Permitting Analysis

Date: July 12, 2017

Source Name: Perdue Registration No.: 60277 CEDS Application No: 031

Source Location: 501 Barnes Rd., Chesapeake, VA 23324

Mail Address: P.O. Box 460, Lewiston-Woodville, NC 27849

Source Status: ____ Greenfield __X__ Currently operating

Source Classification: ___ Minor ___ SynMinor ___ State Major __X__ PSD Major __X__ TV Major

Permit Action:

Perdue Grain and Oilseed, LLC (Perdue) owns and operates a soybean oil extraction and grain elevator facility located in Chesapeake, Virginia. Prior to this permit action the facility operated under three NSR permits (dated February 8, 2016, September 28, 2015, and October 5, 2009) and a SOP (dated February 2, 2009). The Title V permit was last amended on March 31, 2015.

On February 4, 2016 Perdue submitted an air permit application, which triggered review under the PSD program for a significant increase in VOC emissions, proposing to modify the entire facility (the Project). The Project involves adding new equipment and upgrading existing equipment to increase soybean oil production from a permitted rate of 792,865 to 1,095,000 tons of soybeans/year. Perdue also proposes to increase various permitted throughput limits for grain loading and unloading, and to add four new gas-fired boilers (27 MMBtu/hr each). In addition, Perdue proposes to install additional air pollution controls on certain equipment to reduce particulate emissions.

__X_ Inspector Contacted/Consulted

Permit Action Program:

__X__ NSR

Permit Action Type:

__X__ New Article 6

__X__ PSD

__Y__Permit Includes All Emission Units at Source.

__N__Permit Allows Source to avoid Title V/MACT/etc.

Source Classification

After this permit, source is Title V Major for PM10, VOC, HAP, and PSD for VOC

Permit Application Review

Application Received Date: 2/4/16

Application Complete Date: 5/5/17

Permit Fee Paid Date: 2/10/16

Permit Deadline Date: __3/28/2018_

__Y__ Document Certification Form received 3/28/17

__N__ Confidential information with sanitized copy.

__Y__ Local Governing Body Certification Form Date: 1/6/17 (major modified sources)

__Y__ Copy of letter sent to FLM if applicable. (Comments): On March 11, 2016, the Federal Land Managers declined review of the project.

__Y__ Notification of Affected States

This permit supersedes permits dated: February 8, 2016 (NSR), February 19, 2009 (NSR/SOP), and October 5,

2009 (NSR).

Regulatory Review for this Action.

BACT Determination:
See Section IV for complete BACT.

__Y__ (Y/N) NSPS/MACT/NESHAPS Applicability: If Y, Subpart(s):
DD, Dc, IIII NSPS
GGGG, DDDDD, ZZZZ MACT
_____ NESHAPS
__N__ Existing Rules (9VAC5 Chapter 40) Applicability: If Y, Rule(s): _____
Toxic Pollutants (*check one*):
__X__ Exempt.

Modeling: Perdue's net emission increase for VOC is 105.0 tons per year. The increase from Perdue's project is not expected to affect compliance with the O_3 NAAQS.

Site Suitability:
__Y__ Site suitable from an air pollution standpoint, inspection date 10/12/16,
__Y__ Calculation sheet(s) attached
__Y__ NSR Netting (*Major and PSD sources only*) See Regulatory Review Section B, Major NSR):

Public Participation
__Y__ Public Noticed. If yes, Public Notice Date: **Wednesday, May 24, 2017**
__N__ Public Notice Comments. If yes, number and nature of comments:
__Y__ Public Hearing. If yes, Public Hearing Date: **Monday, June 26, 2017**

EPA Review
__Y__ EPA Review. If yes, Date proposed permit sent to EPA: **Monday, May 22, 2017**
__N__ EPA Comments.

Permitting Analysis:

I. Introduction

Perdue Grain and Oilseed, LLC is owned by Perdue Agribusiness, an agricultural division of Perdue. The plant is located in Chesapeake, Virginia on the Southern Branch of the Elizabeth River allowing access to ships and barges. There are two different operations at this site: 1) a grain side; and, 2) a soybean oil/soybean meal production side. The two parts of the company were each considered separate facilities until 2010 when it was determined that they met all three criteria for being considered a single stationary source for program applicability. On the grain side, they receive shipments of grains from rail, barge or truck and ship out grains and meal by all the same modes of transportation. On the soybean oil side of the operation, they receive soybeans from the grain side, clean and dry them, store them and then process the soybeans by cracking, dehulling, conditioning, and flaking in preparation to extract the soybean oil. Mixtures of hexanes are used as a solvent to extract soybean oil from the soybean flakes. The extraction process produces a soybean oil/hexane mixture and hexane-laden flakes. Hexane from each product is recovered for reuse by a distillation system involving the following stages: an extraction step, hexane recovery units, condensers,

solvent-hexane separators, and hexane accumulation tanks. Hexane that is not recovered in the extraction process is emitted to the atmosphere either through the final vent, through fugitive emissions, or as residual solvent in the meal. The soybean flakes are then dried and cooled before being ground into a meal and stored for shipment. After the dehulling process, the hulls and miscellaneous fine particles are pressed into pellets that are sold as animal feed.

Perdue submitted an air permit application for a facility-wide expansion in February 2016, which included PSD review for emissions of VOC.

II. Project Description And Affected Emission Unit(s)

In a review of the facility's permit history the department concluded that past, permitted changes that took place may have been related. The Department of Environmental Quality (DEQ) and Perdue agreed to aggregate all of these previously permitted changes to ensure a conservative PSD applicability analysis is achieved. This aggregated project has a start date of May 2011 with the construction of the desolventizer toaster (DT).

The project involves the following:

- Increase soybean oil production by increasing raw soybean throughput from a currently permitted rate of 792,865 tons per year to 1,095,000 tons of soybeans per year, by installing some new equipment and replacing existing equipment (e.g.,cracking rolls, flakers, extractor, aspiration, meal dome, and condensing systems). New PM control equipment will also be added to certain sources.
- Increase various permitted throughput limits for grain loading and unloading. A new Neuro unit at the vessel unloading dock will also be added. The permitted throughputs for two operations (truck unloading and vessel loading) will be decreased.
- Install four new 27 MMBtu/hr boilers, which will be primarily gas-fired, permitted to use limited quantities of low sulfur diesel fuel[1]. The current boilers will cease operation after shakedown of the new boilers.

The facility is described below by process area.

Grain Elevator Facility:
Grain Receiving - Grain is received at the facility by truck, rail, and marine vessels. Grain is tested for various criteria and stored in the appropriate tanks. Particulate emissions from all grain receiving emission points are controlled by fabric filters.

Grain Handling - Grain is transferred as needed to insure the quality of each grain for shipment. Tanks may be blended for maximum quality. Particulate emissions from all internal handling emission points are controlled by fabric filters.

Grain Shipping - Grain is loaded into vessels, railcars and trucks to meet the customer's needs. Grain is conveyed from the various storage tanks to the loading area. Particulate emissions from all grain shipping emission points are controlled by fabric filters and cyclones.

Grain Drying - Soybeans are dried and then sent to the oil plant for processing. All other grains are dried as needed for customers and shipped by marine vessels. Particulate emissions from all drying emission points are controlled by cyclones and fabric filters.

[1] The four (4) new boilers (B1-4) are also permitted to burn diesel fuel and have a heat input rating of 26 MMBtu/hr while operating on this fuel.

Soybean Oil Plant:
Soybean Preparation - This involves receiving the dried raw soybeans, then cleaning, cracking, dehulling and flaking (pressing into thin sections) the soybeans. There are two products resulting from the soybean preparation process: pelletized hulls and flakes of soybean meat. The hulls are ground up, pelletized, and then stored in preparation for separate shipment as animal feed. Some hulls are brought on-site via truck to be pelletized. The flaked soybeans are transferred to the soybean oil extraction section. Particulate emissions are generated from storage tanks, conveyors, process vents and loading operations.

Oil Production and Soybean Oil Extraction - Hexanes are used as a solvent to extract soybean oil from the soybean flakes. The extraction process produces a soybean oil/hexane mixture and hexane-laden flakes. Hexane from each product is recovered for reuse by a distillation system involving the following stages: an extraction step, hexane recovery units, condensers, solvent-hexane separators, and hexane accumulation tanks. Phospholipids (a naturally occurring compound in soybeans referred to as "gums") are considered an impurity in the oil from the extraction process. These gums are extracted from the oil via the addition of water[2]. Soybean oil is the product of this operation which is stored on site until ready for shipment. Emissions from these processes are volatile organic compounds (VOC) including n-Hexane, which is a Hazardous Air Pollutant (HAP). The VOC emissions are controlled by the solvent recovery system.

Soybean Meal Processing - The hexane laden flakes go through a desolventizer toaster (to remove the solvent from the flakes) and a dryer/cooler, where the hexane is driven off and routed to the solvent recovery system. The spent flakes are then ground (after the hexane has been removed) into meal. The meal is amended with gums (to reduce fugitive dust), stored on-site at the meal storage tank, the meal shed, or the meal domes, and finally conveyed to the container loading area for shipment. Some products are sprayed with purchased soybean oil for product characteristics. The emissions from this section of the plant include particulate and VOC emissions. The particulate emissions are controlled by cyclones and fabric filters.

Steam Generation:
The facility currently uses a 98 MMBtu/hr natural gas fired boiler for steam generation. This boiler has a back-up unit in case of the primary unit's failure; designated as TB-1 and TB-2.

III. Regulatory Review

A. 9VAC5 Chapter 80, Part II, Article 6 – Minor New Source Review

The provisions of Article 6[3] apply throughout Virginia to (i) the construction of any new stationary source, (ii) the construction of any project (which includes the affected emissions units), and (iii) the reduction of any stack outlet elevation at any stationary source.

The application is for a change that meets the definition of "project" contained in 9VAC5-80-1110 C. To be exempt from permitting, the regulations provide that a project must be exempt under both the provisions of 9VAC5-80-1105 B through D as a group and the provisions of 9VAC5-80-1105 E and F.

The facility proposes construction of affected emission units listed in 9VAC5-80-1105 B[4]. 9VAC5-80-1105 B(2)(b) exempts diesel engines with an aggregate rated brake (output) horsepower (hp) of less than 1,675 hp and diesel engines powering electrical generators having an aggregate rated electrical power

[2] No waste water is generated through this process.
[3] Language is paraphrased from 9VAC5-80-1100.
[4] The 27 MMbtu/hr boilers are not considered exempt emission units listed in 9VAC5-80-1105 B. As the provisions of 9VAC5-80-1105 B(1)(b) apply in the City of Chesapeake.

output of less than 1125 kilowatts. The proposed 760 hp diesel emergency generator is an affected unit covered by this provision and is exempt from the provisions of this article.

The project has no other affected emissions units listed in 9VAC5-80-1105 B. In determining if a project is exempt under 9VAC5-80-1105 D, a calculation of the uncontrolled emission rate (UER) increase from the project is required. The project's increase is the sum of the UER increases from each affected emissions unit not listed in 9VAC5-80-1105 B. An emissions unit's increase is the difference between the new UER after the project (NUE) and the current UER (CUE) for that emissions unit and cannot be less than zero.

As shown in the summary table below, the project's increase for all pollutants except CO and H_2S exceeds the respective permitting threshold; therefore, the project is subject to the permitting requirements of Article 6.

Table 1: Article 6 Applicability UER Summary by Pollutant (TPY)

	CUE	NUE	UER Increase	Exemption
SO_2	0.05	231.6	231.5	10
PM	8,443	14,501	6,058	15
PM10	2,317	4,383	2,066	10
PM2.5	425	809	383	6
CO	6.5	44.8	38.3	100
NOx	7.7	99.1	91.4	10
H_2S	2.6	4.2	1.6	10

As described in Section III.E, the units associated with the extraction process, the emergency engine, and the boilers are affected emissions units in a source category subject to a standard promulgated pursuant to 40 CFR 63 (Subpart GGGG, ZZZZ, and DDDDD).[5] Therefore, the affected emissions units that are subject to the Subparts are exempt from the state toxics rule (9VAC5-60 Article 5). No process involving the transfer of grain is expected to be a source of air toxics. The aggregated combustion of natural gas from the grain dryers does not trigger any short term or long term state air toxics exemption threshold (60277 Analysis Attachment D). No interaction of the combined grain and combustion emissions from the dryers is expected to result in an additional source of air toxics. Thus the project is, in its entirety, exempt under 9VAC5-80-1105E and F.

As discussed in Section III.B, the project is subject to the provisions of PSD (9VAC5-80 Article 8) as a major modification occurred for VOC. Thus in accordance with 9 VAC 5-80-1100 H VOC is exempt from the provisions of Article 6.

The facility is a state major source[6] with a potential to emit (PTE) of PM10, PM2.5, and VOC greater than 100 tons per year. State major modifications occur if change in PTE (i.e., the difference between the PTE after permit issuance and PTE prior to the project) is greater than the "significant" value in 9VAC5-80-1110 C. The increase in emissions for pollutants not otherwise subject to major NSR (see Section V)

[5] The boilers firing natural gas and diesel fuel also qualify for toxics exemption under 9VAC5-60-300 C(7).
[6] The term "major source" is the defined term; however, several different definitions of major source may apply at a given facility (e.g., Article 6, Article 8, Title V, HAP). In clarifying which definition of major source applies, "state major" is the common terminology to indicate the source is major under the definition contained in 9VAC5-80 Article 6, Permits for New and Modified Stationary Sources, Virginia's minor new source review permitting regulation.

are not considered significant. Therefore, the project is not a state major modification for any pollutant subject to Article 6.

B. 9VAC5 Chapter 80, Part II, Article 8 - PSD Major New Source Review

The City of Chesapeake is a PSD area for all pollutants as designated in 9VAC5-20-205. The facility is a PSD major source.

A major modification for a PSD source is defined in 9VAC5-80-1615 as "any physical change in or change in the method of operation of a major stationary source that would result in a significant emissions increase of a regulated NSR pollutant, and a significant net emissions increase of that pollutant from the major stationary source." A project is a major modification for a regulated NSR pollutant if it satisfies all of the following:

- the project occurs at an existing major stationary source;
- the project causes a significant emissions increase (SEI); and
- the project causes a significant net emissions increase (SNEI).

The procedure for calculating whether a SEI will occur (Step 1) depends on the type of emissions units being modified. Perdue has utilized the hybrid emissions test contained in 9VAC5-1605G(5) since this project involves the installation of new emissions units and the modification of existing emissions units. The hybrid test utilizes the baseline actual emissions (BAE) to projected actual emissions (PAE)[7] test for existing units and the BAE to future potential emissions test for new units. The emission units being modified consist of every unit on-site except for the current boiler. The new units include the four (4) 27 MMBtu/hr boilers, the third meal dome, the emergency generator, compuweigh two garner scale, and the expander after-cooler.

As shown in 60277 Analysis Attachment B and summarized below, the project causes a SEI for PM, PM10, PM2.5, and VOC. A calculation of the net emissions increase for these pollutants is required.

Table 2: Step 1 SEI Pollutant Summary

	Pollutant Emissions Summary (tpy)								
	SO_2	NOx	CO	PM	PM10	PM2.5	VOC	CO_2e	H_2S
Boilers	0.2	14.0	13.4	0.9	3.0	3.0	1.3	42,695	
Emergency Generator	0.0	2.5	1.0	0.1	0.1	0.1	0.1	221	
Meal Domes (three) and Conveyance				0.18	0.18	0.18			
Two Garner Scale				0.07	0.07	0.07			
Hull Truck Unloading				2.96	0.97	0.16			
Increases from Existing Emission Units	0.01	1.1	0.9	99.0	51.6	33.4	102.1	1,263	1.6
TOTAL PROJECT INCREASES	**0.2**	**17.5**	**15.3**	**103.2**	**55.9**	**36.8**	**103.5**	**44,179**	**1.6**
PSD Significant Emission Rates	40	40	100	25	15	10	40	75,000	10
Significant Emissions Increase?	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**	**NO**	**NO**

[7] Perdue has selected the option to utilize PTE for each existing unit; an allowance made in subdivision (d) of the definition of PAE in 9VAC5-80-1615.

The calculation of SNEI involves summing all of the emission increases associated with the project, and summing all of the other creditable increases and decreases in actual emissions made at the facility during the contemporaneous time period. If the result is greater than the significant emission rate, than the project would be considered a major modification and subject to PSD permitting.

In Step 2, the source created reductions for particulate pollutants. Creditable decreases[8] were realized from the shutdown of the coal boiler and ash handling equipment, current boiler, the whole bean tank, and the old grain dryer. Further decreases in the particulate came from the addition of control technology for Bean Prep Crack/Dehull, Bean Prep Flaking, Bean Prep Flaking Expander, Meal Storage Tank, and Pellet Storage Tank units. At the conclusion of Step 2 the project causes a SNEI for VOC only (see Attachment B). The result of the net is summarized in the table below.

Table 3: Step 2 NEI Pollutant Summary

	Pollutant Emissions Summary (tpy)			
	PM	PM10	PM2.5	VOC
Project Emission Increase	103.2	55.9	36.8	103.5
Contemporaneous Increases	7.3	11.4	6.1	2.7
Contemporaneous Decreases	107.4	84.3	37.3	1.2
Significant Net Emissions Increase	*3.1*	*-17.0*	*5.6*	*105.0*
PSD Significant Emission Rates	25	15	10	40
Significant Emissions Increase?	NO	NO	NO	YES

As discussed previously in this section, the project is a major modification subject to PSD review. Therefore, greenhouse gases (GHG) is a pollutant that must be considered for regulation as a "regulated NSR pollutant". GHG is subject to regulation for a major modification if the project causes an increase in CO_2 equivalents[9] (CO_2e) of at least 75,000 tons per year. The calculation for the increase caused by the project follows the SEI and SNEI calculations for other pollutants. GHG is not subject to regulation because this project does not cause a SEI as shown in Attachment B.

The current boilers on site will cease to operate after a reasonable shakedown period for the new boilers not to exceed 180 days and the start-up of the first new boiler (B-1, B-2, B-3, and B-4).

In the course of this permit action a review of the file indicates that a limit for PM, PM10, and VOC taken in 2003 for the dryer cooler installation represented a PSD avoidance limit for these three pollutants. This limit is being relaxed with this project. The increase in emissions from the relaxation for PM and PM10 has been reviewed. The relaxation of the limit does not generate a significant increase in either PM or PM10 for the past project. Particulate testing of the dryer cooler was conducted as part of this project. The results demonstrate that the dryer cooler does not have the PTE to generate a significant increase of PM, PM10, or PM2.5.

C. <u>9VAC5 Chapter 50, Part II, Article 5 – NSPS</u>
40 CFR Part 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.
This subpart applies to all new and currently operating boilers at the facility. Compliance with the applicable SO_2 standards found in §60.42c(d) is met with the sulfur concentration demonstration of the

[8] Decreases were calculated BAE to zero for units that were shutdown and permanently removed. Decreases from units adding control technology were calculated by subtracting the BAE from the PTE.
[9] CO_2e is the emission rate of each GHG species multiplied by its respective global warming potential (GWP) from 40CFR Part 98.

fuel §60.42c(d) and §60.42c(h)(4) as well as record keeping requirements in §60.48c(f)(1) and §60.48c(f)(4). As the units are less than 30 MMBtu/hr when firing oil, the units are not subject to the PM or opacity standards contained in §60.43c. The record keeping and reporting requirements of §60.48c(a), (f), and (g)(2) apply. Compliance with the standards for fuel oil sulfur found in the permit is as stringent as Subpart Dc.

40 CFR Part 60 Subpart DD – Standards of Performance for Grain Elevators
This subpart applies to the listed grain side emission units. Several units have applicable standards found in Subpart DD. Compliance with the standards for particulate and opacity found in the permit is as stringent as Subpart DD.

40 CFR Part 60 Subpart IIII—Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
This subpart applies to the emergency engine (EG-1). For major sources as defined in 9VAC5-80-60, Virginia has accepted delegation of the standard. This unit is being refurbished as part of this project. However this change does not meet the definition of modification in §60.14(a) as there is no resultant increase in emissions.[10] Thus the engine does not become an affected emissions unit under this subpart as a pre-model year 2007 unit. Per §60.4200(2)(i) stationary compression ignition (CI) internal combustion engine (ICE) manufactured before April 1, 2006 are not subject to this subpart unless modified.

D. 9VAC5 Chapter 60, Part II, Article 1 – NESHAPS
No applicable NESHAPS.

E. 9VAC5 Chapter 60, Part II, Article 2 – MACT
40 CFR Part 63 Subpart GGGG - National Emission Standards for Hazardous Air Pollutants: Solvent Extraction for Vegetable Oil Production
This subpart applies to the soybean oil extraction plant. While this permit document does not include MACT conditions, proper issuance requires validation that the affected source is able to meet all applicable MACT requirements. The PSD VOC BACT in this project generates solvent loss reduction and thus hexane loss reduction across the soybean oil extraction plant. The VOC limit is more stringent than the applicable MACT SLR (solvent loss ratio) standard in both level of emission reduction as well as the structure of compliance demonstration as it relates to the plant's operational periods.

40 CFR Part 63 Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters
This subpart applies to all new and currently operating boilers at the facility. Perdue has proposed to operate these boilers as gas 1 units. While the MACT does not limit hours of operation during periods of curtailment, this permit limits distillate combustion for all operating scenarios, including curtailment. As gas 1 units there are no applicable emission limitations from this MACT. As a new boiler with a continuous oxygen trim system that maintains an optimum air to fuel ratio the MACT requires a tune-up of the boiler or process heater every 5 years as specified in §63.7540 Table 3 as well as a notification of the actual date of startup of the source, delivered or postmarked within 15 calendar days after that date as specified in §63.9.

40 CFR Part 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for stationary reciprocating internal combustion engines (RICE)
This subpart applies to the emergency engine. The emergency engine being installed in this permit action is a 760 hp diesel fired compression ignition (CI) RICE unit originally manufactured in 1988. For

[10] Kg/hr basis per 60.14(b).

stationary RICE with a site rating of more than 500 brake horsepower (hp) located at a major source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before December 19, 2002. The refurbishment does not meet the definition of reconstruction in §63.2. Existing emergency stationary RICE with a site rating of more than 500 brake hp located at a major source of HAP emissions that do not operate or are not contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in §63.6640(f)(2)(ii) and (iii) do not have to meet the requirements of this subpart and of subpart A of Part 63, including initial notification requirements.

IV. Best Available Control Technology Review (BACT) (9VAC5-50-260.C) and (9VAC5-80-1705.C)

A. 9VAC5-50-280 and 9VAC5-80-1705 (PSD: Article 8)

This project triggers BACT for VOC. For a major modification, BACT applies to each unit that is physically or operationally changed and experiences a net emissions increase for a pollutant subject to PSD review. For this project, the soybean oil extraction plant, boilers, grain dryers, and the emergency engine are subject to BACT review for VOC.

Soybean Oil Extraction Plant

Due to the relationship between process plant performance with regard to solvent loss, MACT compliance demonstration approach, and consistent with all BACT determinations in RACT/BACT/LAER Clearinghouse (RBLC), BACT for VOC is being applied to the soybean oil extraction plant.

Step 1: Identify all control technologies:

The permit application identified biofiltration, carbon adsorption, incineration, flares, absorption, leak detection and repair (LDAR), and fugitive VOC capture as potential pollution control techniques. DEQ's review of RBLC and other permit determinations identified no other control technologies.

Step 2: Eliminate technically infeasible options

The control options identified in the previous step are evaluated in this step for technical feasibility. Technically infeasible options are eliminated from further consideration. Each option that has been demonstrated (installed and successfully operated) at an identical or similar source is considered to be technically feasible. An undemonstrated technology is feasible if it is "available" and "applicable."

The application explains the technical infeasibility for biofiltration, carbon adsorption, incineration, flares, and fugitive emissions capture. DEQ concurs with the technical issues (e.g., available space for device placement, particulate loading of exhaust stream) and the various safety issues enumerated in the application.

The remaining control technologies are LDAR and mineral oil scrubber (MOS) resulting in a solvent loss ratio (SLR) numeric emission limit.

Step 3: Rank remaining control technologies by effectiveness

The permittee has selected the top option, application of LDAR and MOS to the extraction plant.

Step 4: Evaluate most effective controls and document

The source has selected the top level of control identified in this review as BACT.

Step 5: Select BACT

BACT is determined to be a SLR of 0.152 gallons of solvent / tons of soybeans processed, process modifications, an upgraded hexane condensing system and MOS, and an LDAR. The SLR limit must be

met during all operational periods which is more stringent than other RBLC source determinations and the structure of the MACT.

The SLR of 0.152 relies heavily on the efficiencies achieved by the installation of the new extractor, an inherently lower polluting process. To accommodate the time necessary for the installation of the new extractor, an interim BACT limit of 0.18 takes effect upon permit issuance. The BACT SLR of 0.152 shall become effective upon start-up of the new extractor. The SLR limits are not retroactive. Each limit starts at month one when the limit is imposed (permit issuance and new extractor start-up). Compliance with each SLR limit is demonstrated once a 12 month average is achieved.

Four (4) 27 MMBtu/hr Boilers:

Step 1: Identify all control technologies:
Good combustion practice, the use of clean burning fuels (ultra-low sulfur diesel (ULSD)), and the use of VOC oxidation catalysts have been identified in the application.

Step 2: Eliminate technically infeasible options
No control technology was deemed infeasible.

Step 3: Rank remaining control technologies by effectiveness
Of the control options identified in the first step, use of VOC oxidation catalysts has the highest potential emission reduction for the combustion of natural gas or diesel. This is followed by the use of good combustion practice and clean burning fuels as an emission control work practice standard.

Step 4: Evaluate most effective controls and document
With the PTE of 0.4 tpy, oxidation catalyst is not considered cost effective for these units. A review of the RBLC indicated no add-on controls have been required for similar boilers (27 MMBtu/hr).

Step 5: Select BACT
BACT is determined to be the work practice standard of good combustion practice, the use of clean burning fuels (ULSD), and an emission limit of 0.1 lb/hr VOC when firing diesel (0.04 lb/hr when firing natural gas).

Emergency Generator:

Step 1: Identify all control technologies:
Good combustion practice, the use of clean burning fuels (ULSD), and the use of VOC oxidation catalysts have been identified in the application.

Step 2: Eliminate technically infeasible options
No control technology was deemed infeasible.

Step 3: Rank remaining control technologies by effectiveness
Of the control options identified in the first step, use of VOC oxidation catalysts has the highest potential emission reduction for the combustion of diesel. This is followed by the use of good combustion practice and clean burning fuels as an emission control work practice standard.

Step 4: Evaluate most effective controls and document
With the PTE of 0.12 tpy, oxidation catalyst is not considered cost effective for these units. A review of the RBLC indicated no add-on controls have been required for similar emergency engines.

Step 5: Select BACT
BACT is determined to be the work practice standard of good combustion practice, the use of clean burning fuels (ULSD), and an emission limit of 0.49 lb/hr VOC.

Two (2) Column Grain Dryers:

Step 1: Identify all control technologies:
Good combustion practice and the use of VOC oxidation catalysts have been identified in the review.

Step 2: Eliminate technically infeasible options
No control technology was deemed infeasible.

Step 3: Rank remaining control technologies by effectiveness
Of the control options identified in the first step, use of VOC oxidation catalysts has the highest potential emission reduction for the combustion of natural gas. This is followed by the use of good combustion practice as an emission control work practice standard.

Step 4: Evaluate most effective controls and document
With the PTE of 0.5 tpy, oxidation catalyst is not considered cost effective for these units. A review of the RBLC indicated no add-on controls have been required for grain dryers.

Step 5: Select BACT
BACT is determined to be the work practice standard good combustion practice, and an emission limit on each column grain dryer of 0.21 lb/hr VOC.

B. 9VAC5-50-260 (Article 6)
For Article 6 permitting BACT applicability is pollutant specific based on the permitting applicability thresholds. Each affected emissions unit emitting a pollutant that is subject to permitting shall apply BACT for that pollutant (9VAC5-50-260 C). For this project BACT is applicable for PM, PM10, PM2.5, NOx, and SO_2 as the UER increases exceed the exemption thresholds in 9VAC5-80-1105D.

BACT for control of PM, PM10, PM2.5 from the two garner scale and Bean Prep Cleaning, Cracking/Dehull, and Hull Cleaning processes (EU-45, and EU-11B-F), Bean Prep Flaking process (EU-13A&B), Meal Grinding and Shifting process (EU-17A-E), Hull Grinder and Product Tank process (EU-12A&C), Ground Hull Transfer and Hopper process (EU-22A&B), Load Out process (EU-21A-D), Pellet Storage Tank process (EU-19), Truck Receiving/Unloading process (EU-36&37), Meal Dome process (soybean meal storage domes (EU-24, 25, and 55), Meal Storage Tank process (EU-18), Truck Loading process (EU-33), Rail Car Receiving/Unloading process (EU-38A), Rail Car Loading process (EU-38B), Marine Vessel Loading/Unloading process (EU-34, EU-35A&B, and EU-56), storage silos (EU-38C and EU-40B), and Internal Handling process (EU-42) is fabric filter control.

BACT for control of PM, PM10, PM2.5 from the Expander and the Expander After-Cooler process (EU-44), Pellet Cooler process (EU-23), Dryer/Cooler process (EU-15 and 16), Column Grain Dryers process (EU31&32) is cyclone control.

BACT for control of PM, PM10, PM2.5 from the cooling towers (EU-58) is a drift eliminator designed to 0.02 percent of the circulated water flow.

BACT for control of SO_2, NOx, and PM, PM10, and PM2.5 from the new boilers (B-1, B-2, B-3, and B-4), in consideration of limitations on the hours of operation, is the use of clean burning fuels, good combustion practices, proper maintenance procedures, and low NOx burners. SO_2 emissions based on natural gas and ULSD usage are less than 0.5 TPY for all boilers.

BACT for control of PM, PM10, PM2.5 from Hull Truck Unloading (EU-57) is considered no add-on control.

BACT for control of particulate matter from the meal storage (meal shed) (EU-20) is the addition of "gums" to the meal.

Table 4: Article 6 BACT Limitations

Emission Unit ID	PM	PM10	PM2.5	NOx
expander and expander after-cooler unit (EU-44)	0.22 lb/hr	0.30 lb/hr	0.24 lb/hr	-
dryer/cooler process (EU-15 and 16)	1.2 lb/hr	1.0 lb/hr	0.88 lb/hr	-
Meal Dome process (under dome conveyors and bucket elevator (EU-26) and soybean meal storage domes (EU-24, 25, and 55))	0.0025 gr/dscf	0.0025 gr/dscf	0.0025 gr/dscf	-
Bean Prep Flaking process (EU-13A&B)	0.25 lb/hr	0.78 lb/hr	0.78 lb/hr	-
Meal Grinding and Shifting process (EU-17A-E)	4.6 lb/hr	4.6 lb/hr	4.6 lb/hr	-
meal storage tank (EU-18)	0.37 lb/hr	0.37 lb/hr	0.37 lb/hr	-
Hull Grinder and Product Tank process (EU-12A&C)	2.7 lb/hr	2.7 lb/hr	2.7 lb/hr	-
Ground Hull Transfer and Hopper process (EU-22A&B)	0.68 lb/hr	0.68 lb/hr	0.68 lb/hr	-
pellet cooler unit (EU-23)	0.45 lb/hr	0.95 lb/hr	0.72 lb/hr	-
Bean Prep Cleaning process (EU-11B)	0.51 lb/hr	0.51 lb/hr	0.51 lb/hr	-
Bean Prep Cracking/Dehull process (EU-11C&D)	2.4 lb/hr	2.4 lb/hr	2.4 lb/hr	-
Bean Prep Hull Cleaning process (EU-11E&F)	2.4 lb/hr	2.4 lb/hr	2.4 lb/hr	-
loadout process (EU-21A-D) during the loading of meal	0.33 lb/hr	0.33 lb/hr	0.33 lb/hr	-
Column Grain Dryers process (EU-31&32)	1.63 lb/hr	2.21 lb/hr	1.40 lb/hr	3.83 lb/hr
Truck Receiving/Unloading process (EU-36&37)	0.01 gr/dscf	0.01 gr/dscf	0.01 gr/dscf	
Truck Loading process (EU-33)	0.01 gr/dscf	0.01 gr/dscf	0.01 gr/dscf	
Rail Car Receiving/Unloading process (EU-38A)	0.01 gr/dscf	0.01 gr/dscf	0.01 gr/dscf	
Rail Car Loading process (EU-38B)	0.01 gr/dscf	0.01 gr/dscf	0.01 gr/dscf	
Marine Vessel Loading/Unloading process (EU-34, EU-35A&B, and EU-56)	0.01 gr/dscf	0.01 gr/dscf	0.01 gr/dscf	
storage silos (EU-38C and EU-40B)	0.01 gr/dscf	0.01 gr/dscf	0.01 gr/dscf	
Internal Handling process (EU-42)	0.01 gr/dscf	0.01 gr/dscf	0.01 gr/dscf	

Emission Unit ID	PM	PM10	PM2.5	NOx
Boilers (B1-4) each, firing on diesel fuel	0.37[11]	0.61 lb/hr	0.61 lb/hr	2.99 lb/hr
Boilers (B1-4) each, firing on natural gas	0.05[11]	0.20 lb/hr	0.20 lb/hr	0.95 lb/hr

Each unit subject to BACT also has a visible emission standard representative of proper design, operation, and maintenance of the respective unit.

V. Summary of Potential Emissions Increase

The change in PTE for the facility[12] is summarized in the table below. The values are calculated in Attachment E.

Pollutant	PTE Change (TPY)
SO_2	-441.3
NOx	-156
CO	-64.1
CO_2e	-37,406
PM	-201.0
PM10	-110.5
PM2.5[13]	-43.8
VOC	22.3

VI. State Operating Permit (SOP)

This project will result in a permit document that supersedes an active SOP. The grain elevator facility was permitted with an Exclusionary General Permit (EGP). The SOP replaced the EGP. The facility is now a Title V source and the nature of the SOP no longer serves a functional purpose for this source. All applicable requirements from the SOP are necessary to proper issuance of the current Article 6 and Article 8 (PSD) permits. As these conditions will be federally enforceable in the combined Article 6 (mNSR) and Article 8 (PSD) permit document, the underlying SOP serves no functional permit and will be superseded with the issuance of this permit.

VII. Boilerplate Deviations

Generic, Testing, Skeleton, Diesel Engine, and NG-DO boilerplates were used to draft this permit.

Conditions 15 and 33 limiting the extraction plant to a SLR of 0.152 gallons of solvent to tons of whole soybean processed and implementation of an LDAR program are deviations from the boiler plate. These conditions follow the methodology of the boilerplate and are based on the previous Perdue permit and other Virginia Audio/Visual/Olfactory (AVO) inspection conditions. This limitation on VOC emissions references the SLR equation in MACT GGGG. Unlike the MACT the SLR limit in Condition 33 is applicable during all

[11] For these boilers, the resulting PM rate is less than 0.5 TPY per boiler for both fuels, considering the hours of operation limitation. Limits for PM10 and PM2.5 are higher due to consideration of the condensable fraction.
[12] The representation of emissions from the facility was revised due to more accurate data being available. Various sources were used such as supplementary docket information for MACT GGGG as well as other technical reviews of other similar facilities around the country.
[13] For many sources PM2.5 was not a NSR pollutant when the permit was issued.

operational periods including start up, shut down, and malfunction.

Condition 84 requires visible emissions observations, a condition taken from Perdue's Title V permit. It was modified to apply to all equipment with a VE limitation in this permit.

Past deviations were carried forward via inclusion of previous permit conditions.

VIII. Compliance Demonstration

Compliance Demonstration for the VOC BACT determination for the soybean oil extraction facility includes the monthly calculation for SLR using the equation in Condition 33 as well as the observation log and records from the daily LDAR program.

Condition 15 has a requirement for Perdue to submit an LDAR plan to TRO for review and approval. The initial plan should reflect the actions in the application at a minimum, which consist of: fixed-location monitors placed on hexane relief valves, the extractor seal screw, and DT discharge, flammable gas monitors set to audible and visual alarm at 5% LEL, monitors calibrated according to the procedure and frequency specified by the manufacturer, and continuous recording of data from all monitors.

To ensure initial and continued compliance with the BACT limitations (see section IV), units utilizing cyclone and fabric filter control technology as well as the meal shed (EU-20). Perdue will be required to conduct visible emissions observations (VEO). All fabric filters shall be equipped with a device to continuously measure the differential pressure drop across the fabric filter. To ensure good performance, each differential pressure gauge used to continuously measure the pressure drop across each fabric filter shall be observed by the permittee with a frequency of not less than once per week. The permittee shall maintain records of emission data, throughputs/production data, and operating parameters as necessary to demonstrate compliance with these conditions.

There are several emission units in the permit that have emission limits for PM, PM10. and PM2.5 that are identical. This is due to the lack of condensable particulate matter emissions expected from these units and the conservative particulate size distribution assumptions in calculating the emissions from the facility. The limits for PM10 and PM2.5 in the permit include condensable particulate matter by nature. Due to these assumptions, Method 5 alone could be considered an appropriate compliance demonstration for these limits (Conditions 54, 56-59, 61-64, 66).

The throughput limit for the Soybean Oil Extraction Facility cannot increase until most particulate control devices required in the permit have been installed and become operational. Two units (EU-55 and EU-56) are not yet constructed and will have the necessary controls operational upon start-up. The necessary decreases must be enforceable prior to the increase to ensure a significant net emission increase does not occur due to the extended construction schedule.

Due to the complexity of the processes at the facility and the need to quantify fugitive emissions consistently, the permit contains area-based tons per year emission limitations. The currently approved calculation methodology is that contained in the PSD applicability calculations in 60277 Analysis Attachment B.

IX. Title V Review - 9VAC5 Chapter 80, Part II, Article 1

The facility is a Title V major source due to a potential to emit (PTE) greater than 100 tons per year for PM10 and VOC and greater than 10 tons per year of a single HAP (n-hexane). Implementation of this project will result in contravening limitations contained in the Title V permit. Therefore, the Title V permit is undergoing a concurrent significant modification.

X. Other Considerations

None

Attachments:

Calculations

60277 Analysis Attachment A: Art 6 Calcs
60277 Analysis Attachment B: PSD Calcs
60277 Analysis Attachment C: Short-term limit Calcs
60277 Analysis Attachment D: NG-DO calc for HAP exemptions
60277 Analysis Attachment E: Calculation of Change in PTE

Final Recommendation: Recommend Approval.

Permit Writer's Signature: _____

The following people have reviewed the permit:

Reviewing Permit Writer: _____

Air Compliance Inspector: _____

Air Compliance Manager: electronic review by John Brandt

Air Permit Manager's Signature: _____