

Missouri Department of dnr.mo.gov

# NATURAL RESOURCES

Michael L. Parson, Governor

Carol S. Comer, Director

October 5, 2020

Bryan Fuhr  
EHS Manager  
Elementis Specialties, Inc  
5548 Manchester Avenue  
St. Louis, MO 63110

RE: New Source Review Permit - Project Number: 2020-08-001

Dear Bryan Fuhr:

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](http://www.oa.mo.gov/ahc).

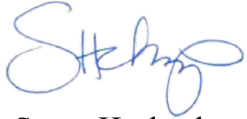


Bryan Fuhr  
Page Two

If you have any questions regarding this permit, please do not hesitate to contact Jared Rhodes, 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

A handwritten signature in blue ink, appearing to read "S Heckenkamp".

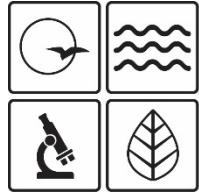
Susan Heckenkamp  
New Source Review Unit Chief

SH:jara

Enclosures

c: St. Louis Regional Office  
PAMS File: 2020-08-001

Permit Number: 102020-00



**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: 102020-002      Project Number: 2020-08-001  
Installation Number: 510-0066

Parent Company: Elementis Specialties, Inc.

Parent Company Address: 5548 Manchester Avenue, St. Louis, MO 63110

Installation Name: Elementis Specialties, Inc.


Installation Address: 5548 Manchester Avenue, St. Louis, MO 63110

Location Information: City of Saint Louis

Application for Authority to Construct was made for:

The installation of equipment to produce 7,165 tons (6,500 metric tons) of the Benathix organoclay. 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.

  
\_\_\_\_\_  
Director or Designee  
Department of Natural Resources

\_\_\_\_\_  
October 5, 2020  
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 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 regional office responsible for the area within which you are located 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 to 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 (3)(E). "Conditions required by permitting authority."*

Elementis Specialties, Inc.  
 City of Saint Louis

1. Benathix Process Production Limit
  - A. Elementis Specialties, Inc. shall not exceed a production limit of 7,165 tons (6,500 metric tons) from the Benathix process per 12 consecutive month period.
  - B. Elementis Specialties, Inc. shall record the monthly production and the sum of the most recent consecutive 12 months of production from the Benathix process at Packaging (EP286a and EP286b).
2. Control Device Requirement-Baghouse
  - A. Elementis Specialties, Inc. shall control emissions from the following emission points using baghouses as specified in the permit application.

Table 1: Emission Points Controlled by Baghouses

Emission Point	Control Device	Description
EP1	CD1	Clay Storage Silos
EP202	CD202	Benathix Day Silo
EP203	CD203	Clay Weigh Hopper
EP209	CD209a and CD209b	Fluid Bed Dryer #1
EP210	CD210a and CD210b	Fluid Bed Dryer #2
EP12b	CD12b	Bentone Pneumatic Transfer System B
EP212	CD212	Benathix Pneumatic Transfer System
EP281	CD281	Benathix Soda Ash Pneumatic Transfer System
EP282	CD282	Benathix Anion Pneumatic Transfer System
EP283	CD283	Benathix Mill "C"
EP284	CD284	Benathix Mill "D"
EP285	CD286	Benathix Packing Hopper
EP286a		Benathix Packing Station – (Normal Bags)
EP286b		Benathix Packing Station – (Supersacks)

- B. The baghouses shall be operated and maintained in accordance with the manufacturer's specifications.

**SPECIAL CONDITIONS:**

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

- C. The baghouses 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 Department of Natural Resources' employees may easily observe them.
  - D. 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).
  - E. Elementis Specialties, Inc. shall monitor and record the operating pressure drop across the baghouses at least once every 24 hours when the associated equipment is in operation. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.
  - F. Elementis Specialties, Inc. shall maintain a copy of the baghouses manufacturer's performance warranty on site.
  - G. Elementis Specialties, Inc. 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.
3. Control Device Requirement-Thermal Oxidizer
- A. Elementis Specialties, Inc. shall control emissions from the Benathix Reactor (EP225), Benathix Filter Press (EP239), and Benathix Vacuum Filter (EP237) using Benathix Regenerative Thermal Oxidizer (CD264) as specified in the permit application.
  - B. The thermal oxidizer shall be operated and maintained in accordance with the manufacturer's specifications.
  - C. The thermal oxidizer shall be operated at a temperature of 1500°F or greater while the associated equipment is in operation.
  - D. The average chamber temperature of the thermal oxidizer shall be continuously monitored. Records of the average chamber temperature of the thermal oxidizer shall be recorded every 15 minutes.
  - E. Elementis Specialties, Inc. shall maintain an operating and maintenance record for the thermal oxidizer which shall include the following:

**SPECIAL CONDITIONS:**

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

- 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.
4. Record Keeping and Reporting Requirements
- A. Elementis Specialties, Inc. 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. Elementis Specialties, Inc. 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](mailto: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 (5) REVIEW

Project Number: 2020-08-001  
Installation ID Number: 510-0066  
Permit Number: 102020-002

Installation Address:  
Elementis Specialties, Inc.  
5548 Manchester Avenue  
St. Louis, MO 63110

Parent Company:  
Elementis Specialties, Inc.  
5548 Manchester Avenue  
St. Louis, MO 63110

City of Saint Louis

REVIEW SUMMARY

- Elementis Specialties, Inc. has applied for authority to install equipment to produce 7,165 tons (6,500 metric tons) of the Benathix organoclay.
- The application was deemed complete on August 17, 2020.
- HAP emissions are expected from the combustion of natural gas in the proposed equipment. HAP emissions are not expected to exceed de minimis or SMAL levels.
- 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.
- 40 CFR Subpart OOO - *Standards of Performance for Nonmetallic Mineral Processing Plants* does not apply since no processing of raw clay occurs at this facility. All milling and processing is done to the new compounds that are produced by the reactor.
- 40 CFR Subpart UUU - *Standards of Performance for Calciners and Dryers in Mineral Industries* does not apply since no drying of raw clay occurs at this facility. All drying is done to the new compounds that are produced by the reactor.
- Dust collectors and a thermal oxidizer are being used to control the PM, PM<sub>10</sub>, PM<sub>2.5</sub>, and VOC 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 all pollutants are conditioned below de minimis levels.
- This installation is located in the City of Saint Louis, a nonattainment area for the 2015 8-hr ozone NAAQS 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.
- A Part 70 Operating Permit application to amend Elementis Specialties, Inc's current operation permit is required within 1 year of equipment startup.
- Approval of this permit is recommended with special conditions.

### INSTALLATION DESCRIPTION

Elementis Specialties, Inc. owns and operates a rheological additives manufacturing plant in St. Louis, MO. Two types of clay and five types of amines are used as raw materials. The main product at the plant is Bentone Organoclay. Elementis Specialties, Inc is proposing the installation of a new Benathix Organoclay production process. This installation is currently a major source under both construction and operating permits. A Part 70 Operating Permit (OP2018-094) was issued to the facility in 2018.

The following NSR permits have been issued to Elementis Specialties, Inc. from the Air Pollution Control Program.

Table 2: NSR Permit History

Permit Number	Description
98-07-048	Plant rebagging station
05-09-008	Raw material change
012007-018	PUG mill production
07-08-014	Packing System
09-06-014	Pneumatic transfer system.
122013-006	Pug Mill
082018-009	Operation of two filter presses simultaneously

### PROJECT DESCRIPTION

Elementis Specialties, Inc. currently manufactures flash dried organoclay products at the company's Saint Louis Plant at 5548 Manchester Avenue. Elementis Specialties, Inc. proposes to produce a new organoclay product whose production requires drying in fluid bed dryers. The project will entail the installation and operation of a new process line (Benathix Process) that will include: preparing clay for reaction with amines in an aqueous slurry; chemically reacting the clay with amines; dewatering the reacted clay;

drying the reacted clay; storage of hexane diol, milling the reacted clay; and packaging the product.

Elementis Specialties, Inc. is requesting that the new process will have a permit condition limiting production to 7,165 tons (6,500 metric tons) of Benathix organoclay. The existing clay silos will be used to supply the new process. Initially, the equipment currently used to prepare clay for reaction in the flash dryer process will be used to prepare clay for the new Benathix Process reactor. The reaction and downstream processing will be performed in newly installed equipment. Upon completion, new clay handling equipment used to prepare the clay for reaction will be installed.

Pollutants that are emitted from the Benathix Process include particulate matter and volatile organic compounds from process and handling activities as well as natural gas combustion products including nitrogen oxides, carbon monoxide, particulate matter and volatile organic compounds. Particulate emissions created by material handling equipment, drying equipment and milling equipment will be controlled with fabric filters. VOC emissions from the reactor, the belt filter and the vacuum filter will be controlled with a regenerative thermal oxidizer (RTO).

In addition, a new pneumatic transfer system equipped with a fabric filter will be installed for the existing Bentone Process to operate in parallel with the existing pneumatic transfer system that transfers dried Bentone organoclay from the flash dryers to the mills. The new pneumatic transfer system will reduce the throughput of the existing pneumatic system. The additional transfer system will not increase the capacity of the dryers, mills or the existing Bentone Process.

The increased quantity of emission of all criteria pollutants resulting from the process with the proposed control equipment in operation will be less than de minimis.

The following table lists the equipment associated with this project.

Table 3: Project Equipment List

Emission Point	Description	Control Type
EP1	Clay Storage Silos (Existing)	Baghouse
EP202	Benathix Day Silo	Baghouse
EP203	Clay Weigh Hopper	Baghouse
EP5	Powerhouse Boiler (Existing)	None
EP6	Amine Tank #4 -Working Losses (Existing)	None
EP7	Amine Tank #8 -Working Losses (Existing)	None
EP8	Amine Tank #7 -Working Losses (Existing)	None
EP205	Hexanediol Tank (Working Losses)	None
EP209	Fluid Bed Dryer #1 (Natural Gas Combustion)	Baghouse
EP209	Fluid Bed Dryer #1 (Product Conveying & Drying)	Baghouse
EP210	Fluid Bed Dryer #2 (Natural Gas Combustion)	Baghouse
EP210	Fluid Bed Dryer #2 (Product Conveying & Drying)	Baghouse
EP212	Benathix Pneumatic Transfer System	Baghouse
EP33	Amine Tank Heater (Existing)	None
EP237	Benathix Vacuum Filter	Thermal Oxidizer
EP239	Benathix Filter Press	Thermal Oxidizer

Emission Point	Description	Control Type
EP245	Benathix Dispersion Tanks	None
EP255	Benathix Reactor	Thermal Oxidizer
EP281	Benathix Soda Ash Pneumatic Transfer System	Baghouse
EP282	Benathix Anion Pneumatic Transfer System	Baghouse
EP283	Mill "C"	Baghouse
EP284	Mill "D"	Baghouse
EP285	Benathix Packing Hopper	Baghouse
EP286a	Benathix Packing Station - (Normal Bags)	Baghouse
EP286b	Benathix Packing Station - (Supersacks)	Baghouse
EP287	Benathix Water Heater	None
EP236	Benathix Seal Water Tank	None
EP12b	New Pneumatic Bentone Transfer System	Baghouse

## EMISSIONS/CONTROLS EVALUATION

### Particulate Emissions – Material Processing

#### Fluid Bed Dryers – EP209, EP210

The only emission factors for bentonite clay drying provided in the EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition (AP-42), Section 11.25 “Clay Processing” (January 1995) are factors for emissions of particulate matter from rotary dryers. PM and PM<sub>10</sub> emission factors for bentonite clay rotary dryers (SCC 3-05-044-30) are provided for uncontrolled emissions and emissions controlled with fabric filters in Table 11.25-10. In addition, size distribution data is provided for both in Table 11.25-11. The exhausts from the new fluid bed dryers are each controlled by a fabric filter. The controlled emission factor for PM<sub>10</sub> emissions, 0.074 pounds of PM<sub>10</sub> per ton processed clay, is used in the calculations. Using the particle size distribution in Table 11.25-11, the PM<sub>2.5</sub> is equal to an emission factor of 0.012 pounds of PM<sub>2.5</sub> per ton processed clay.

#### Material Transfers – Silos, Receivers, Tanks and Hopper – EP1, EP12b, EP202, EP203, EP212, EP281, EP282 and EP285

There are no emission factors presented in AP-42 11.25 “Clay Processing” for material transfer operations. With the clay and the dried reacted clay being a relatively fine powder material, transferred pneumatically, the most representative reference found was AP-42, 11.12 “Concrete Batching” (June 2006). PM and PM<sub>10</sub> emission factors for pneumatic unloading cement to silos (SCC 3-05-011-07) are provided for uncontrolled and fabric filter controlled emissions in Table 11.12-2. No size distribution data is provided for the pneumatic transfer operation. Each of the transfers is controlled by a fabric filter. The emission factor for PM<sub>10</sub> for fabric filter controlled emissions, 0.00034 pounds of PM<sub>10</sub> per ton of material transferred, from Table 11.12-2 is used in the calculations. With no size distribution data, the same factor is used for PM<sub>2.5</sub>.

#### Material Transfer – Dispersion Tanks – EP245

The solids are dropped into the water in the dispersion tanks. The most representative reference is AP-42, 11.12 “Concrete Batching” (June 2006). Equation 11.12.1 provides a method to calculate emission factors for PM<sub>10</sub> and PM<sub>2.5</sub> for central mixer loading

(SCC 3-05-011-09), dropping dry materials into a wetted vessel, for uncontrolled and controlled emissions. The inputs for the equations include a particle size multiplier, a size specific constant, wind speed in miles per hour and moisture content in percent.

$$E = k(0.0032) \left[ \frac{U^a}{M^b} \right] + c \quad \text{Equation 11.12-1}$$

For uncontrolled PM:  $k= 5.90$ ;  $a=0.6$ ;  $b=1.3$  and  $c=0.120$

For uncontrolled PM<sub>10</sub>:  $k= 1.92$ ;  $a=0.4$ ;  $b=1.3$  and  $c=0.040$

For uncontrolled PM<sub>2.5</sub>:  $k= 0.38$ ;  $a=0.4$ ;  $b=1.3$  and  $c=0$

Because the dispersion tanks are located indoors, which eliminates any wind, a value of 1 mph is used in this equation. A conservative minimum moisture content of 0.1 is used. Substituting the values into the equation results in the following emission factors:

For uncontrolled PM:  $E_{PM} = 0.4967$  pounds per ton

For uncontrolled PM<sub>10</sub>:  $E_{PM10} = 0.1626$  pounds per ton

For uncontrolled PM<sub>2.5</sub>:  $E_{PM2.5} = 0.0243$  pounds per ton

#### Milling – Mills – EP283 and EP284

There are no emission factors presented in AP-42 11.25 “Clay Processing” for milling clay material. The most representative reference found for emissions from milling clay was AP-42 11.3 “Brick and Structural Clay Product Manufacturing” (August 1997). A PM<sub>10</sub> emission factor for grinding and screening clay (SCC 3-05-003-02) is presented for uncontrolled and fabric filter controlled emissions in Table 11.3-2. The factor likely overestimates the emissions from milling operations alone, but no better reference could be found. No size distribution data is provided for the pneumatic transfer operation. Each of the mills will be controlled with a dedicated fabric filter. The emission factor for PM<sub>10</sub> for fabric filter controlled emissions is 0.0032 pounds of PM<sub>10</sub> per ton of material milled. With no size distribution data, the same factor is used for PM<sub>2.5</sub>.

#### Packaging – Packing Station – EP286a and EP286b

There are no emission factors presented in AP-42 11.25 “Clay Processing” for packaging or bagging clay material. The most representative reference found for emissions from packaging clay was in AP-42 8.2 “Urea” (July 1993). Table 8.2-1 presents an emission factor for uncontrolled total particulate matter from bagging finished urea (SCC 3-01-040-06) product with no size distribution data. The total particulate matter factor, 0.19 pounds of PM per ton of bagged material, from Table 8.2-1 is used for PM<sub>10</sub> and PM<sub>2.5</sub>.

### VOC Emissions – Material Processing

The reaction, vacuum filtering and press filtering process operations will be essentially identical to the operations currently utilized in the production of Bentone products with slightly different formulations. The same methodology is used here to calculate the emission factors used for the new reactor, vacuum filter, press filter and seal water tank. That methodology is based upon emission testing that was performed on each of the process operations while manufacturing one specific formulation, Bentone 34. The stack test was performed at Elementis Specialties, Inc. in 2001 as part of a VOC RACT analysis and was submitted to and approved by the City of St. Louis – Division of Air Pollution Control Program. The quaternary amine ethanol mixtures used for the

Benathix Process are mixtures that are also being used for the Bentone process. The ethanol content of the amine ethanol mixtures used to react with clay varies for the different formulations. The factors are based upon the formulation with the highest alcohol content. Each of the types of operations and the associated emission factor is discussed below.

#### Reactor – EP255

Based upon testing, the uncontrolled VOC emission factor for the reactors is 4.251 pounds per ton of fluid bed dryer product. The vent from the reactor flows to the New RTO Oxidizer. The emission calculations are based upon a conservative minimum destruction efficiency in the oxidizer of 95%.

#### New Vacuum Filter – EP237

Based upon testing, the uncontrolled VOC emission factor for the vacuum filters is 5.085 pounds per ton of fluid bed dryer product. The exhaust from the vacuum filter is ducted to the New RTO Oxidizer. The emission calculations are based upon a conservative minimum destruction efficiency in the oxidizer of 95%.

#### Filter Press – EP239

Based upon testing, the uncontrolled VOC emission factor for the filter presses is 2.552 pounds per ton of fluid bed dryer product. The exhaust from the filter press will be ducted to the New RTO Oxidizer. The emission calculations are based upon a conservative minimum destruction efficiency in the oxidizer of 95%.

#### Fluid Bed Dryers – EP209, EP210

The alcohol content of the material feed to the dryers has been sampled and analyzed. In addition, stack testing has been performed at Elementis' Charleston, West Virginia facility that produces the same organoclays that will be produced by the planned project using the same process equipment and formulations. The stack testing emission quantities were consistent with the quantity of alcohol that was found in the feed samples.

The average measured concentrations of alcohol in the feed was 0.00096 pounds per pound of feed with a range from 0.00070 to 0.0012. The emission factor using the maximum alcohol concentration is 2.39 pounds per ton of product (equivalent to 0.0012 pound per pound of product). Stack testing of the emissions from the dryer in Charleston reported emissions of 1.94 pounds of VOC per ton of product. The calculations in this permit are utilizing the emission factor that is based upon the highest found concentration of alcohol in the feed, 2.39 pounds per ton of product.

### VOC Emissions – Storage Tanks

#### Amine Tanks – EP6, EP7 and EP8

EPA's Tanks Program Version 4.0.9d was used to calculate the annual emissions from the Amine Storage Tanks. VOC emissions result from ethanol in the mixture of amine and ethanol. The maximum concentration of ethanol used during the past 10 years was used to calculate the emissions from the tanks.

The tanks are located indoors and the temperature of the tank contents is controlled. With controlled temperature, there are no breathing losses from the tanks. The emissions result from working losses. The annual emissions estimates produced by the Tanks Program for each tank were divided by the throughput of the tank to calculate an emission factor.

#### Hexanediol Tank – EP205

There is little data available about the vapor pressure of Hexanediol, 1-6. The material has a melting point from 104 to 107.6 °F. At 77 °F, the vapor pressure is reported at 0.0005 mmHg, or  $9.7 \times 10^{-6}$  psia. At that vapor pressure, if all of the displacement form offloading the maximum amount of material that could be used in a year was saturated, the emissions would be 0.0047 pounds.

### Combustion Emissions

#### Powerhouse Boiler – EP5

The boiler has a heat input capacity of 12.56 million Btu's per hour. For this project and with the production limit, a potential increase in annual natural gas consumption of 34.5 million cubic feet is expected for this equipment. The emission factors for NO<sub>x</sub> and CO used for the emission calculations are for natural gas fired boilers (SCC 1-02-006-02) with less than 100 million Btu heat input presented in AP-42, 1.4 "Natural Gas Combustion" (July 1998), Table 1.4-1. The emission factors for SO<sub>x</sub>, VOC and particulate matter are those presented in Table 1.4-2. All of the particulate matter is assumed to be PM<sub>10</sub> and PM<sub>2.5</sub>.

#### Fluid Bed Dryers (Combustion) - EP209, EP210

The dryers each have a heat input capacity of 10 million Btu's per hour. For this project and with the production limit, a potential increase in annual natural gas consumption of 47.8 million cubic feet is expected for each dryer. The emission factors for the NO<sub>x</sub> and CO used for the emission calculations are for natural gas fired boilers with less than 100 million Btu heat input (SCC 1-02-006-03) presented in AP-42, Table 1.4-1. The emission factors for SO<sub>x</sub>, VOC and particulate matter are those presented in Table 1.4-2. All of the particulate matter is assumed to be PM<sub>10</sub> and PM<sub>2.5</sub>. The exhausts from the dryers flow through fabric filters that reduce the particulate emissions.

#### Amine Tank Heater – EP33

The heater has a heat input capacity of 0.480 million Btu's per hour. For this project and with the production limit, a potential increase in annual natural gas consumption of 1.7 million cubic feet is expected for this equipment. The emission factors for the NO<sub>x</sub> and CO used for the emission calculations are for natural gas fired boilers with less than 100 million Btu heat input (SCC 1-02-006-03) presented in AP-42, Table 1.4-1. The emission factors for SO<sub>x</sub>, VOC and particulate matter are those presented in Table 1.4-2. All of the particulate matter is assumed to be PM<sub>10</sub> and PM<sub>2.5</sub>.

#### Water Heater – EP287

The heater has a heat input capacity of 15 million Btu's per hour. For this project and with the production limit, a potential increase in annual natural gas consumption of 75 million cubic feet is expected for this equipment. The emission factors for the NO<sub>x</sub> and

CO used for the emission calculations are for natural gas fired boilers with less than 100 million Btu heat input (SCC 1-02-006-02) presented in AP-42, Table 1.4-1. The emission factors for SO<sub>x</sub>, VOC and particulate matter are those presented in Table 1.4-2. All of the particulate matter is assumed to be PM<sub>10</sub> and PM<sub>2.5</sub>.

The following table provides an emissions summary for this project. Existing potential emissions were not determined. However, according to information taken from previous permits, this installation is a major source for PM<sub>10</sub> and VOC under construction permits. Existing actual emissions were taken from the installation's 2019 EIQ. Potential emissions of the application represent the potential of the new and modified equipment, assuming continuous operation (8760 hours per year).

Table 4: Emissions Summary (tpy)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2019 EIQ)	Potential Emissions Increase of the Project
PM	25.0	N/D	N/D	2.2
PM <sub>10</sub>	15.0	Major	2.3	1.4
PM <sub>2.5</sub>	10.0	N/D	2.1	0.9
SO <sub>x</sub>	40.0	N/D	0.02	0.1
NO <sub>x</sub>	40.0	N/D	3.0	10.3
VOC	40.0	Major	34.7	13.9
CO	100.0	N/D	2.6	8.7
HAPs	10.0/25.0	N/D	0.3	0.2

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 conditioned below de minimis levels.

## APPLICABLE REQUIREMENTS

Elementis Specialties, Inc. 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 every year for Part 70 installations.
- *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  
 Only one emission unit is not equipped with a fabric filter, EP245 the Dispersion Tank, has a maximum process throughput of 2.95 tons per hour and maximum hourly emission rate of 1.47 pounds per hour of PM. The allowable emission rate of PM is calculated by:
 
$$E_{allowable} = 4.1P^{0.67}; \text{ which gives } E_{allowable} = 8.46 \text{ pounds per hour.}$$
- *Restriction of Particulate Matter Emissions From Fuel Burning Equipment Used for Indirect Heating*, 10 CSR 10-6.405

#### 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 31, 2020, received August 3, 2020, designating Elementis Specialties, Inc as the owner and operator of the installation.



## APPENDIX A

### Abbreviations and Acronyms

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