



**Statement of Basis**

**Construction Permit**

**Red River Energy, LLC**

**Rosholt, South Dakota**

# Table of Content

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	Page
<b>1.0 Background .....</b>	<b>1</b>
<b>1.1 Current Permitted Units .....</b>	<b>1</b>
<b>1.2 Proposed Changes.....</b>	<b>2</b>
<b>2.0 New Source Performance Standards .....</b>	<b>2</b>
<b>2.1 Standards Applicable to Storage Tanks .....</b>	<b>3</b>
<b>2.2 Standards for Synthetic Organic Chemical Manufacturing.....</b>	<b>3</b>
<b>2.3 Other Applicable New Source Performance Standards.....</b>	<b>4</b>
<b>3.0 New Source Review.....</b>	<b>4</b>
<b>4.0 Prevention of Significant Deterioration.....</b>	<b>4</b>
<b>4.1 Potential to Emissions.....</b>	<b>5</b>
<b>4.2 Short Term and Operational Limits .....</b>	<b>7</b>
<b>5.0 National Emission Standards for Hazardous Air Pollutants .....</b>	<b>7</b>
<b>6.0 Maximum Achievable Control Technology Standards.....</b>	<b>7</b>
<b>6.1 Potential Hazardous Air Pollutant Emissions.....</b>	<b>7</b>
<b>6.2 Applicable Standards.....</b>	<b>7</b>
<b>7.0 State Requirements.....</b>	<b>7</b>
<b>7.1 State Emission Limits .....</b>	<b>8</b>
<b>7.2 Title V Air Quality Operating Permit Revision.....</b>	<b>8</b>
<b>8.0 Recommendation .....</b>	<b>8</b>

## 1.0 Background

On September 7, 2010, the South Dakota Department of Environment and Natural Resources (DENR) issued a renewed Title V air quality permit to Red River Energy, LLC for the ethanol production facility near Rosholt, South Dakota. At full capacity the facility may process up to 15,172,500 million bushels of corn per year and produce up to 40 million gallons of denatured ethanol per year. Red River Energy also produces dried distiller grain and solubles (DDGS) as a saleable byproduct.

On January 23, 2012 DENR issued a construction permit to Red River Energy in order to construct a 500,000 gallon denatured ethanol storage tank. A 500,000 bushel corn storage bin as well as new grain transfer legs were to be constructed as well but were considered minor permit amendments to Unit #1. This permit expired before Red River Energy, LLC could begin construction a second permit was issued for the same additions on November 22, 2013.

On June 30, 2014, DENR issued a construction permit to install an additional 515,400 bushel grain storage bin associated with Unit #1. Red River Energy, LLC also requested an increase in maximum operating capacity of Unit #1 from 15,000 bushels per hour to 20,000 bushels per hour.

On January 2, 2015 DENR received a construction permit application from Red River Energy, LLC. Requesting the addition of a corn oil separation unit at the facility. DENR requested additional information and received that information on February 11, 2015.

### 1.1 Current Permitted Units

Table 1.1 summarizes Red River Energy, LLC's permitted equipment under the Title V air quality operating permit issued on September 8, 2014.

**Table 1-1 Description of Permitted Units, Operations, and Processes**

Unit	Description	Maximum Operating Rate	Control Device
#1	Grain receiving. Partially enclosed truck receiving pit and elevator legs transport grain from receiving pit to grain storage silos.	15,000 bushels of grain per hour	MAC baghouse
#2	Grain milling. Roskamp Champion 20 x 44 Magnum hammer mill.	1,200 bushels per hour	MAC baghouse
	New hammer mill.	2,000 bushels per hour	
#3	Victory Energy steam boiler equipped with a low NOx burner. The boiler is fired with natural gas.	99.9 million Btus per hour heat input	Not applicable
#4b	Fermenters #1 through #6.	60,000 gallons of mash per hour	Packed bed wet scrubber
#5	Dryer and cooling system. The wet distiller grain and solubles is dried in a 3	9.5 tons of dried distiller grain and solubles per	Regenerative thermal oxidizer

<b>Unit</b>	<b>Description</b>	<b>Maximum Operating Rate</b>	<b>Control Device</b>
	stage direct fired single pass rotary dryer fired on natural gas. A separator and cyclones used to collect the product and are conveyed to a dried distiller grain and solubles cooling system.	hour 40 million Btus per hour heat input	
	Regenerative thermal oxidizer fired on natural gas and the off-gases from the dryer and cooling system.	8 million Btus per hour heat input	
#6	Dried distillers grain and solubles load out is located in a permanent partial enclosure.	125 tons per hour	Not applicable
#8	Ethanol truck load out.	39,000 gallons per hour	Flare
	Flare fired on natural gas and off gases from truck load out.	8 million Btus per hour heat input	
#9	Ethanol rail car load out	39,000 gallons per hour	Not applicable
#10	Industrial cooling tower with five cells.	Not applicable	Not applicable
#11	Tank #1001 – above ground storage tank.	32,000 gallons	Fixed roof
#12	Tank #1002 – above ground storage tank.	32,000 gallons	Fixed roof
#13	Tank #1003 – above ground storage tank.	339,000 gallons	Internal floating roof
#14	Tank #1004 – above ground storage tank.	19,500 gallons	Fixed roof
#15	Tank #1005 – above ground storage tank.	32,000 gallons	Fixed roof
#16	Tank #1006 – above ground storage tank.	32,000 gallons	Fixed roof

## 1.2 Proposed Changes

DENR received an application from Red River Energy to install a corn oil separation unit. According to documents submitted to DENR the system consists of staging tanks, a 3-phase centrifuge, oil receiver tanks, and oil settling tanks. This system will pull corn syrup from the plants existing evaporators, run it through the centrifuge which will separate the corn oil and return the solids and other liquids to the evaporators.

## 2.0 New Source Performance Standards

DENR reviewed the New Source Performance Standards listed in 40 CFR Part 60 to determine if any of the federal New Source Performance Standards are applicable to this facility, the following may be applicable.

## 2.1 Standards Applicable to Storage Tanks

There are three New Source Performance Standards for storage vessels. The three standards are applicable to the following storage vessels:

1. 40 CFR Part 60, Subpart K: applicable to storage vessels for petroleum liquids capable of storing greater than 40,000 gallons and commenced construction after June 11, 1973 but prior to May 19, 1978;
2. 40 CFR Part 60, Subpart Ka: applicable to storage vessels for petroleum liquids capable of storing greater than 40,000 gallons and commenced construction after May 18, 1978; and
3. 40 CFR Part 60, Subpart Kb: applicable to storage vessels for volatile organic liquids capable of storing 75 cubic meters (approximately 19,813 gallons) or greater and commenced construction after July 23, 1984.

There are 4 tanks associated with this proposed construction, they are listed in Table 2-1

**Table 2-1 Tank and Volatile Organic Liquid Specifications**

Tank	Capacity		Subpart Kb Applicable
	Gallons	Cubic Meters	
<b>Feed Tank</b>	3,800	14.4	No
<b>Bio-Oil Receiver</b>	382	1.45	No
<b>Solids Return Tank</b>	264	1.00	No
<b>Bio-Oil Settling Tank</b>	9,000	34.1	No

The oil separation process tanks' volumes are less than 75 cubic meters, therefore Subpart Kb is not applicable to the proposed construction.

## 2.2 Standards for Synthetic Organic Chemical Manufacturing

There are two New Source Performance Standards for synthetic organic chemical manufacturing industries. The two standards are applicable to the following:

1. 40 CFR Part 60, Subpart VV is applicable to affected facilities in the synthetic organic chemical manufacturing industry, of which ethanol is included; and commence construction, reconstruction or modification after January 5, 1981, but before November 8, 2006 and the capacity of the plant is more than 1,000 megagrams per year of ethanol; and
2. 40 CFR Part 60, Subpart VVa is applicable to affected facilities in the synthetic organic chemical manufacturing industry that commence construction, reconstruction, or modification after November 7, 2006 and the capacity of the plant is more than 1,000 megagrams per year of ethanol.

It has already been determined in previous reviews that Red River Energy is subject to 40 CFR Part 60, Subpart VV. This standard defines an affected facility as a group of all equipment within

a process unit. Based on past evaluations the process unit for an ethanol plant is the fermentation, distillation, and storage activities related to ethanol. The proposed construction will utilize the syrup feed which is created after ethanol has been distilled from the stream. Therefore the proposed construction is outside the process unit and is not subject to this subpart.

### **2.3 Other Applicable New Source Performance Standards**

DENR reviewed the other New Source Performance Standards and determined there are no other standards applicable to POET.

### **3.0 New Source Review**

In accordance with ARSD 74:36:10:01, the new source review regulations apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. This facility is located in Hudson, South Dakota, which is in attainment or unclassifiable for all the criteria air pollutants regulated under the Clean Air Act. Therefore, POET is not subject to a new source review.

### **4.0 Prevention of Significant Deterioration**

Any stationary source which emits or has the potential to emit 250 tons per year or more of any air pollutant is considered a major source and is subject to prevention of significant deterioration (PSD) requirements (ARSD 74:36:09 – 40 CFR. Part 52.21(b)(1)). Any stationary source which emits or has the potential to emit 100 tons per year or more of any air pollutant and is one of the 28 named PSD source categories is subject to PSD requirements (ARSD 74:36:09 – 40 CFR. Part 52.21(b)(1)). The following is a list of regulated pollutants under the PSD program:

1. Total suspended particulate (PM);
2. Particulate matter with a diameter less than or equal to 10 microns (PM<sub>10</sub>);
3. Particulate matter with a diameter less than or equal to 2.5 microns (PM<sub>2.5</sub>);
4. Sulfur dioxide (SO<sub>2</sub>);
5. Nitrogen oxides (NO<sub>x</sub>);
6. Carbon monoxide (CO);
7. Ozone – measured as volatile organic compounds (VOC);
8. Lead;
9. Greenhouse gases (carbon dioxide, nitrous oxide, methane, etc.)
10. Fluorides;
11. Sulfuric acid mist;
12. Hydrogen sulfide;
13. Reduced sulfur compounds; and
14. Total reduced sulfur.

If the source is considered one of the 28 named PSD source categories listed in Section 169 of the Federal Clean Air Act, the major source threshold is 100 tons per year of any regulated air

pollutant, except for greenhouse gases. The major source threshold for all other sources is 250 tons per year of any regulated air pollutant, except for greenhouse gases.

The Environmental Protection Agency (EPA) recently published and implemented a final rule that no longer lists ethanol plants as a chemical manufacturing plant. Therefore, POET is not classified as a chemical manufacturing plant or one of the 28 listed source categories for PSD regulations and the major source threshold is 250 tons per year, except for greenhouse gases.

According to the Clean Air Act, once a pollutant is regulated under any part of the Act, (as was the case with greenhouse gas emissions after the motor vehicle regulations were finalized in March 2010) major new sources or major modifications are subject to the PSD program and Title V air quality operating permit program. Under the Clean Air Act, PSD and Title V air quality operating permits are required for all sources that emit a regulated air pollutant above 100 or 250 tons per year, depending on the source. This threshold, if applied to greenhouse gases, would greatly increase the number of facilities requiring a PSD review or Title V air quality operating permit. Based on administrative necessity, EPA increased these thresholds through the “Tailoring Rule.”

On May 13, 2010, EPA issued the final version of the “Tailoring Rule” for greenhouse gas emissions. The major source threshold for greenhouse gases is listed below:

1. New PSD source because of a criteria air pollutant, the major source threshold for greenhouse gases is 75,000 tons per year of carbon dioxide equivalent or more;
2. For an existing PSD source because of a criteria air pollutant, a major modification for greenhouse gases is an increase of 75,000 tons per year of carbon dioxide equivalent or more;
3. New PSD source if greenhouse gas emissions are 100,000 tons per year of carbon dioxide equivalent or more;
4. For an existing non-PSD source that has the potential to emit 100,000 tons per year of carbon dioxide equivalent emissions or more, a major modification for greenhouse gases is an increase of 75,000 tons per year of carbon dioxide equivalent or more; and
5. In addition to subsection (3) and (4), a specific greenhouse gas, without calculating the carbon dioxide equivalent, also needs to emit greater than 100 or 250 tons per year, whichever is applicable, to be regulated.

On June 23, 2014, The Supreme Court of the United States issued a ruling that the EPA could not require facilities to obtain a PSD permit based solely on greenhouse gas emissions. The Supreme Court of the United States ruling states that in order for a PSD evaluation for greenhouse gas to occur, a facility must trigger one of the major source thresholds for another regulated pollutant. This ruling applies to both new PSD sources as well as major source modifications.

#### **4.1 Potential to Emissions**

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on

manufacturing data, material balance, EPA’s Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant’s application, or other methods to determine potential air emissions.

The proposed construction is essentially a set of 4 tanks and a tricanter (3-phase centrifuge). It is fed the slurry coming from the distillation process. The application did not identify and DENR did not locate through its review, any documentation indicating the slurry would have significant concentrations of volatile organic compounds. As such, this slurry may be assumed to be free of ethanol and all other highly volatile compounds as they all should have left the mixture during the distillation process. The main components remaining are solids, water, and corn oil. The tricanter will separate the three main phases. The solids and water will be returned to the solids return tank, no emissions are expected from this tank as the tricanter will separate any light substances (i.e. VOCs) to the corn oil tanks. The other 3 tanks will contain corn oil in some form and therefore will be required to be evaluated for emissions.

DENR uses Tanks 4.0.9d to estimate tank emissions. The program is dependent on the fluid stored within the tanks. Unfortunately corn oil is not in the programs database of fluids. According to ERI Solutions Inc., Red River Energy’s consultant, Furfural is a close approximation of the qualities of corn oil. DENR agrees with this assessment based on a review of the properties of corn oil. Therefore Furfural will be used to estimate emissions. All of the tanks are heated and are assumed to have Daily liquid Temperature average of 185 degrees Fahrenheit and Liquid Bulk Temperature of 180 degrees Fahrenheit. DENR bases its emission calculation on potential emissions therefore operation every hour of every day of the year (8,760 hours) must be considered. That is multiplied by the maximum corn oil production (1.3 gallons per minute) to obtain the 683,280 gallon potential throughput. Table 4-1 shows the results of running tanks for this proposed construction.

**Table 4-1 Potential Emissions**

<b>Tank</b>	<b>Capacity (Gallons)</b>	<b>Potential Throughput (Gallons/year)</b>	<b>Emissions (tons per year)</b>
<b>Feed Tank<sup>1</sup></b>	3,800	683,280	0.32
<b>Bio-Oil Receiver</b>	382	683,280	0.16
<b>Bio-Oil Settling Tank</b>	9,000	683,280	0.47
<b>Total</b>	<b>Not Applicable</b>	<b>Not Applicable</b>	<b>1</b>

<sup>1</sup>-Through put of tank include solids and water in addition to 683,280 gallons of corn oil which translates to approximately 13,665,600 gallons of material throughput

Red River Energy has a plant wide limit for volatile organic compounds of 95 tons per rolling 12-month period. The potential emissions from the proposed construction is 1 ton. Therefore the proposed construction does not change Red River Energy’s status as a minor source under the PSD program. Since Red River Energy is considered a minor source, is not required to obtain a PSD permit and based on the Supreme Court of the United States, greenhouse gas emissions will not be evaluated.

## **4.2 Short Term and Operational Limits**

As the emissions for the proposed construction are relatively small, DENR will not set a short term limit. However, Red River Energy has a plant wide limit for volatile organic compounds of 95 tons per rolling 12-month period. Therefore this system will need to be included when accounting for facility wide volatile organic compound emissions.

## **5.0 National Emission Standards for Hazardous Air Pollutants**

DENR reviewed 40 CFR Part 61 to determine the applicability to this facility to any of the subparts and determined the following may be applicable.

## **6.0 Maximum Achievable Control Technology Standards**

### **6.1 Potential Hazardous Air Pollutant Emissions**

The federal Maximum Achievable Control Technology Standards are applicable to both major and area sources of hazardous air pollutants. A major source of hazardous air pollutants is defined as having the potential to emit 10 tons or more per year of a single hazardous air pollutant or 25 tons per year or more of a combination of hazardous air pollutants. An area source is a source that is not a major source of hazardous air pollutants.

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA's Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant's application, or other methods to determine potential air emissions.

The proposed construction takes from the feed after the distillation process. That process would remove most hazardous air pollutants from the feed. Any remaining pollutants would require a large amount of heat to release (i.e. a dryer). Therefore the potential emissions of Hazardous Air Pollutants is assumed to be zero. Red River Energy will remain a minor source for HAPs and will not be required to track emissions from the proposed construction.

### **6.2 Applicable Standards**

DENR reviewed 40 CFR Part 63 and did not identify any applicable standards to this proposed construction.

## **7.0 State Requirements**

Red River Energy's existing operation is covered under a Title V air quality operating permit. In accordance with ARSD 74:36:20:02, a construction permit is not required if the unit has less than

2 tons of potential emissions. However that exemption applies only to facilities that do not have federally enforceable permit conditions to avoid a PSD permit. Red River Energy has taken limits to VOC emissions to avoid having to obtain a PSD permit in the past. Therefore the facility is not eligible for the Exemption. The proposed construction will require a construction permit.

## **7.1 State Emission Limits**

Particulate and sulfur dioxide emission limits are derived from ARSD 74:36:06. The proposed construction do not emit particulate and or sulfur dioxide emissions and is not required to meet the state particulate and/or sulfur dioxide limits.

ARSD 74:36:12:01 establishes a visible emission limit of 20 percent opacity for each unit. Red River Energy must maintain opacity at or below 20 percent at all times.

## **7.2 Title V Air Quality Operating Permit Revision**

Red River Energy is required to operate within the requirements stipulated in the Title V air quality operating permit. Red River Energy will be required to submit a revision to the Title V air quality operating permit to include the operation of the fermenter and boiler.

## **8.0 Recommendation**

POET will be required to construct and operate within the requirements stipulated in the following regulations:

- ARSD 74:36:06 – Regulated Air Pollutant Emissions;
- ARSD 74:36:12 – Control of Visible Emissions; and
- ARSD 74:36:20 – Construction Permits for New Sources or Modifications.

Based on the information submitted in the air quality permit application, DENR recommends conditional approval of a construction permit for Red River Energy to install a corn oil separation system. Any questions pertaining to this permit recommendation should be directed to John Conklin, Engineer I, Department of Environment and Natural Resources – Air Quality Program.