

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: **102012-011** Project Number: 2012-07-026
 Installation Number: 121-0028

Parent Company: Northeast Missouri Grain Processors, Inc.

Parent Company Address: 30211 Major Avenue, Macon, MO 63552

Installation Name: 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:
 Installation of one hammermill and three fermentation tanks. This review was conducted in accordance with Section (5), 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.

OCT 23 2012

EFFECTIVE DATE

Lynae L Moore

 DIRECTOR OR DESIGNEE
 DEPARTMENT OF NATURAL RESOURCES

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. Permittee should notify 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 Department's Air Pollution Control Program of the anticipated date of start up of these air contaminant sources. The information must be made available within 30 days of actual startup. Also, you must notify the Department of Natural Resources Regional office responsible for the area within which you are located within 15 days after the actual start up of these air contaminant sources.

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' 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 sources(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 at (573) 751-4817. If you prefer to write, please address your correspondence to the Missouri Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention: Construction Permit Unit.

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SPECIAL CONDITIONS:

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

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

POET Biorefining - Macon
Macon County, S17, T57N, R13W

1. **Superseding Condition**
 The conditions of this permit supersede Special Condition 4.A and 4.B found in the previously issued construction permit amendment (Permit Number 032003-008C) from the Air Pollution Control Program.

2. **Ethanol Production Limits**
 - A. POET Biorefining - Macon shall not exceed an annual production limit of 50,000,000 gallons of anhydrous ethanol per twelve (12) consecutive month period.

 - B. POET Biorefining - Macon shall record the monthly and the sum of the most recent consecutive 12 months production of anhydrous ethanol in gallons from this installation. These records shall be kept on-site for five (5) years and shall be made immediately available for inspection to Department of Natural Resources' personnel upon request.

3. **Shut Down of Existing Equipment at Installation**
 - A. POET Biorefining - Macon shall render the following emission units (listed below) inoperable before the date the new equipment being added under this permit begins operations. The equipment listed below may not be operated after the start-up of the new equipment without first obtaining a New Source Review permit or receiving approval for the like-kind replacement of other existing equipment at the installation from the Air Pollution Control Program.

Table 1: Inoperable Equipment

Unit ID	Control ID #	Emission Unit Description
EP-5	C004	Hot slurry tank
EP-5	C004	3 liquefaction tanks

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SPECIAL CONDITIONS:

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

- B. POET Biorefining - Macon shall notify the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than 15 days after the following events occur:
 - 1) The date of initial start-up of the new equipment added under this permit, and
 - 2) The date the existing equipment (as indicated in Special Condition Number 3.A) was rendered inoperable.

- 4. Control Device Requirement-Baghouse
 - A. POET Biorefining - Macon shall control emissions from the hammermill (EP-37) using baghouses (C014) as specified in the permit application.

 - B. The baghouses shall be operated and maintained in accordance with the manufacturer's specifications. The baghouse shall be equipped with a gauge or meter, which indicates the pressure drop across the control device. These gauges or meters shall be located such that the Department of Natural Resources' employees may easily observe them. The baghouse shall be equipped with a flow meter that indicates the flowrate through the control device. This gauge and meter shall be located in such a way they may be easily observed by Department of Natural Resources' employees.

 - C. Replacement filters for the 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).

 - D. POET Biorefining - Macon shall monitor and record the operating pressure drop across the baghouses at least once every 24 hours. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty and performance test.

 - E. Flowrate across the baghouse shall be maintained with performance test specifications.

 - F. POET Biorefining - Macon shall maintain an operating and maintenance log for the baghouses 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.

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SPECIAL CONDITIONS:

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

5. Control Device Requirement-Fermentation Wet Scrubber

- A. The scrubber listed below must be in use at all times when the associated equipment is in operation:

Table 2: Control Device Requirement

Control ID No.	Emission Point	Emission Unit controlled
C003	EP-04	11 Fermentation Tanks and Beer Well

- B. Emissions from the scrubber shall be routed to the Regenerative Thermal Oxidizer (C005) to further control VOC and HAP emissions. POET Biorefining - Macon may allow scrubber emissions to bypass the RTO during times when the RTO is not in operation for a maximum of 500 hours annually.
- C. The scrubber 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' employees.
- D. POET Biorefining - Macon shall monitor and record the operating pressure drop across the scrubber at least once every twenty-four (24) hours during times when the RTO is being bypassed. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.
- E. POET Biorefining - Macon shall monitor and record the flow rate through the scrubber at least once every twenty-four (24) hours. The flow rate shall be maintained within the design conditions specified by the manufacturer's performance warranty.
- F. POET Biorefining - Macon shall maintain an operating and maintenance log for the scrubber 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.

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SPECIAL CONDITIONS:

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

- 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 RTO is bypassed including the date and time of the bypass.
6. Performance Testing
- A. POET Biorefining – Macon shall conduct performance tests to determine the emission rates on the following units:
 - 1) The baghouse (C014) for EP-37 shall be tested to determine the grains per dry standard cubic feet emission rate when all the processes controlled by this device are in operation. This emission rate shall not be greater than 0.003 gr/dscf and 12,000 dscf per minute.
 - 2) The fermentation scrubber (C003, SV004) shall be tested to determine the cycle average VOC emission rate and the cycle average acetaldehyde emission rate when all the processes controlled by this scrubber are in operation. This emission rate will be used for compliance.
 - B. The operating parameters (pressure, flowrate) at which the stack tests are conducted shall be used to set the appropriate values used in actual operations of the baghouse and scrubber listed in Special Condition 6.A.
 - C. The performance tests for the fermentation wet scrubber (C003, SV004) shall be conducted by collecting continuous emissions data for at least one complete fermenter cycle, defined as the time period between transferring the contents of one fermenter to the beer well and transferring the contents of the next fermenter. Emissions shall be quantified using EPA Reference Method 320 incorporating Fourier transform infra-red spectroscopy and continuous recording of scrubber stack flow rate and relevant scrubber operating parameters.
 - D. These tests shall be performed within 60 days after achieving the maximum production rate of the installation, but not later than 180 days after initial start-up of EP-04 and EP-37 for commercial operation and shall be conducted in accordance with the Stack Test Procedures outlined in Special Condition 6.

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SPECIAL CONDITIONS:

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

7. Proposed Test Plan

- A. A completed Proposed Test Plan Form (enclosed) must be submitted to the Air Pollution Control Program 30 days prior to the proposed test date so that the Air Pollution Control Program may arrange a pretest meeting, if necessary, and assure that the test date is acceptable for an observer to be present. The Proposed Test Plan may serve the purpose of notification and must be approved by the Director prior to conducting the required emission testing.
- B. Two 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 U.S. EPA Method for at least one 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. No later than 30 days after the performance test results are submitted, POET Biorefining – Macon shall provide the Director with a report that establishes the potential emissions of each air pollutant tested in Special Condition 6. This report shall report the potential emission rates in pounds per hour and in tons per year from the equipment in order that the Air Pollution Control Program (APCP) may verify the potential emissions from this project.

8. Performance Test Compliance

- A. If the performance testing required by Special Condition 6.B. of this permit indicate that any of the emission rates specified in Special Condition 6.B. are being exceeded, POET Biorefining – Macon must propose a plan to the APCP within thirty (30) days of submitting the performance test results. This plan must demonstrate how POET Biorefining – Macon will reduce the emission rates below those stated in Special Condition 6.B. POET Biorefining – Macon shall implement any such plan immediately upon its approval by the Director.

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

Project Number: 2012-07-026
Installation ID Number: 121-0028
Permit Number:

POET Biorefining - Macon
30211 Major Avenue
Macon, MO 63552

Complete: July 11, 2012

Parent Company:
Northeast Missouri Grain Processors, Inc.
30211 Major Avenue
Macon, MO 63552

Macon County, S17, T57N, R13W

REVIEW SUMMARY

- POET Biorefining - Macon has applied for authority to install one hammermill and three fermentation tanks.
- HAP emissions are expected from the proposed equipment. HAPs of concern from this process are acetaldehyde (CAS# 75-07-0), acrolein (CAS# 107-02-8), methanol (CAS# 67-56-1), and formaldehyde (CAS# 50-00-0).
- None of the New Source Performance Standards (NSPS) apply to the proposed equipment.
- None of the NESHAPs apply to this project. None of the currently promulgated MACT regulations apply to the proposed equipment.
- A baghouse and a wet scrubber are being used to control the PM₁₀, CO, VOC, and HAPs emissions from the equipment in this permit.
- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of PM₁₀, VOCs, and HAPs are below de minimis levels.
- 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 de minimis levels.
- Emissions testing are required for the equipment.
- A modification to your Part 70 Operating Permit application is required for this installation within one year of equipment startup.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

POET Biorefining-Macon is an existing ethanol plant. They are a major source and hold an intermediate operating permit. Currently, POET Biorefining-Macon is updating their intermediate operating permit to a Part 70 operating permit. The following New Source Review permits have been issued to POET Biorefining - Macon from the Air Pollution Control Program.

Table 3: Permit History

Permit Number	Description
0399-011	Construction permit for ethanol production facility
0399-011A	Construction permit amendment add beer well tank
052002-001	Construction permit for plant expansion
032003-008	Construction permit for change controls
032003-008A	Construction permit amendment for grain receiving
102007-014	Construction permit for hammermill baghouse
032003-008B	Construction permit amendment for upgrade thermal oxidizer
032003-008C	Construction permit amendment for PM ₁₀ emission limit

PROJECT DESCRIPTION

POET Biorefining-Macon, herein referred to as POET, has applied for authority to construct one new hammermill and three fermentation tanks. The additional hammermill and fermentation tanks are necessary due to a proposed project to convert the POET Macon facility from a conventional (cook-process) to a BPx (no-cook) ethanol production facility. The main advantage of the BPx process is to remove the cook process, which saves a significant amount of energy necessary to heat the mash prior to cooling it down before fermentation. This will have the benefit of reducing the amount of steam needed and, therefore, reduce the natural gas consumption at the POET Macon facility.

POET currently has three existing hammermills. The additional hammermill is necessary to grind the corn into smaller particles. The facility will be grinding the same total amount of corn with four hammermills instead of three so that the corn will be ground into smaller particles. No increase in the hourly or annual use of corn is expected as the existing mills will get less corn and the new mill will grind the remaining corn.

POET currently has eight fermentation tanks. The three additional fermentation tanks are necessary to allow for longer fermentation times. Due to the fact that the facility will no longer cook the corn/water (slurry or mash) mixture prior to fermentation, the fermentation process occurs over a longer period of time. Therefore, the three additional fermenters will provide enough volume to make up for the extended fermentation cycle. POET is not requesting any change to the facility-wide ethanol production limit and due to the fact that no additional ethanol will be produced on an annual basis, the amount of CO₂ produced within the fermentation system will remain unchanged. Therefore, POET is not modifying the fermentation wet scrubber and not requesting any change to the existing permits limits on the wet scrubber. However, to verify that the scrubber operation will remain unaffected, testing of the scrubber is required.

Due to the change in operation at the facility the hot slurry tank (EP-5) and three liquefaction tanks (EP-5) will be abandoned in place. Therefore, the mash from the slurry tank will be fed directly to the fermentation tanks. One of the existing liquefaction tanks will be converted to a preblend tank. The converted liquefaction tank that will become a preblend tank will continue to be vented to the distillation scrubber.

EMISSIONS/CONTROLS EVALUATION

The emission factors and control efficiencies used in the hammermill (EP-37) emissions were obtained from the EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Section 9.9.1, *Grain Elevators and Processes* (5/98). The MHDR of the new hammermill is 22.5 tons per hour of grain. Baghouses are used to control PM₁₀ emissions from grain handling and milling operations and rated at 99% efficiency. The emission rates for all non-fugitive sources were based on the baghouses having a controlled outlet concentration of no more than 0.003 grains per standard cubic foot.

VOC and HAPs are emitted from the fermentation processes (EP-4). In addition, testing by other ethanol installations has demonstrated that HAPs can be emitted in large quantities. The HAPs of concern are acetaldehyde, acrolein, formaldehyde and methanol. However, acetaldehyde is the HAP with the greatest emission rate. The equipment used in the fermentation process will be controlled through the use of a wet scrubber (C003). Performance tests required by this permit will verify the emission rate of VOCs and acetaldehyde for compliance purposes. If the emission rates listed in the Special Conditions are met, the installation will remain de minimis for HAPs. Acetaldehyde is the HAP of largest concentration. If the emission rate for acetaldehyde is met, it is assumed that the rest of the HAPs will be below their respected SMALs.

The following table provides an emissions summary for this project. Existing potential emissions were taken from permit number 102007-014. Existing actual emissions were taken from the installation's 2011 EIQ. Potential emissions of the application represent the potential of the new equipment (one hammermill) and all eleven fermentation tanks, assuming continuous operation (8760 hours per year).

Table 4: Emissions Summary (tons per year)

Pollutant	Regulatory De Minimis Levels	Existing Potential Emissions	Existing Actual Emissions (2011 EIQ)	Potential Emissions of the Application	New Installation Conditioned Potential
PM	25.0	N/A	N/A	N/D	N/A
PM ₁₀	15.0	92.65	26.12	1.35	N/A
PM _{2.5}	10.0	N/A	0.02	0.20	N/A
SOx	40.0	0.69	0.13	N/A	N/A
NOx	40.0	76.42	36.32	N/A	N/A
VOC	40.0	100.94	18.57	5.38	N/A
CO	100.0	124.67	46.60	N/A	N/A
HAPs	10.0/25.0	7.39	N/A	0.80	N/A
Acetaldehyde ¹	9.0	0.75	N/A	0.75	N/A
Acrolein ¹	0.04	N/A	N/A	0.001	N/A
Methanol ¹	10.0	N/A	N/A	0.001	N/A
Formaldehyde ¹	2.0	N/A	N/A	0.002	N/A

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

¹Represents the SMAL (ton/yr)

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 PM₁₀, VOCs, and HAPs are below de minimis levels.

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

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110
- *Operating Permits*, 10 CSR 10-6.065
- *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

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

Janelle Lewis
New Source Review Unit

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated July 11, 2012, received July 11, 2012, designating Northeast Missouri Grain Processors, Inc. as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.

APPENDIX A

Abbreviations and Acronyms

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

Mr. Rafe Christopherson
Environmental Engineer
POET Biorefining - Macon
30211 Major Avenue
Macon, MO 63552

RE: New Source Review Permit - Project Number: 2012-07-026

Dear Mr. Christopherson:

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 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.

If you have any questions regarding this permit, please do not hesitate to contact Janelle Lewis, 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:jl

Enclosures

c: Northeast Regional Office
PAMS File: 2012-07-026

Permit Number: