

Missouri Department of

dnr.mo.gov

NATURAL RESOURCES

Michael L. Parson, Governor

Carol S. Comer, Director

APR 23 2019

Mr. Gregory Smith
Plant Manager - Laddonia
POET Biorefining – Laddonia, LLC
809 North Pine
Laddonia, MO 63352

RE: New Source Review Permit - Project Number: 2018-05-046

Dear Mr. Smith:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions, if any, on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions, your new source review permit application and with your amended operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

This permit may include requirements with which you may not be familiar. If you would like the department to meet with you to discuss how to understand and satisfy the requirements contained in this permit, an appointment referred to as a Compliance Assistance Visit (CAV) can be set up with you. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at the following website: <http://dnr.mo.gov/regions/>. The online CAV request can be found at <http://dnr.mo.gov/cav/compliance.htm>.

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 thirty 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, Missouri 65102, phone: 573-751-2422, fax: 573-751-5018, website: www.oa.mo.gov/ahc.



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Mr. Gregory Smith
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If you have any questions regarding this permit, please do not hesitate to contact Chia-Wei Young at the Department of Natural Resources' 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



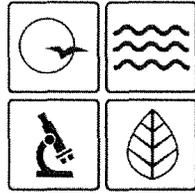
Susan Heckenkamp
New Source Review Unit Chief

SH:cj

Enclosures

c: Northeast Regional Office
PAMS File: 2018-05-046

Permit Number: 042019-015



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 042019-015

Project Number: 2018-05-046
Installation Number: 007-0054

Parent Company: POET Biorefining – Laddonia, LLC

Parent Company Address: 809 North Pine, Laddonia, MO 63352

Installation Name: POET Biorefining – Laddonia, LLC

Installation Address: 809 North Pine, Laddonia, MO 63352

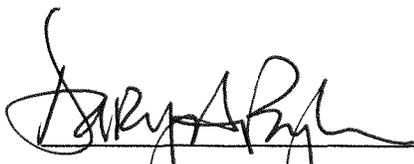
Location Information: Audrain County, S36, T52N, R7W

Application for Authority to Construct was made for:

Increasing ethanol production. This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060 *Construction Permits Required*.

Standard Conditions (on reverse) are applicable to this permit.

Standard Conditions (on reverse) and Special Conditions are applicable to this permit.



Director or Designee
Department of Natural Resources

APR 23 2019

Effective Date

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. The permittee should notify the Enforcement and Compliance Section of the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Enforcement and Compliance Section of the Department's Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available within 30 days of actual startup. Also, you must notify the Department's Northeast Regional Office within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of the permit application and this permit and permit review shall be kept at the installation address and shall be made available to Department's personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC 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 AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit using the contact information below.

Contact Information:
Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102-0176
(573) 751-4817

The regional office information can be found at the following website:
<http://dnr.mo.gov/regions/>

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(12)(A)10. "Conditions required by permitting authority."*

POET Biorefining – Laddonia, LLC
Audrain County, S36, T52N, R7W

1. **Superseding Condition**
The conditions of this permit supersede all of the special conditions found in construction permits 102005-015A, 102005-015C, and 102017-014 previously issued by the Air Pollution Control Program.
2. **Emission Limitations**
 - A. POET Biorefining – Laddonia, LLC shall emit less than 50.0 tons of total PM₁₀ (condensable and filterable) in any consecutive 12-month period from the entire installation. Equipment at the installation that emit PM₁₀ are given below in Table 1.

Table 1: PM_{2.5} and PM₁₀ Emissions Source

Emission Source	Description	Control Equipment for particulates
EP01	Grain Receiving, Transfer, and Loading into (3) 505,000 bushel, (2) 430,000 bushel, and (1) 50,000 bushel storage bins	CE01 Baghouse
EP02	Grain Scalper, Conveyor, and Surge Bin	CE02 Baghouse
EP03	Hammermill #1	CE03 Baghouse
EP04	Hammermill #2	CE04 Baghouse
EP05	Hammermill #3	CE05 Baghouse
EP06	Hammermill #4	CE06 Baghouse
EP07	Pneumatic Flour Conveyor/Receiver	CE07 Baghouse
EP08	Fermentation and Distillation Processes includes (7) 570,000 gallon fermentation tanks, one beer well, a slurry tank, a yeast propagation tank, (4) evaporators, a beer stripper, a rectifier, a side stripper, a 200-proof rundown tank, reboilers, a regeneration tank, and a 190-proof rundown tank	CE08A or CE08B Packed Bed Wet Scrubber (Facility has two scrubbers, but only one will be used at a time).
EP09	CE08A or CE08B Packed Bed Wet Scrubber, (2) DDGS Dryers, and (5) Centrifuges	CE09 and CE10 Multicyclones and CE11 Regenerative Thermal Oxidizer

SPECIAL CONDITIONS:

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

Emission Source	Description	Control Equipment for particulates
		(RTO)
EP10	DDGS Fluid Bed Cooler	CE12 Baghouse
EP11	DDGS Silo	CE13 Baghouse
EP12	DDGS Silo Bypass	CE14 Baghouse
EP13	Boiler #1	None
EP14	Boiler #2	None
EP20	DDGS Transfer and Loadout	None
FS01	Grain Receiving/DDGS Loadout Fugitives	None
FS02	Paved Haul Roads	Paving
CWT	Cooling Tower	Drift eliminators

- B. POET Biorefining – Laddonia, LLC shall emit less than 44.96 tons of total PM_{2.5} (condensable and filterable) in any consecutive 12-month period from the entire installation. Equipment that emit PM_{2.5} are given in Table 1.
- C. POET Biorefining – Laddonia, LLC shall emit less than 64.98 tons of NO_x in any consecutive 12-month period from the entire installation. Equipment that emit NO_x are given below in Table 2.

Table 2: NO_x Emissions Source

Emission Source	Description	Control Equipment for NO_x
EP08	Fermentation and Distillation Processes includes (7) 570,000 gallon fermentation tanks, one beer well, a slurry tank, a yeast propagation tank, (4) evaporators, a beer stripper, a rectifier, a side stripper, a 200-proof rundown tank, reboilers, a regeneration tank, and a 190-proof rundown tank	None
EP09	CE08A or CE08B Packed Bed Wet Scrubber, (2) DDGS Dryers, and (5) Centrifuges (RTO)	None
EP13	Boiler #1	None
EP14	Boiler #2	None
EP15	Denatured Ethanol Truck Loadout (Flare)	¹ None

Note 1: The flare creates NO_x during combustion. Therefore, it is not listed under control equipment.

- D. POET Biorefining – Laddonia, LLC shall emit less than 100.0 tons of Volatile Organic Compounds (VOCs) from this installation in any consecutive 12-month period. Equipment that emits VOC are given below in Table 3.

SPECIAL CONDITIONS:

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

Table 3: VOC/HAP Emissions Source

Emission Source	Description	Control Equipment for VOC/HAP
EP08	Fermentation and Distillation Processes includes (7) 570,000 gallon fermentation tanks, one beer well, a slurry tank, a yeast propagation tank, (4) evaporators, a beer stripper, a rectifier, a side stripper, a 200-proof rundown tank, reboilers, a regeneration tank, and a 190-proof rundown tank	CE08A or CE08B Packed Bed Wet Scrubber (Facility has two scrubbers, but only one will be used at a time).
EP09	CE08A or CE08B Packed Bed Wet Scrubber, (2) DDGS Dryers, and (5) Centrifuges (RTO)	RTO
EP10	DDGS Fluid Bed Cooler	None
EP11	DDGS Silo	None
EP12	DDGS Silo Bypass	None
EP13	Boiler #1	None
EP14	Boiler #2	None
EP15	Denatured Ethanol Truck Loadout (Flare)	¹ None
EP16	Denatured Ethanol Railcar Loadout	None
EP20	DDGS Transfer and Loading	None
TK01	250,000 Gallon Denaturant Tank	None
TK02	250,000 Gallon 190-Proof Ethanol Tank	None
TK03	250,000 Gallon Denaturant Tank	None
TK04	1,500,000 Gallon 200-Proof Ethanol Tank	None
TK05	1,500,000 Gallon 200-Proof Ethanol Tank	None
TK06	1,000 Gallon Corrosion Inhibitor Tank	None
FS01	DDGS Loadout Fugitive	None
FS03	VOC Equipment Leaks	None
FS04	Tank Farm Equipment Leaks	None
FS05	Wet Cake	None

Note 1: The flare also creates VOC/HAPs during combustion. Therefore, it is not listed under control equipment.

- E. POET Biorefining – Laddonia, LLC shall emit less than 100.0 tons of Carbon Monoxide (CO) from this installation in any consecutive 12-month period. Equipment that emits CO are the DDGS Dryers and RTO (EP-09), Boiler No. 1 (EP-13), Boiler No. 2 (EP-14), and Denatured Ethanol Loadout Flare (EP-15).

SPECIAL CONDITIONS:

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

- F. POET Biorefining – Laddonia, LLC shall emit less than twenty-five (25.0) tons of combined HAP from this installation in any consecutive 12-month period. The individual HAPs, except for acrolein, shall be limited below their respective SMAL. Acrolein shall be limited to less than the major source level of 10.0 tons per year. Equipment that emit HAPs are listed in Table 3. The list of SMAL current to the date of permit issuance can be found online at <https://dnr.mo.gov/env/apcp/docs/cp-hapra16.pdf>.
- G. POET Biorefining – Laddonia, LLC shall not discharge PM, PM₁₀, and PM_{2.5} into the atmosphere from the following stacks in excess of the listed amounts. These emission rates shall be verified through performance testing, as detailed in Special Condition 4.

Table 4: Total PM/PM₁₀/PM_{2.5} Emission Rate Limits

Control ID	Emission Point	Description	Emissions Limit (lb/hr)
CE-01	EP01	Corn Receiving, Transfer and Storage	1.00
CE-02	EP02	Corn Scalpers, Conveyor and Surge Bin	0.11
CE-03	EP03	Hammermill #1	0.51
CE-04	EP04	Hammermill #2	0.51
CE-05	EP05	Hammermill #3	0.51
CE-06	EP06	Hammermill #4	0.51
CE-07	EP07	Pneumatic Flour Receiver	0.18
CE-11	EP09	2 DDGS Dryers, 5 Centrifuges, and RTO	8.5
CE-12	EP10	DDGS Fluid Bed Cooler	1.02
CE-13	EP11	DDGS Storage Silo	0.17
CE-14	EP12	DDGS Storage Silo Bypass Receiver	0.17

- H. POET Biorefining – Laddonia, LLC shall not discharge nitrogen oxides (NO_x) into the atmosphere from the following stacks in excess of the listed amounts. These emission rates shall be verified through performance testing, as detailed in Special Condition 4.

SPECIAL CONDITIONS:

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

Table 5: NO_x Emission Rate Limits

Control ID	Emission Point	Description	Emissions Limit (lb/hr)
CE-11	EP09	2 DDGS Dryers, 5 Centrifuges, and RTO	11.5
CE-12	EP13	Boiler No. 1	4.0
CE-13	EP14	Boiler No. 2	4.0

- I. POET Biorefining – Laddonia, LLC shall not discharge acrolein into the atmosphere from the following stacks in excess of the listed amounts. These emission rates shall be verified through performance testing, as detailed in Special Condition 4.

Table 6: Acrolein Emission Rate Limits

Emission Point	Description	Emissions Limit (lb/hr)
EP08	Fermentation and Distillation Processes (Controlled)	0.046
EP09	2 DDGS Dryers, 5 Centrifuges, and RTO (Controlled)	0.044
EP08 FermVent	Fermentation and Distillation Processes (Uncontrolled)	0.103
EP09 CentVent	Centrifuge Stack (Uncontrolled)	0.0041
EP10	DDGS Fluid Bed Cooler	0.012
EP11	DDGS Storage Silo	0.0045
EP12	DDGS Storage Silo Bypass	0.0045
EP20	DDGS Loadout	0.023

- J. Attachments A, B, C, D, E, and F, or equivalent forms, such as electronic forms, approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 2.A through 2.F. The equivalent forms must use the same emission factors or calculation methods as Attachments A, B, C, D, E, and F.
3. Production/Process Limitations
- A. POET Biorefining – Laddonia, LLC shall receive less than 700,000 tons of grain in any consecutive 12-month period.
- B. POET Biorefining – Laddonia, LLC shall produce less than 184,000 tons of DDGS in any consecutive 12-month period.

SPECIAL CONDITIONS:

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

- C. POET Biorefining – Laddonia, LLC shall produce less than 45,000 tons of wet cake in any consecutive 12-month period.
 - D. POET Biorefining – Laddonia, LLC shall produce less than 72,150,000 gallons of anhydrous ethanol (Undenatured) in any consecutive 12-month period.
 - E. POET Biorefining – Laddonia, LLC shall receive less than 1,850,000 gallons of denaturant (gasoline) in any consecutive 12-month period.
 - F. POET Biorefining – Laddonia, LLC shall feed less than 433,620,000 gallons of beer to the distillation columns in any consecutive 12-month period.
 - G. POET Biorefining – Laddonia, LLC shall develop forms to demonstrate compliance with Special Conditions 3.A. through 3.F. The forms shall contain, at a minimum, the following information:
 - 1) Installation name
 - 2) Installation ID
 - 3) Permit number
 - 4) Current month
 - 5) Current 12-month date range
 - 6) Monthly grain received (tons)
 - 7) Monthly DDGS production (tons)
 - 8) Monthly wet cake production (tons)
 - 9) Monthly anhydrous ethanol production (gallons)
 - 10) Monthly denaturant (gasoline) receiving (gallons)
 - 11) Monthly distillation column beer feed (gallons)
 - 12) 12-month rolling total grain received (tons)
 - 13) 12-month rolling total DDGS production (tons)
 - 14) 12-month rolling total wet cake production (tons)
 - 15) 12-month rolling total anhydrous ethanol production (gallons)
 - 16) 12-month rolling total denaturant (gasoline) receiving (gallons)
 - 17) 12-month rolling total of beer fed to the distillation column (gallons).Where each 12-month rolling total is calculated as the sum of the 12 most recent monthly values.
4. Performance Testing
- A. POET Biorefining – Laddonia, LLC shall conduct performance tests to verify the emission rates as follows:
 - 1) The bypass stack (EP08), the RTO stack (EP09), and the fluid bed cooler (EP10) shall be tested to determine the VOC, combined

SPECIAL CONDITIONS:

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

- HAP, acetaldehyde, formaldehyde, and methanol emission rates when all the processes controlled by these devices are in operation. These emission rates shall be used in Attachments C, E, and F for compliance with Special Conditions 2.D. and 2.F.
- 2) For the bypass stack (EP08) and the RTO stack (EP09), the installation plans to use one of two scrubbers located at the site. Testing required in Special Condition 4.A.1) related to these two stacks shall be performed for both scrubbers.
 - 3) The RTO (CE-11) shall be tested to determine the CO emission rate when in operation. The DDGS shall also be in operation during testing. This emission rate shall be used in Attachment D for compliance with Special Condition 2.E.
 - 4) The stacks associated with Special Condition 2.G. shall be tested to determine the filterable and condensable PM emissions, unless the stack temperature is less than 85 °F. At stack temperatures below 85 °F, all PM are expected to be filterable (according to EPA Method 202). Therefore, only filterable PM emissions shall be tested at stack temperature less the 85 °F. Total PM emissions (including both the filterable and condensable portions) shall not exceed the PM, PM₁₀ and PM_{2.5} limits listed in Special Condition 2.G, Table 4. The facility shall use total PM for compliance with PM_{2.5} and PM₁₀ limits in Table 4 because the facility calculated the potential emissions and the baseline actual emissions from the project by assuming that total PM is equal to PM_{2.5} and PM₁₀. The emission factors obtained from the stack tests shall be used in Attachment A for compliance with Special Conditions 2.A. and 2.B.
 - 5) The stacks associated with Special Condition 2.I. shall be tested to determine the acrolein emission rates. The acrolein emission rates shall not exceed the amounts listed in Table 6 of Special Condition 2.I.
 - 6) The RTO (CE-11), Boiler No. 1 (EP13), and Boiler No. 2 (EP14) shall be tested to determine the NO_x emission rate when in operation. This emission rate shall not exceed the amounts listed in Special Condition 2.H. In addition, this emission rate shall be used in Attachment B for compliance with Special Condition 2.C.
 - 7) The denatured ethanol truck loadout (EP15) shall be tested to determine the control efficiency of the flare and the VOC emission rate prior to and post flare combustion during loadout operations. The emission rates and/or control efficiency shall be used in Attachments C for compliance with Special Conditions 2.D.

SPECIAL CONDITIONS:

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

- B. The testing required in Special Conditions 4.A.4) and 4.A.6) may be limited to conducting tests on a representative piece(s) of each type of equipment upon approval by the Director. In addition, an alternative method(s) of quantifying the emission rates of criteria air pollutants (i.e. PM and NO_x) from these sources may be used in place of the above testing requirement if requested by POET Biorefining – Laddonia, LLC and approved by the Director.
 - C. For the tests required in Special Condition 4.A, the tests shall be performed once every five years from the date of the most recent stack test. If an existing emission unit has never been tested, then the initial test shall be performed within 90 days after issuance of this permit. If the emission unit is new (i.e. second scrubber), then the initial test shall be performed within 90 days after startup. After initial testing, subsequent tests shall be performed once every five (5) years from the date of the most recent stack test.
 - D. The highest average emission rates (i.e. average of three (3) one-hour runs) obtained from all of the tests shall be used in Attachments A, B, C, D, E, and F for compliance with Special Conditions 2.A., 2.B., 2.C., 2.E., and 2.F.
 - E. If the performance testing required by Special Condition 4 of this permit indicates that any of the emission limits specified in Special Conditions 2.G., 2.H., and 2.I. are being exceeded, POET Biorefining – Laddonia, LLC must propose a compliance plan to the Air Pollution Control Program within thirty (30) days of submitting the performance test results. This plan must demonstrate how the installation will reduce the emission rates below those stated in Special Condition 2.G., 2.H., and 2.I. POET Biorefining – Laddonia, LLC shall implement any such plan immediately upon its approval by the Director and testing shall be performed within 90 days after plan implementation to ensure that the emission rates in Special Condition 2.G., 2.H., and 2.I. are not exceeded. After testing and showing compliance with the limits in 2.G., 2.H., and 2.I, the frequency shall revert back to those listed in Special Condition 4.C. If further actions cannot bring the facility into compliance with the limits in Special Conditions 2.G., 2.H., and 2.I., POET Biorefining – Laddonia shall contact the Missouri Air Pollution Control Program for further instructions.
5. Proposed Test Plan
- A. For testing required in Special Condition 4, completed Proposed Test Plan Forms must be submitted to the Air Pollution Control Program 30 days

SPECIAL CONDITIONS:

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

prior to the proposed test dates so that the Air Pollution Control Program may arrange pretest meetings, if necessary, and assure that the test dates is acceptable for an observer to be present. The Proposed Test Plans may serve the purpose of notification and must be approved by the Director prior to conducting the required emission testing.

- B. Two (2) copies of a written report of the performance test results shall be submitted to the Director within 30 days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required US EPA method for at least one (1) sample run.
 - C. 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.
 - D. For testing required in Special Condition 4, the installation must note, at a minimum, the following in its testing report.
 - 1) During testing on the bypass stack (EP08), when the scrubber is in operation, POET Biorefining – Laddonia, LLC shall track the beer feed rate (gallons per minute), the scrubber flow rate (gallon per minute), the scrubbing liquid, and the scrubber pressure drop.
 - 2) During testing on the RTO stack (EP09) when the scrubber and the RTO are in operation, POET Biorefining – Laddonia, LLC shall track the beer feed rate (gallons per minute), the scrubber flow rate (gallons per minute), the scrubbing fluid, the scrubber pressure drop, the RTO operating temperature, and the natural gas combustion rate (mmscf/hr).
 - 3) During testing on the fluid bed cooler stack (EP10), POET Biorefining – Laddonia, LLC shall track the DDGS production (tph) and the baghouse pressure drop.
 - 4) During testing of the DDGS storage silo (EP11) and DDGS storage silo bypass (EP12), POET Biorefining – Laddonia, LLC shall track the DDGS handling rate (tph) and the baghouse pressure drop.
 - 5) During testing of the boilers (EP13 and EP14), POET Biorefining – Laddonia, LLC shall track the natural gas combustion rate of the unit being tested (mmscf/hr).
 - 6) During testing of DDGS loadout (EP20), POET Biorefining – Laddonia, LLC shall track the DDGS loadout rate (tph).
6. Control Device Requirements – Wet Scrubbers and RTO
- A. A wet scrubber (CE-08A or CE-08B) routed to an RTO (CE-11) shall be

SPECIAL CONDITIONS:

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

used to control VOC and HAP emissions from the fermentation process (seven fermentation tanks, one beer well, the slurry tank, and the yeast propagation tank) and the distillation process (beer stripper, rectifier, side stripper, 200 proof rundown tank, reboiler, regeneration tank, and 190 proof rundown tank) except under the following scenarios:

- 1) The installation may bypass both the wet scrubber and the RTO for a maximum of forty (40) hours in any consecutive 12-month period.
 - 2) The installation may bypass the RTO (CE-11) (i.e. using only scrubber control) for a maximum of five hundred (500) hours in any consecutive 12-month period.
- B. An RTO (CE-11) shall be used to control emissions from the DDGS dryers (EP-09) at all times.
- C. The scrubbers and any related instrumentation or equipment shall be operated and maintained in accordance with the manufacturer's specifications. The scrubber shall be equipped with a gauge or meter that indicates the pressure drop across the scrubber. The scrubber shall be equipped with a flow meter that indicates the flow through the scrubber. This gauge and meter shall be located in such a way they may be easily observed by Department of Natural Resources' personnel
- D. POET Biorefining – Laddonia, LLC shall monitor and record the operating pressure drop across the scrubbers and the flow rate through the scrubbers at least once every twenty-four (24) hours while the scrubber is in operation. The operating pressure drop shall be maintained within the normal operating range specified by the scrubber manufacturer. The liquid flow rate shall be maintained at a value greater than or equal to the average liquid flow rate recorded during the most recent performance test. The most recent sixty (60) months of record shall be maintained on-site and shall be made available to Missouri Department of Natural Resources' personnel upon request.
- E. The operating temperature of the RTO shall be continuously monitored and recorded during operations. The operating temperature of the RTO shall be maintained on a rolling 3-hour average within 50 degrees Fahrenheit of the average temperature of the oxidizer recorded during the compliance tests required in Special Condition 4 which demonstrated compliance with the emission limits. The acceptable temperature range may be reestablished by performing a new set of emission tests. The most recent sixty (60) months of records shall be maintained on-site and shall be made available to Missouri Department of Natural Resources' personnel upon request.

SPECIAL CONDITIONS:

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

- F. POET Biorefining – Laddonia, LLC shall maintain an operating and maintenance log for the scrubbers and the RTO which shall include the following:
- 1) Incidents of malfunction, with impact on emissions, duration of events, probable cause, and corrective actions: and
 - 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc: and
 - 3) A written record of regular inspection schedule, the date and results of all inspection including any actions or maintenance activities that results from that inspection.
7. PM₁₀ NAAQS and Increment
If a NAAQS or increment evaluation for this area should reveal a violation(s) of the NAAQS or increment in the immediate area of the installation and if it is further demonstrated that the installation is either the cause or is contributing to the violation(s), the Director may require the permittee to submit a corrective action plan to address the violation(s) or the portion of the violation(s) that is caused by the installation. This corrective action plan, if requested, shall be submitted within 30 days and shall be adequate to timely and significantly mitigate the emissions of PM₁₀ to address the situation causing the violation(s). The permittee shall implement any such corrective action plan immediately upon its approval by the Director. Failure to either submit or implement such a plan shall be a violation of this permit.
8. Acrolein Modeling Analysis Restrictions
POET Biorefining – Laddonia, LLC shall notify the Air Pollution Control Program before initial startup of any modifications to the facility design that could impact the release parameters specified in the Memorandums from the Modeling Unit. In the event the Air Pollution Control Program determines that the changes are significant, POET Biorefining – Laddonia, LLC shall submit an updated AAQIA to the Air Pollution Control Program that continues to demonstrate compliance with Missouri's Acrolein RAL.
9. Operating Hour Restrictions
- A. POET Biorefining – Laddonia, LLC shall only operate the DDGS transfer and loadout (EP20) between the hours of 5:00 AM to 9:00 PM daily.
 - B. POET Biorefining – Laddonia, LLC shall track the daily operating hours of DDGS transfer and loadout (EP20) to show compliance with Special Condition 9.A.

SPECIAL CONDITIONS:

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

10. Operational Restrictions
- A. POET Biorefining – Laddonia, LLC shall not transfer more than 50% of the total DDGS through the DDGS storage silo bypass (EP12) in any consecutive 12 month period.
- B. POET Biorefining – Laddonia, LLC shall track the DDGS through the storage silo bypass (EP12), the total DDGS processed through the installation, and the percentage of DDGS processed through the storage silo to show compliance with Special Condition 10.A.
11. Control Equipment – Baghouses
- A. POET Biorefining – Laddonia, LLC shall control emissions from the equipment listed below in Table 7 using baghouses as specified in the permit application.

Table 7: Equipment Controlled by Baghouses

Control ID No.	Emission Point	Description
CE-01	EP01	Corn receiving, transfer and storage
CE-02	EP02	Corn scalpers, conveyor, and surge bin
CE-03	EP03	Hammermill #1
CE-05	EP04	Hammermill #2
CE-05	EP05	Hammermill #3
CE-06	EP06	Hammermill #4
CE-07	EP07	Pneumatic Flour Receiver
CE-12	EP10	DDGS Fluid Bed Cooler
CE-13	EP11	DDGS Storage Silo
CE-14	EP12	DDGS Storage Silo Bypass Receiver

- B. The baghouses and any related instrumentation or equipment shall be operated and maintained in accordance with the manufacturer's specifications. The baghouse(s) shall be equipped with a gauge or meter that indicates the pressure drop across each baghouse. The gauge or meter shall be located in such a way it may be easily observed by Department of Natural Resources' personnel.
- C. Replacement bags for all baghouses shall be kept on hand at all times. The bags shall be made of fibers appropriate for operating conditions expected to occur (i.e. temperature limits, acidic and alkali resistance and abrasion resistance)

SPECIAL CONDITIONS:

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

- D. Visible emissions will be used as an indicator of the proper operation of the control device. During proper operation no visible emissions are expected from this emission unit. The existence of visible emissions will indicate a decrease in the efficiency of the control device and corrective actions shall be implemented.
- 1) Visible emissions from the exhaust shall be monitored on a daily basis when the processes are in operation.
 - 2) The duration of the observation shall be for a 2 minute time period.
 - 3) The condition of no visible emissions is considered normal for the baghouse exhaust. When visible emissions are noted from an exhaust, it shall be documented and corrective actions taken.
- E. The observation of visible emissions from the baghouse exhausts will be considered an excursion and corrective actions shall be implemented within a reasonable period. An excursion does not necessarily indicate a violation of the applicable requirement. When the level of excursions exceed three percent of the total number of observations in a six month period and corrective actions fail to return the emission unit to a no visible emission condition, then the permittee shall conduct source testing within 90 days of the last excursion to demonstrate compliance with 10 CSR 10-6.400. If the test demonstrate noncompliance with the above emission limitation, the permittee shall propose a schedule to implement further corrective actions to bring the source into compliance and demonstrate that compliance.
- F. POET Biorefining – Laddonia, LLC shall monitor and record the operating pressure drop across the baghouses at least once in every twenty-four (24) hour period when the associated equipment is in operation. The operating pressure drop shall be maintained within the normal operating range specified by the manufacturer's performance warranty. If the pressure drop reading shall fall outside of this normal operating range, then the associated equipment shall be shut down as quickly as is reasonably practical. Corrective actions shall be taken to address the cause of the non-normal pressure drop and the baghouses shall be returned to normal operation before restarting the equipment.
- G. POET Biorefining – Laddonia, LLC shall inspect the baghouses at least once every six (6) months and at a minimum, conduct the following activities:
- 1) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and

SPECIAL CONDITIONS:

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

- 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
12. Control Equipment – Multicyclones
 - A. POET Biorefining – Laddonia, LLC shall control emissions from the DDGS Dryer (EP09) using multicyclones (CE-09, CE-10). The multicyclones shall be operated and maintained in accordance with the manufacturer's specifications.
 - B. The multicyclones shall be equipped with a gauge or meter that indicates the pressure drop across the devices. POET Biorefining – Laddonia, LLC shall monitor and record the operating pressure drop across the multicyclones at least once every twenty-four (24) hours when the equipment is in operation. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.
 - C. POET Biorefining – Laddonia, LLC shall maintain an operating and maintenance log for the multicyclones which shall include the following:
 - 1) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
 - 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.' and
 - 3) A written record of regular inspection schedule, the date and results of all inspections, including any actions or maintenance activities that results from the inspection.
 13. Control Equipment – Flare
 - A. The flare must be in use at all times during denatured ethanol truck loadout (EP-15), except for the bypass condition described in Special Condition 13.B. The flare shall be operated and maintained in accordance with the manufacturer's specifications.
 - B. The flare may be bypassed for a loadout total of 2 million gallons of denatured ethanol during which time the uncontrolled emission rate shall be used for compliance with Special Condition 2.D.
 - C. POET Biorefining – Laddonia, LLC shall maintain an operating and maintenance log for the flare which shall include the following:
 - 1) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and

SPECIAL CONDITIONS:

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

- 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
 - 3) A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.
 - 4) A written record of the total number of hours the flare is bypassed, including the date and time of the bypass.
14. Pavement of Haul Roads
- A. POET Biorefining – Laddonia, LLC shall pave all of the haul roads (FS-02) with materials such as asphalt, concrete, and/or other material(s) after receiving approval from the Program. The pavement shall be applied in accordance with industry standards for such pavement so as to achieve “Control of Fugitive Emissions” while the plant is operating.
 - B. Maintenance and/or repair of the surfaces will be conducted as necessary to ensure that the physical integrity of the pavement is adequate to achieve control of fugitive emissions from these areas while the plant is operating.
 - C. POET Biorefining – Laddonia, LLC shall periodically water, wash, and/or otherwise clean all of the paved portions of the haul road as necessary to achieve control of fugitive emissions from these areas while the plant is operating.
15. Operational Restrictions
- POET Biorefining – Laddonia, LLC shall only operate rail loadout using railcars in dedicated service. If the installation decides to use railcars that are not in dedicated service, a new permit review will be required.
16. Record Keeping and Reporting Requirements
- A. POET Biorefining – Laddonia, LLC shall maintain all records required by this permit for not less than five years and shall make them available to any Missouri Department of Natural Resources’ personnel upon request. These records shall include SDS for all materials used.
 - B. POET Biorefining – Laddonia, LLC shall report to the Air Pollution Control Program’s Compliance/Enforcement Section, by mail at P.O. Box 176, Jefferson City, MO 65102 or by email at AirComplianceReporting@dnr.mo.gov, no later than 10 days after the end of the month during which any record required by this permit shows an exceedance of a limitation imposed by this permit.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (6) REVIEW

Project Number: 2018-05-046
Installation ID Number: 007-0054
Permit Number: 042019-015

Installation Address:

POET Biorefining – Laddonia, LLC
809 North Pine
Laddonia, MO 63352

Audrain County, S36, T52N, R7W

REVIEW SUMMARY

- POET Biorefining – Laddonia, LLC has applied for authority to increase ethanol production.
- The application was deemed complete on August 23, 2018
- HAP emissions are expected from the equipment. HAPs are emitted from the fermentation and distillation processes, DDGS production, wet cake production, natural gas combustion, denatured ethanol loadout, storage tanks, and equipment leaks. The primary HAPs of concern are acrolein, hexane, acetaldehyde, methanol, formaldehyde, benzene, and toluene.
- 40 CFR Part 60, Subpart Dc – *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units* applies to Boiler #1 (EP13) and Boiler #2 (EP14).
- 40 CFR Part 60, Subpart Kb – *Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984* applies to the 250,000 gallon Denaturant (Gasoline) Storage Tank (TK01), 250,000 gallon 190-Proof Ethanol Storage Tank (TK02), 250,000 gallon Denaturant (Gasoline) Storage Tank (TK03), 1,500,000 gallon 200-Proof/Anhydrous Ethanol Storage Tank (TK04), and 1,500,000 gallon 200-Proof/Anhydrous Ethanol Storage Tank (TK05).
- 40 CFR Part 60, Subpart DD – *Standards of Performance for Grain Elevators* is not applicable to the installation. Although the installation does handle grain, the installation does not meet the definitions of grain terminal elevator or grain storage elevator in §60.300. The installation is not a grain storage elevator as they are not a wheat flour mill, wet corn mill, dry corn mill, rice mill, or soybean oil extraction plant.

- The installation is not a grain terminal elevator as permanent storage capacity does not exceed 2.5 million bushels. The installation has a permanent storage capacity of 2,425,000 bushels.
- 40 CFR Part 60, Subpart VVa – *Standards of Performance for Equipment Leaks for VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006* applies to VOC Equipment Leaks from Fermentation and Distillation Processes (FS03) and VOC Equipment Leaks from Storage Tanks (FS04).
- 40 CFR Part 60, Subpart XX – *Standards of Performance for Bulk Gasoline Terminals* is not applicable to the installation. The installation does not meet the definition of bulk gasoline terminal at §60.501 as the installation does not receive gasoline by pipeline, ship or barge, and does not have a gasoline throughput greater than 75,700 liters per day.
- 40 CFR Part 60, Subpart III – *Standards of Performance for VOC Emissions From the SOCM I Air Oxidation Unit Processes* is not applicable to the installation. This regulation applies to air oxidation reactors per §60.610(b). The installation does not operate any air oxidation reactors.
- 40 CFR Part 60, Subpart NNN - *Standards of Performance for Volatile Organic Compound Emissions from SOCM I Distillation Operations* is not applicable to the installation. Ethanol is listed as a chemical affected by NSPS NNN; however, background documentation created during the development of the standard indicates creation of ethanol by fermentation (biological synthesis) was excluded from the scope of NSPS NNN.
- 40 CFR Part 60, Subpart RRR - *Standards of Performance for Volatile Organic Compound Emissions from SOCM I Reactor Processes* is not applicable to the installation. Ethanol is listed as a chemical affected by NSPS RRR; however, background documentation created during the development of the standard indicates creation of ethanol by fermentation (biological synthesis) was excluded from the scope of NSPS RRR.
- 40 CFR Part 63, Subpart Q – *National Emission Standards for HAP from Industrial Process Cooling Towers* is not applicable to the installation. The installation does not use chromium-based water treatment chemical in CWT Cooling Tower; therefore, the installation does not meet the applicability requirements of §63.400(a).
- 40 CFR Part 63, Subpart R – *National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations)* is not applicable to the installation. The installation does not meet the definition of bulk gasoline terminal at §63.421 as the installation does not receive gasoline by pipeline, ship or barge, and does not have a gasoline throughput greater than 75,700 liters per day.

- 40 CFR Part 63, Subpart EEEE – *National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)* is not applicable to the installation. The installation is not a major source of HAPs.
- 40 CFR Part 63, Subpart FFFF – *National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing* is not applicable to the installation. The installation is not a major source of HAPs.
- 40 CFR Part 63, Subpart DDDDD – *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters* is not applicable to the installation. The installation is not a major source of HAPs.
- 40 CFR Part 63, Subpart BBBB – *National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities* is not applicable to the installation. The installation does not meet the definition of bulk gasoline plant or bulk gasoline terminal at §63.11100 as the installation does not have a gasoline throughput greater than 20,000 gallons per day.
- 40 CFR Part 63, Subpart CCCCC – *National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities* is not applicable to the installation because this installation is not a Gasoline Dispensing Facility as defined under this subpart. The gasoline stored in the denaturant storage tanks (TK01 and TK03) is not dispensed into the fuel tank of a motor vehicle, motor vehicle engine, nonroad vehicle, or nonroad engine, including a nonroad vehicle or nonroad engine used solely for competition. The gasoline stored in these tanks is not dispensed into on- and off-road, street, or highway motor vehicles, lawn equipment, boats, test engines, landscaping equipment, generators, pumps, and other gasoline-fueled engines and equipment.
- 40 CFR Part 63, Subpart JJJJJ – *National Emission Standards for HAP from Industrial, Commercial, and Institutional Boilers Area Sources* is not applicable to the installation. §63.11195(e) exempts gas-fired boilers.
- 40 CFR Part 63, Subpart VVVVV – *National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources* is not applicable to the installation. The installation does generate some acetaldehyde as a byproduct; however, the concentration of acetaldehyde in each liquid stream (process or waste) and continuous process vent are less than 0.1 wt%; therefore, the installation does not meet the applicability requirements of §63.11494(a)(2)(iii). Data from POET's Alexandria, Indiana plant indicates that the concentration of acetaldehyde is 0.003 wt% in the beerwell, 0.009 wt% in the scrubber bottoms, 0.0001 wt% in the beer stripper bottoms, and 0.027 wt% in the 200-proof storage tank. Stack testing performed in May 2016 on CE08 Packed Bed Wet Scrubber Inlet indicates concentrations of <200 ppmv.

- 40 CFR Part 63, Subpart DDDDDDD – *National Emission Standards for Hazardous Air Pollutants for Area Sources: Prepared Feeds Manufacturing* is not applicable to the installation. The installation does not add any material containing chromium or manganese to their DDGS.
- Baghouses are being used to control particulate emissions from EP01, EP02, EP03, EP04, EP05, EP06, EP07, EP10, EP11, and EP12. A packed bed wet scrubber is being used to control VOC and HAP emissions from EP08. Multicyclones are being used to control filterable particulate emissions from EP09. An RTO is being used to control condensable particulate, VOC, and HAP emissions from EP09. A flare is being used to control VOC and HAP emissions from EP15 and EP16. LDAR is being used to control VOC and HAP emissions from FS03 and FS04 as required by NSPS VVa.
- This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060 *Construction Permits Required*. Potential emissions increases of PM and VOC for the project are above de minimis levels. Potential emissions increases of PM₁₀, PM_{2.5}, and NO_x for the project are conditioned below the de minimis levels.
- This installation is located in Audrain County, an attainment/unclassifiable area for all criteria pollutants.
- Ethanol production facilities that produce ethanol by natural fermentation under NAICS codes 325193 or 312140 are not included in the chemical process plant category at §52.21(b)(1)(i)(a) or §52.21(b)(1)(iii); however, the exclusion for NAICS codes 325193 or 312140 has not been approved into Missouri's State Implementation Plan. The major source threshold for the installation is 100 tons per year and fugitive emissions count towards major source applicability.
- Ambient air quality modeling was performed to determine the ambient impact of acrolein and PM₁₀.
- Ambient air quality modeling for PM_{2.5} and NO_x was not performed as potential emissions of the application are conditioned below de minimis levels. Ambient air quality modeling for VOC was not performed as no model is currently available which can accurately predict ambient ozone concentrations caused by this installation's VOC emissions. Ambient air quality modeling of PM was not performed as there is no currently promulgated PM NAAQS. Ambient air quality modeling of acetaldehyde, formaldehyde, methanol, hexane, benzene, and toluene was not performed as potential emissions of the application are below Missouri's SMALs.
- CO, total PM, NO_x, VOC, combined HAP, acetaldehyde, acrolein, formaldehyde, and methanol testing are required by conditions of this permit.

- The special conditions contained within this permit shall either be included in the installation's Part 70 operating permit renewal application, which is required to be submitted between October 4, 2018 and October 4, 2019, or if the Part 70 operating permit renewal has already been submitted, the installation shall submit an update to the Part 70 operating permit renewal application within one (1) year after issuance of this construction permit.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

POET Biorefining operates an ethanol production plant in Laddonia, MO. Up to 25 million bushels of grain per year are processed to produce 200 proof ethanol. The grain is received and stored on site prior to cleaning and milling. The grain handling equipment is enclosed and vented to a baghouse with negative pressure. Once the grain is cleaned, it is then ground with hammermills. Emissions from each of the four hammermills and grain cleaners are controlled by a baghouse with negative pressure. The milled grain is then blended with water and enzymes to form a mash slurry for the fermentation process. Yeast and more enzymes are added to this mash in the fermentation tanks.

Emissions from the fermentation process are normally controlled by both a scrubber and an RTO. When the scrubber is bypassed, emissions from the fermentation process vent directly to atmosphere. When the RTO is bypassed, emissions from the scrubber are vented to the atmosphere. After batch fermentation, the resultant ethanol mixture (beer) is distilled in a series of distillation columns. The resultant products are approximately 190 proof ethanol and whole stillage. Using molecular sieves, most of the remaining water is removed from the ethanol to produce 200 proof ethanol. This is then combined with natural gasoline (denaturant) and shipped as denatured ethanol. Emissions from the distillation process are controlled by a scrubber and an RTO. When the scrubber is bypassed, emissions from the distillation process vent directly to atmosphere. When the RTO is bypassed, emissions from the scrubber are vented to the atmosphere. Scrubber bypass is limited to 40 hours per year. RTO bypass is limited to 500 hours per year.

The whole stillage is centrifuged to yield thin stillage and solid fractions (wet cake). Emissions from the centrifuge are vented to the RTO. The thin stillage is further evaporated in a series of evaporators to produce a syrup. This syrup is combined with the centrifuged wetcake and dried and cooled in a series of ring driers to produce DDGS.

Two ring dryers are used to dry the DDGS. The air and water vapor from this process go through cyclones to collect additional DDGS product which has an added benefit of

reducing the DDGS dust load before being vented to the RTO. The installation is prohibited from operating the DDGS dryers during RTO bypass. The DDGS is stored and then loaded onto trucks or railcars for distribution. The DDGS loadout system is controlled by a baghouse to minimize emissions. Process steam is produced by two natural gas-fired boilers, each rated at 100 MMBtu/hr. Additional steam is also supplied by one heat recovery steam generator that is associated with a natural gas fired turbine operated by the Missouri Joint Municipal Electric Utility Commission (MJMEUC, see Project 2006-06-002). MJMEUC had previously been determined to be a separate source than the ethanol plant. Although the two installations are located adjacent to each other, the other requirements are not met for the two installation to be considered a single source. MJMEUC and the ethanol plant belong to two (2) separate industrial groupings. In addition, there is no common control between the two installations. A more detailed explanation can be found in Permit No. 092006-009 (Project 2006-06-002).

A 250,000-gallon storage tank is available for 190 proof ethanol (TK-02). The 200 proof ethanol is stored in two 1,500,000 gallon ethanol storage tanks (TK-04, TK-05). Denaturant (gasoline) is stored in two 250,000 gallon tank (TK-01, TK-03). The 200 proof ethanol is mixed with the denaturant at the truck and rail loadouts for delivery to customers through the loadout system. Emissions from truck loadout are controlled by a flare. Emissions from the rail loadout are uncontrolled.

The following New Source Review permits have been issued to POET Biorefining - Laddonia from the Air Pollution Control Program:

Table 7: Permit History

Permit Number	Description
022003-004	Installation of a new 30 million gallon ethanol plant. However, the plant was never constructed
022003-004A	Extension of time to construct for the ethanol plant.
102005-015	Installation of a new 56 million gallon ethanol plant. This permit replaces Permit No. 022003-004.
102005-015A	Increasing the production of the ethanol plant from 56 million to 68 million gallons
102005-015B	Supplement raw materials
102005-015C	Removal of acrolein limit
102017-014	Installation of a new fermentation tank

PROJECT DESCRIPTION

In October 2017, the installation was issued a permit (No. 102017-014) for the installation of a seventh 570,000 gallon fermentation tank. At that time, the installation did not request to increase its denatured ethanol production limit of 68 million gallons per year. The addition of Fermenter #7 increased the efficiency of the plant and the installation would now like to increase the maximum annual production of denatured ethanol from 68 million gallons to 74 million gallons per year. No additional equipment

is being installed. Since the increase in production is directly due to the addition of the fermentation tank, this project is considered to be the same project as Permit No. 102017-014.

EMISSIONS/CONTROLS EVALUATION

Potential emissions of the installation were calculated using the following methods.

Grain Receiving/DDGS Loadout Fugitives (FS01)

Particulate fugitive emissions from grain receiving and DDGS loadout were calculated from emission factors in AP-42, Chapter 9.9.1, *Grain Elevator and Processes*, (5/2003), assuming that 38.67% of the emissions are emitted as fugitive. This percentage is calculated from mass balances using the stack emissions from the grain receiving baghouse (EP01), the 99% default control efficiency from the baghouse, and the uncontrolled emission factors from AP-42, Chapter 9.9.1.

Paved Haul Roads (FS02)

Particulate emissions from haul roads were calculated using equations in EPA document AP-42, Chapter 13.2.1, *Paved Roads*, (1/2011).

Equipment Leaks (FS03 and FS04)

VOC emissions were calculated using emission factors from EPA document "Protocol for Equipment Leak Emission Estimates," 11/1995. HAP emissions, specifically acetaldehyde, formaldehyde, methanol, and acrolein were calculated using the VOC emissions and applying the vapor fraction in undenatured ethanol or the scrubber inlet, depending on where the equipment is located. Fugitive leaks will be controlled in accordance with NSPS, 40 CFR Part 60, Subpart VVa.

Wet Cake Production (FS05)

There will be VOC and HAPs emissions, specifically methanol, from storage and loadout of wet cakes due to the VOC and HAPs content in the wet cakes. Emissions were calculated using mass balances assuming an annual maximum production of 45,000 tons per year of wet cake and the VOC and HAPs content report from various sources. VOC content was taken from tests performed at POET's Macon facility. Methanol content was taken from laboratory reports from 2015. Acrolein has not been detected in wet cakes.

Corn Receiving, Transfer and Loading (EP01), Corn Scalper, Conveyor and Storage Bin (EP02), Hammermills 1, 2, 3, and 4 (EP03-06), Pneumatic Flour Conveyor/Receiver (EP07)

Equipment are controlled by baghouses. Particulate emissions were calculated using the limits in Permit No. 102005-015, which will be continued in this current permit. The limits in Permit No. 102005-015 are for PM₁₀. There are no PM_{2.5} or PM limits in Permit No. 102005-015 since PM_{2.5} and PM emissions were not required to be calculated at the time of permit issuance. For this permit, the emissions from the project were calculated assuming that PM_{2.5}, PM₁₀, and PM emissions are all below the PM₁₀ limit in Permit No.

102005-015. Therefore, the PM₁₀ limit in Permit No. 102005-015 are now for PM_{2.5} and PM in this permit as well.

Fermentation and Distillation Equipment, Centrifuges and DDGS Dryer (EP08 for Bypass Stack, EP09 for Equipment)

The fermentation process includes seven fermentation tanks, one beer well, a slurry tank, and the yeast propagation tank. The distillation process includes four evaporators, a beer stripper, rectifier, side stripper, 200 proof rundown tank, reboilers, regeneration tank, and 190 proof rundown tank. The whole stillage from the beer stripper goes to five (5) centrifuges which separate the whole stillage into thin stillage. The thin stillage goes to the evaporators, which condenses the material into syrup. The wet cake produced is sent to the DDGS dryers.

Emissions from the fermentation and distillation process are controlled by one of two scrubbers followed by a downstream RTO. The fermentation and scrubber equipment are allowed to operate for up to 40 hours without the scrubber and the RTO and up to 500 hours with only scrubber as control. Emissions from DDGS dryers are controlled by a cyclone routed to the same RTO. The centrifuges are allowed 500 hours of operations without RTO control. The DDGS dryers cannot operate during RTO bypass. The installation intends to install a second redundant fermentation scrubber. The two scrubbers would be used interchangeably and only one scrubber would be used at a time.

Emissions are expected from both the processes as well as combustion of fuel from the dryers and RTO. VOC and HAPs emissions were calculated using previous stack testing results scaled up to the new maximum processing rates. PM_{2.5}, PM₁₀, PM, and NO_x emissions were calculated from the installation's proposed limits. SO_x emissions from combustion were calculated from emission factors in AP-42, Chapter 1.4, *Natural Gas Combustion*, July 1998. VOC and HAPs emissions from combustion were calculated using emission factors from the same AP-42 chapter.

DDGD Fluid Bed Cooler (EP10), DDGS Silo (EP11), DDGS Silo Bypass (EP12)

VOC, HAPs and particulate emissions are expected from the fluid bed cooler, the DDGS silo and the DDGS silo bypass. All of the particulate emissions were calculated using the limit in Permit No. 102005-015, which will be continued in this current permit. HAPs/VOC emissions were calculated using testing data from similar installations.

VOC and HAPs emissions from the fluid bed cooler were calculated using data from a previous stack test (2016).

Boiler No. 1 (EP13) and Boiler No. 2 (EP14)

All combustion emissions, except for NO_x, were calculated using emission factors from AP-42, Chapter 1.4, *Natural Gas Combustion*, July 1998. NO_x emissions were calculated using the NO_x limit in the installation's previous permit, which will continue to be used in the current permit.

Denatured Ethanol Truck Loadout (EP15) and Rail Loadout (EP16), Flare for Truck Loadout

For both truck loadout and rail loadout, the uncontrolled VOC emissions were calculated using equation in AP-42, Chapter 5.2, *Transportation and Marketing of Petroleum Liquids*, July 2008. Individual HAP emissions were calculated using the VOC emissions multiplied by the HAPs content in denatured ethanol, supplied by the installation. For truck loadout, the VOC and HAPs emissions are controlled by a flare. The installation is allowed to bypass the flare for 2 MMgal/year of denatured ethanol. The flare is given a capture efficiency of 98.7%, which is based on trucks passing the NSPS-level annual leak test, and a device efficiency of 99.23%, which is based on previous stack testing results (2016). VOC and HAPs emissions from the rail loadout are not controlled by any devices, so no control efficiencies are given.

The flare is not required for the rail loadout (EP16) because the facility is using dedicated railcars. If the facility decides, in the future, to use railcars that are not in dedicated service, then a new permit review will be required.

DDGS Transfer and Loading (EP20)

PM_{2.5}, PM₁₀, and PM emissions from DDGS Truck and Rail Loadout were calculated using emission factors from AP-42, Chapter 9.9.1, *Grain Elevator and Processes*, April 2003. VOC/HAP emissions were calculated from testing data at similar facilities.

Storage Tank Emissions (TK01, TK02, TK03, TK04, and TK05)

VOC emissions from the various storage tanks were calculated using the EPA TANKS 4.0.9d program. Individual HAP emissions, which includes acrolein, acetaldehyde, methanol, and formaldehyde, were calculated by taking the VOC emissions and multiplying by the HAPs content.

Cooling Tower (CWT)

Particulate emissions were calculated from mass balances using water circulation flow (18,500 gpm), drift loss (0.005%), and the total dissolved solids content (1500 ppm).

Emissions from the project were calculated using the Potential Emissions (PTE) minus the Baseline Actual Emissions (BAE). The BAE were calculated using the same method as the potential emissions with the throughputs from the years 2016 and 2017. For the new installation conditioned potential, the following applies:

- For PM_{2.5}, the installation is limited to less than 44.96 tpy to avoid NAAQS modeling requirements. The Baseline Actual Emissions were calculated to be 34.96 tpy. If the facility is limited to a de minimis level (10.0) tpy increase in PM_{2.5} emissions, then no modeling is required.
- For PM₁₀, modeling was performed due to the facility's request to increase the emission rate from EP09, which would have affected previous modeling results. However, the installation is still limited to 50 tpy of PM₁₀ to avoid an emissions increase from this project.
- For PM, SO_x, and CO, the PTE of the installation were calculated during this project and does not factor in the PM_{2.5} and PM₁₀ conditioned potential limits.
- VOC and HAPs emissions were limited to less than 100 tpy and 10.0/25.0 tpy, respectively, so that the facility will not be considered a major source.
- For NO_x, the installation is limited to 64.98 tpy. The BAE was calculated to be 24.98 tpy. If the facility is limited to a de minimis level (40.0) tpy of increase, then no modeling is required.

Table 8: Emissions Summary (tpy)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2017 EIQ)	Project Emissions Increase ¹ (PTE-BAE)	New Installation Conditioned Potential
PM	25.0	¹ N/D	N/D	² 35.97	99.28
PM ₁₀	15.0	<50.0	37.77	33.56	<50.0
PM _{2.5}	10.0	N/D	N/D	32.25	<44.96
SO _x	40.0	1.22	0.48	N/A	1.22
NO _x	40.0	85.8	44.91	60.46	<64.98
VOC	40.0	<100.0	62.21	64.91	<100.0
CO	100.0	<100.0	55.73	N/A	<100.0
GHG (CO ₂ e)	N/A	N/D	N/D	182,461.40	182,461.40
GHG (mass)	N/A	N/D	N/D	181,390.30	181,390.30
HAPs	10.0/25.0	<10.0/25.0	2.58	6.53	<10.0/25.0

N/A = Not Applicable; N/D = Not Determined

Note 1: Project emissions increases are unconditioned (i.e. not based on permit limits).

Note 2: PM emissions were not calculated in previous projects. However, the total PM emissions after this modification is calculated to be 99.28 tpy and it can be concluded that the PM emissions before this modification is less than the major source level of 100 tpy.

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of PM and VOC are above the de minimis level but below major source levels.

APPLICABLE REQUIREMENTS

POET Biorefining – Laddonia, LLC shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Operating Permits*, 10 CSR 10-6.065
- *Start-Up, Shutdown, and Malfunction Conditions*, 10 CSR 10-6.050
- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110
 - Per 10 CSR 10-6.110(4)(B)2.B(II) and (4)(B)2.C(II) a full EIQ is required for the first full calendar year the equipment (or modifications) approved by this permit are in operation.
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Restriction of Emission of Odors*, 10 CSR 10-6.165

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400

- *New Source Performance Regulations, 10 CSR 10-6.070*
 - *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units, applies to Boiler No. 1 (EP13) and Boiler No. 2 (EP14), 40 CFR Part 60, Subpart Dc*
 - *Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced After July 23, 1984, applies to the 250,000 gallon denaturant storage tank (TK01), the 250,000 gallon 190-proof ethanol storage tank (TK02), the 250,000 gallon denaturant (gasoline) storage tank (TK03), the two 1,500,000 gallon 200-proof/anhydrous ethanol storage tank (TK04 and TK05), 40 CFR Part 60, Subpart Kb*
 - *Standards of Performance for Equipment Leaks for VOC in the Synthetic Organic Chemical Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006, applies to the VOC equipment leaks from fermentation and distillation (FS03) and the VOC equipment leaks from the storage tanks (FS04), 40 CFR Part 60, Subpart VVa*
- *Control of Sulfur Dioxide Emissions, 10 CSR 10-6.261*
- *Restriction of Particulate Matter Emissions From Fuel Burning Equipment Used for Indirect Heating, 10 CSR 10-6.405*

AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality modeling was performed to determine the ambient impact of acrolein and PM₁₀. Acrolein modeling is required because the emissions increase from this project is greater than the SMAL. PM₁₀ modeling is required because the emission rate from the DDGS Dryers/Centrifuges/RTO stack (EP-09, CE-11) is being increased from 6.5 lb/hr to 8.5 lb/hr. The original emission rate of 6.5 lb/hr was needed due to modeling.

For acrolein annual RAL, three separate scenarios were modeled.

- Scenario 1: All emission sources of acrolein were run at their maximum annual averaged emission rates except the following:
 - 100% of the DDGS were transferred by EP11 (SV-11, DDGS Storage Silo) and 0% of DDGS was transferred by EP12 (SV-12, DDGS Storage Silo Bypass)
 - Emissions from EP20 (DDGS Transfer & Loadout) and FS001 (DDGS Loadout Fugitive) were limited to operating from 5:00 am to 9:00 pm daily.

- Emissions from EP08, SV08 (Scrubber stack) were averaged based on 500 hours of operation per year.
 - Emissions from EP08, FERMVENT (Fermentation Stack) were averaged based on 40 hours of operation per year.
 - Emissions from EP09 (CENTVENT – Centrifuge Stack) were averaged based on 500 hours of operation per year.
- Scenario 2: All emission sources of acrolein were modeled the same as Scenario 1 except the following:
 - 100% of the DDGS were transferred by EP12 (SV-12, DDGS Storage Silo Bypass) and 0% were transferred by EP11 (SV-11, DDGS Storage Silo)
 - Scenario 3: All emission sources of acrolein were modeled the same as Scenario 1 except the following:
 - 50% of the DDGS were transferred by EP11(SV-11, DDGS Storage Silo) while 50% of the DDGS were transferred by EP12 (SV-12, DDGS Storage Silo Bypass)

Out of the three (3) scenarios modeled, only two passed. Scenario 1 and 3 passed but scenarios 2 did not. Therefore, this permit requires that the installation limit the DDGS through the silo bypass (EP12) to less than 50%.

With the exception of the increased emission rate from stack EP-09, PM₁₀ modeling was performed using the same method as in Permit No. 102005-015.

Table 9: Modeling Results

Pollutant	Modeled Impact	RAL/NAAQS	Time Period
Acrolein	0.55	0.55	24-Hour
Acrolein (Scenario 2)	0.02	0.02	Annual
Acrolein (Scenario 3)	0.02	0.02	Annual
PM ₁₀	92.70	150.00	24-hour
PM ₁₀	12.81	50.0	Annual

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (6), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, it is recommended that this permit be granted with special conditions.

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated February 22, 2018, received May 21, 2018 designating Parent as the owner and operator of the installation.

Attachment A – PM_{2.5}/PM₁₀ Compliance Worksheet

POET Biorefining – Laddonia, LLC
 Audrain County, S36, T52N, R7W
 Project Number: 2018-05-046
 Installation ID Number: 007-0054
 Permit Number: **042019-015**

This sheet covers the period from _____ to _____ for _____
(month, year) (month, year) (PM_{2.5} or PM₁₀)

Emission Point	Control Device	Monthly Usage	PM _{2.5} /PM ₁₀ Emission Factors ¹	Emission Factor Methods/Sources ²	Monthly PM _{2.5} /PM ₁₀ Emission ⁵ (tons)
Grain Receiving, Transfer, and Loading(EP01)	Baghouse (CE01)	tons grain received	0.0011 lb/ton	May 2016 Stack Test	
	SSM ³	tons grain received	0.18 lb/ton	AP-42 Section 9.9.1 "Grain (5/2003)	
Grain Scalper, Conveyor, and Surge Bin (EP02)	Baghouse (CE02)	tons grain received	0.000068 lb/ton	May 2016 Stack Test	
	SSM ³	tons grain received	0.061 lb/ton	AP-42 Section 9.9.1 "Grain (5/2003)	
Hammermill #1 (EP03)	Baghouse (CE03)	tons grain received	0.00567 lb/ton	May 2016 Stack Test	
	SSM ³	tons grain received	0.56735 lb/ton	Back calculated assuming 99% baghouse control	
Hammermill #2 (EP04)	Baghouse (CE04)	tons grain received	0.00567 lb/ton	May 2016 Stack Test	
	SSM ³	tons grain received	0.56735 lb/ton	Back calculated assuming 99% baghouse control	
Hammermill #3 (EP05)	Baghouse (CE05)	tons grain received	0.00567 lb/ton	May 2016 Stack Test	
	SSM ³	tons grain received	0.56735 lb/ton	Back calculated assuming 99% baghouse control	
Hammermill #4 (EP06)	Baghouse (CE06)	tons grain received	0.00567 lb/ton	May 2016 Stack Test	
	SSM ³	tons grain received	0.56735 lb/ton	Back calculated assuming 99% baghouse control	
Pneumatic Flour Conveyor/Receiver (EP07)	Baghouse (CE07)	tons grain received	0.0001 lb/ton	May 2016 Stack Test	
	SSM ³	tons grain received	0.00952 lb/ton	Back calculated assuming 99% baghouse control	
Packed Wet Scrubber, (2) DDGS Dryers ⁴ ,	Multicyclones (CE09, CE10) and RTO (CE11)	Tons DDGS	0.378 lb/ton DDGS	March 2018 Stack Test	

Emission Point	Control Device	Monthly Usage	PM _{2.5} /PM ₁₀ Emission Factors ¹	Emission Factor Methods/Sources ²	Monthly PM _{2.5} /PM ₁₀ Emission ⁵ (tons)
and (5) Centrifuges (EP09 CE08)	RTO (CE11) only during CE09 and CE10 Multicyclone SSM periods	Tons DDGS	0.435 lb/ton DDGS	Back calculated from controlled emission factor, assuming a control efficiency of 50% for filterables	
	RTO SSM	Tons DDGS	0.378 lb/ton DDGS	March 2018 Stack Test	
EP10 DDGS Fluid Bed Cooler	Baghouse (CE12)	tons DDGS produced	0.00832 lb/ton	May 2016 Stack Test	
	SSM ³	tons DDGS produced	0.832 lb/ton	Back calculated from controlled emission factor, assuming a control efficiency of 99%	
EP11 DDGS Silo	Baghouse (CE13)	tons DDGS produced	0.00043 lb/ton	May 2016 Stack Test	
	SSM ³	tons DDGS produced	0.0432 lb/ton	Back calculated from controlled emission factor, assuming a control efficiency of 99%	
EP12 DDGS Silo Bypass	Baghouse (CE14)	tons DDGS produced	0.00011 lb/ton	May 2016 Stack Test	
	SSM ³	tons DDGS produced	0.0108 lb/ton	Back calculated from controlled emission factor, assuming a control efficiency of 99%	
EP13 Boiler #1 and EP14 Boiler #2		MMscf natural gas combusted	7.6 lb/MMscf	AP-42 Section 1.4 "Natural Gas Combustion" (July 1998)	
EP20 DDGS Transfer and Loading		tons DDGS produced	0.0049 lb/ton for PM _{2.5} and 0.029 lb/ton for PM ₁₀	AP-42 Section 9.9.1 "Grain Elevators & Processes" (May 2003)	
FS01 Grain Receiving Fugitives		tons grain received	0.00387 lb/ton for PM _{2.5} and 0.0228 lb/ton for PM ₁₀	AP-42 Section 9.9.1 "Grain Elevators & Processes" (May 2003) and an estimated 38.67% fugitives	
FS02 Paved Haul Roads		Mgal anhydrous ethanol produced	0.00732 lb/Mgal for PM _{2.5} and 0.0294 lb/Mgal for PM ₁₀	AP-42 Section 13.2.1 "Paved Roads" (January 2011)	
CWT Cooling Tower				AP-42 Section 13.4 "Wet Cooling Towers" (January 1995) and Reisman and Frisbie's "Calculating Realistic PM ₁₀ Emissions from Cooling Towers" (2002)	0.04 for both PM _{2.5} and PM ₁₀

Emission Point	Control Device	Monthly Usage	PM _{2.5} /PM ₁₀ Emission Factors ¹	Emission Factor Methods/Sources ²	Monthly PM _{2.5} /PM ₁₀ Emission ⁵ (tons)
Installation-Wide Monthly PM_{2.5}/PM₁₀ Emissions⁶ (tons):					
Installation-wide 12-Month Rolling Total PM_{2.5}/PM₁₀ Emissions⁷ (tons):					

Note 1: EF for both PM_{2.5} and PM₁₀ shall be the sum of the filterable and condensable PM emissions. The installation calculated the baseline actual emissions using the assumption that PM=PM_{2.5}=PM₁₀. Therefore, the actual emissions calculations shall be performed using the same assumption. The exception are the emissions calculated using AP-42 emission factors where the particulates were speciated, specifically EP20, FS01, and FS02.

Note 2: Emission factors based on stack testing may be updated upon performance of a new stack test and approval of the stack test results by the Missouri Air Pollution Control Program. Out of all the stack tests, the highest value obtained shall be used. The emission factors are the stack tested emission rates (in lb/hr) divided by the usage rates obtained during the tests.

Note 3: The permittee shall submit an SSM report as required by 10 CSR 10-6.050 for any SSM event that exceeds one hour.

Note 4: Special Condition 6 prohibits the installation from operating the DDGS Dryers while the RTO is down; Therefore, there are no PM_{2.5} and PM₁₀ emissions expected from this emission source when RTO is down. However, if the RTO is still in startup or malfunction, then there would be PM_{2.5} and PM₁₀ emissions.

Note 5: Monthly PM_{2.5}/PM₁₀ Emissions (tons) = Monthly Usage x PM_{2.5}/PM₁₀ Emission Factor x 0.0005 (ton/lb).

Note 6: Installation-wide Monthly PM_{2.5}/PM₁₀ Emissions (tons) = the sum of each emission source's Monthly Emissions (tons).

Note 7: Installation-wide 12-Month Rolling Total PM_{2.5}/PM₁₀ Emissions (tons) = the sum of the 12 most recent Installation-wide Monthly Emissions (tons).

Installation-wide 12-Month Rolling Total PM_{2.5} and PM₁₀ Emissions of less than 44.96 tons and 50.0 tons, respectively, indicates compliance with Special Condition 2.A. and 2.B.

Attachment B – NO_x Compliance Worksheet

POET Biorefining – Laddonia, LLC
 Audrain County, S36, T52N, R7W
 Project Number: 2018-05-046
 Installation ID Number: 007-0054
 Permit Number: 042019-015

This sheet covers the period from _____ to _____.
 (month, year) (month, year)

Emission Source		Monthly Usage	NO _x Emission Factor	Emission Factor Source ¹	Monthly NO _x Emissions (tons) ²
Packed Wet Scrubber (EP09 CE08), (2) DDGS Dryers ³ , and (5) Centrifuges	Multicyclone (CE09, CE10) RTO (CE11)	Mgal beer Produced	0.12 lb/Mgal	March 2018 Stack Test	
Boiler #1 and Boiler #2 (EP13 and EP14)		MMscf natural gas combusted	0.256 lb/MMBtu	May 2016 Stack Test	
Denatured Ethanol Truck Loadout (EP15) Flare		AP-42 Section 13.5 "Industrial Flares" (February 2018)			0.003
Installation-wide Monthly NO_x Emissions⁴ (tons):					
Installation-wide 12-Month Rolling Total NO_x Emissions⁵(tons):					

Note 1: Emission factors based on stack testing may be updated upon performance of a new stack test and approval of the stack test results by the Missouri Air Pollution Control Program. Out of all the stack tests, the highest value obtained shall be used. The emission factors are the stack tested emission rates (lb/hr) divided by the usage rate obtained during the tests.

Note 2: Monthly NO_x Emissions (tons) = Monthly Usage x NO_x Emission Factor x 0.0005 (ton/lb).

Note 3: Special Condition 6 prohibits the installation from operating the DDGS Dryers while the RTO is down; Therefore, there are no NO_x emissions expected from this emission source when RTO is down. However, if the RTO is still in startup or malfunction, then there would be NO_x emissions.

Note 4: Installation-wide Monthly NO_x Emissions (tons) = the sum of each emission source's Monthly NO_x Emissions (tons).

Note 5: Installation-wide 12-Month Rolling Total NO_x Emissions (tons) = the sum of the 12 most recent Installation-wide Monthly NO_x Emissions (tons).

Installation-wide 12-Month Rolling Total NO_x Emissions of less than 64.98 tons indicates compliance with Special Condition 2.C.

Attachment C – VOC Compliance Worksheet

POET Biorefining – Laddonia, LLC
 Audrain County, S36, T52N, R7W
 Project Number: 2018-05-046
 Installation ID Number: 007-0054
 Permit Number: **042019 - 015**

This sheet covers the period from _____ to _____.
 (month, year) (month, year)

Emission Source/Control Device		Monthly Usage	VOC Emission Factor	Emission Factor Methods/Sources ¹	Monthly VOC Emissions ² (tons)
Packed Wet Scrubber (EP09 CE08), (2) DDGS Dryers ³ , and (5) Centrifuges	Multicyclone (CE09, CE10) RTO (CE11), RTO SSM, Scrubber SSM	Mgal beer Produced	0.05632 lb/Mgal	May 2016 Stack Test	
Fluid Bed Cooler (EP10)	None	Tons of DDGS	0.0632 lb/ton	May 2016 Stack Test	
DDGS Silo (EP11)	None	Tons of DDGS	0.00244 lb/ton	Testing at other POET Facilities	
DDGS Silo Bypass (EP12)	None	Tons of DDGS	0.00244 lb/ton	Testing at other POET Facilities	
Boiler #1 and Boiler #2 (EP13 and EP14)	None	MMscf natural gas combusted	5.5 lb/MMscf	AP-42, Section 1.4, Table 1.4-1	
Denatured Ethanol Truck Loadout (EP15)	Flare	Mgal Ethanol Mgal Gasoline	0.0124 lb/Mgal ethanol 0.186 lb/Mgal gasoline	AP-42, Section 5.2, Equation 1 with 99.2% capture and 99.23% device efficiency	
Denatured Ethanol Truck Loadout (EP15)	None	Mgal Ethanol Mgal Gasoline	0.6919 lb/Mgal ethanol 10.38 lb/Mgal gasoline	AP-42, Section 5.2, Equation 1	
Denatured Ethanol Railcar Loadout (EP16)	None	Mgal Ethanol Mgal Gasoline	0.415 lb/Mgal ethanol 6.228 lb/Mgal gasoline	AP-42, Section 5.2, Equation 1	
DDGS Transfer and Loading (EP20)	None	Tons DDGs	0.00244 lb/ton	Testing at other POET facilities	
Storage Tanks (TK01 and TK03)	None	Mgal	0.00653 lb/Mgal Working Loss 0.163 tons/Month Breathing Loss	TANKS 4.09d	

Emission Source/Control Device		Monthly Usage	VOC Emission Factor	Emission Factor Methods/Sources ¹	Monthly VOC Emissions ² (tons)
Storage Tanks (TK02)	None	Mgal	0.00732 lb/Mgal Working Loss 0.0065 tons/Month Breathing Loss	TANKS 4.09d	
Storage Tanks (TK04 and TK05)	None	Mgal	0.00344 lb/Mgal Working Loss 0.0116 tons/Month Breathing Loss	TANKS 4.09d	
DDGS Loadout Fugitive (FS01)	None	Tons DDGS	0.00244 lb/ton	Testing at other POET facilities	
Equipment Leaks (FS03)	LDAR	Hours of Operation	1.6 lb/hr	EPA document 453/R-95-017, Table 2-1	
Tank Farm Equipment Leaks (FS04) Denaturant Service	LDAR	Hours of Operations	0.17 lb/hr	EPA document 453/R-95-017, Table 2-1	
Tank Farm Equipment Leaks (FS04) Ethanol Service	LDAR	Hours of Operation	1.0 lb/hr	EPA document 453/R-95-017, Table 2-1	
Wet Cake (FS05)	None	Tons Wet Cake	0.0018 Wt. %	Content from Testing	
Installation-wide Monthly VOC Emissions⁴ (tons):					
Installation-wide 12-Month Rolling Total VOC Emissions⁵ (tons):					

Note 1: Emission factors based on stack testing may be updated upon performance of a new stack test and approval of the stack test results by the Missouri Air Pollution Control Program. Out of all the stack tests, the highest average value (i.e. average of three one-hour tests) obtained shall be used. The emission factors are the stack tested emission rates (lb/hr) divided by the usage rates obtained during the tests.

Note 2: Monthly VOC Emissions (tons) = Monthly Usage x VOC Emission Factor x 0.0005 (ton/lb) for all except wet cake (FS-05). For wet cake (FS-05), VOC emissions (tons) = Wet Cake (tons) x Wt % of VOC in Wet Cake. For emission units with multiple emission factors, Multiply each emission factor by the respective monthly usage and sum of the results.

Note 3: Special Condition 6 prohibits the installation from operating the DDGS Dryers while the RTO is down; Therefore, there are no VOC emissions expected from this emission source when RTO is down. However, if the RTO is still in startup or malfunction, then there would be VOC emissions.

Note 4: Installation-wide Monthly VOC Emissions (tons) = the sum of each emission source's Monthly VOC Emissions (tons).

Note 5: Installation-wide 12-Month Rolling Total VOC Emissions (tons) = the sum of the 12 most recent Installation-wide Monthly VOC Emissions (tons).

Installation-Wide 12-Month Rolling Total VOC Emissions of less than 100.0 tons indicates compliance with Special Condition 2.D.

Attachment D – CO Compliance Worksheet

POET Biorefining – Laddonia, LLC
 Audrain County, S36, T52N, R7W
 Project Number: 2018-05-046
 Installation ID Number: 007-0054
 Permit Number: **042019-015**

This sheet covers the period from _____ to _____.
 (month, year) (month, year)

Emission Source		Monthly Usage	CO Emission Factor	Emission Factor Sources ¹	Monthly CO Emissions ² (tons)
Packed Wet Scrubber (EP09 CE08), (2) DDGS Dryers ³ , and (5) Centrifuges	Multicyclone (CE09, CE10) RTO (CE11)	Mgal beer Produced	0.09622 lb/Mgal	Most recent stack test	
Boiler #1 and Boiler #2 (EP13 and EP14)		MMscf natural gas combusted	84 lb/MMscf	AP-42, Chapter 1.4, Table 1.4-1	
Denatured Ethanol Truck Loadout (EP15) Flare		AP-42 Section 13.5 "Industrial Flares" (February 2018)			0.003
Installation-wide Monthly CO Emissions⁴ (tons):					
Installation-wide 12-Month Rolling Total CO Emissions⁵ (tons):					

Note 1: Emission factors based on stack testing may be updated upon performance of a new stack test and approval of the stack test results by the Missouri Air Pollution Control Program. Out of all the stack tests, the highest average value (i.e. average of three one-hour runs) obtained shall be used.

Note 2: Monthly CO Emissions (tons) = Monthly Usage x CO Emission Factor x 0.0005 (ton/lb).

Note 3: Special Condition 6 prohibits the installation from operating the DDGS Dryers while the RTO is down; therefore, there are no CO emissions expected from this emission source during RTO SSM periods.

Note 4: Installation-wide Monthly CO Emissions (tons) = the sum of each emission source's Monthly CO Emissions (tons).

Note 5: Installation-wide 12-Month Rolling Total CO Emissions (tons) = the sum of the 12 most recent Installation-wide Monthly CO Emissions (tons).

Installation-wide 12-Month Rolling Total CO Emissions of less than 100.0 tons indicates compliance with Special Condition 2.E.

Attachment E – Individual HAP Compliance Worksheet

POET Biorefining – Laddonia, LLC
 Audrain County, S36, T52N, R7W
 Project Number: 2018-05-046
 Installation ID Number: 007-0054
 Permit Number: **042019-015**

This sheet covers the period from _____ to _____ for the HAP _____
 (month, year) (month, year) (HAP Name)

Emission Source		Monthly Usage	¹ HAP Emission Factor	Emission Factor Methods/Sources ¹	Monthly HAP Emissions ² (tons)
Packed Wet Scrubber (EP09 CE08), (2) DDGS Dryers ³ , and (5) Centrifuges	Multicyclone (CE09, CE10) RTO (CE11), RTO SSM, Scrubber SSM	Mgal beer Produced		May 2016 stack test	
Fluid Bed Cooler (EP10)	None	Tons of DDGS		May 2016 stack test	
DDGS Silo (EP11)	None	Tons of DDGS		Testing at other POET facilities	
DDGS Silo Bypass (EP12)	None	Tons of DDGS		Testing at other POET facilities	
Boiler #1 and Boiler #2 (EP13 and EP14)	None	MMscf natural gas combusted		AP-42, chapter 1.4, Table 1.4-3	
Denatured Ethanol Truck Loadout (EP15)	Flare	MGal		AP-42, Section 5.2, Equation 1 with 98.7% capture and 99% device efficiency, HAP content	
Denatured Ethanol Truck Loadout (EP15)	None	MGal		AP-42, Section 5.2, Equation 1	
Denatured Ethanol Railcar Loadout (EP16)	None	MGal		AP-42, Section 5.2, Equation 1 and HAP content	
DDGS Transfer and Loading (EP20)	None	Tons DDGS		Testing at other POET facilities	
Storage Tanks (TK01, TK02, TK03, TK04, TK05)	None	Mgal		TANKS 4.09d and HAP content	
DDGS Loadout Fugitive (FS01)	None	Tons DDGS		Testing at other POET facilities	

Emission Source		Monthly Usage	¹ HAP Emission Factor	Emission Factor Methods/Sources ¹	Monthly HAP Emissions ² (tons)
Equipment Leaks (FS03)	LDAR	Hours		EPA document 453/R-95-017, Table 2-1, and HAP content	
Tank Farm Equipment Leaks (FS04)	LDAR	Hours		EPA document 453/R-95-017, Table 2-1, and HAP content	
Wet Cake (FS05)	None	Tons Wet Cake		Content from Testing	
Installation-wide Monthly HAP Emissions⁴ (tons):					
Installation-wide 12-Month Rolling Total HAP Emissions⁵ (tons):					

Note 1: Approved emission factors given in the table below. Emission factors based on stack testing may be updated upon performance of a new stack test and approval of the stack test results by the Missouri Air Pollution Control Program. Out of all the stack tests, the highest average value (i.e. average of three one-hour tests) obtained shall be used. Emission factors are the stack tested emissions (lb/hr) divided by the usage obtained during the tests.

Note 2: Monthly HAP Emissions (tons) = Monthly Usage x HAP Emission Factor x 0.0005 (ton/lb).

Note 3: Special Condition 6 prohibits the installation from operating the DDGS Dryers while the RTO is down; HAPs are expected during RTO SSM periods.

Note 4: Installation-wide Monthly HAP Emissions (tons) = the sum of each emission source's Monthly HAP Emissions (tons).

Note 5: Installation-wide 12-Month Rolling Total HAP Emissions (tons) = the sum of the 12 most recent Installation-wide Monthly HAP Emissions (tons).

Installation-Wide Rolling 12-Month Rolling Individual HAP Emissions of less than 10.0 tons and SMAL indicates compliance with Special Condition 2.F.

List of HAP Emission Factors

Emission Units	Type of HAP	Emission Factors
EP08 Scrubber Only (no RTO)	Acetaldehyde	0.0283 lb/Mgal Beer
	Formaldehyde	0.00023 lb/Mgal Beer
	Methanol	0.00007 lb/Mgal Beer
	Acrolein	0.00092 lb/Mgal Beer
EP08 Uncontrolled	Acetaldehyde	0.0902 lb/Mgal Beer
	Methanol	0.0078 lb/Mgal Beer
	Acrolein	0.00207 lb/Mgal Beer
EP09 (Using Scrubber and RTO)	Acetaldehyde	0.00276 lb/Mgal Beer
	Formaldehyde	0.00138 lb/Mgal Beer
	Methanol	0.00115 lb/Mgal Beer
	Acrolein	0.00089 lb/Mgal Beer
EP09 (CentVent, No RTO)	Acetaldehyde	0.001339 lb/Mgal Beer
	Formaldehyde	4.62 x 10 ⁻⁶ lb/Mgal Beer
	Methanol	0.0002574 lb/Mgal Beer
	Acrolein	0.0000816 lb/Mgal Beer
EP10	Acetaldehyde	0.0005405 lb/ton
	Formaldehyde	0.0002162 lb/ton
	Methanol	0.0002162 lb/ton
	Acrolein	0.0005405 lb/ton
EP11 and EP12	Acetaldehyde	2.03 x 10 ⁻³ lb/ton
	Formaldehyde	3.73 x 10 ⁻⁵ lb/ton
	Methanol	2.28 x 10 ⁻⁴ lb/ton
	Acrolein	1.84 x 10 ⁻⁴ lb/ton

EP13 and EP14	Benzene Formaldehyde Hexane Toluene	2.1×10^{-3} lb/mmscf 7.5×10^{-2} lb/mmscf 1.8 lb/mmscf 3.4×10^{-3} lb/mmscf
EP15 (Uncontrolled)	Hexane Benzene Acrolein Acetaldehyde Methanol Formaldehyde	2.679 lb/Mgal gasoline 0.1806 lb/Mgal gasoline 9.69×10^{-6} lb/Mgal denatured ethanol 1.38×10^{-4} lb/Mgal denatured ethanol 1.46×10^{-5} lb/Mgal denatured ethanol 1.94×10^{-5} lb/Mgal denatured ethanol
EP15 (Controlled with Flare)	Hexane Benzene Acrolein Acetaldehyde Methanol Formaldehyde	0.0552 lb/Mgal gasoline 0.00372 lb/Mgal gasoline 1.9956×10^{-7} lb/Mgal undenatured ethanol 2.8509×10^{-6} lb/Mgal undenatured ethanol 3.0077×10^{-7} lb/Mgal undenatured ethanol 4.0055×10^{-7} lb/Mgal undenatured ethanol
EP16	Hexane Benzene Acrolein Acetaldehyde Methanol Formaldehyde	1.6075 lb/Mgal gasoline 0.108 lb/Mgal gasoline 5.8125×10^{-6} lb/Mgal undenatured ethanol 8.3035×10^{-5} lb/Mgal undenatured ethanol 8.7602×10^{-6} lb/Mgal undenatured ethanol 1.1667×10^{-5} lb/Mgal undenatured ethanol
EP20	Acetaldehyde Acrolein Methanol Formaldehyde	2.03×10^{-4} lb/ton 1.84×10^{-4} lb/ton 2.28×10^{-4} lb/ton 3.73×10^{-5} lb/ton
TK01/TK03 Working Loss	Hexane Benzene	0.00210 lb/Mgal 0.000429 lb/Mgal
TK01/TK03 Breathing Loss	Hexane Benzene	0.0496 lb/hr 0.00295 lb/hr
TK02 Working Loss	Acrolein Acetaldehyde Methanol Formaldehyde	1.02×10^{-7} lb/Mgal 1.46×10^{-6} lb/Mgal 1.54×10^{-7} lb/Mgal 2.06×10^{-7} lb/Mgal
TK02 Breathing Loss	Acrolein Acetaldehyde Methanol Formaldehyde	2.49×10^{-7} lb/hr 1.56×10^{-5} lb/hr 1.64×10^{-6} lb/hr 2.19×10^{-6} lb/hr
TK04/TK05 Working Loss	Acrolein Acetaldehyde Methanol Formaldehyde	4.82×10^{-8} lb/Mgal 6.89×10^{-7} lb/Mgal 7.27×10^{-8} lb/Mgal 9.68×10^{-8} lb/Mgal
TK04/TK05 Breathing Loss	Acrolein Acetaldehyde Methanol Formaldehyde	4.46×10^{-7} lb/hr 2.79×10^{-5} lb/hr 2.94×10^{-6} lb/hr 3.92×10^{-6} lb/hr
FS01	Acetaldehyde Acrolein Methanol Formaldehyde	2.03×10^{-4} lb/ton 1.84×10^{-4} lb/ton 2.28×10^{-4} lb/ton 3.73×10^{-5} lb/ton
FS03, FS04	Acetaldehyde Acrolein Formaldehyde Methanol	2.655×10^{-3} lb/hr 9.8174×10^{-5} lb/hr 6.1644×10^{-5} lb/hr 3.8813×10^{-5} lb/hr

FS05	Methanol	0.0.0104 lb/ton
Fuel Combustion	Various	See appropriate chapters in AP-42

Attachment F: Monthly Combined HAP Emission Tracking Record

Missouri Ethanol
 Audrain County, S36, T52N, R7W
 Project Number: 2005-05-009
 Installation ID Number: 007-0054

Permit Number: 042019-015

This sheet covers the period from _____ to _____.
 (month, year) (month, year)

Name of HAP	Monthly HAP Emissions from Attachment E (tpy)
Acetaldehyde	
Acrolein	
Benzene	
Formaldehyde	
Hexane	
Methanol	
Toluene	
Other HAPs	
Installation-wide Monthly HAP Emissions¹ (tons):	
Installation-wide 12-Month Rolling Total HAP Emissions² (tons):	

Note 1: Installation-Wide Monthly Total HAP Emissions is the sum of the Monthly HAP Emissions for each individual HAP taken from Attachment E.

Note 2: Installation-Wide 12-Month Rolling Total HAP Emissions is the sum of this month's total HAP emissions and the total HAP emissions from the last eleven (11) months.

A 12-Month Rolling Total HAP emissions of less than 25.0 tons indicates compliance.

APPENDIX A

Abbreviations and Acronyms

%	percent	Mgal	1,000 gallons
°F	degrees Fahrenheit	MW	megawatt
acfm	actual cubic feet per minute	MHDR	maximum hourly design rate
BACT	Best Available Control Technology	MMBtu ...	Million British thermal units
BMPs	Best Management Practices	MMCF	million cubic feet
Btu	British thermal unit	MSDS	Material Safety Data Sheet
CAM	Compliance Assurance Monitoring	NAAQS ..	National Ambient Air Quality Standards
CAS	Chemical Abstracts Service	NESHAPs	National Emissions Standards for Hazardous Air Pollutants
CEMS	Continuous Emission Monitor System	NO_x	nitrogen oxides
CFR	Code of Federal Regulations	NSPS	New Source Performance Standards
CO	carbon monoxide	NSR	New Source Review
CO₂	carbon dioxide	PM	particulate matter
CO_{2e}	carbon dioxide equivalent	PM_{2.5}	particulate matter less than 2.5 microns in aerodynamic diameter
COMS	Continuous Opacity Monitoring System	PM₁₀	particulate matter less than 10 microns in aerodynamic diameter
CSR	Code of State Regulations	ppm	parts per million
dscf	dry standard cubic feet	PSD	Prevention of Significant Deterioration
EIQ	Emission Inventory Questionnaire	PTE	potential to emit
EP	Emission Point	RACT	Reasonable Available Control Technology
EPA	Environmental Protection Agency	RAL	Risk Assessment Level
EU	Emission Unit	SCC	Source Classification Code
fps	feet per second	scfm	standard cubic feet per minute
ft	feet	SDS	Safety Data Sheet
GACT	Generally Available Control Technology	SIC	Standard Industrial Classification
GHG	Greenhouse Gas	SIP	State Implementation Plan
gpm	gallons per minute	SMAL	Screening Model Action Levels
gr	grains	SO_x	sulfur oxides
GWP	Global Warming Potential	SO₂	sulfur dioxide
HAP	Hazardous Air Pollutant	SSM	Startup, Shutdown & Malfunction
hr	hour	tph	tons per hour
hp	horsepower	tpy	tons per year
lb	pound	VMT	vehicle miles traveled
lbs/hr	pounds per hour	VOC	Volatile Organic Compound
MACT	Maximum Achievable Control Technology		
µg/m³	micrograms per cubic meter		
m/s	meters per second		