



January 18, 2012

Mr. Scott Rose  
Samson Resources Company  
Two West Second Street  
Tulsa, Oklahoma 74103-3103

**RE: Soil and Water Sampling Results  
Pipeline Release  
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 and water sampling activities conducted at a pipeline release in the southwest quarter of the southwest quarter of Section 11, Township 33 North, Range 8 West in La Plata County, Colorado (Site; Figure 1). LTE conducted the investigation at the request of Samson following a release of approximately 2 to 5 barrels (bbls) of produced water. The release originated at a valve can and flowed through a culvert under a county road and down a natural drainage approximately 200 feet before entering the Morrison Consolidated Ditch (Ditch). Samson responded by isolating the pipeline for repairs. At the request of Samson, LTE collected soil samples from the release footprint and water samples from the Ditch to assess the extent of impact.

**METHODS**

On November 29, 2011, LTE collected four soil samples and two water samples at the Site. Three soil samples were collected within the flow path of the release (labeled “Drainage 1 Soil,” “Drainage 2 Soil,” and “Drainage 3 Soil”) and a background soil sample was collected outside of the release footprint. One upgradient water sample and one downgradient water sample were collected from the Ditch. Sample locations are depicted on Figure 2. On November 30, 2011, LTE collected a sample of produced water for source characterization.

The soil samples were placed in clean Teflon-lined glass jars and Ziploc bags and stored in a cooler with ice in the field. Water samples were collected in unpreserved and nitric acid preserved 1-liter bottles. All samples were shipped on ice to Environmental Science Corporation Lab Sciences (ESC) in Mt. Juliet, Tennessee under strict chain-of-custody protocol.

For source characterization, the produced water sample was analyzed for pH, electrical conductivity (EC), total dissolved solids (TDS), chloride, sulfate, sodium, potassium, calcium, magnesium and total metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc). Analytical results of the produced water sample directed analyses of the soil and water samples. The impacted soil samples were analyzed for pH, EC, sodium adsorption ratio (SAR), barium and selenium. The background soil sample was analyzed

for SAR only. The water samples collected from the Ditch were analyzed for pH, EC, TDS, sodium, calcium, potassium, magnesium, chloride, and sulfate.

## **RESULTS**

Table 1 presents the soil analytical results and Table 2 presents the water analytical results. The complete laboratory reports are included as Appendix A. The produced water sample contained elevated TDS, EC, and chloride, sodium, and potassium concentrations. The sample also contained detectable concentrations of barium and selenium. These parameters were identified as potential contaminants in affected soil and water.

Soil analytical results indicate SAR levels in Drainage 1 Soil and Drainage 2 Soil samples exceed Colorado Oil and Gas Commission (COGCC) Table 910-1 standards. Values for pH and EC and concentrations for barium and selenium in Drainage 1 Soil and Drainage 2 Soil samples were below COGCC Table 910 standards. All parameters analyzed in the Drainage 3 Soil, the most downgradient soil sample, were below COGCC Table 910 standards.

Water analytical results indicate parameters detected in the upgradient and downgradient Ditch samples are comparable. Additionally, the upgradient and downgradient Ditch sample results for all parameters are less than those identified in the produced water source sample.

## **CONCLUSIONS**

Soil analytical results indicate there are produced water impacts at the Site, but they are limited to elevated SAR levels in the soil just downgradient of the release origin. Soil near the Ditch is not impacted. Water samples from the Ditch indicate any produced water that entered the ditch has been washed downstream.

## **RECOMMENDATIONS**

A potential remedy for soil affected by high SAR levels is to add calcium to the soil in the form of gypsum, which will allow the sodium ions to be replaced by calcium ions thus allowing the sodium ions to be leached from the soil with the addition of low-sodium water. This process is slow to occur; subsequent soil sampling will determine the effectiveness of this remedy. LTE suggests a gypsum application on the soil within the flow path between and downgradient of the sample locations with high SAR levels (Drainage 1 Soil and Drainage 2 Soil).

LTE has performed several calculations using site-specific data and literature based assumptions and recommends adding 112 pounds of 86 percent (%) calcium sulfate (gypsum) mixed to a depth of 8 to 12 inches below ground surface over the entire area of impacted soil within the flow path of the release. Applying gypsum in winter, depending on snow cover, will allow the soil to benefit from winter moisture and infiltration of snowmelt through the gypsum during the spring thaw. LTE recommends additional soil sampling in August of 2012 to evaluate the progress of the remedy. Soil samples will be analyzed for SAR. LTE will prepare a brief report

following the August 2012 sampling event to summarize the remedial effort and provide further recommendations, if applicable.

LTE appreciates the opportunity to provide environmental services to Samson. Estimated costs to apply gypsum are included in a separate attachment. If you have any questions regarding this report, please contact us at (970) 385-1096.

Sincerely,

LT ENVIRONMENTAL, INC.

A handwritten signature in black ink that reads "Ashley L. Ager". The signature is written in a cursive, flowing style.

Ashley L. Ager, M.S.

Senior Geologist/Office Manager

Attachments (6)

Figure 1 – Site Location Map

Figure 2 – Site Map

Table 1 – Soil Analytical Results

Table 2 – Water Analytical Results

Appendix A – Laboratory Analytical Reports

## FIGURES



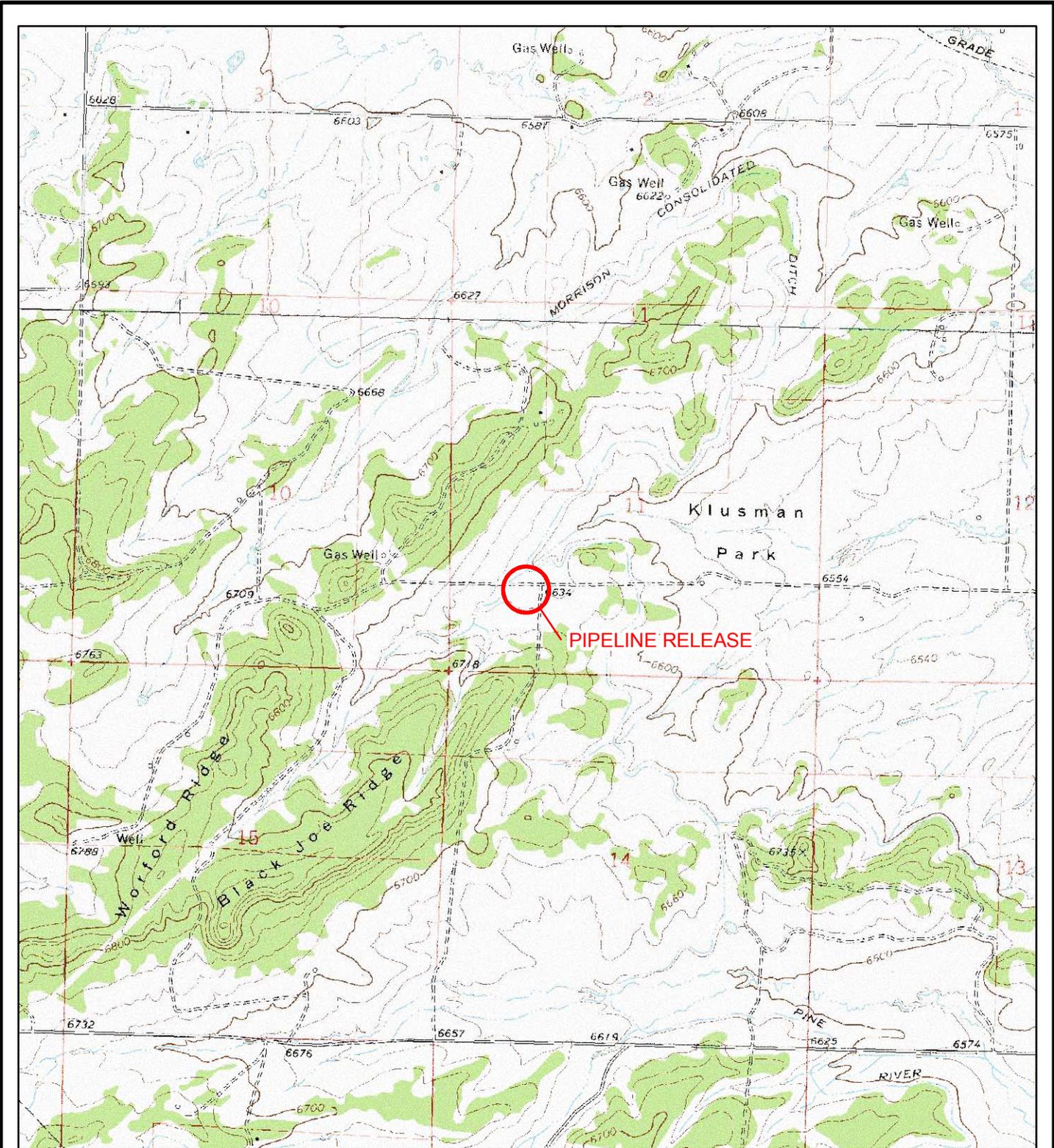
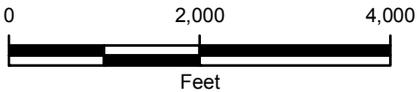


IMAGE COURTESY OF USDA/NRCS, VARIOUS DATES

**LEGEND**

 SITE LOCATION



**FIGURE 1**  
**SITE LOCATION MAP**  
**PIPELINE RELEASE**  
**SWSW SEC 11 T33N R8W**  
**LA PLATA COUNTY, COLORADO**  
**SAMSON RESOURCES**



UP GRADIENT WATER SAMPLE

MORRISON CONSOLIDATED DITCH

DOWN GRADIENT WATER SAMPLE

DRAINAGE 3 SOIL

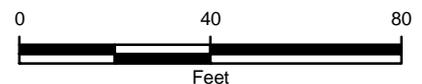
DRAINAGE 2 SOIL

DRAINAGE 1 SOIL

ACCESS ROAD

**LEGEND**

-  WATER SAMPLE
-  DRAINAGE SOIL SAMPLE
-  BACKGROUND SAMPLE
-  VALVE CAN
-  WETLANDS AREA
-  STANDING WATER
-  CULVERT
-  FLOW PATH
-  DITCH BANK
-  ABOVEGROUND PIPING
-  ROAD



**FIGURE 2**  
**SITE MAP**  
 PIPELINE RELEASE  
 SWSW SEC 11 T33N R8W  
 LA PLATA COUNTY, COLORADO  
**SAMSON RESOURCES**



**TABLEU**



**TABLE 1**  
**SOIL ANALYTICAL RESULTS**  
**PIPELINE RELEASE**  
**SAMSON RESOURCES COMPANY**

Analyte	Sample ID				COGCC Standards*
	Background Soil Sample	Drainage 1 Soil	Drainage 2 Soil	Drainage 3 Soil	
Sample Date	11/29/2011	11/29/2011	11/29/2011	11/29/2011	-
pH (su)		8.2	8.2	7.0	<b>6-9</b>
Specific Conductance (umhos/cm)	NA	1,200	950	400	<b>4,000</b>
Sodium Adsorption Ratio	0.48	<b>23.0</b>	<b>14.0</b>	3.6	<b>&lt;12</b>
Calcium (mg/Kg)	NA	NA	NA	NA	<b>NE</b>
Magnesium (mg/Kg)	NA	NA	NA	NA	<b>NE</b>
Potassium (mg/Kg)	NA	NA	NA	NA	<b>NE</b>
Sodium (mg/Kg)	57	NA	NA	NA	<b>NE</b>
Mercury (mg/Kg)	NA	NA	NA	NA	<b>23,000</b>
Arsenic (mg/Kg)**	NA	NA	NA	NA	<b>0.39</b>
Barium (mg/Kg)	NA	250	240	220	<b>15,000</b>
Cadmium (mg/Kg)	NA	NA	NA	NA	<b>70</b>
Chromium (mg/Kg)	NA	NA	NA	NA	<b>120,000</b>
Copper (mg/Kg)	NA	NA	NA	NA	<b>3,100</b>
Lead (mg/Kg)	NA	NA	NA	NA	<b>400</b>
Nickel (mg/Kg)	NA	NA	NA	NA	<b>23</b>
Selenium (mg/Kg)	NA	<1.0	<1.0	<1.0	<b>1,600</b>
Silver (mg/Kg)	NA	NA	NA	NA	<b>390</b>
Zinc (mg/Kg)	NA	NA	NA	NA	<b>390</b>

**BOLD** -indicates result greater than COGCC standard

COGCC - Colorado Oil and Gas Conservation Commission

mg/Kg - milligrams per kilogram

NA - not analyzed

NE - not established

su - standard units

umhos/cm - microohms per centimeter

\* - Colorado Oil and Gas Conservation Commission Concentration Level derived from Table 910-1

< - less than stated laboratory detection limit



**TABLE 2**  
**WATER ANALYTICAL RESULTS**  
**PIPELINE RELEASE**  
**SAMSON RESOURCES COMPANY**

Analyte	Sample ID		
	Produced Water Source	Upgradient Water Sample	Downgradient Water Sample
Sample Date	11/30/2011	11/29/2011	11/29/2011
pH (su)	7.7	7.9	8.0
Specific Conductance (umhos/cm)	9,400	180	180
Total Dissolved Solids (mg/l)	5,800	110	110
Chloride (mg/l)	1,700	1.7	2.0
Sulfate (mg/l)	5.2	8.2	8.2
Calcium (mg/l)	13	24	24
Magnesium (mg/l)	5.6	4.2	4.1
Potassium (mg/l)	22.0	2.5	1.3
Sodium (mg/l)	2,400	6.8	6.1
Mercury (mg/l)	<0.00020	NA	NA
Arsenic (mg/l)	<0.020	NA	NA
Barium (mg/l)	<b>11</b>	NA	NA
Cadmium (mg/l)	<0.0050	NA	NA
Chromium (mg/l)	<0.010	NA	NA
Copper (mg/l)	<0.020	NA	NA
Lead (mg/l)	<0.0050	NA	NA
Nickel (mg/l)	<0.020	NA	NA
Selenium (mg/l)	<b>0.027</b>	NA	NA
Silver (mg/l)	<0.010	NA	NA
Zinc (mg/l)	<0.030	NA	NA

mg/l - milligrams per liter

su - standard units

umhos/cm - microohms per centimeter



**APPENDIX A**  
**LABORATORY ANALYTICAL REPORTS**





12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
(615) 758-5858  
1-800-767-5859  
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Ashley Ager  
LT Environmental  
2243 Main Ave, Ste 3  
Durango, CO 81301

## Report Summary

Tuesday December 06, 2011

Report Number: L549101

Samples Received: 12/01/11

Client Project: 024711006

Description: Samson Pipeline Release

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Daphne Richards , ESC Representative

### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487  
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140  
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233  
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A,  
TX - T104704245, OK-9915, PA - 68-02979

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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REPORT OF ANALYSIS

December 06, 2011

Ashley Ager  
 LT Environmental  
 2243 Main Ave, Ste 3  
 Durango, CO 81301

Date Received : December 01, 2011  
 Description : Samson Pipeline Release  
 Sample ID : PRODUCED WATER SOURCE  
 Collected By : Sam LaRue  
 Collection Date : 11/30/11 12:01

ESC Sample # : L549101-01  
 Site ID : PIPELINE  
 Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chloride	1700	20.	mg/l	9056	12/02/11	20
Sulfate	5.2	5.0	mg/l	9056	12/03/11	1
pH	7.7		su	9040C	12/03/11	1
Specific Conductance	9400	1.8	umhos/cm	9050A	12/03/11	1
Dissolved Solids	5800	10.	mg/l	2540C	12/06/11	1
Mercury	BDL	0.00020	mg/l	7470A	12/02/11	1
Arsenic	BDL	0.020	mg/l	6010B	12/02/11	1
Barium	11.	0.0050	mg/l	6010B	12/02/11	1
Cadmium	BDL	0.0050	mg/l	6010B	12/02/11	1
Calcium	13.	0.50	mg/l	6010B	12/02/11	1
Chromium	BDL	0.010	mg/l	6010B	12/02/11	1
Copper	BDL	0.020	mg/l	6010B	12/02/11	1
Lead	BDL	0.0050	mg/l	6010B	12/02/11	1
Magnesium	5.6	0.10	mg/l	6010B	12/02/11	1
Nickel	BDL	0.020	mg/l	6010B	12/02/11	1
Potassium	22.	0.50	mg/l	6010B	12/02/11	1
Selenium	0.027	0.020	mg/l	6010B	12/02/11	1
Silver	BDL	0.010	mg/l	6010B	12/02/11	1
Sodium	2400	2.5	mg/l	6010B	12/04/11	5
Zinc	BDL	0.030	mg/l	6010B	12/02/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 12/06/11 12:51 Printed: 12/06/11 13:40  
 L549101-01 (PH) - 7.74@19.5c



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REPORT OF ANALYSIS

December 06, 2011

Ashley Ager  
 LT Environmental  
 2243 Main Ave, Ste 3  
 Durango, CO 81301

Date Received : December 01, 2011  
 Description : Samson Pipeline Release  
 Sample ID : UPGRADIENT WATER SAMPLE  
 Collected By : Sam LaRue  
 Collection Date : 11/29/11 16:10

ESC Sample # : L549101-02  
 Site ID : PIPELINE  
 Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chloride	1.7	1.0	mg/l	9056	12/02/11	1
Sulfate	8.2	5.0	mg/l	9056	12/02/11	1
pH	7.9		su	9040C	12/03/11	1
Specific Conductance	180	1.8	umhos/cm	9050A	12/03/11	1
Dissolved Solids	110	10.	mg/l	2540C	12/06/11	1
Calcium	24.	0.50	mg/l	6010B	12/02/11	1
Magnesium	4.2	0.10	mg/l	6010B	12/02/11	1
Potassium	2.5	0.50	mg/l	6010B	12/02/11	1
Sodium	6.8	0.50	mg/l	6010B	12/04/11	1

BDL - Below Detection Limit  
 Det. Limit - Practical Quantitation Limit(PQL)  
 Note:  
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 L549101-02 (PH) - 7.93@18.3c



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REPORT OF ANALYSIS

December 06, 2011

Ashley Ager  
 LT Environmental  
 2243 Main Ave, Ste 3  
 Durango, CO 81301

Date Received : December 01, 2011  
 Description : Samson Pipeline Release  
 Sample ID : DOWNGRADIENT WATER SAMPLE  
 Collected By : Sam LaRue  
 Collection Date : 11/29/11 16:13

ESC Sample # : L549101-03  
 Site ID : PIPELINE  
 Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chloride	2.0	1.0	mg/l	9056	12/02/11	1
Sulfate	8.2	5.0	mg/l	9056	12/02/11	1
pH	8.0		su	9040C	12/03/11	1
Specific Conductance	180	1.8	umhos/cm	9050A	12/03/11	1
Dissolved Solids	110	10.	mg/l	2540C	12/06/11	1
Calcium	24.	0.50	mg/l	6010B	12/02/11	1
Magnesium	4.1	0.10	mg/l	6010B	12/02/11	1
Potassium	1.3	0.50	mg/l	6010B	12/02/11	1
Sodium	6.1	0.50	mg/l	6010B	12/04/11	1

BDL - Below Detection Limit  
 Det. Limit - Practical Quantitation Limit(PQL)  
 Note:  
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 L549101-03 (PH) - 8.00@19.3c



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REPORT OF ANALYSIS

December 06, 2011

Ashley Ager  
LT Environmental  
2243 Main Ave, Ste 3  
Durango, CO 81301

Date Received : December 01, 2011  
Description : Samson Pipeline Release  
Sample ID : DRAINAGE SOIL  
Collected By : Sam LaRue  
Collection Date : 11/29/11 16:31

ESC Sample # : L549101-04  
Site ID : PIPELINE  
Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	8.2		su	9045D	12/02/11	1
Sodium Adsorption Ratio	23.			Calc.	12/03/11	1
Specific Conductance	1200		umhos/cm	9050AMod	12/03/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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L549101-04 (PH) - 8.17@20.0c



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REPORT OF ANALYSIS

December 06, 2011

Ashley Ager  
 LT Environmental  
 2243 Main Ave, Ste 3  
 Durango, CO 81301

Date Received : December 01, 2011  
 Description : Samson Pipeline Release  
 Sample ID : DRAINAGE 3 SOIL  
 Collected By : Sam LaRue  
 Collection Date : 11/29/11 16:50

ESC Sample # : L549101-05  
 Site ID : PIPELINE  
 Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	7.0		su	9045D	12/02/11	1
Sodium Adsorption Ratio	3.6			Calc.	12/03/11	1
Specific Conductance	400		umhos/cm	9050AMod	12/03/11	1

BDL - Below Detection Limit  
 Det. Limit - Practical Quantitation Limit(PQL)  
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 L549101-05 (PH) - 6.96@20.1c



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REPORT OF ANALYSIS

December 06, 2011

Ashley Ager  
LT Environmental  
2243 Main Ave, Ste 3  
Durango, CO 81301

Date Received : December 01, 2011  
Description : Samson Pipeline Release  
Sample ID : DRAINAGE 2 SOIL  
Collected By : Sam LaRue  
Collection Date : 11/29/11 16:47

ESC Sample # : L549101-06  
Site ID : PIPELINE  
Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	8.2		su	9045D	12/02/11	1
Sodium Adsorption Ratio	14.			Calc.	12/03/11	1
Specific Conductance	950		umhos/cm	9050AMod	12/03/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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L549101-06 (PH) - 8.16@20.1c

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L549101-01	WG568237	SAMP	pH	R1954153	T8
	WG568384	SAMP	Sodium	R1954632	V
L549101-02	WG568236	SAMP	pH	R1954133	T8
L549101-03	WG568237	SAMP	pH	R1954153	T8
L549101-04	WG568122	SAMP	pH	R1952572	T8
L549101-05	WG568122	SAMP	pH	R1952572	T8
L549101-06	WG568122	SAMP	pH	R1952572	T8

Attachment B  
Explanation of QC Qualifier Codes

Qualifier	Meaning
T8	(ESC) - Additional method/sample information: Sample(s) received past/too close to holding time expiration.
V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

LT Environmental  
2243 Main Ave, #3  
Durango, CO 81301

Billing Information:  
Ashley Ager  
LT Environmental  
2243 Main Ave, #3  
Durango, CO 81301

Report to: Ashley Ager  
Email to: aager@ltenv.com

Analysis/Container/Preservative

A051

Main of Custody  
Page 1 of 1



12065 Lebanon Road  
Mt. Juliet, TN 37122

Phone: (800) 767-5859  
Phone: (615) 758-5858  
Fax: (615) 758-5859

Project Description: Samson Pipeline Release  
City/State Collected: La Plata County, CO

Phone: 970-385-1096  
FAX: 970-385-1873  
Client Project #: 024711006  
ESC Key:

Collected by: Sam LaRue  
Site/Facility ID#: Pipeline  
P.O.#: 024711006

Collected by (signature): *[Signature]*  
Immediately Packed on Ice N Y X  
**Rush?** (Lab MUST Be Notified)  
Same Day.....200%  
Next Day.....100%  
Two Day.....50%  
Three Day.....25%  
Date Results Needed: 12-7-11  
Email?  No  Yes  
FAX?  No  Yes

pH, EC, TDS	Na, Ca, K, Mg	Cl, SO4	Metals: As, Ba, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn	EC, PH, SAR
-------------	---------------	---------	--	-------------

CoCode: LTENVCO (lab use only)  
Template/Protocol  
Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	PH	EC	TDS	Na	Ca	K	Mg	Cl	SO4	Metals	EC	PH	SAR	Remarks/Contaminant	Sample # (lab only)
Produced Water Source		OT		11/30/11	12:01	2	✓	✓	✓	✓											1549101-01
Upgradient Water Sample		OT		11/29/11	16:10	2	✓	✓	✓											HOLD Metals analysis until further notice	-02
Downgradient Water Sample		OT		11/29/11	16:13	2	✓	✓	✓											HOLD Metals analysis until further notice	-03
Background		SS		11/29/11	16:38	3														HOLD	
Drainage <del>Sample</del> Soil		SS		11/29/11	16:31	3														HOLD Metals	-04
Drainage 3 Soil		SS		11/29/11	16:50	3														HOLD Metals	-05
Drainage 2 Soil		SS		11/29/11	16:47	3														HOLD Metals	-06

\*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other produced water & surface water  
Remarks: pH \_\_\_\_\_ Temp \_\_\_\_\_  
Flow \_\_\_\_\_ Other \_\_\_\_\_

Relinquished by: (Signature) <i>[Signature]</i>	Date: 11/30/11	Time: 12:50	Received by: (Signature) <i>[Signature]</i>	Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>	Condition: (lab use only)
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 54	Bottles Received: 18
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature) <i>[Signature]</i>	Date: 12-1-11	Time: 0900
				CoC Seal Intact: <input checked="" type="checkbox"/> N <input type="checkbox"/> NA	CoC Seal Intact: <input checked="" type="checkbox"/> N <input type="checkbox"/> NA
				pH Checked: 22	NCF:



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Est. 1970

Ashley Ager  
LT Environmental  
2243 Main Ave, Ste 3  
Durango, CO 81301

## Report Summary

Friday December 16, 2011

Report Number: L550439

Samples Received: 12/01/11

Client Project: 024711006

Description: Samson Pipeline Release

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Daphne Richards , ESC Representative

### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487  
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140  
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233  
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A,  
TX - T104704245, OK-9915, PA - 68-02979

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REPORT OF ANALYSIS

December 16, 2011

Ashley Ager  
 LT Environmental  
 2243 Main Ave, Ste 3  
 Durango, CO 81301

Date Received : December 01, 2011  
 Description : Samson Pipeline Release  
 Sample ID : DRAINAGE SOIL  
 Collected By : Sam LaRue  
 Collection Date : 11/29/11 16:31

ESC Sample # : L550439-01  
 Site ID : PIPELINE  
 Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Barium	250	0.25	mg/kg	6010B	12/10/11	1
Selenium	BDL	1.0	mg/kg	6010B	12/15/11	1

BDL - Below Detection Limit  
 Det. Limit - Practical Quantitation Limit(PQL)  
 Note:  
 The reported analytical results relate only to the sample submitted.  
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 Reported: 12/16/11 14:50 Printed: 12/16/11 14:51



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REPORT OF ANALYSIS

December 16, 2011

Ashley Ager  
 LT Environmental  
 2243 Main Ave, Ste 3  
 Durango, CO 81301

Date Received : December 01, 2011  
 Description : Samson Pipeline Release  
 Sample ID : DRAINAGE 3 SOIL  
 Collected By : Sam LaRue  
 Collection Date : 11/29/11 16:50

ESC Sample # : L550439-02  
 Site ID : PIPELINE  
 Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Barium	220	0.25	mg/kg	6010B	12/10/11	1
Selenium	BDL	1.0	mg/kg	6010B	12/15/11	1

BDL - Below Detection Limit  
 Det. Limit - Practical Quantitation Limit(PQL)  
 Note:  
 The reported analytical results relate only to the sample submitted.  
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 Reported: 12/16/11 14:50 Printed: 12/16/11 14:51



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REPORT OF ANALYSIS

December 16, 2011

Ashley Ager  
LT Environmental  
2243 Main Ave, Ste 3  
Durango, CO 81301

Date Received : December 01, 2011  
Description : Samson Pipeline Release  
Sample ID : DRAINAGE 2 SOIL  
Collected By : Sam LaRue  
Collection Date : 11/29/11 16:47

ESC Sample # : L550439-03  
Site ID : PIPELINE  
Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Barium	240	0.25	mg/kg	6010B	12/10/11	1
Selenium	BDL	5.0	mg/kg	6010B	12/11/11	5

BDL - Below Detection Limit  
Det. Limit - Practical Quantitation Limit(PQL)  
Note:  
The reported analytical results relate only to the sample submitted.  
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Reported: 12/16/11 14:50 Printed: 12/16/11 14:51

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L550439-03	WG569207	SAMP	Selenium	R1961674	0

Attachment B  
Explanation of QC Qualifier Codes

Qualifier	Meaning
0	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed  
12/16/11 at 14:51:09

TSR Signing Reports: 288  
R5 - Desired TAT

report J's if above limits-B 0.01, T 0.75, E 0.75, X 0.62 mg/l Charge \$10.00 Shipping Fee on every project-DV 12-14-10. No Energy When transferring TS to a new dash # DO NOT charge a fee

Sample: L550439-01 Account: LTENVCO Received: 12/01/11 09:00 Due Date: 12/15/11 00:00 RPT Date: 12/16/11 14:50  
Relogged from L549101-04

Sample: L550439-02 Account: LTENVCO Received: 12/01/11 09:00 Due Date: 12/15/11 00:00 RPT Date: 12/16/11 14:50  
Relogged from L549101-05

Sample: L550439-03 Account: LTENVCO Received: 12/01/11 09:00 Due Date: 12/15/11 00:00 RPT Date: 12/16/11 14:50  
Relogged from L549101-06



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LT Environmental  
2243 Main Ave, Ste 3  
Durango, CO 81301

## Report Summary

Wednesday December 28, 2011

Report Number: L552115

Samples Received: 12/01/11

Client Project: 024711006

Description: Samson Pipeline Release

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Daphne Richards , ESC Representative

### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487  
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140  
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233  
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032008A,  
TX - T104704245, OK-9915, PA - 68-02979

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Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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REPORT OF ANALYSIS

December 28, 2011

Ashley Ager  
LT Environmental  
2243 Main Ave, Ste 3  
Durango, CO 81301

Date Received : December 01, 2011  
Description : Samson Pipeline Release  
Sample ID : BACKGROUND  
Collected By : Sam LaRue  
Collection Date : 11/29/11 16:38

ESC Sample # : L552115-01  
Site ID : PIPELINE  
Project # : 024711006

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Sodium Adsorption Ratio	0.48			Calc.	12/20/11	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 12/21/11 09:16 Revised: 12/28/11 14:56  
L552115-01 (SAR) - Na 16.7 mg/l Ca 73.5 mg/l Mg 10.3 mg/l

Summary of Remarks For Samples Printed  
12/28/11 at 14:56:02

TSR Signing Reports: 288  
R5 - Desired TAT

report J's if above limits-B 0.01, T 0.75, E 0.75, X 0.62 mg/l Charge \$10.00 Shipping Fee on every project-DV 12-14-10. No Energy When transferring TS to a new dash # DO NOT charge a fee

Sample: L552115-01 Account: LTENVCO Received: 12/01/11 09:00 Due Date: 12/30/11 00:00 RPT Date: 12/21/11 09:16  
Refer to 11-0077/L549101. UNI 621672 dor 12/28/11.

LT Environmental  
2243 Main Ave, #3  
Durango, CO 81301

Billing Information:  
Ashley Ager  
LT Environmental  
2243 Main Ave, #3  
Durango, CO 81301

Report to: Ashley Ager

Email to: aager@ltenv.com

Project Description: Samson Pipeline Release  
City/State Collected: La Plata County, CO

Phone: 970-385-1096  
FAX: 970-385-1873  
Client Project #: 024711006  
ESC Key:

Collected by: Sam LaRue  
Site/Facility ID#: Pipeline  
P.O.#: 024711006

Collected by (signature): *SLR FL*  
Immediately Packed on Ice N Y X  
**Rush?** (Lab MUST Be Notified)  
\_\_\_\_ Same Day ..... 200%  
\_\_\_\_ Next Day ..... 100%  
\_\_\_\_ Two Day ..... 50%  
\_\_\_\_ Three Day ..... 25%  
Date Results Needed: 12-7-11  
Email?  No  Yes  
FAX?  No  Yes

Analysis/Container/Preservative

A051

Chain of Custody  
Page 1 of 1

11-0077



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Phone: (615) 758-5858  
Fax: (615) 758-5859

CoCode: LENVCO (lab use only)

Template: Login

Shipped via:

Remarks/Contaminant Sample # (lab only)

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	PH	EC	TDS	Na, Ca, K, Mg	SO4	Metals: As, Ba, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn	EC, PH, SAR	Remarks/Contaminant	Sample # (lab only)
Produced Water Source		OT		11/30/11	12:01	2	✓	✓	✓	✓	✓	✓	✓		25112101-01 N
Upgradient Water Sample		OT		11/29/11	16:10	2	✓	✓	✓	✓	✓	✓	✓	HOLD Metals analysis until further notice	-02
Downgradient Water Sample		OT		11/29/11	16:13	2	✓	✓	✓	✓	✓	✓	✓	HOLD Metals analysis until further notice	-03
Background		SS		11/29/11	16:38	3								HOLD	6552115-01
Drainage <del>Sample</del> Soil		SS		11/29/11	16:31	3								HOLD Metals	-04
Drainage 3 Soil		SS		11/29/11	16:50	3								HOLD Metals	-05
Drainage 2 Soil		SS		11/29/11	16:47	3								HOLD Metals	-06

\*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other *produced water & surface water*  
Remarks: \_\_\_\_\_  
pH \_\_\_\_\_ Temp \_\_\_\_\_  
Flow \_\_\_\_\_ Other \_\_\_\_\_

Relinquished by: (Signature) <i>SLR FL</i>	Date: 11/30/11	Time: 12:50	Received by: (Signature) <i>SLR FL</i>	Samples returned via: <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> Courier <input type="checkbox"/>	Condition: (lab use only)
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Time: 18	CoC State: <i>00</i> N NA
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Time: 0900	PH Checked: 22 NCF:

**Andy Vann**

---

**From:** Daphne Richards  
**Sent:** Friday, December 16, 2011 4:53 PM  
**To:** Login; Sample Storage  
**Subject:** Taking sample off HOLD L TENVCO

**Follow Up Flag:** Follow up  
**Flag Status:** Green

Please refer to 11-0077. Please log sample id Background for SAR

thanks

Daphne Richards  
ESC Lab Sciences  
(800) 767-5859 ext 9662  
Direct: (615) 773-9662  
drichards@esclabsciences.com

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