



Missouri Department of dnr.mo.gov

NATURAL RESOURCES

Michael L. Parson, Governor

Carol S. Comer, Director

MAY 30 2019

Ms. Mirriah Cooper
Health, Safety & Environmental Supervisor
Archer Daniels Midland Processing - Deerfield
17700 South Highway T
Deerfield, MO 64741

RE: New Source Review Permit Amendment - Permit Number: 122017-013A
Project Number: 2018-12-029; Installation Number: 217-0043

Dear Ms. Cooper:

On December 20, 2018, the Missouri Air Pollution Control Program received your request to amend Permit No. 122017-013 to include hexane emissions that were not included during the initial permit review. Enclosed with this letter is your amendment and additional special conditions that apply to the installation.

Archer Daniels Midland Company (ADM) owns and operates an installation near Deerfield (S98, T35N, R33W) that includes a soybean vegetable oil extraction plant and a biodiesel manufacturing plant. In December, 2017, a permit (No. 122017-013) was issued to the installation to increase both soybean processing at the extraction plant and biodiesel production at the biodiesel manufacturing plant. At that time, the installation did not expect any hexane emissions from the biodiesel plant. However, after the issuance of the permit, ADM obtained data from its biodiesel facility in Mexico, Missouri indicating the presence of hexane in the continuous process vent. ADM also confirmed the presence of hexane at the Deerfield biodiesel plant. The hexane emissions are most likely introduced into the process as residuals from the vegetable oil feedstock. These emissions need to be accounted for in Permit No. 122017-013. Furthermore, in Permit No. 122017-013, Volatile Organic Compound (VOC) emissions from the biodiesel continuous process vent were calculated using a rate of 0.74 lb/hr and is only based on methanol emissions. However, the Total Resource Effectiveness (TRE) testing at the Mexico facility shows that there are other VOC and Hazardous Air Pollutant (HAP) emissions that were not accounted for. Therefore, this amendment also updates the emissions for VOC and HAPs.

In addition, the installation will be constructing a control device for hexane. Currently, a water scrubber is used before the vent to recover methanol for reuse. The facility will be adding a biodiesel absorber downstream of the water scrubber to recover hexane so that the vent emissions will be in compliance with limits in Maximum Achievable Control Technology (MACT) Subpart FFFF, *National Emissions Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing*. The absorber will also recover other oil-soluble VOC not recovered by the water absorber. The recovered hexane will be incorporated into the biodiesel product for its fuel value. ADM also plans on installing additional cooling capacity prior to the water absorber inlet and downstream of the rectification cooler.

The newly discovered emissions should be added to the project emissions calculated for Permit No. 122017-013 because they are part of the same project. The project emissions that involves both



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operations (i.e. the vegetable oil extraction plant and the biodiesel manufacturing plant) were updated to determine if Prevention of Significant Deterioration (PSD) or modeling requirements are triggered from the new information.

For methanol emissions calculations, Permit No. 122017-013 used 0.74 lb/hr and this value is from the February 2009 measurement at the Deerfield plant. The TRE testing performed at the Mexico plant shows methanol emissions less than the 2009 Deerfield measurements. Since the 2009 measurements are higher and site-specific, the methanol emissions from the biodiesel continuous vent were not changed for this review. The methanol emissions are already included in the emissions calculations for Permit No. 122017-013.

For all other pollutants, emissions were calculated and added to the project emissions from Permit No. 122017-013. For hexane and VOCs, emissions from the biodiesel continuous process vent were calculated using mass balance equations (as given in MACT Subpart G) using concentrations obtained from the Mexico facility during testing. A safety factor of 50% was added to account for any variations in emissions between the Mexico and Deerfield locations. The VOC emissions do not include methanol since the methanol emissions are already included in the emissions calculations for Permit No. 122017-013.

A control efficiency of 50% was used for the biodiesel absorber for VOC and total HAPs. Testing at the ADM Mexico plant shows that a control efficiency of 64% and 51% for these pollutants can be achieved, but 50% was used as a conservative value at the Deerfield location. For hexane, testing at the Mexico plant shows a biodiesel absorber control efficiency of 98.8%. A more conservative value of 98% was used to account for any location variations.

Table 1, below, gives the updated installation-wide project emissions.

Table 1: Updated Installation-Wide Project Emissions

Pollutant	Permit No. 122017-013 Emissions (tpy)	Updated Emissions (tpy)	Emissions Increase (tpy)
VOC	225.97	227.03	1.06
Methanol	3.51	3.51	0.00
Hexane	144.41	144.43	0.02
Total HAP	147.92	148.45	0.53

tpy = tons per year

The emissions increase did not change the type of permit that should be issued. For VOC, the installation-wide project emissions remain below the major source level of 250 tpy in which a PSD would have been required. There are no modeling requirements for VOC.

For hexane, the emissions remain above the SMAL and major source value of 10.0 tpy. N-hexane emissions were modeled in Permit No. 122017-013 to ensure that the ambient impacts were below the Risk Assessment Levels (RAL). Normally, an emissions increase would trigger a new modeling analysis. However, the modeled impact from Permit 122017-013 were much less than the RAL. For the 24-hour averaging period, the modeled impact was 1,117 $\mu\text{g}/\text{m}^3$ and the RAL is 4,200 $\mu\text{g}/\text{m}^3$ while for the annual

averaging period, the modeled impact was $99.6 \mu\text{g}/\text{m}^3$ and the RAL is $420 \mu\text{g}/\text{m}^3$. The increase of 0.02 tpy in emissions should not increase the ambient impacts to greater than the RAL and modeling was not performed.

The biodiesel plant is a named source nested within the larger installation and therefore, has its own major source threshold of 100 tpy. The emissions increase were added to just the emissions of the biodiesel diesel plant to ensure that PSD requirements are not triggered for the biodiesel plant.

Table 2 below gives the project emission before and after the update from just the biodiesel plant to see if PSD permitting is triggered.

Table 2: Updated Biodiesel Plant Emissions

Pollutant	Permit No. 122017-013 Emissions (tpy)	Updated Emissions (tpy)	Emissions Increase (tpy)
VOC	21.56	22.62	1.06

tpy= tons per year

Since the VOC project emissions from the entire biodiesel plant remain below the 100 tpy major source levels, the biodiesel plant remains a minor source and a PSD permit is not required.

The emissions were calculated using data from the TRE tests at the Mexico, Missouri plant. The Deerfield plant is required by Permit No. 122017-013 to perform its own testing. However, the tests are required to be performed within 60 days after achieving the maximum production rate of the expanded installation, but not later than 180 days after initial start-up or commercial operation of the expanded installation. Neither of these timelines have been reached and no testing has been performed. If future testing shows that the VOC emissions are greater than 0.242 lb/hr (without methanol) and the n-hexane emissions are greater than 0.0048 lb/hr from the biodiesel absorber, the installation shall submit an amendment request to the Missouri Air Pollution Control Program so that the VOC and hexane emissions from the project and the installation can be updated. These emission rates are the rates from the Mexico plant with a 50% safety factor.

ADM Deerfield plant also requested to clarify the language for the following:

- Removal of references to the rectification cooler with regard to the water absorber inlet temperature since additional cooling capacity is planned ahead of the water absorber inlet and downstream of the rectification cooler.
- Increasing the number of samples or readings of methanol concentration, temperature and flow rate required so that compliance with the limits may be determined by an average value of measurements rather than just one measurement, as required in Permit No. 122017-013. Due to circumstances such as facility downtime, personnel scheduling, and potential monitoring equipment malfunctions, the installation would like to maintain the minimum of one (1) sample or reading as required in Permit No. 122017-013, but also the flexibility of using more than one. In the amendment, the installation is permitted to use a minimum of one (1) sample or readings and a maximum of four (4) samples or readings.

Ms. Mirriah Cooper
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The Special Conditions of this amendment replace Special Conditions 4.A. and 5.G.1) in Permit No. 122017-013. All other special conditions in Permit No. 122017-013 remain in effect.

If you were adversely affected by this permit decision, you may be entitled to pursue an appeal before the Administrative Hearing Commission pursuant to Sections 621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the Administrative Hearing Commission within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the Administrative Hearing Commission, whose contact information is: Administrative Hearing Commission, United States Post Office Building, 131 West High Street, Third Floor, P.O. Box 1557, Jefferson City, MO 65102, phone: 573-751-2422, fax: 573-751-5018, website: www.ao.mo.gov/ahc.

If you have any questions regarding this amendment, please do not hesitate to contact Chia-Wei Young at the department's Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or at (573) 751-4817. Thank you for your attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM



Kendall B. Hale
Permits Section Chief

KBH:cyd

Enclosures

c: Southwest Regional Office
PAMS File: 2018-12-029

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

Archer Daniels Midland Processing - Deerfield
Vernon County, S9, T35N, R33W

1. Superseding Condition

The special conditions of this permit supersede Special Conditions No. 4.A. and No. 5.G.1) in Permit No. 122017-013 previously issued by the Missouri Air Pollution Control Program.

2. Control/Recovery Device Requirements

A. Water Absorber

- 1) ADM Deerfield shall recover VOC emissions from biodiesel methanol stripping and condensation, glycerin methanol stripping and condensation, and methanol rectification and condensation, and the biodiesel reaction and separation process using a water absorber.
- 2) ADM Deerfield shall develop a site-specific operation and maintenance (O&M) procedure for the water absorber in a manner consistent with safety and good air pollution control practices for minimizing emissions. The O&M procedure shall indicate:
 - a) The maximum methanol concentration in the recirculating water, which shall be set as 110% of the average methanol concentration observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d).
 - b) The maximum absorber inlet water temperature, which shall be set as 110% of the average absorber inlet water temperature observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d).
 - c) The minimum recirculating water flow rate, which shall be set as 90% of the average recirculating water flow rate observed during the most recent measurement used to determine the

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most recent TRE index according to §63.115(d).

- 3) The water absorber shall be operated and maintained in accordance with the site-specific O&M procedure. The water absorber shall be equipped with gauges or meters that indicate the absorber inlet water temperature and the recirculating water flow rate through the recovery device. These gauges or meters shall be located such that Department of Natural Resources' employees may easily observe them.
- 4) ADM Deerfield shall determine the methanol concentration in the water absorber from representative samples analyzed by an appropriate analytical method following a standard procedure, including appropriate QA/QC provisions.
 - a) The installation is required to obtain a sample at least once every 24 hours when the process is in operation. The installation may take more than one sample, but cannot exceed four total samples for each 24-hour period. If more than one sample is taken, the average of the samples during each 24-hour period shall be used for compliance with Special Condition 2.A.2)a).
 - b) A methanol concentration (or an average if multiple samples are taken during each 24-hour period) in the recirculating water, determined in the same manner as, and greater than 110% of the methanol concentration observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d) is considered a deviation, excluding periods of start-up, shutdown, and malfunction.
 - c) ADM Deerfield shall retain records of all methanol concentration analytical results.
- 5) ADM Deerfield shall monitor and record the absorber inlet water temperature at least once every 24 hours when the process is in operation. The installation may take more than one reading, but cannot exceed four total readings for each 24-hour period. If more than one reading is taken, the average temperature from all of the samples shall be used for compliance with Special Condition 2.A.2.b).
 - a) An absorber inlet water temperature (or an average if

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The permittee is authorized to construct and operate subject to the following special conditions:

multiple samples are taken during each 24-hour period) determined in the same manner as, and greater than 110% of the average absorber inlet water temperature observed during the most recent TRE index according to §63.115(d) is considered a deviation, excluding periods of start-up, shutdown, and malfunction.

- 6) ADM Deerfield shall monitor and record the recirculating water flow rate through the water absorber at least once every 24 hours when the process is in operation. The installation may take more than one reading, but cannot exceed four total readings for each 24-hour period. If more than one reading is taken, the average temperature from all of the samples shall be used for compliance with Special Condition 2.A.2.c).
 - a) A recirculating water flow rate (or an average if multiple samples are taken during each 24-hour period), determined in the same manner as, and less than 90% of the hourly average recirculating water flow rate observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d) is considered a deviation, excluding periods of start-up, shutdown, and malfunction.
- 7) In lieu of the absorber inlet water temperature and recirculating water flow rate monitoring requirements in Special Conditions 2.A.5) and 2.A.6), ADM Deerfield may also use continuous temperature and water flow rate monitoring systems to determine one-hour average values for compliance with Special Conditions 2.A.2)b) and 2.A.2)c).
- 8) ADM Deerfield shall maintain onsite a copy of the water absorber's site-specific O&M procedure indicating the absorber inlet water temperature and recirculating water flow rate normal operating ranges.
- 9) ADM Deerfield shall maintain an operating and maintenance log for the water absorber which shall include the following:
 - a) Incidents of malfunction, with impact on emissions (tons), duration of event, probable cause, and corrective actions; and

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- b) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
- B. Biodiesel Absorber**
- 1) ADM Deerfield shall install a biodiesel absorber downstream of the water absorber to recover VOC emissions coming from the water absorber.
 - 2) ADM Deerfield shall develop a site-specific operation and maintenance (O&M) procedure for the biodiesel absorber in a manner consistent with safety and good air pollution control practice for minimizing emissions. The O&M procedure shall indicate:
 - a) The maximum average inlet biodiesel scrubbant temperature which shall be set at 110% of the hourly average inlet biodiesel scrubbant temperature observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d).
 - b) The minimum average biodiesel scrubbant flow rate which shall be set as 90% of the average biodiesel scrubbant flow rate observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d).
 - 3) The biodiesel absorber shall be operated and maintained in accordance with the site-specific O&M procedure. The biodiesel absorber shall be equipped with gauges or meters that indicate the inlet biodiesel scrubbant temperature and flow rate through the recovery device. These gauges or meters shall be located such that the Department of Natural Resources' employees may easily observe them.
 - 4) ADM Deerfield shall monitor and record the inlet biodiesel scrubbant temperature at least once every 24 hours. The installation may take more than one reading, but cannot exceed four total readings for each 24-hour period. If more than one reading is taken, the average temperature from all of the samples shall be used for compliance with Special Condition 2.B.2.a).
 - a) An inlet biodiesel scrubbant temperature (or an average biodiesel scrubbant temperature if more than one reading is

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The permittee is authorized to construct and operate subject to the following special conditions:

taken during each 24-hour period), determined in the same manner as, and greater than 110% of the average inlet biodiesel scrubbant temperature observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d) is considered a deviation, excluding periods of start-up, shutdown, and malfunction.

- 5) ADM Deerfield shall monitor and record the biodiesel scrubbant flow rate through the biodiesel absorber at least once every 24 hours when the process is in operation. The installation may take more than one reading, but cannot exceed four total readings for each 24-hour period. If more than one reading is taken, the average temperature from all of the samples shall be used for compliance with Special Condition 2.B.2.b).
 - a) An inlet biodiesel scrubbant flow rate (or an average biodiesel scrubbant flow rate if more than one reading is taken during each 24-hour period), determined in the same manner as, and less than 90% of the average inlet biodiesel scrubbant flow rate observed during the most recent measurements used to determine the most recent TRE index according to §63.115(d) is considered a deviation, excluding periods of start-up, shutdown, and malfunction.

- 6) In lieu of the inlet biodiesel scrubbant temperature and the biodiesel scrubbant flow rate monitoring and recording requirements in Special Conditions 2.B.4) and 2.B.5), ADM Deerfield may use continuous temperature and flowrate monitoring systems and use the one-hour average values to show compliance with Special Conditions 2.B.2)a) and 2.B.2)b).

- 7) ADM Deerfield shall maintain onsite a copy of the biodiesel absorber's site-specific O&M procedure indicating the inlet biodiesel scrubbant temperature and flow rate normal operating ranges.

- 8) ADM Deerfield shall maintain an operating and maintenance log for the biodiesel absorber which shall include the following:
 - a) Incidents of malfunction with impact on emissions (tons),

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SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- duration of event, probable cause, and corrective actions;
and
 - b) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
5. Performance Testing.
- A. The test report is to fully account for all operational and emission parameters addressed both in the permit conditions as well as in any other applicable state or federal rules or regulations.
 - 1) During testing required by Special Condition 5.A. of Permit No. 122017-013, ADM Deerfield shall document:
 - a) The biodiesel production rate during each performance test run.
 - b) The water absorber inlet water temperature during each measurement.
 - c) The recirculating water flow rate through the water absorber during each measurement.
 - d) The methanol concentration of the water absorber recirculating water during each measurement.
 - e) The biodiesel absorber inlet biodiesel scrubbant temperature during each measurement.
 - f) The biodiesel scrubbant flow rate through the biodiesel absorber during each measurement.