



Statement of Basis

Title V Air Quality Operating Permit

**Poet Research Center, Inc.
Scotland, South Dakota**

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1.0 Background

On August 26, 1996, the South Dakota Department of Environment and Natural Resources (DENR) issued a Title V air quality operating permit to Broin Enterprises for an ethanol production facility located near Scotland. Broin Enterprises has since changed its name to Poet Research Center, Inc. The permit was most recently renewed on November 15, 2010. On December 11, 2012, DENR issued a modification to the permit for the addition of Unit #31 through #34, removal of flare requirements, and inclusion of requirements under 40 CFR Part 60, Subpart VVa.

The facility consists of two major elements, a 10 million gallon per year dry corn mill ethanol production plant and a research and development facility with an ethanol production capacity of 1.8 million gallons per year. At full capacity, Poet Research Center may produce up to 12 million gallons of undenatured ethanol per year. In addition to fuel ethanol, the corn mill ethanol plant also produces carbon dioxide (CO₂) and dried distiller grain and solubles (DDGS) as saleable byproducts. Poet Research Center has added an additional fiber processing and packaging system to its facility. The facility includes a fiber dryer controlled by a baghouse and three other miscellaneous processes controlled by filters or baghouses. This fiber processing addition will initially take approximately 60% of the fiber produced from the existing fractionation facility for additional processing and could someday take up to 100% of the fractionation facility fiber stream.

1.1 Existing Equipment

Table 1-1 shows Poet Research Center's existing equipment from its Title V air quality operating permit issued December 11, 2012.

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

Identification	Description	Maximum Operating Rate	Control Device
Unit #1	Grain receiving, grain transfer, and storage bin loading. Trucks transport corn to the ethanol plant and dump corn into a receiving pit located in a partially enclosed building. Elevator legs transport the corn from the receiving pit to grain storage bins.	100 tons of grain per hour	Not applicable
Unit #3	Germ and fiber fractionation system. An elevator leg transports the corn from the storage bins to the germ fractionation system. This system separates the germ from the rest of the corn. The corn is then transported to the fiber fractionation system. This system separates the fiber from the rest of the corn.	15 tons of grain per hour	A separate baghouse controls emissions from each system. Exhaust gases from both baghouses are routed through a common stack.

Identification	Description	Maximum Operating Rate	Control Device
Unit #4	Fiber and germ conveyor system. The fiber and germ are transported to the wet distillers grains storage area.	2.3 tons of fiber and/or germ per hour	Baghouse
Unit #5	Fluid bed germ dryer and cooler system. The dryer is fired with natural gas. A multicyclone collects the dried germ.	1.3 tons of dried germ per hour and 2.4 million Btus per hour heat input	Not applicable
Unit #6	Grain milling. An elevator leg transports the fractionated grain or whole grain from the surge bin to a 2003 Roskamp Champion hammer mill. The hammer mill grinds the fractionated grain or whole grain into flour.	15 tons of grain per hour	Baghouse
Unit #7	Grain milling. An elevator leg transports the fractionated grain or whole grain from the surge bin to a 1998 Bliss hammer mill, model # 2636. The hammer mill grinds the fractionated grain or whole grain into flour.	12 tons of grain per hour	Baghouse
Unit #8	Fermentation system. Ethanol is produced from the fermentation process. The fermentation process occurs in five fermenters and the liquid beer is stored in a beer well.	42 tons of corn mash, yeast, and/or water per hour	Wet scrubber
Unit #9	Pilot plant fermentation system. Ethanol is produced from the fermentation process. The fermentation process occurs in five fermenters and the liquid beer is stored in a beer well.	9 tons of corn mash, yeast, and/or water per hour	Wet scrubber
Unit #10	Carbon dioxide recovery system. The air emissions from the fermentation process (Unit #8) are routed through a 1997 Salof Refrigeration Company carbon dioxide skid. There are three emission points: the side stripper vent, the carbon bed drier, and the alumina bed drier	Not applicable	Not applicable
Unit #11	Distillation process. The distillation process distills the liquid beer. The distillation process consists of the	31 tons of beer (ethanol, mash, and/or water) per	Wet scrubber

Identification	Description	Maximum Operating Rate	Control Device
	beer stripper, rectifier, side stripper, molecular sieve, and evaporator.	hour	
Unit #12	A rotary drum dryer. The dryer is fired with natural gas. The dried distiller grain is collected by multi cyclones.	4.5 tons of dried distillers grain per hour and 17 million Btus per hour heat input	Not applicable
Unit #13	Dried distillers grain cooling drum. The dried distillers grain is cooled in this system prior to storage.	4.5 tons of dried distillers grain per hour	Not applicable
Unit #14	Dried distillers grain shipping. The dried distillers grain is loaded out be trucks and railcar. The loadout occurs in a partially enclosed building	100 tons of dried distillers grain per hour	Not applicable
Unit #15	Ethanol truck and railcar loadout(s)	24,000 gallons per hour	Not applicable
Unit #16	Seven industrial cooling towers	Not applicable	Not applicable
Unit #17	Boiler #1 – 1977 Cleaver-Brooks steam boiler, model # CB-200-700, fired with natural gas and propane.	29.3 million Btus per hour heat input	Not applicable
Unit #18	Boiler #2 – 2003 Superior Boiler Works steam boiler, model # 6_X-3500-S300-ICCF-G, fired with natural gas and propane.	29.3 million Btus per hour heat input	Not applicable
Unit #19	Tank #2 – A fixed roof above ground storage tank. The tank will store 190-proof ethanol.	30,000 gallons	Not applicable
Unit #20	Tank #3 – A fixed roof above ground storage tank. The tank will store 200-proof ethanol.	25,000 gallons	Not applicable
Unit #21	Tank #4 – A fixed roof above ground storage tank. The tank will store 190-proof ethanol.	30,000 gallons	Not applicable
Unit #22	Tank #5 – A fixed roof above ground storage tank. The tank will store denatured ethanol	39,500 gallons	Not applicable
Unit #23	Tank #6 – A fixed roof above ground storage tank. The tank will store denatured ethanol	39,500 gallons	Not applicable
Unit #24	Tank #7 – A fixed roof above ground storage tank. The tank will store denatured ethanol	39,500 gallons	Not applicable
Unit #25	Cellulose receiving, cellulose transfer, and storage silo loading.	20 tons of cellulose per hour	Not applicable

Identification	Description	Maximum Operating Rate	Control Device
	Trucks transport cellulose to the ethanol plant and dump the screened cobs into a receiving hopper. A bucket elevator transports the cellulose from the receiving hopper to the storage silo, then to the mill feed bin. Fiber from Unit #3 may also be transferred to the feed bin.		
Unit #28	Cellulose pretreatment and fermentation. Ground cellulose and fiber are dropped through the transfer filter separator into two pretreatment vessels. A screw conveyor transfers the cellulose/fiber mixture to six fermentation tanks. The liquid beer is transferred to the beer well associated with Unit #9.	195 pounds of cellulose/fiber solids mix per hour	Wet Scrubber
Unit #30	Tank #8 – A fixed roof above ground storage tank. The tank will store denatured ethanol	39,500 gallons	Not applicable
Unit #31	Pneumatic Conveyance System	0.5 tons fiber per hour	Baghouse
Unit #32	Natural Gas fired fiber dryer	2.5 MMBtu per hour	Baghouse
Unit #33	Surge bin	0.3 tons fiber per hour	Baghouse
Unit #34	Fiber mill and packaging system	0.3 tons fiber per hour	Baghouse

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 Boilers

There are three New Source Performance Standards for fossil fuel-fired steam generators. The three standards are applicable to the following steam generators:

1. 40 CFR Part 60, Subpart D: applicable to a steam generator with a maximum operating rate of 250 million Btus per hour or more and commenced construction after August 17, 1971;
2. 40 CFR Part 60, Subpart Db: applicable to a steam generator with a maximum operating rate of 100 million Btus per hour or more and commenced construction after June 19, 1984; and

3. 40 CFR Part 60, Subpart Dc: applicable to a steam generator with a minimum design heat input capacity equal to or greater than 10 million Btus per hour but less than or equal to 100 million Btus per hour and commenced construction after June 9, 1989.

Unit #17 was constructed prior to June 19, 1984 and has a heat input capacity less than 100 million Btus per hour. Unit #18 was constructed after June 19, 1984 but has a heat input capacity less than 100 million Btus per hour. Therefore, Poet Research Center's two boilers are exempt from 40 CFR Part 60, Subparts D and Db. Unit #18 was constructed in 2003, has a heat input greater than 10 million Btus per hour and less than 100 million Btus per hour. Unit #18 is subject to subpart Dc.

2.2 Standards for Grain Elevators

The provisions under 40 CFR Part 60 Subpart DD is applicable to the following grain elevators:

1. The provisions of this subpart are applicable to any grain terminal elevator, which has a permanent grain storage capacity of 2,500,000 bushels. A grain terminal storage elevator means any grain elevator except those located at animal food manufacturers, pet food manufactures, cereal manufacturers, breweries, and livestock feedlots; or
2. The provisions of this subpart are applicable to any grain storage elevator, which has a permanent grain storage capacity of 1,000,000 bushels. A grain storage elevator means any grain elevator located at any wheat flour mill, wet corn mill, dry corn mill (human consumption), rice mill, or soybean oil extraction plant; and
3. Commences construction, modification, or reconstruction after August 3, 1978.

Poet Research Center is considered a grain terminal elevator. The permanent grain storage capacity for this plant is 338,750 bushels, which is less than 2,500,000 bushels. Therefore, this subpart does not apply to Poet Research Center.

2.3 Standards for Synthetic Organic Chemical Manufacturing Industries

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.

Previous reviews determined POET Research Center is subject to 40 CFR Part 60, Subpart VV. This subpart is applicable because construction commenced after January 5, 1981, and the capacity of the plant is more than 1,000 megagrams per year of ethanol.

In 2012, POET Research Center requested that DENR incorporate the requirements in Subpart VVa instead of Subpart VV. The requirements in Subpart VVa are equivalent to or more stringent than those in Subpart VV. Subpart VVa requirements were included in the Title V permit modification on December 11, 2012 and will be included in the draft permit.

2.4 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. This subpart does not apply to storage vessels with a capacity greater than or equal to 151 m³ storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or with a capacity greater than or equal to 75 m³ but less than 151 m³ storing a liquid with a maximum true vapor pressure less than 15.0 kPa.

All eight tanks commenced construction after May 19, 1978. Therefore, subpart K is not applicable. None of the tanks have a capacity greater than 40,000 gallons – therefore Ka is not applicable. See Table 2-1 for tank size and the true vapor pressure of the liquids being stored in the tanks. Tank data not submitted in the 2015 application was derived from previous applications.

Table 2-1 – Tank and Volatile Organic Liquid Specifications

Tank # (Unit #)	Construction Date	Capacity (gallons)	Volume (cubic meters)	Vapor Pressure (kPa)
1	1990	10,000	38	35
2 (19)	1988	30,000	114	0.51
3 (20)	1981	25,000	95	0.51
4 (21)	1990	30,000	114	0.51
5 (22)	1990	39,500	150	4.5
6 (23)	1990	39,500	150	4.5
7 (24)	1993	39,500	150	4.5
8 (30)	1993	39,500	150	4.5

Tank #1 was constructed in 1990 and has a capacity of 10,000 gallons. Therefore Subpart Kb is not applicable. The capacities of Tanks #2 - #8 are all greater than 75 cubic meters and less than 151 cubic meters. Tanks #2 and #4 – #8 were constructed after July 23, 1984. However, as shown in Table 2-1, the tanks store a liquid with a vapor pressure less than 15.0 kPa. Therefore, these tanks are exempt from subpart Kb. Tank #3 was constructed prior to 1984, is less than 40,000 gallons and is exempt from all subparts.

Poet Research Center provided potential volatile organic compound emissions from the tanks using EPA Tanks 4.09d. Tank #1's potential emissions were 1.3 tons per year. The remaining tanks potential emissions were all less than one ton per year. In accordance with ARSD 74:36:05:04.01(7), these tanks will not be considered as permitted units and will not be listed in Table 1-1 of the permit.

2.5 Other Applicable New Source Performance Standards

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

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 Scotland, South Dakota, which is in attainment or unclassifiable for all the criteria air pollutants regulated under the Clean Air Act. Therefore, POET Research Center is not subject to new source review.

4.0 Prevention of Significant Deterioration

A prevention of significant deterioration (PSD) review applies to new major stationary sources and major modifications to existing major stationary sources in areas designated as attainment under Section 107 of the Clean Air Act for any regulated air pollutant. The following is a list of regulated air pollutants under the PSD program:

1. Total suspended particulate (PM);
2. Particulate with a diameter less than or equal to 10 microns (PM10);
3. Particulate with a diameter less than or equal to 2.5 microns (PM2.5);
4. Sulfur dioxide (SO₂);
5. Nitrogen oxides (NO_x);
6. Carbon monoxide (CO);
7. Ozone – measured as volatile organic compounds (VOCs);
8. Lead;
9. Fluorides
10. Sulfuric acid mist;
11. Hydrogen sulfide;
12. Reduced sulfur compounds;
13. Total reduced sulfur; and
14. Greenhouse gases (carbon dioxide, methane, nitrous oxide, etc.).

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 Research Center 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. New PSD source if greenhouse gas emissions are 100,000 tons per year of carbon dioxide equivalent or more;
3. 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;
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 (2) 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.

4.1 Current Short Term and Operational Limits

POET Research Center has requested federally enforceable permit conditions to ensure actual emissions from the ethanol plant do not exceed the major source threshold under the PSD program. POET Research Center has proposed to use a combination of control equipment, time constraints on certain units, and short term emission limits for each unit to maintain actual air emissions below the major source threshold under the PSD program.

The current Title V air quality operating permit contains enforceable permit conditions to ensure actual emissions from the ethanol plant do not exceed the major source threshold under the PSD program. POET Research Center has short term emission limits that restrict the facility’s potential emissions to less than 238 tons per year for the plant for the criteria air pollutants

identified in Table 4-1. The permit also contains a plant wide emission limit for each criteria air pollutant listed in Table 4-1 of 238 tons per 12-month rolling total. Table 4-1 lists POET Research Center's short term emission limits as derived from chapter 7.0 of the existing Title V air quality operating permit as modified on December 11, 2012.

Table 4-1 – Current Short Term Emission Limits

Unit #	Description	TSP	VOC
3	Fractionation	0.01 ²	
4	Germ/Fiber Conveyor	0.01 ²	
6	Hammer mill	0.01 ²	
7	Hammer mill	0.01 ²	
8	Fermentation Process		18.0 ¹
9	Pilot Plant Fermentation		2.8 ¹
11	Distillation		0.9 ¹
12	Distillers Grain Dryer		24.9 ¹
28	Pilot Plant Fermentation		0.3 ¹
31	Fiber filter receiver	0.01 ²	
32	Natural gas fired fiber dryer	0.01 ²	
33	Surge bin	0.01 ²	
34	Fiber mill and packaging system	0.01 ²	

¹ – Pounds per hour; and

² – Grains per dry standard cubic foot

4.2 Potential Emissions

DENR will use the short term limits and operational limits to calculate potential emissions. When short term and operational limits are not applicable, 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.

Table 4-2 summarizes the potential controlled emissions for Poet Research Center. The potential emissions were derived from the statement of basis associated with the modification issued December 11, 2012.

Table #4-2 - Potential Controlled Emissions (tons per year)

Unit #	Description	TSP	PM10	SO ₂	NO _x	VOC	CO
1	Grain Receiving ³	11.8	3.9				
3	Fractionation ³	19.3	19.3				
4	Germ/Fiber Conveyor ³	0.4	0.4				
5	Germ Dryer ³	1.3	0.3	0.0	1.1	8.8	5.3
6	Hammer mill ³	3.0	3.0				
7	Hammer mill ³	1.6	1.6				
8	Fermentation Process ³					10.1	

Unit #	Description	TSP	PM10	SO ₂	NO _x	VOC	CO
9	Pilot Plant Fermentation ³					2.6	
11	Distillation ³					6.1	
12	Distillers Grain Dryer ³	7.4	4.4	0.0	7.3	109.1	39.4
13	Cooling Drum ³	8.3	8.3			9.6	
14	Dried Distillers Loadout ³	0.2	0.2				
15	Ethanol Loadout ³					2.4	
17	Boiler #1 ^{1, 3}	1.0	1.0	0.3	26.6	0.7	10.8
18	Boiler #2 ^{1, 3}	1.0	1.0	0.3	26.6	0.7	10.8
	Tank #1 ²					1.3	
19	Tank #2 ²					0.4	
20	Tank #3 ²					0.4	
21	Tank #4 ²					0.4	
22	Tank #5 ²					0.6	
23	Tank #6 ²					0.6	
24	Tank #7 ²					0.6	
25	Cellulose Receiving ³	1.2	0.4				
28	Pilot Plant Fermentation ³					1.3	
30	Tank #8 ²					0.6	
31	Pneumatic System ³	0.1	0.1				
32	Fiber Dryer ³	1.2	1.2	0.0	0.8	2.2	0.7
33	Fiber Surge Bin ³	0.2	0.2				
34	Fiber Mill & Packaging ³	1.9	1.9				
	Centrifuges ³					3.6	
	Equipment Leaks ²					12.7	
	10 natural gas heaters ³	0.0	0.0	0.0	0.0	0.0	0.0
	Fugitive Dust ²	10.6	3.0				
	Total Emissions	71	50	1	63	176	67

¹ – This boiler is capable of burning natural gas or propane. The air emissions in this table represent the fuel that would emit the greatest amount of the particular pollutant;

² – The emissions were obtained from the application; and

³ – The emissions were obtained from the previous statement of basis.

As determined in the 2012 Statement of Basis, POET Research Center is considered an existing non-PSD source. On June 24, 2014, the Supreme Court decided greenhouse gases may not be regulated under the PSD program unless the facility requires a PSD permit for the other regulated air pollutants. Because POET Research Center is not a major source under the PSD program, greenhouse gases are not required to be evaluated.

5.0 National Emission Standards for Hazardous Air Pollutants

DENR reviewed the National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR Part 61 and determined that there are no NESHAP standards applicable to POET Research Center.

6.0 Maximum Achievable Control Technology Standards

6.1 Potential HAP 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.

The 2012 Statement of Basis determined potential hazardous air pollutant emissions to be less than 25 tons per year of a combination of hazardous air pollutants. Poet Research Center is considered to be an area source of hazardous air pollutants.

DENR reviewed the Maximum Achievable Control Technology Standards and determined the following may be applicable to POET Research Center as an area source of hazardous air pollutants.

6.2 Industrial Process Cooling Towers

The national emission standard for industrial process cooling towers in 40 CFR Part 63 Subpart Q prohibits the use of chromium based water treatment chemicals in industrial process cooling towers. In accordance with 40 CFR § 63.400, this subpart is only applicable to major sources of hazardous air pollutants. As determined in the 2012 Statement of Basis, POET Research Center is considered an area source of hazardous air pollutants and not subject to this subpart.

6.3 Chemical Processing Plants

On November 10, 2003, EPA finalized the maximum achievable control technology standard under 40 CFR Part 63, Subpart FFFF. This rule applies to the following chemical processing plants:

1. Those facilities that produce chemicals classified using the 1987 Standard Industrial Classification Manual of a code indicated by 282, 283, 284, 285, 286, 287, 289, or 386; and
2. Those facilities that are a major source of hazardous air pollutants. A major source of hazardous air pollutants has the potential to emit 10 tons of a single hazardous air pollutant and/or 25 tons of all hazardous air pollutants;

Poet Research Center's Standard Industrial Classification code is 2869, which falls underneath the code of 286. However, Poet Research Center is considered an area source and therefore, is exempt from this subpart.

6.4 Industrial, Commercial, and Institutional Boilers and Process Heaters

40 CFR Part 63, Subpart DDDDD establishes national emission and operating limits for hazardous air pollutants emitted from industrial, commercial, and institutional boilers and

process heaters located at a major source of hazardous air pollutant emissions. POET Research Center is an area source of hazardous air pollutants and not subject to this subpart.

6.5 Area Source for Industrial, Commercial and Institutional Boilers

On March 21, 2011, EPA finalized the MACT standard under 40 CFR Part 63, Subpart JJJJJ. This rule applies to all new or existing industrial, commercial, and institutional boilers located at an area source of hazardous air pollutants. An existing boiler is defined as a boiler where construction or reconstruction occurred prior to June 4, 2010.

Poet Research Center operates two boilers – one constructed in 1977 and the other constructed in 2003. Both boilers are rated at 29.3 million Btus per hour and are fired with natural gas only. In accordance with 40 CFR § 63.11195(e), a gas-fired boiler is exempt from the requirements of this subpart. A gas-fired boiler is defined as “...any boiler that burns gaseous fuels not combined with any solid fuels, burns liquid fuel only during periods of gas curtailment, gas supply emergencies, or periodic testing on liquid fuel.” Gaseous fuels include natural gas. Therefore, Poet Research Center is not subject to this subpart provided natural gas is the only fuel burned in the two boilers.

6.6 Other MACT Standards

DENR reviewed the other Maximum Achievable Control Technology Standards and determined that none are applicable to POET Research Center.

7.0 State Requirements

Any source operating in South Dakota that meets the requirements of the Administrative Rules of South Dakota (ARSD) 74:36:05:03 is required to obtain a Title V air quality operating permit. POET Research Center’s potential to emit is greater than the major source threshold under the Title V air quality permit program and POET Research Center must comply with federal new source performance standards and maximum achievable control technology standards. Therefore, POET Research Center is required to obtain a Title V air quality operating permit.

7.1 State Particulate Emission Limits

ARSD 74:36:06:02(1) and 74:36:06:03(1), establish state emission limits for total suspended particulate matter. In addition, ARSD 74:36:12:01 establishes a visible emission limit of 20 percent opacity for each unit.

A fuel-burning unit is defined as a unit that burns fuel for the primary purpose of producing heat or power by indirect heat transfer. Unit #5, #12, and #32 are dryers and use direct heat transfer to dry products. Therefore, the dryer’s emission limit was calculated by using equations for process industry units (ARSD 74:36:06:03) instead of using the equation for fuel-burning units (ARSD 74:36:06:02).

Equation 7-1, taken from ARSD 74:36:06:02(1)(b), is used to calculate the state limit of allowable particulate emissions for fuel burning units with a heat input value equal to or greater

than 10 million Btus per hour. Unit #17 and #18 each have maximum heat inputs of 29.3 million Btus per hour (see Table 7-1 for particulate limit).

Equation 7-1 – State Particulate Limit for Fuel Burning Units \geq 10 MMBtus/hr

$$E_{TSP} = 0.811 \times H^{-0.131}$$

Where:

- E_{TSP} = Emission limit for total suspended particulate matter, in pounds per million Btus heat input; and
- H = Heat input, in million Btus per hour.

The particulate emission limits for process units are derived from ARSD 74:36:06:03(1). Equation 7-2, taken from ARSD 74:36:06:03(1)(a) and the appropriate maximum operating rate in Table 1-1 were used to calculate the state limit of particulate emissions for each process unit with operating rates less than or equal to 30 tons per hour (Units #3 through #7, #12, #13, #31, #32, #33, and #34). During the processing of the construction permit application for Unit#32, it was determined the maximum process rate for Unit #32 was 0.7 tons per hour.

Equation 7-2 – State total suspended particulate emission limit for process weights less than 30 tons per hour

$$E_{TSP} = 4.10 \times P^{0.67}$$

Where:

- E_{TSP} = Emission limit for total suspended particulate matter, in pounds per hour; and
- P = Design process rate, in tons per hour.

The pounds per hour emission limits were converted to pounds per ton emission limit by dividing the pounds per hour emission limit by the maximum process rate in Table 1-1. The results are displayed in Table 7-1

The comparison of potential emissions to the particulate emission limit was derived from the 2010 and 2012 Statements of Basis and shown in Table 7-1. The comparison shows each unit is capable of meeting the state’s particulate limit.

Table 7-1 – Comparison of Potential Controlled and Allowable Particulate Emissions

Unit #	Potential Emission Rate	Emission Limit
3	0.15 lbs/ton	1.7 lbs/ton
4	0.04 lbs/ton	3.1 lbs/ton
5	0.22 lbs/ton	3.8 lbs/ton
6	0.06 lbs/ton	1.7 lbs/ton
7	0.06 lbs/ton	1.8 lbs/ton
12	0.40 lbs/ton	2.5 lbs/ton
13	0.40 lbs/ton	2.5 lbs/ton
17	0.01 lbs/MMBtu heat input	0.5 lbs/MMBtu heat input
18	0.01 lbs/MMBtu heat input	0.5 lbs/MMBtu heat input
31	0.011 lbs/hour	2.6 lbs/hour
32	0.28 lbs/ hour	3.2 lbs/ hour
33	0.026 lbs/hour	1.8 lbs/hour

Unit #	Potential Emission Rate	Emission Limit
34	0.214 lbs/hour	1.8 lbs/hour

7.2 State Sulfur Dioxide Emission Limits

In accordance with ARSD 74:36:06:02(2) and 74:36:06:03(2), a fuel burning unit and a process unit may not emit sulfur dioxide emissions to the ambient air in an amount greater than 3.0 pounds per million Btus. Units #5, #12, #17, #18, and #32 are fired with natural gas which has negligible sulfur content and capable of meeting the state's sulfur dioxide emission limit. Using the 2010 and 2012 Statements of Basis, Table 7-2 compares the potential and allowable emissions.

Table 7-2 – Comparison of Sulfur Dioxide Potential Emissions to Emission Limit

Unit	lbs/MMBtu	
	Potential Emission Rate	Emission Limit
#5	0.01	3.0
#12	0.01	3.0
#17	0.01	3.0
#18	0.01	3.0
#32	0.0006	3.0

7.3 Performance Tests

Poet Research Center conducted performance testing in April, 2011, to prove compliance with the permitted short-term limits. Table 7-4 summarizes the applicable test results.

Table 7-4 – Comparison of Short Term Limits and Stack Test Results

Unit	Pollutant	Short Term Limit	Stack Test	Percentage of
		(pounds/hour)	(pounds/hour)	Short Term Limit
#8	VOC	18.0 and 96% control efficiency	0.94 and 98.7 % control efficiency	5.2%
#9	VOC	2.8 and 96% control efficiency	1.02 and 97.5 % control efficiency	36%
#11	VOC	0.9 and 96% control efficiency	0.1 and 98% control efficiency	11%
#12	VOC	24.9	8.86	36%
#28	VOC	0.3 and 96% control efficiency	0.00008 and 99% control efficiency	0.3%

EPA has approved a methodology to determine compliance with volatile organic compound (VOC) emission limits in a consent decree with other ethanol plants in South Dakota. DENR is recommending the following permit language be included in the permit renewal regarding stack testing requirements for volatile organic compounds which will be included in the draft permit:

1. Required Test Methods. The owner or operator shall conduct all volatile organic compound mass emission performance tests in accordance with 40 CFR Part 51, Appendix M, Method 207 and 40 CFR Part 60, Appendix A, Method 18;
2. Treatment of 2,3-Butanediol. Due to difficulties associated with appropriate method detection limit, 2,3-Butanediol will be sampled through the chromatography column approximately 2.5 times faster than the maximum allowable sampling rate for the other volatile organic compound in the sampling program (e.g. acetaldehyde, acrolein, and ethyl acetate). This requirement applies only if the Method 207 results indicate that 2,3-Butanediol should be sampled as part of the Method 18 testing;
3. Treatment of Non-Detects. When summing analytes per Method 18, non-detect data will be included in the total volatile organic compound mass as one half of the compound method detection limit; except that, if all three performance test runs result in a non-detect measurement and the method detection limit is less than or equal to 1.0 part per million by volume on a dry basis, then all such non-detect data will be treated as zero.

Based on the stack testing dates and the results compared to the short term limits and the new volatile organic compound testing methodology, DENR is not requiring performance testing as part of the proposed renewal:

7.4 Compliance Assurance Monitoring

Compliance assurance monitoring is applicable to permit applications received on or after April 20, 1998, from major sources applying for a Title V air quality operating permit. POET Research Center's renewal application was received on May 19, 2015. Therefore, compliance assurance monitoring is applicable to any unit that meets the following criteria:

1. The unit is subject to an emission limit or standard for the applicable regulated air pollutant;
2. The unit uses a control device to achieve compliance with such emission limit or standard; and
3. The unit has potential uncontrolled emission of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

The facility's existing fermentation process, plant distillation process, and distillers grain dryer (Units #8, #11 and #12) are the only units that have potential uncontrolled volatile organic compound emission greater than 100 tons per year. Compliance assurance monitoring does not apply to the remaining units.

7.5 Periodic Monitoring

Periodic monitoring is required for each emission unit that is subject to an applicable requirement at a source subject to the Title V air quality operating permit program.

Units #1, #3, #4, #5, #6, #7, #12, #16, #17, #18, #21, #22 and #31 through #34 are subject to periodic monitoring for particulate. Periodic monitoring for the units may consist of visible emission readings, pressure drop readings for the appropriate control device, or implementation

of a maintenance plan for the appropriate control device. A permit condition will be placed in the permit requiring POET Research Center to perform periodic visible emission readings, except for Units #17 and #18. These units will not be required to perform periodic monitoring because they burn natural gas and propane. The periodic visible emission readings combined with stack test results will be used to demonstrate compliance on a periodic basis.

Units #8, #9, and #11 are subject to periodic monitoring for volatile organic compounds. Periodic monitoring will consist of establishing and recording the water flow rate of each wet scrubber system. If the average water flow rate is dropped below the established water flow rate established in the performance test a new stack test will be required to determine compliance with the emission limits.

Units #12, #17, #18 and #32 are subject to periodic monitoring for sulfur dioxide emissions. The periodic monitoring for sulfur dioxide emissions normally consists of the sulfur content of the fuel fired in the units. Because the fuel being used is natural gas or propane, periodic monitoring for sulfur dioxide is not required.

The equipment that is in volatile organic service will be subject to periodic monitoring for volatile organic compound leaks. The volatile organic compound emissions from equipment leaks are covered by the requirements of 40 CFR, Part 60, Subpart VVa,

8.0 Recommendation

Poet Research Center will be required to operate within the requirements stipulated in the following regulations:

1. ARSD 74:36:05 – Operation permits for Part 70 sources;
2. ARSD 74:36:06 – Regulated Air Pollutant Emissions;
3. ARSD 74:36:07 – New Source Performance Standards;
4. ARSD 74:36:08 – National Emission Standards for Hazardous Air Pollutants;
5. ARSD 74:36:11 – Performance Testing
6. ARSD 74:36:12 – Control of Visible Emissions

DENR recommends the approval of the renewal of Poet Research Center's Title V air quality operating permit. Any questions on this review should be directed to Keith Gestring, Engineer, Department of Environment and Natural Resources.