Statement of Basis

Air Quality Construction Permit

South Dakota Soybean Processors
Volga, South Dakota

South Dakota Department of Environment and Natural Resources

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1.0 BACKGROUND

On August 29, 1995, the South Dakota Department of Environment and Natural Resources (DENR) issued a Prevention of Significant Deterioration (PSD) air quality permit to South Dakota Soybean Processors (SD Soybean) for a soybean processing plant near Volga, South Dakota. On July 19, 1999, DENR issued a PSD air quality permit to SD Soybean to allow the facility to increase its process capacity from 2,000 to 2,700 tons per day, which was considered a major modification under the PSD program.

On July 19, 1999, DENR issued a Title V air quality operating permit to SD Soybean for operation of the soybean processing plant near Volga, South Dakota. In September 1999, January 2001, April 2001, April 2002, February 2006, and January 2007, DENR amended and/or modified SD Soybean' Title V air quality operating permit to allow the installation and operation of a pellet mill, a flake expander system, storage tanks, an additive system, burn biodiesel, and add biodiesel production equipment. These revisions were not considered a major modification under the PSD program.

DENR renewed SD Soybean's Title V air quality operating permit on February 9, 2009. On August 31, 2010, DENR issued air quality construction permit #28.0501-06-01C for the installation and operation of a deodorizing process. On October 25, 2012, DENR issued SD Soybean a modification to their permit to add the deodorizing step to remove odoriferous compounds from the refined oil. On June 3, 2013, SD Soybean was issued air quality construction permit #28.0501-06-02C for the addition of two storage bins. On February 18, 2014, SD Soybean was issued a construction permit #28.0501-06-03C for a M9 Fabric Filter Replacement and Conveyor Direct Aspiration. SD Soybean currently has a renewal application pending with DENR.

1.1 Existing Equipment

Table 1-1 displays a description of the existing permitted units as identified in SD Soybean's Title V air quality operating permit issued October 25, 2012.

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

Unit	Description	Maximum Operating Rate	Control Device
#1	EP-#1 – Truck and railcar soybean receiving system consists of two truck receiving pits, a rail car receiving pit, and an underground belt conveyor system.	900 tons per hour or 30,000 bushels per hour	Baghouse (R10)
#2	EP-#2 – Soybean handling, storage, and cleaning process consists of a scalper, de-stoner, hammer mill, and the transfer of soybeans to storage bins. The transfer system consists of the transfer of soybeans from the pre-cleaning building to storage bins, storage bins to dryer, and dryer to day	150 tons per hour or 5,000 bushels per hour	Baghouse (R11)

Unit	Description	Maximum Operating Rate	Control Device
	tanks.		
#3	EP-#3 – 1995 Berico soybean dryer system fired with natural gas.	Process rate = 126 tons per hour and heat input = 20.4 million Btus per hour	Cyclone – emits indoors
#4	EP-#4 – Soybean screened and cleaned with aspiration, each with a separate process cyclone.	125 tons per hour	Baghouse (P8)
#5	EP-#5 – Soybean cracking process consists of four Roskamp cracking mills, transportation system, and a process cyclone.	138 tons per hour	Baghouse (P42)
#6	EP-#6 – Primary soybean de-huller operation with aspirators and a process cyclone.	119 tons per hour	Baghouse (P17)
#18	EP-#7 – Coarse soybean de-huller operation with aspiration and a process cyclone.	11 tons per hour	Baghouse (P20)
#47	EP-#8 – Fines soybean de-huller operation with aspiration.	6 tons per hour	Baghouse (P21)
#8	EP-#9 –Six 1995 Roskamp and two 1999 Roskamp flakers.	110 tons per hour	Cyclone (P36)
#21	EP-#10 – Flake expanding process. The process consists of flakes and fines exposed to steam and pressure to form a collet and transportation to the extraction process. A Cyclone (P65) collects the product	71 tons per hour	Not applicable
#14a	EP-#12 – Desolventizer, toaster, dryer, and cooler system.	113 tons per hour	Kice single cyclone (E14A)
#14b			Kice single cyclone (E14B)
#14c			Kice single cyclone (E14C)
#14d			Kice single cyclone (E14D)
#9	EP-#13 – 1995 Roskamp Champion meal sizing process. The meal sizing process involves two grinders and two sifters.	83 tons per hour	Baghouse (M9)
#12	EP-#14 – Meal handling and storage consisting of conveyors, blenders, and storage tanks.	200 tons per hour	Baghouse (L7)
#10	EP-#15 – Two 1995 Champion hull grinders and a process cyclone used to convey hull to storage tanks.	8.1 tons per hour	Baghouse (HP1)
#20	EP-#16 – Hull pelletizer and cooler	8 tons per hour	Cyclone (HP5).
#13a	EP-#17 – Pneumatic transfer of ground hulls from receiving and hull grinding to two hull storage bins.	9 tons per hour	Baghouse (P34 – D1)

Unit	Description	Maximum Operating Rate	Control Device
#13b	EP-#17 – Pneumatic transfer of ground hulls from receiving and hull grinding to two hull storage bins.	9 tons per hour	Baghouse (P34 – D2)
#11	EP-#18 – Meal and hull load out using one truck load out and one railcar load out. Both loadout areas have a cover.	200 tons per hour	Baghouse (L26)
#22	EP-#19 – Refining additive system. Clay, trycil and diatomatious earth delivered in bulk material bags and is gravimetrically feed to the feed bins.	5 tons per hour	Baghouse (DC 487)
#15	EP-#20a – Boiler A, 1996 Nebraska boiler fueled with natural gas, distillate oil, and biodiesel.	70 million Btus per hour heat input or 50,000 pounds of steam per hour heat output	Not applicable
	EP-#20b – Boiler B, 1996 Nebraska boiler fueled with natural gas, distillate oil, and biodiesel.	70 million Btus per hour heat input or 50,000 pounds of steam per hour heat output	
#17	EP-#21 – Cooling tower.	Not applicable	Not applicable
#48	Mineral oil and miscella exchanger system; waste water extractor system; and a second stage evaporator, oil stripper, and evaporator and stripper condensers.	Not applicable	Mineral oil scrubber
#49	Cooling tower for deodorizing process	2,500 gallons per minute	Not applicable
#50	High pressure steam generator	5.17 million Btus per hour heat input	Not applicable

1.2 Proposed Changes

On May 20, 2014, DENR received an application for a construction permit from SD Soybean to replace the existing baghouse, L26. SD Soybean also proposed to modify the meal load out by the addition of a second load out conveyance line to allow for the two trucks to load out simultaneously, or one truck and one railcar to load out at the same time. The second conveyance line will also be rated at 225 tons per hour to feed the load out area. SD Soybean proposed to increase the maximum operating capacity of Unit #11 from 200 tons per hour to 500 tons per hour. The additional conveyance line will be routed to the L26 baghouse and will increase airflow from 30,672 actual cubic feet per minute to 40,000 actual cubic feet per minute. SD Soybean stated that there will not be an increase in production or the amount of product loaded out annually. The allowable emissions will increase since the L26 stack has existing BACT emission limits (0.01 grains per dry standard cubic foot) for PM_{10} based on airflow. The

proposed equipment will be permitted as part of Unit #11. The application was considered complete on June 9, 2014.

2.0 New Source Performance Standards

DENR reviewed the New Source Performance Standards and determined that the following may be applicable to the proposed changes at SD Soybean:

2.1 Standards of Performance for Grain Elevators - Subpart DD

This subpart establishes standard of performance for grain elevators. The provisions of this subpart are applicable to the following operations:

1. 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, rice mill, or soybean oil extraction plant; and
2. Commences construction, modification, or reconstruction after August 3, 1978.

The permanent grain storage capacity for this plant is greater than 1,000,000 bushels; therefore, the SD Soybean must comply with this New Source Performance Standard. In accordance with 40 CFR §60.300(a), the affected operations at the soybean processing facility are each unloading, loading, grain dryer, and all grain handling operations.

Equipment that alters the soybean so that the material is no longer a grain and equipment that handles the altered material, is not applicable to this subpart. Therefore, the meal and hull loadout (Unit #11), process meal leg is not applicable to this subpart.

2.2 Other Applicable MACT Standards

DENR reviewed other New Source Performance Standards and determined no other standards were applicable in 40 CFR Part 60.

3.0 New Source Performance Review

The ARSD 74:36:10:01 states that New Source Review (NSR) 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. SD Soybean is located near Volga, South Dakota, which is in attainment or unclassifiable for all the pollutants regulated under the Clean Air Act. Therefore, SD Soybean's proposed project is not subject to NSR 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 (SO_2);
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 from Proposed Project

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.

SD Soybean is considered a major source; therefore, any changes to the existing facility need to be evaluated to determine if the proposed change is considered a major modification under the PSD program.

The PSD regulations have established the following procedure for determining if a proposed project is subject to a PSD review:

1. Determine the potential increase from the proposed project and compare it to the significant emission rates in 40 CFR § 52.21(b)(23). If the potential increase is greater than the significant emission rate, proceed; if not, the source is not subject to a PSD review.
2. Determine the beginning and ending dates of the contemporaneous period as it relates to the proposed modification.
3. Determine which emissions units at the source experienced (or will experience, including any proposed decreases resulting from the proposed project) a creditable increase or decrease in emissions during the contemporaneous period.
4. Determine which emissions changes are creditable.
5. Determine, on a pollutant-by-pollutant basis, the amount of each contemporaneous and creditable emissions increase and decrease.
6. Sum all contemporaneous and creditable increases and decreases with the increase from the proposed modification to determine if a significant net emissions increase will occur.

The six-step procedure is discussed in detail in the following subsections.

4.3.1 Step 1 – Projected actual emissions

As outlined in 40 CFR § 52.21(a)(2), to determine if there is a potential increase in emissions from the proposed project, each increase of emissions from both existing and new emissions

shall be summed together and compared to the PSD permitting thresholds. During step 1, decreases in emissions associated with the project are not considered.

The increase of emissions is the "positive" difference between the projected actual emissions and baseline actual emissions (projected – baseline). For new emission units, the baseline actual emissions shall equal zero (40 CFR § 52.21(b)(48)(iii)). The baseline actual emissions for existing emission units and fugitive emissions are based on the average rate in tons per year that was actually emitted over any consecutive 24-month period within a 10 year period either presiding the date actual construction began or the date of a complete application, whichever comes earlier (40 CFR § 52.21(b)(48(ii)). A different 24-month period may be used for each regulated air pollutant.

SD Soybean's project includes the addition of a new conveyance line to the existing loadout system and the replacement of the existing baghouse with a new baghouse to control the particulate emissions generated from the existing and new conveyance lines associated with the existing loadout system. Therefore this raises the question, is the project considered an existing or new emission unit? DENR will review the project both as a new emission unit and as a change to an existing unit.

4.3.1.1 New Emission Unit consideration

DENR assumed the potential to emit for the new conveyance system under two scenarios. The first scenario bases the potential to emit on the baghouse emission limit of 0.01 grains per dry standard cubic feet, the increase in air flowrate associated with the new baghouse, and operating 8,760 hours per year. This scenario assumes the potential to emit is directly related to the increase in the baghouse aspiration.

Equation 4-1- Potential to Emit for New Conveyance System

$$PTE = \left(\frac{0.01\ grains}{ft3}\right) x \left(\frac{9{,}328\ ft3}{min}\right) x \left(\frac{60\ min}{hour}\right) x \left(\frac{8{,}760\ hours}{year}\right) x \left(\frac{tons}{14{,}000{,}000\ grains}\right)$$

The potential to emit is 3.5 tons per year

The second scenario bases the potential to emit on the baghouse limit of 0.01 grains per dry standard cubic feet, the entire air flowrate associated with the new baghosue, and operating 4,380 hours per year. This scenario assumes the potential to emit is directly related to all of the meal being loaded out by the new conveyance system and the amount of meal generated is limited by the capacity of the facility.

Equation 4-2- Potential to Emit for Updated Loadout System

$$PTE = \left(\frac{0.01\ grains}{ft3}\right) x \left(\frac{40{,}000\ ft3}{min}\right) x \left(\frac{60\ min}{hour}\right) x \left(\frac{4{,}380\ hours}{year}\right) x \left(\frac{tons}{14{,}000{,}000\ grains}\right)$$

The potential to emit is 7.5 tons per year

4.3.1.2 Existing Emission Unit consideration

SD Soybean has not begun construction of its project and SD Soybean's application was received May 20, 2014. Therefore, SD Soybean may go back until May 2004 to establish the baseline emissions for the existing emission unit.

DENR considered SD Soybean's 2012 and 2013 operational reports to establish the baseline particulate emissions emissions. Table 4-1 notes the baseline fuel usage.

Table 4-1 – Baseline Usage

Unit	Description	Units	2012 Usage	2013 Usage
#11	EP-#18 – Meal and hull load out using one truck load out and one railcar load out. Both loadout areas have a cover.	Tons per year	654,728	640,895

The baseline actual emissions are calculated by average the 2012 and 2013 actual operations and using the emission factor of 0.0073 pounds per ton derived from the 1997 stack test on the existing baghouse.

Equation 4-3- Baseline Actual Emissions

$$BAE = \left(\frac{0.0073\ lbs}{tons\ meal}\right) x \left(\frac{(654{,}728\ tons\ meal + 640{,}895\ tons\ meal)}{2\ years}\right) x \left(\frac{1\ ton}{2{,}000\ lbs}\right)$$

For the existing sources, the projected actual emissions is the maximum annual rate in tons per year projected to occur during the next 5 years or 10 years if the existing sources design capacity increases. The projected actual emissions are based on the potential emissions calculated above in Equation 4-2 that are listed in Table 4-10.

Table 4-2 lists the baseline, potential, and the potential increase of particulate emissions. If the potential increase (Projected actual – Baseline) would result in a negative number, the table lists zero for this step.

Table 4-2 – Significant Increase Determination (tons per year)

Unit	Description	Baseline	Potential	Increase Potential – Baseline
#11	EP-#18 – Meal and hull load out using one truck load out and one railcar load out. Both loadout areas have a cover.	2.4	7.5	5.1

The potential increase for the proposed project is compared to the significant thresholds to determine if the project may require a PSD permit. Table 4-3 lists the significant rate as defined in 40 CFR §52.21(b)(23) and the potential emissions increase associated with the project.

Table 4-3 – NSR Regulated Air Pollutants Significant Emission Comparison

Pollutant	Controlled Emissions	Significant Rate	PSD Review
PM	3.5 to 7.5 tons/year	25 tons/year	**No**
PM10	3.5 to 7.5 tons/year	15 tons/year	**No**
PM2.5	3.5 to 7.5 tons/year	10 tons/year	**No**

The proposed project does not have a significant increase of particulate matter emissions. Even though no significant increase of emissions will occur, the new proposed baghouse must still meet the existing PSD particulate limit of 0.01 grains per dry standard cubic foot and a new performance test will be required.

4.3.2 Steps 2 through 6

Based on Table 4-3, the proposed replacement of the L26 baghouse and additional conveyance line does not exceed the significant threshold in the PSD program for a significant increase. Therefore, a determination if there is a significant net increase is not required (steps 2 through 6). As such, the proposed change is not considered a major modification.

4.2. Potential to Emit for Greenhouse Gases

The proposed changes 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 generator is not applicable to any standards under 40 CFR Part 61.

6.0 Maximum Achievable Control Technology Standards

6.1 Potential HAP Emissions

It has already been determined in previous reviews that SD Soybean is a major source of hazardous air pollutants; therefore, hazardous air pollutant emissions will not be discussed in this permit review since the proposed changes do not emit HAPs.

DENR reviewed the Maximum Achievable Control Technology (MACT) standards under 40 CFR Part 63 and determined the following need to be reviewed further to determine if they are applicable to the proposed project.

6.2 Standard for Hazardous Air Pollutants for Solvent Extraction - Subpart GGGG

This subpart establishes national emission standards for hazardous air pollutants for solvent extraction for vegetable oil production. The provisions of this subpart apply to each new and existing vegetable oil production process that is a major source under the Title V air quality operating permit program of hazardous air pollutants and removes oil from soybeans. SD Soybean is a major source of hazardous air pollutants under the Title V air quality operating permit program. Therefore, this subpart is applicable.

A vegetable oil production process means the equipment comprising a continuous process for producing crude vegetable oil and meal products, including specialty soybean products, in which oil is removed from listed oilseeds through direct contact with an organic solvent. Process equipment typically includes the following components:

1. Oilseed preparation operations (including conditioning, drying, de-hulling, and cracking);
2. Solvent extractors;
3. Desolventizer toasters;
4. Meal dryers, coolers, and meal conveyor systems;
5. Oil distillation units;
6. Solvent evaporators and condensers;
7. Solvent recovery system (also referred to as a mineral oil absorption system);
8. Vessels storing solvent-laden materials; and
9. Crude meal packaging and storage vessels.

A vegetable oil production process does not include vegetable oil refining operations (including operations such as bleaching, hydrogenation, and deodorizing) and operations that engage in additional chemical treatment of crude soybean meals produced in specialty desolventizer units (including operations such as soybean isolate production).

While SD Soybean's proposed changes do include the meal conveyor system, the proposed project will not change the process involving hazardous air pollutants. The proposed changes do not emit hazardous air pollutants, only particulate matter. Therefore, this subpart is not applicable to the proposed changes for Unit #11.

6.3 Other Applicable MACT Standards

DENR reviewed other Maximum Achievable Control Technology Standards and determined no other standards were applicable in 40 CFR Part 63.

7.0 State Requirements

7.1 Particulate Matter 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.

Equation 7-1, taken from ARSD 74:36:06:03(1)(b), is used to calculate the state limit of allowable particulate emissions for each process unit with operating rates greater than 30 tons per hour. The state particulate emission limits are summarized in Table 7-1.

Equation 7-1 – State Particulate Emission Limit for Process Units > 30 tons per hour

$$E_{TSP} = (55.0 \times P^{0.11}) - 40$$

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 – Comparison of Allowable Emissions to Potential Emissions (pounds per hour)

	Allowable Emissions			Potential Controlled Emissions			Potential Uncontrolled Emissions		
Unit	**TSP**	**PM_{10}**	**$PM_{2.5}$**	**TSP**	**PM_{10}**	**$PM_{2.5}$**	**TSP**	**PM_{10}**	**$PM_{2.5}$**
#11	69.0	69.0	69.0	3.43	3.43	3.43	60.8	60.8	60.8

Based upon the information submitted by SD Soybean, the maximum operating rate for Unit #11 will increase with the proposed changes. SD Soybean submitted potential controlled, uncontrolled emissions, and actual emissions in the application. DENR is in agreement with the emission estimates submitted by the facility.

7.2 Sulfur Dioxide Emission Limits

The proposed change to SD Soybean will not emit sulfur dioxide; therefore, the state sulfur dioxide limits are not applicable in this permit review.

7.3 Visibility Limits

ARSD 74:36:12:01 establishes a visible emission limit of 20 percent opacity for each unit. The proposed change to Unit #11 is required to comply with this opacity limit.

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 permit. 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 any such emission limit or standard; and
3. The unit has potential emissions prior to the control device 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.

SD Soybean submitted its permit application after April 20, 1998.

The 2009 renewal application notes that the meal loadout Unit #11 potentially meets all three criteria and is applicable to the compliance assurance monitoring requirements.

SD Soybean previously requested that compliance assurance monitoring be visible emission readings which will still be valid for Unit #11. The indicator range will be no visible emissions.

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, SD Soybean is required to construct and operate the proposed changes within the requirements stipulated in the following regulations:

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

Based on the above findings and the information submitted in the air quality permit application, the department recommends approval of the modification of South Dakota Soybean Processor's Title V air quality operating permit. Questions regarding this permit review should be directed to Ashley Brakke, Engineer I.