an increase in perched-water elevations in response to several fresh water line leaks. In 1998, water was below the top of screen at these monitoring wells. Since that time, water has raised an average of 8.5 feet throughout the site. We believe increased water elevations caused by fresh water pipeline releases from the Caprock Water system are mixing with the perched ground water beneath site, reducing hydrocarbon concentrations in ground water. Therefore, we would expect water samples to show lower concentrations of petroleum constituents.

Historical data indicates monitoring wells MW-02-06, MW-02-09, MW-02-10, MW-02-11, MW-02-12, MW-02-13, MW-02-14, MW-02-15, MW-03, MW-03-01, MW-03-02, MW-03-03, MW-03-04, and MW-09 contained SPH. Observed March 2004 water elevations are above the top of the screen in these wells. Monitoring wells MW-02-11, MW-02-13, MW-03-04, and MW-06 showed an increase in SPH thickness and water elevations in these wells are below the top of the screen.

We also examined TDS values over time for MW-02, MW-08 and MW-03-03. From 1997 to 2004, the average TDS concentrations for these wells were 2,744, 2,449, and 2,995 mg/L, respectively.

As discussed in our previous reports, from 1991 to 1997, previous workers did not analyze samples for TDS. We do have 1993 data for chloride and sulfate from selected wells. These data are in Table 3. The data suggest that the overall chemistry of MW-02 and MW-08 have not changed significantly over time. The data also show that the sum of chloride plus sulfate is greater than the measured TDS for the 1999 samples. We attribute this apparent anomaly to a failure of the TDS analytical method to capture dissolved hydrogen sulfide in the analysis. We believe that the sulfate analytical method and sampling protocols permit detection of dissolved hydrogen sulfide as sulfate.

Monitoring wells listed in Table 3 have similar TDS values. The TDS concentrations of these monitoring wells are above the Water Quality Control Commission (20NMAC 6.2.3103.B) standard for domestic water supply. The average TDS concentration of the wells listed in Table 3 is 3191mg/L with a standard deviation of 567 mg/L.

Water Use at Empire Abo Gasoline Plant

BP's Groundwater Discharge Permit (GW-22) also requires submission of water use statistics in the annual groundwater monitoring report. In 2004, EAGP purchased 805,535 barrels (bbls) of water from the Caprock Water System, from which EAGP piped 54,669 bbls to their injection well in 2004. The remainder was used in natural gas processing.

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Field Boring Log

Page 1 of 1

Site ID No. EB-01 Federal ID No. _____

Site Name: Empire Abo

Quadrangle: _____ Sec. _____ T. _____ R. _____

(UTM) or State Plane) Coord. N. (X) 569345 E. (Y) 3626210

Latitude: _____ Longitude: _____

~~Boring Location~~ Datum WGS 84

Drilling Equipment: Air Rotary 6" Ø

County: Eddy, NM

Boring No. EB-01 Monitoring Well ~~No.~~ Piezometer

Surface Elevation: 3542' ~~3547~~ (3497) GIS Completion Depth: ~~40.25~~ 38'

Auger Depth: ~~40.25~~ Rotary Depth: _____

Date: Start: 3/29/04 11:48 Finish: 3/29/04

DEM = 3498.5'

Personnel

- TOC, .75' ags
- cutoff 1.1'
- 3491 AMSL

Elev.	Description of Material	Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (%)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	REMARKS
	Surface fill									
	fine sand, red		5							
8'	- Rock, Limestone, grey									
			10		GRAB - Soil					Sample
14'	Silt, grey, moist									
15'	Clay, Red		15							Probed for water
16'	Rock, white, fine grained (anhydrite?)				GRAB - Soil					ND @ 5 min. Sample @ 18'
			20							
23'	Silt, tan, dark, moist									
25'			25		GRAB - Soil					Probe for water
26'	Rock, white, fine grained (anhydrite?)									ND @ 30 min
			30							
32'	clay, grey, dark, moist									
33'	anhydrite		33							
34'	clay, red, moist		35							34 Lease of light green clay
	TD Piezometer 38' bgs 1" PVC		40							Probe for water gpd > 300'
40.25	Total Depth									
			45							
			50							

Graphic Log: Back Fill, Grout, SAND

Field Boring Log (revised 02/02/06)

This form may be completed within Acrobat before printing.

Field Boring Log Page 1 of 2

[redacted]

Site ID No. _____ Federal ID No. _____

Site Name: Empire Abo

Quadrangle: _____ Sec. _____ T. _____ R. _____

(UTM) or State Plane) Coord. N. (X) 569182 E. (Y) 3626365

Latitude: ____ ° ____ ' ____ " Datum: WGS84 Longitude: ____ ° ____ ' ____ "

Boring Location: _____

Drilling Equipment: Air Rotary 6" borehole

County: Eddy, NM

Boring No. EB-02 Monitoring Well No. 465

Surface Elevation: 3493 (3487) - 6 1/5 Completion Depth: _____

Auger Depth: _____ Rotary Depth: _____

Date: Start: 3/29/04 Finish: 3/29/04

DEM = 3532.2'

Personnel: TOC 2.62' ags; 3538' AMSL

Elev.	Description of Material	Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	REMARKS
	Sand, find, tan, caliche, tan									Sample Every 20' til 60' bgs.
3	anhydrite		5							Continuous core >60' bgs
10	Limestone, grey, caliche		10							
13'	Anhydrite		15							
		Bentonite	20							
			25'							
			30							
			33							
		Sand	35							lense clay layer at 35'
35										most drill cutting
	obtained Sample		40							Probed @ 42' recharge 300 yd
▼		Screen								
45'	VOID; Saturated (estimated by driller	Sand	45							Sampled Soil
46	gravel dom Ø recharge) > 20-30 gpm		50'							

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Field Boring Log Page 2 of 2

[redacted]

County: Eddy, NM

Site ID No. _____ Federal ID No. _____

Site Name: Empire Abo

Boring No. EB-02 Monitoring Well No. YES

Quadrangle: _____ Sec. _____ T. _____ R. _____

Surface Elevation: _____ Completion Depth: 55' bgs

UTM (or State Plane) Coord. N. (X) _____ E. (Y) _____

Auger Depth: — Rotary Depth: 55' bgs

Latitude: ° ' " Longitude: ° ' "

Date: Start: 3/29/04 Finish: _____

Boring Location: EB-02

Drilling Equipment: _____

Elev.	Description of Material	Graphic Log	Depth In Feet	SAMPLES: Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	Personnel: G - D - H - H - / REMARKS
50			Sand Bent Slough							
55	TD		2" PVC 20' screen							
60	Complete as MW									

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Field Boring Log

[redacted]

Site ID No. _____ Federal ID No. _____

Site Name: Empire Abo

Quadrangle: _____ Sec. _____ T. _____ R. _____

UTM (or State Plane) Coord. N. (X) 569509 E. (Y) 3626402

Latitude: ____ ° ____ ' ____ " NAD Datum = WGS 84 Longitude: ____ ° ____ ' ____ "

Boring Location: _____

Drilling Equipment: Air Rotary 6" Ø

County: Eddy Lea, NM

Boring No. EB-03 Monitoring Well No. _____

Surface Elevation: ~~3518~~ 3516 Completion Depth: ~~66~~ 66' DEM 3518.2

EB = 3504

Auger Depth: 67 Rotary Depth: 67'

Date: Start: 3/30/04 Finish: 3/30

TOC 3.2' agl

3518' AMSL

Elev.	Description of Material	Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings (Time)	REMARKS
	Sand, fine, light Red								0900	
3'	Anhydrite, white, dry		5							
			10							Soil Sample
15'	Anhydrite, light yellow, light grey		15							
17'	Anhydrite, white, dry									
			20						0910	Dry @ 5 min (0915); Soil Sample
26'	Clay, Red, damp. (dense)		25						0924	Dry @ 10 min (0935)
26.5'	Anhydrite, light grey, dry									
			30							Soil Sample
33'	Silt, Red, moist									
34'	chert		35							
36'	Sand, red, fine, damp									
37'	anhydrite, light grey, dry									
39'	Silt, Red, moist		40						0948	Dry @ 10 min (0958); Soil Sample
43	Silt; sand, fine, brown, ~~dr~~ moist damp									
45	Silt; brown, red, damp		45							
46										
47 48	Sand, fine, grey, moist									Sulfur (H_2S) odor
	gypsum(?) anhydrite		50							

GROUT

Plastic Screen

This form may be completed within Acrobat before printing.

Field Boring Log

[redacted]

Site ID No. _____ Federal ID No. _____

Site Name: Empire Abo

Quadrangle: _____ Sec. _____ T. _____ R. _____

UTM (or State Plane) Coord. N. (X) _____ E. (Y) _____

Latitude: ____ ____ ____ Longitude: ____ ____ ____

Boring Location: _____

Drilling Equipment: _____

County: Lea, NM

Boring No. EB-03 ~~Monitoring Well No.~~ MW Completion

Surface Elevation: 3516 Completion Depth: 66'

Auger Depth: 67' ~~Rotary Depth:~~ _____

Date: Start: 3/30/04 Finish: 3/30/04

Elev.	Description of Material	Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	Time OVA or HNU Readings	Personnel / REMARKS
										G - D - H - H -
50'	Anhydrite, white, dry		50							soil sample
57	water @ ≈ 20-30 gpm		55							H_2S odor
		Sand Screen	60							T_0 = 1025 → 57' DTW
										T_{10} = 1045 45.65
										T_{30} = 44.97
66'	clay, red, saturated		65	66	MW				1025	T_{40} = 44.85 - Hydrocarbon sheen
67'	≈ > 20-30 gpm			TD						T_{50} = 44.37 - Hydrosheen
			70							T_{60} = 45.65 - " "
										T_{90} = 45.57 - " "
										TD = 67'

fbgs DTW

37 47 45 57 67

30 Screen

This form may be completed within Acrobat before printing.

Field Boring Log

County: Eddy, NM

Site ID No. _____ Federal ID No. _____

Site Name: Empire Abo

Boring No. EB-04 Monitoring ~~Well No.~~ _____

Quadrangle: _____ Sec. _____ T. _____ R. _____

Surface Elevation: 3487 (NAD 83 3496) Completion Depth: 51'

DEM 3501.1'

Auger Depth: _____ Rotary Depth: 62.7'

UTM (or State Plane) Coord. N. (X) 568979 E. (Y) 362687

Date: Start: 3/31 Finish: 3/31

Latitude: ____ ° ____ ' ____ " Datum WGS 84 Longitude: ____ ° ____ ' ____ "

Boring Location: _____

Drilling Equipment: Air Rotary 6" Ø

Personnel: TOC 2.75' agl

3505 AMSL

Elev.	Description of Material	Graphic Log	Depth In Feet	SAMPLES: Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	REMARKS
	0-10 ft brown tan blow sand/silt		0							
	10-21 feet light brown fine sand-silt dry									
	21-30 dry white anhydrite/ gypsum evaporites									
	30-35- as above with some brown mudballs slight moisture									
	35-40 gypsum w/ limestone, gray, chips small amount of mudballs.									
	40-44- limestone - chatter bit and gray chips - somewhat soft in cuttings - dark gray hard mud?									
	47- Red claystone									
	49-50 - Red sandy silt									
	50-53 Red mudballs - damp									
	54- bit is jumping									

4:15pm @ 50' stop to allow us to check for H_2O Moisture - wet! Small pocket

EB-04 cont

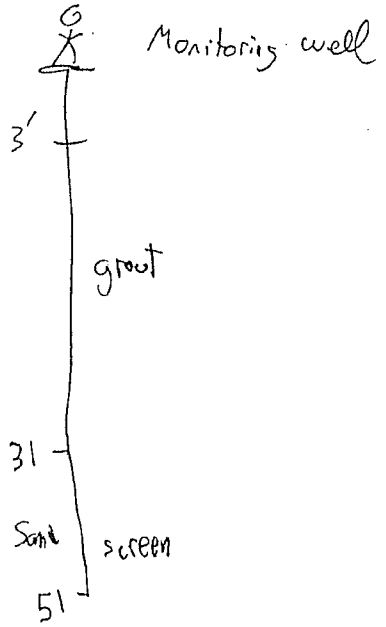
54- gray bit jumping gypsum/anhydrite ~~limestone~~ dry white
some clay silt reddish

55-60 as above very powdery gypsum some thin limestone (from drips)
lots of bit chatter @ 60' still v. dusty white + dry

60-62+ grayish limestone-

4:30 stopped + pulled string + measured for H2O
pipe looks mighty wet

DTW 56.37 @ 4:41 pm TD = 62.7
54.1 @ 4:43
53.3 @ 4:44.0
52.67 445.0
62.17 446.0
51.63 447.0
51.12 448.0
50.61 449.0
50.10 450
46.59 4:58:50
44.41 506.43
41.77 17:28
41.48' 17:35
41.21' 17:47



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Field Boring Log

[redacted]

County: Eddy, NM

Site ID No. _____ Federal ID No. _____

Site Name: Empire A60

Boring No. EB-05 Monitoring Well No. 5 Piezometer 5 Nested

Quadrangle: _____ Sec. _____ T. _____ R. _____

Surface Elevation: 3497 (GIS 3492) Completion Depth: 54' / 30

DGM = 3524.1

Auger Depth: _____ Rotary Depth: 56'

UTM (or State Plane) Coord. N. (X) 569084 E. (Y) 3626323

Date: Start: 3/31 Finish: _____

Latitude: ____ ° ____ ' ____ " NAD 27 Longitude: ____ ° ____ ' ____ "

MW - monitoring well
P - piezometer

Boring Location: _____

Drilling Equipment: Air Rotary 6"ø
Ingersoll TH60
Rand

Personnel
- TOC - MW - 2.80' ags
- TOC - P - 2.76 ags
- 3523' AMSL

Elev.	Description of Material	Graphic Log	Completion Depth in Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	REMARKS
1	Surface Anhydrite, white dry									---- Piezometer (TD=30' bgs)
			5							—— Monitoring well (TD=54' bgs)
10	Anhydrite, white, dry		10							
20	Anhydrite, light grey, dry (20' bgs)	Bentonite	15							
			20							Probed for water (dry)
			25							
26'	Limestone, grey, damp, H_2S odor									
27'	Anhydrite, white, dry		28							28' - hydrocarbon impact to Anhydrite dark grey
28'	dark grey	Sand								
30	light grey } hydrocarbon impacted anhydrite		30							
31	med grey }	Sand								
32	anhydrite, white, dry		31.5							
35.23		Bentonite Chips	35							
			40							
39'	Silt, brown, dry		42							
41'	Limestone, grey, dry	Sand								
42'	Anhydrite, white, dry		44							Water level 35.23'
			46							
46'	hydrocarbon impacted anhydrite, dark grey	Screen	47							
47'	hydrocarbon impacted silt (yellowish green streaks)									
49'	clay, silt, red, saturated		50							

Field Boring Log

Site ID No. _____ Federal ID No. _____

Site Name: _____

Quadrangle: _____ Sec. _____ T. _____ R. _____

UTM (or State Plane) Coord. N. (X) _____ E. (Y) _____

Latitude: ____ ____ ____ Longitude: ____ ____ ____

Boring Location: _____

Drilling Equipment: _____

County: _____

Boring No. EB-05 Monitoring Well No. _____

Surface Elevation: _____ Completion Depth: _____

Auger Depth: _____ Rotary Depth: _____

Date: Start: _____ Finish: _____

Elev.	Description of Material	Graphic Log	Depth In Feet	SAMPLES: Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	Personnel: G - D - H - H - / REMARKS
Screen →			50							
56	clay, red, dry		55							15:18 - blow 15:21 - blow
			60							

[redacted]

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Field Boring Log Page 1 of 2

Site ID No. ______ Federal ID No. ______

Site Name: Empire Abo

Quadrangle: ______ Sec. ______ T. ______ R. ______

UTM (or State Plane) Coord. N. (X) 569051 E. (Y) 362661

Latitude: ° ' " NAD 27 Longitude: ° ' "

Boring Location: ______

Drilling Equipment: Air Rotary

County: Eddy, NM

Boring No. EB-06 ~~Monitoring Well No.~~ Piezometer

Surface Elevation: 3634 - Alt, 615 3617 Completion Depth: ______ DEM 3550.7

Auger Depth: ______ Rotary Depth: ______

Date: Start: 3/31/04 Finish: ______

Personnel: TOC 0.82' ; Cutoff 1.97' ; 3557' AMSL

Elev.	Description of Material	Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	REMARKS
	Surface grade		0							
3' – 4'	anhydrite, white, dry		5							
			10							probed for water dry
13'	fine sand, red, dry									
15'	anhydrite, white, dry		15							
			20			Drill Cuttings				
			25							
29'	Limestone grey, dry									
30	Anhydrite, white, dry		30							
			35							
			40							
			45							
			50							

Field Boring Log (revised 02/02/06)

4-13', 13-15', 15-29', 29-30', 30-53', 53-54', 54+ ; 65'; 72'; 74'; 75'

This form may be completed within Acrobat before printing.

Field Boring Log

[redacted]

Site ID No. _____ Federal ID No. _____

Site Name: _____

Quadrangle: _____ Sec. _____ T. _____ R. _____

UTM (or State Plane) Coord. N. (X) _____ E. (Y) _____

Latitude: ____ ____ ____ Longitude: ____ ____ ____

Boring Location: _____

Drilling Equipment: _____

County: _____

Boring No. EB-06 Monitoring Well No. _____

Surface Elevation: _____ Completion Depth: _____

Auger Depth: _____ Rotary Depth: _____

Date: Start: _____ Finish: _____

Elev.	Description of Material
53'	Limestone, light grey, dry
54'	Anhydrite, white, dry
65	Silt, brown, dry
70	Anhydrite, ~~brown, light grey, dry~~ white, dry
72'	silt, brown, light grey, dry
73 ~~74~~'	silt, red, dry
75'	silt, red, damp
78	water
80'	~~silt~~ clay, dark red, damp
83'	TD

Graphic Log: Bentonite; Sand

SAMPLES: Sample No. | Sample Type | Sample Recovery (X) | Penetrometer | N Values (Blow Counts) | OVA or HNU Readings

Personnel: G- [redacted] H-

REMARKS

Pump Test TD=83'

T_0 = 11:37

T_{15} = 75.8' (?)

T_{20} 76.01

T_{25} 74.29

T_{30} 72.82

$T_{1300\,hrs}$ = 64.43

This form may be completed within Acrobat before printing.

Field Boring Log Page 1 of 2

[redacted]

County: Eddy, NM

Site ID No. _____ Federal ID No. _____

Site Name: Empire Abo

Boring No. EB-07 Monitoring Well No. and piezometer

Quadrangle: _____ Sec. _____ T. _____ R. _____

Surface Elevation: [redacted] Completion Depth: 53' and 38.5'

(GIS) 3502

Auger Depth: _____ Rotary Depth: _____

DEM = 3508.7'

UTM (or State Plane) Coord. N. (X) 569677 E. (Y) 3626134

Date: Start: 4/1/04 Finish: _____

Latitude: ° ' " Nad 27 Longitude: ° ' "

Boring Location: _____

Drilling Equipment: Air Rotary - 6"

Elev.	Description of Material
	silt, clay, red, dry
6'	Anhydrite, dry, white
13	Limestone, grey
15'	Anhydrite, grey, dry
18	clay, red, damp
-21	grey limestone
23	yellow grey clay
-26	grey limestone
—	white anhydrite/lime
30 —	red-maroon clay moist
—	anhydrite
35 —	
—	tan clay moist
—	anhydrite
—	some lime
46	grey silt moist

SAMPLES

Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings
	5						
	10						
	15						
	20	*	bentonite				13:18
	25						
	30						
	35						
	40	*	bentonite				
sand							

Personnel

G -
D -
H -
H -

REMARKS

Samples obtained every 5' bgs

—— Well

~~Piezometer~~ piezometer

min / DTW
T_0 = 13:47
T_3 = 32.81
T_5 =
T_8 36.31
T_{10} 36.3
T_{15} 36.31

interbedded limestone

probe for water

* - bentonite

drillers estimate 10 gal/min

Probed for water

Top of screen at 43'

hit water

bottom of piezometer

This form may be completed within Acrobat before printing.

Field Boring Log

[redacted]

County: Eddy, NM

Site ID No. _____ Federal ID No. _____

Site Name: Empire Abo

Boring No. EB07 Monitoring Well No. and piezometer

Quadrangle: _____ Sec. _____ T. _____ R. _____

Surface Elevation: 3502 (GIS) Completion Depth: 53' and 38.5'

Auger Depth: _____ Rotary Depth: _____

UTM (or State Plane) Coord. N. (X) _____ E. (Y) _____

Date: Start: 4-1-04 Finish: _____

Latitude: ° ' " Longitude: ° ' "

Boring Location: _____

Drilling Equipment: Air rotary 6"

Elev.	Description of Material	Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	SAMPLES / Personnel / REMARKS
	gravel w/ clay		50							G - D - H - H -
			fill sand							Bottom of hole
			55							

This form may be completed within Acrobat before printing.

Field Boring Log

[redacted]

Site ID No. _____ Federal ID No. _____

Site Name: EB-08 Empire Abo Gas

Quadrangle: _____ Sec. _____ T. _____ R. _____

(UTM or State Plane) Coord. N. (X) 569586 E. (Y) 362377

Latitude: ° ' " NAD 27 Longitude: ° ' "

Boring Location: _____

Drilling Equipment: 6" Air Rotary

County: Eddy County

Boring No. EB-08 Monitoring Well No.: _____

Surface Elevation: 3523 (GLS) ALT 3543 Completion Depth: 81'

Auger Depth: 81' Rotary Depth: 81'

Date: Start: 4/2/04 Finish: 4/2/04

DEM = 3536.6'

Geophysics

Personnel

TOC 3.23' ags

3540' AMSL

Elev.	Description of Material	Graphic Log	Depth In Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	REMARKS
	3' - anhydrite,									
	4' - limestone, grey									
	5' - silt, red		5							
	6' - anhydrite									
	7' - clay, red									
	9' - anhydrite		10							
	13' - silt, red light									
	14' - silt, grey lense									
	14.5' - anhydrite, white		15							
	16' - silt, red, clayey									
	16.5' - Anhydrite,									
			20							
S	18' - limestone, grey									
	20' - anhydrite		25							
S	22' - hydrocarbons									22' hydrocarbon weathered
	23' - silt, grey									
	24' - anhydrite		30							
S	35		35							
	40		40							
	45 hydrocarbon impacted interbedded limestone & anhydrite		45							
XS →	46									
	48' - silt, red 47' - silt, brown (sample)									
	49' - anhydrite, white, dry									
	silt, Light red, dry									

26' - Interbedded limestone & anhydrite note: hard to drill

anhydrite

This form may be completed within Acrobat before printing.

Field Boring Log

[redacted]

Site ID No. _____ Federal ID No. _____

Site Name: _____

Quadrangle: _____ Sec. _____ T. _____ R. _____

(UTM) or State Plane) Coord. N. (X) 569586 E. (Y) 362377

Latitude: ____ ____ ____ Longitude: ____ ____ ____

Boring Location: _____

Drilling Equipment: 6" Air Rotary

County: _____

Boring No. EB-08 Monitoring Well No. _____

Surface Elevation: 3523 (GLS) Completion Depth: 81'

Auger Depth: _____ Rotary Depth: ALT 3543

Date: Start: _____ Finish: _____

Elev.	Description of Material	Graphic Log	Depth Scale in Feet	Sample No.	Sample Type	Sample Recovery (X)	Penetrometer	N Values (Blow Counts)	OVA or HNU Readings	REMARKS
51	silt, brown (loose)		50							
52	anhydrite									
53	clay, red, dark, moist									
54										
55	silt, light brown clay		55							
56	anhydrite, interbedded limestone									hard to drill
57										
60	anhydrite, interbedded limestone		60							
60	silt, brown, moist									
61	hydrocarbon impact anhydrite interbedded limestone									hydrocarbon impact
64	hydrocarbon impacted soft stopped		65							
			66							
71	~~impacte~~ hydrocarbon impact		70							
			75							
80	silt, dark red,		80							
81	clay, dark red		81'							
			TD							
			85							

bedrock

screen

Personnel: G - D - H - H -

REMARKS:

Screen 15' 81-66' bgs

grout @ 64-66

~~hy~~

H_2S odor during well completion

EMPIRE ABO GASOLINE PLANT: 2002/2003 WATER MONITORING REPORT

July 22, 2003

Prepared for:

PERMIAN ASSET
BP AMERICA PRODUCTION COMPANY
600 N Marienfeld
Midland, TX 79701

R. T. Hicks Consultants, Ltd.
219 Central NW Suite 266
Albuquerque, NM 87102

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Purpose and Scope

BP America Production Company, Permian Asset, has contracted R. T. Hicks Consultants (Hicks Consultants) to sample perched water beneath the Empire Abo Gas Plant (EAGP) annually and to prepare annual monitoring reports based on results. This document summarizes perched-water data collected during March 2003 and serves as BP's 2002/2003 Groundwater Monitoring Report. The annual water monitoring and annual report are part of the New Mexico Oil Conservation Division (NMOCD) Groundwater Discharge Permit (GW-22) requirements for EAGP, as amended via personal communications with Mr. Jack Ford of NMOCD. We also evaluated the results from recent monitoring to determine if data support termination of the Discharge Plan for the Empire Abo Plant and plugging and abandonment of the existing monitoring wells.

In March 2003, Hicks Consultants collected water samples from MW-2, MW 2-14, MW 2-15, MW 3-1, MW 3-2, MW 3-3, and MW-8 and measured depth to water and separate phase hydrocarbon (SPH) thickness at all EAGP monitoring wells. We submitted all samples to Assaigai Analytical Laboratories, Inc., for chemical analysis. Appendix A provides Assaigai's analytical reports. To augment these data, we also measured water levels in nearby monitoring wells constructed in Scoggins Draw, near the BP Artesia Terminal.

Site Background

Amoco, the previous owner of the Empire Abo Gas Plant (EAGP), initiated a subsurface investigation at the facility in 1991 in order to assess the impact of petroleum releases on water beneath the plant. As part of their investigation, they drilled 31 borings, completing 27 of the borings as monitoring wells. In addition to using these monitoring wells to assess changes in water chemistry and SPH thickness, Amoco installed petroleum and fluid recovery pumps in many of the monitoring wells to remove petroleum from the subsurface. In 1996, ARCO Permian (now the Permian Asset of BP America Production Company) purchased the gas plant from Amoco.

In 1998, BP submitted a discharge plan renewal application. Data and analysis in this renewal application demonstrate that subsurface hydrocarbons pose no threat to human health or the environment. Data in the renewal application suggested that ground water, as defined by New Mexico statute and regulation, may not exist at or adjacent to the Plant. The data were sufficient to permit BP to remove the inefficient recovery pumps from the monitoring wells. However, the approved discharge plan requires BP to continue monitoring perched-water chemistry and changes in SPH thickness and perched-water elevations. The discharge plan mandates that BP remove SPH from monitoring wells showing more than half a foot of SPH.

Perched Water and SPH Thickness

Figures 1 through 3 show SPH and perched-water elevation data from 1991 through March 2003 for several monitoring wells. Many of these monitoring wells show a significant increase in water elevation after 1998, the year that BP ended the continual fluid recovery program. Table 1 presents perched-water and SPH elevation data collected from November 1996 through March 2003.

Because the fluid recovery program was replaced in 1998 with a semi-annual separate-phase removal program, we compared 2003 fluid level data to December 1998 fluid level data, as we did in the 2000 Monitoring Report. Results of this comparison, which are summarized in Figure 4 and Table 2, are essentially identical to those reported for 2000. Figure 4 is a bar graph showing the number of monitoring wells with increasing or decreasing water elevations. Since 1998, water levels have risen more than 10 feet in 46% of the existing 26 monitoring wells (38%

using 2001 data). Fifteen percent of the monitoring wells showed an increase between 5 and 10 feet, and another 31% displayed an increase less than 5 feet. Two wells (MW 2-11 and MW-18) showed a water elevation decline since 1998.

Table 3 summarizes changes in SPH thickness and water elevations between 1998 and 2003. The table also provides the total depth and depth to top of screen for each monitoring well and identifies monitoring wells with a water level above the top of screen. In December 1998, water elevation was above the top of screen in eight monitoring wells. In November 2000, this number increased to 19 and in December 2001, this number decreased to 16. As of March 2003, fluid level in 18 wells is higher than the top of the screen.

As stated in our 2000 report, monitoring wells with water elevation above the top of screen are of limited use in assessing changes in SPH thickness because SPH is less dense than water and hence floats atop the water table. Therefore, in wells where the water table is above top of screen SPH does not generally enter the monitoring well. Due to this limitation, we cannot assess changes in SPH for most of the 26 monitoring wells. In Table 3, these locations are identified by an "above screen" entry in the "Change in SPH Thickness" column.

For those wells where the fluid level is below the top of the screen, only three monitoring wells show SPH. These wells are MW-6, MW 2-9, and MW 2-13. The SPH thickness increased in all wells since 1998. The following seven wells show no SPH and the fluid level is below the top of the screen: MW-2, MW 2-4, MW 2-9, MW 2-11, MW-3-3, MW 3-4, and MW-4.

Perched-Water Chemistry

The Groundwater Discharge Permit (GW-22) requires EAGP to sample the following wells provided that SPH is not evident in the well:

MW-2, MW 2-8, MW 2-14, MW 2-15, MW 3-2, MW 3-3, and MW-8.

With the exception of MW 2-8, we collected water samples from the required monitoring wells listed above in March 2003. Because MW 2-8 was destroyed, we sampled MW 3-1 in its place.

Table 4 presents benzene, toluene, ethylbenzene, total xylene (BTEX) and total dissolved solids (TDS) data for water samples collected in 2003. Appendix A contains a complete chemical analysis of each water sample.

BTEX was below detection limits at MW-2, which we consider a background well. MW 3-3 continues to show the highest benzene concentration, 2.8 ppm. This monitoring well is located northeast of the welding shop. Wells MW-2, MW-8 and MW-3-2 exhibit benzene concentrations below New Mexico Ground Water Standards (benzene < 0.01 ppm). With the exception of MW-8, all wells sampled display a benzene concentration decrease less than one order of magnitude.

As discussed in our 2000 report, MW 2-14, MW 2-15, and MW 3-2 have contained SPH. Recent data show an apparent decline in benzene concentration at these monitoring wells. This apparent decline of benzene concentration is most likely a consequence of an increase in perched-water elevations. In 1998, water was below the top of screen at these monitoring wells. Since that time, water has raised an average of 16.9 feet at these locations and is currently well above the top each well's screen. Recent water samples collected at these wells represent

perched-water from a greater depth beneath the water table and any potential floating product than previous samples. Therefore, we would expect them to show lower concentrations of petroleum constituents.

We also examined TDS values over time for MW-2, MW-8 and MW 3-3. From 1997 to 2003, the average TDS concentrations for these wells were 2,907, 3,396, and 2,412 mg/L, respectively.

As discussed in our 2000 report, from 1991 to 1997, previous workers did not analyze samples for TDS. We do have 1993 data for chloride and sulfate from selected wells. These data are in Table 4. The data suggest that the overall chemistry of MW-2 and MW-8 have not changed significantly over time. The data also show that the sum of chloride plus sulfate is greater than the measured TDS for the 1999 samples. We attribute this apparent anomaly to a failure of the TDS analytical method to capture dissolved hydrogen sulfide in the analysis and that the sulfate analytical method and sampling protocol permits detection of dissolved hydrogen sulfide as sulfate.

Monitoring wells listed in Table 4 have similar TDS values. The TDS concentrations of these monitoring wells are above the Water Quality Control Commission (WQCC) standard for domestic water supply. The average TDS concentration of the wells listed in Table 4 is 3,173 mg/L with a standard deviation of 542 mg/L.

Water Use at Empire Abo Gasoline Plant

BP's Groundwater Discharge Permit (GW-22) also requires submission of water use statistics in the annual groundwater monitoring report. Below are the 2002 water use statistics.

In 2002, EAGP purchased 952,737 barrels (bbls) of water from the Caprock Water System; and 330,352 bbls from January 2003 through April 2003. Of that water, EAGP piped 98,164 bbls to their injection well in 2002.

Hydrogeologic Relationship to Surface Water and Shallow Ground Water in Scoggin Draw

In the 1997 Discharge Plan Submittal, Plate III-b (attached) shows a north-south hydrogeologic cross section of the eastern portion of the Empire Abo Gas Plant. Boring 1, drilled on the north side of the plant, did not encounter ground water. Boring 2-17, on the southeast part of the plant also was a dry hole. The highest ground water elevations are near the water softener area and cooling towers (Well 2-2 and 2-6), where the plant consumes much of its imported water. Based upon this cross section, and our knowledge that several water pipeline leaks existed in this area, we hypothesized that the ground water beneath the EAGP was caused by leaks from the plant itself. If this hypothesis is correct, then the ground water beneath the plant may be considered "private waters, not connected with Waters of the State", and therefore would not be subject to regulation under the New Mexico Water Quality Act.

NMOCD asked that we test this hypothesis further by evaluating the hydrogeology in Scoggins Draw, using the monitoring well data from the BP Artesia Terminal site. Plates 1 though 4 present the hydrogeologic data from this evaluation. Plate 1 is a site map showing location of cross-sections. Plate 2, which is a northwest-southeast cross section showing the ground water elevations, suggests that the ground water beneath the EAGP may be hydraulically connected to the ground water system of Scoggin Draw. We projected the data from MW-1 and MW-2-17 (both of which are east of the line of section) to tie this section to Plate III-b of the Discharge Plan Submittal. Borings north of MW-2-2 and south of MW-8 may be dry holes, as they are on the east side of the Empire Abo Gas Plant (EAGP). If we were to drill at these two hypothetical locations, the data may show a direct

connection with the ground water system of Scoggin Draw. We do not have sufficient data to draw a conclusion regarding any hydraulic connection between the EAGP and the Scoggin Draw ground water system. We can conclude, however, that the ground water beneath the EAGP will not enter the surface water system of Scoggin Draw; the ground water elevation is below the base of Scoggin Draw.

Plate 3 is a northwest-southeast cross section near the BP Artesia Terminal. Although lithologic data for all of these borings are not available, we do know the depth of the wells and the depth to ground water. We have estimated the elevation of the wells from the Spring Lake USGS 7.5' Quad topographic map. From this cross section, we arrive at two important conclusions for this area of Scoggin Draw:

1. Ground water lies below the stream bed (MW-1), and

2. Ground water flows from the northwest (MW-2) into the Scoggin Draw ground water system.

In the absence of an accurate elevation survey, we cannot determine the direction of ground water flow between MW-1 and MW-7.

Plate 4 is a cross section along Scoggin Draw. Although only three wells within the draw are displayed on this cross section, the data support our conclusion that the ground water system lies below the streambed and is not directly connected to the surface water of the draw. Surface water in the draw resides only in areas where clay-rich bedrock underlie the stream bed effectively preventing surface water from entering the ground water system. In these areas, surface water appears to exist throughout most of the year.

After closely examining the hydrologic data from Scoggin Draw with the data from the EAGP, we cannot conclude with a reasonable degree of scientific certainty that the ground water system of Scoggin Draw is not connected to the ground water observed below the EAGP.

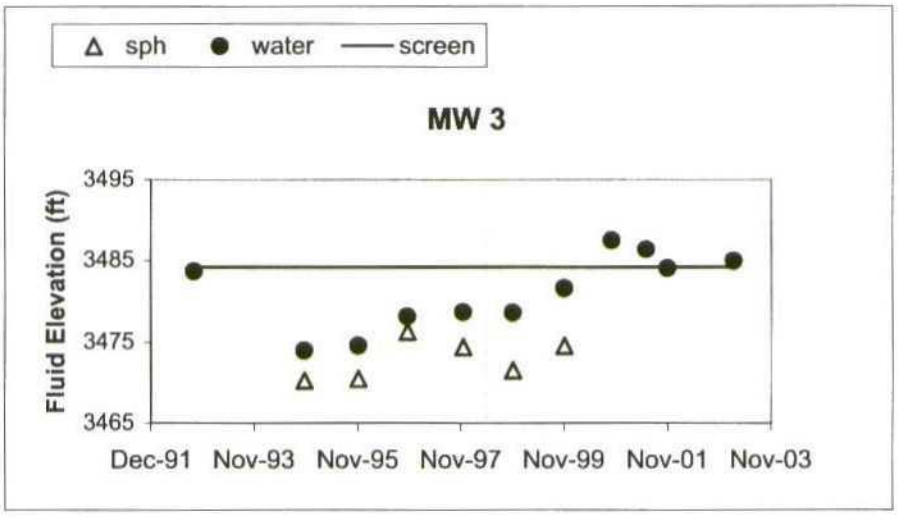
Conclusions and Recommendations

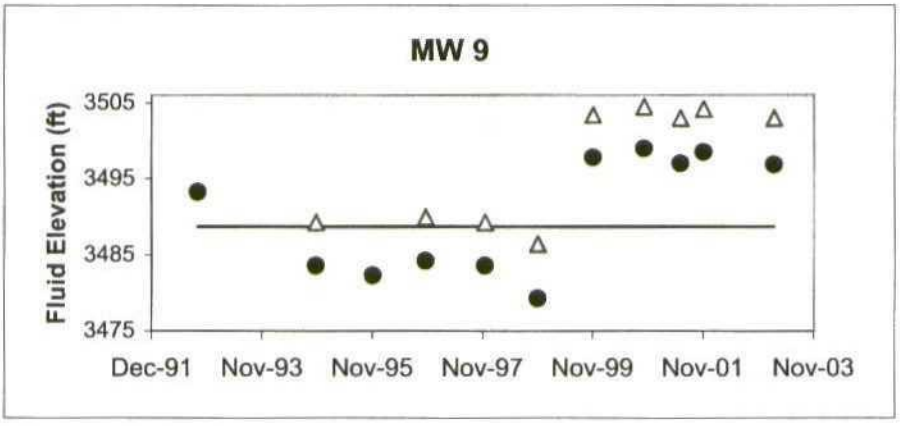
Perched-water elevations have increased significantly in many of the monitoring wells since the termination of the fluid recovery program in 1998. Because water elevations are above the top of screen in many of the monitoring wells, the majority of the monitoring wells can no longer be used to assess changes in SPH thickness. In addition, water samples from wells where water elevation is above the top of screen will be collected at depths well below the water table rather than at the water table where changes in chemistry should be monitored.

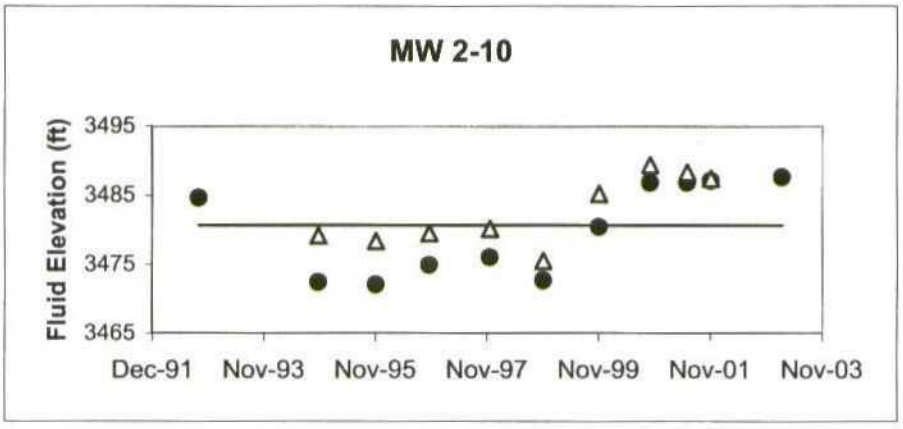
We conclude that dissolved petroleum constituents and SPH beneath the Empire Abo Plant do not pose a risk to human health and the environment..

We recommend that BP petition the Water Quality Control Commission for Alternate Abatement Standards at the EAGP and the adjacent property between the plant and Scoggins Draw.

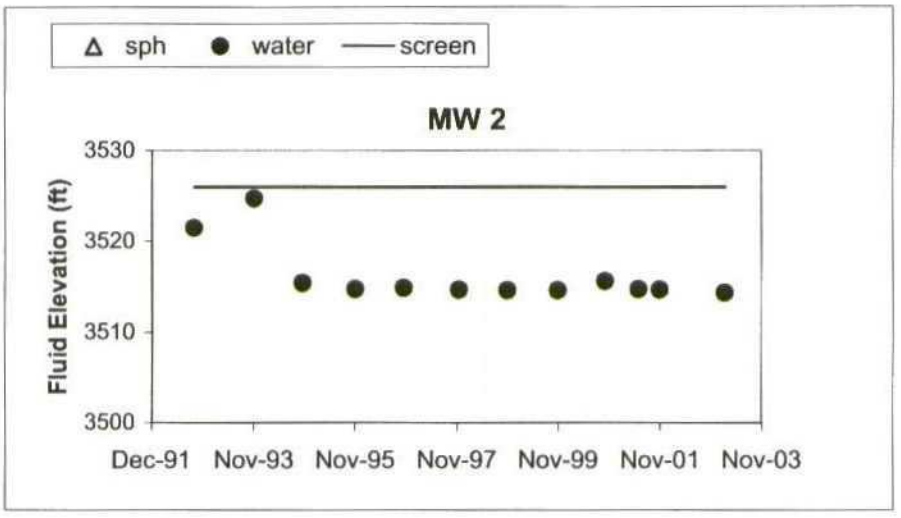
FIGURES

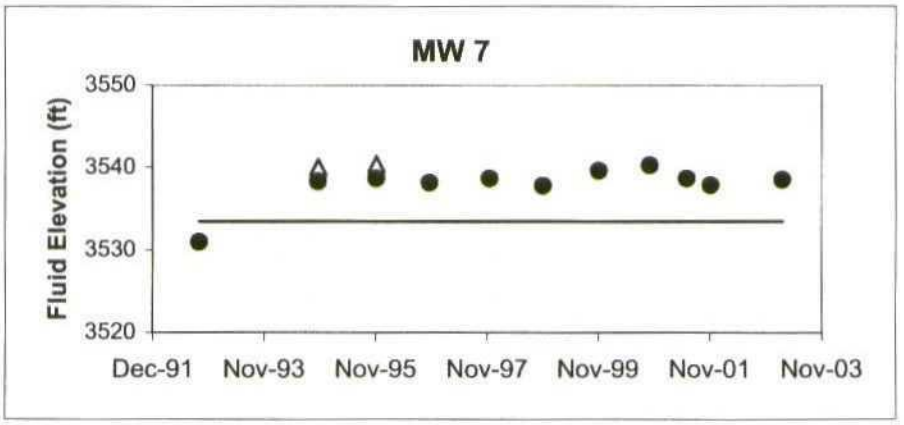


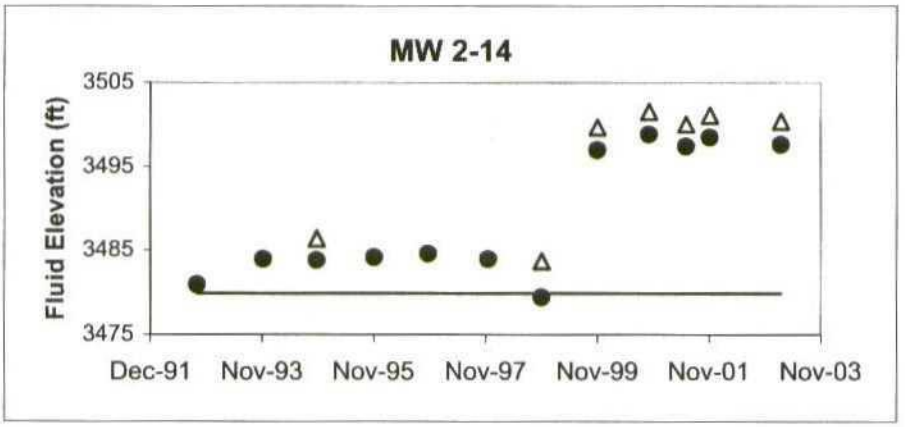




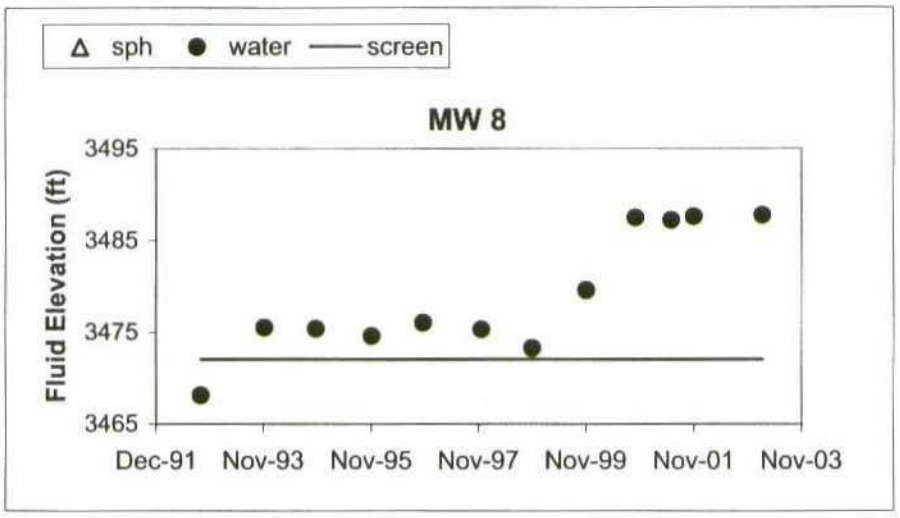
Empire ABO Gasoline Plant	Figure 1
Fluid Levels over Time	May 2003

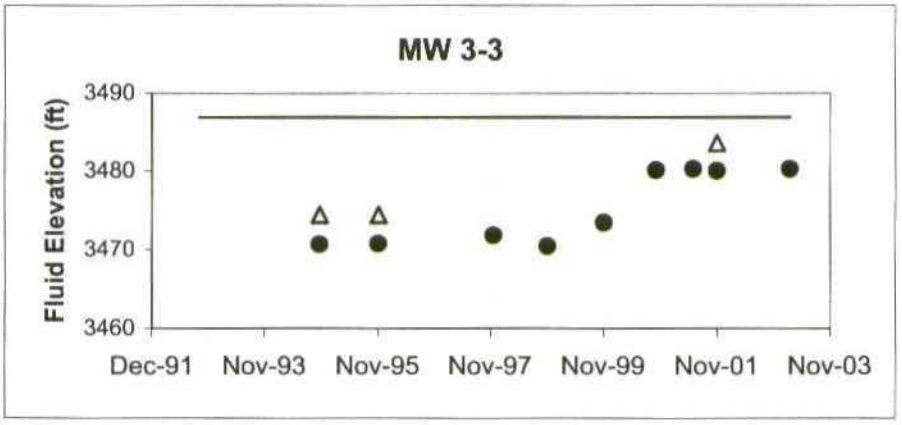


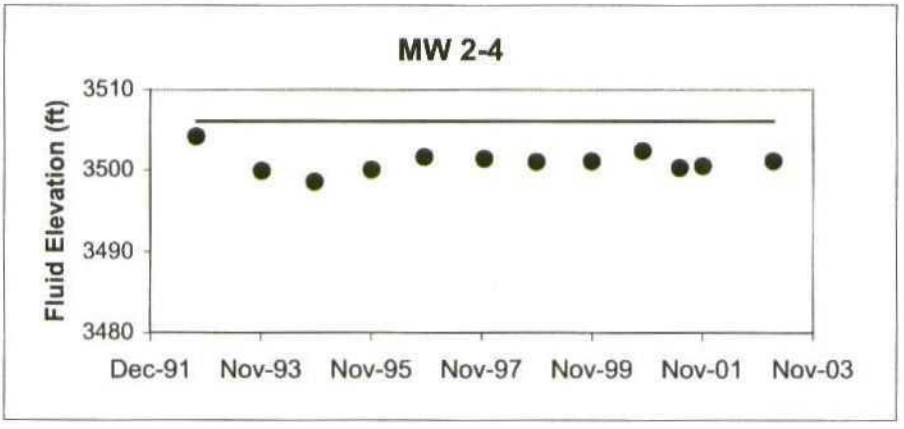




Empire ABO Gasoline Plant	Figure 2
Fluid Levels over Time	May 2003

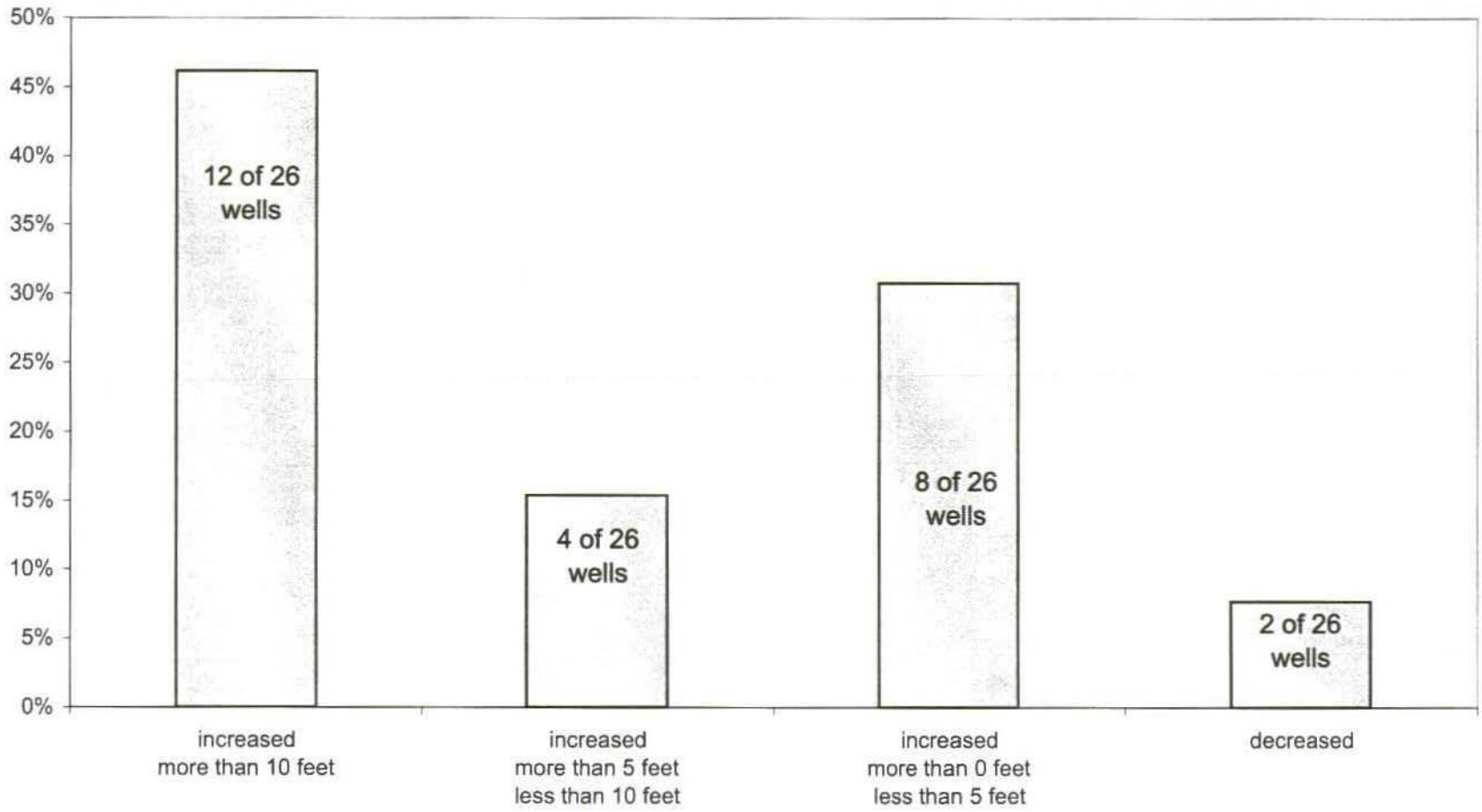






Empire ABO Gasoline Plant	Figure 3
Fluid Levels over Time	May 2003

Figure 4:
Percent of Monitoring Wells with Increasing or Decreasing Water Levels Between 1998 and 2003



TABLES

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2	**3548.50**	**3526.00**	Mar-03	x	34.16	x	3514.34	0	
			Dec-01	x	33.81	x	3514.69	0	
			Jul-01	x	33.77	x	3514.73	0	
			Nov-00	x	32.91	x	3515.59	0	
			Dec-99	x	33.92	x	3514.58	0	
			Dec-98	x	33.90	x	3514.60	0	
			Dec-97	x	33.86	x	3514.64	0	
			Nov-96	x	33.62	x	3514.88	0	
			Dec-95	x	33.79	x	3514.71	0	
			Nov-94	x	33.12	x	3515.38	0	
			Dec-93	x	23.80	x	3524.70	0	
			Oct-92	x	27.00	x	3521.50	0	
3	**3555.70**	**3484.20**	Mar-03	x	70.78	x	3484.92	0	above screen
			Dec-01	x	71.66	x	3484.04	0	
			Jul-01	x	69.35	x	3486.35	0	above screen
			Nov-00	x	68.23	x	3487.47	0	above screen
			Dec-99	73.98	74.10	3474.52	3481.60	0.12	
			Dec-98	77.00	77.11	3471.5	3478.59	0.11	
			Dec-97	74.10	77.02	3474.4	3478.68	2.92	
			Nov-96	72.27	77.60	3476.23	3478.10	5.33	
			Dec-95	77.99	81.18	3470.51	3474.52	3.19	
			Nov-94	78.28	81.75	3470.22	3473.95	3.47	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	72.00	x	3483.70	nm	
4	**3551.30**	**3503.80**	Mar-03	x	52.85	x	3498.45	0	
			Dec-01	x	52.16	x	3499.14	0	
			Jul-01	nm	52.48	x	3498.82	nm	
			Nov-00	x	53.00	x	3498.30	0	
			Dec-99	x	52.45	x	3498.85	0	
			Dec-98	x	60.69	x	3490.61	0	
			Dec-97	nm	nm	x	nm	nm	above screen
			Nov-96	x	56.84	x	3494.46	0	
			Dec-95	52.94	52.95	3495.56	3498.35	0.01	
			Nov-94	57.2	57.23	3491.3	3494.07	0.03	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	34	x	3517.30	0	above screen

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
5	**3543.90**	**3469.90**	Mar-03	x	59.23	x	3484.67	0	above screen
			Dec-01	x	59.76	x	3484.14	0	above screen
			Jul-01	nm	59.76	x	3484.14	nm	above screen
			Nov-00	x	59.55	x	3484.35	0	above screen
			Dec-99	x	64.10	x	3479.80	0	above screen
			Dec-98	x	71.31	x	3472.59	0	above screen
			Dec-97	69.08	69.34	3479.42	3474.56	0.26	above screen
			Nov-96	69.19	69.79	3479.31	3474.11	0.6	above screen
			Dec-95	70.1	70.25	3478.4	3473.65	0.15	above screen
			Nov-94	70.05	70.08	3478.45	3473.82	0.03	above screen
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	71	x	3472.90	0	above screen
6	**3544.90**	**3511.90**	Mar-03	40.1	46.8	3508.4	3498.10	6.7	
			Dec-01	40.69	41.75	3507.81	3503.15	1.06	
			Jul-01	39.8	41.28	3508.7	3503.62	1.48	
			Nov-00	x	36.28	x	3508.62	0	
			Dec-99	nm	nm	x	nm	nm	above screen
			Dec-98	x	46.38	x	3498.52	0	
			Dec-97	40.15	45.75	3508.35	3499.15	5.6	
			Nov-96	39.29	45.51	3509.21	3499.39	6.22	
			Dec-95	41.46	45.65	3507.04	3499.25	4.19	
			Nov-94	42.33	46.54	3506.17	3498.36	4.21	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	42	x	3502.90	nm	
7	**3546.90**	**3533.40**	Mar-03	x	8.4	x	3538.50	0	above screen
			Dec-01	x	9.11	x	3537.79	0	above screen
			Jul-01	x	8.24	x	3538.66	0	above screen
			Nov-00	x	6.68	x	3540.22	0	above screen
			Dec-99	x	7.35	x	3539.55	0	above screen
			Dec-98	x	9.14	x	3537.76	0	above screen
			Dec-97	x	8.27	x	3538.63	0	above screen
			Nov-96	x	8.78	x	3538.12	0	above screen
			Dec-95	8.1	8.25	3540.4	3538.65	0.15	above screen
			Nov-94	8.46	8.6	3540.04	3538.30	0.14	above screen
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	16	x	3530.90	0	

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
8	**3544.10**	**3472.10**	Mar-03	x	56.31	x	3487.79	0	above screen
			Dec-01	x	56.46	x	3487.64	0	above screen
			Jul-01	x	56.85	x	3487.25	0	above screen
			Nov-00	x	56.60	x	3487.50	0	above screen
			Dec-99	x	64.50	x	3479.60	0	above screen
			Dec-98	x	70.81	x	3473.29	0	above screen
			Dec-97	x	68.75	x	3475.35	0	above screen
			Nov-96	x	68.05	x	3476.05	0	above screen
			Dec-95	x	69.49	x	3474.61	0	above screen
			Nov-94	nm	68.73	x	3475.37	nm	above screen
			Dec-93	x	68.6	x	3475.50	0	above screen
			Oct-92	x	76	x	3468.10	0	
9	**3543.20**	**3488.70**	Mar-03	45.5	46.4	3503	3496.80	0.9	above screen
			Dec-01	44.32	44.75	3504.18	3498.45	0.43	above screen
			Jul-01	45.52	46.21	3502.98	3496.99	0.69	above screen
			Nov-00	43.98	44.24	3504.52	3498.96	0.26	above screen
			Dec-99	45.12	45.42	3503.38	3497.78	0.3	above screen
			Dec-98	62.12	63.92	3486.38	3479.28	1.8	
			Dec-97	59.21	59.64	3489.29	3483.56	0.43	
			Nov-96	58.54	59.02	3489.96	3484.18	0.48	
			Dec-95	nm	60.88	x	3482.32	nm	
			Nov-94	59.21	59.62	3489.29	3483.58	0.24	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	50	x	3493.20	nm	above screen
2-2	**3552.55**	**3514.55**	Mar-03	x	26.85	x	3525.70	0	above screen
			Dec-01	x	26.97	x	3525.58	0	above screen
			Jul-01	x	27.04	x	3525.51	0	above screen
			Nov-00	x	25.28	x	3527.27	0	above screen
			Dec-99	x	26.75	x	3525.80	0	above screen
			Dec-98	x	26.85	x	3525.70	0	above screen
			Dec-97	x	26.88	x	3525.67	0	above screen
			Nov-96	x	26.92	x	3525.63	0	above screen
			Dec-95	x	27.42	x	3525.13	0	above screen
			Nov-94	x	27.05	x	3525.50	0	above screen
			Dec-93	x	26.9	x	3525.65	0	above screen
			Oct-92	x	27	x	3525.55	0	above screen

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-3	**3557.98**	**3459.98**	Mar-03	x	73.23	x	3484.75	0	above screen
			Dec-01	x	74.02	x	3483.96	0	above screen
			Jul-01	x	73.25	x	3484.73	0	above screen
			Nov-00	x	73.42	x	3484.56	0	above screen
			Dec-99	x	78.53	x	3479.45	0	above screen
			Dec-98	x	83.51	x	3474.47	0	above screen
			Dec-97	x	82.11	x	3475.87	0	above screen
			Nov-96	x	82.32	x	3475.66	0	above screen
			Dec-95	nm	83.5	x	3474.48	nm	above screen
			Nov-94	nm	83.4	x	3474.58	nm	above screen
			Dec-93	x	84	x	3473.98	0	above screen
			Oct-92	x	97	x	3460.98	0	above screen
2-4	**3554.09**	**3506.09**	Mar-03	x	53.05	x	3501.04	0	
			Dec-01	x	53.65	x	3500.44	0	
			Jul-01	x	53.82	x	3500.27	0	
			Nov-00	x	51.76	x	3502.33	0	
			Dec-99	x	53.02	x	3501.07	0	
			Dec-98	x	53.11	x	3500.98	0	
			Dec-97	x	52.69	x	3501.40	0	
			Nov-96	x	52.52	x	3501.57	0	
			Dec-95	x	54.06	x	3500.03	0	
			Nov-94	nm	55.57	x	3498.52	nm	
			Dec-93	x	54.2	x	3499.89	0	
			Oct-92	x	50	x	3504.09	0	
2-5	**3553.00**	**3510.00**	Mar-03	x	27.62	x	3525.38	0	above screen
			Dec-01	x	27.73	x	3525.27	0	above screen
			Jul-01	x	27.81	x	3525.19	0	above screen
			Nov-00	x	26.78	x	3526.22	0	above screen
			Dec-99	x	27.60	x	3525.40	0	above screen
			Dec-98	x	29.42	x	3523.58	0	above screen
			Dec-97	x	27.50	x	3525.50	0	above screen
			Nov-96	x	27.50	x	3525.50	0	above screen
			Dec-95	x	27.89	x	3525.11	0	above screen
			Nov-94	x	27.37	x	3525.63	0	above screen
			Dec-93	x	27.2	x	3525.80	0	above screen
			Oct-92	x	45	x	3508.00	0	

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-6	**3551.11**	**3537.11**	Mar-03	x	10.1	x	3541.01	0	above screen
			Dec-01	x	18.11	x	3533.00	0	
			Jul-01	16.69	16.71	3531.81	3534.40	0.02	
			Nov-00	9.58	9.61	3538.92	3541.50	0.03	above screen
			Dec-99	7.6	8.60	3540.9	3542.51	1	above screen
			Dec-98	18.22	18.26	3530.28	3532.85	0.04	
			Dec-97	15.45	16.52	3533.05	3534.59	1.07	
			Nov-96	21.81	22.22	3526.69	3528.89	0.41	
			Dec-95	21.3	23.02	3527.2	3528.09	1.72	
			Nov-94	19.46	22.76	3529.04	3528.35	3.3	
			Dec-93	x	11.6	x	3539.51	0	above screen
			Oct-92	x	17	x	3534.11	0	
2-7	**3547.34**	**3491.34**	Mar-03	x	50.68	x	3496.66	0	above screen
			Dec-01	x	49.80	x	3497.54	0	above screen
			Jul-01	x	50.21	x	3497.13	0	above screen
			Nov-00	x	47.61	x	3499.73	0	above screen
			Dec-99	x	49.40	x	3497.94	0	above screen
			Dec-98	nm	nm	x	nm	nm	above screen
			Dec-97	nm	nm	x	nm	nm	above screen
			Nov-96	nm	nm	x	nm	nm	above screen
			Dec-95	63.8	63.92	3484.7	3483.42	0.12	
			Nov-94	62.72	62.72	3485.78	3484.62	0	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	55	x	3492.34	nm	above screen
2-9	**3546.81**	**3513.81**	Mar-03	35.5	38.84	3513	3507.97	3.34	
			Dec-01	35.41	38.94	3513.09	3507.87	3.53	
			Jul-01	35.34	37.65	3513.16	3509.16	2.31	
			Nov-00	36.76	39.85	3511.74	3506.96	3.09	
			Dec-99	34.75	36.80	3513.75	3510.01	2.05	
			Dec-98	35.90	39.00	3512.6	3507.81	3.1	
			Dec-97	35.25	39.03	3513.25	3507.78	3.78	
			Nov-96	35.3	38.75	3513.2	3508.06	3.45	
			Dec-95	34.15	39.22	3514.35	3507.59	5.07	
			Nov-94	34.71	39.35	3513.79	3507.46	4.64	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	32	x	3514.81	nm	above screen

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-10	**3548.67**	**3480.67**	Mar-03	x	61	x	3487.67	0	above screen
			Dec-01	61.06	61.57	3487.44	3487.10	0.51	above screen
			Jul-01	60.21	61.86	3488.29	3486.81	1.65	above screen
			Nov-00	59.15	61.81	3489.35	3486.86	2.66	above screen
			Dec-99	63.23	68.25	3485.27	3480.42	5.02	
			Dec-98	73.00	75.92	3475.5	3472.75	2.92	
			Dec-97	68.35	72.65	3480.15	3476.02	4.3	
			Nov-96	68.98	73.75	3479.52	3474.92	4.77	
			Dec-95	70.1	76.54	3478.4	3472.13	6.44	
			Nov-94	69.32	76.21	3479.18	3472.46	6.89	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	64	x	3484.67	nm	above screen
2-11	**3547.06**	**3534.06**	Mar-03	x	23.5	x	3523.56	0	
			Dec-01	x	22.95	x	3524.11	0	
			Jul-01	x	21.95	x	3525.11	0	
			Nov-00	17.20	18.57	3531.3	3528.49	1.37	
			Dec-99	20.72	21.22	3527.78	3525.84	0.5	
			Dec-98	x	23.36	x	3523.70	0	
			Dec-97	21.99	22.43	3526.51	3524.63	0.44	
			Nov-96	x	23.21	x	3523.85	0	
			Dec-95	22.92	23.12	3525.58	3523.94	0.2	
			Nov-94	22.31	23.05	3526.19	3524.01	0.74	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	17	x	3530.06	nm	
2-12	**3543.40**	**3470.40**	Mar-03	59.82	60.2	3488.68	3483.20	0.38	above screen
			Dec-01	60.80	60.82	3487.7	3482.58	0.02	above screen
			Jul-01	60.6	60.73	3487.9	3482.67	0.13	above screen
			Nov-00	60.56	61.00	3487.94	3482.40	0.44	above screen
			Dec-99	65.50	66.90	3483	3476.50	1.4	above screen
			Dec-98	65.90	73.61	3482.6	3469.79	7.71	
			Dec-97	69.75	70.24	3478.75	3473.16	0.49	above screen
			Nov-96	x	72.96	x	3470.44	0	above screen
			Dec-95	70.05	73.76	3478.45	3469.64	3.71	
			Nov-94	70.2	74.05	3478.3	3469.35	3.85	
			Dec-93	x	71	x	3472.40	0	above screen
			Oct-92	x	74	x	3469.40	0	

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-13	**3545.91**	**3506.91**	Mar-03	41.66	44.73	3506.84	3501.18	3.07	
			Dec-01	42.08	42.70	3506.42	3503.21	0.62	
			Jul-01	41.68	43.23	3506.82	3502.68	1.55	
			Nov-00	33.94	36.76	3514.56	3509.15	2.82	above screen
			Dec-99	41.57	41.80	3506.93	3504.11	0.23	
			Dec-98	45.60	45.70	3502.9	3500.21	0.1	
			Dec-97	43.00	43.06	3505.5	3502.85	0.06	
			Nov-96	42.47	42.48	3506.03	3503.43	0.01	
			Dec-95	44.05	46.55	3504.45	3499.36	2.5	
			Nov-94	44.13	46.86	3504.37	3499.05	2.73	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	42	x	3503.91	nm	
2-14	**3545.91**	**3479.91**	Mar-03	48.12	48.31	3500.38	3497.60	0.19	above screen
			Dec-01	47.38	47.50	3501.12	3498.41	0.12	above screen
			Jul-01	48.45	48.55	3500.05	3497.36	0.1	above screen
			Nov-00	46.99	47.10	3501.51	3498.81	0.11	above screen
			Dec-99	48.82	48.98	3499.68	3496.93	0.16	above screen
			Dec-98	64.80	66.54	3483.7	3479.37	1.74	
			Dec-97	x	61.98	x	3483.93	0	above screen
			Nov-96	x	61.34	x	3484.57	0	above screen
			Dec-95	nm	61.77	x	3484.14	nm	above screen
			Nov-94	62.1	62.11	3486.4	3483.80	0.01	above screen
			Dec-93	x	62	x	3483.91	0	above screen
			Oct-92	x	65	x	3480.91	0	above screen
2-15	**3543.64**	**3480.64**	Mar-03	x	52.43	x	3491.21	0	above screen
			Dec-01	x	52.47	x	3491.17	0	above screen
			Jul-01	x	53.37	x	3490.27	0	above screen
			Nov-00	52.77	52.85	3495.73	3490.79	0.08	above screen
			Dec-99	54.55	55.75	3493.95	3487.89	1.2	above screen
			Dec-98	65.42	69.10	3483.08	3474.54	3.68	
			Dec-97	62.88	65.48	3485.62	3478.16	2.6	
			Nov-96	62.7	65.44	3485.8	3478.20	2.74	
			Dec-95	nm	65.2	x	3478.44	nm	
			Nov-94	x	63.27	x	3480.37	0	
			Dec-93	x	63.1	x	3480.54	0	
			Oct-92	x	64	x	3479.64	0	

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-16	**3544.39**	**3471.39**	Mar-03	x	59.4	x	3484.99	0	above screen
			Dec-01	x	59.78	x	3484.61	0	above screen
			Jul-01	x	59.88	x	3484.51	0	above screen
			Nov-00	x	59.80	x	3484.59	0	above screen
			Dec-99	x	65.05	x	3479.34	0	above screen
			Dec-98	x	71.15	x	3473.24	0	above screen
			Dec-97	x	69.39	x	3475.00	0	above screen
			Nov-96	x	69.14	x	3475.25	0	above screen
			Dec-95	71.1	74.2	3477.4	3470.19	3.1	
			Nov-94	70.06	70.06	3478.44	3474.33	0	above screen
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	74	x	3470.39	0	
2-18	**3545.79**	**3516.79**	Mar-03	x	22.3	x	3523.49	0	above screen
			Dec-01	x	22.33	x	3523.46	0	above screen
			Jul-01	x	21.01	x	3524.78	0	above screen
			Nov-00	x	16.76	x	3529.03	0	above screen
			Dec-99	x	20.18	x	3525.61	0	above screen
			Dec-98	x	22.12	x	3523.67	0	above screen
			Dec-97	x	20.95	x	3524.84	0	above screen
			Nov-96	x	22.71	x	3523.08	0	above screen
			Dec-95	22.2	22.2	3526.3	3523.59	0	above screen
			Nov-94	22.22	22.22	3526.28	3523.57	0	above screen
			Dec-93	x	22.9	x	3522.89	0	above screen
			Oct-92	x	30	x	3515.79	0	
3-1	**3543.04**	**3490.04**	Mar-03	x	45.82	x	3497.22	0	above screen
			Dec-01	x	43.91	x	3499.13	0	above screen
			Jul-01	45.16	45.19	3503.34	3497.85	0.03	above screen
			Nov-00	x	43.66	x	3499.38	0	above screen
			Dec-99	x	45.70	x	3497.34	0	above screen
			Dec-98	x	63.00	x	3480.04	0	
			Dec-97	x	60.16	x	3482.88	0	
			Nov-96	58.45	58.46	3490.05	3484.58	0.01	
			Dec-95	60.13	60.15	3488.37	3482.89	0.02	
			Nov-94	59.21	59.22	3489.29	3483.82	0.01	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen

Table 1: Changes in SPH Thickness and Perched-Water Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
3-2	**3541.59**	**3478.59**	Mar-03	x	59.32	x	3482.27	0	above screen
			Dec-01	x	59.00	x	3482.59	0	above screen
			Jul-01	x	59.67	x	3481.92	0	above screen
			Nov-00	59.90	61.10	3488.6	3480.49	1.2	above screen
			Dec-99	63.70	65.40	3484.8	3476.19	1.7	
			Dec-98	71.10	75.25	3477.4	3466.34	4.15	
			Dec-97	69.71	74.50	3478.79	3467.09	4.79	
			Nov-96	69.72	71.10	3478.78	3470.49	1.38	
			Dec-95	nm	73.24	x	3468.35	nm	
			Nov-94	nm	72.87	x	3468.72	nm	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen
3-3	**3544.93**	**3486.93**	Mar-03	x	64.7	x	3480.23	0	
			Dec-01	64.93	64.96	3483.57	3479.97	0.03	
			Jul-01	x	64.67	x	3480.26	0	
			Nov-00	x	64.85	x	3480.08	0	
			Dec-99	x	71.50	x	3473.43	0	
			Dec-98	x	74.49	x	3470.44	0	
			Dec-97	x	73.09	x	3471.84	0	
			Nov-96	nm	nm	x	nm	nm	above screen
			Dec-95	74	74.16	3474.5	3470.77	0.16	
			Nov-94	74.06	74.2	3474.44	3470.73	0.14	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen
3-4	**3558.63**	**3490.63**	Mar-03	x	74.27	x	3484.36	0	
			Dec-01	75.81	83.46	3472.69	3475.17	7.65	
			Jul-01	73.28	86.18	3475.22	3472.45	12.9	
			Nov-00	x	73.97	x	3484.66	0	
			Dec-99	x	82.15	x	3476.48	0	
			Dec-98	x	86.15	x	3472.48	0	
			Dec-97	x	84.69	x	3473.94	0	
			Nov-96	x	85.09	x	3473.54	0	
			Dec-95	nm	86.44	x	3472.19	nm	
			Nov-94	nm	86.51	x	3472.12	nm	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen
Notes:									
nm: Not measured or not recorded for that date									

Table 2: Water and SPH, Empire Abo Gasoline Plant

		Mar-03				Dec-01				Jul-01			
Monitoring Well	Top of Casing (feet asl)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)
2	3548.50	x	34.16		3514.34	x	33.81		3514.69	x	33.77		3514.73
3	3555.70	x	70.78		3484.92	x	71.66		3484.04	x	69.35		3486.35
4	3551.30	x	52.85		3498.45	x	52.16		3499.14	sheen	52.48		3498.82
5	3543.90	x	59.23		3484.67	x	59.76		3484.14	sheen	59.76		3484.14
6	3544.90	40.10	46.80	3504.80	3498.10	40.69	41.75	3504.21	3503.15	39.8	41.28	3505.10	3503.62
7	3546.90	x	8.40		3538.50	x	9.11		3537.79	x	8.24		3538.66
8	3544.10	x	56.31		3487.79	x	56.46		3487.64	x	56.85		3487.25
9	3543.20	45.50	46.40	3497.70	3496.80	44.32	44.75	3498.88	3498.45	45.52	46.21	3497.68	3496.99
2-2	3552.55	x	26.85		3525.70	x	26.97		3525.58	x	27.04		3525.51
2-3	3557.98	x	72.23		3485.75	x	74.02		3483.96	x	73.25		3484.73
2-4	3554.09	x	53.05		3501.04	x	53.65		3500.44	x	53.82		3500.27
2-5	3553.00	x	27.62		3525.38	x	27.73		3525.27	x	27.81		3525.19
2-6	3551.11	x	10.10		3541.01	x	18.11		3533.00	16.69	16.71	3534.42	3534.40
2-7	3547.34	x	50.68		3496.66	x	49.80		3497.54	x	50.21		3497.13
2-9	3546.81	35.50	38.84	3511.31	3507.97	35.41	38.94	3511.40	3507.87	35.34	37.65	3511.47	3509.16
2-10	3548.67	x	61.00		3487.67	61.06	61.57	3487.61	3487.10	60.21	61.86	3488.46	3486.81
2-11	3547.06	x	23.50		3523.56	x	22.95		3524.11	x	21.95		3525.11
2-12	3543.40	59.82	60.20	3483.58	3483.20	60.80	60.82	3482.60	3482.58	60.6	60.73	3482.80	3482.67
2-13	3545.91	41.66	44.73	3504.25	3501.18	42.08	42.70	3503.83	3503.21	41.68	43.23	3504.23	3502.68
2-14	3545.91	48.12	48.31	3497.79	3497.60	47.38	47.50	3498.53	3498.41	48.45	48.55	3497.46	3497.36
2-15	3543.64	x	52.43		3491.21	x	52.47		3491.17	x	53.37		3490.27
2-16	3544.39	x	59.40		3484.99	x	59.78		3484.61	x	59.88		3484.51
2-18	3545.79	x	22.30		3523.49	x	22.33		3523.46	x	21.01		3524.78
3-1	3543.04	x	45.82		3497.22	x	43.91		3499.13	45.16	45.19	3497.88	3497.85
3-2	3541.59	x	59.32		3482.27	x	59.00		3482.59	x	59.67		3481.92
3-3	3544.93	x	64.70		3480.23	64.93	64.96	3480.00	3479.97	x	64.67		3480.26
3-4	3558.63	x	74.27		3484.36	75.81	83.46	3482.82	3475.17	73.28	86.18	3485.35	3472.45

legend: asl above sea level, "x" SPH not present, "nm" not measured

Table 2: Water and SPH, Empire Abo Gasoline Plant

Monitoring Well	Nov-00				Dec-99				Dec-98				Dec-97			
	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)
2	x	32.91		3515.59	x	33.92		3514.58	x	33.90		3514.60	x	33.86		3514.64
3	x	68.23		3487.47	73.98	74.10	3481.72	3481.60	77.00	77.11	3478.70	3478.59	74.10	77.02	3481.60	3478.68
4	x	53.00		3498.30	x	52.45		3498.85	x	60.69		3490.61	nm	nm	nm	nm
5	x	59.55		3484.35	x	64.10		3479.80	x	71.31		3472.59	69.08	69.34	3474.82	3474.56
6	x	36.28		3508.62	nm	nm	nm	nm	x	46.38		3498.52	40.15	45.75	3504.75	3499.15
7	x	6.68		3540.22	x	7.35		3539.55	x	9.14		3537.76	x	8.27		3538.63
8	x	56.60		3487.50	x	64.50		3479.60	x	70.81		3473.29	x	68.75		3475.35
9	43.98	44.24	3499.22	3498.96	45.12	45.42	3498.08	3497.78	62.12	63.92	3481.08	3479.28	59.21	59.64	3483.99	3483.56
2-2	x	25.28		3527.27	x	26.75		3525.80	x	26.85		3525.70	x	26.88		3525.67
2-3	x	73.42		3484.56	x	78.53		3479.45	x	83.51		3474.47	x	82.11		3475.87
2-4	x	51.76		3502.33	x	53.02		3501.07	x	53.11		3500.98	x	52.69		3501.40
2-5	x	26.78		3526.22	x	27.60		3525.40	x	29.42		3523.58	x	27.50		3525.50
2-6	9.58	9.61	3541.53	3541.50	7.6	8.60	3543.51	3542.51	18.22	18.26	3532.89	3532.85	15.45	16.52	3535.66	3534.59
2-7	x	47.61		3499.73	x	49.40		3497.94	nm	nm	nm	nm	nm	nm	nm	nm
2-9	36.76	39.85	3510.05	3506.96	34.75	36.80	3512.06	3510.01	35.90	39.00	3510.91	3507.81	35.25	39.03	3511.56	3507.78
2-10	59.15	61.81	3489.52	3486.86	63.23	68.25	3485.44	3480.42	73.00	75.92	3475.67	3472.75	68.35	72.65	3480.32	3476.02
2-11	17.20	18.57	3529.86	3528.49	20.72	21.22	3526.34	3525.84	x	23.36		3523.70	21.99	22.43	3525.07	3524.63
2-12	60.56	61.00	3482.84	3482.40	65.50	66.90	3477.90	3476.50	65.90	73.61	3477.50	3469.79	69.75	70.24	3473.65	3473.16
2-13	33.94	36.76	3511.97	3509.15	41.57	41.80	3504.34	3504.11	45.60	45.70	3500.31	3500.21	43.00	43.06	3502.91	3502.85
2-14	46.99	47.10	3498.92	3498.81	48.82	48.98	3497.09	3496.93	64.80	66.54	3481.11	3479.37	x	61.98		3483.93
2-15	52.77	52.85	3490.87	3490.79	54.55	55.75	3489.09	3487.89	65.42	69.10	3478.22	3474.54	62.88	65.48	3480.76	3478.16
2-16	x	59.80		3484.59	x	65.05		3479.34	x	71.15		3473.24	x	69.39		3475.00
2-18	x	16.76		3529.03	x	20.18		3525.61	x	22.12		3523.67	x	20.95		3524.84
3-1	x	43.66		3499.38	x	45.70		3497.34	x	63.00		3480.04	x	60.16		3482.88
3-2	59.90	61.10	3481.69	3480.49	63.70	65.40	3477.89	3476.19	71.10	75.25	3470.49	3466.34	69.71	74.50	3471.88	3467.09
3-3	x	64.85		3480.08	x	71.50		3473.43	x	74.49		3470.44	x	73.09		3471.84
3-4	x	73.97		3484.66	x	82.15		3476.48	x	86.15		3472.48	x	84.69		3473.94
legend:																

Table 2: Water and SPH, Empire Abo Gasoline Plant								
	Nov-96				Dec-95	Nov-94	Dec-93	Oct-92
Monitoring Well	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)
2	x	33.62		3514.88	3514.71	3515.38	3524.70	3521.50
3	72.27	77.60	3483.43	3478.10	3474.52	3473.95	nm	3483.70
4	x	56.84		3494.46				
5	69.19	69.79	3474.71	3474.11				
6	39.29	45.51	3505.61	3499.39				
7	x	8.78		3538.12	3538.65	3538.30	nm	3530.90
8	x	68.05		3476.05	3474.61	3475.37	3475.50	3468.10
9	58.54	59.02	3484.66	3484.18	3482.32	3483.58	nm	3493.20
2-2	x	26.92		3525.63				
2-3	x	82.32		3475.66				
2-4	x	52.52		3501.57	3500.03	3498.52	3499.89	3504.09
2-5	x	27.50		3525.50				
2-6	21.81	22.22	3529.30	3528.89				
2-7	nm	nm	nm	nm				
2-9	35.3	38.75	3511.51	3508.06				
2-10	68.98	73.75	3479.69	3474.92	3472.13	3472.46	nm	3484.67
2-11	x	23.21		3523.85				
2-12	x	72.96		3470.44				
2-13	42.47	42.48	3503.44	3503.43				
2-14	x	61.34		3484.57	3484.14	3483.80	3483.91	3480.91
2-15	62.7	65.44	3480.94	3478.20				
2-16	x	69.14		3475.25				
2-18	x	22.71		3523.08				
3-1	58.45	58.46	3484.59	3484.58				
3-2	69.72	71.10	3471.87	3470.49				
3-3	nm	nm	nm	nm	3470.77	3470.73		
3-4	x	85.09		3473.54				
legend:								

Table 3: Change in Perched Groundwater and SPH Between 1998 and 2003

Monitoring Well	Bottom of Well (below TOC)	Top of Screen (below TOC)	Is March-03 water level above screen?	Is Dec-98 water level above screen?	[1]Type of pump placed in well during recovery operations	Change in Water Elevation (feet; 2001 to 2003)	[3]Change in Water Elevation (feet)	[4]Change in SPH Thickness (feet)
2	38	23	no	no	sampling	0.3	0.1	no SPH
3	91	72	yes	no	skimmer	-0.9	5.5	above screen
4	61	48	no	no	skimmer	0.7	8.5	no SPH
5	93	74	yes	yes	total fluids	-0.5	11.5	above screen
6	53	33	no	no	skimmer	5.1	4.6	6.7
7	26	14	yes	yes	total fluids	-0.7	0.0	above screen
8	82	72	yes	yes	sampling	-0.1	14.3	above screen
9	74	55	yes	no	skimmer	1.7	19.2	above screen
2-2	49	38	yes	yes	sampling	-0.1	0.0	above screen
2-3	107	98	yes	yes	none	-1.8	11.3	above screen
2-4	59	48	no	no	sampling	0.6	0.1	no SPH
2-5	53	43	yes	yes	sampling	0.1	1.8	above screen
2-6	24	14	yes	no	skimmer	8.0	8.2	above screen
2-7	61	56	yes	no	none	-0.9	nm	nm
2-9	42	33	no	no	skimmer	0.1	0.2	0.2
2-10	78	68	yes	no	skimmer	0.6	14.9	above screen
2-11	23	13	no	no	skimmer	-0.6	-0.1	no SPH
2-12	83	73	yes	no	total fluids	0.6	13.4	above screen
2-13	49	39	no	no	skimmer	-2.0	1.0	3.0
2-14	76	66	yes	no	total fluids	-0.8	18.2	above screen
2-15	74	63	yes	no	skimmer	0.0	16.7	above screen
2-16	83	73	yes	yes	total fluids	0.4	11.8	above screen
2-18	38	29	yes	yes	total fluids	0.0	-0.2	above screen
3-1	73	53	yes	no	skimmer	-1.9	17.2	above screen
3-2	102	63	yes	no	skimmer	-0.3	15.9	above screen
3-3	82	58	no	no	skimmer	0.3	9.8	no SPH
3-4	112	68	no	no	none	9.2	11.9	no SPH

legend:
[1]skimmer removes only SPH, total fluids removes SPH and water
[2]a zero implies that the well was used for recovery
[3]difference between March-03 and Dec-98 water elevations, negative values represent a drop in water elevation
[4]difference between March-03 and Dec-98 SPH thickness, negative values represent a decline in SPH thickness; "nm" not measured in either March-03 and/or Dec-98;
[4]"above screen" is displayed when March-03 or Dec-98 water level is above top of screen; "no SPH" is displayed when SPH is absent in March-03 and Dec-98

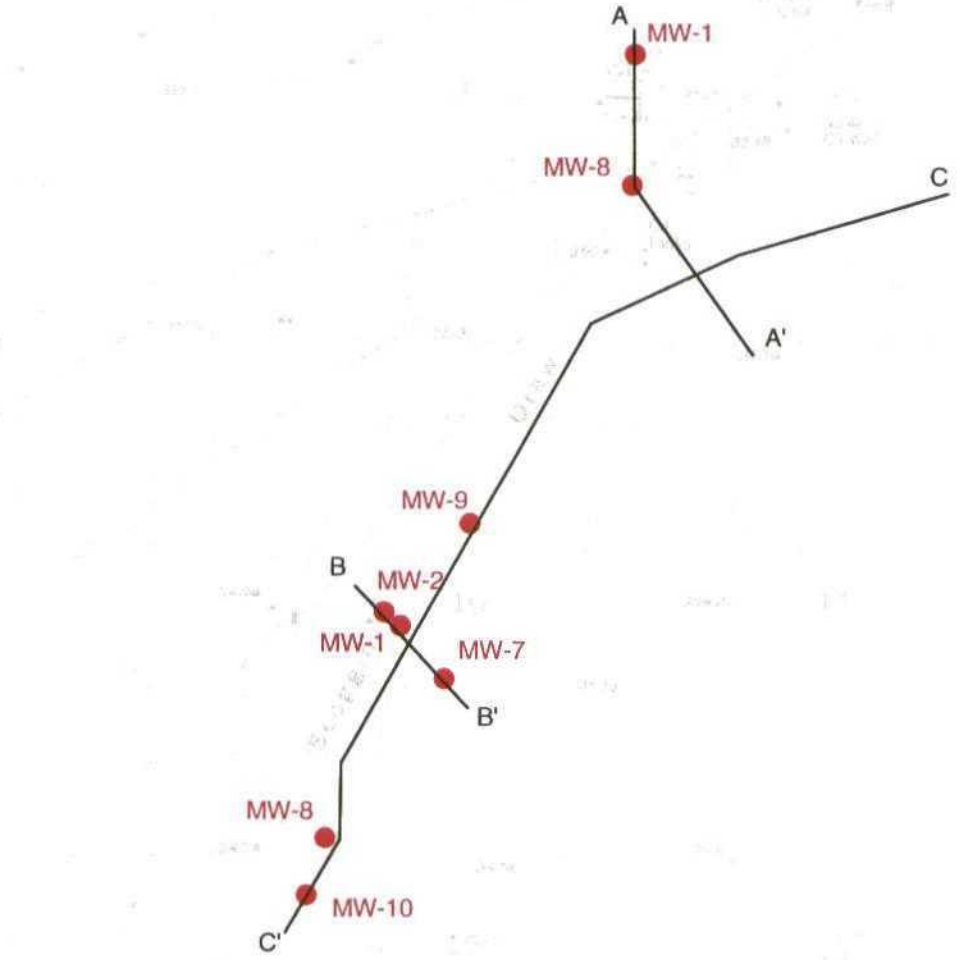
Table 4: Chemisty Data

Sample #	Date	Units	Benzene	Toluene	Ethylbenzene	Total Xylene	BTEX	TDS	Cl + SO4	Fe	Pb	Mn	Nitrate	Sulfate
NM Ground Water Standard		mg/L	0.01	0.75	0.75			1000		1	0.5	0.2	10	600
MW 2	Jan-93								4200					
	Dec-97	mg/L	<0.001	<0.001	<0.001	<0.003	0	3100						
	Dec-98	mg/L	0.027	0.0071	0.0057	0.0106	0.0504	2850						
	Dec-99	mg/L	<0.001	<0.001	<0.001	<0.003	0	2960	3141					
	Aug-00	mg/L	<0.001	<0.001	<0.001	<0.001	0	2210						
	Nov-00	mg/L	<0.001	<0.001	<0.001	<0.003	0	3700						
	Jul-01	mg/L	<0.001	<0.001	<0.001	<0.001	0	2800						
	Dec-01	mg/L	<0.001	<0.001	<0.001	<0.001	0	2820						
	Mar-03	mg/L	<0.001	<0.001	<0.001	<0.001	0	2820		0.13	ND	0.01	9.15	1630
MW 8	Jan-93								3577					
	Dec-97	mg/L	<0.001	<0.001	<0.001	<0.001	0	3370	1764					
	Dec-98	mg/L	0.0012	0.0011	0.0012	0.0021	0.0056	3480						
	Dec-99	mg/L	0.0037	0.0013	0.0044	0.0076	0.017	3460	3227					
	Aug-00	mg/L	<0.001	<0.001	<0.001	<0.001	0	3910						
	Nov-00	mg/L	0.019	<0.001	0.0026	0.0048	0.0264	3670						
	Jul-01	mg/L	<0.001	0.0011	<0.001	<0.001	0.0011	3530						
	Dec-01	mg/L	<0.001	0.0013	<0.001	<0.001	0.0013	3380						
	Mar-03	mg/L	0.0078	0.001	0.0032	0.0074	0.0194	2370						
MW 2-14	Dec-98	mg/L	SPH	SPH	SPH	SPH	0	SPH						
	Dec-99	mg/L	0.41	0.018	0.31	0.26	0.998	na						
	Nov-00	mg/L	1	<0.001	0.049	0.18	1.229	3570						
	Dec-01	mg/L	0.23	<0.001	0.016	0.25	0.496	3090						
	Mar-03	mg/L	0.024	0.0019	0.004	0.049	0.0789	2830						
MW 2-15	Dec-98	mg/L	SPH	SPH	SPH	SPH	0	SPH						
	Dec-99	mg/L	SPH	SPH	SPH	SPH	0	SPH						
	Nov-00	mg/L	0.5	0.19	0.33	0.584	1.604	4190						
	Dec-01	mg/L	1.4	0.039	0.14	0.177	1.756	3380						
	Mar-03	mg/L	0.12	0.0053	0.03	0.034	0.1893	3080						
MW 2-16	Dec-97	mg/L	0.0045	<0.001	<0.001	<0.001	0.0045	3540						
	Jan-98	mg/L	0.0049	0.011	0.007	0.0034	0.0263	na						
	Dec-99	mg/L	0.014	0.0039	0.012	0.021	0.0509	3280						

Table 4: Chemisty Data

Sample #	Date	Units	Benzene	Toluene	Ethylbenzene	Total Xylene	BTEX	TDS	Cl + SO4	Fe	Pb	Mn	Nitrate	Sulfate
MW 3-1*	Dec-98	mg/L	0.097	0.0026	0.0038	0.0068	0.1102	4150						
	Dec-99	mg/L	3.5	0.011	0.48	0.274	4.265	>4510						
	Nov-00	mg/L	1	<0.001	0.16	0.13	1.29	3870						
	Dec-01	mg/L	1.5	<0.001	0.18	0.18	1.86	3290						
	Mar-03	mg/L	0.25	0.002	0.0078	0.0096	0.2694	2990		21..	ND	1.84	ND	1620
MW 3-2	Dec-97	mg/L	SPH	SPH	SPH	SPH	0	SPH						
	Dec-98	mg/L	SPH	SPH	SPH	SPH	0	SPH						
	Dec-99	mg/L	8.8	4.3	1.6	2.96	17.66	na						
	Nov-00	mg/L	0.048	0.044	0.083	0.152	0.327	3520						
	Dec-01	mg/L	0.005	0.0012	0.0036	0.0072	0.017	3550						
	Mar-03	mg/L	0.0028	0.0014	0.0029	0.0035	0.0106	3390						
MW-3-3	Dec-98	mg/L	4.6	nd	nd	nd	4.6	2590						
	Dec-99	mg/L	3.8	0.11	0.047	0.124	4.081	2090						
	Nov-00	mg/L	2.7	<0.001	0.06	0.11	2.87	1990						
	Dec-01	mg/L	3.1	0.0071	0.17	0.231	3.5081	2590						
	Mar-03	mg/L	2.8	0.098	0.82	0.75	4.468	2800						
* Replaces MW 2-8, not analyzed (na), "<x.xx" below detection														
ND = below detection														

PLATES



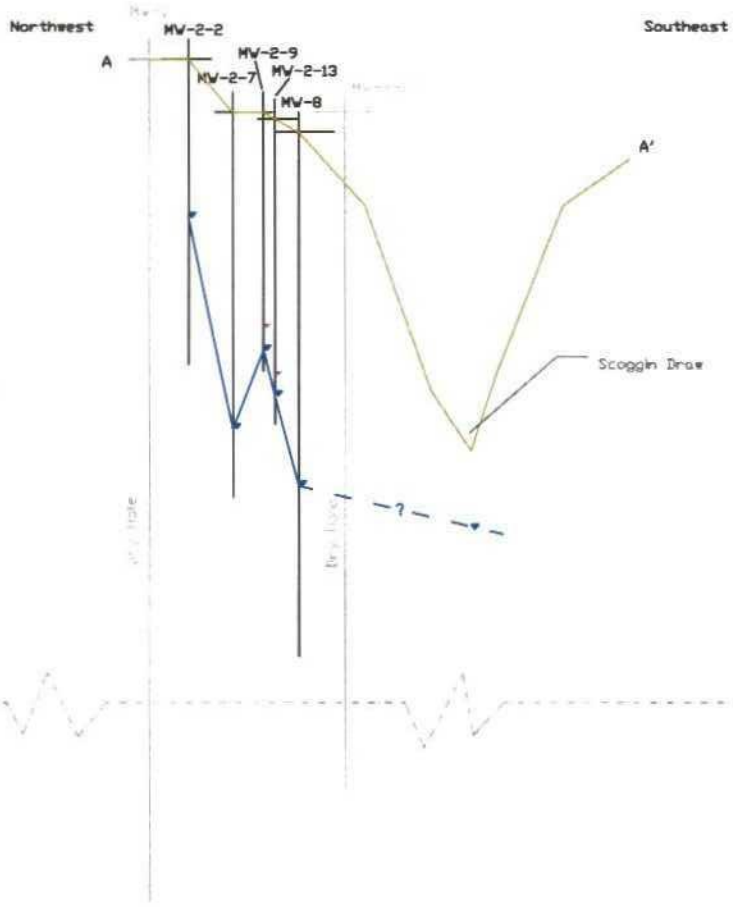
Map Source: Sping Lake; USGS 7.5' Quad

0 1,100 2,200 4,400 6,600 8,800 Feet

N

Monitoring Well

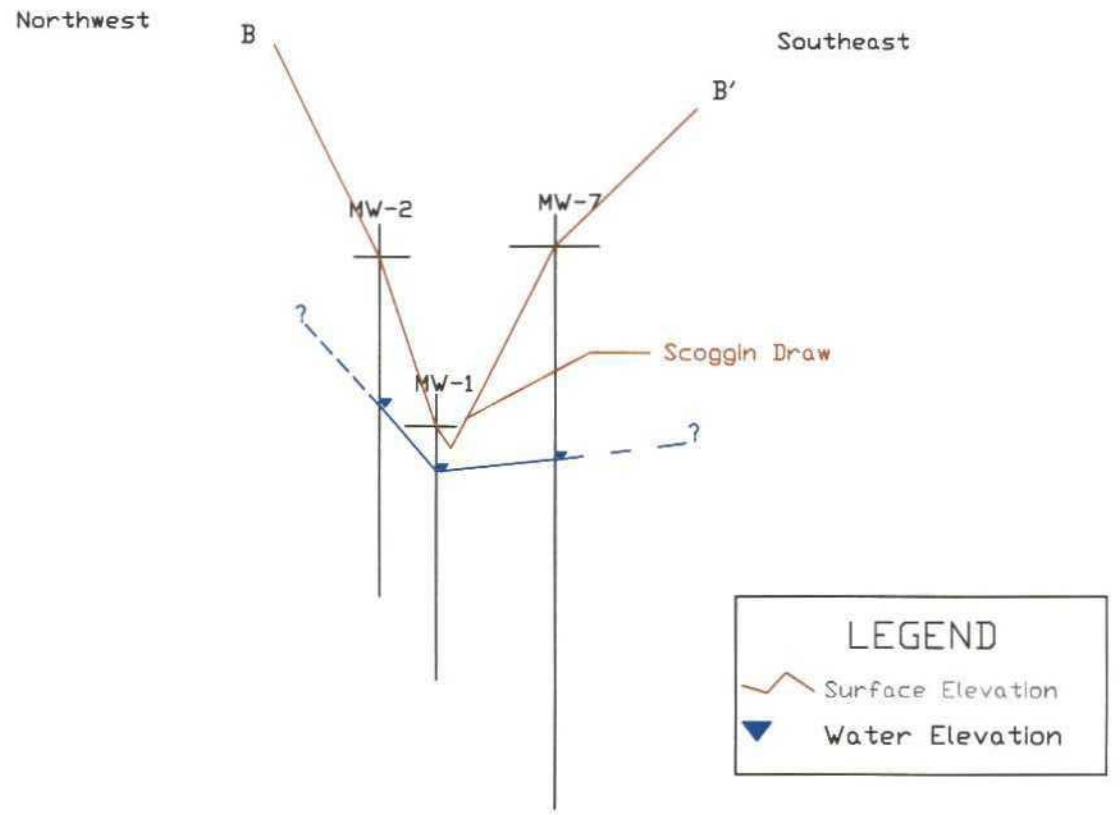
RT. Hicks Consultants 219 Central NW, Suite 266 Albuquerque, NM 87102 505.266.5004 fax 246.1818	BP Empire Abo	Plate 1
	Site Map - Location of Cross-Sections	May 2003



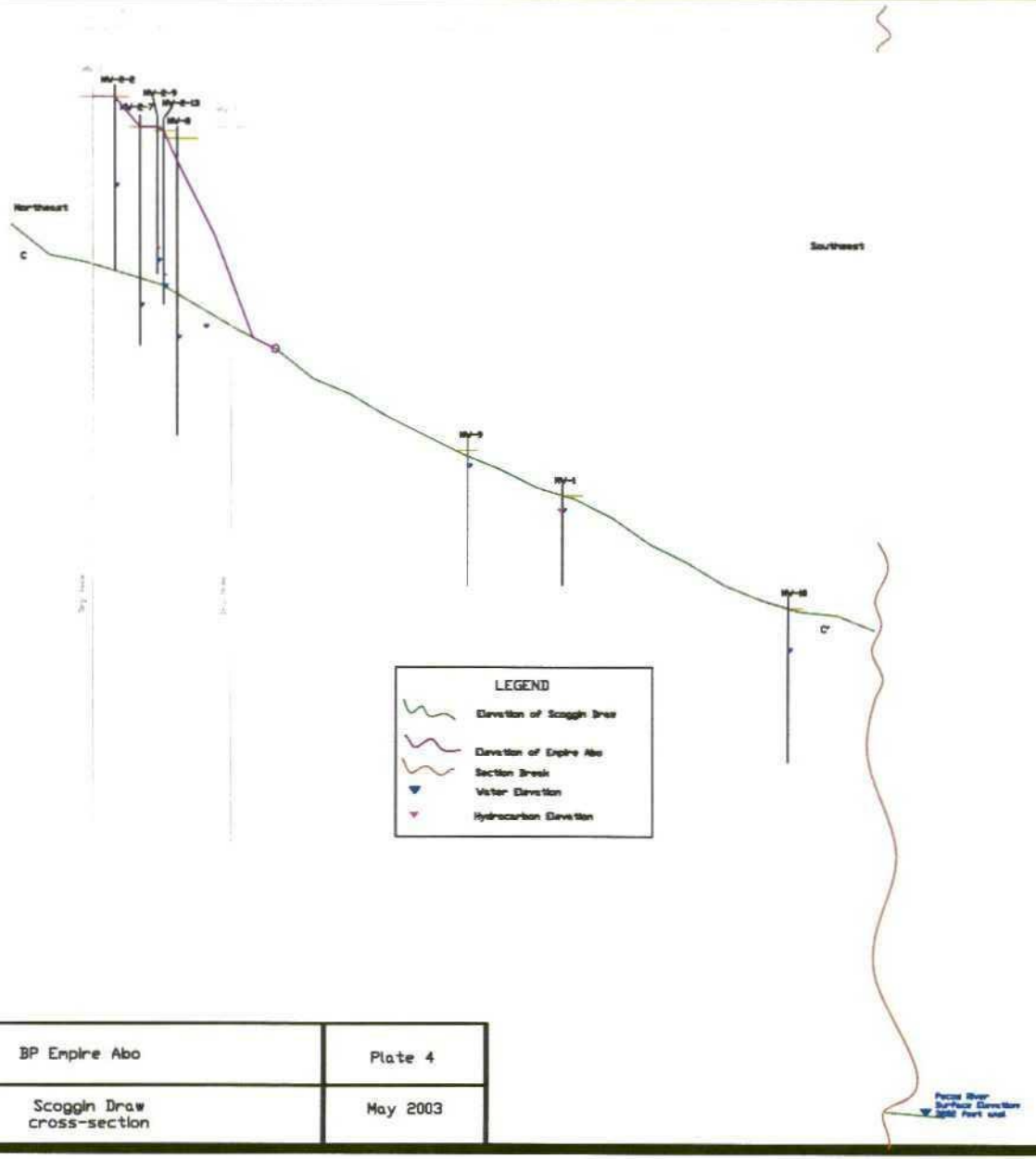
LEGEND

- Elevation of Scoggin Draw
- Surface Elevation
- Water Elevation
- Hydrocarbon Elevation

R.T. Hicks Consultants 219 Central NW, Suite 266 Albuquerque, NM 87106 505.266.5004 Fax: 505.246.1818	BP Empire Abo	Plate 2
	Empire Abo to Scoggin Draw Cross Section	May 2003



R.T. Hicks Consultants 219 Central NW, Suite 266 Albuquerque, NM 87106 505.266.5004 Fax 505.246.1818	BP Empire Abo	Plate 3
	Scoggin MW-1 to MW-7 cross-section	May 2003



R.T. Hicks Consultants 219 Central NW, Suite 266 Albuquerque, NM 87106 505.266.5004 Faxi 505.246.1818	BP Empire Abo	Plate 4
	Scoggin Draw cross-section	May 2003

esc	EMPIRE ABO GAS PLANT	PLATE III-b
	EXPANDED CROSS SECTION C - C'	DATE: OCTOBER, 1997

APPENDICIES

Explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

RT HICKS CONSULTING. LTD
attn ANDREW PARKER
219 CENTRAL AVE.. NW. STE 266
ALBUQUERQUE NM 87102

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **EMPIRE ABO**
Order: **0303291** **RTHC01** Receipt: **03-17-03**

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Sample: ***MW-2*** Collected: *03-11-03 15:15:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-01A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.5	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-19-03	03-19-03
X03113	XG.2003.489.5	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-19-03	03-19-03
X03113	XG.2003.489.5	71-43-2	Benzene	ND	ug / L	1	1		03-19-03	03-19-03
X03113	XG.2003.489.5	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-19-03	03-19-03
X03113	XG.2003.489.5	91-20-3	Naphthalene	ND	ug / L	1	5		03-19-03	03-19-03
X03113	XG.2003.489.5	95-47-6	o-Xylene	ND	ug / L	1	1		03-19-03	03-19-03
X03113	XG.2003.489.5	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-19-03	03-19-03
X03113	XG.2003.489.5	108-88-3	Toluene	ND	ug / L	1	1		03-19-03	03-19-03
0303291-01B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.4		Total Dissolved Solids	2820	mg/L	1	10		03-17-03	03-18-03
0303291-01C		**EPA 4.1.3/200.7 ICP**						By: JRE		
M03335	MT.2003.316.16	7439-89-6	Iron	0.13	mg / L	1	0.05		03-18-03	03-19-03
M03335	MT.2003.317.19	7439-92-1	Lead	ND	mg / L	1	0.06		03-18-03	03-19-03
M03335	MT.2003.321.31	7439-96-5	Manganese	0.01	mg / L	1	0.01		03-18-03	03-20-03
0303291-01D		**EPA 300.0 Anions by IC**						By: MDE		
W0395	WC.2003.678.19	14797-65-0	Nitrate, as N	9.15	mg / L	10	0.05		03-17-03	03-17-03
W03113	WC.2003.773.5		Sulfate	1630	mg / L	100	0.05		03-31-03	03-31-03

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **EMPIRE ABO**
Order: **0303291** **RTHC01** Receipt: **03-17-03**

Sample: ***MW-8*** Collected: *03-12-03 16:17:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-02A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.6	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-19-03	03-19-03
X03113	XG.2003.489.6	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-19-03	03-19-03
X03113	XG.2003.489.6	71-43-2	Benzene	7.8	ug / L	1	1		03-19-03	03-19-03
X03113	XG.2003.489.6	100-41-4	Ethylbenzene	3.2	ug / L	1	1		03-19-03	03-19-03
X03113	XG.2003.489.6	91-20-3	Naphthalene	ND	ug / L	1	5		03-19-03	03-19-03
X03113	XG.2003.489.6	95-47-6	o-Xylene	2.3	ug / L	1	1		03-19-03	03-19-03
X03113	XG.2003.489.6	108-38-3/106-42	p/m-Xylenes	5.1	ug / L	1	2		03-19-03	03-19-03
X03113	XG.2003.489.6	108-88-3	Toluene	1.0	ug / L	1	1		03-19-03	03-19-03
0303291-02B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.6		Total Dissolved Solids	2370	mg/L	1	10		03-17-03	03-18-03

Sample: ***MW-3-1*** Collected: *03-12-03 17:00:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-03A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.509.1	90-12-0	1-Methylnaphthalene	16	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.509.1	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.21	71-43-2	Benzene	250	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.26	100-41-4	Ethylbenzene	7.8	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.26	91-20-3	Naphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.26	95-47-6	o-Xylene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.26	108-38-3/106-42	p/m-Xylenes	9.6	ug / L	1	2		03-20-03	03-20-03
X03113	XG.2003.489.26	108-88-3	Toluene	2.0	ug / L	1	1		03-20-03	03-20-03
0303291-03B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.7		Total Dissolved Solids	2990	mg/L	1	10		03-17-03	03-18-03
0303291-03C		**EPA 4.1.3/200.7 ICP**						By: JRE		
M03335	MT.2003.316.17	7439-89-6	Iron	2.11	mg / L	1	0.05		03-18-03	03-19-03
M03335	MT.2003.317.20	7439-92-1	Lead	ND	mg / L	1	0.06		03-18-03	03-19-03
M03335	MT.2003.316.17	7439-96-5	Manganese	1.84	mg / L	1	0.01		03-18-03	03-19-03
0303291-03D		**EPA 300.0 Anions by IC**						By: MDE		
W0395	WC.2003.678.20	14797-65-0	Nitrate, as N	ND	mg / L	10	0.05		03-17-03	03-17-03
W03113	WC.2003.773.8		Sulfate	1620	mg / L	100	0.05		03-31-03	03-31-03

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **EMPIRE ABO**
Order: **0303291** **RTHC01** Receipt: **03-17-03**

Sample: ***MW-3-2*** Collected: *03-13-03 9:10:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-04A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.22	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.22	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.22	71-43-2	Benzene	2.8	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.22	100-41-4	Ethylbenzene	2.9	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.22	91-20-3	Naphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.22	95-47-6	o-Xylene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.22	108-38-3/106-42	p/m-Xylenes	3.5	ug / L	1	2		03-20-03	03-20-03
X03113	XG.2003.489.22	108-88-3	Toluene	1.4	ug / L	1	1		03-20-03	03-20-03
0303291-04B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.8		Total Dissolved Solids	3390	mg/L	1	10		03-17-03	03-18-03

Sample: ***MW-2-15*** Collected: *03-13-03 10:10:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-05A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.23	90-12-0	1-Methylnaphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.23	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.23	71-43-2	Benzene	120	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.23	100-41-4	Ethylbenzene	30	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.23	91-20-3	Naphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.23	95-47-6	o-Xylene	ND	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.23	108-38-3/106-42	p/m-Xylenes	34	ug / L	5	2		03-20-03	03-20-03
X03113	XG.2003.489.23	108-88-3	Toluene	5.3	ug / L	5	1		03-20-03	03-20-03
0303291-05B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.9		Total Dissolved Solids	3080	mg/L	1	10		03-17-03	03-18-03

Sample: ***MW-2-14*** Collected: *03-13-03 11:30:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-06A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.24	90-12-0	1-Methylnaphthalene	47	ug / L	1	5	1	03-20-03	03-20-03
X03113	XG.2003.489.24	91-57-6	2-Methylnaphthalene	10	ug / L	1	5	1	03-20-03	03-20-03
X03113	XG.2003.489.24	71-43-2	Benzene	24	ug / L	1	1	1	03-20-03	03-20-03
X03113	XG.2003.489.24	100-41-4	Ethylbenzene	4.0	ug / L	1	1	1	03-20-03	03-20-03
X03113	XG.2003.489.24	91-20-3	Naphthalene	7.0	ug / L	1	5	1	03-20-03	03-20-03
X03113	XG.2003.489.24	95-47-6	o-Xylene	ND	ug / L	1	1	1	03-20-03	03-20-03

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **EMPIRE ABO**
Order: **0303291** **RTHC01** Receipt: **03-17-03**

Sample: ***MW-2-14*** Collected: *03-13-03 11:30:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-06A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.24	108-38-3/106-42	p/m-Xylenes	49	ug / L	1	2	1	03-20-03	03-20-03
X03113	XG.2003.489.24	108-88-3	Toluene	1.9	ug / L	1	1	1	03-20-03	03-20-03
0303291-06B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.10		Total Dissolved Solids	2830	mg/L	1	10		03-17-03	03-18-03

Sample: ***MW-3-3*** Collected: *03-13-03 12:50:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303291-07A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.25	90-12-0	1-Methylnaphthalene	ND	ug / L	50	5		03-20-03	03-20-03
X03113	XG.2003.489.25	91-57-6	2-Methylnaphthalene	ND	ug / L	50	5		03-20-03	03-20-03
X03113	XG.2003.489.25	71-43-2	Benzene	2800	ug / L	50	1		03-20-03	03-20-03
X03113	XG.2003.489.25	100-41-4	Ethylbenzene	820	ug / L	50	1		03-20-03	03-20-03
X03113	XG.2003.489.25	91-20-3	Naphthalene	ND	ug / L	50	5		03-20-03	03-20-03
X03113	XG.2003.489.25	95-47-6	o-Xylene	ND	ug / L	50	1		03-20-03	03-20-03
X03113	XG.2003.489.25	108-38-3/106-42	p/m-Xylenes	750	ug / L	50	2		03-20-03	03-20-03
X03113	XG.2003.489.25	108-88-3	Toluene	98	ug / L	50	1		03-20-03	03-20-03
0303291-07B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.11		Total Dissolved Solids	2800	mg/L	1	10		03-17-03	03-18-03

Unless otherwise noted, all samples were received in acceptable condition and all sampling was performed by client or client representative. Sample result of ND indicates Not Detected, ie result is less than the sample specific Detection Limit. Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. All results relate only to the items tested. Any miscellaneous workorder information or foonotes will appear below.

[1] Sample pH at the time of analysis was greater than 2, exceeding QA/QC criteria.

Explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

RT HICKS CONSULTING. LTD
attn ANDREW PARKER
219 CENTRAL AVE.. NW. STE 266
ALBUQUERQUE NM 87102

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **SCOGGIN DRAW**
Order: **0303298** **RTHC01** Receipt: **03-17-03**

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Sample: ***SD-8*** Collected: *03-12-03 11:40:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-01A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.33	90-12-0	1-Methylnaphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.33	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.33	71-43-2	Benzene	760	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.33	100-41-4	Ethylbenzene	270	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.33	91-20-3	Naphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.33	95-47-6	o-Xylene	170	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.33	108-38-3/106-42	p/m-Xylenes	430	ug / L	5	2		03-20-03	03-20-03
X03113	XG.2003.489.33	108-88-3	Toluene	39	ug / L	5	1		03-20-03	03-20-03
0303298-01B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.12		Total Dissolved Solids	3990	mg/L	1	10		03-17-03	03-18-03
0303298-01B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.14	16887-00-6	Chloride	583	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-11*** Collected: *03-14-03 9:10:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-02A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.29	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.29	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.29	71-43-2	Benzene	ND	ug / L	1	1		03-20-03	03-20-03

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **SCOGGIN DRAW**
Order: **0303298** **RTHC01** Receipt: **03-17-03**

Sample: ***SD-11*** Collected: *03-14-03 9:10:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-02A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.29	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.29	91-20-3	Naphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.29	95-47-6	o-Xylene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.29	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-20-03	03-20-03
X03113	XG.2003.489.29	108-88-3	Toluene	ND	ug / L	1	1		03-20-03	03-20-03
0303298-02B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.13		Total Dissolved Solids	3000	mg/L	1	10		03-17-03	03-18-03
0303298-02B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.15	16887-00-6	Chloride	41.7	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-14*** Collected: *03-14-03 9:40:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-03A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.30	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.30	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.30	71-43-2	Benzene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.30	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.30	91-20-3	Naphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.30	95-47-6	o-Xylene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.30	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-20-03	03-20-03
X03113	XG.2003.489.30	108-88-3	Toluene	ND	ug / L	1	1		03-20-03	03-20-03
0303298-03B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.14		Total Dissolved Solids	2950	mg/L	1	10		03-17-03	03-18-03
0303298-03B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.16	16887-00-6	Chloride	39.1	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-10*** Collected: *03-14-03 11:04:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-04A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.32	90-12-0	1-Methylnaphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.32	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.32	71-43-2	Benzene	220	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.32	100-41-4	Ethylbenzene	ND	ug / L	5	1		03-20-03	03-20-03

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **SCOGGIN DRAW**
Order: **0303298** **RTHC01** Receipt: **03-17-03**

Sample: ***SD-10*** Collected: *03-14-03 11:04:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-04A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.32	91-20-3	Naphthalene	ND	ug / L	5	5		03-20-03	03-20-03
X03113	XG.2003.489.32	95-47-6	o-Xylene	ND	ug / L	5	1		03-20-03	03-20-03
X03113	XG.2003.489.32	108-38-3/106-42	p/m-Xylenes	19	ug / L	5	2		03-20-03	03-20-03
X03113	XG.2003.489.32	108-88-3	Toluene	7.8	ug / L	5	1		03-20-03	03-20-03
0303298-04B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.15		Total Dissolved Solids	4480	mg/L	1	10		03-17-03	03-18-03
0303298-04B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.17	16887-00-6	Chloride	795	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-13*** Collected: *03-14-03 10:40:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-05A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JAA		
X03113	XG.2003.489.31	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.31	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.31	71-43-2	Benzene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.31	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.31	91-20-3	Naphthalene	ND	ug / L	1	5		03-20-03	03-20-03
X03113	XG.2003.489.31	95-47-6	o-Xylene	ND	ug / L	1	1		03-20-03	03-20-03
X03113	XG.2003.489.31	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-20-03	03-20-03
X03113	XG.2003.489.31	108-88-3	Toluene	1.1	ug / L	1	1		03-20-03	03-20-03
0303298-05B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.16		Total Dissolved Solids	2940	mg/L	1	10		03-17-03	03-18-03
0303298-05B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.18	16887-00-6	Chloride	28.2	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-12*** Collected: *03-14-03 11:15:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-06A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.13	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.13	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.13	71-43-2	Benzene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.13	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.13	91-20-3	Naphthalene	ND	ug / L	1	5		03-25-03	03-25-03

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **SCOGGIN DRAW**
Order: **0303298** **RTHC01** Receipt: **03-17-03**

Sample: ***SD-12*** Collected: *03-14-03 11:15:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-06A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.13	95-47-6	o-Xylene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.13	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-25-03	03-25-03
X03123	XG.2003.513.13	108-88-3	Toluene	ND	ug / L	1	1		03-25-03	03-25-03
0303298-06B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.17		Total Dissolved Solids	4150	mg/L	1	10		03-17-03	03-18-03
0303298-06B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.19	16887-00-6	Chloride	676	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-7*** Collected: *03-14-03 12:15:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-07A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.3	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-24-03	03-24-03
X03123	XG.2003.513.3	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-24-03	03-24-03
X03123	XG.2003.513.3	71-43-2	Benzene	ND	ug / L	1	1		03-24-03	03-24-03
X03123	XG.2003.513.3	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-24-03	03-24-03
X03123	XG.2003.513.3	91-20-3	Naphthalene	ND	ug / L	1	5		03-24-03	03-24-03
X03123	XG.2003.513.3	95-47-6	o-Xylene	ND	ug / L	1	1		03-24-03	03-24-03
X03123	XG.2003.513.3	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-24-03	03-24-03
X03123	XG.2003.513.3	108-88-3	Toluene	ND	ug / L	1	1		03-24-03	03-24-03
0303298-07B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.18		Total Dissolved Solids	3640	mg/L	1	10		03-17-03	03-18-03
0303298-07B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.20	16887-00-6	Chloride	503	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-4*** Collected: *03-14-03 13:10:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-08A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.4	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-24-03	03-24-03
X03123	XG.2003.513.4	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-24-03	03-24-03
X03123	XG.2003.513.4	71-43-2	Benzene	ND	ug / L	1	1		03-24-03	03-24-03
X03123	XG.2003.513.4	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-24-03	03-24-03
X03123	XG.2003.513.4	91-20-3	Naphthalene	ND	ug / L	1	5		03-24-03	03-24-03
X03123	XG.2003.513.4	95-47-6	o-Xylene	ND	ug / L	1	1		03-24-03	03-24-03

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **SCOGGIN DRAW**
Order: **0303298** **RTHC01** Receipt: **03-17-03**

Sample: ***SD-4*** Collected: *03-14-03 13:10:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-08A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.4	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-24-03	03-24-03
X03123	XG.2003.513.4	108-88-3	Toluene	ND	ug / L	1	1		03-24-03	03-24-03
0303298-08B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.19		Total Dissolved Solids	3290	mg/L	1	10		03-17-03	03-18-03
0303298-08B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.21	16887-00-6	Chloride	328	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-9*** Collected: *03-14-03 14:00:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-09A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.14	90-12-0	1-Methylnaphthalene	8.0	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.14	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.14	71-43-2	Benzene	8.2	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.14	100-41-4	Ethylbenzene	1.3	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.14	91-20-3	Naphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.14	95-47-6	o-Xylene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.14	108-38-3/106-42	p/m-Xylenes	72	ug / L	1	2		03-25-03	03-25-03
X03123	XG.2003.513.14	108-88-3	Toluene	ND	ug / L	1	1		03-25-03	03-25-03
0303298-09B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.20		Total Dissolved Solids	3580	mg/L	1	10		03-17-03	03-18-03
0303298-09B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.22	16887-00-6	Chloride	530	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-2*** Collected: *03-14-03 14:45:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-10A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.7	90-12-0	1-Methylnaphthalene	ND	ug / L	5	5		03-24-03	03-24-03
X03123	XG.2003.513.7	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		03-24-03	03-24-03
X03123	XG.2003.513.18	71-43-2	Benzene	980	ug / L	10	1		03-25-03	03-25-03
X03123	XG.2003.513.7	100-41-4	Ethylbenzene	290	ug / L	5	1		03-24-03	03-24-03
X03123	XG.2003.513.7	91-20-3	Naphthalene	27	ug / L	5	5		03-24-03	03-24-03
X03123	XG.2003.513.7	95-47-6	o-Xylene	86	ug / L	5	1		03-24-03	03-24-03

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **SCOGGIN DRAW**
Order: **0303298** **RTHC01** Receipt: **03-17-03**

Sample: ***SD-2*** Collected: *03-14-03 14:45:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-10A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.7	108-38-3/106-42	p/m-Xylenes	440	ug / L	5	2		03-24-03	03-24-03
X03123	XG.2003.513.7	108-88-3	Toluene	15	ug / L	5	1		03-24-03	03-24-03
0303298-10B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.21		Total Dissolved Solids	4320	mg/L	1	10		03-17-03	03-18-03
0303298-10B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.24	16887-00-6	Chloride	745	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-3-CENTRAL*** Collected: *03-14-03 15:20:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-11A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.514.10	90-12-0	1-Methylnaphthalene	ND	ug / L	5	5		03-24-03	03-24-03
X03123	XG.2003.514.10	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		03-24-03	03-24-03
X03123	XG.2003.514.10	71-43-2	Benzene	720	ug / L	5	1		03-24-03	03-24-03
X03123	XG.2003.514.10	100-41-4	Ethylbenzene	87	ug / L	5	1		03-24-03	03-24-03
X03123	XG.2003.514.10	91-20-3	Naphthalene	ND	ug / L	5	5		03-24-03	03-24-03
X03123	XG.2003.514.10	95-47-6	o-Xylene	ND	ug / L	5	1		03-24-03	03-24-03
X03123	XG.2003.514.10	108-38-3/106-42	p/m-Xylenes	110	ug / L	5	2		03-24-03	03-24-03
X03123	XG.2003.514.10	108-88-3	Toluene	ND	ug / L	5	1		03-24-03	03-24-03
0303298-11B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.22		Total Dissolved Solids	4220	mg/L	1	10		03-17-03	03-18-03
0303298-11B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.25	16887-00-6	Chloride	526	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-6*** Collected: *03-14-03 16:05:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-12A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.15	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.15	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.15	71-43-2	Benzene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.15	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.15	91-20-3	Naphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.15	95-47-6	o-Xylene	ND	ug / L	1	1		03-25-03	03-25-03

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **SCOGGIN DRAW**
Order: **0303298** **RTHC01** Receipt: **03-17-03**

Sample: ***SD-6*** Collected: *03-14-03 16:05:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-12A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.15	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		03-25-03	03-25-03
X03123	XG.2003.513.15	108-88-3	Toluene	ND	ug / L	1	1		03-25-03	03-25-03
0303298-12B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.23		Total Dissolved Solids	4740	mg/L	1	10		03-17-03	03-18-03
0303298-12B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.26	16887-00-6	Chloride	1100	mg / L	100	0.05		03-31-03	03-31-03

Sample: ***SD-5*** Collected: *03-14-03 16:20:00* By: *AP*
Matrix: ***AQ***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0303298-13A		**SW846 8260B Purgeable VOCs by GC/MS**						By:DR/JAA		
X03123	XG.2003.513.16	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.16	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.16	71-43-2	Benzene	9.4	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.16	100-41-4	Ethylbenzene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.16	91-20-3	Naphthalene	ND	ug / L	1	5		03-25-03	03-25-03
X03123	XG.2003.513.16	95-47-6	o-Xylene	ND	ug / L	1	1		03-25-03	03-25-03
X03123	XG.2003.513.16	108-38-3/106-42	p/m-Xylenes	7.8	ug / L	1	2		03-25-03	03-25-03
X03123	XG.2003.513.16	108-88-3	Toluene	ND	ug / L	1	1		03-25-03	03-25-03
0303298-13B		**EPA 160.1 Total Dissolved Solids**						By: MVR		
WTDS-03-013	WC.2003.643.24		Total Dissolved Solids	4170	mg/L	1	10		03-17-03	03-18-03
0303298-13B		**EPA 300.0 Anions by IC**						By: MDE		
W03113	WC.2003.773.27	16887-00-6	Chloride	832	mg / L	100	0.05		03-31-03	03-31-03

Unless otherwise noted, all samples were received in acceptable condition and all sampling was performed by client or client representative. Sample result of ND indicates Not Detected, ie result is less than the sample specific Detection Limit. Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. All results relate only to the items tested. Any miscellaneous workorder information or foonotes will appear below.

bp

Margaret J. Lowe
Senior Environmental Engineer
Permian Performance Unit

BP America Production Company
600 N. Marienfeld
Suite 869
PO Box 1610
Midland, TX 79701

June 10, 2002

Mr. Jack Ford
New Mexico Oil Conservation Division
2040 South Pacheco Street
Santa Fe, NM 87505

Re: Submittal of EAGP's 2001 Groundwater Monitoring Report (Discharge Plan GW-022) and Request to Terminate Discharge Plan

VIA Electronic Mail

Direct: (915) 688-5799
Cell: (915) 556-5322
Pager: 800 738-9633
Main: (915) 688-5200
Fax: (915) 688-7258
Lowemj1@bp.com

Dear Jack:

The attached report from R.T. Hicks Consultants presents results from the July and December 2001 sampling programs. The sampling program is consistent with the monitoring requirements of the above-referenced, approved Discharge Plan. Because you preferred our report in an electronic version, Hicks Consultants is submitting Appendix B (laboratory result sheets) separately.

After examining the data in this report and reflecting upon the data presented in our discharge plan renewal, we believe that the plant does not pose the potential to impact "waters of the State". Therefore, we do not believe that the WQCC Regulations apply to the site. We recognize that the environmental mandates specified in the New Mexico Oil and Gas Act do apply to the Empire Abo Plant. As the report indicates, most of the monitoring wells at the site have been rendered relatively useless due to a rise in water level elevations.

We propose to plug and abandon the existing monitor well network upon NMOCD concurrence with the recommendations of Hicks Consultants. If required by NMOCD, we will prepare a Best Management Practices Plan to demonstrate compliance with NMOCD Rules and Orders. If you have any questions regarding these data, please contact me.

Sincerely,

Margaret J. Lowe
Sr. Environmental Engineer

cc: Elkhorn Field Services
R.T. Hicks Consultants Ltd.
File 43A3d

EMPIRE ABO GASOLINE PLANT: 2001 WATER MONITORING REPORT

Prepared for:

PERMIAN PERFORMANCE UNIT
BP AMERICA PRODUCTION COMPANY
600 N Marienfeld
Midland, TX 79701

R. T. Hicks Consultants, Ltd.
4665 Indian School #106
Albuquerque, NM 87110

Table of Contents

Purpose and Scope

BP America Production Company, Permian Performance Unit, has contracted R. T. Hicks Consultants (Hicks Consultants) to sample perched water beneath the Empire Abo Gas Plant (EAGP) semi-annually and to prepare annual monitoring reports based on results. This document summarizes perched-water data collected during July and December 2001 and serves as BP's 2001 Groundwater Monitoring Report. The semi-annual water monitoring and annual report are part of the New Mexico Oil Conservation Division (NMOCD) Groundwater Discharge Permit (GW-22) requirements for EAGP. We also evaluated the results from recent monitoring to determine if data support termination of the Discharge Plan for the Empire Abo Plant and plugging and abandonment of the existing monitoring wells.

In July 2001, Hicks Consultants collected water samples from MW-2 and MW-8. In December2001, we collected water samples from MW 3-3, MW-8, MW 3-1, MW-2, MW 2-15, MW 3-2 and MW 2-14. We submitted all samples to Assaigai Analytical Laboratories, Inc., for chemical analysis. Appendix A provides Assaigai's analytical reports. In addition to sampling, we measured depth to water and separate phase hydrocarbon (SPH) thickness at all EAGP monitoring wells in December 2001.

Site Background

Amoco, the previous owner of the Empire Abo Gas Plant (EAGP), initiated a subsurface investigation at the facility in 1991 in order to assess the impact of petroleum releases on water beneath the plant. As part of their investigation, they drilled 31 borings, completing 27 of the borings as monitoring wells. In addition to using these monitoring wells to assess changes in water chemistry and SPH thickness, Amoco installed petroleum and fluid recovery pumps in many of the monitoring wells to remove petroleum from the subsurface. In 1996, ARCO Permian (now the Permian Performance Unit of BP America Production Company) purchased the gas plant from Amoco.

In 1998, BP submitted a discharge plan renewal application. Data and analysis in this renewal application demonstrate that subsurface hydrocarbons pose no threat to human health or the environment. Data in the renewal application suggested that ground water, as defined by New Mexico statute and regulation, does not exist at or adjacent to the Plant. The data were sufficient to permit BP to remove the inefficient recovery pumps from the monitoring wells. However, the approved discharge plan requires BP to continue monitoring perched-water chemistry and changes in SPH thickness and perched-water elevations. The discharge plan mandates that BP remove SPH from monitoring wells showing more than half a foot of SPH.

Perched Water and SPH Thickness

Figures 1 through 3 show SPH and perched-water elevation data from 1991 through 2001 for several monitoring wells. Many of these monitoring wells show a significant increase in water elevation after 1998, the year BP terminated the fluid recovery program. Table B-1 in Appendix B presents perched-water and SPH elevation data collected from November 1996 through December 2001.

Because the fluid recovery program was terminated in 1998, we compared 2001 fluid level data to December 1998 fluid level data, as we did in the 2000 Monitoring Report. Results of this comparison, which are summarized in Figure 4 and Table 1, are essentially identical to those reported for 2000. Figure 4 is a bar graph showing the number of monitoring wells with increasing or decreasing water elevations. Since 1998, water levels have risen more than 10 feet in 38% of the existing 26 monitoring wells (50% using 2000 data). Fifteen percent of the

monitoring wells showed an increase between 10 and 5 feet, and another 35% displayed an increase less than 5 feet. Only one well (MW 2-9) showed a water elevation decline, the same well as in 2000.

Table 1 summarizes changes in SPH thickness and water elevations between 1998 and 2001. The table also provides the total depth and depth to top of screen for each monitoring well and identifies monitoring wells with a water level above the top of screen. In December 1998, water elevation was above the top of screen in 8 monitoring wells. In November 2000, this number increased to 19. As of December 2001, the fluid level in 16 wells is higher than the top of the screen.

As stated in our 2000 report, monitoring wells with water elevation above the top of screen are of limited use in assessing changes in SPH thickness because SPH is less dense than water and hence floats atop the water table. Therefore, in wells where the water table is above top of screen SPH cannot enter the monitoring well. Due to this limitation, we cannot assess changes in SPH for most of the 26 monitoring wells. In Table 1, these locations are identified by an "above screen" entry in the "Change in SPH Thickness" column.

For those wells where the fluid level is below the top of the screen, only five monitoring wells show SPH. These wells are MW-6, MW 2-9, MW 2-13, MW 3-3, and MW 3-4. With the exception of MW 2-9, the SPH thickness decreased in all wells. The following six wells show no SPH and the fluid level is below the top of the screen: MW-2, MW-3, MW-4, MW 2-4, MW 2-6 and MW 2-11.

Perched-Water Chemistry

The Groundwater Discharge Permit (GW-22) requires EAGP to sample the following wells provided that SPH is not evident in the well:

MW-2, MW-8, MW 2-8, MW 2-14, MW 2-15, MW 3-2 and MW 3-3.

In July 2001, we collected water samples from MW-2 and MW-8. With the exception of MW 2-8, we collected water samples from the required monitoring wells listed above in December2001. Because MW 2-8 was destroyed, we sampled MW 3-3 in its place.

Table 2 presents benzene, toluene, ethylbenzene, total xylene (BTEX) and total dissolved solids (TDS) data for water samples collected in 2001. Appendix A contains a complete chemical analysis of each water sample.

BTEX was below detection limits at MW-2, which we consider a background well, and MW-8. MW 3-3 continues to show the highest benzene concentration, 3.1 ppm. This monitoring well is located northeast of the welding shop. With the exception of MW 3-2, which is now below ground water standards, most wells display a relatively consistent hydrocarbon chemistry.

As discussed in our 2000 report, MW 2-14, MW 2-15, and MW 3-2 have contained SPH. Recent data show an apparent decline of benzene concentration at these monitoring wells. This apparent decline of benzene concentration is most likely a consequence of an increase in perched-water elevations. In 1998, water was below the top of screen at these monitoring wells. Since that time, water has raised an average of 16.6 feet at these locations and is currently well above the top each well's screen. Recent water samples collected at these wells represent perched-water from a greater depth beneath the water table and any potential floating product than previous samples. Therefore, we would expect them to show lower concentrations of petroleum constituents.

We also examined TDS values over time for MW-2, MW-8 and MW 3-3. From 1997 to 2001, the average TDS concentrations for these wells were 2,920, 3,542, and 2,315 mg/L, respectively.

As discussed in our 2000 report, from 1991 to 1997, previous workers did not analyze samples for TDS. We do have 1993 data for chloride and sulfate from selected wells. These data are in Table 2. The data suggest that the overall chemistry of MW-2 and MW-8 have not changed significantly over time. The data also show that the sum of chloride plus sulfate is greater than the measured TDS for the 1999 samples. We attribute this apparent anomaly to a failure of the TDS analytical method to capture dissolved hydrogen sulfide in the analysis and that the sulfate analytical method and sampling protocol permits detection of dissolved hydrogen sulfide as sulfate.

Monitoring wells listed in Table 2 have similar TDS values. The TDS concentrations of these monitoring wells are above the Water Quality Control Commission (WQCC) standard for domestic water supply. The average TDS concentration of the wells listed in Table 2 is 3,239 mg/L with a standard deviation of 568 mg/L.

Water Use at Empire Abo Gasoline Plant

BP's Groundwater Discharge Permit (GW-22) also requires submission of water use statistics in the annual groundwater monitoring report. Below are the 2001 water use statistics.

EAGP purchased 893,149 barrels (bbls) of water from the Caprock Water System. Of that water, EAGP piped 104,385 bbls to their injection well and hired I&W to transport 1,285 bbls for disposal at the Walter Solt Salt Water Disposal Injection Well. The remainder evaporated during gas processing or in the evaporation pond.

Conclusions and Recommendations

Perched-water elevations have increased significantly in many of the monitoring wells since the termination of the fluid recovery program in 1998. Because water elevations are above the top of screen in many of the monitoring wells, the majority of the monitoring wells can no longer be used to assess changes in SPH thickness. In addition, water samples from wells where water elevation is above the top of screen will be collected at depths well below the water table rather than at the water table where changes in chemistry should be monitored.

We recommend that BP terminate their Groundwater Discharge Permit. Hicks Consultants contends that water beneath the EAGP is perched and originates from facility operations. The perched water is captured on individual clay lenses and is not laterally continuous. We conclude that the water beneath the Empire Abo Plant does not fit the definition of "waters of the State" and are "private waters" as defined by NM Statute and Regulation. We contend that WQCC regulations do not apply to the site. However, the environmental mandates established by the NM Oil and Gas Act and the NMOCD Rules and Regulations do apply to the site.

We conclude that dissolved petroleum constituents and SPH beneath the Empire Abo Plant do not pose a risk to human health and the environment. We propose plugging and abandonment of all wells.

Tables

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2	**3548.50**	**3526.00**	Dec-01	x	33.81	x	3514.69	0	
			Jul-01	x	33.77	x	3514.73	0	
			Nov-00	x	32.91	x	3515.59	0	
			Dec-99	x	33.92	x	3514.58	0	
			Dec-98	x	33.90	x	3514.60	0	
			Dec-97	x	33.86	x	3514.64	0	
			Nov-96	x	33.62	x	3514.88	0	
			Dec-95	x	33.79	x	3514.71	0	
			Nov-94	x	33.12	x	3515.38	0	
			Dec-93	x	23.80	x	3524.70	0	
			Oct-92	x	27.00	x	3521.50	0	
3	**3555.70**	**3484.20**	Dec-01	x	71.66	x	3484.04	0	
			Jul-01	x	69.35	x	3486.35	0	above screen
			Nov-00	x	68.23	x	3487.47	0	above screen
			Dec-99	73.98	74.10	3474.52	3481.60	0.12	
			Dec-98	77.00	77.11	3471.5	3478.59	0.11	
			Dec-97	74.10	77.02	3474.4	3478.68	2.92	
			Nov-96	72.27	77.60	3476.23	3478.10	5.33	
			Dec-95	77.99	81.18	3470.51	3474.52	3.19	
			Nov-94	78.28	81.75	3470.22	3473.95	3.47	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	72.00	x	3483.70	nm	
4	**3551.30**	**3503.80**	Dec-01	x	52.16	x	3499.14	0	
			Jul-01	nm	52.48	x	3498.82	nm	
			Nov-00	x	53.00	x	3498.30	0	
			Dec-99	x	52.45	x	3498.85	0	
			Dec-98	x	60.69	x	3490.61	0	
			Dec-97	nm	nm	x	nm	nm	above screen
			Nov-96	x	56.84	x	3494.46	0	
			Dec-95	52.94	52.95	3495.56	3498.35	0.01	
			Nov-94	57.2	57.23	3491.3	3494.07	0.03	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	34	x	3517.30	0	above screen

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
5	3543.90	3469.90	Dec-01	x	59.76	x	3484.14	0	above screen
			Jul-01	nm	59.76	x	3484.14	nm	above screen
			Nov-00	x	59.55	x	3484.35	0	above screen
			Dec-99	x	64.10	x	3479.80	0	above screen
			Dec-98	x	71.31	x	3472.59	0	above screen
			Dec-97	69.08	69.34	3479.42	3474.56	0.26	above screen
			Nov-96	69.19	69.79	3479.31	3474.11	0.6	above screen
			Dec-95	70.1	70.25	3478.4	3473.65	0.15	above screen
			Nov-94	70.05	70.08	3478.45	3473.82	0.03	above screen
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	71	x	3472.90	0	above screen
6	3544.90	3511.90	Dec-01	40.69	41.75	3507.81	3503.15	1.06	
			Jul-01	39.8	41.28	3508.7	3503.62	1.48	
			Nov-00	x	36.28	x	3508.62	0	
			Dec-99	nm	nm	x	nm	nm	above screen
			Dec-98	x	46.38	x	3498.52	0	
			Dec-97	40.15	45.75	3508.35	3499.15	5.6	
			Nov-96	39.29	45.51	3509.21	3499.39	6.22	
			Dec-95	41.46	45.65	3507.04	3499.25	4.19	
			Nov-94	42.33	46.54	3506.17	3498.36	4.21	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	42	x	3502.90	nm	
7	3546.90	3533.40	Dec-01	x	9.11	x	3537.79	0	above screen
			Jul-01	x	8.24	x	3538.66	0	above screen
			Nov-00	x	6.68	x	3540.22	0	above screen
			Dec-99	x	7.35	x	3539.55	0	above screen
			Dec-98	x	9.14	x	3537.76	0	above screen
			Dec-97	x	8.27	x	3538.63	0	above screen
			Nov-96	x	8.78	x	3538.12	0	above screen
			Dec-95	8.1	8.25	3540.4	3538.65	0.15	above screen
			Nov-94	8.46	8.6	3540.04	3538.30	0.14	above screen
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	16	x	3530.90	0	

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
8	**3544.10**	**3472.10**	Dec-01	x	56.46	x	3487.64	0	above screen
			Jul-01	x	56.85	x	3487.25	0	above screen
			Nov-00	x	56.60	x	3487.50	0	above screen
			Dec-99	x	64.50	x	3479.60	0	above screen
			Dec-98	x	70.81	x	3473.29	0	above screen
			Dec-97	x	68.75	x	3475.35	0	above screen
			Nov-96	x	68.05	x	3476.05	0	above screen
			Dec-95	x	69.49	x	3474.61	0	above screen
			Nov-94	nm	68.73	x	3475.37	nm	above screen
			Dec-93	x	68.6	x	3475.50	0	above screen
			Oct-92	x	76	x	3468.10	0	
9	**3543.20**	**3488.70**	Dec-01	44.32	44.75	3504.18	3498.45	0.43	above screen
			Jul-01	45.52	46.21	3502.98	3496.99	0.69	above screen
			Nov-00	43.98	44.24	3504.52	3498.96	0.26	above screen
			Dec-99	45.12	45.42	3503.38	3497.78	0.3	above screen
			Dec-98	62.12	63.92	3486.38	3479.28	1.8	
			Dec-97	59.21	59.64	3489.29	3483.56	0.43	
			Nov-96	58.54	59.02	3489.96	3484.18	0.48	
			Dec-95	nm	60.88	x	3482.32	nm	
			Nov-94	59.21	59.62	3489.29	3483.58	0.24	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	50	x	3493.20	nm	above screen
2-2	**3552.55**	**3514.55**	Dec-01	x	26.97	x	3525.58	0	above screen
			Jul-01	x	27.04	x	3525.51	0	above screen
			Nov-00	x	25.28	x	3527.27	0	above screen
			Dec-99	x	26.75	x	3525.80	0	above screen
			Dec-98	x	26.85	x	3525.70	0	above screen
			Dec-97	x	26.88	x	3525.67	0	above screen
			Nov-96	x	26.92	x	3525.63	0	above screen
			Dec-95	x	27.42	x	3525.13	0	above screen
			Nov-94	x	27.05	x	3525.50	0	above screen
			Dec-93	x	26.9	x	3525.65	0	above screen
			Oct-92	x	27	x	3525.55	0	above screen

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-3	**3557.98**	**3459.98**	Dec-01	x	74.02	x	3483.96	0	above screen
			Jul-01	x	73.25	x	3484.73	0	above screen
			Nov-00	x	73.42	x	3484.56	0	above screen
			Dec-99	x	78.53	x	3479.45	0	above screen
			Dec-98	x	83.51	x	3474.47	0	above screen
			Dec-97	x	82.11	x	3475.87	0	above screen
			Nov-96	x	82.32	x	3475.66	0	above screen
			Dec-95	nm	83.5	x	3474.48	nm	above screen
			Nov-94	nm	83.4	x	3474.58	nm	above screen
			Dec-93	x	84	x	3473.98	0	above screen
			Oct-92	x	97	x	3460.98	0	above screen
2-4	**3554.09**	**3506.09**	Dec-01	x	53.65	x	3500.44	0	
			Jul-01	x	53.82	x	3500.27	0	
			Nov-00	x	51.76	x	3502.33	0	
			Dec-99	x	53.02	x	3501.07	0	
			Dec-98	x	53.11	x	3500.98	0	
			Dec-97	x	52.69	x	3501.40	0	
			Nov-96	x	52.52	x	3501.57	0	
			Dec-95	x	54.06	x	3500.03	0	
			Nov-94	nm	55.57	x	3498.52	nm	
			Dec-93	x	54.2	x	3499.89	0	
			Oct-92	x	50	x	3504.09	0	
2-5	**3553.00**	**3510.00**	Dec-01	x	27.73	x	3525.27	0	above screen
			Jul-01	x	27.81	x	3525.19	0	above screen
			Nov-00	x	26.78	x	3526.22	0	above screen
			Dec-99	x	27.60	x	3525.40	0	above screen
			Dec-98	x	29.42	x	3523.58	0	above screen
			Dec-97	x	27.50	x	3525.50	0	above screen
			Nov-96	x	27.50	x	3525.50	0	above screen
			Dec-95	x	27.89	x	3525.11	0	above screen
			Nov-94	x	27.37	x	3525.63	0	above screen
			Dec-93	x	27.2	x	3525.80	0	above screen
			Oct-92	x	45	x	3508.00	0	

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-6	**3551.11**	**3537.11**	Dec-01	x	18.11	x	3533.00	0	
			Jul-01	16.69	16.71	3531.81	3534.40	0.02	
			Nov-00	9.58	9.61	3538.92	3541.50	0.03	above screen
			Dec-99	7.6	8.60	3540.9	3542.51	1	above screen
			Dec-98	18.22	18.26	3530.28	3532.85	0.04	
			Dec-97	15.45	16.52	3533.05	3534.59	1.07	
			Nov-96	21.81	22.22	3526.69	3528.89	0.41	
			Dec-95	21.3	23.02	3527.2	3528.09	1.72	
			Nov-94	19.46	22.76	3529.04	3528.35	3.3	
			Dec-93	x	11.6	x	3539.51	0	above screen
			Oct-92	x	17	x	3534.11	0	
2-7	**3547.34**	**3491.34**	Dec-01	x	49.80	x	3497.54	0	above screen
			Jul-01	x	50.21	x	3497.13	0	above screen
			Nov-00	x	47.61	x	3499.73	0	above screen
			Dec-99	x	49.40	x	3497.94	0	above screen
			Dec-98	nm	nm	x	nm	nm	above screen
			Dec-97	nm	nm	x	nm	nm	above screen
			Nov-96	nm	nm	x	nm	nm	above screen
			Dec-95	63.8	63.92	3484.7	3483.42	0.12	
			Nov-94	62.72	62.72	3485.78	3484.62	0	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	55	x	3492.34	nm	above screen
2-9	**3546.81**	**3513.81**	Dec-01	35.41	38.94	3513.09	3507.87	3.53	
			Jul-01	35.34	37.65	3513.16	3509.16	2.31	
			Nov-00	36.76	39.85	3511.74	3506.96	3.09	
			Dec-99	34.75	36.80	3513.75	3510.01	2.05	
			Dec-98	35.90	39.00	3512.6	3507.81	3.1	
			Dec-97	35.25	39.03	3513.25	3507.78	3.78	
			Nov-96	35.3	38.75	3513.2	3508.06	3.45	
			Dec-95	34.15	39.22	3514.35	3507.59	5.07	
			Nov-94	34.71	39.35	3513.79	3507.46	4.64	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	32	x	3514.81	nm	above screen

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-10	**3548.67**	**3480.67**	Dec-01	61.06	61.57	3487.44	3487.10	0.51	above screen
			Jul-01	60.21	61.86	3488.29	3486.81	1.65	above screen
			Nov-00	59.15	61.81	3489.35	3486.86	2.66	above screen
			Dec-99	63.23	68.25	3485.27	3480.42	5.02	
			Dec-98	73.00	75.92	3475.5	3472.75	2.92	
			Dec-97	68.35	72.65	3480.15	3476.02	4.3	
			Nov-96	68.98	73.75	3479.52	3474.92	4.77	
			Dec-95	70.1	76.54	3478.4	3472.13	6.44	
			Nov-94	69.32	76.21	3479.18	3472.46	6.89	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	64	x	3484.67	nm	above screen
2-11	**3547.06**	**3534.06**	Dec-01	x	22.95	x	3524.11	0	
			Jul-01	x	21.95	x	3525.11	0	
			Nov-00	17.20	18.57	3531.3	3528.49	1.37	
			Dec-99	20.72	21.22	3527.78	3525.84	0.5	
			Dec-98	x	23.36	x	3523.70	0	
			Dec-97	21.99	22.43	3526.51	3524.63	0.44	
			Nov-96	x	23.21	x	3523.85	0	
			Dec-95	22.92	23.12	3525.58	3523.94	0.2	
			Nov-94	22.31	23.05	3526.19	3524.01	0.74	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	17	x	3530.06	nm	
2-12	**3543.40**	**3470.40**	Dec-01	60.80	60.82	3487.7	3482.58	0.02	above screen
			Jul-01	60.6	60.73	3487.9	3482.67	0.13	above screen
			Nov-00	60.56	61.00	3487.94	3482.40	0.44	above screen
			Dec-99	65.50	66.90	3483	3476.50	1.4	above screen
			Dec-98	65.90	73.61	3482.6	3469.79	7.71	
			Dec-97	69.75	70.24	3478.75	3473.16	0.49	above screen
			Nov-96	x	72.96	x	3470.44	0	above screen
			Dec-95	70.05	73.76	3478.45	3469.64	3.71	
			Nov-94	70.2	74.05	3478.3	3469.35	3.85	
			Dec-93	x	71	x	3472.40	0	above screen
			Oct-92	x	74	x	3469.40	0	

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-13	**3545.91**	**3506.91**	Dec-01	42.08	42.70	3506.42	3503.21	0.62	
			Jul-01	41.68	43.23	3506.82	3502.68	1.55	
			Nov-00	33.94	36.76	3514.56	3509.15	2.82	above screen
			Dec-99	41.57	41.80	3506.93	3504.11	0.23	
			Dec-98	45.60	45.70	3502.9	3500.21	0.1	
			Dec-97	43.00	43.06	3505.5	3502.85	0.06	
			Nov-96	42.47	42.48	3506.03	3503.43	0.01	
			Dec-95	44.05	46.55	3504.45	3499.36	2.5	
			Nov-94	44.13	46.86	3504.37	3499.05	2.73	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	42	x	3503.91	nm	
2-14	**3545.91**	**3479.91**	Dec-01	47.38	47.50	3501.12	3498.41	0.12	above screen
			Jul-01	48.45	48.55	3500.05	3497.36	0.1	above screen
			Nov-00	46.99	47.10	3501.51	3498.81	0.11	above screen
			Dec-99	48.82	48.98	3499.68	3496.93	0.16	above screen
			Dec-98	64.80	66.54	3483.7	3479.37	1.74	
			Dec-97	x	61.98	x	3483.93	0	above screen
			Nov-96	x	61.34	x	3484.57	0	above screen
			Dec-95	nm	61.77	x	3484.14	nm	above screen
			Nov-94	62.1	62.11	3486.4	3483.80	0.01	above screen
			Dec-93	x	62	x	3483.91	0	above screen
			Oct-92	x	65	x	3480.91	0	above screen
2-15	**3543.64**	**3480.64**	Dec-01	x	52.47	x	3491.17	0	above screen
			Jul-01	x	53.37	x	3490.27	0	above screen
			Nov-00	52.77	52.85	3495.73	3490.79	0.08	above screen
			Dec-99	54.55	55.75	3493.95	3487.89	1.2	above screen
			Dec-98	65.42	69.10	3483.08	3474.54	3.68	
			Dec-97	62.88	65.48	3485.62	3478.16	2.6	
			Nov-96	62.7	65.44	3485.8	3478.20	2.74	
			Dec-95	nm	65.2	x	3478.44	nm	
			Nov-94	x	63.27	x	3480.37	0	
			Dec-93	x	63.1	x	3480.54	0	
			Oct-92	x	64	x	3479.64	0	

Table 1: Fluid and Well Screen Elevations

Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
2-16	**3544.39**	**3471.39**	Dec-01	x	59.78	x	3484.61	0	above screen
			Jul-01	x	59.88	x	3484.51	0	above screen
			Nov-00	x	59.80	x	3484.59	0	above screen
			Dec-99	x	65.05	x	3479.34	0	above screen
			Dec-98	x	71.15	x	3473.24	0	above screen
			Dec-97	x	69.39	x	3475.00	0	above screen
			Nov-96	x	69.14	x	3475.25	0	above screen
			Dec-95	71.1	74.2	3477.4	3470.19	3.1	
			Nov-94	70.06	70.06	3478.44	3474.33	0	above screen
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	x	74	x	3470.39	0	
2-18	**3545.79**	**3516.79**	Dec-01	x	22.33	x	3523.46	0	above screen
			Jul-01	x	21.01	x	3524.78	0	above screen
			Nov-00	x	16.76	x	3529.03	0	above screen
			Dec-99	x	20.18	x	3525.61	0	above screen
			Dec-98	x	22.12	x	3523.67	0	above screen
			Dec-97	x	20.95	x	3524.84	0	above screen
			Nov-96	x	22.71	x	3523.08	0	above screen
			Dec-95	22.2	22.2	3526.3	3523.59	0	above screen
			Nov-94	22.22	22.22	3526.28	3523.57	0	above screen
			Dec-93	x	22.9	x	3522.89	0	above screen
			Oct-92	x	30	x	3515.79	0	
3-1	**3543.04**	**3490.04**	Dec-01	x	43.91	x	3499.13	0	above screen
			Jul-01	45.16	45.19	3503.34	3497.85	0.03	above screen
			Nov-00	x	43.66	x	3499.38	0	above screen
			Dec-99	x	45.70	x	3497.34	0	above screen
			Dec-98	x	63.00	x	3480.04	0	
			Dec-97	x	60.16	x	3482.88	0	
			Nov-96	58.45	58.46	3490.05	3484.58	0.01	
			Dec-95	60.13	60.15	3488.37	3482.89	0.02	
			Nov-94	59.21	59.22	3489.29	3483.82	0.01	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen

Table 1: Fluid and Well Screen Elevations

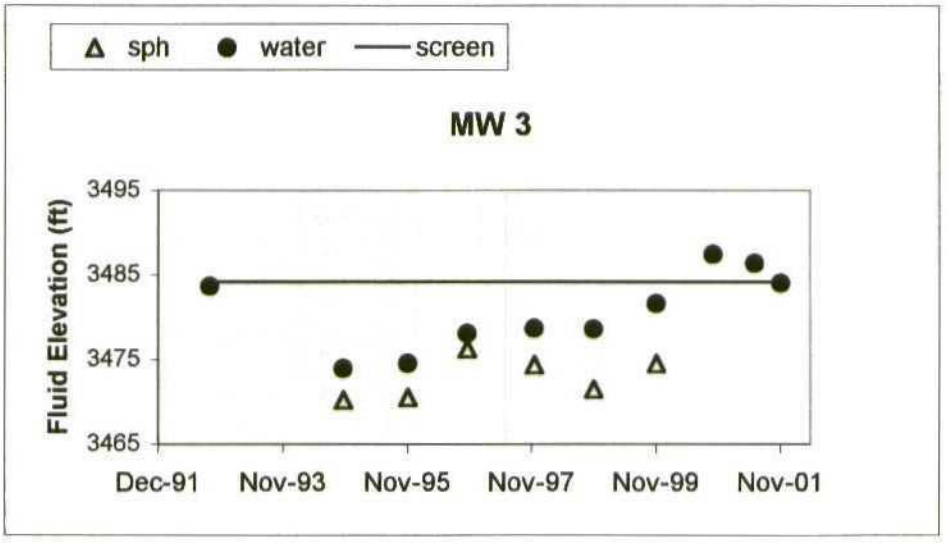
Monitoring Well	Top of Casing (feet asl)	Top of Screen (feet asl)	Date	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	SPH Thickness	Water Elevation Above Screen?
3-2	**3541.59**	**3478.59**	Dec-01	x	59.00	x	3482.59	0	above screen
			Jul-01	x	59.67	x	3481.92	0	above screen
			Nov-00	59.90	61.10	3488.6	3480.49	1.2	above screen
			Dec-99	63.70	65.40	3484.8	3476.19	1.7	
			Dec-98	71.10	75.25	3477.4	3466.34	4.15	
			Dec-97	69.71	74.50	3478.79	3467.09	4.79	
			Nov-96	69.72	71.10	3478.78	3470.49	1.38	
			Dec-95	nm	73.24	x	3468.35	nm	
			Nov-94	nm	72.87	x	3468.72	nm	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen
3-3	**3544.93**	**3486.93**	Dec-01	64.93	64.96	3483.57	3479.97	0.03	
			Jul-01	x	64.67	x	3480.26	0	
			Nov-00	x	64.85	x	3480.08	0	
			Dec-99	x	71.50	x	3473.43	0	
			Dec-98	x	74.49	x	3470.44	0	
			Dec-97	x	73.09	x	3471.84	0	
			Nov-96	nm	nm	x	nm	nm	above screen
			Dec-95	74	74.16	3474.5	3470.77	0.16	
			Nov-94	74.06	74.2	3474.44	3470.73	0.14	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen
3-4	**3558.63**	**3490.63**	Dec-01	75.81	83.46	3472.69	3475.17	7.65	
			Jul-01	73.28	86.18	3475.22	3472.45	12.9	
			Nov-00	x	73.97	x	3484.66	0	
			Dec-99	x	82.15	x	3476.48	0	
			Dec-98	x	86.15	x	3472.48	0	
			Dec-97	x	84.69	x	3473.94	0	
			Nov-96	x	85.09	x	3473.54	0	
			Dec-95	nm	86.44	x	3472.19	nm	
			Nov-94	nm	86.51	x	3472.12	nm	
			Dec-93	nm	nm	x	nm	nm	above screen
			Oct-92	nm	nm	x	nm	nm	above screen
Notes:									
nm: Not measured or not recorded for that date									

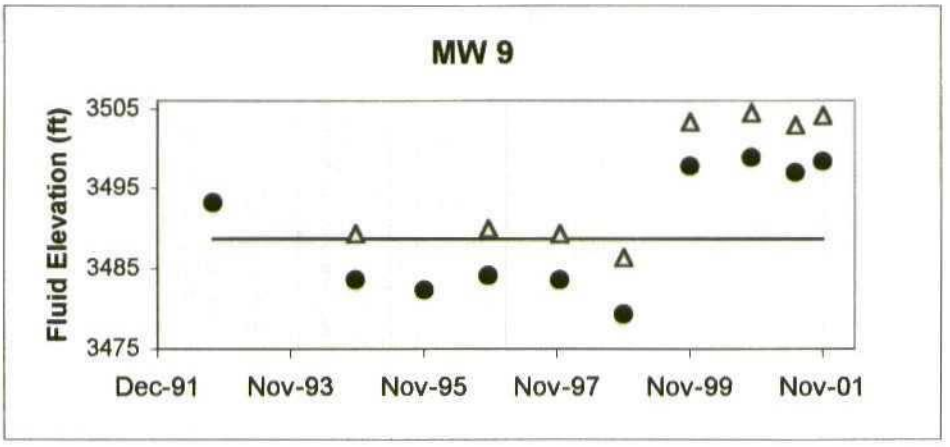
Table 2: Ground Water Chemistry

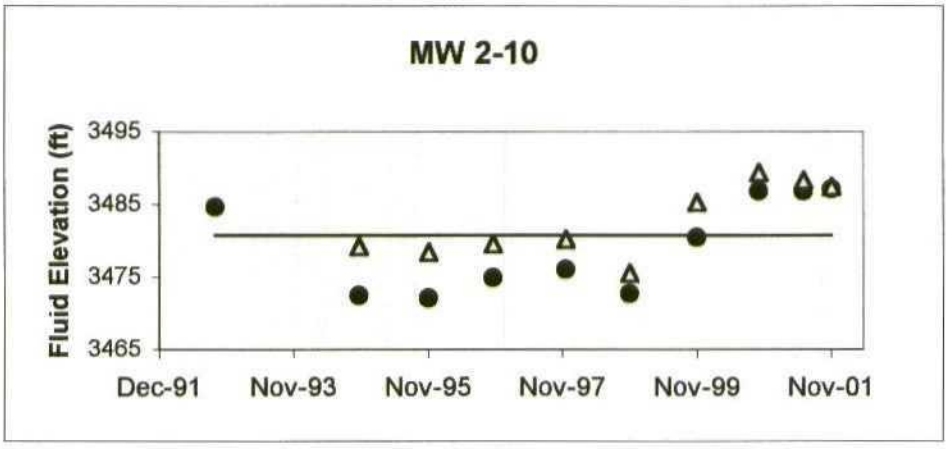
Sample #	Date	Units	Benzene	Toluene	Ethylbenzene	Total Xylene	TDS	Cl + SO4
MW 2	Jan-93							4200
	Dec-97	mg/L	<0.001	<0.001	<0.001	<0.003	3100	
	Dec-98	mg/L	0.027	0.0071	0.0057	0.0106	2850	
	Dec-99	mg/L	<0.001	<0.001	<0.001	<0.003	2960	3141
	Aug-00	mg/L	<0.001	<0.001	<0.001	<0.001	2210	
	Nov-00	mg/L	<0.001	<0.001	<0.001	<0.003	3700	
	Jul-01	mg/L	<0.001	<0.001	<0.001	<0.001	2800	
	Dec-01	mg/L	<0.001	<0.001	<0.001	<0.001	2820	
MW 8	Jan-93							3577
	Dec-97	mg/L	<0.001	<0.001	<0.001	<0.001	3370	1764
	Dec-98	mg/L	0.0012	0.0011	0.0012	0.0021	3480	
	Dec-99	mg/L	0.0037	0.0013	0.0044	0.0076	3460	3227
	Aug-00	mg/L	<0.001	<0.001	<0.001	<0.001	3910	
	Nov-00	mg/L	0.019	<0.001	0.0026	0.0048	3670	
	Jul-01	mg/L	<0.001	0.0011	<0.001	<0.001	3530	
	Dec-01	mg/L	<0.001	0.0013	<0.001	<0.001	3380	
MW 2-14	Dec-98	mg/L	SPH	SPH	SPH	SPH	SPH	
	Dec-99	mg/L	0.41	0.018	0.31	0.26	na	
	Nov-00	mg/L	1	<0.001	0.049	0.18	3570	
	Dec-01	mg/L	0.23	<0.001	0.016	0.25	3090	
MW 2-15	Dec-98	mg/L	SPH	SPH	SPH	SPH	SPH	
	Dec-99	mg/L	SPH	SPH	SPH	SPH	SPH	
	Nov-00	mg/L	0.5	0.19	0.33	0.584	4190	
	Dec-01	mg/L	1.4	0.039	0.14	0.177	3380	
MW 2-16	Dec-97	mg/L	0.0045	<0.001	<0.001	<0.001	3540	
	Jan-98	mg/L	0.0049	0.011	0.007	0.0034	na	
	Dec-99	mg/L	0.014	0.0039	0.012	0.021	3280	
MW 3-1*	Dec-98	mg/L	0.097	0.0026	0.0038	0.0068	4150	
	Dec-99	mg/L	3.5	0.011	0.48	0.274	>4510	
	Nov-00	mg/L	1	<0.001	0.16	0.13	3870	
	Dec-01	mg/L	1.5	<0.001	0.18	0.18	3290	
MW 3-2	Dec-97	mg/L	SPH	SPH	SPH	SPH	SPH	
	Dec-98	mg/L	SPH	SPH	SPH	SPH	SPH	
	Dec-99	mg/L	8.8	4.3	1.6	2.96	na	
	Nov-00	mg/L	0.048	0.044	0.083	0.152	3520	
	Dec-01	mg/L	0.005	0.0012	0.0036	0.0072	3550	
MW-3-3	Dec-98	mg/L	4.6	nd	nd	nd	2590	
	Dec-99	mg/L	3.8	0.11	0.047	0.124	2090	
	Nov-00	mg/L	2.7	<0.001	0.06	0.11	1990	
	Dec-01	mg/L	3.1	0.0071	0.17	0.231	2590	
						Average	3239	
						Standard Deviation	568	

* Replaces MW 2-8, not analyzed (na), "<x.xx" below detection

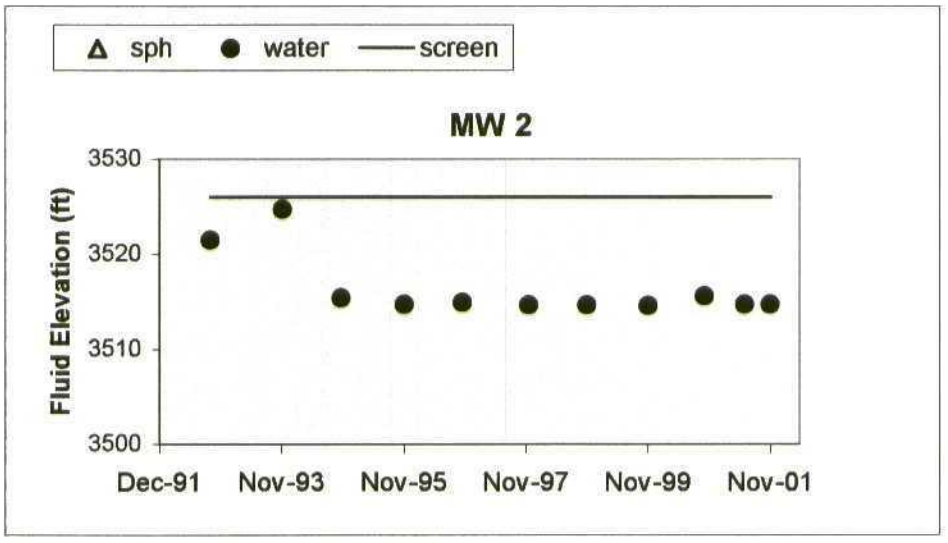
Figures

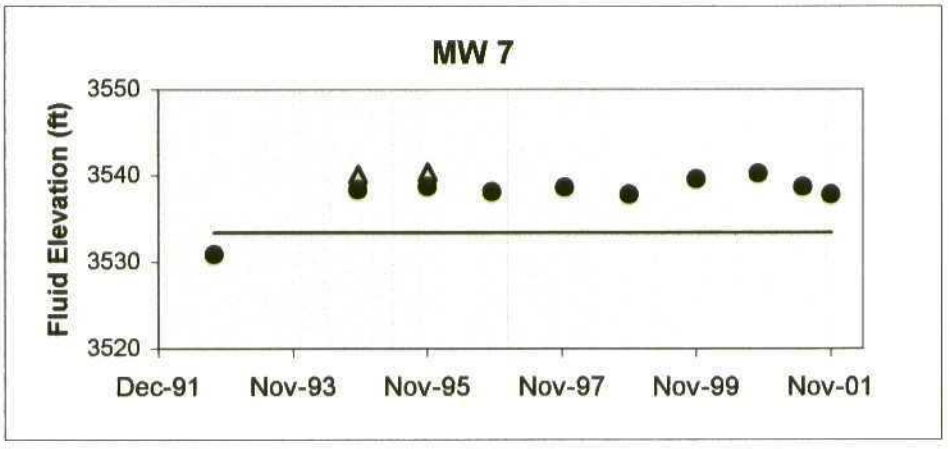


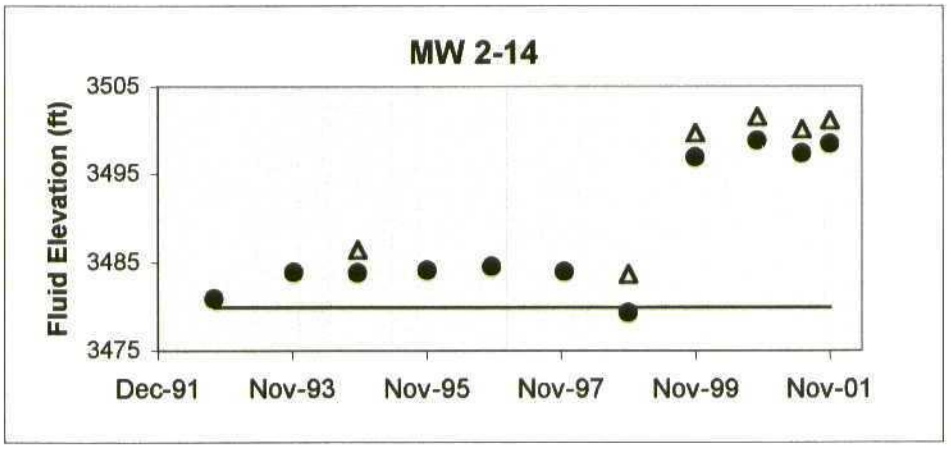




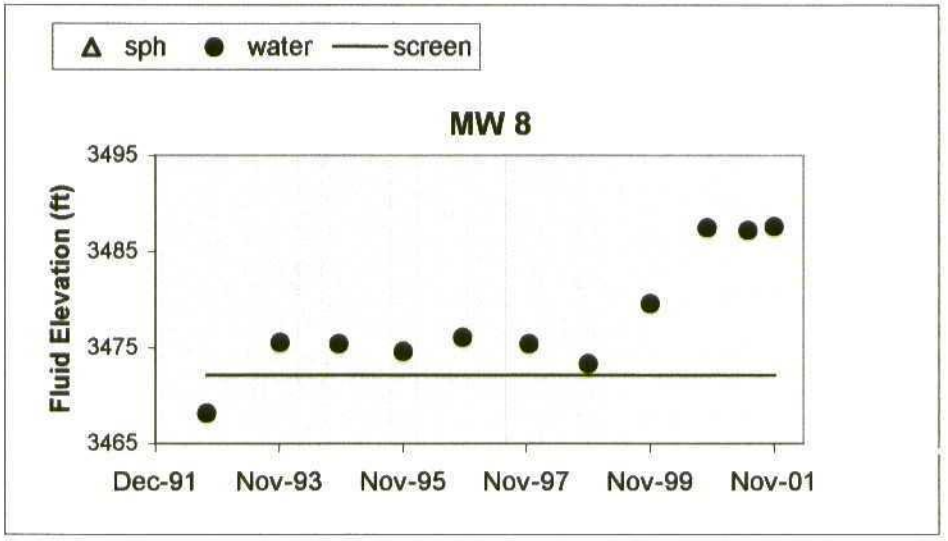
Empire ABO Gasoline Plant	Figure 1
Fluid Levels over Time	January 2001

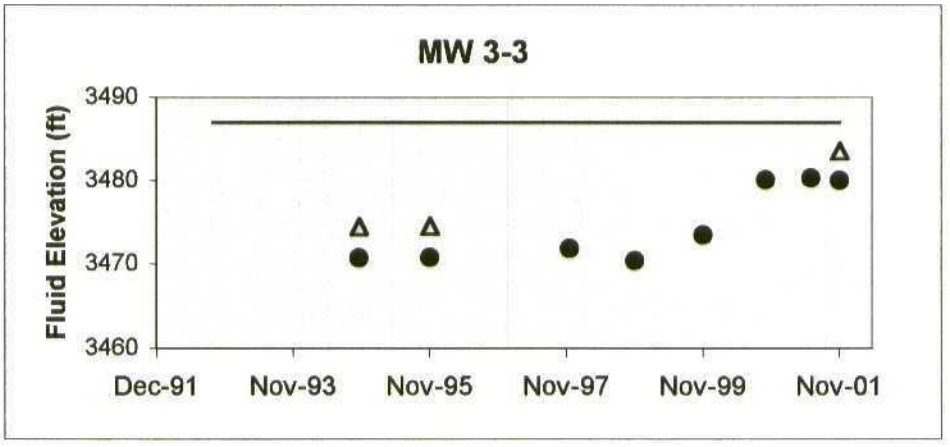


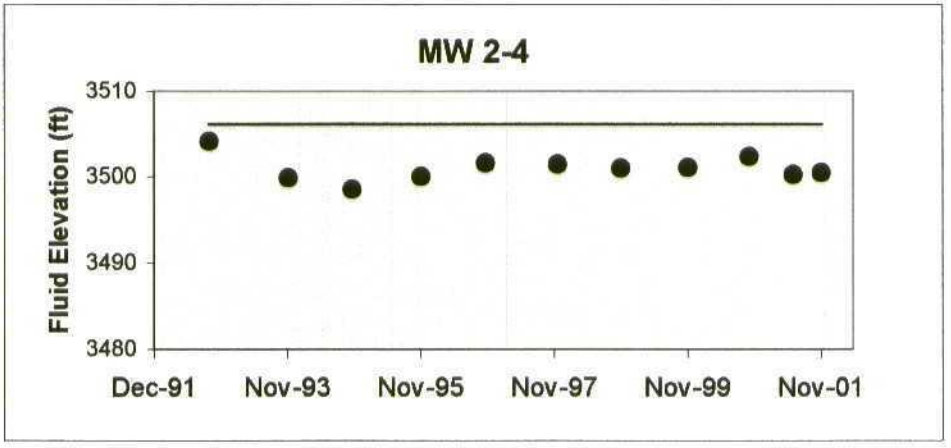




Empire ABO Gasoline Plant	Figure 2
Fluid Levels over Time	January 2001

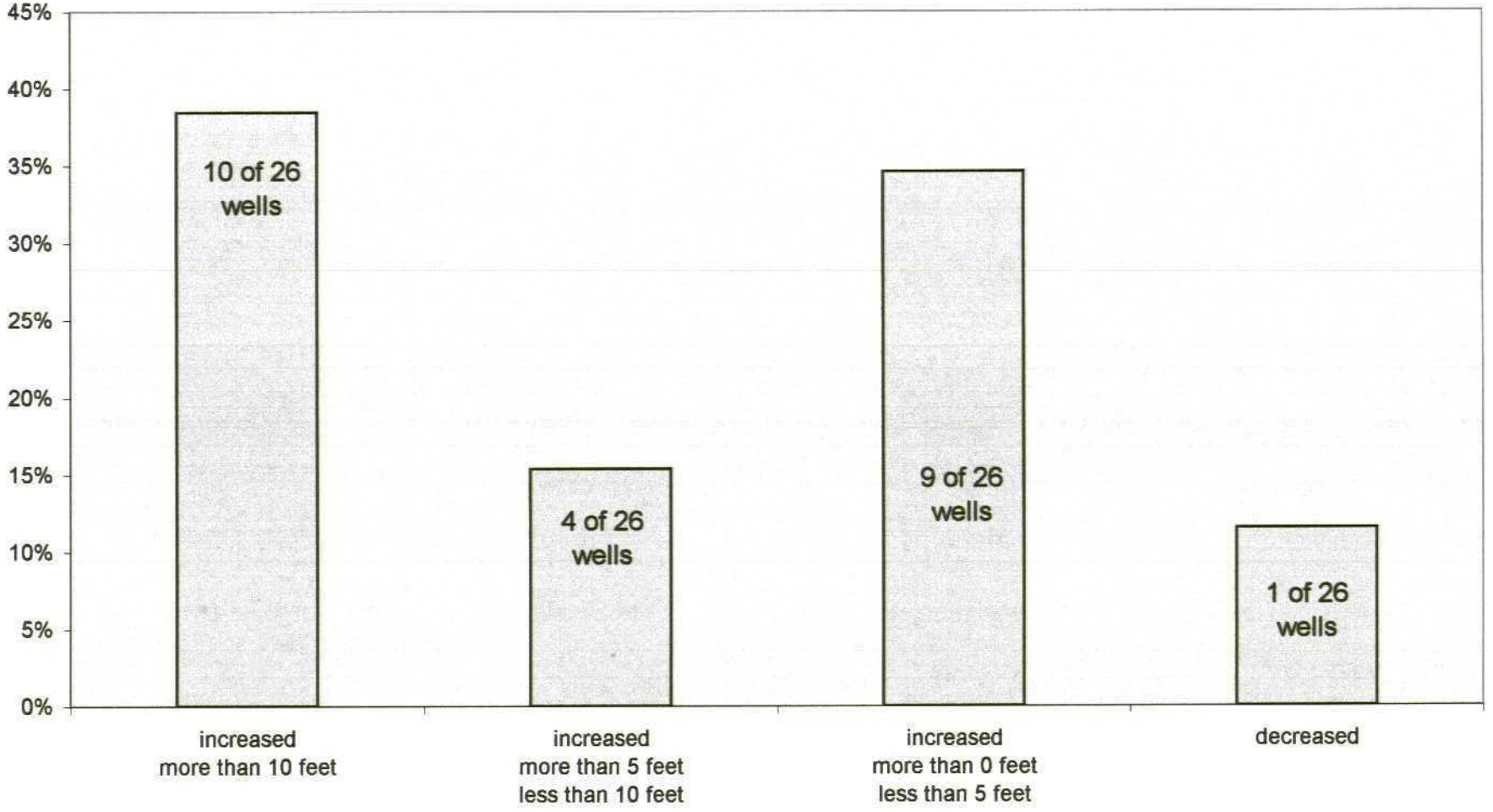






Empire ABO Gasoline Plant	Figure 3
Fluid Levels over Time	January 2001

Figure 4:
Percent of Monitoring Wells with Increasing or Decreasing Water Levels Between 1998 and 2001



Appendices

Appendix A

ASSAIGAI
ANALYTICAL
LABORATORIES, INC.
7300 Jefferson, NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood Dr., Suite N • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820
127 Eastgate Drive, 212-C • Los Alamos, New Mexico 87544 • (505) 662-2558

Explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

RT HICKS CONSULTING, LTD
attn: **RANDY HICKS**
4665 INDIAN SCHOOL NE 106
ALBUQUERQUE NM 87110

STANDARD

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **EMPIRE ABO PLANT-DECEMBER**
Order: **0112343** **RTHC01** Receipt: **12-19-01**

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Sample: ***MW-#2*** Collected: *12-17-01 11:15:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-01A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JDR		
X01539	XG.2001.1867.1	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		12-27-01	12-27-01
X01539	XG.2001.1867.1	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		12-27-01	12-27-01
X01539	XG.2001.1867.1	71-43-2	Benzene	ND	ug / L	1	1		12-27-01	12-27-01
X01539	XG.2001.1867.1	100-41-4	Ethylbenzene	ND	ug / L	1	1		12-27-01	12-27-01
X01539	XG.2001.1867.1	91-20-3	Naphthalene	ND	ug / L	1	5		12-27-01	12-27-01
X01539	XG.2001.1867.1	95-47-6	o-Xylene	2.8	ug / L	1	1		12-27-01	12-27-01
X01539	XG.2001.1867.1	108-38-3/106-42	p/m Xylenes	5.0	ug / L	1	2		12-27-01	12-27-01
X01539	XG.2001.1867.1	108-88-3	Toluene	2.7	ug / L	1	1		12-27-01	12-27-01
0112343-01B		**EPA 160.1**						By: NL		
TD0167	TT.2001.3323.15		Total Dissolved Solids	2820	mg / L	1	10		12-21-01	12-21-01

Sample: ***MW-#8*** Collected: *12-17-01 12:15:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-02A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JDR		
X01539	XG.2001.1867.2	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		12-27-01	12-27-01
X01539	XG.2001.1867.2	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		12-27-01	12-27-01
X01539	XG.2001.1867.2	71-43-2	Benzene	ND	ug / L	1	1		12-27-01	12-27-01
X01539	XG.2001.1867.2	100-41-4	Ethylbenzene	ND	ug / L	1	1		12-27-01	12-27-01
X01539	XG.2001.1867.2	91-20-3	Naphthalene	ND	ug / L	1	5		12-27-01	12-27-01

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **EMPIRE ABO PLANT-DECEMBER**
Order: **0112343 RTHC01** Receipt: **12-19-01**

Sample: ***MW-#8*** Collected: *12-17-01 12:15:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-02A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JDR		
X01539	XG.2001.1867.2	95-47-6	o-Xylene	1.4	ug / L	1	1		12-27-01	12-27-01
X01539	XG.2001.1867.2	108-38-3/106-42	p/m Xylenes	3.0	ug / L	1	2		12-27-01	12-27-01
X01539	XG.2001.1867.2	108-88-3	Toluene	1.3	ug / L	1	1		12-27-01	12-27-01
0112343-02B		**EPA 160.1**						By: NL		
TD0167	TT.2001.3323.16		Total Dissolved Solids	3380	mg / L	1	10		12-21-01	12-21-01

Sample: ***MW-#3-1*** Collected: *12-17-01 12:58:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-03A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JDR		
X01539	XG.2001.1874.2	90-12-0	1-Methylnaphthalene	ND	ug / L	25	5		12-28-01	12-28-01
X01539	XG.2001.1874.2	91-57-6	2-Methylnaphthalene	ND	ug / L	25	5		12-28-01	12-28-01
X01539	XG.2001.1874.2	71-43-2	Benzene	1500	ug / L	25	1		12-28-01	12-28-01
X01539	XG.2001.1874.2	100-41-4	Ethylbenzene	180	ug / L	25	1		12-28-01	12-28-01
X01539	XG.2001.1874.2	91-20-3	Naphthalene	ND	ug / L	25	5		12-28-01	12-28-01
X01539	XG.2001.1874.2	95-47-6	o-Xylene	ND	ug / L	25	1		12-28-01	12-28-01
X01539	XG.2001.1874.2	108-38-3/106-42	p/m Xylenes	180	ug / L	25	2		12-28-01	12-28-01
X01539	XG.2001.1874.2	108-88-3	Toluene	ND	ug / L	25	1		12-28-01	12-28-01
0112343-03B		**EPA 160.1**						By: NL		
TD0167	TT.2001.3323.17		Total Dissolved Solids	3290	mg / L	1	10		12-21-01	12-21-01

Sample: ***MW-#3-2*** Collected: *12-17-01 14:25:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-04A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JDR		
X01539	XG.2001.1874.7	90-12-0	1-Methylnaphthalene	ND	ug / L	1	5		12-28-01	12-28-01
X01539	XG.2001.1874.7	91-57-6	2-Methylnaphthalene	ND	ug / L	1	5		12-28-01	12-28-01
X01539	XG.2001.1874.7	71-43-2	Benzene	5.0	ug / L	1	1		12-28-01	12-28-01
X01539	XG.2001.1874.7	100-41-4	Ethylbenzene	3.6	ug / L	1	1		12-28-01	12-28-01
X01539	XG.2001.1874.7	91-20-3	Naphthalene	ND	ug / L	1	5		12-28-01	12-28-01
X01539	XG.2001.1874.7	95-47-6	o-Xylene	1.2	ug / L	1	1		12-28-01	12-28-01
X01539	XG.2001.1874.7	108-38-3/106-42	p/m Xylenes	6.0	ug / L	1	2		12-28-01	12-28-01
X01539	XG.2001.1874.7	108-88-3	Toluene	1.2	ug / L	1	1		12-28-01	12-28-01
0112343-04B		**EPA 160.1**						By: NL		
TD0167	TT.2001.3323.18		Total Dissolved Solids	3550	mg / L	1	10		12-21-01	12-21-01

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **EMPIRE ABO PLANT-DECEMBER**
Order: **0112343** **RTHC01** Receipt: **12-19-01**

Sample: ***MW-#3-2*** Collected: *12-17-01 14:25:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date

Sample: ***MW-#2-15*** Collected: *12-17-01 15:00:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-05A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JDR		
X01539	XG.2001.1867.3	90-12-0	1-Methylnaphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1867.3	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1874.8	71-43-2	Benzene	1400	ug / L	500	1		12-28-01	12-28-01
X01539	XG.2001.1867.3	100-41-4	Ethylbenzene	140	ug / L	5	1		12-27-01	12-27-01
X01539	XG.2001.1867.3	91-20-3	Naphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1867.3	95-47-6	o-Xylene	17	ug / L	5	1		12-27-01	12-27-01
X01539	XG.2001.1867.3	108-38-3/106-42	p/m Xylenes	160	ug / L	5	2		12-27-01	12-27-01
X01539	XG.2001.1867.3	108-88-3	Toluene	39	ug / L	5	1		12-27-01	12-27-01
0112343-05B		**EPA 160.1**					By:	NL		
TD0167	TT.2001.3323.19		Total Dissolved Solids	3380	mg / L	1	10		12-21-01	12-21-01

Sample: ***MW-#2-14*** Collected: *12-17-01 15:45:00* By: *SP*
Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-06A		**SW846 8260B Purgeable VOCs by GC/MS**					By:	JDR		
X01539	XG.2001.1867.4	90-12-0	1-Methylnaphthalene	54	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1867.4	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1874.9	71-43-2	Benzene	230	ug / L	5	1		12-28-01	12-28-01
X01539	XG.2001.1867.4	100-41-4	Ethylbenzene	16	ug / L	5	1		12-27-01	12-27-01
X01539	XG.2001.1867.4	91-20-3	Naphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1867.4	95-47-6	o-Xylene	ND	ug / L	5	1		12-27-01	12-27-01
X01539	XG.2001.1867.4	108-38-3/106-42	p/m Xylenes	250	ug / L	5	2		12-27-01	12-27-01
X01539	XG.2001.1867.4	108-88-3	Toluene	ND	ug / L	5	1		12-27-01	12-27-01
0112343-06B		**EPA 160.1**					By:	NL		
TD0167	TT.2001.3323.20		Total Dissolved Solids	3090	mg / L	1	10		12-21-01	12-21-01

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**

Project: **EMPIRE ABO PLANT-DECEMBER**

Order: **0112343** **RTHC01** Receipt: **12-19-01**

Sample: ***MW-#3-3*** Collected: *12-18-01 10:50:00* By: *SP*

Matrix: ***GW***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Prep Date	Run Date
0112343-07A		**SW846 8260B Purgeable VOCs by GC/MS**						By: JDR		
X01539	XG.2001.1867.5	90-12-0	1-Methylnaphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1867.5	91-57-6	2-Methylnaphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1874.10	71-43-2	Benzene	3100	ug / L	1000	1		12-28-01	12-28-01
X01539	XG.2001.1867.5	100-41-4	Ethylbenzene	170	ug / L	5	1		12-27-01	12-27-01
X01539	XG.2001.1867.5	91-20-3	Naphthalene	ND	ug / L	5	5		12-27-01	12-27-01
X01539	XG.2001.1867.5	95-47-6	o-Xylene	11	ug / L	5	1		12-27-01	12-27-01
X01539	XG.2001.1867.5	108-38-3/106-42	p/m Xylenes	220	ug / L	5	2		12-27-01	12-27-01
X01539	XG.2001.1867.5	108-88-3	Toluene	7.1	ug / L	5	1		12-27-01	12-27-01
0112343-07B		**EPA 160.1**						By: NL		
TD0167	TT.2001.3323.21		Total Dissolved Solids	2590	mg / L	1	10		12-21-01	12-21-01

Unless otherwise noted, all samples were received in acceptable condition and all sampling was performed by client or client representative. Sample result of ND indicates Not Detected, ie result is less than the sample specific Detection Limit. Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. All results relate only to the items tested. Any miscellaneous workorder information or foonotes will appear below.

Appendix B

Table B-1: Water and SPH, Empire Abo Gasoline Plant

Monitoring Well	Top of Casing (feet asl)	Dec-01				Jul-01				Nov-00				Dec-99				Dec-98			
		Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)
2	3548.50	x	33.81		3514.69	x	33.77		3514.73	x	32.91		3515.59	x	33.92		3514.58	x	33.90		3514.60
3	3555.70	x	71.66		3484.04	x	69.35		3486.35	x	68.23		3487.47	73.98	74.10	3481.72	3481.60	77.00	77.11	3478.70	3478.59
4	3551.30	x	52.16		3499.14	sheen	52.48		3498.82	x	53.00		3498.30	x	52.45		3498.85	x	60.69		3490.61
5	3543.90	x	59.76		3484.14	sheen	59.76		3484.14	x	59.55		3484.35	x	64.10		3479.80	x	71.31		3472.59
6	3544.90	40.69	41.75	3504.21	3503.15	39.8	41.28	3505.10	3503.62	x	36.28		3508.62	nm	nm	nm	nm	x	46.38		3498.52
7	3546.90	x	9.11		3537.79	x	8.24		3538.66	x	6.68		3540.22	x	7.35		3539.55	x	9.14		3537.76
8	3544.10	x	56.46		3487.64	x	56.85		3487.25	x	56.60		3487.50	x	64.50		3479.60	x	70.81		3473.29
9	3543.20	44.32	44.75	3498.88	3498.45	45.52	46.21	3497.68	3496.99	43.98	44.24	3499.22	3498.96	45.12	45.42	3498.08	3497.78	62.12	63.92	3481.08	3479.28
2-2	3552.55	x	26.97		3525.58	x	27.04		3525.51	x	25.28		3527.27	x	26.75		3525.80	x	26.85		3525.70
2-3	3557.98	x	74.02		3483.96	x	73.25		3484.73	x	73.42		3484.56	x	78.53		3479.45	x	83.51		3474.47
2-4	3554.09	x	53.65		3500.44	x	53.82		3500.27	x	51.76		3502.33	x	53.02		3501.07	x	53.11		3500.98
2-5	3553.00	x	27.73		3525.27	x	27.81		3525.19	x	26.78		3526.22	x	27.60		3525.40	x	29.42		3523.58
2-6	3551.11	x	18.11		3533.00	16.69	16.71	3534.42	3534.40	9.58	9.61	3541.53	3541.50	7.6	8.60	3543.51	3542.51	18.22	18.26	3532.89	3532.85
2-7	3547.34	x	49.80		3497.54	x	50.21		3497.13	x	47.61		3499.73	x	49.40		3497.94	nm	nm	nm	nm
2-9	3546.81	35.41	38.94	3511.40	3507.87	35.34	37.65	3511.47	3509.16	36.76	39.85	3510.05	3506.96	34.75	36.80	3512.06	3510.01	35.90	39.00	3510.91	3507.81
2-10	3548.67	61.06	61.57	3487.61	3487.10	60.21	61.86	3488.46	3486.81	59.15	61.81	3489.52	3486.86	63.23	68.25	3485.44	3480.42	73.00	75.92	3475.67	3472.75
2-11	3547.06	x	22.95		3524.11	x	21.95		3525.11	17.20	18.57	3529.86	3528.49	20.72	21.22	3526.34	3525.84	x	23.36		3523.70
2-12	3543.40	60.80	60.82	3482.60	3482.58	60.6	60.73	3482.80	3482.67	60.56	61.00	3482.84	3482.40	65.50	66.90	3477.90	3476.50	65.90	73.61	3477.50	3469.79
2-13	3545.91	42.08	42.70	3503.83	3503.21	41.68	43.23	3504.23	3502.68	33.94	36.76	3511.97	3509.15	41.57	41.80	3504.34	3504.11	45.60	45.70	3500.31	3500.21
2-14	3545.91	47.38	47.50	3498.53	3498.41	48.45	48.55	3497.46	3497.36	46.99	47.10	3498.92	3498.81	48.82	48.98	3497.09	3496.93	64.80	66.54	3481.11	3479.37
2-15	3543.64	x	52.47		3491.17	x	53.37		3490.27	52.77	52.85	3490.87	3490.79	54.55	55.75	3489.09	3487.89	65.42	69.10	3478.22	3474.54
2-16	3544.39	x	59.78		3484.61	x	59.88		3484.51	x	59.80		3484.59	x	65.05		3479.34	x	71.15		3473.24
2-18	3545.79	x	22.33		3523.46	x	21.01		3524.78	x	16.76		3529.03	x	20.18		3525.61	x	22.12		3523.67
3-1	3543.04	x	43.91		3499.13	45.16	45.19	3497.88	3497.85	x	43.66		3499.38	x	45.70		3497.34	x	63.00		3480.04
3-2	3541.59	x	59.00		3482.59	x	59.67		3481.92	59.90	61.10	3481.69	3480.49	63.70	65.40	3477.89	3476.19	71.10	75.25	3470.49	3466.34
3-3	3544.93	64.93	64.96	3480.00	3479.97	x	64.67		3480.26	x	64.85		3480.08	x	71.50		3473.43	x	74.49		3470.44
3-4	3558.63	75.81	83.46	3482.82	3475.17	73.28	86.18	3485.35	3472.45	x	73.97		3484.66	x	82.15		3476.48	x	86.15		3472.48

legend: asl above sea level, "x" SPH not present, "nm" not measured

Monitoring Well	Dec-97				Nov-96				Dec-95	Nov-94	Dec-93	Oct-92
	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)	Water Elevation (feet)
2	x	33.86		3514.64	x	33.62		3514.88	3514.71	3515.38	3524.70	3521.50
3	74.10	77.02	3481.60	3478.68	72.27	77.60	3483.43	3478.10	3474.52	3473.95	nm	3483.70
4	nm	nm	nm	nm	x	56.84		3494.46				
5	69.08	69.34	3474.82	3474.56	69.19	69.79	3474.71	3474.11				
6	40.15	45.75	3504.75	3499.15	39.29	45.51	3505.61	3499.39				
7	x	8.27		3538.63	x	8.78		3538.12	3538.65	3538.30	nm	3530.90
8	x	68.75		3475.35	x	68.05		3476.05	3474.61	3475.37	3475.50	3468.10
9	59.21	59.64	3483.99	3483.56	58.54	59.02	3484.66	3484.18	3482.32	3483.58	nm	3493.20
2-2	x	26.88		3525.67	x	26.92		3525.63				
2-3	x	82.11		3475.87	x	82.32		3475.66				
2-4	x	52.69		3501.40	x	52.52		3501.57	3500.03	3498.52	3499.89	3504.09
2-5	x	27.50		3525.50	x	27.50		3525.50				
2-6	15.45	16.52	3535.66	3534.59	21.81	22.22	3529.30	3528.89				
2-7	nm	nm	nm	nm	nm	nm	nm	nm				
2-9	35.25	39.03	3511.56	3507.78	35.3	38.75	3511.51	3508.06				
2-10	68.35	72.65	3480.32	3476.02	68.98	73.75	3479.69	3474.92	3472.13	3472.46	nm	3484.67
2-11	21.99	22.43	3525.07	3524.63	x	23.21		3523.85				
2-12	69.75	70.24	3473.65	3473.16	x	72.96		3470.44				
2-13	43.00	43.06	3502.91	3502.85	42.47	42.48	3503.44	3503.43				
2-14	x	61.98		3483.93	x	61.34		3484.57	3484.14	3483.80	3483.91	3480.91
2-15	62.88	65.48	3480.76	3478.16	62.7	65.44	3480.94	3478.20				
2-16	x	69.39		3475.00	x	69.14		3475.25				
2-18	x	20.95		3524.84	x	22.71		3523.08				
3-1	x	60.16		3482.88	58.45	58.46	3484.59	3484.58				
3-2	69.71	74.50	3471.88	3467.09	69.72	71.10	3471.87	3470.49				
3-3	x	73.09		3471.84	nm	nm	nm	nm	3470.77	3470.73		
3-4	x	84.69		3473.94	x	85.09		3473.54				

legend:

ARCO Permian
600 N Marienfeld
Midland TX 79701
Post Office Box 1610
Midland TX 79702
Telephone 915 688 5200

OIL CONSERVATION DIV.

01 JUL 25 PM 12:58

July 20, 2001

Mr. Jack Ford
New Mexico Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505

RE: Submittal of EAGP's 2000 Groundwater Monitoring Report
(Discharge Plan GW-022)

Dear Jack:

The attached report from R.T. Hicks Consultants presents results from the August and December 2000 sampling programs. The sampling program is consistent with the monitoring requirements of the above-referenced, approved Discharge Plan.

If you have any questions regarding these data, please contact me at (915) 688-5799 or by e-mail at lowemj1@bp.com.

Sincerely,

Margaret J. Lowe
Sr. Environmental Engineer

cc: F. Noah/EAGP
R.T. Hicks Consultants Ltd.
File 43A3d

EMPIRE ABO GASOLINE PLANT: 2000 WATER MONITORING REPORT

Prepared for:

ARCO PERMIAN, A PART OF BP
600 N Marienfeld
Midland, TX 79701

July 20, 2001

R. T. Hicks Consultants, Ltd.
4665 Indian School #106
Albuquerque, NM 87110

Table of Contents

Purpose and Scope

ARCO Permian, a part of BP, has contracted R. T. Hicks Consultants (Hicks Consultants) to semi-annually sample perched water beneath the Empire Abo Gas Plant (EAGP) and to prepare annual monitoring reports based on results from the semiannual sampling events. This document summarizes perched-water data collected during August and November 2000 and serves as ARCO Permian's 2000 Groundwater Monitoring Report. The semi-annual water monitoring and annual report are part of the New Mexico Oil Conservation Division (NMOCD) Groundwater Discharge Permit (GW-22) requirements for EAGP.

In August 2000, Hicks Consultants collected water samples from MW-2 and MW-8. In November 2000, we collected water samples from MW 3-3, MW-8, MW 3-1, MW-2, MW 2-15, MW 3-2 and MW 2-14. We submitted all samples to Assaigai Analytical Laboratories, Inc., for chemical analysis. Appendix A provides Assaigai's analytical reports. In addition to sampling, we measured depth to water and separate phase hydrocarbon (SPH) thickness at all EAGP monitoring wells in November 2000.

Site Background

Amoco, the previous owner of the Empire Abo Gas Plant (EAGP), initiated a subsurface investigation at the facility in 1991 in order to assess the impact of petroleum releases on water beneath the plant. As part of their investigation, they drilled 31 borings, completing 27 of the borings as monitoring wells. In addition to using these monitoring wells to assess changes in water chemistry and SPH thickness, Amoco installed petroleum and fluid recovery pumps in many of the monitoring wells to remove petroleum from the subsurface. In 1996, ARCO Permian purchased the gas plant from Amoco. In 1998, ARCO Permian removed the recovery pumps from the monitoring wells as part of their discharge plan renewal application. Since 1998, ARCO Permian has continued to monitor perched-water chemistry and changes in SPH thickness and perched-water elevations. Every six months, ARCO Permian removes SPH from monitoring wells showing more than half a foot of SPH.

Perched Water and SPH Thickness

Figures 1 through 3 show SPH and perched-water elevation data from 1991 through 2000 for several monitoring wells. Many of these monitoring wells show a significant increase in water elevation after 1998, the year ARCO Permian terminated the fluid recovery program. Table B-1 in Appendix B presents perched-water and SPH elevation data collected from November 1996 through November 2000.

Because the fluid recovery program was terminated in 1998, we compared November 2000 fluid level data to December 1998 fluid level data. Results of this comparison are summarized in Figure 4 and Table 1. Figure 4 is a bar graph showing the number of monitoring wells with increasing or decreasing water elevations. Since 1998, water levels have risen more 10 feet in 50% of the existing 26 monitoring wells. Twenty-three percent of the monitoring wells showed an increase between 10 and 5 feet, and another 23% displayed an increase less than 5 feet. Only one well (MW 2-9) showed a water elevation decline.

Table 1 summarizes changes in SPH thickness and water elevations between 1998 and 2000. The table also provides the total depth and depth to top of screen for each monitoring well and identifies monitoring wells with a water level above the top of screen. In December 1998, water elevation was above the top of screen in 8 monitoring wells. In November 2000, this number increased to 19. Monitoring wells with water elevation above the top of screen are of limited use in assessing changes in SPH thickness because SPH is less dense than water and hence floats atop the water table. Therefore, in wells where the water table is above top of screen SPH cannot enter

the monitoring well. Due to this limitation, we cannot assess changes in SPH for 16 of the 26 monitoring wells. In Table 1, these locations are identified by an "above screen" entry in the "Change in SPH Thickness" column. Five monitoring wells continue to show no SPH. These wells are MW-2, MW-4, MW-6, MW-9 and MW 2-4. SPH rose in MW 2-11 by 1.4 feet.

Perched-Water Chemistry

The Groundwater Discharge Permit (GW-22) requires EAGP to sample the following wells provided that SPH is not evident in the well:

MW-2, MW-8, MW 2-8, MW 2-14, MW 2-15, MW 3-2 and MW 3-3.

In August 2000, we collected water samples from MW-2 and MW-8. With the exception of MW 2-8, we collected water samples from the required monitoring wells listed above in November 2000. Because MW 2-8 was destroyed, we sampled MW 3-3 in its place.

Table 2 presents benzene, toluene, ethylbenzene, total xylene (BTEX) and total dissolved solids (TDS) data for water samples collected in 2000. Appendix A contains a complete chemical analysis of each water sample.

BTEX remained below detection limits at MW-2, which we consider a background well. MW 3-3 showed the greatest benzene concentration, 2.7 ppm. This monitoring well is located northeast of the welding shop. MW-8 and MW 2-16 showed a slight increase in benzene concentration, while MW 3-2 showed a slight decline.

Historically, MW 2-14, MW 2-15, and MW 3-2 have contained SPH. Recent data show an apparent decline of benzene concentration at these monitoring wells. This apparent decline of benzene concentration is most likely a consequence of an increase in perched-water elevations. In 1998, water was below the top of screen at these monitoring wells. Since that time, water has raised an average of 16.6 feet at these locations and is currently well above the top each well's screen. Recent water samples collected at these wells represent perched-water from a greater depth beneath the water table and any potential floating product than previous samples. Therefore, we would expect them to show lower concentrations of petroleum constituents.

The small amount of SPH observed at MW 2-15 and MW 3-2 in November 2000 may have leaked into each well from SPH atop perched water or from residual product in the filter pack. Because water levels are above the top of each well's screen, we cannot determine whether the SPH contained in the monitoring wells is representative of any floating product.

We also examined TDS values over time for MW-2, MW-8 and MW 3-3. From 1997 to 2000, the average TDS concentrations for these wells were 2,964, 3,578, and 2,223 mg/L, respectively. While MW-2 and MW-8 showed no increasing or decreasing trend from 1997 to 2000, MW 3-3 displayed a small decreasing trend.

From 1991 to 1997, previous workers did not analyze samples for TDS. We do have 1993 data for chloride and sulfate from selected wells. These data are in Table 2. The data suggest that the overall chemistry of MW-2 and MW-8 have not changed significantly over time. The data also show that the sum of chloride plus sulfate is greater than the measured TDS for the 1999 samples. We attribute this apparent anomaly to a failure of the TDS analytical method to capture dissolved hydrogen sulfide in the analysis and that the sulfate analytical method and sampling protocol permits detection of dissolved hydrogen sulfide as sulfate.

Monitoring wells listed in Table 2 have similar TDS values. The TDS concentrations of these monitoring wells are above the Water Quality Control Commission (WQCC) standard for domestic water supply. The average TDS concentration of the wells listed in Table 2 is 3,274 mg/L with a standard deviation of 648 mg/L.

Proposed 2001 Activities

ARCO Permian's Groundwater Discharge Permit (GW-22) requires semiannual SPH removal from wells exhibiting more than half a foot of product and sampling of water beneath EAGP. We will perform the first of these semi-annual events in July 2001.

Water Use at Empire Abo Gasoline Plant

ARCO Permian's Groundwater Discharge Permit (GW-22) also requires submission of water use statistics in the annual groundwater monitoring report. Below are the 2000 water use statistics.

EAGP purchased 949,627 barrels (bbls) of water from the Caprock Water System. Of that water, EAGP piped 126,458 bbls to their injection well and hired I&W to transport 5,355 bbls for disposal at the Walter Solt Salt Water Disposal Injection Well. The remainder evaporated during gas processing or in the evaporation pond.

Conclusions

Perched-water elevations have increased significantly in many of the monitoring wells since the termination of the fluid recovery program in 1998. Because water elevations are above the top of screen in many of the monitoring wells, the majority of the monitoring wells can no longer be used to assess changes in SPH thickness. In addition, water samples from wells where water elevation is above the top of screen will be collected at depths well below the water table rather than at the water table where changes in chemistry should be monitored.

Tables

Table 1: Change is Perched-Water and SPH Levels Between 1998 and 2000

Monitoring Well	Total Well Depth (feet)	Depth to Top of Screen (feet)	Is Nov-00 water level above screen?	Is Dec-98 water level above screen?	[1]Change in Water Elevation (feet)	[2]Change is SPH Thickness (feet)
2	37.52	22.5	no	no	0.99	no SPH
3	91.46	71.5	YES	no	8.88	above screen
4	60.6	47.5	no	no	7.69	no SPH
5	92.5	74	YES	YES	11.76	above screen
6	53.37	33	no	no	10.1	no SPH
7	26.4	13.5	YES	YES	2.46	above screen
8	82.05	72	YES	YES	14.21	above screen
9	73.54	54.5	YES	no	19.68	above screen
2-2	48.62	38	YES	YES	1.57	above screen
2-3	106.5	98	YES	YES	10.09	above screen
2-4	58.8	48	no	no	1.35	no SPH
2-5	52.96	43	YES	YES	2.64	above screen
2-6	23.97	14	YES	no	8.65	above screen
2-7	60.75	56	YES	nm	nm	nm
2-9	42.23	33	no	no	-0.85	-0.01
2-10	77.5	68	YES	no	14.11	above screen
2-11	23.32	13	no	no	4.79	1.37
2-12	82.96	73	YES	no	12.61	above screen
2-13	49.2	39	YES	no	8.94	above screen
2-14	76.25	66	YES	no	19.44	above screen
2-15	73.56	63	YES	no	16.25	above screen
2-16	82.51	73	YES	YES	11.35	above screen
2-18	38.35	29	YES	YES	5.36	above screen
3-1	72.8	53	YES	no	19.34	above screen
3-2	102	63	YES	no	14.15	above screen
3-3	82.21	58	no	no	9.64	no SPH
3-4	112.4	68	no	no	12.18	no SPH

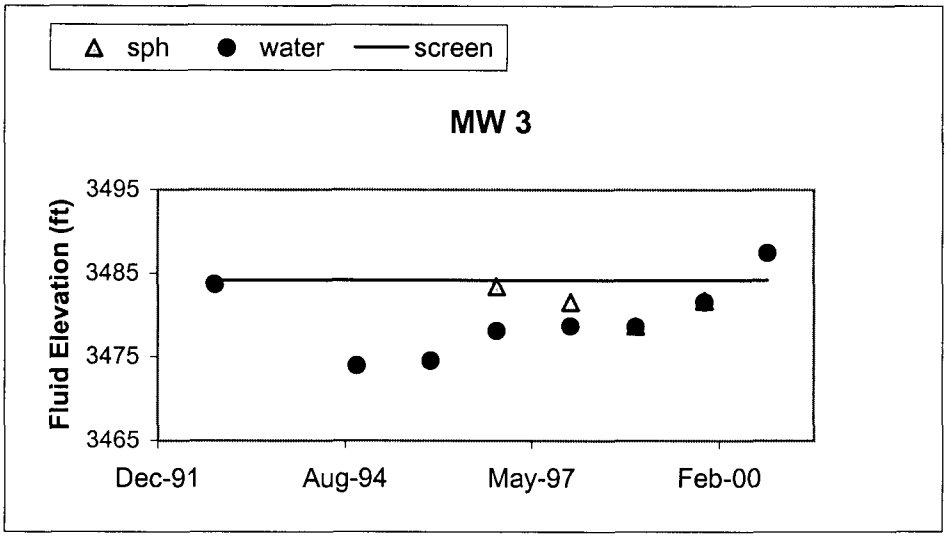
[1] difference between Nov-00 and Dec-98 water elevations, negative values represent a drop in water elevation; [2]difference between Nov-00 and Dec-98 SPH thickness, negative values represent a decline in SPH thickness; "nm" not measured in either Nov-00 and/or Dec-98; "above screen" is displayed when Nov-00 or Dec-98 water level is above top of screen; "no SPH" is displayed when SPH is absent in Nov-00 and Dec-98.

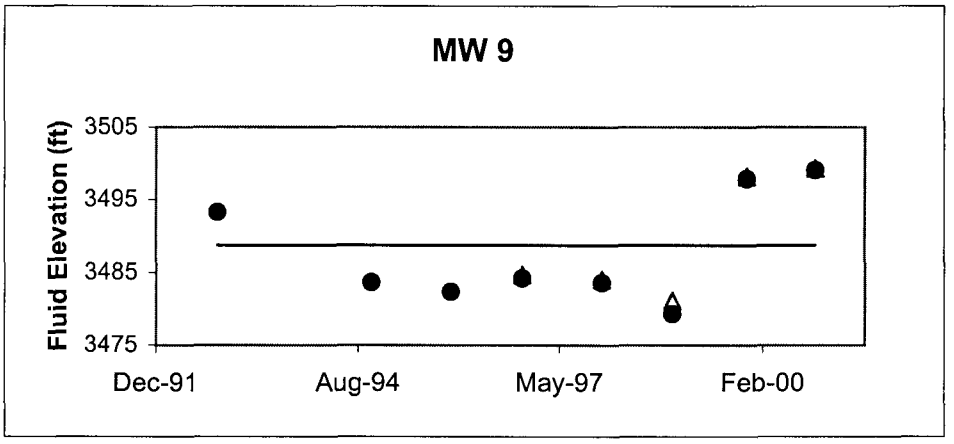
Table 2. Perched-Water Chemistry

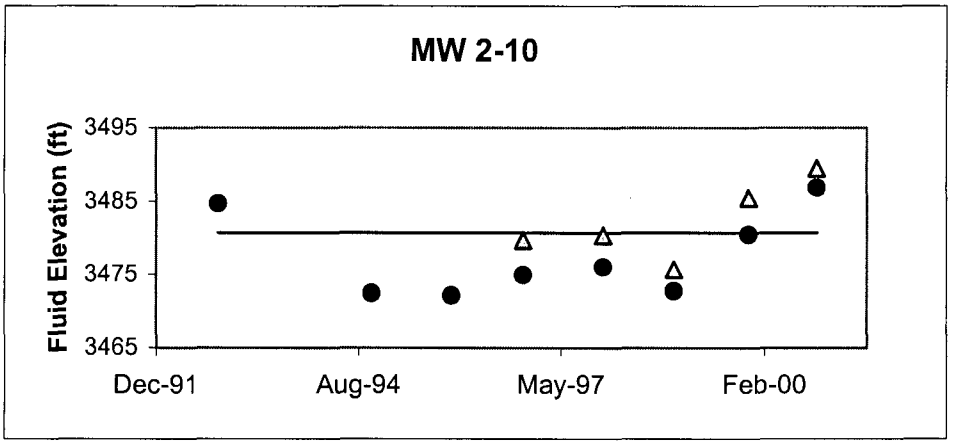
Sample #	Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Total Xylene (mg/L)	TDS (mg/L)	Cl + SO4
MW-2	Jan 93						4200
	Dec-97	<0.001	<0.001	<0.001	<0.003	3100	
	Dec-98	0.027	0.0071	0.0057	0.0106	2850	
	Dec-99	<0.001	<0.001	<0.001	<0.003	2960	3141
	Aug-00	<0.001	<0.001	<0.001	<0.003	2210	
	Nov-00	<0.001	<0.001	<0.001	<0.003	3700	
MW-8	Jan 93						3577
	Dec-97	<0.001	<0.001	<0.001	<0.003	3370	
	Dec-98	0.0012	0.0011	0.0012	0.0021	3480	
	Dec-99	0.0037	0.0013	0.0044	0.0076	3460	3227
	Aug-00	<0.001	<0.001	<0.001	<0.0031	3910	
	Nov-00	0.019	<0.001	0.0026	0.0048	3670	
MW 2-14	Dec-98	SPH	SPH	SPH	SPH	SPH	
	Dec-99	0.41	0.018	0.31	0.26	na	
	Nov-00	1	<0.001	0.049	0.18	3570	
MW 2-15	Dec-98	SPH	SPH	SPH	SPH	SPH	
	Dec-99	SPH	SPH	SPH	SPH	SPH	
	Nov-00	0.5	0.19	0.33	0.584	4190	
MW 2-16	Dec-97	0.0045	<0.001	<0.001	<0.003	3540	
	Jan-98	0.0049	0.011	0.007	0.0034	na	
	Dec-99	0.014	0.0039	0.012	0.021	3280	
MW 3-1*	Dec-98	0.097	0.0026	0.0038	0.0068	4150	
	Dec-99	3.5	0.011	0.48	0.274	>4510	
	Nov-00	1	<0.001	0.16	0.13	3870	
MW 3-2	Dec-97	SPH	SPH	SPH	SPH	SPH	
	Dec-98	SPH	SPH	SPH	SPH	SPH	
	Dec-99	8.8	4.3	1.6	2.96	na	
	Nov-00	0.048	0.044	0.083	0.152	3520	
MW 3-3	Dec-98	4.6	nd	nd	nd	2590	
	Dec-99	3.8	0.11	0.047	0.124	2090	
	Nov-00	2.7	<0.001	0.06	0.11	1990	
					Average	3274	
					Standard Deviation	648	

* Replaces MW 2-8, not analyzed (na), "<0.001" or "<0.003" below detection

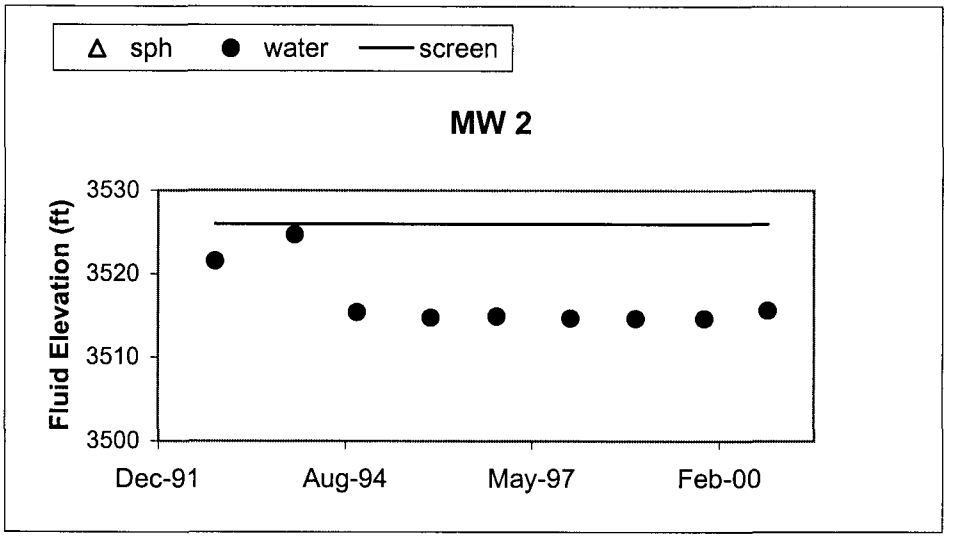
Figures

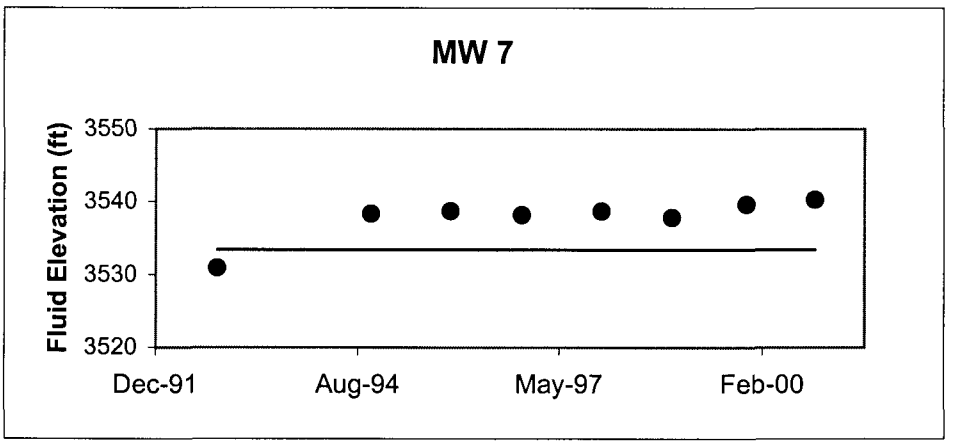


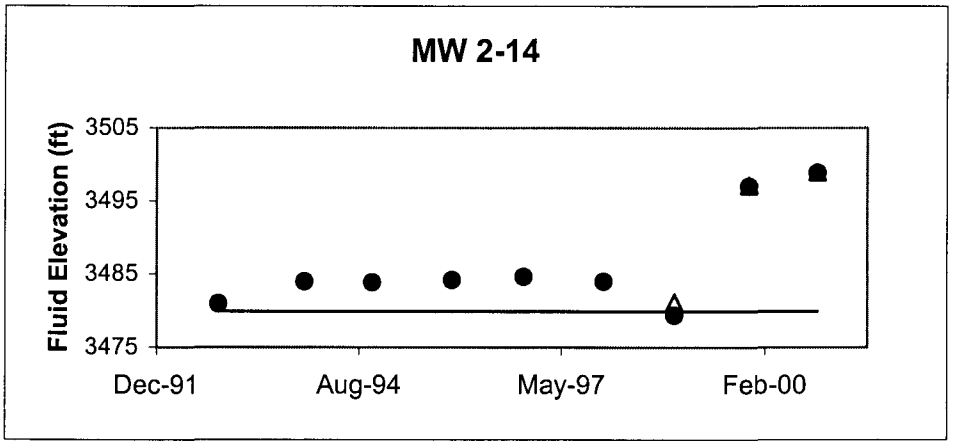




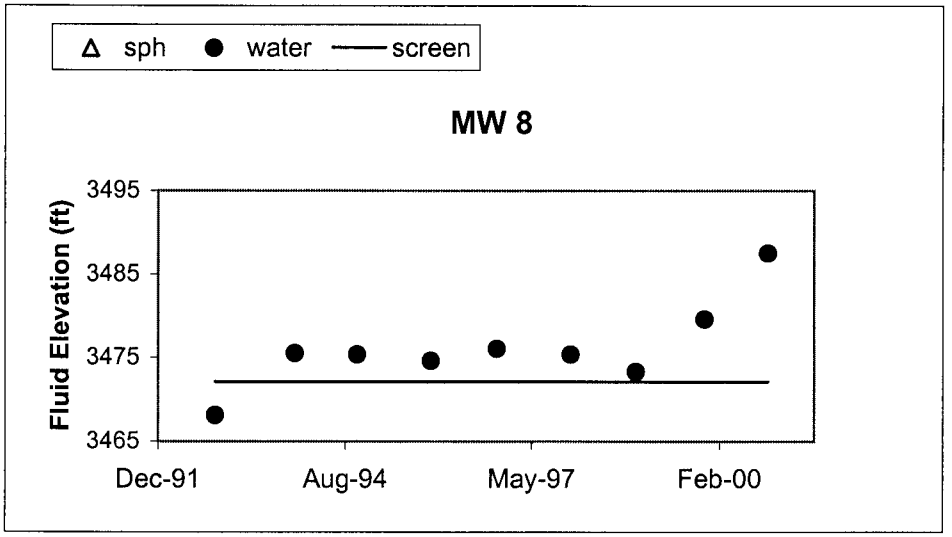
Empire ABO Gasoline Plant	Figure 1
Fluid Levels over Time	January 2001

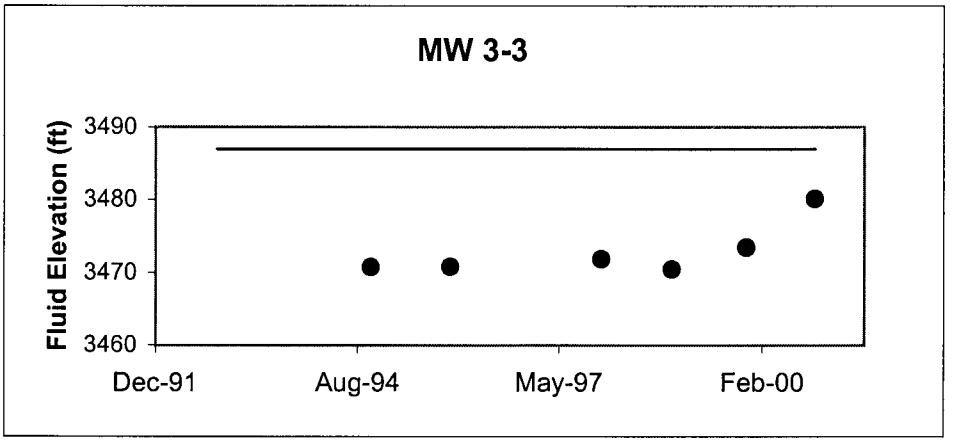


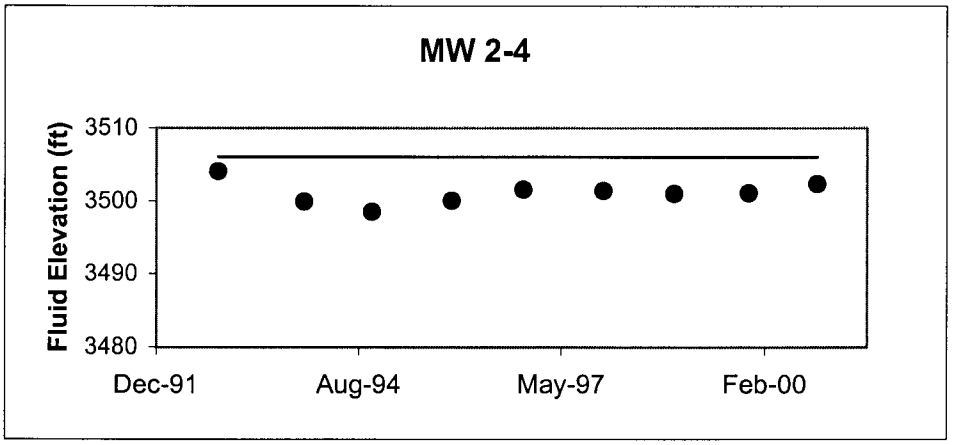




Empire ABO Gasoline Plant	Figure 2
Fluid Levels over Time	January 2001

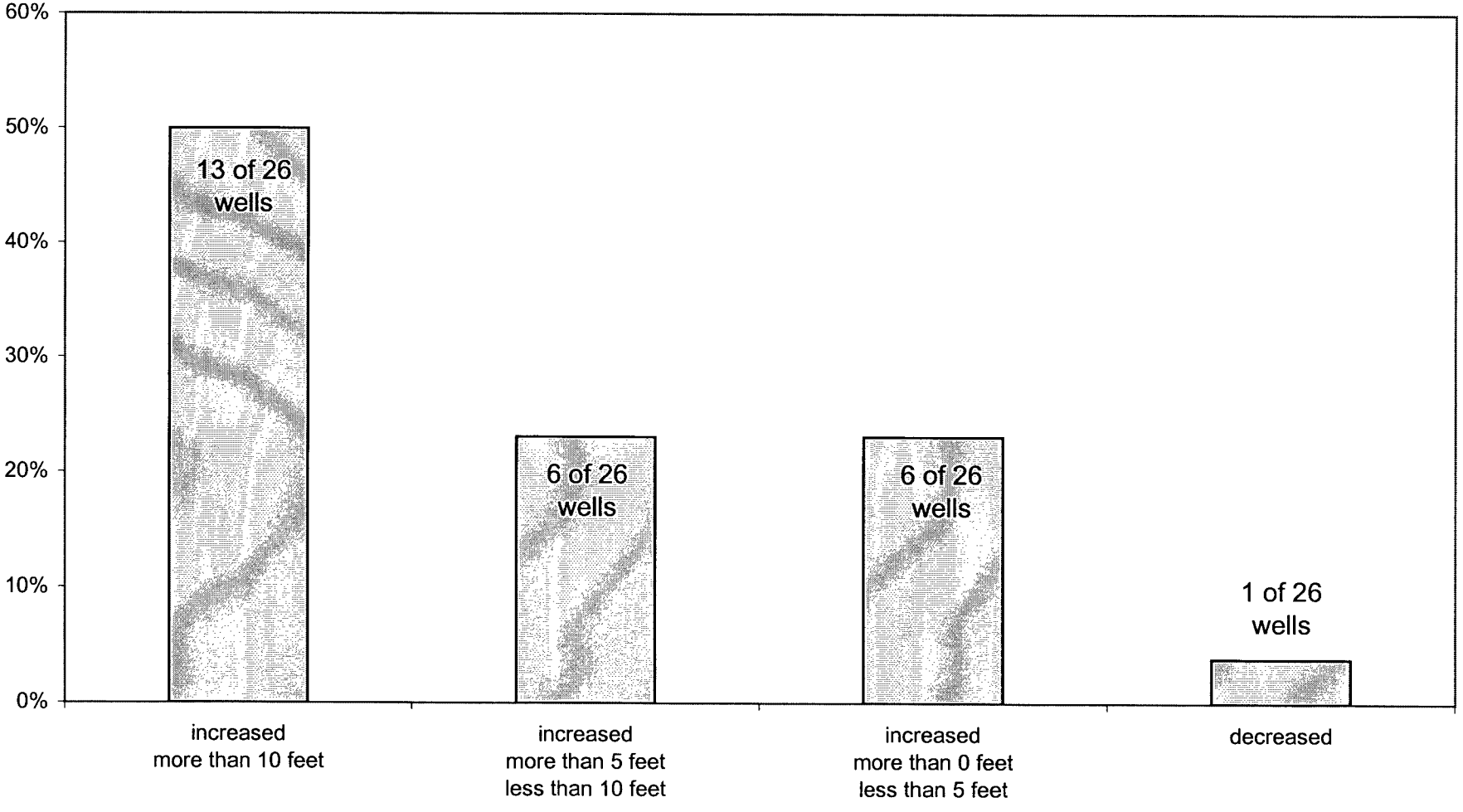






Empire ABO Gasoline Plant	Figure 3
Fluid Levels over Time	January 2001

Figure 4:
Percent of Monitoring Wells with Increasing or Decreasing Water Levels Between 1998 and 2000



Appendices

Appendix A

ASSAIGAI
ANALYTICAL
LABORATORIES, INC.
7300 Jefferson, NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood Dr., Suite N • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820
127 Eastgate Drive, 212-C • Los Alamos, New Mexico 87544 • (505) 662-2555

Explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

RT HICKS CONSULTING, LTD
attn: **MICHELLE HUNTER / RANDY HICKS**
4665 INDIAN SCH. NE 106
ALBUQUERQUE, NM 87110

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **0008286 ABO**

William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Client Sample ID: ***MW#2*** Sample Matrix: ***GW*** Sample Collected: ***08/17/00 13:30:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0008286-01A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00322	XG.2000.907-14	71-43-2	Benzene	ND	ug / L	1	1		08/25/00
X00322	XG.2000.907-14	100-41-4	Ethylbenzene	ND	ug / L	1	1		08/25/00
X00322	XG.2000.907-14		Naphthalene	ND	ug / L	1	2		08/25/00
X00322	XG.2000.907-14	95-47-6	o-Xylene	ND	ug / L	1	1		08/25/00
X00322	XG.2000.907-14	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		08/25/00
X00322	XG.2000.907-14	108-88-3	Toluene	ND	ug / L	1	1		08/25/00
0008286-01B		**EPA 160.1**							
TD0031	TT.2000.689-6		Total Dissolved Solids	2210	mg / L	1	10		08/29/00

Client Sample ID: ***MW#8*** Sample Matrix: ***GW*** Sample Collected: ***08/17/00 14:10:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0008286-02A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00322	XG.2000.907-15	71-43-2	Benzene	ND	ug / L	1	1		08/25/00
X00322	XG.2000.907-15	100-41-4	Ethylbenzene	ND	ug / L	1	1		08/25/00
X00322	XG.2000.907-15		Naphthalene	ND	ug / L	1	2		08/25/00
X00322	XG.2000.907-15	95-47-6	o-Xylene	ND	ug / L	1	1		08/25/00

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**

Project: **0008286 ABO**

X00322	XG.2000.907-15	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2	08/25/00
X00322	XG.2000.907-15	108-88-3	Toluene	ND	ug / L	1	1	08/25/00
0008286-02B		**EPA 160.1**						
TD0031	TT.2000.719-1		Total Dissolved Solids	3910	mg / L	1	10	08/29/00

**** Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. ****

**** ND = Not detected: less than the sample specific Detection Limit. Results relate only to the items tested. ****

RTCH01 9/7/00 FR1624 E-2

Chain of Custody Record

ASSAIGAI ANALYTICAL LABORATORIES, INC.

7300 JEFFERSON N.E.
ALBUQUERQUE, NEW MEXICO 87109
(505) 345-8964

3332 WEDGEWOOD
EL PASO, TEXAS 79925
(915) 593-6000

127 EASTGATE DRIVE, 212-C
LOS ALAMOS, NEW MEXICO 87544
(505) 662-2558

Lab Job No.: 8286 Date 24 Aug 00

Page 1 of 1

Client: R.T. Hicks

Address:

City / State / Zip:

Project Name / Number: Abo

Contract / Purchase Order / Quote:

Project Manager / Contact: Randy Hicks

Telephone No.:

Fax No.:

Samplers : (signature) M.H. / E.C.

AAL Fraction Number	Field Sample Number / Location	Date	Time	Sample Type	Type / Size of Container	Preservation: Temp.	Preservation: Chemical	No. of Containers	Analysis Required: BTEXN	Analysis Required: TDS	Remarks
1A	MW-#2	8-17-00	1330	GW	40 ml. VIAL	4°C	HCL	2	X		
1B	MW-#2	"	1330	"	250 ml. P	"	—	1		X	
2A	MW-#8	"	1410	"	40 ml. VIAL	"	HCL	2	X		
2B	MW-#8	8-17-00	1410	GW	250 ml. P	4°C	—	1		X	

OFFICE USE

250 24 Aug 00

Relinquished by:	Date 24 Aug 00	Received by:	Relinquished by:
Signature	Time 14:30	Signature	Signature
Printed Scott Pratt		Printed	Printed
Company AAL		Company	Company
Reason For M.H, E.C.		Reason	Reason

Date	Received by:	
Time	Signature	
	Printed	
	Company	
	Reason	

Method of Shipment: COURIER

Shipment No.:

Special Instructions:

Comments:

After analysis, samples are to be:

- ❑ Disposed of (additional fee)
- ❑ Stored (30 days max)
- ❑ Stored over 30 days (additional fee)
- ❑ Returned to customer

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Explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

RT HICKS CONSULTING, LTD
attn: **MICHELLE HUNTER / RANDY HICKS**
4665 INDIAN SCH. NE 106
ALBUQUERQUE, NM 87110

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **0011199 EAGP**

For William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Client Sample ID: ***MW 3-3*** Sample Matrix: ***GW*** Sample Collected: ***11/20/00 10:50:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0011199-01A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00446	XG.2000.1308-7	71-43-2	Benzene	2700	ug / L	50	1		11/28/00
X00446	XG.2000.1308-7	100-41-4	Ethylbenzene	60	ug / L	50	1		11/28/00
X00446	XG.2000.1308-7		Naphthalene	ND	ug / L	50	2		11/28/00
X00446	XG.2000.1308-7	95-47-6	o-Xylene	ND	ug / L	50	1		11/28/00
X00446	XG.2000.1308-7	108-38-3/106-42	p/m-Xylenes	110	ug / L	50	2		11/28/00
X00446	XG.2000.1308-7	108-88-3	Toluene	ND	ug / L	50	1		11/28/00
0011199-01B		**EPA 160.1**							
TD0042	TT.2000.1481-10		Total Dissolved Solids	1990	mg / L	1	10		11/27/00

Client Sample ID: ***MW 8*** Sample Matrix: ***GW*** Sample Collected: ***11/20/00 12:00:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0011199-02A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00446	XG.2000.1308-2	71-43-2	Benzene	19	ug / L	1	1		11/27/00
X00446	XG.2000.1308-2	100-41-4	Ethylbenzene	2.6	ug / L	1	1		11/27/00
X00446	XG.2000.1308-2		Naphthalene	2.6	ug / L	1	2		11/27/00
X00446	XG.2000.1308-2	95-47-6	o-Xylene	ND	ug / L	1	1		11/27/00

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **0011199 EAGP**

X00446	XG.2000.1308-2	108-38-3/106-42	p/m-Xylenes	4.8	ug / L	1	2	11/27/00
X00446	XG.2000.1308-2	108-88-3	Toluene	ND	ug / L	1	1	11/27/00
0011199-02B		**EPA 160.1**						
TD0043	TT.2000.1477-13		Total Dissolved Solids	3670	mg / L	1	10	11/30/00

Client Sample ID: ***MW 3-1*** Sample Matrix: ***GW*** Sample Collected: ***11/20/00 12:40:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0011199-03A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00446	XG.2000.1308-8	71-43-2	Benzene	1000	ug / L	17	1		11/28/00
X00446	XG.2000.1308-8	100-41-4	Ethylbenzene	160	ug / L	17	1		11/28/00
X00446	XG.2000.1308-8		Naphthalene	ND	ug / L	17	2		11/28/00
X00446	XG.2000.1308-8	95-47-6	o-Xylene	ND	ug / L	17	1		11/28/00
X00446	XG.2000.1308-8	108-38-3/106-42	p/m-Xylenes	130	ug / L	17	2		11/28/00
X00446	XG.2000.1308-8	108-88-3	Toluene	ND	ug / L	17	1		11/28/00
0011199-03B		**EPA 160.1**							
TD0043	TT.2000.1477-14		Total Dissolved Solids	3870	mg / L	1	10		11/30/00

Client Sample ID: ***MW 2*** Sample Matrix: ***GW*** Sample Collected: ***11/20/00 13:10:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0011199-04A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00446	XG.2000.1308-3	71-43-2	Benzene	ND	ug / L	1	1		11/27/00
X00446	XG.2000.1308-3	100-41-4	Ethylbenzene	ND	ug / L	1	1		11/27/00
X00446	XG.2000.1308-3		Naphthalene	ND	ug / L	1	2		11/27/00
X00446	XG.2000.1308-3	95-47-6	o-Xylene	ND	ug / L	1	1		11/27/00
X00446	XG.2000.1308-3	108-38-3/106-42	p/m-Xylenes	ND	ug / L	1	2		11/27/00
X00446	XG.2000.1308-3	108-88-3	Toluene	ND	ug / L	1	1		11/27/00
0011199-04B		**EPA 160.1**							
TD0043	TT.2000.1477-15		Total Dissolved Solids	3700	mg / L	1	10		11/30/00

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**
Project: **0011199 EAGP**

Client Sample ID: ***MW 2-15*** Sample Matrix: ***GW*** Sample Collected: ***11/20/00 13:50:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0011199-05A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00446	XG.2000.1308-9	71-43-2	Benzene	500	ug / L	10	1		11/28/00
X00446	XG.2000.1308-9	100-41-4	Ethylbenzene	330	ug / L	10	1		11/28/00
X00446	XG.2000.1308-9		Naphthalene	30	ug / L	10	2		11/28/00
X00446	XG.2000.1308-9	95-47-6	o-Xylene	84	ug / L	10	1		11/28/00
X00446	XG.2000.1308-9	108-38-3/106-42	p/m-Xylenes	500	ug / L	10	2		11/28/00
X00446	XG.2000.1308-9	108-88-3	Toluene	190	ug / L	10	1		11/28/00
0011199-05B		**EPA 160.1**							
TD0043	TT.2000.1477-16		Total Dissolved Solids	4190	mg / L	1	10		11/30/00

Client Sample ID: ***MW 3-2*** Sample Matrix: ***GW*** Sample Collected: ***11/20/00 15:00:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0011199-06A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00446	XG.2000.1308-10	71-43-2	Benzene	48	ug / L	3	1		11/28/00
X00446	XG.2000.1308-10	100-41-4	Ethylbenzene	83	ug / L	3	1		11/28/00
X00446	XG.2000.1308-10		Naphthalene	8.6	ug / L	3	2		11/28/00
X00446	XG.2000.1308-10	95-47-6	o-Xylene	32	ug / L	3	1		11/28/00
X00446	XG.2000.1308-10	108-38-3/106-42	p/m-Xylenes	120	ug / L	3	2		11/28/00
X00446	XG.2000.1308-10	108-88-3	Toluene	44	ug / L	3	1		11/28/00
0011199-06B		**EPA 160.1**							
TD0043	TT.2000.1477-17		Total Dissolved Solids	3520	mg / L	1	10		11/30/00

Client Sample ID: ***MW 2-14*** Sample Matrix: ***GW*** Sample Collected: ***11/21/00 15:00:00***

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
0011199-07A		**SW846 5030A/8021B Purgeable VOCs by GC/PID**							
X00446	XG.2000.1308-11	71-43-2	Benzene	1000	ug / L	17	1		11/28/00
X00446	XG.2000.1308-11	100-41-4	Ethylbenzene	49	ug / L	17	1		11/28/00
X00446	XG.2000.1308-11		Naphthalene	ND	ug / L	17	2		11/28/00
X00446	XG.2000.1308-11	95-47-6	o-Xylene	ND	ug / L	17	1		11/28/00
X00446	XG.2000.1308-11	108-38-3/106-42	p/m-Xylenes	180	ug / L	17	2		11/28/00

Certificate of Analysis

Client: **RT HICKS CONSULTING, LTD**

Project: **0011199 EAGP**

X00446	XG.2000.1308-11	108-88-3	Toluene	ND	ug / L	17	1	11/28/00

0011199-07B **EPA 160.1**

TD0043	TT.2000.1477-18		Total Dissolved Solids	3570	mg / L	1	10	11/30/00

**** Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. ****

**** ND = Not detected: less than the sample specific Detection Limit. Results relate only to the items tested. ****

Chain of Custody Record

ASSAIGAI ANALYTICAL LABORATORIES, INC.

7300 JEFFERSON N.E.
ALBUQUERQUE, NEW MEXICO 87109
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3332 WEDGEWOOD
EL PASO, TEXAS 79925
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127 EASTGATE DRIVE, 212-C
LOS ALAMOS, NEW MEXICO 87544
(505) 662-2558

Lab Job No.: 11199 Date 11.22.00

Page 1 of 2

Client RT Hicks Consultants LTD.

Address 4665 Indian School Rd. NE

City / State / Zip Alb. NM 87110

Project Name / Number EAGP

Contract / Purchase Order / Quote

Project Manager / Contact Randy Hicks

Telephone No. 266-5001

Fax No. 266-7738

Samplers : (signature) Elvin J. Chavez

AAL Fraction Number	Field Sample Number / Location	Date	Time	Sample Type	Type / Size of Container	Preservation: Temp.	Preservation: Chemical	No. of Containers	Analysis Required: BTEX N	Analysis Required: TDS	Remarks
1A	MW 3-3	11/20/00	1050	GW	40ml VOA	4C	HCL	2	✓		
1B	" "		"		250ml P.		—	1		✓	
2A	MW-8		1200		40ml VOA		HCL	2	✓		
2B	" "		"		250ml P.		—	1		✓	
3A	MW 3-1		1240		40ml VOA		HCL	2	✓		
3B	" "		"		250ml P.		—	1		✓	
4A	MW-2		1310		40ml VOA		HCL	2	✓		
4B	" "		"		250ml P.		—	1		✓	
5A	MW 2-5		1350		40ml VOA		HCL	2	✓		
5B	" "		"		250ml P.		—	1		✓	
6A	MW 3-2		1500		40ml VOA		HCL	2	✓		
6B	" "		"		250ml P.		—	1		✓	

Relinquished by:	Date	Received by:	Relinquished by:	Date	Received by:
Signature Elvin J. Chavez	11/21/00	Signature	Signature		Signature
Printed Elvin J. Chavez	Time 1540	Printed Steven Crandell	Printed	Time	Printed
Company		Company AAL	Company		Company
Reason		Reason Analysis	Reason		Reason

Method of Shipment: COURIER

Shipment No.

Special Instructions:

Comments: 30°C

After analysis, samples are to be:

- ☐ Disposed of (additional fee)
- ☐ Stored (30 days max)
- ☐ Stored over 30 days (additional fee)
- ☐ Returned to customer

Chain of Custody Record

ASSAIGAI ANALYTICAL LABORATORIES, INC.

7300 JEFFERSON N.E.
ALBUQUERQUE, NEW MEXICO 87109
(505) 345-8964

3332 WEDGEWOOD
EL PASO, TEXAS 79925
(915) 593-6000

127 EASTGATE DRIVE, 212-C
LOS ALAMOS, NEW MEXICO 87544
(505) 662-2558

Lab Job No.: 11199 Date 11/20/00

Page 2 of 2

Client RT Hicks Cons.

Address

City / State / Zip

Project Name / Number

Contract / Purchase Order / Quote

Project Manager / Contact

Telephone No.

Fax No.

Samplers: (signature)

AAL Fraction Number	Field Sample Number / Location	Date	Time	Sample Type	Type / Size of Container	Preservation: Temp.	Preservation: Chemical	No. of Containers	Analysis Required: BTEX	Analysis Required: TPH	Remarks
7A	MW 2-14	11-21-00	1500	GW	40 ml. VOA	4°C	HCL	2	X		
7B	↓	11-21-00	1500	GW	250 ml. P.	4°C	—	1		X	

OFFICE USE ONLY

Relinquished by:	Date	Received by:	Relinquished by:	Date	Received by:
Signature	11/21/00	Signature	Signature		Signature
Printed Elvin J. Chavez	Time 1540	Printed Steven Crandall	Printed	Time	Printed
Company		Company AAL	Company		Company
Reason		Reason Analysis	Reason		Reason
		11-22-00 11:50am			

Method of Shipment: COURIER

Shipment No.

Special Instructions:

Comments: 3.0°C

After analysis, samples are to be:

- ❑ Disposed of (additional fee)
- ❑ Stored (30 days max)
- ❑ Stored over 30 days (additional fee)
- ❑ Returned to customer

Appendix B

Table B-1: Water and SPH, Empire Abo Gasoline Plant

Monitoring Well	Top of Casing (feet asl)	Nov-00				Dec-99				Dec-98				Dec-97				Nov-96			
		Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Elevation (feet)	Water Elevation (feet)
2	3548.50	x	32.91		3515.59	x	33.92		3514.58	x	33.90		3514.60	x	33.86		3514.64	x	33.62		3514.88
3	3555.70	x	68.23		3487.47	73.98	74.10	3481.72	3481.60	77.00	77.11	3478.70	3478.59	74.10	77.02	3481.60	3478.68	72.27	77.60	3483.43	3478.10
4	3551.30	x	53.00		3498.30	x	52.45		3498.85	x	60.69		3490.61	nm	nm	nm	nm	x	56.84		3494.46
5	3543.90	x	59.55		3484.35	x	64.10		3479.80	x	71.31		3472.59	69.08	69.34	3474.82	3474.56	69.19	69.79	3474.71	3474.11
6	3544.90	x	36.28		3508.62	nm	nm	nm	nm	x	46.38		3498.52	40.15	45.75	3504.75	3499.15	39.29	45.51	3505.61	3499.39
7	3546.90	x	6.68		3540.22	x	7.35		3539.55	x	9.14		3537.76	x	8.27		3538.63	x	8.78		3538.12
8	3544.10	x	56.60		3487.50	x	64.50		3479.60	x	70.81		3473.29	x	68.75		3475.35	x	68.05		3476.05
9	3543.20	43.98	44.24	3499.22	3498.96	45.12	45.42	3498.08	3497.78	62.12	63.92	3481.08	3479.28	59.21	59.64	3483.99	3483.56	58.54	59.02	3484.66	3484.18
2-2	3552.55	x	25.28		3527.27	x	26.75		3525.80	x	26.85		3525.70	x	26.88		3525.67	x	26.92		3525.63
2-3	3557.98	x	73.42		3484.56	x	78.53		3479.45	x	83.51		3474.47	x	82.11		3475.87	x	82.32		3475.66
2-4	3554.09	x	51.76		3502.33	x	53.02		3501.07	x	53.11		3500.98	x	52.69		3501.40	x	52.52		3501.57
2-5	3553.00	x	26.78		3526.22	x	27.60		3525.40	x	29.42		3523.58	x	27.50		3525.50	x	27.50		3525.50
2-6	3551.11	9.58	9.61	3541.53	3541.50	7.6	8.60	3543.51	3542.51	18.22	18.26	3532.89	3532.85	15.45	16.52	3535.66	3534.59	21.81	22.22	3529.30	3528.89
2-7	3547.34	x	47.61		3499.73	x	49.40		3497.94	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm	nm
2-9	3546.81	36.76	39.85	3510.05	3506.96	34.75	36.80	3512.06	3510.01	35.90	39.00	3510.91	3507.81	35.25	39.03	3511.56	3507.78	35.3	38.75	3511.51	3508.06
2-10	3548.67	59.15	61.81	3489.52	3486.86	63.23	68.25	3485.44	3480.42	73.00	75.92	3475.67	3472.75	68.35	72.65	3480.32	3476.02	68.98	73.75	3479.69	3474.92
2-11	3547.06	17.20	18.57	3529.86	3528.49	20.72	21.22	3526.34	3525.84	x	23.36		3523.70	21.99	22.43	3525.07	3524.63	x	23.21		3523.85
2-12	3543.40	60.56	61.00	3482.84	3482.40	65.50	66.90	3477.90	3476.50	65.90	73.61	3477.50	3469.79	69.75	70.24	3473.65	3473.16	x	72.96		3470.44
2-13	3545.91	33.94	36.76	3511.97	3509.15	41.57	41.80	3504.34	3504.11	45.60	45.70	3500.31	3500.21	43.00	43.06	3502.91	3502.85	42.47	42.48	3503.44	3503.43
2-14	3545.91	46.99	47.10	3498.92	3498.81	48.82	48.98	3497.09	3496.93	64.80	66.54	3481.11	3479.37	x	61.98		3483.93	x	61.34		3484.57
2-15	3543.64	52.77	52.85	3490.87	3490.79	54.55	55.75	3489.09	3487.89	65.42	69.10	3478.22	3474.54	62.88	65.48	3480.76	3478.16	62.7	65.44	3480.94	3478.20
2-16	3544.39	x	59.80		3484.59	x	65.05		3479.34	x	71.15		3473.24	x	69.39		3475.00	x	69.14		3475.25
2-18	3545.79	x	16.76		3529.03	x	20.18		3525.61	x	22.12		3523.67	x	20.95		3524.84	x	22.71		3523.08
3-1	3543.04	x	43.66		3499.38	x	45.70		3497.34	x	63.00		3480.04	x	60.16		3482.88	58.45	58.46	3484.59	3484.58
3-2	3541.59	59.90	61.10	3481.69	3480.49	63.70	65.40	3477.89	3476.19	71.10	75.25	3470.49	3466.34	69.71	74.50	3471.88	3467.09	69.72	71.10	3471.87	3470.49
3-3	3544.93	x	64.85		3480.08	x	71.50		3473.43	x	74.49		3470.44	x	73.09		3471.84	nm	nm	nm	nm
3-4	3558.63	x	73.97		3484.66	x	82.15		3476.48	x	86.15		3472.48	x	84.69		3473.94	x	85.09		3473.54

legend: asl above sea level, "x" SPH not present, "nm" not measured