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REPORTS

DATE:

2001

12366



Highlander Environmental Corp.

Midland, Texas

April 25, 2000

IR-366

Ms. Donna Williams
Environmental Bureau
Oil Conservation Division
1625 N. French Drive
P.O. Box 1980
Hobbs, New Mexico 88240

RE: Assessment and Closure Report for the Spill located at the Pogo Shell State #3 Well, Lea County, New Mexico

Dear Ms. Williams,

Highlander Environmental Corp. (Highlander) was contacted by Pogo Producing Company (Pogo) to assess a spill, which occurred at the Pogo Shell State Lease Well #3 in Lea County, New Mexico. The Site is located in Section 36, Township 22 South, Range 32 East. According to published data, groundwater in the area of the Site is sparse and no water wells are located in Section 36, Township 22 South, Range 32 East. Located in Township 23 South, Range 32 East, the published data indicated water wells are to the top of the Triassic at depths greater than 500 feet below surface. In addition, the New Mexico Engineers Office has been contacted to confirm the groundwater depth at the Site.

A risk-based evaluation was performed for the Site in accordance with the New Mexico Oil Conservation Division (NMOCD) Guidelines for Remediation of Leaks, Spills and Releases, dated August 13, 1993. The guidelines require a risk-based evaluation of the site to determine recommended remediation action levels (RRAL) for benzene, toluene, ethylbenzene and xylene (collectively referred to as BTEX) and total petroleum hydrocarbons (TPH) in soil. The proposed RRAL for benzene was determined to be 10 parts per million (ppm) or milligrams per kilogram (mg/kg) and 50 ppm for total BTEX (sum of benzene, toluene, ethylbenzene and xylene). Based on the regional groundwater data, the proposed recommended remedial action level (RRAL) for TPH is 5,000 mg/kg.

Background

On November 28, 1999, the spill from a oil tank (tank overflow) occurred inside the dike of the tank battery. The spill area is confined inside the dike area. Approximately 65 barrels of oil was released on the surface and approximately 60.5 barrels was recovered with vacuum trucks. The impacted surface area measured approximately 40' x 75'. Pogo has removed approximately 8 cubic yards of impacted soil and disposed of properly.

Site Inspection and Assessment

On March 22, 2000, Highlander inspected the leak area. No visual impact was noted inside the tank battery dike. The area of the diked tank battery measured approximately 40' x 80'. Soil samples were collected using a stainless steel, bucket type hand auger. A total of six auger holes were installed to define the extent of the impact. The tank battery and sample locations are shown in Figure 1. Deeper soil samples could not be collected due to a dense caliche layer encountered at a depth of 2-3 feet below surface. Soil samples were collected from the spill area for evaluation of Total Petroleum Hydrocarbon (TPH) by method EPA 418.1, Benzene, Toluene, Ethylbenzene and Xylene (BTEX) by method SW 846-8020 and chloride by method SW846-9252. Three sample locations were selected for BTEX evaluation based upon the highest TPH levels. The soil samples results are shown in Table 1. The laboratory reports and the chain of custody documentation are attached.

Table 1
(concentration in mg/kg)

Sample ID	Depth (ft)	TPH	B	T	E	X	Total BTEX	Chloride
#1	0-1	970	-	-	-	-	-	158
	1-2	ND	-	-	-	-	-	17.5
	2-3	ND	-	-	-	-	-	ND
#2	0-1	340	-	-	-	-	-	70
	1-2	ND	-	-	-	-	-	17.5
	2-3	ND	-	-	-	-	-	17.5
#3	0-1	14,000	1.4	32	22	73	128.4	52.5
	1-2	85	ND	ND	ND	ND	ND	26.3
	2-3	620	-	-	-	-	-	ND
#4	0-1	17,000	3.8	37	23	80	143.8	403
	1-2	6,800	0.480	11	9.2	44	64.68	ND
#5	0-1	14,000	-	-	-	-	-	123
	1-2	11,000	0.84	24	17	65	106.84	210
	2-3	7,500	0.180	8.4	7.3	33	48.88	ND
#6	0-1	5,800	-	-	-	-	-	473
	1-2	30	-	-	-	-	-	70
	2-3	45	-	-	-	-	-	ND

(-) Not Analyzed
(ND) Not Detected



Referring to Table 1, the areas of auger holes #1 and #2 did not exceed the RRAL for TPH. The areas of auger holes #3 and #6 only exceeded the RRAL for TPH of 5,000 mg/kg at a depth of 0-1' below surface. Deeper hydrocarbon impact was detected in the areas of auger holes #4 and #5. The TPH levels in #4 decreased with depth from 17,000 mg/kg at (0-1') to 6,800 mg/kg at (1'-2'). Sample location #5 showed a TPH of 14,000 mg/kg at (0-1') and decreased to 7,500 mg/kg at (2'-3') below surface. The soil samples from #4 and #5 were above the RRAL of 5,000 mg/kg and the vertical extents of the hydrocarbon impact was not defined.

The benzene concentrations detected in samples (#3, #4 and #5) did not exceed the RRAL of benzene of 10 mg/kg. However, the total BTEX concentrations exceeded the RRAL of 50 mg/kg. The soil sample #3 (0-1') detected a total BTEX of 128.4 mg/kg and the deeper sample (1'-2') was below the method detection limit. The soil sample #4 (0-1') showed detectable total BTEX levels of 143.8 mg/kg, which decreased to 64.68 mg/kg at (1'-2') below surface. The soil samples collected in #5 showed a BTEX of 106.84 mg/kg at (1'-2') which decreased below the RRAL of 50 mg/kg to 48.88 mg/kg at (2'-3') below surface.

The chloride evaluation showed detectable levels ranging from 17.5 mg/kg to 473 mg/kg. The deeper samples collected at 2-3' below surface showed levels below the method detection limit, except the area of sample #2 at 17.5 mg/kg. Based on the results, the chloride levels detected do not appear to be an environmental concern.

Conclusion

1. According to published data, the groundwater is sparse in the area of the Site and no water wells were located in Section 36, Township 22 South, Range 32 East. Published data indicated water wells are located in Township 23 South, Range 32 East and encountered groundwater at depths greater than 500 feet below surface.
2. The Remediation of Leaks, Spills and Releases guidelines require a risk-based evaluation of the site to determine recommended remediation action levels (RRAL) for benzene, toluene, ethylbenzene and xylene (collectively referred to as BTEX) and total petroleum hydrocarbons (TPH) in soil. The proposed RRAL for benzene was determined to be 10 parts per million (ppm) or milligrams per kilogram (mg/kg) and 50 ppm for total BTEX (sum of benzene, toluene, ethylbenzene and xylene). Based on the regional groundwater data, the proposed recommended remedial action level (RRAL) for TPH is 5,000 mg/kg.
3. The spill area appears to be confined inside the tank battery dike. During the inspection, no visual impact was noted inside the active tank battery dike. The area inside the dike measured approximately 40' x 80'. The assessment showed the soils located in the north side (sample #1 and #2) of the tank battery were below the RRAL for TPH. The soil in the vicinity of west area (sample #3) and east area (sample #6) of the tanks showed a shallow impact to a depth of 0-1' below surface. Deeper hydrocarbon impact was noted in the south area (#4 and #5) of the tanks, showing a decreasing concentration with depth.



Deeper soil samples could not be collected due to a dense caliche layer encountered at a depth of 2-3' below surface. The impact appears to be shallow and may extend deeper in the areas (#4 and #5). However, due to the dense caliche encountered at these locations, the depth of impact may be limited to the top of the caliche layer. Based on the depth to groundwater, the shallow impact is not considered a threat the groundwater in this area.

4. The chloride evaluation showed detectable levels ranging from 17.5 mg/kg to 473 mg/kg. The deeper samples collected at 2-3' below surface showed levels below the method detection limit, except the area of sample #2 at 17.5 mg/kg. Based on the results, the chloride levels detected do not appear to be an environmental concern.

Recommendation

1. Based on the impact and depth to groundwater, Pogo Producing Company propose closure with natural attenuation for the spill area. The tank battery will continue to remain active and maintained. The impacted soil inside the dike will be worked to a depth of 2' below surface to enhance the reduction of the impact levels below the RRAL.

If you require any additional information or have any questions or comments concerning the assessment report, please call.

Very truly yours,



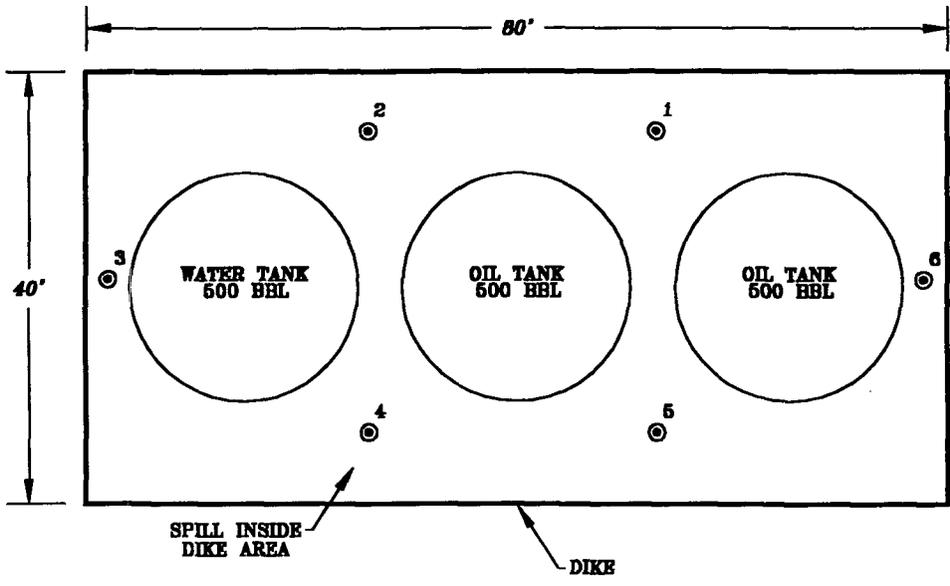
Ike Tavarez
Project Manager/Geologist

cc: Don Riggs - Pogo Producing Co.
Berrit Smith - Pogo Producing Co.





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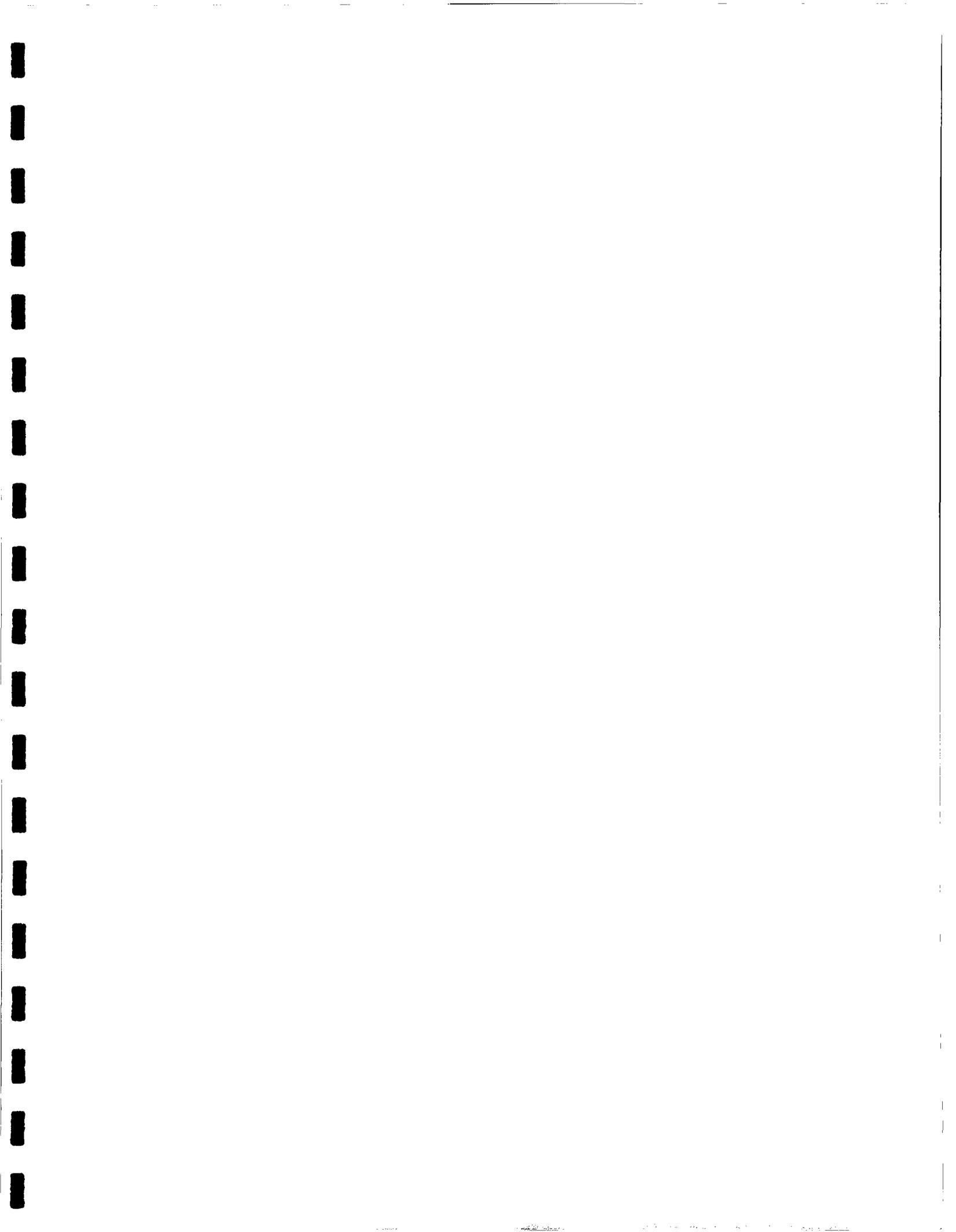
SEPARATOR
○
HEATER TREATER
○

LEGEND
◎ SAMPLE LOCATIONS (AUGER HOLES)

NOT TO SCALE

DATE:
04/7/00
DWN. BY:
JDA
FILE:
04/0004/HELL

FIGURE NO. 1
LEA COUNTY, NEW MEXICO
POGO PRODUCING COMPANY
SHELL STATE #3 TANK BATTERY SAMPLE LOCATIONS
HIGHLANDER ENVIRONMENTAL CORP. MIDLAND, TEXAS





HOUSTON LABORATORY
 8880 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Case Narrative for:
Highlander Environmental Corp

Certificate of Analysis Number:
00030719

<p>Report To:</p> <p>Highlander Environmental Corp Ike Tavarez 1910 N. Big Spring Street</p> <p>Midland Texas 79705- ph: (915) 682-4559 fax: (915) 682-3946</p>	<p>Project Name:</p> <p>Site: Pogo/Shell State #3 TB</p> <p>Site Address:</p> <p>Lea County NM</p> <p>PO Number:</p> <p>State: Texas</p> <p>State Cert. No.:</p> <p>Date Reported:</p>
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Any data flags or quality control exceptions associated with this report will be footnoted in the analytical result page(s) or the quality control summary page(s).

Please do not hesitate to contact us if you have any questions or comments pertaining to this data report. Please reference the above Certificate of Analysis Number.

SPL, Inc. is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

This report shall not be reproduced except in full, without the written approval of the laboratory. The reported results are only representative of the samples submitted for testing.

Gendine Tatosian
 Tatosian, Gma
 Senior Project Manager

4/6/00
 Date



HOUSTON LABORATORY
 8880 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Highlander Environmental Corp

Certificate of Analysis Number:

00030719

Report To: Highlander Environmental Corp
 Ike Tavarez
 1910 N. Big Spring Street

 Midland
 Texas
 79705-
 ph: (915) 682-4559 fax: (915) 682-3946

Fax To: Highlander Environmental Corp
 Ike Tavarez fax: (915) 682-3946

Project Name:
Site: Pogo/Shell State #3 TB
Site Address:
 Lea County NM

PO Number:
State: Texas
State Cert. No.:
Date Reported:

Client Sample ID	Lab Sample ID	Matrix	Date Collected	Date Received	COC ID	HOLD
#1 (0-1 ft)	00030719-01	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#1 (1-2)	00030719-02	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#1 (2-3)	00030719-03	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#2 (0-1)	00030719-04	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#2 (1-2)	00030719-05	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#2 (2-3)	00030719-06	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#3 (0-1)	00030719-07	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#3 (1-2)	00030719-08	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#3 (2-3)	00030719-09	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#4 (0-1)	00030719-10	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#4 (1-2)	00030719-11	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#5 (0-1)	00030719-12	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#5 (1-2)	00030719-13	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#5 (2-3)	00030719-14	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#6 (0-1)	00030719-15	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#6 (1-2)	00030719-16	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>
#6 (2-3)	00030719-17	Soil	3/22/00	3/25/00 10:00:00 AM		<input type="checkbox"/>

Gina Tatosian
 Tatosian, Gina
 Senior Project Manager

4/6/00
 Date

Joel Grice
 Laboratory Director

 Ted Yen
 Quality Assurance Officer



HOUSTON LABORATORY
 6880 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Client Sample ID #1 (0-1 ft)

Collected: 3/22/00

SPL Sample ID: 00030719-01

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL				MCL	E325.3	Units: mg/Kg	
Chloride	158	10	1		03/30/00 10:15	CV	232408
TOTAL PETROLEUM HYDROCARBONS				MCL	E418.1	Units: mg/Kg	
Petroleum Hydrocarbons,TR	970	10	1		03/28/00 12:00	CB	229618

Run ID/Seq #: EX_000328B-229618

Prep Method	Prep Date	Prep Initials
	03/28/2000 12:00	

Qualifiers:
 ND/U - Not Detected at the Reporting Limit
 B - Analyte detected in the associated Method Blank
 * - Surrogate Recovery Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL

>MCL - Result Over Maximum Contamination Limit(MCL)
 D - Surrogate Recovery Unreportable due to Dilution



HOUSTON LABORATORY
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 HOUSTON, TEXAS 77054
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Client Sample ID #1 (2-3) Collected: 3/22/00 SPL Sample ID: 00030719-03

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL				MCL	E325.3	Units: mg/Kg	
Chloride	ND	10	1		03/30/00 10:15	CV	232412
TOTAL PETROLEUM HYDROCARBONS				MCL	E418.1	Units: mg/Kg	
Petroleum Hydrocarbons,TR	ND	10	1		03/28/00 12:00	CB	229620

Run ID/Seq #: EX_000328B-229620

Prep Method	Prep Date	Prep Initials
	03/28/2000 12:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit >MCL - Result Over Maximum Contamination Limit(MCL)
 B - Analyte detected in the associated Method Blank D - Surrogate Recovery Unreportable due to Dilution
 * - Surrogate Recovery Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL

4/6/00 8:46:46 AM



HOUSTON LABORATORY
 8880 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Client Sample ID #2 (1-2) Collected: 3/22/00 SPL Sample ID: 00030719-05

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL				MCL	E325.3	Units: mg/Kg	
Chloride	17.5	10	1		03/30/00 10:15	CV	232414
TOTAL PETROLEUM HYDROCARBONS				MCL	E418.1	Units: mg/Kg	
Petroleum Hydrocarbons,TR	ND	10	1		03/28/00 12:00	CB	229622

Run ID/Seq #: EX_000328B-229622

Prep Method	Prep Date	Prep Initials
	03/28/2000 12:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit >MCL - Result Over Maximum Contamination Limit(MCL)
 B - Analyte detected in the associated Method Blank D - Surrogate Recovery Unreportable due to Dilution
 * - Surrogate Recovery Outside Admissible QC Limits
 J - Estimated Value between MDL and PQL

4/6/00 8:46:46 AM



HOUSTON LABORATORY
 8880 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Client Sample ID #3 (0-1) Collected: 3/22/00 SPL Sample ID: 00030719-07

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL				MCL	E325.3	Units: mg/Kg	
Chloride	52.5	10	1		03/30/00 10:15	CV	232418
PURGEABLE AROMATICS				MCL	SW8021B	Units: ug/Kg	
Benzene	1400	1000	1000		04/05/00 9:42	CJ	237450
Ethylbenzene	22000	1000	1000		04/05/00 9:42	CJ	237450
Toluene	32000	1000	1000		04/05/00 9:42	CJ	237450
m,p-Xylene	48000	1000	1000		04/05/00 9:42	CJ	237450
o-Xylene	25000	1000	1000		04/05/00 9:42	CJ	237450
Xylenes, Total	73000	1000	1000		04/05/00 9:42	CJ	237450
Surr: 1,4-Difluorobenzene	126	% 59-127	1000		04/05/00 9:42	CJ	237450
Surr: 4-Bromofluorobenzene	202	% 48-156	1000	*	04/05/00 9:42	CJ	237450
TOTAL PETROLEUM HYDROCARBONS				MCL	E418.1	Units: mg/Kg	
Petroleum Hydrocarbons, TR	14000	200	20		03/28/00 12:00	CB	229624

Run ID/Seq #: EX_000328B-229624

Prep Method	Prep Date	Prep Initials
	03/28/2000 12:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit >MCL - Result Over Maximum Contamination Limit(MCL)
 B - Analyte detected in the associated Method Blank D - Surrogate Recovery Unreportable due to Dilution
 * - Surrogate Recovery Outside Advisory QC Limits
 J - Estimated Value between MDL and PQL



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 8880 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Client Sample ID #3 (1-2) Collected: 3/22/00 SPL Sample ID: 00030719-08

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL			MCL	E325.3	Units: mg/Kg		
Chloride	26.3	10	1		03/30/00 10:15	CV	232419
PURGEABLE AROMATICS			MCL	SW8021B	Units: ug/Kg		
Benzene	ND	1	1		04/05/00 4:29	CJ	237043
Ethylbenzene	ND	1	1		04/05/00 4:29	CJ	237043
Toluene	ND	1	1		04/05/00 4:29	CJ	237043
m,p-Xylene	ND	1	1		04/05/00 4:29	CJ	237043
o-Xylene	ND	1	1		04/05/00 4:29	CJ	237043
Xylenes, Total	ND	1	1		04/05/00 4:29	CJ	237043
Surr: 1,4-Difluorobenzene	87.4	% 59-127	1		04/05/00 4:29	CJ	237043
Surr: 4-Bromofluorobenzene	104	% 48-156	1		04/05/00 4:29	CJ	237043
TOTAL PETROLEUM HYDROCARBONS			MCL	E418.1	Units: mg/Kg		
Petroleum Hydrocarbons, TR	85	10	1		03/28/00 12:00	CB	229625

Run ID/Seq #: EX_000328B-229625

Prep Method	Prep Date	Prep Initials
	03/28/2000 12:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit >MCL - Result Over Maximum Contamination Limit(MCL)
 B - Analyte detected in the associated Method Blank D - Surrogate Recovery Unreportable due to Dilution
 * - Surrogate Recovery Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL



HOUSTON LABORATORY
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 HOUSTON, TEXAS 77054
 (713) 660-0901

Client Sample ID #4 (0-1) Collected: 3/22/00 SPL Sample ID: 00030719-10

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL				MCL	E325.3	Units: mg/Kg	
Chloride	403	10	1		03/30/00 10:15	CV	232421
PURGEABLE AROMATICS				MCL	SW8021B	Units: ug/Kg	
Benzene	3800	1000	1000		04/04/00 12:16	CJ	236155
Ethylbenzene	23000	1000	1000		04/04/00 12:16	CJ	236155
Toluene	37000	1000	1000		04/04/00 12:16	CJ	236155
m,p-Xylene	54000	1000	1000		04/04/00 12:16	CJ	236155
o-Xylene	26000	1000	1000		04/04/00 12:16	CJ	236155
Xylenes, Total	80000	1000	1000		04/04/00 12:16	CJ	236155
Surr: 1,4-Difluorobenzene	126	% 59-127	1000		04/04/00 12:16	CJ	236155
Surr: 4-Bromofluorobenzene	225	% 48-156	1000	*	04/04/00 12:16	CJ	236155
TOTAL PETROLEUM HYDROCARBONS				MCL	E418.1	Units: mg/Kg	
Petroleum Hydrocarbons, TR	17000	200	20		03/28/00 12:00	CB	229628

Run ID/Seq #: EX_000328B-229628

Prep Method	Prep Date	Prep Initials
	03/28/2000 12:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit
 B - Analyte detected in the associated Method Blank
 * - Surrogate Recovery Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL

>MCL - Result Over Maximum Contamination Limit(MCL)
 D - Surrogate Recovery Unreportable due to Dilution



HOUSTON LABORATORY
 8880 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Client Sample ID #4 (1-2) Collected: 3/22/00 SPL Sample ID: 00030719-11

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL			MCL	E325.3	Units: mg/Kg		
Chloride	ND	10	1		03/30/00 10:15	CV	232422
PURGEABLE AROMATICS			MCL	SW8021B	Units: ug/Kg		
Benzene	480	250	500		04/05/00 11:51	CJ	237452
Ethylbenzene	11000	500	500		04/05/00 11:51	CJ	237452
Toluene	9200	500	500		04/05/00 11:51	CJ	237452
m,p-Xylene	29000	500	500		04/05/00 11:51	CJ	237452
o-Xylene	15000	500	500		04/05/00 11:51	CJ	237452
Xylenes, Total	44000	500	500		04/05/00 11:51	CJ	237452
Surr: 1,4-Difluorobenzene	117	% 59-127	500		04/05/00 11:51	CJ	237452
Surr: 4-Bromofluorobenzene	267	% 48-156	500	*	04/05/00 11:51	CJ	237452
TOTAL PETROLEUM HYDROCARBONS			MCL	E418.1	Units: mg/Kg		
Petroleum Hydrocarbons, TR	6800	100	10		03/28/00 12:00	CB	229630

Run ID/Seq #: EX_000328B-229630

Prep Method	Prep Date	Prep Initials
	03/28/2000 12:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit >MCL - Result Over Maximum Contamination Limit(MCL)
 B - Analyte detected in the associated Method Blank D - Surrogate Recovery Unreportable due to Dilution
 * - Surrogate Recovery Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL



HOUSTON LABORATORY
 8380 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 (713) 660-0901

Client Sample ID #5 (1-2) Collected: 3/22/00 SPL Sample ID: 00030719-13

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL			MCL	E325.3	Units: mg/Kg		
Chloride	210	10	1		03/30/00 10:15	CV	232426
PURGEABLE AROMATICS			MCL	SW8021B	Units: ug/Kg		
Benzene	840	500	500		04/05/00 9:14	CJ	237449
Ethylbenzene	17000	500	500		04/05/00 9:14	CJ	237449
Toluene	24000	500	500		04/05/00 9:14	CJ	237449
m,p-Xylene	45000	500	500		04/05/00 9:14	CJ	237449
o-Xylene	20000	500	500		04/05/00 9:14	CJ	237449
Xylenes, Total	65000	500	500		04/05/00 9:14	CJ	237449
Surr: 1,4-Difluorobenzene	124	% 59-127	500		04/05/00 9:14	CJ	237449
Surr: 4-Bromofluorobenzene	264	% 48-156	500	*	04/05/00 9:14	CJ	237449
TOTAL PETROLEUM HYDROCARBONS			MCL	E418.1	Units: mg/Kg		
Petroleum Hydrocarbons, TR	11000	500	50		03/30/00 0:00	G_T	232329

Run ID/Seq #: EX_000330C-232329

Prep Method	Prep Date	Prep Initials
	03/30/2000 0:00	

Qualifiers:
 ND/U - Not Detected at the Reporting Limit
 B - Analyte detected in the associated Method Blank
 * - Surrogate Recovery, Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL

>MCL - Result Over Maximum Contamination Limit(MCL)
 D - Surrogate Recovery Unreportable due to Dilution



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Client Sample ID #5 (2-3)

Collected: 3/22/00

SPL Sample ID: 00030719-14

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL				MCL	E325.3	Units: mg/Kg	
Chloride	ND	10	1		03/30/00 10:15	CV	232427
PURGEABLE AROMATICS				MCL	SW8021B	Units: ug/Kg	
Benzene	180	100	200		04/05/00 11:20	CJ	237451
Ethylbenzene	7300	200	200		04/05/00 11:20	CJ	237451
Toluene	8400	200	200		04/05/00 11:20	CJ	237451
m,p-Xylene	22000	200	200		04/05/00 11:20	CJ	237451
o-Xylene	11000	200	200		04/05/00 11:20	CJ	237451
Xylenes, Total	33000	200	200		04/05/00 11:20	CJ	237451
Surr: 1,4-Difluorobenzene	116	% 59-127	200		04/05/00 11:20	CJ	237451
Surr: 4-Bromofluorobenzene	331	% 48-156	200 *		04/05/00 11:20	CJ	237451
TOTAL PETROLEUM HYDROCARBONS				MCL	E418.1	Units: mg/Kg	
Petroleum Hydrocarbons, TR	7500	500	50		03/30/00 0:00	G_T	232331

Run ID/Seq #: EX_000330C-232331

Prep Method	Prep Date	Prep Initials
	03/30/2000 0:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit >MCL - Result Over Maximum Contamination Limit(MCL)
 B - Analyte detected in the associated Method Blank D - Surrogate Recovery Unreportable due to Dilution
 * - Surrogate Recovery Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL

4:50:54 AM



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Client Sample ID #6 (1-2)

Collected: 3/22/00

SPL Sample ID: 00030719-16

Site: Pogo/Shell State #3 TB

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
CHLORIDE, TOTAL				E325.3			Units: mg/Kg
Chloride	70	10	1		03/30/00 10:15	CV	232430
TOTAL PETROLEUM HYDROCARBONS				E418.1			Units: mg/Kg
Petroleum Hydrocarbons,TR	30	10	1		03/30/00 0:00	G_T	232333

Run ID/Seq #: EX_000330C-232333

Prep Method	Prep Date	Prep Initials
	03/30/2000 0:00	

Qualifiers: ND/U - Not Detected at the Reporting Limit >MCL - Result Over Maximum Contamination Limit(MCL)
 B - Analyte detected in the associated Method Blank D - Surrogate Recovery Unreportable due to Dilution
 * - Surrogate Recovery Outside Advisable QC Limits
 J - Estimated Value between MDL and PQL

4 5:00 8 43 50 AM

Quality Control Documentation



Quality Control Report
Highlander Environmental Corp

Analysis: Total Petroleum Hydrocarbons
Method: E418.1

WorkOrder: 00030719
Lab Batch ID: R11339

Method Blank

RunID: EX_000328B-229605 **Units:** mg/Kg
Analysis Date: 03/28/2000 12:00 **Analyst:** CB
Preparation Date: 03/28/2000 12:00 **Prep By:** Method

Analyte	Result	Rep Limit
Petroleum Hydrocarbons,TR	ND	10

Samples in Analytical Batch:

<u>Lab Sample ID</u>	<u>Client Sample ID</u>
00030719-01A	#1 (0-1 ft)
00030719-02A	#1 (1-2)
00030719-03A	#1 (2-3)
00030719-04A	#2 (0-1)
00030719-05A	#2 (1-2)
00030719-06A	#2 (2-3)
00030719-07A	#3 (0-1)
00030719-08A	#3 (1-2)
00030719-09A	#3 (2-3)
00030719-10A	#4 (0-1)
00030719-11A	#4 (1-2)

Laboratory Control Sample (LCS)

RunID: EX_000328B-229606 **Units:** mg/Kg
Analysis Date: 03/28/2000 12:00 **Analyst:** CB
Preparation Date: 03/28/2000 12:00 **Prep By:** Method

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Petroleum Hydrocarbons,TR	200	200	100	86	117

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00030719-01
RunID: EX_000328B-229632 **Units:** mg/Kg
Analysis Date: 03/28/2000 12:00 **Analyst:** CB
Preparation Date: 03/28/2000 12:00 **Prep By:** Method

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Petroleum Hydrocarbons,TR	970	200	1200	103	200	1200	103	0	8	72	119

Qualifiers: ND/U - Not Detected at the Reporting Limit * - Recovery Outside Advisable QC Limits
 B - Analyte detected in the associated Method Blank D - Recovery Unreportable due to Dilution
 J - Estimated value between MIDL and PQL



Quality Control Report
 Highlander Environmental Corp

Analysis: Total Petroleum Hydrocarbons
 Method: E418.1

WorkOrder: 00030719
 Lab Batch ID: R11516

Method Blank

Samples in Analytical Batch:

RunID: EX_000330C-232321 Units: mg/Kg
 Analysis Date: 03/30/2000 0:00 Analyst: G_T
 Preparation Date: 03/30/2000 0:00 Prep By: Method

Lab Sample ID	Client Sample ID
00030719-12A	#5 (0-1)
00030719-13A	#5 (1-2)
00030719-14A	#5 (2-3)
00030719-15A	#6 (0-1)
00030719-16A	#6 (1-2)
00030719-17A	#6 (2-3)

Analyte	Result	Rep Limit
Petroleum Hydrocarbons,TR	ND	10

Laboratory Control Sample (LCS)

RunID: EX_000330C-232322 Units: mg/Kg
 Analysis Date: 03/30/2000 0:00 Analyst: G_T
 Preparation Date: 03/30/2000 0:00 Prep By: Method

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Petroleum Hydrocarbons,TR	200	190	95	86	117

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00030719-16
 RunID: EX_000330C-232338 Units: mg/Kg
 Analysis Date: 03/30/2000 0:00 Analyst: G_T
 Preparation Date: 03/30/2000 0:00 Prep By: Method

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Petroleum Hydrocarbons,TR	30	200	220	97.5	200	240	102	5.00	8	72	119

Qualifiers: ND/U - Not Detected at the Reporting Limit * - Recovery Outside Advisable QC Limits
 B - Analyte detected in the associated Method Blank D - Recovery Unreportable due to Dilution
 J - Estimated value between MDL and PQL



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Quality Control Report
 Highlander Environmental Corp

Analysis: Purgeable Aromatics
 Method: SW8021B

WorkOrder: 00030719
 Lab Batch ID: R11682

Method Blank

Samples in Analytical Batch:

RunID: HP_R_000403A-235199 Units: ug/Kg
 Analysis Date: 04/03/2000 20:59 Analyst: CJ

Lab Sample ID: 00030719-10A
 Client Sample ID: #4 (0-1)

Analyte	Result	Rep Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
m,p-Xylene	ND	1.0
o-Xylene	ND	1.0
Xylenes, Total	ND	1.0
Surr: 1,4-Difluorobenzene	94.1	59-127
Surr: 4-Bromofluorobenzene	98.1	48-156

Laboratory Control Sample (LCS)

RunID: HP_R_000403A-235487 Units: ug/Kg
 Analysis Date: 04/04/2000 8:19 Analyst: CJ

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Benzene	50	48	95	60	116
Ethylbenzene	50	48	95	68	127
Toluene	50	47	94	64	122
m,p-Xylene	100	94	94	68	129
o-Xylene	50	47	94	68	127
Xylenes, Total	150	141	94	68	129

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00030881-07
 RunID: HP_R_000403A-235195 Units: ug/Kg
 Analysis Date: 04/03/2000 18:49 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Benzene	ND	20	15	77.1	20	14	70.8	8.58	34	35	139
Ethylbenzene	ND	20	15	76.0	20	14	71.0	6.78	35	31	137
Toluene	ND	20	16	78.0	20	14	71.5	8.72	28	31	137
m,p-Xylene	ND	40	30	75.4	40	28	70.7	6.41	38	19	144
o-Xylene	ND	20	15	74.8	20	14	70.0	6.63	57	25	139

Qualifiers: ND/U - Not Detected at the Reporting Limit
 B - Analyte detected in the associated Method Blank
 J - Estimated value between MDL and PQL

* - Recovery Outside Advisable QC Limits
 D - Recovery Unreportable due to Dilution



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Quality Control Report
Highlander Environmental Corp

Analysis: Purgeable Aromatics
Method: SW8021B

WorkOrder: 00030719
Lab Batch ID: R11682

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00030881-07
RunID: HP_R_000403A-235195 **Units:** ug/Kg
Analysis Date: 04/03/2000 18:49 **Analyst:** CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Xylenes, Total	ND	60	45	75.0	60	42	70.0	6.90	38	19	144

Qualifiers: ND/U - Not Detected at the Reporting Limit * - Recovery Outside Advisable QC Limits
 B - Analyte detected in the associated Method Blank D - Recovery Unreportable due to Dilution
 J - Estimated value between MDL and PQL



Quality Control Report
 Highlander Environmental Corp

Analysis: Purgeable Aromatics
 Method: SW8021B

WorkOrder: 00030719
 Lab Batch ID: R11763

Method Blank

Samples in Analytical Batch:

RunID: HP_R_000404A-236808 Units: ug/Kg
 Analysis Date: 04/04/2000 16:49 Analyst: CJ

Lab Sample ID	Client Sample ID
00030719-07A	#3 (0-1)
00030719-08A	#3 (1-2)
00030719-11A	#4 (1-2)
00030719-13A	#5 (1-2)
00030719-14A	#5 (2-3)

Analyte	Result	Rep Limit
Benzene	ND	0.50
Ethylbenzene	ND	1.0
Toluene	ND	1.0
m,p-Xylene	ND	1.0
o-Xylene	ND	1.0
Xylenes, Total	ND	1.0
Surr: 1,4-Difluorobenzene	91.2	59-127
Surr: 4-Bromofluorobenzene	94.4	48-156

Laboratory Control Sample (LCS)

RunID: HP_R_000404A-236807 Units: ug/Kg
 Analysis Date: 04/04/2000 15:55 Analyst: CJ

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Benzene	50	43	85	60	116
Ethylbenzene	50	42	84	68	127
Toluene	50	43	86	64	122
m,p-Xylene	100	84	84	68	129
o-Xylene	50	42	84	68	127
Xylenes, Total	150	126	84	68	129

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00040041-05
 RunID: HP_R_000404A-236824 Units: ug/Kg
 Analysis Date: 04/04/2000 23:48 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Benzene	6.6	20	17	54.0	20	18	59.0	8.87	34	35	139
Ethylbenzene	ND	20	15	74.0	20	16	78.4	5.76	35	31	137
Toluene	ND	20	16	76.4	20	17	81.9	6.99	28	31	137
m,p-Xylene	1.4	40	31	74.0	40	33	78.7	6.09	38	19	144
o-Xylene	ND	20	15	76.4	20	17	82.3	7.42	57	25	139

Qualifiers: ND/U - Not Detected at the Reporting Limit * - Recovery Outside Advisable QC Limits
 B - Analyte detected in the associated Method Blank D - Recovery Unreportable due to Dilution
 J - Estimated value between MDL and PQL



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Quality Control Report
 Highlander Environmental Corp

Analysis: Purgeable Aromatics
 Method: SW8021B

WorkOrder: 00030719
 Lab Batch ID: R11763

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00040041-05
 RunID: HP_R_000404A-236824 Units: ug/Kg
 Analysis Date: 04/04/2000 23:48 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Xylenes, Total	1.4	60	46	74.3	60	50	81.0	8.58	38	19	144

Qualifiers: ND/U - Not Detected at the Reporting Limit * - Recovery Outside Advisable QC Limits
 B - Analyte detected in the associated Method Blank D - Recovery Unreportable due to Dilution
 J - Estimated value between MDL and PQL



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Quality Control Report
 Highlander Environmental Corp

Analysis: Chloride, Total
 Method: E325.3

WorkOrder: 00030719
 Lab Batch ID: R11518A

Method Blank

Samples in Analytical Batch:

RunID: WET_000330Q-232416 Units: mg/Kg
 Analysis Date: 03/30/2000 10:15 Analyst: CV

Lab Sample ID	Client Sample ID
00030719-01A	#1 (0-1 ft)
00030719-02A	#1 (1-2)
00030719-03A	#1 (2-3)
00030719-04A	#2 (0-1)
00030719-05A	#2 (1-2)
00030719-06A	#2 (2-3)
00030719-07A	#3 (0-1)
00030719-08A	#3 (1-2)
00030719-09A	#3 (2-3)
00030719-10A	#4 (0-1)

Analyte	Result	Rep Limit
Chloride	ND	10

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00030719-01
 RunID: WET_000330Q-232409 Units: mg/Kg
 Analysis Date: 03/30/2000 10:15 Analyst: CV

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Chloride	160	500	648	98.1	500	648	98.1	0	20	91.8	115

Qualifiers: ND/U - Not Detected at the Reporting Limit * - Recovery Outside Advisable QC Limits
 B - Analyte detected in the associated Method Blank D - Recovery Unreportable due to Dilution
 J - Estimated value between MDL and PQL



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Quality Control Report
 Highlander Environmental Corp

Analysis: Chloride, Total
 Method: E325.3

WorkOrder: 00030719
 Lab Batch ID: R11518B

Method Blank

Samples in Analytical Batch:

RunID: WET_000330Q-232416 Units: mg/Kg
 Analysis Date: 03/30/2000 10:15 Analyst: CV

Lab Sample ID	Client Sample ID
00030719-11A	#4 (1-2)
00030719-12A	#5 (0-1)
00030719-13A	#5 (1-2)
00030719-14A	#5 (2-3)
00030719-15A	#6 (0-1)
00030719-16A	#6 (1-2)
00030719-17A	#6 (2-3)

Analyte	Result	Rep Limit
Chloride	ND	10

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 00030719-11
 RunID: WET_000330Q-232423 Units: mg/Kg
 Analysis Date: 03/30/2000 10:15 Analyst: CV

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Chloride	ND	500	508	102	500	508	102	0	20	91.8	115

Qualifiers: ND/U - Not Detected at the Reporting Limit * - Recovery Outside Advisable QC Limits
 B - Analyte detected in the associated Method Blank D - Recovery Unreportable due to Dilution
 J - Estimated value between MDL and PQL

*Chain of Custody
And
Sample Receipt Checklist*



Highlander Environmental Corp.

Midland, Texas

March 24, 2000

Southern Petroleum Lab

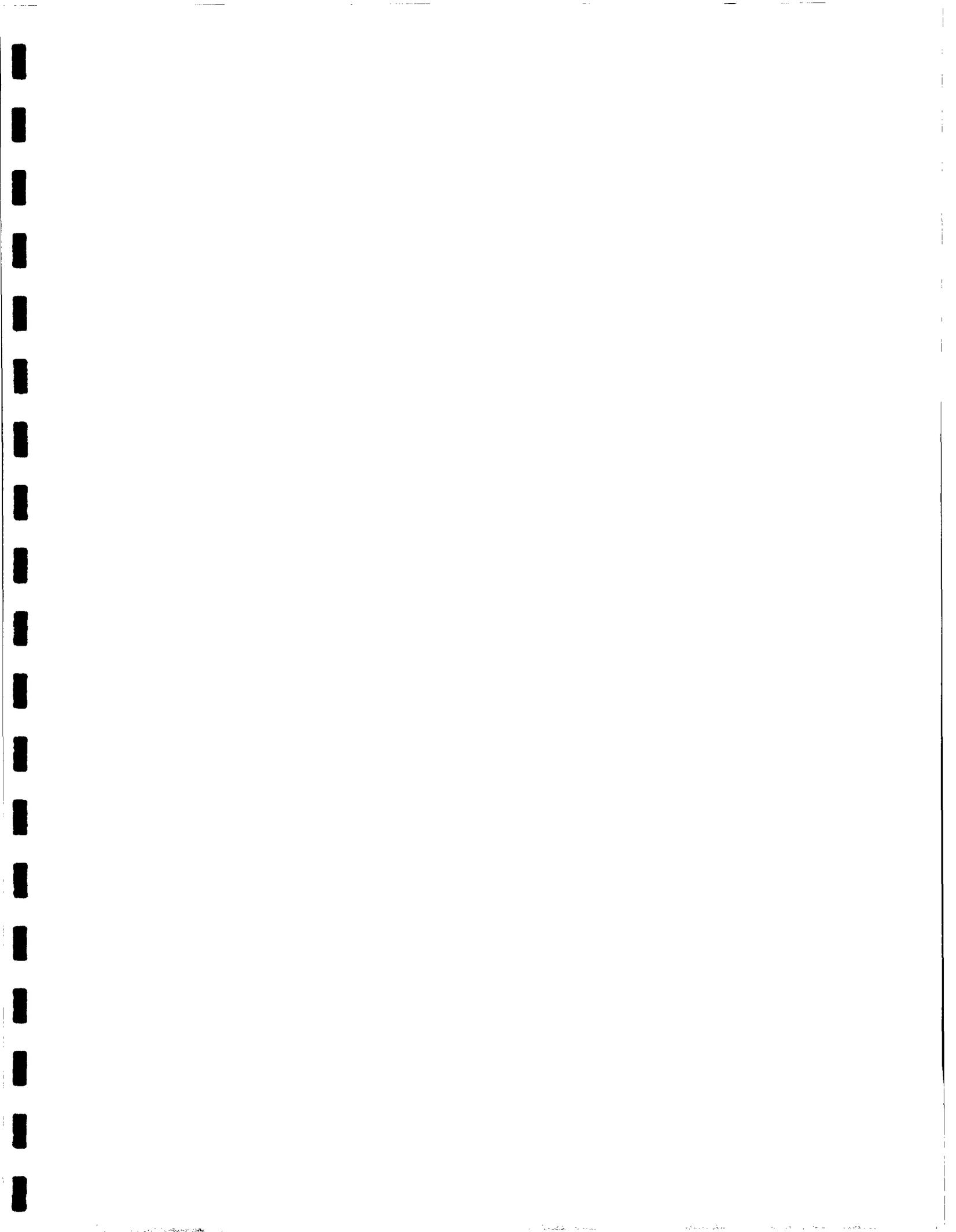
Re: Pogo Producing Company, Shell State # 3 (Job # 1439), Laboratory Analysis Request

Please run the analysis requested on the chain of custody. In addition, not included on the COC, run BTEX analysis on the two highest TPH results from samples #1 thru #6 (0-1'). Please call or fax the analysis on the TPH analysis to determine if additional analysis will be performed the deeper samples.

Please call if you have questions.

Sincerely,
Highlander Environmental Corp


Ike Tavaréz
Project Manager



PHOTOGRAPHIC DOCUMENTATION
POGO - SPILL ASSESSMENT - LEA COUNTY
Shell State #3 Tank Battery



1. View of Shell State #3 Tank Battery



2. View of Shell State #3 Tank Battery

PHOTOGRAPHIC DOCUMENTATION
POGO - SPILL ASSESSMENT - LEA COUNTY
Shell State #3 Tank Battery



3. View of spill area and sample locations (auger holes #1 and #2)



4. View of spill area and sample location (auger hole #3)

PHOTOGRAPHIC DOCUMENTATION
POGO - SPILL ASSESSMENT - LEA COUNTY
Shell State #3 Tank Battery



5. View of spill area and sample locations (auger holes #4 and #5)



6. View of spill area and sample location (auger hole #6)