1R - 273

REPORTS

DATE:

1999

Highlander Environmental Corp.

Midland, Texas

April 27, 1999

Mr. Wayne Price
Environmental Bureau
Oil Conservation Division
New Mexico Energy, Minerals and Natural Resources Division
2040 S. Pacheco
Santa Fe, New Mexico 87505

Re: Report on Semi-Annual Sampling of Former Greenhill Petroleum Landfarm, Lovington Paddock/San Andres Unit, Lea County, New Mexico, Prepared for Titan Resources, L.P.

Dear Wayne:

Enclosed is a copy of the report for the above-mentioned project. I appreciate your continued interest and involvement in these Titan projects. Please contact me if you have any questions or require any additional information.

Very truly yours,

Tim Reed

Timothy M. Reed, REM
Vice President

1910 N. Big Spring • Midland, Texas 79705 • (915) 682-4559 • Fax (915) 682-3946

NEW MEXICO ENERGY, MINERALS
& NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

June 12, 1999

CERTIFIED MAIL
RETURN RECEIPT NO. Z 357 870 137

Mr. Ron Lechwar
Titan Resources, Inc.
500 W. Texas
Suite 500
Midland, Tx 79701

Re: Investigation and Remediation of former Greenhill Petroleum Landfarm, Lovington Paddock/San Andres Unit, NE/4 of Section 1, Ts17s-R36e, Lea County, New Mexico.

Dear Mr. Lechwar:

The New Mexico Oil Conservation Division (NMOCD) is in receipt of the Report on Semi-Annual Sampling dated April 27, 1999 for the above captioned site submitted by Highlander Environmental Corp. in which closure is requested. The NMOCD hereby denies your request for closure at this time. In order to further evaluate your request please provide to NMOCD the following information:

1. Please provide a legal surveyed point (to nearest foot) from approximately the center of the landfarm.

2. Please provide another round of sampling from the landfarm area. Samples shall be tested for the constituents of concern i.e. BTEX, TPH, Lead etc. Titan will notify the OCD Santa Fe office and the OCD District office at least 48 hours in advance of all scheduled activities such that the OCD has the opportunity to witness the events and/or split samples during OCD's normal business hours.

3. Please provide to NMOCD a linear regression curve showing time vs remaining constituents levels. Please plot existing data and extrapolate into the future.

4. Please provide a copy of the EPA/CERCLA OSWER Dir. 9355.4-02 Sept 7, 1989.

5. Please provide land status ownership.

6. Please provide a plan or rational i.e. model etc. as to how current or future landowners will be protected if they excavate in this area.

Please provide the above information by December 1, 1999, If you require any further information or assistance please do not hesitate to write or call me at (505-827-7155).

Sincerely Yours,

Wayne Price-Pet. Engr. Spec.
Environmental Bureau

7/9/99 2PM
TELE CON: IKE T. (HIGHLANDER)
OK TO ELIMINATE BTEX,
GPS - OK for ITEM #1.
WAYNE PRICE
Ike

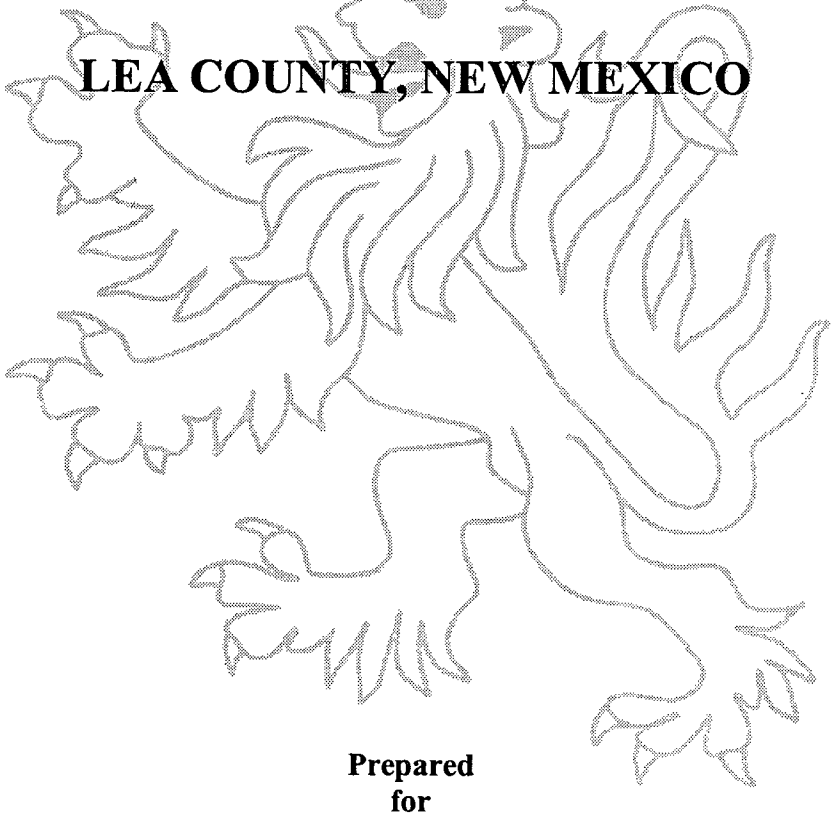
cc: OCD Hobbs District Office
Tim M. Reed- Highlander

SEMI-ANNUAL SAMPLING

OF

FORMER GREENHILL PETROLEUM LANDFARM
LOVINGTON PADDOCK/SAN ANDRES UNIT

LEA COUNTY, NEW MEXICO



Prepared
for

TITAN RESOURCES, L.P.

APRIL, 1999

Highlander Environmental Corp.

Midland, Texas

SEMI-ANNUAL SAMPLING
OF
FORMER GREENHILL PETROLEUM LANDFARM
LOVINGTON PADDOCK / SAN ANDRES UNIT
LEA COUNTY, NEW MEXICO

Prepared For

TITAN RESOURCES, L.P.

1.0 INTRODUCTION

The purpose of this report is to detail the findings of semi-annual soil sampling of a landfarm located in the Lovington Paddock / San Andres Unit in the NE/4 of Section 1, T-17-S, R-36-E, Lea County, New Mexico. An investigation report and workplan for this landfarm was previously submitted (May 1998) and approved by the New Mexico Oil Conservation Division (OCD) by letter dated June 6, 1998. This work is being performed for Titan Resources, L.P. (Titan).

2.0 BACKGROUND

Titan purchased production in the Lovington Paddock / San Andres Field in December 1997 from Pioneer Natural Resources (Pioneer). Pioneer had acquired this property from Greenhill Petroleum in early 1997. Conveyed along with this production was an ongoing bioremediation (landfarm) area at the Central Production Facility, which Greenhill had operated since 1994. This landfarm had been approved by the New Mexico Oil Conservation Division (OCD) to treat sludges and sediments from two open topped tanks and one unlined pit.

On March 9, 1998, Lynn Ward with Highlander supervised the investigation of the landfarm area. The site was segregated into six areas as shown on the attached Figure 2. Discrete soil samples were taken with a backhoe at depths of 0-1.0', 3.0' and 5.0' in each of the six areas (18 samples in all). The prior location of the removed north and south pits (tanks) were ascertained and it was determined that only the north pit area was accessible. The south pit area is currently the site of a 5000-barrel storage tank. A

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backhoe trench was excavated in the area of the removed north pit, and samples were taken at 0-1.0', 3.0' and 5.0' below surface and analyzed for total lead. The results indicated that there was no residual lead contamination in the area of the removed north pit. The following table lists the analytical results for the landfarm area for the March 8, 1998 sampling event:

Table 1.

(All results in mg/kg)

Location	0-1.0'	3.0'	5.0'
Area 1	Pb 7.0 BTEX <0.050 TPH 11,900	Pb 5.2 BTEX <0.050 TPH 96.9	Pb <5.0 BTEX <0.050 TPH 38.5
Area 2	Pb 13.0 BTEX 0.435 TPH 21,900	Pb <5.0 BTEX 1.66 TPH 14,100	Pb <5.0 BTEX <0.050 TPH 139
Area 3	Pb 15.0 BTEX <0.050 TPH 8,200	Pb <5.0 BTEX <0.050 TPH 161	Pb <5.0 BTEX <0.050 TPH 139
Area 4	Pb 15.0 BTEX <0.050 TPH 7,120	Pb <5.0 BTEX <0.050 TPH 916	Pb <5.0 BTEX <0.050 TPH 235
Area 5	Pb 22.0 BTEX <0.050 TPH 16,900	Pb <5.0 BTEX <0.050 TPH 121	Pb <5.0 BTEX <0.050 TPH 12.5
Area 6	Pb 7.6 BTEX <0.050 TPH 4,240	Pb <5.0 BTEX <0.050 TPH 133	Pb <5.0 BTEX <0.050 TPH <10

BTEX levels were below method detection limits for all samples except the 0-1.0' and 3.0' samples in Area 2, which exhibited total BTEX levels of 0.435 and 1.66 mg/kg

respectively. No benzene was detected in either sample. These levels are well below the NMOCD RRAL level of 50 mg/kg total BTEX.

TPH levels were high in the 0-1.0' samples, ranging from 4,240 mg/kg to 21,900 mg/kg, however, all samples were below 100 mg/kg in the 3.0' sample, with the exception of Area 2. The TPH levels in this area did decrease dramatically from 14,100 mg/kg in the 3.0' sample to 139 mg/kg in the 5.0' sample.

3.0 LEAD IN SOILS

Original testing of a composite sample of soil from the landfarm indicated a total lead level of 37.3 mg/kg. Additionally, Toxicity Characteristic Leachate Procedure (TCLP) testing did not indicate any leachability for the lead in this soil. Subsequent testing for lead has shown no lead levels above the test method detection in samples from 5.0' below surface and only one sample from the 3.0' level was above the test method detection limit (5.2 mg/kg). It is obvious that the lead content of the shallow soils is not leaching into the deeper soils at the landfarm. Further, if you multiply the target groundwater concentration by what is considered to be a conservative Concentration Reduction Factor (CRF) of 100, to yield the maximum theoretical contaminant concentration in the soil leachate (in mg/L), the result would be 5 mg/L of lead **leachate**. The soils at 3.0' do not exceed 5 mg/kg of **Total** Lead. In other words, the lead would have to be 100% soluble in order to reach the 5 mg/L leachate parameter. Given the relative insolubility of lead and the depth to groundwater in this area, it is virtually impossible for the lead levels found in the near surface soils to impact groundwater. As for soil levels in the near surface soils, the highest total lead concentration (22 mg/kg) is well below the soil cleanup level of 500 to 1,000 mg/kg, established by EPA for residential soil cleanup at CERCLA sites. (OSWER Directive 9355.4-02, September 7, 1989).

4.0 REMEDIATION

Due to the high TPH levels found in the 3.0' sample, the soils in Area 2 were turned to a depth of approximately 36" to 42" in order to bring the deeper contamination to the surface for treatment. All of the landfarm area soils were treated with a high

nitrogen content fertilizer and watered. The shallow surface soils across the entire landfarm have been periodically watered and tilled to a depth of approximately 18".

5.0 SAMPLING AND ANALYSIS

The landfarm was re-sampled by Lynn Ward on January 22, 1999. In Areas 1,3,4,5 and 6, composite samples were taken from 0-1.0'. Composite samples were taken from 0-1.0' and 2.0' in Area 2. The results are summarized in Table 2.

Table 2.

(All results for TPH in mg/kg; March 8, 1998 sample results in parentheses)

Location	0-1.0'	2.0'
Area 1	10,200 (11,900)	N/A
Area 2	12,900 (21,900)	5,790 (14,100)
Area 3	3,200 (8,200)	N/A
Area 4	4,900 (7,100)	N/A
Area 5	8,910 (16,900)	N/A
Area 6	8,150 (4,240)	N/A

N/A: Not Analyzed

6.0 CONCLUSIONS AND RECOMMENDATIONS

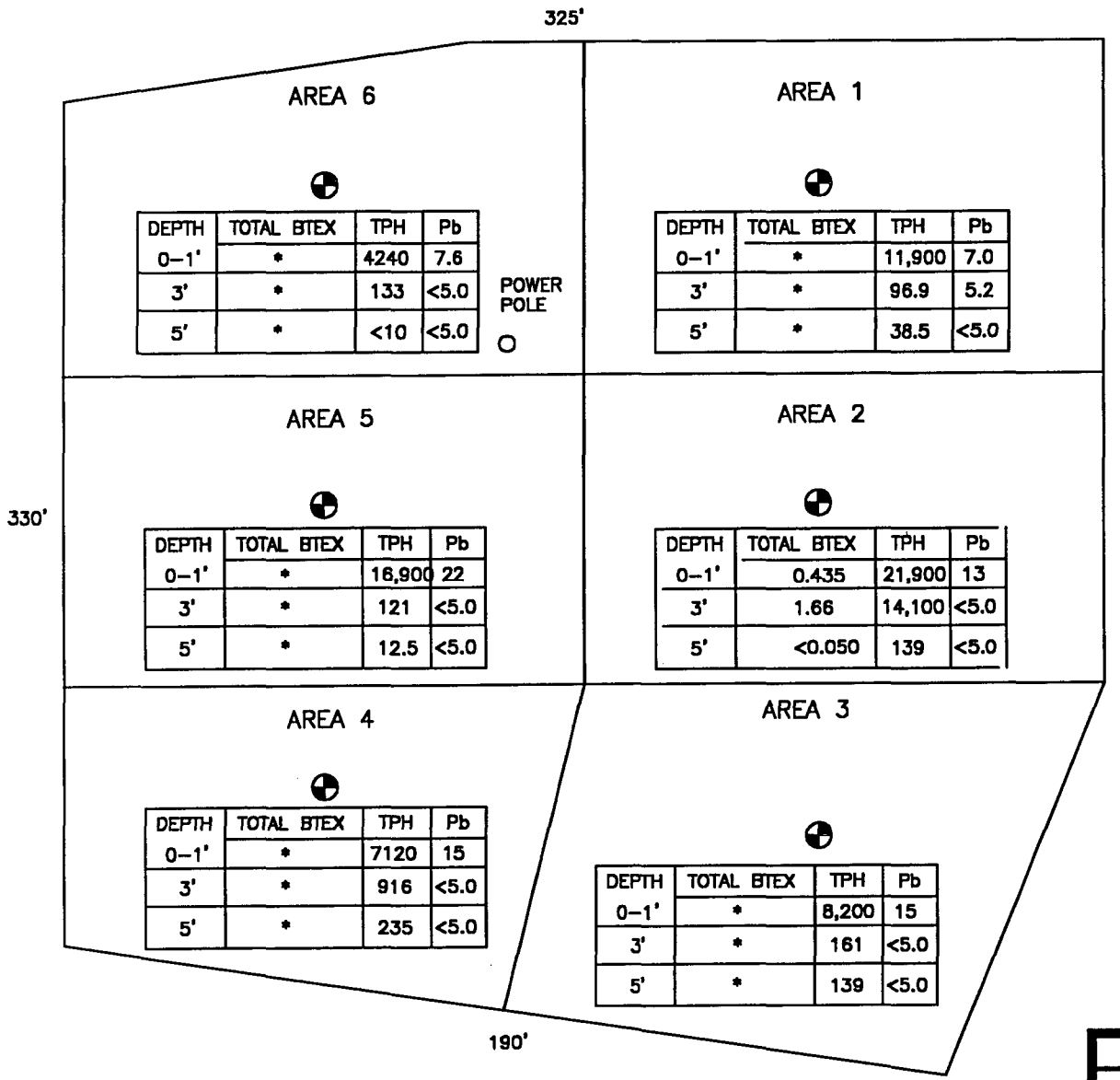
1. The analytical results indicate TPH reduction of approximately 50% or more for most areas.
2. Original testing of a composite sample of soil from the landfarm indicated a total lead level of 37.3 mg/kg. Additionally, Toxicity Characteristic Leachate Procedure (TCLP) testing did not indicate any leachable lead in this soil. Subsequent testing for lead has shown no lead levels above the test method detection in samples from 5.0' below surface, and only one sample from the 3.0' level was above the test method detection limit (5.2 mg/kg). It is obvious that the lead content of the shallow soils is not leaching into the deeper soils at the landfarm. Further, if you multiply the

target groundwater concentration by what is considered to be a conservative Concentration Reduction Factor (CRF) of 100, to yield the maximum theoretical contaminant concentration in the soil leachate (in mg/L) the result would be 5 mg/L of lead **leachate**. The soils at 3.0' do not exceed 5 mg/kg of **Total** Lead. In other words, the lead would have to be 100% soluble in order to reach the 5 mg/L leachate parameter. Given the relatively insolubility of lead and the depth to groundwater in this area, it is virtually impossible for the lead levels found in the near surface soils to impact groundwater. As for soil levels in the near surface soils, the highest total lead concentration (22 mg/kg) is below the soil cleanup level of 500 to 1,000 mg/kg, established by EPA for residential soil cleanup at CERCLA sites. (OSWER Directive 9355.4-02, September 7, 1989).

3. Considering the absence of any BTEX constituents, the significant reduction in TPH levels, the absence of deep hydrocarbon impact and the fact that the soil TPH levels will only continue to improve over time, we respectfully request that this site be considered for closure.

Respectfully Submitted,
Highlander Environmental Corp.

By: Tim Reed
Timothy M. Reed, REM
Vice President



DEPTH	TOTAL BTEX	TPH	Pb
0–1'	*	4240	7.6
3'	*	133	<5.0
5'	*	<10	<5.0

DEPTH	TOTAL BTEX	TPH	Pb
0–1'	*	11,900	7.0
3'	*	96.9	5.2
5'	*	38.5	<5.0

DEPTH	TOTAL BTEX	TPH	Pb
0–1'	*	16,900	22
3'	*	121	<5.0
5'	*	12.5	<5.0

DEPTH	TOTAL BTEX	TPH	Pb
0–1'	0.435	21,900	13
3'	1.66	14,100	<5.0
5'	<0.050	139	<5.0

DEPTH	TOTAL BTEX	TPH	Pb
0–1'	*	7120	15
3'	*	916	<5.0
5'	*	235	<5.0

DEPTH	TOTAL BTEX	TPH	Pb
0–1'	*	8,200	15
3'	*	161	<5.0
5'	*	139	<5.0

* = NON DETECTABLE

SAMPLE DATE: 3/9/98

NOT TO SCALE

DATE: 4/2/98
DWN. BY: JDA
FILE: S:\TITAN 1998\ SITE PLAN

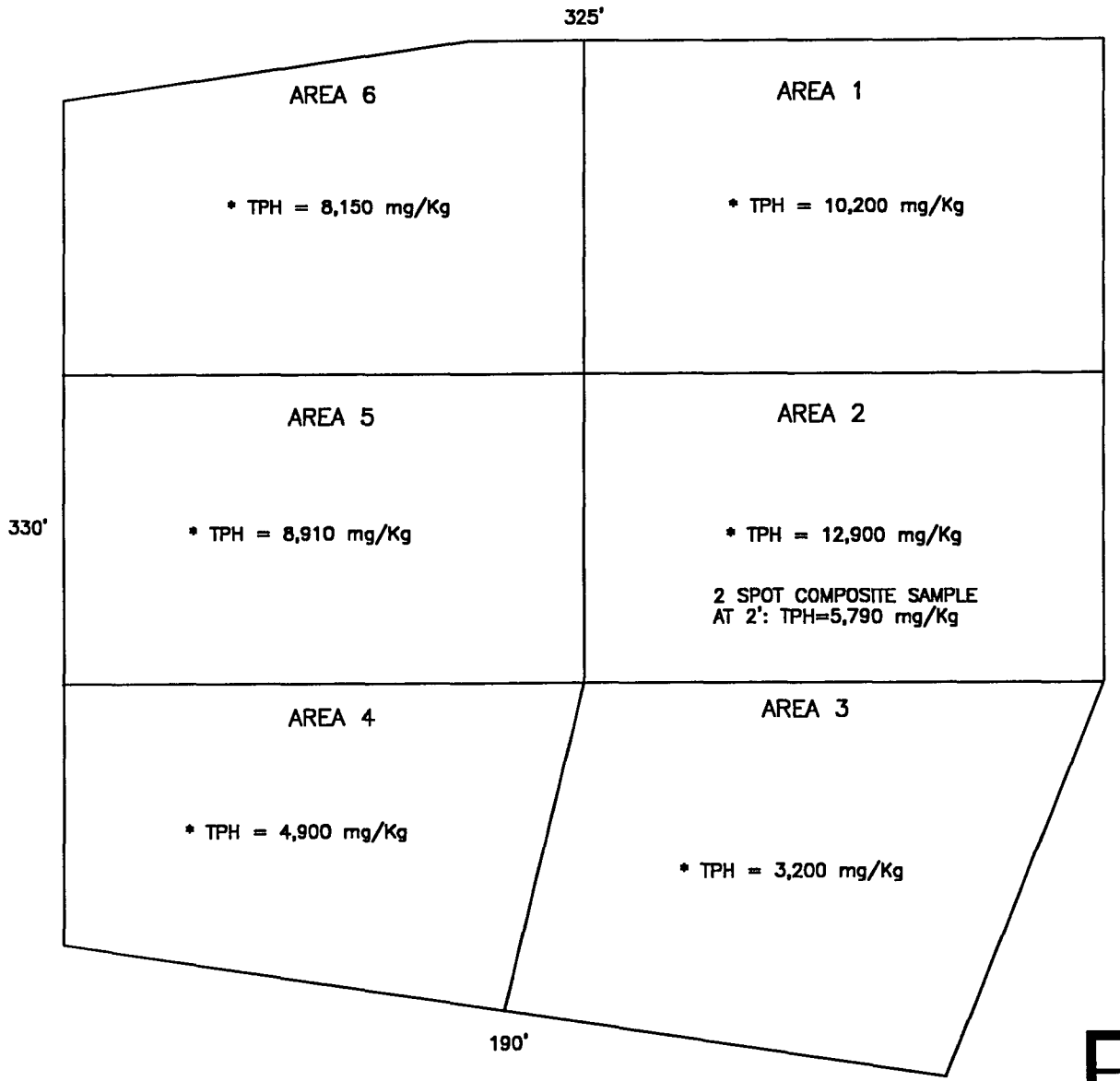
FIGURE NO. 1

LEA COUNTY, NEW MEXICO

TITAN RESOURCES, L.P.

GREENHILL LANDFARM
LOVINGTON PADDOCK/SAN ANDRES

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS



* = 4 SPOT COMPOSITE SAMPLE FROM 0–1'

SAMPLE DATE: 1/21/99

NOT TO SCALE

DATE: 4/13/99
DWN. BY: JDA
FILE:

FIGURE NO. 2

LEA COUNTY, NEW MEXICO

TITAN RESOURCES, L.P.

GREENHILL LANDFARM
LOVINGTON PADDOCK/SAN ANDRES

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

TRACE ANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

ANALYTICAL RESULTS FOR
HIGHLANDER ENVIRONMENTAL SERVICES
Attention: Tim Reed
1910 N. Big Spring St.
Midland TX 79705

Date: Apr 15, 1999
Date Rec: 1/22/99
Project: 1084
Proj Name: Greenhill Landfarm
Proj Loc: N/A

Lab Receiving # : 9901000301
Sampling Date: 1/21/99
Sample Condition: Intact and Cool
Sample Received By: VW

TA#	Field Code	MATRIX	TRPHC (mg/L)
117300	Area 1 @ 0-1'	Soil	10,200
117301	Area 2 @ 0-1'	Soil	12,900
117302	Area 2 @ 2'	Soil	5,790
117303	Area 3 @ 0-1'	Soil	3,200
117304	Area 4 @ 0-1'	Soil	4,900
117305	Area 5 @ 0-1'	Soil	8,910
117306	Area 6 @ 0-1'	Soil	8,150
Method			<10.0
Reporting Limit			10
QC			94
RPD			2
% Extraction Accuracy			98
% Instrument Accuracy			94

TEST	PREP METHOD	PREP DATE	ANALYSIS METHOD	ANALYSIS COMPLETED	CHEMIST	QC (mg/L	SPIKE (mg/L)
TRPHC	EPA 3550B	1/25/99	EPA 418.1	1/25/99	MF	100	250

Director, Dr. Blair Leftwich

4-15-99
Date

301

Analysis Request and Chain of Custody Record

HIGHLANDER ENVIRONMENTAL CORP.

1910 N. Big Spring St.
Midland, Texas 79705

(915) 682-4559 Fax (915) 682-3946

PAGE: 1 OF: 1

CLIENT NAME: Titan

SITE MANAGER: Lynn Ward

PROJECT NO.: 1084

PROJECT NAME: Greenhill Landfarm

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8020/602	MTBE 8020/602	TPH 418.1	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	BOD, TSS, pH, TDS, Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)
117300	1/21/99	10:00	S	X		Area 1 @ 0-1'	1				X				X														
301	1/21/99	10:20	S	X		Area 2 @ 0-1'	1				X				X														
302	1/21/99	12:25	S	X		Area 2 @ 2'	1				X				X														
303	1/21/99	10:50	S	X		Area 3 @ 0-1'	1				X				X														
304	1/21/99	11:30	S	X		Area 4 @ 0-1'	1				X				X														
305	1/21/99	11:55	S	X		Area 5 @ 0-1'	1				X				X														
306	1/21/99	12:05	S	X		Area 6 @ 0-1'	1				X				X														

ANALYSIS REQUEST (Circle or Specify Method No.)

RELINQUISHED BY: (Signature) Lynn Ward Date: 1/21/99 Time: 3:30 PM

RECEIVED BY: (Signature) Helen Shelton Date: 1/21/99 Time: 3:30 PM

SAMPLED BY: (Print & Sign) Lynn Ward Date: 1/21/99 Time: 3:30

RELINQUISHED BY: (Signature) Helen Shelton Date: 1/21/99 Time: 6:00 PM

RECEIVED BY: (Signature) Date: Time:

SAMPLE SHIPPED BY: (Circle) FEDEX BUS UPS HAND DELIVERED AIRBILL # 139394940 OTHER:

RELINQUISHED BY: (Signature) Date: Time:

RECEIVED BY: (Signature) Date: Time:

RECEIVING LABORATORY: Trace Analysis

ADDRESS:

CITY: Lubbock STATE: TX ZIP:

CONTACT: PHONE:

RECEIVED BY: (Signature) Jack Wondra

DATE: 1-22-99 TIME: 9:30a 40

HIGHLANDER CONTACT PERSON: Tim Reed

Results by: ASAP-please

RUSH Charges Authorized: Yes (No)

SAMPLE CONDITION WHEN RECEIVED: High tph. (WORD)

MATRIX: W-Water (S-Soil) SD-Solid A-Air SL-Sludge O-Other

REMARKS:

1/26/99

White original copy to Highlander Environmental Corp. - Project Manager retains pink copy - Accounting receives Gold copy.