Commonwealth of Pennsylvania
Department of Environmental Protection
Air Quality Program
September 25, 2012

Subject: Perdue Grain & Oil Seed, LLC
Conoy Township, Lancaster County
Plan Approval Application No. 36-03189A

To: William R. Weaver WRW 10/3/12
Regional Manager, Air Quality

Thru: Tom Hanlon TJH 9/26/12
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From: Brian Wetzel BW
Air Quality Permitting

Introduction/Facility Description

A Plan Approval (PA) Application was received on June 27, 2012 from Perdue Grain & Oil Seed, LLC (Perdue). Perdue is proposing the installation of a grain elevator in Conoy Township, Lancaster County.

This application will be Phase 1 of 2 in the overall project. Phase 2 will include the installation of a soybean oil extraction operation. A separate plan approval application was submitted on August 13, 2012 to address the second phase. The phased permitting/construction will allow Perdue to receive, handle, dry, and store soybeans by the soybean harvest season of Fall 2013, while the Phase 2 processing operations, if approved, are being constructed. This will, in turn, allow Perdue to establish the market that will ultimately be served by the Phase 2 processing operations. In the event that the Phase 2 soybean oil extraction operations are not constructed, the Phase 1 grain elevator would function as a stand-alone facility. Under this scenario, soybeans originating locally would be received and stored at the facility. Soybeans would then be transferred either south or west for processing or exported as is the current movement of the majority of soybeans produced in the area.

The proposed grain elevator (Refer to Figure 1 for a process flow diagram of the process) will consist of the following equipment:

1) One (1) enclosed truck receiving area containing 2 pits
    a. The receiving area is rated at 600 tph and will be controlled by a 30,000 acfm Airlanco Model 236RLP10 baghouse or equivalent.
2) Four (4) 30,000 bushel storage bins (wet grain)
    a. The bins will be manufactured by GSI, Chief, Brock, or equivalent and will be equipped with collapsible fabric filters. Air displacement from filling the bins is expected to be 300 cfm.
3) Two (2) Hayes-Stolz scalper screens
    a. The screens will be fully enclosed; however, miscellaneous dust pick-up points will be controlled by the Airlanco baghouse.
4) Two (2) 4,800 bushel/hr Shanzer Model 8P7 column dryers
    a. Each dryer is rated at 39.5 mmBtu and will be fired on natural gas or propane.
    b. Approximately 50 percent of the exhaust air will be recirculated back into the dryer. The recirculated air will be cleaned with screens (size 24 mesh) and an internal cyclone. The mesh will be cleaned by mechanical scraping with vacuum assist.
    c. The upper warm air fan will have an airflow of approximately 215,000 cfm. The lower cool air fan will have an airflow of approximately 105,000 cfm.
5) Four (4) 500,000 bushel storage bins (dry grain)
    a. The bins will be manufactured by GS, Chief, Brock, or equivalent.
6) Grain loadout operations

A maximum of 630,000 tons of soybeans per year will be delivered to the facility by truck and off-loaded into one of two enclosed grain receiving pits. Dust associated with the truck receiving area will be controlled by the grain baghouse. The soybeans will be sampled, analyzed and weighed before being sent to the wet grain storage bins. Since the wet grain storage bins can be filled relatively quickly, resulting in the displacement of a significant volume of air, the vents will be equipped with collapsible fabric filters to minimize fugitive emissions of dust.

From the wet grain storage tanks, the soybeans will pass through one of two scalper screens to remove foreign material such as sticks, stems, pods, dirt, and other debris. The totally enclosed scalper screens will not be emission sources themselves; however, miscellaneous dust pick up points associated with the processing system will be sent to the grain baghouse for control. The soybeans will then proceed to one of two natural gas- or propane-fired column grain dryers where the moisture content of the soybeans will be reduced to approximately 10%. The soybeans will then enter the top of the grain dryers and flow down the continuous packed columns between perforated metal sheets.

From the grain dryers, the dried soybeans will be sent to the grain storage bins for storage and tempering prior to either preparation for oil extraction, if approved, or for loadout into trucks via a gravity fed loading spout.

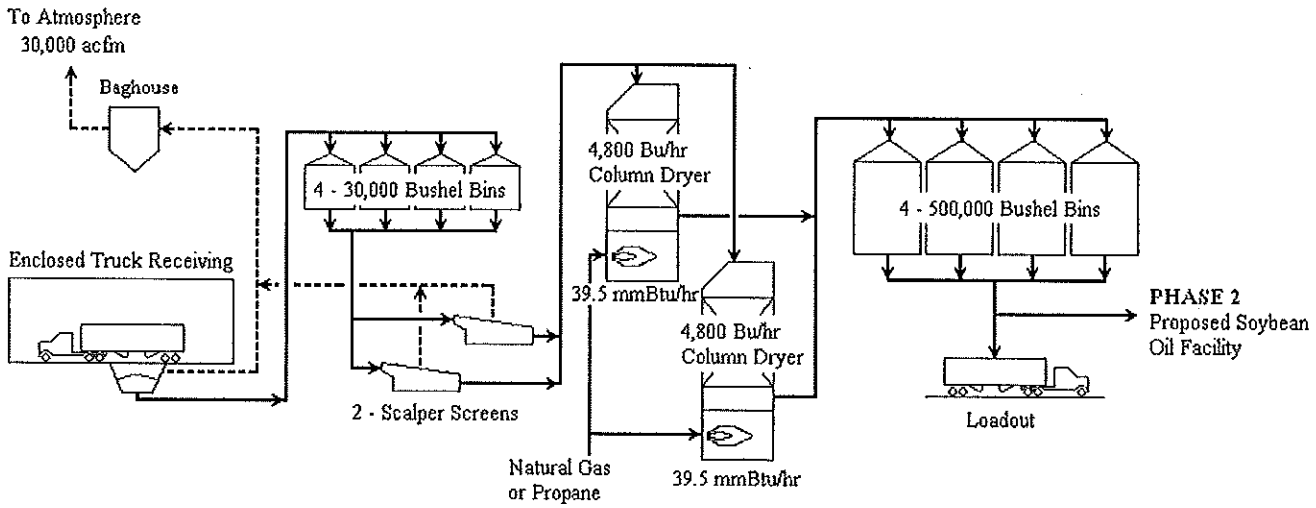

Figure 1: General Process Flow Diagram of New Grain Elevator

Based on receiving and processing 630,000 tpy soybeans and shipping 72,000 tpy soybeans offsite, the grain elevator's potential-to-emit (PTE) emissions are estimated at:

Table 1: PTE Emissions Due to Phase 1

Pollutant	PTE Emissions (tpy)
PM	58.59
PM_{10}	15.86
$PM_{2.5}$	3.25
SOx	0.20
CO	28.50
NOx	24.58
VOC	3.02
Single HAP (hexane)	0.62
Combined HAPs	0.64
CO_2	47,270.50
N_2O	1.00
CH_4	0.78
CO_2e	47,593.30

Although Phase 1 is not subject to NSR, the installation of the grain elevator and the soybean oil extraction facility will be subject to NNSR for VOC (Refer to Table 2). NNSR will be addressed in detail during the review of Phase 2's application.

Table 2: Complete Project (Phases 1 & 2) PTE Emissions and NSR Applicability

Pollutant	Major Facility Threshold (tpy)	PTE Emissions (tpy)	Subject to NNSR/PSD Permitting?
Nonattainment New Source Review (NNSR)			
Ozone – NOx	100	24.95	No
Ozone – VOCs	50	247.33	*Yes*
$PM_{2.5}$	100	6.90	No
$PM_{2.5}$ Precursor - SOx	100	0.21	No
Prevention of Significant Deterioration (PSD)			
CO	250	28.93	No
NOx	250	24.95	No
SOx	250	0.21	No
PM	250	143.05	No
PM_{10}	250	36.85	No
$PM_{2.5}$	250	6.90	No
VOCs	250	247.33	No
CO_2e	100,000	48,309.63	No

Emissions Calculations

I concur with all supplied calculations as provided in the application. An example for each source's calculation is listed below.

Source ID 101, Grain Receiving & Processing

Particulate emissions from grain receiving and processing operations were estimated using emission factors from US EPA's AP-42, Compilation of Air Pollutant Emission Factors, Section 9.9, "Grain Processing" and the following information.

Hourly Grain Handling Rate	600 tph
Maximum Yearly Grain Handling Rate	630,000 tpy
Control Efficiency	99.9%

Hourly particulate emissions

$$600\frac{ton}{hr}\times 0.096\frac{lb}{ton}\times(1-0.999)=0.06\frac{lb}{hr}PM$$

Annual particulate emissions

$$630{,}000\frac{ton}{yr}\times 0.096\frac{lb}{ton}\times(1-0.999)\times\frac{ton}{2000\ lb}=0.03\frac{ton}{yr}PM$$

Note: The emission factors used in the receiving/processing calculations are a combination of two factors, i.e. 0.096 lb PM/ton = 0.035 lb/ton for hopper truck receiving plus 0.061 lb/ton for headhouse and grain handling

Source ID 102, Wet Grain Storage Bins

Particulate emissions from grain receiving and processing operations were estimated using emission factors from US EPA's AP-42, Compilation of Air Pollutant Emission Factors, Section 9.9, "Grain Processing" and the following information.

Hourly Grain Handling Rate	600 tph
Maximum Yearly Grain Handling Rate	630,000 tpy
Control Efficiency	99.0%

Hourly particulate emissions

$$600\frac{ton}{hr}\times 0.025\frac{lb}{ton}\times(1-0.99)=0.15\frac{lb}{hr}PM$$

Annual particulate emissions

$$630{,}000\frac{ton}{yr}\times 0.025\frac{lb}{ton}\times(1-0.99)\times\frac{ton}{2000\ lb}=0.08\frac{ton}{yr}PM$$

Source IDs 103 & 104, Grain Dryer Nos. 1 & 2

Particulate emissions from grain receiving and processing operations were estimated using emission factors from US EPA's AP-42, Compilation of Air Pollutant Emission Factors, Section 1.4, "Natural Gas Combustion", Section 1.5, "Liquified Petroleum Gas Combustion", Section 9.9, "Grain Processing" and the following information.

Hourly Grain Handling Rate	144 tph
Maximum Yearly Grain Handling Rate	315,000 tpy
Amount of Recirculated Air	50%
Control Efficiency of Internal Screen/Cyclone	90.0%
Heat Input (mmBtu/hr)	39.5
Heat Content of NG (btu/scf)	1,020

Hourly particulate emissions for each grain dryer

$$144\frac{ton}{hr}\times 0.22\frac{lb}{ton}\times 0.5+144\frac{ton}{hr}\times 0.22\frac{lb}{ton}\times 0.5\times(1-0.9)=17.42\frac{lb}{hr}PM$$

Annual particulate emissions for each grain dryer

$$\left[315{,}000\frac{ton}{yr}\times 0.22\frac{lb}{ton}\times 0.5+315{,}000\frac{ton}{yr}\times 0.22\frac{lb}{ton}\times 0.5\times(1-0.9)\right]\times\frac{ton}{2000\ lb}=19.06\frac{ton}{yr}PM$$

Hourly & yearly PM emissions from NG combustion for each grain dryer

$$7.6e-6\frac{lb}{scf}\times\frac{1}{1{,}020}\frac{scf}{btu}\times 39.5e6\frac{btu}{hr}=0.29\frac{lb}{hr}\times 8{,}760\frac{hr}{yr}\times\frac{ton}{2000\ lb}=1.29\frac{ton}{yr}PM$$

Hourly & yearly PM emissions from propane combustion for each grain dryer

$$7e-4\frac{lb}{gal}\times\frac{1}{91{,}500}\frac{gal}{btu}\times 39.5e6\frac{btu}{hr}=0.30\frac{lb}{hr}\times 8{,}760\frac{hr}{yr}\times\frac{ton}{2000\ lb}=1.32\frac{ton}{yr}PM$$

Source ID 105, Grain Storage Bins

Particulate emissions from grain receiving and processing operations were estimated using emission factors from US EPA's AP-42, Compilation of Air Pollutant Emission Factors, Section 9.9, "Grain Processing" and the following information.

Hourly Grain Handling Rate	300 tph
Maximum Yearly Grain Handling Rate	630,000 tpy

Hourly particulate emissions

$$300\frac{ton}{hr}\times 0.025\frac{lb}{ton}=7.5\frac{lb}{hr}PM$$

Annual particulate emissions

$$630{,}000\frac{ton}{yr}\times 0.025\frac{lb}{ton}\times\frac{ton}{2000\ lb}=7.88\frac{ton}{yr}PM$$

Source ID 106, Grain Loadout

Particulate emissions from grain receiving and processing operations were estimated using emission factors from US EPA's AP-42, Compilation of Air Pollutant Emission Factors, Section 9.9, "Grain Processing" and the following information.

Hourly Grain Handling Rate	120 tph
Maximum Yearly Grain Handling Rate	72,000 tpy

Hourly particulate emissions

$$120\frac{ton}{hr}\times 0.086\frac{lb}{ton}=10.32\frac{lb}{hr}PM$$

Annual particulate emissions

$$72{,}000\frac{ton}{yr}\times 0.086\frac{lb}{ton}\times\frac{ton}{2000\ lb}=3.1\frac{ton}{yr}PM$$

Source ID 301, Roadway Fugitives

Particulate emissions from paved roads were calculated using the following equation from US EPA's AP-42, Compilation of Air Pollutant Emission Factors, Section 13.2.1.3 – "Paved Roads". The equation calculates emissions on a daily basis.

$$E_{ext}=\left[k(sL)^{0.91}\times(W)^{1.02}\right]\times\left(1-\frac{P}{4N}\right)$$

Where:

Eext = annual or other long-term average emission factor in the same units as *k*,
k = particle size multiplier for particle size range and units of interest,
sL = road surface silt loading (grams per square meter) (g/m^2),
W = average weight (tons) of the vehicles traveling the road, and
P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period,
N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly).

Facility used the following

k = 0.011 for PM
0.0022 for PM_{10}
0.00054 for $PM_{2.5}$
sL = 1.1 g/m^2,
W = 34 tons
P = 140 days
N = 365 for annual

Additionally, roadway emissions were based on receiving 630,000 tpy soybeans and shipping 72,000 tpy soybeans from the facility. The remainder, 558,000 tpy soybeans were to be utilized by the soybean oil extraction facility (Phase 2).

PM emission factor for inbound/outbound truck traffic

$$E_{PM} = \left[0.011 \times \left(1.1 \frac{g}{m^2}\right)^{0.91} (34\ tons)^{1.02}\right]\left(1 - \frac{140\ days}{4 \times 365\ days}\right) = 0.396 \frac{lb\ PM}{VMT}$$

Estimated fugitive PM emissions from inbound & outbound truck traffic

$$0.396 \frac{lb\ PM}{VMT} \times 34{,}083 \frac{mi}{yr} \times \frac{ton}{2000\ lb} = 6.74 \frac{ton}{yr}$$

If the soybean oil extraction portion of the project is not approved, the amount of particulate emissions from truck traffic for Phase 1 would double. This is due in part to the increase in the amount of outbound truck traffic, i.e. soybeans received would equal soybeans shipped.

Estimated fugitive PM emissions from inbound & outbound truck traffic if Phase 1 was only approved

$$0.396 \frac{lb\ PM}{VMT} \times 68{,}040 \frac{mi}{yr} \times \frac{ton}{2000\ lb} = 13.47 \frac{ton}{yr}$$

Applicable Requirements

The proposed facility will not be located in an air basin or in an Environmental Justice Area. The grain elevator will be subject to 40 CFR 60, Subpart DD—Standards of Performance for Grain Elevators since the storage capacity of the overall project (Phase 1 & 2) will have a storage capacity greater than 1 million bushels. The facility will be required to conduct the performance testing (PM & opacity) as specified under 40 CFR 60.303. The dryers will not be required to meet the applicable opacity limit under the regulation since the screens will have perforations no greater than 0.094 inches.

Grain elevator operations are subject to 25 Pa Code §123.13 for particulate emissions, §123.21 for sulfur dioxide emissions, §123.41 for visible air contaminants, and §123.31 for malodorous air contaminants. However, compliance with 40 CFR 60, Subpart DD satisfies the requirements of 25 Pa Code §123 and compliance with the more stringent visible emission limits established by General Permit No.15 for feed mills (feed mills operate types of sources common to grain elevators) satisfies the requirements of §123.41.

The installation of the grain elevator (Phase 1) is not subject to Prevention of Significant Deterioration (PSD) or Nonattainment New Source Review (NNSR) since there will be no resulting significant increase of a NSR regulated pollutant. However, the overall project including the soybean oil extraction facility (Phase 2) will be subject to NNSR requirements (Lowest Achievable Emission Rate (LAER) & Emission Offsets) for VOC (Refer to Table 2 for NSR applicability). Therefore, the VOC emissions (3.02 tpy) associated with the grain elevator are subject to LAER and offset requirements. Consequently, the facility will have a facility-wide VOC limit imposed and will be required to obtain emission offsets, including the 3.02 tons from Phase 1, during the review of Phase 2's application.

The grain elevator and oil extraction facility will be adjacent to the Lancaster County Solid Waste Management Authority (LCSWMA) facility. LCSWMA will supply steam & process water for the extraction operations. Steam condensate, used process water, and plant washdown water will be sent back to LCSWMA for reuse. Although the extraction facility will rely on LCSWMA to supply utilities (steam & water), LCSWMA is not a support facility for Perdue due to the following reasons:

1) LCSWMA is not increasing production in order to supply the steam demand from Perdue. The extraction operations will utilize "waste steam" in that the steam being used by Perdue would have previously been vented to the atmosphere. Furthermore, in the unlikely event that LCSWMA would be unable to provide steam to the extraction facility for a short time, Perdue will have the ability to hook-up a portable, truck-mounted steam plant.

2) The two facilities will not share any production intermediates, products, byproducts, manufacturing equipment, or air pollution control equipment.
3) All air emission sources and air pollution control equipment at the extraction facility will be owned and operated exclusively by Perdue.
4) The two facilities do not have common executive officers or boards. Additionally, the facilities will not have common workforces, plant management, or security, nor will the employees and managers of one facility be involved with the other facility. The two facilities will not share administrative functions such as payroll, employee benefits, health plans, retirement funds, or insurance coverage.

The facility supplied a Top-Down Best Available Technology (BAT) Analysis that addressed controlling particulate emissions from the grain handling operations. Perdue examined the following control technologies:

1) Baghouses
2) Cyclones
3) Wet scrubbers
4) Electrostatic precipitators

Although all of the control technologies were technically feasible, the use of a baghouse resulted as the most cost effective option. Therefore, the use of a baghouse on grain receiving/processing operations with an emission limit of 0.01 gr/dscf shall be considered BAT. In addition, the use of collapsible filters on the wet storage bins shall be considered BAT.

Furthermore, Perdue evaluated controls for particulate & combustion emissions from the grain dryers. The use of column dryers equipped with low-NOx burners, internal screens with perforations less than 0.094 inches, and recirculating exhaust air which is cleaned by internal screens (size 24 mesh) and a cyclone shall be considered BAT.

Since the grain elevator's potential-to-emit emissions were based on a throughput of 630,000 tpy soybeans, a throughput limit at this level will be established. Finally, the facility will incorporate the use of Iowa's Department of Natural Resources Best Management Practices (BMPs) for Grain Elevators to ensure proper operation and compliance with all applicable requirements. These BMPs will be incorporated under Section C of the permit.

Notifications

The application was deemed "administratively complete" on July 2, 2012. Conoy Township & Lancaster County received municipal notification on June 28, 2012. The latest Compliance History Form was received June 27, 2012.

This Plan Approval Application is subject to the DEP's Land Use Policy since the project will occur on an existing non-permitted area. The proposed project is consistent with the county comprehensive plan and the local zoning ordinance. It should be noted that Perdue received a height variance for the facility's extraction building involved during Phase 2.

A Pennsylvania Natural Diversity Inventory (PNDI) search was conducted on November 29, 2011. Search results indicated potential impacts from the PA Game Commission and the PA Fish and Boat Commission. Both agencies were notified of the impacts via a December 5, 2011 letter. The PA Fish and Boat Commission determined there were no adverse impacts of the proposed project via a December 27, 2011 letter. The PA Game Commission determined there were no adverse impacts of the proposed project via a February 28, 2012 letter.

A Cultural Resource Notice was received by the PA Historical & Museum Commission on July 2, 2012. The Bureau for Historic Preservation responded via a July 30, 2012 letter stating "...no historic buildings, structures, districts, or objects will be affected by this project." However, the letter also indicated that site 36LA1484 lies within the project area and a determination of significance (Phase II) must be conducted. At the time of this memorandum, a Phase II has been completed and was being finalized.

A notice of the Department's intent to issue the plan approval will be published in the *Pennsylvania Bulletin* on or around October 13, 2012.

I recommend Plan Approval No. 36-03189A be distributed for comment.

Cc: SCRO, 36-03189A
Permits
EPA