

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: 07 2017 - 018

Project Number: 2016-08-030
Installation Number: 510-0809

Parent Company: PQ Corporation

Parent Company Address: 300 Lindenwood Drive, Malvern, PA 19355

Installation Name: PQ Corporation

Installation Address: 4238 Geraldine Avenue, St. Louis, MO 63115

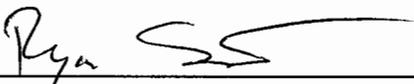
Location Information: St. Louis City (Landgrant 422, T46N, R7E)

Application for Authority to Construct was made for:

The installation of a new silica gel mill/classifier. 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.


Prepared by
Ryan Schott
New Source Review Unit


Director of Designee
Department of Natural Resources
JUL 26 2017

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. 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 startup 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 regional office responsible for the area within which you are located within 15 days after the actual startup 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 paragraph (12)(A)10. "Conditions required by permitting authority."

PQ Corporation

St. Louis City (Landgrant 422, T46N, R7E)

1. Superseding Conditions

The conditions of this permit supersede Section II: Limitations A & B from Construction Permit 10-10-019, previously issued by the City of St. Louis Air Pollution Control Program.

2. Control Device Requirement – Baghouse

- A. PQ Corporation shall control emissions from the Silica Gel Mill/Classifier (and the Recovery Cyclone) [EP-102] using baghouses, as specified in the permit application.
- B. The baghouses shall be operated and maintained in accordance with the manufacturer's specifications. The baghouses shall be equipped with gauges or meters, which indicate the pressure drop across the control devices. These gauges or meters shall be located such that Department of Natural Resources' employees may easily observe them.
- 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. PQ Corporation shall monitor and record the operating pressure drop across the baghouses at least once every 24 hours while the plant is operating. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.
- E. PQ Corporation shall maintain copies of the baghouse manufacturers' performance warranties on site.
- F. PQ Corporation 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.

SPECIAL CONDITIONS:

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

3. Recordkeeping Requirements

PQ Corporation 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. These records shall include SDS for all materials used.

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

Project Number: 2016-08-030
Installation ID Number: 510-0809
Permit Number:

07 2017 - 018

Installation Address:
PQ Corporation
4238 Geraldine Avenue
St. Louis, MO 63115

Parent Company:
PQ Corporation
300 Lindenwood Drive
Malvern, PA 19355

St. Louis City (Landgrant 422, T46N, R7E)

REVIEW SUMMARY

- PQ Corporation has applied for authority to install a new silica gel mill/classifier.
- The application was deemed complete on August 29, 2016.
- The only HAPs expected from this process are the products of natural gas combustion.
- None of the New Source Performance Standards (NSPS) apply to the installation.
- None of the NESHAPs apply to this installation. None of the currently promulgated MACT regulations apply to the proposed equipment.
- An existing baghouse is being used to control emissions from the new equipment.
- 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.
- This installation is located in St. Louis City, a nonattainment area for the 8-hour ozone standard and the PM_{2.5} standard and an attainment area for all other 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 is not required for the equipment as a part of this permit. Testing may be required as part of other state, federal or applicable rules.

- Submittal of an update to your Part 70 Operating Permit renewal application is required prior to its issuance.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

PQ Corporation, located within the City of St. Louis, produces sodium silicate (water glass) and silica gel. Sodium silicate and silica gel are used in a variety of products including clarifying agents for alcoholic beverages. The production of sodium silicate begins by unloading railcars of soda ash and sand into storage silos. From the storage silos, a carefully controlled amount of soda ash and sand are fused and reacted to produce sodium silicate. The sodium silicate is then solidified and conveyed to the storage silos. Silica gel is produced by reacting sodium silicate with sulfuric acid. Once the silica gel has been produced; it is washed, dried and ground to the size specified by the customer. The installation is a major source of particulate matter for construction permits and major source of particulate matter and nitrogen oxides for operating permits. PQ Corporation currently operates under permit OP2012-044, which expires on October 22, 2017.

The following New Source Review permits have been issued to PQ Corporation from the Air Pollution Control Program.

Table 1: Permit History

Permit Number	Description
10-10-019	Production increase (Local CP)
99-08-058	Boiler addition (Local CP)
99-11-077T	Boiler time extension (Local CP)
99-05-032T	Temporary boiler (Local CP)
99-01-006	Gel refeed station (Local CP)
96-11-094	Silica gel manufacturing plant (Local CP)

PROJECT DESCRIPTION

In December 2015, PQ Corporation submitted a permit applicability determination request (Project Number: 2015-12-025) regarding the installation of a second silica gel production nozzle. The installation of the second nozzle reduced production down time, allowing for an increase in silica gel production from 11 million pounds per year to 13 million pounds per year, without debottlenecking any other existing processes. A "no permit required" determination was made in regard to this project.

With the production of silica gel having increased to 13 million pounds per year, the silica gel mill/classifier had reached its maximum silica gel processing rate; therefore, PQ Corporation is proposing to replace the existing mill/classifier with a new unit. The new mill/classifier will allow the Gel Plant to produce up to 15 million pounds of silica gel per year, which is the maximum allowed production rate, originally permitted in (Local) Construction Permit 96-11-0094.

Silica gel from the production process will be recovered and recycled using the existing silica gel recovery cyclone, and emissions from the new silica gel mill/classifier will be controlled by the existing baghouse.

The increase in silica gel production will subsequently cause an increase in the amount of natural gas combusted in the silica gel dryer. No other processes should be debottlenecked as a result of this project.

EMISSIONS/CONTROLS EVALUATION

Potential particulate emissions associated with silica gel production were calculated using emission rates taken from a stack test conducted in April 2012. Because the replacement silica gel mill/classifier will be similar to the existing unit and will be controlled by the same baghouse, the emission factors from the stack test should remain the same. The gel milling/classifying process currently emits 0.827 pounds of PM per ton of material produced and has a new maximum potential of 15 million pounds of silica gel produced per year. It was assumed that all emitted PM is PM_{2.5}.

Potential emissions from the silica gel dryer were calculated using emission factors taken from AP-42 Section 1.4 *Natural Gas Combustion* (July 1998), along with the maximum design rate of the heater, 12 MMBtu/hr.

The following table provides an emissions summary for this project. Existing potential emissions were taken from the installation's current operating permit (OP2012-044). Existing actual emissions were taken from the installation's 2015 EIQ. Potential emissions of the project represent the total potential of the new equipment and affected existing equipment, assuming continuous operation (8,760 hours per year) at the maximum design rate (15 million pounds of silica gel per year).

Table 2: Emissions Summary (tons per year)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2015 EIQ)	Potential Emissions of the Project	New Installation Conditioned Potential
PM	25.0	N/D	N/D	3.48	N/D
PM ₁₀	15.0	351.24	31.43	3.48	354.72
PM _{2.5}	10.0	329.91	31.00	3.48	333.39
SO _x	40.0	0.16	0.07	0.03	0.19
NO _x	40.0	179.93	100.50	5.01	184.94
VOC	40.0	4.67	4.65	0.28	4.95
CO	100.0	19.50	9.67	4.20	23.70
Total HAPs	25.0	0.61	1.82	0.57	1.18

N/D = Not Determined

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.

APPLICABLE REQUIREMENTS

PQ Corporation 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
- *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 annually.
- *Restriction of Emission of Odors*, 10 CSR 10-6.165
- *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

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*, 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 July 28, 2016, received August 12, 2016, designating PQ Corporation as the owner and operator of the installation.

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 Sheet
CAS	Chemical Abstracts Service	NAAQS ..	National Ambient Air Quality Standards
CEMS	Continuous Emission Monitor System	NESHAPs	National Emissions Standards for Hazardous Air Pollutants
CFR	Code of Federal Regulations	NO_x	nitrogen oxides
CO	carbon monoxide	NSPS	New Source Performance Standards
CO₂	carbon dioxide	NSR	New Source Review
CO_{2e}	carbon dioxide equivalent	PM	particulate matter
COMS	Continuous Opacity Monitoring System	PM_{2.5}	particulate matter less than 2.5 microns in aerodynamic diameter
CSR	Code of State Regulations	PM₁₀	particulate matter less than 10 microns in aerodynamic diameter
dscf	dry standard cubic feet	ppm	parts per million
EIQ	Emission Inventory Questionnaire	PSD	Prevention of Significant Deterioration
EP	Emission Point	PTE	potential to emit
EPA	Environmental Protection Agency	RACT	Reasonable Available Control Technology
EU	Emission Unit	RAL	Risk Assessment Level
fps	feet per second	SCC	Source Classification Code
ft	feet	scfm	standard cubic feet per minute
GACT	Generally Available Control Technology	SDS	Safety Data Sheet
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	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		

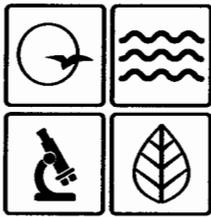
PQ Corporation
 510-0809
 2016-08-030

Silica Gel Process
0.827 lb PM/ton silica (stack test 4/12)
1.50E+07 lb silica/yr
7.50E+03 ton silica/yr
8760 hr/yr
6202.50 lb PM/yr
0.71 lb PM/hr
0.71 lb PM10/hr
0.71 lb PM2.5/hr

Mill Furnace - MHDR		
12 MMBtu/hr		
1050 MMBtu/MMcf		
0.011429 MMcf/hr		
Pollutant	EF (lb/MMcf)	Emissions (lb/hr)
PM	7.6	0.087
PM10	7.6	0.087
PM2.5	7.6	0.087
SOx	0.6	0.007
NOx	100	1.143
VOC	5.5	0.063
CO	84	0.960
HAPs	11.33	0.129

Totals (lb/hr)	
PM	0.795
PM10	0.795
PM2.5	0.795
SOx	0.007
NOx	1.143
VOC	0.063
CO	0.960
HAPs	0.129

Total PTE (ton/ year)	
PM	3.48
PM10	3.48
PM2.5	3.48
SOx	0.03
NOx	5.01
VOC	0.28
CO	4.20
HAPs	0.57



Missouri Department of dnr.mo.gov

NATURAL RESOURCES

Eric R. Greitens, Governor

Carol S. Comer, Director

JUL 26 2017

Mr. Richard Heisse
Site Manager
PQ Corporation
4238 Geraldine Avenue
St. Louis, MO 63115

RE: New Source Review Permit - Project Number: 2016-08-030

Dear Mr. Heisse:

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.

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.

Mr. Richard Heisse
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If you have any questions regarding this permit, please do not hesitate to contact Ryan Schott, 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:rsj

Enclosures

c: St. Louis Regional Office
PAMS File: 2016-08-030

Permit Number:

07 2 0 1 7 - 0 1 8