EPA REGIONAL HAZE INFO REQUEST -11/3/23

1) Calpine Edge Moor – Review of current Title V permit to ensure retention of post-fuel switch permit conditions.

On July 20, 2023, in response to an information request from EPA Region 3 in relation to MANEVU Ask No.4 - Fuel Switch Limits, Delaware sent EPA a chart regarding the Calpine Edge Moor facility. The chart compared permits from 9/22/10 (pre-fuel switch) and 10/8/12 (post-fuel switch) for Emission Unit 3 (EM3) and Emissions Unit 4 (EM4).

Per EPA's request, Delaware has attached an additional chart (Attachment A), which compares Edge Moor's most recent permit issued 3/18/22 with the previous "post-fuel switch" permit issued 10/8/12. The applicable conditions from the 2012 permit were either carried forward or replaced with even lower emission limits. Delaware has also attached a pdf of the 3/18/22 Permit (Attachment B). The SO_2 limits that were reduced have been highlighted (Page 25 of the permit).

Delaware believes it has adequately addressed EPA's request for post-fuel switch permit condition information for Edge Moor, showing the permit conditions were either carried forward or replaced with even lower emission limits.

2) Copies of Delaware City Refinery Permit and Regulation 1142 – documentation of NOx Cap

Delaware has attached highlighted copies of the Refinery Permit (Attachment C) and Regulation 1142, *Specific Emission Control Requirements*, (Attachment D) to document the Refinery's 1,650 tons/year NOx Cap. Regulation 1142 is in the Delaware State Implementation Program (SIP).[1] The last revision to 1142 included the NOx Cap and was approved into the SIP by EPA, effective June 14, 2012.[2] References to the NOx Cap can be found in the following locations in Attachments C and D respectively:

- Refinery Permit – Pages 130-131
- Regulation 1142 – Section 2.3.2.3

Delaware believes it has adequately addressed EPA's request for further documentation of the Delaware City Refinery's NOx Cap requirements in Regulation 1142 and the facility's the permit.

[1] EPA Approved Regulations in the Delaware SIP. Accessed on October 10, 2023. https://www.epa.gov/sips-de/epa-approved-regulations-delaware-sip

[2] Approval and Promulgation of Air Quality Implementation Plans; Delaware; Amendments to the Control of Nitrogen Oxides Emissions From Industrial Boilers and Process Heaters at Petroleum Refineries. EPA Final Rule. May 15, 2012. https://www.govinfo.gov/content/pkg/FR-2012-05-15/pdf/2012-11656.pdf

3) MANE-VU's Selection of Individual Industrial/Non-EGU Sources for CALPUFF Modeling in the 2nd Implementation Period

A core component of a Regional Haze SIP is to develop a Long-Term Strategy (LTS) that includes enforceable emissions limitations, compliance schedules, and other measures necessary to make reasonable progress in affected Class I areas. States without Class I areas but with sources identified to cause or contribute to another State's Class I area must consult with that State in order to develop coordinated emission management strategies containing the emission reductions necessary to make reasonable progress. Reasonable Progress Goals (RPGs) are visibility goals for each planning period.

Another MANEVU analysis conducted to support in Regional Haze Long Term Strategy is a Four Factor Analysis, which is used to assess whether it would be reasonable to control sources/group of sources by considering: cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts of compliance, and remaining useful life or any potentially affected sources.[3]

During the first regional haze planning cycle, MANEVU published the *Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas*, which documented six sectors that had emissions that were reasonable anticipated to contribute to visibility degradation in MANEVU: Electric Generating Units (EGUs), Industrial/Commercial/Institutional Boilers (ICI Boilers), Cement Kilns, Heating Oil, Residential Wood Combustion, and Outdoor Wood Boilers[4]. The Assessment was further updated in 2016, *2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas* (Appendix 8-4 of Delaware's 2nd Regional Haze SIP). Of the six sources, EGUs and industrial point sources were found to be point source sectors of high emissions that warranted further scrutiny.

For the second implementation period SIPs, MANEVU carried out air pollution transport modeling to assess the impact of EGU and Industrial sources. MANEVU used the CALPUFF air dispersion model to estimate sulfate and nitrate formation and transport in MANEVU and nearby regions originating from large EGU point sources and other large industrial and institutional sources in the eastern and central United States.

[3] Ibid.

[4] Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas. MACTEC Federal Programs, Inc. July 9, 2007. https://s3.amazonaws.com/marama.org/wp-content/uploads/2019/12/26123243/Regional_Haze_Progress_Assessment-2007.pdf

Regional Haze 10-year SIPs require an extensive amount of technical work to develop. Therefore, MANEVU began to develop its modeling analyses/reports for the 2nd Implementation period (2018-2028) in 2015; using emissions data from the 2011 National Emissions Inventory (NEI), which was the most recent NEI available at the time. MANEVU's CALPUFF Modeling effort was documented in the *2016 MANE-VU CALPUFF Point Source Contribution Modeling Analysis* (CALPUFF Point Source Modeling).[5] Section 3.1 of the CALPUFF Point Source Modeling states:

> *"For the 2016 modeling effort, the MANE-VU Technical Support Committee (TSC) provided a preliminary list of EGU sources. This list was based on an enhanced Q/d analysis considering recent SO_2 emissions in the eastern United States and an analysis that adjusted previous 2002 MANE-VU CALPUFF modeling by applying a ratio of 2011 to 2002 SO_2 emissions (MANE-VU Technical Support Committee 6 April 2016). This list of sources was then enhanced by including the top five SO_2 and NO_X emission sources for 2011 for each state included in the modeling domain… The MANE-VU TSC also identified 82 industrial and institutional facilities located within the CALPUFF modeling domain that either have emissions similar in magnitude to the EGUs modeled in this exercise, or are close enough to a Class I area that they would have the potential for visibility impacts."*

2011 NEI emission data for SO_2 was also used to for MANEVU's Q/d analysis as stated above. The Q/d analysis is an empirical formula that related emission source strength and estimated impacts.[6] It is expressed through the following equation:

$$I = (Q/d)$$

In this equation, the strength of an emission source, Q, is linearly related to the impact, I, that it will have on a receptor located a distance, d, away. The Q/d analysis assists in determining a sources contribution of emissions to Class I areas.

Additional details about MANEVU source selection process can be found in the *Four-Factor Data Collection Memo*.[7] Information from the initial round of CALPUFF modeling was collated on the 444 EGUs that were determined to warrant further scrutiny based on their emissions of SO_2 and NO_X. Regarding industrial facilities, the *Four-Factor Data Collection Memo* states:

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[5] 2016 MANE-VU Source Contribution Modeling Report. CALPUFF Modeling of Large Electrical Generating Units and Industrial Sources. MANEVU Report. April 4, 2017. https://otcair.org/manevu/Upload/Publication/Reports/MANE-VU%20CALPUFF%20Modeling%20Report%20Draft%2004-4-2017.pdf

[6] Q/d *C Contribution Assessment. MANEVU Report. April 6, 2016. https://www1.maine.gov/dep/ftp/DEP_RH/2021SIP/APPENDICES/APPENDIX%20E%20-%20MANE-VU%20TSC%20-%20Updated%20QC%20over%20d%20Contribution%20Assessment%20-%20Final.pdf

[7] Four-Factor Data Collection. MANEVU Memo. March 30, 2017. https://otcair.org/manevu/Upload/Publication/Reports/Four-Factor%20Data%20Collection%20Memo%20-%20170314.pdf

"Information was also collected on the 50 facilities that according to 2011 Q/d analysis contributed the must [most] to visibility impact in each Class I area from sulfate emissions. Many of these facilities were duplicates and therefore the total number of sites from which data was collected was 82. Later in the data collection process the number of sources was limited to only sources that cumulatively contributed to 50% of the impairment."

The 82 industrial facilities that were selected by MANEVU for modeling, based on the criteria used by MANEVU. The 2011 SO_2 emissions for the 82 facilities can be found in the MANVEVU Excel Spreadsheet *Industrial Source Data for Four-Factor Analyses*.[8]

The Delaware City Refinery was not one of the 82 industrial facilities selected by MANE-VU through CALPUFF modeling, in fact none of the 82 industrial facilities were located in Delaware.[9] The Refinery's 2011 NEI SO_2 emissions were 333 tons per year (tpy). The Refinery's Q/d, as calculated by MANEVU, ranged from 0.36 - 3.25 for Class 1 Areas in or near MANEVU (Attachment E – "QDC Point Only - Delaware" Excel Sheet – Refinery data highlighted). [10] 2020 NEI[11] data shows that the SO_2 emissions at the Refinery have continued to decline. In 2020 SO_2 emissions were 216 tpy, a 117 ton decrease from the 2011 NEI (333 tpy).

Delaware believes it has it has adequately addressed EPA's request for additional documentation on how MANEVU determined which Industrial Sources/Non-EGU Sources were selected for CALPUFF modeling. Specifically, why the Delaware City Refinery was not selected by MANEVU for modeling. We would also like to reiterate that the Refinery has further decreased its SO_2 emissions from the 2011 to 2020 by 117 tons.

[8] Industrial Source Data for Four-Factor Analyses. MANEVU Excel Sheet. March 30, 2017. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fotcair.org%2Fmanevu%2FUpload%2FPublication%2FReports%2FIndustrial_Source_Data_for_Four-Factor_Analyses_20170330.xlsx&wdOrigin=BROWSELINK

[9] Ibid.

[10] Q/d calculations were done for the following Class I areas: James River Face, Shenandoah National Park, Brigantine Wilderness Area, Lye Brook Wilderness Area, Great Gulf Wilderness Area, Acadia National Park, and Moosehorn Wilderness Area.

[11] The most recent point source data finalized by EPA is currently the 2020 NEI.