



Statement of Basis

Air Quality Construction Permit

**Aberdeen Energy
Aberdeen, South Dakota**

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1.0 BACKGROUND

On January 22, 2007, the South Dakota Department of Environment and Natural Resources (DENR) issued Aberdeen Energy’s Title V air quality permit #28.0502-26 to construct and operate a dry corn mill ethanol production plant located in Mina, South Dakota. Aberdeen Energy was permitted to produce 104.5 million gallons of undenatured ethanol per 12-month rolling period. The Title V air quality operating permit was renewed on May 7, 2012.

On May 1, 2014, DENR received a construction permit application from Aberdeen Energy to install two 750,000 bushels grain storage bins. The application was considered complete May 8, 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 amended on August 14, 2013.

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

Unit	Description	Maximum Operating Rate	Control Device
#1	Grain receiving. Trucks and railcars dump grain into two receiving pits located in a partially enclosed building. Elevator legs transport grain to storage bins.	420 tons of grain per hour	Baghouse
	Elevator legs transport grain to a day bin.	156 tons of grain per hour	
#2	Grain milling. Grain is milled in one of four hammer mills.	37 tons of grain per hour per hammer mill	Baghouse
#3	Fermentation system. The fermentation process occurs in seven fermenters and liquid beer is stored in a beer well.	96,802 gallons of mash per hour	Wet scrubber
#4	Distillation process. The distillation process distills the liquid beer. The distillation process consists of the beer stripper, rectifier, side stripper, molecular sieve, condensers, and evaporators.	15,000 gallons of ethanol produced per hour	Thermal oxidizer and heat recovery boiler system #1 and #2.
	DDGS dryers A and B. Each dryer has a multi cyclone to collect product and low NOx burners. The dryers are fired with natural gas.	45 million Btus per hour per dryer and 46 tons of dried distiller grain and solubles per hour	
	DDGS dryers C and D. Each dryer has a multi cyclone to collect product and low NOx burners. The dryers are fired with natural gas.	45 million Btus per hour per dryer and 46 tons of dried distiller grain and solubles per hour	
	The thin stillage and solids fractions of the wet distiller grain and solubles are separated	Not applicable	

Unit	Description	Maximum Operating Rate	Control Device
	by six centrifuges.		
	Slurry tank, process vent mixer, and yeast tank.	Not applicable	
	Biomethanator associated with Unit #8.	Not applicable	
	Cooling drum.	See Unit #5	
	Thermal oxidizer and heat recovery boiler system #1 with low NOx burners. The thermal oxidizer is fired with natural gas.	150 million Btus per hour heat input	
	Thermal oxidizer and heat recovery boiler system #2 with low NOx burners. The thermal oxidizer is fired with natural gas.	150 million Btus per hour heat input	
#5	Cooling drum for dried distiller grain and solubles.	91 tons of dried distillers grain per hour	Baghouse. Exhaust gases may be routed to one of the two thermal oxidizers associated with Unit #4.
#6	Dried distiller grain and solubles silo and load out.	560 tons of dried distillers grain per hour	Baghouse
#7	Submerged truck loading rack.	36,000 gallons of denatured ethanol per hour	Flare
	Rail car loading rack.	120,000 gallons of denatured ethanol per hour	
	Flare fired with natural gas.	12.4 million Btus per hour heat input	
#8	Biomethanator.	Not applicable	Flare. Methane from the biomethanator process may be routed to Unit #4.
	Flare fired with natural gas.	3.2 million Btus per hour heat input	
#9	Fire pump fired with distillate oil.	300 horsepower heat output	Not applicable
#10	Industrial cooling tower	Not applicable	Not applicable
#11	Tank 001 – An aboveground storage tank with an internal floating roof. The tank will store ethanol.	200,000 gallons	Not applicable
#12	Tank 002 – An aboveground storage tank with an internal floating roof. The tank will store ethanol.	200,000 gallons	Not applicable
#13	Tank 003 – An aboveground storage tank with an internal floating roof. The tank will store gasoline.	200,000 gallons	Not applicable
#14	Tank 004 – An aboveground storage tank with an internal floating roof. The tank will	1,500,000 gallons	Not applicable

Unit	Description	Maximum Operating Rate	Control Device
	store denatured ethanol.		
#15	Tank 005 – An aboveground storage tank with an internal floating roof. The tank will store denatured ethanol.	1,500,000 gallons	Not applicable
#16	2009 Brock grain dryer, model #BCT6000, fired by natural gas.	68.2 million Btu per hour heat input and 226.6 tons of grain per hour	Not applicable
#17	Grain receiving. Trucks dump grain into receiving pits. Elevator legs transport grain to a storage bin.	560 tons of grain per hour	Not applicable
	Storage bin.	18,000,000 bushels per year	

1.2 Proposed Changes

Aberdeen Energy has proposed to install two Behlen 750,000 bushels each grain storage silos. The additional grain silos would make Aberdeen Energy’s permanent grain storage capacity over 2.5 million bushels.

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. The following may be applicable.

2.1 Standards for Grain Elevators

The provisions under 40 CFR Part 60, Subpart DD are 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.

Aberdeen Energy is considered a grain terminal elevator. With the additional proposed storage bins, the permanent grain storage capacity for this plant will be greater than 2,500,000 bushels.

Therefore, this subpart does apply to Aberdeen Energy. In accordance with 40 CFR §60.300(a), the affected operations at the grain processing facility are each unloading, loading, grain dryer, and all grain handling operations. The standard applies to the equipment that processes the whole grain not a portion of the grain; therefore the proposed grain storage bins and handling system must meet the requirements outlined in this subpart.

The proposed project involves the installation of two grain storage bins. The proposed storage bins are to be operated in parallel with the existing storage bins. Emissions from the new bins will be routed to the existing baghouse that controls the existing storage bins. Storage bin vents are routed to the baghouse when the storage piles are actively being disturbed while only one of the bins will be actively transferring grain at any time. Therefore, the gas flow rate to the baghouse will not change with the proposed project. Gas flow, capture, and control efficiency, and emission limits will remain as currently permitted. No additional annual grain throughput is requested so an increase of emissions on an annual basis is not expected.

The new source performance standard does not specifically indicate if the grain bin vents are considered affected facilities under the standard, but does indicate that "all grain handling operations" are affected facilities. However, in looking at the *Standards Support and Environmental Impact Statement Volume I: Proposed Standards of Performance for Grain Elevator Industry, EPA-450/2-77-001a, January 1977*, the bottom of page 4-13 reads:

Normally, particulate emissions from silos are not visible and, therefore, they are not controlled. In some cases, storage silos have been ventilated to a fabric filter. The magnitude of particulate emissions from storage silos vents has not been estimated; however, EPA believes these emissions to be minimal and therefore does not cover silo vents under the proposed standards.

On January 28, 2013, it was determined by U.S. EPA and DENR that storage silo (or bin) vents are not considered an affected facility. The bin vents are not covered under the standard since the rule applies to emissions from grain handling operations, not the storage silos/bins. Therefore, the storage bin vents do not have to demonstrate compliance with the zero percent opacity grain handling limits.

The installation of the proposed grain bins will not increase their rate of receiving or downstream process rates. Per § 60.304, the installation of permanent storage capacity with no increase in hourly grain handling capacity should not be considered a modification of a new facility. Therefore, Aberdeen Energy is not required to do stack testing since there are no requirements under Subpart DD applicable to the proposed change.

2.2 Other New Source Performance Standards

DENR reviewed other new source performance standards under 40 CFR Part 60 and determined no others were applicable to the proposed addition of two grain storage bins.

3.0 New Source Performance 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 Mina, South Dakota, which is in attainment or unclassifiable for all the criteria air pollutants regulated under the Clean Air Act. Therefore, Aberdeen Energy's proposed change 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 pollutant. 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 (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. 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.

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 Potential Emissions

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

4.1.1 Proposed Grain Storage Bins

Aberdeen Energy's proposed project will add two grain storage bins and conveyor system to this process. While the proposed project does add storage capacity, it will not increase capacity to any other process in the facility. Because of this, the increase in emissions from the proposed grain storage bins only come from loading and unloading the new storage bins. These emissions are routed through the baghouse, thus increasing the use of the baghouse. However, the air flow rate does not change, and remains at 48,000 cubic feet per minute.

Since Aberdeen Energy is subject to the New Source Performance Standard Subpart DD, the facility cannot emit filterable particulate matter into the atmosphere in excess of 0.01 grains per dry standard cubic foot. Aberdeen Energy used a conservative approach and assumed emissions rates of 0.01 grains of particulate matter per cubic foot of grain processed while the grain storage elevators were being loaded and unloaded. They also made the assumption that the emissions rates of particulate matter equal to or less than 10 microns (PM10) and particulate matter equal to or less than 2.5 microns (PM2.5) are equal to the emission rates of the total particulate matter. DENR reviewed these assumptions and agrees. The controlled emissions were calculated using Equation 4-1 assuming a maximum operating rate of 48,000 cubic feet per minute. These results are summarized in Table 4-1.

Equation 4-1 – Controlled Emissions

$$Potential\ Emissions = \frac{Emission\ Rate \frac{grains}{ft^3} \times Operating\ Rate \frac{ft^3}{min} \times 60 \frac{min}{hours} \times 8,760 \frac{hours}{year}}{7000 \frac{grains}{lbs} \times 2000 \frac{lbs}{ton}}$$

Table 4-1 – Controlled Potential Emissions (ton per year)

Source	TSP	PM ₁₀	PM _{2.5}
Grain Handling	18.02	18.02	18.02

4.1.2 Potential Emissions Summary

Table 4-2 shows the potential emissions with the additional grain storage with the existing particulate matter potential emissions from the most recent Statement of Basis.

Table 4-2 – Summary of Existing & New Potential Emissions (tons/year)

Source	TSP	PM ₁₀	PM _{2.5}
Potential Emissions ¹	87	87	87
Grain Bin Emissions	18	18	18
Total	105	105	105

¹- From 2012 Statement of Basis

4.2. Potential to Emit for Greenhouse Gases

The proposed addition of grain storage bins will not emit greenhouse gases; therefore, greenhouse gases will not be discussed in this permit review.

5.0 National Emission Standards for Hazardous Air Pollutants

DENR reviewed the national emission standards for hazardous air pollutants and determined the proposed grain storage bins are not applicable to any standards under 40 CFR Part 61.

6.0 Maximum Achievable Control Technology Standards

The proposed addition of grain storage bins will not emit hazardous air pollutants; therefore, hazardous air pollutant emissions will not be discussed in this permit review.

7.0 State Requirements

7.1 State Emission Limits

State particulate limits are not applicable if a NSPS or MACT standard is applicable and has a limit for that pollutant. The air emissions from the proposed storage bins and handling

equipment is being routed to an existing baghouse which is subject to 40 CFR 60 Subpart DD – Standards of Performance for Grain Elevators (ARSD Chapter 74:36:07:17), therefore the proposed equipment is not required to meet state emission limits.

7.2 Visibility Limits

ARSD 74:36:12:01 establishes a visible emission limit of 20 percent opacity for each unit. The proposed storage bins are required to comply with this opacity limit.

8.0 Recommendation

Any existing source that is proposing modification to its existing equipment is required to obtain an air quality construction permit under ARSD 74:36:20. Based on the above findings, Aberdeen Energy is required to construct and operate the proposed changes within the requirements stipulated in the following regulations:

1. ARSD 74:36:07 - New Source Performance Standards;
2. ARSD 74:36:12 - Control of Visible Emissions;
3. 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 Aberdeen Energy's operations near Mina, South Dakota. Any questions pertaining to this recommendation should be directed to Ashley Brakke, Engineer I at 605-773-3151.