July 23, 2020

Curt Gardner
EHS Specialist Senior II
BASF Corporation - Hannibal Plant
3150 Highway JJ
Palmyra, MO 63461, MO 63461

RE: New Source Review Temporary Permit Request - Project Number: 2020-05-024
    Installation ID Number: 127-0001
    Expiration Date: July 1, 2022
    Temporary Permit Number: 072020-012

Dear Curt Gardner:

The Missouri Department of Natural Resources' Air Pollution Control Program has completed a review of your request to install a temporary water chilling system for two heat exchangers at the Spent Sulfuric Acid Regeneration (SAR) facility at your plant in Hannibal, Missouri. The Air Pollution Control Program is hereby granting your request to conduct this temporary operation at this location in accordance with Missouri State Rule 10 CSR 10-6.060(10). Your installation proposed confidentiality for some of the information in your application. This is the public version of the permit. The confidential version of the permit will be issued under Project Number 2020-05-052.

Your installation proposes to employ electric chillers, an electric transformer and hoses to provide colder (chilled) cooling water to two SAR heat exchangers, X-30A and B. It is believed that this chilling of cooling water supplied to these heat exchangers will improve SAR SO₂ recovery efficiency during the warmer months when the cooling water supplied to the heat exchangers would otherwise be warmer and the heat exchangers would be less efficient. If successful, the test will enable preserving SAR spent acid feed rates during the warmer months to support the facility’s production rate of PROWL herbicide, which otherwise needs to be reduced when SAR recovery efficiency drops and spent acid to SAR from PROWL production must be reduced as a result.

To issue the temporary permit, a potential emissions (PTE) minus baseline actual emissions (BAE) analysis was performed to ensure that a Prevention of Significant Deterioration (PSD) permit would not be triggered since the installation is an existing major source. The project emissions were then calculated as the PTE before this project minus the PTE after the project. Both calculations are described in further details below.
Emissions Increase for PSD Applicability

The maximum hourly design rate of the SAR facility is XXXX tons of acid feed rate per day. The facility was originally permitted, through Permit 062000-019 for the higher feed rate of XXXX tons per day. Stack testing performed in 2000 were also tested at two separate daily throughputs, one of which is at the higher feed rate allowed in Permit 062000-019. However, your facility indicated that the 2000 stack testing was performed at the most extreme feeds that could be maintained long enough to take the necessary samples and measurements to demonstrate that the SAR facility could meet its permit requirements. It is questionable whether the facility could actually sustain that high a rate for more than a day or two without eventually encountering operating problems that would force the facility to reduce rates. During the last ten (10) years, XXXX tons per day is the maximum daily rate that the facility sustained for a day or more. Therefore, the potential emissions calculations were calculated using XXXX tons per day (or XXXX tons per year). The installation will be required, in Special Condition 1 of this temporary permit, to track its annual spent acid acceptance to ensure that this acceptance rate is not exceeded.

Stack testing performed in 2000 shows that the SOx and NOx emissions are higher at the higher throughput rate. Since the facility cannot process more than XXXX tons per day, the lower values were used to calculate PTE emissions. The SOx emission factor is 2.64 pounds per ton while the NOx emission factor is 1.61 lb/ton. For the BAE, the SOx emissions were calculated using the same emission factor with average throughput from 2015 and 2016. The NOx emissions were calculated using the same emission factor with the average throughput from 2017 and 2018.

There will be VOC emissions increase from the PROWL process as well. Although the facility indicated that the throughput of the PROWL process will not be increased beyond what they were originally permitted for, for PSD applicability, emissions increase is based on the actual emissions that the PROWL facility is capable of. Therefore, PTE minus BAE should be performed on VOC emissions from the PROWL process as well. The PTE of VOC from the PROWL process were taken from the previous permit issued to the installation for the expansion of the PROWL process (082019-012) and the BAE were taken from 2018-2019 Emissions Inventory Questionnaire (EIQ).

The SAR facility uses a preheater and a furnace, fired by natural gas. The preheater and the furnace has MHDR of 16.2 and 75.6 MMBtu/hr, respectively. PM$_{2.5}$, PM$_{10}$, PM, VOC, and CO PTE from combustion were calculated using emission factors from EPA document AP-42, Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources, Fifth Edition, Chapter 1.4, Natural Gas Combustion, (July, 1998). For the actual emissions, data from the 2018-2019 EIQ were used.
Table 1: PTE Minus BAE Calculations (in tpy)

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>PSD Significance Level</th>
<th>PTE</th>
<th>BAE</th>
<th>Emissions Increase (PTE-BAE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM&lt;sub&gt;2.5&lt;/sub&gt;</td>
<td>10.0</td>
<td>2.99</td>
<td>1.13</td>
<td>1.86</td>
</tr>
<tr>
<td>PM&lt;sub&gt;10&lt;/sub&gt;</td>
<td>15.0</td>
<td>2.99</td>
<td>1.13</td>
<td>1.86</td>
</tr>
<tr>
<td>PM</td>
<td>25.0</td>
<td>0.75</td>
<td>1.00</td>
<td>0.75</td>
</tr>
<tr>
<td>SO&lt;sub&gt;x&lt;/sub&gt;</td>
<td>40.0</td>
<td>98.28</td>
<td>70.74</td>
<td>27.54</td>
</tr>
<tr>
<td>NO&lt;sub&gt;x&lt;/sub&gt;</td>
<td>40.0</td>
<td>66.90</td>
<td>44.12</td>
<td>22.78</td>
</tr>
<tr>
<td>VOC</td>
<td>40.0</td>
<td>33.32</td>
<td>7.96</td>
<td>25.37</td>
</tr>
<tr>
<td>CO</td>
<td>100.0</td>
<td>33.11</td>
<td>17.63</td>
<td>15.48</td>
</tr>
</tbody>
</table>

Note 1: No PM were calculated for the 2018-2019 EIQ so zero (0) was used.

Results show that the emissions increases are below the significance level for PSD.

Project Emissions Increase

The project emissions increases were calculated using the post-project PTE minus the pre-project PTE. For the SAR facility, the post-project PTE were calculated using the maximum daily rate of XXXXX tons per day for the entire year. The pre-project PTE were calculated using the reduced maximum daily rate during the warmer months. The facility estimates that the facility operates at XXXXX tons per day for XXXXX days (cold months) and operates at XXXXX tons per day for XXXXX days (warm months). Although these days are estimates and may vary, any deviance is not expected to increase the project emissions to above the de minimis levels. Emissions from the SAR facility were calculated using the same emission factor as in the PSD applicability determination.

For the PROWL process, the post-project emissions were taken from Permit No. 082019-012. The pre-project emissions were calculated by taking the post-project emissions and multiplying by the ratio of pre-project maximum spent acid generation and the post-project maximum spent acid generation.

For the combustion units, not enough data was given in the application regarding pre-project maximum design rate. Therefore, only post-project PTE was used. Emissions from combustion were calculated using the same emission factors as in the PSD applicability determination.

The SAR stack also emits sulfuric acid mist, which is not an EPA regulated pollutant but is regulated by the State of Missouri. The de minimis level of sulfuric acid is 7 tons per year. Sulfuric acid mist emissions were calculated using the emission factor determined in the 2000 stack tests. HAPs are not criteria pollutants so they were not included in the PSD applicability determination. They are included here in the project emissions increase.
Table 2: Post-Project PTE minus Pre-Project PTE Calculations (in tpy)

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>De Minimis</th>
<th>Emissions Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{2.5}$</td>
<td>10.0</td>
<td>3.0</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>15.0</td>
<td>3.0</td>
</tr>
<tr>
<td>PM</td>
<td>25.0</td>
<td>0.75</td>
</tr>
<tr>
<td>SO$_{X}$</td>
<td>40.0</td>
<td>9.70</td>
</tr>
<tr>
<td>NO$_{X}$</td>
<td>40.0</td>
<td>5.92</td>
</tr>
<tr>
<td>VOC</td>
<td>40.0</td>
<td>5.24</td>
</tr>
<tr>
<td>CO</td>
<td>100.0</td>
<td>33.11</td>
</tr>
<tr>
<td>Sulfuric Acid Mist</td>
<td>7.0</td>
<td>0.15</td>
</tr>
<tr>
<td>HAPs</td>
<td>10.0/25.0</td>
<td>2.35</td>
</tr>
</tbody>
</table>

You are still obligated to meet all applicable air pollution control rules, Department of Natural Resources’ rules, or any other applicable federal, state, or local agency regulations. Specifically, you should avoid violating 10 CSR 10-6.045 Open Burning Requirements, 10 CSR 10-6.220, Restriction of Emission of Visible Air Contaminants, and 10 CSR 10-6.165 Restriction of Emission of Odors.

A copy of this letter should be kept with the unit and be made available to Department of Natural Resources' personnel upon verbal request. If you have any questions regarding this determination, 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

Darcy A. Bybee
Director

DAB: cya

c: PAMS File: 2020-05-024
Northeast Regional Office
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.”

BASF Corporation – Hannibal Plant
Marion County, S14, T53N, R5W

1. Spent Acid Limitation
   A. BASF Corporation – Hannibal Plant shall not process more than XXXXX tons of spent acid from the PROWL process in the SAR facility in any consecutive 12-month period.
   B. BASF Corporation – Hannibal Plant shall develop and use its own forms to demonstrate compliance with Special Condition 1.A. The forms shall include, at a minimum, the total monthly spent acid processed, the total 12-month spent acid processed, the compliance limit, and indication of compliance.

2. Record Keeping and Reporting Requirements
   A. BASF Corporation – Hannibal Plant 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 Plant 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, 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.