PLW J0088 48341

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266.0745

July 27, 2009

RECEIVED
JUL 27 2009
HOBBSOCD

Mr. Geoffrey R. Leking
New Mexico Oil Conservation Division
1625 North French Drive
Hobbs, New Mexico 88240

RE: **Southwest Royalties, Inc., Wyatt "A" Federal Tank Battery Release Site: T-17-S, R-33-E, Section 34, Unit C, Lea County, New Mexico, Lease No. 94189, Termination Request**

Dear Mr. Leking:

On behalf of Southwest Royalties, Inc. (SW Royalties), R.T. Hicks Consultants, Ltd. is submitting this request for closure of the regulatory file associated with the recent release (1R-2190-0) at the Wyatt "A" Federal Tank Battery Release Site regulatory file. The investigation demonstrated that neither chloride nor hydrocarbons are present in the concentrations quantities that represent a threat to fresh water, human health or the environment. However, during abandonment of the battery and surface restoration, the operator will conduct additional investigations as required by regulatory mandates in force at the time.

Background and Site Characteristics

On Saturday morning, of May 23, 2009 a release of 100 bbls of fluid occurred from a hole in the south oil tank (300 bbl capacity) at the SW Royalties Wyatt "A" Federal Tank Battery. Fluid from the release was contained within the firewall except for a very small volume that leaked from around some piping at the southern end of the facility. A vacuum truck was used to recover 50 bbls of fluid from the firewall for a net loss of 50 bbls. Both the NMOCD and the BLM were notified via phone and fax on the afternoon of the release.

The Wyatt "A" Federal battery is located approximately 0.5 miles north of the Mescalero Ridge at T-17-S, R-33-E, Section 34, Unit C, in western Lea County, New Mexico (North 32° 47' 49.1" latitude and West 103° 39' 9.3" longitude, Plate 1).

The surface soil is described as a loam or gravelly loam within the Kimbrough-Lea Complex, according to the USDA Soil Survey. A sieve analysis of the top meter of soil from the background boring supports this description and with a fine grain sand component.

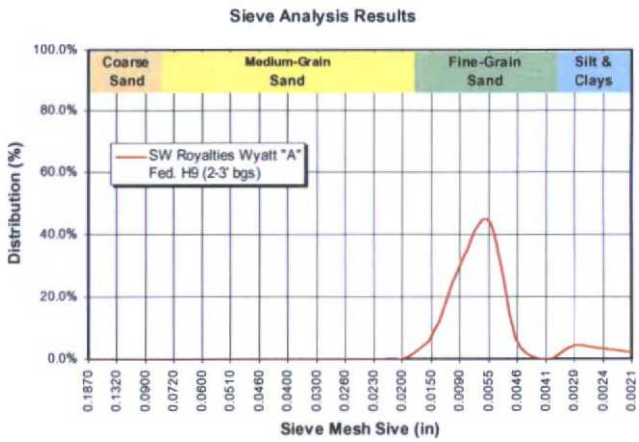


Plate 1 is geologic map of the area. The Wyatt "A" Federal site is located on the surface outcrop of the Tertiary Ogallala formation which is exposed to the northeast of the cap rock escarpment. The Ogallala Formation generally consists of semi-consolidated fine-grained calcareous sand, capped with a thick layer of caliche and is approximately 250 feet thick in this area. The Ogallala overlies the red clay and shale beds of the Triassic Dockum Group.

Depth to ground water at the site is approximately 150 to 160 feet below the surface according to the most recent USGS measurements taken from nearby wells northeast of the cap rock escarpment (see Plate 2). The ground water gradient is to the southeast at approximately 0.002 ft/ft. The background chloride concentration of the ground water based on the few published measurements that are available (Plate 3) is less than 50 mg/L.

Field Program

On June 3, 2009 Hicks Consultants investigated the release then prepared a site map, and recovered soil samples according to the NMOCD guidelines. Nine hand auger borings were installed to determine the hydrocarbon and chloride concentrations within the spill area (See Plate 4). Six of the soil borings (H-3 to H-8) encountered auger refusal at a depth of one foot or less due to a hard caliche layer. Soil borings H-1 (10 feet south of the source area) encountered the caliche layer at a depth of three feet and H-2 (source area) was advanced to a depth of nine feet but did not encounter the caliche layer. In addition, a background boring (H-9) located 35 feet northeast of the source area, was advanced to a depth of three feet and did not encounter the caliche layer. Laboratory analyses of chloride, benzene, toluene, ethylbenzene, xylenes, and total petroleum hydrocarbons were performed on at lease one sample from each auger boring. Attachment A provides a copy of the laboratory report and chain of custody documents.

Results

A summary of the laboratory results from the June 3, 2009 soil sampling event are provided on Table 1. Plate 4 is a site map that indicates the extent of the spill area and the location of the hand auger borings.

Although the presence of hard caliche limited our ability to easily determine the vertical extent of impact to soil at all

Table 1
Wyatt "A" Federal Tank Battery
Laboratory Data - Soil Samples

Sample Location	Depth (feet)	Sample Date	Chloride (mg/kg)	PID (ppm)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	BTEX (mg/kg)
H-1	2-3	6/3/09	2,370	--	<0.058	0.240	3.17	**10.7**	14.1
H-2	1-2	6/3/09	373	1,646	**1.904**	**41.1**	19.0	**70.5**	133
	8-9	6/3/09	187	81	<0.001	<0.002	<0.001	<0.001	<0.005
H-3	0-1	6/3/09	23.7	--	<0.056	4.581	14.2	**31.8**	50.6
H-4	0-0.5	6/3/09	4,520	--	**0.292**	1.218	0.252	0.252	2.01
H-5	0-1	6/3/09	5,670	--	**0.102**	1.698	5.62	**12.0**	19.4
H-6	0-0.5	6/3/09	1,330	--	**2.329**	3.167	17.3	**30.8**	53.5
H-7	0-0.5	6/3/09	315	--	**0.120**	17.9	**31.4**	**56.7**	106
H-8	0-0.25	6/3/09	1,400	--	<0.005	0.014	0.013	0.033	0.065
H-9	2-3	6/3/09	<5.39	--	<0.001	<0.002	<0.001	<0.001	<0.005
Fire Wall	Comp	6/3/09	4,120	--	<0.001	0.005	0.014	0.035	0.054
2006 NMED Soil Screening Guidelines			Com/Ind Exposure		25.8	252	128	82	--
			Protect GW (DAF_{20})		0.0201	21.7	20.2	2.06	--
Site Specific GW Protective Levels (DAF_{120})					0.121	130	121	12.4	--

Bold red or blue text values indicate conc. that exceed the 2006 NMED screening guidelines.
Bold text values indicate concentrations that exceed the calculated site specific remediation levels.

locations with sampling, site data permit a reasonable estimate of the vertical impact from the 50-barrel release. The following calculation shows this estimate:

$$\text{Depth of Impact} = \frac{\text{Volume of Release/Area of Release Footprint}}{\text{Porosity}}$$

$$\text{Depth of Impact} = \frac{\text{280 cubic feet of produced water/5,800 square feet}}{0.30}$$

Average Depth of Impact = 2 inches

This calculation presents the average depth of impact from the 100-barrel spill (50 barrels net release) and does not consider the impact of historic releases.

Although chloride and hydrocarbon concentrations in the soil exceed the recommended levels listed in the NMOCD 1993 Guidelines, the guidelines state that procedures may deviate from the guidelines "if is can be shown that the proposed procedure will either remediate, remove, isolate or control contaminants in such a manner that fresh waters, public health and the environment will not be impacted." We belive this plan meets this criteria.

Demonstration of Compliance with NMOCD Rules: Chloride Concentrations

Title 19, Chapter 15, Part 30.9 of the NMAC states "The responsible person shall abate the vadose zone so that water contamination in the vadose zone will not with reasonable probability contaminate ground water or surface water, in excess of the standards in Subsection B and C of the 19.15.30.9 NMAC, through leaching, percolation or other transport mechanisms, or as the water table elevation fluctuates." We believe that impairment of surface water is not an issue at this site, therefore only the ground water standard for chloride (250 mg/L) is addressed herein. Because contact with chloride in soil does not pose a threat to human health, the discussion herein is restricted to the threat posed to ground water quality.

We used the AMIGO tool (HYDRUS-1D model) to determine if the non-saturated chloride transport through the vadose zone would cause the underlying ground water to exceed the criteria established by NMOCD Rules. The input to the model employed field data from the site, nearby locations, and conservative input data for parameters that were not measured at or near the site. As explained in Attachment B, the model employed a conservative estimate of the depth of chloride impact.

The results of the simulation indicate that a maximum ground water chloride concentration of 225 mg/l (below standards) will occur in the years 2086 to 2090 (77 years from the release date) if no further corrective actions are taken. Attachment B provides an explanation of the data used and results from the

simulation at the Wyatt "A" Federal site. Additional information concerning the AMIGO tool can be found at www.rthicksconsult.com.

The site data and our evaluation permit a conclusion that chloride "in the vadose zone will not with reasonable probability contaminate ground water or surface water, in excess of the standards in Subsection B and C of the 19.15.30.9 NMAC, through leaching, percolation or other transport mechanisms, or as the water table elevation fluctuates."

Demonstration of Compliance With NMOCD Rules: Hydrocarbon Concentrations

The NMED has provided soil screening guidelines for petroleum-related contaminants in a document dated October 2006. These include soil screening levels (SSLs) for benzene, toluene, ethylbenzene, and xylenes designed to protect residential and commercial receptors that may be directly exposed to the soil. None of the hydrocarbon concentrations in the soil at the Wyatt "A" Federal site exceed these levels as shown on Table 1. From these data we conclude that hydrocarbons in soil do not pose a threat to human health.

The October 2006 guidelines also include screening levels for soil protective of the ground water relative to the human health standards listed in 20.6.2.3103 of the NMAC under conditions where the soil is directly exposed to the ground water (Dilution-Attenuation Factor or DAF = 1) and also conditions where the soil is not directly exposed to ground water (DAF = 20). A June 2006 NMED guidance document, that describes the calculation of SSLs, recommends the calculation of SSLs using the site specific aquifer characteristics, spill size, and recharge rate where appropriate. Using the protocols described in the NMED document, we calculated a DAF of 120 for the Wyatt "A" Federal site, as shown on Table 1. Hydrocarbon concentrations from the auger boring samples collected at the site exceed the DAF_{120} SSLs for benzene (H-2, H-4, and H-6) and xylenes (H-2, H-3, H-6, and H-7).

The SSLs provided by and calculated from the June 2006 guidance document do not take into account the liquid-phase advection, biodegradation of hydrocarbons solid-phase sorption, vapor-phase diffusion, and three-phase equilibration that occurs as hydrocarbon contaminates migrate through the vadose zone. Therefore we used the VLEACH vadose zone model to determine if the benzene and xylenes would cause the underlying ground water to exceed the regulatory standard. The input to the model employed field data from the site, nearby locations, and conservative input data for parameters that were not measured at or near the site.

The results of the simulation indicate that a maximum ground water benzene concentration of 0.00017 mg/l (below standards) will occur in 400 years and a maximum ground water xylene concentration of 0.00385 mg/l (below standards) will occur in 700 years if no further corrective actions are taken.

Like the method used to calculate SSLs, the VLEACH model does not take into account the natural biological degradation of the hydrocarbons; therefore this prediction is highly conservative of ground water quality. Attachment C provides an explanation of the data used and results from the simulation at the Wyatt "A" Federal site. A detailed description of the model and a free windows-based program download is available from the USEPA at http://www.epa.gov/ada/csmos/models/vleach.html.

The site data and our evaluation permit a conclusion that regulated hydrocarbons "in the vadose zone will not with reasonable probability contaminate ground water or surface water, in excess of the standards in Subsection B and C of the 19.15.30.9 NMAC, through leaching, percolation or other transport mechanisms, or as the water table elevation fluctuates."

Recommendations

Based on the results of the soil sampling and vadose zone modeling, we conclude that this site is in compliance with the mandates of Title 19, Chapter 15, Part 29 of the NMAC such that the remaining chloride- and hydrocarbon-impacted soil associated with the 100-barrel release does not and will not endanger public health or the environment.

While we recommend termination of the regulatory file associated with this release, we also understand that the subsurface caliche limited our ability to easily determine the vertical extent of any historic releases associated with this site. We do not recommend a boring or trenching sampling program at this site to gain additional sample data as such sampling requires penetration of the caliche layer and could create a conduit to deeper penetration of a future release at the battery. We understand that the BLM (as the mineral owner) will require restoration of the site when the use of the battery is permanently terminated. At that time, we recommend a full characterization of the vertical extent of historic impairment.

Please contact me or Mr. Randy Wiley of Southwest Royalties (806-495-5284) if you have any questions concerning this submission. Thank you for your time and consideration.

Sincerely,
R.T Hicks Consultants, Ltd.

Dale T Littlejohn
Geologist

Copy: Randy Willey
Matt Swierc

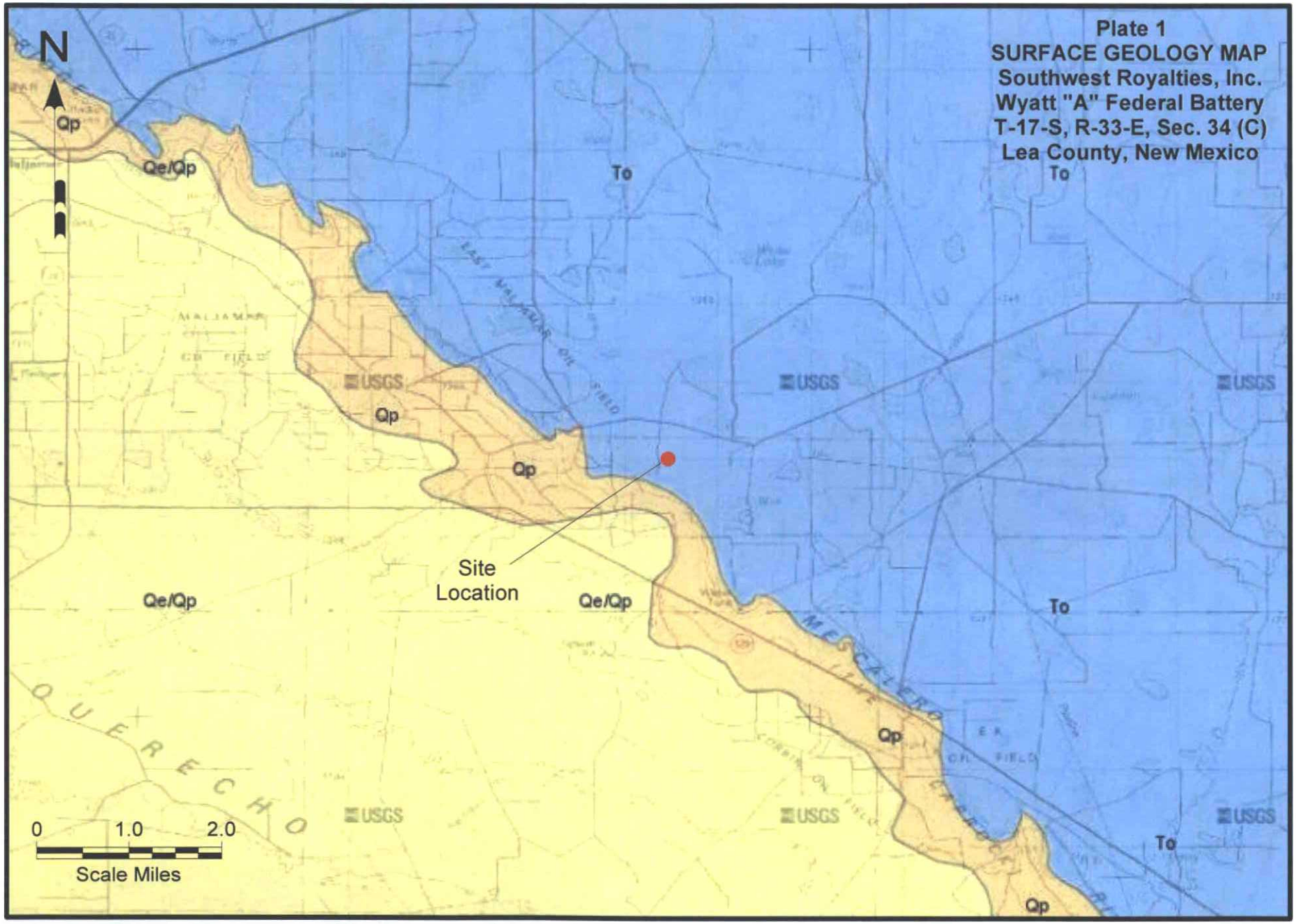


Plate 1
SURFACE GEOLOGY MAP
Southwest Royalties, Inc.
Wyatt "A" Federal Battery
T-17-S, R-33-E, Sec. 34 (C)
Lea County, New Mexico
N
Qp
Qe/Qp
To
USGS
Site
Location
MESCALERO
QUERECHO
0
1.0
2.0
Scale Miles

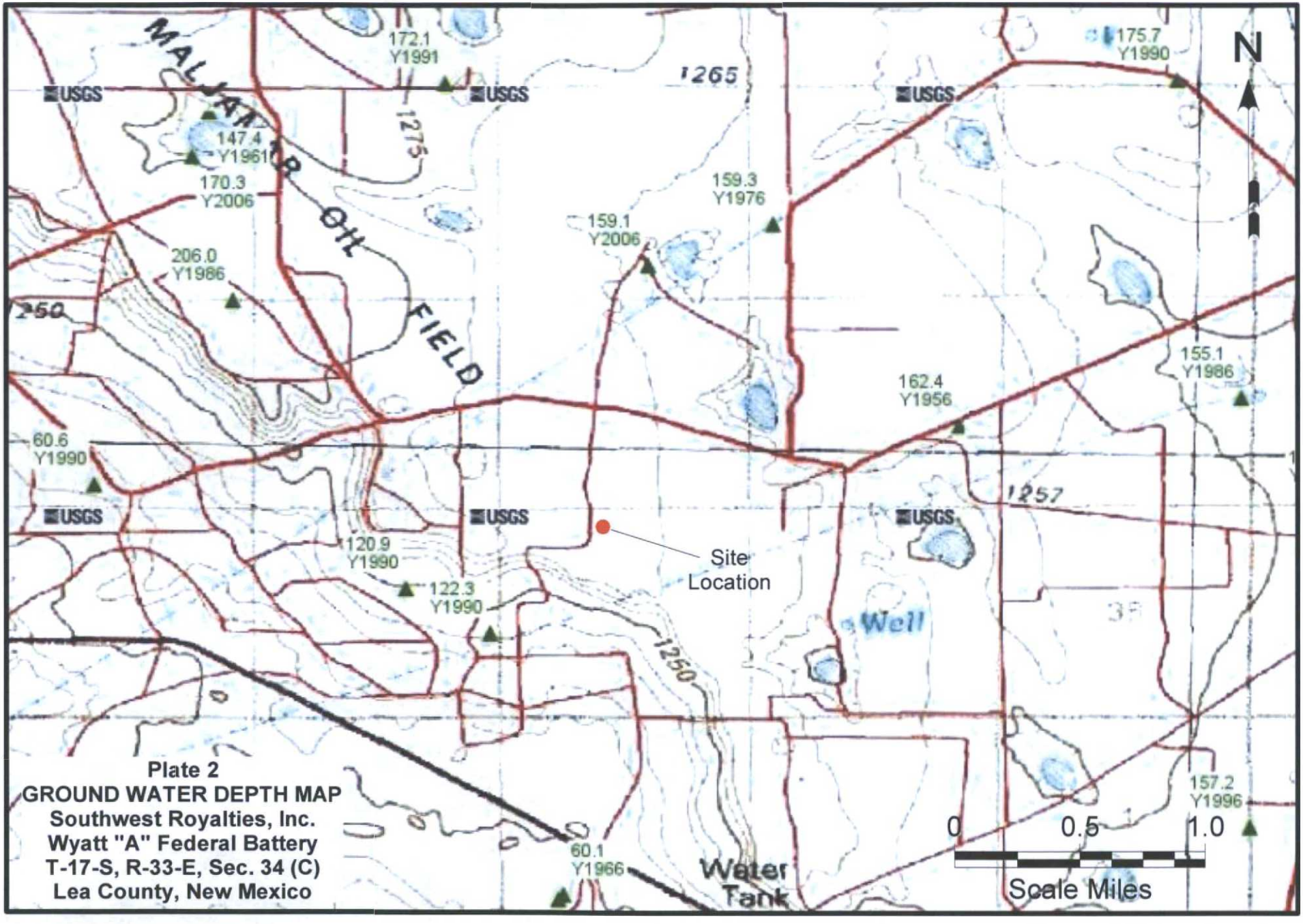


Plate 2
GROUND WATER DEPTH MAP
Southwest Royalties, Inc.
Wyatt "A" Federal Battery
T-17-S, R-33-E, Sec. 34 (C)
Lea County, New Mexico

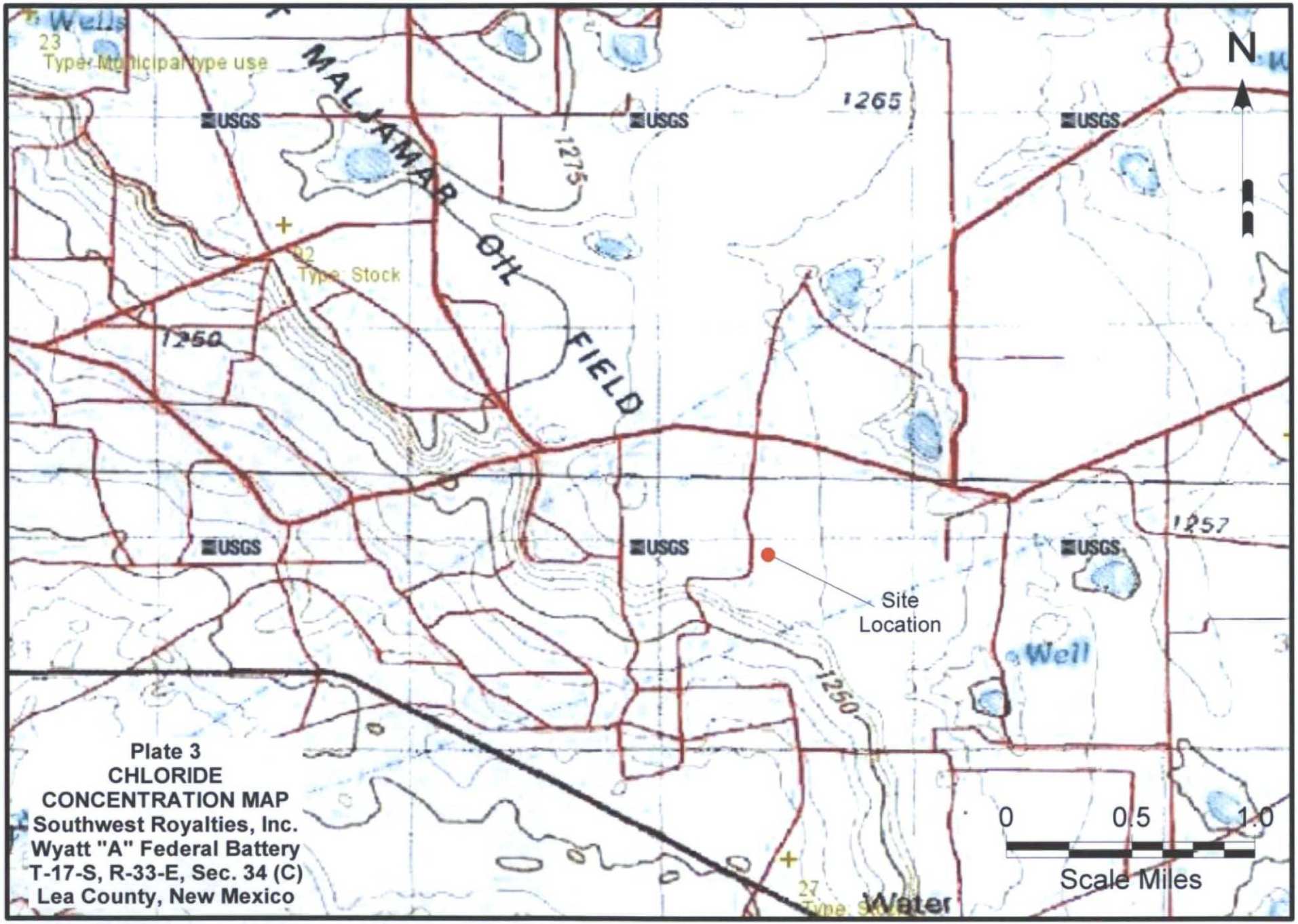
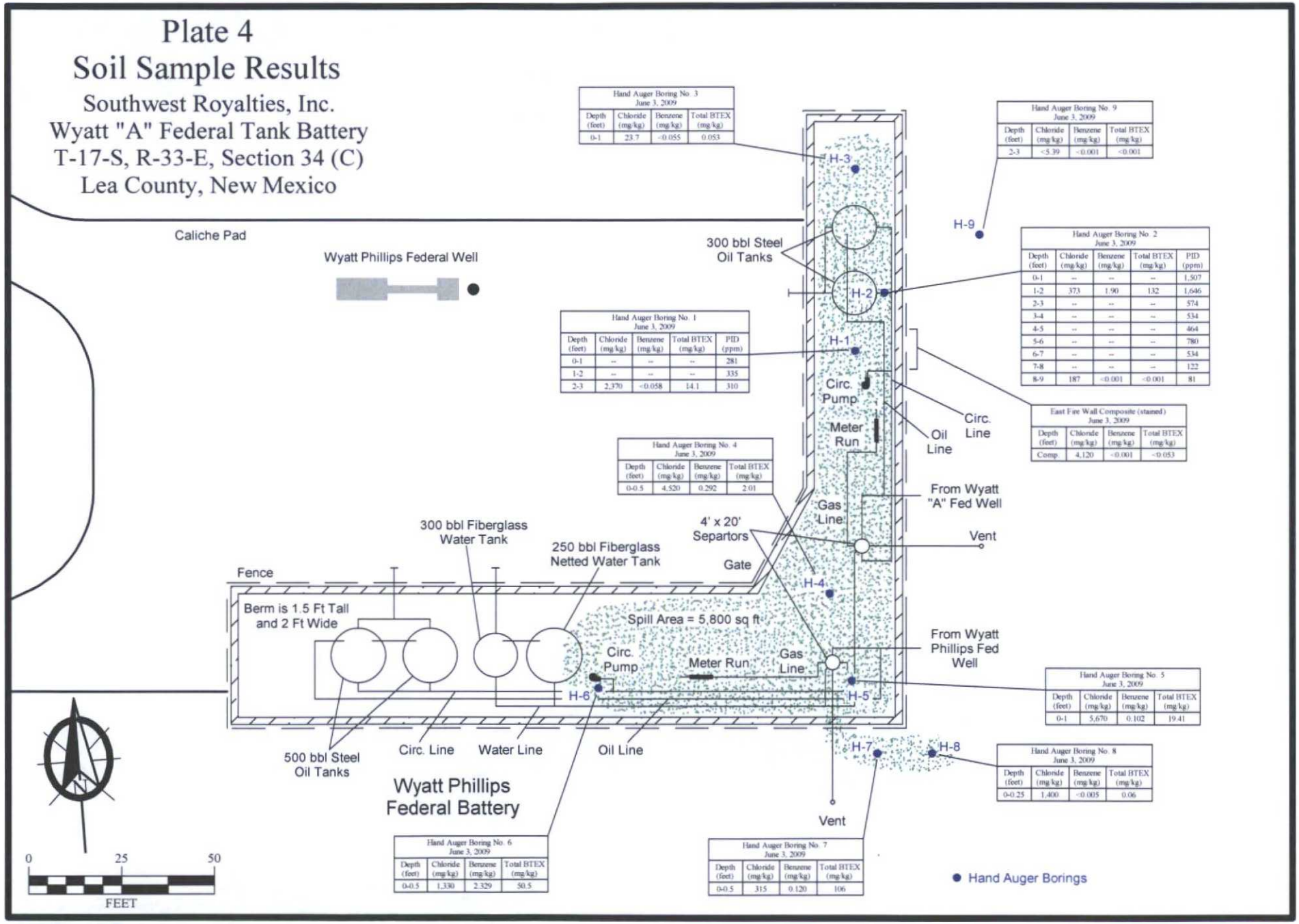


Plate 3
CHLORIDE
CONCENTRATION MAP
Southwest Royalties, Inc.
Wyatt "A" Federal Battery
T-17-S, R-33-E, Sec. 34 (C)
Lea County, New Mexico

Plate 4
Soil Sample Results

Southwest Royalties, Inc.
Wyatt "A" Federal Tank Battery
T-17-S, R-33-E, Section 34 (C)
Lea County, New Mexico



Hand Auger Boring No. 3
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
0-1	23.7	<0.055	0.053

Hand Auger Boring No. 9
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
2-3	<5.39	<0.001	<0.001

Hand Auger Boring No. 2
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)	PID (ppm)
0-1	--	--	--	1,507
1-2	373	1.90	132	1,646
2-3	--	--	--	574
3-4	--	--	--	534
4-5	--	--	--	464
5-6	--	--	--	780
6-7	--	--	--	534
7-8	--	--	--	122
8-9	187	<0.001	<0.001	81

Hand Auger Boring No. 1
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)	PID (ppm)
0-1	--	--	--	281
1-2	--	--	--	335
2-3	2,370	<0.058	14.1	310

East Fire Wall Composite (stained)
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
Comp.	4,120	<0.001	<0.053

Hand Auger Boring No. 4
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
0-0.5	4,520	0.292	2.01

Hand Auger Boring No. 5
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
0-1	5,670	0.102	19.41

Hand Auger Boring No. 8
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
0-0.25	1,400	<0.005	0.06

Hand Auger Boring No. 6
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
0-0.5	1,330	2.329	50.5

Hand Auger Boring No. 7
June 3, 2009

Depth (feet)	Chloride (mg/kg)	Benzene (mg/kg)	Total BTEX (mg/kg)
0-0.5	315	0.120	106

ATTACHMENT A

Laboratory Reports and Chain-of-Custody Documentation
From June 2009 Characterization

Analytical Report 334495

for

R.T. Hicks Consultants, LTD

Project Manager: Dale Littlejohn

SW Royalties: Wyatt "A" Fed Bat

L-179-0609

16-JUN-09

12600 West I-20 East Odessa, Texas 79765

Texas certification numbers:
Houston, TX T104704215-08B-TX - Odessa/Midland, TX T104704400-08-TX
Corpus Christi, TX T104704370-08-TX - Dallas, TX T104704295-08-TX

Florida certification numbers:
Houston, TX E871002 - Miami, FL E86678 - Tampa, FL E86675
Miramar, FL E86349
Norcross(Atlanta), GA E87429

South Carolina certification numbers:
Norcross(Atlanta), GA 98015

North Carolina certification numbers:
Norcross(Atlanta), GA 483

Houston - Dallas - San Antonio - Tampa - Miami - Latin America
Midland - Corpus Christi - Atlanta

Sample Cross Reference 334495

R.T. Hicks Consultants, LTD, Albuquerque, NM

SW Royalties: Wyatt "A" Fed Bat

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
H-1 (2-3 Ft)	S	Jun-03-09 10:12	2 - 3 ft	334495-001
H-2 (1-2 Ft)	S	Jun-03-09 10:35	1 - 2 ft	334495-002
H-2 (8-9 Ft)	S	Jun-03-09 11:25	8 - 9 ft	334495-003
H-3 (0-1 Ft)	S	Jun-03-09 11:50	0 - 1 ft	334495-004
East Fire Wall Composite	S	Jun-03-09 12:00		334495-005
H-4 (3-6 In)	S	Jun-03-09 12:15	3 - 6 In	334495-006
H-5 (0-1 Ft)	S	Jun-03-09 12:25	0 - 1 ft	334495-007
H-6 (0-6 In)	S	Jun-03-09 12:35	0 - 6 In	334495-008
H-7 (0-6 In)	S	Jun-03-09 12:45	0 - 6 In	334495-009
H-8 (0-3 In)	S	Jun-03-09 12:55	0 - 3 In	334495-010
H-9 Background (2-3 Ft)	S	Jun-03-09 13:15	2 - 3 ft	334495-011

CASE NARRATIVE

Client Name: R.T. Hicks Consultants, LTD
Project Name: SW Royalties: Wyatt "A" Fed Bat

Project ID: L-179-0609 *Report Date:* 16-JUN-09
Work Order Number: 334495 *Date Received:* 06/04/2009

Batch: LBA-761510 BTEX-MTBE EPA 8021B
SW8021BM

Batch 761510, 4-Bromofluorobenzene recovered below QC limits; Data not confirmed by re-analysis. Matrix interference is suspected in sample surrogate failures.
Samples affected are: 531420-1-BLK,334451-002 SD,334495-011.

Bath 761510, 4-Bromofluorobenzene recovered above QC limits; Data not confirmed by re-analyses. Matrix interference is suspected in sample surrogate failures.
Samples affected are: 334495-004

Batch: LBA-761515 BTEX-MTBE EPA 8021B
SW8021BM

Batch 761515, 1,4-Difluorobenzene recovered below QC limits . Matrix interferences is suspected; data confirmed by re-analysis.
Samples affected are: 334495-002,334495-009,334495-007.
4-Bromofluorobenzene recovered below QC limits; QC Data not confirmed by re-analysis.
Samples affected are: 531430-1-BLK.

4-Bromofluorobenzene recovered above QC limits.Matrix interferences is suspected; data confirmed by re-analysis.
Samples affected are: 334495-001

SW8021BM

Batch 761515, Ethylbenzene, m,p-Xylenes, o-Xylene recovered below QC limits in the Matrix Spike and Matrix Spike Duplicate.
Samples affected are: 334495-002, -010, -009, -001, -007.
The Laboratory Control Sample for m,p-Xylenes , Ethylbenzene, o-Xylene is within laboratory Control Limits

Certificate of Analysis Summary 334495

R.T. Hicks Consultants, LTD, Albuquerque, NM

Project Name: SW Royalties: Wyatt "A" Fed Bat

Project Id: L-179-0609
Contact: Dale Littlejohn
Project Location: Lea Co., New Mexico

Date Received in Lab: Thu Jun-04-09 09:39 am
Report Date: 16-JUN-09
Project Manager: Brent Barron, II

Analysis Requested													
	Lab Id:	334495-001		334495-002		334495-003		334495-004		334495-005		334495-006	
	Field Id:	H-1 (2-3 Ft)		H-2 (1-2 Ft)		H-2 (8-9 Ft)		H-3 (0-1 Ft)		East Fire Wall Composite		H-4 (3-6 In)	
	Depth:	2-3 ft		1-2 ft		8-9 ft		0-1 ft				3-6 In	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	Jun-03-09 10:12		Jun-03-09 10:35		Jun-03-09 11:25		Jun-03-09 11:50		Jun-03-09 12:00		Jun-03-09 12:15	
Anions by EPA 300	***Extracted:***												
	Analyzed:	Jun-04-09 13:36		Jun-04-09 13:36		Jun-04-09 13:36		Jun-04-09 13:36		Jun-04-09 13:36		Jun-04-09 13:36	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		2370	58.4	373	11.8	187	11.2	23.7	5.59	4120	52.7	4520	107
BTEX by EPA 8021B	***Extracted:***	Jun-08-09 10:30		Jun-08-09 10:30		Jun-07-09 13:00		Jun-07-09 13:00		Jun-07-09 13:00		Jun-07-09 13:30	
	Analyzed:	Jun-08-09 15:02		Jun-08-09 18:59		Jun-07-09 16:41		Jun-07-09 22:25		Jun-07-09 16:19		Jun-08-09 05:11	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Benzene		ND	0.0582	1.904	0.2929	ND	0.0011	ND	0.0555	ND	0.0010	0.2916	0.1064
Toluene		0.2403	0.1164	41.08	0.5857	ND	0.0022	4.581	0.1110	0.0046	0.0021	1.218	0.2128
Ethylbenzene		3.174	0.0582	18.98	0.2929	ND	0.0011	14.18	0.0555	0.0136	0.0010	0.2522	0.1064
m,p-Xylenes		6.762	0.1164	51.49	0.5857	ND	0.0022	21.94	0.1110	0.0231	0.0021	0.2522	0.2128
o-Xylene		3.913	0.0582	19.05	0.2929	ND	0.0011	9.886	0.0555	0.0118	0.0010	ND	0.1064
Total Xylenes		10.675	0.0582	70.54	0.2929	ND	0.0011	31.826	0.0555	0.0349	0.0010	0.2522	0.1064
Total BTEX		14.0893	0.0582	132.504	0.2929	ND	0.0011	50.587	0.0555	0.0531	0.0010	2.014	0.1064
Percent Moisture	***Extracted:***												
	Analyzed:	Jun-05-09 08:55		Jun-05-09 08:55		Jun-05-09 08:55		Jun-05-09 08:55		Jun-05-09 08:55		Jun-05-09 08:55	
	Units/RL:	%	RL	%	RL	%	RL	%	RL	%	RL	%	RL
Percent Moisture		14.41	1.00	15.31	1.00	10.41	1.00	10.59	1.00	5.13	1.00	6.96	1.00
TPH By SW8015 Mod	***Extracted:***	Jun-04-09 10:34		Jun-04-09 10:34		Jun-04-09 10:34							
	Analyzed:	Jun-05-09 01:45		Jun-05-09 02:08		Jun-05-09 02:31							
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL						
C6-C12 Gasoline Range Hydrocarbons		325	87.6	1180	88.6	19.7	16.7						
C12-C28 Diesel Range Hydrocarbons		1080	87.6	2210	88.6	64.5	16.7						
C28-C35 Oil Range Hydrocarbons		202	87.6	339	88.6	21.0	16.7						
Total TPH		1607	87.6	3729	88.6	105.2	16.7						

Brent Barron
Odessa Laboratory Director

Certificate of Analysis Summary 334495

R.T. Hicks Consultants, LTD, Albuquerque, NM

Project Name: SW Royalties: Wyatt "A" Fed Bat

Project Id: L-179-0609
Contact: Dale Littlejohn
Project Location: Lea Co., New Mexico

Date Received in Lab: Thu Jun-04-09 09:39 am
Report Date: 16-JUN-09
Project Manager: Brent Barron, II

Analysis Requested											
	Lab Id:	334495-007		334495-008		334495-009		334495-010		334495-011	
	Field Id:	H-5 (0-1 Ft)		H-6 (0-6 In)		H-7 (0-6 In)		H-8 (0-3 In)		H-9 Background (2-3 Ft)	
	Depth:	0-1 ft		0-6 In		0-6 In		0-3 In		2-3 ft	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	Jun-03-09 12:25		Jun-03-09 12:35		Jun-03-09 12:45		Jun-03-09 12:55		Jun-03-09 13:15	
Anions by EPA 300	Extracted:										
	Analyzed:	Jun-04-09 13:36		Jun-04-09 13:36		Jun-04-09 13:36		Jun-04-09 13:36		Jun-04-09 13:36	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		5670	117	1330	26.9	315	10.8	1400	26.5	ND	5.39
BTEX by EPA 8021B	Extracted:	Jun-08-09 10:30		Jun-09-09 14:50		Jun-08-09 10:30		Jun-08-09 10:30		Jun-07-09 13:00	
	Analyzed:	Jun-08-09 16:28		Jun-09-09 23:29		Jun-08-09 17:33		Jun-08-09 16:50		Jun-07-09 17:24	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Benzene		0.1020	0.0583	2.329	1.073	0.1195	0.1076	ND	0.0053	ND	0.0011
Toluene		1.698	0.1166	3.167	2.147	17.89	0.2152	0.0138	0.0106	ND	0.0022
Ethylbenzene		5.621	0.0583	17.28	1.073	31.43	0.1076	0.0134	0.0053	ND	0.0011
m,p-Xylenes		8.403	0.1166	28.85	2.147	38.58	0.2152	0.0224	0.0106	ND	0.0022
o-Xylene		3.573	0.0583	1.900	1.073	18.09	0.1076	0.0105	0.0053	ND	0.0011
Total Xylenes		11.976	0.0583	30.75	1.073	56.67	0.1076	0.0329	0.0053	ND	0.0011
Total BTEX		19.397	0.0583	53.526	1.073	106.1095	0.1076	0.0601	0.0053	ND	0.0011
FOC by ASTM D2974C	Extracted:										
	Analyzed:									Jun-15-09 12:02	
	Units/RL:									%	RL
Fraction Organic Carbon										1.43	0.010
Percent Moisture	Extracted:										
	Analyzed:	Jun-05-09 08:55		Jun-05-09 08:55		Jun-05-09 08:55		Jun-05-09 08:55		Jun-05-09 08:55	
	Units/RL:	%	RL	%	RL	%	RL	%	RL	%	RL
Percent Moisture		14.20	1.00	7.03	1.00	7.45	1.00	5.72	1.00	7.26	1.00
TPH by EPA 418.1	Extracted:										
	Analyzed:	Jun-04-09 16:27		Jun-04-09 16:27		Jun-04-09 16:27		Jun-04-09 16:27		Jun-04-09 16:27	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
TPH, Total Petroleum Hydrocarbons		28500	58.3	66400	108	12300	10.8	5760	10.6	109	10.8

Brent Barron
Odessa Laboratory Director

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Orders : 334495,

Project ID: L-179-0609

Lab Batch #: 761507 **Sample:** 531422-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 06/08/09 01:16

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0312	0.0300	104	80-120	
4-Bromofluorobenzene	0.0269	0.0300	90	80-120	

Lab Batch #: 761507 **Sample:** 531422-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 06/08/09 01:38

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0315	0.0300	105	80-120	
4-Bromofluorobenzene	0.0277	0.0300	92	80-120	

Lab Batch #: 761507 **Sample:** 531422-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 06/08/09 02:20

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0267	0.0300	89	80-120	
4-Bromofluorobenzene	0.0187	0.0300	62	80-120	*

Lab Batch #: 761507 **Sample:** 334495-006 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 05:11

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0243	0.0300	81	80-120	
4-Bromofluorobenzene	0.0236	0.0300	79	80-120	*

Lab Batch #: 761507 **Sample:** 334710-007 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 06:58

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0304	0.0300	101	80-120	
4-Bromofluorobenzene	0.0257	0.0300	86	80-120	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Orders : 334495,

Project ID: L-179-0609

Lab Batch #: 761510 **Sample:** 334495-003 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/07/09 16:41

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0252	0.0300	84	80-120	
4-Bromofluorobenzene	0.0271	0.0300	90	80-120	

Lab Batch #: 761510 **Sample:** 334495-011 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/07/09 17:24

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0267	0.0300	89	80-120	
4-Bromofluorobenzene	0.0211	0.0300	70	80-120	*

Lab Batch #: 761510 **Sample:** 334495-004 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/07/09 22:25

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0244	0.0300	81	80-120	
4-Bromofluorobenzene	0.0477	0.0300	159	80-120	*

Lab Batch #: 761510 **Sample:** 334451-002 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 00:12

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0311	0.0300	104	80-120	
4-Bromofluorobenzene	0.0295	0.0300	98	80-120	

Lab Batch #: 761510 **Sample:** 334451-002 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 00:34

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0312	0.0300	104	80-120	
4-Bromofluorobenzene	0.0192	0.0300	64	80-120	*

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Orders : 334495,

Project ID: L-179-0609

Lab Batch #: 761515 **Sample:** 334495-010 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 16:50

BTEX by EPA 8021B	SURROGATE RECOVERY STUDY				
Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0257	0.0300	86	80-120	
4-Bromofluorobenzene	0.0254	0.0300	85	80-120	

Lab Batch #: 761515 **Sample:** 334495-009 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 17:33

BTEX by EPA 8021B	SURROGATE RECOVERY STUDY				
Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0232	0.0300	77	80-120	**
4-Bromofluorobenzene	0.0361	0.0300	120	80-120	

Lab Batch #: 761515 **Sample:** 334495-002 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 18:59

BTEX by EPA 8021B	SURROGATE RECOVERY STUDY				
Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0228	0.0300	76	80-120	**
4-Bromofluorobenzene	0.0287	0.0300	96	80-120	

Lab Batch #: 761515 **Sample:** 334710-004 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 19:20

BTEX by EPA 8021B	SURROGATE RECOVERY STUDY				
Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0320	0.0300	107	80-120	
4-Bromofluorobenzene	0.0240	0.0300	80	80-120	

Lab Batch #: 761515 **Sample:** 334710-004 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/08/09 19:42

BTEX by EPA 8021B	SURROGATE RECOVERY STUDY				
Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0321	0.0300	107	80-120	
4-Bromofluorobenzene	0.0241	0.0300	80	80-120	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Orders : 334495,

Project ID: L-179-0609

Lab Batch #: 761404 **Sample:** 531366-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 06/04/09 21:58

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	97.2	100	97	70-135	
o-Terphenyl	41.0	50.0	82	70-135	

Lab Batch #: 761404 **Sample:** 531366-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 06/04/09 22:20

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	94.1	100	94	70-135	
o-Terphenyl	39.1	50.0	78	70-135	

Lab Batch #: 761404 **Sample:** 531366-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 06/04/09 22:43

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	80.0	100	80	70-135	
o-Terphenyl	43.1	50.0	86	70-135	

Lab Batch #: 761404 **Sample:** 334431-005 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/05/09 01:00

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	90.3	100	90	70-135	
o-Terphenyl	35.5	50.0	71	70-135	

Lab Batch #: 761404 **Sample:** 334431-005 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 06/05/09 01:22

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	89.9	100	90	70-135	
o-Terphenyl	36.3	50.0	73	70-135	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Blank Spike Recovery

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Order #: 334495 **Project ID:** L-179-0609

Lab Batch #: 761287 **Sample:** 761287-1-BKS **Matrix:** Solid

Date Analyzed: 06/04/2009 **Date Prepared:** 06/04/2009 **Analyst:** LATCOR

Reporting Units: mg/kg **Batch #:** 1

Anions by EPA 300 Analytes	Blank Result [A]	BLANK /BLANK SPIKE RECOVERY STUDY Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Control Limits %R	Flags
Chloride	ND	10.0	9.47	95	80-120	

Blank Spike Recovery [D] = 100*[C]/[B]
All results are based on MDL and validated for QC purposes.
BRL - Below Reporting Limit

BS / BSD Recoveries

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Order #: 334495 **Project ID:** L-179-0609

Analyst: ASA **Date Prepared:** 06/08/2009 **Date Analyzed:** 06/08/2009

Lab Batch ID: 761515 **Sample:** 531430-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BTEX by EPA 8021B	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	ND	0.1000	0.1103	110	0.1	0.1061	106	4	70-130	35	
Toluene	ND	0.1000	0.1067	107	0.1	0.1026	103	4	70-130	35	
Ethylbenzene	ND	0.1000	0.1108	111	0.1	0.1067	107	4	71-129	35	
m,p-Xylenes	ND	0.2000	0.2246	112	0.2	0.2161	108	4	70-135	35	
o-Xylene	ND	0.1000	0.1062	106	0.1	0.1028	103	3	71-133	35	

Analyst: ASA **Date Prepared:** 06/09/2009 **Date Analyzed:** 06/09/2009

Lab Batch ID: 761769 **Sample:** 531580-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BTEX by EPA 8021B	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	ND	0.1000	0.1067	107	0.1	0.1093	109	2	70-130	35	
Toluene	ND	0.1000	0.1032	103	0.1	0.1064	106	3	70-130	35	
Ethylbenzene	ND	0.1000	0.1081	108	0.1	0.1117	112	3	71-129	35	
m,p-Xylenes	ND	0.2000	0.2186	109	0.2	0.2260	113	3	70-135	35	
o-Xylene	ND	0.1000	0.1033	103	0.1	0.1065	107	3	71-133	35	

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS Recoveries

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Order #: 334495
Lab Batch #: 761287
Project ID: L-179-0609
Date Analyzed: 06/04/2009
Date Prepared: 06/04/2009
Analyst: LATCOR
QC- Sample ID: 334495-001 S
Batch #: 1
Matrix: Soil
Reporting Units: mg/kg

Inorganic Anions by EPA 300	MATRIX / MATRIX SPIKE RECOVERY STUDY					
Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Chloride	2370	1170	3390	87	80-120	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference [E] = 200*(C-A)/(C+B)
All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit

XENCO Laboratories

Form 3 - MS / MSD Recoveries

Project Name: SW Royalties: Wyatt "A" Fed Bat

Work Order # : 334495 **Project ID:** L-179-0609

Lab Batch ID: 761515 **QC- Sample ID:** 334710-004 S **Batch #:** 1 **Matrix:** Soil
Date Analyzed: 06/08/2009 **Date Prepared:** 06/08/2009 **Analyst:** ASA
Reporting Units: mg/kg

BTEX by EPA 8021B Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	ND	0.1029	0.0912	89	0.1029	0.0935	91	2	70-130	35	
Toluene	ND	0.1029	0.0742	72	0.1029	0.0761	74	3	70-130	35	
Ethylbenzene	ND	0.1029	0.0587	57	0.1029	0.0610	59	4	71-129	35	X
m,p-Xylenes	ND	0.2059	0.1168	57	0.2059	0.1210	59	4	70-135	35	X
o-Xylene	ND	0.1029	0.0534	52	0.1029	0.0550	53	3	71-133	35	X

Lab Batch ID: 761207 **QC- Sample ID:** 334495-003 S **Batch #:** 1 **Matrix:** Soil
Date Analyzed: 06/04/2009 **Date Prepared:** 06/04/2009 **Analyst:** LATCOR
Reporting Units: mg/kg

TPH by EPA 418.1 Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
TPH, Total Petroleum Hydrocarbons	291	2790	2870	92	2790	3100	101	8	65-135	35	

Lab Batch ID: 761404 **QC- Sample ID:** 334431-005 S **Batch #:** 1 **Matrix:** Soil
Date Analyzed: 06/05/2009 **Date Prepared:** 06/04/2009 **Analyst:** BHW
Reporting Units: mg/kg

TPH By SW8015 Mod Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
C6-C12 Gasoline Range Hydrocarbons	18.2	999	809	79	999	780	76	4	70-135	35	
C12-C28 Diesel Range Hydrocarbons	ND	999	1010	101	999	1000	100	1	70-135	35	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*|(C-F)/(C+F)|

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Xenco Laboratories

12600 West I-20 East
Odessa, Texas 79765
Phone: 432-563-1800
Fax: 432-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Dale Littlejohn
Company Name: RT Hicks Consultants Ltd
Company Address: P O Box 7624
City/State/Zip: Midland, Texas 79708
Telephone No: (432) 528-3878
Fax No: (432) 689-4578 (Fax)
Sampler Signature: Dale Littlejohn

Project Name: SW Royalties: Wyatt "A" Fed Bat
Project #: L-179-0609
Project Loc: Lea Co., New Mexico
PO #:

LAB # 33496 (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice 4 deg. C	Preservative: HNO3	Preservative: HCl	Preservative: NaOH	Preservative: H2SO4	Preservative: None	Preservative: Other (Specify)	Matrix: Water	Matrix: Sludge	Matrix: Soil	Matrix: Other (specify)	Analyze For: TPH, TX-1005 (Ext. to C35)	Analyze For: TCLP: Cations (Ca, Mg, Na, K)	Analyze For: TCLP: Anions (Cl, SO4, CO3, HCO3)	Analyze For: TOTAL: TPH - GRO (8015)	Analyze For: TOTAL: TPH - DRO (8015)	Analyze For: TOTAL: TPH (418.1)	Analyze For: TOTAL: Semivolatiles	Analyze For: TOTAL: BTEX (8021B)	Analyze For: TOTAL: RCI	Analyze For: TOTAL: N.O.R.M.	Analyze For: TOTAL: Chlorids	Analyze For: TOTAL: Bromide	Analyze For: TOTAL: Total Dissolved Solids	Analyze For: TOTAL:	RUSH TAT (Pre-Schedule)	Standard TAT
01	H-1 (2-3 Ft)	6/3/09	1012	1	X									X					X	X	X		X		X					X
02	H-2 (1-2 Ft)	6/3/09	1035	1	X									X					X	X	X		X		X					X
03	H-2 (8-9 Ft)	6/3/09	1125	1	X									X					X	X	X		X		X					X
04	H-3 (0-1 Ft)	6/3/09	1150	1	X									X							X		X		X					X
05	East Fire Wall Composite	6/3/09	1200	1	X									X							X		X		X					X
06	H-4 (3-6 in)	6/3/09	1215	1	X									X							X		X		X					X
07	H-5 (0-1 Ft)	6/3/09	1225	1	X									X							X		X		X					X
08	H-6 (0-6 in)	6/3/09	1235	1	X									X							X		X		X					X
09	H-7 (0-6 In)	6/3/09	1245	1	X									X							X		X		X					X
10	H-8 (0-3 in)	6/3/09	1255	1	X									X							X		X		X					X

Special Instructions: Send Invoice to Dawn Howard at Southwest Royalties, Inc., 6 Desta Drive, Ste 2100, Midland, TX 79705 (DHoward@claytonwilliams.com); Send results to Dale Littlejohn at dale@rthicksconsult.com

Sample Containers Intact? Y N
Temperature Upon Receipt: 6.0
Laboratory Comments: No Seals

Relinquished by:	Date	Time	Received by:	Date	Time
Dale Littlejohn	6/4/09	939			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
			Gracie M Avalos	06/04/09	9:34

Xenco Laboratories

12600 West I-20 East
Odessa, Texas 79765

Phone: 432-563-1800
Fax: 432-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: Dale Littlejohn

Company Name: RT Hicks Consultants Ltd

Company Address: P O Box 7624

City/State/Zip: Midland, Texas 79708

Telephone No: (432) 528-3878

Fax No: (432) 689-4578 (Fax)

Sampler Signature: Dale Littlejohn

Project Name: SW Royalties: Wyatt "A" Fed Bat

Project #: L-179-0609

Project Loc: Lea Co., New Mexico

PO #:

LAB # 334495 (lab use only)	FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO₃	HCl	NaOH	H₂SO₄	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For (TCLP / TOTAL): TPH: TX-1005 (Ext. to C35)	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	TPH - GRO (8015)	TPH - DRO (8015)	TPH (418.1)	Semivolatiles	BTEX 8021B	RCI	N.O.R.M.	Chloride	Bromide	Fraction of Organic Carbon (g/g)	RUSH TAT (Pre-Schedule)	Standard TAT
11	H-9 Background (2-3 Ft)	6/3/09	1315	2	X									X							X		X			X		X		X
																														X
																														X
																														X
																														X
																														X
																														X
																														X
																														X
																														X

Special Instructions: Send invoice to Dawn Howard at Southwest Royalties, Inc., 6 Desta Drive, Ste 2100, Midland, TX 79705 (DHoward@claytonwilliams.com); Send results to Dale Littlejohn at dale@rthicksconsult.com

Relinquished by:	Date	Time	Received by:	Date	Time
Dale Littlejohn	6/4/09	939			
Relinquished by:	Date	Time	Received by ELOT:	06/04/09	9:39

Sample Containers Intact? Y N

Temperature Upon Receipt: 6.0

Laboratory Comments: N/O Seals

Environmental Lab of Texas

Variance/ Corrective Action Report- Sample Log-In

Client: RT Hicks Con.

Date/ Time: 04/04/09 9:39

Lab ID #: 334495

Initials: gwA

Sample Receipt Checklist

				Client Initials
#1 Temperature of container/ cooler?	(Yes)	No	6.0 °C	
#2 Shipping container in good condition?	(Yes)	No		
#3 Custody Seals intact on shipping container/ cooler?	Yes	No	(Not Present)	
#4 Custody Seals intact on sample bottles/ container?	Yes	No	(Not Present)	
#5 Chain of Custody present?	(Yes)	No		
#6 Sample instructions complete of Chain of Custody?	(Yes)	No		
#7 Chain of Custody signed when relinquished/ received?	(Yes)	No		
#8 Chain of Custody agrees with sample label(s)?	(Yes)	No	ID written on Cont / Lid	
#9 Container label(s) legible and intact?	(Yes)	No	Not Applicable	
#10 Sample matrix/ properties agree with Chain of Custody?	(Yes)	No		
#11 Containers supplied by ELOT?	(Yes)	No		
#12 Samples in proper container/ bottle?	(Yes)	No	See Below	
#13 Samples properly preserved?	(Yes)	No	See Below	
#14 Sample bottles intact?	(Yes)	No		
#15 Preservations documented on Chain of Custody?	(Yes)	No		
#16 Containers documented on Chain of Custody?	(Yes)	No		
#17 Sufficient sample amount for indicated test(s)?	(Yes)	No	See Below	
#18 All samples received within sufficient hold time?	(Yes)	No	See Below	
#19 Subcontract of sample(s)?	Yes	No	(Not Applicable)	
#20 VOC samples have zero headspace?	(Yes)	No	Not Applicable	

Variance Documentation

Contact: _____ Contacted by: _____ Date/ Time: _____

Regarding: _____

Corrective Action Taken: _____

Check all that Apply:

- ☐ See attached e-mail/ fax
- ☐ Client understands and would like to proceed with analysis
- ☐ Cooling process had begun shortly after sampling event

R. T. HICKS CONSULTANTS, LTD. ATTACHMENT B

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266.0745

Input and Results of the AMIGO Simulation Performed at the Southwest Royalties Wyatt "A" Federal Site

The specific parameters used in the simulation at the site are presented in the table below.

Table 1 - Parameters Employed in AMIGO tool for the Wyatt "A" Federal Site

Model Parameter	Value	Source of Value
Climate (non-smoothed)	1946 - 1992	Pearl, NM Station
Input for distant or hypothetical well (ft)	NA	Not Required
Background Chloride in Aquifer (mg/L)	50	NM WAIDS, PTTC (Plate 3)
Aquifer Porosity (unitless)	0.25	Prof. Judgment Conservative Assumption
Groundwater Table Depth (ft)	100	Max. for AMIGO (Plate 2)
Aquifer Thickness (ft)	30	Professional Judgment Conservative Assumption
Slope of Water Table	0.002	Tillery 2008
Hydraulic Conductivity (ft/d)	100	Musharrafieh 1999
Average Chloride Load (kg/m²)	12.0	Worst-Case Profile using Mass-load
Max length of spill in dir. of GW flow (ft)	100	Site Data
Plant Uptake Trigger (%)	1.0	Prof. Judgment Conservative Assumption
Surface Layer	Med. Sand	Background Sample (conservative option)
Soil Profile (caliche - medium sand ratio)	1:5	Nicholson 1961

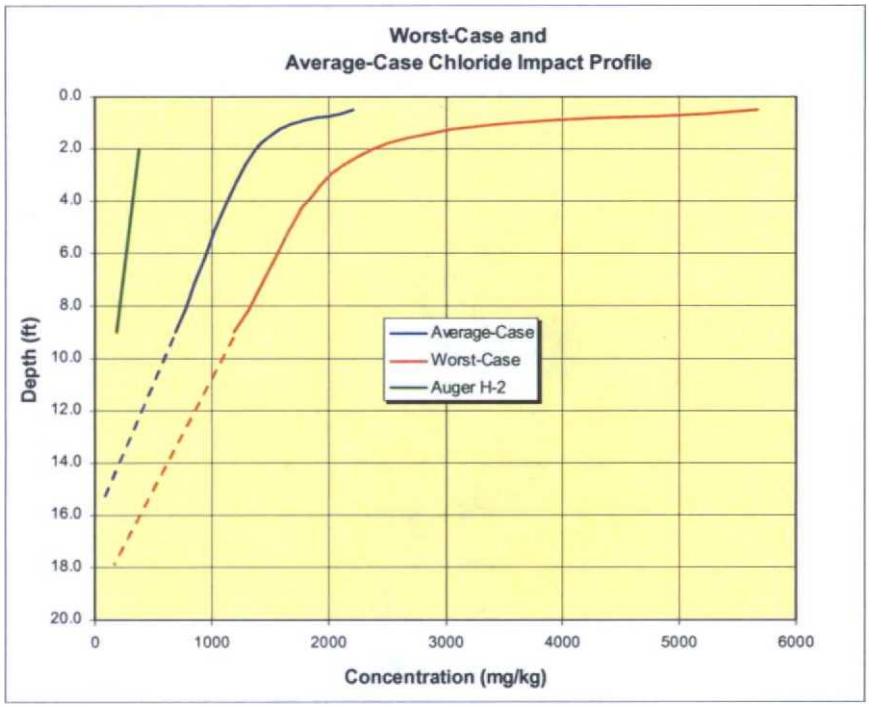
Although the actual ground water depth is approximately 150 feet (Plate 2), the AMIGO tool is limited to a maximum depth input of 100 feet, a conservative assumption for this simulation.

Musharrafieh and Chudnoff (1999) predict that the saturated thickness of the aquifer beneath the site will remain at least 100 feet until the year 2040. Data from similar sites show that, unlike hydrocarbons, chloride that enters the upper portion of an aquifer will become distributed throughout the entire saturated thickness within a relatively short travel distance from the source. The arbitrary selection of a 10-foot thick mixing zone (used as a default value for hydrocarbon sites) is unrealistic where the constituent of concern is chloride. In our opinion, a simulation using the 30-foot thickness of the aquifer is conservative for this site.

The average chloride load was calculated in three ways for this simulation. A "most-likely value" for this release was calculated with the assumption that the entire 50 bbls of un-recovered fluid was brine water with a chloride concentration of 250,000 mg/L and was spilled over the 5,800 ft² area. This calculation yielded an average chloride mass load of 4.0 kg/m² but may not take into account chloride-impacted soil from a previous release.

The auger borings located in the areas of the highest surface chloride concentrations could not be advanced to a depth sufficient for vertical delineation. Delineation was achieved, however, at auger hole H-2 at a depth of 9 feet. In order to provide a more conservative value for the simulation, the rate of chloride concentration decline with depth was applied to the "worst-case" and "average-case" surface values as shown in the Figure 1 below:

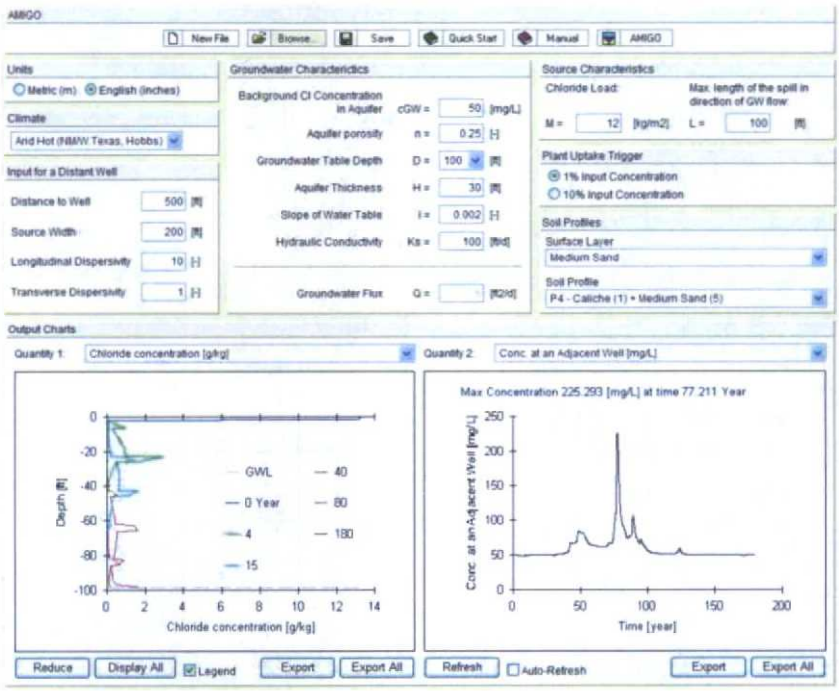
Figure 1



The calculation of chloride load using the concentrations from the "average-case" impact profile is 6.5 kg/m² and the chloride load using the concentrations from the "worst-case" impact profile is 12 kg/m².

The results of the simulation are shown below on the AMIGO ground water output chart which has been copied directly from the model results screen. It indicates that chloride concentrations in the ground water below the site, using the "worst-case" chloride load, will reach a maximum concentration of 225 mg/L (below standards) in the years between 2086 and 2090 if no further corrective actions are taken. Simulations run using chloride load calculation from spill data and "average-case" profile (not shown) indicate maximum chloride concentrations in the ground water of 108 and 145 mg/L respectively.

Figure 2
AMIGO Ground Water Output Chart for Wyatt "A" Federal Site



R. T. HICKS CONSULTANTS, LTD. ATTACHMENT C
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266.0745

Input and Results of the VLEACH Simulation Performed at the Southwest Royalties Wyatt "A" Federal Site

The specific parameters used in the simulation and diffusion to ground water equation at the site are presented in the table and figures below.

Table 1 – Common Parameters Employed in the VLEACH model for the Wyatt "A" Federal Site

Model Parameter	Value	Source of Value
Benzene & Xylene Chemical Parameters	Chemical Specific	NMED June 2006 Soil Screening Levels Document
Spill Area (ft^2)	5,800	Site Measurement
Groundwater Table Depth (ft)	150	Plate 2
Vadose Zone Soil Bulk Density (g/cm^3)	1.5	NMED June 2006 Document
Vadose Zone Porosity (unitless)	0.43	NMED June 2006 Document
Volumetric Water Content (%)	0.26	NMED June 2006 Document
Vadose Zone Soil Organic Content (f_{oc})	0.0015	NMED June 2006 Document
Recharge Rate (ft/year)	0.131	Results of AMIGO Simulation
Benzene & Xylene Concentrations (ug/kg)	Chemical Specific	Worst-Case Hydrocarbon Profile (H-1, H-2, H-6, H-7)
Slope of Water Table	0.002	Tillery 2008
Hydraulic Conductivity (ft/d)	100	Musharrafieh 1999
Max width perpendicular to direction of GW flow (ft)	180	Site Measurement
Aquifer Porosity (unitless)	0.25	Prof. Judgment Conservative Assumption
Mixing zone depth in aquifer	6.6	Prof. Judgment Conservative Assumption

Figure 1 - Actual Input Screens from the VLEACH Model Program for the Benzene Run

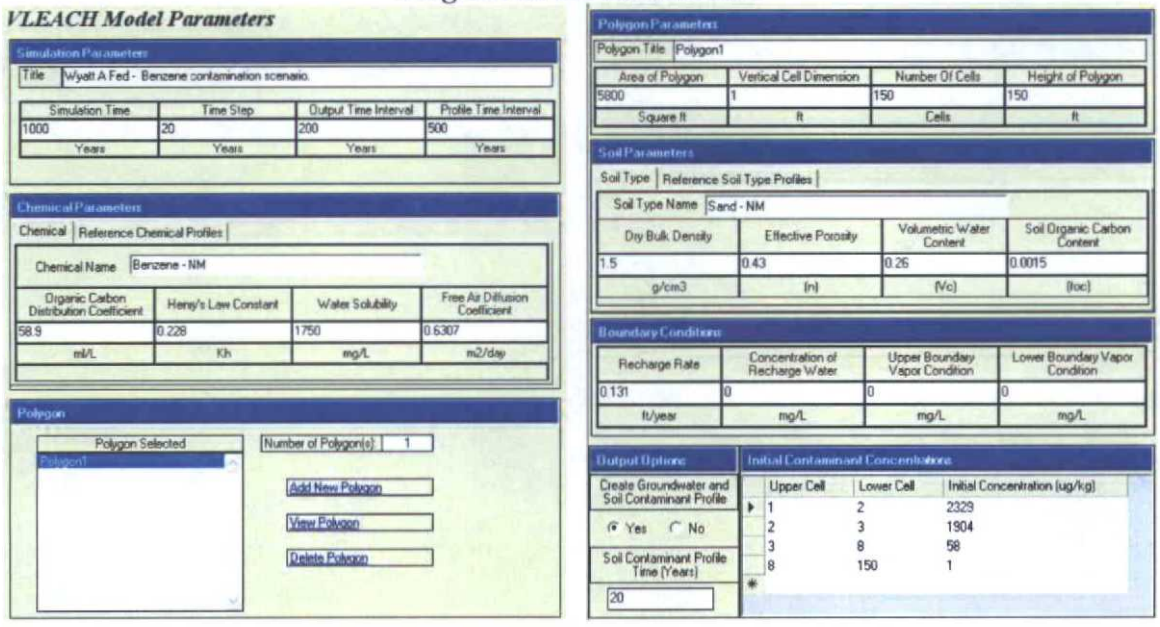
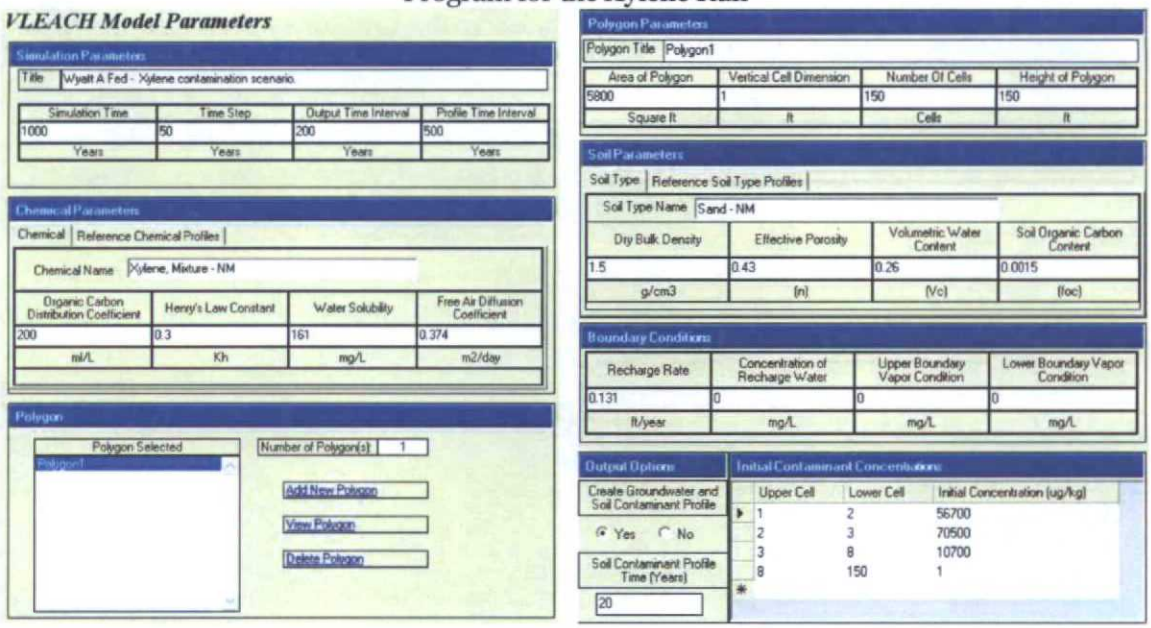
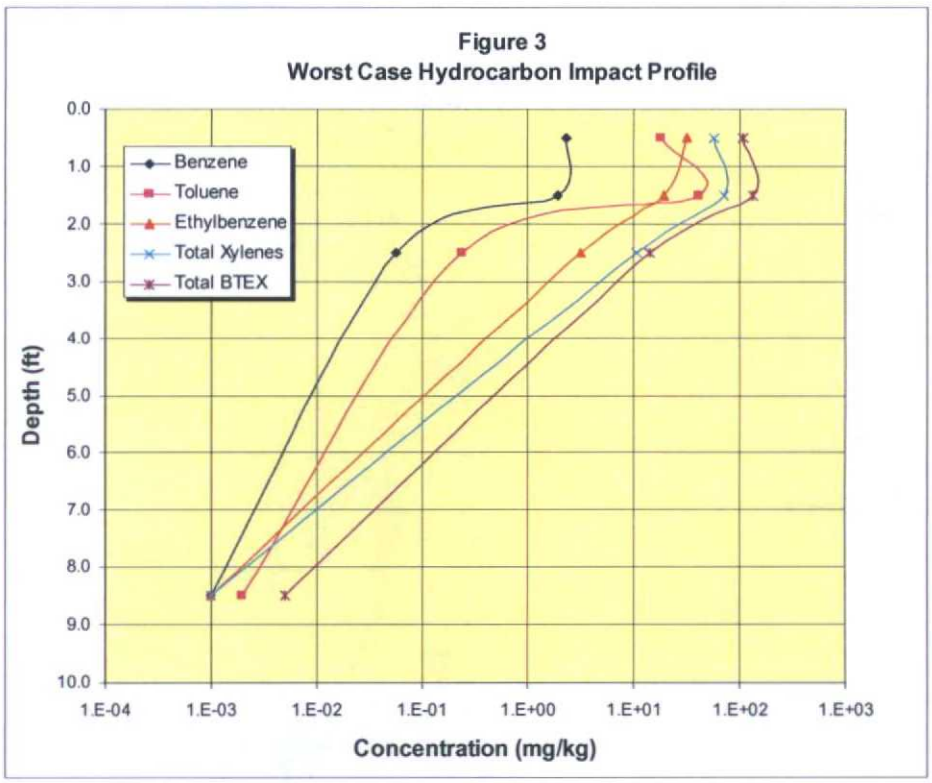


Figure 2 - Actual Input Screens from the VLEACH Model Program for the Xylene Run



Simulation Time, Time Step, Output Time Interval, and Profile Time Interval were selected to provide the clearest presentation of the results based on the time required to identify the maximum impact to groundwater.

As a conservative measure a "worst-case" hydrocarbon soil profile was constructed by taking the highest concentrations from each sampled depth as shown in Figure 3. The benzene and xylenes values from this profile were assumed to be present across the entire 5,800 ft2 area.



Other conservative measures include the use of a default soil fraction of organic

content value (0.0015) instead of the value calculated from the site background auger boring (0.0143), and the use of a recharge rate calculated by the AMIGO tool (1.57 in/yr) instead of the recharge rate estimated by Musharrafieh and Chudnoff (0.49 in/yr) in their 1999 report.

The results from the VLEACH modeling relative to this assessment are provided as graphs for each compound that present the subsurface impact as Mass Flux to Ground Water in grams/year (g/yr) as a function of future time as shown below:

Figure 4A
Results of VLEACH Vadose Model for Benzene

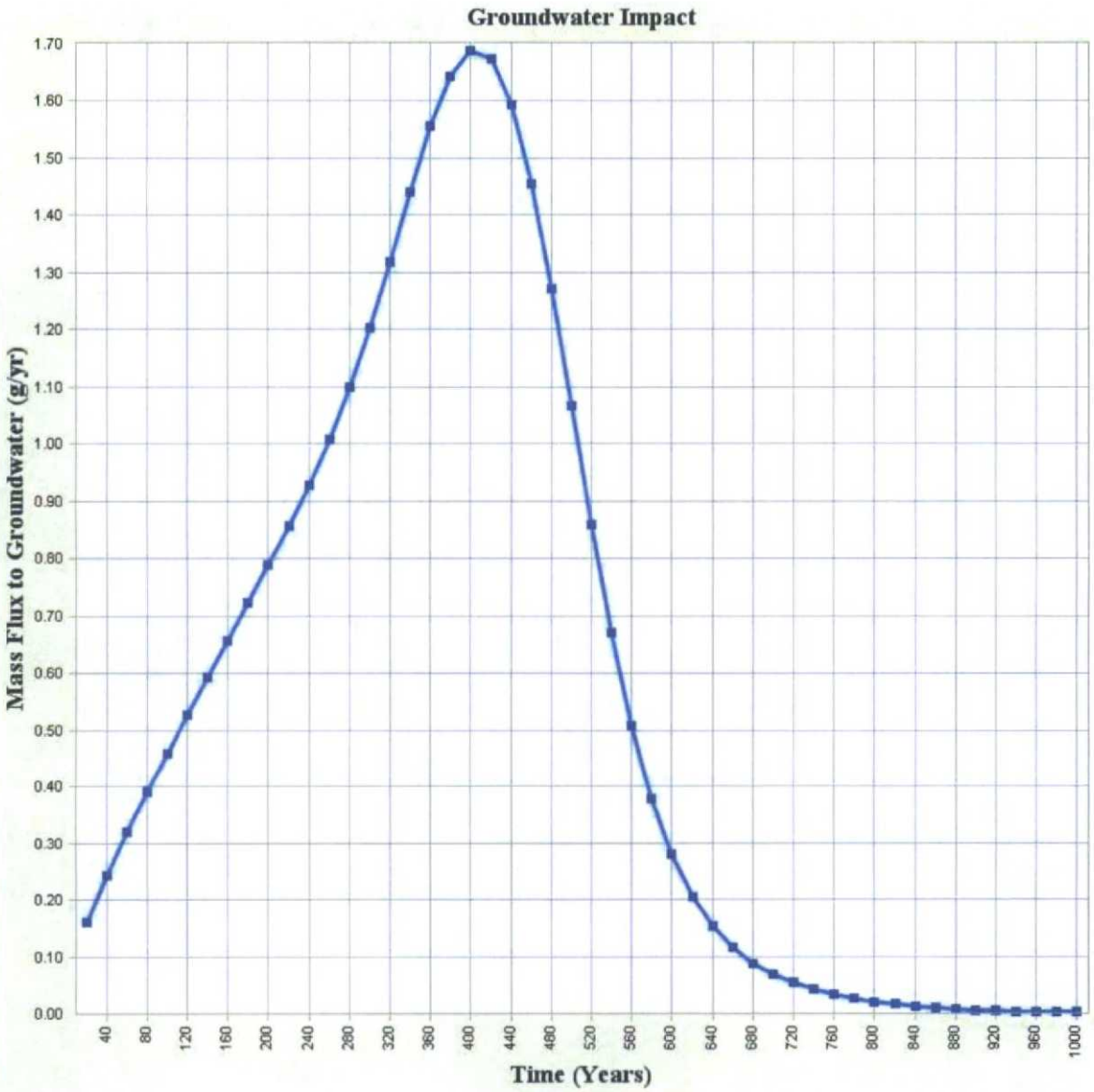
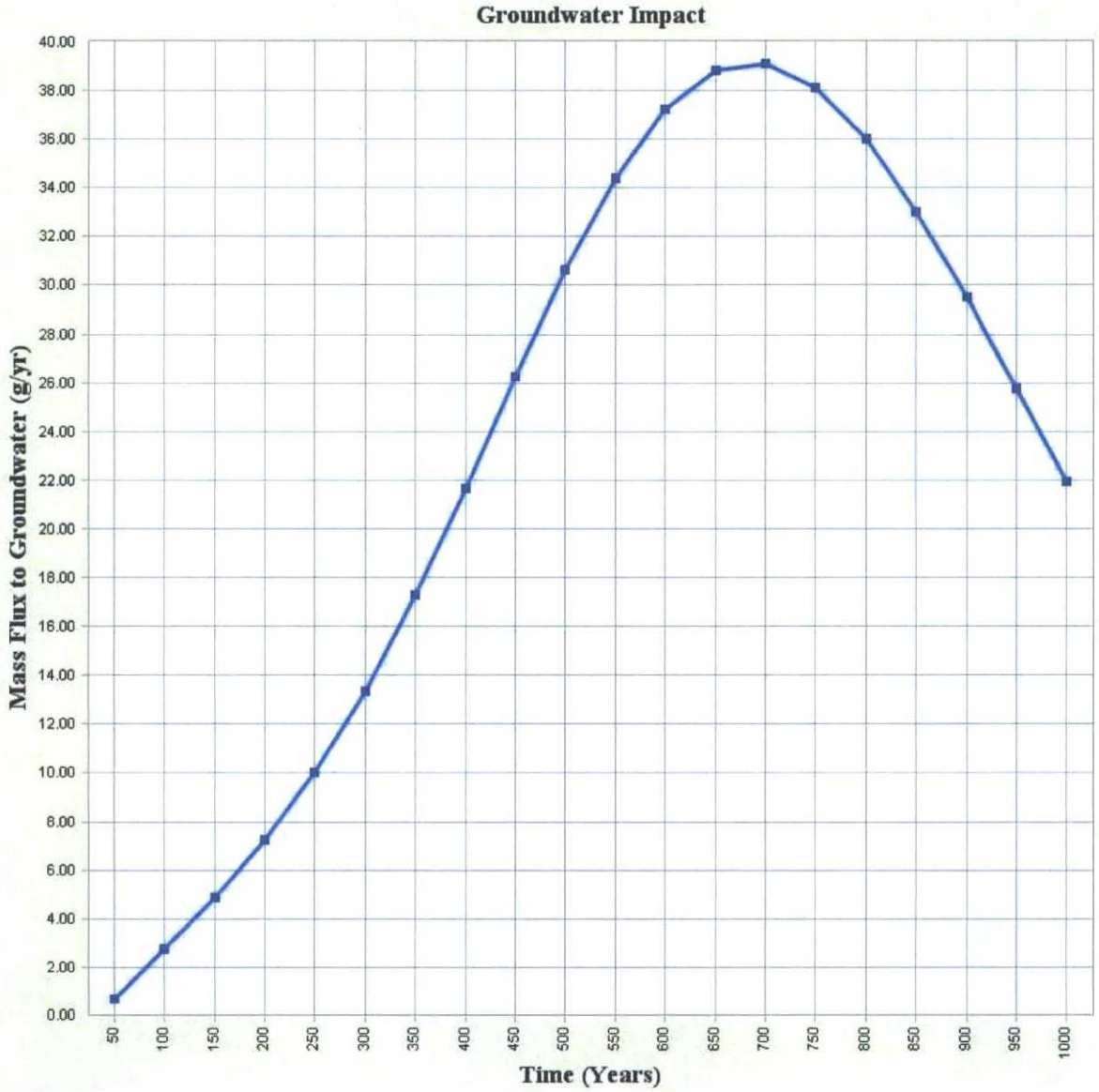


Figure 4B
Results of VLEACH Vadose Model for Xylenes



In order to compare the modeled results to NMED ground water standard, the VLEACH output data required a conversion from g/yr to mg/L. This was performed by calculating the annual recharge (flux) volume from the spill area and the annual ground water flow volume below the spill area as shown:

Recharge is defined as: $Flux_{flow}(L/yr) = A \times R \times 29.317$ where,

A = spill area (ft^2)
R = recharge rate (ft/yr), and
29.317 = conversion factor from ft^3 to liters

Groundwater flow is defined as: $GW_{flow}(L/yr) = \left(\frac{k \times i}{\theta_T}\right) \times T_{aq} \times W \times 29.317$ where,

k = hydraulic conductivity of the aquifer (ft/yr)
i = groundwater gradient (ft/ft)
θ_T = porosity of the aquifer
T_{aq} = aquifer mixing zone thickness (ft) and,
W = length of the spill area (ft) perpendicular to the ground water gradient direction

The relationship between the annual recharge volume and the annual ground water flow volume was used to calculate the predicted ground water concentration for the initial (year zero) time and the maximum impact year time for each constituent of concern as demonstrated on the table below:

	Initial Impact Data				Maximum Impact Data				NMED
Chemical of Concern	Time (yrs)	Impact (g/yr)	Leachate Conc. (mg/L)	GW Conc. (mg/L)	Time (yrs)	Impact (g/yr)	Leachate Conc. (mg/L)	GW Conc. (mg/L)	Health Standard (mg/L)
Benzene	0	0.1	0.004	0.00001	400	1.69	0.08	0.00017	0.01
Xylenes	0	0	0.00	0.00000	700	39.11	1.76	0.00385	0.62

Bold and highlighted text values indicate concentrations that exceed the NMED Human Health Standards for groundwater.