Ohio Environmental Protection Agency

Division of Air Pollution Control
Response to Comments

Draft Regional Haze State Implementation Plan for the Second Implementation Period – Public Comment Period

Agency Contact for this Package

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Ohio EPA held a public comment period beginning May 10, 2020 regarding the draft Regional Haze State Implementation Plan for the Second Implementation Period. This document summarizes the comments and questions received during the comment period, which ended on June 28, 2020.

Ohio EPA reviewed and considered all comments received during the public comment period. By law, Ohio EPA has authority to consider specific issues related to protection of the environment and public health.

In an effort to help you review this document, the questions are grouped by topic and organized in a consistent format. The name of the commenter follows the comment.

General Comments

Comment 1: Over 500 comments in a standard format and similar in language, tone and intent (with some minor variation) were received urging Ohio EPA to reduce pollution from coal-fired power plants. The following was included in each comment:

"For too long coal-fired power plants have spewed toxic pollution into our air, impacting the health of Ohioans, harming the water, land, and wildlife, and reducing visibility both locally and regionally, including beautiful national parks, such as Mammoth Cave in Kentucky. The Clean Air Act requires that this pollution be reduced, and by mid-century eliminated, so that visitors can enjoy the splendor of these parks.

OEPA can dramatically reduce this type of pollution by further limiting the emissions from coal-fired power plants in Ohio. The top five sources of haze-causing of pollution in this state are General James M Gavin Power Plant in Gallia County, Miami Fort Power Station in Hamilton County, Cardinal Power Plant in Jefferson County, Zimmer Power Station in Clermont County, and OVEC Kyger Creek Station in Gallia County. Cleaner and less expensive energy alternatives like wind and solar are available and are creating construction and manufacturing jobs around the

state without generating the toxic pollution our communities have tolerated from coal plants for generations.

Please protect visibility at national parks and the quality of our air by focusing on reducing coal plant pollution in the Regional Haze State Implementation Plan. Reducing pollution from these coal-burning plants will not only comply with the Regional Haze Rule requirements, but will also improve the health and well-being of Ohioans." **(Individuals associated with Sierra Club)**

Response 1: Thank you for your comments and interest in Ohio's air quality. Ohio has carefully considered the required elements of the Regional Haze Rule and anticipated visibility benefits, along with the overall progress in the Regional Haze program. As described in the SIP, Ohio determined that potential additional controls are not cost-effective or affordable, and the estimated visibility benefit is minimal. In addition, all Class I areas impacted by sources in Ohio have made steady and significant improvement in visibility, and modeling shows they are projected to be below, or well below, their uniform rate of progress (URP) glidepaths in 2028. Trends show huge reductions in both NOx and SO_2 emissions. Additional emissions reductions are expected from the Revised Cross-State Air Pollution Rule (CSAPR) Update and permanent shutdown of coal-fired boilers at Miami Fort Power Station and Zimmer Power Station. Given all of these factors, Ohio concludes that on-the-books and on-the-way controls are more than sufficient to achieve reasonable progress goals, and no additional measures are necessary to make reasonable progress in the second implementation period.

Comment 2: Comments were received from the following:

- Pamela Blakely, U.S. EPA Region 5 - Appendix P4
- J. Michael Brown, Ohio Valley Electric Corporation (OVEC) - Appendix P5
- Rob Brundrett, Ohio Manufacturer's Association (OMA) - Appendix P6
- Sharon Davis, Co-Chair of MANE-VU - Appendix P7
- Sharon Davis, New Jersey Department of Environmental Protection - Appendix P8
- Herbert C. Frost, National Park Service (NPS) - Appendix P9
- Sara Laumann, Laumann Legal LLC on behalf of Conservation Organizations (National Parks Conservation Association, Sierra Club, Coalition to Protect America's National Parks, and Ohio Environmental Council) - Appendix P10
- Glenn D. Truzzi, Energy Harbor Generation LLC - Appendix P11

The full comment letters including attachments can be found in the appendices noted above.

Response 2: Thank you for your comments. Excerpts from specific comments along with Ohio EPA's responses may be found below.

Comment 3: "The OMA supports Ohio's Regional Haze SIP for the Second Implementation Period, and Ohio EPA's stated intention to request that U.S. EPA review and approve Ohio's long-term strategy and the other elements of the SIP." **(Rob Brundrett, Ohio Manufacturer's Association)**

Response 3: Thank you for your comments.

Comment 4: "The RP and technical analyses must be based on accurate information that is consistent with the Act and EPA's implementing regulations. As discussed in the attached report by Joe Kordzi, and fully incorporated by reference into these comments, OEPA's proposed analyses rely on inflated cost effectiveness analysis by using incorrect information for interest rate, equipment life, control efficiency, and retrofit and other factors. Furthermore, the proposed SIP unreasonably screened sources from the required four-factor analysis based on faulty assumptions regarding the effectiveness of current controls, and does not require sources to support suggested assumptions and proposed conclusions." **(Sarah Laumann on behalf of Conservation Organizations)**

"Each state must submit for EPA review a SIP that is designed to make reasonable progress toward achieving natural visibility conditions. Contrary to the requirements that OEPA's regional haze SIP must provide "emissions limits, schedules of compliance and other measures as may be necessary to make reasonable progress towards meeting the national goal," OEPA's relies on existing permits that are not part of the SIP and does not seek emission controls at any sources for this ten-year planning period. Ohio should obtain and revise the required reasonable progress four-factor analyses, use reasonable and accurate inputs and then propose practically enforceable controls and emission limitations that curb visibility-impairing emissions for its sources that emit visibility impairing pollution and are of concern for the treasured Class I areas that also harm our communities." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

Response 4: Ohio EPA believes our analysis and conclusions are appropriate and consistent with the Clean Air Act, Regional Haze Rule and U.S. EPA's Regional Haze Guidance. Additional responses to specific comments, which are summarized in this comment, are provided below.

Enforceable Limits

Comment 5: "OEPA's Proposed SIP Does Not Contain Provisions to Ensure Emission Limitations are Permanent and Enforceable and That Its Permits Complement the Act's Reasonable Progress Requirements

"The CAA requires states to submit implementation plans that "contain such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal" of achieving natural visibility conditions at all Class I Areas. The RHR requires that states must revise and update its regional haze SIP, and the "periodic comprehensive revisions must include the "enforceable emissions limitations, compliance schedules, and other measures that are necessary to make reasonable progress as determined pursuant to [51.308](f)(2)(i) through (iv)." The emission limitations and other requirements of the RHR must be adopted into the SIP. Under the RHR, RPGs adopted by a state with a Class I area must be based only on emission controls measures that have been adopted and are enforceable in the SIP.

"OEPA's proposal explains that it intends to rely on provisions in Title V permits. The State's proposed reliance on permits in the SIP context is inconsistent with the Act, EPA's regulations and guidance. EPA's Guidance explains that the requirements in 40 C.F.R. §51.308(d)(3)(v)(F):

"[R]equires SIPs to include enforceable emission limitations and/or other measures to address regional haze, deadlines for their implementation, and provisions to make the measures practicably enforceable including averaging times, monitoring requirements, and record keeping and reporting requirements.

"The reasonable progress requirements apply to all sources, there is not an off-ramp for sources that hold permits. The regional haze emission limitations and other requirements must be embodied in the SIP. OEPA's reliance on terms and conditions in Title V and NSR permits is inconsistent with the CAA, EPA's regulations and guidance requires emission limitations be adopted into the SIP.

"Moreover, EPA's Guidance recognizes EPA's long-standing position that while the SIP is the basis for demonstrating and ensuring state plans meet the regional haze requirements, state-issued permits must complement the SIP and SIP requirements. State-issued permits must not frustrate SIP requirements. For example, sources with PSD permits under Title I must not hold permits that allow emissions that conflict with SIP requirements. Additionally, the Act's Title V operating permits collect and implement all the Act's requirements – including the requirements in the SIP – as applicable to the particular permittee. Furthermore, Title V permits are only

good for a period of five years and may expire under certain conditions. There is no assurance that Title V permit terms and conditions will be permanent since they may lapse. Therefore, contrary to OEPA's assertions in its proposed SIP that Title V permits are permanent – they are not. Furthermore, it is not enough that the Title V permits are reviewable by U.S. EPA, Title V permits are not part of the SIP and approved through EPA's SIP process. Finally, Title V permits must not hold such permits if they contain permit terms and conditions that conflict with the SIP and CAA requirements.

"OEPA's proposed SIP lacks the required "enforceable emissions limitations, compliance schedules, and other measures that are necessary to make reasonable progress." and thus would allow the companies to modify operations, increase emissions impact the Class I areas for many years without first meeting reasonable progress emission limitation and other necessary requirements. Contrary to the requirement to ensure permits complement the SIP, OEPA's proposed SIP mentions the permits and does not contain the enforceable emissions limitations, monitoring, recordkeeping and reporting requirements." (footnotes omitted) **(Sarah Laumann on behalf of Conservation Organizations)**

"OEPA's Proposed SIP Lacks Practically Enforceable Emission Limitations

"The CAA requires that states submit implementation plans that "contain such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal" of achieving natural visibility conditions at all Class I Areas. The RHR requires that states must revise and update their regional haze SIP, and the:

> Periodic comprehensive revisions must include the enforceable emissions limitations, compliance schedules, and other measures that are necessary to make reasonable progress as determined pursuant to [51.308](f)(2)(i) through (iv)."

"Thus, the RP emission limits and other requirements included in OEPA's regional haze SIP must be practically enforceable and adopted into the SIP, which means they need to contain the elements necessary for enforceability. OEPA's proposed SIP lacks these required elements. As discussed elsewhere in these comments, it refers to permit provisions that are not included in the proposed SIP. **(Sara Laumann on behalf of Conservation Organizations)**

Response 5: The commenter has misconstrued Ohio's reasoning for including a discussion of existing emission limits in the SIP. Ohio has not claimed, nor inferred, that the existing limits in consent decrees and permit provisions

are intended to limit emissions for purposes of the Regional Haze SIP. The details regarding existing emission limits in consent decrees and permits was included in the SIP for informational purposes as part of the overall analysis of the source.

Ohio has ensured the measures in Ohio's Long-Term Strategy (LTS) that are being relied on for reasonable progress in the second implementation period are federally enforceable. These measures include on-the-books and on-the-way controls as described in Ohio's LTS, including the permanent shutdowns of coal-fired boilers at Miami Fort Power Station and Zimmer Power Station by 2028, which are made enforceable through Director's Final Findings and Orders (DFFOs).

Ohio is not relying on any existing measures for sources evaluated but not selected for four-factor analysis, or for sources selected for four-factor analysis but where new additional measures were found not to be necessary, as part of the LTS to make reasonable progress in the second implementation period.

Ohio does not agree that the Regional Haze Rule requires enforceable limits commensurate with existing operations (including reduced operating capacity or pollution control efficiency) for sources which were evaluated in screening and determined to be currently effectively controlled, or for sources where a four-factor analysis was performed but where new additional measures were found not to be necessary.

40 CFR 51.308(f)(2) states "The long-term strategy must include the enforceable emissions limitations, compliance schedules, and other measures **that are necessary to make reasonable progress**, as determined pursuant to (f)(2)(i) through (iv)." (emphasis added)

Ohio agrees that once a measure is determined necessary to make reasonable progress, enforceable limits are applicable. Ohio has determined that measures are not necessary for these sources; therefore, enforceable limitations are not required.

Further, an interpretation that enforceable limitations are required for all sources that were evaluated during the screening or four-factor processes is inconsistent with requirements under the first round of Regional Haze and with other Clean Air Act (CAA) and National Ambient Air Quality Standards (NAAQS) programs. Programs related to the NAAQS (such as the SO_2 Data Requirements Rule) allow facilities to be screened out of requirements without establishing enforceable limits on the conditions that led to the exclusion.

Additionally, Ohio believes establishing enforceable limitations on all sources that were evaluated during the screening or four-factor processes

is unnecessary. All Class I areas impacted by sources in Ohio are below, or well below, the glidepath. In addition, significant pressures and incentives already exist to deter the source from increasing emissions in the future, including compliance with other rules (e.g. MATS, CSAPR/CSAPR Update/Revised CSAPR Update).

Such an approach would provoke extreme opposition from the regulated community. It would be seen as "punishing" good actors that have already minimized emissions to the extent possible. Locking in existing emission rates for the purposes of Regional Haze could provide a serious disincentive for sources to install and operate effective controls in the future. This approach would send the message to the regulated community to operate at the maximum rate that complies with existing limits, and never any better, otherwise it would be implied their emissions limit must be continually ratcheted down commiserate with existing operations. This is contrary to allowing and even encouraging sources to operate below their allowable limits. It also does not take into consideration the inherent variability in emissions rates nor the need for a "buffer" between an emissions limitation and actual operations in order to maintain compliance.

Further, such an interpretation results in an uneven playing field for states and sources within states due to the generous amount of discretion in the selection of sources, as the specific process and threshold for which sources are selected are left to each individual state's judgement. The outcome of this discretion when paired with this interpretation of the rule will lead to significant inconsistency as to which sources (and types of sources) are selected, and then automatically become subject to an interpretation that existing measures are necessary for reasonable progress and thus emissions limits commensurate with existing emissions must be approved into the SIP.

In sum, Ohio has ensured the measures being relied on for reasonable progress are federally enforceable but is not relying on existing measures for all sources evaluated during the screening process or four-factor analyses. Ohio finds that enforceable limits commensurate with existing operations for all sources evaluated is unnecessary, would be inconsistent with the federal regulations and past practice, would serve as a disincentive to future voluntary emissions reductions, and would create significant and unreasonable inconsistency in the application and impact of the Regional Haze Rule on sources across the country.

Comment 6: "Furthermore, the provisions for the permanent retirement of the coal-fired boilers at the Miami Fort and Zimmer Power Stations are not practically enforceable. The retirement provisions that appear in the Director's Final Findings and Order are inadequate. First, as explained in the Kordzi Report, the Director's Order is a draft and has not been finalized. It is

unclear if OEPA is using this SIP notice and comment process to take comment on the draft Order.

"The draft Order for Miami Fort includes the following:

- By no later than January 1, 2028, Dynegy Miami Fort, LLC shall permanently shut down all coal-burning activities at EUs B015 and B016 at Miami Fort.
- By no later than January 1, 2028, Dynegy Zimmer, LLC shall permanently shut down all coal-burning activities at EU B006 at Zimmer.
- Following notification to Ohio EPA of the permanent shut down of all coal-burning activities at a unit, authorization to conduct coal-burning activities at the unit shall cease. Respondent shall not resume coal-burning activities at this unit without first applying for and obtaining a permit pursuant to new source review (NSR) requirements in accordance with Ohio Admin. Code Chapter 3745-31.

"The draft Order gives the two plants until the end of the second regional haze planning period to retire. Therefore, the Conservation Organizations strongly urge OEPA to include enforceable requirements reflecting this retirement schedule in the SIP, as the State's proposed action is unclear as to whether the Order is part of the SIP and would be submitted to EPA for approval. In the absence of enforceable retirement dates, Dynegy must conduct and submit a four-factor analysis that OEPA reviews and proposes as a SIP revision promptly for inclusion in the second planning period SIP. Section IX in the Order allows for modifications by the parties to the Order. There is no opportunity for the public to comment on the modifications. Such modifications could include continued operation of the coal-fired units. Furthermore, any modifications to the Order must be subject to the SIP revision process, including the opportunity for public notice and comment. The draft Order must either eliminate the modification provision, or be revised to ensure that revisions are part of the SIP process. Finally, the Act requires that SIP provisions must be permanent and subsequent revisions are subject to anti-backsliding requirements. As drafted, the Order could be terminated outside the SIP process. OEPA should amend the draft Order so that if the company proposes termination, the public has an opportunity to review and comment on that proposal as part of the SIP process." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"Ohio must include in its final state implementation plan fully executed and enforceable Director's Findings and Order requiring the permanent retirement of Miami Fort Power Station and Zimmer Power Station. On page 13 of the Ohio Regional Haze SIP, Ohio states that it issued a Director's Final Findings and Orders (Appendix C) which establish an enforceable requirement for the permanent shut down of the coal-fired

operations at the boilers at Miami Fort Power Station and Zimmer Power Station by no later than January 1, 2028. However, the document present in Appendix C is not executed. Furthermore, the SIP lacks enforceable requirements that reflect the permanent shut downs. Therefore, Ohio should ensure that its final SIP contains an executed copy." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 6: It was Ohio's intent to finalize the Director's Final Findings and Orders (DFFOs) for the permanent shutdown of Miami Fort Power Station and Zimmer Power Station prior to submitting the final Regional Haze SIP to U.S. EPA. A draft, unexecuted copy of the DFFOs was included in the draft SIP distributed for public comment in order to also seek comments on the DFFOs.

A final executed copy of the DFFOs is included in the SIP submitted to U.S. EPA, which requests that the DFFOs be approved into Ohio's SIP. Upon approval of the DFFOs into Ohio's SIP, any modifications or termination of the DFFOs would have to be submitted as a revision to the SIP and would be subject to public notice and comment requirements. The DFFOs approved into the SIP would remain enforceable until a revised SIP is approved.

Step 2: Determination of affected Class I areas

Comment 7: "To support the statement regarding Ohio's contribution to visibility impairment in Class I areas, it would be helpful for Ohio EPA to add information in Table 1 of modeled visibility impacts on Class I Areas impacted by Ohio that includes the 2011-2028 Total Light Extinction (Mm-1) and Ohio's contribution to the 2011-2028 Total Light Extinction in (Mm-1) and (%).

"Table 1 also contains some blanks. It would be helpful for Ohio EPA to indicate if the blanks mean "No" or if the information was unavailable.

"In Table 1, the footnote reference to the LADCO TSD in Appendix A for the column labeled "Impacted by Emissions from Ohio – Round 2 Determination" does not seem to provide the information presented in Table 1. Ohio has included a more comprehensive list in Table 1 that identifies Class I areas outside of Region 5, which do not seem to appear in the May 2021 LADCO TSD itself. It would be helpful to provide a clearer reference for the source of information for these areas. Also helpful would be to include a reference and link to any accompanying spreadsheet as well as a physical page that extracts the data related to the Ohio." **(Pamela Blakely, U.S. EPA Region 5)**

Response 7: Table 1 has been revised to include the requested information, including a specific reference to the spreadsheet contained in LADCO's electronic docket.

Step 3: Selection of sources for analysis

Comment 8: "We recommend explaining how Ohio arrived at the primary selection criteria of a Q/d threshold of greater than 5 and why this approach is a reasonable one." **(Pamela Blakely, U.S. EPA Region 5)**

Re: secondary selection criteria: "We recommend including an explanation of why Ohio chose this approach with regard to Q/d value for source selection and why this approach was a reasonable one." **(Pamela Blakely, U.S. EPA Region 5)**

Response 8: Ohio provided our rationale for selecting our primary and secondary selection criteria in Step 3(c) (page 10 of the draft SIP) and has added additional explanation to the SIP for clarification. To reiterate, Ohio initially selected the primary selection criteria because it captured a reasonable set of sources to carry forward for further analysis. Based on comments, Ohio then determined it would be appropriate to add secondary selection criteria in order to capture those sources with a significant facility-wide contribution that were not captured by the primary selection criteria (which was unit-specific). As part of this secondary criteria, we thought it was reasonable to limit a potential four-factor analysis to only those units which had a larger contribution, for efficiency and effectiveness in allocating Ohio's resources as well as the expenditures of source owners.

We believe this approach is reasonable because together the primary and secondary criteria captured a reasonable set of sources to carry forward for further analysis (37 units at 16 facilities, 72% of the total Q/d and 68% of total emissions analyzed). With the addition of Sammis unit B011 (Unit 5) per Comment 25, this brings the sources captured by the selection criteria to 38 units at 16 facilities, 73% of the total Q/d and 68% of total emissions analyzed.

Comment 9: "The reference to the CSAPR Update no longer needs to include "proposed." As noted on page 19 of the draft, "On April 30, 2021, U.S. EPA finalized the Revised Cross-State Air Pollution Rule (CSAPR) Update in order to fully address states' outstanding interstate pollution transport obligations for the 2008 ozone standard (86 FR 23054)." **(Pamela Blakely, U.S. EPA Region 5)**

Response 9: The reference has been updated.

Comment 10: "Table 4, and the subsequent information provided for each source above Ohio's chosen Q/d threshold, includes 2016 annual emissions, Q/d,

enforceable emissions limits, and types of enforceable mechanisms. From this Table 4, Ohio selected four sources for a four-factor analysis and designated the remaining sources as either effectively controlled or slated for enforceable retirement/shutdown.

"On page 79, Ohio asserts, "Ohio is not relying on any existing measures for sources evaluated but not selected for four-factor analysis, or for sources selected for four-factor analysis but where new additional measures were found not to be necessary, as part of the LTS to make reasonable progress in the second implementation period."

"To demonstrate if existing measures at sources that Ohio considered effectively controlled are not necessary for reasonable progress, additional information in Table 4 and elsewhere would help to provide stronger justification. For the enforceable mechanisms in place, it is important for Ohio to demonstrate whether a source's existing measures have been implemented consistently in the past and whether Ohio is reasonably certain that they will continue to be implemented such that emission rates are not projected to increase and degrade future visibility conditions. To help make this demonstration, it is also important to list and compare the actual emissions and emission rates such as from a base year like 2016, the most recent 5 years available, and the projected emissions for 2028." **(Pamela Blakely, U.S. EPA Region 5)**

Response 10: As described in further detail in Response 5, Ohio continues to believe it is not a requirement that existing measures evaluated as part of a Regional Haze analysis be sustained permanently, except where they are explicitly being relied on for reasonable progress.

In addition, Ohio is not required to include projected future emissions in the SIP. U.S. EPA's Regional Haze Guidance (pp. 55-56) states "Regarding section 51.308(f)(6)(v) of the Regional Haze Rule on emission inventories, we first note that the requirement in the rule is to provide for the preparation of emission inventories. **The emission inventories themselves are not required SIP elements and so are not required to be submitted according to the procedures for SIP revisions. The emission inventories themselves are not subject to EPA review.** We also note that the 2017 revisions to the Regional Haze Rule clarified that SIPs for the second and later implementation period do not need to provide for a statewide inventory for a baseline year, because SIPs for the first implementation period provided for that one-time inventory. A state may note in its regional haze SIP that its compliance with the Air Emissions Reporting Requirements in 40 CFR Part 51 Subpart A satisfies the requirement to provide for an emissions inventory for the most recent year for which data are available. **To satisfy the requirement to provide estimates of future projected emissions, a state may explain in its SIP how projected emissions are developed for use in establishing**

RPGs for its own and nearby Class I areas. Typically, these projections are developed through a regional planning process, in some cases using projections provided by EPA as a starting point or point of comparison. States will also find relevant explanations and advice in a separate EPA guidance document on the preparation of SIP emission inventories." (emphasis added)

Projected emissions were built into the LADCO modeling and are therefore accounted for in the glidepath projections.

Comment 11: "Ohio EPA Should Evaluate Additional Sources Under a Four-Factor Analysis

"Ohio does not mention the AK Steel facility (now Cleveland-Cliffs) in its SIP. Based on 2017 emissions from the National Emissions Inventory, this facility emits 1,963.3 tons of NOx, 1,962.6 tons of SO2, and 906.4 tons of PM10. The cumulative Q/d (considering all Class I Areas) for this facility is 179.3, with a high Q/d value at Mammoth Cave of 17.0. This is a significant source of visibility impairing pollution. Therefore, Ohio should explain why this facility was not selected for a four-factor analysis. (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations; Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 11: AK Steel (now Cleveland Cliffs) did not meet Ohio's selection criteria. Ohio's Q/d analysis showed a facility Q/d of 15, from 67 units. However, no individual units had a Q/d greater than 4; in fact, the highest individual unit had a Q/d of 2. Ohio considered it appropriate to limit any potential four-factor analysis to only those units which had a larger contribution, for efficiency and effectiveness in allocating Ohio's resources as well as the expenditures of source owners. We believe Ohio's selection criteria is reasonable because together the primary and secondary criteria captured a reasonable set of sources to carry forward for further analysis.

Comment 12: "On page 5, Ohio acknowledges that 40 CFR 51.308(f)(2)(i) indicates that states should consider evaluating major and minor stationary sources or groups of sources, mobile sources, and area sources. Regarding area sources, Ohio only states that it is focusing on major and minor stationary sources and groups of sources, as it considers these sources are more controllable at the state level and are significant contributors to Regional Haze at Class I areas impacted by sources in Ohio. This statement is essentially the only reasoning that Ohio presents to explain why it has not considered area sources. It is difficult to understand how Ohio can dismiss area sources when it does not appear it has even evaluated area source impacts. This is especially important since Ohio's proposed regional haze SIP does not include any new controls for its point sources, other than

controls that are on the books." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 12: Ohio did evaluate area source impacts. Table 2 in Ohio's SIP shows that nonpoint source (also known as area source) contributions range between 8 and 23 percent (average 14 percent). As noted in the SIP, Ohio EPA is exploring options for regulating the nonpoint category as a part of our strategy to attain the 2015 ozone standard and may look further at this category as a part of Regional Haze in future rounds. The Regional Haze Guidance is quite clear that states are not required to evaluate all sources during each implementation period; it is reasonable to address some sources in in the second implementation period and defer analysis of other sectors to future implementation periods.

Comment 13: "Ohio has only required four-factor analyses for the Dover, Avon Lake, Carmeuse and Gavin facilities. As described in this report, there are a number of other sources that did not submit four-factor analyses, which nevertheless could demonstrably lower their NOx and/or SO2 emissions through controls, control upgrades, or continuous operation of controls that are in typically very cost-effective. This includes:

- Scrubber upgrades on the Cardinal units.
- SCR optimization/upgrades on the Cardinal units.
- A scrubber upgrade on Bay Shore Unit 1.
- Scrubber upgrades on the Gavin units.
- Continuous operation and SCR optimization/upgrades on the Gavin.
- Continuous operation and SCR optimization/upgrades on the Kyger Creek units.
- Scrubber upgrades on the WH Sammis units.
- SCR optimization/upgrades for the WH Sammis Units 6 and 7.
- SNCR optimization for WH Sammis Unit 5.

"In addition, in a number of cases, units are operating considerably below their permitted limits. Some of these units are satisfying their MATS HCl obligations directly, and so do not have an SO2 limit under MATS. Because cost-effectiveness calculations are based on historical emission data, there is nothing preventing these units from greatly increasing their emissions. Accordingly, Ohio must reevaluate the four statutory factors and determine whether more stringent, technically achievable and cost effective emission limits are necessary to ensure reasonable progress." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 13: Please see below for detailed responses to specific comments, which are summarized in this comment. Please see Response 5 regarding enforceable limits (i.e. units operating below their currently permitted limits).

Cardinal Power Plant

Comment 14: "For the Cardinal Power Plant, based upon the information provided, we now agree that all three Cardinal EGUs are effectively controlled for Sulfur Dioxide (SO2) and a four-factor analysis is not warranted for that pollutant. However, for NOx, we found 68 similar facilities in 2020 with lower NOx rates than Cardinal Unit #3. Based upon the information provided, we continue to believe that Cardinal Unit #3 is not effectively controlled for NOx and a four-factor analysis is warranted. The four-factor analysis should focus on improving the effectiveness of the existing SCR system." **(Herbert C. Frost, NPS)**

Response 14: This unit is achieving an NOx emission rate of 0.09 lb/MMBtu. Ohio EPA continues to conclude that this unit is effectively controlled for NOx, and it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

Comment 15: "For the section on Cardinal Power Plant, the strength of the analysis would be improved if it included a comparison of projected emissions to historical emissions as well as historical emissions rates." **(Pamela Blakely, U.S. EPA Region 5)**

Response 15: As described further in Response 10, Ohio is not required to include projected future emissions in the SIP.

Comment 16: "The word "into" may be missing between "incorporated" and "Permits"." **(Pamela Blakely, U.S. EPA Region 5)**

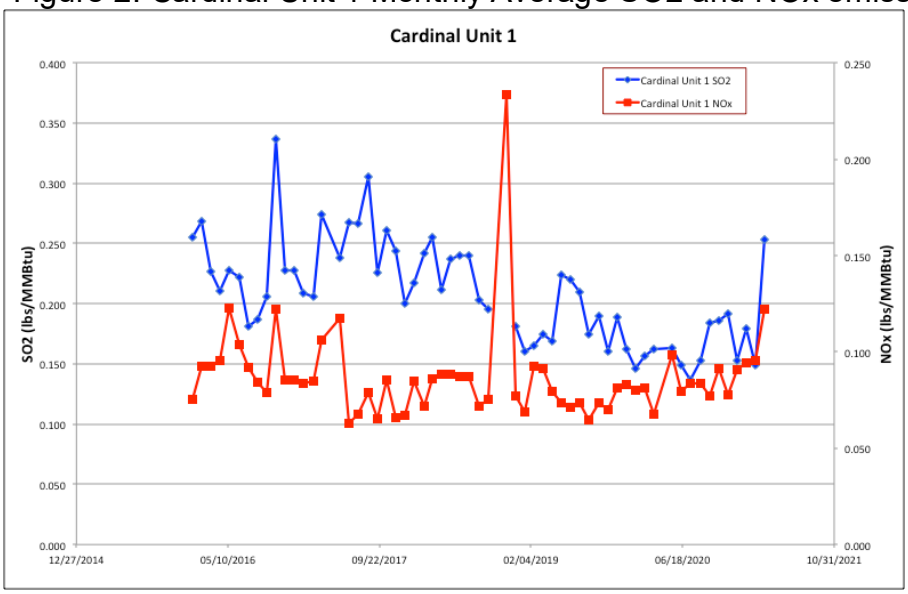
Response 16: This typo has been corrected.

Comment 17: "Footnotes 25 and 26 seem to be missing from the footer. From an earlier draft it appears Footnote 25 was intended to be "https://www.epa.gov/enforcement/consent-decree-and-modifications-american-electric-power-service-corporation" ; and Footnote 26 was intended to be "The 2016 and 2017 emissions are based on stack testing conducted 02/26/09, whereas the 2018 and 2019 emissions are based on a stack test conducted on 08/23/2017."" **(Pamela Blakely, U.S. EPA Region 5)**

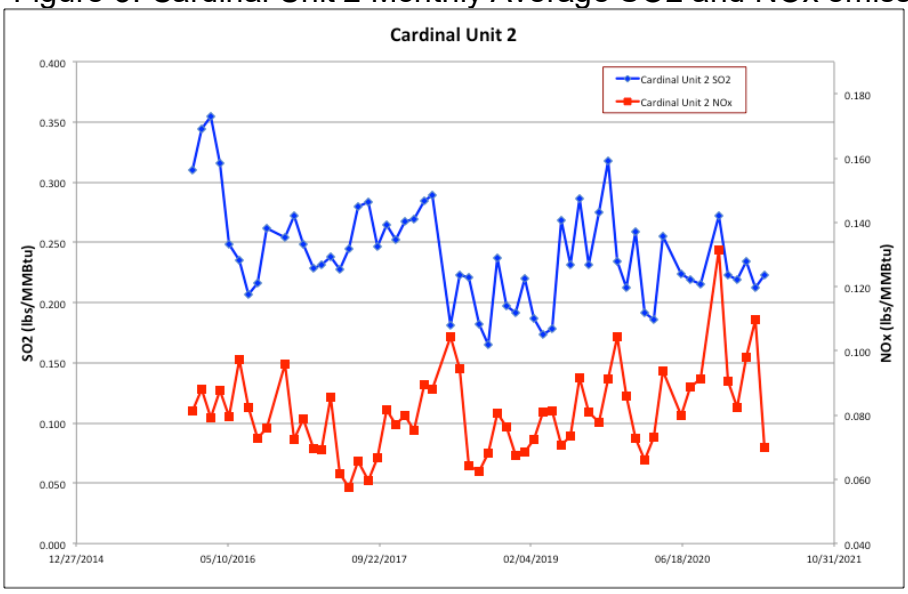
Response 17: These errors have been corrected.

Comment 18: "Ohio uses annual emission averages to illustrate its points. Instead, because emission limits are conditioned in the regional haze program on the basis of 30 day rolling averages, or better yet, 30 Boiler Operating Day (BOD) averages, Ohio should base its evaluations on that type of emission data. Below are 30 day monthly averages for the Cardinal Units:

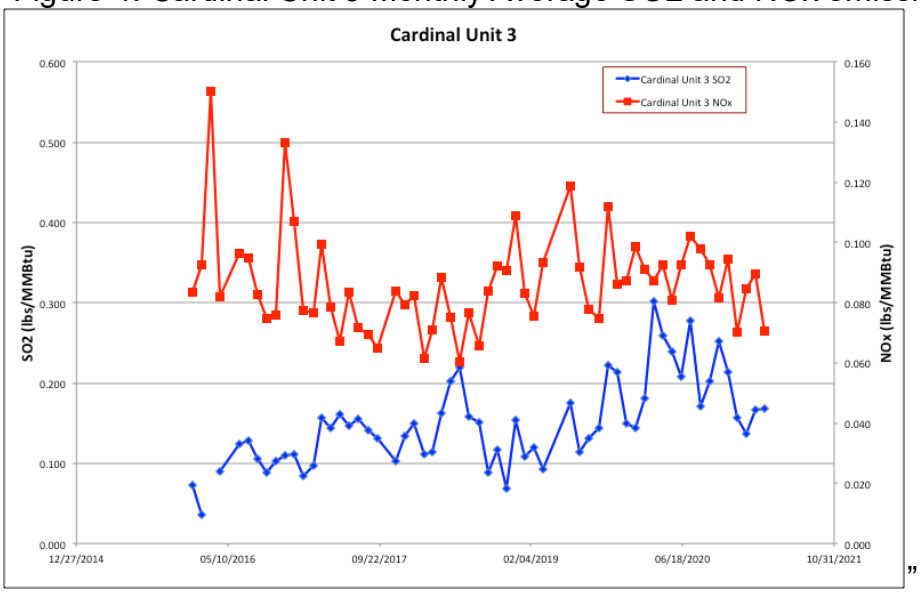
"Figure 2. Cardinal Unit 1 Monthly Average SO2 and NOx emissions.



"Figure 3. Cardinal Unit 2 Monthly Average SO2 and NOx emissions.



"Figure 4. Cardinal Unit 3 Monthly Average SO2 and NOx emissions.



"

(footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 18: Neither the Regional Haze Rule nor Regional Haze Guidance specifies which averaging time is most appropriate for use in these analyses. Ohio believes use of an annual emissions average is acceptable for these purposes but has reviewed and considered the additional information provided by the commenter.

Comment 19: "The Cardinal Power Plant is fired by coal and located south of Brilliant, Ohio. The power plant has three units. OEPA did not require a four-factor analysis for the three coal-fired boilers at the Cardinal Power Plant, instead proposes that it is effectively controlled for SO2 and NOx with FGDs and SCRs, respectively. Contrary to OEPA's assertions that the boilers are effectively controlled, as discussed in the Kordzi Report, the emission controls can be further optimized. The state asserts Cardinal's SO2 controls are subject to a 95% efficiency via a Consent Decree and its permits impose 30-day rolling average SO2 emissions limits of 1.056 lb/MMBtu on Units 1 and 2, and 0.66 lb/MMBtu on Unit 3. It further states that the CD requires SCRs operate at approximately 90%. Emission rates for SO2 and NOx do not appear to be included in the CD and the emission rates in the Title V permit are more lax, not meeting either percentage reduction despite the fact that the controls for both pollutants are capable of achieving these more stringent rates. Additionally, OEPA's suggestion that the CD and permit provisions can limit emissions for purposes of the regional haze SIP is misplaced. OEPA should require a four-factor SO2 and NOx analysis be performed, independently review the analyses, filling in gaps where necessary, and then establish practically enforceable emission limitations in the SIP reflecting optimization of controls."

(footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"It can be seen from the above graphs, that the monthly SO2 emissions for the Cardinal units are fairly variable, which suggests that Cardinal's scrubbers can be further optimized." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Ohio discusses the reasons it did not require that Cardinal Units 1, 2, and 3 investigate scrubber upgrades on page 27. Ohio references a consent decree and without providing a reference to where the requirement appears, suggests that FGDs with approximately 95% control efficiency were installed. An examination of that consent decree appears to indicate that although Cardinal was required to install scrubbers on each of the three units, no actual SO2 emission limits or scrubber efficiencies were specified for those units. Ohio further states that its permits impose 30 day rolling average SO2 emissions limits of 1.056 lb/MMBtu on Units 1 and 2, and 0.66 lb/MMBtu on Unit 3. However, these limits are much less stringent than 95% control, and as Ohio notes, the Cardinal units are comfortably operating well under these limits. EPA's MATS Rule for power plants requires that Cardinal meet either a Hydrogen Chloride (HCl) limit of 0.002 lb/MMBtu (or 0.02 lb/MWh), or because it has an FGD an SO2 limit of 0.2 lb/MMBtu (or 1.5 lb/MWh) on a 30 BOD average. Since Cardinal is not meeting the SO2 limit, presumably it is complying with MATS by meeting the HCL limit. Thus, there appears to be no meaningful restrictive SO2 limit and therefore no guarantee that the scrubbers for these units will continue to perform at these levels." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Similar comments pertain to Ohio's assumptions regarding the performance of the Cardinal SCR systems. Ohio states that the same consent decree resulted in the installation of SCR systems on the three Cardinal units with efficiencies of approximately 90%. Again, the consent decree does not appear to specify any actual NOx emission limits or SCR efficiencies for those units. In addition, Cardinal's Title V permit does not appear to specify any NOx emission limits for the units that would approach 90% control.

"SCR systems can often be upgraded very cost-effectively by selecting catalyst that is better optimized to the SCR inlet temperature, optimizing the ammonia injection system to improve the ammonia mixing and distribution, optimizing catalyst rejuvenation/regeneration, or simply using more reagent. As the Control Cost Manual states,

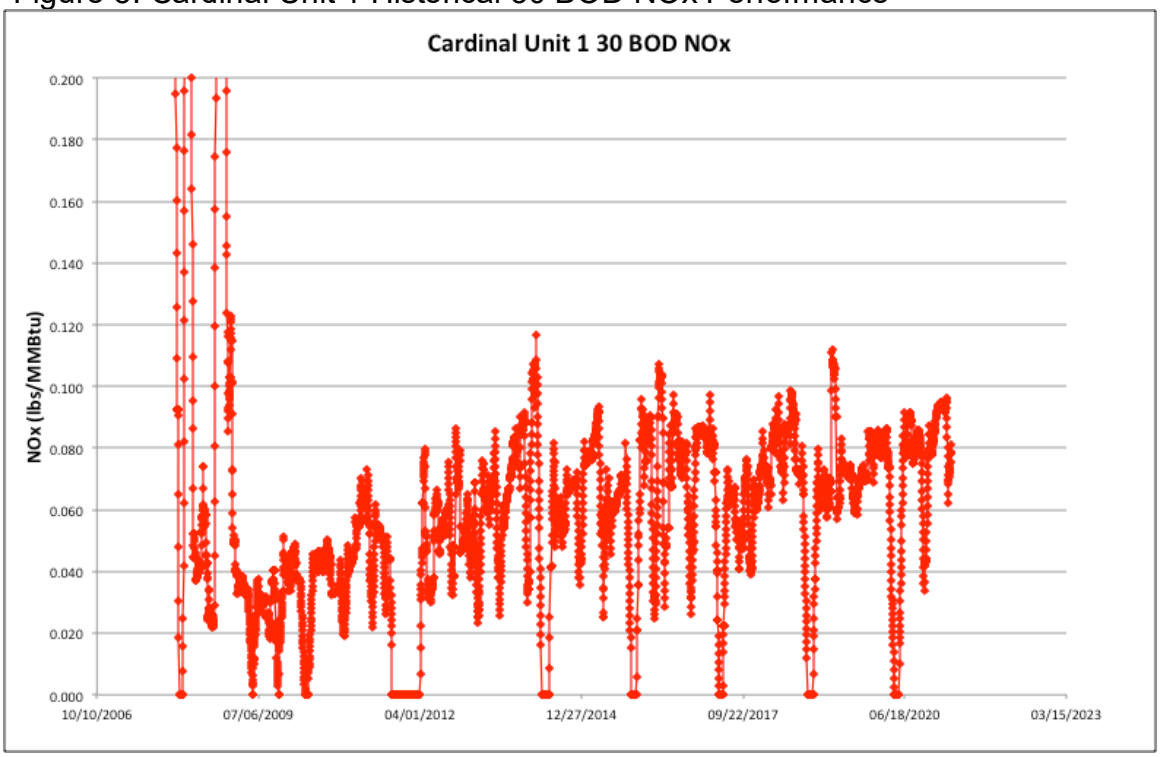
> Theoretically, SCR systems can be designed for NOx removal efficiencies up close to 100 percent. In practice, commercial coal-,

> oil-, and natural gas–fired SCR systems are often designed to meet control targets of over 90 percent. However, the reduction may be less than 90 percent when SCR follows other NOx controls such as LNB or FGR [Flue Gas Recirculation] that achieve relatively low emissions on their own. The outlet concentration from SCR on a utility boiler is rarely less than 0.04 lb/million British thermal units (MMBtu).

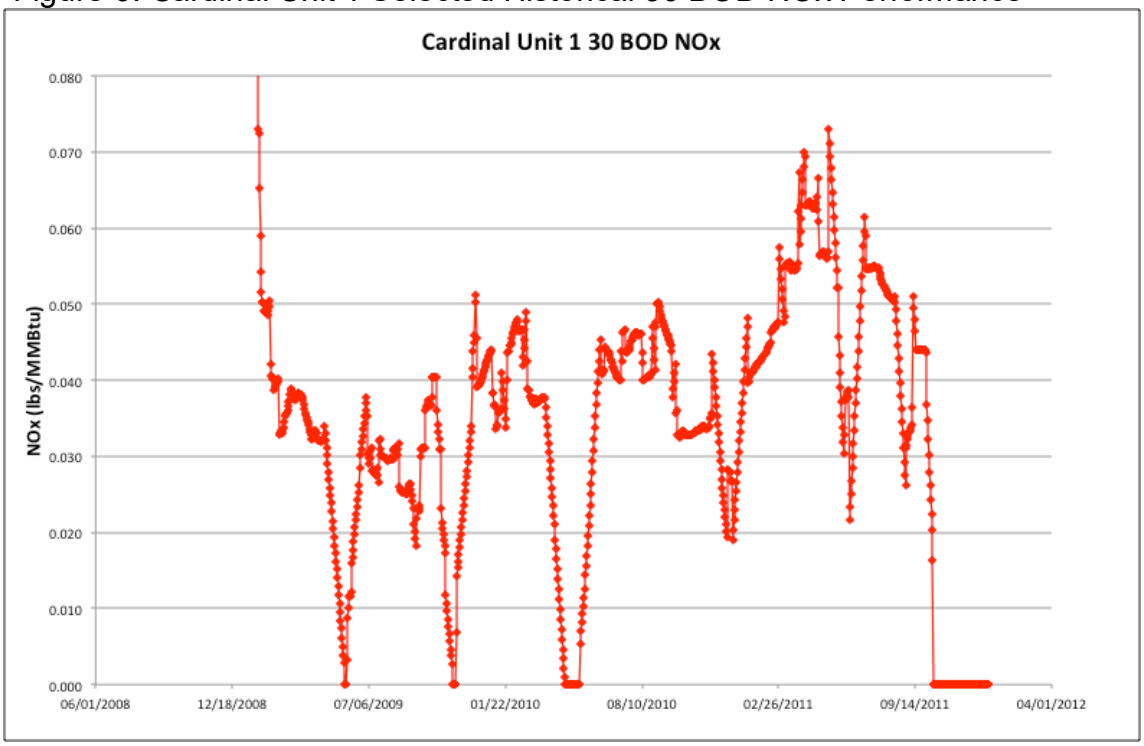
"Thus retrofit SCR systems for coal-fired EGUs can typically be relied upon to achieve at least 90% control with a floor of 0.04 lbs/MMBtu. In some cases, coal-fired EGU SCR systems can continuously achieve less than 0.04 lbs/MMBtu on a 30 day rolling average basis." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"It appears from the above graphs that the performance of Cardinal's SCR systems is suboptimal, with recent monthly NOx averages typically ranging from 0.06 – 0.12 lbs/MMBtu. As indicated above, the performance floor for coal-fired EGUs is at least 0.04 lbs/MMBtu, if not lower. In fact, Cardinal Unit 1 formerly had one of the best performing SCR units in the U.S., as the following graphs indicate:

"Figure 5. Cardinal Unit 1 Historical 30 BOD NOx Performance



"Figure 6. Cardinal Unit 1 Selected Historical 30 BOD NOx Performance



"The above figures illustrate the Cardinal Unit 1 SCR system performance during two different time intervals. The NOx emissions are plotted based on a 30 BOD average. As can be seen from Figure 4, the Cardinal Unit 1's SCR performance has gradually worsened over time. Figure 5 illustrates the SCR performance for the first two years after it was first installed. As can be seen, the SCR system is capable of sustained performance under 0.04 lbs/MMBtu. An examination of Cardinal Units 2 and 3 SCR systems reveals similar capabilities. In fact, the performance of the Cardinal Units' SCR systems was formerly so good that EPA included it in its survey of the best coal-fired EGU SCR systems to support its New Mexico FIP, which concluded that SCR systems for the San Juan Generating Station were not only cost-effective, but should be required to meet a NOx rate of 0.50 on a 30 BOD average. It appears that the only thing preventing the Cardinal units from achieving this level of SCR performance again is the lack of an enforceable NOx limit requiring it. Consequently, Ohio should require that a four-factor NOx analysis be performed, as it appears likely that additional NOx reductions could be achieved very cost-effectively.

"[27] Emissions were downloaded from https://ampd.epa.gov/ampd/. EGU emission limits based on rolling 30 BOD averages are preferred over those conditioned based on 30 day running averages because they de-emphasize emission spikes that occur when units are started, shut down, or malfunction. This results fromonly counting the days when the unit operates in the averaging. Note that EPA states that EGUs should infact be conditioned on rolling 30 BOD averages in the BART Final Rule (70 FR 39172).

[28] See EPA's proposal at 76 FR 491 (January 11, 2011) and its final at 76 FR 52388 (August 22, 2011). Inparticular, see the discussion at 76 FR 52404: "The Havana Unit 9 data shows that it has operated under lbs/MMBtu from mid-2009 to the end of 2010 on a continuous basis. In fact, this unit has operated under 0.035 lbs/MMBtu for much of that time. The Parish Unit 7 data shows that it has operated under 0.05 lbs/MMBtu from mid-2006 to mid 2010 on a continuous basis. In fact, this unit has operated for months at approximately 0.035 lbs/MMBtu, and for approximately 2 years at approximately 0.04 lbs/MMBtu. The Parish Unit 8 data show that it has operated almost continuously under 0.045 lbs/MMBtu since the beginning of 2006. Other units' data show months of continuous operation below 0.05 lbs/ MMBtu. We believe this data demonstrates that similar coal fired units that have been retrofitted with SCRs are capable of achieving NOx emission limits of 0.05 lbs/MMBtu on a continuous basis." Also see this document in which the SCR performance of the Cardinal and other top performing SCR systems discussed above was graphed: https://www.regulations.gov/document/EPA-R06-OAR-2010-0846-0129."

(Joe Kordzi Report attached to Conservation Organizations' comments)

Response 19: Ohio EPA continues to conclude that these units are effectively controlled for SO_2 and NOx. We consider the standard here to be *effectively* controlled, not *perfectly* controlled. Ohio recognizes there may be some variability in the emission rate over time. Even if there should be some small amount of additional emissions reductions that could be achieved with further optimization or control upgrades, we conclude that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

In addition, the commenter has misconstrued Ohio's reasoning for including a discussion of existing emission limits in the SIP. Ohio has not claimed, nor inferred, that the existing emission limits in consent decrees and permit provisions are intended to limit emissions for purposes of the Regional Haze SIP. The details regarding existing limits in consent decrees and permits was included in the SIP for informational purposes as part of the overall analysis of this source.

As discussed in more detail in Response 5 regarding enforceable limits, Ohio agrees that enforceable limits are required for those measures determined necessary for reasonable progress. In this case, Ohio is not relying on control measures at Cardinal Power Plant for reasonable progress; therefore, enforceable limits are not required.

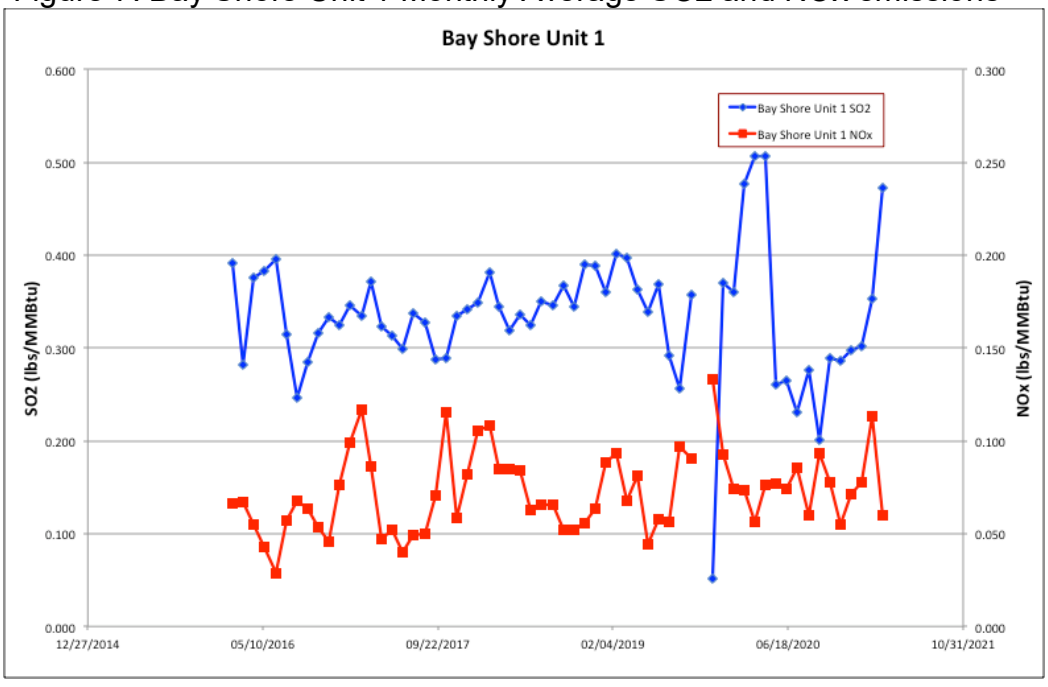
<u>FirstEnergy Generation LLC. Bay Shore Plant</u>

Comment 20: "The Bay Shore Plant is a coal-fired power station owned and operated by FirstEnergy near Oregon, Ohio. OEPA did not end up requiring a four-factor analysis for the plant, and finds that it is effectively controlled for SO2 and NOX with scrubbers and SCR. As explained in the Kordzi

Report, there are options available to further control the SO2 and NOx emissions, "and the fact that an EGU is equipped with the most effective control technology (e.g., scrubbers and/or SCRs) does not mean those controls are operating at their most effective levels." The State explains it has the following limits in a Title V permit: a SO2 limit of 0.73 lb/MMBtu on a 30-day rolling average basis and is required to meet 90% reduction of SO2 (except that 70% reduction is allowable for all heat inputs less than 0.60 lb SO2 /MMBtu) and that has a NOx limit of 0.20 lb/MMBtu on a 30-day rolling average basis. The control technology for both pollutants can achieve more stringent rates and there are additional SO2 control options, which the State did not consider. OEPA should require that four-factor SO2 and NOX analyses be performed, independently review the analyses, filling in gaps where necessary, and then establish practically enforceable emission limitations in the SIP reflecting optimization of controls for both pollutants, and consideration of additional SO2 controls such as DSI." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"On page 30, Ohio discusses the emissions of the Bay Shore Unit B006 (Unit 1). Similar to its discussion of the Cardinal units, Ohio states that it has a SO2 limit of 0.73 lb/MMBtu on a 30-day rolling average basis and is required to meet 90% reduction of SO2 (except that 70% reduction is allowable for all heat inputs less than 0.60 lb SO2 /MMBtu). It also has a NOx limit of 0.20 lb/MMBtu on a 30-day rolling average basis. Ohio points to annual SO2 emissions of 0.32 – 0.34 lbs/MMBtu and annual NOx emissions of 0.06 – 0.08 lbs/MMBtu. As with the Cardinal units, an examination of the monthly emissions provides more detail:

"Figure 7. Bay Shore Unit 1 Monthly Average SO2 and NOx emissions



"As with the Cardinal units, Bay Shore has been operating considerably below its permitted 30-day SO2 limit of 0.73 lbs/MMBtu. Also similar to the Cardinal units, Bay Shore cannot meet its MATS SO2 limit (0.3 lbs/MMBtu when burning pet coke) and so presumably satisfies MATS by alternatively meeting an HCl limit. Therefore, the permit SO2 limits for the Bay Shore Unit 1, do not guarantee future performance. In fact, as can be see from the above graph, there are significant recent excursions from Bay Shore's better historical SO2 control. This indicates that Bay Shore's permitted SO2 rates should be tightened. In addition, there are instances in which the monthly SO2 emission rate has averaged 0.25 lbs/MMBtu or less. Assuming a relatively stable coke sulfur content, this would indicate additional SO2 control could be brought to bear. Lastly, there is no technical reason why post combustion controls such as DSI cannot be installed on a CFB boiler such as Bay Shore Unit 1. This would likely result in significant additional SO2 reductions. For these reasons, Ohio should require that Bay Shore perform a four-factor analysis.

"In summary, the fact that an EGU is equipped with the most effective control technology (e.g., scrubbers and/or SCRs) does not mean those controls are operating at their most effective levels. In every case, Ohio should investigate whether upgrades to these controls would be cost-effective. Furthermore, the above comments concerning the performance level of wet scrubbers and SCR systems notwithstanding, any performance level that Ohio uses to determine that a control should not be further optimized should be secured with an enforceable instrument in its SIP." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 20: Ohio EPA continues to conclude that Bay Shore is effectively controlled for SO_2. We consider the standard here to be *effectively* controlled, not *perfectly* controlled. Ohio recognizes there may be some variability in the emission rate over time. Even if there should be some small amount of additional emissions reductions that could be achieved with further optimization or control upgrades, we conclude that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

As discussed in more detail in Response 5 regarding enforceable limits, Ohio agrees that enforceable limits are required for those measures determined necessary for reasonable progress. In this case, Ohio is not relying on control measures at Bay Shore Plant for reasonable progress; therefore, enforceable limits are not required.

Kyger Creek

Comment 21: OVEC provided comments including additional analysis of NOx emissions performed by AECOM to support the conclusion that a four-factor analysis is not necessary for the Kyger Creek Station. The full comment letter and analysis can be found in Appendix P5. **(J. Michael Brown, OVEC)**

Response 21: Thank you for providing this additional analysis and information.

Comment 22: "For the Kyger Creek Station Power Plant, based on the information provided, we now agree that all five EGUs are effectively controlled for SO2 and four-factor analyses are not warranted for that pollutant. However, we find that these same EGUs are all achieving less than 90% control efficiency for NOx and are therefore not effectively controlled for that pollutant. Four-factor analyses for NOx control opportunities are warranted for Kyger Creek Station units B001, B002, B003, B004, and B005. We recommend that four-factor analyses focus on improving the effectiveness of existing SCRs while maintaining necessary mercury removal." **(Herbert C. Frost, NPS)**

Response 22: As discussed in Comment 21, Kyger Creek has provided additional information and clarification regarding their NOx emissions (please see Appendix P5). Ohio EPA continues to conclude based on a case-by-case evaluation of the control efficiency, emission rate, year-round control operation, and operational improvements and visibility impacts described further in the attachment that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis for NOx would result in the conclusion that no further controls are necessary.

Comment 23: "This review included the material Ohio presents beginning on page 35 of its SIP and the additional material it cites to in Appendix L4, Attachment 1. Ohio declined to require a four-factor analysis for any of the five Kyger Creek units, concluding that the existing scrubbers and SCR systems were operating well enough that they could be considered "effectively controlled." As Kyger Creek indicates on page 2 of Appendix L4, Attachment 1, Units 1 and 2 share a scrubber and CEMS and Units 3, 4, and 5 share a scrubber and CEMS. Thus, the monitoring data available from EPA's AMPD website is apportioned and cannot be thought of as being particular to each unit. Analysis indicates that the NOx and SO_2 data for Units 1 and 2 are very similar and that for Units 3, 4, and 5 are very similar. Therefore, only monitoring data for Units 1 and 3 are referenced below:

Figure 12. Kyger Creek Unit 1 Recent NOx and SO_2 Monthly Emissions

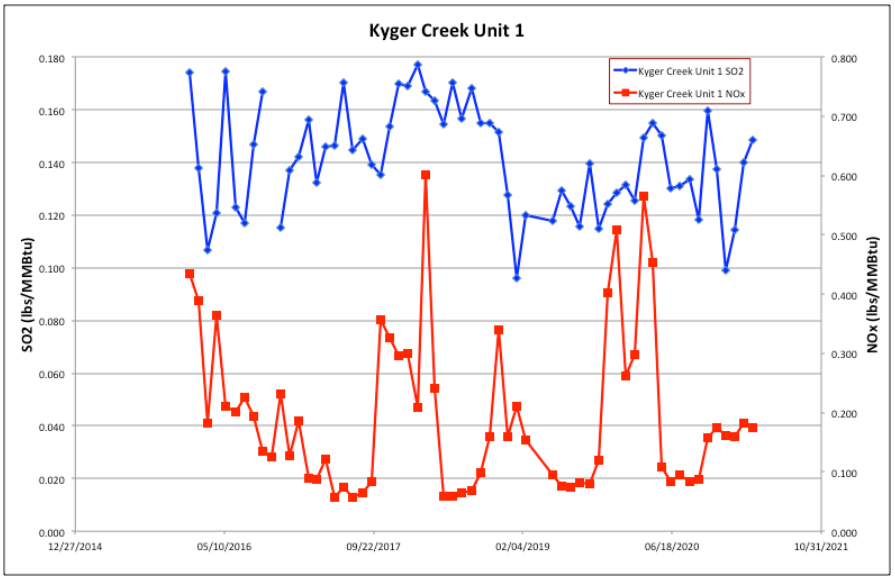
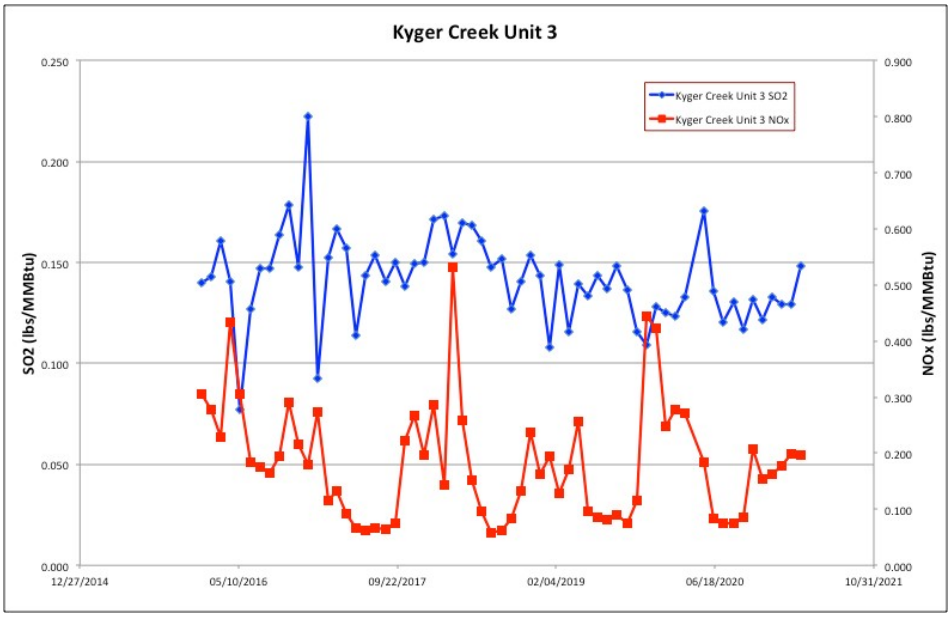
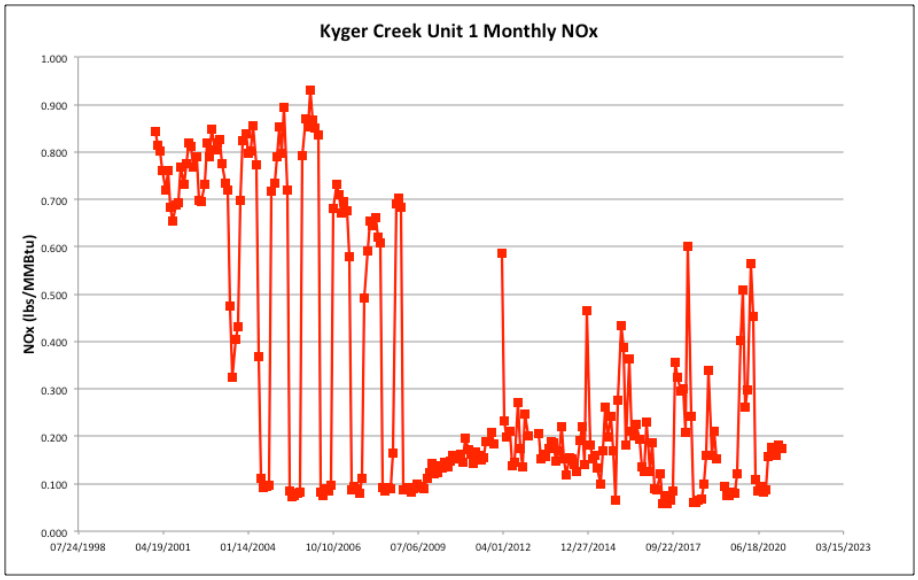


Figure 13. Kyger Creek Unit 3 Recent NOx and SO_2 Monthly Emissions



"As can be seen from the above graphs, the performance of the Kyger Creek SCR systems alternates between 3-4 month periods of good NOx removal (approximately 0.06 – 0.08 lbs/MMBtu) with the rest of the time consisting of poor NOx removal. On page 35 of its SIP, Ohio states that Kyger Creek operates its SCR systems year round. However, it seems evident the facility only utilizes its SCR systems at their full capabilities during ozone season. This indicates that the true current performance potential of the Kyger Creek SCR systems is likely at least 0.06 lbs/MMBtu. The pre-SCR NOx level of Unit 1 is shown below:

Figure 14. Kyger Creek Unit 1 Historical NOx Monthly Emissions



"Averaging the monthly NOx rates prior to the SCR installation in May, 2003 yields the following:

Table 2. Kyger Creek Unit 1 Pre-SCR Average Monthly NOx Rates

Month	Year	Avg. NOx Rate (lb/MMBtu)
1	2001	0.843
2	2001	0.814
3	2001	0.802
4	2001	0.761
5	2001	0.719
6	2001	0.761
7	2001	0.684
8	2001	0.654
9	2001	0.687
10	2001	0.694
11	2001	0.768
12	2001	0.733
1	2002	0.775
2	2002	0.820
3	2002	0.811
4	2002	0.767
5	2002	0.790
6	2002	0.699

7	2002	0.694
8	2002	0.732
9	2002	0.819
10	2002	0.789
11	2002	0.849
12	2002	0.804
1	2003	0.820
2	2003	0.827
3	2003	0.775
4	2003	0.734
Avg. Monthly NOx		0.765

"Therefore, assuming a relatively consistent coal nitrogen content, and a floor of 0.06 lbs/MMBtu, a gross approximation of the current SCR system performance is approximately 92%.[35] As with the Gavin units, Kyger Creek argues that further optimizing the SCR units may result in reduced mercury control, potentially jeopardizing MATS compliance. This argument is flawed for the same reasons discussed above in the Gavin analysis. In addition, when the Kyger Creek SCR units do perform well, they do so for 3 – 4 months at a time. So it is evident that at least this level of performance would not jeopardize the Kyger Creek mercury MATS compliance, as such an issue would have already surfaced, since MATS compliance is figured on the basis of a 30 BOD average.

"Thus, it appears the only thing preventing the Kyger SCR units from consistently achieving this level of performance is the lack of an enforceable NOx limit requiring it. Ohio should therefore require that the Kyger Creek SCR systems undergo four-factor analyses. At a minimum simply running its SCR systems at full capacity all year round would likely be very cost-effective. Further SCR optimization may result in even more very cost-effective controls.

[35] ((0.765-0..060)/0.765) x 100% = 92.16%. Note that Kyger Creek states on page 4 of Appendix L4,Attachment 1, "the baseline emission rate for Kyger Creek Station boilers prior to SCR installation as defined in 40 CFR Section 76.6, is an emission rate of 0.84 lb/mmBtu." Based on the emissions noted above, this appears too high." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 23: As discussed in Comment 21, Kyger Creek has provided additional information and clarification regarding their NOx emissions (please see Appendix P5). Ohio EPA continues to conclude based on a case-by-case evaluation of the control efficiency, emission rate, year-round control operation, and operational improvements and visibility impacts described further in the attachment that Kyger Creek is effectively controlled for NOx. We consider the standard here to be *effectively* controlled, not *perfectly*

controlled. Ohio recognizes there may be some variability in the emission rate over time. Even if there should be some small amount of additional emissions reductions that could be achieved with further optimization or control upgrades, we conclude that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

As discussed in more detail in Response 5 regarding enforceable limits, Ohio agrees that enforceable limits are required for those measures determined necessary for reasonable progress. In this case, Ohio is not relying on control measures at Cardinal Power Plant for reasonable progress; therefore, enforceable limits are not required.

W. H. Sammis Power Plant

Comment 24: "On page 38 of the draft SIP, the 2017 NOx for Unit B012 is listed as 1,326 tons. This appears to be a minor typographical error. Please revise the quantity to 1,327 tons.

"Please correct the annual NOx emission rates for Units B012 and B013, listed on pages 38-39 of the draft SIP. The following Table present the Units' NOx emissions for years 2016 through 2020.

Table 1: 2016 - 2020 NOx Emission Rates

Unit	Year	NOX rate, lb/MMBtu[1]
Unit 6, B012	2016	0.08
	2017	0.08
	2018	0.08
	2019	0.08
	2020	0.08
Unit 7, B013	2016	0.08
	2017	0.08
	2018	0.07
	2019	0.07
	2020	0.07

[1]Facility 30-Day Rolling Averages

"

(Glenn D. Truzzi, Energy Harbor Generation LLC)

Response 24: The NOx emissions and emission rate data in the SIP was obtained from U.S. EPA's Clean Air Markets Database (CAMD). This data was reported to CAMD by Sammis Power Plant. In addition, the NOx emission rate data obtained from CAMD and used in the SIP is the annual average emission rate, rather than the 30-day rolling average provided in the comment. For consistency throughout the SIP, Ohio will continue to use the available CAMD data, including annual emission rate. Thank you for including this additional information into the record.

Comment 25: "The W. H. Sammis Power Plant is located in Stratton, Ohio and OEPA declined to require a four-factor analysis, instead relying on the emission limits and existing scrubber and SCR. Based on the analysis and discussion in the Kordzi Report, OEPA should require a four factor analysis for Units 5, 6 and 7 so that performance of the pollution control systems can be optimized. In 2020, Units 6 and 7 have FGDs and SCRs with low NOX burners with overfire air installed, with 95% and 90% control efficiency. The units have a 0.13 lb/MMBtu 30-day rolling average limit for SO2, and for NOX an emission limit of 0.100 lb/MMBtu 30-day rolling average. The State's proposed SIP neglects to discuss emissions from and controls on Unit 5. OEPA should require that four-factor SO2 and NOX analyses be performed for all three units, independently review the analyses, filling in gaps where necessary, and then establish practically enforceable emission limitations in the SIP that reflect optimization." **(Sara Laumann on behalf of Conservation Organizations)**

"Ohio declined to require a four-factor analysis for any of the W H Sammis Creek units, concluding that the existing scrubber and SCR systems were operating well enough that they could be considered "effectively controlled." Ohio states that Sammis permanently shut down coal-fired boilers B007, B008, B009 and B010 (Units 1-4) on May 31, 2020. Ohio also states that FGDs with 95% control efficiency were installed February 10, 2010 on B012 and B013 (Units 6-7), and SCRs with at least 90% control efficiency were installed February 3, 2010 on B012 and April 24, 2010 on B013.

"However, Ohio does not discuss B011 (Unit 5). According to the CD Ohio cites, by December 31, 2008, Unit 5 was required to have a Flash Dryer Absorber or equivalent with at least a 50% efficiency for SO2. According to Ohio's Title V permit and EPA's AMPD data, this unit is fitted with a wet scrubber and SNCR system. Ohio should include this unit in its analysis." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"According to information from Babcock and Wilcox Power, three absorbers were installed, which provided enough scrubbing capacity for all seven units. Sammis' Title V permit indicates that all seven units were indeed scrubbed. Consequently, with four units now retired, it appears there is excess scrubbing capacity. However, it does not appear that the scrubber systems for Units 5-7 are being used to their full capacity, as the following graphs illustrate:

Figure 15. WH Sammis Unit 5 Recent NOx and SO_2 Monthly Emissions

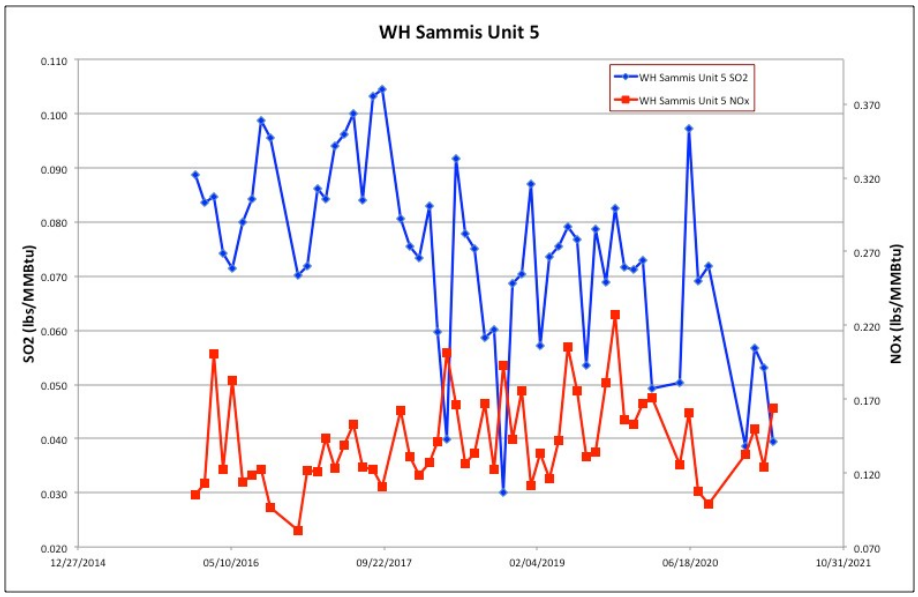


Figure 16. WH Sammis Unit 6 Recent NOx and SO_2 Monthly Emissions

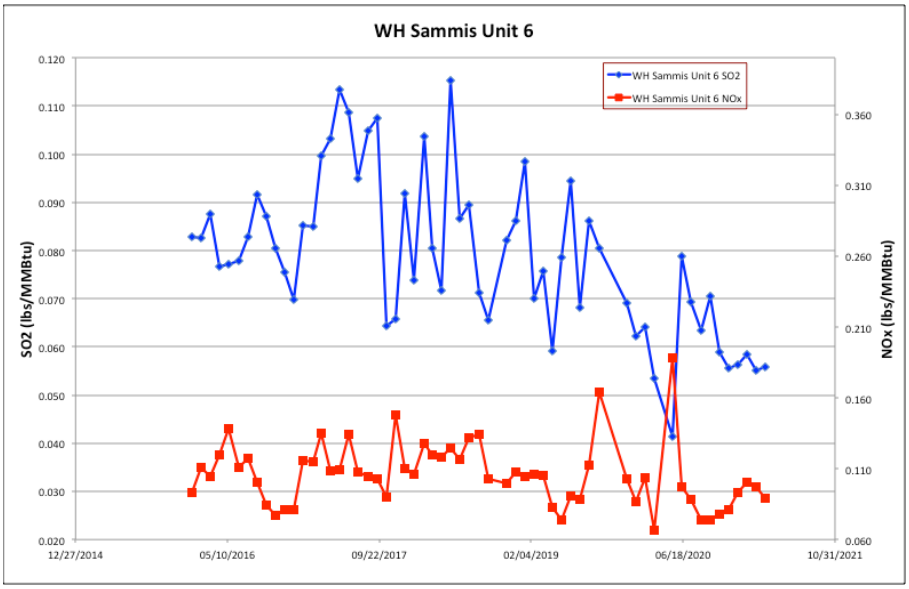
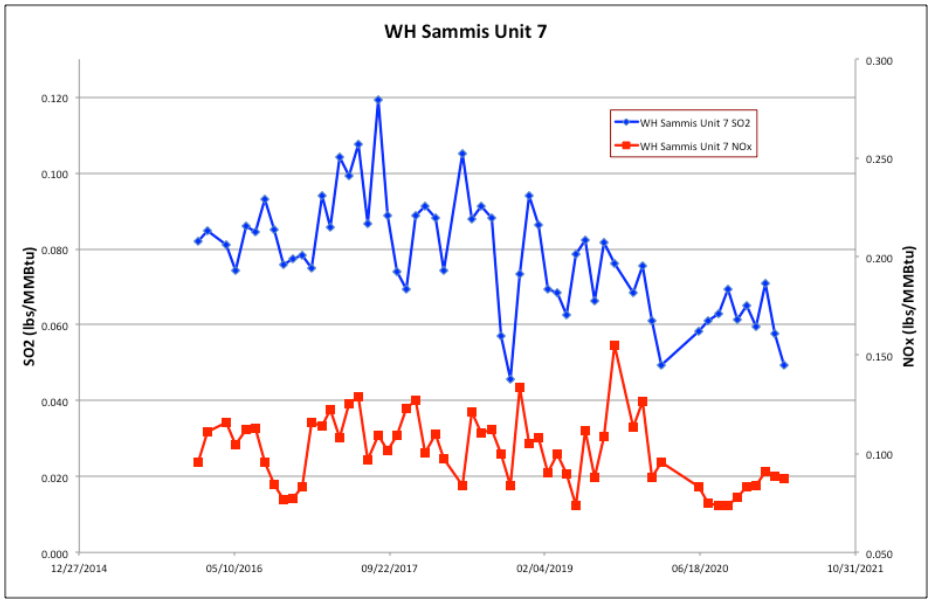


Figure 17. WH Sammis Unit 6 Recent NOx and SO_2 Monthly Emissions



"Furthermore, as the above figures indicate, the scrubber performance of the three Sammis units is sporadic. Sammis' CD and its Title V require that Units 5, 6, and 7 meet a rolling 30 day emission limit of 0.13 lbs/MMBtu. As can be seen from the above graphs, all three units operate considerably under that limit most of the time. In fact, it appears the performance floor for the scrubber systems is at least 0.060 lbs/MMBtu. Considering the capacity of the scrubber systems and its newness, this is not unexpected.

"Similarly, the SCR systems for Units 6 and 7 indicate that the performance floor is at least 0.07 lbs/MMBtu, as it appears the units regularly operate at those levels for 2-3 months at a time. Also, the SNCR system for Unit 5 appears capable of operating considerably below its CD and Title V rolling 30 day emission limit of 0.290 lbs/MMBtu. Therefore, Ohio should require a four-factor analysis for Units 5, 6, and 7 so that the performance of the scrubber, SCR, and SNCR systems can be optimized and their emission reductions secured. It is very likely that these improvements will prove to be very cost-effective." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 25: Unit 5 (B011) was inadvertently omitted. With a Q/d of 5 for this unit, this unit did not meet the primary selection criteria. However, it should have been included based on the secondary selection criteria. Thank you for bringing this error to our attention.

The SIP has been revised to include Unit 5 (B011). After analysis, Ohio concluded that this unit is also effectively controlled for SO_2 and NOx. B011 has an FGD essentially getting the same level of control and subject

to the same requirements as B012 and B013. For NOx, although B011's SNCR and low NOx burner do not meet a strict interpretation of the "effectively controlled" examples in the Regional Haze Guidance, Ohio EPA concludes based on a case-by-case evaluation of the control efficiency, low emissions (762 tons in 2019), low emission rate (0.15 lb/MMBtu in 2019), and year-round control operation that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

Therefore, Ohio EPA continues to conclude that Sammis Units 5, 6 and 7 (B011, B012 and B013) are effectively controlled for SO_2 and NOx. We consider the standard here to be *effectively* controlled, not *perfectly* controlled. Ohio recognizes there may be some variability in the emission rate over time. Even if there should be some small amount of additional emissions reductions that could be achieved with further optimization or control upgrades, we conclude that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

Step 4: Characterization of factors for emission control measures

Comment 26: "On pages 41-47, Ohio EPA summarizes the four-factor analyses for Avon Lake Power Plant, Carmeuse Lime, Inc. – Maple Grove Operations, Dover Municipal Light, and General James M. Gavin Power Plant. The full four-factor analyses are provided in Appendices F, G, H, and I. Please bring forward some additional details from the full four-factor analyses into the narrative summary. This would include total costs, interest rates used, and remaining useful life assumed." **(Pamela Blakely, U.S. EPA Region 5)**

Response 26: Additional details, including capital costs, total annual costs and interest rate used, were added to the narrative summary. The remaining useful life assumed was already described in the summary.

Comment 27: "As Ohio EPA notes, affordability of controls was addressed in the 1st Implementation Planning Period in the BART context under the "Guidelines for BART Determinations Under the Regional Haze Rule" 40 CFR 51 Appendix Y, IV.E.3 (https://www.govinfo.gov/content/pkg/CFR-2019-title40-vol2/pdf/CFR-2019-title40-vol2-part51-appY.pdf). However, EPA is still considering whether and how affordability of controls may be considered when assessing controls for reasonable progress. To determine the costs of compliance, the 2019 Regional Haze Guidance notes that states should use methods like the "EPA Air Pollution Control Cost Manual" and "Control Strategy Tool," however, these methods do not include a discussion of affordability. If the SIP includes information on "affordability" and potential economic impacts on sources, such information should be in addition to, and not in place of, the cost

effectiveness, since the cost of compliance factor is required by the statute and rule." **(Pamela Blakely, U.S. EPA Region 5)**

Response 27: Ohio has included discussion of affordability in the SIP as part of a weight of evidence approach to be considered alongside (not instead of) the four statutory factors, including cost of compliance.

Comment 28: "Appendix J contains the spreadsheet with VISTAS/SESARM data and calculations used to arrive at the visibility impacts and benefits that Ohio EPA asserted for the emissions and controls from Avon Lake Power Plant, Carmeuse Lime, Dover Municipal Power, and Gavin Power Plant. Page 48-49 of the 5-10-2021 Draft SIP explains how the visibility impact and visibility benefit of the potential controls were estimated. Please reference Appendix J and the discussion on pages 48-49 when asserting the visibility impact and benefit in the earlier pages for Avon Lake Power Plant, Carmeuse Lime, Dover Municipal Power, and Gavin Power Plant." **(Pamela Blakely, U.S. EPA Region 5)**

Response 28: Some sources chose to include a visibility analysis as an optional fifth factor in the analysis provided to Ohio EPA. Ohio EPA's analysis as described on page 48-49 (Step 5) was based on the same approach but differs slightly (in that it takes an expanded approach to consider all Class 1 areas and considers cumulative impacts) from the analysis submitted by the sources and included in the four-factor analysis documentation. Therefore, it would not be accurate or appropriate to reference Appendix J and the discussion regarding Ohio's analysis in the earlier sections.

Comment 29: "Little documentation has been provided to support a number of assertions contained in some cost-effectiveness calculations. For those cost-analyses that do not employ Control Cost Manual approved algorithms or cost models, adequate documentation (e.g., vendor quotes, actual costs from a similar facility, generally accepted estimates) should be provided to support any of the capital control costs provided. It is assumed that the Department has procedures to protect confidential business information, should that be asserted." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 29: Ohio believes adequate documentation has been provided to support the four-factor analyses.

<u>Avon Lake Power Plant</u>

Comment 30: "Per a June 9, 2021 press release from GenOn Holdings, LLC, Avon Lake Unit 9 and a small oilfired unit are anticipated to retire by September 15, 2021. MANE-VU respectfully asks that this shutdown be included in OH EPA's regional haze SIP as a permanent and enforceable measure to

achieve further reduction of visibility-impairing pollutants." **(Sharon Davis, Co-Chair of MANE-VU)**

Response 30: Ohio does not believe it is necessary to ensure the shutdown planned for September 15, 2021 be made an enforceable commitment at this time. The planned shutdown is just months from now, and once the facility has notified Ohio EPA of the shutdown it will become permanent and enforceable through our normal permitting process. As further described in Step 3(e)(3), when an owner or operator notifies Ohio EPA of a permanent shut down, the facility cannot resume operations without being considered a new facility and being subject to the new source review (NSR) requirements. Thus, the Avon Lake shutdown is expected to become permanent and enforceable through our normal processes far in advance of any approval of an enforceable measure into the SIP.

Comment 31: "It would be helpful to elaborate on the efficiency of the NOx controls and whether the four-factor analysis considered how the efficiency could be improved. Although the cost effectiveness ratio for the SO2 controls evaluated is high, the enforceable SO2 limit for B010 and B012 appears more than twice as high as the actual rates from 2017 – 2019. The four-factor analysis did not appear to address the option of operating at a lower enforceable limit. As part of its evaluation of the four-factor analysis, Ohio should explain its approach regarding evaluating a lower limit as a potential control mechanism and why a new limit would or would not be necessary for reasonable progress." **(Pamela Blakely, U.S. EPA Region 5)**

Response 31: Avon Lake Unit B012 is currently equipped with Low-NOx cell burners and overfire air. The four-factor analysis did not evaluate the current efficiency or evaluate how the efficiency could be improved of these existing NOx controls, but instead focused on potential additional controls. As Avon Lake has announced the permanent shutdown of this unit by September 15, 2021, Ohio does not believe it is reasonable or necessary to require additional revisions to the four-factor analysis at this time.

Ohio did not evaluate a lower limit as a potential control mechanism because, as previously indicated and described further in Response 5, Ohio does not believe enforceable limits commensurate with existing operations are either required or necessary. In addition, it is unclear how a lower enforceable limit set at the level of existing emissions serves as an emissions control or how to calculate the cost-effectiveness – the emissions reduced are zero, so the cost-effectiveness calculation has no meaning, as you cannot divide by zero.

Comment 32: "On page 57 of the draft, Ohio EPA notes, "Regarding MANE-VU's fourth request for sources that have switched to lower emitting fuels, in most cases the fuel switch is already incorporated into federally-enforceable

permits." Please indicate if the fuel switch at Avon Lake is enforceable and if it is a part of Ohio's Long-Term Strategy." **(Pamela Blakely, U.S. EPA Region 5)**

Response 32: Avon Lake accepted a federally enforceable SO_2 emissions limit from all SO_2-emitting sources at the facility (i.e., emissions units B010, B012, B013, B015, and B016, combined) of 9,600 lbs/hr on a 1-hour average basis, effective January 13, 2017. In addition, SO_2 emissions from emissions units B010 and B012, combined, shall not exceed 1.59 lb/MMBtu as a rolling, 30-day average (Title V permit no. P0085253, effective April 18, 2017). In addition, the fuel was changed in 2016 to a Western Bituminous and Powder River Basin coal blend which resulted in reduced SO_2 emissions. The fuel switch to Powder River Basin coal blend is not an enforceable requirement, but is a strategy that helps Avon Lake comply with the 2017 emission limits which are incorporated into federally-enforceable permits.

As noted in the SIP, Ohio is not relying on the existing measures at sources selected for four-factor analysis, but where new additional measures were found not to be necessary, to make reasonable progress. This statement includes Avon Lake, which is not part of Ohio's Long-Term Strategy.

Comment 33: "The Avon Lake Power Plant is fired by coal and located near Avon Lake, Ohio. The Kordzi Report explains that while OEPA required the company to conduct a four-factor analysis, one of the key studies referenced and relied on by the analysis "is missing all of its appendices." The lack of access to this critical information thwarted the public's ability to review and comment on the four-factor analysis. OEPA should renotice the proposed SIP and provide an opportunity for the public to comment on the missing information that appears to be foundational to the state's proposal. The State proposes to rely on an SO2 Title V emissions limit for all for units of 9,600 lbs/hr on a 1-hour average basis (all four units combined), and for units B010 and B01238, combined, a Title V emission limit of 1.59 lb/MMBtu on a rolling 30-day average, which effectively only applies to Unit B012 because the other unit is retired. Notably, the proposed SIP's summary of emission limits that would be subject to the proposed emission limit includes a coal-burning unit that is retired, Unit 10.

"Avon Lake's four-factor SO2 analysis also inflated the retrofit factor, using an aerial photograph showing only a portion of its property to suggest it lacked adequate space onsite. The Kordzi Report contains an aerial photograph of the entire property, which shows "a great deal more room for staging and assembly of equipment" and explains that the company has not adequately documented the inflated costs. Avon Lake also included costs that are disallowed, and OEPA must remove these cost items.[42] Additionally, OEPA must not allow use of the higher interest rate

and 20-year useful life information, as they, along with other cost adjustments are inconsistent with EPA's Control Cost Manual and as explained in the Kordzi Report are not supportable.

"Avon Lake's NOX analysis made numerous suggestions, and before accepting the assertions as "true", OEPA should obtain and make available for public review any documentation of the company's assertions. Example of these assertions include: SNCR system parts are not salvageable; low furnace temperatures prohibit effective operation of a SNCR; emission control assumption of only 20%; limiting generating capacity without associated practically enforceable commitments; and others. Furthermore, GenOn recently announced Avon Lake's retirement for September 2021 along with some others units. The retirements at Avon Lake include Unit 9 that "came online in 1970 and a "small, oil-fired unit that came online in 1973." As discussed in Kordzi Report, OEPA must not consider the visibility impacts as germane to whether Avon Lake should be controlled as the company's assertions are erroneous and inconsistent with the Act's requirements. OEPA should either incorporate the planned retirement as an enforceable commitment, or revise its four-factor analyses as discussed in these comments and the Kordzi Report.

[42] As explained in the Kordzi report, "the Control Cost Manual states 'owner's costs and AFUDC costs are capital cost items that are not included in the EPA Control Cost Manual methodology, and thus are not included in the total capital investment (TCI) estimates in this section.'" Kordzi Report at 29, citing Control Cost Manual, Section 4, Chapter 2, Selective Catalytic Reduction, June 2019, pdf page 65. Also see, Section 5, SO2 and Acid Gas Controls, Chapter 1 Wet and Dry Scrubbers for Acid Gas Control, April 2021, page 1-49. Oklahoma v. EPA, 723 F.3d 1201, 1219 (July 19, 2013)."

(select footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"In several places Avon Lake mentions a 2009 URS study from which it quotes wet scrubber and SCR costs. It appears part of this study is in Appendix D. However, that study is missing all of its appendices, which include important details to the cost analyses, including the costs. Ohio should request this information, as it is important to the determination of reasonable progress for Avon Lake. It is assumed that if it is claimed as confidential, Ohio has procedures in place to properly review and house that material while providing the public with the information necessary to allow for meaningful review and comment." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 4 of its report, Avon Lake states that the existing DSI system, which uses the existing ESP, is designed to satisfy its HCl obligation under MATS and is therefore not designed to reduce SO2. Avon Lake concludes that high sorbent injection rates required for any appreciable SO2 control would exceed the capability of the existing ESP and therefore, implementing upgrades to the existing DSI system is not a

practical control option. Avon Lake then states that a SDA or wet scrubber is required for achieving SO2 reduction and does not further consider DSI. There does not appear to be any technical reason why a separate DSI system, designed for SO2 removal, cannot be retrofitted to Avon Lake Unit 9. Such a system will likely require a baghouse. However, there are many EGUs that operate with ESPs and a baghouse, or a baghouse and an abandoned ESP. Such a system should be able to address Avon Lake's HCl MATS obligation and also substantially reduce SO2. Therefore, Ohio should require that Avon Lake investigate this option for SO2 control." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 4 of its report, Avon Lake states that it escalated a December 2009, URS Washington Group cost analysis, which estimated the total capital cost of a wet FGD system at $389 million, which if escalated to 2019 would result in a capital cost of $453 million." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 5 of its report, Avon Lake states that the site presents space constraints due to the DSI and ACI systems, which results in limited space available for installation of an SO2 scrubbing system including a new wet stack. It presents a picture that is intended to depict that situation:
Figure 18. Avon Lake's Aerial Photograph of its Facility

" **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Avon Lake also states there is inadequate space available for staging and assembly of equipment and that the fabrication and assembly would have to be done offsite and transported to the plant, which is a significant cost

adder. As such, Avon Lake has states that a retrofit factor of 1.2 is appropriate in its SCR and scrubber cost estimates.

"However, the picture presented by Avon Lake does appear to depict all of the property under its control. The following is an aerial photograph of the site that indicates additional property to the South and East-Northeast:

Figure 19. Google Earth Aerial Photograph of the Avon Lake Facility

"As can be seen from the above picture, it appears there is a great deal more room for staging and assembly of equipment, including additional space in a parking lot that is not being used. In fact, some of this additional area was identified by URS for use in its 2009 SCR and scrubber cost analyses. Furthermore, it is not unusual for similar facilities, including those in Ohio, to construct very large pieces of control equipment offsite, including absorbers, and transport them to the site. Although this is not a BART determination, Ohio has referenced other aspects of the BART Rule, and it is believed that BART Guidance is generally instructive: in this case, the BART Guidelines require that "documentation" be provided for "any unusual circumstances that exist for the source that would lead to cost-effectiveness estimates that would exceed that for recent retrofits." Thus, it does not appear that Avon Lake has adequately documented its need for a retrofit factor of 1.2. A retrofit factor is a direct multiplier to the capital costs. Therefore, a retrofit factor other than 1.0, which covers average difficulty retrofits, should be very well

documented." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 6 of its report, Avon Lake states that it incorporated Allowance for Funds Used During Construction (AFUDC) because the Control Cost Manual, Chapter 2, Page 11 notes that AFUDC is considered a cost item within the electric power industry. Avon Lake also includes owner's costs in its emission control cost estimates in Appendix B. Avon Lake misunderstands the Control Cost Manual's position on AFUDC. It is correct that the Control Cost Manual notes that AFUDC is used in the electric power industry. However, it is not used in the Control Cost Manual's "overnight" cost calculation methodology. In fact, the Control Cost Manual states "owner's costs and AFUDC costs are capital cost items that are not included in the EPA Control Cost Manual methodology, and thus are not included in the total capital investment (TCI) estimates in this section." Therefore, Ohio should require that these cost items be removed from all control cost analyses." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 6 of its report, Avon Lake states that it based its capital recovery costs on a 7% interest rate and 20-year equipment life. Avon Lake states that the Control Cost Manual states that "[t]he Control Cost Manual notes that the bank prime rate can be used as an indicator of interest rate when a firm-specific interest rate is not available. However, EPA cautions that the bank prime rates do not adequately account for project-specific risks including the length of the project and the credit risks of the borrowers." Avon Lake also states that the Office of Management and Budget (OMB) uses an interest rate of 7%, citing OMB Circular A-4:

> As a default position, OMB Circular A-94 states that a real discount rate of 7 percent should be used as a base-case for regulatory analysis. The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy. It is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. It approximates the opportunity cost of capital, and it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector.

"Avon Lake misunderstands the Control Cost Manual's position on the OMB Circular to which it cites. In fact, the Control Cost Manual states the following:

> As stated earlier, interest rate accounts for the time value of money, inflation, and other premiums, including risks, faced by lenders. The social discount rate is the rate at which society can trade consumption through time (i.e., the time value of money). When

> assessing the societal effect of regulations, such as for EPA rulemakings that are economically significant according to Executive Order 12866, analysts should use the 3% and 7% real discount rates as specified in the U.S. Office of Management and Budget (OMB)'s Circular A-4 [6]. The 3% discount rate represents the social discount rate when consumption is displaced by regulation and the 7% rate represents the social discount rate when capital investment is displaced. Regardless, these are real social discount rates that are riskless. *Therefore, they are not appropriate to use to assess private costs that will be incurred by firms in making their investment decisions. In assessing these private decisions, interest rates that face firms must be used, not social rates* [emphasis added].

"As a consequence, the 7% interest rate that Avon Lake cites to should not be used in any way, directly or indirectly, in a regional haze control cost analysis. Avon Lake further states that as a privately held wholesale power generator and not a public utility or subsidiary thereof, GenOn's [Avon Lake's owner] cost of capital is significantly higher than the bank prime rate and the default 7% rate. Avon Lakes states that the financing rates of two other independent coal plants ranged from 11.5 to 12.5%, citing to "Longview Power, LLC bankruptcy exit financing LIBOR + 10% (7/31/20); Homer City Generation LP; bankruptcy exit financing LIBOR + 11% (12/31/20)." It is difficult to understand how the interest rates associated with the bankruptcy exit financing of two other companies in any way relates to the financing for Avon Lake. Nevertheless, the Control Cost Manual is clear on this issue: For input to analysis of rulemakings, assessments of private cost should be prepared using firm-specific nominal interest rates if possible, or the bank prime rate if firm-specific interest rates cannot be estimated or verified [emphasis added]." As of the end of May, 2021, the Bank Prime Interest Rate is 3.25%. Using a higher interest rate will artificially increase the total annualized costs and worsen (higher $/ton) the cost-effectiveness of all controls." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 7 of its report, Avon Lake states that although it is calculating the cost- effectiveness of controls using a 20-year equipment life, it is also using a 30-year equipment life due to direction from Ohio. Avon Lake notes, "[t]he Control Cost Manual states that the remaining useful life of a new dry or wet SO2 scrubbing system should be assumed to be 20 - 30 years." The full context of the Control Cost Manual's statement is:

"As noted in Section 1.1.2, we expect an equipment life of 20 to 30 years for wet FGD systems. One study of coal-fired U.S. power plants found that 50% of the scrubbers at power plants were over 20 years old, with the oldest still operating after 34 years.[27]. The wastewater treatment system

can reasonably be expected to operate for over 20 years based on the reported performance characteristics of the wastewater system components. However, the remaining life of the controlled combustion unit may also be a determining factor when deciding on the correct equipment life for calculating the total annual costs. Given these considerations, we estimate an equipment life of 30 years as appropriate for wet FGD systems.

"In support of a 20-year life, Avon Lake states "During the first regional haze planning period, a 20-year useful life was used as a default for amortization purposes." This is incorrect. EPA has consistently assumed a thirty-year equipment life for scrubber retrofits, scrubber upgrades, SCRs, and SNCR installations. Much of this is summarized and cited to in EPA's response to comments document for its Texas and Oklahoma Regional Haze SIP final disapproval and FIP.[48]

"Avon Lake also cites to many coal-fired EGU retirements and President Biden's Executive Order on Tackling the Climate Crisis at Home and Abroad in which he states the federal government's intent to implement a carbon-free electric power supply sector by 2035. All of this information is indeed true. Avon Lake is free to enter into an enforceable commitment to retire early. If such a commitment is made a part of the Ohio regional haze SIP, then it would be appropriate to base the equipment life on the date of that retirement. Without such an enforceable instrument, an earlier retirement is speculation and not creditable in a SIP.

"In many cases, facilities have employed equipment lives that are too short. Regarding this, the Control Cost Manual states:

> The life of the control is defined in this Manual as the equipment life. This is the expected design or operational life of the control equipment. This is not an estimate of the economic life, for there are many parameters and plant-specific considerations that can yield widely differing estimates for a particular type of control equipment.

"A number of EGU contractors have been assuming an equipment life of twenty years for SNCR systems, by reference to the Control Cost Manual. The 4/25/2019 SNCR update of the Control Cost Manual does state on page 1-53, "Thus, an equipment lifetime of 20 years is assumed for the SNCR system in this analysis." However, this is a calculation example and does not indicate that EPA universally considers the equipment life for all SNCR systems installed on EGUs to be twenty years. Just prior to this statement, EPA notes:

> As mentioned earlier in this chapter, SNCR control systems began to be installed in Japan the late 1980's. Based on data EPA

> collected from electric utility manufacturers, at least 11 of approximately 190 SNCR systems on utility boilers in the U.S. were installed before January 1993. In responses to another Institute of Coal Research (ICR), petroleum refiners estimated SNCR life at between 15 and 25 years.

"Therefore, based on a 1993 SNCR installation date, these SNCR systems are at least twenty-eight years old, which all other considerations aside, strongly argues for a thirty- year equipment life. Furthermore, an SNCR system is much less complicated than a SCR system, for which EPA clearly indicates the life should be thirty years. In an SNCR system, the only parts exposed to the exhaust stream are lances with replaceable nozzles. The injection lances must be regularly checked and serviced, but this can be done relatively quickly if necessary, is relatively inexpensive, and should be considered a maintenance item. In this regard, the lances are analogous to SCR catalyst, which is not considered when estimating equipment life. All other items, which comprise the vast majority of the SNCR system capital costs, are outside the exhaust stream and should be considered to last the life of the facility or longer.

"Thus, all types of scrubbers, DSI systems, SCR systems, SNCR systems, and NOx combustion controls should have equipment lives of thirty years unless the unit's retirement is secured by an enforceable commitment. Use of a shorter equipment life artificially inflates the cost-effectiveness figures (higher $/ton).

[48] See Response to Comments for the Federal Register Notice for the Texas and Oklahoma Regional Haze State Implementation Plans; Interstate Visibility Transport State Implementation Plan to Address Pollution Affecting Visibility and Regional Haze; and Federal Implementation Plan for Regional Haze, Docket No. EPA-R06-OAR-2014-0754, 12/9/2015, available here: https://www.regulations.gov/document?D=EPA- R06-OAR-2014-0754-0087. See pages 240-245, 268, and 274. See also the Texas BART FIP proposal, which conducted extensive cost determinations for scrubber upgrades, at 82 FR 930 and 938. See also Control Cost Manual, Section 4, Chapter 2, Selective Catalytic Reduction, June 2019, pdf page 80: "For the purposes of this cost example, the equipment lifetime of an SCR system is assumed to be 30 years for power plants."**"** (select footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 7, Avon Lake summarizes its wet and dry scrubber cost-effectiveness calculations. Avon Lake does not provide any discussion or reference to the cost models employed. However, it appears Avon Lake used the Sargent and Lundy (S&L) wet and dry scrubber cost algorithms commissioned by EPA for use in its IPM modeling. The Control Cost Manual discusses the use of these cost algorithms and allows their use, but cautions that they must be modified to remove AFUDC and owner's' costs. These cost- only algorithms also require other adjustments in order to be used to calculate cost- effectiveness, including an elevation

adjustment, an SO2 baseline, and the capital recovery factor. These cost algorithms, along with the described adjustments have been made and utilized by EPA in the past, including its Texas BART FIP. These algorithms, based on 2012 dollars, have since been updated and are utilized by Avon Lake. In some areas, Avon Lake's treatment of these cost algorithms differs from how EPA has used these algorithms in the past and those differences are discussed below.

Avon Lake provides multiple cases for its wet and dry scrubber cost-effectiveness calculations that use different combinations of retrofit factor and equipment life, but only the cases that use a 30-year equipment life and a retrofit factor of 1.0, are reviewed given the inappropriateness of using other calculations." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 8, Avon Lake summarizes its wet scrubber cost-effectiveness calculations. As discussed above, Avon Lake has erroneously added owners' costs and AFUDC to its cost analyses. In its wet scrubber cost-effectiveness calculation (Table B-4), these charges inflate the Capital Engineering and Construction Cost (CECC) subtotal by $13,592,000 (5% of CECC) and $28,542,000 (10% of CECC + owners costs), respectively. In addition, Avon Lake has further inflated the CECC by an Engineering Procurement and Construction (EPC) fee of $45,056,000 (15% of CECC + owners' costs). Apparently, Avon Lake has noted that S&L states in the documentation for its cost algorithms, "[s]hould a turnkey engineering procurement construction (EPC) contract be executed, the total project cost could be 10 to 15% higher than what is currently estimated." This is echoed in the Control Cost Manual. However, the Control Cost manual notes that the default approach is that "[t]he capital costs assume the installation is completed using multiple lump sum contracts." In fact, the cost algorithms already include Engineering and Construction Management Costs, which for Avon Lake totals $20,745,000. Therefore, because construction management costs are already included, and there is no reason why Avon Lake could not choose to construct a scrubber "using multiple lump sum contracts," this additional undocumented very large fee should also be deleted. Together, deletion of these unwarranted fees this lowers the CECC by $87,190,000.

"It appears that Avon Lake has miscalculated the annual Fixed Operating Costs (FOM) in its scrubber cost-effectiveness calculation. Avon Lake does not disclose how it calculated its FOM, but in Appendix B, Table B-4, it lists the FOM as $5,200,000.
According to the S&L algorithms, the FOM is calculated with units of $/kW-yr. Avon Lake calculates this as $8.02/kW-yr. In order to convert this to an annual value, it must be multiplied by the gross load and a conversion factor. The correct equation is:

FOM x (Gross Load) x (1000kw/MW) x (yr/8760 hours)

"The gross load is 748,173 MWh, based on a 2017 – 2019 average. Therefore, the annual FOM is $8.02/kW-yr x 748,173 MWh x (1000kw/MW) x (yr/8760 hours) = $684,971.

"In its fourth case B-4, which uses a 30-year equipment life and a retrofit factor of 1.0, Avon Lake calculates a wet scrubber cost-effectiveness of $16,800/ton. Correcting the issues described above and using an interest rate of 3.25%, results in a wet scrubber cost- effectiveness calculation of $7,651/ton." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 9 Avon Lake summarizes its dry scrubber cost-effectiveness calculations. The same issues concerning interest rate, equipment life, retrofit factor, AFUDC, owners' costs, and FOM apply here. In addition, Avon Lake has assumed an auxiliary power cost of $0.06/kWh, when previously in its wet scrubber, SNCR, and SCR cost-effectiveness calculations it used an auxiliary power cost of $0.025/kWh. Since the 0.06 figure is the default, it is assumed it was overlooked. Avon Lake also assumes a control efficiency of 95%. In this case, this level of control results in a NOx outlet of 0.036 lbs/MMBtu. This is much lower than the typical floor capability of an SDA system, which is typically 0.06 lbs/MMBtu.[58] As a consequence, the level of control was adjusted to 91.55%, which corresponds to an outlet of 0.06 lbs/MMBtu.

"In its fourth case B-8, which uses a 30-year equipment life and a retrofit factor of 1.0, Avon Lake calculates a wet scrubber cost-effectiveness of $14,500/ton. Correcting the issues described above and using an interest rate of 3.25%, results in a wet scrubber cost- effectiveness calculation of $6,962/ton."

[58] Note that this level of control may be approachable by other types of dry scrubbing systems, such as aNovel Integrated Desulfurization System (NIDS)."(select footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"As with its scrubber cost-effectiveness analyses, Avon Lake provides multiple cases for its SNCR and SCR cost-effectiveness calculations that use different combinations of equipment life, and for SCR retrofit factors. Only the cases that uses a 30-year equipment life, and for SCR a retrofit factor of 1.0, are reviewed." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 11 of its report, Avon Lake states

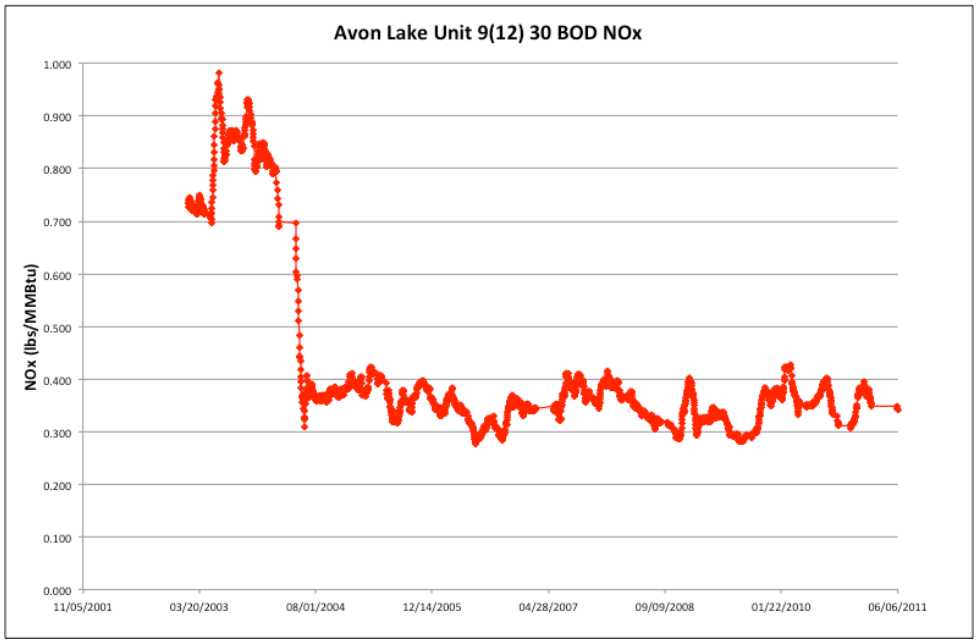
There is minimal, salvageable infrastructure remaining from the temporary, demonstration SNCR system. If an SNCR is considered, it should be a new system with adequate performance guarantees. An OEM will not be willing to give any performance guarantees with used equipment. Therefore, a new SNCR system was evaluated for costing purposes.

"If in fact the previously used equipment can continue to be used, then it would represent a very cost-effective NOx reduction. Therefore, Ohio should require that Avon Lake's statement, that the SNCR system cannot be salvaged, be documented." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 11, Avon Lake states that at loads below 300 MW, the furnace temperatures are too low for SNCR to effectively operate. Because the hourly data show that in 2019, only about 75.36% of the power was generated at loads greater than 300 MW, it uses that percentage in its SNCR cost-effectiveness calculations to reduce the actual MWh output, which significantly worsens the SNCR cost-effectiveness. The Control Cost Manual discusses the temperature sensitivity of typical SNCR systems. Avon Lake should provide documentation of the inlet temperature at various loads so this assertion can be verified." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"The SNCR system that Avon Lake installed on Unit 9 (12) was functioning during the 2006-9 ozone seasons, as the following graph indicates:

Figure 20. Avon Lake Unit 9 (12) Selected 30 BOD NOx Emissions



"As can be seen from the above graph, it appears that use of the SNCR system during the ozone seasons of 2006-9 reduced the 30 BOD NOx rate from approximately 0.4 to 0.3 lbs/MMBtu (or better). This represents a reduction of at least 25%. This level of control should be considered an average for urea-based coal-fired EGUs, with control level ranging up to 60% control, as the Control Cost Manual notes. In fact, considering all coal-fired boilers using both urea and ammonia reagents, a 25% level of control is at the low end of the range. Thus, Avon Lake's assumption of 20% control appears to be unsupported. In its SNCR cost-effectiveness calculation, Avon Lake assumes a NOx inlet of 0.327 lbs/MMBtu which it states is "based on actual operation in 2017 - 2019 at >300 MW." That figure appears to be unsupported by the data contained in Avon Lake's report. If the inlet is considered to be 0.4 lbs/MMBtu, which appears to be a reasonable figure based on the above graph, and Avon Lake's own outlet of 0.262 lbs/MMBtu is used, then the control level becomes 35%." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"The control level effectiveness is very influential in the SNCR cost-effectiveness calculation. For instance, using Avon Lake's own inputs (30-year equipment life, 7% interest rate case, retrofit factor = 1) and changing only the control level from 20% to 25% (inlet = 0.4, outlet = 0.3 lbs/MMBtu), improves the calculated cost-effectiveness from $9,215/ton to $6,375.[64] Further increasing the SNCR control effectiveness to 35%, results in a cost-effectiveness calculation of $4,712/ton. Retaining a 35% control effectiveness and correcting the interest rate from 7% to 3.25%, improves the cost- effectiveness to $3,599/ton. This represents a cost-effective control.

64 Note that despite using the same inputs in EPA's SNCR cost-effectiveness model, Avon Lake's 30 year, 7% interest, 20% control scenario cost-effectiveness of $9,100 could not be matched exactly, as the value obtained was $9,215/ton. It is suspected the difference is due to rounding of certain inputs. Therefore, in comparisons herein, this value was used as a baseline for consistent comparisons. The final SNCR cost-effectiveness calculation is in the file, "Avon Lake Unit 9 SNCR Cost-Effectiveness.xlsm." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Similar to the control level effectiveness, the amount (in MWh) of the EGU the SNCR system operates is also very influential in the SNCR cost-effectiveness calculation, as the more it operates, the more NOx it can remove, which directly determines the cost- effectiveness ($/ton) calculation. Avon Lake assumes a value of 563,823 MWh. Avon Lake calculates this figure by averaging the total 2017 – 2019 MWh, which is 748,173 MWh, and then multiplying that figure by the fraction of time the unit's generation was 300 MW or greater during 2019, which is 0.754. Not only does this approach introduce a mismatch in the time period of the data used, it assumes that the future generation profile should be based

on that calculation. Avon Lake has not presented any justification that its generation profile should be based on this approach, especially the use of only one year of data for the fraction of time the unit's generation was 300 MW or greater. Typically, EGUs have used multiple years to support emission baselines, capacities and similarly influential data, unless secured by an enforceable commitment.

"A more reasonable approach would minimally be to base the fraction of time the unit's generation was 300 MW or greater on a 2017 – 2019 average. Doing so increases the 0.754 fraction to 0.930, which causes the time the SNCR system operates to increase from 563,823 MWh to 695,801 MWh. This approach would represent a consistent three year averaging of the data. Use of this figure in the SNCR calculations, along with a 30- year equipment life, a 3.25% interest rate, a NOx inlet of 0.4 lbs/MMBtu and an outlet of 0.262 lbs/MMBtu, results in a SNCR cost-effectiveness of $3,082/ton.

"An even more reasonable approach would be to base this calculation on five years of data, using an averaging period of 2015 – 2019, which was commonly done by EPA in the first planning period. This results in a 2015 – 2019 average MWh figure of 1,174,329, and a figure of 0.970 for the fraction of time the unit's generation was 300 MW or greater. This revision results in a figure for the time the SNCR system operates of 1,139,099 MWh. Substituting this figure into the SNCR calculation (and retaining the other parameters discussed above), further improves the SNCR cost-effectiveness to $2,224/ton.

"Therefore, even completely ignoring any opportunity to reuse all or portions of Avon Lake's previously operating successful SNCR system, either of these figures represents a cost-effectiveness NOx control." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 12 of its report, Avon Lake discusses its SCR cost-effectiveness calculations. As discussed above, the same concerns regarding the length of time the EGU and SCR operate, the retrofit factor, interest rate and equipment life apply. Avon Lake assumes a control efficiency of 90%, which applied to its inlet NOx rate of 0.317 lbs/MMBtu, results in an outlet rate of 0.032 lbs/MMBtu. This outlet rate may be too low unless backed up by a vendor quote or other direct or applicable experience. As discussed in the Cardinal example, a more reasonable NOx outlet floor is 0.04 lbs/MMBtu. If used with an inlet of 0.4 lbs/MMBtu as discussed above, this would also result in an SCR control efficiency of 90%. Even though the control efficiency in both cases is the same, simply raising the inlet has a significant impact on the cost-effectiveness. If these changes are made to Avon Lake's SCR cost-effectiveness calculations, the value changes from

$20,000/ton to $6,343/ton." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 15 of its report, Avon Lake discusses how it considered visibility in its four- factor analysis, citing to the Regional Haze Guidance. In considering visibility, Avon Lake cites to the preamble to the 1999 RHR (64 FR 35730) stating that it establishes a "no degradation" visibility change if the impact is less than 0.1 deciview. This represents a misunderstanding of the meaning of "no degradation." The cited passage is as follows:

> Two options were presented for the presumptive target for the most impaired days: (1) A rate of improvement equivalent to 1.0 deciview over a 10-year period, and (2) a rate of improvement equivalent to 1.0 deciview over a 15-year period. For the least impaired days, EPA proposed a target of no degradation, defined as less than a 0.1 deciview increase.

"EPA is therefore discussing how it had proposed to determine whether the "no degradation" requirement for the least impaired days would be satisfied. Thus, it is not applicable to a discussion that concerns visibility impairment on the 20% most impaired days. Also, this point does not apply to a source, it concerns the aggregate visibility at a Class I area. Avon Lake also states that, "MANE-VU determined in the first decadal review that a visibility improvement less than 0.1 deciview individual impact does not warrant consideration of additional controls." The cited passage is: "As can be seen in Table 9, the highest individual PM visibility impact (0.0035 dv) is significantly less than the 0.1 deciview individual impact MANE–VU warrants worthy of consideration of BART controls." The MANE-VU 0.1 dv impact was based on CALPUFF "clean background" modeling and is not applicable to the kind of "dirty background" visibility impacts analysis produced by CAMx. EPA explains this and how it developed thresholds for considering whether sources merited controls when using dirty background modeling, like CAMx, in its Texas BART FIP. EPA developed a 0.3% contribution threshold as a cut point for further evaluation. This was based on individual unit contributions at any Class I Area on the 20% worst days. Avon Lake's analysis of visibility impacts against a dirty background is simply not germane to whether it should be controlled." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 33: Avon Lake has provided case-specific justification for the use of a 7% interest rate. Although we believe a remaining useful life of 20 years and a retrofit factor of 1.2 for FGD, SDA and SCR have been justified in this case, the costs were also calculated based on a remaining useful life of 30 years and a retrofit factor of 1.0 to show the sensitivity of costs to these parameters. Ohio has included the visibility benefit analysis as additional

weight of evidence to be weighed along with the other factors in accordance with the Regional Haze Guidance.

Ohio agrees that some additional information may have proven helpful in further evaluating this source. However, due to the impending shutdown we find that it is no longer necessary to obtain additional information or to resolve disagreements noted in the comments regarding the various technical inputs for the cost-effectiveness calculations or types of controls evaluated as part of the four-factor analysis. As Avon Lake has announced the permanent shutdown of this unit by September 15, 2021, Ohio does not believe it is reasonable or necessary to require additional information or revisions to the four-factor analysis at this time.

Ohio also does not believe it is necessary to ensure the shutdown be made an enforceable commitment at this time. As described further in Response 30, the Avon Lake shutdown is expected to become permanent and enforceable through our normal processes far in advance of any approval of an enforceable measure into the SIP.

Carmeuse Lime – Maple Grove

Comment 34: "We have several remaining concerns on the control cost calculation for Carmeuse Lime, which is largely uncontrolled and has substantial emissions. We disagree with the retrofit factor, interest rate, and control life used in the four-factor analysis as well as the decision to not account for tax exemptions in determining control costs. In addition, while we appreciate the inclusion of tail-end SCR to the four factor analysis for NOx reduction, we believe the cost per ton is overestimated because it includes the cost of an SO2 scrubber but does not account for the reduction in SO2 emissions. With these adjustments, the cost effectiveness estimates are even more reasonable than those presented in the analysis. In evaluating the affordability considerations, we recommend you include these improvements to the cost estimates." **(Herbert C. Frost, NPS)**

Response 34: Ohio believes adequate justification has been provided for the retrofit factor, interest rate, and control life used in the four-factor analysis. As described in our previous response to the FLM comments, the exclusion of potential tax exemptions is consistent with our current process using in our permitting program and we do not see valid reason to deviate from this process.

Regarding the tail-end SCR analysis, the cost-effectiveness is being determined for NOx reductions. While additional costs must be incurred which also result in the co-benefit of SO_2 removal, Ohio does not believe it is appropriate to include the amount of SO_2 emissions removed as part of this co-benefit in the calculation for cost-effectiveness of the NOx control.

Comment 35: "In this section, and in Appendix G2, Carmeuse Lime, Inc. makes a demonstration that the cost/sales ratio for SO2 and NOX controls at its Maple Grove Plant is above the 3% threshold typically considered by EPA to cause a significant economic burden according to its November 2006 Final Guidance for EPA Rulewriters: Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act. It should be noted that this guidance is aimed at preventing economic burden to small entities. Large companies are equipped to absorb the capital and operating costs associated with the installation of emissions controls, and they have historically done so. Therefore, Carmeuse Lime, Inc. should make a demonstration that it qualifies as a small entity using the criteria outlined in Section 5.2 of the Guidance, or it should further consider the emissions controls as outlined in its analysis." **(Sharon Davis, Co-Chair of MANE-VU)**

Response 35: While the specific U.S. EPA guidance mentioned is aimed at small businesses, it is only included in Ohio's SIP as a reference for the threshold commonly considered by U.S. EPA as posing a significant economic impact. The application of the affordability analysis in the Regional Haze program during the during the first implementation period, specifically with regards to BART determinations, was not limited to small businesses (see 40 CFR, Appendix Y to Part 51, Section IV.E.3). An example of the application of this concept during the first round is for Alcoa Wenatchee 78 Fed. Reg. 79353 (December 30, 2013). Therefore, Ohio does not believe it is necessary or required for Carmeuse Lime, Inc. to make a demonstration that it qualifies as a small entity in order for the affordability analysis to be considered as part of the weight of evidence.

Comment 36: "At least some of these control options appear cost effective. We recommend including additional explanation of why the state is declining to require these controls. This could include expanding on the energy and solid waste impacts associated that were noted with the SO2 controls. In addition, please note that affordability of controls is a construct from the BART Guidelines. As previously noted, cost of compliance is the relevant consideration. To determine the cost of compliance, the 2019 Regional Haze Guidance notes that states should use methods like the "EPA Air Pollution Control Cost Manual" and "Control Strategy Tool," however, they do not include a discussion of affordability. If the SIP includes information on "affordability" and potential economic impacts on sources, such information should be in addition to, and not in place of, the cost effectiveness, since the cost of compliance factor is required by the statute and rule." **(Pamela Blakely, U.S. EPA Region 5)**

Response 36: Ohio believes sufficient justification was provided for why the state is declining to require SO_2 controls at this facility. Ohio considered the four statutory factors, along with affordability considerations and visibility benefit. Ohio has included discussion of affordability, as well as visibility

benefit, in the SIP as part of a weight of evidence approach to be considered alongside (not instead of) the four statutory factors, including cost of compliance. Nevertheless, we have added additional description regarding the energy and solid waste impacts as suggested to make this discussion more robust and complete.

Comment 37: "Carmeuse Lime, Inc. Maple Grove Operations is located in Bettsville, Ohio and as explained in the Kordzi Report, its NOX analysis makes numerous contentions about maintenance for the rotary kilns and coolers (emission units P003 and P004) not technical feasibility that were not supported in any way. Although Carmeuse is permitted to and uses natural gas to some extent, without documentation and a reasoned analysis to support its assertions regarding availability and cost, it eliminated switching the kilns from coal and coke to natural gas as an emission reducing measure. As discussed in the Kordzi report, fuel mix with inherently lower emissions should be considered. Thus, OEPA should investigate this claim and require documentation of Carmeuse's assertion. Additionally, Carmeuse did not provide an explanation and supporting information for its cost-effectiveness calculation for SCR, thus the public does not have the needed information to review and critique. Furthermore, the company neglected to consider effective control technologies and used a shortened equipment life. The State proposes to rely on the existing Title V permit limits as follows: the maximum sulfur content of 5.50 percent for coal and 6.50 percent for coke, by weight; SO2 emission limits for each unit of 1,102.00 pounds SO2/hour and 4,826.80 tons SO2per rolling, 12-month period; NOx limits for each unit of 1,234.90 pounds NOx/hour and 5,408.90 tons NOx per rolling, 12-month period. OEPA should require that the company redo its analysis correcting the errors and missing information.

"The SO2 analysis for Carmeuse Lime also contains unsupported and incomplete assertions. First, the company suggests that retrofitting the plant will be more difficult, but fails to justify the why. Before accepting a retrofit factor of 1.2, which increases the total capital investment by 20%, OEPA must require that that company substantiate the difficulty, that it is reasoned analysis and made available to the public for review and comment. Second, the control efficiencies provided to OEPA were for another plant and do not appear relevant to this facility. Third, other control efficiency assertions are unsupported. Based on the revised cost effectiveness calculations in the Kordzi Report, several control technologies rejected by OEPA are cost-effective and should be required absent adequate justification, which is currently missing."
(footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"On page 3-6 of its report, Carmeuse states that it eliminated switching Kilns 1 and 2 from coal and coke to natural gas because it would

constitute a process change and would be too fundamental to the operation and design of the source. Carmeuse is permitted to use natural gas in its kilns and in fact does so to some extent. Carmeuse cites to the Regional Haze Guidance to support its position but does not provide a specific page number. The Regional Haze Guidance states the following regarding fuel switching [emphasis added]:

> States have the flexibility to reasonably determine which control measures to evaluate, and the following is a list of example types of control measures that states may consider:
>
> - Emission reductions through improved work practices.
> - Retrofits for sources with no existing controls.
> - Upgrades or replacements for existing, less effective controls.
> - Year-round operation of existing controls.
> - *Fuel mix with inherently lower SO2, NOx , and/or PM emissions. States may also determine that it is unreasonable to consider some fuel-use changes because they would be too fundamental to the operation and design of a source.*
> - Operating restrictions on hours, fuel input, or product output to reduce emissions. Energy efficiency and renewable energy measures that could be applied elsewhere in a state to reduce emissions from EGUs.
> - Basic smoke management practices and smoke management programs for agricultural or wildland prescribed fires.

"EPA's Regional Haze Guidance clearly informs states that they may consider fuel mixes that inherently lower SO2, NOx, or PM emissions. Although Carmeuse states a switch to natural gas would cause a process change that would be too fundamental to the design and operation of the kilns, it does not provide any documentation to support that position. In fact, following this statement, it provides a brief listing of six reasons why or how this change would however have both chemical and economic impacts on the Maple Grove operation. With the exception of its statement that there is insufficient natural gas supply, none of these reasons appear to eliminate a full or partial switch to natural gas from a purely technical infeasibility standpoint. Therefore, it appears the only issue limiting a full or partial switch to natural gas is cost and availability. Ohio should therefore investigate this claim and require documentation from Carmeuse to support its position." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Beginning on page 4-4, Carmeuse discusses why it believes it should use an interest rate of 7%, in lieu of the current Bank Prime rate of 3.25%. For the same reasons discussed in the review of the Avon Lake analyses, Carmeuse misunderstands the Control Cost Manual's position on the OMB Circular to which it cites. The Control Cost Manual is clear on this

issue: For input to analysis of rulemakings, assessments of private cost should be prepared using firm-specific nominal interest rates if possible, or the bank prime rate if firm-specific interest rates cannot be estimated or verified [emphasis added].” As of the end of May, 2021, the Bank Prime Interest Rate is 3.25%. Using a higher interest rate will artificially increase the total annualized costs and worsen (higher $/ton) the cost-effectiveness of all controls. Therefore, unless Carmeuse provides documentation that supports an alternative interest rate, it should use an interest rate of 3.25% in all its cost-effectiveness analyses.” (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations’ comments)**

“Beginning on page 3-10, Carmeuse makes a number of claims supporting its contention that both high-dust and tail-end SCR systems are technically infeasible. These claims include the fouling or plugging of a high dust SCR installation, and catalyst poisoning in a tail-end configuration. Carmeuse also claims that the ammonia utilized as a reducing agent in the SCR can react with the SO3 or H2SO4 present in the exhaust stream to form ammonium sulfate or ammonium bisulfate which can condense within the catalyst pores or produce a high opacity visible plume at the stack exhaust. None of these contentions have been supported in any way.

“All of these issues relate to maintenance and not technical feasibility. SCR system operators have been successfully addressing these and other maintenance issues on a wide variety of source types for decades. The Control Cost Manual contains a great deal of information concerning the costing, design and historically successful operation of SCR systems on cement kilns, a similar type of source. This information addresses all of these claims, specifically from the operational standpoint of cement kilns. Although beyond the scope of this report, Ohio is encouraged to consult this information. As Carmeuse notes, “The type of dust generated from Kilns #1 and #2 is similar to dust generated in PH/PC cement kilns.” Also, many cement kilns use the same types of feed stock and fuels as the Carmeuse kilns. Therefore, there is little to distinguish the installation of an SCR system on a cement kiln from the type of kilns Carmeuse operates. For example, SCR was required by a consent decree at the Lafarge Joppa plant in Illinois. As Lafarge itself noted in its 2014 annual report, SCR “installed at Joppa plant reduced NOx by up to 80%.” The Lafarge Holcim cement plant in Midlothian, TX also installed SCR with a reported efficiency of at least 70%. These and other commonly cited to issues are discussed in detail and rejected as cause infeasibility in a Texas Commission on Environmental Quality Report concerning the application of SCR systems at a number of cement kilns. Ohio should therefore require that either Carmeuse prove these claims, or it should assume both of these SCR configurations are technically feasible.” (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations’ comments)**

"In its SCR cost-effectiveness analysis, Carmeuse indicates on page 5-1 that it is assuming a control efficiency of 70%. Carmeuse's only support for this figure appears to be its citation to a 5-page EPA fact sheet, intended to provide an overview of SCR technology. As even this elementary document indicates, "SCR is capable of NOx reduction efficiencies in the range of 70% to 90%." In evaluating cement kilns in Texas, the previously cited to Texas Commission on Environmental Quality report stated:

> For example, performance levels for selective catalytic reduction (SCR) and LoTOx TM oxidation are conservatively estimated at 80-85%. These technologies typically perform better than these levels in other industrial applications. However, using a slightly lower performance value presents a more conservative evaluation of control costs, allowing potential difficulties in initial application of these technologies to Ellis County cement kilns.

"As a consequence, the Carmeuse SCR system cost-effectiveness should be performed on the basis of at least 85% efficiency." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Carmeuse concedes that it is performing a SCR cost-effectiveness analysis at the request of Ohio. However, it states that due to the risk of catalyst poisoning and opacity from formation of aerosols, its SCR cost includes the installation of a wet scrubber to minimize SO2 emissions upstream of the SCR. Again, Carmeuse has not documented the need for this additional cost adder. No reasoning has been presented that would preclude the installation of a high-dust SCR installation. Thus, considering the long established record of successful high-dust SCR installations discussed above, including the dry kilns discussed in the TCEQ referenced report, that cost should be deleted. Compounding this unwarranted cost adder, Carmeuse further includes the cost of a gas reheater downstream of the wet scrubber in order to raise the gas temperature back up to the level needed to make catalyst operate effectively. In a high-dust configuration, there is usually no need for reheat (since the gas would not be cooled by passing through a wet scrubber) and this cost should also be deleted." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Carmeuse does not provide any explanation of how it conducted its SCR cost- effectiveness calculations. However, it appears it has assumed that the Control Cost Manual's SCR equations for industrial coal-fired boilers are appropriate. Carmeuse has provided no reasoning why SCR costing equations designed for industrial boilers are appropriate for its kilns. Because of this, a revised cost-effectiveness calculation that depends on Carmeuse's figures cannot be made in this report. Thus, Ohio should

require that Carmeuse either demonstrate that its adoption of these equations is appropriate, or revise its SCR calculations using relevant estimating techniques. It should be noted, that in addition to the TCEQ finding that similar claims Carmeuse makes regarding technical infeasibility were meritless its determined that SCR systems at the dry cement kilns it evaluated were very cost-effective at $1,900/ton to $2,000/tom for the two high-dust Holcim dry kilns it evaluated. Considering this, Ohio should require a more appropriate, robust, and well documented SCR cost-effectiveness analysis from Carmeuse." (footnote omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"In its NOx control discussion, Carmeuse does not consider air mixing technology. As discussed in the Magnesita York, PA four-factor analysis, that facility is currently installing an enhanced air mixing technology on its kilns to reduce NOx. These kilns are similar to those used by Carmeuse and are cited to by Carmeuse in its lime kiln dead-burn survey. Magnesita states this technology is currently in use on a similar kiln at its plant in Austria. If this technology is licensable, Ohio should require that it be considered by Carmeuse." (footnote omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 4-8, Carmeuse briefly states that it is using an equipment life of 20 years for its control cost-effectiveness calculations. For the reasons discussed elsewhere in this report, a 30-year equipment life should be used for all control equipment. With regard to its selection of a 20 year equipment life for DSI, Carmeuse cites to Section 6, Chapter 1 of the Control Cost Manual and reasons that the useful life of the DSI and Conditioning Tower Slurry Injection systems should based on the life of the replacement baghouse per CCM. With regard to this, the Control Cost Manual states the following:

> The capital recovery cost is based on the equipment lifetime and the annual interest rate employed. (See Section 1 for a discussion of the capital recovery cost and the variables that determine it.) For fabric filters, the system lifetime varies from 5 to 40 years, with 20 years being typical. However, this does not apply to the bags, which usually have much shorter lives. Therefore, one should base system capital recovery cost estimates on the installed capital cost, less the cost of replacing the bags (i.e., the purchased cost of the bags plus the cost of labor necessary to replace them).

"A typical baghouse is a simple, robust piece of equipment, constructed of structural steel, with few moving parts. As the Control Cost Manual states, the system lifetime of a typical baghouse varies from 5 to 40 years, with the bags themselves being considered maintenance items. Baghouses are widely used as a particulate control in many different industries and thus have long established service records. Furthermore, it is important to

note that this section of the Control Cost Manual was written in 1998 and has not been updated. Since that time, there are many examples of baghouses having been in service in the power industry, where they are exposed to fly ash, for more than 20 years. In addition, baghouse are integral to DSI and dry scrubbers, and yet these controls have equipment lives of 30 years. Therefore, unless Carmeuse can provide additional information that documents why baghouses installed at its facility should be treated differently from those in other industries and cement manufacturers, it should use an equipment life of 30 years." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 4-3, Carmeuse states that it is assuming a 1.2 retrofit factor in its DSI and Conditioning Tower Slurry Injection SO2 cost-effectiveness calculations. Carmeuse has not provided any documentation for this cost adder, simply reasoning on page 4-4:

> For the installation of the DSI and Conditioning Tower Slurry Injection systems, the retrofit factor is 1.2 due to required replacement of the fabric filter on each rotary kiln. Installation of the fabric filters will require replacement of one existing filter unit in combination with process downtime for demolition of the existing units and construction of the new units. Site conditions and the proximity of the two kilns does not allow construction of a new filter while operating the existing units. In addition, relocation of the associated ducts will require construction of additional structural support.

"In fact, almost every control system installation involves replacement of existing structures that involves some demolition of existing structures and construction of new structures. As the Control Cost Manual indicates, a retrofit factor of 1.0 represents a retrofit of average difficulty. Therefore, because Carmeuse's use of this retrofit factor would increase the total capital investment by 20%, Ohio should require more documentation from Carmeuse that the installation of these controls represents retrofits that are more complex that average." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"On page 4-1, Carmeuse presents the control efficiencies it assumed for DSI of 50%, conditioning tower slurry injection of 39%, and wet scrubbing of 50%. Carmeuse states the figures for DSI and the conditioning tower slurry injection were obtained from vendor quotes. Those quotes are provided in Appendix B. The BSCI quote is actually a hydrated lime DSI system for two boilers at a plant in Akron, Ohio. It does not appear any information is provided that would indicate this quote is applicable to the Carmeuse kilns, or that Carmeuse's assumed DSI control efficiency is appropriate. Also, while the quote provided for the conditioning tower

slurry injection is based on a 39% control efficiency, there is no indication this level of control is the maximum available from this system. In fact, the vendor states, "High scrubbing efficiencies can be achieved where required by the process." Therefore in this review, an additional level of control equal to a 50% efficiency is assumed. Compared to other scrubbing systems, even this level of control is low." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Carmeuse states the control efficiency for the wet scrubber was based on "Engineering determination based on inlet loading SO2 concentration." Additional discussion was provided on page 4-2. However, no actual references or calculations were provided to support Carmeuse's reasoning. It seems that Carmeuse's main point is that as NOx inlet decreases, the control effectiveness of a wet scrubber also decreases. Considering that this parameter has a significant impact on the cost-effectiveness calculation, Ohio should either require that a much higher efficiency be assumed, or that Carmeuse provide documentation to support its claims." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"The following is a summarized version of Carmeuse's SO2 cost-effectiveness calculations, which it presents in Appendix A of its report. In addition, revised calculations are also presented in which Carmeuse's interest rate is corrected from 7% to 3.25%, its equipment life is corrected from 20 to 30 years, and the retrofit factor for its DSI and conditioning tower slurry injection is corrected from 1.2 to 1.0.[86]

"Revised calculations are also presented in which the control efficiency for the conditioning tower slurry injection is increased from 39% to 50%, and for which the wet scrubber efficiency is increased from 50% to 75%. These latter cases are presented to illustrate the significant impact control efficiency has on the cost-effectiveness calculation, so that Ohio will place the proper emphasis on obtaining adequate documentation:

Table 3. Summarization of Carmeuse SO2 Cost-effectiveness Calculations

Control	Efficiency (%)	Carmeuse ($/ton)	Revised ($/ton)
DSI Kiln 1	50	5,857	5,310
DSI Kiln 2	50	5,862	5,312
Conditioning Tower Slurry Injection Kiln 1	39	3,266	2,670
Conditioning Tower Slurry Injection Kiln 2	39	3,274	2,676
Conditioning Tower Slurry Injection Kiln 1	50	N/A	2,082

Conditioning Tower Slurry Injection Kiln 2	50	N/A	2,086
Wet scrubber Kiln 1	50	4,056	3,423
Wet scrubber Kiln 2	50	4,043	3,407
Wet scrubber Kiln 1	75	N/A	2,282
Wet scrubber Kiln 2	75	N/A	2,272

"The above figures are based on accepting Carmeuse's cost items, which as discussed above, should be documented. Nevertheless, it is apparent that the revised calculations for cost-effectiveness indicate that minimally, the conditioning tower slurry injection and wet scrubber technologies are cost-effective.

[86] It should be noted that as indicated earlier, the DSI quote Carmeuse adopted was intended for two boilers at another facility. No information has been provided to indicate these quotes are applicable to the Carmeuse kilns. They have been reviewed here due to their simplicity and as a general indicator but these quotes should not be viewed as determinative." (select footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Considering the analyses provided herein, it is apparent that SO2 controls are available for retrofit to the Carmeuse kilns at cost-effectiveness levels that have previously been found to be cost-effective by many states. Information has also been presented that indicates that SCR experience in the cement kiln industry is relevant, which makes it highly likely that SCR is technically feasible for retrofit on the Carmeuse kilns. Furthermore, the SCR cost analysis provided by Carmeuse uses an inappropriate costing methodology. In addition, due to the inclusion of inappropriate cost adders, this analysis is highly inflated. Based on the TCEQ's own analysis and figures (discussed above), it is likely that SCR systems retrofitted on the Carmeuse kilns will be much lower and cost-effective. Consequently, the figures Carmeuse presents in its affordability analysis are likely overstated.

"Ohio is urged to take note that many cement kilns have installed advanced NOx and SO2 controls and continue to be competitive. In addition, as noted in Magnesita's own four- factor analysis, it is in the process of enhanced air mixing technology for the control of NOx emissions and dry sorbent injection (DSI) technology for the control of SO2. Magnesita kilns produce dolomite sinter and are very similar to Carmeuse's kilns." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 37: Ohio believes Carmeuse Lime evaluated a reasonable set of potential control options. The Regional Haze Guidance is clear that all possible control options are not required to be evaluated. Ohio finds that the facility

provided reasonable justification as to why certain technologies would not be feasible.

A key provision in the Regional Haze Guidance (p. 30) is "States may also determine that it is unreasonable to consider some fuel-use changes because they would be too fundamental to the operation and design of a source." Ohio believes the facility has provided sufficient justification that a switch to natural gas would be too fundamental to the operation and design of the source.

Ohio believes adequate justification and documentation has been provided for the cost-effectiveness calculations, including retrofit factor, control efficiencies, interest rate, and equipment life used in the four-factor analysis. In Section 5.1.2 of the four-factor analysis, Carmeuse describes that the SCR cost analysis was based on the approach of EPA's Cost Control Manual, Section 4, Chapter 2 Selective Catalytic Reduction (June 2019). They also include the specific equations used in the calculation spreadsheet contained in the appendix to the report.

In addition, the commenter has misconstrued Ohio's reasoning for including a discussion of existing emission limits in the SIP. Ohio has not claimed, nor inferred, that the existing limits in consent decrees and permit provisions are intended to limit emissions for purposes of the Regional Haze SIP. The details regarding existing emission limits in consent decrees and permits was included in the SIP for informational purposes as part of the overall analysis of the source.

As discussed in more detail in Response 5 regarding enforceable limits, Ohio agrees that enforceable limits are required for those measures determined necessary for reasonable progress. In this case, Ohio is not relying on control measures at Carmeuse Lime – Maple Grove for reasonable progress; therefore, enforceable limits are not required.

<u>Dover Municipal Light</u>

Comment 38: "The above comment applies here: Dover Municipal Light asserts that that cost/sales ratio associated with controls exceeds EPA's 3% threshold. Dover Municipal Light should demonstrate that it qualifies as a small entity or further consider the emissions controls as outlined in its analysis." **(Sharon Davis, Co-Chair of MANE-VU)**

Response 38: While the specific U.S. EPA guidance mentioned is aimed at small businesses, it is only included in Ohio's SIP as a reference for the threshold commonly considered by U.S. EPA as posing a significant economic impact. The application of the affordability analysis in the Regional Haze program during the during the first implementation period, specifically with regards to BART determinations, was not limited to small

businesses (see 40 CFR, Appendix Y to Part 51, Section IV.E.3). An example of the application of this concept during the first round is for Alcoa Wenatchee 78 Fed. Reg. 79353 (December 30, 2013). Therefore, Ohio does not believe it is necessary or required for Dover Municipal Light to make a demonstration that it qualifies as a small entity in order for the affordability analysis to be considered as part of the weight of evidence.

Comment 39: "As noted in the previous comment with regard to cost effectiveness and affordability, the comment is similar here. At least some of these control options appear cost effective. We recommend including a more robust explanation of why the state is declining to require these controls. In addition, please note that affordability of controls is a construct from the BART Guidelines. As previously noted, cost of compliance is the relevant consideration. To determine the cost of compliance, the 2019 Regional Haze Guidance notes that states should use methods like the "EPA Air Pollution Control Cost Manual" and "Control Strategy Tool," however, they do not include a discussion of affordability. If the SIP includes information on "affordability" and potential economic impacts on sources, such information should be in addition to, and not in place of, the cost of compliance since the cost of compliance factor is required by the statute and rule." **(Pamela Blakely, U.S. EPA Region 5)**

Response 39: Ohio believes sufficient justification was provided for why the state is declining to require SO_2 controls at this facility. Ohio considered the four statutory factors, along with affordability considerations and visibility benefit. Ohio has included discussion of affordability, as well as visibility benefit, in the SIP as part of a weight of evidence approach to be considered alongside (not instead of) the four statutory factors, including cost of compliance.

Comment 40: "The Kordzi Report contains a review of the four-factor analysis for the Dover Municipal Light and Power and explains that while Dover used many of the correct input assumptions, its control efficiency assumptions for SO2 were low and it did not consider NOX controls. OEPA should require Dover to explain why it did not consider NOX controls, and lacking a reasoned justification, require the four-factor analysis." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"In its wet scrubber cost-effectiveness calculation, Dover properly use a 30-year equipment life and an interest rate of 3.25%. In addition, it appears that Dover has generally followed the Control Cost Manual, using appropriate costing algorithms and not including disallowed cost items such as AFUDC and owners' costs.

"However, it appears that Dover's assumed control efficiencies are low. Dover has assumed a wet scrubber control efficiency of 94%, which when applied to its SO2 inlet of 2.17 lbs/MMBtu results in an outlet of 0.13

lbs/MMBtu. A more appropriate control efficiency would be 98%, would result in an outlet of 0.04. Similarly, Dover assumed a dry scrubber control efficiency of 93.5%, resulting in an outlet of 0.14 lbs/MMBtu. A more appropriate dry scrubber control efficiency would be 95%, resulting in an outlet of 0.10 lbs/MMBtu. These are relatively minor changes that are not expected to significantly improve the cost-effectiveness." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Dover does not consider any NOx controls in its four-factor analysis. Ohio should explain why Dover is not required to include NOx in its four-factor analysis, and lacking a reasoned justification, require the four-factor analysis." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 40: Ohio did not request a four-factor analysis for NOx from Dover, as it was determined that Dover is not a significant source of NOx (172 tons in 2016).

Ohio believes Dover provided adequate justification for use of a 94% control efficiency, which results in the average SO_2 emission rate for all plants as shown in the Control Cost Manual, Section 5 Chapter 1 for Wet and Dry Scrubbers for Acid Gas Control, Table 1.2. Additionally, the commenter acknowledges that the slight different in this variable is not expected to impact the resulting cost-effectiveness calculation significantly.

Comment 41: "Apparently, Dover's size is too small to be required to report its emissions to EPA. However, despite its small size, it has relatively high SO2 emissions, averaging 979 tpy. This is apparently due to the relatively high sulfur content of the coal it burns. Ohio should disclose how it collects emissions data from Dover." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 41: Dover is required to report emissions annually on a Fee Emissions Report (FERs). This data is compiled in Ohio's Emission Inventory System (EIS) and is available at https://epa.ohio.gov/dapc/aqmp/eiu/eis#126013925-download-eis-data-and-reports.

Gavin Power Plant

Comment 42: "The General James M. Gavin Power Plant (Gavin) is one of the largest air pollution sources in the US and is likely a significant contributor to visibility impairment in Class I areas. The existing Sulfur Dioxide (SO2) scrubbers at this facility are approaching 30 years of age and are achieving about 94% control. It is generally assumed that a modern wet flue gas desulfurization (WFGD) system can achieve at least 98% control. Upgrading to this type of control equipment would remove an additional

19,000 tons of SO2 annually for $3,700–$4,100/ton. Replacing the old scrubbers with new, much more efficient WFGDs represents a very cost-effective solution to these high-emitting units. In addition, replacement of the selective catalytic reduction (SCR) systems could reduce Nitrogen oxides (NOx) emissions by over 4,800 tons per year at about $9,000/ton." **(Herbert C. Frost, NPS)**

Response 42: The Regional Haze Guidance is clear that all possible control options are not required to be evaluated. Gavin Power Plant submitted a four-factor analysis which evaluated optimizing their existing SO_2 controls (FGDs) which are already achieving 95% control efficiency. Gavin also provided documentation to show that NOx is effectively controlled with existing SCRs.

Ohio does not believe it is required or necessary to evaluate replacements for existing, well-performing control equipment. First, the analyses provided by the commenter for the replacement of the existing controls are not accurate as they do not account for the costs of dismantling the controls currently in place. However, we do not agree that it is necessary to go through a four-factor analysis to fully account for all costs as we believe it is highly unlikely that a project with capital cost of greater than $600 million for replacement FGDs and greater than $400 million for replacement SCRs for a few percent additional removal efficiency will be cost-effective. We therefore conclude that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary

Comment 43: "As noted for Avon Lake above, the enforceable SO2 limits are higher than the actual rates from 2016-2019. The four-factor analysis did not appear to address the option of operating at a lower enforceable limit. As part of its evaluation of the four-factor analysis, Ohio should explain its approach regarding evaluating a lower limit as a potential control mechanism and why a new limit would or would not be necessary for reasonable progress. Additionally, it would be helpful to explain why further optimization of the FGD is not technically feasible and why it is not possible to permanently achieve rates at the lower end of recent operation or below (< 0.3 lb/MMBtu)." **(Pamela Blakely, U.S. EPA Region 5)**

Response 43: Gavin evaluated optimization of the existing FGDs in section 5.1.3 of the four-factor analysis. Ohio did not evaluate a lower limit as a potential control mechanism because, as previously indicated and described further in Response 5, Ohio does not believe enforceable limits commensurate with existing operations are either required or necessary.

Comment 44: "Although calculation of the glidepath is relevant to the regional haze rule requirements, it is not appropriate to reject cost-effective controls based on Class I areas being below the glidepath. The rule is clear that the

glidepath cannot be used as a "safe harbor". However, Ohio EPA could note the following as it did for other sources: "Ohio finds it important to recognize that each Class I area is below the glidepath, while acknowledging that this is not a reason, on its own, to not consider additional controls." **(Pamela Blakely, U.S. EPA Region 5)**

Response 44: Ohio has added this statement.

Comment 45: "The General James M. Gavin Power Plant is fired by coal and located in the village of Cheshire, Ohio. OEPA requested a four-factor analysis for SO2 from the company, which is controlled by scrubbers and has a Title V permit requirement not to exceed 7.41 lbs/MMBtu. OEPA also proposes that the units are effectively controlled by emission limits in a Title V permit for NOX with SCRs and low NOX controls that achieve 91% effectiveness. As the Kordzi Report explains, the State relies on Gavin's report that is fraught with errors as the issues Gavin asserts for further controlling NOX all involve operation and maintenance, can easily be monetized and rolled into a cost-effectiveness calculation as part of the four-factor analysis. OEPA should require that a complete four-factor SO2 and NOX analyses be performed, independently review the analyses, filling in gaps where necessary, and then establish practically enforceable emission limitations in the SIP that reflect optimization of controls for both pollutants." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"Ohio Should Revise the Gavin SO2 and NOx Limits. As Ohio notes on page 31 of its SIP, the only SO2 limitation Ohio has placed on the Gavin units is that SO2 emissions cannot exceed 7.41 lbs/MMBtu.[31] As with the Cardinal and Bay Shore units, Gavin does not meet the MATS SO2 limit of 0.2 lbs/MMBtu, and so presumably satisfies MATS by alternatively eeting a HCL limit. Therefore, the permit SO2 limits for Gavin Units 1 and 2 do not guarantee Gavin's compliance with an achievable, cost-effective SO2 emission limit necessary to make reasonable progress.

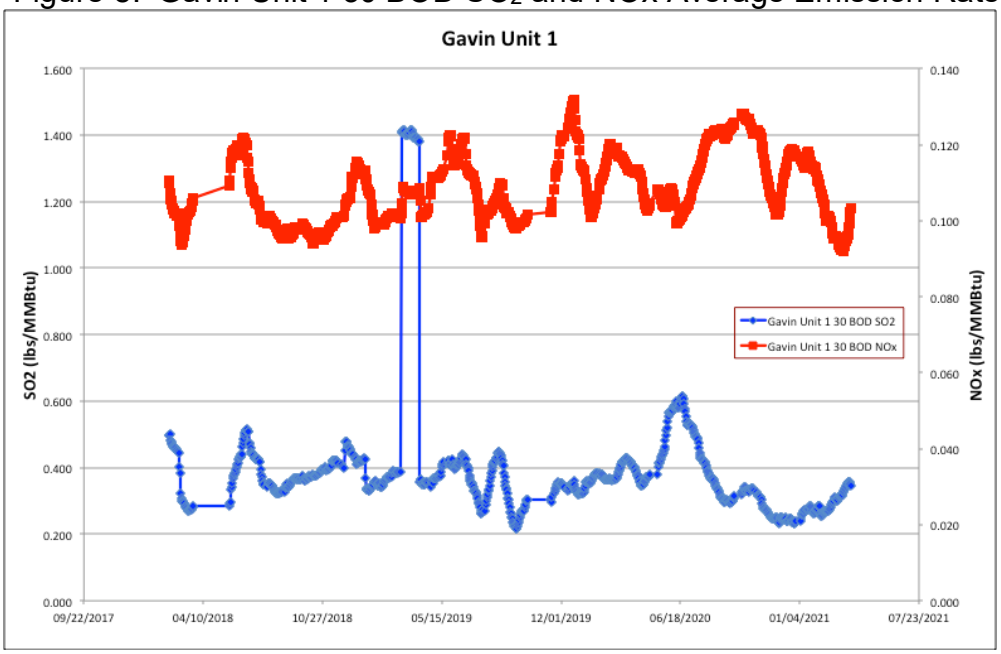
[31] This limit is so high, that if Unit 1 actually met this limit at its 2019 heat rate, it would be by far the mostpolluting EGU in the U.S., emitting more than 269,000 tons of SO_2: 72,700,693.5 MMBtu x 7.41lbs/MMbtu x 1.0 ton/2,000lbs = 269,356 tons."

(Joe Kordzi Report attached to Conservation Organizations' comments)

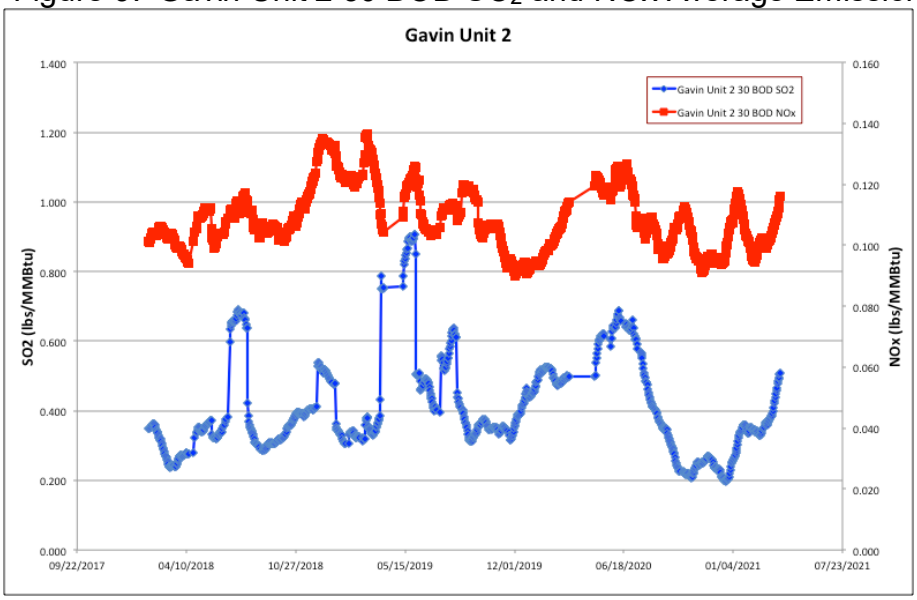
"Ohio Should Require a Four-Factor Analysis for SO2 and NOx. Gavin's 19 page SO2 four-factor report's main point was that it has exhausted all possibilities for further upgrading its scrubbers. On page 6, Gavin states that it upgraded its wet scrubbers in May 2019 to use limestone instead of magnesium-lime as a reagent. Gavin also states that two new trays were installed in each of its six absorbers, new

recycle pumps were installed, recycle pump motors were (as of the March 2021 date of the report) in the process of being upgraded, and an additive is used to add buffering to the recycle slurry. Gavin states these improvements increased the Liquid/Gas (L/G) ratio from 21-32 to 56. Once the recycle pumps are upgraded, it expects the recycle pump rate to further increase, resulting in an even higher L/G ratio.[32] Gavin states that with these improvements, its wet scrubber systems have been operating at just above 95% control efficiency since the improvements were completed in mid-2020. Below is a graph of the Gavin Unit 1 and Unit 2 SO2 and NOx emissions before and after these improvements:

"Figure 8. Gavin Unit 1 30 BOD SO_2 and NOx Average Emission Rates



"Figure 9. Gavin Unit 2 30 BOD SO_2 and NOx Average Emission Rates



"As the above graphs illustrate, the Gavin SO2 removal performance is fairly erratic, ranging from approximately 0.2 – 0.6 lbs/MMBtu for both units. There does not seem to be any indication of a clear performance improvement following the mid-2020 scrubber improvements that Gavin describes. This may in part be due to variability in the coal Gavin burns, which the EIA reports as "refined coal." Below is the sulfur content of the coal Gavin reported to the Energy Information Agency (EIA) for 2020:[33]

Table 1. Gavin Refined Coal Sulfur Content

Month	Sulfur Content (% by weight)
Jan	3.99
Feb	3.84
March	4.17
April	3.96
May	3.98
June	4.06
July	4.11
Aug	4.27
Sept	4.16
Oct	4.27
Nov	3.95
Dec	3.51

"However, on page 5, Gavin states that the uncontrolled SO2 emission rate for this coal typically ranges from 6.2 lb/MMBtu to 6.7 lb/MMBtu. Assuming Gavin's claimed 95% control, this would place the SO2 emission rate at 0.31 – 0.34 lbs/MMBtu. Based on the above graphs of Gavin's 30 BOD SO2 rates, it appears that Gavin frequently misses this level of control. Consequently, Ohio should require a SO2 four-factor analysis for the Gavin Units.

[32] Although this is an improvement in the L/G ratio, it appears there is considerable room for additional improvement. See https://www.powermag.com/scrubbing-optimizing-flue-gas-desulfurization- technologies-is-essential/: "A not uncommon L/G ratio is around 120 gallons per minute (gpm) liquid flowper 1,000 actual cubic feet per minute (acfm) gas flow.

[33] See the file, "OH EIA Fuel Data.xlsx." It appears there is an onsite processing plant that supplies"refined coal" to Gavin." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Like the Cardinal Units, the Gavin SCR systems have historically performed better than they have done recently. Below are the historical rolling 30 Day NOx graphs for Units 1and 2[34]:

Figure 10. Gavin Unit 1 Historical Rolling 30 Day NOx Performance

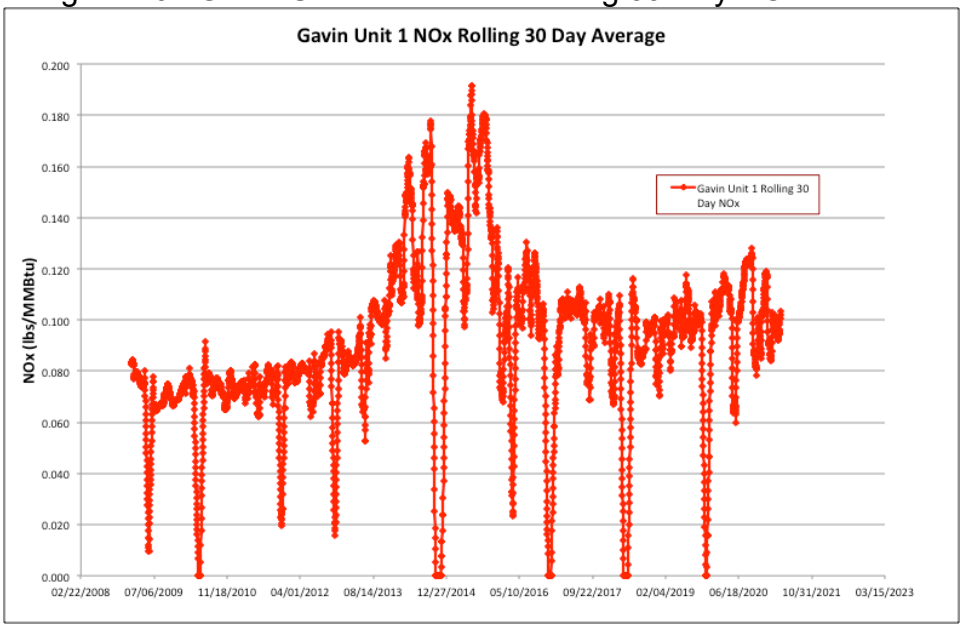
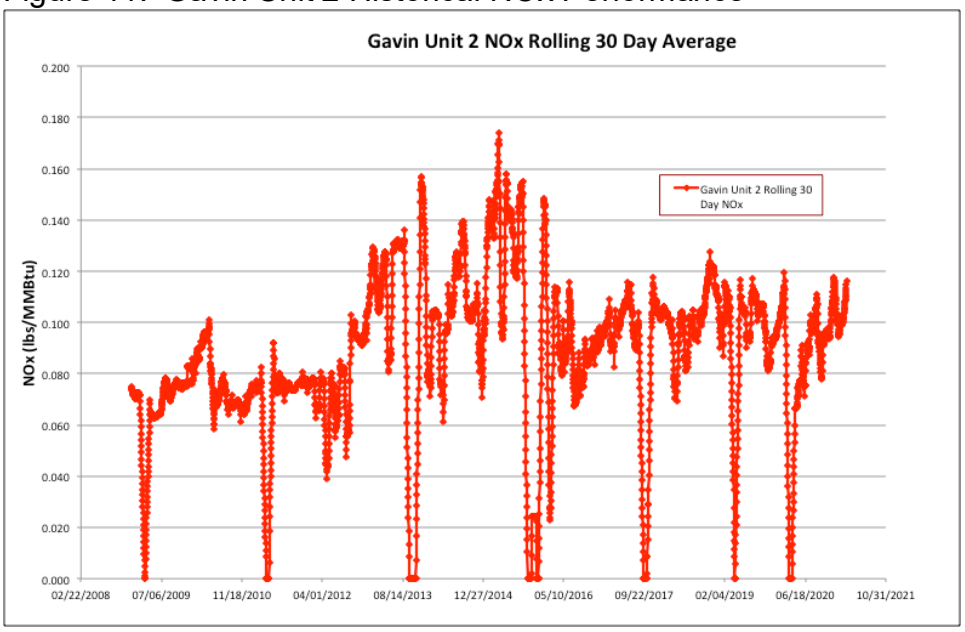


Figure 11. Gavin Unit 2 Historical NOx Performance



"As can be seen from the above graphs, the SCR systems for both the Gavin units performed significantly better during the time period from at least January 1, 2009 to July, 2012 – a period of at least 3-1/2 years. Regarding this, Gavin states on page 4 of Attachment 2 to Appendix L:

> As noted previously, in the 2009 to 2012 time period, the prior owner/operator of the Gavin Power Plant attempted to lower NOx emissions by injecting more ammonia. That effort was ultimately abandoned because of recurring issues with high ammonia slip that decreased mercury control levels and caused air heater pluggage. Indeed,the pluggage issues were so significant that they required repeated majorplant outages to clean the air heater. During the 2009 to 2012 period, these air heater washes were required, at a minimum, twice a year – as well as more limited cleaning occurring every time there was any forced outage, no matter how short.

"Essentially, the constraints Gavin mentions all involve operational and maintenance issues. But these issues are not unusual and have been routinely addressed by SCR system operators for decades. Operational and maintenance issues, along with the cost of additional ammonia, are regularly considered as part of control cost analyses and so can be easily monetized and rolled into a cost-effectiveness calculation. The fact remains that Gavin successfully operated its SCR systems with significantly improved performance for at least 3-1/2 years.

"In an apparent attempt to tie these operational and maintenance issues to technical feasibility, Gavin states that the issues "were so significant that they required repeated major plant outages." However, it appears from the

interruptions shown in the emissions data (when the data goes to zero) that the outages during the 2009-2012 timeframe occurred at approximately the same frequency as the time period following 2012, when Gavin states the practice of injecting additional ammonia ceased. Therefore, it does not appear that operating Gavin's SCR systems at a higher performance level resulted in a technical infeasibility issue, but rather a cost issue, which again is easily considered in a cost-effectiveness calculation.

[34] Note that 30 BOD averages are not used here, because by definition they discard days when the boiler isnot running, and so the outages are better shown with straight 30 day rolling averages." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

"Gavin also cites to concerns that higher levels of ammonia will reduce mercury oxidation, returning it to its elemental state, and thus adversely affect the ability of the wet FGD system to capture and control the mercury, potentially jeopardizing MATS compliance. If this indeed a real concern, then Gavin should demonstrate it as such. Optionally, Gavin can investigate methods of improving the ammonia injection, mixing and distribution system to minimize ammonia slip while maximizing SCR performance. In any case, it does not appear that Gavin has any active mercury controls, electing to depend on its scrubber and SCR system to remove mercury. Many coal-fired EGUs employ Activated Carbon Injection (ACI) to control mercury, and if necessary, so can Gavin. Any additional costs to install such a system as part of SCR optimization, if demonstrated to be necessary, can be rolled into a cost-effectiveness analysis.

"Lastly, it appears that the Gavin SCR systems may not be running consistently, as there are many periods of much better SCR performance than others. As Ohio notes on page 31 of its SIP, Gavin's "Title V permit defines "continuously operated" as

> [W]hen an SCR, FGD, DSI, ESP or other NOx pollution controls are used at an emissions unit, except during a malfunction, they shall be operated at all times such emissions unit is in operation, consistent with the technological limitations, manufacturers' specifications, and good engineering and maintenance practices for such equipment and the emissions unit so as to minimize emissions to the greatest extent practicable.

"This language was carried over from Gavin's consent decree. Considering this, Ohio may wish to examine if these SCR systems have indeed been run according to this requirement. In any case, Ohio should require a NOx four-factor analysis for the Gavin units." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 45: Ohio does not believe enforceable limits commensurate with existing operations are either required or necessary. As discussed in more detail in Response 5 regarding enforceable limits, Ohio agrees that enforceable limits are required for those measures determined necessary for reasonable progress. In this case, Ohio is not relying on control measures at Gavin Power Plant for reasonable progress; therefore, enforceable limits are not required.

Ohio did require a four-factor analysis for SO_2 at Gavin. In this analysis, Gavin concluded that no additional technically feasible SO_2 emissions controls beyond the existing FGD systems, which had been recently upgraded in May 2019. While an improvement in SO_2 removal following the May 2019 upgrades may not be evident from the emission rates themselves, those upgrades were likely important in maintaining the current effectiveness of the controls.

Ohio EPA continues to conclude that the Gavin units are effectively controlled for NOx. We consider the standard here to be *effectively* controlled, not *perfectly* controlled. Ohio recognizes there may be some variability in the emission rate over time. Even if there should be some small amount of additional emissions reductions that could be achieved with further optimization or control upgrades, we conclude that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

Step 5: Decisions on what control measures are necessary to make reasonable progress

Comment 46: "As previously noted, the relevant factor is the cost-effectiveness of controls. Affordability is a concept from the BART Guidelines in the first planning period. EPA is still considering whether and how to consider affordability of controls in the second planning period. Any information the state provides on affordability should be submitted in addition, not in place of, an assessment of the cost-effectiveness of controls." **(Pamela Blakely, U.S. EPA Region 5)**

"As previously noted, some of these controls appear to be cost effective. Affordability of controls is a construct from the first planning period BART Guidelines. EPA is still assessing how and to what extent affordability will be considered for the second planning period. Any information on affordability of controls should be in addition to, not in place of, an assessment of the cost-effectiveness of controls." **(Pamela Blakely, U.S. EPA Region 5)**

Response 46: Ohio has included discussion of affordability in the SIP as part of a weight of evidence approach to be considered alongside (not instead of) the four statutory factors, including cost of compliance.

Comment 47: "Table 18 "Summary of cost-effectiveness and estimated visibility benefit" shows what appear to be some fairly cost effective options. For Carmeuse Lime, the cost effectiveness is $3266/ton SO2 for Conditioning Tower Slurry Injection with a predicted maximum estimated visibility benefit at a Class I area of 0.192 Mm-1. For Dover Municipal Light, the cost effectiveness is $2985/ton SO2 for DSI with a predicted maximum estimated visibility benefit at a Class I area of 0.041 Mm-1. Ohio should further explain its rationale for whether the measures at Carmeuse and Dover are cost effective and should be considered necessary for reasonable progress. Although both sources raise the issue of affordability, any information on affordability should be in addition to, not in place of, an assessment of the cost-effectiveness of controls.

"Additionally, even relatively small visibility benefits from individual sources can be important. As noted in the Regional Haze Rule preamble: "Regional haze is visibility impairment that is caused by the emission of air pollutants from numerous sources located over a wide geographic area. At any given Class I area, hundreds or even thousands of individual sources may contribute to regional haze. Thus, it would not be appropriate for a state to reject a control measure (or measures) because its effect on the RPG is subjectively assessed as not 'meaningful.' " 82 Fed. Reg. 3093 (January 19, 2017)." **(Pamela Blakely, U.S. EPA Region 5)**

Response 47: Ohio believes sufficient justification was provided for why the measures evaluated for Carmeuse and Dover are not necessary for reasonable progress. Ohio considered the four statutory factors, along with affordability considerations and visibility benefit. Ohio has included discussion of affordability, as well as visibility benefit, in the SIP as part of a weight of evidence approach to be considered alongside (not instead of) the four statutory factors, including cost of compliance. Ohio understands that even relatively small visibility benefits from individual sources can be important, and to that end our analysis accounted for the cumulative effects of across all Class I areas, consistent with the Regional Haze Guidance.

Balancing the four statutory factors (most notably cost-effectiveness and energy and non-air quality environmental impacts) along with affordability and visibility benefits, Ohio does not find any of the potential controls evaluated to be necessary for reasonable progress.

Comment 48: "It is Inconsistent with Clean Air Act's Requirements to Use Visibility as a Fifth Factor to Decide Reasonable Progress Controls

"OEPA's SIP relies on visibility impacts to reject emission controls, which is at odds with the plain language of the CAA. Because visibility is not one of the four statutory factors, the State cannot rely on visibility impacts to

exclude emission reducing measures from a source that otherwise satisfies the four statutory factors.

"The Act distinctly identifies that the RP analysis is done based on four-factors:
1. The costs of compliance
2. The time necessary for compliance
3. The energy and non-air quality environmental impacts of compliance
4. The remaining useful life of any potentially affected sources.

"The plain language of the Act clearly bounds the information for each of the factors. Therefore, where OEPA's RP analysis considers information outside the bounds of these factors (e.g., air quality impacts, modeling results, and emission inventories) it is inconsistent with the Act's four factor analysis. OEPA suggests that while it did not consider visibility in the RP analysis, it did include visibility as additional weight-of-evidence in its decision-making. This approach is inconsistent with the Act and OEPA must remove consideration of visibility in selecting emission controls from its SIP analyses." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

Response 48: Ohio has included discussion of visibility benefit in the SIP as part of a weight of evidence approach to be considered alongside (not instead of) the four statutory factors, including cost of compliance. The Regional Haze Guidance is very clear that visibility benefit may be considered, stating (pp. 36-37):

> "Importantly, this section assumes that the state will consider visibility benefits as part of the analysis. Section 51.308(f)(2)(i) of the Regional Haze Rule requires consideration of the four factors listed in CAA section 169A(g)(1) and does not mention visibility benefits. However, neither the CAA nor the Rule suggest that only the listed factors may be considered. Because the goal of the regional haze program is to improve visibility, it is reasonable for a state to consider whether and by how much an emission control measure would help achieve that goal. Likewise, it is reasonable that such information on visibility benefits be considered in light of other factors that may weigh for or against the control at issue. Such a balancing of outcomes is consistent with CAA section 169A(b)(2), which states that SIPs must contain elements as may be necessary to make reasonable progress towards meeting the national visibility goal. Thus, **EPA interprets the CAA and the Regional Haze Rule to allow a state reasonable discretion to consider the anticipated visibility benefits of an emission control measure along with the other factors when determining whether a measure is necessary to make reasonable progress**." (footnote omitted, emphasis added)

Ohio understands that NPCA has submitted a Request for Reconsideration of this guidance. However, unless and until it is revised or retracted by U.S. EPA, Ohio will follow the applicable guidance.

Comment 49: "Ohio EPA Should Disclose Emission Inventory Projections and Identify Measures Needed to Prevent Future Impairment of Visibility

The Regional Haze program requires states to adopt measures to prevent future visibility impairment as well as to address existing visibility impairment. OEPA's draft regional haze SIP revision lacks an analysis of 2028 emission inventory projections and future source development, thus the public has no information to assess whether emissions from specific source categories are projected to increase between 2011 and 2028 as seen in other states (e.g., anticipated new development in the State, ammonia emissions from nonroad sources, visibility impairing pollutants from oil and gas and others). OEPA should analyze future emission inventory projections, explain what these emissions sources are within the state and discuss the programs it has in place to address any potential future increases in emissions. Importantly, OEPA should evaluate the measures that may be needed to prevent any currently projected future increases in visibility-impairing emissions from these source categories. Moreover, as OEPA develops permit modifications for existing sources and permits for new sources, it must take regional haze implications into consideration – these requirements should be discussed and committed to in the State's SIP. Finally, OEPA should commit to revisit this issue as necessary in a supplemental proposed revision to its regional haze plan." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

Response 49: Ohio is not required to include projected future emissions in the SIP. U.S. EPA's Regional Haze Guidance (pp. 55-56) states

> "Regarding section 51.308(f)(6)(v) of the Regional Haze Rule on emission inventories, we first note that the requirement in the rule is to provide for the preparation of emission inventories. **The emission inventories themselves are not required SIP elements and so are not required to be submitted according to the procedures for SIP revisions. The emission inventories themselves are not subject to EPA review.** We also note that the 2017 revisions to the Regional Haze Rule clarified that SIPs for the second and later implementation period do not need to provide for a statewide inventory for a baseline year, because SIPs for the first implementation period provided for that one-time inventory. A state may note in its regional haze SIP that its compliance with the Air Emissions Reporting Requirements in 40 CFR Part 51 Subpart A satisfies the requirement to provide for an emissions inventory for the most recent year for which data are available. **To satisfy the**

> **requirement to provide estimates of future projected emissions, a state may explain in its SIP how projected emissions are developed for use in establishing RPGs for its own and nearby Class I areas. Typically, these projections are developed through a regional planning process**, in some cases using projections provided by EPA as a starting point or point of comparison. States will also find relevant explanations and advice in a separate EPA guidance document on the preparation of SIP emission inventories." (emphasis added)

Projected emissions were built into the LADCO modeling and are therefore accounted for in the glidepath projections. There is no requirement to evaluate trends and projected emissions increase by source sector. Nevertheless, a discussion of projected emissions is available in the LADCO TSD (Appendix A) section 4.2.2.

Comment 50: "Ohio should reconsider its conclusions that some units are "effectively controlled." In section III.3.h, Ohio takes the position that a number of EGUs that are already equipped with scrubbers and SCRs are "effectively controlled" for SO2 and NOx and points to the Regional Haze Guidance to support its position. Ohio concludes that it need not further consider controlling these sources. The following points address this issue:

- Because the Regional Haze Guidance is merely guidance, it does not take precedence over the Regional Haze Rule. In fact, the Regional Haze Rule does not provide any discussion at all concerning the topic of "effective controls." The Regional Haze Rule has long recognized that scrubber upgrades are generally cost-effective and should be examined by states to ensure reasonable progress.[14] To the extent Ohio interprets EPA's guidance as suggesting otherwise, that interpretation has no basis in either the CAA or the Regional Haze Rule.
- In fact, EPA's record for its Oklahoma FIP, indicates that underperforming scrubbers should be evaluated at 98% control (with a floor of 0.04 lbs/MMBtu) for Wet Flue Gas Desulfurization (WFGD) scrubbers, and 95% control (with a floor of 0.06 lbs/MMBtu) for Spray Dryer Absorbers (SDA). Also, The IPM wet FGD Documentation states: "The least-squares curve fit of the data was defined as a "typical" wet FGD retrofit for removal of 98% of the inlet sulfur. It should be noted that the lowest available SO2 emission guarantees, from the original equipment manufacturers of wet FGD systems, are 0.04 lb/MMBtu." This contrasts with the 90% control threshold, discussed below, that Ohio has adopted. Ohio should therefore review EPA's Texas scrubber upgrade information and incorporate it into its SIP.
- The problems with Ohio's interpretation of the Regional Haze Guidance's advice notwithstanding, Ohio has ignored a key qualifier of that advice. The Regional Haze Guidance states regarding its "effectively controlled" advice that

> [A] state that does not select a source or sources for the following or any similar reasons should explain why the decision is consistent with the requirement to make reasonable progress, i.e., why it is reasonable to assume for the purposes of efficiency and prioritization that a full four factor analysis would likely result in the conclusion that no further controls are necessary.

Ohio has arbitrarily failed to consider technically and economically feasible upgrades to scrubbers and SCR systems.

- Although EPA's guidance states, regarding scrubbers installed as a result of regional haze first round requirements, that "we expect that any FGD system installed to meet CAA requirements since 2007 would have an effectiveness of 95 percent or higher," that does not relieve the state of evaluating achievable, cost effective emission reductions. Here, a number of examples of non-regional haze requirements (e.g., NSPS, BACT, LAER, and MATS), which could serve as surrogate four-factor analyses, support imposing more stringent control and/or emission limits for SO2 than EPA assumed for first round regional haze controls. For instance many of the EGUs that meet MATS do so by monitoring for HCl and so only control SO2 indirectly. Even those that do satisfy MATS by controlling SO2 are (assuming coal) usually limited to 30 day average SO2 rates of 0.2 lbs/MMBtu, which is often much less stringent than would have been required under a source-by-source BART analysis. In fact, Ohio recognizes this and states:

  > [I]t believes the metric of 90% control efficiency noted in the main text of the example [the Regional Haze Guidance example list] is controlling and most appropriate. Ohio believes that conducting a four-factor analysis on a source with an FGD system with 90% control efficiency or greater would likely result in the conclusion that no further controls are necessary.

  Ohio's approach erroneously assumes that EPA's guidance is "controlling." It is not. Moreover, the state's approach arbitrarily ignores achievable emission reductions. Given EPA's has previously findings that scrubber upgrades can achieve 98% control for WFGD and 95% for SDA, the state must evaluate the cost-effectiveness of those emission limits under the four statutory factors. Many significant wet scrubber upgrades involve relatively low capital expenditures (e.g., liquid to gas improvements such as rings or trays, new spray headers/nozzles, etc.) and often consist of simply running all available absorbers and pumps and utilizing better reagent management or simply using more reagent and/or organic acid additives such as Dibasic Acid (DBA). These types of upgrades will likely result in very cost-effective scrubber upgrades. In fact, it appears that some of these

types of upgrades have recently been performed on the Gavin units, discussed below.

[14] For instance, see the Final Regional Haze Rule update, 82 Fed. Reg. 3088 (January 10, 2017): Here, EPA explains that Texas' analysis was in part rejected because it did not properly consider EGU scrubber upgrades. Also see the BART Final Rule, 70 Fed. Red. 39171 (July 6, 2005): "For those BART-eligible EGUs with preexisting post-combustion SO2 controls achieving removal efficiencies of at least 50 percent, your BART determination should consider cost effective scrubber upgrades designed to improve the system's overall SO2 removal efficiency.""

(select footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 50: U.S. EPA's Regional Haze Guidance provides for the consideration of "effectively controlled" sources. Ohio understands that NPCA has submitted a Request for Reconsideration of this guidance. However, unless and until it is revised or retracted by U.S. EPA, Ohio will follow the applicable guidance.

Further, as explained above for individual sources, Ohio considers the standard here to be *effectively* controlled, not *perfectly* controlled. Ohio recognizes there may be some variability in the emission rate over time. Even if there should be some small amount of additional emissions reductions that could be achieved with further optimization or control upgrades, we conclude that it is reasonable to assume for the purposes of efficiency and prioritization that a full four-factor analysis would result in the conclusion that no further controls are necessary.

Comment 51: "Beginning on page 47, Ohio describes how it has considered the four factors in assessing reasonable progress. For Ohio, the controlling factor in all cases appears to be cost. Regarding this, Ohio states:

> Additional SO2 or NOx controls are clearly not cost-effective for Avon Lake Power Plant. While the cost-effectiveness of SO2 controls at Carmeuse Lime – Maple Grove and Dover Municipal Light are lower in comparison to Avon Lake Power Plant, these sources have both included an analysis showing the added costs of these controls are not affordable. No technically feasible control measures were identified for SO2 control at Gavin Power Plant beyond existing wet FGD systems, or for NOx control at Carmeuse Lime – Maple Grove beyond current operation under good combustion practices.

"However, as has been discussed in this report, with the exception of Dover, all the cost- effectiveness calculations reviewed are demonstrably inflated, due to the use of inappropriate or minimally undocumented parameters, control efficiencies that are too low, or inappropriate cost

adders. Therefore, Ohio's principal determinant is based on incorrect information. Ohio should therefore require that all of these cost-effectiveness issues be properly documented or corrected to inform its final control decisions. It is likely that most of these units have available cost-effective controls that will significantly reduce emissions and otherwise satisfy the four factor reasonable progress analysis." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 51: As described in further detail in responses to previous comments regarding the specific sources evaluated, Ohio believes each four-factor analysis evaluated a reasonable set of potential control options and provided sufficient justification and documentation for the cost-effectiveness calculations, including retrofit factors, control efficiencies, interest rates, and equipment life used in the four-factor analysis.

Comment 52: "On page 39, Ohio states that it has considered the affordability of controls for some of its sources. As Ohio notes, there is no provision within the Regional Haze Rule to consider affordability. However, EPA advised states within the BART Guidelines that the affordability of controls could be considered under BART. In so doing, EPA cautions states that these situations should be considered to be "unusual," and that considerations should include "effects on product prices, the market share, and profitability of the source." In that same section, EPA states:

> Where these effects are judged to have a severe impact on plant operations you may consider them in the selection process, but you may wish to provide an economic analysis that demonstrates, in sufficient detail for public review, the specific economic effects, parameters, and reasoning. (We recognize that this review process must preserve the confidentiality of sensitive business information). Any analysis may also consider whether other competing plants in the same industry have been required to install BART controls if this information is available.

"Thus, EPA places great emphasis on documentation in any consideration of affordability As has been demonstrated in Carmeuse's case, its cost analyses are demonstrably inflated. SO2 and NOx controls are available for retrofit to the Carmeuse kilns at cost-effectiveness levels that have previously been found to be cost-effective by many states.

"At a minimum, Ohio must judge affordability based on a sound and well documented cost- analysis. Lastly, there is no mention of affordability in any subsequent revision to the Regional Haze Rule, the recent Regional Haze Guidance, or the applicable sections of the Clean Air Act. Therefore, Ohio must not elevate affordability considerations above the statutorily required four factors." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 52: Ohio believes the affordability analyses were based on sound and well documented cost analyses. Ohio is not elevating affordability considerations above the statutorily required four factors but believes affordability can and should be to be considered alongside (not instead of) the four statutory factors, including cost of compliance, as part of a weight of evidence approach.

Long-Term Strategy

Comment 53: "For on-the-books controls, Ohio can include in its Long-Term Strategy and take credit for the shutdowns and retirements that have occurred during the 2nd Implementation Period at sources that were included in its source selection process, including Conesville Power Plant, DP & L JM Stuart, DP & L Killen, and WH Sammis Plant. Ohio could make it clear that these shutdowns and retirements provided major reductions and list the tons of pollutants reduced as part of the Long-Term Strategy (and are included in the SIP). Additionally, for on-the-way controls that include the shutdown of the boilers at Miami Fort Power Station and Zimmer Power Station, Ohio can similarly identify the projected reductions as part of the Long-Term Strategy. In considering the results of the four-factor analyses and the five additional factors in weighing the multiple control options and evaluating what measures are necessary for reasonable progress, Ohio can recognize these major reductions in the Long-Term Strategy." **(Pamela Blakely, U.S. EPA Region 5)**

Response 53: The SIP has been revised to include a discussion of the shutdown of these facilities in the context of the permanent shutdown of numerous sources during the second implementation period. These shutdowns were accounted for in the glidepath modeling and one of the reasons that Ohio continues to assert that the fact all Class I areas are below the glidepath is a relevant consideration. However, we do not believe we need to quantify projected reductions for these or any of the other many shutdowns during this period to show that Ohio has made reasonable progress. These shutdowns are on the books, accounted for in the modeling, and part of our Long Term Strategy, which we have clarified by adding them to the list.

Comment 54: "OEPA Wrongly Suggests Existing Emission Trading Programs and EPA Programs Not Yet Proposed Will Continue to Reduce Visibility Impairing Pollutants

"OEPA's proposal to rely on existing emission trading programs and a replacement to EPA's Affordable Clean Energy ("ACE") rule is misplaced. Regarding EGU's covered by CSAPR and the other emission trading programs, as detailed extensively in the Kordzi Report, OEPA should not rely on that program to drive emission reductions for several reasons. First, several of Ohio's EGUs have historically demonstrated they are

capable of better emission control than they are currently displaying. Second, "there does not appear to be any economic incentive from CSAPR that would cause EGUs to either run their existing controls at their full performance potential, or to install new controls." Furthermore, EPA has not yet proposed much less promulgated a replacement to ACE. Therefore, it is premature and impermissible for OEPA to suggest it will rely on a non-existing program." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"Ohio should not rely on CSAPR to drive emissions reductions. Through its proposed SIP amendments, Ohio states that EGUs "are subject to CSAPR [Cross State Air Pollution Rule], which provides significant economic incentive to operate and optimize SO2 and NOx emissions controls. This incentive will become stronger with additional reductions to NOx allocations with the proposed Revised CSAPR Update." First, as demonstrated in several places in this report, some of the EGUs reviewed have historically demonstrated they are capable of better emission control than they are currently achieving. If CSAPR did indeed provide an economic incentive to these EGUs to reduce their emissions, then certainly those EGUs that already have the controls installed (e.g., SCRs and scrubbers) would operate them in an optimal fashion, since doing so only involves additional reagent and potential operational and maintenance issues.

"Second, there does not appear to be any economic incentive from CSAPR that would cause EGUs to either run their existing controls at their full performance potential, or to install new controls. According to EPA, a fundamental tenet of any cap and trade program is that, "the cap and associated allowance market creates a monetary value for allowances, providing sources with a tangible incentive to decrease emissions." This is perhaps the single most important aspect of a successful emissions trading program, because if market forces do not adequately value allowances, there is little to no incentive for sources to install pollution controls or take other measures to reduce emissions.

Unfortunately, that is exactly what has happened to EPA's two premier SO2 cap and trade programs, the Acid Rain Program (ARP) and CSAPR:

2019 Allowance Prices

• The ARP SO2 allowance prices averaged less than $1 per ton in 2019.
• The CSAPR SO2 Group 1 allowance prices started 2019 at $2.31 per ton and remained at that level at the end of the year.
• The CSAPR SO2 Group 2 allowance prices started 2019 at $2.56 per ton and remained at that level at the end of the year.
• The CSAPR NOx annual program allowances started 2019 at $2.88 per ton and ended 2019 at $2.75 per ton.

• The CSAPR NOx ozone season program allowances started 2019 at $180 per ton and ended 2019 at $93.75 per ton.

"As can be seen from the above data, the 2019 average price of SO2 allowances for the ARP was less than $1 per ton, making them almost worthless. Although the ARP was successful for many years, it no longer provides any incentive to reduce SO2.

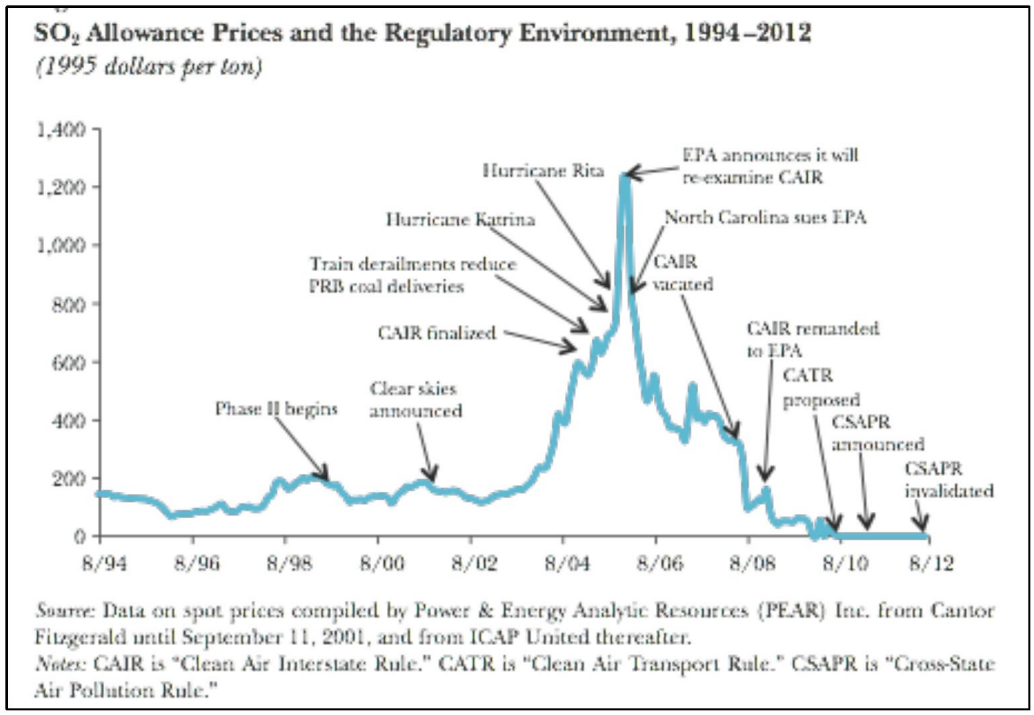
"Similarly, CSAPR SO2 allowances ranged between $2.31 and $2.56 per ton in 2019, providing little to no regulatory pressure to control SO2. EPA concedes this point when it states in relation to the above pricing,

> The 2019 emissions were below emission budgets for the Acid Rain Program (ARP) and for all five Cross State Air Pollution Rule (CSAPR) programs. As a result, the CSAPR allowance prices were well below the marginal cost for reductions projected at the time of the final rule, and are subject, in part, to downward pressure from the available banks of allowances.

In other words, EPA concludes that it was cheaper to buy allowances than to reduce SO2 emissions. In fact, simple calculations can easily indicate that it is much more expensive to install any type of commonly employed NOx or SO2 EGU pollution control it is to purchase the necessary CSAPR allowances.

There are many reasons why the price of allowances can collapse. In the case of the ARP, this is primarily due to external market forces that were unanticipated by the program. As the figure below indicates, much of the collapse of the ARP SO2 allowance market was in fact due to the effect of CAIR, CSAPR, litigation of these programs, and although not shown on the graph, the National Ambient Air Quality Standards ("NAAQS") and Mercury and Air Toxics Standards ("MATS") programs. In other words, trading programs do not operate in a vacuum. There are a number of externalities that can serve as drivers to EGU owners for making economic decisions, including other regulatory programs. Trading programs can, however, remain pertinent if they contain minimum allowance prices—a feature that the ARP and CSAPR lack.

Figure 1. The Collapse of the SO2 Allowances Market in the Acid Rain Program



" (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 54: As the ACE replacement has not yet been proposed, Ohio agrees that it cannot be relied on for reasonable progress and has removed it from our SIP.

The CSAPR/CSAPR Update rules have created significant emissions reductions in the past and continues to provide incentive for emissions reductions to some degree. The Revised CSAPR Update will further reduce allocations for ozone season NOx, which the commenters information shows are significantly higher price than annual NOx and SO_2 allowances.

<u>FLM Consultation</u>

Comment 55: "OEPA Should to Meaningfully Reconsider and Adapt Its SIP to Reflect Comments from the FLMs

"The RHR and the CAA require that states consult with the FLMs that manage the Class I Areas impacted by a state's sources. Because the FLMs' role is to manage their resources – including air quality – OEPA should meaningfully consider and adapt its SIP measures to reflect comments and suggestions from the FLMs.

"OEPA has neither fully considered nor adapted its proposed SIP to reflect information it received during the FLM consultation. OEPA should reconsider the NPS and USFS comments, for example:

- The lack of federally enforceable emission limitations in the SIP;
- Improper reliance on a broad weight-of-evidence approach, including visibility, rather than consideration of the four statutory RP factor to determine RP requirements;
- The need to broaden what OEPA considers as effective emission controls;
- Sources should not be excluded from the RP analysis requirement based on "design" efficiency of emission controls;
- Inflated cost analyses (e.g., inaccurate interest rate, equipment life, control efficiency and retrofit factors) prejudicing emission reduction outcome;
- Analysis based on reduced capacity, where there are no enforceable limitations on capacity, are erroneous;
- Perceptibility is not a requirement for reasonable progress;
- If visibility benefit analyses are undertaken, they should reference a clean background;
- Use of PSAT modeled visibility impacts from specific sources should not be used to generically represent other sources;
- Scale PSAT modeled visibility impacts to reflect different emission scenarios from those that were actually modeled; and
- Relieve a source or group of sources from performing a four-factor analysis and installing cost effective controls if the Class I Area impacted is below the glidepath;

"Notably, OEPA appears to not have considered comments made by the U.S. Forest Service. Additionally, OEPA merely includes the companies' response to the several FLM comments, without providing its independent assessment of the information submitted by the companies. In doing so, it appears that OEPA has fully endorsed the companies' submittals critiquing the FLM comments." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

Response 55: Ohio did fully consider FLM comments during the LADCO Regional Haze workgroup meetings, informal early engagement period (see Appendix K4), formal consultation period (see Appendix L4) and the public comment period (see responses above). Specifically, Ohio considered and responded to comments made by the U.S. Forest Service (see Appendix K4, page 33, and Appendix L4). Ohio has adjusted our SIP as we deemed appropriate. While we have not agreed on all points, we have fully considered the information and comments provided and included our response to comments throughout the process.

Ohio has relied in part on the detailed knowledge of the company of their own source, and so the information is rightly authored by and credited to

the company; however, where we have included a submittal or information from a company, Ohio EPA has carefully reviewed the information and included in our SIP only that which we find appropriate. In many cases, there were several iterations and revisions of this information based on Ohio's comments before it was approved by us for inclusion into the SIP.

Consultation with Other States/Tribes

Comment 56: "Ohio did not address all of New Jersey's Asks in their proposed SIP as required by 40 CFR § 51.308(f)(2)(ii)(A), "The State must demonstrate that it has included in its implementation plan all measures agreed to during state-to-state consultations or a regional planning process, or measures that will provide equivalent visibility improvement." New Jersey recognizes Ohio's analyses and control strategies that directly or indirectly address New Jersey Asks 1 and 2 as described in Steps 3 and 4 of the proposed Ohio regional haze SIP. However, Ohio has stated that it does not find it necessary and appropriate to implement New Jersey's Ask 3, a low sulfur fuel standard, at this time. New Jersey requests that Ohio reconsider the low sulfur fuel strategy or document in its SIP how it considered the four statutory factors in determining that the adoption of the strategy is not reasonable.

"In response to New Jersey's Ask 5, Ohio stated that it lacks the authority to dictate energy policy, including the type of fuel used by a source and the order of distribution of electricity. This is not the expectation of this Ask. Ask 5 expects states to consider and document in its SIP control strategies or programs that increase in-state use of Combined Heat and Power (CHP), and other clean Distribution technologies, and use energy efficiency to decrease energy demand. Energy efficiency measures include programs that reduce emissions that could benefit visibility, for example, improving efficiency and lowering demand for fossil fuel generation is relevant to regional haze. Like many states, Ohio may not have the authority to mandate such actions, but energy efficiency can and should be supported, encouraged, and promoted by environmental agencies. Many states are pursuing renewable energy targets as strategic goals. Reducing the demand allows for emission reductions which will improve visibility.

"According to 40 CFR § 51.308 (f)(2)(ii)(B), States must consider, in their Regional Haze SIPs, the emission reduction measures identified by other States as being necessary to make reasonable progress in the mandatory Class I Federal area. Ohio considered some of New Jersey's identified measures, but it did not consider all as required by this rule. Ohio should implement the measures requested by New Jersey in the MANE-VU Inter-RPO Ask, or equivalent measures, to reduce emissions from sulfates and nitrates and ensure incremental progress to improve visibility at Brigantine Wilderness Area. Ohio must document how it addressed New Jersey's

Asks in its Regional Haze SIP submittal for review and action by EPA and the Federal Land Managers prior to the approval of its SIP." **(Sharon Davis, New Jersey Department of Environmental Protection)**

"MANE-VU coordinated with its members to identify a set of Inter-RPO Asks for the upwind contributory states that were deemed necessary to achieve reasonable progress in visibility improvement at MANE-VU Class I areas. The MANE-VU Inter-RPO Asks were discussed with the upwind contributing states as part of the Regional Haze Consultation Process, in which Ohio participated. MANE-VU acknowledges the analyses and control measures described in Steps 3 and 4 in the OH EPA draft that directly or indirectly address Items 1 and 2 of MANE-VU's Inter-RPO Ask. However, on page 56 of the OH EPA draft, Ohio states that it merely considered MANE-VU Ask Item 3, a low sulfur fuel standard, and that Ohio does not find it necessary or appropriate at this time. MANE-VU respectfully asks Ohio to reconsider MANE-VU Ask Item 3 or provide a detailed analysis that considers the four statutory factors to demonstrate why the adoption of such a measure is not reasonable.

"Regarding MANE-VU's Ask Item 5, the expectation of this Ask is not for states to dictate energy policy, including the type of fuel used by a source and the order of distribution of electricity, as stated by Ohio, but for states to consider and report in their SIPs on control measures or programs that reduce energy demand by using energy efficiency and increasing the use of Combined Heat and Power (CHP) and other clean distribution technologies. Energy efficiency measures include programs that reduce emissions and therefore benefit visibility. For example, improving efficiency and reducing demand for fossil fuel generation can improve visibility. Although some states, including Ohio, may not have the requisite authority to require measures such as those in the stated example, energy efficiency is something environmental agencies can and should encourage and promote." **(Sharon Davis, Co-Chair of MANE-VU)**

"40 CFR § 51.308(f)(2)(ii)(C) states, "In any situation in which a State cannot agree with another State on the emission reduction measures necessary to make reasonable progress in a Mandatory Class I Federal area, the State must describe the actions taken to resolve the disagreement." If Ohio decides not to implement New Jersey's Ask, then Ohio should include in its SIP the actions it plans to take to address its impacts on New Jersey's Class I area. New Jersey has determined that Ohio's implementation of its Asks is necessary to make reasonable and incremental progress at Brigantine Wilderness Area." **(Sharon Davis, New Jersey Department of Environmental Protection)**

Response 56: 40 CFR §51.308(f)(2)(ii)(B) requires states to consider the emission reduction measures identified by other States as being necessary to make reasonable progress. It does not require states to include a full four-factor

analysis of those measures as part of the consideration, or to implement those measures requested or equivalent measures.
Ohio considered MANE-VU Ask Item 3 (ultra-low sulfur fuel standard) but does not find it necessary or appropriate at this time because we do not believe that use of distillate oil, #4 or #6 residual oils comprise a significant portion of fuel usage in Ohio. Thus, establishing an ultra-low sulfur fuel standard would have little impact on visibility and further evaluating this potential control would not be an efficient use of state resources.

Regarding MANE-VU Ask 5 (energy efficiency, CHP and other clean distribution technologies), as discussed in the draft SIP, Ohio EPA does not have regulatory authority to mandate this as a federally enforceable control measure. Ohio EPA does, however, encourage and promote energy efficiency, for example, through our Encouraging Environmental Excellence (E3)[1] Program which recognizes organizations achievements in environmental stewardship.

40 CFR § 51.308(f)(2)(ii)(C) requires states to describe the actions taken to resolve a disagreement with another State on the emission reduction measures that are necessary. Ohio EPA participated in several consultation calls with MANE-VU in 2017 regarding the Ask, provided feedback on the information and data used to develop the Ask (see Appendices M2 and M3), and provided our response and an opportunity to comment during public comment period, and are responding to comments herein.

Comment 57: "New Jersey's analysis included varied methodologies and results for qualitative rankings. The results show that Ohio is the second topmost contributor to visibility impairment at New Jersey and MANE-VU Class I areas. Additionally, Ohio ranked 2nd in terms of maximum mass-weighted sulfate and nitrate contribution at any given MANE-VU Class I area, and 2nd at Brigantine. By contrast, New Jersey is not considered a significant contributor to its own Class I area or any other MANE-VU Class I area, ranking at most 27th or lower at other MANE-VU Class I areas.

"As shown in Table 1, the units at the Muskingum River, Avon Lake Power Plant and Gen J M Gavin facilities have significant impact on Brigantine Wilderness Area. A four-factor analysis should be performed on the nine units at these three facilities based on the MANE-VU Asks.

"Table 1: Maximum Extinction Contributions from Ohio Facilities at Brigantine Wilderness Area.

Rank	Facility Name	Unit ID	Max Extinction (Mm-1)
4	Muskingum River	5	7.685

[1] https://www.epa.state.oh.us/ocapp/ohioe3

7	Avon Lake Power Plant	12	6.720
9	Avon Lake Power Plant	1,2,3,4,	4.437
20	Gen J M Gavin	1	3.330
24	Gen J M Gavin	2	3.073
32	W H Zimmer Generating Station	1	2.551
35	Killen Station	2	2.360
39	Kyger Creek	1,2,3,4,5	2.275

(Sharon Davis, New Jersey Department of Environmental Protection)

Response 57: New Jersey's analysis is based on outdated emissions data and overstates Ohio's contribution to visibility impairment at New Jersey's Class I areas. Ohio EPA has addressed each of the sources on Table 1 above as follows:

- Muskingum River Power Plant permanently shutdown in 2015.
- Avon Lake accepted a federally enforceable SO_2 emissions limit from all SO_2-emitting sources at the facility effective January 13, 2017. Nevertheless, a four-factor analysis was performed for SO_2 and NOx at Avon Lake unit B012. Further, Avon Lake recently announced plans to permanently shutdown by September 15, 2021 (although this is not currently an enforceable commitment, it is not being relied on as part of the SIP).
- A four-factor analysis for SO_2 was performed for Gavin Power Plant. NOx was determined to be effectively controlled such that a four-factor analysis was not warranted.
- Zimmer Power Station announced plans to permanently shut down, and has agreed to an enforceable commitment for the permanent shut down of the coal-fired operations of the boilers no later than January 1, 2028.
- Killen Station permanently shutdown in 2018.
- Kyger Creek was determined to be effectively controlled for both SO_2 and NOx such that a four-factor analysis was not warranted.

Comment 58: "OEPA Did Not Respond to the MANE-VU Asks

"As discussed in detail in the Kordzi Report, two of the MANE-VU Asks are of particular concern and relevance:
1. EGUs with a nameplate capacity larger than or equal to 25 MW with already installed NOx and/or SO2 controls - ensure the most effective use of control technologies on a year-round basis to consistently minimize emissions of haze precursors, or obtain equivalent alternative emission reductions; and
4. EGUs and other large point emission sources larger than 250 MMBTU per hour heat input that have switched operations to lower emitting fuels - pursue updating permits, enforceable agreements, and/or rules to lock-in lower emission rates for SO2, NOx and PM. The permit, enforcement

agreement, and/or rule can allow for suspension of the lower emission rate during natural gas curtailment.

"OEPA inaccurately suggests that it followed the MANE-VU first request. As explained in the Kordzi Report, it has not done so because in a number of cases, OEPA has not required that certain sources perform reasonable upgrades and optimizations of existing controls, or that those controls be continuously run at their full capabilities. Regarding MANE-VU's fourth request, "Ohio states that in most cases the fuel switch is already incorporated into federally-enforceable permits but that it does not agree that establishing lower emission rates commensurate with the fuel switch is either required or appropriate. Again, it is evident that some sources have considerable compliance latitude with regard to their permitting limits."

"OEPA should reconsider examining permit limits for sources that operate substantially under its permit limits and revise such limits accordingly, including the emission limits and monitoring, recordkeeping and reporting requirements in the SIP." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"On page 56, Ohio describes how it responded to the MANE-VU Ask. The issues contained in Request 1 and 4 are of particular relevance [emphasis added]:

1. EGUs with a nameplate capacity larger than or equal to 25 MW with already installed NOx and/or SO2 controls - *ensure the most effective use of control technologies on a year-round basis* to consistently minimize emissions of haze precursors, or obtain equivalent alternative emission reductions;

4. EGUs and other large point emission sources larger than 250 MMBTU per hour heat input that have switched operations to lower emitting fuels - *pursue updating permits, enforceable agreements, and/or rules to lock-in lower emission rates for SO2, NOx and PM*. The permit, enforcement agreement, and/or rule can allow for suspension of the lower emission rate during natural gas curtailment;

"Although Ohio states it followed the MANE-VU first request, it does not appear it has done so, considering the issued described in the previous comment. For instance, as summarized above, in a number of cases, Ohio has not required that certain sources perform reasonable upgrades and optimizations of existing controls, or that those controls be continuously run at their full capabilities. Regarding MANE-VU's fourth request, Ohio states that in most cases the fuel switch is already incorporated into federally- enforceable permits but that it does not agree

that establishing lower emission rates commensurate with the fuel switch is either required or appropriate. Again, it is evident that some sources have considerable compliance latitude with regard to their permitting limits. Ohio is urged to reconsider examining permit limits for any source that is operating substantially under its permit limits and revise such limits accordingly, including the emission limits and monitoring, recordkeeping and reporting requirements in the SIP." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 58: Ohio continues to believe our process for source selection and four factor analysis essentially fulfills MANE-VU's first request, as described further in the SIP.

40 CFR §51.308(f)(2)(ii)(B) requires states to consider the emission reduction measures identified by other States as being necessary to make reasonable progress. It does not require states to include a full four-factor analysis of those measures as part of the consideration, or to implement those measures requested or equivalent measures. U.S. EPA's July 8, 2021 memorandum "Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period" (p. 4) provides that "A state receiving a request to select a particular source(s) should either perform a four-factor analysis on the source(s) or provide a well-reasoned explanation as to why it is choosing not to do so." Ohio has, through the source selection process documented in Step 3 of the SIP and the four-factor analyses documented in Step 4 of the SIP, either performed a four-factor analysis on all major sources or provided well-reasoned explanation as to why a four-factor analysis was not performed.

40 CFR § 51.308(f)(2)(ii)(C) requires states to describe the actions taken to resolve a disagreement with another State on the emission reduction measures that are necessary. Ohio EPA participated in several consultation calls with MANE-VU in 2017 regarding the Ask, provided feedback on the information and data used to develop the Ask (see Appendices M2 and M3), and provided our response and an opportunity to comment during public comment period, and are responding to comments herein.

Comment 59: "OEPA Did Not Perform the Four-Factor Analyses Requested by the VISTAS States

"As discussed in the Kordzi Report, OEPA's proposed SIP does not respond to the VISTAS Ask letter where it asked that Ohio conduct a four-factor analysis for four Ohio sources:
• Kyger Creek
• Cardinal
• Gavin
• W.H. Zimmer.

"OEPA neither required that Kyger Creek and Cardinal prepare the four-factor analysis nor did OEPA prepare the analyses for these sources. NPCA's expert identified cost-effective control options for both Kyger Creek and Cardinal. Furthermore, OEPA has not required that Gavin properly assess scrubber and SCR optimization/upgrades, which also has cost-effective control options. Finally, while a four-factor analysis for W.H. Zimmer may not be necessary since the plant plans to retire, OEPA's SIP needs to contain practically enforceable provisions reflecting the retirement should the agency not conduct such an analysis." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

"On page 57, Ohio summarizes how it replied to the VISTAS Ask. Ohio states that on behalf of Alabama, Georgia, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia, it requested that Ohio conduct a reasonable progress analysis for four Ohio sources that were identified by VISTAS to have an impact on visibility in Class I areas located in VISTAS states. An examination of the VISTAS letter, indicates these sources are Kyger Creek, Cardinal, Gavin, and WH Zimmer. As Ohio indicates elsewhere in its SIP, the WH Zimmer is scheduled to retire, although that commitment is apparently not fully executed and practically enforceable in its SIP. Ohio's response letter echoed statements expressed in its SIP – largely that it considers these sources already "effectively controlled." However, as described above, Kyger Creek, Cardinal, and Gavin likely have cost-effective controls options available. Also, contrary to the VISTAS Ask, Ohio did not even require that Kyger Creek and Cardinal prepare four- factor analyses, and it has not required that Gavin properly assess scrubber and SCR optimization/upgrades. Again, Ohio should require that four-factor analyses be performed for Cardinal and Kyger Creek and that Gavin properly consider optimization/upgrades to its scrubber and SCR systems. (footnote omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 59: Ohio EPA did response to the VISTAS request (see Appendix N2). While did not agree to all elements of the request, Ohio did provide a response providing our rationale and explaining our decision-making process. Ohio is not required to agree to perform a four-factor analysis or to implement requested the measures. As noted above in Response 58, Ohio is required to consider other states requests, perform a four-factor analysis or provide a well-reasoned explanation as to why it is choosing not to do so, and to document actions taken to resolve a disagreement on which measures are necessary.

Ohio EPA responded to the VISTAS request on October 29, 2020 (Appendix N2) and provided an opportunity to comment further during the public comment period. Ohio did not receive any further comments from

VISTAS following the October 29, 2020 letter or during the public comment period.

Environmental Justice

Comment 60: "Ohio EPA Should Analyze the Environmental Justice Impacts of its Regional Haze SIP, and It Should Ensure the SIP Will Reduce Emissions and Minimize Harms to Disproportionately Impacted Communities

"OEPA should evaluate environmental justice considerations for those facilities impacting environmental justice communities. A question-and-answer post on OEPA's website site explains that Ohio EPA has found that the most effective way to address environmental justice (EJ) concerns is by building partnerships with community organizations.

"We strongly urge OEPA to do more than build partnerships to address EJ concerns and impacts. Indeed, sources that impact our treasured Class I Areas also impact Ohio's environmental justice communities. For example, the Cleveland-Cliffs (formerly AK Steel) Middletown Works source is located in the low-income county of Butler and the community has a higher NATA Air Toxics Cancer Risk value. Middleton Works is located on a 2,791-acre site in Southwest Ohio, midway between Cincinnati and Dayton and its major production facilities include: "coke ovens; blast furnace; basic oxygen furnaces; CAS-O.B.; RH vacuum degasser; dual-strand slab caster; hot strip mill; pickling lines; five-stand cold mill; electro galvanizing line; hot dip carbon and stainless aluminizing line; hot dip galvanizing line; box annealing furnaces; temper mills [and] open coil annealing. By evaluating Middletown Works and other facilities, we believe OEPA will identify emission-reducing options – and when SIP emission limitations are required – will improve air quality for these impacted communities and help achieve reasonable progress in this round of regional haze rulemaking.

"Historically, conservation and environmental work has concerned itself with protecting nature from people and has thus "siloed" its work (e.g., mainstream conservation vs. environmental justice.) While this siloed approach has led to the protection of many vulnerable habitats, it ignores the reality that people live in concert with and are a part of nature; to protect one and not the other is a job half done. By considering viewshed protection and environmental justice at the same time, we can collectively begin to dismantle the silos that exist in conservation and environmental work and chart a new path forward.

"Therefore, OEPA should analyze the environmental justice impacts of its second planning period haze SIP. For those RP sources located near a low-income or minority community that suffers disproportionate environmental harms, OEPA's four-factor analysis for that source should

take into consideration how each considered measure would either increase or reduce the environmental justice impacts to the community. Such considerations will not only lead to sound policy decisions but are also pragmatic as pointed out above, where sectors and sources implicated under the regional haze program are of concern to disproportionately impacted communities in Ohio. Thus, considering the intersection of these issues and advancing regulations accordingly will help deliver necessary environmental improvements across issue areas, reduce uncertainty for the regulated community, increase the state's regulatory efficiency, result in more rational decision making.

"A. Consideration of Environmental Justice to Comply with Executive Orders

"There are additional legal grounds for considering environmental justice when determining reasonable progress controls. Under the CAA, states are permitted to include in a SIP measures that are authorized by state law but go beyond the minimum requirements of federal law. Moreover, the State can also consider environmental justice when developing its haze plan, regardless of whether the CAA's haze provisions require such consideration. Ultimately, EPA will review the haze plan that Ohio submits, and EPA will be required to ensure that its action on Ohio's haze plan addresses any disproportionate environmental impacts of the pollution that contributes to haze. Executive Orders in place since 1994, require federal executive agencies such as EPA to:

> [M]ake achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations"

"On January 27, 2021, the current Administration signed "Executive Order on Tackling the Climate Crisis at Home and Abroad." The new Executive Order on climate change and environmental justice amended the 1994 Order and provides that:

> It is the policy of [this] Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; … protects public health … delivers environmental justice …[and that] … [s]uccessfully meeting these challenges will require the Federal Government to pursue such a coordinated approach from planning to implementation, coupled with substantive engagement by stakeholders, including State, local, and Tribal governments.

"Ohio can facilitate EPA's compliance with these Executive Orders by considering environmental justice in its SIP submission.

"B. EPA's Regional Haze Guidance for the Second Implementation Period

"On August 20, 2019, EPA finalized its Regional Haze Guidance for the Second Planning Period. Importantly, this guidance specifies, "States may also consider any beneficial non-air quality environmental impacts." EPA also pointed to another EPA program that states could rely upon for guidance in interpreting how to apply the non-air quality environmental impacts standard:

> When there are significant potential non-air environmental impacts, characterizing those impacts will usually be very source- and place-specific. Other EPA guidance intended for use in environmental impact assessments under the National Environmental Policy Act may be informative, but not obligatory to follow, in this task.

"A collection of EPA policies and guidance related to the National Environmental Policy Act ("NEPA") is available at https://www.epa.gov/nepa/national-environmental-policy-act-policiesand-guidance. One of these policies concerns Environmental Justice.

"C. EPA has a Repository of Material Available for Considering Environmental Justice

"In addition to the NEPA guidance materials referenced above, EPA provides a wealth of additional material. The most important aspect of assessing Environmental Justice is to identify the areas where people are most vulnerable or likely to be exposed to different types of pollution. EPA's EJSCREEN tool can assist in that task. It uses standard and nationally consistent data to highlight places that may have higher environmental burdens and vulnerable populations.

"D. EPA Must Consider Environmental Justice

"As occurred in the first planning period, if a state fails to submit its SIP on time, or if EPA finds that all or part of a state's SIP does not satisfy the Regional Haze regulations, then EPA must promulgate its own Federal Implementation Plan to cover the SIP's inadequacy ("FIP"). Should EPA promulgate a FIP that reconsiders a state's four-factor analysis, it is completely free to reconsider any aspect of that state' analysis. The two Presidential Executive Orders referenced above require that federal agencies integrate Environmental Justice principles into their decision-making. EPA has a lead role in coordinating these efforts, and recently EPA Administrator Regan directed all EPA offices to clearly integrate environmental justice considerations into their plans and actions.

Consequently, should EPA promulgate a FIP, it has an obligation to integrate Environmental Justice principles into its decision-making. The non-air quality environmental impacts of compliance portion of the third factor, is a pathway for doing so.

"Consistent with legal requirements and government efficiency, we urge OEPA to take impacts to EJ communities, like the ones we have expressed for the AK Steel facility, into consideration as it evaluates all sources that impact regional haze." (footnotes omitted) **(Sara Laumann on behalf of Conservation Organizations)**

Response 60: Ohio recognizes that EJ is an important consideration for many of U.S. EPA's programs. The Regional Haze program focuses on certain sources with respect to the impact on visibility at Class 1 areas (national parks, national wilderness areas, etc.), which may or may not have a relationship or link to EJ communities. Actions associated with reducing emissions throughout the state impact both EJ and non-EJ areas and Ohio continues to evaluate all air quality throughout state through other programs including Air Toxics and the National Ambient Air Quality Standards (NAAQS) to determine if additional measures are needed.

Ohio acknowledges that EJ is an important emerging regulatory initiative, and U.S. EPA is currently reviewing policies and procedures on how EJ will be incorporated into various regulatory programs and how that may impact states' activities. At this time, there is no direct requirement to incorporate an EJ analysis in the Regional Haze SIP for the second implementation period. Future Regional Haze submittals will take into account any future requirements established by U.S. EPA.

<u>Other/Miscellaneous Comments</u>

Comment 61: "Ohio has misinterpreted its "robust demonstration" obligation. Ohio concludes that "after fulfilling the source selection and control measure analysis requirements, Ohio has no "robust demonstration" obligation per 40 CFR 51.308(f)(3)(ii)(A) and/or (B)." In support of its conclusion, Ohio cites to the Regional Haze Guidance. Because Ohio make this statement before it presents any consideration of "the source selection and control measure analysis requirements," it appears that it has adopted a view that because the Class I Areas its sources impact are all below the Uniform Rate of Progress (URP), it is free from any judgement whether it has satisfied its "robust obligation." The Regional Haze Rule makes it clear that this is not the case:

> The CAA requires states to determine what emission limitations, compliance schedules and other measures are necessary to make reasonable progress by considering the four factors. The CAA does not provide that states may then reject some control measures

> already determined to be reasonable if, in the aggregate, the controls are projected to result in too much or too little progress. Rather, the rate of progress that will be achieved by the emission reductions resulting from all reasonable control measures is, by definition, a reasonable rate of progress. [I]f a state has reasonably selected a set of sources for analysis and has reasonably considered the four factors in determining what additional control measures are necessary to make reasonable progress, then the state's analytical obligations are complete if the resulting RPG for the most impaired days is below the URP line.

"Thus, the key determinant in whether Ohio's "robust determination" obligation has been satisfied under Section 51.308(f)(3)(ii)(B) is not whether the Reasonable Progress Goal (RPG) of a Class I Area is below that Class I Area's URP, but rather whether Ohio has considered and determined requirements to make reasonable progress based on the four statutory factors. Ohio must consider the four factors regardless of the status of any Class I Area's RPG." (footnotes omitted) **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 61: The commenter has misinterpreted the "robust demonstration" requirement. U.S. EPA's Regional Haze Guidance (p. 8) states "Section 51.308(f)(3) of the Regional Haze Rule provides that if a state contains sources whose emissions are reasonably anticipated to contribute to visibility impairment in a Class I area in another state **for which the RPG is above the URP glidepath**, the state must provide a "robust demonstration" that there are no additional emission reduction measures that would be reasonable to include in its own LTS." (emphasis added).

The Regional Haze Guidance (p. 22) further states: "The fact that visibility conditions in 2028 will be on or below the URP glidepath is not a sufficient basis by itself for a state to select no sources for analysis of control measures; however, the state may consider this information when selecting sources. See the final rule preamble discussion of this subject at 82 FR 3078 at 3093 and 3099-3100, January 10, 2017. Rather, that fact would serve to demonstrate that, after a state has gone through its source selection and control measure analysis, it has no "robust demonstration" obligation per 40 CFR 51.308(f)(3)(ii)(A) and/or (B)."

Ohio's SIP demonstrates a reasonable and well-documented process for source selection (step 3) and control measure analysis (steps 4 and 5), considering the four statutory factors, five additional factors and other weight of evidence to determine the necessary measures to make reasonable progress. In addition, we determined there is no further "robust demonstration" requirement because all Class 1 areas contributed to by Ohio are below, or well below, the URP glidepath.

Comment 62: Re: page 58: "There seems to be a word missing after "the"." **(Pamela Blakely, U.S. EPA Region 5)**

Response 62: This error has been corrected.

Comment 63: Re: pages 2-3: "We recommend adding citation to page 8 of the Regional Haze Guidance." **(Pamela Blakely, U.S. EPA Region 5)**

Response 63: This citation has been added.

Comment 64: Re: page 5: "We recommend adding citation to page 10 of the Regional Haze Guidance." **(Pamela Blakely, U.S. EPA Region 5)**

Response 64: This citation has been added.

Comment 65: Re: pages 5-6: "We recommend adding citation to pages 9–10 of the Regional Haze Guidance." **(Pamela Blakely, U.S. EPA Region 5)**

Response 65: This citation has been added.

Comment 66: Re: page 8: "We recommend adding quotation mark to end of this sentence above." **(Pamela Blakely, U.S. EPA Region 5)**

Response 66: This error has been corrected.

Comment 67: Re: page 8: "We recommend making clear that this is also citing to page 13 of the Guidance." **(Pamela Blakely, U.S. EPA Region 5)**

Response 67: This citation has been added.

Comment 68: Re: page 9: "Since this is a long 2-paragraph quote, we recommend indenting the text in a block quote for clarity." **(Pamela Blakely, U.S. EPA Region 5)**

Response 68: A quote block has been added.

Comment 69: Re: page 20: "We recommend making clear that this is also citing to page 23 of the Guidance." **(Pamela Blakely, U.S. EPA Region 5)**

Response 69: This citation has been added.

Comment 70: "Footnote 25 on page 31 of Ohio's report is missing. The SDA cost effectiveness calculations in Appendix B are labeled as "Dry Sorbent Injection Cost." Footnote "b" to Table 4-4 on page 4-8 of the Carmeuse report is not referenced in that table. The first sentence of the section on page 57 of Ohio's report relating to the June 22, 2020 VISTAS Ask

appears to have a typo." **(Joe Kordzi Report attached to Conservation Organizations' comments)**

Response 70: These corrections have been made.

End of Response to Comments