



Statement of Basis

Air Quality Construction Permit

Dakota Ethanol, LLC

Wentworth, South Dakota

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1.0 Background

On July 19, 2000, the South Dakota Department of Environment and Natural Resources (DENR) issued a Title V air quality permit #28.0501-43 to Dakota Ethanol, LLC (Dakota Ethanol) to construct and operate an ethanol production facility near Wentworth, South Dakota. Dakota Ethanol was permitted to produce 50 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 May 4, 2001, Dakota Ethanol's permit was modified to add periodic monitoring conditions to the permit;
2. On February 11, 2002, the permit was amended to add the operation of a thermal oxidizer. Contact information was also updated at this time;
3. On June 15, 2006 the permit was modified to include the addition of an ethanol load-out flare; and
4. On August 14, 2006, the permit was amended to accommodate the addition of a hammermill and baghouse.

On August 16, 2007, the Title V air quality operating permit was renewed and modified to increase the production capacity to 55 million gallons of undenatured ethanol per 12-month rolling period.

On February 15, 2012, DENR received an application from Dakota Ethanol to renew its Title V air quality operating permit. The Title V air quality operating permit was renewed on March 5, 2013.

On December 23, 2013, DENR received a construction application from Dakota Ethanol requesting changes to their operation. On May 5, 2014, DENR issued a construction permit to Dakota Ethanol with the following changes:

1. Increase annual production of undenatured ethanol from 55 million gallons per year to 75 million gallons per year;
2. Replace the existing packing in the existing wet scrubber (Unit #4) with stainless steel packing to reduce pressure drop and increase the efficiency of the scrubber;
3. Reconfigure the rectifier column, which is part of the distillation process. The internals on the existing rectifier column will be replaced with another set of internals that will reduce the pressure drop. This would lead to lower pressure and temperatures in the evaporations system and reduce the potential for excessive fouling and operational issue;
4. Increase short-term emission limits as follows:
 - a. PM10 and PM2.5 – Units 1, 2, 3, 6, 7, 9 10 and 11;
 - b. VOC – Units 4,6, 7, 9, 10 and 11;
 - c. CO – Units 6, 9, 10 and 11;
 - d. SO₂ – Unit 6; and
 - e. NO_x – Units 6, 9, 10 and 11;
5. Increase the operational limits established in the current air quality permit, specifically Permit Conditions 7.9 and 7.10:

- a. Permit Condition 7.9 establishes an operational limit from 595,680 tons of grain processed per 12-month period. Dakota Ethanol proposes to increase that limit to 806,000 tons; and
 - b. Permit Condition 7.10 establishes an operational limit of 184,000 tons of distillers dried grain solids (DDGS) to 250,000 tons; and
6. Increase the hourly operational limit on Unit #4 from 207 tons per hour to 275 tons per hour.

On August 27, 2014 DENR received a construction permit application from Dakota Ethanol to install a 1,500,000 gallon storage tank with internal floating roof for denatured ethanol and replace the 500 gallon per minute pump on the rail loading rack with two 1200 gallon per minute pumps. The application was considered complete August 29, 2014.

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 as issued on March 5, 2013 and the Construction Permit #28-0501-43-02C issued on May 5, 2014.

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

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Unit	Description	Maximum Operating Rate	Control Device
#1	Grain receiving and dried distiller's grain loading.	Grain receiving – 840 tons per hour. Dried distiller's grain and solubles loadout – 240 tons per hour.	MAC baghouse
#2	Grain cleaning. The corn is transported from the four large corn bins by elevators and conveyors to a scalper. The corn is then transferred to a small corn bin.	3,000 bushels per hour.	MAC baghouse
#3	Grain milling. The corn is transported from the small corn bin to be ground in a Bliss hammermill. An elevator and conveyors transport the ground corn to the fermentation process.	2,400 bushels per hour.	MAC baghouse
#4	Fermentation process – Four 580,000 gallon fermenters and a 692,000 gallon beer well.	275 tons of corn mash, yeast and water per hour	Wet scrubber
	Distillation process – The distillation process consists of the beer stiller, evaporator, three molecular sieves, rectifier, side stripper, and the yeast tank.		
#6	Dryer System – Two ICM dried distiller grain and solubles dryers in series fired on natural gas.	Each dryer - 78 million Btus per hour and 23 tons per hour of dried distiller's	Unit 6a

Unit	Description	Maximum Operating Rate	Control Device
		grain	
#6a	Thermal oxidizer. The thermal oxidizer is fired on the off gases from the system and natural gas.	8 million Btus per hour heat input	
#7	The dried distiller grain and solubles cooling system.	23 tons per hour of dried distiller's grain	Baghouse
#9	Boiler #1 – 1999 Johnston steam boiler, model #PFTS 2000 3G-150S equipped with LoNOx burners. The boiler is fired on natural gas.	81.1 million Btus per hour heat input	Not applicable
#10	Boiler #2 – 1999 Johnston steam boiler, model #PFTS 2000 3G-150S equipped with LoNOx burners. The boiler is fired on natural gas.	81.1 million Btus per hour heat input	Not applicable
#11	Boiler #3 – 1999 Johnston steam boiler, model #PFTS 2000 3G-150S equipped with LoNOx burners. The boiler is fired on natural gas.	81.1 million Btus per hour heat input	Not applicable
#12	Tank #1 – An above ground storage tank with an internal floating roof for storing undenatured ethanol.	192,504 gallons	Not applicable
#13	Tank #2 – An above ground storage tank with an internal floating roof for storing denaturant.	34,261 gallons	Not applicable
#14	Tank #3 – An above ground storage tank with an internal floating roof for storing denatured ethanol.	523,184 gallons	Not applicable
#15	Tank #4 – An above ground storage tank with an internal floating roof for storing denatured ethanol.	523,184 gallons	Not applicable
#16	Tank #5 – An above ground fixed roof storage tank with an internal floating roof for storing undenatured ethanol.	192,504 gallons	Not applicable
#17	A submerged truck loading rack loads ethanol onto trucks.	24,000 gallons per hour	Unit #17a
	A railcar loading rack loads ethanol onto railcars.		Emissions may be routed to Unit #17a
#17a	Flare. The flare is fired on the off gases from the system and natural gas.	7.23 million Btus per hour heat input	
#18	Grain milling. The corn is transported from the small corn bin to be ground in a Bliss hammermill. An elevator and	2,400 bushels per hour.	MAC baghouse

Unit	Description	Maximum Operating Rate	Control Device
	conveyors transport the ground corn to the fermentation process.		

1.2 Proposed Changes

Dakota Ethanol is proposing to add a 1,500,000 gallon denatured ethanol storage tank and replacing the 500 gallon per minute rail loading pump (Unit #17) with two new pumps rated at 1200 gallons per minute to its facility. The proposed storage tank will be above ground and have an internal floating roof. The tank will be used to allow Dakota Ethanol the ability to deal with in-climate weather and railcar shortages by increasing finished product storage. This should help prevent shutdowns due to events outside Dakota Ethanol’s control. The new pumps will increase the maximum operating rate on Unit #17 from 24,000 gallons per hour to 174,000 gallons per hour. The combined new rail loading capacity would allow Dakota Ethanol to ship by unit (100-car) trains. This short term loadout rate increase will not affect the annual emissions since the amount of product shipped by rail will not increase from 75 million gallons per year. Dakota Ethanol has not requested an increase in ethanol production. The storage tank will be permitted unit #19.

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 the proposed changes for this facility and the following may be applicable.

2.1 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.

Dakota Ethanol’s facility is currently applicable to Subpart VV. It is possible for a facility to trigger applicability to VVa, by making certain modifications to the facility. This is based on capital expenditure. In order to trigger the change a percentage of the cost of the facilities replacement cost must be met by the capital expenditures for the project.

The proposed construction does not fit the subpart's definition of process unit as the storage of final product is not covered by the subpart. The cost would not be considered part of the capital expenditure for the project. However the pumps, valves and connections used for the railcar loading rack and to fill the tank could be covered. The capital expenditure for these items would be very small compared to the cost of replacing all of the pumps, valves, connections, etc. throughout the entire plant. Therefore, Dakota Ethanol will not become applicable to VVa due to this project. It should be noted though, that the proposed construction will be subject to VV for any new pumps valves, connections, etc., required to connect the new storage tank and the installation of the new pumps for the railcar loading rack to the facility.

2.2 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.

The proposed storage tank will be constructed after July 23, 1984, have a capacity greater than 19,913 gallons, and will contain "volatile organic liquids". Therefore the new storage tank is applicable to Kb and the construction permit will contain pertinent conditions for new storage tank.

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 Dakota Ethanol's proposed revisions.

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 Wentworth, South Dakota, which is in attainment or unclassifiable for all the criteria air pollutants regulated under the Clean Air Act. Therefore, Dakota Ethanol 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, Dakota Ethanol 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 Potential Emissions from Storage Tank

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 only emitted criteria pollutant from the proposed construction will be volatile organic compounds (VOC). In theory the proposed construction should not change the emissions from the facility as the addition is purely for procedural purposes and Dakota Ethanol has not requested an increase in ethanol production. Even though the emissions should not increase, DENR examined the potential emissions using Tanks 4.0.9d and equipment leak calculations. The amount of VOC emissions is relatively small, and may be viewed in Table 4.1.

Dakota Ethanol has a production limit for undenatured ethanol is 75 million gallons which will be evenly distributed between the three storage tanks. According to Dakota Ethanol’s application the denaturant (gasoline) increases the volume of the undenatured ethanol by 2.49% for a total throughput of 25,622,630 gallons per year of denatured ethanol for each tank. Table 4.1 summarizes the potential VOC emissions from the additional storage tank and components.

Table 4.1 – Storage Tank Potential Emissions

Unit	Individual Tank Capacity (gallons)	Net throughput (gallons)	VOC Emissions (tons)
#19	1,500,000	25,622,630	0.21
Equipment Leaks ¹	-	-	0.64

¹ – Includes addition of components associated with the new tank and the two new rail loadouts.

Based on the information provided by Tanks 4.0.9d and equipment leak calculations, the proposed construction of the denatured ethanol storage tank and components at the facility has

the potential to emit less than 1 ton of VOC's per year. In the existing permit, DENR did not require a short term limit for the permitted storage tanks. Therefore, DENR does not feel a short term limit is necessary for the new storage tank. However, Dakota Ethanol will be required to keep records of tank emissions in order to ensure compliance with the facilities current 238 ton VOC limit.

4.2 Potential Emissions from Loading Rack

Dakota Ethanol submitted in the application calculations for the potential increase of VOC emissions from the components related to the changes to the rail loading rack. The potential emissions for the rail loading rack are summarized in Table 4.2.

According to Dakota Ethanol's application the denaturant (gasoline) increases the volume of the undenatured ethanol by 2.49% for a total throughput of 76,867,890 gallons per year. Therefore this volume and concentration will be used to estimate the emissions from the proposed changes to the rail loading rack.

Table 4.2 – Potential Emissions from Loading Rack

Unit	Maximum Operating Rate (gallons per hour)	Net throughput (gallons per year)	VOC Emissions (tons)
Proposed #17	174,000	76,867,890	23.7
Existing #17	24,000	76,867,890	23.7

Based on Table 4.2, the changes to Unit #17 will not increase the potential emissions from the railcar loading rack. Since Dakota Ethanol is not requesting an increase to the annual production limit of 75 million gallons of undenatured ethanol the VOC emissions from the loading rack will not increase from the proposed changes.

4.3 Potential Emission Summary

Table 4.3 summarizes the increase of potential emissions for the new storage tank and changes to the rail loading rack.

4.3 – Proposed Potential Emissions Summary (tons per year)

Unit	Description	VOCs
	Existing Facility ¹	144.0
#17	Existing Pump Rail loading Rack ¹	23.7
	Existing Facility without Unit #17	120.3
#17	New Pumps in Rail Loading Rack ²	23.7
#19	Storage Tank ²	0.21
	Equipment Leaks ²	0.64
	Total	145.0

¹ – The potential emissions are based in the March 2014 statement of basis;

² – The potential emissions were provided in the construction application.

Based on the information provided in Table 4.3, the proposed construction at the facility of the denatured ethanol storage tank and additional rail loading pumps have the potential to emit less than 1 ton of VOC's per year. As long as compliance with the long term limit of 238 tons is maintained, Dakota Ethanol will be considered a minor source under the PSD program. Based on the US Supreme Court's decision and because Dakota Ethanol is not applicable to the PSD program, a review for greenhouse gas emissions are not warranted or required.

5.0 National Emission Standards for Hazardous Air Pollutants

DENR reviewed 40 CFR Part 61 to determine the applicability to the proposed changes to this facility to any of the subparts and determined there are not any that are 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.

Dakota Ethanol projects that the new storage tank and changes to the rail loading rack would be negligible and would not increase the potential emission of hazardous air pollutants as shown in Table 6.1.

Table 6.1 – Potential HAP emissions increase (tons/year)

Unit	Description	HAP
#17	Rail loading Rack	0.0
#19	Storage Tank	0.0
	Equipment Leaks ¹	0.0
	Existing Facility ²	13.0
	Total	13.0

¹ – Includes addition of components associated with the new tank and the two new rail loadouts.

² – The total hazardous air pollutants were derived from Construction Permit # 28.0501-02C Statement of Basis.

Based on Table 6.1, Dakota Ethanol is considered an area source of hazardous air pollutants. DENR reviewed the Maximum Achievable Control Technology Standards and determined the following may be applicable to Dakota Ethanol 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.

Dakota Ethanol's Standard Industrial Classification code is 2869, which falls underneath the code of 286. Dakota Ethanol requested operational restrictions that maintain hazardous air pollutant emissions less than the major source threshold under the Title V air quality operating permit program. The proposed project increases the amounts of hazardous air pollutants emitted but does not place Dakota Ethanol into the major source category. Dakota Ethanol is not applicable to this maximum achievable control technology standard.

6.3 Area Source for Chemical Processing Plants

On March 29, 2009, EPA finalized the MACT standard under 40 CFR Part 63, Subpart VVVVVV. This rule applies to chemical manufacturing process units located at an area source of hazardous air pollutants. For Dakota Ethanol to be applicable, Dakota Ethanol would need to have one of the hazardous air pollutants present in a process fluid greater than 1.0 percent of those compounds listed as non-carcinogens or greater than 0.1 percent of those compounds that are considered carcinogens.

On March 1, 2010, Dakota Ethanol submitted an initial notification indicating its ethanol production facility may be applicable to this standard because the facility may have process fluids with acetaldehyde greater than 0.1 percent.

In the February 2012 application and in a November 2012 response, Dakota Ethanol identified it is not applicable to 40 CFR Part 63, Subpart VVVVVV because it does not have a process fluid with acetaldehyde greater than 0.1 percent. The proposed project will not affect the status of this determination.

6.4 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

Dakota Ethanol's existing operations are 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. There are exemptions to this rule under ARSD 74:36:20:04 but because Dakota

Ethanol has requested federally enforceable limits to avoid PSD, the new storage tank and pumps are not applicable to the exemption and required to obtain a construction permit.

7.1 State Visible Emission Limits

ARSD 74:36:12:01 establishes a visible emission limit of 20 percent opacity for each unit.

7.2 State Emission Limits

The proposed construction is not applicable to the state's particulate or sulfur dioxide limits.

7.3 Title V Air Quality Operating Permit Revision

Dakota Ethanol will be required to submit an application to revise its Title V air quality operating permit within one year of the initial startup of the new storage tank. Initial startup will be defined as the first time denatured ethanol is stored in the storage tank and the first time the rail loading rack is in operation.

8.0 Recommendation

Based on the information submitted in the construction permit application, DENR recommends conditional approval of a construction permit for the proposed addition of the denatured ethanol storage tank and replacing the rail loadout pump with two new pumps at Dakota Ethanol's plant. Questions regarding this permit review should be directed to Earl Berg, Engineer I, Department of Environmental and Natural Resources, Air Quality Program.