1R - 432

REPORTS

DATE:

2/4/2005

Whole Earth Environmental, Inc.
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2005 FEB 7 AM 9 59

February 4, 2005

IRO432

NMOCD
1220 South St. Francis Dr.
Sante Fe, NM 87505

Attn: Wayne Price

Dear Wayne:
Enclosed, please find a copy of the rather extensive revisions to the Dickinson Battery remediation protocol we discussed last week. I hope that these additions will help clarify how relatively minor the contamination is at the site. I've also taken your suggestion that we retain as many of the monitor wells as possible and have modified the actual protocol accordingly.

I do want to thank you again for the time and attention given me last week. I truly enjoyed the visit though I may now hold the land speed record between your office and the airport.

Please call if you've any questions or comments.

Warmest regards,

Mike Griffin
President
Whole Earth Environmental, Inc.

Executive Summary

B.C. Dickerson Site

Location

The site is situated in Lea County, New Mexico south of US 182 on fee land. The topography is unremarkable. The primary land use of the surrounding property is grazing of cattle however extensive oil and gas operations are present within the area. The area is semi-arid with a net precipitation / pan evaporation amount of -73" per year. The legal description of the site is the NW ¼ of the SW ¼, S-1, T-15S, R-37E.

Setting

A thin veneer of windblown sand covers the site and overlies the Ogallala formation. The Ogallala formation consists of poorly to well-cemented sand and sandstone, interbedded with clay, silt and gravel. The Ogallala overlies the Triassic age Chinle formation consisting chiefly of mudstone, shale and sandstone. Groundwater is found at a depth of approximately 60' below ground surface.

Site History

At this writing, we've little history of the location however from the surface features it appears that the site was used as a bulk storage and processing point for crude oil and natural gas. A production pit appears to have been in use as a repository for tank bottoms and the storage of contaminated soils.

Investigation

Thirteen soil borings were advanced within the property with seven converted to monitor wells. Water analysis of the site reveals the water to be of "non-beneficial" use with TDS concentrations exceeding 1,000 ppm. BTEX concentrations at all monitor wells appear to be within NMOCD guidelines.

The site is characterized by the presence of two plumes of hydrocarbon contamination and one of chlorides. The first appears to be centered within the production pit having TPH concentrations of 1,798 ppm extending to a depth of 60' below ground surface (soil boring # 6). This contaminant plumes appear to consist mainly of aliphatic fractions with a minor BTEX component. The BTEX appears to drop to acceptable levels at a depth of 55' bgs.

One significant chloride reading (874 ppm) was discovered at the southeast corner of the pit at a depth of 40' below ground surface. There is no data regarding the chloride concentrations within the vertical soil profile of the monitor well situated approximately 10' down-gradient of the anomaly however the chloride concentrations within this monitor well (MW-1) are 363 ppm.

The second area of concern centers around soil boring # 4 in which TPH concentrations of 4,420 ppm are found at a depth of 10' below ground surface and extend to a minimum depth of 55' bgs at a concentration of 242 ppm. Again, the plume appears to be aliphatic in makeup as the BTEX component cleans up at a depth of approximately 15' bgs.

The final area of concern is the comparatively high chloride concentrations contained within monitor well no. 2. Though no BTEX component was discovered, the groundwater chloride concentrations within this well are 1,360 ppm.

The soil morphology is initially sandy to a depth of approximately 5-7' followed by a 12-15' band of soft caliche underlain by yet another 20' sand lens atop a denser caliche layer. The bulk of the hydrocarbon plume is situated between the caliche bands.

Modeling

Based on the previous site borings, a comprehensive contaminant migration model was prepared by Dr. Jan M.H. Hendrickx of New Mexico State University. The model data indicates that the contaminant migration from the two main plumes may be effectively retarded by excavating the extensive surface contamination and placing a one foot layer of compacted clay atop the remaining minor concentrations. Our protocol doubles the thickness of the clay cap to twenty-four inches. A copy of the migration model is included within the Exhibits section of this report.

Conclusions and Recommendations

We propose to excavate the three plumes to a depth sufficient to achieve a TPH concentration of <5,000 ppm and then to cap the excavations with a minimum of 12" of compacted clay. No significant BTEX concentration has yet impacted the groundwater. By removing the bulk of each plume and further capping the surface with an impenetrable layer of compacted clay, the only mechanism by which the BTEX may enter the groundwater is through "wicking" – that is, the water table rising into the bottom of the plume. We further propose to retain or replace all existing monitor wells at the site. Two wells (nos. 1 & 2) may be grouted to surface prior to any excavation and replaced upon the conclusion of the project.

The excavated materials may be treated on the surface by a combination of simple aeration and dilution using native topsoils and bio-augmentation. An existing monitor well will be used to check the continuing ground water quality. The wells will be sampled on an annual basis for the presence and concentrations of BTEX and chlorides for a period of five years.

B.C. Dickenson
Exhibit Index

1. U.S.G.S. 7.5' Map of site
2. Locations of Previous Soil Borings & Monitor Wells
3. Detail of Earlier Excavation
4. South Side of Site View to East
5. South Side of Site View to Northeast
6. Detail of Partial Excavation View to Northwest
7. Detail of Asphaltic Material on Location
8. Detail of Test Trench
9. Soil Chemistry Summary
10. Groundwater Chemistry Summary
11. PID Results @ 5'
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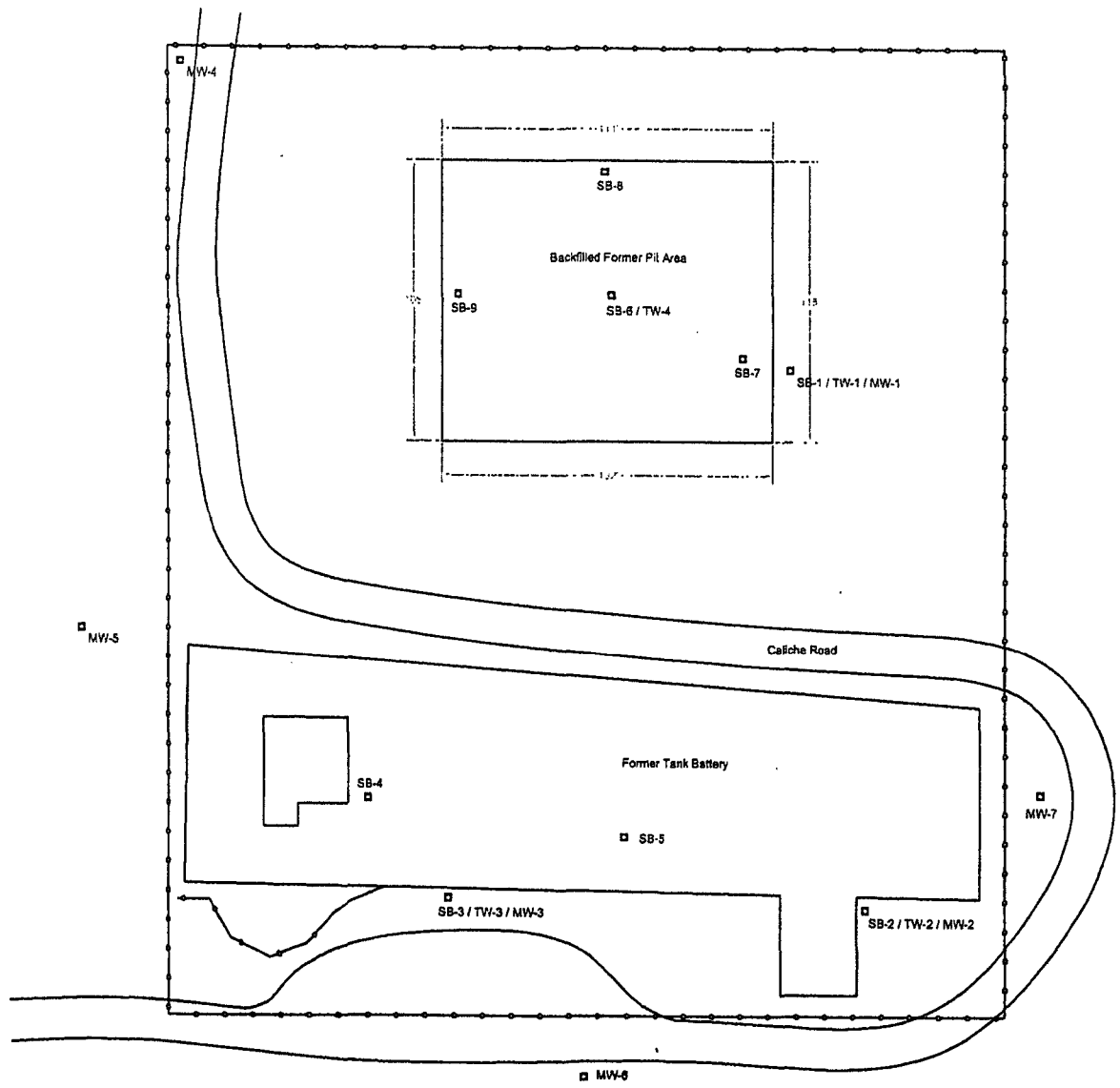
14. PID Results @ 20'
15. PID Results @ 25'
16. PID Results @ 30'
17. PID Results @ 35'
18. PID Results @ 40'
19. PID Results @ 45'
20. PID Results @ 50'
21. PID Results @ 55'
22. PID Results @ 60'
23. Soil Boring Logs
24. Chlorides in Groundwater
25. Hydrus 1-D Modeling Results



Legend:

- Soil Boring Location
- Fence

Site Map

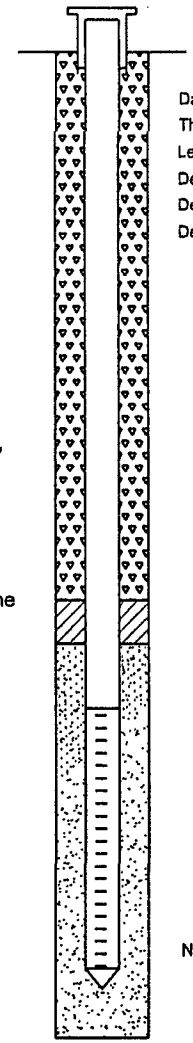
Devon Energy
B.C. Dickinson A-1
Lea County, NM

Environmental Technology Group, Inc.

Scale: 1" = 60'	Prep By: JDJ	Checked By: KD
May 8, 2002	ETGI Project #: DEV2100C	

Soil Boring SB-1

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				Caliche - Dark Gray, Moderately Firm.
5	0.4	None	None	
10	0.6	None	None	Sand (SP) - Pale Reddish Brown, Very Fine Grained to Fine Grained, Sub-Angular, Well Sorted, Imbedded Caliche.
15	0.6	None	None	
20	0.8	None	None	
				Caliche - White, Firm.
25	1.8	None	None	Sand (SP) - Pale Yellowish Orange, Moderately Consolidated, Very Fine Grained, Sub-Rounded, Moderately Sorted.
30	2.0	None	None	
35	(2.9)	None	None	
40	2.7	None	None	Sand (SP) - Dark Yellowish Orange, Very Fine Grained, Sub-Rounded, Well Sorted, Slightly Moist at 35.0' to 37.0'.
45	2.3	None	None	
50	1.3	None	None	
55	1.3	None	None	
60 ▼	(1.0)	None	None	Sand (SP) - Moderate Yellowish Brown, Very Fine Grained, Sub-Angular to Sub-Rounded, Moderately Sorted.
65	1.2	None	None	
70 TD	0.9	None	None	



Monitor Well Details

Date Drilled: May 2, 2002
Thickness of Bentonite Seal: 3 ft
Length of PVC Well Screen: 20 ft
Depth of PVC Well: 66.5 ft
Depth of Exploratory Well: 70 ft
Depth to Groundwater: 60 ft

- Grout Surface Seal
- Bentonite Pellet Seal
- Sand Pack
- Screen

▼ Indicates the groundwater level measured on date.

( ) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector.

Notes: The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

SB-1

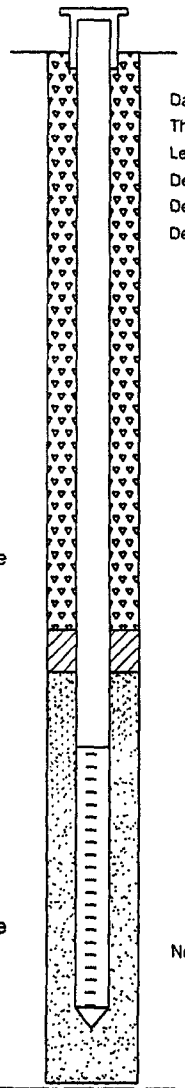
Devon Energy | B.C. Dickinson A-1 | Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 14, 2002	ETGI Project # DEV2100R

Soil Boring SB-2

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				
5	1.2	None	None	Caliche - White, Moderately Firm.
10	(2.4)	None	None	
15	2.0	None	None	Sand (SP) - Pale Reddish Brown, Very Fine Grained, Sub-Rounded, Well Sorted.
20	0.4	None	None	
25	0.4	None	None	Sand (SP) - Pale Yellowish Orange, Moderately Consolidated, Very Fine to Fine Grained, Sub-Rounded, Moderately Sorted.
30	0.7	None	None	
35	1.3	None	None	Sand (SP) - Dark Yellowish Orange, Very Fine Grained, Sub-Rounded, Well Sorted.
40	1.2	None	None	
45	1.3	None	None	Caliche - White, Moderately Firm.
50	1.3	None	None	
55	0.6	None	None	
60 ▼	(1.1)	None	None	Sand (SP) - Dark Yellowish Orange, Very Fine Grained, Sub-Rounded, Well Sorted.
65	1.3	None	None	
70	1.9	None	None	



Monitor Well Details

Date Drilled: May 2, 2002
Thickness of Bentonite Seal: 3 ft
Length of PVC Well Screen: 20 ft
Depth of PVC Well: 69 ft
Depth of Exploratory Well: 73 ft
Depth to Groundwater: 61 ft

Grout Surface Seal

Bentonite Pellet Seal

Sand Pack

Screen

▼ Indicates the groundwater level measured on date.

( ) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector.

Notes: The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

SB-2

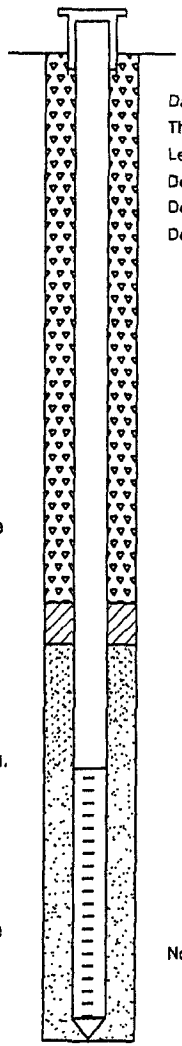
Devon Energy B.C. Dickinson A-1 Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 14, 2002	ETGI Project # DEV2100R

Soil Boring SB-3

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				
5	9.2	None	None	Sand (SP) - Pale Reddish Brown, Very Fine Grained, Sub-Rounded, Well Sorted.
10	17.3	None	None	
15	4.8	None	None	Caliche - White to Light Gray, Soft.
20	1.6	None	None	Sand (SP) - Pale Yellowish Orange, Moderately Consolidated, Very Fine to Fined Grained, Sub-Rounded, Moderately Sorted.
25	0.2	None	None	
30	2.4	None	None	
35	0.7	None	None	Sand (SP) - Dark Yellowish Orange, Very Fine Grained, Sub-Rounded, Well Sorted.
40	96	None	None	
45	(181)	Slight	None	
50	18.4	None	None	Caliche - White to Light Gray, Moderately Firm.
55	8.2	None	None	
60 ▼	(2.4)	None	None	
65	1.5	None	None	Sand (SP) - Dark Yellowish Orange, Very Fine Grained, Sub-Rounded, Well Sorted.
70 TD	0.6	None	None	



Monitor Well Details

Date Drilled: May 2, 2002
Thickness of Bentonite Seal: 3 ft
Length of PVC Well Screen: 20 ft
Depth of PVC Well: 70 ft
Depth of Exploratory Well: 70 ft
Depth to Groundwater: 60 ft

- Grout Surface Seal
- Bentonite Pellet Seal
- Sand Pack
- Screen
- ▼ Indicates the groundwater level measured on date.
- ( ) Indicates samples selected for Laboratory Analysis.
- PID Head-space reading in ppm obtained with a photo-ionization detector.

Notes: The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

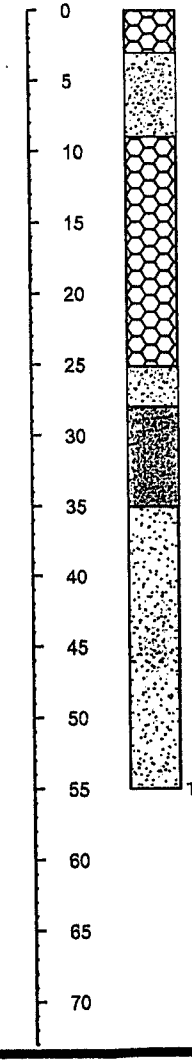
SB-3

Devon Energy B.C. Dickinson A-1 Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 14, 2002	ETGI Project # DEV2100R

Soil Boring SB-4



Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				Caliche - White to Light Gray.
5	(389)	Strong	Moderate	Sand (SP) - Light Olive Gray, Very Fine Grained, Sub-Rounded, Well Sorted.
10	(841)	Strong	Moderate	
15	(181)	Strong	Moderate	Caliche - White to Light Gray, Moderately Firm.
20	31.7	Moderate	None	
25	50.4	Moderate	None	Sand (SP) - Pale Yellow Orange, Moderately Consolidated, Very Fine to Fine Grained, Sub-Rounded, Moderately Sorted.
30	8.4	None	None	Sand (SP) - Dark Yellowish Orange, Very Fine Grained. Sub-Rounded, Well Sorted.
35	18.2	Moderate	None	
40	7.7	None	None	
45	(106)	Moderate	None	Sand (SP) - Moderate Yellowish Brown, Very Fine Grained, Sub-Rounded, Well Sorted.
50	34.8	None	None	
55 TD	(7.5)	None	None	

( ) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector.

Notes: The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Date Drilled: May 2, 2002

Soil Boring Log Details

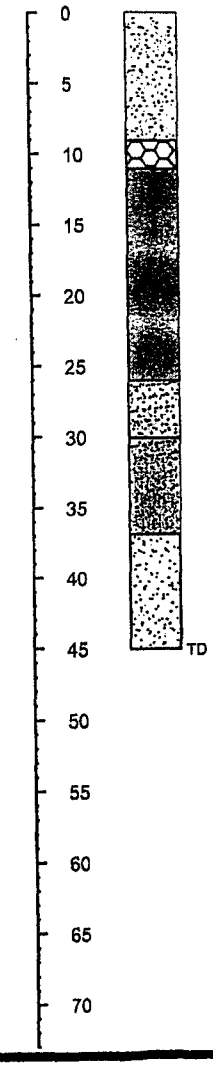
SB-4

Devon Energy B.C. Dickinson A-1 Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 14, 2002	ETGI Project # DEV2100R

Soil Boring SB-5



Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				
5	(456)	Strong	Moderate	Sand (SP) - Light Olive, Gray, Very Fine Grained, Well Sorted.
10	25.9	Strong	Moderate	Caliche - White to Light Gray, Soft.
15	(10.2)	Moderate	None	
20	5.1	None	None	Sand (SP) - Pale Reddish Brown, Very Fine Grained, Sub-Rounded, Well Sorted.
25	3.7	None	None	
30	1.3	None	None	Sand (SP) - Pale Yellowish Orange, Moderately Consolidated, Very Fine to Fine Grained, Sub-Rounded, Moderately Sorted.
35	1.2	None	None	Sand (SP) - Dark Yellowish Orange, Very Fine Grained, Sub-Rounded, Well Sorted.
40	2.7	None	None	Sand (SP) - Moderate Yellowish Brown, Very Fine Grained, Sub-Rounded, Well Sorted.
45 TD	(3.3)	None	None	
50				
55				
60				
65				
70				

( ) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector.

Notes: The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Date Drilled : May 3, 2002

Soil Boring Log Details

SB-5

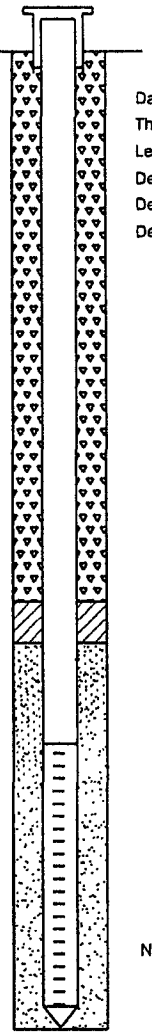
Devon Energy B.C. Dickinson A-1 Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 14, 2002	ETGI Project # DEV2100R

Soil Boring SB-6

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				Gravely Sand (GC) - Light Brown, Very Fine to Fine Grained, Sub-Rounded, Moderately Sorted.
5	43.7	Moderate	None	Gravely Sand (GC) - Pale Yellowish Orange, Very Fine Grained, Sub-Rounded, Imbedded Caliche, Moderately Sorted.
	54.4	Moderate	None	
10	(635)	Strong	Moderate	
	153	Moderate	Moderate	
15	631	Moderate	Moderate	Caliche - Light Olive Gray, Moderately Firm.
20	659	Strong	Moderate	
25	423	Strong	Moderate	Sand (SP) - Pale Yellowish Orange, Moderately Consolidated, Very Fine to Fine Grained, Sub-Rounded, Moderately Sorted.
30	(811)	Strong	Moderate	Sand (SP) - Light Olive Gray, Very Fine Grained, Sub-Rounded, Well Sorted.
35	481	Strong	Moderate	Sand (SP) - Pale Yellowish Orange, Moderately Consolidated, Very Fine to Fine Grained, Sub-Rounded, Moderately Sorted.
40	385	Strong	Moderate	
45	265	Strong	Moderate	
50	377	Strong	Moderate	
55	(311)	Strong	Moderate	Sand (SP) - Light Olive Gray, Very Fine Grained, Sub-Rounded, Well Sorted.
60 ▼	(247)	Strong	Moderate	
65	38.6	Slight	Moderate	
70 TD	24.2	Slight	Moderate	



Monitor Well Details

Date Drilled May 3, 2002
Thickness of Bentonite Seal 3 ft
Length of PVC Well Screen 20 ft
Depth of PVC Well 69 ft
Depth of Exploratory Well 69 ft
Depth to Groundwater 60 ft

Grout Surface Seal

Bentonite Pellet Seal

Sand Pack

Screen

▼ Indicates the groundwater level measured on date.

Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector.

Notes: The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

SB-6

Devon Energy B.C. Dickinson A-1 Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 14, 2002	ETGI Project # DEV2100R

Soil Boring SB-7

Depth (feet)	Soil Columns	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0					
5		33	Slight	None	Caliche - White (Medium Gray) Soft.
10		281	Strong	Moderate	
15		341	Strong	Moderate	Sand (SP) - Pale Green, Very Fine Grained, Sub-Rounded, Well Sorted, Stained Green.
20		417	Strong	Moderate	
25		140	Strong	Slight/Mod.	Sand (SP) - Pale Yellowish Orange, Dense, Fine Grained, Sub-Rounded, Well Sorted.
					Sand (SP) - Pale Green, Dense, Very Fine Grained, Sub-Rounded, Well Sorted.
30		254	Strong	Moderate	
					Sand (SP) - Pale Yellowish Orange, Dense, Fine Grained, Sub-Rounded, Well Sorted.
35		182	Strong	Moderate	Sand (SP) - Green, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
40	TD	(210)	Strong	Moderate	
45					
50					
55					
60					
65					
70					

( ) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector.

Notes: The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Date Drilled : May 20, 2002

Hole was plugged with bentonite pellet seal.

Soil Boring Log Details

SB-7

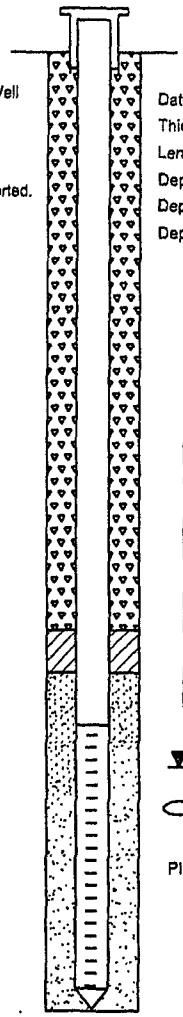
Devon Energy B.C. Dickinson A-1 Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 24, 2002	ETGI Project # DEV2100R

Monitor Well MW-4

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				Caliche - Gray, Soft.
5	2.4	None	None	Sand (SP) - Pale Reddish Brown, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
		None	None	Caliche - Medium Gray, Soft.
10	2.7	None	None	Sand (SP) - Pale Yellowish Orange, Moderately Dense, Fine Grained, Well Sorted.
		None	None	
15	3.2	None	None	Sand (SP) - Very Pale Orange to Grayish Orange, Loose, Very Fine Grained, Sub-Rounded to Sub-Angular, Well Sorted.
20	2.8	None	None	
				Caliche - Medium Gray, Soft to Moderately Firm.
25	2.3	None	None	Sand (SP) - Pale Yellowish Orange to Grayish Orange, Dense, Fine Grained, Imbedded Caliche.
30	3.1	None	None	
35	(3.9)	None	None	
40	2.8	None	None	
45	2.6	None	None	
50	2.6	None	None	Sand (SP) - Grayish Orange, Loose, Very Fine Grained, Well Sorted, Sub-Rounded, Trace of Caliche.
55	2.1	None	None	
	2.5			
60 ▼	(3.8)	None	None	
65	3.2	None	None	
	TD 3.1	None	None	
70				



Monitor Well Details

Date Drilled May 20, 2002
Thickness of Bentonite Seal 3 ft
Length of PVC Well Screen 20 ft
Depth of PVC Well 68 ft
Depth of Exploratory Well 68 ft
Depth to Groundwater 60 ft

Grout Surface Seal

Bentonite Pellet Seal

Sand Pack

Screen

▼ Indicates the groundwater level measured on date.

( ) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector

Notes:
The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

MW-4

Devon Energy B.C. Dickinson A-1 Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 24, 2002	ETGI Project # DEV2100R

Monitor Well MW-5

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain
5	2.2	None	None
10	3.4	None	None
15	3.6	None	None
20	3.8	None	None
25	3.8	None	None
30	1.3	None	None
35	1.9	None	None
40	(2.3)	None	None
45	3.1	None	None
50	1.4	None	None
55	2.3	None	None
60	(2.1)	None	None
65	1.6	None	None
70 (TD)	2.0	None	None

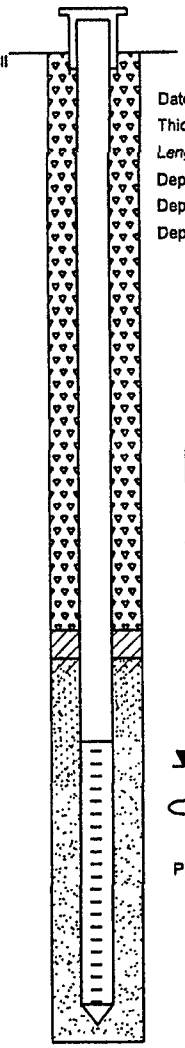
Soil Description

Sand (SP) - Very Pale Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.

Caliche - Medium Gray, Soft to Medium Hard.

Sand (SP) - Very Pale Orange, Very Fine Grained, Loose, Sub-Rounded, Imbedded Caliche, Moderately Sorted.

Sand (SP) - Grayish Orange to Dark Yellowish Orange, Loose, Very Fine Grained, Sub-Rounded, Well Sorted.



Monitor Well Details

Date Drilled: May 20, 2002
Thickness of Bentonite Seal: 3 ft
Length of PVC Well Screen: 20 ft
Depth of PVC Well: 69 ft
Depth of Exploratory Well: 70 ft
Depth to Groundwater: 59 ft

Grout Surface Seal

Bentonite Pellet Seal

Sand Pack

Screen

▼ Indicates the groundwater level measured on date.

(2.3) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector

Notes:
The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

MW-5

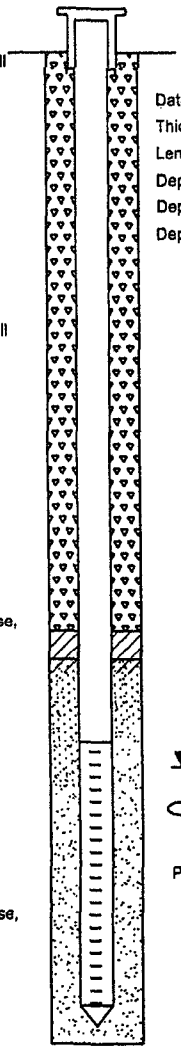
Devon Energy | B.C. Dickinson A-1 | Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 24, 2002	ETGI Project # DEV2100R

Monitor Well MW-6

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				Sand (SP) - Very Pale Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sortec.
5	4.5	None	None	
10	4.7	None	None	Caliche - Medium Gray, Soft to Moderately Hard.
15	3.8	None	None	
20	4.2	None	None	Sand (SP) - Very Pale Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
25	(5.6)	None	None	Sand (SP) - Pale Yellowish Orange, Very Fine Grained, Sub-Rounded, Well Sorted, Moderately Dense.
30	4.5	None	None	Caliche - Medium Gray, Moderately Hard.
35	3.6	None	None	
40	4.1	None	None	Sand (SP) - Grayish Orange to Dark Yellow Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
45	4.3	None	None	
50	3.9	None	None	Caliche - Medium Gray, Moderately Hard.
55	1.5	None	None	
60 ▼	(1.0)	None	None	Sand (SP) - Grayish Orange to Dark Yellow Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
65	0.9	None	None	
70 TD	1.3	None	None	



Monitor Well Details

Date Drilled: May 20, 2002
Thickness of Bentonite Seal: 3 ft
Length of PVC Well Screen: 20 ft
Depth of PVC Well: 69 ft
Depth of Exploratory Well: 70 ft
Depth to Groundwater: 59 ft

Grout Surface Seal

Bentonite Pellet Seal

Sand Pack

Screen

▼ Indicates the groundwater level measured on date.

(oval) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector

Notes:
The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

MW-6

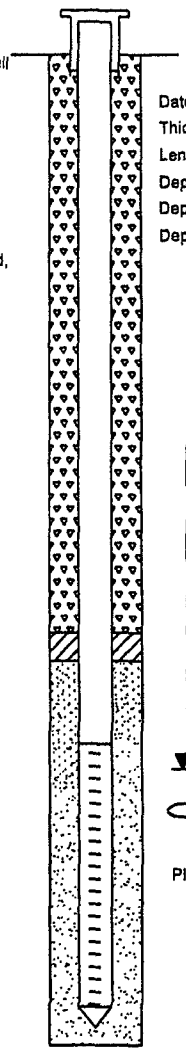
Devon Energy | B.C. Dickinson A-1 | Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 24, 2002	ETGI Project # DEV2100R

Monitor Well MW-7

Depth (feet)	PID Reading	Petroleum Odor	Petroleum Stain	Soil Description
0				Sand (SP) - Very Pale Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
5	2.0	None	None	Caliche - Medium Gray, Soft to Moderately Hard.
10	1.9	None	None	
15	1.6	None	None	Sand (SP) - Pale Yellowish Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
20	0.9	None	None	Caliche - Medium Gray, Moderately Hard.
25	1.5	None	None	Sand (SP) - Pale Yellowish Orange, Moderately Dense, Very Fine Grained, Sub-Rounded, Well Sorted.
30	0.5	None	None	Caliche - Medium Gray, Soft.
35	(1.5)	None	None	
40	1.1	None	None	
45	1.4	None	None	
50	1.4	None	None	
55	1.4	None	None	Sand (SP) - Grayish Orange, Very Fine Grained, Loose, Sub-Rounded, Well Sorted.
60 ▼	(1.5)	None	None	
65	1.3	None	None	
70 TD	1.2	None	None	



Monitor Well Details

Date Drilled: May 20, 2002
Thickness of Bentonite Seal: 3 ft
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Depth of PVC Well: 69 ft
Depth of Exploratory Well: 70 ft
Depth to Groundwater: 59 ft

Grout Surface Seal

Bentonite Pellet Seal

Sand Pack

Screen

▼ Indicates the groundwater level measured on date.

( ) Indicates samples selected for Laboratory Analysis.

PID Head-space reading in ppm obtained with a photo-ionization detector

Notes:
The lines between material types shown on the profile log represent approximate boundaries. Actual transitions may be gradual.

The depths indicated are referenced from the ground surface.

Soil Boring Log Details

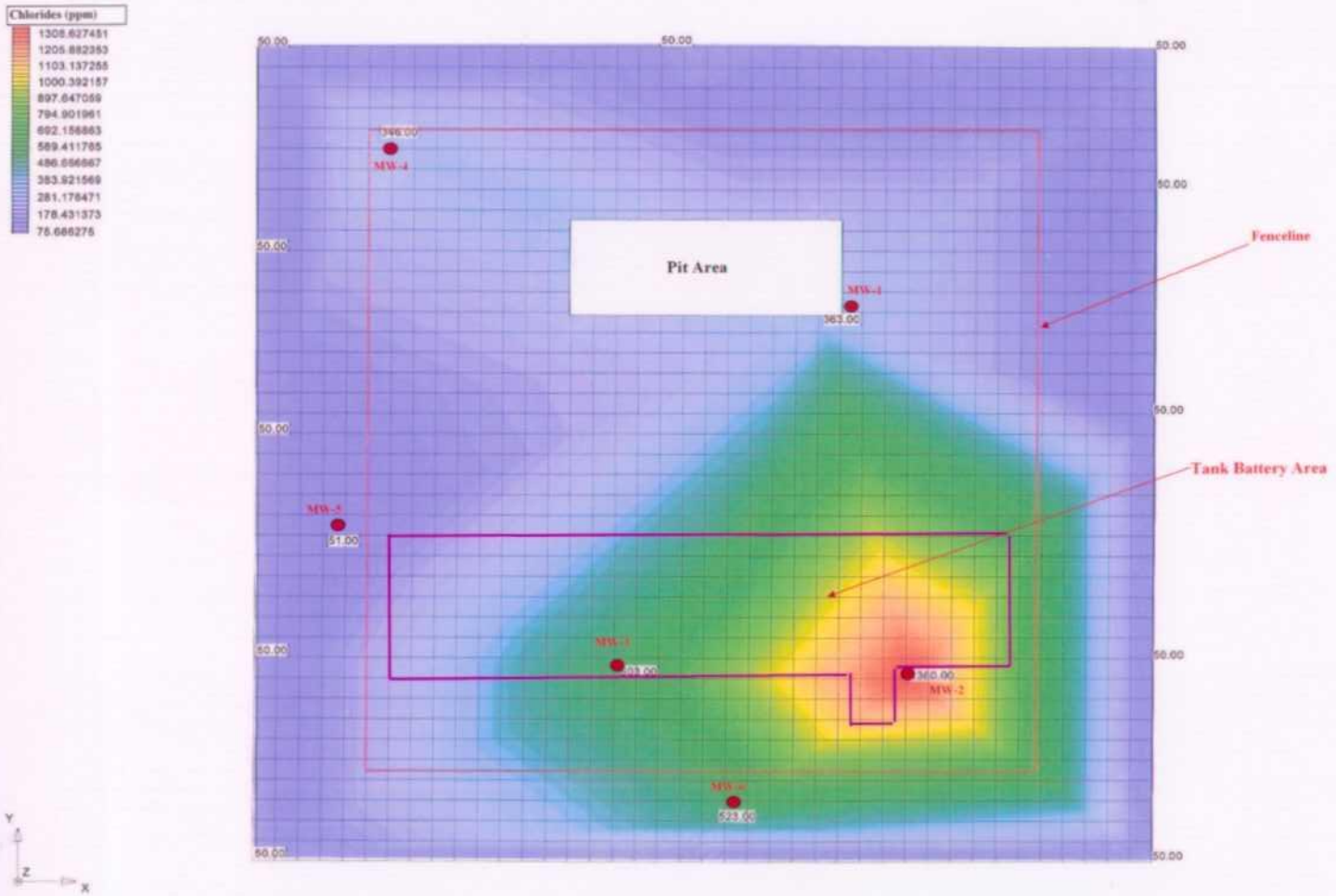
MW-7

Devon Energy | B.C. Dickinson A-1 | Lea County, NM

Environmental Technology Group, Inc.

Prep By: JDJ	Checked By: RE
May 24, 2002	ETGI Project # DEV2100R

Devon Energy Corporation
B.C. Dickinson Battery
Chlorides In Groundwater



PR-57B

Remediation Protocol
Devon Energy Corporation
B.C. Dickenson Battery

1.0 Purpose

This protocol is to provide a detailed outline of the steps to be employed in the remediation and closure of the B.C. Dickenson Battery located east of Lovington, New Mexico.

2.0 Scope

This protocol is site specific for the Devon Energy B.C. Dickenson remediation project.

3.0 Preliminary

Prior to any field operations, Whole Earth Environmental shall conduct the following activities:

3.1 Client Review

3.1.1 Whole Earth shall meet with cognizant personnel within Devon, the NMOCD and the landowner to review and approve this protocol.

3.1.2 Changes to this protocol will be documented and submitted for final review by all parties prior to the initiation of actual field work.

4.0 Safety

4.1 Prior to work on the site, Whole Earth shall obtain the location and phone numbers of the nearest emergency medical treatment facility. We will review all safety related issues with the appropriate Client personnel, sub-contractors and exchange phone numbers.

4.2 A tailgate safety meeting shall be held and documented each day. All sub-contractors must attend and sign the daily log-in sheet.

4.3 Anyone allowed on to location must be wearing sleeved shirts, steel toed boots, and long pants. Each vehicle must be equipped with two way communication capabilities.

4.4 Prior to any excavation, New Mexico One Call will be notified. The One Call notification number will be included within the closure report. If lines are discovered within the area to be excavated they shall be marked with pin flags on either side of the line at maximum five-foot intervals.

4.5 Prior to any field operations, Whole Earth will prepare and submit to Devon Energy a detailed site Health and Safety Plan.

5.0 Preliminary Activities

5.1 All barrels, trash and piping will be scanned for the presence and concentration of naturally occurring radioactive materials (NORM). Any component containing radiation reading exceeding 10 µrems above background will be segregated for further inspection by a third party certified to work in New Mexico on radioactive materials.

5.2 All clean trash will be collected and sent to a commercial disposal facility. A manifest will be generated and signed by the disposal company. All such manifests shall be collected and included within the final closure report.

5.3 All cement shall be collected and deep buried on-site. The top of the cement shall be a minimum distance of 5' below ground level.

5.4 Monitor wells no. 1 & 2 will be grouted to surface prior to excavation and replaced at the conclusion of the project.

6.0 Remediation

6.1 All berms and assorted piles of contaminated soils will be spread to a maximum depth of 6 inches on the surface of the site. The areas designated on the plat map as "A" and "B" shall be excavated to a minimum depth of 15' below ground surface. The contaminated soils shall be set aside of the excavation but within the existing fence perimeter.

6.2 The side walls and bottom of each excavated area shall be field screened for the presence and concentration of TPH by means of EPA method 418.1 (modified). Excavation of each site shall continue until the TPH concentrations are <5,000 ppm. Prior to backfill, laboratory confirmation samples shall be taken from each side-wall and bottom. The Hobbs office of the NMOCD will be given a minimum of forty-eight hours notification of the intended sampling event.

6.3 Each excavation will be backfilled with soils containing a TPH concentration of <500 ppm to a maximum depth of 5' below ground surface. Composite confirmation samples will be collected each 3' lift and submitted to an independent laboratory for analysis under EPA SW-846 Method 8015M. Records of each test will be incorporated within the closure report.

6.4 Upon approval by the NMOCD, Whole Earth will install a clay liner in the bottom of the excavation. The minimum depth on the bottom of the excavation shall be 12". All clay layers will be watered and compacted to 100% density.

6.5 All remaining contaminated soils will be land spread over the existing impoundment to a maximum depth of 12" and a maximum TPH concentration of 2,000 ppm. Surface treatment methods may include bio-augmentation, fertilization, inoculation, and phyto-remediation.

7.0 Monitoring

The monitor wells will be tested on an annual basis for the presence and concentration of BTEX, and chlorides for a minimum period of five years. If the well shows criteria contaminant concentrations within NMWQCC standards for a minimum of the last three of five years, Devon will request final site closure to include plugging the remaining well.

8.0 Closure Report

8.1 At the conclusion of the project, Whole Earth shall prepare a closure report that contains the following minimum information:

- Photographs of the location prior to remediation
- Photographs of the site at the point of maximum excavation
- Detail photographs of the liner installation
- Photographs of the location at time of final closure
- Lab analysis and related chain of custody for THP, BTEX and chloride testing of each side-wall and excavation bottom
- Lab analysis and related chain of custody for chloride testing of each 3'lift composite
- Procter analysis of the clay
- Clay compaction test report
- Copies of this protocol and all testing procedures

- Shipping manifests for all materials taken to disposal
- Laboratory analysis of water samples obtained from each monitoring well
- Boring logs of any new monitor wells installed at the location