Duke Energy Field Services

SITE INVESTIGATION, REMEDIATION AND FINAL C-141 CLOSURE DOCUMENTATION

A-9 8-INCH

DEFS REF: #042403

UL-C NE¼ OF THE NW¼ OF SECTION 18 T21S R36E

~9.3 MILES WEST-NORTHWEST (BEARING 292.1°) OF EUNICE, LEA COUNTY, NEW MEXICO

LATITUDE: N32° 29' 09.70" LONGITUDE: W103° 18' 27.80"

JANUARY 13, 2004

PREPARED BY:

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C

Duke = 299153
facility = fPAC0602031484
incident = nPAC0602031463
application = pPAC0602031971

Table of Contents

Project Summary

Site Specific:

- **Company Name**: Duke Energy Field Services
- **Facility Name**: A-9 8" Natural Gas Gathering Line
- **Project Reference** 042403
- **Company Contact**: Paul Mulkey
- **Site Location:** WGS84: N32° 29' 09.70"; W103° 18' 27.80"
- **Legal Description**: Unit Letter C, (NE¼ of the NW¼), Section 18, T21S, R36E
- **General Description**: approximately ~9.3-miles west-northwest (292.1°) of Eunice, Lea County, NM
- **Elevation**: 3625-ft amsl **Depth to Ground Water**: 106-ft
- **Land Ownership**: Bureau of Land Management; Leased by DASCO Cattle Corp.
- **EPI Personnel**: Technical Manager – Pat McCasland
  Consultant – John Good
  Foreman – Conrad Falcon

Release Specific:

- **Product Released**: Natural Gas and associated liquids (NGL)
- **Volume Released**: ~30 bbl **Volume Recovered**: 15 bbl
- **Time of Occurrence**: 4/24/03 **Time of Discovery**: 4/24/03
- **Release Source**: 8" Steel Pipeline – Internal Corrosion
- **Initial Surface Area Affected**: 1,568-ft^2 *

Remediation Specific:

- **Final Vertical extent of contamination**: 30-ft bgs (73-ppm TPH); Remaining depth to ground water: 76-ft
- **Water wells within 1000-ft**: 0 **Surface water bodies within 1000-ft**: 0
- **NMOCD Site Ranking Index**: 10 points (>50-ft; <100-ft to top of water table)
- **Remedial goals for Soil < 56-ft bgs**: TPH – 1000 ppm; BTEX – 50 ppm; Benzene – 10 ppm; Chlorides – 250 ppm
- **RCRA Waste Classification**: Exempt
- **Remediation Option Selected**: a) Excavate and dispose of contaminated soil from 0'-8' bgs; b) analytical confirmation of sidewall and perimeter contaminant levels; c) Install 2-ft compacted clay barrier at 6' – 8' bgs depth, with 5-ft overlap; d) backfill with clean topsoil for adequate root zone.
- **Disposal Facility**: South Monument SWF **Volume disposed of**: 2,896-yd^3
- **Project Completion Date**: June 4, 2003
- **Additional Commentary**: * Due to historical leakage, sub-surface affected area was larger than preliminary surface indications (6,165-ft^2).

1.0 Introduction & Background

This report addresses the site investigation and remediation of the Duke Energy Field Services (DEFS) "A-9 8-Inch 042403" natural gas gathering pipeline remediation site. On April 24, 2003, Environmental Plus, Inc. (EPI) was notified by DEFS regarding a newly discovered natural gas liquids (NGL) release at a location on the A-9 8" pipeline. The initial C-141 Form submitted to the New Mexico Oil Conservation Division (NMOCD) on April 28, 2003 reports the release volume as ~30-bbl with 15-bbl recovered. EPI responded the following day (4/25/03) and commenced GPS delineation, photography, preliminary excavation and characterization of the site. The site initially consisted of a 1,568–ft^2 area with obvious surface NGL contamination *(Plate 3, Attachments)*. Excavation of the site revealed sub-surface contamination from previous releases. Remediation of this release site consisted of the excavation and disposal of 2,896-yd^3 (0-ft to 8-ft depth) of contaminated soil from a 6,165-ft^2 final excavation extent. The contaminated soil was disposed of at the South Monument NMOCD approved surface waste facility. After confirmation of adequate lateral excavation, a 2-ft compacted clay barrier was installed at the 6-ft to 8-ft excavation level. The remainder of the excavation (6-ft depth) was backfilled with clean topsoil purchased from DASCO Cattle Corp. The site was contoured for adequate drainage. The project was completed on June 4, 2003.

The release site is located in Unit Letter C (NE¼ of the NW¼), Section 18, T21S, R36E, N32° 29' 09.70" and W103° 18' 27.80". The site is located approximately 9.3-miles west-northwest (292.1°) of Eunice, Lea County, NM. The property is owned by the Bureau of Land Management and leased for grazing purposes by DASCO Cattle Co. (Atlee Snyder). A site location map, site topographical map and detailed GPS site diagrams are included in the Attachments as *Plates 1, 2, 3 and 5.*

The NGL release at this site was discovered on April 24, 2003 and reported to NMOCD that afternoon by Stan Shaver, DEFS. The Initial NMOCD C-141 Form was submitted on April 28, 2003 by EPI. The leak was the result of internal corrosion of the A-9 8" natural gas pipeline. The pipeline was temporarily repaired with a clamp by DEFS personnel, and eventually replaced by a section of poly pipe.

2.0 Site Description

2.1 Geological Description

The United States Geological Survey (USGS) Ground-Water Report 6, "Geology and Ground-Water Conditions in Southern Lea County, New Mexico," A. Nicholson and A. Clebsch, 1961, describes the near surface geology of southern Lea County as an intergrade of the Quaternary Alluvium (QA) sediments, i.e., fine to medium sand, with the mostly eroded Cenozoic Ogallala (CO) formation. Typically, the QA and CO formations in the area are capped by a thick interbed of caliche and generally overlain by sandy soil. The release site is located in the Eunice Plain physiographic subdivision, described by Nicholson & Clebsch as an area "underlain by a hard caliche surface and is almost entirely covered by reddish-brown dune sand". The thickness of the sand cover ranges from 2-5 feet in most areas to as much as 20-30 feet in drift areas.

2.2 Ecological Description

The area is typical of the Upper Chihuahuan Desert Biome consisting primarily of hummocky sand hills covered with Harvard Shin Oak (Querqus harvardi) interspersed with Honey Mesquite (Prosopis glandulosa) along with typical desert grasses, flowering annuals and flowering perennials. Mammals represented, include Orrd's and Merriam's Kangaroo Rat, Deer

Mouse, White Throated Wood Rat, Cottontail Rabbit, Black Tailed Jackrabbit, Mule Deer, Bobcat, Red Fox and Coyote. Reptiles, Amphibians, and Birds are numerous and typical of area. A survey of Listed, Threatened, or Endangered species was not conducted.

2.3 Area Ground Water

The subsurface at the site is composed of a hard caliche base covered with 2-3-feet of reddish sand/clay topsoil. The presence of ground water in this area of Lea County is best described as intermittent. Based on data obtained from the Office of the State Engineer for a water well approximately 5000-ft southeast of the site, a conservative estimate of ground water depth at this site, if present, would be ~106-ft bgs.

2.4 Area Water Wells and/or Surface Water Features

There are no water wells and/or surface water features within 1000-ft of the release site.

There are no surface water bodies within 1000-ft of the site.

3.0 NMOCD Site Ranking

Contaminant delineation and site characterization accomplished at this site indicate that the chemical parameters of the soil and ground water were characterized consistent with the NMOCD guidelines published in the following documents:

- ***Guidelines for Remediation of Leaks, Spills and Releases (August 13, 1993)***
- ***Unlined Surface Impoundment Closure Guidelines (February 1993)***

Acceptable thresholds for **contaminants/constituents of concern** (CoCs), i.e., TPH^{8015m}, Benzene, and the mass sum of Benzene, Toluene, Ethyl Benzene, and total Xylene (BTEX), was determined based on the NMOCD Ranking Criteria as follows:

- Depth to Ground water, i.e., distance from the lower most acceptable concentration to the ground water.
- Wellhead Protection Area, i.e., distance from fresh water supply wells.
- Distance to Surface Water Body, i.e., horizontal distance to all down gradient surface water bodies.

Based on the proximity of the site to protectable area water wells, surface water bodies, and depth to ground water from the lower most contamination, the NMOCD ranking score for the site is 10 points with the soil remedial goals highlighted in the Site Ranking Matrix presented as Table 1 on page 5.

4.0 Subsurface Soil Investigation

The subsurface soil analyses were accomplished on May 2 and May 23, 2003 with the drilling and sampling of two boreholes in the central area of the release down to 40-ft bgs. Analyses results indicate that TPH, BTEX and Chloride contamination above NMOCD remedial goals exists at the 0-35-ft depth zone within the central area of the release. *(Plates 4, 6 and 7; Attachments).*

5.0 Ground Water Investigation

Ground water depth is conservatively projected to be 106-ft bgs at the site, based on the nearest recorded water well. The site was excavated to a level depth of 8-ft. All contaminated soil left within the excavation *(see Section 7.0 below)* was covered with a 2-ft impermeable layer of compacted clay. The remaining 6-ft depth of the excavation was backfilled with clean caliche and topsoil. Based on the VADSAT Risk Assessment Models for remaining benzene and chlorides and a remaining depth to ground water of >65-ft, there will be no need for further ground water investigation at this site.

Table 1 - Site Ranking Matrix

1. Ground Water	2. Wellhead Protection Area	3. Distance to Surface Water
Depth to GW <50 feet: *20 points*	If <1000' from water source, or; <200' from private domestic water source: *20 points*	<200 horizontal feet: *20 points*
Depth to GW 50 to 99 feet: *10 points*		200-1000 horizontal feet: *10 points*
Depth to GW >100 feet: 0 points	If >1000' from water source, or; >200' from private domestic water source: *0 points*	>1000 horizontal feet: *0 points*
Ground Water Score = 10	Wellhead Protection Score = 0	Surface Water Score= 0
Site Rank (1+2+3) = 10 + 0 + 0 = 10 points (for soil 0-56'bgs)		

Total Site Ranking Score and Acceptable Remedial Goal Concentrations			
Parameter	20+	10	0
Benzene[1]	10 ppm	10 ppm	10 ppm
BTEX[1]	50 ppm	50 ppm	50 ppm
TPH	100 ppm	1000 ppm	5000 ppm

6.0 VADSAT Risk Assessment

Very conservative 1000-year Risk Assessment Models of vertical hydrocarbon (benzene) and inorganic chloride migration for this site were generated utilizing the American Petroleum Institute's VADSAT 3.0 software. Although the sampling protocol for this site does not show an inordinate presence of Benzene, it is the chemical species utilized to run the assessment because it is the lightest and fastest migrating of the chemical choices VADSAT offers. VADSAT calculates the Mean Infiltration Rate based on annual precipitation minus a runoff coefficient and the evaporation rate. This number must be positive, so VADSAT does not accommodate arid and semi-arid areas such as southeast NM where the evaporation rate exceeds the precipitation rate.

Although the water table is assumed to be ~106-ft deep at this site, there is no empirical confirmation of this assumption. To allow for more conservancy in the VADSAT risk assessment modeling, the water table depth was artificially set at 50-feet for both assessment models presented with this site.

Two contrasting assessment sets were run for this site: one clay barrier/no barrier set for Chlorides present in the soil at >4200 ppm and one clay barrier/no barrier set for Benzene with a correlated TPH concentration of 32,000 ppm. Other than the two variable constituents and the presence, or lack of, the clay barrier, the input parameters for each assessment are identical. The downstream receptors were set at 1-meter, 10-meters and 100-meters (X=1 X=10 X=100). The transverse offset (Y value) was set at 0-meters, and the depth into the aquifer (Z value) was set at 0.

The results of the computer risk assessment modeling for benzene without a clay barrier in place indicate that benzene present would reach the top of a 50-ft aquifer directly under the site in approximately 20-years (2023) and reach its peak concentration of 1.678×10^{-2} ppm 120-years later (2143). The results of the computer risk assessment modeling for chlorides without a clay barrier in place indicate that chlorides present would reach the top of a 50-ft aquifer directly under the site in

approximately 20-years (2023) and reach its peak concentration of 18.28 X 10^3 ppm 160-years later (2163). The risk assessment models of the site for both benzene and chlorides, with a clay barrier in place, show a flat-line of 0 values for the 1000-year period modeled, thus the contaminant migration for either constituent theoretically would never reach the aquifer. *(See Attachments, pages 27 –34).*

7.0 Remediation Process

Remediation of the site commenced on April 25, 2003 and continued through June 4, 2003. Remediation of the site consisted of excavation and disposal of 2,896 yd^3 of contaminated soil from the excavation down to the 8-ft bgs level. All contaminated soil excavated from the site was disposed of at the South Monument Surface Waste Treatment Facility.

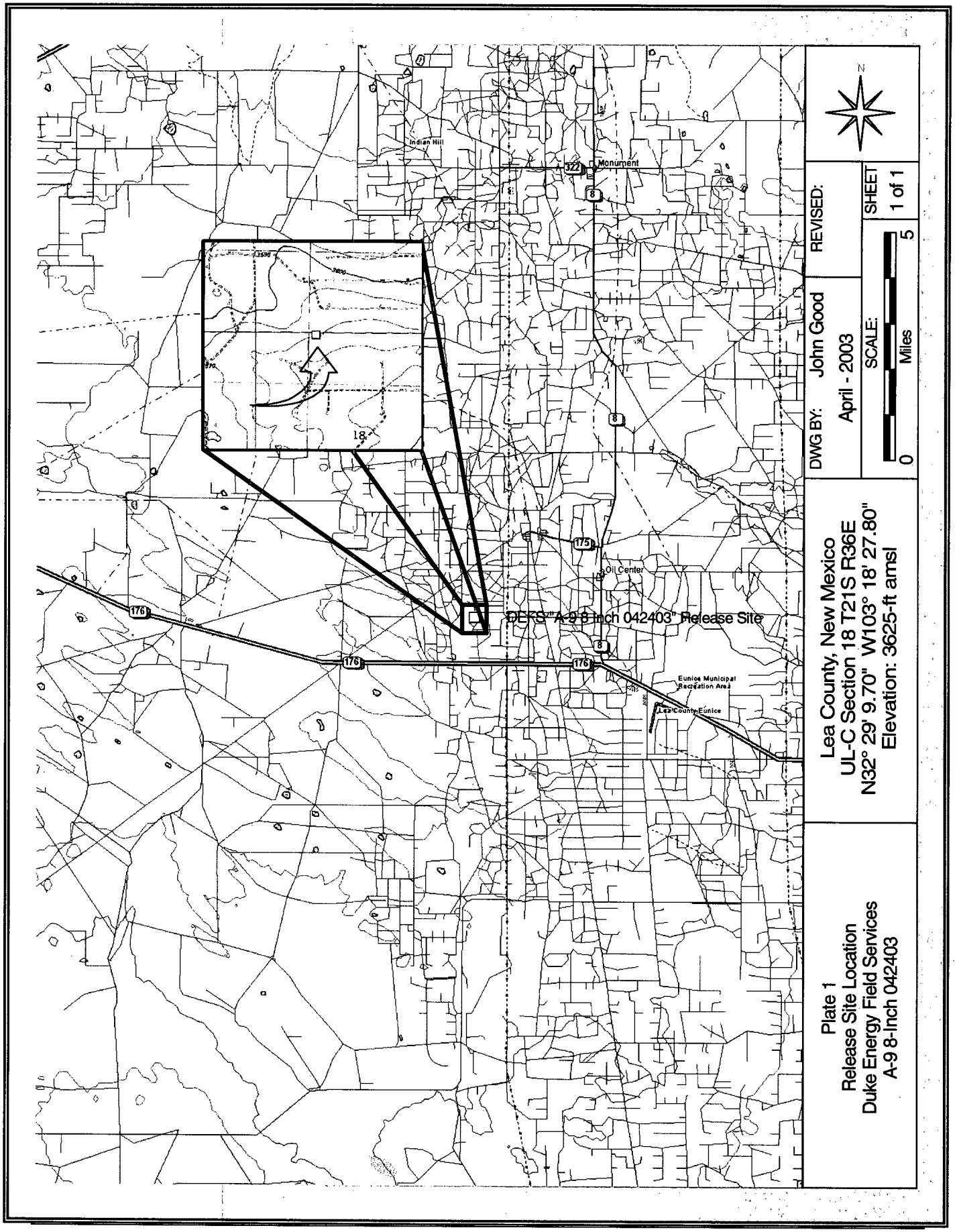
Upon determination that the vertical extent of contamination went to approximately 35-ft bgs beneath the release area, it was decided to isolate the contaminated soil below the 8-ft depth level with the installation of a 2-ft compacted clay barrier. The perimeter of the excavation was expanded approximately 5-ft to provide a clean overlap zone for the clay barrier system. Soil samples of the excavation sidewalls and expanded perimeter were obtained prior to installation of the barrier. One perimeter area (north) displayed a bottom TPH contamination level of 2,370 mg/kg, however, the sidewall in this same area had a TPH level of <40 mg/kg. The 2,370 mg/kg level of TPH contamination beneath the clay barrier perimeter at this one location will present no future problem.

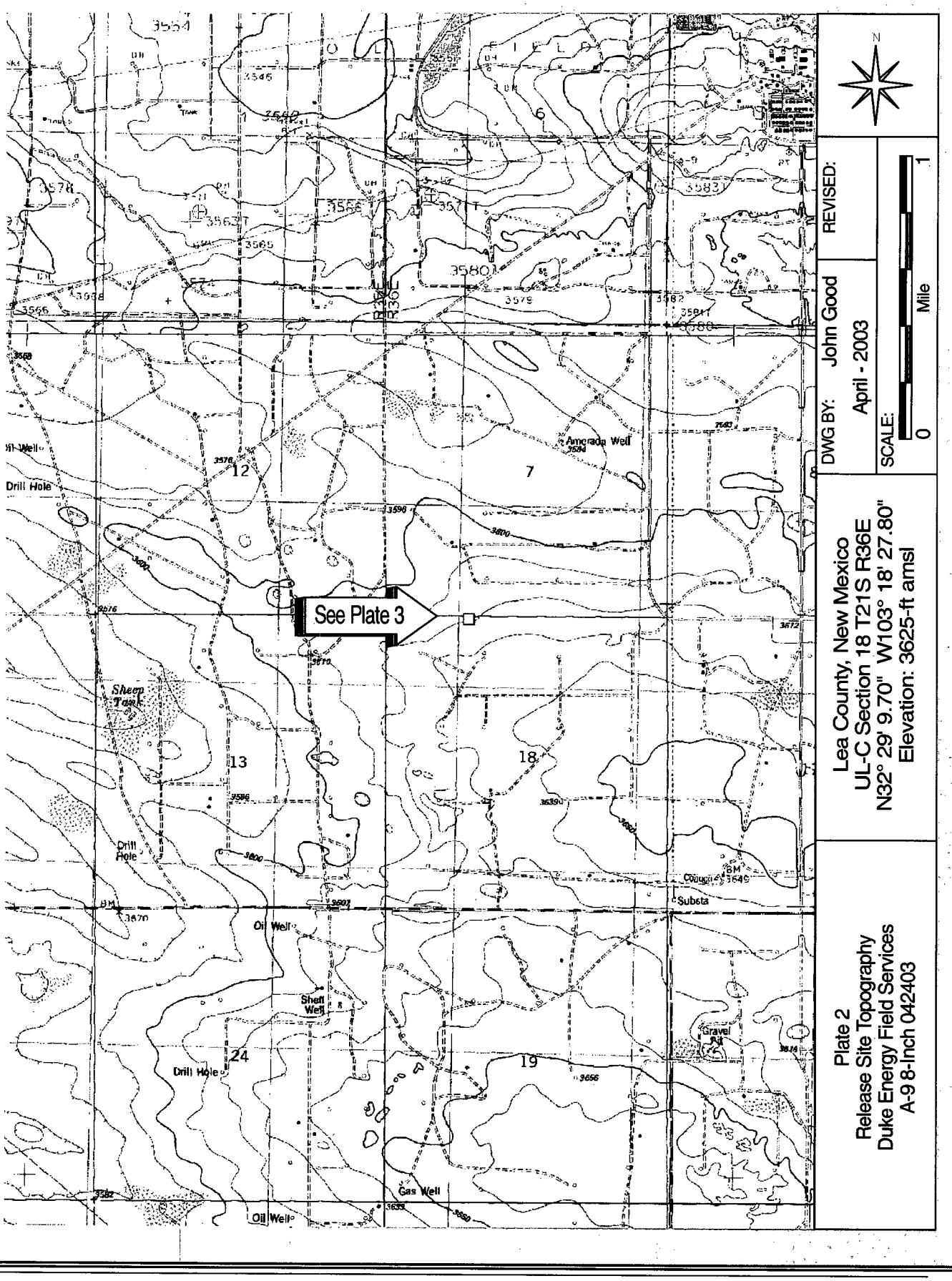
The clay barrier was placed in two stages, 1-ft thickness in each stage. After each 1-ft layer of clay was placed, it was compacted and tested by Pettigrew and Associates, Hobbs, NM. Both layers tested >95% compaction. *(Compaction test results are included in the Attachments).* After the clay barrier was in place and certified, the remainder of the excavation was backfilled with clean topsoil, smoothed and then contoured. *(Plate 5 is a final site demarcation incorporating a GPS delineation of the surface damage area).*

8.0 Closure Justification

This report documents successful implementation of the Risk Assessment and Site Closure Proposal (05-29-03) approved by NMOCD for this release site. 2,896-yd^3 of soil contaminated above acceptable CoC remedial concentrations was excavated and removed from the location. Disposal of the RCRA Exempt contaminated soils was at the South Monument approved land farm. A 2-ft compacted and certified clay barrier was placed over all contaminated soil that was allowed to remain in place in the excavation. The VADSAT Risk Assessment model for this site, with a conservative parameter basis, indicates that there is no risk inherent to leaving the contaminants in-place and that no threat to the existing aquifer beneath the site presents itself. The excavation was backfilled with clean caliche and topsoil and properly contoured to provide adequate drainage. Based on the data presented in this report, Environmental Plus, Inc., on behalf of Duke Energy Field Services, requests that the NMOCD require "no further action" at this site.

Attachments: (*pages 8-41*)


Indian Hill
Monument
Oil Center
DEFS "A-9 8 inch 042403" Release Site
Eunice Municipal Recreation Area
Lea County Eunice
322
8
175
176
18
Plate 1
Release Site Location
Duke Energy Field Services
A-9 8-Inch 042403
Lea County, New Mexico
UL-C Section 18 T21S R36E
N32° 29' 9.70" W103° 18' 27.80"
Elevation: 3625-ft amsl
DWG BY: John Good
April - 2003
REVISED:
SCALE:
0
5
Miles
SHEET
1 of 1
N


See Plate 3
Drill Hole
Sheep Tank
Oil Well
Shell Well
Drill Hole
Drill Hole
Oil Well
Gas Well
Amerada Well
Gravel Pit
Substa
Lea County, New Mexico
UL-C Section 18 T21S R36E
N32° 29' 9.70" W103° 18' 27.80"
Elevation: 3625-ft amsl
DWG BY: John Good
April - 2003
REVISED:
SCALE:
0
1
Mile
Plate 2
Release Site Topography
Duke Energy Field Services
A-9 8-Inch 042403

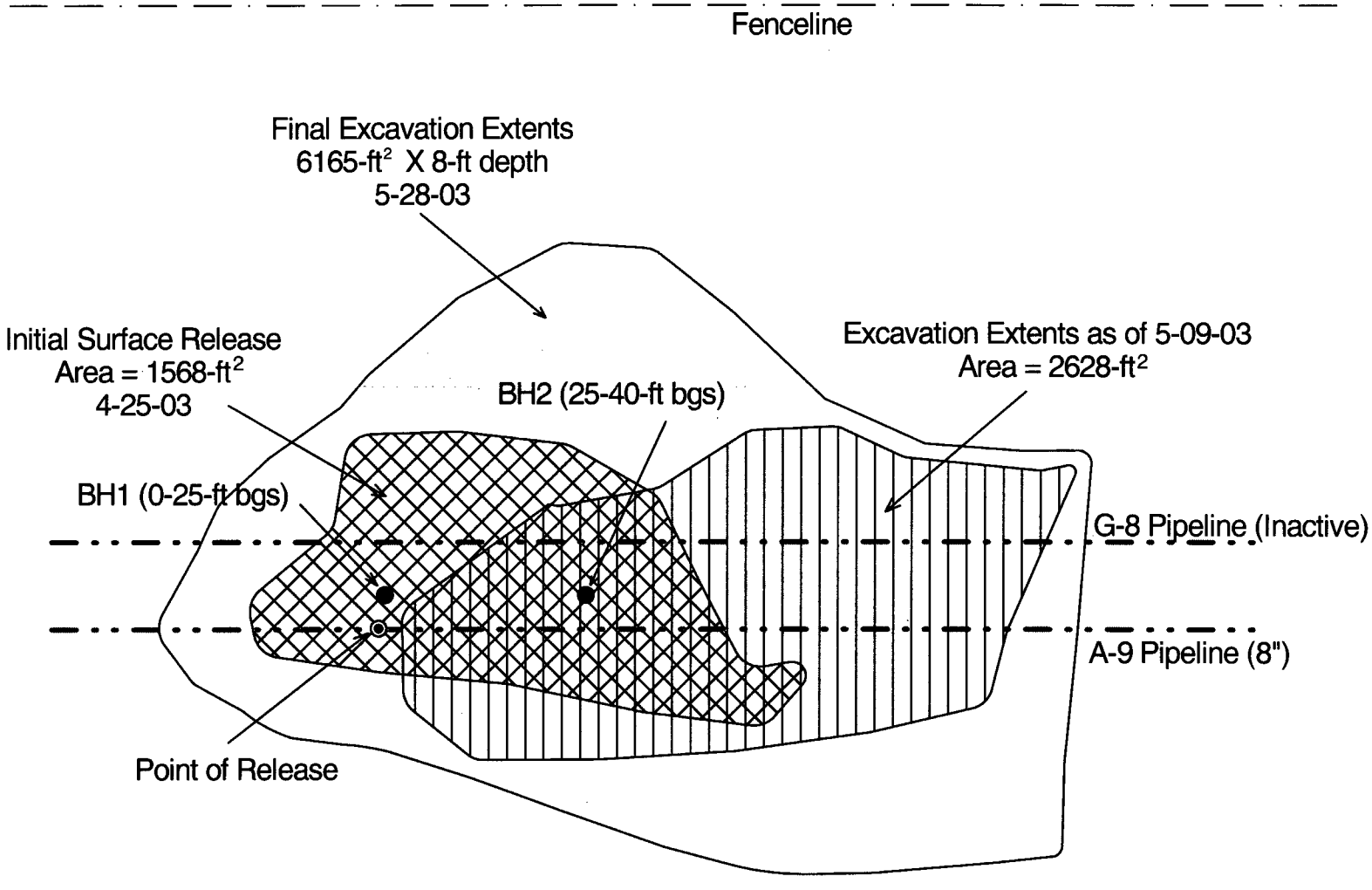
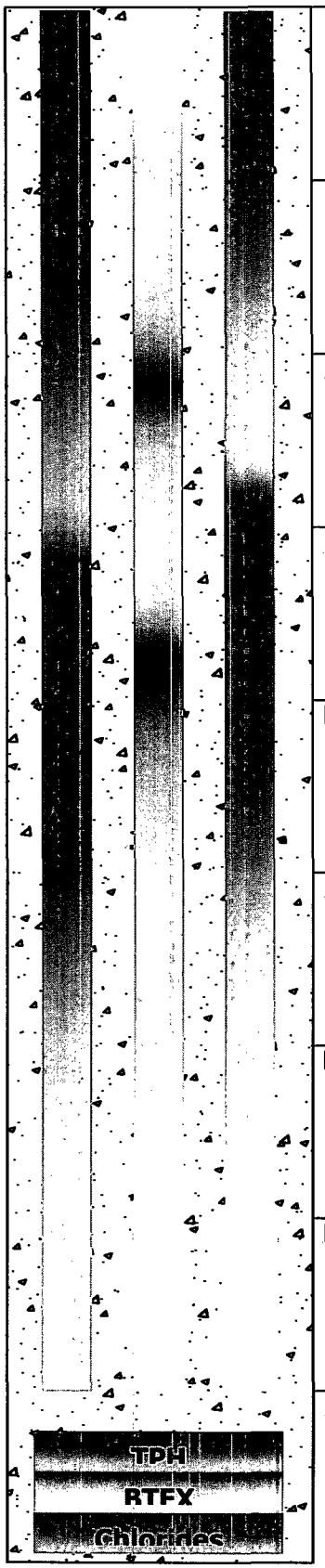


Plate 3 Release Site GPS Demarcations Duke Energy Field Services A-9 8-Inch 042403	Lea County, New Mexico UL-C Section 18 T21S R36E N32° 29' 9.70" W103° 18' 27.80" Elevation: 3625-ft amsl	DWG BY: John Good April - 2003 SCALE: 0 Feet 25	REVISED: May - 2003 PAGE 1 of 1 SIZE: ANSI A	N



Surface

TPH: 53000 ppm
BTEX: 239 ppm
Chlorides: >4500

5-ft
Red-Brown Sand

TPH: 30800 ppm
BTEX: 258 ppm
Chlorides: 4240 ppm

10-ft
Light Brown Sand/Caliche

TPH: 22100 ppm
BTEX: 173 ppm
Chlorides: 1120 ppm

15-ft
Light Brown Sand/Caliche

TPH: 32000 ppm
BTEX: 500 ppm
Chlorides: 178 ppm

20-ft
Light Brown Sand

TPH: 19950 ppm
BTEX: 298 ppm
Chlorides: 240 ppm

25-ft
Light Brown Sand

TPH: 1012 ppm
BTEX: 37 ppm

30-ft
Light Brown Sand

TPH: 73 ppm
BTEX: ND

35-ft
Light Brown Sand

TPH: ND
BTEX: ND

40-ft
Light Brown Sand

Plate 4
Vertical Contamination Profile
Duke Energy Field Services
A-9 8-Inch 042403

Lea County, New Mexico
UL-C Section 18 T21S R36E
N32° 29' 9.70" W103° 18' 27.80"
Elevation: 3625-ft amsl

DWG BY: John Good
May - 2003

SCALE: Not Applicable

REVISED:

PAGE 1 of 1

SIZE: ANSI A

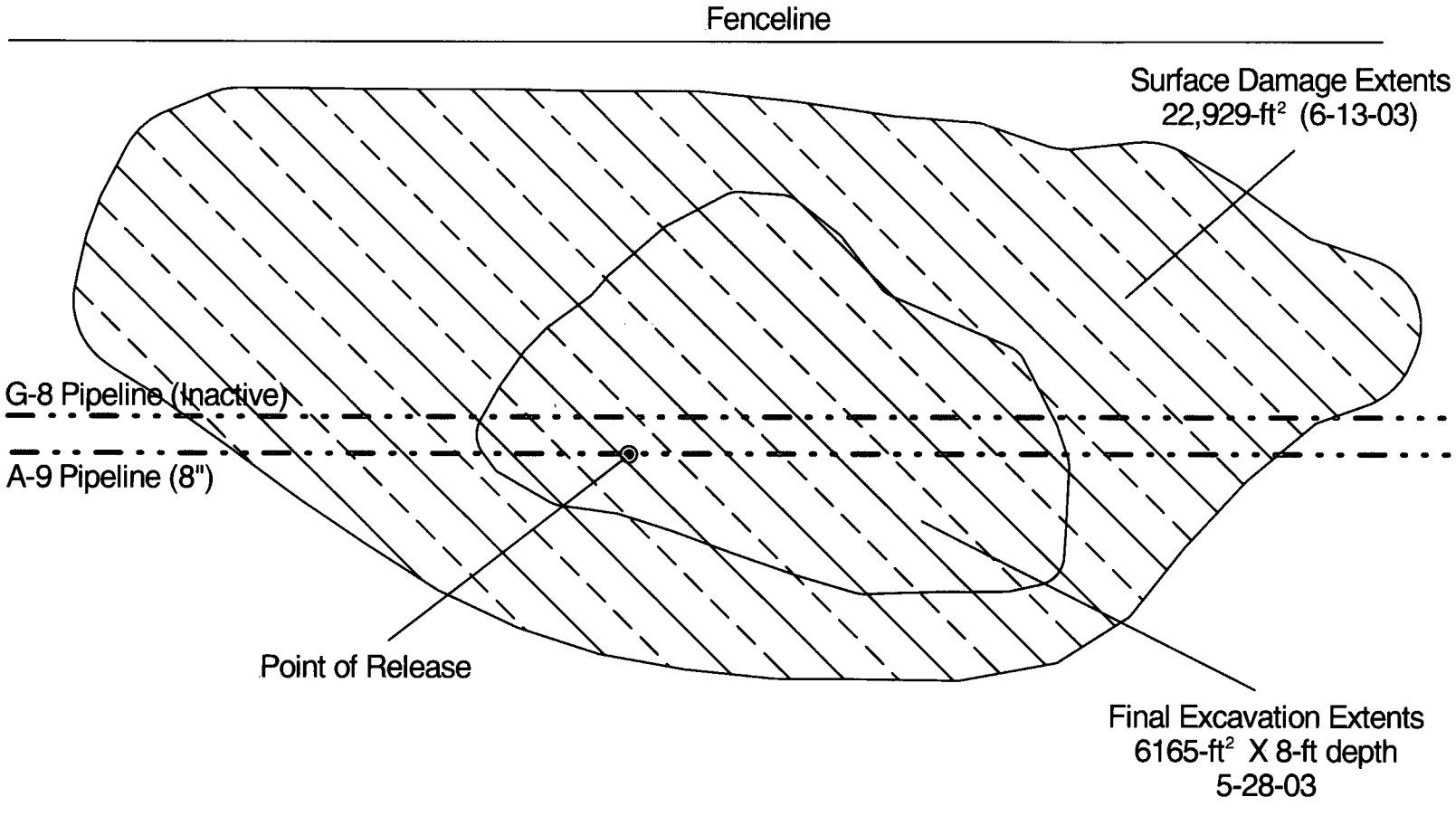


Plate 5 Final GPS Demarcations Duke Energy Field Services A-9 8-Inch 042403	Lea County, New Mexico UL-C Section 18 T21S R36E N32° 29' 9.70" W103° 18' 27.80" Elevation: 3625-ft amsl	DWG BY: John Good October - 2003 SCALE: 0 Feet 50	REVISED: N

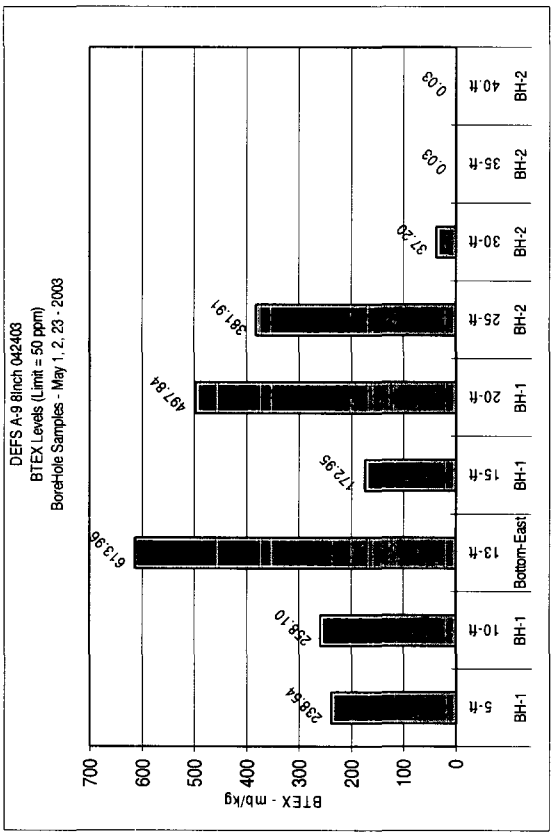
Duke Energy Field Services - A-9 8" - Excavation Sampling Results

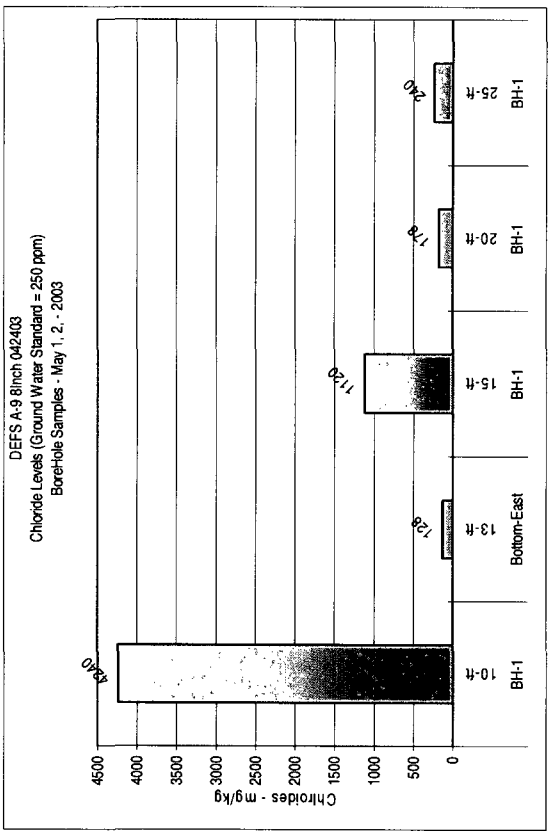
Bold highlighted cells indicate values in excess of the NMOCD remedial action guideline thresholds: TPH = 1000 mg/Kg; Benzene = 10 mg/Kg; BTEX = 50 mg/Kg; Cl = 250 + background

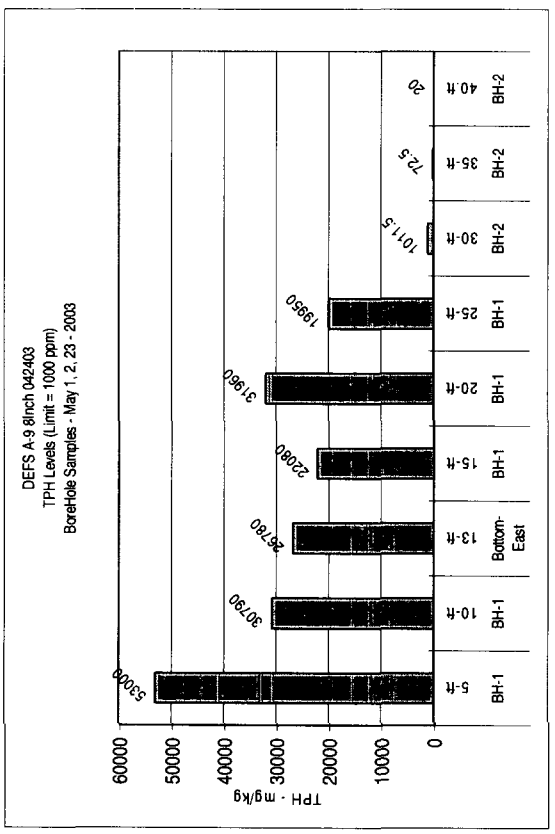
Sample Date	Excavation Sampling Area	Depth (ft - bgs[1])	SAMPLE ID#	GRO[2] mg/Kg	DRO[3] mg/Kg	TPH[4] mg/Kg	BTEX[5] mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Total Xylenes mg/Kg	Cl^- mg/Kg	SO_4 mg/Kg	pH
2-May	Borehole #1	5-ft	SDA985203BH1-5	**3100**	**49900**	**53000**	**238.540**	0.640	27.200	24.700	**186.000**			
2-May	Borehole #1	10-ft	SDA985203BH1-10	**2390**	**28400**	**30790**	**258.100**	0.600	30.600	26.900	**200.000**	**4240**		
1-May	BottomHole	13-ft	SDA98in050103EDHG-13	**7580**	**19200**	**26780**	**613.960**	5.760	**152.000**	**62.200**	**394.000**	128		
2-May	Borehole #1	15-ft	SDA985203BH1-15	**1680**	**20400**	**22080**	**172.950**	0.050	10.600	17.300	**145.000**	**1120**		
2-May	Borehole #1	20-ft	SDA985203BH1-20	**4660**	**27300**	**31960**	**497.840**	1.140	**64.200**	**51.500**	**381.000**	178		
2-May	Borehole #1	25-ft	SDA985203BH1-25	**1750**	**18200**	**19950**	**298.000**	0.400	37.000	31.600	**229.000**	240		
23-May	Borehole #2	25-ft	SDA952303CBH-25	**1990**	**7390**	**9380**	**381.910**	1.510	**85.000**	38.400	**257.000**			
23-May	Borehole #2	30-ft	SDA952303CBH-30	56	956	**1012**	37.196	0.005	0.410	0.481	36.300			
23-May	Borehole #2	40.ft	SDA952303CBH-40	10	10	20	0.030	0.005	0.005	0.005	0.015			
28-May	SW Sidewall	4-8-ft	SDA952803SWSWC	10	16	26	0.030	0.005	0.005	0.005	0.015			
28-May	NW Sidewall	4-8-ft	SDA952803NWSWC	10	26	36	0.030	0.005	0.005	0.005	0.015			
28-May	SE Sidewall	4-8-ft	SDA952803SESWC	10	10	20	0.030	0.005	0.005	0.005	0.015			
28-May	NE Sidewall	4-8-ft	SDA952803NESWC	10	22	32	0.030	0.005	0.005	0.005	0.015			
28-May	South Btm Perimeter	8-ft	SDA952803SBPC	10	315	325	0.030	0.005	0.005	0.005	0.015			
28-May	North Btm Perimeter	8-ft	SDA952803NBPC	10	**2360**	**2370**	0.030	0.005	0.005	0.005	0.015			
28-May	East Btm Perimeter	8-ft	SDA952803EBPC	10	281	291	0.030	0.005	0.005	0.005	0.015			
28-May	West Btm Perimeter	8-ft	SDA952803WBPC	10	794	804	0.046	0.005	0.005	0.005	0.031			

[1] bgs = below ground surface [2] GRO - Gasoline Range Organics (Detection Limit = 10 mg/Kg) [3] DRO - Diesel Range Organics (Detection Limit = 10 mg/Kg) [4] TPH - Total Petroleum Hydrocarbon (GRO+DRO)
[5] BTEX = Sum of CoC's (Detection Limits = 0.005 mg/Kg; 0.015 mg/Kg) Note: Reported detection limits are considered "de minimus" values and are included in the TPH and BTEX summations.

Plate 7 – Borehole Sample Analytical Results Bar Charts







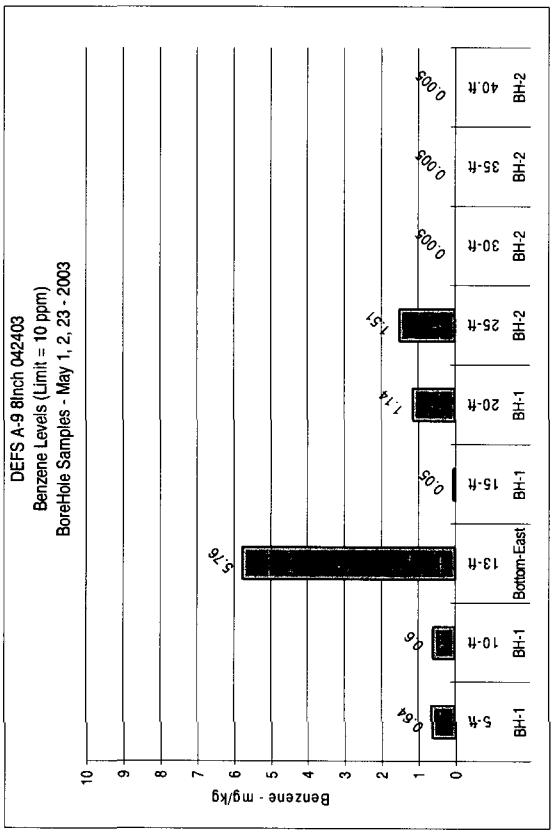
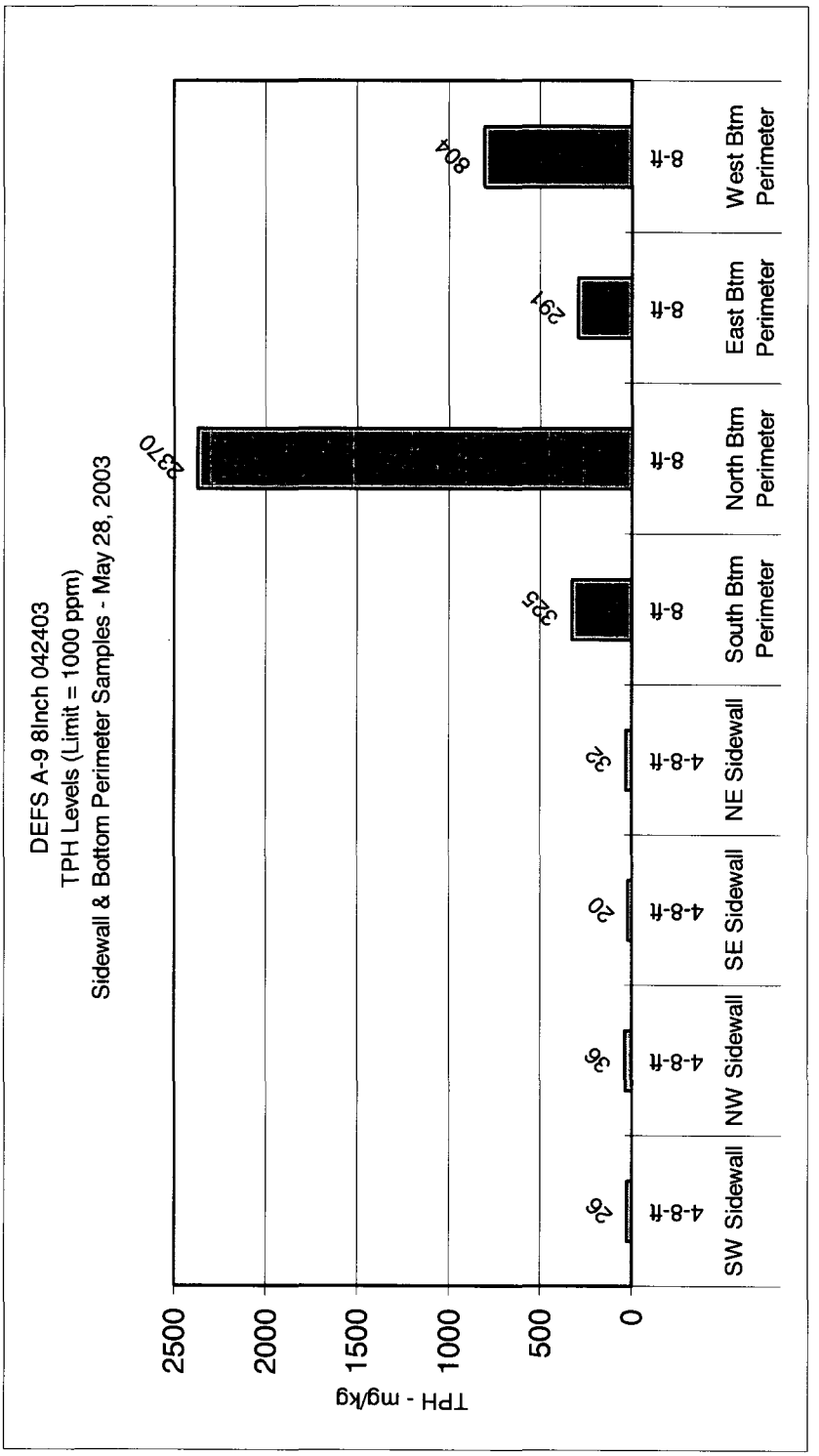


Plate 8 – Sidewall & Perimeter Sample Analytical Results Bar Charts



LABORATORY ANALYTICAL RESULTS

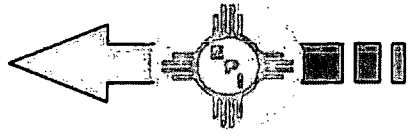
Cardinal Laboratories Inc.

101 East Marland, Hobbs, NM 88240
505-393-2326 Fax 505-393-2476

2111 Beechwood, Abilene, TX 79603
915-673-7001 Fax 915-673-7020

Company Name	Environmental Plus, Inc.
EPI Project Manager	John Good
Billing Address	P.O. BOX 1558
City, State, Zip	Eunice New Mexico 88231
EPI Phone#/Fax#	505-394-3481 / 505-394-2601
Client Company	DUKE ENERGY FIELD SERVICES
Project Name (Inv. Ref)	DEFS A-9 8" 042403
Project Location	UL-C SECTION 18 T21S R36E
EPI Sampler Name	JOHN GOOD

Bill To



LAB I.D.	SAMPLE I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUND WATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE	ICE/COOL	OTHER	SAMPLING: DATE	TIME	BTEX 8021B	TPH 8015M	CHLORIDES (Cl)	SULFATES (SO_4^{2-})	pH	TCLP	OTHER >>>
H7631-1	1 SDA98in050103EBHG-13	G	1			X					X		1-May	9:00	X	X	X				
	2																				
	3																				
	4																				
	5																				
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ANALYSIS REQUEST

Sampler Relinquished: John Good	Date: 5-1-03 Time:	Received By:	Fax Results To John Good 505-394-2601
Relinquished by:	Date: 05/02/2003 Time: 3:35PM	Received By: (lab staff)	REMARKS:
Delivered by:	Sample Cool & Intact: Yes / No	Checked By:	

A-9 8-inch 042403

Duke Energy Field Services

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
ENVIRONMENTAL PLUS, INC.
ATTN: JOHN GOOD
P.O. BOX 1558
EUNICE, NM 88231
FAX TO: (505) 394-2601

Receiving Date: 05/02/03
Reporting Date: 05/06/03
Project Owner: DUKE ENERGY FIELD SERVICES
Project Name: DEFS A-9 8" 042403
Project Location: UL-C SECTION 18 T21S R36E

Sampling Date: 05/01/03
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: GP
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE		05/05/03	05/05/03	05/05/03
H7631-1	SDA98in050103EDHG-13	7580	19200	128
Quality Control		790	813	1050
True Value QC		800	800	1000
% Recovery		98.8	102	105
Relative Percent Difference		0.3	1.2	2.0

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl^-: Std. Methods 4500-Cl^-B
*Analysis performed on a 1:4 w:v aqueous extract.

Chemist

5/6/03
Date

H7631A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
ENVIRONMENTAL PLUS, INC.
ATTN: JOHN GOOD
P.O. BOX 1558
EUNICE, NM 88231
FAX TO: (505) 394-2601

Receiving Date: 05/02/03
Reporting Date: 05/06/03
Project Owner: DUKE ENERGY FIELD SERVICES
Project Name: DEFS A-9 8" 042403
Project Location: UL-C SECTION 18 T21S R36E

Sampling Date: 05/01/03
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: GP
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		05/05/03	05/05/03	05/05/03	05/05/03
H7631-1	SDA98in050103EDHG-13	5.76	152	62.2	394
Quality Control		0.112	0.108	0.109	0.309
True Value QC		0.100	0.100	0.100	0.300
% Recovery		112	108	109	103.0
Relative Percent Difference		4.7	0.9	1.1	3.8

METHOD: EPA SW-846 8260

Chemist

5/6/03
Date

H7631B.XLS

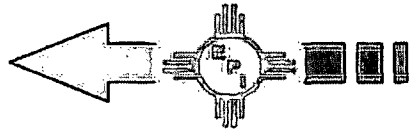
Cardinal Laboratories Inc.

101 East Marland, Hobbs, NM 88240
505-393-2326 Fax 505-393-2476

2111 Beechwood, Abilene, TX 79603
915-673-7001 Fax 915-673-7020

Company Name	Environmental Plus, Inc.
EPI Project Manager	John Good
Billing Address	P.O. BOX 1558
City, State, Zip	Eunice New Mexico 88231
EPI Phone#/Fax#	505-394-3481 / 505-394-2601
Client Company	DUKE ENERGY FIELD SERVICES
Project Name (Inv. Ref.)	DEFS A-9 8" 042403
Project Location	UL-C SECTION 18 T21S R36E
EPI Sampler Name	BRADLEY BLEVINS

Bill To



ANALYSIS REQUEST

LAB I.D.	SAMPLE I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUND WATER	MATRIX: WASTEWATER	MATRIX: SOIL	MATRIX: CRUDE OIL	MATRIX: SLUDGE	MATRIX: OTHER:	PRESERV.: ACID/BASE	PRESERV.: ICE/COOL	PRESERV.: OTHER	SAMPLING: DATE	SAMPLING: TIME	BTEX 8021B	TPH 8015M	CHLORIDES (Cl⁻)	SULFATES (SO_4^{-})	pH	TCLP	OTHER >>>
17632-1 1	SDA985203BH1-5	G	1			X					X		2-May	8:40	X	X					
-2 2	SDA985203BH1-10	G	1			X					X		2-May	9:00	X	X	X				
-3 3	SDA985203BH1-15	G	1			X					X		2-May	9:45	X	X	X				
-4 4	SDA985203BH1-20	G	1			X					X		2-May	11:30	X	X	X				
-5 5	SDA985203BH1-25	G	1			X					X		2-May	14:10	X	X	X				
6																					
7																					
8																					
9																					
10																					

Sampler Relinquished: Brad Blevins	Date: 5/2/03 Time: 4:10	Received By: C Miller	Fax Results To John Good 505-394-2601
Relinquished by: C Miller	Date: 5/5/03 Time:	Received By: (lab staff)	REMARKS:
Delivered by:	Sample Cool & Intact Yes / No	Checked By:	

DEFS A-9 8inch 042403 Chain of Custody 050502.xls

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
ENVIRONMENTAL PLUS, INC.
ATTN: JOHN GOOD
P.O. BOX 1558
EUNICE, NM 88231
FAX TO: (505) 394-2601

Receiving Date: 05/05/03
Reporting Date: 05/07/03
Project Owner: DUKE ENERGY FIELD SERVICES
Project Name: DEFS A-9 8" 042403
Project Location: UL-C SECTION 18 T21S R36E

Sampling Date: 05/02/03
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	Cl* (mg/Kg)
ANALYSIS DATE		05/06/03	05/06/03	05/06/03
H7633-1	SDA985203BH1-5	3100	49900	-
H7633-2	SDA985203BH1-10	2390	28400	4240
H7633-3	SDA985203BH1-15	1680	20400	1120
H7633-4	SDA985203BH1-20	4660	27300	176
H7633-5	SDA985203BH1-25	1750	18200	240
Quality Control		771	806	1050
True Value QC		800	800	1000
% Recovery		96.4	101	105
Relative Percent Difference		5.7	1.7	2.0

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl: Std. Methods 4500-Cl B
*Analyses performed on 1:4 w:v aqueous extracts.

Chemist

5/7/03
Date

H7633A.XLS

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
ENVIRONMENTAL PLUS, INC.
ATTN: JOHN GOOD
P.O. BOX 1558
EUNICE, NM 88231
FAX TO: (505) 394-2601

Receiving Date: 05/05/03
Reporting Date: 05/07/03
Project Owner: DUKE ENERGY FIELD SERVICES
Project Name: DEFS A-9 8" 042403
Project Location: UL-C SECTION 18 T21S R36E

Sampling Date: 05/02/03
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: BC/AH

LAB NUMBER	SAMPLE ID	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE		05/07/03	05/07/03	05/07/03	05/07/03
H7633-1	SDA985203BH1-5	0.640	27.2	24.7	186
H7633-2	SDA985203BH1-10	0.600	30.6	26.9	200
H7633-3	SDA985203BH1-15	<0.050	10.6	17.3	145
H7633-4	SDA985203BH1-20	1.14	64.2	51.5	381
H7633-5	SDA985203BH1-25	0.400	37.0	31.6	229
Quality Control		0.099	0.106	0.103	0.290
True Value QC		0.100	0.100	0.100	0.300
% Recovery		99.0	106	103	96.8
Relative Percent Difference		7.9	4.1	1.0	2.4

METHOD: EPA SW-846 8260

Chemist

5/7/03
Date

H7633B.XLS

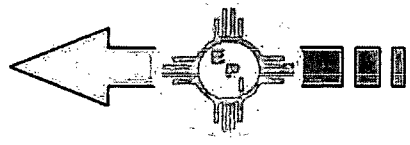
Cardinal Laboratories Inc.

101 East Marland, Hobbs, NM 88240
505-393-2326 Fax 505-393-2476

2111 Beechwood, Abilene, TX 79603
915-673-7001 Fax 915-673-7020

Company Name	Environmental Plus, Inc.
EPI Project Manager	John Good
Billing Address	P.O. BOX 1558
City, State, Zip	Eunice New Mexico 88231
EPI Phone#/Fax#	505-394-3481 / 505-394-2601
Client Company	DUKE ENERGY FIELD SERVICES
Project Name (Inv. Ref)	DEFS A-9 8" 042403
Project Location	UL-C SECTION 18 T21S R36E
EPI Sampler Name	Bradley Blevins

Bill To



ANALYSIS REQUEST

LAB I.D.		SAMPLE I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUND WATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE	ICE/COOL	OTHER	SAMPLING: DATE	TIME	BTEX 8021B	TPH 8015M	CHLORIDES (Cl)	SULFATES (SO_4^{-})	pH	TCLP	OTHER >>>
H7685-1	1	SDA952303CBH-25	G	1			X					X		23-May	8:40	X	X					
-2	2	SDA952303CBH-30	G	1			X					X		23-May	9:25	X	X					
-3	3	SDA952303CBH-35	G	1			X					X		23-May	10:20	X	X					
-4	4	SDA952303CBH-40	G	1			X					X		23-May	12:45	X	X					
	5																					
	6																					
	7																					
	8																					
	9																					
	10																					

Sampler Relinquished: Brad Blevins	Date 5/23/03 Time 4:00	Received By: John Good
Relinquished by: John Good	Date 5-27-03 Time	Received By: (lab staff) Amy Hill
Delivered by:	Sample Cool & Intact: (Yes) No	Checked By:

Fax Results To John Good 505-394-2601
REMARKS:

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
ENVIRONMENTAL PLUS, INC.
ATTN: JOHN GOOD
P.O. BOX 1558
EUNICE, NM 88231
FAX TO: (505) 394-2601

Receiving Date: 05/27/03
Reporting Date: 05/28/03
Project Owner: DUKE ENERGY FIELD SERVICES
Project Name: DEFS A-9 8" 042403
Project Location: UL-C SECTION 18 T21S R36E

Sampling Date: 05/23/03
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: AH
Analyzed By: BC

LAB NO.	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE:		05/27/03	05/27/03	05/27/03	05/27/03	05/27/03	05/27/03
H7685-1	SDA952303CBH-25	1990	7390	1.51	85.0	38.4	257
H7685-2	SDA952303CBH-30	55.5	946	<0.005	0.410	0.481	36.3
H7685-3	SDA952303CBH-35	<10.0	62.5	<0.005	<0.005	<0.005	<0.015
H7685-4	SDA952303CBH-40	<10.0	<10.0	<0.005	<0.005	<0.005	<0.015
Quality Control		779	824	0.094	0.093	0.092	0.273
True Value QC		800	800	0.100	0.100	0.100	0.300
% Recovery		97.4	103	93.6	93.0	92.2	91.1
Relative Percent Difference		2.3	10.3	7.1	1.1	4.4	4.3

METHODS: TPH GRO & DRO - EPA SW-846 8015 M; BTEX - SW-846 8260.

Burgess J. A. Cooke, Ph. D.

5/28/03
Date

H7685.XLS

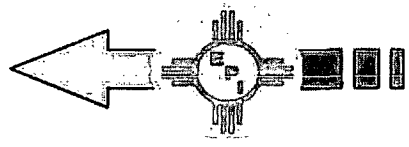
Cardinal Laboratories Inc.

101 East Marland, Hobbs, NM 88240
505-393-2326 Fax 505-393-2476

2111 Beechwood, Abilene, TX 79603
915-673-7001 Fax 915-673-7020

Company Name	Environmental Plus, Inc.
EPI Project Manager	John Good
Billing Address	P.O. BOX 1558
City, State, Zip	Eunice New Mexico 88231
EPI Phone#/Fax#	505-394-3481 / 505-394-2601
Client Company	DUKE ENERGY FIELD SERVICES
Project Name (Inv. Ref)	DEFS A-9 8" 042403
Project Location	UL-C SECTION 18 T21S R36E
EPI Sampler Name	JOHN GOOD

Bill To



LAB I.D.		SAMPLE I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUND WATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE	ICE/COOL	OTHER	SAMPLING: DATE	TIME	ANALYSIS REQUEST: BTEX 8021B	TPH 8015M	CHLORIDES (Cl)	SULFATES (SO_4^{-2})	pH	TCLP	OTHER >>>
171689-1	1	SDA952803SWSWC	C	1			X					X		28-May	8:30	X	X					
-2	2	SDA952803NWSWC	C	1			X					X		28-May	8:35	X	X					
-3	3	SDA952803SESWC	C	1			X					X		28-May	8:40	X	X					
-4	4	SDA952803NESWC	C	1			X					X		28-May	8:45	X	X					
-5	5	SDA952803SBPC	C	1			X					X		28-May	8:50	X	X					
-6	6	SDA952803NBPC	C	1			X					X		28-May	8:55	X	X					
-7	7	SDA952803EBPC	C	1			X					X		28-May	9:00	X	X					
-8	8	SDA952803WBPC	C	1			X					X		28-May	9:05	X	X					
	9																					
	10																					

Sampler Relinquished: John Good	Date: 5/6/03 Time: 3:07	Received By: Cody Miller	Fax Results To John Good 505-394-2601
Relinquished by: Cody Miller	Date: 5/29/03 Time:	Received By: (lab staff) Emily Hill	REMARKS:
Delivered by:	Sample Cool & Intact: (Yes) No	Checked By:	

CARDINAL LABORATORIES

PHONE (915) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
ENVIRONMENTAL PLUS, INC.
ATTN: JOHN GOOD
P.O. BOX 1558
EUNICE, NM 88231
FAX TO: (505) 394-2601

Receiving Date: 05/28/03
Reporting Date: 06/04/03
Project Owner: DUKE ENERGY FIELD SERVICES
Project Name: DEFS A-9 8" 042403
Project Location: UL-C SECTION 18 T21S R36E

Sampling Date: 05/28/03
Sample Type: SOIL
Sample Condition: COOL & IN TACT
Sample Received By: AH
Analyzed By: BC

LAB NO.	SAMPLE ID	GRO (C_6-C_{10}) (mg/Kg)	DRO (>C_{10}-C_{28}) (mg/Kg)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL BENZENE (mg/Kg)	TOTAL XYLENES (mg/Kg)
ANALYSIS DATE:		05/28/03	05/28/03	05/29/03	05/29/03	05/29/03	05/29/03
H7689-1	SDA952803SWSWC	<10.0	15.5	<0.005	<0.005	<0.005	<0.015
H7689-2	SDA952803NWSWC	<10.0	26.2	<0.005	<0.005	<0.005	<0.015
H7689-3	SDA952803SESWC	<10.0	<10.0	<0.005	<0.005	<0.005	<0.015
H7689-4	SDA952803NESWC	<10.0	21.6	<0.005	<0.005	<0.005	<0.015
H7689-5	SDA952803SBPC	<10.0	315	<0.005	<0.005	<0.005	<0.015
H7689-6	SDA952803NBPC	<10.0	733*	<0.005	<0.005	<0.005	<0.015
H7689-7	SDA952803EBPC	<10.0	281	<0.005	<0.005	<0.005	<0.015
H7689-8	SDA952803WBPC	<10.0	483*	<0.005	<0.005	<0.005	<0.015*
Quality Control		814	844	0.092	0.098	0.091	0.268
True Value QC		800	800	0.100	0.100	0.100	0.300
% Recovery		102	106	91.9	97.9	90.8	89.3
Relative Percent Difference		2.5	3.4	1.9	5.1	1.6	2.1

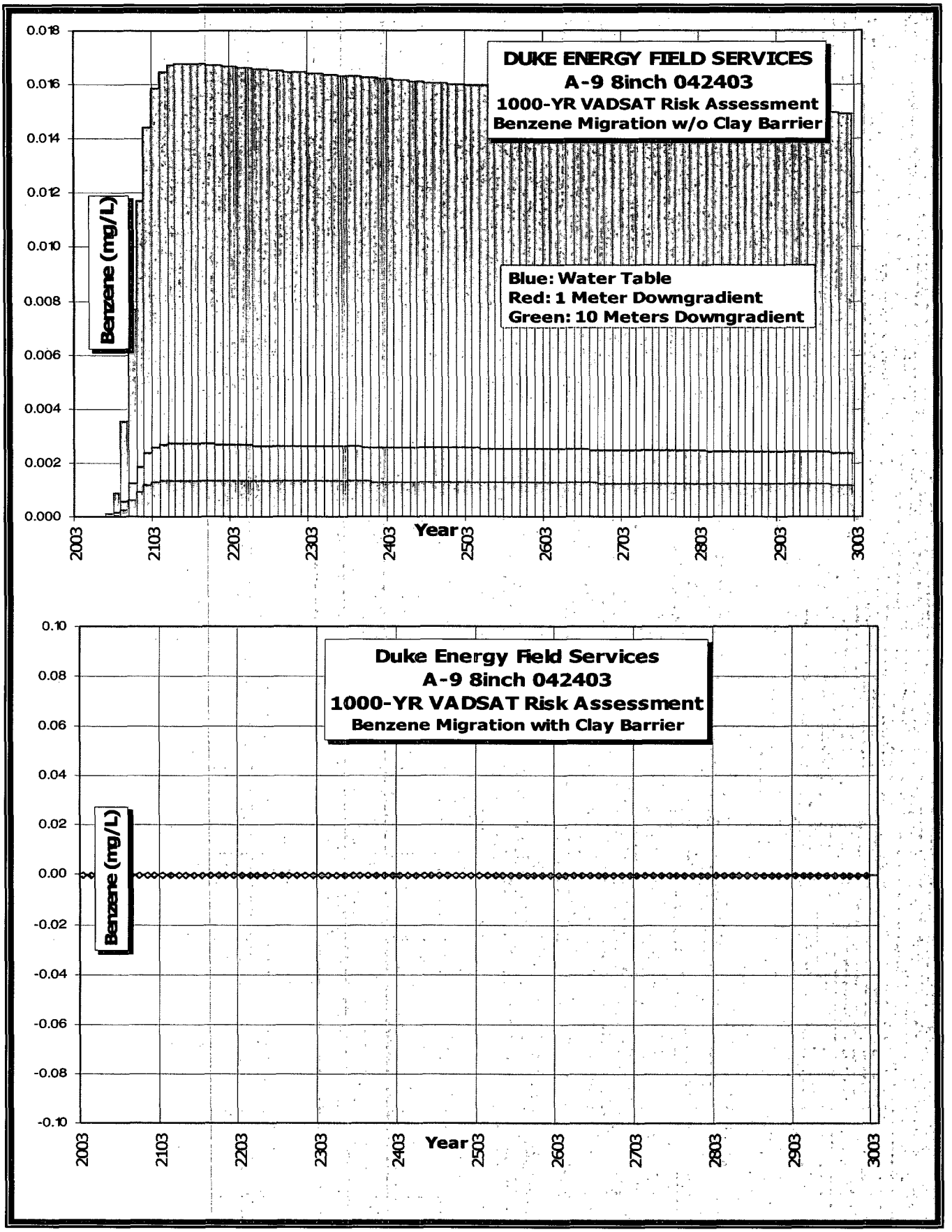
METHODS: TPH GRO & DRO - EPA SW-846 8015 M; BTEX - SW-846 8260.
*From reanalysis on 06/02/03.

Burgess J. A. Cooke, Ph. D.

6/4/03
Date

H7689A.XLS

Plate 9 - VADSAT Benzene Risk Assessment Charts



VADSAT Data Table (Benzene without a clay barrier)

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2013	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2023	3.83E-10	5.30E-11	2.14E-11	1.19E-13
2033	1.13E-06	1.69E-07	7.55E-08	8.71E-10
2043	7.97E-05	1.21E-05	5.76E-06	9.74E-08
2053	8.85E-04	1.37E-04	6.68E-05	1.41E-06
2063	3.53E-03	5.51E-04	2.73E-04	6.58E-06
2073	7.70E-03	1.21E-03	6.06E-04	1.58E-05
2083	1.17E-02	1.85E-03	9.30E-04	2.56E-05
2093	1.44E-02	2.33E-03	1.15E-03	3.26E-05
2103	1.59E-02	2.57E-03	1.27E-03	3.65E-05
2113	1.65E-02	2.67E-03	1.32E-03	3.83E-05
2123	1.67E-02	2.71E-03	1.34E-03	3.89E-05
2133	1.68E-02	2.72E-03	1.35E-03	3.91E-05
2143	1.68E-02	2.72E-03	1.35E-03	3.92E-05
2153	1.68E-02	2.72E-03	1.35E-03	3.91E-05
2163	1.68E-02	2.71E-03	1.34E-03	3.91E-05
2173	1.67E-02	2.71E-03	1.34E-03	3.90E-05
2183	1.67E-02	2.65E-03	1.34E-03	3.90E-05
2193	1.67E-02	2.65E-03	1.34E-03	3.89E-05
2203	1.67E-02	2.64E-03	1.34E-03	3.89E-05
2213	1.66E-02	2.64E-03	1.33E-03	3.88E-05
2223	1.66E-02	2.64E-03	1.33E-03	3.88E-05
2233	1.66E-02	2.63E-03	1.33E-03	3.87E-05
2243	1.66E-02	2.63E-03	1.33E-03	3.87E-05
2253	1.65E-02	2.63E-03	1.33E-03	3.86E-05
2263	1.65E-02	2.62E-03	1.33E-03	3.85E-05
2273	1.65E-02	2.62E-03	1.32E-03	3.85E-05
2283	1.65E-02	2.61E-03	1.32E-03	3.84E-05
2293	1.65E-02	2.61E-03	1.32E-03	3.84E-05
2303	1.64E-02	2.61E-03	1.32E-03	3.83E-05
2313	1.64E-02	2.60E-03	1.32E-03	3.83E-05
2323	1.64E-02	2.60E-03	1.31E-03	3.82E-05
2333	1.64E-02	2.60E-03	1.31E-03	3.82E-05
2343	1.63E-02	2.59E-03	1.31E-03	3.81E-05
2353	1.63E-02	2.59E-03	1.31E-03	3.81E-05
2363	1.63E-02	2.59E-03	1.31E-03	3.80E-05
2373	1.63E-02	2.58E-03	1.31E-03	3.80E-05
2383	1.62E-02	2.58E-03	1.30E-03	3.79E-05
2393	1.62E-02	2.57E-03	1.30E-03	3.79E-05
2403	1.62E-02	2.57E-03	1.30E-03	3.78E-05
2413	1.62E-02	2.57E-03	1.30E-03	3.77E-05
2423	1.62E-02	2.56E-03	1.30E-03	3.77E-05
2433	1.61E-02	2.56E-03	1.29E-03	3.76E-05
2443	1.61E-02	2.56E-03	1.29E-03	3.76E-05
2453	1.61E-02	2.55E-03	1.29E-03	3.75E-05
2463	1.61E-02	2.55E-03	1.29E-03	3.75E-05
2473	1.60E-02	2.55E-03	1.29E-03	3.74E-05
2483	1.60E-02	2.54E-03	1.29E-03	3.74E-05
2493	1.60E-02	2.54E-03	1.28E-03	3.73E-05

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2503	1.60E-02	2.54E-03	1.28E-03	3.73E-05
2513	1.60E-02	2.53E-03	1.28E-03	3.72E-05
2523	1.59E-02	2.53E-03	1.28E-03	3.72E-05
2533	1.59E-02	2.53E-03	1.28E-03	3.71E-05
2543	1.59E-02	2.52E-03	1.28E-03	3.71E-05
2553	1.59E-02	2.52E-03	1.27E-03	3.70E-05
2563	1.58E-02	2.51E-03	1.27E-03	3.70E-05
2573	1.58E-02	2.51E-03	1.27E-03	3.69E-05
2583	1.58E-02	2.51E-03	1.27E-03	3.69E-05
2593	1.58E-02	2.50E-03	1.27E-03	3.68E-05
2603	1.58E-02	2.50E-03	1.26E-03	3.68E-05
2613	1.57E-02	2.50E-03	1.26E-03	3.67E-05
2623	1.57E-02	2.49E-03	1.26E-03	3.67E-05
2633	1.57E-02	2.49E-03	1.26E-03	3.66E-05
2643	1.57E-02	2.49E-03	1.26E-03	3.66E-05
2653	1.56E-02	2.48E-03	1.26E-03	3.65E-05
2663	1.56E-02	2.48E-03	1.25E-03	3.65E-05
2673	1.56E-02	2.48E-03	1.25E-03	3.64E-05
2683	1.56E-02	2.47E-03	1.25E-03	3.64E-05
2693	1.56E-02	2.47E-03	1.25E-03	3.63E-05
2703	1.55E-02	2.47E-03	1.25E-03	3.63E-05
2713	1.55E-02	2.46E-03	1.25E-03	3.62E-05
2723	1.55E-02	2.46E-03	1.24E-03	3.62E-05
2733	1.55E-02	2.46E-03	1.24E-03	3.61E-05
2743	1.55E-02	2.45E-03	1.24E-03	3.61E-05
2753	1.54E-02	2.45E-03	1.24E-03	3.60E-05
2763	1.54E-02	2.45E-03	1.24E-03	3.60E-05
2773	1.54E-02	2.44E-03	1.23E-03	3.59E-05
2783	1.54E-02	2.44E-03	1.23E-03	3.59E-05
2793	1.53E-02	2.44E-03	1.23E-03	3.58E-05
2803	1.53E-02	2.43E-03	1.23E-03	3.58E-05
2813	1.53E-02	2.43E-03	1.23E-03	3.57E-05
2823	1.53E-02	2.43E-03	1.23E-03	3.57E-05
2833	1.53E-02	2.42E-03	1.22E-03	3.56E-05
2843	1.52E-02	2.42E-03	1.22E-03	3.56E-05
2853	1.52E-02	2.42E-03	1.22E-03	3.55E-05
2863	1.52E-02	2.41E-03	1.22E-03	3.55E-05
2873	1.52E-02	2.41E-03	1.22E-03	3.54E-05
2883	1.52E-02	2.41E-03	1.22E-03	3.54E-05
2893	1.51E-02	2.40E-03	1.21E-03	3.53E-05
2903	1.51E-02	2.40E-03	1.21E-03	3.53E-05
2913	1.51E-02	2.40E-03	1.21E-03	3.52E-05
2923	1.51E-02	2.39E-03	1.21E-03	3.52E-05
2933	1.50E-02	2.39E-03	1.21E-03	3.51E-05
2943	1.50E-02	2.39E-03	1.21E-03	3.51E-05
2953	1.50E-02	2.38E-03	1.20E-03	3.50E-05
2963	1.50E-02	2.38E-03	1.20E-03	3.50E-05
2973	1.50E-02	2.38E-03	1.20E-03	3.49E-05
2983	1.49E-02	2.37E-03	1.20E-03	3.49E-05
2993	1.49E-02	2.37E-03	1.20E-03	3.48E-05

VADSAT Risk Assessment Criteria and Data (Benzene)

VADSAT Version 3.0

A Monte Carlo Model for Assessing the Effects of Soil Contamination on Groundwater Quality

Developed by:
Environmental Systems and Technologies Inc.
Blacksburg, Virginia
Tel: 703-552-0685, Fax: 703-951-5307

For
The American Petroleum Institute
1995

PROJECT TITLE:DEFS A9 8inch 042403

SOURCE AND CHEMICAL DATA ****
DEPTHM, MEAN THICKNESS OF WASTE ZONE (m) = 12.19200

DEPSTD, STD.DEV. OF THICKNESS OF WASTE ZONE = 0.00000

AREAM, MEAN WASTE ZONE AREA (m^2) = 185.81000
STDA, STD.DEV. OF WASTE ZONE AREA = 0.00000

RLWM, MEAN L/W RATIO (-) = 1.00000
STDRLW, STD.DEV. OF L/W RATIO = 0.00000

CVRTHM, MEAN VALUE OF COVER THICKNESS (m) = 0.00000
CVRTHS, STD.DEV. OF COVER THICKNESS = 0.00000

KOCM, MEAN ORG. CARBON PARTITION COEF (cm^3/g)= 83.20000
STDKOC, STD.DEV. OF ORG.CARBON PARTITION COEF= 0.00000

FMOLM, MEAN INIT.VOL.FRAC. OF CONTAMINANT(-) = 0.00019
FMOLSTD, STD.DEV. OF VOL.FRAC. OF CONTAMINANT= 0.00000

CMFM, MASS OF CONTAMINANT PER MASS OF WASTE(mg/kg) = 6.00000
CMFSD, STD.DEV. OF MASS CONTAMINANT PER MASS WASTE = 0.00000

HCCONM, HYDCARBON MASS FRAC. IN WASTE (mg/kg)= 32000.00000
HCCONS, STD OF HYDCARBON MASS FRAC. IN WASTE = 0.00000

CHEMICAL SPECIES benzene

MOLW, MOLECULAR WT. OF CONTAMINANT (g/mole) = 78.10000

AVERMW, AVG. MOL. WT. OF OILY WASTE (g/mole) = 100.00000

RHO, DENSITY OF CONTAMINANT (g/cm^3) = 0.87600

RHOG, AVERAGE DENSITY OF HYDROCARBON (g/cm^3)= 0.90000

SOL, AQUEOUS SOLUB. OF CONTAMINANT (g/m^3) = 1790.00000

HENRYC, HENRY'S CONSTANT (-) = 0.23000

DIFFA, DIFFUSION COEF. IN FREE AIR (m^2/day) = 0.77000

HYDROGEOLOGICAL PROPERTIES

** UNSATURATED ZONE INPUT PARAMETERS **
GAMMAM, MEAN UNSAT ZONE DECAY COEF (1/day) = 0.00010
STDGAM, STD.DEV. OF UNSAT ZONE DECAY COEF = 0.00000

UNFOCM, MEAN UNSAT ZONE ORGANIC CARBON FRACTION (-) = 0.00000
UNFOCS, STD.DEV. OF UNSAT ZONE ORGANIC CARBON FRAC. = 0.00000

FKSW, MEAN SAT. CONDUCTIVITY (m/day) = 0.02900
STDFKS, STD.DEV. OF SAT. CONDUCTIVITY = 0.000

DISTM, MEAN DEPTH TO GROUNDWATER (m) = 15.24000
STDDST, STD.DEV. OF DEPTH TO GROUNDWATER = 0.00000

UNPORM, MEAN VADOSE ZONE POROSITY (-) = 0.38000
SUNPOR, STD.DEV. OF VADOSE ZONE POROSITY = 0.00000

PARNM, MEAN VALUE OF VG PARAMETER N (-) = 1.23000
SDPARN, STD.DEV. OF VG PARAMETER N = 0.00000

RESWCM, MEAN RESIDUAL WATER CONTENT (-) = 0.01110
RESWCS, STD.DEV. OF RESIDUAL WATER CONTENT = 0.00000

ALFINM = 0, UNSAT DISPERSIVITY CALCULATED INTERNALLY
** SATURATED ZONE INPUT PARAMETERS **

LAMBW, MEAN SAT. ZONE DECAY COEFF. (1/day) = 0.00010
SLAMB, STD.DEV. OF SAT. ZONE DECAY COEFF. = 0.00000

PORM, MEAN SAT. ZONE POROSITY (-) = 0.20000
STDPOR, STD.DEV. OF SAT. ZONE POROSITY = 0.00000

FOCM, MEAN SAT. ZONE ORG. CARBON FRAC. (-) = 0.00000
STDFOC, STD.DEV. SAT. ZONE ORG. CARBON FRAC.= 0.00000

ALRLTM, MEAN DISPERS, RATIO LONG/TRANSV. (-) = 3.00000
SALRLT, STD.DEV. OF DISP. RATIO LONG/TRANSV. = 0.00000

ALRTVM, MEAN DISPERS. RATIO TRANSV/VERT. (-) = 87.00000
SALRTV, STD.DEV. OF DISP. RATIO TRANSV/VERT. = 0.00000

CONDS, SAT. HYDRAULIC COND. (m/day) = 1.03000
SCONDS, STD.DEV. OF SAT HYDRAULIC COND. = 0.00000

GRADS, HYDRAULIC GRADIENT (m/m) = 0.02700
SGRADS, STD.DEV. OF HYDRAULIC GRADIENT = 0.00000

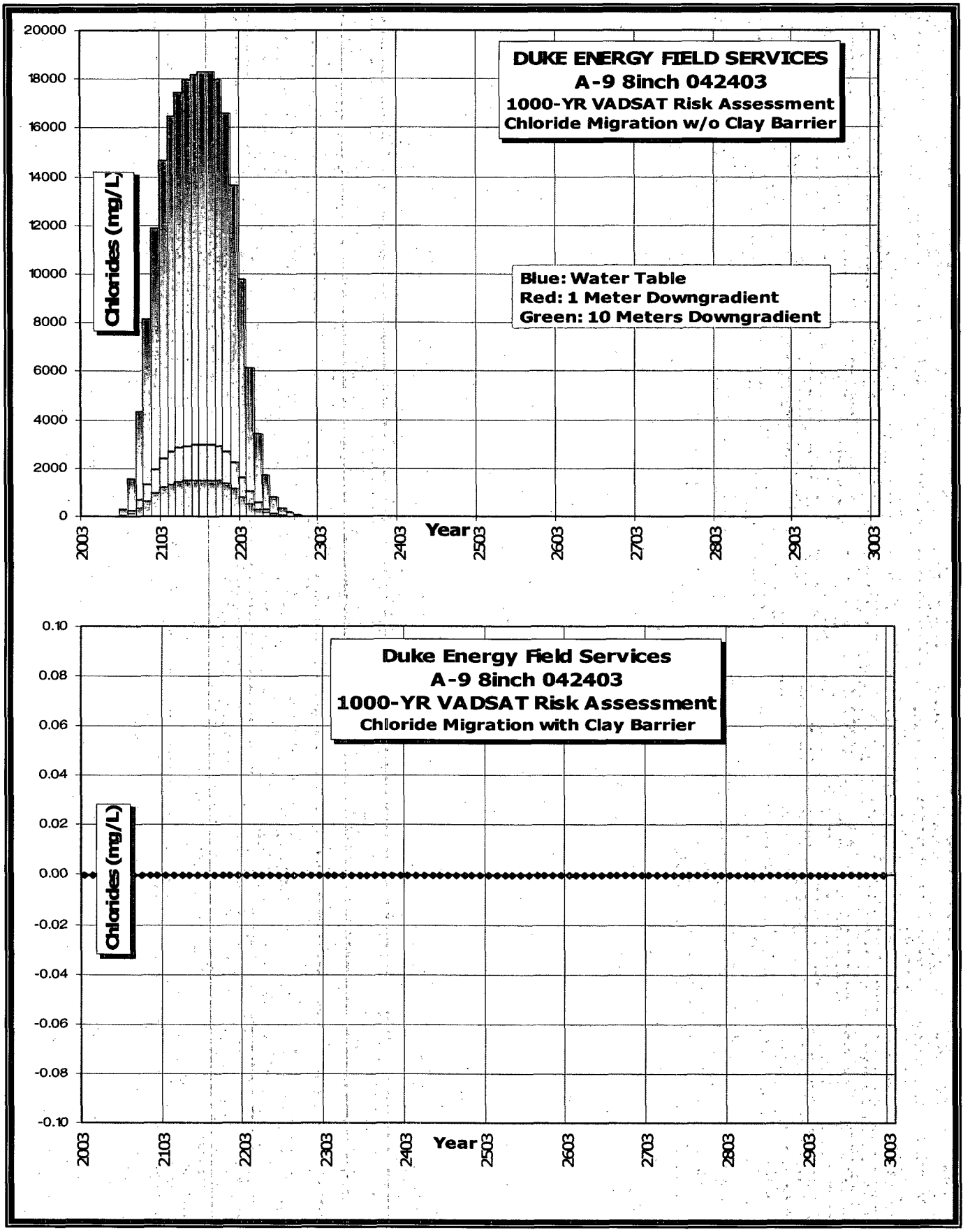
HMEAN, MEAN AQUIFER THICKNESS (m) = 15.24000
STDH, STD.DEV. OF AQUIFER THICKNESS = 0.00000

QINM, MEAN INFILTRATION RATE (m/day) = 0.00011
QINSTD, STD.DEV. OF INFILTRATION RATE = 0.00000

LOCATION OF RECEPTORS:

	X (M)	Y (M)	Z (M)
RECEPTOR(1)	1.0	0.0	0.0
RECEPTOR(2)	10.0	0.0	0.0
RECEPTOR(3)	100.0	0.0	0.0

Plate 10 - VADSAT Chlorides Risk Assessment Charts



VADSAT Data (Chlorides without a clay barrier)

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2013	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2023	4.83E-05	6.63E-06	2.70E-06	1.51E-08
2033	2.00E-01	2.96E-02	1.33E-02	1.54E-04
2043	1.94E+01	2.97E+00	1.40E+00	2.39E-02
2053	2.92E+02	4.58E+01	2.21E+01	4.70E-01
2063	1.54E+03	2.45E+02	1.20E+02	2.94E+00
2073	4.33E+03	6.93E+02	3.43E+02	9.15E+00
2083	8.15E+03	1.31E+03	6.51E+02	1.84E+01
2093	1.19E+04	1.91E+03	9.54E+02	2.80E+01
2103	1.47E+04	2.37E+03	1.19E+03	3.57E+01
2113	1.65E+04	2.66E+03	1.33E+03	4.07E+01
2123	1.75E+04	2.82E+03	1.42E+03	4.36E+01
2133	1.80E+04	2.90E+03	1.46E+03	4.50E+01
2143	1.82E+04	2.94E+03	1.48E+03	4.57E+01
2153	1.83E+04	2.96E+03	1.48E+03	4.60E+01
2163	1.83E+04	2.96E+03	1.49E+03	4.61E+01
2173	1.80E+04	2.91E+03	1.46E+03	4.55E+01
2183	1.66E+04	2.69E+03	1.35E+03	4.28E+01
2193	1.36E+04	2.22E+03	1.12E+03	3.62E+01
2203	9.78E+03	1.59E+03	8.06E+02	2.67E+01
2213	6.14E+03	1.00E+03	5.08E+02	1.72E+01
2223	3.43E+03	5.60E+02	2.84E+02	9.85E+00
2233	1.73E+03	2.83E+02	1.44E+02	5.08E+00
2243	8.05E+02	1.32E+02	6.72E+01	2.40E+00
2253	3.50E+02	5.74E+01	2.93E+01	1.06E+00
2263	1.44E+02	2.36E+01	1.20E+01	4.40E-01
2273	5.63E+01	9.24E+00	4.73E+00	1.74E-01
2283	2.12E+01	3.48E+00	1.78E+00	6.61E-02
2293	7.72E+00	1.27E+00	6.50E-01	2.43E-02
2303	2.73E+00	4.50E-01	2.31E-01	8.64E-03
2313	9.45E-01	1.56E-01	7.98E-02	3.01E-03
2323	3.20E-01	5.28E-02	2.71E-02	1.02E-03
2333	1.06E-01	1.74E-02	8.95E-03	3.41E-04
2343	3.32E-02	5.50E-03	2.84E-03	1.11E-04
2353	1.17E-02	1.90E-03	9.52E-04	3.43E-05
2363	3.91E-03	6.32E-04	3.17E-04	1.06E-05
2373	1.95E-03	3.16E-04	1.59E-04	4.93E-06
2383	1.95E-03	0.00E+00	0.00E+00	6.40E-09
2393	0.00E+00	0.00E+00	0.00E+00	2.02E-14
2403	0.00E+00	0.00E+00	0.00E+00	2.40E-19
2413	0.00E+00	0.00E+00	0.00E+00	2.54E-24
2423	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2433	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2443	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2453	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2463	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2473	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2483	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2493	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2503	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2513	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2523	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2533	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2543	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2553	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2563	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2573	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2583	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2593	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2603	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2613	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2623	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2633	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2643	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2653	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2663	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2673	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2683	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2693	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2703	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2713	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2723	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2733	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2743	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2753	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2763	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2773	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2783	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2793	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2803	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2813	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2823	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2833	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2843	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2853	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2863	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2873	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2883	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2893	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2903	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2913	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2923	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2933	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2943	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2953	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2963	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2973	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2983	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2993	0.00E+00	0.00E+00	0.00E+00	0.00E+00

VADSAT Risk Assessment Criteria and Data (Chlorides)

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+                                                                         +
+                        VADSAT Version 3.0                               +
+                                                                         +
+     A Monte Carlo Model for Assessing the Effects of Soil              +
+              Contamination on Groundwater Quality                       +
+                                                                         +
+                                                                         +
+                         Developed by:                                   +
+             Environmental Systems and Technologies Inc.                 +
+                   Blacksburg, Virginia                                  +
+               Tel: 703-552-0685, Fax: 703-951-5307                      +
+                                                                         +
+                                                                         +
+                             For                                         +
+                The American Petroleum Institute                         +
+                             1995                                        +
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PROJECT TITLE:DEFS A9 8inch 042403

SOURCE AND CHEMICAL DATA ****

DEPTHM, MEAN THICKNESS OF WASTE ZONE (m)	=	12.19200
DEPSTD, STD.DEV. OF THICKNESS OF WASTE ZONE	=	0.00000
AREAM, MEAN WASTE ZONE AREA (m^2)	=	185.81000
STDA, STD.DEV. OF WASTE ZONE AREA	=	0.00000
RLWM, MEAN L/W RATIO (-)	=	1.00000
STDRLW, STD.DEV. OF L/W RATIO	=	0.00000
CVRTHM, MEAN VALUE OF COVER THICKNESS (m)	=	0.00000
CVRTHS, STD.DEV. OF COVER THICKNESS	=	0.00000
MEAN MASS FRACTION OF SALT IN WASTE (mg/kg)	=	4239.90234
STD OF MASS FRACTION OF SALT IN WASTE	=	0.00000
CZEROM, MEAN AQU. PHASE CONC OF SALT (g/m^3)	=	18332.00000
CZEROS, STD.DEV. OF AQU. PHASE CONC. OF SALT	=	0.00000

CHEMICAL SPECIES Sodium Chloride

HYDROGEOLOGICAL PROPERTIES

** UNSATURATED ZONE INPUT PARAMETERS **

GAMMAM, MEAN UNSAT ZONE DECAY COEF (1/day)	=	0.00010
STDGAM, STD.DEV. OF UNSAT ZONE DECAY COEF	=	0.00000
UNFOCM, MEAN UNSAT ZONE ORGANIC CARBON FRACTION (-)	=	0.00000
UNFOCS, STD.DEV. OF UNSAT ZONE ORGANIC CARBON FRAC.	=	0.00000
FKSW, MEAN SAT. CONDUCTIVITY (m/day)	=	0.02900
STDFKS, STD.DEV. OF SAT. CONDUCTIVITY	=	0.000

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     DISTM, MEAN DEPTH TO GROUNDWATER (m)          =    15.24000
     STDDST, STD.DEV. OF DEPTH TO GROUNDWATER      =     0.00000

     UNPORM, MEAN VADOSE ZONE POROSITY (-)         =     0.38000
     SUNPOR, STD.DEV. OF VADOSE ZONE POROSITY      =     0.00000

     PARNM, MEAN VALUE OF VG PARAMETER N (-)       =     1.23000
     SDPARN, STD.DEV. OF VG PARAMETER N            =     0.00000

     RESWCM, MEAN RESIDUAL WATER CONTENT (-)       =     0.01110
     RESWCS, STD.DEV. OF RESIDUAL WATER CONTENT    =     0.00000

ALFINM = 0, UNSAT DISPERSIVITY CALCULATED INTERNALLY
     ** SATURATED ZONE INPUT PARAMETERS **

     LAMBW, MEAN SAT. ZONE DECAY COEFF. (1/day)    =     0.00010
     SLAMB, STD.DEV. OF SAT. ZONE DECAY COEFF.     =     0.00000

     PORM, MEAN SAT. ZONE POROSITY (-)             =     0.20000
     STDPOR, STD.DEV. OF SAT. ZONE POROSITY        =     0.00000

     FOCM, MEAN SAT. ZONE ORG. CARBON FRAC. (-)    =     0.00000
     STDFOC, STD.DEV. SAT. ZONE ORG. CARBON FRAC.=     0.00000

     ALRLTM, MEAN DISPERS, RATIO LONG/TRANSV. (-) =     3.00000
     SALRLT, STD.DEV. OF DISP. RATIO LONG/TRANSV. =     0.00000

     ALRTVM, MEAN DISPERS. RATIO TRANSV/VERT. (-) =    87.00000
     SALRTV, STD.DEV. OF DISP. RATIO TRANSV/VERT. =     0.00000

     CONDS, SAT. HYDRAULIC COND. (m/day)           =     1.03000
     SCONDS, STD.DEV. OF SAT HYDRAULIC COND.       =     0.00000

     GRADS, HYDRAULIC GRADIENT (m/m)               =     0.02700
     SGRADS, STD.DEV. OF HYDRAULIC GRADIENT        =     0.00000

     HMEAN, MEAN AQUIFER THICKNESS (m)             =    15.24000
     STDH, STD.DEV. OF AQUIFER THICKNESS           =     0.00000

     QINM, MEAN INFILTRATION RATE (m/day)          =     0.00011
     QINSTD, STD.DEV. OF INFILTRATION RATE         =     0.00000


     LOCATION OF RECEPTORS:

                  X (M)          Y (M)          Z (M)
   RECEPTOR( 1)    1.0            0.0            0.0
   RECEPTOR( 2)   10.0            0.0            0.0
   RECEPTOR( 3)  100.0            0.0            0.0
```

Clay Barrier Compaction Certifications

LABORATORY TEST REPORT

PETTIGREW and ASSOCIATES, P.A.
1110 N. GRIMES
HOBBS, NM 88240
(505) 393-9827

DEBRA P. HICKS, P.E./L.S.I.
WILLIAM M. HICKS. III, P.E./P.S.

To:	Environmental Plus Attn: Roger Boone P.O. Box 1558 Eunice, NM 88231	**Material:**	Red Clay
		Test Method:	ASTM: D 2922
Project:	Duke 9A Line		
Date of Test:	May 29, 2003	**Depth:**	1 1/2' Below Finished Subgrade

Test No.	Location	Dry Density % Maximum	% Moisture	Depth
SG-1	Pit - 25' N. & 15' W. of the SE Corner	97.7	13.1	
SG-2	Pit - 10' E. & 15' N. of the SW Corner	98.0	14.2	

Control Density: 110.4
ASTM: D

Optimum Moisture: 15.6%

Required Compaction: 95%

Lab No.: 03 2790-2793

Copies To: Environmental Plus

PETTIGREW and ASSOCIATES

BY: S.G.T.

LABORATORY TEST REPORT

PETTIGREW and ASSOCIATES, P.A.
1110 N. GRIMES
HOBBS, NM 88240
(505) 393-9827

DEBRA P. HICKS, P.E./L.S.I.
WILLIAM M. HICKS. III, P.E./P.S.

To: Environmental Plus
Attn: Roger Boone
P.O. Box 1558
Eunice, NM 88231

Material: Red Clay

Test Method: ASTM: D 2922

Project: Duke 9A Line

Date of Test: May 30, 2003

Depth: Finished Subgrade

Test No.	Location	Dry Density % Maximum	% Moisture	Depth
SG-3	Pit - 25' N. & 15' E. of the SW Corner	95.3	15.1	
SG-4	Pit - 20' N. & 25' W. of the SE Corner	96.8	14.6	

Control Density: 110.4
ASTM: D 698

Optimum Moisture: 15.6%

Required Compaction: 95%

Lab No.: 03 2865-2867

Copies To: Environmental Plus

PETTIGREW and ASSOCIATES

BY: S.E.T.

Duke Energy®
Field Services

DUKE ENERGY FIELD SERVICES
370 17th Street
Suite 2500
Denver, CO 80202

303 595 3331

January 27, 2004

Mr. Larry Johnson
New Mexico Oil Conservation Division
1625 N. French Drive
Hobbs, New Mexico 88240

RE: Site Investigation, Remediation and Final C-141 Closure Documentation
A-9 8-Inch Pipeline Release
Duke Energy Field Services, LP
UL-C NE ¼ of the NW ¼ of Sec 18, T21S R36E
Lea County, NM

Mr. Johnson:

Enclosed please find for your review, one copy of the **Site Investigation, Remediation and Final C-141 Closure Documentation** for the A-9 8-Inch pipeline release that occurred on April 4, 2003.

Based on the information provided in the above referenced report, Duke Energy Field Services, LP would like to request no further action for this site.

If you have any questions regarding the information provided in the closure reports, please give me a call at 303-605-1718.

Sincerely

Duke Energy Field Services, LP

Stephen Weathers P.G.
Sr. Environmental Specialist

cc: Lynn Ward, DEFS Midland
Environmental Files

Enclosure

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised March 17, 1999

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☑ Final Report

Name of Company	Contact
DUKE ENERGY FIELD SERVICES	**Steve Weathers**
Address	Telephone No.
PO Box 5493 Denver, CO 80217	**(303) 605-1718**
Facility Name	Facility Type
A-9 8-Inch	**Natural Gas Gathering Pipeline**

Surface Owner	Mineral Owner	Lease No.
BLM	**NA**	**NA**

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from South Line	Feet from West Line	Longitude	Latitude	County:
C	**18**	**21S**	**36E**	**5243**	**1500**	**W103° 18' 27.80"**	**N32° 29' 9.70"**	**Lea**

NATURE OF RELEASE

Type of Release	Volume of Release	Volume Recovered
Natural Gas release and associated liquid components	**30 bbl**	**15 bbl**
Source of Release	Date and Hour of Occurrence	Date and Hour of Discovery
8" Steel Pipeline	**4/24/2003**	**4/24/03**
Was Immediate Notice Given? ☑ Yes ☐ No ☐ Not Required	If YES, To Whom?	
	Larry Johnson (NMOCD-Hobbs)	
By Whom?	Date and Hour	
Stan Shaver (DEFS)	**4/24/03 3:00 PM**	
Was a Watercourse Reached? ☐ Yes ☑ No	If YES, Volume Impacting the Watercourse.	
	NA	

If a Watercourse was Impacted, Describe Fully.*
NA

Describe Cause of Problem and Remedial Action Taken.*
Internally Corroded pipeline, line was replaced by looping with new poly pipe.

Describe Area Affected and Cleanup Action Taken.*
6165-ft^2 area excavated to 8-ft depth. 2-ft clay barrier installed at 6-8-ft depth based on 1000-year VADSAT Risk Assessment. RCRA Exempt Non-hazardous contaminated soil above remedial goals excavated from the site was disposed of by EPI at a NMOCD approved surface waste facility (South Monument)

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature:	**OIL CONSERVATION DIVISION**	
Printed Name: **Steve Weathers**	Approved by District Supervisor:	
Title: **DEFS Environmental Specialist**	Approval Date:	Expiration Date:
swweathers@duke-energy.com		
Date: **1/13/04** Phone: **(303) 605-1718**	Conditions of Approval:	☐ Attached

Duke Energy Field Services	Incident Date and NMOCD Notified? 4/24/03 4/24/03 3:00 PM

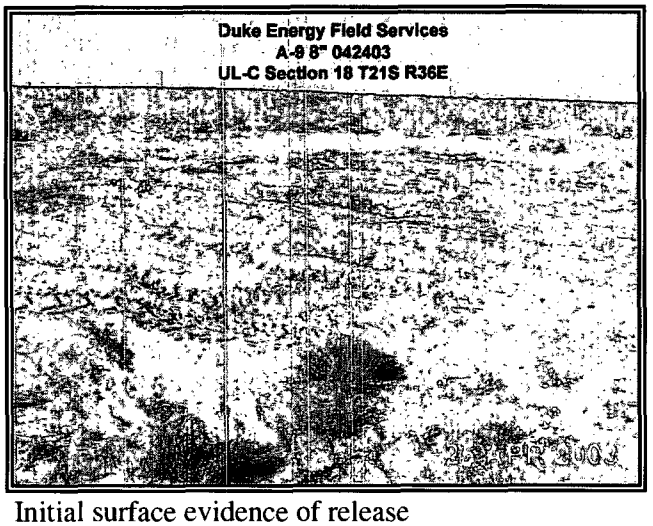
SITE: A-9 8-Inch		Assigned Site Reference # 042403	
Company:	DUKE ENERGY FIELD SERVICES		
Street Address:	5805 East Highway 80		
Mailing Address:	PO Box 5493		
City, State, Zip:	Denver, CO 80217		
Representative:	Steve Weathers		
Representative Telephone:	(303) 605-1718		
Telephone:			
Fluid volume released (bbls):	30	Recovered (bbls):	15
>25 bbls: Notify NMOCD verbally within 24 hrs and submit form C-141 within 15 days.			
5-25 bbls: Submit form C-141 within 15 days (Also applies to unauthorized releases of 50-500 mcf Natural Gas)			
Leak, Spill, or Pit (LSP) Name:	# 042403		
Source of contamination:	8" Steel Pipeline		
Land Owner, i.e., BLM, ST, Fee, Other:	BLM	620 E. Green St, Carlsbad, NM 88220	
LSP Dimensions:	(GPS Site Diagram attached)		
LSP Area:	6,165 -ft^2		
Location of Reference Point (RP):			
Location distance and direction from RP:			
Latitude:	N32° 29' 9.70"		
Longitude:	W103° 18' 27.80"		
Elevation above mean sea level:	3625 -ft amsl		
Feet from South Section Line:	5243		
Feet from West Section Line:	1500		
Location - Unit and 1/4 1/4:	UL- C	NE 1/4 of NW 1/4	
Location - Section:	18		
Location - Township:	21S		
Location - Range:	36E		
Surface water body within 1000' radius of Site:	0		
Surface water body within 1000' radius of Site:	0		
Domestic water wells within 1000' radius of Site:	0		
Domestic water wells within 1000' radius of Site:	0		
Agricultural water wells within 1000' radius of Site:	0		
Agricultural water wells within 1000' radius of Site:	0		
Public water supply wells within 1000' radius of Site:	0		
Public water supply wells within 1000' radius of Site:	0		
Depth (ft) from land surface to ground water (DG):	106		
Depth (ft) of contamination (DC):	35		
Depth (ft) to ground water (DG - DC = DtGW):	71		

1. Ground Water	2. Wellhead Protection Area	3. Distance to Surface Water Body
If Depth to GW <50 feet: *20 points*	If <1000' from water source, or, <200' from private domestic water source: *20 points*	<200 horizontal feet: 20 points
If Depth to GW 50 to 99 feet: *10 points*		200-100 horizontal feet: 10 points
If Depth to GW >100 feet: *0 points*	If >1000' from water source, or, >200' from private domestic water source: *0 points*	>1000 horizontal feet: 0 points
Ground water Score: 10	*Wellhead Protection Area Scor 0*	*Surface Water Score: 0*
Site Rank (1+2+3) = 10		

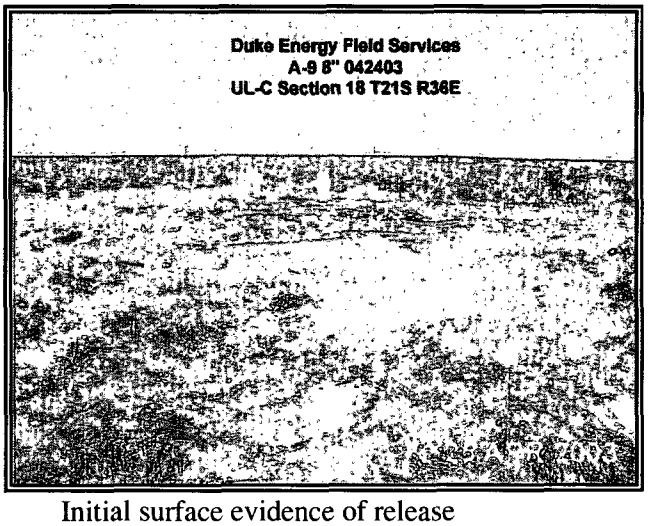
Total Site Ranking Score and Acceptable Concentrations

Parameter	20 or >	**10**	0
Benzene[1]	10 ppm	**10 ppm**	10 ppm
BTEX[1]	50 ppm	**50 ppm**	50 ppm
TPH	100 ppm	**1000 ppm**	5000 ppm

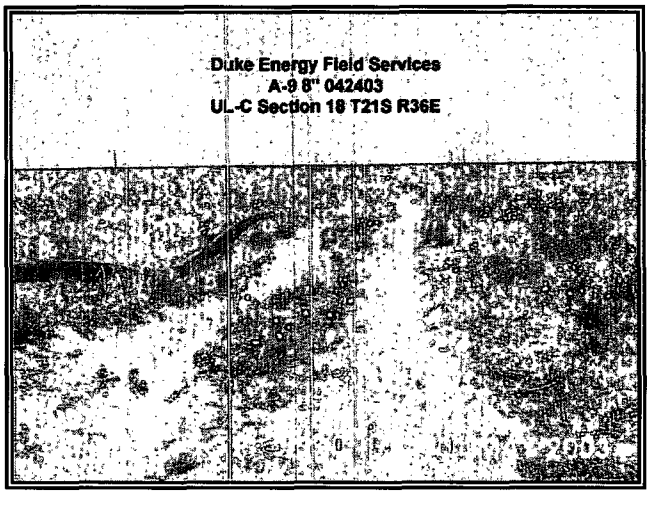
[1]100 ppm field VOC headspace measurement may be substituted for lab analysis



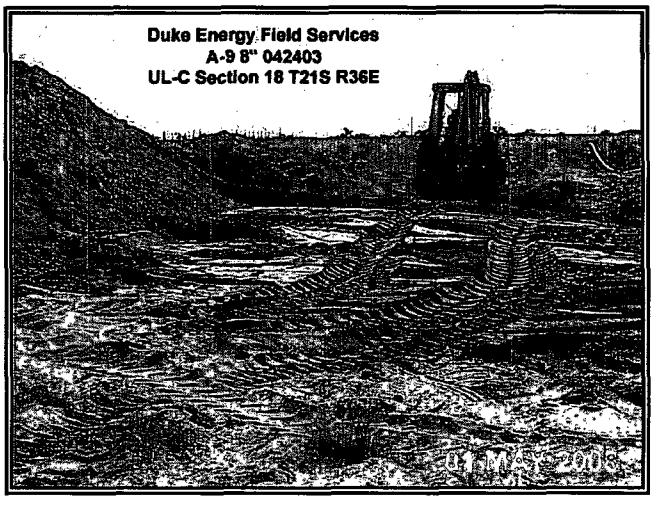
Initial surface evidence of release



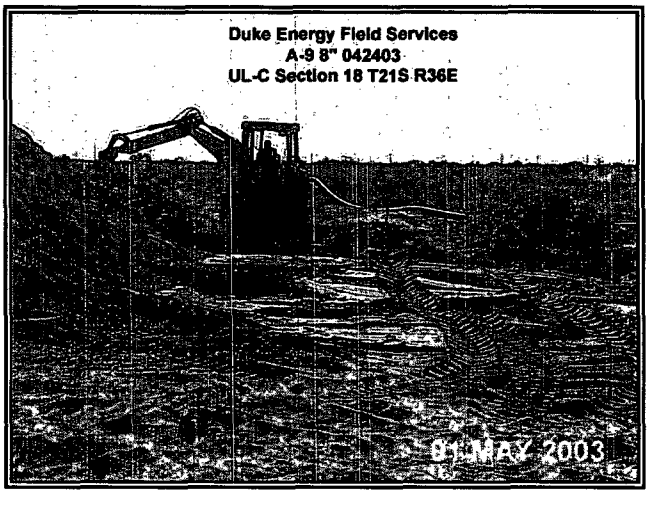
Initial surface evidence of release



Access from west - - too sandy for heavy trucks

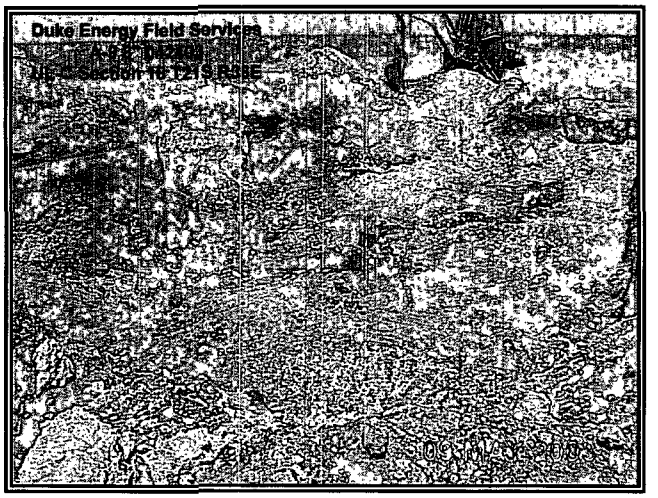


Commencement of excavation activity

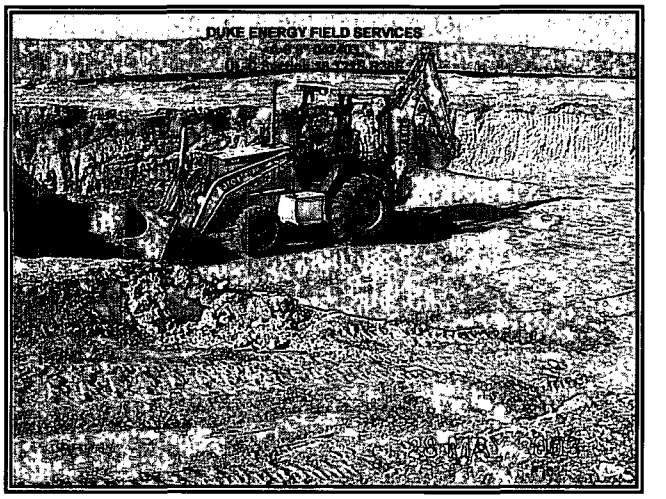


Commencement of excavation activity

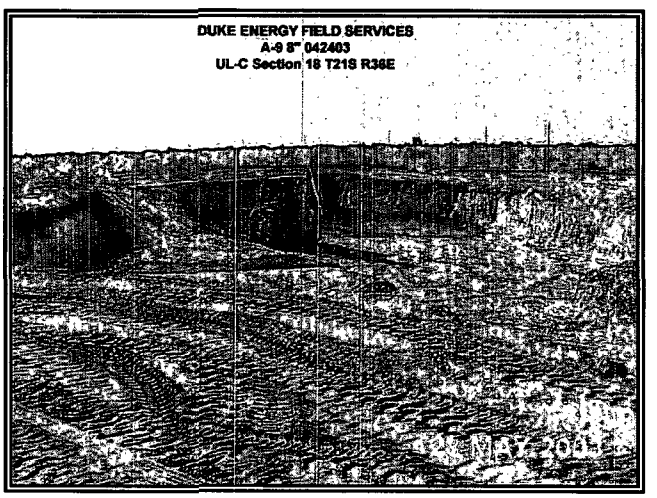
A-9 8" looped around excavation by DEFS



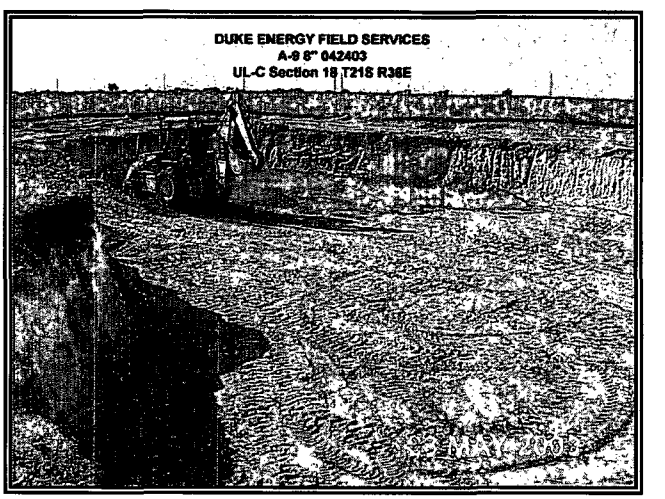
Excavation at 8' - - note sidewall contamination



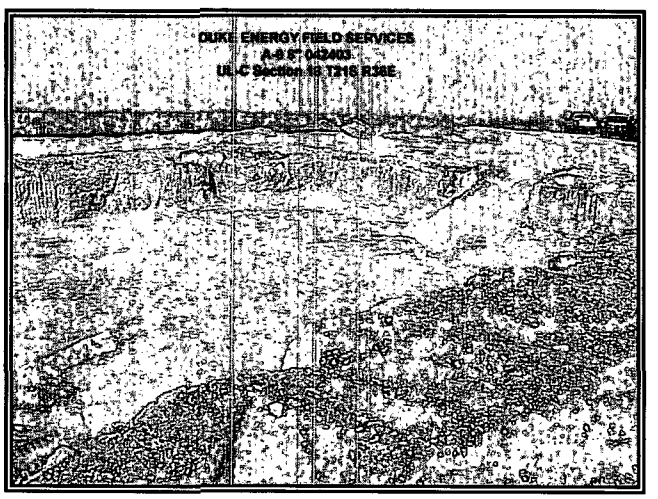
Installation of 1st clay barrier lift



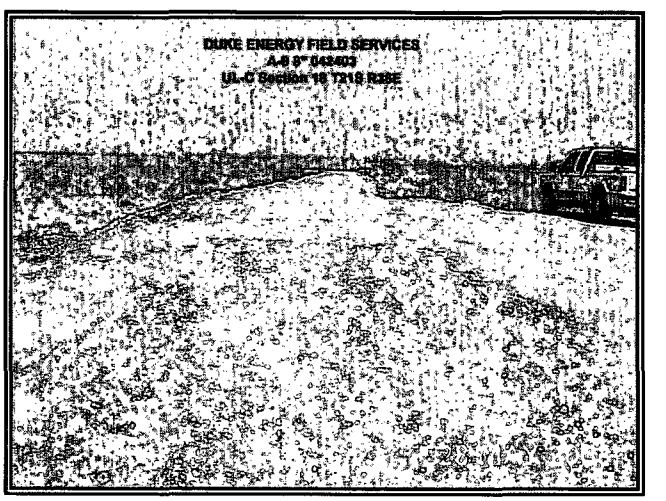
Installation of 1st clay barrier lift



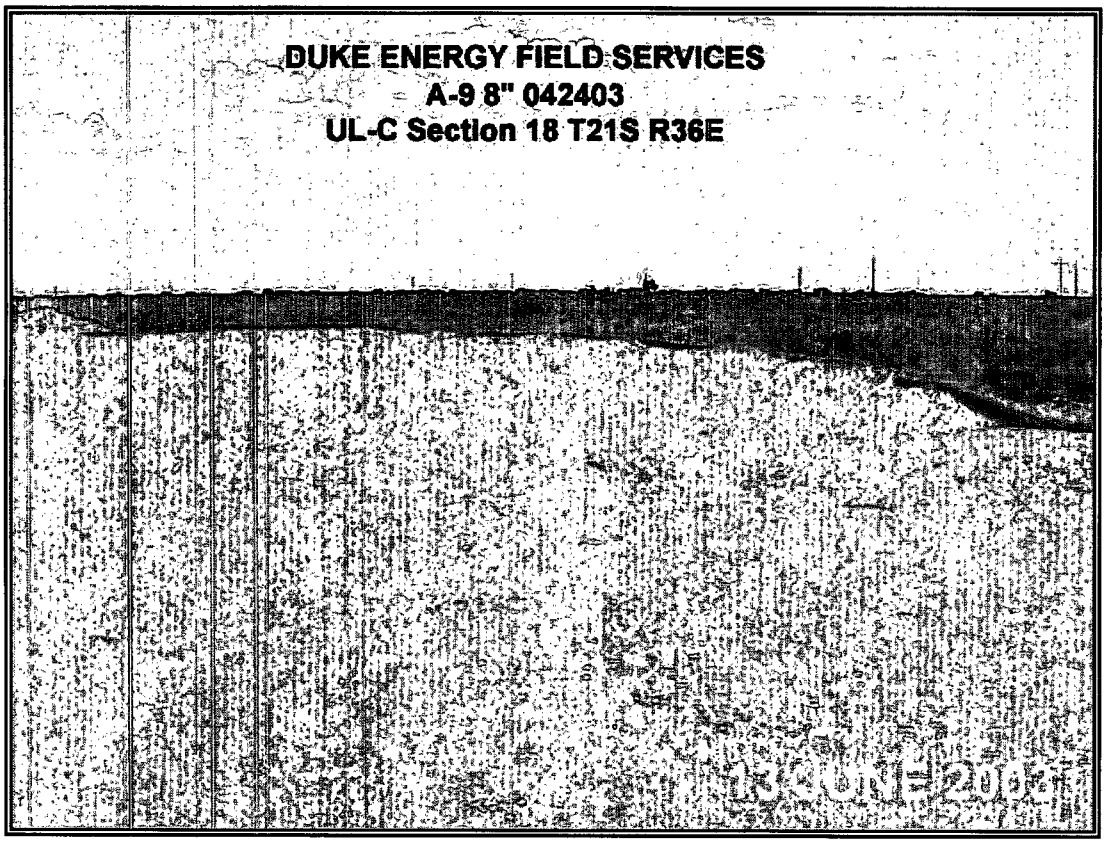
Installation of 1st clay barrier lift



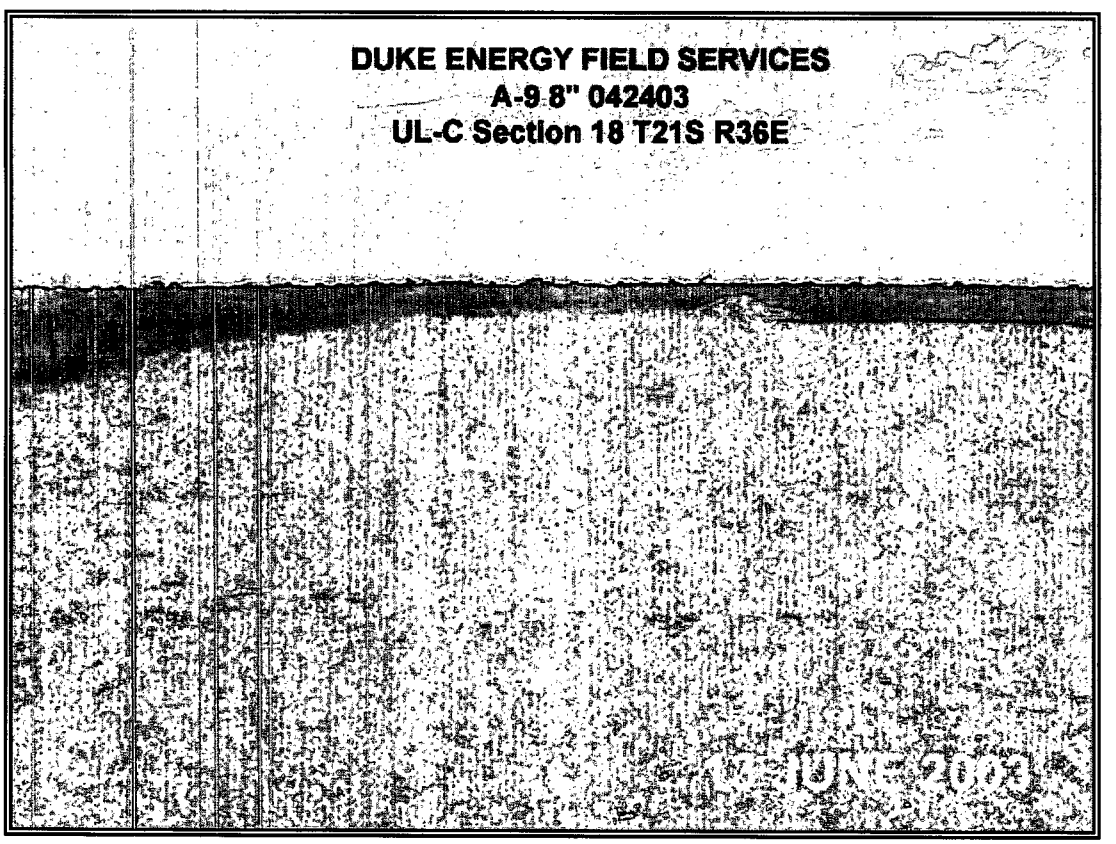
West portion of excavation



Caliche access road from west constructed for project



Site contoured and completed



Site contoured and completed

RISK ASSESSMENT

AND

SITE CLOSURE PROPOSAL

A-9 8-INCH

DEFS REF: #042403

UL-C NE¼ OF THE NW¼ OF SECTION 18 T21S R36E

~9.3 MILES NORTH-NORTHWEST (BEARING 292.1°) OF

EUNICE, LEA COUNTY, NEW MEXICO

LATITUDE: N32° 29' 09.70" LONGITUDE: W103° 18' 27.80"

MAY 29, 2003

PREPARED BY:

John Good
Environmental Consultant
ENVIRONMENTAL PLUS, INC.
PO Box 1558
2100 Ave. O
Eunice, NM 88231
Phone: 505-394-3481
Fax: 505-394-2601
Cell: 505-390-9804
Email: enviplus1@aol.com

May 29, 2003

Mr. Larry Johnson
New Mexico Oil Conservation Division
1625 North French
Hobbs, New Mexico 88240

Subject: DEFS A-9 8-Inch Release Site (042403)
Risk Assessment and Site Closure Proposal

Dear Mr. Johnson:

Environmental Plus, Inc. (EPI), on behalf of Mr. Paul Mulkey, Duke Energy Field Services, submits the attached "**Risk Assessment and Closure Proposal**" for the above referenced leak site located on land owned by the Federal Bureau of Land Management and leased to DASCO Land Corporation. The site is located in the NE¼ of the NW¼ (Unit Letter C), Section 1, Township 21 South, and Range 36 East. The geographic location is 32°29'09.70"N and 103°18'27.80"W. The site is approximately 9.3 miles north-northwest (bearing 292.1°) of Eunice, Lea County, New Mexico. According to information obtained from the New Mexico Office of the State Engineer (NMOSE) database, ground water level beneath this site is conservatively estimated to be ~106-ft below ground surface (bgs). The site matrix ranking for this site is 10 based on depth to ground water from lowest contaminant level of 50-100-ft.

The remedial action proposal for this site is to install a 2-ft compacted clay barrier over the areal extents of the contamination at the depth interval of 6-ft to 8-ft. Two 1000-year VADSAT Risk Assessments (benzene and chlorides) were performed for this site incorporating conservative data parameters. The results of these VADSAT models indicate that the proposed placement of an impermeable layer above the zone of contamination will eliminate the risk of contaminant migration to the water table, even if artificially placed at 50-ft bgs.

If there are any questions please call Mr. Ben Miller, or myself, at our office or at 505-390-0288 and 505-390-9804, respectively, or Mr. Paul Mulkey at 505-397-5716. All official written communications should be addressed to:

Mr. Paul Mulkey
Duke Energy Field Services
11525 West Carlsbad Highway
Hobbs, New Mexico 88240

Sincerely,

John Good
EPI – Environmental Consultant

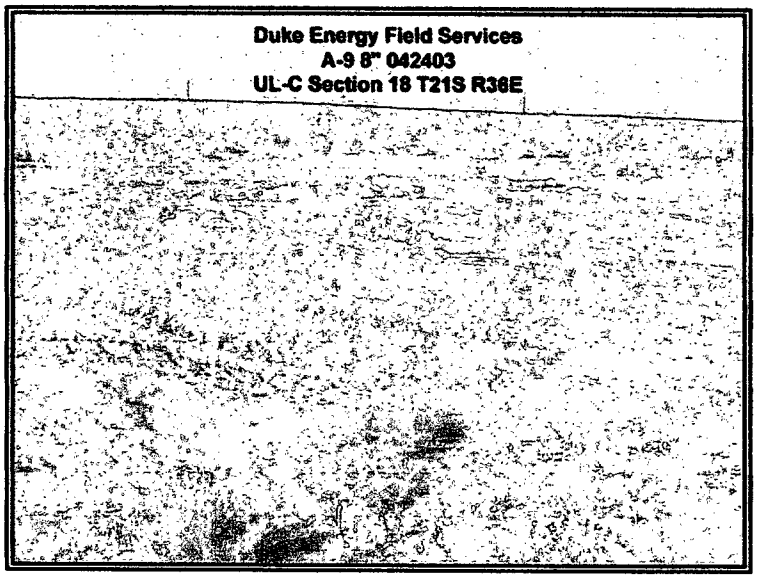
cc: Paul Mulkey, Duke Energy Field Services
Lynn Ward, Duke Energy Field Services, Midland, TX
Steve Weathers, Duke Energy Field Services, Denver, CO
Ben Miller, EPI Vice President and General Manager
Sherry Miller, EPI President
Pat McCasland, EPI Technical Manager
file

ENVIRONMENTAL PLUS, INC.

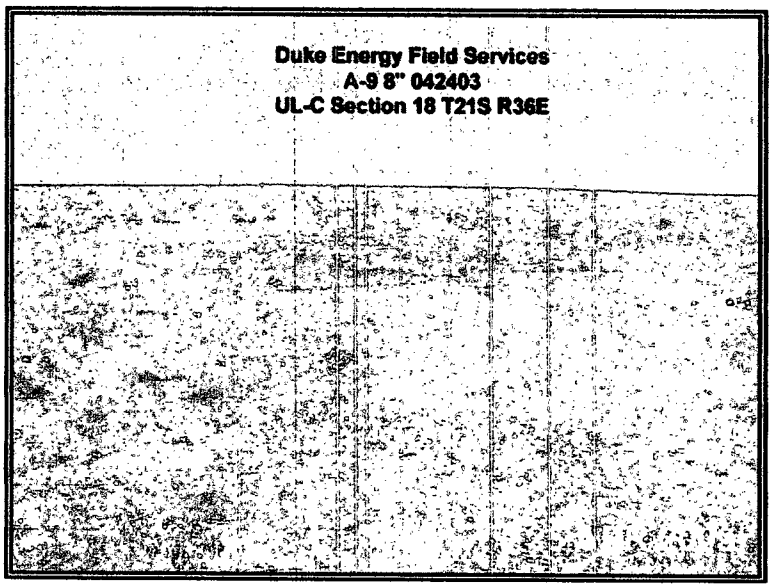
Table of Contents

1.0 Introduction

This document addresses the initial site characterization, partial excavation, vertical contaminant delineation and the proposal to close this site with the installation of an impermeable clay barrier. Environmental Plus, Inc. (EPI), Eunice, New Mexico commenced the initial site characterization and delineation process at this site on April 24, 2003. To date, the following remediation activities have taken place:



- GPS demarcation of the release site and relevant surface features. *(See Plate 3, Attachments).*
- Excavation (to 8-ft bgs) and on-site stockpiling of ~800-yd^3 of contaminated soil (as of 5-9-03, excavation still in progress). The excavation had an approximate areal extent of 2,628-ft^2. *(See Plate 3, Attachments).*
- Drilling and sampling of two boreholes to 40-ft bgs. *(See Plates 3, 4, 5 - Attachments).*
- VADSAT 3.0 Risk Assessment for the site based on sampling results for the boreholes. The sample results *(Plates 4 and 5, Attachments)* indicate that the contamination extends to approximately 35-ft bgs. A value of 40-ft bgs was utilized to run the VADSAT Risk Assessment. *(See Plate 6, Attachments).*
- Water depths of >200-ft are the most common for this particular area of southern Lea County. The State Engineer's records indicate one water well in the southeast quarter of Section 18 T21S R36E, that has a depth-to-water of 106-ft. A well this shallow is uncommon in the area (and this record may be in error). However, since it is the closest well (~5000-ft) to the release site, the recorded 106-ft depth-to-water value is utilized for all calculations relative to water depth.

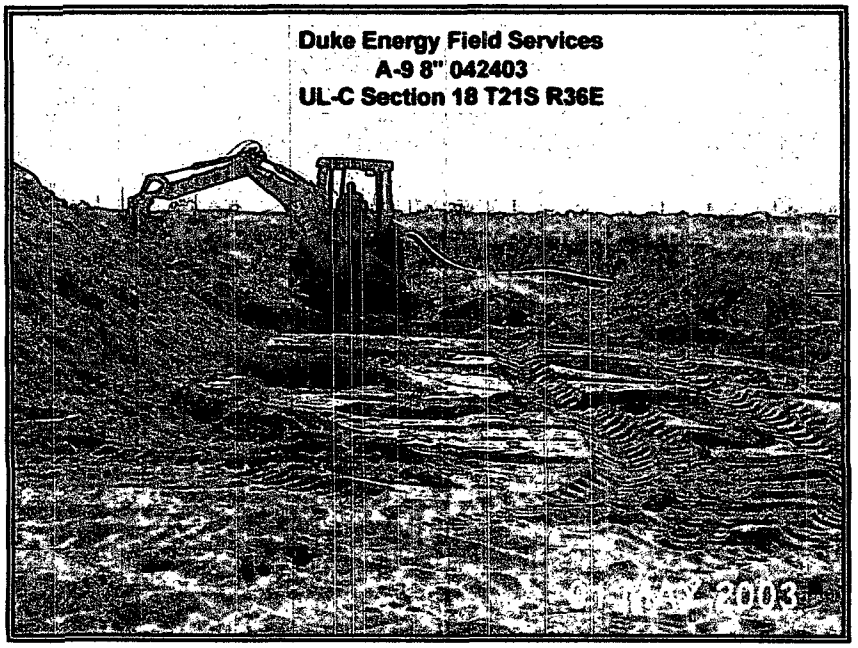


2.0 Background

Environmental Plus, Inc. (EPI) was notified by Duke Energy Field Services on August 24, 2003 regarding a pipeline release and remediation project located on the 8-inch steel "A-9" line southwest of Oil Center. The site is designated "A-9 8-inch", and has the DEFS reference number of 042403. The release is located on federal (BLM) land and is leased to DASCO Land Corporation for grazing purposes. The Initial C-141 Form *(page 22, Attachments)* indicates a 30-bbl loss (NGL) with 15-bbl recovered. The vertical contaminant extent determined from

borehole data, and the horizontal extent demonstrated by the preliminary excavation, indicates that this site is predominantly "historical" in nature.

The initial response consisted of excavation and repair (clamping) of the pipeline leak by DEFS personnel on April 24, 2003. EPI commenced remediation activities at the site on the following day. The initial portion of the excavation was taken to a depth of 8-ft. Field testing indicated that the soil was significantly contaminated at the 10-ft level. A test trench was dug to ~13-ft and a soil sample was obtained and submitted for laboratory analysis. A 25-ft borehole was drilled immediately west of the partial excavation on May 2, 2003, with samples being obtained at 5-ft intervals. A subsequent borehole was drilled on May 23, 2003 to obtain soil samples from the zone 25-40-ft bgs. The soil analyses results indicate that contamination extends to ~35-ft bgs and has not progressed beyond the 40-ft bgs level. *(see Plates 4 and 5)*.



Due to the prohibitive financial, engineering and safety factors involved with excavating to 35-ft bgs, EPI, on behalf of Duke Energy Field Services, is proposing to remediate and close this site with the installation of an impermeable 2-ft clay barrier. This proposal contains the VADSAT 3.0 Risk Assessment models for this site. The 1000-year assessments *(Plates 6 and 7, Attachments)*, compiled for both benzene and chlorides, project "no impact" on the water table with the installation of an impermeable layer at this site. EPI proposes to excavate and dispose of contaminated soil down to the 8-ft bgs level. The lateral contaminated extents of the release will be determined by field testing (PID) and then verified with composite sidewall samples analyzed for TPH and BTEX. A 5-ft "overlap" area will then be excavated from the perimeter of the excavation. This clean material will be retained as backfill. The two-lift clay barrier system will be installed at the 8-ft depth of the excavation, each 1-ft layer being certified for >95% compaction by a Professional Engineer. The remaining 6-ft of the excavation will be backfilled with clean caliche and topsoil. All contaminated soil removed from the site will be disposed of in the South Monument surface waste disposal facility.

3.0 Site Description

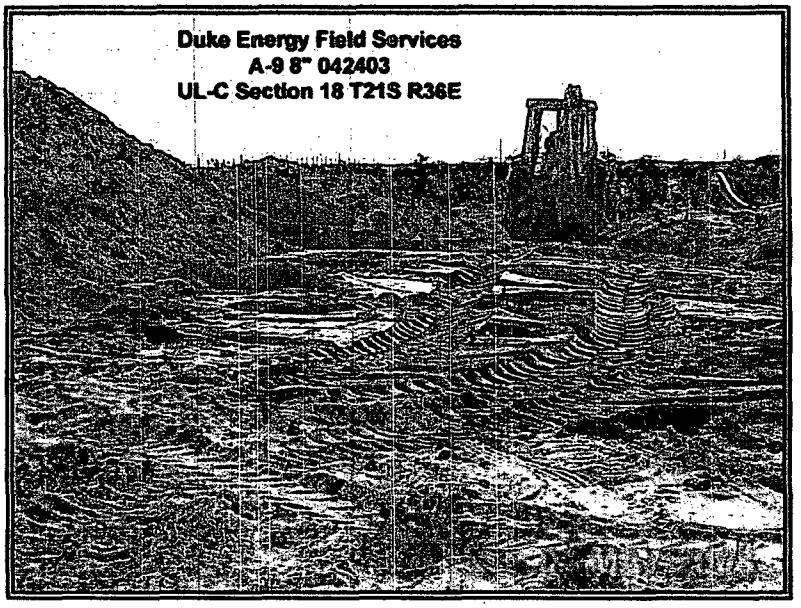
3.1 Site Location

The DEFS "A-9 8-inch 042403" site is located in UL-C of Section 18 T21S R36E. The site is approximately 1,500-ft from the west section line and 5,243-ft from the south section line. The Latitude and Longitude coordinates are: 32°29'09.70"N; 103°18'27.80"W. The land is owned by the federal government (BLM) and leased to DASCO Land Corporation *(see Attachments, Plates 1, 2 and 3)*

3.2 Geohydrology

The United States Geological Survey (USGS) Ground-Water Report 6, "Geology and Ground-Water Conditions in Southern Lea County, New Mexico," A. Nicholson and A. Clebsch, 1961, describes the near surface geology of southern Lea County as an intergrade of the Quaternary Alluvium (QA) sediments, i.e., fine to medium sand, with the mostly eroded Cenozoic Ogallala (CO) formation. Typically, the QA and CO formations in the area are capped by a thick interbed of caliche and generally overlain by sandy soil. The release site is located in the Eunice Plain physiographic subdivision, described by Nicholson & Clebsch as an area "underlain by a hard caliche surface and is almost entirely covered by reddish-brown dune sand". The thickness of the sand cover ranges from 2-5 feet in most areas to as much as 20-30 feet in drift areas.

The subsurface at the site is composed of a hard caliche base covered with 2-3-feet of reddish sand/clay topsoil. The presence of ground water in this area of Lea County is best described as intermittent. Based on data obtained from the Office of the State Engineer for a water well approximately 5000-ft southeast of the site, a conservative estimate of ground water depth at this site, if present, would be ~106-ft bgs.



3.3 Ecology

The area is typical of the Upper Chihuahuan Desert Biome consisting primarily of hummocky sand hills covered with Harvard Shin Oak (Querqus harvardi) interspersed with Honey Mesquite (Prosopis glandulosa) along with typical desert grasses, flowering annuals and flowering perennials. Mammals represented, include Orrd's and Merriam's Kangaroo Rat, Deer Mouse, White Throated Wood Rat, Cottontail Rabbit, Black Tailed Jackrabbit, Mule Deer, Bobcat, Red Fox and Coyote. Reptiles, Amphibians, and Birds are numerous and typical of area. A survey of Listed, Threatened, or Endangered species was not conducted.

3.4 Area Water Wells and/or Surface Water Features

There are no water wells and/or surface water features within 1000-ft of the release site.

There are no surface water bodies within 1000-ft of the site.

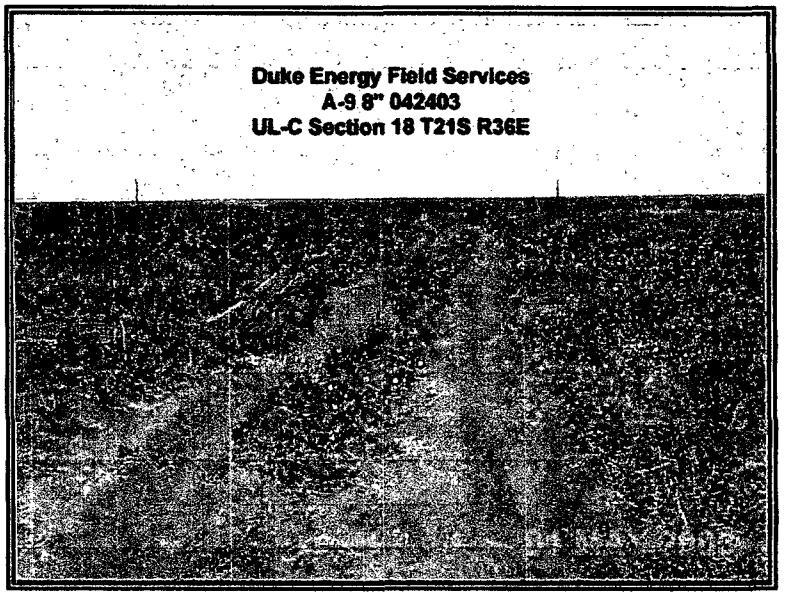
4.0 NMOCD Site Ranking

Contaminant delineation and site characterization accomplished at this site indicate that the chemical parameters of the soil and ground water were characterized consistent with the NMOCD guidelines published in the following documents:

- ***Guidelines for Remediation of Leaks, Spills and Releases (August 13, 1993)***
- ***Unlined Surface Impoundment Closure Guidelines (February 1993)***

Acceptable thresholds for **contaminants/constituents of concern** (CoCs), i.e., TPH^{8015m}, Benzene, and the mass sum of Benzene, Toluene, Ethyl Benzene, and total Xylene (BTEX), was determined based on the NMOCD Ranking Criteria as follows:

- Depth to Ground water, i.e., distance from the lower most acceptable concentration to the ground water.
- Wellhead Protection Area, i.e., distance from fresh water supply wells.
- Distance to Surface Water Body, i.e., horizontal distance to all down gradient surface water bodies.



Based on the proximity of the site to protectable area water wells, surface water bodies, and depth to ground water from the lower most contamination, the NMOCD ranking score for the site is 10 points with the soil remedial goals highlighted in the Site Ranking Matrix presented as Table 1.

Table 1 - Site Ranking Matrix

1. Ground Water	2. Wellhead Protection Area	3. Distance to Surface Water
Depth to GW <50 feet: *20 points*	**If <1000' from water source, or; <200' from private domestic water source: *20 points***	**<200 horizontal feet: *20 points***
Depth to GW 50 to 99 feet: *10 points*		**200-1000 horizontal feet: *10 points***
Depth to GW >100 feet: 0 points	**If >1000' from water source, or; >200' from private domestic water source: *0 points***	**>1000 horizontal feet: *0 points***
Ground Water Score = 10	Wellhead Protection Score = 0	Surface Water Score= 0
Site Rank (1+2+3) = 10 + 0 + 0 = 10 points (for soil 0-56'bgs)		

Total Site Ranking Score and Acceptable Remedial Goal Concentrations			
Parameter	20+	**10**	0
Benzene[1]	10 ppm	**10 ppm**	10 ppm
BTEX[1]	50 ppm	**50 ppm**	50 ppm
TPH	100 ppm	**1000 ppm**	5000 ppm

5.0 Subsurface Soil Investigation

The subsurface soil analyses were accomplished on May 2 and May 23, 2003 with the drilling and sampling of two boreholes in the central area of the release down to 40-ft bgs. Analyses results indicate

that TPH, BTEX and Chloride contamination above NMOCD remedial goals exists at the 0-35-ft depth zone within the central area of the release. *(See Plates 4 and 5 in the Attachments)*.

6.0 Ground Water Investigation

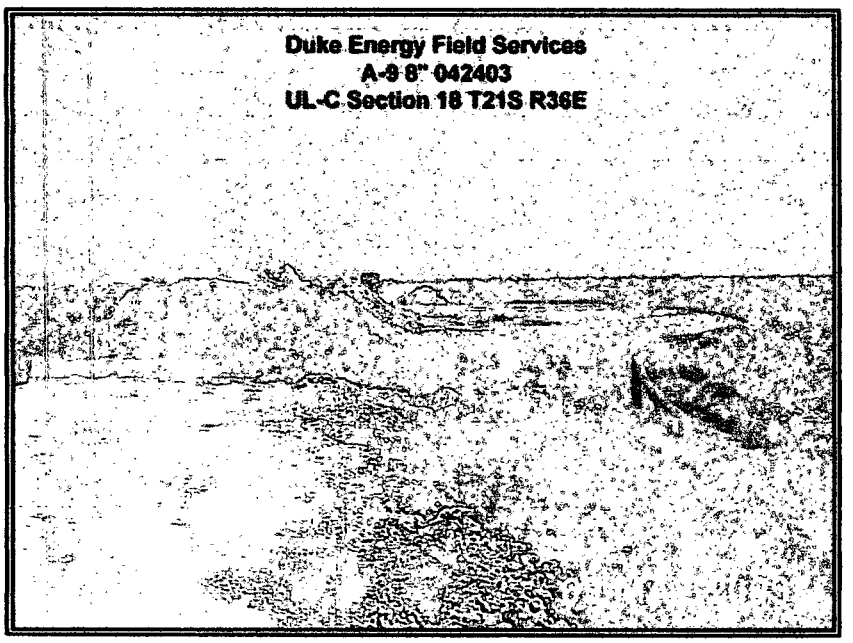
Ground water depth is conservatively projected to be 106-ft bgs at the site, based on the nearest recorded water well. The site will be excavated to a level depth of 8-ft. All contaminated soil left within the excavation *(see Section 8.0 below)* will be covered with a 2-ft impermeable layer of compacted clay. The remaining 6-ft depth of the excavation will be backfilled with clean caliche and topsoil. Based on the containment of the Constituents of Concern, VADSAT Risk Assessment Models for benzene and chlorides and a remaining depth to ground water of >65-ft, there will be no need for further ground water investigation at this site.

7.0 VADSAT Risk Assessment

Very conservative 1000-year Risk Assessment Models of vertical hydrocarbon (benzene) and inorganic chloride migration for this site were generated utilizing the American Petroleum Institute's VADSAT 3.0 software. Although the sampling protocol for this site does not show an inordinate presence of Benzene, it was the chemical species utilized to run the assessment because it is the lightest and fastest migrating of the chemical choices VADSAT offers. VADSAT calculates the Mean Infiltration Rate based on annual precipitation minus a runoff coefficient and the evaporation rate. This number must be positive, so VADSAT does not accommodate arid and semi-arid areas such as southeast NM where the evaporation rate exceeds the precipitation rate.

Although the water table is assumed to be ~106-ft deep at this site, there is no empirical confirmation of this assumption. To allow for more conservancy in the VADSAT risk assessment modeling, the water table depth was artificially set at 50-feet for both assessment models presented with this site.

Two contrasting assessment sets were run for this site: one clay barrier/no barrier set for Chlorides present in the soil at >4200 ppm and one clay barrier/no barrier set for Benzene with a correlated TPH concentration of 32,000 ppm. Other than the two variable constituents and the presence, or lack of, the clay barrier, the input parameters for each assessment are identical. The downstream receptors were set at 1-meter, 10-meters and 100-meters (X=1 X=10 X=100). The transverse offset (Y value) was set at 0-meters, and the depth into the aquifer (Z value) was set at 0.

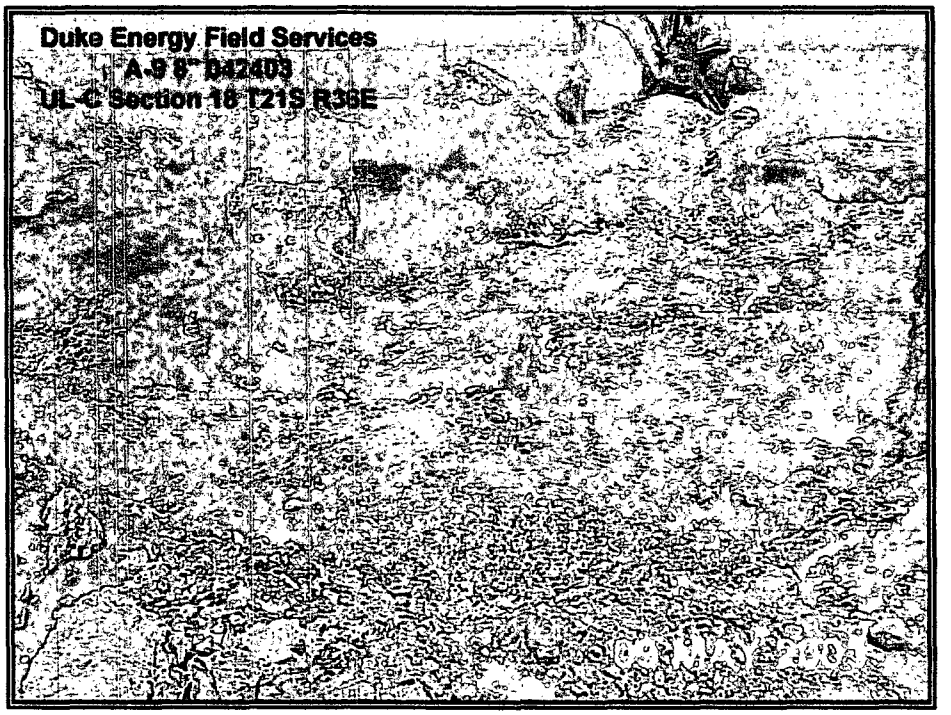


The results of the computer risk assessment modeling for benzene without a clay barrier in place indicate that benzene present would reach the top of a 50-ft aquifer directly under the site in approximately 20-years (2023) and reach its peak concentration of 1.678×10^{-2} ppm 120-years later (2143). The results of the computer risk assessment modeling for chlorides without a clay barrier in place indicate that chlorides present would reach the top of a 50-ft aquifer directly under the site in approximately 20-years (2023) and

reach its peak concentration of 18.28 X 10^3 ppm 160-years later (2163). The risk assessment models of the site for both benzene and chlorides, with a clay barrier in place, show a flat-line of 0 values for the 1000-year period modeled, thus the contaminant migration for either constituent theoretically would never reach the aquifer. *(See Attachments, pages 14 –21).*

8.0 Closure Proposal

Based upon the VADSAT Risk Assessment model for this site which predicts no ground water impact with the placement of an impermeable layer, Duke Energy Field Services proposes to contract with EPI for the placement of a 2-ft compacted clay barrier, with 5-ft overlap, over the contaminated soil in the excavation. The clay barrier will be placed in two stages, 1-ft thickness in each stage. After each 1-ft layer of clay is placed, it will be compacted and tested for compaction percentage by Pettigrew and Associates, Hobbs, NM. After the clay barrier is in place and certified, the remainder of the excavation will be backfilled with the clean caliche and topsoil, smoothed and contoured.



Attachments: (*pages 8-23*)

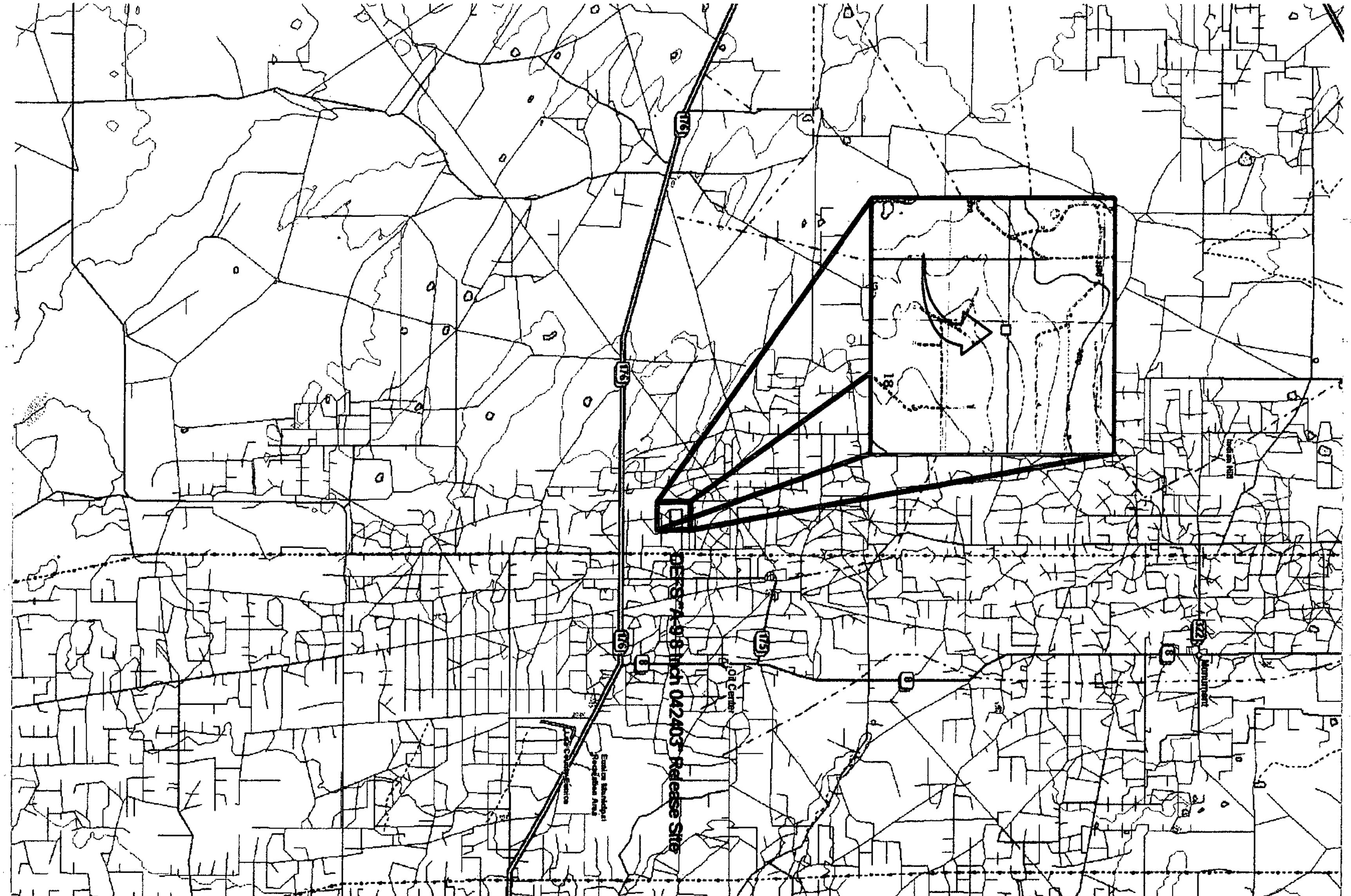
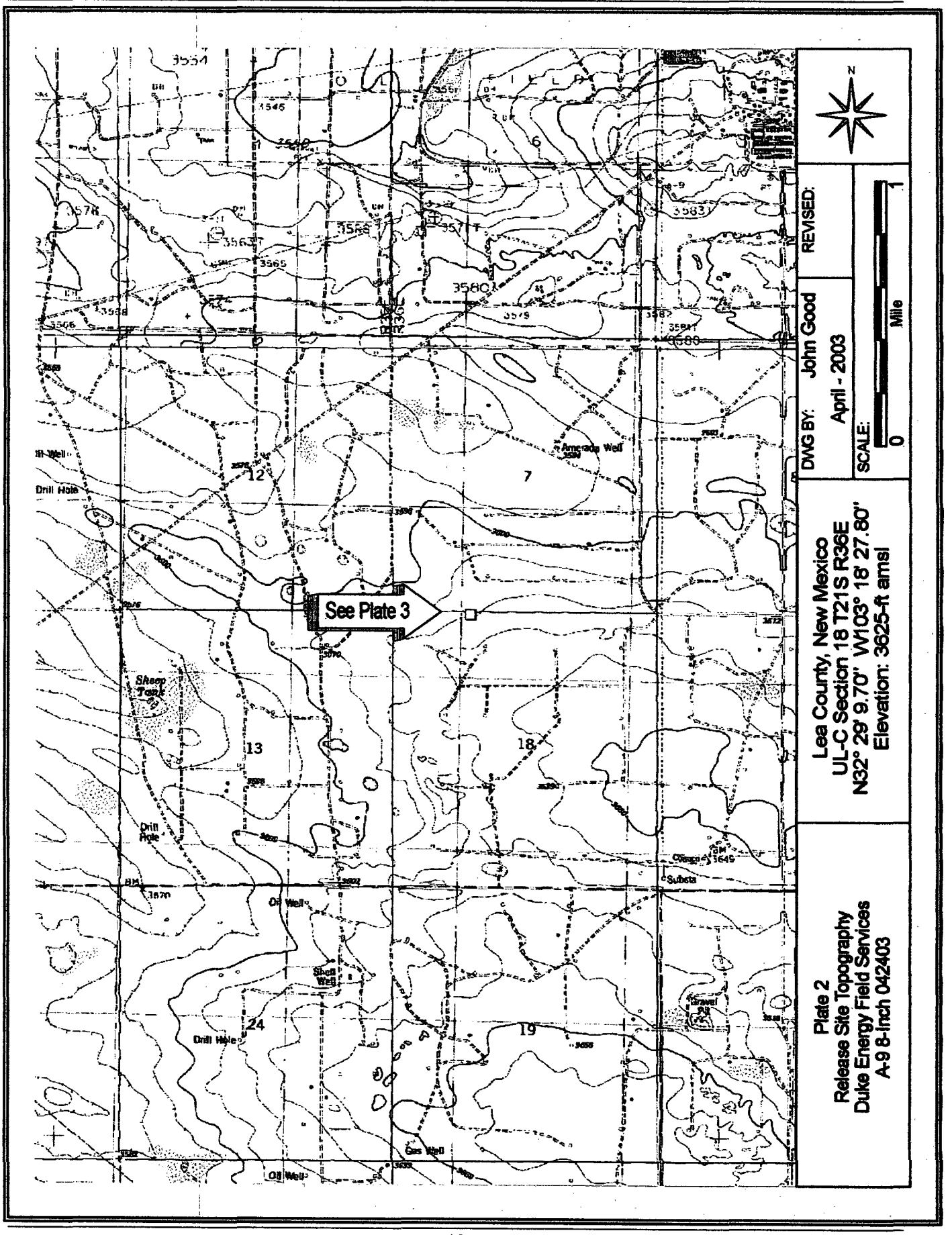


Plate 1 Release Site Location Duke Energy Field Services A-9 8-Inch 042403	Lea County, New Mexico UL-C Section 18 T21S R36E N32° 29' 9.70" W103° 18' 27.80" Elevation: 3625-ft amsl	DWG BY: John Good April - 2003	REVISED:	N
		SCALE: 0 Miles 5	SHEET 1 of 1	


See Plate 3
Sheep Tank
Drill Hole
Oil Well
Gas Well
Amerada Well
Shell Well
Gravel Pit
Substa
Plate 2
Release Site Topography
Duke Energy Field Services
A-9 8-Inch 042403
Lea County, New Mexico
UL-C Section 18 T21S R36E
N32° 29' 9.70" W103° 18' 27.80"
Elevation: 3625-ft amsl
DWG BY: John Good
April - 2003
REVISED:
SCALE:
0
1
Mile
N

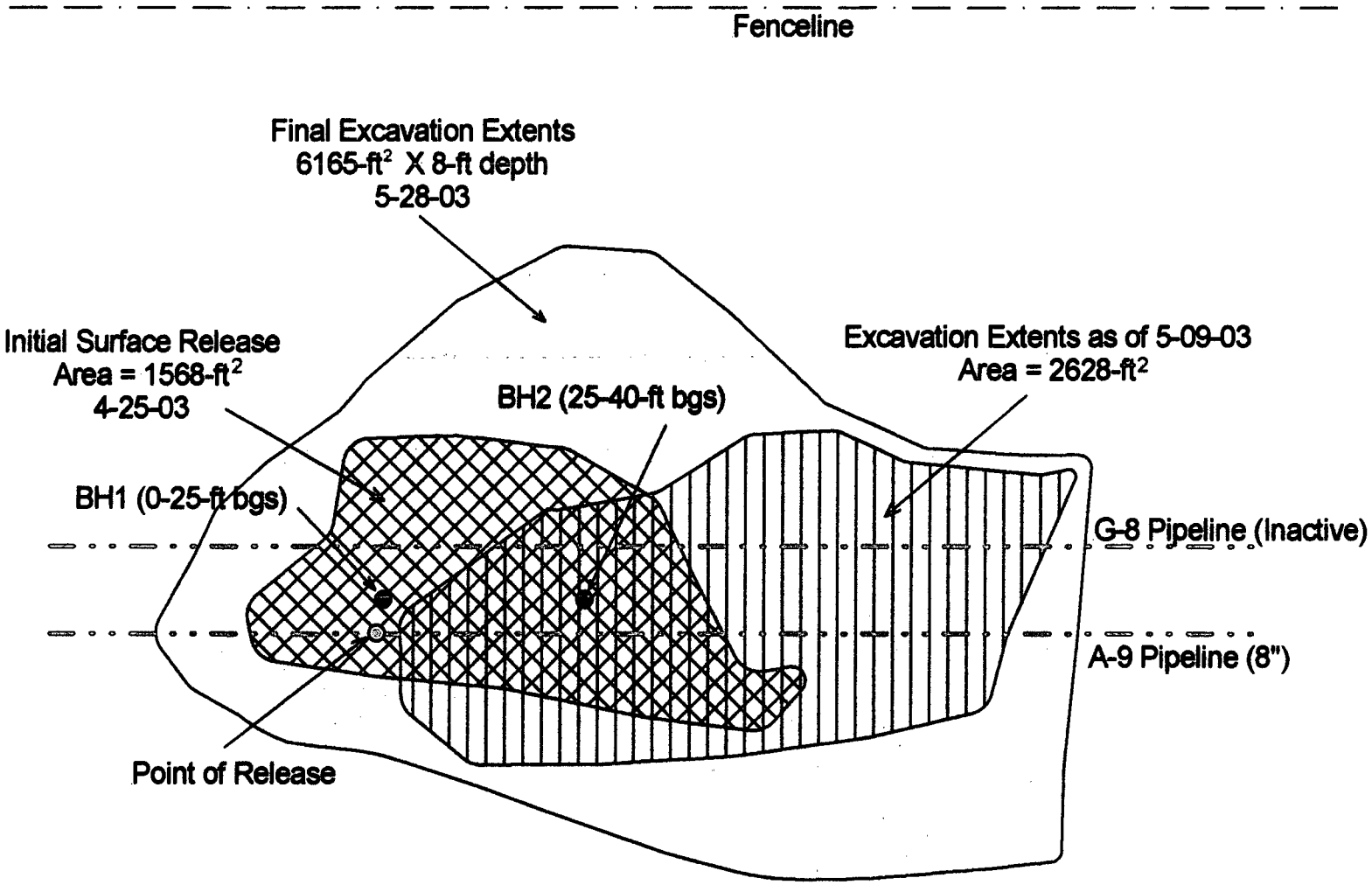
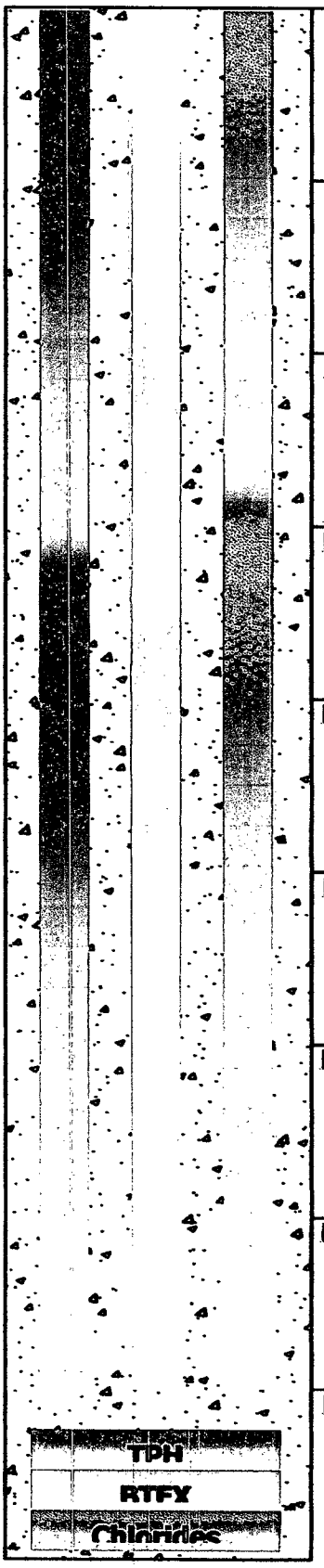


Plate 3 Release Site GPS Demarcations Duke Energy Field Services A-9 8-Inch 042403	Lea County, New Mexico UL-C Section 18 T21S R36E N32° 29' 9.70" W103° 18' 27.80" Elevation: 3625-ft amsl	DWG BY: John Good April - 2003 SCALE: 0 Feet 25	REVISED: May - 2003 PAGE 1 of 1 SIZE: ANSI A	N



Surface

TPH: 53000 ppm
BTEX: 239 ppm
Chlorides: >4500

5-ft
Red-Brown Sand

TPH: 30800 ppm
BTEX: 258 ppm
Chlorides: 4240 ppm

10-ft
Light Brown Sand/Caliche

TPH: 22100 ppm
BTEX: 173 ppm
Chlorides: 1120 ppm

15-ft
Light Brown Sand/Caliche

TPH: 32000 ppm
BTEX: 500 ppm
Chlorides: 178 ppm

20-ft
Light Brown Sand

TPH: 19950 ppm
BTEX: 298 ppm
Chlorides: 240 ppm

25-ft
Light Brown Sand

TPH: 1012 ppm
BTEX: 37 ppm

30-ft
Light Brown Sand

TPH: 73 ppm
BTEX: ND

35-ft
Light Brown Sand

TPH: ND
BTEX: ND

40-ft
Light Brown Sand

Plate 4
Vertical Contamination Profile
Duke Energy Field Services
A-9 8-Inch 042403

Lea County, New Mexico
UL-C Section 18 T21S R36E
N32° 29' 9.70" W103° 18' 27.80"
Elevation: 3625-ft amsl

DWG BY: John Good
May - 2003

SCALE: Not Applicable

REVISED:

PAGE 1 of 1

SIZE: ANSI A

Plate 5 - Soil Analysis Results (TPH, BTEX & Chlorides)

Duke Energy Field Services - A-9 8" - Excavation Sampling Results

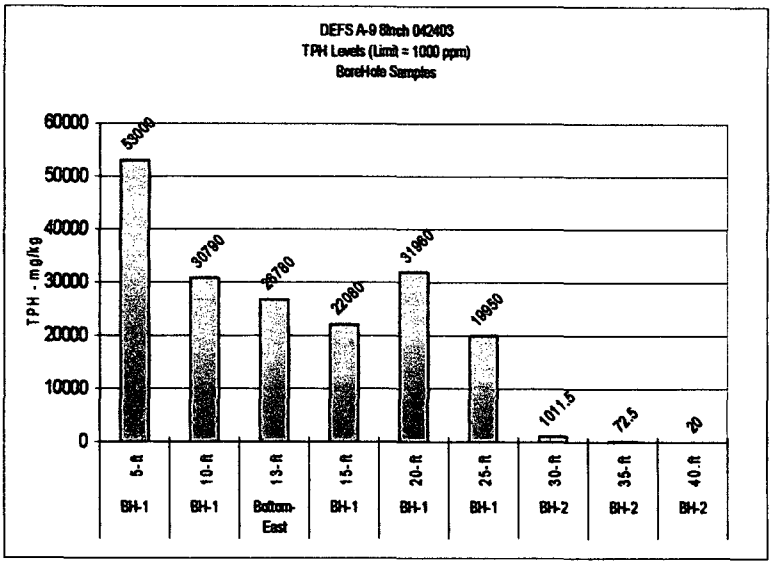
Bold highlighted cells indicate values in excess of the NMOCD remedial action guideline thresholds: TPH = 1000 mg/Kg; Benzene = 10 mg/Kg; BTEX = 50 mg/Kg; Cl = 250 + background

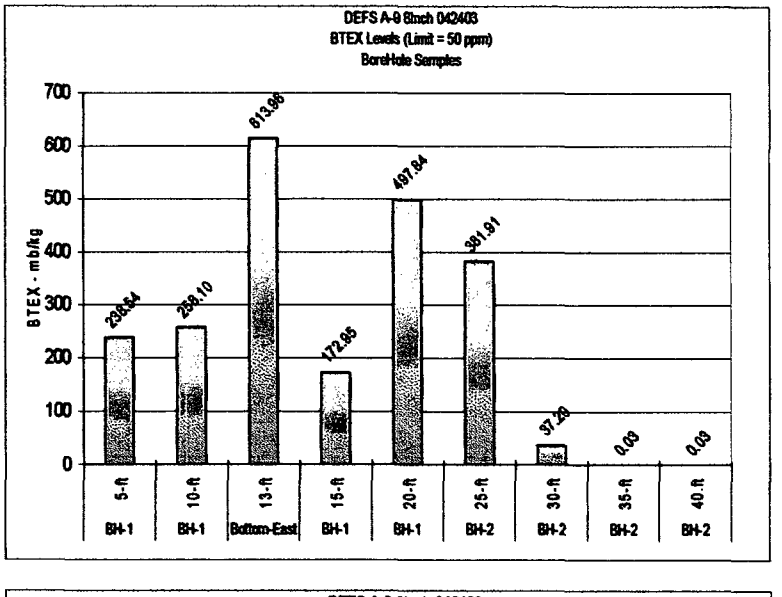
Sample Date	Excavation Sampling Area	Depth (ft - bgs[1])	SAMPLE ID#	GRO[3] mg/Kg	DRO[4] mg/Kg	TPH[5] mg/Kg	BTEX[6] mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Total Xylenes mg/Kg	Cl⁻ mg/Kg	SO_4 mg/Kg	pH
2-May	Borehole #1	5-ft	SDA985203BH1-5	3100	49800	53000	238.640	0.640	27.200	24.700	186.000			
2-May	Borehole #1	10-ft	SDA985203BH1-10	2390	28400	30790	258.100	0.600	30.600	26.900	200.000	4240		
1-May	BottomHole	13-ft	SDA98lin050103EDHG-13	7550	19200	26750	613.960	5.760	152.000	62.200	394.000	128		
2-May	Borehole #1	15-ft	SDA985203BH1-15	1680	20400	22080	172.950	0.050	10.600	17.300	148.000	1120		
2-May	Borehole #1	20-ft	SDA985203BH1-20	4660	27300	31960	497.840	1.140	64.200	61.500	351.000	178		
2-May	Borehole #1	25-ft	SDA985203BH1-25	1750	18200	19950	286.000	0.400	37.000	31.600	229.000	240		
23-May	Borehole #2	26-ft	SDA952303CBH-25	1990	7360	9360	381.910	1.510	85.000	38.400	257.000			
23-May	Borehole #2	30-ft	SDA952303CBH-30	56	956	1012	37.186	0.005	0.410	0.481	36.300			
23-May	Borehole #2	35-ft	SDA952303CBH-35	10	63	73	0.030	0.005	0.005	0.005	0.015			
23-May	Borehole #2	40.ft	SDA952303CBH-40	10	10	20	0.030	0.005	0.005	0.005	0.015			

[1] bgs = below ground surface [3] GRO - Gasoline Range Organics (Detection Limit = 10 mg/Kg) [4] DRO - Diesel Range Organics (Detection Limit = 10 mg/Kg)

[5] GRO - Gasoline Range Organics (Detection Limit = 10 mg/Kg) [4] DRO - Diesel Range Organics (Detection Limit = 10 mg/Kg) [5] TPH - Total Petroleum Hydrocarbon (GRO+DRO)

[6] BTEX = Sum of CoC's (Detection Limits = 0.005 mg/Kg; 0.015 mg/Kg) Note: Reported detection limits are considered "de minimus" values and are included in the TPH and BTEX summations.





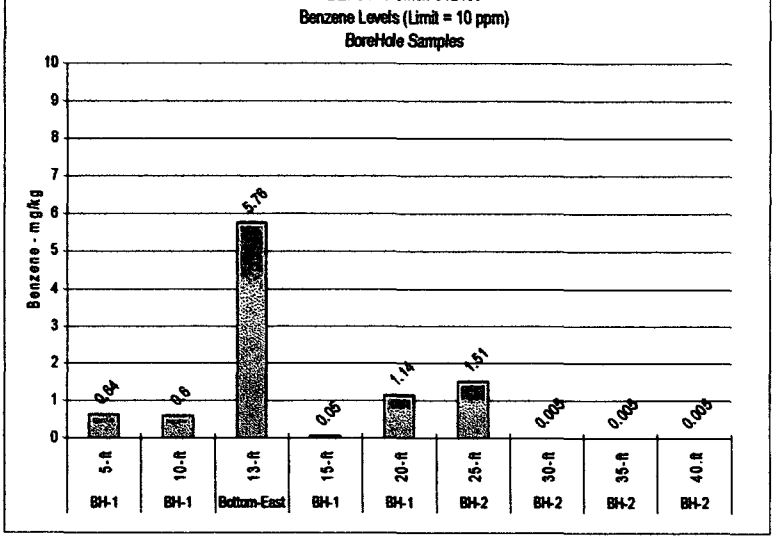
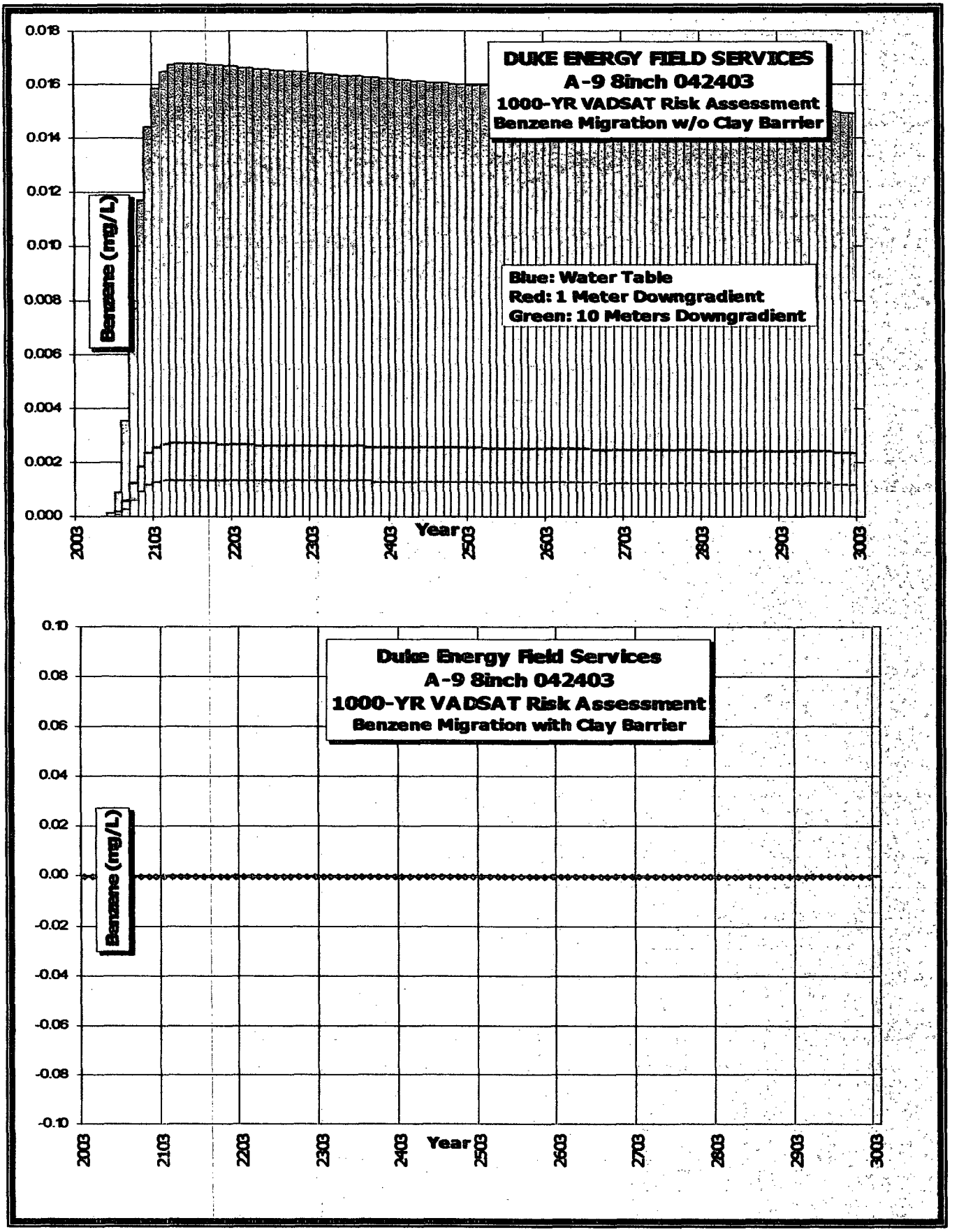


Plate 6 - VADSAT Benzene Risk Assessment Charts



VADSAT Data Table (Benzene without a clay barrier)

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2013	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2023	3.83E-10	5.30E-11	2.14E-11	1.19E-13
2033	1.13E-06	1.69E-07	7.55E-08	8.71E-10
2043	7.97E-05	1.21E-05	5.76E-06	9.74E-08
2053	8.85E-04	1.37E-04	6.68E-05	1.41E-06
2063	3.53E-03	5.51E-04	2.73E-04	6.58E-06
2073	7.70E-03	1.21E-03	6.06E-04	1.58E-05
2083	1.17E-02	1.85E-03	9.30E-04	2.56E-05
2093	1.44E-02	2.33E-03	1.15E-03	3.26E-05
2103	1.59E-02	2.57E-03	1.27E-03	3.65E-05
2113	1.65E-02	2.67E-03	1.32E-03	3.83E-05
2123	1.67E-02	2.71E-03	1.34E-03	3.89E-05
2133	1.68E-02	2.72E-03	1.35E-03	3.91E-05
2143	1.68E-02	2.72E-03	1.35E-03	3.92E-05
2153	1.68E-02	2.72E-03	1.35E-03	3.91E-05
2163	1.68E-02	2.71E-03	1.34E-03	3.91E-05
2173	1.67E-02	2.71E-03	1.34E-03	3.90E-05
2183	1.67E-02	2.65E-03	1.34E-03	3.90E-05
2193	1.67E-02	2.65E-03	1.34E-03	3.89E-05
2203	1.67E-02	2.64E-03	1.34E-03	3.89E-05
2213	1.66E-02	2.64E-03	1.33E-03	3.88E-05
2223	1.66E-02	2.64E-03	1.33E-03	3.88E-05
2233	1.66E-02	2.63E-03	1.33E-03	3.87E-05
2243	1.66E-02	2.63E-03	1.33E-03	3.87E-05
2253	1.65E-02	2.63E-03	1.33E-03	3.86E-05
2263	1.65E-02	2.62E-03	1.33E-03	3.85E-05
2273	1.65E-02	2.62E-03	1.32E-03	3.85E-05
2283	1.65E-02	2.61E-03	1.32E-03	3.84E-05
2293	1.65E-02	2.61E-03	1.32E-03	3.84E-05
2303	1.64E-02	2.61E-03	1.32E-03	3.83E-05
2313	1.64E-02	2.60E-03	1.32E-03	3.83E-05
2323	1.64E-02	2.60E-03	1.31E-03	3.82E-05
2333	1.64E-02	2.60E-03	1.31E-03	3.82E-05
2343	1.63E-02	2.59E-03	1.31E-03	3.81E-05
2353	1.63E-02	2.59E-03	1.31E-03	3.81E-05
2363	1.63E-02	2.59E-03	1.31E-03	3.80E-05
2373	1.63E-02	2.58E-03	1.31E-03	3.80E-05
2383	1.62E-02	2.58E-03	1.30E-03	3.79E-05
2393	1.62E-02	2.57E-03	1.30E-03	3.79E-05
2403	1.62E-02	2.57E-03	1.30E-03	3.78E-05
2413	1.62E-02	2.57E-03	1.30E-03	3.77E-05
2423	1.62E-02	2.56E-03	1.30E-03	3.77E-05
2433	1.61E-02	2.56E-03	1.29E-03	3.76E-05
2443	1.61E-02	2.56E-03	1.29E-03	3.76E-05
2453	1.61E-02	2.55E-03	1.29E-03	3.75E-05
2463	1.61E-02	2.55E-03	1.29E-03	3.75E-05
2473	1.60E-02	2.55E-03	1.29E-03	3.74E-05
2483	1.60E-02	2.54E-03	1.29E-03	3.74E-05
2493	1.60E-02	2.54E-03	1.28E-03	3.73E-05

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2503	1.60E-02	2.54E-03	1.28E-03	3.73E-05
2513	1.60E-02	2.53E-03	1.28E-03	3.72E-05
2523	1.59E-02	2.53E-03	1.28E-03	3.72E-05
2533	1.59E-02	2.53E-03	1.28E-03	3.71E-05
2543	1.59E-02	2.52E-03	1.28E-03	3.71E-05
2553	1.59E-02	2.52E-03	1.27E-03	3.70E-05
2563	1.58E-02	2.51E-03	1.27E-03	3.70E-05
2573	1.58E-02	2.51E-03	1.27E-03	3.69E-05
2583	1.58E-02	2.51E-03	1.27E-03	3.69E-05
2593	1.58E-02	2.50E-03	1.27E-03	3.68E-05
2603	1.58E-02	2.50E-03	1.26E-03	3.68E-05
2613	1.57E-02	2.50E-03	1.26E-03	3.67E-05
2623	1.57E-02	2.49E-03	1.26E-03	3.67E-05
2633	1.57E-02	2.49E-03	1.26E-03	3.66E-05
2643	1.57E-02	2.49E-03	1.26E-03	3.66E-05
2653	1.56E-02	2.48E-03	1.26E-03	3.65E-05
2663	1.56E-02	2.48E-03	1.25E-03	3.65E-05
2673	1.56E-02	2.48E-03	1.25E-03	3.64E-05
2683	1.56E-02	2.47E-03	1.25E-03	3.64E-05
2693	1.56E-02	2.47E-03	1.25E-03	3.63E-05
2703	1.55E-02	2.47E-03	1.25E-03	3.63E-05
2713	1.55E-02	2.46E-03	1.25E-03	3.62E-05
2723	1.55E-02	2.46E-03	1.24E-03	3.62E-05
2733	1.55E-02	2.46E-03	1.24E-03	3.61E-05
2743	1.55E-02	2.45E-03	1.24E-03	3.61E-05
2753	1.54E-02	2.45E-03	1.24E-03	3.60E-05
2763	1.54E-02	2.45E-03	1.24E-03	3.60E-05
2773	1.54E-02	2.44E-03	1.23E-03	3.59E-05
2783	1.54E-02	2.44E-03	1.23E-03	3.59E-05
2793	1.53E-02	2.44E-03	1.23E-03	3.58E-05
2803	1.53E-02	2.43E-03	1.23E-03	3.58E-05
2813	1.53E-02	2.43E-03	1.23E-03	3.57E-05
2823	1.53E-02	2.43E-03	1.23E-03	3.57E-05
2833	1.53E-02	2.42E-03	1.22E-03	3.56E-05
2843	1.52E-02	2.42E-03	1.22E-03	3.56E-05
2853	1.52E-02	2.42E-03	1.22E-03	3.55E-05
2863	1.52E-02	2.41E-03	1.22E-03	3.55E-05
2873	1.52E-02	2.41E-03	1.22E-03	3.54E-05
2883	1.52E-02	2.41E-03	1.22E-03	3.54E-05
2893	1.51E-02	2.40E-03	1.21E-03	3.53E-05
2903	1.51E-02	2.40E-03	1.21E-03	3.53E-05
2913	1.51E-02	2.40E-03	1.21E-03	3.52E-05
2923	1.51E-02	2.39E-03	1.21E-03	3.52E-05
2933	1.50E-02	2.39E-03	1.21E-03	3.51E-05
2943	1.50E-02	2.39E-03	1.21E-03	3.51E-05
2953	1.50E-02	2.38E-03	1.20E-03	3.50E-05
2963	1.50E-02	2.38E-03	1.20E-03	3.50E-05
2973	1.50E-02	2.38E-03	1.20E-03	3.49E-05
2983	1.49E-02	2.37E-03	1.20E-03	3.49E-05
2993	1.49E-02	2.37E-03	1.20E-03	3.48E-05

VADSAT Risk Assessment Criteria and Data (Benzene)

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+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +
+                                                                       +
+                        VADSAT Version 3.0                             +
+                                                                       +
+   A Monte Carlo Model for Assessing the Effects of Soil               +
+            Contamination on Groundwater Quality                       +
+                                                                       +
+                                                                       +
+                        Developed by:                                  +
+           Environmental Systems and Technologies Inc.                 +
+                 Blacksburg, Virginia                                  +
+              Tel: 703-552-0685, Fax: 703-951-5307                     +
+                                                                       +
+                                                                       +
+                             For                                       +
+               The American Petroleum Institute                        +
+                             1995                                      +
+                                                                       +
+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +
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PROJECT TITLE:DEFS A9 8inch 042403

SOURCE AND CHEMICAL DATA ****
DEPTHM, MEAN THICKNESS OF WASTE ZONE (m) = 12.19200

DEPSTD, STD.DEV. OF THICKNESS OF WASTE ZONE = 0.00000

AREAM, MEAN WASTE ZONE AREA (m^2) = 185.81000
STDA, STD.DEV. OF WASTE ZONE AREA = 0.00000

RLWM, MEAN L/W RATIO (-) = 1.00000
STDRLW, STD.DEV. OF L/W RATIO = 0.00000

CVRTHM, MEAN VALUE OF COVER THICKNESS (m) = 0.00000
CVRTHS, STD.DEV. OF COVER THICKNESS = 0.00000

KOCM, MEAN ORG. CARBON PARTITION COEF (cm^3/g)= 83.20000
STDKOC, STD.DEV. OF ORG.CARBON PARTITION COEF= 0.00000

FMOLM, MEAN INIT.VOL.FRAC. OF CONTAMINANT(-) = 0.00019
FMOLSTD, STD.DEV. OF VOL.FRAC. OF CONTAMINANT= 0.00000

CMFM, MASS OF CONTAMINANT PER MASS OF WASTE(mg/kg) = 6.00000
CMFSD, STD.DEV. OF MASS CONTAMINANT PER MASS WASTE = 0.00000

HCCONM, HYDCARBON MASS FRAC. IN WASTE (mg/kg)= 32000.00000
HCCONS, STD OF HYDCARBON MASS FRAC. IN WASTE = 0.00000

CHEMICAL SPECIES benzene

MOLW, MOLECULAR WT. OF CONTAMINANT (g/mole) = 78.10000

AVERMW, AVG. MOL. WT. OF OILY WASTE (g/mole) = 100.00000

RHO, DENSITY OF CONTAMINANT (g/cm^3) = 0.87600

RHOG, AVERAGE DENSITY OF HYDROCARBON (g/cm^3)= 0.90000

SOL, AQUEOUS SOLUB. OF CONTAMINANT (g/m^3) = 1790.00000

HENRYC, HENRY'S CONSTANT (-) = 0.23000

DIFFA, DIFFUSION COEF. IN FREE AIR (m^2/day) = 0.77000

HYDROGEOLOGICAL PROPERTIES

** UNSATURATED ZONE INPUT PARAMETERS **
GAMMAM, MEAN UNSAT ZONE DECAY COEF (1/day) = 0.00010
STDGAM, STD.DEV. OF UNSAT ZONE DECAY COEF = 0.00000

UNFOCM, MEAN UNSAT ZONE ORGANIC CARBON FRACTION (-) = 0.00000
UNFOCS, STD.DEV. OF UNSAT ZONE ORGANIC CARBON FRAC. = 0.00000

FKSW, MEAN SAT. CONDUCTIVITY (m/day) = 0.02900
STDFKS, STD.DEV. OF SAT. CONDUCTIVITY = 0.000

DISTM, MEAN DEPTH TO GROUNDWATER (m) = 15.24000
STDDST, STD.DEV. OF DEPTH TO GROUNDWATER = 0.00000

UNPORM, MEAN VADOSE ZONE POROSITY (-) = 0.38000
SUNPOR, STD.DEV. OF VADOSE ZONE POROSITY = 0.00000

PARNM, MEAN VALUE OF VG PARAMETER N (-) = 1.23000
SDPARN, STD.DEV. OF VG PARAMETER N = 0.00000

RESWCM, MEAN RESIDUAL WATER CONTENT (-) = 0.01110
RESWCS, STD.DEV. OF RESIDUAL WATER CONTENT = 0.00000

ALFINM = 0, UNSAT DISPERSIVITY CALCULATED INTERNALLY
** SATURATED ZONE INPUT PARAMETERS **

LAMBW, MEAN SAT. ZONE DECAY COEFF. (1/day) = 0.00010
SLAMB, STD.DEV. OF SAT. ZONE DECAY COEFF. = 0.00000

PORM, MEAN SAT. ZONE POROSITY (-) = 0.20000
STDPOR, STD.DEV. OF SAT. ZONE POROSITY = 0.00000

FOCM, MEAN SAT. ZONE ORG. CARBON FRAC. (-) = 0.00000
STDFOC, STD.DEV. SAT. ZONE ORG. CARBON FRAC.= 0.00000

ALRLTM, MEAN DISPERS, RATIO LONG/TRANSV. (-) = 3.00000
SALRLT, STD.DEV. OF DISP. RATIO LONG/TRANSV. = 0.00000

ALRTVM, MEAN DISPERS. RATIO TRANSV/VERT. (-) = 87.00000
SALRTV, STD.DEV. OF DISP. RATIO TRANSV/VERT. = 0.00000

CONDS, SAT. HYDRAULIC COND. (m/day) = 1.03000
SCONDS, STD.DEV. OF SAT HYDRAULIC COND. = 0.00000

GRADS, HYDRAULIC GRADIENT (m/m) = 0.02700
SGRADS, STD.DEV. OF HYDRAULIC GRADIENT = 0.00000

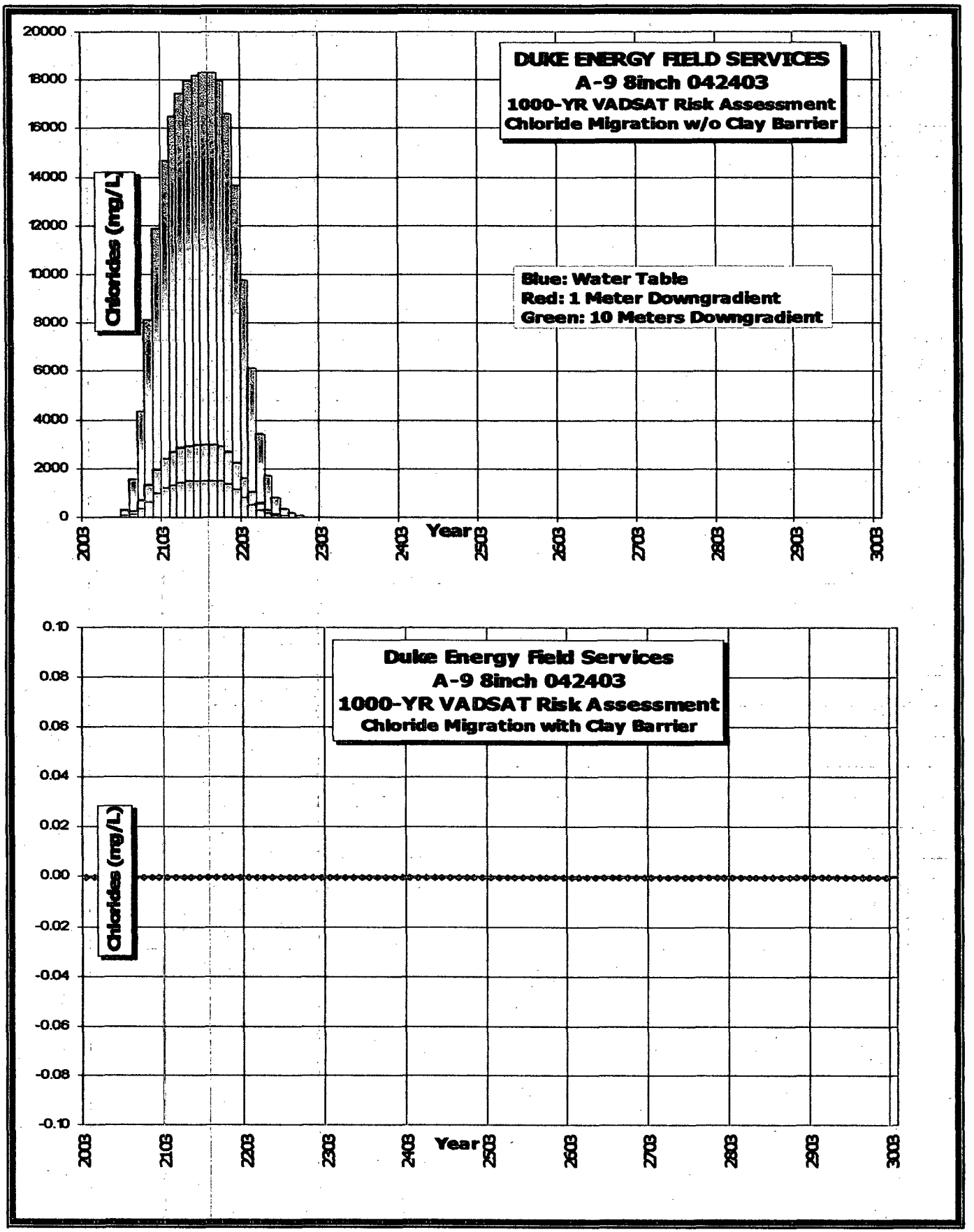
HMEAN, MEAN AQUIFER THICKNESS (m) = 15.24000
STDH, STD.DEV. OF AQUIFER THICKNESS = 0.00000

QINM, MEAN INFILTRATION RATE (m/day) = 0.00011
QINSTD, STD.DEV. OF INFILTRATION RATE = 0.00000

LOCATION OF RECEPTORS:

	X (M)	Y (M)	Z (M)
RECEPTOR(1)	1.0	0.0	0.0
RECEPTOR(2)	10.0	0.0	0.0
RECEPTOR(3)	100.0	0.0	0.0

Plate 7 - VADSAT Chlorides Risk Assessment Charts



VADSAT Data (Chlorides without a clay barrier)

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2013	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2023	4.83E-05	6.63E-06	2.70E-06	1.51E-08
2033	2.00E-01	2.96E-02	1.33E-02	1.54E-04
2043	1.94E+01	2.97E+00	1.40E+00	2.39E-02
2053	2.92E+02	4.58E+01	2.21E+01	4.70E-01
2063	1.54E+03	2.45E+02	1.20E+02	2.94E+00
2073	4.33E+03	6.93E+02	3.43E+02	9.15E+00
2083	8.15E+03	1.31E+03	6.51E+02	1.84E+01
2093	1.19E+04	1.91E+03	9.54E+02	2.80E+01
2103	1.47E+04	2.37E+03	1.19E+03	3.57E+01
2113	1.65E+04	2.66E+03	1.33E+03	4.07E+01
2123	1.75E+04	2.82E+03	1.42E+03	4.36E+01
2133	1.80E+04	2.90E+03	1.46E+03	4.50E+01
2143	1.82E+04	2.94E+03	1.48E+03	4.57E+01
2153	1.83E+04	2.96E+03	1.48E+03	4.60E+01
2163	1.83E+04	2.96E+03	1.49E+03	4.61E+01
2173	1.80E+04	2.91E+03	1.46E+03	4.55E+01
2183	1.66E+04	2.69E+03	1.35E+03	4.28E+01
2193	1.36E+04	2.22E+03	1.12E+03	3.62E+01
2203	9.78E+03	1.59E+03	8.06E+02	2.67E+01
2213	6.14E+03	1.00E+03	5.08E+02	1.72E+01
2223	3.43E+03	5.60E+02	2.84E+02	9.85E+00
2233	1.73E+03	2.83E+02	1.44E+02	5.08E+00
2243	8.05E+02	1.32E+02	6.72E+01	2.40E+00
2253	3.50E+02	5.74E+01	2.93E+01	1.06E+00
2263	1.44E+02	2.36E+01	1.20E+01	4.40E-01
2273	5.63E+01	9.24E+00	4.73E+00	1.74E-01
2283	2.12E+01	3.48E+00	1.78E+00	6.61E-02
2293	7.72E+00	1.27E+00	6.50E-01	2.43E-02
2303	2.73E+00	4.50E-01	2.31E-01	8.64E-03
2313	9.45E-01	1.56E-01	7.98E-02	3.01E-03
2323	3.20E-01	5.28E-02	2.71E-02	1.02E-03
2333	1.06E-01	1.74E-02	8.95E-03	3.41E-04
2343	3.32E-02	5.50E-03	2.84E-03	1.11E-04
2353	1.17E-02	1.90E-03	9.52E-04	3.43E-05
2363	3.91E-03	6.32E-04	3.17E-04	1.06E-05
2373	1.95E-03	3.16E-04	1.59E-04	4.93E-06
2383	1.95E-03	0.00E+00	0.00E+00	6.40E-09
2393	0.00E+00	0.00E+00	0.00E+00	2.02E-14
2403	0.00E+00	0.00E+00	0.00E+00	2.40E-19
2413	0.00E+00	0.00E+00	0.00E+00	2.54E-24
2423	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2433	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2443	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2453	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2463	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2473	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2483	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2493	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Year	Water Table	1 Meter Down Gradient	10 Meter Down Gradient	100 Meter Down Gradient
2503	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2513	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2523	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2533	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2543	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2553	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2563	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2573	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2583	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2593	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2603	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2613	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2623	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2633	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2643	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2653	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2663	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2673	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2683	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2693	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2703	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2713	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2723	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2733	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2743	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2753	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2763	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2773	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2783	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2793	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2803	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2813	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2823	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2833	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2843	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2853	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2863	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2873	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2883	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2893	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2903	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2913	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2923	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2933	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2943	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2953	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2963	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2973	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2983	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2993	0.00E+00	0.00E+00	0.00E+00	0.00E+00

VADSAT Risk Assessment Criteria and Data (Chlorides)

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+                                                                       +
+                        VADSAT Version 3.0                             +
+                                                                       +
+    A Monte Carlo Model for Assessing the Effects of Soil              +
+             Contamination on Groundwater Quality                      +
+                                                                       +
+                                                                       +
+                        Developed by:                                  +
+             Environmental Systems and Technologies Inc.               +
+                  Blacksburg, Virginia                                 +
+               Tel: 703-552-0685, Fax: 703-951-5307                    +
+                                                                       +
+                                                                       +
+                            For                                        +
+                The American Petroleum Institute                       +
+                            1995                                       +
+                                                                       +
+ + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + + +
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PROJECT TITLE:DEFS A9 8inch 042403

SOURCE AND CHEMICAL DATA ****
DEPTHM, MEAN THICKNESS OF WASTE ZONE (m) = 12.19200

DEPSTD, STD.DEV. OF THICKNESS OF WASTE ZONE = 0.00000

AREAM, MEAN WASTE ZONE AREA (m^2) = 185.81000
STDA, STD.DEV. OF WASTE ZONE AREA = 0.00000

RLWM, MEAN L/W RATIO (-) = 1.00000
STDRLW, STD.DEV. OF L/W RATIO = 0.00000

CVRTHM, MEAN VALUE OF COVER THICKNESS (m) = 0.00000
CVRTHS, STD.DEV. OF COVER THICKNESS = 0.00000

MEAN MASS FRACTION OF SALT IN WASTE (mg/kg)= 4239.90234
STD OF MASS FRACTION OF SALT IN WASTE = 0.00000

CZEROM, MEAN AQU. PHASE CONC OF SALT (g/m^3) = 18332.00000
CZEROS, STD.DEV. OF AQU. PHASE CONC. OF SALT = 0.00000

CHEMICAL SPECIES Sodium Chloride

HYDROGEOLOGICAL PROPERTIES

** UNSATURATED ZONE INPUT PARAMETERS **
GAMMAM, MEAN UNSAT ZONE DECAY COEF (1/day) = 0.00010
STDGAM, STD.DEV. OF UNSAT ZONE DECAY COEF = 0.00000

UNFOCM, MEAN UNSAT ZONE ORGANIC CARBON FRACTION (-) = 0.00000
UNFOCS, STD.DEV. OF UNSAT ZONE ORGANIC CARBON FRAC. = 0.00000

FKSW, MEAN SAT. CONDUCTIVITY (m/day) = 0.02900
STDFKS, STD.DEV. OF SAT. CONDUCTIVITY = 0.000

```
     DISTM, MEAN DEPTH TO GROUNDWATER (m)          =    15.24000
     STDDST, STD.DEV. OF DEPTH TO GROUNDWATER      =     0.00000

     UNPORM, MEAN VADOSE ZONE POROSITY (-)         =     0.38000
     SUNPOR, STD.DEV. OF VADOSE ZONE POROSITY      =     0.00000

     PARNM, MEAN VALUE OF VG PARAMETER N (-)       =     1.23000
     SDPARN, STD.DEV. OF VG PARAMETER N            =     0.00000

     RESWCM, MEAN RESIDUAL WATER CONTENT (-)       =     0.01110
     RESWCS, STD.DEV. OF RESIDUAL WATER CONTENT    =     0.00000

ALFINM = 0, UNSAT DISPERSIVITY CALCULATED INTERNALLY
     ** SATURATED ZONE INPUT PARAMETERS **

     LAMBW, MEAN SAT. ZONE DECAY COEFF. (1/day)    =     0.00010
     SLAMB, STD.DEV. OF SAT. ZONE DECAY COEFF.     =     0.00000

     PORM, MEAN SAT. ZONE POROSITY (-)             =     0.20000
     STDPOR, STD.DEV. OF SAT. ZONE POROSITY        =     0.00000

     FOCM, MEAN SAT. ZONE ORG. CARBON FRAC. (-)    =     0.00000
     STDFOC, STD.DEV. SAT. ZONE ORG. CARBON FRAC.= 0.00000

     ALRLTM, MEAN DISPERS, RATIO LONG/TRANSV. (-) =     3.00000
     SALRLT, STD.DEV. OF DISP. RATIO LONG/TRANSV. =     0.00000

     ALRTVM, MEAN DISPERS. RATIO TRANSV/VERT. (-) =    87.00000
     SALRTV, STD.DEV. OF DISP. RATIO TRANSV/VERT. =     0.00000

     CONDS, SAT. HYDRAULIC COND. (m/day)           =     1.03000
     SCONDS, STD.DEV. OF SAT HYDRAULIC COND.       =     0.00000

     GRADS, HYDRAULIC GRADIENT (m/m)               =    0.02700
     SGRADS, STD.DEV. OF HYDRAULIC GRADIENT        =    0.00000

     HMEAN, MEAN AQUIFER THICKNESS (m)             =    15.24000
     STDH, STD.DEV. OF AQUIFER THICKNESS           =     0.00000

     QINM, MEAN INFILTRATION RATE (m/day)          =     0.00011
     QINSTD, STD.DEV. OF INFILTRATION RATE         =     0.00000


     LOCATION OF RECEPTORS:

                  X (M)          Y (M)          Z (M)
   RECEPTOR( 1)    1.0           0.0            0.0
   RECEPTOR( 2)   10.0           0.0            0.0
   RECEPTOR( 3)  100.0           0.0            0.0
```

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised March 17, 1999

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☑ Initial Report ☐ Final Report

Name of Company **DUKE ENERGY FIELD SERVICES**	Contact **Paul Mulkey**
Address **11525 W. Carlsbad Hwy. Hobbs, NM 88240**	Telephone No. **505-397-5716**
Facility Name **A-9 8-Inch**	Facility Type **Natural Gas Gathering Pipeline**

Surface Owner	Mineral Owner	Lease No.
BLM	**NA**	**NA**

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from South Line	Feet from West Line	Longitude	Latitude	County:
C	**18**	**21S**	**36E**	**5243**	**1500**	**W103° 18' 27.80"**	**N32° 29' 9.70"**	**Lea**

NATURE OF RELEASE

Type of Release **Natural Gas release and associated liquid components**	Volume of Release **30 bbl**	Volume Recovered **15 bbl**
Source of Release **8" Steel Pipeline**	Date and Hour of Occurrence **4/24/2003**	Date and Hour of Discovery **4/24/03**
Was Immediate Notice Given? ☑ Yes ☐ No ☐ Not Required	If YES, To Whom? **Larry Johnson (NMOCD-Hobbs)**	
By Whom? **Stan Shaver (DEFS)**	Date and Hour **4/24/03 3:00 PM**	
Was a Watercourse Reached? ☐ Yes ☑ No	If YES, Volume Impacting the Watercourse. **NA**	

If a Watercourse was Impacted, Describe Fully.*
NA

Describe Cause of Problem and Remedial Action Taken.*
Internally Corroded pipeline, repaired by clamping leak

Describe Area Affected and Cleanup Action Taken.*
~1568-ft^2 surface area affected. 15-bbl of NGL recovered from ~30-bbl release. RCRA Exempt Non-hazardous contaminated soil above remedial goals will be remediated on-site or excavated and disposed of by EPI.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature:	OIL CONSERVATION DIVISION
Printed Name: **John Good**	Approved by District Supervisor:
Title: **EPI - Environmental Consultant**	Approval Date: / Expiration Date:
Date: **4/28/03** Phone: **505-397-5716**	Conditions of Approval: ☐ Attached

Duke Energy Field Services	Incident Date and NMOCD Notified? 4/24/03 4/24/03 3:00 PM
SITE: A-9 8-Inch	Assigned Site Reference # 042403
Company:	DUKE ENERGY FIELD SERVICES
Street Address:	5805 East Highway 80
Mailing Address:	11525 W. Carlsbad Hwy.
City, State, Zip:	Hobbs, NM 88240
Representative:	Paul Mulkey
Representative Telephone:	505-397-5716
Telephone:	
Fluid volume released (bbls): 30	Recovered (bbls): 15
>25 bbls: Notify NMOCD verbally within 24 hrs and submit form C-141 within 15 days.	
5-25 bbls: Submit form C-141 within 15 days (Also applies to unauthorized releases of 50-500 mcf Natural Gas)	
Leak, Spill, or Pit (LSP) Name:	# 042403
Source of contamination:	8" Steel Pipeline
Land Owner, i.e., BLM, ST, Fee, Other:	BLM 620 E. Green St, Carlsbad, NM 88220
LSP Dimensions:	30' x 60' (GPS Site Diagram attached)
LSP Area:	1,568 -ft^2
Location of Reference Point (RP):	
Location distance and direction from RP:	
Latitude:	N32° 29' 9.70"
Longitude:	W103° 18' 27.80"
Elevation above mean sea level:	3625 -ft amsl
Feet from South Section Line:	5243
Feet from West Section Line:	1500
Location - Unit and 1/4 1/4: UL-	C NE 1/4 of NW 1/4
Location - Section:	18
Location - Township:	21S
Location - Range:	36E
Surface water body within 1000' radius of Site:	0
Surface water body within 1000' radius of Site:	0
Domestic water wells within 1000' radius of Site:	0
Domestic water wells within 1000' radius of Site:	0
Agricultural water wells within 1000' radius of Site:	0
Agricultural water wells within 1000' radius of Site:	0
Public water supply wells within 1000' radius of Site:	0
Public water supply wells within 1000' radius of Site:	0
Depth (ft) from land surface to ground water (DG):	106
Depth (ft) of contamination (DC):	10
Depth (ft) to ground water (DG - DC = DtGW):	96

1. Ground Water	2. Wellhead Protection Area	3. Distance to Surface Water Body
If Depth to GW <50 feet: *20 points*	If <1000' from water source, or, <200' from private domestic water source: *20 points*	<200 horizontal feet: 20 points
If Depth to GW 50 to 99 feet: *10 points*		200-100 horizontal feet: 10 points
If Depth to GW >100 feet: *0 points*	If >1000' from water source, or, >200' from private domestic water source: *0 points*	>1000 horizontal feet: 0 points
Ground water Score: 10	*Wellhead Protection Area Scor 0*	*Surface Water Score: 0*
Site Rank (1+2+3) = 10		

Total Site Ranking Score and Acceptable Concentrations

Parameter	20 or >	**10**	0
Benzene[1]	10 ppm	**10 ppm**	10 ppm
BTEX[1]	50 ppm	**50 ppm**	50 ppm
TPH	100 ppm	**1000 ppm**	5000 ppm

[1]100 ppm field VOC headspace measurement may be substituted for lab analysis