Spill #200204999

Document #1733320

COMPLIANCE / ENGINEERING / REMEDIATION

LT Environmental Inc.
15 West Mill Street, Suite 213
PO Box 874
Bayfield, Colorado 81122
T 970.884.5215 / F 970.884.5215

April 08, 2009

Mr. Scott Rose
Samson Resources Company
Two West 2nd Street
Tulsa, OK 74103

RE: Soil Investigation Results
Gore GU A#15-1 (API #05-067-07900)
La Plata County, Colorado

Dear Mr. Rose:

LT Environmental, Inc. (LTE) is pleased to provide Samson Resources Company (Samson) with this letter summarizing the results of soil investigation activities conducted at the Gore GU A#15-1 (API #05-067-07900) production well site (Site) on March 13, 2009 (Figure 1, Site Location Map). LTE conducted the investigation in response to a release of produced water that overfilled a pit at the Site. The pit fluids traveled downhill through a culvert onto agricultural land. A stock pond identified downgradient of the site was not impacted by the release. The surface spill stopped approximately 200 feet from the stock pond.

SOIL SAMPLING

On March 13, 2009, LTE collected two surface soil samples in the vicinity of the Site to gather preliminary data regarding potential impacts to the soil. One sample (Background) was collected downgradient of the well pad and west of the spill area. The other sample (Impacted) was collected downgradient of the well pad within the spill extent immediately north of the access road. All samples were collected between the ground surface and 3 inches below ground surface (bgs). The sample locations are shown on Figure 2.

The soil samples were placed in clean Teflon-lined glass jars and stored in a cooler with ice in the field. The samples were submitted to Cardinal Laboratories of Hobbs, New Mexico for the analysis of Gasoline Range Organics (GRO) and Diesel Range Organics (DRO). Soil samples were also placed in plastic bags and submitted to Green Analytical Laboratories (GAL) of Durango, Colorado for analysis of calcium, magnesium, and sodium by EPA method 200.7 and calculation of Sodium Adsorption Ratio (SAR).

RESULTS

Movement of pit fluids caused a minor erosion channel extending northwest into the adjacent field. The erosion channel extends approximately 550 feet into the field.

Laboratory analytical results for the Background sample indicate SAR of 1.35 and DRO of <10.0 milligrams per kilogram (mg/kg). Analytical results for the Impacted Sample indicate SAR of 7.77 and DRO of 3,600 mg/kg. Table 1 and 2 present the soil analytical results. The laboratory analytical reports are included as Attachment 1.

CONCLUSIONS

Based on soil analytical results, the Impacted sample collected north of the access road is above the Colorado Oil and Gas Conservation Commission (COGCC) Concentration Levels of 500 mg/kg for total produced hydrocarbons (TPH) established in Table 910-1 of the Rules. The reported SAR value for the Impacted soil sample is below the COGCC Concentration Level of 12.

It is reasonable to assume that the TPH impact is present throughout the spill area based on the field observations and laboratory analytical results. However, the vertical extent is likely limited. Rather than conducting additional site investigation to confirm the presence or absence of TPH in the spill area and delineate the horizontal and vertical extent of impact, LTE recommends that the impacted soil within the release area be scraped clean. Confirmation samples from the scraped area should be collected to demonstrate that the release has been mitigated. The impacted soil collected can either be land-farmed onsite in a lined and bermed containment or transported offsite for disposal at an approved disposal facility.

LTE can provide Samson with assistance in overseeing the impacted soil removal, collecting confirmation samples, reclaiming the scraped area, and preparing a report documenting field activities.

LTE appreciates the opportunity to provide environmental services to Samson. If you have any questions regarding this report or would like additional information, please contact us at (970) 884-5215.

Sincerely,

LT ENVIRONMENTAL, INC.

Travis Laverty
Staff Geologist

John D. Peterson, P.G.
Principal/Senior Geologist

Attachments (3)

TABLES

TABLE 1
SOIL ANALYTICAL RESULTS - SAR & TPH
GORE GU A#15-1 (API #05-067-07900)
LA PLATA COUNTY, COLORADO
SAMSON RESOURCES COMPANY

Sample ID	Sample Depth	Sample Date	Calcium (meq/L)	Magnesium (meq/L)	Sodium (mg/L)	SAR	GRO (mg/kg)	DRO (mg/kg)
Impacted	0-3"	3/13/2008	1.47	0.63	7.96	7.77	11.6	3,600
Background	0-3"	3/13/2008	0.64	0.26	0.90	1.35	<10.0	<10.0
COGCC Concentration Level*			--	--	--	12	500 TPH	

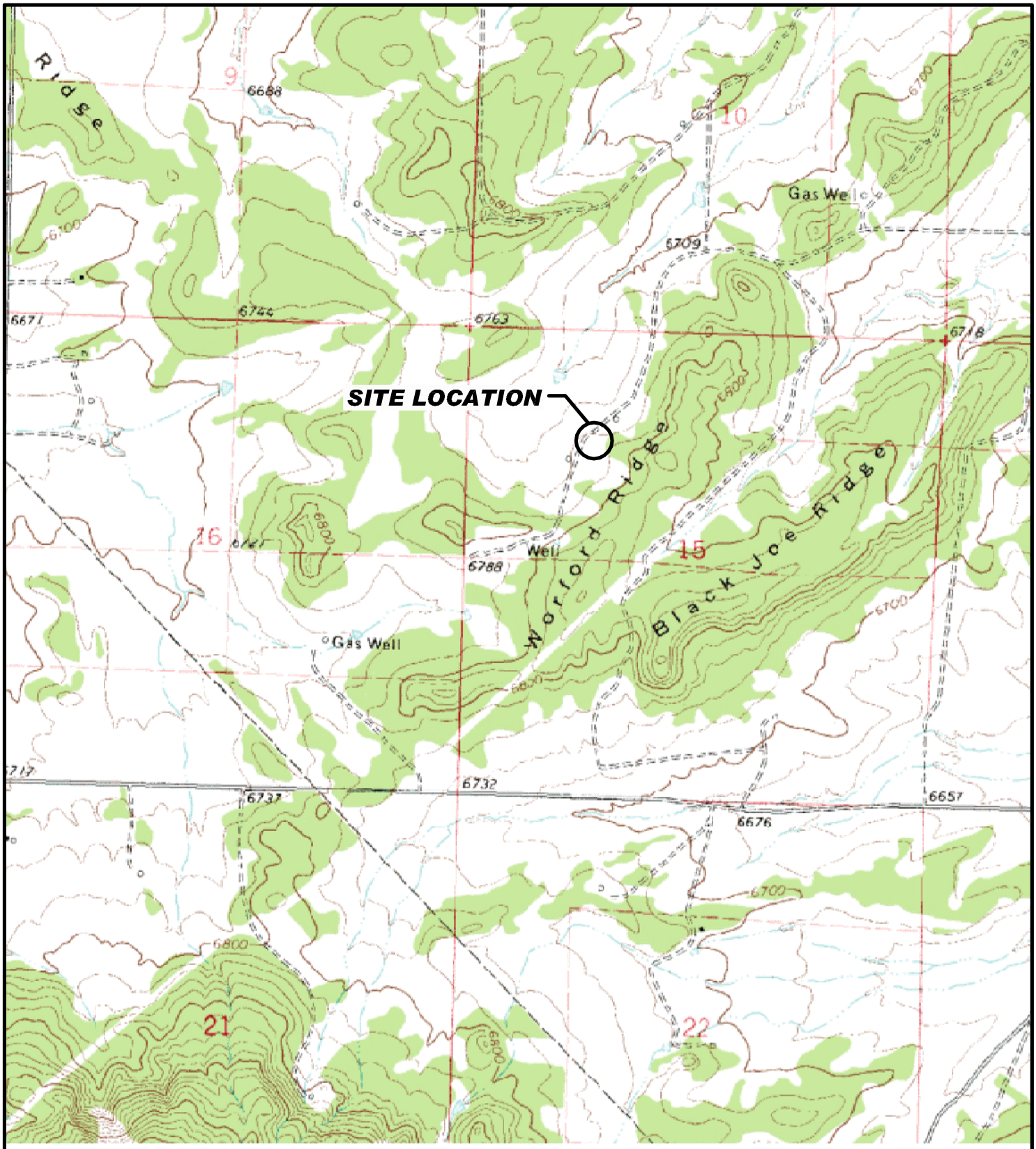
Notes:
meq/L - milliequivalents per liter
mg/kg - milligrams per kilogram
SAR - Sodium Adsorption Ratio
GRO - gasoline range organics
DRO - diesel range organics
" - inches
Colorado Oil and Gas Conservation Commission Concentration Level derived from Table 910-1
TPH - total petroleum hydrocarbons

TABLE 2
SOIL ANALYTICAL RESULTS - METALS
GORE GU A#15-1 (API #05-067-07900)
LA PLATA COUNTY, COLORADO
SAMSON RESOURCES COMPANY

Analyte	Sample ID		COGCC Concentration Level* (mg/kg)
	Background (mg/kg)	Impacted (mg/kg)	
Arsenic	<10.0	<10.0	0.39
Barium	381	276	15,000
Boron	<10.0	<10.0	2
Cadmium	<1.0	<1.0	70
Chromium	6.94	6.89	120,000
Copper	15.3	14.9	3,100
Lead	15.7	14.1	400
Mercury	<0.1	<0.1	23
Molybdenum	<1.0	<1.0	--
Nickel	12.1	9.7	1,600
Selenium	<20.0	<20.0	390
Silver	<1.0	<1.0	390
Zinc	57.0	68.5	23,000

Notes:
mg/kg - milligrams per kilogram
< - less than the stated laboratory method detection limit
* - Colorado Oil and Gas Conservation Commission Concentration Level derived from Table 910-1

FIGURES



LEGEND

SITE LOCATION

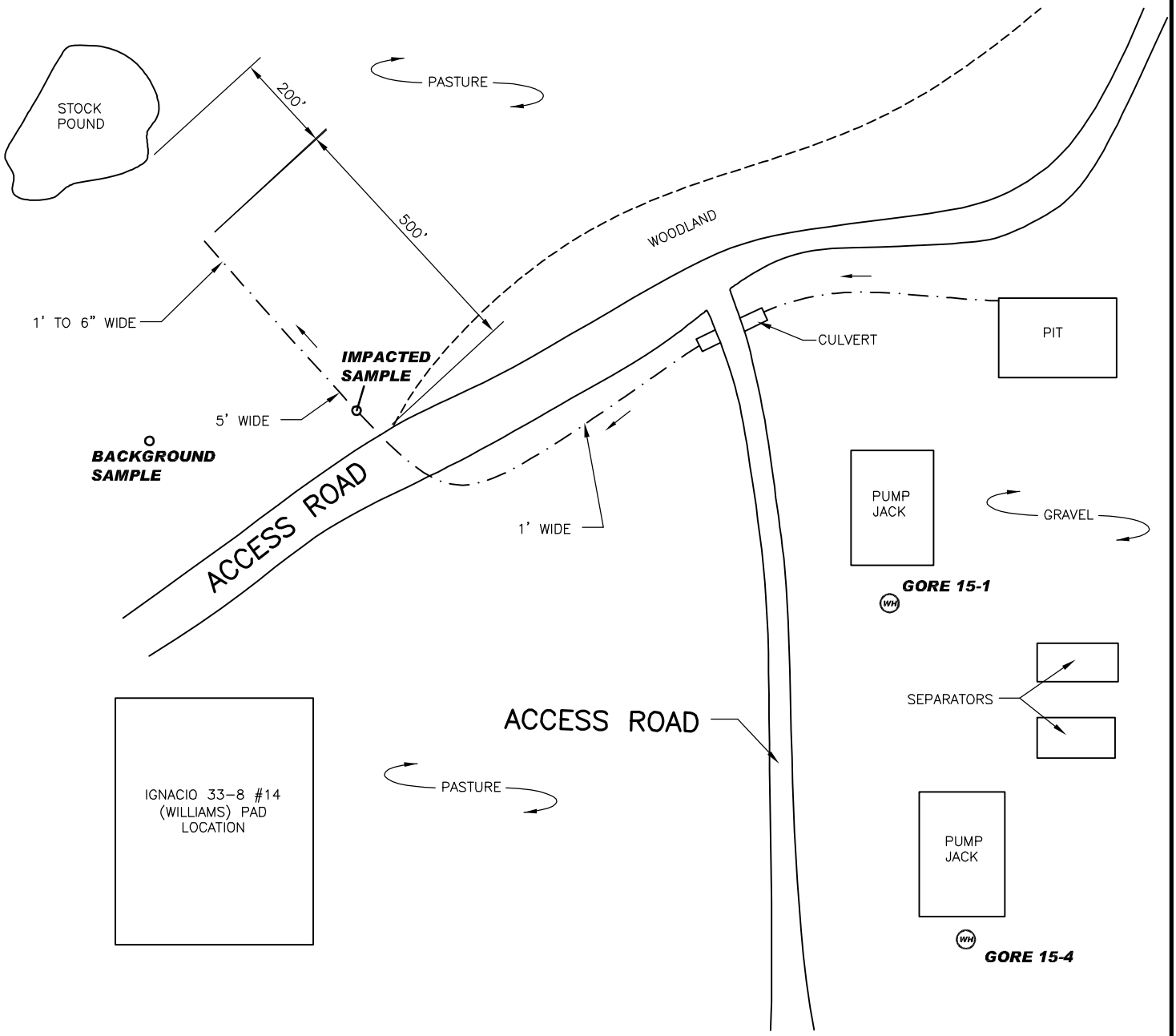
0 375 750 1500

FEET

SOURCE: TOPOZONE.COM
USGS 7.5' QUADRANGLE
(NAD27)

FIGURE 1
SITE LOCATION MAP
GORE GU A#15-1
LA PLATA COUNTY, CO
SAMSON RESOURCES COMPANY

SAM090101_SL 4/09



LEGEND

GORE 15-1 (WH) WELL HEAD

BACKGROUND SAMPLE SOIL SAMPLE LOCATION

SPILL (ROAD SIDE DITCH) LOCATION

DIRECTION OF PIT OVERFLOW

0 30 60 120

FEET

SOURCE: LTE SKETCH

FIGURE 2
SITE MAP
GORE GU A#15-1
LA PLATA COUNTY, CO
SAMSON RESOURCES COMPANY

SAM090101 4/09

ATTACHMENT 1

LABORATORY ANALYTICAL REPORT

CARDINAL LABORATORIES

PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
GREEN ANALYTICAL LABORATORIES, INC.
ATTN: DEBBIE ZUFELT
75 SUTTLE STREET
DURANGO, CO 81303
FAX TO: (970) 247-4227

Receiving Date: 03/17/09
Reporting Date: 03/19/09
Project Number: 903-081-01 & 02
Project Name: LT ENVIRONMENTAL
Project Location: NOT GIVEN

Sampling Date: 03/13/09
Sample Type: SOIL/SEDIMENT
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: AB

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)
ANALYSIS DATE		03/18/09	03/18/09
H17070-1	BACKGROUND	<10.0	<10.0
H17070-2	IMPACTED	11.6	3,600
Quality Control		505	561
True Value		500	500
% Recovery		101	112
Relative Percent Deviation		0.6	0.1

METHOD: SW 846-8015M

Chemist

03/19/09
Date

H17070 5 GAL

PLEASE NOTE: **Liability and Damages. Cardinal's** liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those based on negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by **Cardinal** within thirty (30) days after completion of the applicable service. In no event shall **Cardinal** be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by **Cardinal**, regardless of whether such claim is based upon any of the above-stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

CHAIN OF CUSTODY RECORD

Client: GREEN ANALYTICAL
Contact: DEBBIE ZUFELT
Address: 75 SUTTLE ST
DURANGO, CO 81303
Phone Number: 970-247-4220
FAX Number: 970-247-4227

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
3) Designate Sample Reject Disposition.

PO# GA09-054
Project Name: LT Environmental
Samplers Signature:

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR GAL USE ONLY
GAL JOB # _____

PLEASE CALL WITH ANY QUESTIONS

Lab Name: Green Analytical Laboratories (970) 247-4220 FAX (970) 247-4227
Address: 75 Suttle Street, Durango, CO 81303

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: BTEX 8021	Analyses Required: TPH 8015	Comments
H17070-1 1. Background	3-13-09	1415	TL	3	1								X	X	903-081 -01
-2 2. Impacted	↓	1420	TL	3	1								X	X	-02
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10.															

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Debbie Zufelt	3-16-09	1530	Misty LeBert	3-17-09	10:37
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

C of I

GAL ID No.: 903-081,01-02

March 26, 2009

LT Environmental
PO Box 874
Bayfield, CO 81122
Attention: Marc Yalom

Project Name: Samson Gore GU A#15-1 Pit Release
Project Number:
Date Received: 03/13/09

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Standard Methods for the Examination of Water and Wastewater, 18th & 19th editions, and Methods for Determination of Organic Compounds in Drinking Water, EPA-600/4-79-020.

Samples were received by Green Analytical Laboratories in good condition on 03/13/09.

If you should have any questions or comments regarding this report, please do not hesitate to call.

Sincerely,

Debbie Zufelt
Laboratory Manager

Enclosure

Green Analytical Laboratories
75 Suttle Street
Durango, CO 81303

GAL I.D.:	**903-081-01**
Date Received:	03/13/09
Date Reported:	03/26/09
QC Batches:	

LT Environmental
PO Box 874
Bayfield, CO 81122
Attention: Marc Yalom

PROJECT NAME: Samson Gore GU A#15-1 Pit Release
PROJECT NUMBER:
SAMPLE I.D.: Background

Sample Date:	03/13/09
Sample Matrix:	Soil
Units:	mg/kg

RCRA Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION	DATE ANALYZED	ANALYST
Arsenic	6010B	10.0	<10.0	100		
Barium	6010B	1.0	381	100		
Boron	6010B	10.0	<10.0	100		
Cadmium	6010B	1.0	<1.0	100		
Chromium	6010B	1.0	6.94	100		
Copper	6010B	2.0	15.3	100		
Lead	6010B	5.0	15.7	100		
Mercury	7471A	0.1	<0.1	500		
Molybdenum	6010B	1.0	<1.0	100		
Nickel	6010B	2.0	12.1	100		
Selenium	6010B	20.0	<20.0	100		
Silver	6010B	1.0	<1.0	100		
Zinc	6010B	5.0	57.0	100		

_____
Debbie Zufelt, Laboratory Manager

Green Analytical Laboratories
75 Suttle Street
Durango, CO 81303

GAL I.D.: **903-081-01**

LT Environmental
PO Box 874
Bayfield, CO 81122
Attention: Marc Yalom

Date Received: 03/13/09
Date Reported: 03/26/09
QC Batches:

PROJECT NAME: Samson Gore GU A#15-1 Pit Release
PROJECT NUMBER:
SAMPLE I.D.: Background

Sample Date: 03/13/09
Sample Matrix: Soil

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS
EC	2510B	1.0	0.17	mmho/cm
pH	150.1	NA	6.69	SU on 1:1Ext
Calcium	200.7	0.5	0.64	meq/L
Magnesium	200.7	0.5	0.26	meq/L
Sodium	200.7	0.5	0.90	meq/L
SAR	Calc.		1.35	

_____
Debbie Zufelt, Laboratory Manager

Green Analytical Laboratories
75 Suttle Street
Durango, CO 81303

GAL I.D.: **903-081-01**

LT Environmental
PO Box 874
Bayfield, CO 81122
Attention: Marc Yalom

Date Received: 03/13/09
Date Reported: 03/26/09
QC Batches:

PROJECT NAME: Samson Gore GU A#15-1 Pit Release
PROJECT NUMBER:
SAMPLE I.D.: Background

Sample Date: 03/13/09
Sample Matrix: Soil

Petroleum Hydrocarbons

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
TPHGRO	8015	10	Attached	1	mg/kg
TPHDRO	8015	10	Attached	1	mg/kg
TPHORO	8015	10	Attached	1	mg/kg

_____
Debbie Zufelt, Laboratory Manager

Green Analytical Laboratories
75 Suttle Street
Durango, CO 81303

GAL I.D.:	**903-081-02**
Date Received:	03/13/09
Date Reported:	03/26/09
QC Batches:	

LT Environmental
PO Box 874
Bayfield, CO 81122
Attention: Marc Yalom

PROJECT NAME: Samson Gore GU A#15-1 Pit Release
PROJECT NUMBER:
SAMPLE I.D.: Impacted

Sample Date:	03/13/09
Sample Matrix:	Soil
Units:	mg/kg

RCRA Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION	DATE ANALYZED	ANALYST
Arsenic	6010B	10.0	<10.0	100		
Barium	6010B	1.0	276	100		
Boron	6010B	10.0	<10.0	100		
Cadmium	6010B	1.0	<1.0	100		
Chromium	6010B	1.0	6.89	100		
Copper	6010B	2.0	14.9	100		
Lead	6010B	5.0	14.1	100		
Mercury	7471A	0.1	<0.1	500		
Molybdenum	6010B	1.0	<1.0	100		
Nickel	6010B	2.0	9.7	100		
Selenium	6010B	20.0	<20.0	100		
Silver	6010B	1.0	<1.0	100		
Zinc	6010B	5.0	68.5	100		

_____
Debbie Zufelt, Laboratory Manager

Green Analytical Laboratories
75 Suttle Street
Durango, CO 81303

GAL I.D.: **903-081-02**

LT Environmental
PO Box 874
Bayfield, CO 81122
Attention: Marc Yalom

Date Received: 03/13/09
Date Reported: 03/26/09
QC Batches:

PROJECT NAME: Samson Gore GU A#15-1 Pit Release
PROJECT NUMBER:
SAMPLE I.D.: Impacted

Sample Date: 03/13/09
Sample Matrix: Soil

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS
EC	2510B	1.0	0.98	mmho/cm
pH	150.1	NA	8.30	SU on 1:1Ext
Calcium	200.7	0.5	1.47	meq/L
Magnesium	200.7	0.5	0.63	meq/L
Sodium	200.7	0.5	7.96	meq/L
SAR	Calc.		7.77	

_____
Debbie Zufelt, Laboratory Manager

Green Analytical Laboratories
75 Suttle Street
Durango, CO 81303

GAL I.D.: **903-081-02**

LT Environmental
PO Box 874
Bayfield, CO 81122
Attention: Marc Yalom

Date Received: 03/13/09
Date Reported: 03/26/09
QC Batches:

PROJECT NAME: Samson Gore GU A#15-1 Pit Release
PROJECT NUMBER:
SAMPLE I.D.: Impacted

Sample Date: 03/13/09
Sample Matrix: Soil

Petroleum Hydrocarbons

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
TPHGRO	8015	10	Attached	1	mg/kg
TPHDRO	8015	10	Attached	1	mg/kg
TPHORO	8015	10	Attached	1	mg/kg

_____
Debbie Zufelt, Laboratory Manager