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# ENGINEERING EVALUATION/FACT SHEET

## B ACKGROUND INFORMATION

| | |
|---|---|
| Application No.: | R13-3230 |
| Plant ID No.: | 039-00001 |
| Applicant: | The Chemours Company FC, LLC |
| Facility Name: | Belle Plant |
| Location: | Belle |
| NAICS Code: | 4325199 |
| Application Type: | Modification |
| Received Date: | January 8, 2015 |
| Engineer Assigned: | Edward S. Andrews, P.E. |
| Fee Amount: | $3,500.00 |
| Date Received: | January 13, 2015 |
| Complete Date: | May 31, 2016 |
| Due Date: | August 29, 2016 |
| Applicant Ad Date: | February 19, 2015 |
| Newspaper: | *The Charleston Gazette* |
| UTM's: | Easting: 491.40 km Northing: 4,368.57 km Zone: 17 |
| Description: | The application is for the after-the-fact replacement of four vessels that are used to support the DMF process unit, which is covered by Consent Order CO-R13-E2014-30. |

## DESCRIPTION OF PROCESS

The Chemours Company commenced constructed of four replacement vessels on July 21, 2014. The use of these vessels are in support of the dimethylformamide (DMF) process unit located at the Belle Plant, which is in Belle, WV.

The four vessels that were taken out of service were identified as S-2, S-10, S12, S-13. The replacement vessels are identified as S-102, S-110, S-112, S-113. Each of the new vessels are identical in size. In support of the DMF process unit, each vessel has a different role in supporting the process. The equipment used in producing DMF are also used in the manufacturing of monomethylformamide (MMF).

These replacement vessels would be used in similar roles when manufacturing MMF as used in the DMF process.

## SITE INSPECTION

Belle Plant is classified as a Major Title V facility, which requires the agency to conduct routine inspections to ensure compliance with all applicable rules and regulations. This facility was last inspected on August 8, 2012, by Ms. Rebecca Johnson, a Technical Analyst for the Compliance & Enforcement Section. During this inspection, Ms. Johnson found the facility to be operating in compliance with all applicable limitations and permits. For this review, no site inspection was deemed necessary.

## ESTIMATE OF EMISSION BY REVIEWING ENGINEER

The applicant used US EPA's TANKS 4.09 program to predict volatile organic compound (VOC) and volatile hazardous air pollutant (HAPs) emissions, which will be methanol and DMF, from replacement vessels. The writer used ProMax 4.0 to verify the applicant's predicted emissions rates. ProMax 4.0 has a function that uses the procedures and equations from Chapter 7-1 of AP-42 to predict losses from storage vessels. The following table is a comparison of the uncontrolled predicted emissions by vessel.

| Table #1 – Predicted Working and Breathing Losses from the Replacement Vessels | | |
|---|---|---|
| Vessels | Applicant's Predicted VOC Losses (pounds per year) | ProMax Predicted VOC Losses (tons per year) |
| S-102 | 3,597.04 | 3,681.86 |
| S-110 | 1,811.66 | 1,800.00 |
| S-112 | 2,814.69 | 2,681.68 |
| S-113 | 328.90 | 328.40 |
| Total | 8,552.29 | 8,491.94 |

These emission estimates were predicted at continuous flow rates. The organic liquid in Tank S-110 will be transferred into tanker cars or trucks. The emissions from this loading activity has the potential to emit 0.29 pounds per hour of VOC and volatile HAPs, which equates to 1.27 tons per year on an annualized basis.

When manufacturing MMF, the organic liquids stored in Tanks S-110 and S-113 would have different components. The liquids in S-102 and S-112 for the MMF would be nearly the same mixture when used to manufacture DMF. The VOC had HAP emissions from working and breathing loses from the liquids in Tanks S-110 and S-113 during the MMF process are 0.04 tpy and 0.03 tons per year respectively.

Chemours has vented S-102 and S-112 in accordance with Consent Order CO-R13-E2014-30 and has proposed to vent S-113 to a control device, which is the Amines Flare (Control Device AMCD01). The particular control device has a destruction efficiency of 98% for VOCs and volatile HAPs. The VOCs and volatile HAPs are reduced down to 340 pounds per year from these three vessels.

Other sources of emissions are due to equipment leaks. Chemours estimated 0.03 tons per year of methanol and 0.03 tons per year of DMF emissions from the connectors that are connected to the replacement vessels.

These vessels are subject to Subpart G. This subpart allows the control device to not meet the emission standard for 240 hours per year for routine planned or scheduled maintenance. The potential emissions for these 240 hours were based on these hours occurring during the warmest month of the year, which was August. The vessels affected by the routine planned maintenance outages of the control device are Tanks S-102, S-112, and S-113. The total hourly potential of VOCs and HAPs from these vessels would be 1.39 pounds per hour. For this maintenance period, the potential VOCs and HAPs from these tanks would be 333.6 pounds per year. Of the 333.6 pounds, 319 pounds would be methanol.

Presented in the following table is a summary of emissions from replacing these four vessels.

| Table #2 Summary of Emissions from the replacement vessel project | | | | |
|---|---|---|---|---|
| Pollutant | S-102, S-112, S-113 After Control (pounds per year)[1] | S-110* (pounds per year) | Equipment Leaks (pounds per year) | Total (pounds per year) |
| VOC | 466.5 | 4,389 | 120 | 4,975.5 |
| Total HAPs | 466.5 | 4,389 | 120 | 4,975.5 |
| DMF | 19.9 | 4,384 | 60 | 4,463.9 |
| Methanol | 446.5 | <5 | 60 | 511.5 |

* Includes loading losses from tanker or rail cars.
1 – Includes 240 hours per year of uncontrolled emissions.

## REGULATORY APPLICABLILITY

The Belle Plant is a major source under Rule 14(PSD 45 CSR 14) and Rule 30 (Title V Operating Permit Program 45CSR30). The total potential VOCs from this project is 2.32 tons per year. The potential to emit of VOC, which is classified as a precursor to ozone, is less than the 40 tons per year significance threshold for Ozone under Rule 14 (45 CSR §14-2,74.a.). Thus, this project does not represent a "significant emission increase" for any regulated pollutant under Rule 14 and therefore no further evaluation of this project for applicability under Rule 14 is required.

These tanks are supporting the DMF process, which is an affected process unit under Subpart G - National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater (HON MACT). The HON MACT classifies storage vessels into two classes, Group 1 and Group 2. The classification is based on size of the vessel and maximum true vapor pressure of the organic liquid stored in the vessel.

Because these replacement vessels were constructed after the initial compliance date of 40 CFR §63.100, these vessels are considered to be new vessels. The four replacement vessels each have a capacity greater than 151 cubic meters. Therefore, Table 6 to Subpart G of Part 63 defines Group 1 vessels storing a liquid with a true vapor pressure equal to or greater than 0.7 kilopascals (kPa). The writer used the Vapor Pressure, Dew and Bubble Point Analysis tool in ProMax™ 4.0 to verify the applicant's determination of which vessel is Group 1 or Group 2. Chemours used ETAP – DIPPER Single Component Physical Properties program to determine the vapor pressure of the liquids to be stored in the vessel.

There are issues with both of these tools to determine the vapor pressure of the liquids. All three of the vessels will be storing a liquid that is a mixture of components. The vapor pressure based on ETAP – DIPPER would require additional calculations to get a value of the mixture. The vapor pressure tool in ProMax calculates the true vapor pressure of the liquid in accordance with ASTM Method 1267, which is the pressure of the vapor in equilibrium with the liquid at 37.8° C (~100°F). Subpart G defines maximum true vapor pressure of the total organic HAP at storage temperature, which should be near ambient temperature.

Chapter 7.1 of AP-42 outlines several approaches to correct the true vapor pressure of the liquid to a specific temperature. However, the only approach that the writer had enough information to correct the vapor pressure was mean for liquids with a vapor pressure between 2 to 15 psia (See Figure 7.1-13b of Chapter 7.1 of AP-42). The following table are the true vapor pressures of the liquids by vessel determined by the applicant and the writer.

| Table #3 – True Vapor of Organic Liquids | | | |
|---|---|---|---|
| Tank Name | Applicant's Vapor Pressure (kPa) | True Vapor Pressure using ASTM 1267 (kPa) | Corrected to $77^0$ F (kPa) |
| S-102 | 16.8 | 32.84 | 26.75 |
| S-110 | 0.54 | 1.30 | 0.65 |
| S-112 | 16.8 | 32.84 | 26.75 |
| S-113 | 0.62 | 1.79 | 0.88 |

The writer concurs that vessels S-102 and S-112 are Group 1 vessels with S-110 as a Group 2 vessel. However, the writer can only concur to S-113 on a conditional basis. The liquid sent to S-113 can vary in the methanol content which directly affects the vapor pressure of the stored liquid. Thus, the status of this vessel could change unless the methanol content can be measured on a real time basis or operational parameter that can be linked to the process that

affects the methanol content. Chemours proposed a third approach which is to control the vessel by routing it to the amines flare. When operating the MMF process, the vapor pressured of the liquids in Tank S-110 is 0.09 kPa using ASTM Method 1267. Thus, Tank S-110 is a Group 2 Vessel whether either process is in operation.

Because the vapor pressure of these Group 1 vessels are less than 76.6 kPa, the level of control on these vessels must comply with 40 CFR §63.119(a)(1).

Thus, Chemours prepared and submitted a complete application, paid the filing fee, and published a Class I Legal ad in Charleston Gazette on February 19, 2015.

As a result of replacing these four tanks, the Belle Plant will remain to be classified as Major Source under the Title V. The Chemours Company is required to incorporate this permit into the facility Title V Operation Permit. With this application submittal, the applicant filed an minor modification application to the Facility's Title V Operating Permit to incorporate the requirements from this permit.

## TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The replacement tanks will not emit any pollutants that aren't already being emitted by the existing tanks. Therefore, no information about the toxicity of the hazardous air pollutants (HAPs) is presented in this evaluation.

## AIR QUALITY IMPACT ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed change does not meet the definition of a major source as defined in 45CSR14.

## MONITORING OF OPERATIONS

As noted earlier, the replacement tanks are subject to Subpart G which requires routine annual inspections of the closed vent system and monitoring of the parameter for control device listed in the Notification of Compliance Status for Subpart G for the Amines Flare. In Chemours' September 17, 1997 Notification of Compliance Status Report, Chemours was monitoring the presence of flame for the flare for Subpart G.

Subpart G allows for the control device for Group 1 vessels not to be meeting the design specification or monitoring requirements for planning routine maintenance of the control device for up to 240 hours per year. Thus, the permittee will be required to monitor the hours of scheduled maintenance that cause the operation of the flare to be out of design or monitoring specification.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates the proposed changes of the facility will meet all the requirements of the applicable rules and regulations when operated in accordance with the permit application. Therefore, the writer recommends granting The Chemours Company, FC a Rule 13 Modification Permit for replacing Tanks S-102, S110, S-112, and S-113 at Belle Plant located in Belle, WV.

Edward S. Andrews, P.E.
Engineer

July 18, 2016
Date