

| Contaminant of Concern           | Concentrations                  | Republican WC<br>Road 29 & U<br>Sample #1 Line<br>Leak 04-22-16 | Republican<br>WC Road 29 &<br>U Background |
|----------------------------------|---------------------------------|---|--|
| <b>Organic Compounds in Soil</b> |                                 |   |  |
| <b>Inorganics in Soils</b>       |                                 |   |  |
| Electrical Conductivity (EC)     | <4 mmhos/cm or 2x<br>background | 7.19  | 0.39                                       |
| Sodium Adsorption Ratio (SAR)    | <12 <sub>s</sub>                | 83.4  | 0.2  |
| pH                               | 6-9                             | 8.6   | 7.6  |

# SOIL ANALYSIS REPORT

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



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|                       |               |
|-----------------------|---------------|
| <b>LAB NO:</b>        | 88849 - 88850 |
| <b>INVOICE NO:</b>    | 210642        |
| <b>DATE RECEIVED:</b> | 04/27/2016    |
| <b>DATE REPORTED:</b> | 04/29/2016    |

## SOIL ANALYSIS RESULTS FOR: FIELD IDENTIFICATION: REPUBLICAN WC RD 29 & U LINE

| METHOD USED:  |              |                 | 1:1<br>Water-Soil |              | 1:1<br>Water-Soil     |                |                     |  |  |                     | Ammonium<br>Acetate |  |  | Ammonium Acetate  |                     |                  |                |                |                     |                  |                |
|---------------|--------------|-----------------|-------------------|--------------|-----------------------|----------------|---------------------|--|--|---------------------|---------------------|--|--|-------------------|---------------------|------------------|----------------|----------------|---------------------|------------------|----------------|
| Lab<br>Number | Sample<br>ID | Sample<br>Depth | Soil<br>pH        | Buffer<br>pH | Sol. Salts<br>mmho/cm | Excess<br>Lime | % Organic<br>Matter |  |  | Phosphorus<br>ppm P | Potassium<br>ppm K  |  |  | Calcium<br>ppm Ca | Magnesium<br>ppm Mg | Sodium<br>ppm Na | Zinc<br>ppm Zn | Iron<br>ppm Fe | Manganese<br>ppm Mn | Copper<br>ppm Cu | Boron<br>ppm B |
| 88849         | LEAK         | 0 - 6           | 9.2               |              | 1.41                  | Lo             |                     |  |  |                     | 101                 |  |  | 1153              | 60                  | 1250             |                |                |                     |                  |                |
| 88850         | BACKGROUND   | 0 - 6           | 7.8               |              | 0.09                  | Lo             |                     |  |  |                     | 135                 |  |  | 1734              | 77                  | 12               |                |                |                     |                  |                |

| 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 |  |  |  |  |  |
| 88849        | LEAK       | 0 - 6        | 33               | 8.6     | 7.19                            | 15               | 13            | 20              | 5.0               | 1610           | <10                | 470                   | 2280             | 5.61         | 83.4                    | 71.8 / 74.3  |  |  |  |  |  |
| 88850        | BACKGROUND | 0 - 6        | 33               | 7.6     | 0.39                            | 18               | 2             | 64              | 6.2               | 6              | <10                | 240                   | 7                | 0.08         | 0.2                     | 4.4 / 4.3    |  |  |  |  |  |

| 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 | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | Zn                              | S | Mn | Cu | MgO | B | Ca | Cl | CEC | %H | %K                       | %Ca | %Mg | %N |  |  |
|                             |            |                  |            | 6.0                              | 6.5 | 7.0 |   |                               |                  |                                 |   |    |    |     |   |    |    |     |    |                          |     |     |    |  |  |
| 88849                       | LEAK       |                  |            |                                  |     |     |   |                               |                  |                                 |   |    |    |     |   |    |    | 12  | 0  | 2                        | 48  | 4   | 4  |  |  |
| 88850                       | BACKGROUND |                  |            |                                  |     |     |   |                               |                  |                                 |   |    |    |     |   |    |    | 10  | 0  | 4                        | 89  | 7   |    |  |  |

### SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 88849

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): 88849, 88850

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:

Steve Harrold  
Laboratory Manager

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04/29/2016 4:54 pm




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|  |  |   |  |  |  |
|--|--|---|--|--|--|
| <b>Lab No.:</b> 88849  |  | <b>SOIL ANALYSIS RESULTS</b>  |  | <b>Date Reported:</b> 04/29/2016   |  |
| <b>Send To:</b><br>18250   |  | AUGUSTUS ENERGY RESOURCES LLC<br>36695 HWY 385<br>PO BOX 250<br>WRAY, CO 80758    |  | <br>Steve Harrold<br>Laboratory Manager |  |
| <b>Results For:</b><br><b>Sample Identification:</b> LEAK<br><b>Sample Depth:</b> 0-6" |  | <b>Invoice No.:</b> 210642<br><b>Date Received:</b> 04/27/2016<br><b>Field ID</b> |  | REPUBLICAN WC RD 29 & U LI   |  |

|                     |            |          |  |  |      |
|---------------------|------------|----------|--|--|------|
| <b>Exchangable:</b> |            |          |  |  |      |
|                     | <u>ppm</u> | <u>%</u> |  |  |      |
| Calcium, Ca         | 1153       | 48       | Cation Exchange Capacity, CEC meq/100g |  | 12   |
| Magnesium, Mg       | 60         | 4        | Soil pH - 1:1                          |  | 9.2  |
| Potassium, K        | 101        | 2        | Soil pH - Saturated Paste              |  | 8.6  |
| Sodium, Na          | 1250       | 45       | Soluble Salts, mmho/cm                 |  | 1.41 |
| Excess Lime Rating  |            | LOW      | Exchangable Sodium Percent, ESP        |  | 45   |

|   |             |              |
|---|-------------|--------------|
| <b>Extractable (from saturated paste, based on 33% water saturation):</b> |             |              |
|   | <b>mg/L</b> | <b>meq/L</b> |
| Calcium (Ca)  | 20          | 1.0          |
| Magnesium (Mg)  | 5.0         | 0.4          |
| Sodium (Na)   | 1610        | 70.0         |
| Chloride (Cl)   | 2280        | 64.3         |
| Sulfur (S)  | 13          | 0.8          |
| Boron (B)   | 5.61        |              |
| Potassium (K)   | 15          | 0.4          |
| Bicarbonate (HCO <sub>3</sub> )   | 470         | 7.7          |
| Carbonate (CO <sub>3</sub> )  | <10         | <0.3         |

|  |             |
|--|-------------|
| Sodium Adsorption Ratio (SAR)          | 83.4        |
| Electrical Conductivity (ECe), mmho/cm | 7.19        |
| Cation:Anion                           | 71.8 / 74.3 |

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|   |                                   |                 |         |
|---|-----------------------------------|-----------------|---------|
| Calculated Gypsum Recommendation (from ESP and CEC) |                                   |                 |         |
| Soil Texture  |                                   | Gypsum Rec. T/A |         |
| COARSE  | (sands, loamy sands, sandy loams) | 7.5             | To 8.0  |
| MEDIUM  | (loams, silt loams, clay loams)   | 8.8             | To 9.3  |
| FINE  | (silty clay, clay loams, clays)   | 9.5             | To 10.1 |

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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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| Lab No.: 88849  |  | SOIL ANALYSIS RESULTS  |  | Date Reported: 04/29/2016  |  |
|---|--|--|--|--|--|
| <b>Send To:</b><br>18250  |  | AUGUSTUS ENERGY RESOURCES LLC<br>36695 HWY 385<br>PO BOX 250<br>WRAY, CO 80758                               |  | <br>Steve Harrold<br>Laboratory Manager |  |
| <b>Results For:</b><br><b>Sample Identification:</b> LEAK<br><b>Sample Depth:</b> 0-6"  |  | <b>Invoice No.:</b> 210642<br><b>Date Received:</b> 04/27/2016<br><b>Field ID</b> REPUBLICAN WC RD 29 & U LI |  |  |  |
| 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.)   |  | CAUTION  |  |  |  |
| 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.)   |  |  |  |  |  |
| 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 TOLERANT** (such as alfalfa, beets, cotton, grain sorghum, tomatoes, vetch, etc.) . . . . **CAUTION**



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| <b>Lab No.:</b> 88850  |  | <b>SOIL ANALYSIS RESULTS</b>  |  | <b>Date Reported:</b> 04/29/2016   |  |
| <b>Send To:</b><br>18250   |  | AUGUSTUS ENERGY RESOURCES LLC<br>36695 HWY 385<br>PO BOX 250<br>WRAY, CO 80758    |  | <br>Steve Harrold<br>Laboratory Manager |  |
| <b>Results For:</b><br><b>Sample Identification:</b> BACKGROUND<br><b>Sample Depth:</b> 0-6" |  | <b>Invoice No.:</b> 210642<br><b>Date Received:</b> 04/27/2016<br><b>Field ID</b> |  | REPUBLICAN WC RD 29 & U LI   |  |

|                     |            |          |  |  |      |
|---------------------|------------|----------|--|--|------|
| <b>Exchangable:</b> |            |          |  |  |      |
|                     | <u>ppm</u> | <u>%</u> |  |  |      |
| Calcium, Ca         | 1734       | 89       | Cation Exchange Capacity, CEC meq/100g |  | 10   |
| Magnesium, Mg       | 77         | 7        | Soil pH - 1:1                          |  | 7.8  |
| Potassium, K        | 135        | 4        | Soil pH - Saturated Paste              |  | 7.6  |
| Sodium, Na          | 12         | 1        | Soluble Salts, mmho/cm                 |  | 0.09 |
| Excess Lime Rating  |            | LOW      | Exchangable Sodium Percent, ESP        |  | 1    |

|   |             |              |
|---|-------------|--------------|
| <b>Extractable (from saturated paste, based on 33% water saturation):</b> |             |              |
|   | <b>mg/L</b> | <b>meq/L</b> |
| Calcium (Ca)  | 64          | 3.2          |
| Magnesium (Mg)  | 6.2         | 0.5          |
| Sodium (Na)   | 6           | 0.3          |
| Chloride (Cl)   | 7           | 0.2          |
| Sulfur (S)  | 2           | 0.1          |
| Boron (B)   | 0.08        |              |
| Potassium (K)   | 18          | 0.5          |
| Bicarbonate (HCO <sub>3</sub> )   | 240         | 3.9          |
| Carbonate (CO <sub>3</sub> )  | <10         | <0.3         |

|  |           |
|--|-----------|
| Sodium Adsorption Ratio (SAR)          | 0.2       |
| Electrical Conductivity (ECe), mmho/cm | 0.39      |
| Cation:Anion                           | 4.4 / 4.3 |

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|   |                                   |                 |        |
|---|-----------------------------------|-----------------|--------|
| 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 |

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This soil is considered: NON-SALINE/NON-SODIC

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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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|--|------------------|--|--|--|--|-----------|------------------|--|-----|--|-----|---|-----|---|-----|
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| <b>Results For:</b>  |                  | <b>Invoice No.:</b> 210642   |  | <b>Date Received:</b> 04/27/2016   |  |           |                  |  |     |  |     |   |     |   |     |
| <b>Sample Identification:</b> BACKGROUND   |                  | <b>Date Received:</b> 04/27/2016   |  | <b>Field ID</b> REPUBLICAN WC RD 29 & U LI   |  |           |                  |  |     |  |     |   |     |   |     |
| <b>Sample Depth:</b> 0-6"  |                  | <b>Field ID</b> REPUBLICAN WC RD 29 & U LI                                     |  |  |  |           |                  |  |     |  |     |   |     |   |     |
| 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>LOW</td></tr><tr><td>MODERATELY SENSITIVE (seedling alfalfa, corn, soybeans, many vegetables, etc.)</td><td>LOW</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.)             | 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 |
| 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):  |                  |  |  |  |  |           |                  |  |     |  |     |   |     |   |     |
| LOW for chloride sensitive crops (includes berries, fruit trees, grapes, citrus, etc.)<br>LOW for moderately tolerant crops (includes alfalfa, beans, rice, sorghum, etc.)<br>LOW for chloride tolerant crops (includes wheat, flax, tomato, cotton, barley, corn, beets, etc.)  |                  |  |  |  |  |           |                  |  |     |  |     |   |     |   |     |
| EXTRACTABLE BORON HAZARD (based on soil extractable boron, B):   |                  |  |  |  |  |           |                  |  |     |  |     |   |     |   |     |
| <table border="0"><thead><tr><th>Crop type</th><th>Potential hazard</th></tr></thead><tbody><tr><td>BORON SENSITIVE (such as sunflower, barley, onions, citrus, fruit trees, grapes, etc.)</td><td>LOW</td></tr><tr><td>MODERATELY SENSITIVE (such as potatoes, peppers, peas, radishes, etc.)</td><td>LOW</td></tr><tr><td>MODERATELY TOLERANT (such as wheat, corn, oats, clover, lettuce, turnips, celery, etc.)</td><td>LOW</td></tr><tr><td>BORON TOLERANT (such as alfalfa, beets, cotton, grain sorghum, tomatoes, vetch, etc.)</td><td>LOW</td></tr></tbody></table> |                  |  |  |  |  | Crop type | Potential hazard | BORON SENSITIVE (such as sunflower, barley, onions, citrus, fruit trees, grapes, etc.) | LOW | MODERATELY SENSITIVE (such as potatoes, peppers, peas, radishes, etc.)         | LOW | 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 |
| Crop type  | Potential hazard |  |  |  |  |           |                  |  |     |  |     |   |     |   |     |
| BORON SENSITIVE (such as sunflower, barley, onions, citrus, fruit trees, grapes, etc.)   | LOW              |  |  |  |  |           |                  |  |     |  |     |   |     |   |     |
| MODERATELY SENSITIVE (such as potatoes, peppers, peas, radishes, etc.)   | LOW              |  |  |  |  |           |                  |  |     |  |     |   |     |   |     |
| 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              |  |  |  |  |           |                  |  |     |  |     |   |     |   |     |