MISSOURI DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 052018-001 Project Number: 2017-03-085
Installation Number: 075-0026

Parent Company Address: 9200 Watson Road, Suite 200, St. Louis, MO 63126

Installation Name: Roeslein Alternative Energy of Missouri, LLC - Ruckman
Installation Address: Near State Highway N & 250th Street, Albany, MO 64402
Location Information: Gentry County (S3/4/9/10, T64N, R31W)

Application for Authority to Construct was made for:
The installation of a new gas collection, cleaning, and compression system on nine existing lagoons. This review was conducted in accordance with Section (6), Missouri State Rule 10 CSR 10-6.060, Construction Permits Required.

☑ Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

Prepared by
Ryan Schott
New Source Review Unit

Director or Designee
Department of Natural Resources

MAY 03 2018

Effective Date
STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Enforcement and Compliance Section of the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Enforcement and Compliance Section of the Department's Air Pollution Control Program of the anticipated date of startup of this (these) air contaminant source(s). The information must be made available within 30 days of actual startup. Also, you must notify the Department's regional office responsible for the area within which you are located within 15 days after the actual startup of this (these) air contaminant source(s).

A copy of the permit application and this permit and permit review shall be kept at the installation address and shall be made available to Department's personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit using the contact information below.

Contact Information:
Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102-0176
(573) 751-4817

The regional office information can be found at the following website: http://dnr.mo.gov/regions/
SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. “Conditions required by permitting authority.”

Roeslein Alternative Energy of Missouri, LLC – Ruckman
Gentry County (S3/4/9/10, T64N, R31W)

1. Superseding Condition
   The conditions of this permit supersede all special conditions from Construction Permit 022016-015, previously issued by the Air Pollution Control Program.

2. Control Device Requirement – Thermal Oxidizer

   B. The thermal oxidizer must be in use at all times when the PSA system is operating and producing tail gas.

   C. The operating temperature of the thermal oxidizer shall be continuously monitored and recorded during operations. The operating temperature of the control device shall be maintained at a minimum of 1,425 °F (averaged every minute).

   D. The thermal oxidizer shall be operated and maintained in accordance with the manufacturer’s specifications. A copy of the thermal oxidizer manufacturer’s performance warranty shall be kept onsite.

   E. Roeslein Alternative Energy of Missouri, LLC shall maintain an operating and maintenance log for the thermal oxidizer, which shall include the following:
      1) Incidents of malfunction, with impact on emissions (tons), duration of event, probable cause, and corrective actions; and
      2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.

   F. Roeslein Alternative Energy of Missouri, LLC shall not exceed the SOx emission rates provided in Table 1 from the thermal oxidizer.
SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special conditions:

Table 1: Thermal Oxidizer Emission Limits

<table>
<thead>
<tr>
<th>Months</th>
<th>SOx Emission Limit (lb/hr)</th>
<th>Tail Gas Combustion Limit (MMscf/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>February – May</td>
<td>16.59</td>
<td>11.24</td>
</tr>
<tr>
<td>June – September</td>
<td>39.12</td>
<td>26.51</td>
</tr>
<tr>
<td>October – November</td>
<td>16.59</td>
<td>11.24</td>
</tr>
<tr>
<td>December – January</td>
<td>1.095</td>
<td>0.742</td>
</tr>
</tbody>
</table>

G. Roeslein Alternative Energy of Missouri, LLC shall demonstrate compliance with Special Condition 2.F by limiting the amount of tail gas combusted in the thermal oxidizer (which is proportional to the SOx emission rate) and keeping a monthly record of this amount. These records shall contain, at a minimum, the following information:

1) Installation name & ID number
2) Permit number
3) Current month
4) Monthly amount of tail gas combusted
5) Monthly tail gas combustion limit (from Table 1)

3. Control Device Requirement – Flares

B. The flares shall be operated and maintained in accordance with the manufacturer’s specifications. A copy of the flare manufacturer’s specifications shall be kept onsite.

C. Roeslein Alternative Energy of Missouri, LLC shall maintain an operating and maintenance log for the flares, which shall include the following:
1) Incidents of malfunction, with impact on emissions (tons), duration of event, probable cause, and corrective actions; and
2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.

4. Operational Requirements
A. Roeslein Alternative Energy of Missouri, LLC shall divert the biogas collected by the lagoon covers to either the PSA system or the flares at all times. The biogas shall not be emitted directly into the atmosphere, except during periods of equipment maintenance or for safety considerations, which shall not exceed 50 MMscf per consecutive 12-month period.

B. Roeslein Alternative Energy of Missouri, LLC shall demonstrate compliance with Special Condition 4.A by keeping a record of the amount of biogas emitted directly into the atmosphere. These records shall
SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special conditions:

contain, at a minimum, the following information:
1) Installation name & ID number
2) Permit number
3) Date of direct biogas emission event (month, day, year)
4) Duration of direct biogas emission event (hours)
5) Biogas generation rate during direct emission event (scfm)
6) Reason for direct biogas emission
7) 12-month rolling total of direct biogas emissions (MMscf)
8) Biogas emission limit (50 MMscf per year)

5. Sampling Requirements
A. Roeslein Alternative Energy of Missouri, LLC shall sample the biogas to determine the H₂S concentration.
B. The H₂S concentration shall not exceed 0.25% by volume.
C. Roeslein Alternative Energy of Missouri, LLC shall collect one sample from each lagoon every calendar quarter. The results shall be averaged to compare with the limit in Special Condition 5.B.
D. The first sample collection shall be performed within 30 days after startup of operations. Sampling shall be performed using an approved EPA method or a method approved by the Missouri Air Pollution Control Program, including the use of a Landtec Biogas 5000 or equivalent unit. Roeslein Alternative Energy of Missouri, LLC shall submit a testing protocol to the Missouri Air Pollution Control Program at least 14 days before the first test for approval. All subsequent tests shall be performed in accordance with the approved testing protocol.
E. During the first and/or fourth calendar quarters (January through March and/or October through December), if less than 5 scfm of biogas is being generated on a daily average basis, Roeslein Alternative Energy of Missouri, LLC will not be required to sample the biogas during that quarter.
F. If any of the sampling results show an exceedance of the value in Special Condition 5.B, Roeslein Alternative Energy of Missouri, LLC shall submit ambient impact modeling results to show that the potential SO₂ emissions do not exceed the NAAQS. Roeslein Alternative Energy of Missouri, LLC shall also submit an emissions analysis to show that the potential SO₂ emissions do not exceed the major source level of 250 tons per year.
G. If Roeslein Alternative Energy of Missouri, LLC cannot show compliance
SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special conditions:

with Special Condition 5.F, they shall contact the Air Pollution Control Program for further instructions.

H. After at least 4 biogas sample collections have been performed, Roeslein Alternative Energy of Missouri, LLC may petition the Air Pollution Control Program to change the sampling frequency if compliance is demonstrated with Special Condition 5.

6. Modification to Release Parameters Requirement
Roeslein Alternative Energy of Missouri, LLC shall notify the Air Pollution Control Program prior to making any modifications to the facility that impact the release parameters and/or emission rates listed in the memo: Ambient Air Quality Impact Analysis (AAQIA) for Roeslein Alternative Energy of Missouri, LLC – Ruckman Farm – Gentry County Site – 2017-03-085. In the event that the Air Pollution Control Program determines the changes are significant, Roeslein Alternative Energy of Missouri, LLC shall submit an updated AAQIA indicating compliance with the NAAQS.

7. Record Keeping and Reporting Requirements
A. Roeslein Alternative Energy of Missouri, LLC shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request.

B. Roeslein Alternative Energy of Missouri, LLC shall report to the Air Pollution Control Program’s Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than 10 days after the end of the month during which any record required by this permit shows an exceedance of a limitation imposed by this permit.
REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (6) REVIEW
Project Number: 2017-03-085
Installation ID Number: 075-0026
Permit Number: 052018-001

Installation Address:
Roeslein Alternative Energy of Missouri, LLC – Ruckman
Near State Highway N & 250th Street
Albany, MO 64402
Gentry County (S3/4/9/10, T64N, R31W)

Parent Company:
Roeslein & Associates, Inc.
9200 Watson Road, Suite 200
St. Louis, MO 63126

REVIEW SUMMARY

- Roeslein Alternative Energy of Missouri, LLC has applied for authority to install a new gas collection, cleaning, and compression system on nine existing lagoons.

- The application was deemed complete on April 17, 2017.

- HAP emissions from the project include the products of biogas and natural gas combustion.


- A thermal oxidizer and lagoon flares are being used to control H₂S, NH₃, and VOC emissions from the tail gas and biogas.

- This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, Construction Permits Required. Potential emissions of SOₓ are above the de minimis level but below the major source level. Potential emissions of all other pollutants are below their respective de minimis levels.

- This installation is located in Gentry County, an attainment area for all criteria pollutants.

- This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation’s major source level is 250 tons per year, and fugitive emissions are not counted toward major source applicability.

- Ambient air quality modeling was performed to determine the ambient impact of SOₓ, NOₓ, and CO. No other pollutants were modeled because their potential emissions are below their respective de minimis levels.
- H$_2$S sampling is required as a part of this permit. Further testing may be required as part of other state, federal or applicable rules.

- Submittal of an Intermediate Operating Permit application within 90 days of commencement of operations or submittal of a Part 70 Operating Permit application within one year of commencement of operations is required for this installation.

- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

Roeslein Alternative Energy of Missouri, LLC operates an existing biogas collection, cleaning, and compression system at Murphy Brown of Missouri's Ruckman Farm in Gentry County. There are currently nine swine waste lagoons with impermeable geomembrane gas collection covers, which provide an oxygen deficient environment to facilitate anaerobic digestion and produce biogas. The biogas is then collected in underground piping and sent to cleaning equipment, where the methane is separated out and compressed. A thermal oxidizer is used to control H$_2$S emissions from the cleaning system and biogas emissions during periods of cleaning system shutdown and malfunction.

Roeslein Alternative Energy of Missouri, LLC – Ruckman is considered a minor source for construction permits. The installation was not required to apply for an operating permit because the potential emissions of the installation during Phase II operations of Construction Permit 022016-015 were expected to be below de minimis levels and no federal regulations (NSPS, NESHAP, or MACT) applied. Table 2 provides a list of NSR permits that were previously issued to Roeslein Alternative Energy of Missouri, LLC – Ruckman from the Air Pollution Control Program.

Table 2: Permit History

<table>
<thead>
<tr>
<th>Project/Permit Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 2012-10-057</td>
<td>Murphy Brown of Missouri, LLC's &quot;no permit required&quot; determination letter for the installation of impermeable covers on two (2) existing lagoons, and the installation of two (2) flares</td>
</tr>
<tr>
<td>Permit 022016-015</td>
<td>The installation of impermeable covers on seven (7) existing lagoons, and the installation of a gas collection, cleaning, compression, and flare system for all nine (9) covered lagoons</td>
</tr>
</tbody>
</table>

PROJECT DESCRIPTION

After a review of the development and implementation of the existing gas collection, cleaning, and compression system, Roeslein Alternative Energy of Missouri, LLC determined that a different system would be more suitable for this process. Instead of using water scrubbing to clean the biogas, Roeslein Alternative Energy of Missouri, LLC will use a Pressure Swing Adsorption (PSA) system, also known as a molecular sieve.
A thermal oxidizer will be used to control emissions from the tail gas. The proposed gas collection, cleaning, and compression process is as follows.

Under the nine existing lagoon covers, underground piping collects saturated biogas and combines it into a single stream, which leads to the PSA system [EP-10]. The PSA system is composed of several vessels in parallel that are filled with adsorbent media capable of separating CO₂, H₂S, H₂O, and NH₃ from CH₄, based on each compound's adsorption affinity. The product gas separated in the PSA system is renewable natural gas (RNG), which is >94% CH₄. The non-product tail gas is sent to a natural gas assisted thermal oxidizer [EP-11] for destruction.

Each of the nine lagoons has an enclosed flare [EP-01–EP-09] which will only be used during periods of PSA system maintenance and malfunction to prevent the uncontrolled emission of biogas.

The PSA system and thermal oxidizer receive power from three parallel 334 kW natural gas fired generator sets [EP-14, EP-15 & EP-16]. For a "black start," utility pipeline natural gas is purchased to supply the generator sets and the thermal oxidizer until the PSA is operational.

Roeslein Alternative Energy of Missouri, LLC has asked to keep the design of the cleaning system and the emission factors confidential per Missouri State Rules 10 CSR 10-6.210, Confidential Information. Therefore, no information is given in this permit regarding the types of equipment involved in the cleaning process, and no emission factors are specifically listed. This permit is a public version, and there is no confidential version of the permit.

EMISSIONS/CONTROLS EVALUATION

Lagoon biogas generation varies seasonally; therefore, three separate operating scenarios were considered. Winter operation includes the cold weather period of the year when little to no biogas is produced. Normal operation includes the expected annual average biogas production. Peak operation includes the historical peak production during the summer months. The duration of each of these operating periods was varied to obtain the maximum estimated biogas flow rate to the PSA system.

Biogas is normally fed to the PSA system to produce RNG; however, during periods of maintenance or malfunction, the biogas may need to be sent directly to the flares to prevent the uncontrolled emission of biogas. It was assumed that 5% of the biogas will be directly flared annually; however, biogas combustion emissions from the flares are nearly identical to the tail gas emissions from the thermal oxidizer. Therefore, the amount of biogas directly flared is not of significance for this project.

PM, PM₁₀, PM₂.₅, and CO emissions from the combustion of biogas diverted to the flares [EP-01–EP-09] were calculated using emission factors taken from AP-42, Section 2.4 Municipal Solid Waste Landfills, Draft (October 2008). SOₓ emissions were
calculated using mass balances, assuming that all H₂S contained in the biogas is oxidized to SOₓ. H₂S emissions were calculated assuming that 95% of the H₂S is oxidized, which should be a conservative value since AP-42, Chapter 2.4 suggests a value greater than 98%. The concentration used in the calculation for H₂S is 0.25% by volume. NOₓ can be formed from the oxidation of NH₃ contained in the biogas, the fixation of atmospheric N₂ with O₂ (thermal NOₓ), and the reaction with partially oxidized compounds within the flare (prompt NOₓ). NOₓ emissions from the oxidation of NH₃ were calculated using mass balances, assuming a concentration of 0.026% by volume in the biogas. Thermal and prompt NOₓ emissions were calculated using emission factors taken from AP-42, Chapter 2.4. The concentrations of H₂S and NH₃ were provided by Roeslein Alternative Energy of Missouri, LLC and they are required by Special Condition 5 to sample the biogas periodically to ensure that the value of H₂S is not exceeded. H₂S is expected to be the majority contributor to SOₓ emissions; therefore, H₂S is the only sulfur compound required to be sampled. NH₃ sampling is not required because the potential to emit NOₓ is below de minimis levels, and a large amount of previous biogas generation/emission data shows an NH₃ concentration that does not significantly fluctuate on a seasonal basis. VOC emissions from the biogas passing through the flare were calculated assuming that 1% of the methane production potential is emitted as VOC and that 98% will be destroyed by the flare. The 1% was taken from the EPA document Emissions from Animal Feeding Operations, Draft (August 2001) and the 98% device control efficiency is from AP-42, Chapter 2.4, Table 2.4-3. VOC and HAP emissions from combustion were calculated using emission factors taken from AP-42, Chapter 1.4 Natural Gas Combustion (July 1998).

CO₂ emissions from the combustion of biogas diverted to the flares were calculated using the emission factor from AP-42, Chapter 1.4. CO₂ emissions from the biogas were calculated from mass balances, assuming that 29% of the emitted biogas is CO₂. CH₄ emissions from combustion were calculated from mass balances, assuming that 56% of the emitted biogas is CH₄ and applying a 98% control efficiency for the use of the flares. N₂O emissions were calculated using the emission factor taken from 40 CFR 98, Table C-2. GHG (mass) emissions were calculated by summing the CO₂, CH₄, and N₂O emissions. GHG (CO₂e) emissions were calculated by multiplying the CO₂, CH₄, and N₂O emissions by their respective global warming potential (1 for CO₂, 25 for CH₄, and 298 for N₂O) and adding the results.

Emissions from the thermal oxidizer were calculated in three separate operating scenarios, which represent the minimum operation, normal operation, and peak operation rates of the PSA system. The maximum design rate of the PSA system is greater than the estimated maximum biogas generation rate; therefore, potential emissions of the thermal oxidizer that were calculated using the design rates of the PSA system are conservative. No emissions are expected from the PSA system itself.

PM, PM₁₀, PM₂₅, and CO emissions from the combustion of tail gas in the thermal oxidizer [EP-11] were calculated using emission factors taken from AP-42, Section 2.4. SOₓ emissions were calculated using mass balances, assuming that all H₂S contained in the tail gas is oxidized to SOₓ. H₂S emissions were calculated assuming that 95% of the H₂S is oxidized, which should be a conservative value since AP-42, Chapter 2.4
suggests a value greater than 98%. The concentration used in the calculation for H\textsubscript{2}S is 0.68\% by volume. NO\textsubscript{x} can be formed from the oxidation of NH\textsubscript{3} contained in the tail gas, the fixation of atmospheric N\textsubscript{2} with O\textsubscript{2} (thermal NO\textsubscript{x}), and the reaction with partially oxidized compounds within the thermal oxidizer (prompt NO\textsubscript{x}). NO\textsubscript{x} emissions from the oxidation of NH\textsubscript{3} were calculated using mass balances, assuming a concentration of 0.077\% by volume in the tail gas. Thermal and prompt NO\textsubscript{x} emissions were calculated assuming that 1\% of the methane production potential is emitted as VOC and that 98\% will be destroyed by the thermal oxidizer. The 1\% was taken from the EPA document *Emissions from Animal Feeding Operations, Draft (August 2001)* and the 98\% device control efficiency is from AP-42, Chapter 2.4, Table 2.4-3. VOC and HAP emissions from combustion were calculated using emission factors taken from AP-42, Chapter 1.4.

CO\textsubscript{2} emissions from combustion of tail gas in the thermal oxidizer were calculated using the emission factor from AP-42, Chapter 1.4. CO\textsubscript{2} emissions from the tail gas were calculated from mass balances, assuming that 86\% of the feed is CO\textsubscript{2} and 38\% of the feed is tail gas. CH\textsubscript{4} emissions from combustion were calculated from mass balances, assuming that 12\% of the feed is CH\textsubscript{4}, 38\% of the feed is tail gas, and applying a 98\% control efficiency for the use of the thermal oxidizer. N\textsubscript{2}O emissions were calculated using the emission factor taken from 40 CFR 98, Table C-2. GHG (mass) emissions were calculated by summing the CO\textsubscript{2}, CH\textsubscript{4}, and N\textsubscript{2}O emissions. GHG (CO\textsubscript{2}e) emissions were calculated by multiplying the CO\textsubscript{2}, CH\textsubscript{4}, and N\textsubscript{2}O emissions by their respective global warming potential (1 for CO\textsubscript{2}, 25 for CH\textsubscript{4}, and 298 for N\textsubscript{2}O) and adding the results.

The impermeable membranes are not expected to capture 100\% of the biogas. To calculate fugitive emissions, it was assumed that only 98\% of the biogas would be captured. This is the capture efficiency given in 40 CFR 98, Subpart JJ *Manure Management, Table JJ-6 Collection Efficiencies of Anaerobic Digesters.*

Potential emissions from the combustion of natural gas used to assist the thermal oxidizer [EP-11] were calculated in three separate operating scenarios to represent startup, normal operation, and peak operation. The emission factors were taken from AP-42 Section 1.4.


Increased H\textsubscript{2}S emissions are expected when the biogas is emitted directly into the atmosphere during periods of equipment maintenance or for safety considerations. Special Condition 4 limits the total amount of biogas directly emitted to less than 50 MMscf per year, which subsequently limits H\textsubscript{2}S emissions below the de minimis level, even when accounting for all other H\textsubscript{2}S emissions in the project.
Table 3 provides an emissions summary for this project. Existing potential emissions were taken from the installation's previous construction permit (022016-015). Existing actual emissions were taken from the installation's 2016 EIQ. Potential emissions of the application represent the potential of the equipment, assuming continuous operation (8,760 hours per year).

Table 3: Emissions Summary (tons per year)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>25.0</td>
<td>0.58</td>
<td>N/D</td>
<td>3.08</td>
<td>3.08</td>
</tr>
<tr>
<td>PM10</td>
<td>15.0</td>
<td>0.25</td>
<td>0.84</td>
<td>3.08</td>
<td>3.08</td>
</tr>
<tr>
<td>PM2.5</td>
<td>10.0</td>
<td>0.11</td>
<td>0.84</td>
<td>3.08</td>
<td>3.08</td>
</tr>
<tr>
<td>SOx</td>
<td>40.0</td>
<td>3.81</td>
<td>17.58</td>
<td>110.19</td>
<td>110.19</td>
</tr>
<tr>
<td>NOx</td>
<td>40.0</td>
<td>3.73</td>
<td>7.56</td>
<td>23.32</td>
<td>23.32</td>
</tr>
<tr>
<td>VOC</td>
<td>40.0</td>
<td>0.20</td>
<td>1.45</td>
<td>10.25</td>
<td>10.25</td>
</tr>
<tr>
<td>CO</td>
<td>100.0</td>
<td>4.38</td>
<td>9.64</td>
<td>96.99</td>
<td>96.99</td>
</tr>
<tr>
<td>H2S</td>
<td>10.0</td>
<td>N/D</td>
<td>N/D</td>
<td>8.56</td>
<td>8.56</td>
</tr>
<tr>
<td>GHG (mass)</td>
<td>N/A</td>
<td>2,400</td>
<td>N/D</td>
<td>20,691</td>
<td>20,691</td>
</tr>
<tr>
<td>GHG (CO2e)</td>
<td>N/A</td>
<td>6,788</td>
<td>N/D</td>
<td>58,145</td>
<td>58,145</td>
</tr>
<tr>
<td>Total HAPs*</td>
<td>25.0</td>
<td>0.08</td>
<td>0.38</td>
<td>4.43</td>
<td>4.43</td>
</tr>
</tbody>
</table>

N/A = Not Applicable N/D = Not Determined
*All individual HAPs have a potential to emit below their respective screening model action levels

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, Construction Permits Required. Potential emissions of SOx are above the de minimis level but below the major source level. Potential emissions of all other pollutants are below their respective de minimis levels.

APPLICABLE REQUIREMENTS

Roeslein Alternative Energy of Missouri, LLC shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.
GENERAL REQUIREMENTS

- **Start-Up, Shutdown, and Malfunction Conditions**, 10 CSR 10-6.050
- **Operating Permits**, 10 CSR 10-6.065
- **Submission of Emission Data, Emission Fees and Process Information**, 10 CSR 10-6.110
  - Per 10 CSR 10-6.110(4)(B)2.B, a full EIQ is required for the first full calendar year the equipment (or modifications) approved by this permit are in operation.
- **Restriction of Emission of Odors**, 10 CSR 10-6.165
- **Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin**, 10 CSR 10-6.170
- **Restriction of Emission of Visible Air Contaminants**, 10 CSR 10-6.220

SPECIFIC REQUIREMENTS

- **New Source Performance Regulations**, 10 CSR 10-6.070
  - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, 40 CFR Part 60, Subpart JJJJ
- **MACT Regulations**, 10 CSR 10-6.075
- **Restriction of Emission of Sulfur Compounds**, 10 CSR 10-6.260
- **Control of Sulfur Dioxide Emissions**, 10 CSR 10-6.261

AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality modeling was performed to determine the ambient impact of SO$_x$, NO$_x$, and CO. Due to the facility having the ability to either process the biogas in the PSA system and thermal oxidizer or directly combust it in the flares, two scenarios were modeled: Scenario 1 modeled the nine flares running at the maximum hourly emissions for NO$_x$, SO$_x$, and CO. Scenario 2 modeled the PSA system which included the thermal oxidizer, two compressors, three engines, and a line heater. Only SO$_x$ and CO were modeled for Scenario 2 because NO$_x$ emissions are below the de minimis level. An increment analysis was not completed for this project because there have been no PSD
projects issued in Gentry County; therefore, the county is considered “clean,” which does not require an increment analysis for minor sources.

Results of the preliminary model analysis showed that NO\textsubscript{x} and SO\textsubscript{x} both exceeded at least one of their respective significance levels, thereby triggering a full impact analysis. CO remained below its significance levels; therefore, no further analysis was required. Although NO\textsubscript{x} exceeded the 1-hour NAAQS standard, it was determined that the installation had a less than significant impact on the violating receptors; therefore, no further analysis is necessary. Tables 4 & 5 provide a summary of the modeling results. More information regarding the AAQIA can be found in the memorandum: Ambient Air Quality Impact Analysis (AAQIA) for Roeslein Alternative Energy of Missouri, LLC – Ruckman Farm – Gentry County Site – 2017-03-085.

Table 4: Modeling Summary – Scenario 1

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Significance Level (µg/m\textsuperscript{3})</th>
<th>Maximum Concentration (µg/m\textsuperscript{3})</th>
<th>NAAQS Standard (µg/m\textsuperscript{3})</th>
<th>Worst-Case Impact (µg/m\textsuperscript{3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO\textsubscript{x}</td>
<td>1-hour</td>
<td>7.55</td>
<td>33.468</td>
<td>188</td>
<td>21,010.40</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>1</td>
<td>0.686</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SO\textsubscript{x}</td>
<td>1-hour</td>
<td>7.84</td>
<td>25.647</td>
<td>196</td>
<td>57.65</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>25.0</td>
<td>22.162</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>5.0</td>
<td>8.186</td>
<td>365</td>
<td>28.83</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>1.0</td>
<td>0.550</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO</td>
<td>1-hour</td>
<td>2,000</td>
<td>19.824</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>8-hour</td>
<td>500</td>
<td>9.634</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5: Modeling Summary – Scenario 2

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Significance Level (µg/m\textsuperscript{3})</th>
<th>Maximum Concentration (µg/m\textsuperscript{3})</th>
<th>NAAQS Standard (µg/m\textsuperscript{3})</th>
<th>Worst-Case Impact (µg/m\textsuperscript{3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO\textsubscript{x}</td>
<td>1-hour</td>
<td>7.84</td>
<td>187.232</td>
<td>196</td>
<td>135.14</td>
</tr>
<tr>
<td></td>
<td>3-hour</td>
<td>25.0</td>
<td>157.602</td>
<td>1,300</td>
<td>173.04</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>5.0</td>
<td>61.570</td>
<td>365</td>
<td>54.42</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>1.0</td>
<td>3.351</td>
<td>80</td>
<td>3.97</td>
</tr>
<tr>
<td>CO</td>
<td>1-hour</td>
<td>2,000</td>
<td>22.328</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>8-hour</td>
<td>500</td>
<td>12.678</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (6), Missouri State Rule 10 CSR 10-6.060, Construction Permits Required, it is recommended that this permit be granted with special conditions.

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated March 13, 2017, received
March 23, 2017, designating Roeslein & Associates, Inc. as the owner and operator of the installation.

APPENDIX A

Abbreviations and Acronyms

% ................ percent
°F .............. degrees Fahrenheit
acfm .......... actual cubic feet per minute
BACT ....... Best Available Control Technology
BMPs ......... Best Management Practices
Btu ............ British thermal unit
CAM ...... Compliance Assurance Monitoring
CAS .......... Chemical Abstracts Service
CEMS ...... Continuous Emission Monitor System
CFR .......... Code of Federal Regulations
CO .......... carbon monoxide
CO₂ .......... carbon dioxide
cO₂e .......... carbon dioxide equivalent
COMS ...... Continuous Opacity Monitoring System
CSR ........ Code of State Regulations
dscf ....... dry standard cubic feet
EIQ ........ Emission Inventory Questionnaire
EP .......... Emission Point
EPA .......... Environmental Protection Agency
EU .......... Emission Unit
fps .......... feet per second
ft ........... feet
GACT ....... Generally Available Control Technology
GHG .......... Greenhouse Gas
gpm .......... gallons per minute
gr .......... grains
GWP .......... Global Warming Potential
HAP .......... Hazardous Air Pollutant
hr .......... hour
hp .......... horsepower
lb .......... pound
lbs/hr ....... pounds per hour
MACT ....... Maximum Achievable Control Technology
µg/m³ ....... micrograms per cubic meter
m/s .......... meters per second
Mgal ........ 1,000 gallons
MW ........... megawatt
MHDR ...... maximum hourly design rate
MMBtu ...... Million British thermal units
MMCF ........ million cubic feet
MSDS .......... Material Safety Data Sheet
NAAQS ........ National Ambient Air Quality Standards
NEShAPs National Emissions Standards for Hazardous Air Pollutants
NOx .......... nitrogen oxides
NSPS .......... New Source Performance Standards
NSR .......... New Source Review
PM .......... particulate matter
PM₁₀ .......... particulate matter less than 10 microns in aerodynamic diameter
PM₂.₅ .......... particulate matter less than 2.5 microns in aerodynamic diameter
ppm .......... parts per million
PSD ........ Prevention of Significant Deterioration
PTE .......... potential to emit
RACT ...... Reasonable Available Control Technology
RAL .......... Risk Assessment Level
SCC .......... Source Classification Code
scfm .......... standard cubic feet per minute
SDS .......... Safety Data Sheet
SIC .......... Standard Industrial Classification
SIP .......... State Implementation Plan
SMAL ....... Screening Model Action Levels
SO₂ .......... sulfur oxides
SO₃ .......... sulfur dioxide
tph .......... tons per hour
tpy .......... tons per year
VMT ...... vehicle miles traveled
VOC .......... Volatile Organic Compound
MAY 03 2018

Mr. Chris Roach
Director
Roeslein Alternative Energy of Missouri, LLC – Ruckman
9200 Watson Road, Suite 200
St. Louis, MO 63126

RE: New Source Review Permit - Project Number: 2017-03-085

Dear Mr. Roach:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions, your new source review permit application, and with your operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

This permit may include requirements with which you may not be familiar. If you would like the department to meet with you to discuss how to understand and satisfy the requirements contained in this permit, an appointment referred to as a Compliance Assistance Visit (CAV) can be set up with you. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at the following website: http://dnr.mo.gov/regions/. The online CAV request can be found at http://dnr.mo.gov/cav/compliance.htm.

If you were adversely affected by this permit decision, you may be entitled to pursue an appeal before the administrative hearing commission pursuant to Sections 621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission, whose contact information is: Administrative Hearing Commission, United States Post Office Building, 131 West High Street, Third Floor, P.O. Box 1557, Jefferson City, Missouri 65102, phone: 573-751-2422, fax: 573-751-5018, website: www.oa.mo.gov/ahc.
If you have any questions regarding this permit, please do not hesitate to contact Ryan Schott, at the Department of Natural Resources’ Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or at (573) 751-4817. Thank you for your attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Susan Heckenkamp
New Source Review Unit Chief

SH:rsj

Enclosures

c: Kansas City Regional Office
   PAMS File: 2017-03-085

Permit Number: 052018-001