



REGION 6

DALLAS, TX 75270

March 18, 2024

Russell Wozniak
US Air Advocacy Leader & California Regulatory Affairs Leader
Dow Chemical Company, Louisiana Operations
21255 Louisiana Hwy 1
Plaquemine, Louisiana 70764
vnowak3@dow.com

Re: Alternative Monitoring Plan (AMP) – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Miscellaneous Organic Chemical Manufacturing (MON), 40 Code of Federal Regulations (C.F.R.) Part 63 Subpart FFFF – Glycol II Amines Production, T-660 Scrubber - Dow Chemical Louisiana Operations, Plaquemine, LA (Dow Plaquemine)

Dear Mr. Wozniak:

This letter is in response to your January 5, 2022, request for approval of an AMP with alternate monitoring parameters at the Dow Plaquemine Glycol II Amines Production Facility T-660 scrubber, in lieu of requirements under NESHAP Subpart FFFF. The AMP is needed to demonstrate compliance with new ethylene oxide provisions in the MON rule, 40 C.F.R. §§ 63.2493(b)(4)(i)-(v). Dow Plaquemine submitted the AMP request in accordance with the alternative monitoring provisions in §§ 63.2493(b)(4)(i), (ii), and (v). Upon review of all available information, the U.S. Environmental Protection Agency (EPA) conditionally approves your AMP, as delineated in the Enclosure to this letter.

On July 26, 2022, Dow Plaquemine requested a compliance extension to the August 12, 2022, compliance deadline under the MON rule. The extension request was needed to allow Dow Plaquemine to complete performance testing under additional operating scenarios requested by EPA. The additional testing was necessary for EPA to complete its technical evaluation of the AMP request. EPA approved the compliance extension on August 9, 2022. Dow Chemical furnished a copy of its proposed revised test plan to EPA and the Louisiana Department of Environmental Quality (LDEQ) with its testing notification prior to August 12, 2022, in accordance with Part 63 Subpart A § 63.9(e).

EPA will furnish a copy of the AMP conditional approval response to LDEQ to attach to the facility's air permit for federal enforceability, and so that LDEQ may modify the facility's permit conditions to be consistent with the approved alternate monitoring parameters and operating condition

representations for the AMP, in accordance with requirements of Part 63 Subpart FFFF and LDEQ's delegated air program.

If operations change from those represented in the Enclosure for the Glycol II Amines Production Facility or the T-660 Scrubber, such that the alternate monitoring parameters and conditions are no longer representative, this approval may become void and a new AMP request will be necessary. If you have questions or concerns about this conditional approval, please contact Justin Chen of my staff at (214) 665-2273 or chen.justin@epa.gov.

Sincerely,

STEVEN
THOMPSON

 Digitally signed by STEVEN
THOMPSON
Date: 2024.03.18 13:17:56
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Steve Thompson
Chief
Air Enforcement Branch

Enclosure

cc: Eura DeHart, LDEQ, Eura.DeHart@la.gov.

ENCLOSURE
ALTERNATIVE MONITORING PLAN (AMP)
Dow Chemical Plaquemine Operations
Glycol II Amines Production Plant, T-660 Scrubber

BACKGROUND INFORMATION

Dow Plaquemine has proposed an AMP with alternate monitoring parameters for the Glycol II Amines Production T-660 Scrubber at the facility located in Plaquemine, Louisiana. This Enclosure provides EPA's technical evaluation of the operating conditions and associated implementation of rule requirements for the T-660 Scrubber. Since the Dow Plaquemine facility must comply with recently added ethylene oxide emission standards under NESHAP Part 63 Subpart FFFF (the MON Rule), an AMP is necessary to evaluate equivalency and adequacy of the alternate monitoring parameters proposed, in lieu of rule-specified requirements for monitoring vapor flow rate, pH operating limits, and liquid feed pressure.

The Glycol II Amines Production Plant produces two different product lines. One product line uses ethylene oxide as a raw material. Ethylene oxide reacts with methylamine to produce a mixture of n-methylethanolamine, methyldiethanolamine, and higher molecular weight amine compounds. The other product line does not use ethylene oxide. Small quantities of ethylene oxide are vented to the T-660 scrubber during only a portion of the year. The main flows to the scrubber are nitrogen, ammonia, methylamine, and n-methylethanolamine, when the products using ethylene oxide are produced. Based on sampling and testing Dow Plaquemine conducted at the inlet stream to the scrubber, the ethylene oxide flow to the scrubber is slightly greater than 100 pounds per year if ethylene oxide were used as a raw material for the entire year. Based on the testing, the ethylene oxide concentration in the vapor stream entering the T-660 scrubber is greater than one part per million by volume (ppmv) undiluted ethylene oxide, and the mass flow of ethylene oxide is greater than five pounds per year. Therefore, although the proportion of flow of ethylene oxide to the scrubber is very small, the vent gas stream entering the T-660 scrubber meets the criteria for being in ethylene oxide service for process vents regulated by 40 C.F.R. Part 63 Subpart FFFF, per § 63.2550. In cases where ethylene oxide is vented through a closed-vent system to a scrubber, the MON rule requires that the concentration of ethylene oxide be reduced to one ppmv or lower. Based on Dow Plaquemine's sampling and testing on the T-660 outlet vent to the atmosphere, the scrubber meets the pollutant removal efficiency requirement to reduce the ethylene oxide concentration to 1 ppmv or lower, as required by Table 1 to Subpart FFFF, Item 5.ii. The MON rule also requires that the operating parameter limits specified in § 63.2493(b)(4)(i) - (v) be met continuously on a one-hour block basis. Based on the operation of the T-660 scrubber and the very low expected mass loading of ethylene oxide to the scrubber, Dow

Plaquemine proposes alternative monitoring parameters in lieu of establishing a wet gas scrubber liquid-to-gas (L/G) ratio, and monitoring vent gas vapor flow rate, pH operating limits, and liquid feed pressure.

TECHNICAL INFORMATION FOR AMP APPROVAL

From August 31 to September 1, 2022, a performance test was conducted on the T-660 Scrubber to demonstrate compliance with the ethylene oxide provisions of the MON Rule. The results of this test were submitted to EPA Region 6 on November 1, 2022. The wet gas scrubber L/G ratio is one critical operating parameter which must be monitored for ensuring scrubber performance in all the scrubber designs EPA evaluated across the chemical manufacturing sector. Although the L/G Ratio involves measurement of both the total liquid flow rate and the total gas flow rate through the scrubber, EPA views the L/G Ratio as a single operating parameter for the purpose of compliance monitoring. There is a +/- five percent accuracy requirement for measuring the flow rate per the MON Rule. If a scrubber's flow rate measurement is out of the required accuracy range (in this situation, too low), meeting the rule requirement will be problematic.

pH operating limits are another critical operating parameter for ensuring scrubber performance when a certain pH level must be maintained to ensure proper reaction of the scrubbing liquid medium with the chemical(s) of concern. However, if the chemicals are at low enough concentrations, an acid or alkaline reactant may not be needed in the scrubbing liquid (water in this situation) to ensure reaction with the pollutant chemicals in the incoming vent gas stream; therefore, the scrubbing liquid will not require pH adjustment.

Liquid feed pressure to the spray nozzles has also been considered a key monitoring parameter to ensure adequate distribution of the scrubbing liquid medium inside a wet gas scrubber. However, certain wet gas scrubbers are designed without spray nozzles, and distribute their scrubbing liquid medium by other means. The T-660 Scrubber in the Glycol II Amines Production Plant at Dow Plaquemine is a proprietary Dow design that does not use spray nozzles to disperse the scrubbing liquid into the scrubber column. The liquid flows into the system at the top of the scrubber and is distributed by gravity through the column via an array of perforated distributor trays.

The final selection of critical operating parameters is entirely dependent upon ensuring that effective scrubber performance is maintained, and that the ethylene oxide emission standard will be continually met at the T-660 scrubber. Through the performance testing conducted by Dow Plaquemine, the selected alternate operating parameters were established using minimum, average, and maximum values which were representative of the range of process operating conditions and operation of the T-660 scrubber.

AMP CONDITIONAL APPROVAL PROVISIONS

Dow provided a performance test report showing ethylene oxide emissions from the scrubber in relation to scrubber flow rates determined on a one-hour block average. Under all conditions of the testing, the ethylene oxide concentration was measured at less than 0.2 parts per million wet volume (ppmvw), including at the lowest measured flow rates of the scrubbing liquid medium. The measured values were monitored for 60-minute durations, under two different temperature conditions, three different scrubbing liquid rates, and using the two different scrubbing liquid sources, for a total of nine test runs. Dow included two qualifying conditional operating parameter limits (OPLs): the scrubbing liquid will be condensate water from other Dow processes, or potable water, such that no acid solution is used in the scrubbing liquid medium; and the scrubber design does not include spray nozzles inside the scrubber column. During the August 31 – September 1, 2022, performance test, the following parameters were measured under minimum and maximum representative operating conditions:

- Inlet scrubbing liquid flow rate;
- Amine vent gas flow rate;
- Scrubbing liquid temperature; and,
- Concentration of ethylene oxide.

Based upon the performance testing data under representative operating conditions provided by Dow Plaquemine, and the facility's post-testing correspondence dated December 7, 2022, EPA approves the following alternate monitoring parameters, in lieu of establishing wet scrubber L/G, and monitoring vent gas vapor flow rate, pH operating limits, and liquid feed pressure, to ensure that the T-660 scrubber functions as intended, and that emissions from the Glycol II Amines Production Facility will continuously meet the regulatory requirements of NESHAP FFFF for ethylene oxide:

- Monitoring the scrubber inlet liquid flow rate, and establishing a minimum flow to the scrubber of 6,709 pounds per hour, using an existing flowmeter, which is located on the scrubbing liquid supply line.
- Waiving the requirement to monitor scrubber liquid pH, provided no acid catalyst is needed or used, and that the amount of ethylene oxide in the incoming vent gas stream is at or below 0.012 pounds per hour, such that the scrubbing liquid water is sufficient to remove ethylene oxide from the vapor stream; and,
- Waiving the requirement to monitor liquid feed pressure to the scrubber column as long as the scrubber design employs no spray nozzles to introduce scrubbing liquid into the scrubber column.

Compliance with the approved alternate monitoring parameters will be determined on an hourly rolling or other average basis, as required by NESHAP FFFF. If Dow Plaquemine wishes to increase the minimum liquid flow rate limit value from that determined for this conditional approval, another performance test will be required. Per NESHAP FFFF § 63.2493(b)(3), Dow must conduct another.

performance test no later than 60 months after the testing conducted for this AMP conditional approval in order to establish a new alternate monitoring parameter limit value. Dow Plaquemine must also submit a request to EPA to revise the previously approved AMP, along with the supporting test results at representative operating conditions.