

STATE OF 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: 052016-005 Project Number: 2016-03-022  
Installation Number: 121-0028

Installation Name: Northeast Missouri Grain Processors, Inc.  
d/b/a POET Biorefining - Macon

Installation Address: 30211 Major Avenue, Macon, MO 63552

Location Information: Macon County, S17, T57N, R13W

Application for Authority to Construct was made for:  
Reduced scrubber liquid flow rate during CO<sub>2</sub> plant operation. This review was conducted in accordance with Section (5) 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.

*Alana L Hess*

Prepared by  
Alana Hess  
New Source Review Unit

*Kyra L Moore*

Director or Designee  
Department of Natural Resources

MAY 24 2016

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."*

Northeast Missouri Grain Processors, Inc. d/b/a POET Biorefining - Macon  
Macon County, S17, T57N, R13W

1. Superseding Condition
  - A. The conditions of this permit supersede the following special conditions found in construction permits previously issued by the Air Pollution Control Program:
    - 1) Special Condition 5.E of Construction Permit 102012-011
    - 2) Special Condition 9.B of Construction Permit 032003-008C
2. Fermentation Scrubber Monitoring
  - A. Northeast Missouri Grain Processors, Inc. d/b/a POET Biorefining – Macon (POET Biorefining – Macon) shall monitor and record the liquid flow rate through the scrubber at least once every 24 hours. The liquid flow rate shall be maintained at or greater than the specified values for the following operating scenarios:
    - 1) Operating Scenario – CO<sub>2</sub> plant online and RTO online: 20 gallons per minute.
    - 2) Operating Scenario – CO<sub>2</sub> plant offline and/or RTO offline: 45 gallons per minute.
  - B. POET Biorefining – Macon shall maintain a log indicating CO<sub>2</sub> plant operation (i.e. online or offline and the date and time).
  - C. POET Biorefining – Macon shall maintain a log indicating RTO operation (i.e. online or offline and the date and time).
  - D. The liquid flow rate restrictions may be reset if Air Pollution Control Program approved stack testing is conducted which demonstrates that at the new liquid flow rate all emission limits for the scrubber (as indicated in the operating permit and other construction permits) are met for the operating scenario.
3. RTO Monitoring
  - A. POET Biorefining – Macon shall continuously monitor and record the three-hour rolling average RTO operating temperature. The three-hour rolling average RTO operating temperature shall be maintained within  $\pm 50^{\circ}\text{F}$  of the specified values for the following operating scenarios:

**SPECIAL CONDITIONS:**

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

- 1) Operating Scenario – CO<sub>2</sub> plant online: 1671°F.
  - 2) Operating Scenario – CO<sub>2</sub> plant offline: 1657°F.
- B. POET Biorefining – Macon shall maintain a log indicating CO<sub>2</sub> plant operation (i.e. online or offline and the date and time).
- C. The three-hour rolling average operating temperature restrictions may be reset if Air Pollution Control Program approved stack testing is conducted which demonstrates that at the new three-hour rolling average operating temperature for the RTO all emission limits (as indicated in the operating permit and other construction permits) are met for the operating scenario.
4. Record Keeping and Reporting Requirements
- A. POET Biorefining - Macon shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request.
  - B. POET Biorefining - Macon shall report to the Air Pollution Control Program's Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, as required by 10 CSR 10-6.050 any startup, shutdown, or malfunction event which results in excess emissions exceeding one hour.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE  
SECTION (5) REVIEW

Project Number: 2016-03-022  
Installation ID Number: 121-0028  
Permit Number:

Installation Address:

Northeast Missouri Grain Processors, Inc.  
d/b/a POET Biorefining - Macon  
30211 Major Avenue  
Macon, MO 63552

Macon County, S17, T57N, R13W

REVIEW SUMMARY

- Northeast Missouri Grain Processors, Inc. d/b/a POET Biorefining - Macon has applied for authority to reduce scrubber liquid flow rate during CO<sub>2</sub> plant operation.
- The application was deemed complete on March 9, 2016.
- Methanol, formaldehyde, acetaldehyde, and acrolein are emitted by both the fermentation scrubber and the RTO. Stack testing indicates that at the reduced scrubber liquid flow rate there may be an increase in formaldehyde emissions.
- None of the regulations at 40 CFR Parts 60, 61, or 63 apply to the fermentation scrubber or RTO.
- The fermentation scrubber controls emissions from the fermentation process as required by Construction Permit 102012-011. The RTO controls emissions from the fermentation process, distillation process, and DDGS dryers as required by Construction Permit 032003-008C.
- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060 *Construction Permits Required*. Potential emissions of all pollutants are below de minimis levels; however, a permit was required in order to revise previously issued construction permit special conditions.
- This installation is located in Macon County, an attainment area for all criteria pollutants.
- This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation's major source level is 250 tons per year and fugitive emissions are not counted toward major source applicability.

- Ambient air quality modeling was not performed since potential emissions of the application are below the de minimis levels and the SMALs.
- Emissions testing is not required by this permit, but may be conducted as indicated in Special Conditions 2.D and 3.C to reset the scrubber and RTO operational restrictions.
- POET Biorefining – Macon shall submit any necessary revisions to their intermediate operating permit application, 2010-05-083, within 90 days after the issuance of this permit.
- Approval of this permit is recommended with special conditions.

### INSTALLATION DESCRIPTION

POET Biorefining – Macon operates an ethanol production plant in Macon, MO. Up to 19 million bushels of grain are processed to produce 200-proof ethanol. The grain is received and stored onsite 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 11 fermentation tanks. Emissions from the fermentation process are controlled by a scrubber and an RTO. 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 will be 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. During RTO bypass, emissions from the scrubber are vented to the atmosphere.

The whole stillage is centrifuged to yield thin stillage and solid fractions (wetcake). 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, then 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 DDGS is stored and then loaded onto trucks for distribution. The DDGS load out system is controlled by a baghouse to minimize emissions. Process steam is produced by two natural gas-fired boilers.

A 67,000-gallon storage tank is available for 190-proof ethanol. Denaturant (gasoline) is stored in two storage tanks, one 49,000 gallons and the other 18,000 gallons. 200-proof ethanol is stored in three storage tanks, two 180,000 gallons and one 1,000,000 gallons. Emissions from truck loadout are voluntarily controlled by a flare.

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

**Table 1: Permit History**

Permit Number	Description
0399-011	Installation of a 15,000,000 gallons per year anhydrous ethanol manufacturing plant
0399-011A	Addition of another beer well
052002-001	Increase anhydrous ethanol production to 50,000,000 gallons per year
102007-014	Installation of four hammermills
032003-008	Increase anhydrous ethanol production to 50,000,000 gallons per year (replaces 052002-001)
032003-008A	Replace grain receiving pit, conveyors, storage bins, and flare
032003-008B	Replace RTO
032003-008C	Reevaluate PM <sub>10</sub> emission limitations and modeling
102012-011	Install a hammermill and three fermentation tanks

## PROJECT DESCRIPTION/EMISSIONS EVALUATION

POET Biorefining – Macon has requested to reduce scrubber liquid flow rate during CO<sub>2</sub> plant operation. Stack testing of the RTO was conducted in March 2015 with the CO<sub>2</sub> plant offline and in November 2015 with the CO<sub>2</sub> plant online, the results are provided in Table 2. During both stack testing events all observed emission rates were below currently applicable emission limits.

**Table 2: RTO Stack Testing Results**

Pollutant/Operating Parameter	March 2015 Stack Test Result	November 2015 Stack Test Result
CO <sub>2</sub> Plant	Offline, 0 tph production	Online, 15.58 tph production
PM <sub>10</sub>	1.45 lb/hr	1.90 lb/hr
CO	2.33 lb/hr	0.64 lb/hr
NO <sub>x</sub>	8.44 lb/hr	9.44 lb/hr
Methanol	<0.06 lb/hr	<0.05 lb/hr
Formaldehyde	<0.03 lb/hr	0.09 lb/hr
Acetaldehyde	0.14 lb/hr	0.12 lb/hr
Acrolein	0.10 lb/hr	<0.06 lb/hr
Combined HAP	<0.33 lb/hr	<0.32 lb/hr
VOC	<3.28 lb/hr	<2.52 lb/hr
RTO beer feed rate	34,200 gallons/hr	34,200 gallons/hr
RTO operating temperature	1657°F	1671°F
Scrubber liquid flow rate	45 gallons/minute	20 gallons/minute

With any process a slight variation in emissions is expected from one stack testing

event to the next; however, it is most conservative to assume that any increases observed in the November 2015 stack testing results as compared to the March 2015 stack testing results are due to the change in operating conditions. The stack testing data indicates that during the operating conditions of the November 2015 stack test (CO<sub>2</sub> plant online, reduced scrubber liquid flow rate) there may be an increase in PM<sub>10</sub>, NO<sub>x</sub>, and formaldehyde emissions.

Tables 3 and 4 provide an emissions summary for this project. Existing potential emissions were recalculated for this project using the March 2015 RTO stack test results. Existing actual emissions were taken from the installation's 2014 EIQ. Potential emissions of the application represent the potential emissions increase from the new operating scenario, assuming continuous operation (8,760 hours per year).

**Table 3: Emissions Summary (tpy)**

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2014 EIQ)	Potential Emissions Increase due to this Project
PM	25.0	110.98	N/D	N/D
PM <sub>10</sub>	15.0	44.93	25.18	1.97
PM <sub>2.5</sub>	10.0	15.92	17.33	N/D
SO <sub>x</sub>	40.0	0.82	0.12	N/D
NO <sub>x</sub>	40.0	107.82 <sup>1</sup>	41.88	4.38
VOC	40.0	330.99 <sup>2</sup>	23.12	N/D
CO	100.0	69.59	44.01	N/D
HAPs	25.0	9.99	1.14	N/D

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

**Table 12: Individual HAP Emissions Summary (tons per year)**

Pollutant	Regulatory <i>De Minimis</i> Levels	SMAL	Existing Potential Emissions	Existing Actual Emissions (2014 EIQ)	Potential Emissions Increase due to this Project
Acetaldehyde (75-07-0)	10.0	10	2.61	1.14	N/D
Acrolein (107-02-8)	10.0	0.04	0.53	N/D	N/D
Formaldehyde (50-00-0)	10.0	2	0.54	N/D	0.26
Methanol (67-56-1)	10.0	10	0.44	N/D	N/D

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

<sup>1</sup> The installation is limited to 100.0 tons per year of NO<sub>x</sub> by a voluntary limitation requested in their Intermediate Operating Permit Application, Project 2010-05-083.

<sup>2</sup> The installation is limited to 100.0 tons per year of VOC by Special Condition 2.A of Construction Permit 032003-008C.

## PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060 *Construction Permits Required*. Potential emissions of all pollutants are below de minimis levels; however, a permit was required in order to revise previously issued construction permit special conditions.

## APPLICABLE REQUIREMENTS

POET Biorefining - Macon 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

- 10 CSR 10-6.065 *Operating Permits*
- 10 CSR 10-6.110 *Submission of Emission Data, Emission Fees and Process Information*
  - The installation is required to submit a full EIQ for the first full calendar year after the issuance of this permit.
- 10 CSR 10-6.165 *Restriction of Emission of Odors*
- 10 CSR 10-6.170 *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*
- 10 CSR 10-6.220 *Restriction of Emission of Visible Air Contaminants*

## SPECIFIC REQUIREMENTS

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

## STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5) of 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 March 3, 2016, received March 9, 2016, designating as the owner and operator of the installation.

## APPENDIX A

### Abbreviations and Acronyms

<b>%</b> .....	percent	<b>m/s</b> .....	meters per second
<b>°F</b> .....	degrees Fahrenheit	<b>Mgal</b> .....	1,000 gallons
<b>acfm</b> .....	actual cubic feet per minute	<b>MW</b> .....	megawatt
<b>BACT</b> .....	Best Available Control Technology	<b>MHDR</b> .....	maximum hourly design rate
<b>BMPs</b> .....	Best Management Practices	<b>MMBtu</b> ....	Million British thermal units
<b>Btu</b> .....	British thermal unit	<b>MMCF</b> .....	million cubic feet
<b>CAM</b> .....	Compliance Assurance Monitoring	<b>MSDS</b> .....	Material Safety Data Sheet
<b>CAS</b> .....	Chemical Abstracts Service	<b>NAAQS</b> ...	National Ambient Air Quality Standards
<b>CEMS</b> .....	Continuous Emission Monitor System	<b>NESHAPs</b>	National Emissions Standards for Hazardous Air Pollutants
<b>CFR</b> .....	Code of Federal Regulations	<b>NO<sub>x</sub></b> .....	nitrogen oxides
<b>CO</b> .....	carbon monoxide	<b>NSPS</b> .....	New Source Performance Standards
<b>CO<sub>2</sub></b> .....	carbon dioxide	<b>NSR</b> .....	New Source Review
<b>CO<sub>2e</sub></b> .....	carbon dioxide equivalent	<b>PM</b> .....	particulate matter
<b>COMS</b> .....	Continuous Opacity Monitoring System	<b>PM<sub>2.5</sub></b> .....	particulate matter less than 2.5 microns in aerodynamic diameter
<b>CSR</b> .....	Code of State Regulations	<b>PM<sub>10</sub></b> .....	particulate matter less than 10 microns in aerodynamic diameter
<b>dscf</b> .....	dry standard cubic feet	<b>ppm</b> .....	parts per million
<b>EQ</b> .....	Emission Inventory Questionnaire	<b>PSD</b> .....	Prevention of Significant Deterioration
<b>EP</b> .....	Emission Point	<b>PTE</b> .....	potential to emit
<b>EPA</b> .....	Environmental Protection Agency	<b>RACT</b> .....	Reasonable Available Control Technology
<b>EU</b> .....	Emission Unit	<b>RAL</b> .....	Risk Assessment Level
<b>fps</b> .....	feet per second	<b>SCC</b> .....	Source Classification Code
<b>ft</b> .....	feet	<b>scfm</b> .....	standard cubic feet per minute
<b>GACT</b> .....	Generally Available Control Technology	<b>SDS</b> .....	Safety Data Sheet
<b>GHG</b> .....	Greenhouse Gas	<b>SIC</b> .....	Standard Industrial Classification
<b>gpm</b> .....	gallons per minute	<b>SIP</b> .....	State Implementation Plan
<b>gr</b> .....	grains	<b>SMAL</b> .....	Screening Model Action Levels
<b>GWP</b> .....	Global Warming Potential	<b>SO<sub>x</sub></b> .....	sulfur oxides
<b>HAP</b> .....	Hazardous Air Pollutant	<b>SO<sub>2</sub></b> .....	sulfur dioxide
<b>hr</b> .....	hour	<b>tph</b> .....	tons per hour
<b>hp</b> .....	horsepower	<b>tpy</b> .....	tons per year
<b>lb</b> .....	pound	<b>VMT</b> .....	vehicle miles traveled
<b>lbs/hr</b> .....	pounds per hour	<b>VOC</b> .....	Volatile Organic Compound
<b>MACT</b> .....	Maximum Achievable Control Technology		
<b>µg/m<sup>3</sup></b> .....	micrograms per cubic meter		

Mr. Chris Peterson  
Environmental Engineer  
Northeast Missouri Grain Processors, Inc. d/b/a POET Biorefining - Macon  
30211 Major Avenue  
Macon, MO 63552

RE: New Source Review Permit  
Project Number: 2016-03-022; Installation ID Number: 121-0028

Dear Mr. Peterson:

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 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 updating your intermediate operating permit application are 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 §§621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the Administrative Hearing Commission within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the Administrative Hearing Commission. You may contact the Administrative Hearing Commission by writing to them at the United States Post Office Building, 131 West High Street, Third Floor, P.O. Box 1557, Jefferson City, MO 65102,

Mr. Chris Peterson  
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or by phone at (573) 751-2422 or by fax at (573) 751-5018. The Administrative Hearing Commission also has a website located at [www.ao.mo.gov/ahc](http://www.ao.mo.gov/ahc).

If you have any questions regarding this permit, please do not hesitate to contact Alana Hess at the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or by phone 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:ahd

Enclosures

c: Northeast Regional Office  
PAMS File: 2016-03-022

Permit Number: