



Statement of Basis

Construction Permit

**Great Plains Ethanol, LLC d.b.a. POET Biorefining
Chancellor, South Dakota**

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1.0 Background

On May 24, 2002, the South Dakota Department of Environment and Natural Resources (DENR) issued Great Plains Ethanol, LLC's (Great Plains) Title V air quality permit #28.0501-61 to construct and operate a dry corn mill ethanol production plant located near Chancellor, South Dakota. Great Plains was permitted to produce 62 million gallons of undenatured ethanol per 12-month rolling period. The following actions were incorporated in the Title V air quality operating permit during the term of the permit:

1. On April 4, 2003, the permit was modified to clarify existing permit conditions and update the storage tank capacities; and
2. On August 25, 2005, the permit was modified to revise emission limits, conduct additional stack tests, install a lime storage silo, emergency generator, thermal oxidizer, and additional fermentation tanks, and replace the existing hammer mill with three small hammer mills.

On January 26, 2007, the permit was renewed and modified to increase the production capacity to 120 million gallons of undenatured ethanol per 12-month rolling period. The following actions were incorporated in the Title V air quality operating permit since it was renewed:

1. On April 24, 2007, the permit was revised to install a new 652,000 corrugated steel grain storage bin and replace three 430,000 bushel bins with three 652,000 bushel bins;
2. On February 11, 2008, the permit was modified to include E-85 in-line blending equipment;
3. On July 11, 2008, the permit was revised to allow corn cobs, corn stover, cellulose ethanol waste (non-fermentable cellulose by-product), anaerobic digester biosolids, corn fiber, and landfill gas/biogas as a fuel for Boiler #4 (Unit #36), update Unit #39's descriptions, remove Unit #42 from permit, remove "emergency" associated with Unit #16 and #37, clarify how solid fuel boiler ash will be handled, replace any reference to an "ash storage building" with "ash storage and load out", remove Table 1.1, and correct typographical errors;
4. On August 21, 2008, the permit was modified to change the short-term particulate matter limit for Unit #39;
5. On June 29, 2009, the permit was revised for the redesign of the solid fuel receiving and handling system (Unit #39);
6. On September 21, 2009, the permit was revised for the addition of waste corn as fuel for Unit #36 and installation of a continuous opacity monitoring system on Unit #36; and
7. On July 11, 2011, the permit was revised to include specified volatile organic compound stack testing methodology based on a consent decree with the U.S. Environmental Protection Agency.

On November 27, 2012, the permit was renewed. The following actions were incorporated in the Title V air quality operating permit.

1. On February 6, 2013, the permit was amended to revise the responsible official.

1.1 Existing Equipment

Table 1.1 provides a list of the units presently permitted which was taken from the current Title V air quality operating permit issued February 6, 2013.

Table 1.1 – Description of Permitted Units, Operations, and Processes

Unit	Description	Maximum Operating Range	Control Device
#1	Enclosed truck and railcar grain handling system	840 tons per hour	Baghouse
	Elevator legs transport corn from receiving pits to seven grain storage bins		
	Elevator legs transport dried distiller grain and solubles (DDGS) from DDGS silo to bulk weigh and load out stations	220 tons per hour	
	DDGS load out into trucks and railcars in enclosed grain handling building		
#2	Elevator legs transport the grain from the storage bins to a scalper	140 tons per hour	Baghouse
	Corn scalper to clean corn		
	Elevator legs transports cleaned corn to surge bin		
#4	Fermentation process #1 consists of six fermenters. Liquid beer stored in a beer well	207 tons of corn mash, yeast and water per hour	Wet scrubber – Exhaust gases may be routed to Unit #6b or #6c
	Distillation process #1 distills the liquid beer and consists of the beer stripper, rectifier, side stripper, one set of three molecular sieves, and one set of evaporators	35,730 gallons of beer per hour	
#6	Dryer A equipped with a multi cyclone to collected product and fired with natural gas and landfill gas	23 tons dried distiller grain and solubles per hour and 60 million Btus per hour heat input	Unit #6b or #6c
	Dryer B equipped with a multi cyclone to collected product and fired with natural gas and landfill gas	23 tons dried distiller grain and solubles per hour and 34 million Btus per hour heat input	
	Dryer C equipped with a multi cyclone to collected product and fired	23 tons dried distiller grain and solubles per	

Unit	Description	Maximum Operating Range	Control Device
	with natural gas and landfill gas	hour and 60 million Btus per hour heat input	
	Dryer D equipped with a multi cyclone to collected product and fired with natural gas and landfill gas	23 tons dried distiller grain and solubles per hour and 60 million Btus per hour heat input	
	One set of four centrifuges and one set of five centrifuges	50 tons of whole stillage per hour per centrifuge	
	Fermentation and distillation process #1	See Unit #4	
	Fermentation and distillation process #2	See Unit #29	
#6b	Three chambered regenerative thermal oxidizer fired with natural gas, landfill gas, and off gases generated from the ethanol production process	14.5 million Btus per hour	Three chambered regenerative thermal oxidizer
#6c	Seven chambered regenerative thermal oxidizer fired with natural gas, landfill gas, and off gases generated from the ethanol production process	42 million Btus per hour	Seven chambered regenerative thermal oxidizer
#7	Industrial cooling tower #1	18,000 gallons per minute	Not applicable
#8	Ethanol truck load out	39,000 gallons per hour	Flare
	Ethanol rail car load out	150,000 gallon per hour	
	Flare fired with natural gas and off gases from the load out process	25 million Btus per hour	
#9	DDGS fluid bed cooler #1	23 tons of DDGS per hour	Baghouse
#10	DDGS silo #1	46 tons per hour	Baghouse
#11	DDGS silo bypass receiver #1	46 tons per hour	Baghouse
#12	Elevator leg transports corn from surge bin to hammer mill #1 and ground corn to fermentation process	22 tons of grain per hour	Baghouse
#13	Elevator leg transports corn from surge bin to hammer mill #2 and ground corn to fermentation process	22 tons of grain per hour	Baghouse
#14	Elevator leg transports corn from surge bin to hammer mill #3 and ground corn to fermentation process	22 tons of grain per hour	Baghouse
#15	Elevator leg transports corn from surge bin to hammer mill #4 and ground corn to fermentation process	22 tons of grain per hour	Baghouse
#16	Diesel generator #1 fired with	1,000 kilowatts	Not applicable

Unit	Description	Maximum Operating Range	Control Device
	distillate oil		
#18	Tank #1 – Above ground storage tank equipped with an internal floating roof	192,500 gallons	Not applicable
#19	Tank #2 – Above ground storage tank equipped with an internal floating roof	60,000 gallons	Not applicable
#20	Tank #3 – Above ground storage tank equipped with an internal floating roof	2,000,000 gallons	Not applicable
#21	Tank #4 – Above ground storage tank equipped with an internal floating roof	2,000,000 gallons	Not applicable
#22	Tank #6 – Above ground storage tank equipped with an internal floating roof	192,500 gallons	Not applicable
#23	Corn surge bin loading	140 tons per hour	Baghouse
#24	Elevator leg transports corn from surge bin to hammer mill #5	22 tons of grain per hour	Baghouse
#25	Elevator leg transports corn from surge bin to hammer mill #6	22 tons of grain per hour	Baghouse
#26	Elevator leg transports corn from surge bin to hammer mill #7	22 tons of grain per hour	Baghouse
#27	Elevator leg transports corn from surge bin to hammer mill #8	22 tons of grain per hour	Baghouse
#28	Flour conveyor and receiver	88 tons per hour	Baghouse
#29	Fermentation process #2 consists of four fermenters and the liquid beer is stored in a beer well.	207 tons of corn mash, yeast and water per hour	Wet scrubber – Exhaust gases may be routed to Unit #6b or #6c
	Distillation process #2 distills the liquid beer and consists of the beer stripper, rectifier, side stripper, one set of three molecular sieves, and one set of evaporators	40,500 gallons of beer per hour	
#30	DDGS fluid bed cooler #2	23 tons per hour	Baghouse
#31	DDGS silo #2	46 tons per hour	Baghouse
#32	DDGS silo bypass receiver #2	46 tons per hour	Baghouse
#33	Boiler #1 – 2006 Erie Power/Keystone boiler fired with natural gas	100 million Btus per hour heat input	Not applicable
#34	Boiler #2 – 2006 Erie Power/Keystone boiler fired with natural gas	100 million Btus per hour heat input	Not applicable

Unit	Description	Maximum Operating Range	Control Device
#35	Boiler #3 – 2006 Erie Power/Keystone boiler fired with natural gas	100 million Btus per hour heat input	Not applicable
#36	Boiler #4 – 2007 Factory Sales boiler fired with natural gas, wood waste, syrup, landfill gas, corn cobs, agriculture waste products, native grasses, cellulose ethanol waste, anaerobic digester biosolids, waste corn, dried distillers grain and solubles, wet cake, and used toner	178 million Btus per hour heat input	Electrostatic precipitator
#37	Diesel generator #2 fired with distillate oil	2,000 kilowatts	Not applicable
#38	Trona storage bin	33 tons per hour	Baghouse
#39	Solid fuel receiving and storage building, conveyors, screener and metal separator	250 tons per hour	Baghouse
#40	Industrial cooling tower #2	18,000 gallons per minute	Not applicable
#41	Ash storage and load out.	1 ton per hour	Baghouse
#42	Dried distillers grain bypass to boiler #4	46 tons per hour	Baghouse

1.2 Proposed Revisions

Great Plains is proposing to add two 580,000 gallon fermentation tanks to the existing fermentation system included as part of Unit #29 and install a new hammermill that will be controlled by a new baghouse (Unit #43). The additional fermentation tanks will allow Great Plains the ability to increase the batch fermentation time in order to increase yield on the available starch contained within the corn received and processed. Since the additional fermentation tanks will be used to increase the length of the batch fermentation time, no increase of ethanol production, or associated emissions rates will occur. Therefore, Great Plains is not requesting an increase in emission limits. The hammermill is being added to allow for flexibility in the facility's milling operations. The amount of grain milled at the facility and ultimate grain throughput will not change with the addition of the hammermill. The addition of the hammermill will add an additional stack vent resulting in an increased potential to emit both particulate matter with a diameter less than or equal to 10 microns and particular matter with a diameter less than or equal to 2.5 microns.

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.

Great Plains proposed fermentation tanks are 580,000 gallons or 2196 cubic meters each. Therefore, the tanks are possibly applicable to Subpart Kb. However the fermentation tanks are process tanks and are not subject to these subparts.

2.2 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.

It has already been determined in previous reviews that Great Plains 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. The initial notification and demonstration of compliance has been completed.

In the previous review Great Plains requested that DENR incorporate the requirements in Subpart VVa instead of Subpart VV. DENR will require the proposed fermentation tanks meet the Subpart VVa requirements. Since Great Plains has requested and accepted the requirements of Subpart VVa, DENR did not determine if the new fermentation tanks were considered a modification to an existing system and trigger the Subpart VVa applicability.

2.3 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.

Great Plains is considered a grain terminal elevator. Based on the previous statement of basis for the modification issued April 24, 2007, the permanent enclosed grain storage capacity of Great Plains is 2,608,000 bushels. The permanent grain storage capacity for this plant is greater than 2,500,000 bushels. Therefore, this subpart is applicable to Great Plains facility.

In accordance with 40 CFR § 60.300(a), the affected operations at the ethanol plant are each unloading, loading, grain dryer, and all grain handling operations. According to an EPA Applicability Determination on August 18, 2005 states Subpart DD addresses emissions resulting from the five primary functions that take place in an elevator, which are receiving, handling, cleaning, drying, and shipping. All of these are material handling processes rather than processes which effect a chemical or physical change in the product. The standards in Subpart DD are based on data that was collected only from handling processes and not processes which effect a chemical or physical change in the product. Therefore, it has been determined that only the handling of unprocessed grain is subject to the standards. Unit #43 is a process unit that physically changes the corn into a powder. Therefore, this subpart is not applicable to the construction of Unit #43.

2.4 Other Applicable New Source Performance Standards

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

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 near Chancellor, South Dakota, which is in attainment or unclassifiable for all the criteria air pollutants regulated under the Clean Air Act. Therefore, Great Plains is not subject to 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 (PM₁₀);
3. Particulate matter with a diameter less than or equal to 2.5 microns (PM_{2.5});
4. Sulfur dioxide (SO₂);
5. Nitrogen oxides (NO_x);
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, Great Plains 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. Under the Clean Air Act, PSD 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. 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 24, 2014, the US 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. Based on the US Supreme Court decision, scenarios #3, #4, and #5 are not applicable.

4.1 Current Short Term and Operational Limits

The current permit contains enforceable permit conditions to ensure actual emissions from the ethanol plant do not exceed the major source threshold under the PSD program. Great Plains has short term emission limits that restrict the facility’s potential emissions for the existing plant constructed in 2002 and the expansion plant constructed in 2007 to less than 238 tons per year for each 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 Great Plains short term emission limits as derived from chapter 8.0 of the existing permit.

Table 4.1 – Current Short Term Emission Limits

Unit	Description	PM10	SO ₂	NO _x	VOCs	CO
		(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)	(lbs/hr)
#1	Grain receiving	1.0 ¹				
#2	Grain cleaning	0.1				
#4	Fermentation and distillation #1				10.0	
#6	Dryers, centrifuges, and fermentation and distillation #1 and #2	12.0	4.2	16.3	18.0	14.0
#7	Industrial cooling tower #1					
#8	Ethanol load out/flare					
#9	Fluid bed cooler #1	1.0			2.8	
#10	DDGS silo #1	0.4				
#11	DDGS silo #1 bypass	0.2				
#12	Hammer mill #1	0.4				
#13	Hammer mill #2	0.4				

#14	Hammer mill #3	0.4				
#15	Hammer mill #4	0.4				
#16	Generator #1	0.9	5.4	32.2	0.9	7.4
#23	Surge bin	0.2				
#24	Hammer mill #5	0.4				
#25	Hammer mill #6	0.4				
#26	Hammer mill #7	0.4				
#27	Hammer mill #8	0.4				
#28	Flour conveyer	0.2				
#29	Fermentation and distillation #2				20.0	
#30	Fluid bed cooler #2	1.0			3.5	
#31	DDGS silo #2	0.4				
#32	DDGS silo #2 bypass	0.2				
#33	Boiler #1	0.8	0.1	3.0	0.5	2.5
#34	Boiler #2	0.8	0.1	3.0	0.5	2.5
#35	Boiler #3	0.8	0.1	3.0	0.5	2.5
#36	Boiler #4	5.3	122.0 ²	85.0 ²	3.0	106.0 ²
#37	Generator #2	0.4	10.7	54.2	1.0	1.2
#38	Trona storage bin	0.1				
#39	Solid fuel receiving and storage	1.1				
#40	Industrial cooling tower #2					
#41	Ash storage building	0.1				
#42	Dried distillers grain bypass					
#43	Hammermill #9	0.4				

¹ – In addition to a 1.0 pounds per hour emission limit, Unit #1 is also subject to a 0.01 grains per dry standard cubic meter limit which is derived from 40 CFR Part 60 Subpart DD. After checking the units for the emission limit in Subpart DD, it was determined the units should be grains per dry standard cubic foot; and

² – Short term limit is in tons per 12-month rolling period;

In addition to the short term and long term limits, Great Plains has accepted operational limits that restrict the operation of certain units. Table 4.2 provides a summary of the operational limits.

Table 4.2 – Current Operational Limits

Condition	Unit(s)	Operational Limit
8.9	#4 and #29	Produce less than or equal to 120 million gallons of undenatured ethanol per 12-month rolling period
8.10	#12, #13, #14, #15, #24, #25, #26, and #27	Process less than or equal to 1,226,400 tons of grain per 12-month rolling period
8.11	#6 (Dryers A, B, C, and D)	Produce less than or equal to 351,176 tons of dried distillers grain and solubles per 12-month rolling

Condition	Unit(s)	Operational Limit
		period
8.12	#4 and #29	Limit emissions not routed to the regenerative thermal oxidizer to less than or equal to 500 hours each per 12-month rolling period

Great Plains has not requested any increase in the production limit of undenatured ethanol or the process limit of grain. Therefore, the current operational limits will be used for the two fermentation tanks and hammermill.

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.

4.3 Particulate Matter Emissions

The potential particulate matter emissions for Unit #43 are based on the short term limits and are displayed in Table 4.3.

4.4 Volatile Organic Compound Emissions

The potential volatile organic compound emissions based on the short term limits and applicable operational limits are displayed in Table 4.3.

In the case of Unit #29, the emissions from the wet scrubber are typically routed to the one of the two regenerative thermal oxidizers; but in certain cases, Great Plains may bypass the regenerative thermal oxidizers. In the original review, Great Plains accepted an operational limit of 500 hours per 12-month rolling period to maintain air emissions below the major source threshold for the PSD program.

4.5 Summary of Potential Emissions

Table 4.3 summarizes the potential emissions from the permitted units based on the short term and operational limits. Potential emissions for each applicable pollutant are calculated from the maximum design capacity listed in the application, the short term emission limits in Table 4.1, operational limits in Table 4.2, except where changes are being proposed and identified in the footnotes to Table 4.2, and assuming the unit operates every hour of every day of the year (8,760 hours per year), unless otherwise specified.

Table 4.3 –Potential Emissions (tons per year)

Description	PM¹	SO₂	NO_x	VOCs	CO
Existing Facility²	140	207	215	157	218
Unit #29³				5	
Unit # 43	1.75				
Total	141.8	207	215	162	218

¹ – “PM” includes total suspended particulate matter, particulate matter 10 microns in diameter or less, and particulate matter 2.5 microns in diameter or less;

² – VOC emissions from Unit #29 removed; and

³ – VOC emissions from Unit #29 including the two additional fermentation tanks.

The addition of the two fermentation tanks will not change the short term limits of the fermentation process. Based on the total emissions in Table 4.3 with addition of the two fermentation tanks to Unit #29 and the hammermill, Great Plains is still capable of operating in compliance with the existing short term limits, Great Plains is capable of meeting the plant wide limits to maintain actual air emissions below the major source threshold under the PSD program. Based on the US Supreme Court’s decision and because Great Plains is not applicable to the PSD program, a review for greenhouse gas emissions is not warranted or required.

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 none were applicable.

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.

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 6.1 provides a summary of stack test results for hazardous air pollutants using 40 CFR Part 60, Appendix A, Method 320.

Table 6.1 – Summary of Stack Test Results

Date	Unit	Pollutant	Results
04/30/08	#29	Acetaldehyde	5.54 pounds per hour
		Acrolein	0.03 pounds per hour
		Methanol	0.03 pounds per hour
		Formaldehyde	0.04 pounds per hour

Great Plains accepted operational limits to ensure their potential to emit does not exceed the major source threshold under the Title V air quality operating permit program for hazardous air pollutants. Table 6.2 provides a summary of hazardous air pollutant emissions based on the operational limits Great Plains accepted to avoid the Prevention of Significant Deterioration program.

Table 6.2 –Potential Controlled Emissions for Hazardous Air Pollutants (tons per year)

Unit	Acetaldehyde	Acrolein	Methanol	Formaldehyde	HCl	Total
Facility^{1,2}	7.7	1.0	0.8	1.1	12.3	25.9
#29^{1,3}	24.2	0.1	0.1	0.2	-	24.7
Total	32	1.1	0.9	1.3	12.3	50.6

¹ – The potential emissions were derived from Appendix B in the statement of basis written for the Title V air quality operating permit issued November 27, 2012;

² – VOC emissions from Unit #29 removed; and

³ – VOC emissions from Unit #29 including the two additional fermentation tanks

Based on Table 6.2, there are two areas in which Great Plains may exceed the major source threshold for hazardous air pollutants. First, Unit #29, if allowed to operate 8,760 hours per year, would cause an exceedance of the total hazardous air pollutant major source threshold of 25 tons per year. Although potential hazardous air pollutant emissions appear to exceed the major source threshold, air emissions from Unit #29 can either be emitted through the wet scrubber the unit or through one of two thermal oxidizers. In most cases, the air emissions are passed through one of the thermal oxidizers and that is why the actual emissions of hazardous air pollutants have not exceeded the major source threshold. Therefore, to ensure compliance the number of hours Unit #29 can emit through the wet scrubber will be limited. Based on previous applications, Great Plains has requested the number of hours the thermal oxidizers can be bypassed be established at 500 hours per 12-month rolling period.

Table 6.3 provides a summary of hazardous air pollutant emissions based on this operational limit.

Table 6.3 –Potential Controlled Emissions for Hazardous Air Pollutants (tons per year)

Unit	Acetaldehyde	Acrolein	Methanol	Formaldehyde	HCl	Total
Facility¹	4.8	0.9	0.7	1.0	12.3	22.6
#29¹	1.4	0.01	0.01	0.01	-	1.4
Total	6.2	0.9	0.7	1.0	12.3	24.0

¹ – The potential emissions were derived from the statement of basis written for the Title V air quality operating permit issued November 27, 2012;

Great Plains uses additives to reduce hazardous air pollutant emissions from existing Unit #29. Therefore, the use of these additives will need to be established from a performance test on Unit #29 with the two additional fermentation tanks to demonstrate compliance with the plant wide hazardous air pollutant emission limits.

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

6.2 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.

Great Plains Standard Industrial Classification code is 2869, which falls underneath the code of 286. Great Plains requested operational restrictions that maintain hazardous air pollutant emissions less than the major source threshold under the Title V air quality operating permit program. Taking this into account, Great Plains is not applicable to this maximum achievable control technology standard.

6.3 Other MACT Standards

DENR reviewed the other Maximum Achievable Control Technology Standards and determined there are no other standards applicable to this ethanol plant.

7.0 State Requirements

Great Plains existing operation is covered under a Title V air quality operating permit. In accordance with ARSD 74:36:20:01, a construction permit is required for all modifications to an existing source. The addition of the two fermentation tanks and hammermill has the potential to increase the actual emissions of the facility and the fermentation tanks are applicable to a new source performance standard. Therefore, the addition of the two fermentation tanks and hammermill are considered a modification. Therefore, Great Plains is required to obtain a construction permit for the proposed change.

7.1 Type of Permit

Great Plains is required to submit an application to modify its Title V operating permit within 12 months of initial startup of the two fermentation tanks in Unit #29 and Unit #43.

7.2 State Particulate Emission Limits

ARSD 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.

The particulate emission limits for process units are derived from ARSD 74:36:06:03(1). Equation 7-1, taken from ARSD 74:36:06:03(1)(a), is used to calculate the state limit of particulate emissions for each process unit with operating rates equal to or less than 30 tons per hour. This state limit is applicable to Unit #43. Table 7.1 provides a maximum process rate for the unit and particulate emission limit. Table 7.2 provides a comparison of the state emission limit to the potential emissions to determine if the units are in compliance with the state emission limits.

Equation 7-1 – State Particulate Emission Limit for Process Units \leq 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.

Table 7.1 – Total Suspended Particulate Matter Emission Limit for Processes

Unit	Description	Maximum Process Rate	State Emission Limit
#43	Hammermill #9	22 tons per hour	32.5 pounds per hour

Table 7.2 – Emission Limit Comparison

Unit	Description	Emission Limit	State Emission Limit
#43	Hammermill #9	0.4 pounds per hour	32.5 pounds per hour

7.3 State Sulfur Dioxide Emission Limits

The proposed construction is not applicable to the state’s sulfur dioxide limits.

7.4 Performance Tests

Conditions will be placed in the construction permit requiring stack testing to be completed once the units are installed and operational. A condition will also be placed in the permit that will allow DENR to require additional stack tests if warranted.

8.0 Recommendation

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

- ARSD 74:36:06 – Regulated Air Pollutant Emissions;
- ARSD 74:36:11 – Performance testing;

- 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 Great Plains proposed construction of two additional fermentation tanks to the existing Unit #29 and installation of a new hammermill that will be controlled with a new baghouse (Unit #43) at their facility in Chancellor, South Dakota. Any questions pertaining to this permit recommendation should be directed to Earl Berg, Engineer I, Department of Environment and Natural Resources – Air Quality Program.