

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: 122017-011      Project Number: 2017-05-034  
Parent Company:                BASF Corporation Agricultural Products  
Parent Company Address: 26 Davis Drive, Research Triangle Park, NC 27709  
Installation Name:                BASF Corporation - Hannibal Site  
Installation Address:            3150 Highway JJ, Palmyra, MO 63461  
Location Information:            Marion County, S14, T53N, R5W

Application for Authority to Construct was made for:

The modification of an existing active ingredient facility (the Pyrrole Plant) to be able to accommodate a new active ingredient called Revysol. This review was conducted in accordance with Section (6), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

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

  
Prepared by  
Chia-Wei Young  
New Source Review Unit

  
Director or Designee  
Department of Natural Resources

DEC 22 2017

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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 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 Departments' Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available not more than 60 days but at least 30 days in advance of this date. 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 this (these) air contaminant source(s).

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 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 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."*

**BASF Corporation - Hannibal Site  
Marion County, S14, T53N, R5W**

**1. Superseding Condition**

The conditions of this permit supersede all special conditions found in the previously issued construction permits (No. 012017-006, 022006-005 and 092009-005) from the Air Pollution Control Program.

**2. Control Equipment – Scrubbers and Thermal Oxidizer**

- A. BASF Corporation – Hannibal shall operate a fume handling scrubber system (631-203/206/207/210), a thermal oxidizer (631-401), and a scrubber (631-402) to control emissions from the process and the hold tanks (633-001, 633-006, and 633-004) (PY-06) as specified in the permit application. The fume handling scrubber system (631-203/206/207/210) shall be upstream of the thermal oxidizer. The scrubber (631-402) shall be downstream of the thermal oxidizer.
- B. The fume handling scrubber system (631-203/206/207/210) shall be operated at all times during Chlorfenapyr and Revysol production. The scrubber (631-402) and thermal oxidizer (631-401) shall be operated at all times during Chlorfenapyr and Revysol production except during emergency shutdown situations and necessary planned maintenance of the thermal oxidizer and associated equipment, total not to exceed 240 hours per 12-month rolling total.
- C. BASF Corporation – Hannibal shall track the hours of by-passing the thermal oxidizer and the downstream scrubber to ensure compliance with Special Condition 2.B. BASF Corporation – Hannibal shall develop its own forms, including electronic forms, for this purpose.
- D. The scrubbers shall be maintained and operated according to manufacturer's design specifications and the Maximum Achievable Control Technology (MACT) Standard, 40 CFR Part 63, Subpart MMM,

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**SPECIAL CONDITIONS:**

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

*National Emission Standards for Pesticide Active Ingredient Production.*  
The facility shall abide by the monitoring requirements in MACT Subpart MMM.

- E. The thermal oxidizer shall be operated at a temperature of at least 1,500 degrees Fahrenheit, based on a 15-minute rolling average and shall be equipped with a continuous temperature monitoring system. The temperature monitoring system shall alert the operator(s) whenever the oxidizer temperature drops below 1,500 degrees Fahrenheit.
3. Control Equipment – Baghouses
- A. BASF Corporation – Hannibal shall operate baghouses (631-002, 631-015) to control emissions from the dump station (PY-03) and the product sack/drum filler (PY-05) as specified in the permit application whenever the equipment is in operation.
  - B. The baghouses shall be equipped with gauges or meters that indicate the pressure drop across them. The gauges or meters shall be located such that they can be easily observed by the Department of Natural Resources' personnel.
  - C. BASF Corporation – Hannibal shall monitor and record the operating pressure drop across the baghouses at least once a day during periods of operation. The operating pressure drop shall be maintained in accordance with the manufacturer's performance warranty, a copy of which shall be kept onsite.
  - D. Replacement bags 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, acidic and alkali resistance, abrasion resistance and etc.)
  - E. The baghouses shall be operated and maintained in accordance with the manufacturer's specifications.
4. Control Equipment – Caustic Scrubber
- A. BASF Corporation – Hannibal shall operate a caustic scrubber (631-063) to control emissions from the tank farm (PY-09) during Chlorfenapyr production. The tank farm scrubber receives vents from storage and truck unloading associated with Chlorfenapyr production only. Therefore, no

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**SPECIAL CONDITIONS:**

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

emissions are expected from the tank farm scrubber during Revysol production.

- B. The scrubber shall be maintained and operated according to manufacturer's design specifications and the Maximum Achievable Control Technology (MACT) Standard, 40 CFR Part 63, Subpart MMM, *National Emission Standards for Pesticide Active Ingredient Production*. The facility shall abide by the monitoring requirements in MACT Subpart MMM.
5. Control Equipment – Wet Scrubber
- A. BASF Corporation – Hannibal shall control emissions from the potassium hydroxide (KOH) and sodium hydroxide (NaOH) charge system (PY -16) using a wet scrubber (631-280) as specified in the permit application.
  - B. The scrubber shall be maintained and operated according to manufacturer's design specifications, a copy of which shall be kept onsite.
  - C. The scrubber shall be equipped with a flow meter that indicates the liquid flow rate through the scrubber. BASF Corporation – Hannibal shall monitor and record the liquid flow rate of the scrubber at least once a day while the scrubber is in operation. The flow rate shall be maintained within the design conditions specified by the manufacturer's performance specifications.
6. Control Devices – Operating and Maintenance Logs
- BASF Corporation – Hannibal shall maintain operating and maintenance logs for all of the control devices listed in Special Conditions 2, 3, 4, and 5 that include the following:
- A. Incidents of malfunction, with impact on emissions, duration of event, probable cause and corrective actions; and
  - B. Maintenance activities, with inspection schedule, repair actions, replacements, etc.; and
  - C. A written record of regular inspection schedule, the date and results of all inspections, including any actions or maintenance activities resulting from the inspections.

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**SPECIAL CONDITIONS:**

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

7. **Operational Restrictions**  
BASF Corporation – Hannibal shall only manufacture Chlorfenapyr and Revysol at the Pyrrole Plant. If the facility decides to produce other products, it shall apply for and receive a new construction permit to manufacture these products.
8. **Removal of equipment**  
BASF Corporation – Hannibal shall remove or otherwise render inoperable the coal-fired boilers (UTIL-02 and UTIL-03) before beginning production of Revysol.
9. **Hauling of 3-Nitro-Ortho-Xylene (3-NOX)**
  - A. BASF Corporation shall keep a record of the 12-month rolling total of Revysol production (in lbs) and 3-NOX hauled offsite based on the following criterias.
    - 1) If the 12-month rolling total of Revysol production exceeds, for the first time, [REDACTED], BASF Corporation shall haul offsite a minimum of [REDACTED] lbs of 3-NOX during the same 12-month period. Thereafter, the same minimum amount shall be shipped during any 12 month rolling period regardless of Revysol production until the 12-month rolling total of Revysol production exceeds [REDACTED].
    - 2) If the 12-month rolling total of Revysol production exceeds, for the first time, [REDACTED], BASF Corporation shall haul offsite a minimum of [REDACTED] lbs of 3-NOX during the same 12-month period. Thereafter, the same minimum amount shall be shipped during any 12-month rolling period regardless of Revysol production until the 12-month rolling total or Revysol production exceeds [REDACTED].
    - 3) If the 12-month rolling total of Revysol production exceeds, for the first time, [REDACTED], BASF Corporation shall haul offsite a minimum of [REDACTED] lbs of 3-NOX during the same 12-month period. Thereafter, the same minimum amount shall be shipped during any 12-month rolling period regardless of Revysol production until the 12-month rolling total or Revysol production exceeds [REDACTED].
    - 4) If the 12-month rolling total of Revysol production exceeds, for the first time, [REDACTED], BASF Corporation shall haul offsite a minimum of [REDACTED] lbs of 3-NOX during the same 12-month period. Thereafter, the same

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**SPECIAL CONDITIONS:**

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

- minimum amount shall be shipped during any 12-month rolling period regardless of Revysol production until the 12-month rolling total or Revysol production exceeds [REDACTED].
- 5) If the 12-month rolling total of Revysol production exceeds, for the first time, [REDACTED], BASF Corporation shall haul offsite a minimum of [REDACTED] lbs of 3-NOX during the same 12-month period. Thereafter, the same minimum amount shall be shipped during any 12-month rolling period regardless of Revysol production.
10. Record Keeping and Reporting Requirements
- A. BASF Corporation – Hannibal 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.
- B. BASF Corporation – Hannibal shall report to the Air Pollution Control Program's Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, 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.
11. If a continuing situation of demonstrated nuisance odors exists in violation of Missouri State Rules 10 CSR 10-6.165, *Restriction of Emissions of Odors*, the Director may require that BASF Corporation – Hannibal submit a corrective action plan within ten (10) days adequate to timely and significantly mitigate the odors. BASF Corporation – Hannibal shall implement any such plan immediately upon its approval by the Director. Failure to either submit or implement such a plan shall be a violation of the permit

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

Project Number: 2017-05-034

Installation ID Number: 127-0001

Permit Number: 122017-011

BASF Corporation - Hannibal Site  
3150 Highway JJ  
Palmyra, MO 63461

Complete: May 15, 2017

Parent Company:  
BASF Corporation Agricultural Products  
P.O. Box 13528  
26 Davis Drive  
Research Triangle Park, NC 27709-3528

Marion County, S14, T53N, R5W

REVIEW SUMMARY

- BASF Corporation - Hannibal Site has applied for authority to modify the existing chlorfenapyr production facility (the Pyrrole Plant) to also produce Revysol.
- Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment. HAPs of concern from this process include, but are not limited to, hydrochloric acid (HCl), toluene, and chlorine.
- Subpart Kb of the New Source Performance Standards (NSPS), *Standards of Performance for Volatile Organic Liquid Storage Vessels for Which Construction Reconstruction or Modification Commences After July 23, 1984* may apply to the storage tanks depending on volume and maximum true vapor pressure of the liquid stored. BASF Corporation – Hannibal Site shall determine applicability based on the conditions listed in the subpart.
- The Maximum Achievable Control Technology (MACT) standard, 40 CFR Part 63, Subpart MMM, *National Emission Standards for Pesticide Active Ingredient Production*, applies to the equipment affected by this permit. MACT standard, 40 CFR Part 63, Subpart FFFF, *National Emission Standards for Hazardous Air Pollutants for Miscellaneous Organic Chemical Manufacturing* does not apply to the equipment affected by this permit, but does apply to other parts of the installation (IMI-1, IMI-2 and FFP production). MACT Standard, 40 CFR Part 63, Subpart EEE, *National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors*, applies to the existing incinerators (PR-47, PR-53, PR-54).



- Existing control devices will be used to control emissions from the affected equipment. Emissions from the process and the hold tanks (633-001, 633-006, and 633-004) are routed to the fume scrubbing system (631-203/206/207/210) prior to the thermal oxidizer (631-401). The exit gas from the thermal oxidizer passes through a caustic scrubber (631-402) for the removal of acidic components formed in the thermal oxidizer at PY-06. Particulate emissions from raw material and product handling (PY-03, PY-05, PY-14, and PY-18) are controlled by baghouses (631-002, 631-015, 631-073, and 180-046) with voluntary downstream HEPA filters. The floor drain tank (PY-08) and sampling point and local ventilation area (PY-10) are equipped with voluntary carbon filters. The KOH charge system and the NaOH charge system (PY-16) are controlled using a water scrubber (631-280) with a downstream voluntary HEPA filter.
- This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Toluene emissions are greater than its *de minimis* level. However, the facility is subject to MACT, Subpart MMM. Therefore, a Section (9) permit is not required and this permit is issued under Section (6).
- This installation is located in Marion County, an attainment area for all criteria air pollutants.
- This installation is on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2]. It is listed under number 9, *Hydrofluoric, Sulfuric or Nitric Acid Plants*, and number 20, *Chemical Processing Plants*. The installation's major source level is 100 tons per year and fugitive emissions are counted toward major source applicability.
- Ambient air quality modeling was not performed for any criteria pollutants since the emissions increases for them are below their respective *de minimis* levels. Toluene emissions are greater than the SMAL, but since MACT, Subpart MMM, applies to the installation and the EPA has performed a Risk and Technology Review (RTR) for this MACT, ambient air quality modeling was not required.
- Emissions testing is not required for the equipment as a condition of this permit.
- A Part 70 Operating Permit modification request is required for this installation within one (1) year of equipment startup for Revysol production.
- Approval of this permit is recommended with special conditions.

## INSTALLATION DESCRIPTION

BASF-Corporation – Hannibal is an agricultural chemical manufacturing installation in Marion County, Missouri. This installation is classified as a major source for construction permits and a Part 70 source for operating permits. The following construction permits have been issued to the installation from the Air Pollution Control Program.

**Table 1: List of Previously Issued Permits**

Permit Number	Description
1179-EPA	Major Source permit for a Nitric Acid plant
0380-002	Installation of an Animal Feed Intermediate spray drying system
0385-002	Installation of a solid waste incinerator for herbicide wastes generated during processing
0885-005	Construction of SCEPTER and ARSENEL herbicide production lines
0887-003	Construction of ASSERT herbicide production line
0488-001	Construction of a sulfuric acid regeneration facility
0588-007	Installation of a packaging operation for THIMET and COUNTER insecticides
0988-004	Installation of a back-up flare for odor control
0489-004	Addition of bulk herbicide blending and storage facility
1189-001	Installation of the PROWL-"C" incinerator and waste storage tank
0690-005	Modification of existing equipment to increase PROWL herbicide production
0491-002	Addition of a fermenter to expand pharmaceutical plant
0392-006	Construction of bulk lime and dicalite handling equipment and storage
0393-001	Modification of existing Animal Feed Intermediate Plant
0793-001	Construction of a pellet-coating plant
0694-008	Addition of a centrifuge to increase PROWL herbicide production
0894-010	Modification to increase COUNTER insecticide production
0696-013	Modification to imidazoline (IMI-2) line
122000-003	Addition of pyrrole production plant
0997-003	Modification to increase PROWL herbicide production
062000-019	Modification to increase PROWL herbicide production
082005-014	Modification of the IMI-2 herbicide manufacturing facility to allow the production of three new pesticide active ingredient intermediates for imidazolinone herbicides
022006-005	Modification of the Pyrrole/MMPDC manufacturing facility to allow for the production of a new broad-spectrum insecticide called 320I. Production will use existing equipment and a new potassium methoxide (KCOH3) scrubber.
102008-001	Allow production of a new active ingredient, 800H and expand production capacity of three (3) diacids.
062000-019A	Reduce reporting requirements.
062000-019B	Account for cleaning emissions.
102009-007	Increasing production of Imidazolinone.
092009-005	Increasing production of MMPDC.
092010-009	Conversion of herbicide storage tank to store o-xylene
022011-009	Addition of tank into existing process.
072013-001	Construct natural gas fired boilers.
092014-007	Increase in production of 800H herbicide.
052015-012	Replacement of centrifuges for IMI-1.
062000-019C	Reducing reporting requirements for excess SO <sub>2</sub> emissions during startup.
072013-001A	Eliminating GHG emission rate limit.
032016-002	Temporary permit to vent fumes to the atmosphere via the incineration bypass vent to identify emission sources and investigate source reductions.
012017-006	Increasing production of Chlorfenapyr active ingredient.

## PROJECT DESCRIPTION

The installation plans to modify the chlorfenapyr production process at the Pyrrole Plant to also

accommodate the production of Revysol active ingredient. There will be two extra emission points. The KOH and NaOH transfer system (PY-16) is new equipment. The out-of-spec production pneumatic transfer system (PY-18) is currently onsite but is not used in Chlorfenapyr production, but will be used for Revysol production.

For product transfer (PY-14) and out-of-spec pneumatic transfer system (PY-18), the system is pneumatic, so the baghouses (631-073 and 180-046) are considered an inherent part of the operation. Therefore, there are no special conditions in this permit that requires the operation of the baghouses. The other baghouses are not considered an inherent part of the operation and therefore, are required via special conditions.

The facility operates HEPA filters downstream of the baghouses (PY-03, PY-05, PY-14, and PY-18) to further control particulate emissions. In Permit No. 092009-005, the facility is required to operate HEPA filters because the facility took credit for them in the emissions calculations. However, that project only involved the production of [REDACTED]. BASF did not take credit for the HEPA filters in the emissions calculations for this project. Therefore, these devices are considered voluntary and are not required by special condition.

This is the public version of the permit. A confidential version of the permit will be issued under Project No. 2017-05-035.

## EMISSIONS/CONTROLS EVALUATION

To calculate the potential emissions from the affected equipment, emissions from the production of Chlorfenapyr and Revysol were calculated and the higher numbers were used.

The emission points from the Chlorfenapyr and Revysol production process are listed below.

**Table 2: List of Emission Points Affected by the Project.**

<b>Emission Point</b>	<b>Description</b>
PY-01	50% NaOH Tank
PY-02	3-NO <sub>x</sub> Storage Tank
PY-03	[REDACTED] Charge System
PY-04	Fugitive Emissions from Equipment Leaks
PY-05	Product Baghouse
PY-06	Thermal Oxidizer/Scrubber Discharge
PY-07	Fume Scrubber Emergency (Thermal Oxidizer Bypass) Vent
PY-08	Floor Drain Tank
PY-09	Tank Farm Scrubber
PY-10	Sample Point and Local Equipment Ventilation
PY-12	Sulfuric Acid Storage Tank
PY-14	Product Transfer System Baghouse
PY-16	KOH and NaOH Charge System
PY-18	Out-of-Spec Product Pneumatic Transfer System

#### Emission Point PY-01: NaOH Storage Tank

This tank vents to the atmosphere and does not emit any regulated pollutants.

#### Emission Point PY-02: 3-NOX Storage Tank.

Emissions from this point consist of the breathing and working losses from an existing 3-nitro-ortho-xylene (3-NOX) storage tank. 3-NOX is a VOC. Emissions were calculated using equations found in EPA document AP-42, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*, Fifth Edition, Chapter 7.1, *Organic Liquid Storage Tanks*.

#### Emission Point PY-03: ██████████ Charge System

Emissions from this point consist of PM<sub>2.5</sub>, PM<sub>10</sub>, and PM controlled by a baghouse and is inside a building. A voluntary HEPA filter has been installed downstream of the baghouse. This system is used for ██████████ while producing Chlorfenapyr. For the Revysol, this system is used for ██████████. There are no known emission factors for this process, so the emission factor for lime transfer (scc 3-05-016-027) in Chapter 11.17, *Lime Manufacturing*, (2/1998) of EPA document AP-42, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*, Fifth Edition was used instead to estimate emissions for charging ██████████ solids into the process. AP-42 only includes emission factor for PM so PM<sub>2.5</sub> and PM<sub>10</sub> emissions were assumed to be the same as PM. The equipment is completely enclosed so the capture efficiency was assumed to be high. For the baghouse, a value of 95% capture and 99% control efficiency was used. The 99% control efficiency is the default value used by the Air Pollution Control Program.

#### Emission Point PY-04: Equipment Leaks

VOC emissions from equipment leaks were calculated using factors and efficiencies from EPA document, *Protocol for Equipment Leak Emission Estimates*, Table 2-9 and Table 5-2. The individual HAP emissions were calculated by taking the VOC emissions and multiplying by the weighted average concentration of that specific HAP.

#### Emission Point PY-05: Product Packaging

Emissions from this point consist of PM<sub>2.5</sub>, PM<sub>10</sub>, and PM. Emissions were calculated using the same factors and efficiencies as emission point PY-03.

#### Emission Point PY-06: Thermal Oxidizer and Packed Tower Scrubber

Emissions from this point consist of the neutralized combustion products of storage tanks and process emissions. The emissions are first treated by the fume handling system scrubber prior to combustion. The scrubber system exhaust is next vented to the thermal oxidizer. The thermal oxidizer exit gas is vented to a caustic scrubber to neutralize acidic components. This scrubber then vents to the atmosphere.

VOC and HAP emissions were calculated using ideal gas law and vapor compositions, which were estimated using process simulator ChemCad. Combustion emissions (i.e. NO<sub>x</sub>, CO, VOC, SO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, PM, NH<sub>3</sub>, CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O) from natural gas combustion were calculated using emission factor from AP-42, Chapter 1.4, *Natural Gas Combustion*, (7/1998). GHG-mass emissions were calculated by summing the CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions while the GHG-CO<sub>2</sub>e emissions were calculated by multiplying the CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions by their respective Global Warming Potentials and summing the results.

NO<sub>x</sub> will be produced during the combustion process from organic nitrogen in the fumes. It was assumed that 10% of the nitrogen will be converted to NO<sub>x</sub>. This conversion rate is taken from an emissions report prepared in 1998 by Anderson 2000, Inc.

#### Emission Point PY-07: Fume Scrubber Emergency or Thermal Oxidizer By-Pass Stack

Emission from this point consists of VOC, HAPs, and reduced sulfur from storage tanks and processes during emergency thermal oxidizer system trip events resulting in a bypass of the thermal oxidizer and the downstream scrubber control devices. The storage tank and process emissions are first treated by the fume handling system scrubber and then released directly to the atmosphere during a bypass event. There is a voluntary scrubber used for reduced sulfur compounds to control odor, but the facility did not take this into account while calculating emissions. Therefore, this scrubber is not required by special condition. The facility calculated emissions using a maximum of 240 hours of by-pass, which is now a limit in Special Condition 2.B. of this permit.

#### Emission Point PY-08: Floor Drain Tank

Emissions from this point consists of VOC from breathing and working losses. Emissions were calculated using equations from EPA document AP-42, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*, Fifth Edition, Chapter 7.1, *Organic Liquid Storage Tanks*. A carbon canister has been voluntarily added to reduce organic emissions from this tank. No credit is taken in the potential emissions calculation for the use of the carbon filter since it is not required by special condition.

#### Emission Point PY-09: Tank Farm Scrubber for Acid Gases

The tank farm scrubber only receives vents from storage and truck unloading activities associated with production of Chlorfenapyr. No emissions will be vented through this emission point during Revysol production. VOC and HAP emissions from this point were calculated using mass balances and the ideal gas law. The capture efficiency was assumed to be 100% since the emission point is completely enclosed. The installation suggested using a scrubber control efficiency of 95%.

Due to the small amount of VOC and HAPs being emitted at this point, using a smaller efficiency would not change the type of permit that should be issued to the facility nor would it trigger any modeling requirements for HAPs. Therefore, this number was accepted for use.

#### Emission Point PY-10: Sample Point and Local Equipment Ventilation

Emissions from this point consist of VOC and HAPs displaced from sample jars during routine collection of process samples and emissions from equipment enclosures when equipment is opened for maintenance. Emissions were calculated using material balances on the number of samples that will be taken and the expected loss per sample. A carbon filter has been voluntarily added to reduce organic emissions. No credit is taken in the potential emissions calculation for the use of the carbon filter and it is not required by special condition.

#### Emission Point PY-12: 98% H<sub>2</sub>SO<sub>4</sub> Storage Tank

Sulfuric acid mist is a regulated pollutant. Sulfuric emissions from the tank were calculated using the EPA Tanks 4.09d program.

#### Emission Point PY-14: Product Pneumatic Transfer System

PM<sub>2.5</sub>, PM<sub>10</sub>, and PM emissions were calculated using the PM emission factor in AP-42, Table 11.17-04, *Product Transfer and Conveying*, SCC 3-05-016-15 and assuming that all PM are PM<sub>2.5</sub> and PM<sub>10</sub>. A 99% control efficiency was given for the use of a baghouse. The capture efficiency is 100% since the transfer system is pneumatic.

#### Emission Point PY-16: KOH and NaOH Charge System

This emission point is only used for Revysol. There are no known emission factors for this process, so the emission factor for lime transfer (scc 3-05-016-027) in Chapter 11.17, *Lime Manufacturing*, (2/1998) of EPA document AP-42, *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*, Fifth Edition was used instead to estimate emissions. AP-42 only includes emission factor for PM so PM<sub>2.5</sub> and PM<sub>10</sub> emissions were assumed to be the same as PM. For the NaOH charge system, a wet scrubber is used to control particulate emissions. For the KOH charge system, a baghouse is used followed by the same wet scrubber used for NaOH. The equipment is completely enclosed so the capture efficiency (95%) was assumed to be high. A 90% control efficiency was given for the wet scrubber. This value was suggested for use by the installation in the application. A wet scrubber should achieve between 70-99% particulate control according the EPA's Air Pollution Control Technology Fact Sheet. Using either 70% or 90% would have led to the same type of permit that should be issued. Therefore, the 90% efficiency was accepted for use.

#### Emission Point PY-18: Out-of-Spec Product Pneumatic Transfer System

This emission point is only used for Revysol. The PM emission factor for product transfer and conveying (SCC 3-05-016-15) from AP-42, Chapter 11.17, was used to calculate particulate emissions. AP-42 does not give PM<sub>2.5</sub> and PM<sub>10</sub> emission factors so the PM emission factor was assumed to be PM<sub>2.5</sub> and PM<sub>10</sub> as well. A 99.5 % control efficiency was given for the baghouse for PM<sub>10</sub> and PM, and a 99.0% control efficiency was given for PM<sub>2.5</sub>, which are the default values

used by the Air Pollution Control Program. The capture efficiency is 100% since the transfer system is pneumatic.

**Emission Point EP155, EP156: Two Natural Gas Fired Boilers**

In permit no. 072013-001, two natural gas fired boilers were permitted at 147.1 MMBtu/hr each. However, this entire amount of usage is not needed for the manufacturing of chlorfenapyr and MMPDC. With the addition of Revysol, the steam usage will be increased and the emissions from the increased usage needs to be included as part of this project. Emissions were calculated using factors from AP-42, Chapter 1.4, *Natural Gas Combustion*, 7/1998.

**Potential-Minus-Actual Emissions**

Potential emissions minus the baseline actual emissions were used to calculate the emissions increase from this project. The baseline period used is 2014 and 2015. Results show that the emissions of all pollutants, except for SO<sub>x</sub> and NO<sub>x</sub>, will be less than their respective de minimis levels. For SO<sub>x</sub> and NO<sub>x</sub>, a netting analysis was performed to determine if the net emissions increase are greater than their respective de minimis levels.

**Table 3: Emissions Summary (tons per year)**

<b>Pollutant</b>	<b>Regulatory De Minimis Levels</b>	<b>Existing Potential Emissions</b>	<b>Existing Actual Emissions (2016 EIQ)</b>	<b>PTE-BAE</b>
PM <sub>2.5</sub>	10.0	Major	67.24	9.44
PM <sub>10</sub>	15.0	Major	67.24	9.44
PM	25.0	Major	N/D	3.12
SO <sub>x</sub>	40.0	Major	79.32	115.85
NO <sub>x</sub>	40.0	Major	309.88	155.94
VOC	40.0	Major	24.95	32.73
CO	100.0	Major	43.87	36.52
Combined HAPs	25.0	Major	10.54	38.62
Toluene	10.0	Major	N/D	13.60
Sulfuric Acid Mist	7.0	N/D	N/D	0.01
Total Reduced Sulfur	10.0	N/D	N/D	6.38

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

**Net Emissions Increase Analysis**

The process of evaluating the net emissions increase at the facility involves evaluating all creditable increases and decreases in actual emissions from the entire facility during the contemporaneous period, which is the period from five years before the beginning of construction on the proposed project to the start of operation of the new project. To be creditable, a contemporaneous emissions decrease must be enforceable as a practical matter on and after the date that construction begins for the proposed project. The emissions decrease must take place

prior to the emissions increase with which it is being netted. The creditable increases and decreases must also not have been relied on in issuing a PSD permit. For this installation, an emissions decrease occurred in May, 2015 when it removed two coal-fired boilers (UTIL-02 and UTIL-03) and an increase occurred in 2014 when it added two natural gas-fired boilers (EU0155 and EU0156) to replace the coal-fired boilers. The decreases from the removal of the coal-fired boilers were used in another netting analysis (Permit No. 072013-001). However, the final permit issued during the previous netting analysis is not a PSD permit. Therefore, the decrease is still creditable for this netting analysis. (See 40 CFR 52.21(b)(3)(iii)(a))

The result of the netting analysis is given in Table 4 and Table 5.

**Table 4: SO<sub>x</sub> Netting Analysis**

Project	Increase/Decrease (tpy)
Coal-Fired Boilers	-2408.31
Natural Gas-Fired Boilers	0.72
Current Project	115.85
<b>Net Emissions Increase</b>	<b>-2,291.74</b>

**Table 5: NO<sub>x</sub> Netting Analysis**

Project	Increase/Decrease (tpy)
Coal-Fired Boilers	-126.1
Natural Gas-Fired Boilers	102.7
Current Project	155.9
3-NOX Shipping	-92.5
<b>Net Emissions Increase</b>	<b>&lt;40.0</b>

Note 1: BASF Inc. will ship offsite enough 3-NO<sub>x</sub> that ensures the net emissions increase are less than 40.0 tpy

The emissions decreases due to the shutdown of the coal-fired boilers were calculated using the past actual coal usage for 2008-2009 for NO<sub>x</sub> and 2013-2014 for SO<sub>x</sub>. The emission factors for both pollutants were taken from AP-42, Chapter 1.1, Bituminous and Subbituminous Coal Combustion, (9/1998). The emissions increases from the natural gas-fired boilers were taken from the construction permit (No. 072013-001) issued in July of 2013 which permitted these boilers. In addition, the facility generates NO<sub>x</sub> emissions by incinerating a byproduct, non-hazardous liquid waste stream called 3-NOX (3-Nitro-ortho-xylene). The facility will, instead, ship some of the non-hazardous liquid off-site to one or more commercial recycling, reuse, and/or treatment facility to cause a decrease in NO<sub>x</sub> emissions at the site.

If Revysol is manufactured at a rate less than █ of the maximum production level, netting analysis shows that no 3-NO<sub>x</sub> will have to be shipped offsite. The net NO<sub>x</sub> emissions will still be under the significance levels. Therefore, this permit does not require BASF to ship off the 3-NOX until it reaches █ of the maximum production of Revysol. Once it reaches █ of maximum production, 3-NOX must be shipped offsite. The facility is allowed to ship the 3-NOX based upon how much Revysol it produces. The more Revysol it produces, the more 3-NOX must be shipped offsite to ensure that the net emissions increase is less than the significance level of 40 tpy.



The amount of 3-NOX to be shipped offsite is listed in Special Condition 9. It is based on assumptions of 8% conversion of N to NO<sub>2</sub>. The percentage is a conservative estimate based on a combination of sources such as the [REDACTED] and Anderson's recommended conversion rate. The facility may perform stack tests in the future to determine if 3-NOX shipping can be minimized or avoided. After any such stack tests are performed, the facility may amend this permit to take into account the new information.

### PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of HAPs are greater than de minimis levels. However, a MACT subpart applies to the affected equipment and a section (9) permit is not required.

### APPLICABLE REQUIREMENTS

BASF Corporation - Hannibal Site 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  
The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required June 1 for the previous year's emissions.
- *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 10-3.090

## SPECIFIC REQUIREMENTS

- New Source Performance Regulations, 10 CSR 10-6.070 – New Source *Performance Standards (NSPS) for Volatile Organic Liquid Storage Vessels for Which Construction Reconstruction or Modification Commences After July 23, 1984*, 40 CFR Part 60, Subpart Kb
- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Pesticide Active Ingredient Production*, 40 CFR Part 63, Subpart MMM
- 10 CSR 10-6.261, *Control of Sulfur Dioxide Emissions*.

## STAFF RECOMMENDATION

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

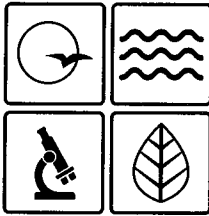
## PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated May 5, 2017, received May 15, 2017, designating BASF Corporation Agricultural Products as the owner and operator of the installation.
- E-mail communications between Missouri Air Pollution Control Program and BASF Corporation Agricultural Products

Other documents relied upon during technical review:

- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Draft permits sent by the Missouri Air Pollution Control Program to BASF Corporation Agricultural Products.
- 40 CFR 98, Table A-1.
- Emissions report from Anderson 2000, Inc., 1998.



Missouri Department of dnr.mo.gov

# NATURAL RESOURCES

Eric R. Greitens, Governor

Carol S. Comer, Director

**DEC 22 2017**

Mr. Curt Gardner  
Sr. EHS Specialist  
BASF Corporation - Hannibal  
3150 Highway JJ  
Palmyra, MO 63461

RE: New Source Review Permit - Project Number: 2017-05-034

Dear Mr. Gardner:

Enclosed with this letter is your permit to construct. Please study it carefully. Also, note the special conditions, if any, on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files.

Operation in accordance with these conditions, your new source review permit application and with your amended operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

If you have any questions regarding this permit, please do not hesitate to contact Chia-Wei Young at the Departments' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102, or by telephone at (573) 751-4817. Thank you for your time and attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Susan Heckenkamp  
New Source Review Unit Chief

KBH:cj

Enclosures

c: Northeast Regional Office  
PAMS File: 2016-11-009  
Permit Number:

122017-011



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