UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303-8960

July 21, 2023

Ms. Veronica Figueroa, PE
Engineer Lead, Air Permitting & Compliance
Mosaic Fertilizer, LLC
13830 Circa Crossing Drive
Lithia, Florida 33547

Dear Ms. Figueroa:

This is in response to your letter, dated May 31, 2022, to the U.S. Environmental Protection Agency requesting an alternative monitoring procedure (AMP) to determine the equivalent phosphorus pentaoxide (P_2O_5) feed rate for Mosaic Fertilizer's New Wales facility (New Wales) in Mulberry, Florida. The New Wales facility is subject to Title 40, Code of Federal Regulation (C.F.R.), Part 63, Subpart BB - National Emission Standards for Hazardous Air Pollutants (NESHAP) from Phosphate Fertilizers Production Plants. Based on our review of available information, your AMP request is denied. Details regarding the AMP and the basis for our denial are provided in the remainder of this letter.

Description of New Wales Facility

The New Wales facility consists of several industrial processes that convert insoluble rock containing phosphorus ore into a soluble form suitable for agricultural use. The processes at the New Wales facility include: 1) five sulfuric acid plants, 2) three phosphoric acid plants, 3) one phosphoric acid clarification and storage area, 4) five ammoniated phosphate (AP) plants, 5) one animal feed ingredients (AFI) plant with defluorination batch tanks, 6) one sulfur melter, 7) one molten sulfur storage and handling system, 8) one limestone storage silo/rock grinding operation, and 9) phosphogypsum storage/stacks.

Description of the New Wales Facility's Current Monitoring Approach

The New Wales facility currently uses magnetic flow meters with a manufacturer guaranteed accuracy of ±0.5 percent (%) error to determine the volumetric flowrates in the AP plants. Determining total P_2O_5 input to the AP plants using the existing acid flow meters to the AP plants at New Wales requires Mosaic to monitor up to eight variables per plant, including: 1) 54% acid to reactor (volumetric flowmeter), 2) 54% acid to granulator (volumetric flowmeter), 3) 30% acid to scrubber seal tank (volumetric flowmeter), 4) 54% acid to scrubber seal tank (volumetric flowmeter), 5) 30% acid equivalent P_2O_5 concentration (analysis), 6) 54% acid equivalent P_2O_5 concentration (analysis), 7) 30% acid density (analysis), and 8) 54% acid density (analysis). The magnetic flow meters apply an electromagnetic field to the stream passing through a tube with a known cross-sectional area. The stream flowing through the meter creates a potential difference in the electromagnetic field, which is proportional to the velocity of the stream. The meter measures the potential difference in the electromagnetic field and calculates the speed of the stream as it passes through the meter. Multiplying the measured flow rate by the cross-sectional area yields a volumetric flow rate of the P_2O_5 feed.

Mosaic's Current Monitoring Approach

While the magnetic flow meters have a manufacturer guaranteed accuracy of ±0.5%, the guarantee is based on studies conducted under laboratory conditions where the water volumetric flow rate is indicated by a meter's constant cross section area. The stream of phosphoric acid or slurry entering the granulator presents a challenge as phosphoric acid scale accumulates along the walls of the flow meter. Scaling on the inside of the flow meters shrinks the meter's cross-sectional area. This results in a tendency for the flow meters to detect a higher volumetric flow, resulting in an overestimation of the P_2O_5 input.

The scaling effect has been shown to appear in the inside of the flow meters after only a short period (hours) of operation. The rate of scaling is non-constant, and material accumulates along the length of the flow meter at different rates. Chunks of scaling are also expected to occasionally break off, such that the cross-sectional area within the flow meter is continuously changing, and not uniformly increasing and decreasing. The random nature of accumulation of material within the flow meter makes quantifying the error instantaneously difficult to determine, though this error has been demonstrated over a longer timescale (e.g., monthly). The New Wales facility is required to maintain multiple flow meters and regularly sample from both the 30% and 54% tanks to quantify the P_2O_5 input through direct monitoring. The total number of inputs increases the chance of error associated with direct P_2O_5 monitoring through the propagation of error.

Description of the New Wales AMP Request

Mosaic has identified alternative monitoring methods to determine the phosphate feed for five ammoniated phosphate (AP) fertilizer process lines: 1) Diammonium Phosphate (DAP) Plant No. 1, 2) DAP Plant No. 2 – East Train, 3) DAP Plant No. 2 – West Train, 4) Monoammonium Phosphate (MAP) Prill Plant & MAP Plant Cooler, and 5) Granular Monoammonium Phosphate (GMAP) Plant. AP is manufactured by reacting anhydrous ammonia and phosphoric acid in a sealed reaction tank and then by further adding ammonia to the ammoniated acid in a rotary reactor-granulator. The granulated un-sized AP exits the granulator and is dried in a rotary dryer. The dried material is then screened, and the oversized and undersized material is recycled back to the granulator. The product is then cooled in a rotary drum cooler, screened, and sent to storage.

Mosaic proposes to determine the equivalent P_2O_5 feed to the APs by the following method: 1) Ammonia (NH_3) to reactor (volumetric flowmeter), 2) NH_3 to scrubber (volumetric flowmeter), 3) phosphorus concentration of fertilizer products (analysis), and 4) nitrogen concentration of fertilizer products (analysis). Mosaic proposes to determine the corresponding mass feed rate of equivalent P_2O_5 by mass balances and stoichiometric relationships. Mosaic proposes that the alternative method is a functionally equivalent method for determining continuous compliance and will improve accuracy, real-time process information feedback for operations, and minimize discrepancy with month-end financial reporting for the AP plants at New Wales. Under 40 C.F.R. § 63.632(b)(1), Mosaic is seeking explicit approval for an AMP for continuous compliance with Subpart BB to determine P_2O_5 feed to the AP plants at the New Wales facility by the NH_3 consumption method.

EPA's Review of Relevant Subpart BB Monitoring Standards

Under 40 C.F.R. § 63.625(a), for each phosphate fertilizer process line subject to the provisions of Subpart BB, a continuous monitoring system (CMS) must be installed, calibrated, maintained, and operated according to a site-specific monitoring plan specified in § 63.628(c). The CMS must have an accuracy of ±5 percent over its operating range and the operator must determine and permanently record the mass flow of phosphorus-bearing material fed to the process. Additionally, a daily record of equivalent P_2O_5 feed must be maintained. The equivalent P_2O_5 feed is calculated by determining the total mass rate in metric ton/hour of phosphorus bearing feed using the procedures specified in 40 C.F.R. § 63.626(f)(3).

Under 40 CFR 63.621, equivalent P_2O_5 means "… feed means the quantity of phosphorus, expressed as phosphorus pentoxide (P_2O_5), fed to the process."

Under 40 C.F.R. § 63.626(f)(3), you must compute the equivalent P_2O_5 feed rate (P) using Equation BB–2:

$$P = M_p R_p \qquad \text{Eq. BB-2}$$

Where:

P = P_2O_5 feed rate, metric ton/hour (ton/hour).
Mp = Total mass flow rate of phosphorus-bearing feed, metric ton/hour (ton/hour).
Rp = P_2O_5 content, decimal fraction.

Under 40 C.F.R. § 63.626(f)(3)(i), the Mp of the phosphorus-bearing feed must be determined using the measurement system described in 40 C.F.R. § 63.625(a). Under 40 C.F.R. § 63.626(f)(3)(ii), the Rp of the feed must be determined using, as appropriate, the following methods specified in the Book of Methods Used and Adopted by The Association of Florida Phosphate Chemists (incorporated by reference, see § 40 C.F.R § 63.14) where applicable:

(A) Section IX, Methods of Analysis for Phosphate Rock, No. 1 Preparation of Sample.
(B) Section IX, Methods of Analysis for Phosphate Rock, No. 3 Phosphorus- P_2O_5 or $Ca_3(PO_4)_2$, Method A—Volumetric Method.
(C) Section IX, Methods of Analysis for Phosphate Rock, No. 3 Phosphorus- P_2O_5 or $Ca_3(PO_4)_2$, Method B—Gravimetric Quimociac Method.
(D) Section IX, Methods of Analysis for Phosphate Rock, No. 3 Phosphorus- P_2O_5 or $Ca_3(PO_4)_2$, Method C—Spectrophotometric Method.
(E) Section XI, Methods of Analysis for Phosphoric Acid, Superphosphate, Triple superphosphate, and Ammonium Phosphates, No. 3 Total Phosphorus- P_2O_5, Method A—Volumetric Method.
(F) Section XI, Methods of Analysis for Phosphoric Acid, Superphosphate, Triple Superphosphate, and Ammonium Phosphates, No. 3 Total Phosphorus- P_2O_5, Method B—Gravimetric Quimociac Method.
(G) Section XI, Methods of Analysis for Phosphoric Acid, Superphosphate, Triple Superphosphate, and Ammonium Phosphates, No. 3 Total Phosphorus- P_2O_5, Method C—Spectrophotometric Method.

Under 40 C.F.R. § 63.628(c), for each CMS used to demonstrate compliance with any applicable emission limit, the operator must develop and submit to the Administrator for approval upon request, a site-specific monitoring plan according to the requirements specified in 40 C.F.R. § 63.628(c)(1-3). The

operator must submit the site-specific monitoring plan, if requested by the Administrator, at least 60 days before the initial performance evaluation of the CMS. The requirements of this paragraph also apply if a petition is made to the Administrator for alternative monitoring parameters under 40 C.F.R. § 63.8(f).

Under 40 C.F.R. § 63.628(c)(1), the operator must include the following information in the site-specific monitoring plan:

(i) Location of the CMS sampling probe or other interface. The operator must include a justification demonstrating that the sampling probe or other interface is at a measurement location relative to each affected process unit such that the measurement is representative of control of the exhaust emissions (e.g., on or downstream of the last control device).
(ii) Performance and equipment specifications for the sample interface, the pollutant concentration or parametric signal analyzer, and the data collection and reduction systems.
(iii) Performance evaluation procedures and acceptance criteria (e.g., calibrations).
(iv) Ongoing operation and maintenance procedures in accordance with the general requirements of 40 C.F.R. § 63.8: (c)(1)(ii), (c)(3), (c)(4)(ii), and Table 4 to Subpart BB.
(v) Ongoing data quality assurance procedures in accordance with the general requirements of 40 C.F.R. § 63.8(d): (1) and (2), and Table 5 to Subpart BB.
(vi) Ongoing recordkeeping and reporting procedures in accordance with the general requirements of 40 C.F.R. § 63.10: (c), (e)(1), and (e)(2)(i).

Under 40 C.F.R. § 63.628(c)(2-3), the operator must include a schedule for conducting initial and subsequent performance evaluations in the site-specific monitoring plan and you must keep the site-specific monitoring plan on site for the life of the affected source or until the affected source is no longer subject to the provisions of this part, to be made available for inspection, upon request, by the Administrator. If the site-specific monitoring plan is revised, the operator must keep previous (i.e., superseded) versions of the plan on site to be made available for inspection, upon request, by the Administrator, for a period of 5 years after each revision to the plan. The operator must also include the program of corrective action required under 40 C.F.R. § 63.8(d)(2) in the plan.

The EPA's Determination

Mosaic's request for an AMP was submitted under the provision of 40 C.F.R. § 63.632(b)(3) that allows an owner or operator to request approval under 40 C.F.R. § 63.8(f) for alternative requirements or major changes to the monitoring requirements specified in Subpart BB. Based upon our review, the proposed AMP is unacceptable to the EPA and therefore denied. The reasons for our decision are provided below:

1. Based on the EPA's research, there are flow meters available for Mosaic to choose from which prohibit scale formation in the flow meter (*e.g.*, flow tube liners).

2. The request fails to provide a narrative explaining why scale formation develops in the flow meter and provide a history of any attempted corrective actions implemented to provide resolution of the circumstance.

3. The emission standard in Subpart BB is promulgated using the feed rate of equivalent P_2O_5 to the process (*e.g.*, phosphorus-bearing feed), not the processes' use of anhydrous ammonia or the production rate of P_2O_5 (*e.g.*, equivalent P_2O_5 stored). The rule does not provide an optional

method to use the stochiometric relationship of NH_3 to determine equivalent P_2O_5 fed to the process.

4. Sufficient evidence of justification was not provided regarding the technical or economic infeasibility, or the impracticality of using a compatible material(s) flow monitoring device.

5. Based on the EPA's review, it appears possible that scaling may also be occurring upstream of the meter. It is unclear to the EPA if the scaling is limited to the flow meter or if an upstream circumstance creates scaling which contributes to fouling of the meter.

Please note, that in addition to meeting the applicable requirements of Subpart BB, Mosaic is required to meet all other applicable NESHAP requirements, including, but not limited to the following NESHAP general provisions:

- The requirement to maintain and operate affected facilities and associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions, per 40 C.F.R. § 63.6, and

- The prohibition against concealing emissions which would otherwise constitute a violation of an applicable standard, including the use of gaseous diluents to achieve compliance with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere, per 40 C.F.R. § 63.4.

This response was coordinated with the EPA's Office of Enforcement and Compliance Assurance and Office of Air Quality Planning and Standards. If you have any questions about this approval, please contact Tracy Watson at (404) 562-8998, or by email at watson.marion@epa.gov.

Sincerely,

CAROLINE FREEMAN
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Date: 2023.07.21 09:55:34 -04'00'

Caroline Y. Freeman
Director
Air and Radiation Division

cc: Keith Barnett, EPA OAQPS
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