

Contaminant of Concern	Concentrations	Republican WCS Sample #1 Line Leak 10-19-15	Republican WCS Sample #2 Line Leak 10-19-15	Republican WCS Sample #3 Line Leak 10-19-15	Republican WD Sample #4 Line Leak 10- 19-15	Republican WCS Background 10- 19-15
<b>Organic Compounds in Soil</b>						
<b>Inorganics in Soils</b>						
Electrical Conductivity (EC)	<4 mmhos/cm or 2x background	12.9	11.8	14.1	10.6	0.59
Sodium Adsorption Ratio (SAR)	<12 <sub>s</sub>	27.6	40.1	32.6	31.6	0.2
pH	6-9	7.5	7.9	7.5	7.8	7.7

# SOIL ANALYSIS REPORT

<b>CLIENT:</b> 18250	AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758
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<b>LAB NO:</b>	13499 - 13503
<b>INVOICE NO:</b>	204991
<b>DATE RECEIVED:</b>	10/23/2015
<b>DATE REPORTED:</b>	10/28/2015

## SOIL ANALYSIS RESULTS FOR: FIELD IDENTIFICATION: FIX SEC 2 MS LINE

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
13499	SAMPLE 1	0 - 6	8.0		3.24	Hi					361			3998	180	1700					
13500	SAMPLE 2	0 - 6	8.4		2.77	Hi					706			3816	162	2037					
13501	SAMPLE 3	0 - 6	7.9		3.33	Lo					488			2080	132	1533					
13502	SAMPLE 4	0 - 6	8.2		2.86	Lo					774			3093	111	1593					
13503	SAMPLE BG	0 - 6	8.0		0.26	Hi					565			3950	153	45					

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					
13499	SAMPLE 1	0 - 6	42	7.5	12.9	48	7	482	38.0	2340	<10	140	3890	2.14	27.6	130.2 / 112.9					
13500	SAMPLE 2	0 - 6	46	7.9	11.8	109	32	221	22.2	2340	<10	200	4220	1.95	40.1	117.4 / 124.7					
13501	SAMPLE 3	0 - 6	37	7.5	14.1	129	7	423	42.1	2630	<10	230	4530	1.95	32.6	142.3 / 132.4					
13502	SAMPLE 4	0 - 6	49	7.8	10.6	160	7	290	17.5	2050	<10	260	3170	0.89	31.6	109.2 / 94.2					
13503	SAMPLE BG	0 - 6	47	7.7	0.59	45	7	100	6.7	7	<10	270	24	0.11	0.2	7.0 / 5.6					

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																	
13499	SAMPLE 1																	30	0	3	67	5	25
13500	SAMPLE 2																	31	0	6	61	4	28
13501	SAMPLE 3																	19	0	6	54	6	34
13502	SAMPLE 4																	25	0	8	61	4	27
13503	SAMPLE BG																	23	0	6	87	6	1

<b>SPECIAL COMMENTS AND SUGGESTIONS:</b>

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: Ed McGuire  
Data Review Coordinator

*Edwin J. McGuire*

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# SOIL ANALYSIS REPORT



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

<b>LAB NO:</b>	13499 - 13503
<b>INVOICE NO:</b>	204991
<b>DATE RECEIVED:</b>	10/23/2015
<b>DATE REPORTED:</b>	10/28/2015

## SOIL ANALYSIS RESULTS FOR:

**FIELD IDENTIFICATION:** FIX SEC 2 MS LINE

Lab Number(s): 13499, 13500, 13501, 13502

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): 13499, 13500, 13501, 13502, 13503

Servi-Tech Laboratory fertilizer recommendations were not requested.

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:

Ed McGuire  
Data Review Coordinator

*Edwin J. McGuire*

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10/28/2015 1:34 pm




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Lab No.: 13499		SOIL ANALYSIS RESULTS		Date Reported: 10/28/2015	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b>		<b>Invoice No.:</b> 204991		<b>Date Received:</b> 10/23/2015	
<b>Sample Identification:</b> SAMPLE 1		<b>Date Received:</b> 10/23/2015		<b>Field ID</b> FIX SEC 2 MS LINE	
<b>Sample Depth:</b> 0-6"					
<b>Exchangable:</b>					
	ppm	%			
Calcium, Ca	3998	67	Cation Exchange Capacity, CEC meq/100g		30
Magnesium, Mg	180	5	Soil pH - 1:1		8.0
Potassium, K	361	3	Soil pH - Saturated Paste		7.5
Sodium, Na	1700	25	Soluble Salts, mmho/cm		3.24
Excess Lime Rating		HIGH	Exchangable Sodium Percent, ESP		25
<b>Extractable (from saturated paste, based on 42% water saturation):</b>					
	mg/L	meq/L			
Calcium (Ca)	482	24.1			
Magnesium (Mg)	38.0	3.1			
Sodium (Na)	2340	101.7			
Chloride (Cl)	3890	109.7			
Sulfur (S)	7	0.4			
Boron (B)	2.14				
Potassium (K)	48	1.2			
Bicarbonate (HCO <sub>3</sub> )	140	2.3			
Carbonate (CO <sub>3</sub> )	<10	<0.3			
Sodium Adsorption Ratio (SAR) 27.6					
Electrical Conductivity (ECe), mmho/cm 12.9					
Cation:Anion 130.2 / 112.9					
Calculated Gypsum Recommendation (from ESP and CEC)					
Soil Texture			Gypsum Rec. T/A		
COARSE	(sands, loamy sands, sandy loams)	5.8	To	7.1	
MEDIUM	(loams, silt loams, clay loams)	9.0	To	10.3	
FINE	(silty clay, clay loams, clays)	11.0	To	12.3	
This soil is considered: 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>Sample Identification:</b> SAMPLE 1		<b>Date Received:</b> 10/23/2015		<b>Field ID:</b> FIX SEC 2 MS LINE											
<b>Sample Depth:</b> 0-6"		<b>Field ID:</b> FIX SEC 2 MS LINE													
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):															
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Crop type	Potential hazard														
SALT SENSITIVE (onions, carrots, many ornamentals, many fruit crops, etc.)	HIGH														
MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)	HIGH														
MODERATELY TOLERANT (wheat, wheatgrass, sudangrass, sorghum, fescue, oats, brome grass, etc.)	HIGH														
SALT TOLERANT (barley, bermudagrass, sugarbeets, cotton, etc.)	CAUTION														
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.)															
HIGH for moderately tolerant crops (includes alfalfa, beans, rice, sorghum, etc.)															
HIGH 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.															




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Lab No.: 13499		SOIL ANALYSIS RESULTS		Date Reported: 10/28/2015	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b>		<b>Invoice No.:</b> 204991		<b>Date Received:</b> 10/23/2015	
<b>Sample Identification:</b> SAMPLE 1		<b>Date Received:</b> 10/23/2015		<b>Field ID</b> FIX SEC 2 MS LINE	
<b>Sample Depth:</b> 0-6"		<b>Date Received:</b> 10/23/2015		<b>Field ID</b> FIX SEC 2 MS LINE	
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					



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<b>Lab No.: 13500</b>		<b>SOIL ANALYSIS RESULTS</b>		<b>Date Reported: 10/28/2015</b>	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b> <b>Sample Identification:</b> SAMPLE 2 <b>Sample Depth:</b> 0-6"		<b>Invoice No.:</b> 204991 <b>Date Received:</b> 10/23/2015 <b>Field ID</b>		FIX SEC 2 MS LINE	

<b>Exchangable:</b>					
	<u>ppm</u>	<u>%</u>			
Calcium, Ca	3816	61	Cation Exchange Capacity, CEC meq/100g		31
Magnesium, Mg	162	4	Soil pH - 1:1		8.4
Potassium, K	706	6	Soil pH - Saturated Paste		7.9
Sodium, Na	2037	28	Soluble Salts, mmho/cm		2.77
Excess Lime Rating		HIGH	Exchangable Sodium Percent, ESP		28

**Extractable (from saturated paste, based on 46% water saturation):**

	<b>mg/L</b>	<b>meq/L</b>
Calcium (Ca)	221	11.0
Magnesium (Mg)	22.2	1.8
Sodium (Na)	2340	101.7
Chloride (Cl)	4220	119.0
Sulfur (S)	32	2.0
Boron (B)	1.95	
Potassium (K)	109	2.8
Bicarbonate (HCO <sub>3</sub> )	200	3.3
Carbonate (CO <sub>3</sub> )	<10	<0.3

Sodium Adsorption Ratio (SAR)	40.1
Electrical Conductivity (ECe), mmho/cm	11.8
Cation:Anion	117.4 / 124.7

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Calculated Gypsum Recommendation (from ESP and CEC)		
Soil Texture	Gypsum Rec. T/A	
COARSE (sands, loamy sands, sandy loams)	8.0	To 9.3
MEDIUM (loams, silt loams, clay loams)	11.3	To 12.7
FINE (silty clay, clay loams, clays)	13.3	To 14.7

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This soil is considered: SALINE/SODIC

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**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>		SAMPLE 2 0-6"		<b>Invoice No.:</b> 204991 <b>Date Received:</b> 10/23/2015 <b>Field ID:</b> FIX SEC 2 MS LINE	
SOIL PERMEABILITY HAZARD (based on ESP and SAR):					
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):					
Crop type		Potential hazard			
-----		-----			
SALT SENSITIVE (onions, carrots, many ornamentals, many fruit crops, etc.)		HIGH			
MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)		HIGH			
MODERATELY TOLERANT (wheat, wheatgrass, sudangrass, sorghum, fescue, oats, brome grass, etc.)		HIGH			
SALT TOLERANT (barley, bermudagrass, sugarbeets, cotton, etc.)		CAUTION			
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.)					
HIGH for moderately tolerant crops (includes alfalfa, beans, rice, sorghum, etc.)					
HIGH 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.					





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Lab No.: 13501		SOIL ANALYSIS RESULTS		Date Reported: 10/28/2015	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b>		<b>Invoice No.:</b> 204991		<b>Date Received:</b> 10/23/2015	
<b>Sample Identification:</b> SAMPLE 3		<b>Date Received:</b> 10/23/2015		<b>Field ID</b> FIX SEC 2 MS LINE	
<b>Sample Depth:</b> 0-6"					
<b>Exchangable:</b>					
	ppm	%			
Calcium, Ca	2080	54	Cation Exchange Capacity, CEC meq/100g		19
Magnesium, Mg	132	6	Soil pH - 1:1		7.9
Potassium, K	488	6	Soil pH - Saturated Paste		7.5
Sodium, Na	1533	34	Soluble Salts, mmho/cm		3.33
Excess Lime Rating		LOW	Exchangable Sodium Percent, ESP		34
<b>Extractable (from saturated paste, based on 37% water saturation):</b>					
	mg/L	meq/L			
Calcium (Ca)	423	21.1			
Magnesium (Mg)	42.1	3.5			
Sodium (Na)	2630	114.3			
Chloride (Cl)	4530	127.8			
Sulfur (S)	7	0.4			
Boron (B)	1.95				
Potassium (K)	129	3.3			
Bicarbonate (HCO <sub>3</sub> )	230	3.8			
Carbonate (CO <sub>3</sub> )	<10	<0.3			
Sodium Adsorption Ratio (SAR) 32.6					
Electrical Conductivity (ECe), mmho/cm 14.1					
Cation:Anion 142.3 / 132.4					
Calculated Gypsum Recommendation (from ESP and CEC)					
Soil Texture			Gypsum Rec. T/A		
COARSE	(sands, loamy sands, sandy loams)		7.4	To	8.2
MEDIUM	(loams, silt loams, clay loams)		9.4	To	10.2
FINE	(silty clay, clay loams, clays)		10.6	To	11.4
This soil is considered: 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>Sample Identification:</b> SAMPLE 3		<b>Date Received:</b> 10/23/2015		<b>Field ID:</b> FIX SEC 2 MS LINE											
<b>Sample Depth:</b> 0-6"		<b>Field ID:</b> FIX SEC 2 MS LINE													
<b>SOIL PERMEABILITY HAZARD (based on ESP and SAR):</b>															
<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														
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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.															
<b>SOIL SALINITY HAZARD (based on extractable salts, ECe):</b>															
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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.															
<b>EXTRACTABLE CHLORIDE HAZARD (based on soil extractable chloride, Cl):</b>															
HIGH for chloride sensitive crops (includes berries, fruit trees, grapes, citrus, etc.) HIGH for moderately tolerant crops (includes alfalfa, beans, rice, sorghum, etc.) HIGH 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.															




# Servi-Tech Laboratories

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800.557.7509

Fax: 620.227.2047

<b>Lab No.: 13501</b>		<b>SOIL ANALYSIS RESULTS</b>		<b>Date Reported: 10/28/2015</b>	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b>		<b>Invoice No.:</b> 204991		<b>Date Received:</b> 10/23/2015	
<b>Sample Identification:</b> SAMPLE 3		<b>Date Received:</b> 10/23/2015		<b>Field ID:</b> FIX SEC 2 MS LINE	
<b>Sample Depth:</b> 0-6"					
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.) . . . . . CAUTION					
MODERATELY TOLERANT (such as wheat, corn, oats, clover, lettuce, turnips, celery, etc.) . . LOW					
BORON TOLERANT (such as alfalfa, beets, cotton, grain sorghum, tomatoes, vetch, etc.) . . . . . LOW					



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Lab No.: 13502		SOIL ANALYSIS RESULTS		Date Reported: 10/28/2015	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b>		<b>Invoice No.:</b> 204991		<b>Date Received:</b> 10/23/2015	
<b>Sample Identification:</b> SAMPLE 4		<b>Field ID</b>		FIX SEC 2 MS LINE	
<b>Sample Depth:</b> 0-6"					
<b>Exchangable:</b>					
	ppm	%			
Calcium, Ca	3093	61	Cation Exchange Capacity, CEC meq/100g		25
Magnesium, Mg	111	4	Soil pH - 1:1		8.2
Potassium, K	774	8	Soil pH - Saturated Paste		7.8
Sodium, Na	1593	27	Soluble Salts, mmho/cm		2.86
Excess Lime Rating		LOW	Exchangable Sodium Percent, ESP		27
<b>Extractable (from saturated paste, based on 49% water saturation):</b>					
	mg/L		meq/L		
Calcium (Ca)	290		14.5		
Magnesium (Mg)	17.5		1.4		
Sodium (Na)	2050		89.1		
Chloride (Cl)	3170		89.4		
Sulfur (S)	7		0.4		
Boron (B)	0.89				
Potassium (K)	160		4.1		
Bicarbonate (HCO <sub>3</sub> )	260		4.3		
Carbonate (CO <sub>3</sub> )	<10		<0.3		
Sodium Adsorption Ratio (SAR) 31.6					
Electrical Conductivity (ECe), mmho/cm 10.6					
Cation:Anion 109.2 / 94.2					
Calculated Gypsum Recommendation (from ESP and CEC)					
Soil Texture			Gypsum Rec. T/A		
COARSE	(sands, loamy sands, sandy loams)		5.9	To	7.0
MEDIUM	(loams, silt loams, clay loams)		8.6	To	9.7
FINE	(silty clay, clay loams, clays)		10.2	To	11.3
This soil is considered: 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>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b> <b>Sample Identification:</b> <b>Sample Depth:</b>		SAMPLE 4 0-6"		<b>Invoice No.:</b> 204991 <b>Date Received:</b> 10/23/2015 <b>Field ID:</b> FIX SEC 2 MS LINE	
SOIL PERMEABILITY HAZARD (based on ESP and SAR):					
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):					
Crop type		Potential hazard			
-----		-----			
SALT SENSITIVE (onions, carrots, many ornamentals, many fruit crops, etc.)		HIGH			
MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)		HIGH			
MODERATELY TOLERANT (wheat, wheatgrass, sudangrass, sorghum, fescue, oats, brome grass, etc.)		HIGH			
SALT TOLERANT (barley, bermudagrass, sugarbeets, cotton, etc.)		CAUTION			
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.)					
HIGH for moderately tolerant crops (includes alfalfa, beans, rice, sorghum, etc.)					
HIGH 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.					



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BORON SENSITIVE (such as sunflower, barley, onions, citrus, fruit trees, grapes, etc.) . . . . . HIGH  
MODERATELY SENSITIVE (such as potatoes, peppers, peas, radishes, etc.) . . . . . CAUTION  
MODERATELY TOLERANT (such as wheat, corn, oats, clover, lettuce, turnips, celery, etc.) . . . . . LOW  
BORON TOLERANT (such as alfalfa, beets, cotton, grain sorghum, tomatoes, vetch, etc.) . . . . . LOW



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Lab No.: 13503		SOIL ANALYSIS RESULTS		Date Reported: 10/28/2015	
<b>Send To:</b> 18250		AUGUSTUS ENERGY RESOURCES LLC 36695 HWY 385 PO BOX 250 WRAY, CO 80758		 Ed McGuire Data Review Coordinator	
<b>Results For:</b>		<b>Invoice No.:</b> 204991		<b>Date Received:</b> 10/23/2015	
<b>Sample Identification:</b> SAMPLE BG		<b>Date Received:</b> 10/23/2015		<b>Field ID:</b> FIX SEC 2 MS LINE	
<b>Sample Depth:</b> 0-6"					
<b>Exchangable:</b>					
	ppm	%			
Calcium, Ca	3950	87	Cation Exchange Capacity, CEC meq/100g		23
Magnesium, Mg	153	6	Soil pH - 1:1		8.0
Potassium, K	565	6	Soil pH - Saturated Paste		7.7
Sodium, Na	45	1	Soluble Salts, mmho/cm		0.26
Excess Lime Rating		HIGH	Exchangable Sodium Percent, ESP		1
<b>Extractable (from saturated paste, based on 47% water saturation):</b>					
	mg/L		meq/L		
Calcium (Ca)	100		5.0		
Magnesium (Mg)	6.7		0.6		
Sodium (Na)	7		0.3		
Chloride (Cl)	24		0.7		
Sulfur (S)	7		0.4		
Boron (B)	0.11				
Potassium (K)	45		1.2		
Bicarbonate (HCO <sub>3</sub> )	270		4.4		
Carbonate (CO <sub>3</sub> )	<10		<0.3		
Sodium Adsorption Ratio (SAR) 0.2					
Electrical Conductivity (ECe), mmho/cm 0.59					
Cation:Anion 7.0 / 5.6					
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	0.0
FINE	(silty clay, clay loams, clays)		0.0	To	0.0
This soil is considered: NON-SALINE/NON-SODIC					
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)		LOW			
FINE (silty clay loams, clays)		LOW			






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EXTRACTABLE CHLORIDE HAZARD (based on soil extractable chloride, Cl):															
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