

State of Colorado  
**Oil and Gas Conservation Commission**

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303)894-2100 Fax:(303)894-2109



FOR OGCC USE ONLY  
RECEIVED 10/24/2014  
REM 8718  
DOC 200416113

**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

Spill or Release    Plug & Abandon    Central Facility Closure    Site/Facility Closure    Other (describe): \_\_\_\_\_

OGCC Operator Number: _____	Contact Name and Telephone: _____
Name of Operator: _____	_____
Address: _____	No: _____
City: _____ State: _____ Zip: _____	Fax: _____
API Number: _____	County: _____
Facility Name: _____	Facility Number: _____
Well Name: _____	Well Number: _____
Location: (QtrQtr, Sec, Twp, Rng, Meridian): _____ Latitude: _____ Longitude: _____	

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): \_\_\_\_\_

Site Conditions: Is location within a sensitive area (according to Rule 901e)?      Y      N      If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): \_\_\_\_\_

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: \_\_\_\_\_

Potential receptors (water wells within 1/4 mi, surface waters, etc.): \_\_\_\_\_

\_\_\_\_\_

Description of Impact (if previously provided, refer to that form or document):

Impacted Media (check):	Extent of Impact:	How Determined:
Soils	_____	_____
Vegetation	_____	_____
Groundwater	_____	_____
Surface Water	_____	_____

**REMEDIALTION WORKPLAN**

Describe initial action taken (if previously provided, refer to that form or document):

Describe how source is to be removed:

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

FORM  
27  
Rev 6/99State of Colorado  
Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801, Denver, Colorado 80203  
(303)894-2100 Fax: (303)894-2109Page 2  
REMEDATION WORKPLAN (Cont.)Tracking Number: \_\_\_\_\_  
Name of Operator: \_\_\_\_\_  
OGCC Operator No: \_\_\_\_\_  
Received Date: \_\_\_\_\_  
Well Name & No: \_\_\_\_\_  
Facility Name & No: \_\_\_\_\_OGCC Employee: Young

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

**Describe reclamation plan.** Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

The tank hole was treated with agricultural pelleted gypsum and covered with 3' of fill dirt. The location will be seeded and straw will be crimped to help prevent erosion and promote re-growth.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☒ Y ☐ N If yes, describe:

We will continue to monitor the location for re-growth and erosion and will take the necessary steps to alleviate any issues or problems

Final disposition of E&amp;P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

## IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 09/26/14 Date Site Investigation Completed: 09/26/14 Date Remediation Plan Submitted: 10/24/14  
Remediation Start Date: 09/30/14 Anticipated Completion Date: 10/2/14 Actual Completion Date: \_\_\_\_\_

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Loni J. DavisSigned: Loni J. DavisTitle: Operations Accounting and Regulatory SpecialistDate: 10/24/14OGCC Approved: Ann C. GoldmanTitle: EPS NE CODate: 10/28/14

for Rob Young

# SOIL ANALYSIS REPORT

<b>CLIENT:</b>	AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758
18250	



1816 E. Wyatt Earp  
PO Box 1397  
Dodge City, KS 67801  
800.557.7509  
620.227.7123  
Fax 620.227.2047

<b>LAB NO:</b>	3980 - 3985
<b>INVOICE NO:</b>	193403
<b>DATE RECEIVED:</b>	10/10/2014
<b>DATE REPORTED:</b>	10/23/2014

## SOIL ANALYSIS RESULTS FOR: LUEKING 02-19 FIELD IDENTIFICATION: TANK REMOVALS

METHOD USED:			1:1 Water-Soil		1:1 Water-Soil					Ammonium Acetate				Ammonium Acetate								
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH	Sol. Salts mmho/cm	Excess Lime	% Organic Matter			Phosphorus ppm P	Potassium ppm K				Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
3980	01-30 TANK	0-48	8.5		2.84	Hi					643				3409	149	2664					
3981	01-30 TANK	0-12	8.0		0.34	Hi					657				3688	187	15					
3982	08-30 TANK	0-36	9.0		3.61	Hi					332				2908	93	2603					
3983	08-30 BACKG	0-12	7.2		0.21	No					538				1310	136	9					
3984	02-19 TANK	0 - 36	9.0		1.40	Hi					626				2943	74	1655					
3985	02-19 BACKG	0 - 12	8.9		0.46	Hi					568				3308	161	481					

METHOD USED:			Sat. Paste																			
Lab Number	Sample ID	Sample Depth	Saturation % Sat	Soil pH	Electrical Conductivity mmho/cm	Potassium mg/L K	Sulfur mg/L S	Calcium mg/L Ca	Magnesium mg/L Mg	Sodium mg/L Na	Carbonate mg/L CO3	Bicarbonate mg/L HCO3	Chloride mg/L Cl	Boron mg/L B	Sodium Adsorption Ratio	Cation:Anion						
3980	01-30-TANK	0-48	53	8.2	7.24	47	20	54	9.2	2140	<10	110	2890	4.88	70.8	97.7 / 85.8						
3981	01-30-TANK	0-12	46	7.8	0.75	84	11	139	13.2	22	<10	360	43	0.28	0.5	11.1 / 7.9						
3982	08-30-TANK	0-36	42	8.5	8.13	31	20	30	4.0	1680	<10	170	2340	5.78	76.4	75.7 / 71.6						
3983	08-30-BACKG	0-12	45	6.7	0.50	67	4	44	7.0	27	<10	260	12	0.34	1.0	5.7 / 4.9						
3984	02-19 TANK	0 - 36	44	8.6	3.10	68	16	40	42.0	564	<10	370	724	4.94	14.9	31.7 / 28.8						
3985	02-19 BACKG	0 - 12	37	8.3	0.84	163	14	91	126	249	<10	320	149	3.08	4.0	29.9 / 11.2						

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE																		Cation Exchange Capacity					
Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P2O5	K2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl	CEC	%H	%K	%Ca	%Mg	%Na
				6.0	6.5	7.0																	
3980	01-30-TANK																	34	0	4	65	4	37
3981	01-30-TANK																	22	0	8	85	7	0
3982	08-30-TANK																	27	0	3	53	3	44
3983	08-30-BACKG																	9	0	15	72	12	0
3984	02-19 TANK																	24	0	7	61	3	30
3985	02-19 BACKG																	21	0	7	77	6	10

Analyses are representative of the samples submitted      Samples are retained 30 days after report of analysis      Explanations of soil analysis terms are available upon request

Reviewed and  
Approved By: Steve Harrold  
Technical Coordinator

*Steve Harrold*

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10/23/2014 11:26 am

# SOIL ANALYSIS REPORT

**CLIENT:**  
18250  
AUGUSTUS ENERGY RESOURCES  
LLC  
36695 HWY 385  
PO BOX 250  
WRAY, CO 80758



1816 E. Wyatt Earp  
PO Box 1397  
Dodge City, KS 67801  
800.557.7509  
620.227.7123  
Fax 620.227.2047

<b>LAB NO:</b>	3980 - 3985
<b>INVOICE NO:</b>	193403
<b>DATE RECEIVED:</b>	10/10/2014
<b>DATE REPORTED:</b>	10/23/2014

**SOIL ANALYSIS RESULTS FOR:** LUEKING

**FIELD IDENTIFICATION:** TANK REMOVALS

**SPECIAL COMMENTS AND SUGGESTIONS:**

Lab Number(s): 3980, 3981, 3982, 3983, 3984, 3985

Servi-Tech Laboratory fertilizer recommendations were not requested.

Lab Number(s): 3980, 3981, 3982, 3984, 3985

CEC calculated by cation summation may overestimate true CEC and underestimate exchangeable sodium percentage (ESP) in soils containing excess lime.

Lab Number(s): 3980, 3982, 3984

**WARNING:** Soil sodium (% Na) is very high. Typical symptoms of a sodic soil are surface crusting, soil sealing, and poor water penetration. Additional soil analysis can determine the proper rate of gypsum or other soil amendment. If irrigated, water analysis can help identify the sodium source. Contact the laboratory for more information.

Lab Number(s): 3985

**WARNING:** Soil sodium (% Na) is high. Typical symptoms of a sodium problem are soil sealing, crusting, and poor water penetration. Applying gypsum may be beneficial, but additional soil analysis may be required to determine the rate. If irrigated, water analysis can help identify the sodium source. Contact the laboratory for more information.

Analyses are representative of the samples submitted

Samples are retained 30 days after report of analysis

Explanations of soil analysis terms are available upon request

Reviewed and  
Approved By:

Steve Harrold  
Technical Coordinator

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10/23/2014 11:26 am




# Servi-Tech Laboratories

1816 E. Wyatt Earp • PO Box 1397 • Dodge City, KS 67801  
www.servitechlabs.com

Phone: 620.227.7123

800.557.7509

Fax: 620.227.2047

Lab No.: 3984		SOIL ANALYSIS RESULTS		Date Reported: 10/23/2014	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Steve Harrold Technical Coordinator	
<b>Results For:</b> LUEKING		<b>Invoice No.:</b> 193403		<b>Date Received:</b> 10/10/2014	
<b>Sample Identification:</b> 02-19 TANK		<b>Field ID</b>		TANK REMOVALS	
<b>Sample Depth:</b> 0-36"					
<b>Exchangable:</b>					
	ppm	%			
Calcium, Ca	2943	61	Cation Exchange Capacity, CEC meq/100g		24
Magnesium, Mg	74	3	Soil pH - 1:1		9.0
Potassium, K	626	7	Soil pH - Saturated Paste		8.6
Sodium, Na	1655	30	Soluble Salts, mmho/cm		1.40
Excess Lime Rating		HIGH	Exchangable Sodium Percent, ESP		30
<b>Extractable (from saturated paste, based on 44% water saturation):</b>					
	mg/L		meq/L		
Calcium (Ca)	40		2.0		
Magnesium (Mg)	42.0		3.5		
Sodium (Na)	564		24.5		
Chloride (Cl)	724		20.4		
Sulfur (S)	16		1.0		
Boron (B)	4.94				
Potassium (K)	68		1.7		
Bicarbonate (HCO <sub>3</sub> )	370		6.1		
Carbonate (CO <sub>3</sub> )	<10		<0.3		
Sodium Adsorption Ratio (SAR) 14.9					
Electrical Conductivity (ECe), mmho/cm 3.10					
Cation:Anion 31.7 / 28.8					
Calculated Gypsum Recommendation (from ESP and CEC)					
Soil Texture			Gypsum Rec. T/A		
COARSE	(sands, loamy sands, sandy loams)		7.2	To	8.3
MEDIUM	(loams, silt loams, clay loams)		9.8	To	10.8
FINE	(silty clay, clay loams, clays)		11.4	To	12.4
This soil is considered: NON-SALINE/SODIC					
GYPSUM SUGGESTIONS: If soil has good internal drainage, full gypsum rate can be used to reclaim the affected area, but keep applications below 2 to 3 tons in a single year. Reclamation may not be feasible if a high water table is present, but applying 1/2 to 1 ton of gypsum every one to two years may help prevent crusting and surface "sealing".					




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<b>Results For:</b> <b>Sample Identification:</b> <b>Sample Depth:</b>		LUEKING 02-19 TANK 0-36"		<b>Invoice No.:</b> 193403 <b>Date Received:</b> 10/10/2014 <b>Field ID</b> TANK REMOVALS											
SOIL PERMEABILITY HAZARD (based on ESP and SAR):															
<table border="0"><thead><tr><th>Soil texture</th><th>Potential hazard</th></tr></thead><tbody><tr><td>COARSE (sands, loamy sands, sandy loams)</td><td>CAUTION</td></tr><tr><td>MEDIUM (loams, silt loams, clay loams)</td><td>HIGH</td></tr><tr><td>FINE (silty clay loams, clays)</td><td>HIGH</td></tr></tbody></table>						Soil texture	Potential hazard	COARSE (sands, loamy sands, sandy loams)	CAUTION	MEDIUM (loams, silt loams, clay loams)	HIGH	FINE (silty clay loams, clays)	HIGH		
Soil texture	Potential hazard														
COARSE (sands, loamy sands, sandy loams)	CAUTION														
MEDIUM (loams, silt loams, clay loams)	HIGH														
FINE (silty clay loams, clays)	HIGH														
SOIL SALINITY: Saline soils can be managed by choosing tolerant crops, keeping the seedbed moist until crop establishment, and/or irrigating with relatively good quality irrigation water. Good internal soil drainage is needed to reclaim saline areas, so lowering water tables may be necessary. Test soil (and water) annually to monitor changes in salinity levels.															
SOIL SALINITY HAZARD (based on extractable salts, ECe):															
<table border="0"><thead><tr><th>Crop type</th><th>Potential hazard</th></tr></thead><tbody><tr><td>SALT SENSITIVE (onions, carrots, many ornamentals, many fruit crops, etc.)</td><td>HIGH</td></tr><tr><td>MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)</td><td>CAUTION</td></tr><tr><td>MODERATELY TOLERANT (wheat, wheatgrass, sudangrass, sorghum, fescue, oats, brome grass, etc.)</td><td>LOW</td></tr><tr><td>SALT TOLERANT (barley, bermudagrass, sugarbeets, cotton, etc.)</td><td>LOW</td></tr></tbody></table>						Crop type	Potential hazard	SALT SENSITIVE (onions, carrots, many ornamentals, many fruit crops, etc.)	HIGH	MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)	CAUTION	MODERATELY TOLERANT (wheat, wheatgrass, sudangrass, sorghum, fescue, oats, brome grass, etc.)	LOW	SALT TOLERANT (barley, bermudagrass, sugarbeets, cotton, etc.)	LOW
Crop type	Potential hazard														
SALT SENSITIVE (onions, carrots, many ornamentals, many fruit crops, etc.)	HIGH														
MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)	CAUTION														
MODERATELY TOLERANT (wheat, wheatgrass, sudangrass, sorghum, fescue, oats, brome grass, etc.)	LOW														
SALT TOLERANT (barley, bermudagrass, sugarbeets, cotton, etc.)	LOW														
CHLORIDE: Excess soil chloride may cause toxicity symptoms in sensitive plants. Toxicity should be verified by plant tissue analysis. High chloride soils can be managed by choosing tolerant crops, keeping the seed bed moist until crop establishment, and/or by irrigating with relatively good quality irrigation water.															
EXTRACTABLE CHLORIDE HAZARD (based on soil extractable chloride, Cl):															
HIGH for chloride sensitive crops (includes berries, fruit trees, grapes, citrus, etc.) CAUTION for moderately tolerant crops (includes alfalfa, beans, rice, sorghum, etc.) LOW for chloride tolerant crops (includes wheat, flax, tomato, cotton, barley, corn, beets, etc.)															
BORON: Excess soil boron may cause toxicity symptoms in sensitive plants. Toxicity should be verified by plant tissue analysis. If toxicity is a problem, choose boron tolerant crops and/or irrigate with relatively good quality irrigation water.															



**Fax:** 620.227.2047

BORON TOLERANT (such as alfalfa, beets, cotton, grain sorghum, tomatoes, vetch, etc.) . . . . CAUTION



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<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Steve Harrold Technical Coordinator	
<b>Results For:</b> LUEKING		<b>Invoice No.:</b> 193403		<b>Date Received:</b> 10/10/2014	
<b>Sample Identification:</b> 02-19 BACKG		<b>Field ID</b>		TANK REMOVALS	
<b>Sample Depth:</b> 0-12"					
<b>Exchangable:</b>					
	ppm	%			
Calcium, Ca	3308	77	Cation Exchange Capacity, CEC meq/100g		21
Magnesium, Mg	161	6	Soil pH - 1:1		8.9
Potassium, K	568	7	Soil pH - Saturated Paste		8.3
Sodium, Na	481	10	Soluble Salts, mmho/cm		0.46
Excess Lime Rating		HIGH	Exchangable Sodium Percent, ESP		10
<b>Extractable (from saturated paste, based on 37% water saturation):</b>					
	mg/L		meq/L		
Calcium (Ca)	91		4.5		
Magnesium (Mg)	126		10.4		
Sodium (Na)	249		10.8		
Chloride (Cl)	149		4.2		
Sulfur (S)	14		0.9		
Boron (B)	3.08				
Potassium (K)	163		4.2		
Bicarbonate (HCO <sub>3</sub> )	320		5.2		
Carbonate (CO <sub>3</sub> )	<10		<0.3		
Sodium Adsorption Ratio (SAR) 4.0					
Electrical Conductivity (ECe), mmho/cm 0.84					
Cation:Anion 29.9 / 11.2					
Calculated Gypsum Recommendation (from ESP and CEC)					
Soil Texture			Gypsum Rec. T/A		
COARSE	(sands, loamy sands, sandy loams)		0.0	To	0.0
MEDIUM	(loams, silt loams, clay loams)		0.0	To	0.5
FINE	(silty clay, clay loams, clays)		0.9	To	1.8
This soil is considered: NON-SALINE/NON-SODIC					
GYPSUM SUGGESTIONS: If soil has good internal drainage, full gypsum rate can be used to reclaim the affected area, but keep applications below 2 to 3 tons in a single year. Reclamation may not be feasible if a high water table is present, but applying 1/2 to 1 ton of gypsum every one to two years may help prevent crusting and surface "sealing".					






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<b>Results For:</b> <b>Sample Identification:</b> <b>Sample Depth:</b>		LUEKING 02-19 BACKG 0-12"		<b>Invoice No.:</b> 193403 <b>Date Received:</b> 10/10/2014 <b>Field ID</b> TANK REMOVALS	
SOIL PERMEABILITY HAZARD (based on ESP and SAR):					
Soil texture		Potential hazard			
-----		-----			
COARSE (sands, loamy sands, sandy loams)		LOW			
MEDIUM (loams, silt loams, clay loams)		CAUTION			
FINE (silty clay loams, clays)		HIGH			
SOIL SALINITY HAZARD (based on extractable salts, ECe):					
Crop type		Potential hazard			
-----		-----			
SALT SENSITIVE (onions, carrots, many ornamentals, many fruit crops, etc.)		LOW			
MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)		LOW			
MODERATELY TOLERANT (wheat, wheatgrass, sudangrass, sorghum, fescue, oats, brome grass, etc.)		LOW			
SALT TOLERANT (barley, bermudagrass, sugarbeets, cotton, etc.)		LOW			
EXTRACTABLE CHLORIDE HAZARD (based on soil extractable chloride, Cl <sub>e</sub> ):					
CAUTION for chloride sensitive crops (includes berries, fruit trees, grapes, citrus, etc.)					
LOW for moderately tolerant crops (includes alfalfa, beans, rice, sorghum, etc.)					
LOW for chloride tolerant crops (includes wheat, flax, tomato, cotton, barley, corn, beets, etc.)					
BORON: Excess soil boron may cause toxicity symptoms in sensitive plants. Toxicity should be verified by plant tissue analysis. If toxicity is a problem, choose boron tolerant crops and/or irrigate with relatively good quality irrigation water.					
EXTRACTABLE BORON HAZARD (based on soil extractable boron, B):					
Crop type		Potential hazard			
-----		-----			
BORON SENSITIVE (such as sunflower, barley, onions, citrus, fruit trees, grapes, etc.)		HIGH			
MODERATELY SENSITIVE (such as potatoes, peppers, peas, radishes, etc.)		HIGH			
MODERATELY TOLERANT (such as wheat, corn, oats, clover, lettuce, turnips, celery, etc.)		CAUTION			
BORON TOLERANT (such as alfalfa, beets, cotton, grain sorghum, tomatoes, vetch, etc.)		LOW			

North  
↑

## Lueking 02-19 - Tank Pull

Tank Removal soil sample depths 1' to 3'

• LUEKING 2-19

• ROCK CREEK D 1-19

Background Lat 40.38039/Lon -102.53394

Tank Lat 40.38045/Lon -102.53397

• LUEKING 14-30

• O. LUEKING 1

• LUEKING 13-30

• LUEKING 11-30

• O. LUEKING 8-30

• ROCK CREEK D 2-30

