SUPPLEMENT TO
MICHIGAN'S AUGUST 23, 2021,
REGIONAL HAZE STATE IMPLEMENTATION PLAN REVISION
FOR THE SECOND PLANNING PERIOD

MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

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[Public Notice Draft for 30-day Public Comment Period]

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EXECUTIVE SUMMARY

The federal Clean Air Act (CAA) sections 169A and B [42 United States Code (U.S.C.), Sections 7491 and 7492] require the protection of visibility in 156 mandatory Federal Class I areas (Class I areas). These areas consist of all international parks, national wilderness areas and national memorial parks exceeding 5,000 acres, and national parks exceeding 6,000 acres that were in existence on August 7, 1977, for which visibility was found to be an important value, as stated in CAA section 162(a) [42 U.S.C. 7472(a)]. The United States Environmental Protection Agency's (USEPA) 1999 Regional Haze Rule, Title 40 of the Code of Federal Regulations (CFR) 51.308, requires states to develop and implement State Implementation Plan (SIP) revisions on a periodic basis to reduce visibility impairment, known as regional haze, resulting from "manmade air pollution." SIP revisions for the second planning period were due July 31, 2021. *See* 82 Federal Register (FR) 3078, January 10, 2017.

On August 23, 2021, the Michigan Department of Environment, Great Lakes, and Energy (formerly known as the Department of Environmental Quality, collectively referred to as "EGLE" in this document) submitted to the USEPA its Regional Haze SIP revision for the second implementation period, covering the 10-year period of 2019 to 2028. (Michigan's August 23, 2021, Regional Haze SIP submittal is included in full as Appendix 1 to this SIP Supplement). This document is a supplement to the Regional Haze SIP submitted to the USEPA in August 2021. The primary purpose is to expand on the four-factor analysis included in the original SIP submittal. It also addresses further the emission reductions that have occurred as well as those expected in the future from the shutdown of electric generation units (EGU) throughout the state of Michigan. The shutdown information is a key component to understanding the continued reduction in sulfur dioxide (SO_2) and oxides of nitrogen (NO_X) emissions in Michigan that improve visibility at Michigan's two Class I areas addressed in this SIP. These reductions also positively impact visibility in downwind regions of the country. The appendices contain details of each EGU that has shut down in recent years and those planning on shutting down in the relatively near future. This detail on emission reductions in the state expands on Michigan's position taken in the 2021 Regional Haze SIP submittal that visibility continues to improve and that additional emission reductions from the sources reviewed for the four-factor analysis would have little impact on already-improving visibility compared to the many reductions from EGUs.

Some other considerations in this supplement address USEPA guidance and input that may not have been addressed in the August 2021 SIP submittal. On July 8, 2021, approximately seven weeks before EGLE submitted its 2021 Regional Haze SIP revision, the USEPA released a memo entitled "Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period" (2021 Clarifications Memo)[1], describing clarifications to the Regional Haze Rule and USEPA's "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period," published on August 20, 2019 (2019 Regional Haze Guidance)[2]. Because of the timing of the memo and the July 31, 2021, deadline for SIP revisions contained in the Regional Haze Rule, EGLE did not have a timely opportunity to fully assess the clarifications, revise its SIP submittal accordingly, or provide a second 60-day Federal Land Management (FLM) consultation period and public comment period.

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[1] Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period. USEPA Office of Air Quality Planning and Standards, Research Triangle Park (July 8, 2021). (2021 Clarifications Memo) https://www.epa.gov/system/files/documents/2021-07/clarifications-regarding-regional-haze-state-implementation-plans-for-the-second-implementation-period.pdf.

[2] Guidance on Regional Haze State Implementation Plans for the Second Implementation Period. https://www.epa.gov/visibility/guidance-regional-haze-state-implementation-plans-second-implementation-period EPA Office of Air Quality Planning and Standards, Research Triangle Park (August 20, 2019).

This SIP supplement also provides additional information and justification to ensure Michigan achieves its reasonable progress goals for 2028 and meets the requirements as specified under 40 CFR 51.308(f). Coupled with Michigan's 2021 Regional Haze SIP submittal, this SIP supplement provides further evaluation of control measures and strategies as potential components of EGLE's Long-term Strategy (LTS) as required under 40 CFR 51.308(h)(4). The evaluation was conducted in accordance with the Regional Haze SIP development steps outlined in the USEPA's 2019 Regional Haze Guidance document outlined in the Table of Contents.

Overall, EGLE's LTS relies on on-the-books and on-the-way control measures that include, among other things, the retirements of 30 coal and fossil-fuel fired EGUs at 12 different power plants during the second implementation period. Based on the 2016 emissions inventory, the retirements that have already occurred during the second implementation period between 2018 and 2024 account for reductions in emissions of 17,417 tons per year (tpy) NO_X and 42,655 tpy SO_2. On the way are also the retirements of 3 more coal-fired EGUs required under a settlement agreement by May 31, 2025, representing additional reductions in emissions of 2,346 tpy NO_X and 12,850 tpy SO_2 based on the 2016 inventory. Together, these reductions represent a historically significant decrease in Michigan's statewide emissions by 30 percent NO_X and 65 percent SO_2 from all units in the second implementation period, with a sum, annual emissions in tons divided by distance in kilometers between a source and the nearest Class I area (Q/d) of 1.0 or greater. With still more on the way, 2 additional coal-fired EGUs will be retired under the same settlement agreement by May 31, 2031, representing additional reductions of 40 tpy NO_X and 58 tpy SO_2 in the third implementation period.

To summarize, this SIP supplement provides updates, additional information, and justification for:

- Determination of Affected Class I Areas
- Selection of Source for Analysis
- Confirmations of Source Retirements
- Effective Control Demonstrations
- Full Four-factor Analyses for Emission Units at Billerud Escanaba LLC, Graymont Western Lime, Inc., and Tilden Mining Company LC
- LTS and Control Measures Necessary to make Reasonable Progress
- Reasonable Progress Goals
- Progress Report

For this SIP supplement, EGLE facilitated a 60-day consultation period with the FLM as required by 51.308(i)(2) as well as an opportunity for public comment and hearing. EGLE made revisions based on comments received during the consultation and comment period, and EGLE's response to comments is included in the appendices.

EGLE is providing this SIP Supplement at this time fully aware that the USEPA became subject to a final action deadline set for May 30, 2025, for Michigan's Regional Haze SIP through a Federal Consent Decree that was entered on July 12, 2024, by the United States (U.S.) District Court for the District of Columbia. See *Sierra Club, et al. v. United States Environmental Protection Agency, et al.*, No. 1:23–cv–01744–JDB (U.S. District Court for the District of Columbia).

Together, Michigan's 2021 Regional Haze SIP Revision and this SIP Supplement address all required elements of 40 CFR 51.308(f) and demonstrate satisfactory progress toward the long-term visibility goals in the Regional Haze Rule and the CAA. This SIP does not include the relaxation of any existing requirements and therefore will not interfere with the attainment or

maintenance of the National Ambient Air Quality Standards (NAAQS) in accordance with section 110(l) of the CAA.

1. Step 1: AMBIENT DATA ANALYSIS

Identify the 20 percent most anthropogenically impaired days and the 20 percent clearest days and determine baseline, current, and natural visibility conditions for each Class I area within the state. See 40 CFR 51.308(f)(1).

EGLE's ambient data analysis was provided in Section 2 of Michigan's 2021 Regional Haze SIP submittal, beginning on page 6. Michigan's August 23, 2021, Regional Haze SIP submittal is provided in full as Appendix 1 to this SIP Supplement.

2. Step 2: DETERMINATION OF AFFECTED CLASS I AREAS IN OTHER STATES

Determine which Class I area(s) in other states may be affected by the state's own emissions. See 40 CFR 51.308(f)(2)

The determination of affected Class I Areas is initially addressed in Section 2 of Michigan's 2021 Regional Haze SIP submittal, beginning on page 7 (*See* Appendix 1). Further elaboration is provided below.

To determine the impact on visibility at Class I areas from sources in Michigan for the second implementation period, EGLE relied upon modeling performed by the Lake Michigan Air Directors Consortium (LADCO). LADCO is the regional planning organization representing the states of Michigan, Illinois, Indiana, Minnesota, Ohio, and Wisconsin. LADCO used the Comprehensive Air Quality Model with extensions Particulate Matter Source Apportionment Tool (PSAT) for its analysis. LADCO tagged states and regions as well as individual point sources and inventory source groups to apportion emissions to states and regions. Then LADCO estimated relative visibility impacts in 2028 by projecting representative emissions inventories and known emission controls using 2011 and 2016 as base years. *See* Appendices 2 and 3: "Modeling and Analysis for Demonstrating Reasonable Progress for the Regional Haze Rule 2018 – 2028 Planning Period: Technical Support Document and Supplemental Materials," June 17, 2021 (LADCO's 2021 Technical Support Document).

2.1 Updated Information for the Determination of Affected Class I Areas

Michigan's 2021 Regional Haze SIP submittal contained data on projected visibility in 2028 based on LADCO's modeling using a 2011 base year. Reflecting LADCO's more recent modeling for the 2028 projections with a 2016 base year, updated tables and figures appear in Step 6, below, to depict EGLE's 2028 reasonable progress goals for Isle Royale and Seney under the projected 2028 deciviews on the 20 percent most impaired and clearest days.

Table 6 is sourced from Table 8-5 of LADCO's 2021 Technical Support Document. This Table 6 updates Table 3 in Michigan's 2021 Regional Haze SIP submittal, which relied on modeling results using the 2011 base year, with the more recent modeling results using the 2016 base year.

Table 6: 2028_{2016} Tracer Contributions to b_{ext} on the Most Impaired Days at the LADCO Class I Areas

Source region tags	Source contributions to 2028 visibility at IMPROVE Sites (Mm-1)				Percent source contributions to 2028 visibility at IMPROVE Sites (%)			
IMPROVE Sites	ISLE1	SENE1	BOWA1	VOYA2	ISLE1	SENE1	BOWA1	VOYA2
Total Bext	**48.6**	**57.4**	**40.5**	**41.0**				
Rayleigh	12.0	12.0	11.0	12.0	24.7%	20.9%	27.2%	29.2%
Sea salt (SS)	0.3	0.2	0.2	0.3	0.5%	0.4%	0.5%	0.7%
Biogenic	1.4	1.8	1.2	1.3	2.9%	3.1%	2.9%	3.1%
ICBC	10.5	9.9	9.7	10.0	21.5%	17.2%	23.9%	24.4%
OC Estimated	4.2	5.1	3.6	3.5	8.6%	8.9%	8.9%	8.6%
Fire	0.9	0.9	0.9	0.4	1.9%	1.5%	2.1%	0.9%
Int'l anthropogenic	1.7	2.7	1.7	2.3	3.5%	4.8%	4.3%	5.7%
Offshore	0.2	0.2	0.1	0.1	0.5%	0.4%	0.1%	0.1%
West	1.6	1.9	1.9	1.8	3.4%	3.2%	4.6%	4.4%
Northeast	0.1	0.3	0.1	0.1	0.2%	0.5%	0.2%	0.2%
Southeast	0.4	1.3	0.2	0.2	0.8%	2.2%	0.6%	0.5%
CenSARA Other	2.4	1.8	1.9	1.5	4.9%	3.2%	4.6%	3.6%
IA	1.4	1.5	0.9	0.9	2.9%	2.6%	2.3%	2.1%
MO	1.4	1.7	0.8	0.6	3.0%	3.0%	2.1%	1.6%
TX	0.6	0.3	0.3	0.3	1.1%	0.6%	0.8%	0.7%
IL	2.0	3.6	0.6	0.4	4.0%	6.3%	1.6%	1.0%
WI	2.3	3.5	0.9	0.4	4.8%	6.2%	2.3%	1.0%
MI	1.7	3.4	0.1	0.2	3.5%	6.0%	0.3%	0.5%
OH	0.2	1.2	0.2	0.2	0.4%	2.0%	0.4%	0.5%
MN	2.4	1.7	3.9	4.4	5.0%	3.0%	9.6%	10.6%
IN (Total)	0.9	2.3	0.2	0.2	1.9%	4.0%	0.6%	0.5%
IN (Nonpoint)	0.3	0.7	0.1	0.1	0.6%	1.2%	0.2%	0.2%
IN (Rockport EGU)	0.0	0.1	0.0	0.0	0.1%	0.1%	0.0%	0.0%
IN (Gibson EGU)	0.0	0.1	0.0	0.0	0.1%	0.1%	0.0%	0.0%
IN (other EGU)	0.2	0.5	0.0	0.0	0.4%	0.8%	0.1%	0.1%
IN (Cement)	0.0	0.0	0.0	0.0	0.0%	0.1%	0.0%	0.0%
IN (Iron & Steel)	0.3	0.7	0.0	0.1	0.6%	1.2%	0.1%	0.1%
IN (Plastics & Resins)	0.0	0.0	0.0	0.0	0.0%	0.1%	0.0%	0.0%
IN (Aluminum)	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0%	0.0%
IN (Other Point)	0.1	0.2	0.0	0.0	0.2%	0.4%	0.1%	0.0%
Other Anthro	0.0	0.0	0.0	0.0	0.0%	0.0%	0.0%	0.0%
Aggregated by RPO								
Natural	2.3	2.7	2.0	1.6	5%	5%	5%	4%
LADCO	9.6	15.7	6.0	5.8	20%	27%	15%	14%
WRAP	1.6	1.9	1.9	1.8	3%	3%	5%	4%
CenSARA	5.8	5.4	4.0	3.3	12%	9%	10%	8%
VISTAS	0.4	1.3	0.2	0.2	1%	2%	1%	0%

Source: LADCO's "Modeling and Analysis for Demonstrating Reasonable Progress for the Regional Haze Rule 2018 – 2028 Planning Period: Technical Support Document," Table 8-5, June 17, 2021.

By sorting the regional visibility impairment contributions in units of inverse megameters (Mm^{-1}) in descending order for the source region tags in Table 6 above, 80 percent of the total contribution to visibility impairment at Isle Royale and 74 percent at Seney are attributed to regions with a contribution of 3.5 percent or greater.

Based on LADCO's 2028 modeled projections using the 2016 base year, Table 7 lists the Class I areas where Michigan contributes more than 1 percent to the 2028 modeled total light extinction. Although Michigan's contribution to visibility impairment is less than 1 percent at Voyageurs and Boundary Waters; both are listed below since they are located within the LADCO region.

Table 7: Class I Areas Impacted by Michigan Based on LADCO Source Apportionment Modeling Results for 2028, 2028 Adjusted Glidepath, and 2028 Projected Visibility on Most Impaired Days

Class I Area	State	LADCO 2028_{2016} Projected Total Light Extinction (Mm^{-1})	LADCO 2028_{2016} Projected Michigan Contribution (Mm^{-1})	LADCO 2028_{2016} Projected Michigan Contribution (%)
Seney Wilderness Area	MI	57.36	3.44	6.00%
Isle Royale National Park	MI	48.62	1.71	3.51%
Lye Brook Wilderness	VT	42.86	1.35	3.15%
Brigantine Wilderness Area	NJ	69.4	1.64	2.36%
Great Gulf Wilderness	NH	36.4	0.62	1.70%
Presidential Range-Dry River Wilderness	NH	36.4	0.62	1.70%
Mammoth Cave National Park	KY	74.18	1.11	1.49%
Acadia National Park	ME	41.9	0.59	1.42%
Shenandoah National Park	VA	50.63	0.66	1.29%
Swanquarter Wilderness Area	NC	48.52	0.62	1.29%
James River Face Wilderness	VA	53.42	0.62	1.15%
Moosehorn Wilderness Area	ME	37.33	0.41	1.09%
Roosevelt Campobello International Park	ME	37.33	0.41	1.09%
Dolly Sods Wilderness	WV	54.03	0.56	1.03%
Otter Creek Wilderness	WV	54.03	0.56	1.03%
Voyageurs National Park	MN	41.03	0.20	0.48%
Boundary Waters Canoe Area Wilderness	MN	40.51	0.11	0.28%

Source: LADCO's "Modeling and Analysis for Demonstrating Reasonable Progress for the Regional Haze Rule 2018 – 2028 Planning Period: Technical Support Document and Supplemental Materials," June 17, 2021 (*See* Appendices 2 and 3).

LADCO's "2021 Technical Support Document Modeling Files for the 2016 base year, 2028 modeling, specifically the "2016-based 2028 glidepaths and PSAT tracer contributions" spreadsheet posted on LADCO's electronic docket at https://www.ladco.org/reports/technical-support/ladco-regional-haze-tsd-second-implementation-period/

Based on the 2028 projections, Michigan is projected to contribute 3.44 Mm^{-1} to visibility impairment at Seney and 1.71 Mm^{-1} at Isle Royale, representing 6.00 percent and 3.51 percent to the total contributions to visibility impairment, respectively. To a lesser extent, Michigan is also projected to contribute 1.35 Mm^{-1} or less to visibility impairment at Class I areas in other states, representing 3.15 percent or less of the total contributions as shown in Table 7, above.

2.2. Addressing Impacts on Out-of-State Class I Areas

Under 40 CFR 51.308(f)(2)(ii)(B), States must consider and address the emissions reduction measures identified by other States for their sources as being necessary to make reasonable progress in the mandatory out-of-state Class I area.

Outside LADCO, the Mid-Atlantic/Northeast Visibility Union (MANE-VU) is the regional planning organization for the Northeastern and Mid-Atlantic States and Tribal Governments, which includes: Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Penobscot Indian Nation, Rhode Island, St. Regis Mohawk Tribe, and Vermont, and suburbs of Washington, D.C. Southeastern Air Pollution Control Agencies (SESARM) is the regional planning organization for Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia and the Eastern Band of the Cherokee Indians. Of the 17 Class I areas listed in Table 7, 4 are located in the LADCO states, 7 are located in the MANE-VU states, and 6 are located in SESARM. Michigan's contribution to visibility impairment in Class I areas is 6 percent or less in LADCO, 3.15 percent or less in MANE-VU, and 1.49 percent or less in SESARM.

As noted in Michigan's 2021 Regional Haze submittal, to the extent that Michigan affects Class I areas in other states, MANE–VU sent a letter to Michigan and other upwind states dated August 25, 2017, identifying large emission sources that MANE-VU wanted further controlled as a response to the Regional Haze Rule (*See* Appendix 4).

In Michigan, MANE-VU's August 25, 2017, letter identified the following units as contributing 3.0 Mm^{-1} or more to visibility impacts at one or more MANE-VU Class I areas based on 2011 and 2015 emissions:

- DTE – St. Clair Power Plant (Units 1, 2, 3, 4, 6, collectively)
- DTE – Belle River Power Plant (Units 1 and 2, separately)

For these sources, MANE-VU presented five requests:

- Ensure most effective use of control technologies on a year-round basis for EGUs > 25 MW.
- Perform four-factor analyses for new emission controls.
- Pursue an ultra-low sulfur fuel oil standard.
- Pursue enforceable means to lock in lower emission rates for sources >250 million British Thermal Units (MMBtu)/hour that have switched fuels.
- Consider energy efficiency, combined heat and power, as well as fuel cells, wind, and solar energy.

Additionally, on July 27, 2018, MANE-VU sent a consultation report to non-MANE-VU states that it identified as having sources that significantly contributed to visibility impairment at the Class I areas within the MANE-VU region (*See* Appendix 5). Michigan was determined to be one of the 14 states that MANE-VU identified for consultation. The July 27, 2018, MANE-VU requests included the following measures that would apply to sources in Michigan:

- A 90 percent reduction from the 2002 SO_2 emission levels should be achieved at the following uncontrolled sources in Michigan:

- DTE – Trenton Channel Power Plant, Unit 9A
- DTE – St. Clair, Unit 7

The State of New Jersey (a representative of MANE-VU) also approached Michigan with a request in a letter dated June 23, 2021: “Although New Jersey recognizes that St. Clair Power Plant is scheduled to be shut down in 2022 as stated in Section B of Michigan’s proposed SIP submittal, New Jersey requests that Michigan document in its SIP that this shutdown is permanent and enforceable.” (*See* Appendix E (*Comments Received*) of Michigan’s 2021 Second Planning Period Regional Haze Submittal to the USEPA.)

In response to the August 25, 2017, and July 27, 2018, MANE-VU requests, LADCO represented Michigan and the other LADCO states by replying with letters dated December 20, 2017, and May 23, 2018 (*See* Appendices 6 and 7). LADCO indicated that the 2011 and 2015 base year inventories and 2018 projections used by MANE-VU neglected the use of best available emissions information in the screening analysis, and that MANE-VU’s impact assessments did not accurately characterize the regional haze impacts of the LADCO sources on receptors in the MANE-VU region. LADCO explained that MANE-VU’s 2018 projections did not reflect significant shifts in the energy and industrial sections that had occurred.

As to the Michigan sources specifically identified by New Jersey and MANE-VU, EGLE responds that each was subject to a Federal Consent Decree in United States v. DTE Energy, Case No. 2:10-cv-13101-BAF-RSW (E.D. Mich.), which was entered May 14, 2020. https://www.justice.gov/enrd/consent-decree/file/1276421/download (*See* Appendix 8). The Consent Decree required DTE to “retrofit, refuel, or repower” the following units:

- Belle River Units 1 and 2 by December 31, 2030
- St. Clair Units 2, 3, 6 and 7 by December 31, 2022
- Trenton Channel Unit 9 by December 31, 2022

Each unit listed above has already taken measures to reduce emissions beyond the requests themselves. The emission reductions achieved are federally enforceable and permanent, and are discussed in further detail below in Section 3.3 for sources that already have Effective Emission Control Measures.

- St. Clair retired Unit 4 in 2017, Unit 1 in 2019, and Units 2, 3 ,6, and 7 in 2022, while Unit 5 has been retired since 1980. (*See* Appendix 33-A with the Certified Retired Unit Exemption Forms.)
- DTE – Trenton Channel, Unit 9A, retired in 2022. (*See* Appendix 33-C with the Certified Retired Unit Exemption Form.)

- DTE Belle River, Units 1 and 2, were required to operate a low NO_X combustion system with overfire air and became subject to emission limits of 0.290 lb./MMBtu NO_X, 0.680 lb./MMBtu SO_2, and 0.030 lb./MMBtu particulate matter (PM) under the Consent Decree. DTE is also in the process of converting Belle River Units 1 and 2 to natural gas by December 2025 and December 2026, respectively. https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000008puPjAAI (*See* Appendix 9).

As discussed further below under Section 3.3.1, other large emitters of NO_X and SO_2 in the EGU category in Michigan have also experienced shutdowns and retirements since MANE-VU initiated consultation in 2017, such as the coal-fired boilers at the Consumers Energy – Dan E. Karn Plant, Lansing Board of Water and Light (LBWL) – Erickson Station, DTE Electric – River Rouge Power Plant, and Michigan Hub Plant. These shutdowns/retirements of coal-fired EGUs resulted in reduced emissions of greenhouse gases, as well as NOx and SO_2. Michigan expects that these operational changes will have a positive impact on visibility impairment at nearby Class I areas in surrounding states, including those that are part of MANE-VU.

3. Step 3: SELECTION OF SOURCES FOR ANALYSIS

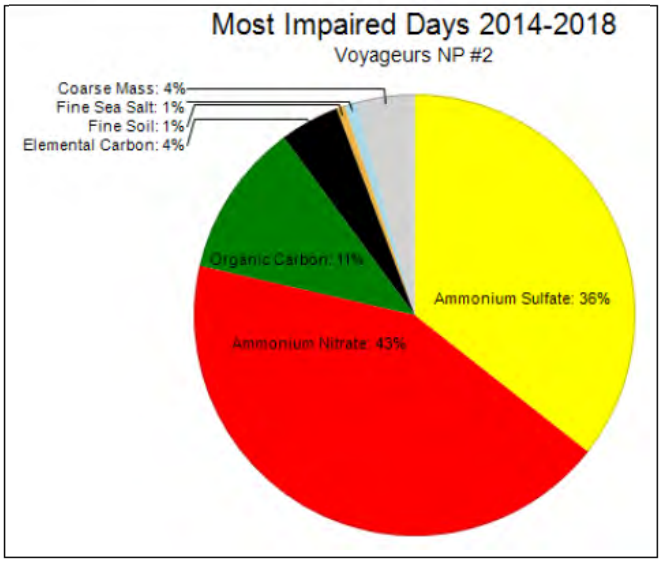
Select the emission sources for which an analysis of emission control measures will be completed in the second implementation period and explain the basis for these selections. For the purpose of this source selection step, a state may consider estimated visibility impacts (or surrogate metrics for visibility impacts), the four statutory factors, the five required factors listed in section 51.308(f)(2)(iv), and other factors that are reasonable to consider.

3.1 Determination of Which Pollutants to Consider

Contributing to regional haze are direct and precursor pollutants that primarily include SO_2, NO_X, fine and coarse PM, volatile organic compounds (VOC), and ammonia (NH_3). Depending on the location of the Class I areas, there may be only certain pollutants and precursors that dominate visibility impairment.

Based on the analyses in LADCO's 2021 Technical Support Document of the IMPROVE monitoring data, NO_X and SO_2 emissions were found to lead to the formation of the particulate species of nitrate and sulfate that currently contribute more to visibility impairment in the LADCO Class I Areas than $PM_{2.5}$, NH_3, and VOC. Figure 5 illustrates the PM species contribution plot for Voyageurs National Park, for which LADCO noted, "The PM species contributions for other LADCO region Class I areas are similar to Voyageurs." *See* LADCO's 2021 Technical Support Document, page 70.

Figure 5: Average PM Species Composition at Voyageurs National Park, Minnesota on the Most Impaired Days during 2014 – 2018



Source: LADCO's 2021 Technical Support Document, Figure 6-2.

The USEPA's August 20, 2019, "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period" (2019 Regional Haze Guidance) states:

> "When selecting sources for analysis of control measures, a state may focus on the PM species that dominate visibility impairment at the Class I areas affected by emissions from the state and then select only sources with emissions of those dominant pollutants and their precursors." 2019 Regional Haze Guidance, page 11.

As discussed below in Section 3.2 Estimation of Baseline Visibility Impacts for Source Selection, EGLE's source selection process followed LADCO's approach in considering the sum of NH_3, NO_X, $PM_{2.5}$ and SO_2 emissions from Michigan sources divided by the distance to the closest Class I area. Then in Section 4 Characterization of Factors for Emission Control Measures, given the predominance of NO_X and SO_2 emissions contributing to visibility impairment at the LADCO Class I areas, EGLE focused on NO_X and SO_2 emissions in the evaluation of control measures necessary for reasonable progress.

3.2 Estimation of Baseline Visibility Impacts for Source Selection

To estimate visibility impacts for the purpose of selecting sources for further evaluation, the 2019 Regional Haze Guidance lists the following techniques from the least complicated to the most complicated and resource-intensive:

1) Emissions divided by distance (Q/d)
2) Trajectory analyses
3) Residence time analyses
4) Photochemical modeling (zero-out and/or source apportionment)

Among the least complicated techniques, a Q/d analysis is a surrogate analysis using tons/year emissions (Q) divided by distance in kilometers (d) from the Class I areas to estimate emissions source impacts at downwind receptors when air quality modeling would be overly resource-intensive and is not therefore a feasible process to support decision making.

3.2.1 Background on Previous Q/d Analysis

In an effort to support Region 5 states in the process of selecting sources/units for the Regional Haze Second Implementation Period, LADCO complied a detailed Q/d Analysis using the National Emissions Inventory (NEI) Collaborative 2016 alpha inventory for NO_X, SO_2, NH_3, VOCs, and fine particulate matter ($PM_{2.5}$) as the best available inventory at that time. *See* ‘‘Base Year Selection Workgroup Final Report,’’ produced by the Inventory Collaborative Base Year Selection Workgroup, April 5, 2017. 2017-12-12_Base_Year_Selection_Report_V1.1.pdf

In Michigan’s 2021 Regional Haze SIP submittal on pages 9-10, EGLE describes how Michigan’s estimation relied on LADCO’s Q/d method to identify sources in the state for a possible four-factor analysis. At the time, EGLE screened in sources using a Q/d > 4 based on 2016 actual emissions to represent approximately 80 percent of emissions from Michigan sources. Through this process, EGLE identified the following sources:

Paper Manufacturing Facilities:
- Neenah Paper
- Verso Quinnesec
- Verso Escanaba

Cement Manufacturer:
- St. Marys – Charlevoix

Lime Facility:
- Graymont – Gulliver

Power Plants:
- DTE – Monroe
- DTE – Belle River
- Consumers Energy – J.H. Campbell
- Consumers Energy – Dan E. Karn

During the FLM consultation process, the FLMs recommended Michigan also address the following facilities:

- Tilden Mining Company LC
- Holcim d/b/a Lafarge Alpena Plant
- LBWL – Erickson Station
- EES Coke Battery LLC
- Midland Cogeneration Venture
- L’Anse Warden Electric Company
- US Steel Great Lakes Works

3.2.2 Revised Q/d Analysis for the Selection of Impacting Sources

In this SIP supplement, EGLE re-examines LADCO's Q/d's analysis to further expand and refine its earlier source selection process.

Using the NEI collaborative 2016 alpha inventory to gather NO_X, SO_2, $PM_{2.5}$, VOCs, and NH_3 emissions data for an exhaustive list of Michigan sources of air pollution, LADCO's 2021 Technical Support Document provided calculations of the unit Q/d for each source. EGLE cross checked the inventory data with the Clean Air Markets Program Data (https://campd.epa.gov/) and the Michigan Air Emissions Reporting Systems Annual Pollutant Totals Query (https://www.egle.state.mi.us/maers/emissions_query.asp).

In selecting a Q/d threshold value that would serve as a metric for identifying sources of high impact potential on visibility impairment at Class I areas, EGLE's Air Quality Division (AQD) intended to set this threshold at a value that would capture nearly 80 percent of the total combined emissions of haze forming pollutants from all sources throughout the state.

The 2019 Regional Haze Guidance states, "In the most simple implementation of Q/d, metrics and thresholds can be defined on the basis of the sum of emissions of all visibility-impairing pollutants." The 2019 Regional Haze Guidance also notes, however, "it may be best to evaluate Q/d metrics on an individual pollutant basis. Additionally, since the magnitude of Q/d may vary considerably when total emissions are considered versus emissions of individual primary PM and precursor pollutants, appropriate pollutant-specific Q/d thresholds…may need to be considered." (2019 Regional Haze Rule, pg. 13.)

Table 8 lists each of the units indexed by LADCO's Q/d analysis with a Q/d of 1.0 or greater. Table 8 includes Q/d by unit level, facility level, and pollutant specific unit level (NO_X and SO_2). Unit level and facility level 'Q' were based on the sum of 2016 actual emissions for NH_3, NO_X, $PM_{2.5}$, and SO_2 in tpy. Pollutant-specific unit level Q was based on 2016 emissions for NO_X and SO_2, individually. The distance 'd' in kilometers (km) was from the source to the closest Class I area (CIA) drawn from the following list:

- Isle Royale National Park (ISLE)
- Seney Wilderness Area (SENE)
- Boundary Waters Canoe Area Wilderness
- Voyageurs National Park (VOYA)
- Mingo Wilderness Area
- Mammoth Cave National Park
- Dolly Sods Wilderness (DOSO)

The emissions for all analyzed sources were totaled and multiplied by a factor of 0.80 (80 percent). The target "80 percent" value functioned as a guidepost for setting a Q/d threshold to identify sources for possible four-factor analyses.

To capture 80 percent of emissions of NO_X and SO_2 collectively, an incremental evaluation led to a threshold Q/d>6 on an individual pollutant basis at the unit level for NO_X and SO_2 separately. As described in the 2019 Regional Haze Guidance, it may be best to evaluate Q/d metrics on an individual pollutant basis since the magnitude of a Q/d based on total emissions may vary considerably from a Q/d based on the individual primary PM and precursor pollutants. Inclusion of the other haze precursors ($PM_{2.5}$, VOC, and ammonia) in the Q/d analysis would not

reflect NO_X and SO_2 as the dominant species contributing to visibility impairment in the LADCO Class I areas. Additionally, a unit pollutant level Q/d approach recognizes that the evaluation of control measures takes place at the unit level, and that addressing NO_X and SO_2 emissions would entail entirely different control systems. In the Q/d analysis below, a pollutant specific unit Q/d>6 threshold captured 70 percent of NO_X and 85 percent of SO_2 emissions, and 79 percent of both NO_X and SO_2, collectively.

In Table 8, units with a pollutant specific unit Q/d>6 are highlighted in green, and units that have retired or have an enforceable commitment to retire by 2028 or soon thereafter are highlighted in orange with an asterisk (*) to differentiate colors for viewing when no color option is available.

Table 8: Sources Listed by Q/d for Source Selection Process

KEY: Green shaded cells: Units selected based on Pollutant Specific Unit Q/d>6
Orange shaded cells with * to differentiate color: Units selected based on retirement

Facility Name	Sector	Agency Unit ID	Facility Unit ID	2016 Base Year Emissions (tpy)					Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)	CIA (km)
				NH3	NO_X	$PM_{2.5}$	SO_2	Total					
TILDEN MINING COMPANY LC	NON-EGU	EU0087	EU Kiln 2–gas fired	0	5070	62.1	3.3	5135.3	42.8	42.3	0.0	108.6	ISLE
		EU0064	EU Kiln 1–gas fired	0	4544.5	143.4	4.1	4691.9	39.2	37.9	0.0		120
		EU0064	EU Kiln 1–coal fired	0	1545	48.7	131.2	1724.9	14.4	12.9	1.1		
		EU0087	EU Kiln 2 –coal fired	0	1320.5	16.2	105.5	1442.1	12	11.0	0.9		
ST. CLAIR / BELLE RIVER POWER PLANT	EGU	EU0120	Belle River Unit 2	0	3950.5	0.9	11590	15541.4	32.5	8.2	24.2	105.1	SENE
		EU0119	Belle River Unit 1	0	3040	0.2	9235	12275.2	25.6	6.3	19.3		479
*ST. CLAIR / BELLE RIVER POWER PLANT	EGU	EU0111	St. Clair Boiler 7	0	1046	2.6	5600	6648.6	13.9	*2.2	*11.7		
		EU0107	St. Clair Boiler 3	0	910	0	1780	2690	5.6	*1.9	*3.7		
		EU0106	St. Clair Boiler 2	0	913.5	0.4	1763	2676.9	5.6	*1.9	*3.7		
		EU0105	St. Clair Boiler 1	0	1273	0.3	2385.5	3658.8	7.6	*2.7	*5.0		
		EU0110	St. Clair Boiler 6	0	596	0.5	3019.5	3616	7.6	*1.2	*6.3		
		EU0108	St. Clair Boiler 4	0	694.5	0	1780.5	2475	5.2	*1.4	*3.7		
	NON-EGU	EU0117	St. Clair Diesel Generator 12-1	0	720.5	12.4	0.3	733.3	1.5	*1.5	*0.0		
*WISCONSIN ELECTRIC POWER COMPANY, Marquette – Presque Isle	EGU	EU0036	Boiler 9	0.1	926.5	0.6	1386.5	2313.7	20.4	*8.2	*12.3	84.9	ISLE
		EU0034	Boiler 7	0.1	934	0.6	1344.5	2279.2	20.1	*8.3	*11.9		113
		EU0035	Boiler 8	0.1	895.5	0.6	1317.5	2213.7	19.5	*7.9	*11.7		
		EU0033	Boiler 6	0.1	503.5	0.4	921.5	1425.4	12.6	*4.5	*8.2		
		EU0032	Boiler 5	0.1	491.2	0.4	914.5	1406.1	12.4	*4.3	*8.1		
EMPIRE IRON MINING PARTNERSHIP	NON-EGU	EU0147	Unit 4	0	2021.5	33.5	271.9	2326.8	19.4	16.8	2.3	41.5	ISLE

Facility Name	Sector	Agency Unit ID	Facility Unit ID	2016 Base Year Emissions (tpy)					Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)	CIA (km)
				NH3	NO_X	$PM_{2.5}$	SO_2	Total					
		EU0143	Unit 2	0	1350	97	50.6	1497.6	12.5	11.3	0.4		120
		EU0145	Unit 3	0	1010.5	96.5	50.4	1157.4	9.6	8.4	0.4		
*J. H. Campbell Plant	EGU	EU0062	Boiler 3	21.1	806.5	17.6	6900	7745.2	20.6	*2.1	*18.4	40.6	SENE
		EU0059	Boiler 1	6	1234.5	8.5	2522.5	3771.5	10	*3.3	*6.7		376
		EU0061	Boiler 2	9.8	305.2	21.7	3427	3763.7	10	*0.8	*9.1		
St. Marys Cement, Inc. - Charlevoix Plant	NON-EGU	RG0148	Compiled Kiln	6.8	2063	34	1178.5	3282.2	27.5	17.3	9.9	27.5	SENE 119
LAFARGE MIDWEST INC. - Alpena	NON-EGU	EU0181	Kiln 23	2.5	1419.5	4.5	452.8	1879.4	7.9	5.9	1.9	25.9	SENE
(Now Holcim (US), Inc.		EU0176	Kiln 22	2.7	1447.5	4.9	490	1945.1	8	6.0	2.0		240
DBA Lafarge Alpena Plant)		EU0161	Kiln 20	1.6	729.5	17.5	544.5	1293.1	5.4	3.0	2.3		
		EU0158	Kiln 19	1.5	630.5	10.3	445.4	1087.6	4.5	2.6	1.9		
*DTE - Electric Company TRENTON CHANNEL	EGU	EU0035	Boiler 9A	0	1763.5	12.1	9395	11170.6	24.2	*3.8	*20.3	25.8	DOS O
		RG0053	High Pressure Boilers	0	179.2	0.2	549.5	728.9	1.6	0.4	1.2		462
Verso Escanaba LLC (Now Billerud Escanaba LLC)	NON-EGU	EU0183	Recovery Furnace 10	0	623.5	107.8	15.2	746.5	7.2	3.1	0.1	22.5	ISLE
		EU0139	No. 11 Power Boiler	0	606.8	12.2	687.4	1306.4	12.7	3.0	3.4		201
		EU0161	Boiler 8	0	261.2	9.2	0.7	271.1	2.6	1.3	0.0		
NEENAH PAPER – MICHIGAN, INC - Munising	NON-EGU	EU0080	Boiler 1	0	264.6	1.4	588.5	854.5	15.5	4.8	10.7	15.5	SENE 55
Detroit Edison DTE Electric Company - Monroe Power Plant	EGU	EU0063	Unit 3	0	1220.5	7.5	800	2028	4.5	2.7	1.8	14.3	DOS O
		EU0064	Unit 4	0	1129.5	4.6	738.5	1872.6	4.1	2.5	1.6		454
		EU0062	Unit 1	0	998.5	4.6	529.5	1532.6	3.4	2.2	1.2		
		EU0068	Unit 2	0	760.5	5.7	275.3	1041.4	2.3	1.7	0.6		
Midland Cogeneration Venture	EGU	RG0063	SV0001	0.0	357.7	19.7	4.4	381.8	1.2	1.1	0.0	11.6	SENE 330
Combined Cycle Gas			SV0002	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		

Facility Name	Sector	Agency Unit ID	Facility Unit ID	2016 Base Year Emissions (tpy)					Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)	CIA (km)
				NH3	NO_X	$PM_{2.5}$	SO_2	Total					
Turbines			SV0003	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0004	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0005	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0011	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0006	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0007	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0008	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0009	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
			SV0012	0.0	321.9	17.7	3.9	343.6	1.0	1.0	0.0		
*B. C. Cobb Plant	EGU	RG0028	Boilers 4 & 5	0.1	643.5	28.1	2712.5	3384.1	10	*1.9	*8.0	10	SENE 339
*DTE - Electric Company RIVER ROUGE	EGU	EU0040	Unit 3	0	1814	4.5	2723.8	4542.3	9.7	*3.9	*5.8	9.7	DOSO 470
*LBWL, Erickson Station	EGU	EU0007	Coal-fired boiler	0.1	1058.5	1.4	2588.5	3648.6	8.8	*2.6	*6.3	8.8	SENE 413
GRAYMONT WESTERN LIME, INC.	NON-EGU	EU0001	EU Kiln 1	0	254.5	13.3	19.6	287.4	8.1	7.1	0.5	8.1	SENE 36
TES Filer City Station	EGU	RG0017	Boilers 1 & 2	0.1	1373.5	46.4	360.1	1780.1	7.7	5.9	1.6	7.7	SENE 232
VERSO QUINNESEC LLC (Now Billerud Quinnesec LLC)	NON-EGU	EU0153	Recovery Furnace	0	603	73.9	14	691	4.2	3.7	0.1	7.6	SENE 164
		EU0159	Waste Fuel Boiler	9.1	418.8	13.2	117.9	558.9	3.4	2.6	0.7		
*LBWL - Eckert Station	EGU	RG0023	Coal Fired Boiler	0.1	785.5	12.4	1858	2656	6.4	*1.9	*4.5	6.4	SENE 412
*Consumers Energy – J.C. Weadock Facility	EGU	RG0060	Weadock 7 & 8	0	510.5	30.9	1635.5	2176.9	6.4	*1.5	*4.8	9.8	SENE 338
*Consumers Energy – D.E. Karn Facility		RG0058	Karn 1 & 2	0	213.8	12	283.9	509.7	3.4	*0.6	*0.8		SENE 338
L'ANSE WARDEN ELECTRIC COMPANY LLC	EGU	EU0009	Boiler 1	0.1	373.5	0.9	243.7	618.2	6.2	4.6	3.0	6.2	ISLE 82
*MARQUETTE BOARD OF LIGHT & POWER - Shiras	EGU	EU0003	Boiler 3	0	196.7	44.5	419	660.1	5.4	*1.7	*3.7	5.4	SENE 114

Facility Name	Sector	Agency Unit ID	Facility Unit ID	2016 Base Year Emissions (tpy)					Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)	CIA (km)
				NH3	NO_X	$PM_{2.5}$	SO_2	Total					
EES COKE BATTERY LLC	NON-EGU	EU0007	Coke Oven Gas Flare	0	521	200.9	1110	1831.9	1.4	1.1	2.4	5.3	DOSO 471
		EU0008	No. 5 Coke Battery	111.8	0	0	0	111.8	3.9	0.0	0.0		
PENINSULA COPPER INDUSTRIES, INC.	NON-EGU			86.5	0	0	0	86.5	3	0.0	0.0	5.3	ISLE
				0	202.9	21.1	503	727	2.3	5.3	13.2		38
J.R. WHITING CO.	EGU	EU0021	Boiler 3	0	217.4	18.8	484.7	720.9	1.6	0.5	1.1	4.6	DOSO
		EU0019	Boiler 1	0	178.3	6.1	440.6	625	1.6	0.4	1.0		453
		EU0020	Boiler 2	14.4	589	7.3	527.5	1138.2	1.4	1.3	1.2		
Marquette Branch Prison	NON-EGU	EU0005	Diesel Electric Generator	0	161.9	12.3	10.6	184.7	1.6	1.4	0.1	3.3	SENE 113
		EU0006	Diesel Electric Generator	0	161.9	12.3	10.6	184.7	1.6	1.4	0.1		
Guardian Industries, LLC	NON-EGU	EU0079	Line 1	0	917	271.5	343.9	1532.4	3.3	2.0	0.7	3.3	DOSO 470
GREAT LAKES GAS TRANSMISSION STATION #10	OIL GAS	EU0006	Unit 1001	0	61.3	2.6	1.4	65.3	1.5	1.4	0.0	2.7	SENE 44
		EU0007	Unit 1002	0	49.1	2.1	1.1	52.2	1.2	1.1	0.0		
Morton Salt, Inc.	NON-EGU	EU0023	Boiler	0	161.3	15	393.9	570.2	2.5	0.7	1.7	2.5	SENE 230
J.B. Sims Generating Station	EGU	EU0023	PC Boiler	0	459.4	9.5	364.9	833.8	2.3	1.3	1.0	2.3	SENE 359
CARMEUSE LIME, INC., RIVER ROUGE OPERATION	NON-EGU	RG0025	Kilns 1 & 2	0	565	6.2	438.2	1009.4	2.1	1.2	0.9	2.1	DOSO 471
WEYERHAEUSER NR COMPANY	NON-EGU	RG0062	Dryers 1, 2, 3, 4 and Coen Burner	0	94.2	339.7	3.1	437	2.1	0.4	0.0	2.1	SENE 213
Consumers Energy - Muskegon River Compressor Station	OIL GAS	RG0062	Engines H9, H10, H11, H12 (HBA-10) and T11, T12	0	508.7	7.8	0.1	516.5	2	2.0	0.0	2	SENE 257

Facility Name	Sector	Agency Unit ID	Facility Unit ID	2016 Base Year Emissions (tpy)					Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)	CIA (km)
				NH3	NO_X	$PM_{2.5}$	SO_2	Total					
ANR Pipeline Company - Lincoln Compressor Station	OIL GAS	EU0017	Natural Gas Compressor Engine	0	497.8	8.4	0.1	506.3	1.8	1.8	0.0	1.8	SENE 274
Cadillac Renewable Energy Facility	EGU	EU0006	Wood/bark Boiler	9	177.7	17.1	57.7	261.3	1.1	0.8	0.3	1.1	SENE 229
Packaging Corporation of America - Filer City Mill	NON-EGU	EU0037	Boiler 1	2.8	246.7	6.7	0.5	256.7	1.1	1.1	0.0	1.1	SENE 232
Great Lakes Gas - Farwell Compressor Station 12	OIL GAS	EU0016	Natural Gas Engine	0	279.9	8.5	0.1	288.5	1.1	1.0	0.0	1.1	SENE 274
Viking Energy of McBain	EGU	EU0003	Wood Fired Boiler	0	37.8	2.2	206.7	246.7	1	0.2	0.9	1	SENE 239
DETROIT RENEWABLE POWER LLC	EGU	EU0020	Boiler 11	0	435.4	3	45.6	484	1	0.9	0.1	1	DOSO 475
TOTAL EMISSIONS for Sources with Unit Q/d of 1.0 or Greater				287	68,547	2,259	91,160	162,252					
TOTAL Emissions from Sources with Unit Q/d > 6 per Pollutant + Retirements					48,273		77,413						
% of Total Emissions Represented by Selected Sources					**70%**		**85%**						

Source:

- LADCO's "Modeling and Analysis for Demonstrating Reasonable Progress for the Regional Haze Rule 2018 – 2028 Planning Period: Technical Support Document," June 17, 2021. *See* Appendices G and H.
- LADCO's 2021 Technical Support Document Modeling Files for the 2016 base year, 2028 modeling, specifically the "Process level report of Q/D sources (Haze_Control_Sheet_6.9.xlsx)" spreadsheet posted on LADCO's electronic docket at https://www.ladco.org/reports/technical-support/ladco-regional-haze-tsd-second-implementation-period/
- Clean Air Markets Program Data https://campd.epa.gov/
- Michigan Air Emissions Reporting Systems Annual Pollutant Totals Query https://www.egle.state.mi.us/maers/emissions_query.asp

To summarize, the application of the pollutant specific unit Q/d>6 threshold as a screening tool for the Q/d data compiled by LADCO generated the following updated list of 'selected sources' for possible four-factor analyses. Although the FLMs recommended selecting EES Coke Battery LLC, Midland Cogeneration Venture, L'Anse Warden Electric Company, and US Steel Great Lakes Works, emissions for these sources were below the pollutant specific unit Q/d>6 threshold and beyond EGLE's 80 percent target. As shown in Table 9 below, the pollutant specific unit Q/d>6 threshold level captured Michigan's largest sources with the greatest impacts on visibility impairment.

Table 9: Sources Selected for Possible Four-factor Analysis

KEY: Green shaded cells: Units selected based on Pollutant Specific Unit Q/d>6
Orange shaded cells with * to differentiate colors: Units selected based on Retirement

Facility Name	Sector	Facility Unit ID	Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)
TILDEN MINING COMPANY LC	NON-EGU	EU Kiln 2–gas fired	42.8	42.3	0.0	108.6
		EU Kiln 1–gas fired	39.2	37.9	0.0	
		EU Kiln 1–coal fired	14.4	12.9	1.1	
		EU Kiln 2 –coal fired	12	11.0	0.9	
ST. CLAIR / BELLE RIVER POWER PLANT	EGU	Belle River Unit 2	32.5	8.2	24.2	105.1
		Belle River Unit 1	25.6	6.3	19.3	
*ST. CLAIR / BELLE RIVER POWER PLANT	EGU	St. Clair Boiler 7	13.9	*2.2	*11.7	
		St. Clair Boiler 3	5.6	*1.9	*3.7	
		St. Clair Boiler 2	5.6	*1.9	*3.7	
		St. Clair Boiler 1	7.6	*2.7	*5.0	
		St. Clair Boiler 6	7.6	*1.2	*6.3	
		St. Clair Boiler 4	5.2	*1.4	*3.7	
	NON-EGU	St. Clair Diesel Generator 12-1	1.5	*1.5	*0.0	
*WISCONSIN ELECTRIC POWER COMPANY, Marquette – Presque Isle	EGU	Boiler 9	20.4	*8.2	*12.3	84.9
		Boiler 7	20.1	*8.3	*11.9	
		Boiler 8	19.5	*7.9	*11.7	
		Boiler 6	12.6	*4.5	*8.2	
		Boiler 5	12.4	*4.3	*8.1	
EMPIRE IRON MINING PARTNERSHIP	NON-EGU	Unit 4	19.4	16.8	2.3	41.5
		Unit 2	12.5	11.3	0.4	
		Unit 3	9.6	8.4	0.4	
*J. H. Campbell Plant	EGU	Boiler 3	20.6	*2.1	*18.4	40.6
		Boiler 1	10	*3.3	*6.7	
		Boiler 2	10	*0.8	*9.1	
St. Marys Cement, Inc. - Charlevoix Plant	NON-EGU	Compiled Kiln	27.5	17.3	9.9	27.5
LAFARGE MIDWEST INC. – Alpena (Now Holcim (US), Inc. DBA Lafarge Alpena Plant	NON-EGU	Kiln 23	7.9	5.9	1.9	25.9
		Kiln 22	8	6.0	2.0	
*DTE - Electric Company TRENTON CHANNEL	EGU	Boiler 9A	24.2	*3.8	*20.3	25.8

Facility Name	Sector	Facility Unit ID	Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)
Verso Escanaba LLC (Now Billerud Escanaba LLC)	NON-EGU	Recovery Furnace 10	7.2	3.1	0.1	22.5
		No. 11 Power Boiler	12.7	3.0	3.4	
NEENAH PAPER – MICHIGAN, INC. - Munising	NON-EGU	Boiler 1	15.5	4.8	10.7	15.5
*B. C. Cobb Plant	EGU	Boilers 4 & 5	10	*1.9	*8.0	10
*DTE - Electric Company RIVER ROUGE	EGU	Unit 3	9.7	*3.9	*5.8	9.7
*LBWL, Erickson Station	EGU	Coal-fired boiler	8.8	*2.6	*6.3	8.8
GRAYMONT WESTERN LIME, INC.	NON-EGU	EU Kiln 1	8.1	7.1	0.5	8.1
*LBWL - Eckert Station	EGU	Coal Fired Boiler	6.4	1.9	4.5	6.4
*Consumers Energy – J.C. Weadock Facility	EGU	Weadock 7 & 8	6.4	*1.5	*4.8	9.8
*Consumers Energy – D.E. Karn Facility		Karn 1 & 2	3.4	*0.6	*0.8	
*MARQUETTE BOARD OF LIGHT & POWER – Shiras	EGU	Boiler 3	5.4	*1.7	*3.7	5.4

3.3 Sources that already have Effective Emission Control Measures

The 2019 Regional Haze Guidance explains that it may be reasonable for a state not to select sources for a four-factor analysis if those sources already have effective emission controls in place. (*See* 2019 Regional Haze Guidance, pg. 22.)

3.3.1 Sources with Retirements

As explained in the 2019 Regional Haze Guidance, under 40 CFR 51.308(f)(1)(iv)(C), states may consider source retirement and replacement schedules in not selecting sources for a four-factor analysis if they have an enforceable commitment to retire by 2028 or soon thereafter. Within the 2021 Clarifications Memorandum, the USEPA articulates that "anticipated source shutdowns could be considered the most stringent on-the-way measure and may be relied upon to forgo a four-factor analysis or shorten the remaining useful life of a source." (*See* 2021 Clarifications Memo, pg. 10.)

Michigan's 2021 Regional Haze SIP submittal discussed plans for upcoming retirements at facilities that were selected for evaluation. Of the sources selected for a possible four-factor analysis under Section 3.2.2 above, this SIP supplement provides confirmation of those sources that have retired as well as those having an enforceable commitment to retire by 2028.

EGLE selected for evaluation the retirements of coal and fossil fuel-fired electrical generation at 30 EGUs at 12 different power plants during the second implementation period. Based on the 2016 emissions inventory, retirements that have already occurred during the second implementation period between 2018 and 2024 account for 17,417 tpy NO_X and 42,655 tpy SO_2. Three additional coal-fired EGUs are required to retire under a settlement agreement by May 31, 2025. These retirements represent additional reductions in emissions of 2,346 tpy NO_X and 12,850 tpy SO_2 based on the 2016 inventory. Together, these reductions represent a historically significant decrease in Michigan's statewide emissions by 30 percent for NO_X and 65 percent for SO_2 from all units in the second implementation period with a sum Q/d of 1.0 or greater.

Two additional coal-fired EGUs will be retired under the same settlement agreement by May 31, 2031, representing additional reductions of 40 tpy of NO_X and 58 tpy of SO_2 in the third implementation period.

Table 10 lists the permanent shutdowns/retirements of 44 units from 18 different Michigan power plants, which occurred during 2016 – 2024. Retirements that occurred during 2016 and 2017 before the beginning of the second implementation period are also included in Table 10 below for completeness given that LADCO's Q/d source selection process and 2028 projection modeling were based on units that were operating in 2016. Other retirements that have occurred since 2016 for sources that were not included in LADCO's Q/d list have also been included in Table 10 below.

The shutdowns/retirements of these units are considered permanent and enforceable. Under EGLE's regulations, when a unit is no longer permitted to operate, the unit cannot resume operation without being considered a "new" unit subject to New Source Review and Prevention of Significant Deterioration (PSD).

USEPA Retired Unit Exemption Forms have been included in the appendices for each unit. (*See* Appendix 33.) With each Retired Unit Exemption Form filed with the USEPA, the owner/operator certifies the date the unit was or will be retired and that the unit shall not emit any NO_X or SO_2 from that date forward.

Although not all the units listed in Table 10 were selected during EGLE's revised source selection process mentioned previously, EGLE is adopting the retirements that occurred during the second implementation period between 2018 to 2024 into the LTS since the retirements are already federally enforceable and permanent.

Table 10: Retirements of Michigan EGUs from 2016 – 2024

Facility Name	Sector	Facility Unit ID	Retirement Date	2016 Emissions (tpy)			
				NH3	NO_X	$PM_{2.5}$	SO_2
ST. CLAIR / BELLE RIVER POWER PLANT	EGU	St. Clair Boiler 7	5/31/2022	0	1046	2.6	5600
		St. Clair Boiler 3	5/31/2022	0	910	0	1780
		St. Clair Boiler 2	5/31/2022	0	913.5	0.4	1763
		St. Clair Boiler 1	3/27/2019	0	1273	0.3	2385.5
		St. Clair Boiler 6	5/31/2022	0	596	0.5	3019.5
		St. Clair Boiler 4	11/13/2017	0	694.5	0	1780.5
WISCONSIN ELECTRIC POWER COMPANY, Marquette – Presque Isle	EGU	Boiler 9	4/8/2019	0.1	926.5	0.6	1386.5
		Boiler 7	4/8/2019	0.1	934	0.6	1344.5
		Boiler 8	4/8/2019	0.1	895.5	0.6	1317.5
		Boiler 6	4/8/2019	0.1	503.5	0.4	921.5
		Boiler 5	4/8/2019	0.1	491.2	0.4	914.5
DTE - Electric Company TRENTON CHANNEL	EGU	Boiler 9A	7/8/2022	0	1763.5	12.1	9395
		Unit 16	4/16/2016				
		Unit 17	4/16/2016				
		Unit 18	4/16/2016		86.2		263
		Unit 19	4/16/2016		286.8		94
B. C. Cobb Plant	EGU	Boiler 4	4/15/2016	0.1	643.5	28.1	2712.5
		Boiler 5	4/15/2016		215.6		1449.6
DTE - Electric Company RIVER ROUGE	EGU	Unit 1	6/7/2021	0	1814	4.5	2723.8
		Unit 2	4/16/2016		0	0	0

Facility Name	Sector	Facility Unit ID	Retirement Date	2016 Emissions (tpy)			
				NH3	NO_X	$PM_{2.5}$	SO_2
		Unit 3	6/1/2021		1859.4	3.6	2805.7
LBWL, Erickson Station	EGU	Unit 1	11/28/2022	0.1	1058.5	1.4	2588.5
LBWL, Eckert Station	EGU	Unit 1	12/31/2020	0.1	785.5	12.4	1858
		Unit 3	12/31/2020				
		Unit 4	5/31/2021				
		Unit 5	12/31/2020				
		Unit 6	12/31/2020				
Consumers Energy – J.C. Weadock Facility	EGU	Weadock 7	4/15/2016	0	510.5	30.9	1635.5
		Weadock 8	4/15/2016				
Consumers Energy – D.E. Karn Facility		Karn 1	6/1/2023	0	213.8	12	283.9
		Karn 2	6/1/2023				
MARQUETTE BOARD OF LIGHT & POWER - Shiras	EGU	Boiler 3	4/29/2019	0	196.7	44.5	419
Michigan Hub Plant	EGU	Unit 1	9/30/2017		132.9	0.8	139.5
DTE – Pontiac North LLC		EUBHB9	1/10/2017	0	0	0	0
Graphic Packing International, Inc. - Kalamazoo		Unit BLR08	10/07/2024		82.1	4.5	0.4
J B Sims		Unit 3	6/1/2020	0	459.4	9.5	364.9
J R Whiting		Unit 1	4/15/2016	0	217.4	18.8	484.7
		Unit 2	4/15/2016	0	178.3	6.1	440.6
		Unit 3	4/15/2016	14.4	589	7.3	527.5
James De Young		Unit 5	6/1/2017		0.1	0	0
Consumers Energy - Thetford		Unit 2	6/1/2019		0		0.6
		Unit 3	4/1/2018		0		0.8
		Unit 4	6/1/2019		0		1.5
Wyandotte		Unit 8	6/30/2016		0	0	0.0

In addition to the retirements that have already occurred, the following units will be retired in the future, although not all were selected for a possible four-factor analysis under Section 3.2.2.

- **Consumers Energy – J.H. Campbell Plant: Units 1, 2, and 3**

  Units 1, 2, and 3 are discussed in detail in Michigan's 2021 Regional Haze SIP submittal on pages 14, 20, and 21 (*See* Appendix 1). This SIP supplement provides further elaboration.

  Consumers Energy – J.H. Campbell Power Plant is subject to a settlement agreement approved by the Michigan Public Service Commission on April 20, 2020, which requires closure/retirement of coal-fired Units 1, 2, and 3 on or before May 31, 2025. *See* April 20, 2022, Settlement Agreement – Michigan Public Service Commission, Case No. U-21090 – In the Matter of the Application of Consumers Energy Company for Approval of and Integrated Resource Plan under MCL 460.6t, certain accounting approvals, and for other relief. https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000002gLkGAAU (*See* Appendix 10).

  The settlement agreement was executed by Consumers Energy Company, the Michigan Public Service Commission staff, Michigan Environmental Council, the Natural Resources Defense Council, the Sierra Club, Attorney General Dana Nessel, Environmental Law and Policy Center, Vote Solar, Ecology Center, Union of Concerned

Scientists, Urban Core Collective, Citizens Utility Board of Michigan, Hemlock Semiconductor Operations LLC, Michigan Energy Innovation Business Council, Institute for Energy Innovation, Clean Grid Alliance, Michigan Electric Transmission Company LLC, and Great Lakes Renewable Energy Association.

The settlement agreement was affirmed in the State of Michigan Court of Appeals. *See* No. 362294 Public Service Commission, LC No. 00-021090, March 23, 2023. https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/0688y000007I2GEAA0 (*See* Appendix 11).

When retired sometime before May 31, 2025, the permanent shutdown of coal-fired Units 1, 2 and 3 at Consumers Energy – J.H. Campbell Power Plant will represent a reduction in emissions of 2,346 tpy NO_X and 12,850 tpy SO_2 based on the 2016 inventory.

- **Consumers Energy – Dan E. Karn, Units 3 and 4**

  Units 3 and 4 are discussed in detail in Michigan's 2021 Regional Haze SIP submittal on pages 14,15, 21, and 22 (*See* Appendix 1). This SIP supplement provides further elaboration.

  Consumers Energy – Dan E. Karn Power Plant is subject to the same settlement agreement mentioned above for the J.H. Campbell Plant that was approved by the Michigan Public Service Commission on April 20, 2022. The settlement agreement requires closure/retirement of coal-fired Units 3 and 4 at Consumers Energy – Dan E. Karn on or before May 31, 2031. *See* April 20, 2022, Settlement Agreement - Michigan Public Service Commission, Case No. U-21090 (*See* Appendix 10). In 2023, Consumers Energy voluntarily converted Units 3 and 4 from coal to natural gas and fuel oil – approximately 8 years ahead of its 2031 retirement deadline. https://www.consumersenergy.com/news-releases/news-release-details/2023/06/14/15/30/consumers-energy-takes-next-step-to-clean-energy-future-by-closing-karn-coal-plants.

  Although 2031 is beyond the end of the second implementation period in 2028, the 2019 Regional Haze Guidance states, "if a source is certain to close by December 31, 2028 (or soon thereafter), under an enforceable requirement, a state can reasonably consider that to be sufficient reason to remove the source from further analysis and reasonable progress consideration" (2019 Regional Haze Guidance, pg. 42).

  Although Units 3 and 4 did not appear on LADCO's list in Table 8 because the Q/d for both units was below 1.0, the emission reductions are still noteworthy. When retired sometime before May 31, 2031, the permanent shutdown of coal-fired Units 3 and 4 at Consumers Energy – Dan E. Karn will represent a reduction in emissions of 40 tpy NO_X and 58 tpy SO_2 based on the 2016 inventory.

3.3.2 Source that is Indefinitely Idled

- **Cleveland-Cliffs, Inc. – Empire Iron Mining Partnership**

  Empire Iron Mining Partnership was among the sources screened in using EGLE's revised Q/d analysis based on emissions from a 2016 base year; however, since 2016, the facility has been idled indefinitely. A recent January 17, 2024, on-site inspection report by EGLE's AQD documented the following conditions:

  > "Production at the facility ceased on August 3, 2016, and the mine was indefinitely idled after the last stockpile of finished pellets were shipped. While there are currently no plans in place to begin production, the facility is being preserved in a care and maintenance mode to preserve its ability to restart when market conditions and pellet pricing support access of remaining ore reserves. The facility would need to undergo significant maintenance to restart production, and a large wastewater treatment plant would need to be constructed in order to treat the water currently in the pit."
  >
  > "Empire is considered a major source and is required to report its annual emissions through the Michigan Air Emissions Reporting System (MAERS). However, the facility has been idled since 2016, so no emissions have been reported since then." *See* EGLE's AQD Activity Report: On-Site Inspection, January 17, 2024. https://www.egle.state.mi.us/aps/downloads/SRN/B1827/B1827_SAR_20240117.pdf (*See* Appendix 12).

  Given the uncertainty of future operations and the significant maintenance and construction that would need to take place to restart production, EGLE did not select this source for an analysis of control measures for the second implementation period. If the facility resumes operations, EGLE will revisit and revise its determination not to select this source for an analysis of control measures.

3.3.3 Sources with Existing Effective Control Measures

The USEPA provided clarification for sources with existing effective control measures in a memorandum entitled, "Clarifications Regarding Regional Haze State Implementation Plans for the Second implementation Period," July 8, 2021 (2021 Clarifications Memo).[3] The USEPA stated that "a source that otherwise would undergo four-factor analysis (e.g., because it exceeds a threshold of emissions divided by distance or Q/d, visibility, or other source-selection threshold) may forgo a full four-factor analysis if it is already 'effectively controlled.'" (*See* 2021 Clarifications Memo, pg. 5.) The 2019 Regional Haze Guidance provided examples to illustrate scenarios in which the USEPA believes it may be reasonable for a state not to select a particular source that is effectively controlled for further analysis. (*See* 2019 Regional Haze Guidance, pages 22-25.)

The USEPA noted in the 2021 Clarifications Memo that after a state first assesses whether a source operates an 'effective control,' a "source's existing measures are generally needed to prevent future visibility impairment; i.e., to prevent future emission increases, and thus

[3] https://www.epa.gov/system/files/documents/2021-07/clarifications-regarding-regional-haze-state-implementation-plans-for-the-second-implementation-period.pdf

necessary to make reasonable progress. Measures that are necessary to make reasonable progress must be included in the SIP. However, there may be circumstances in which a source's existing measures are not necessary to make reasonable progress." (*See* 2021 Clarifications Memo, pg. 9.) To support such a determination, the USEPA described a weight-of-evidence demonstration based on the source's most recent 5-year historical emission rate, projected emissions and emission rate, and enforceable limits related to its existing measures to demonstrate that "the source has consistently implemented its existing measures and has achieved, using those measures, a reasonably consistent emission rate." (*See* 2021 Clarifications Memo, pg. 9.)

EGLE determined that the following sources, identified through EGLE's source selection process in Table 9 above, are effectively controlled, thereby forgoing a full four-factor analysis. Additionally, EGLE demonstrates below that the effectively controlled measures are not necessary to include in the regulatory portion of the SIP to prevent future emission increases and to make reasonable progress during the second implementation period consistent with the 2021 Clarifications Memo in Section 4.1.

To assist in making the determinations, EGLE supplemented LADCO's Q/d analysis and 2028 modeled projections with data from the Michigan Air Emissions Reporting Systems Annual Pollutant Totals Query (https://www.egle.state.mi.us/maers/emissions_query.asp), Clean Air Markets Program Data (Clean Air Markets Program Data (CAMPD) | US EPA), and the USEPA's 2022v1 Emissions Modeling Platform (https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform). The USEPA's 2022v1 Emissions Modeling Platform is based on the most recent 2020 National Emissions Inventory, which was released in the spring of 2023, and provides updated emissions data for 2022, as well as modeling of emissions data on a facility-wide basis for future years of 2026, 2032, and 2038.

Table 11: Units with Existing Effective Control Measures

Facility Name	Sector	Facility Unit ID	Q/d NOX	Q/d SO_2
TILDEN MINING COMPANY LC	NON-EGU	EU Kiln 1–gas fired	37.9	
		EU Kiln 1–coal fired	12.9	
ST. CLAIR / BELLE RIVER POWER PLANT	EGU	Belle River Unit 2	8.2	24.2
		Belle River Unit 1	6.3	19.3
St. Marys Cement, Inc. - Charlevoix Plant	NON-EGU	Compiled Kiln	17.3	9.9
LAFARGE MIDWEST INC. – Alpena (Now Holcim (US), Inc. DBA Lafarge Alpena Plant	NON-EGU	Kiln 23	5.9	
		Kiln 22	6.0	
NEENAH PAPER – MICHIGAN, INC. - Munising	NON-EGU	Boiler 1		10.7

3.3.3.1 TILDEN MINING COMPANY LC

- Kiln 1:
  Q/d NO_X 37.9 – Natural gas-fired
  Q/d NO_X 12.9 – Coal-fired
  Q/d NO_X 50.8 – Overall

Tilden Mining Company LC, Kiln 1 is described in detail in Michigan's 2021 Regional Haze SIP submittal on pages 12 and 19.

Nearly three years after Michigan submitted its 2021 Regional Haze SIP, on April 23, 2024, the USEPA published a proposed settlement agreement in Cleveland-Cliffs, Inc. v. Environmental Protection Agency, Case No. 16-2643, which was published in the Federal Register (89 FR 30360). https://www.govinfo.gov/content/pkg/FR-2024-04-23/pdf/2024-08612.pdf (*See* Appendices 13 and 14).

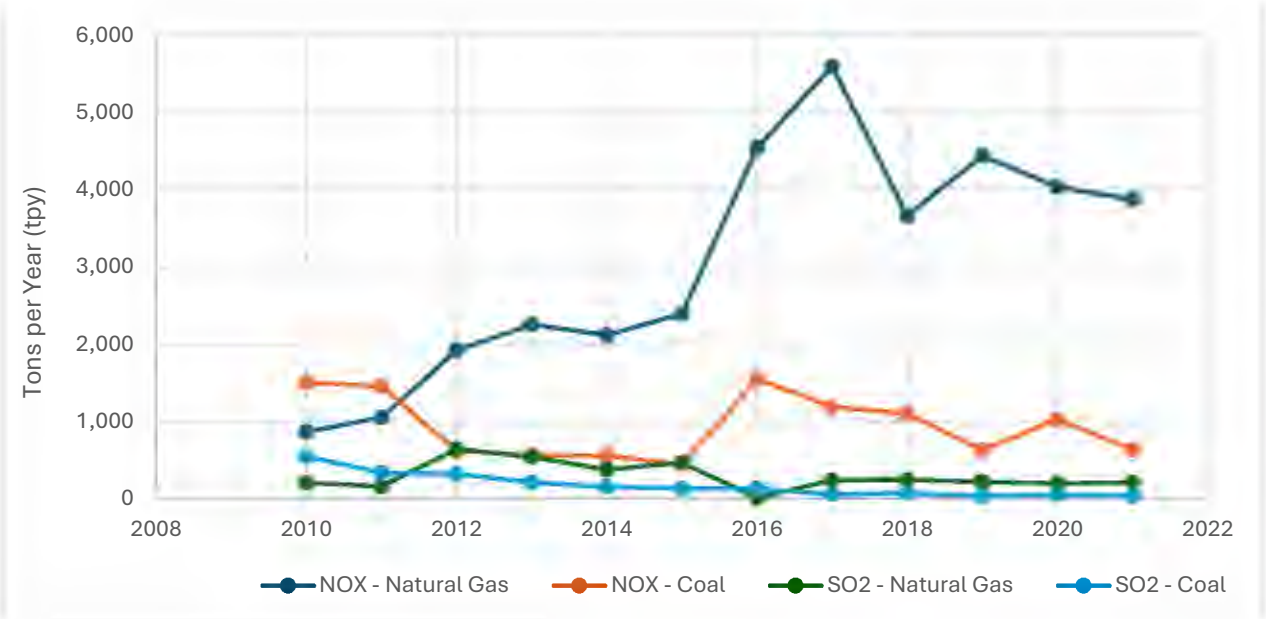
If finalized, the proposed settlement agreement would set forth revised NO_X Best Available Retrofit Technology (BART) limits for Kiln 1 in a Federal Implementation Plan (FIP) that would be incorporated into Tilden's Renewable Operating Permit (ROP) at the state level. On December 4, 2024, the USEPA proposed a revision to the Taconite FIP for Michigan and Minnesota, which includes NO_X and/or SO_2 limits for Kiln 1 based on the conditions within the proposed settlement agreement detailed in the paragraph above.

Despite ongoing litigation surrounding the NO_X/SO_2 BART limits established in the 2015 FIP Rule, Tilden's ROP has been modified to add a condition specifying that the facility must comply with the applicable requirements of 40 CFR Part 52, Approval and Promulgation of Implementation Plans, Subpart X—Michigan, Section 52.1183 Visibility Protection, which would include the newly proposed BART limits for Kiln 1 beginning 30 days after the date of publication in the Federal Register. EGLE would then re-open the ROP and incorporate the FIP BART limits into the ROP in accordance with the renewal schedule.

Given the current situation, it would be illogical for the AQD to pursue further NO_X control measures while previously litigated federal requirements are in the process of being settled at the federal level. When the revised FIP is finalized, the revised limits for Kiln 1 will be federally enforceable, the ROP will incorporate the FIP BART limits, and Kiln 1 will be considered effectively controlled. Until the FIP is finalized, EGLE cannot yet include the revised FIP in Michigan's LTS.

Figure 6 and Table 12 illustrate the annual emissions from Kiln 1 as fired by natural gas and coal from 2010 to 2021.

Figure 6: Tilden Mining Company LC, Kiln 1 - Annual Emissions (in tons) as fired by Natural Gas and Coal (2010 – 2021)



Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 12: Tilden Mining Company LC, Kiln 1: Annual Emissions (in tons) as fired by Natural Gas and Coal (2010 – 2021)

Year	NOX - Natural Gas	NOX - Coal	SO_2 - Natural Gas	SO_2 - Coal
2010	862	1,498	203	543
2011	1,046	1,453	155	331
2012	1,919	617	639	316
2013	2,250	558	537	205
2014	2,116	551	373	150
2015	2,391	440	462	131
2016	4,545	1,545	4	131
2017	5,595	1,186	237	50
2018	3,663	1,097	240	72
2019	4,438	626	216	31
2020	4,033	1,025	195	50
2021	3,870	631	205	34

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

3.3.3.2 DTE – ST. CLAIR/BELLE RIVER POWER PLANT

- Belle River Unit 1, Q/d NO_X: 6.3; Q/d SO_2: 19.3
- Belle River Unit 2, Q/d NO_X: 8.2; Q/d SO_2: 24.2

DTE – St. Clair/Belle River Power Plant, Belle River Units 1 and 2, are discussed in detail in Michigan's 2021 Regional Haze SIP submittal on pages 13 and 20. This SIP supplement provides further elaboration.

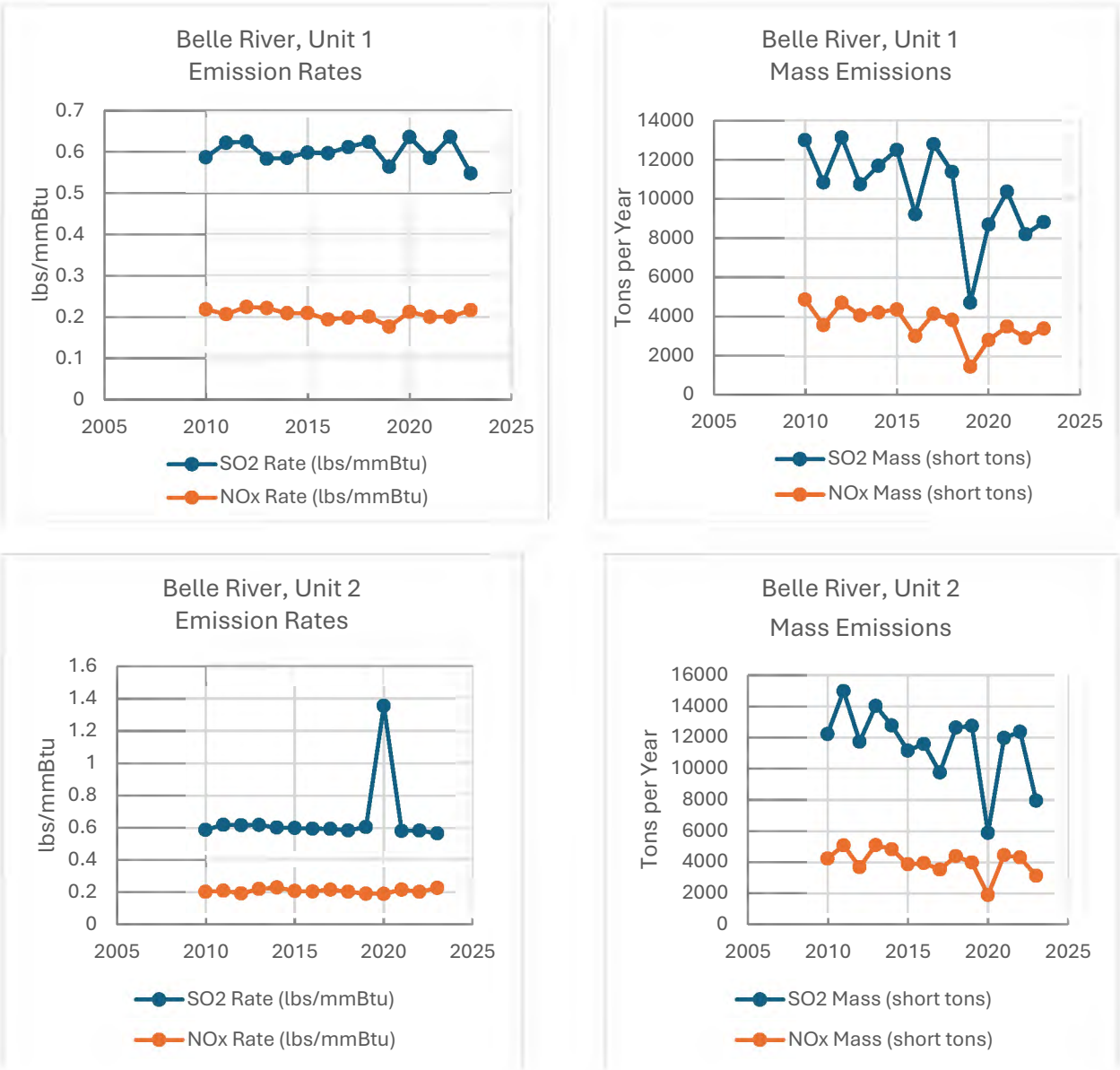
DTE – Belle River, Units 1 and 2 are subject to a federal Consent Decree. *See* United States v. DTE Energy, Case No. 2:10-cv-13101-BAF-RSW (E.D. Mich)., Consent Decree filed May 14, 2020. (*See* Appendix 8, https://www.justice.gov/enrd/consent-decree/file/1276421/download.) The Consent Decree requires DTE to "retrofit, refuel, or repower" Belle River Units 1 and 2 by December 31, 2030. According to news outlets, DTE – Belle River Units 1 and 2 will be converted to natural gas ahead of schedule by December 2025 and December 2026, respectively. (*See* Appendix 9: 12-14-2022 Power Engineering Article: https://www.power-eng.com/coal/dte-energy-officially-retires-two-coal-plants/#gref.) (*See* also Appendix 16: 9-5-2024 WPHM News Article, https://www.wphm.net/2024/09/05/belle-river-gas-conversion-begins-next-year/#:~:text=The%20%24154%20million%20investment%20is,a%20tour%20of%20the%20plant.")

Although the Consent Decree does not require Belle River Units 1 and 2 to retrofit, refuel or repower until December 31, 2030, two years beyond the end of the second implementation period in 2028, the 2019 Regional Haze Guidance notes, "The year 2028 is not a bright line for these considerations, so a state may be able to justify not selecting a source for analysis of control measures because there is an enforceable requirement for the source to cease operation by a date after 2028." (*See* 2019 Regional Haze Guidance, pg. 20.) Although not fully ceasing operation by 2028, in this case, Belle River Units 1 and 2 have an enforceable requirement to cease operation with the use of coal by 2030.

Since Belle River Units 1 and 2 are considered effectively controlled under the Federal Consent Decree and the Consent Decree is already federally enforceable, EGLE is including it in Michigan's LTS for the second implementation period.

Figure 7 and Table 13 depict the SO_2 and NO_X annual emission rates and mass emissions from 2010 – 2023 for Belle River Unit 1 and Unit 2. With the retrofitting, refueling, or repowering under the Consent Decree, emission rates are expected to decrease dramatically, preventing future emission increases and future visibility impairment, leading to reasonable progress.

Figure 7: DTE – St. Clair/Belle River Power Plant: Belle River Units 1 and 2: Emission Rates and Mass Emissions (2010 – 2023)



Source: Clean Air Markets Program Data
https://campd.epa.gov/

Table 13: DTE – St. Clair/Belle River Power Plant, Belle River Units 1 and 2: Emission Rates and Mass Emissions (2010 – 2023)

Unit	Year	SO_2 (lb./MMBtu)	NO_X (lb./MMBtu)	SO_2 (tpy)	NO_X (tpy)
1	2010	0.587	0.218	12992.33	4888.729
	2011	0.6218	0.2063	10844.55	3594.419
	2012	0.6248	0.2239	13127.13	4730.661
	2013	0.5834	0.2209	10752.03	4086.574
	2014	0.5857	0.2088	11691.05	4239.782
	2015	0.5982	0.2091	12495.72	4385.617
	2016	0.5968	0.1938	9235.916	3043.498
	2017	0.6114	0.1981	12793.03	4169.662
	2018	0.6238	0.2007	11384.78	3857.1
	2019	0.5644	0.1768	4739.351	1480.958
	2020	0.6359	0.212	8704.394	2835.029
	2021	0.5853	0.2003	10377.34	3516.849
	2022	0.6361	0.2002	8212.738	2940.672
	2023	0.5483	0.2161	8831.158	3418.006
2	2010	0.5885	0.2029	12229.09	4245.376
	2011	0.6202	0.21	14987.74	5092.765
	2012	0.6171	0.1934	11741.21	3694.442
	2013	0.6194	0.2206	14034.35	5111.914
	2014	0.6026	0.2301	12775.47	4841.232
	2015	0.6002	0.2087	11166.33	3878.082
	2016	0.5962	0.2052	11591.58	3954.595
	2017	0.5951	0.2167	9765.679	3544.41
	2018	0.5854	0.2038	12637.73	4395.036
	2019	0.6063	0.1915	12753.45	3988.847
	2020	1.3551	0.1904	5892.147	1911.493
	2021	0.5823	0.2166	11973.83	4459.964
	2022	0.5846	0.203	12375.95	4313.716
	2023	0.5671	0.2269	7961.242	3142.187

Source: Clean Air Markets Program Data
https://campd.epa.gov/

3.3.3.3 St. Marys Cement, Inc. – Charlevoix Plant

- Compiled Kiln, Q/d NO_X: 17.3; Q/d SO_2: 9.9

St. Marys Cement, Inc. – Charlevoix Plant, Kiln 1 is described in detail in Michigan's 2021 Regional Haze SIP submittal on pages 13, 19, and 20.

NO_X:
In 2012, the USEPA promulgated a FIP for St. Marys Cement, Inc. – Charlevoix Plant. *See* Proposed Rule 77 FR 46912 (8/6/2012), (https://www.govinfo.gov/content/pkg/FR-2012-08-

06/pdf/2012-19039.pdf) and Final Rule 77 FR 71533 (12/3/2012) (https://www.govinfo.gov/content/pkg/FR-2012-12-03/pdf/2012-29014.pdf). Under the FIP, the USEPA provided a BART analysis that required installation of selective non-catalytic reduction (SNCR) system for NO_X.

The Compiled Kiln at St. Marys Cement, Inc. – Charlevoix Plant currently operates an SNCR (post-combustion control), in combination with an indirect fire system, which includes low NO_X burners (LNB), at an average reduction efficiency of 50 percent to meet the two NO_X limits (2.80 lb. per ton of clinker [30-day rolling-average] and 2.40 lb. per ton of clinker [12-month rolling average]) established in the USEPA's 2012 BART FIP for Michigan (per 40 CFR 52.1183(h)). (*See* 77 Federal Register 71533, December 3, 2012.)

Given the federally enforceable requirements under the FIP, EGLE found it was not necessary to evaluate and/or pursue additional NO_X control devices, since the kiln is equipped with both precombustion (LNB) and post-combustion (SNCR) abatement technologies. It would be technically infeasible and cost ineffective to retrofit the kiln with additional pre- or post-combustion controls.

Although coal and petroleum coke are the primary fuels for the kiln, the kiln is designed to use asphalt flakes, plastic, and small quantities of cellulose fiber as alternative fuels. Currently, plastics are the only type of alternative fuel being utilized by the unit. The facility has determined that the use of asphalt flakes as a fuel source for the kiln would negatively impact product quality.

SO_2:
SO_2 emissions for the kiln are limited to 1,175 pounds per hour and 7.5 pounds per ton of clinker produced (per 40 CFR 52.1183(h)). In the USEPA's 2012 BART FIP for Michigan, the USEPA determined that the installation and operation of SO_2 controls is not warranted under "current circumstances" but would be necessary if higher sulfur feed materials were used. Similarly, the USEPA found that removal of SO_2 at normal emission rates for this unit would result in a cost-per-ton value of $4,500 or greater. *See* 77 FR 71533, December 3, 2012, https://www.govinfo.gov/content/pkg/FR-2012-12-03/pdf/2012-29014.pdf .

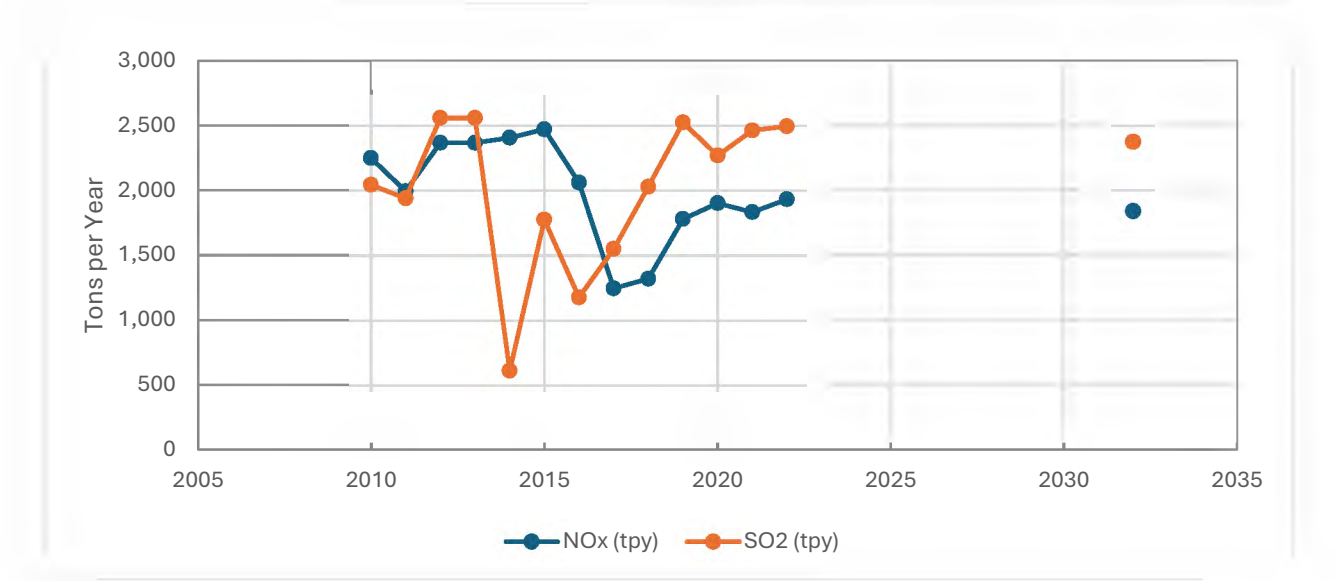
EGLE found that it was not necessary to evaluate and/or pursue SO_2 control devices since the estimated cost-per-ton of SO_2 removal is greater than the cost-effectiveness thresholds (noted in the USEPA's currently implemented rules above) to determine whether a control measure is economically reasonable. Moreover, the facility is not planning to use higher sulfur feed materials that were evaluated by the USEPA under the 2012 BART FIP. Although coal and petroleum coke are the primary fuels for the kiln, the kiln is designed to use asphalt flakes, plastic, and small quantities of cellulose fiber as alternative fuels. Currently, plastics are the only type of alternative fuel being utilized by the unit. The facility has determined that the use of asphalt flakes as a fuel source for the kiln would negatively impact product quality.

Emission Trends:
Table 14 and Figure 8 illustrate the trends in facility-wide actual NO_X and SO_2 emissions for 2010 – 2022 and 2032. The USEPA's 2022v1 Emissions Modeling Platform[4] projects both facility-wide NO_X and SO_2 emissions to be lower for St. Marys Cement – Charlevoix in 2032 than what was reported in 2022. With the BART FIP limits and the 10-year future projections indicating that both NO_X and SO_2 emissions will be reduced source-wide, St. Marys Cement – Charlevoix is projected to continue to implement the existing measures for the kiln and not to

[4] https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

increase its emission rate. As such, EGLE has concluded that the in-line kiln system is "effectively controlled" for both NO_X and SO_2 emissions for the second implementation period, and that the existing control measures are not necessary for reasonable progress to prevent future emission increases and future visibility impairment.

Figure 8: St. Marys Cement, Inc. – Charlevoix Plant: Annual Actual and Projected Emissions (2010 – 2032)



Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform (https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform)

Table 14: St. Marys Cement, Inc. – Charlevoix Plant: Annual Actual and Projected Emissions (2010 – 2032)

Year	NO_X (tpy)	SO_2 (tpy)
2010	2,251	2,045
2011	1,996	1,942
2012	2,369	2,560
2013	2,369	2,560
2014	2,408	614
2015	2,473	1,777
2016	2,063	1,179
2017	1,248	1,551
2018	1,322	2,031
2019	1,782	2,525
2020	1,904	2,271
2021	1,835	2,464
2022	1,934	2,496
2032 (Projected)	1,844	2,380

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform (https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform)

3.3.3.4 Holcim (US), Inc. DBA Lafarge Alpena Plant (Formerly Lafarge Midwest, Inc. – Alpena)

- Kiln 22: Q/d NO_X: 6.0
- Kiln 23: Q/d NO_X: 5.9

In 2010, Lafarge Midwest became subject to a Federal Consent Decree that required NO_X and SO_2 controls as well as limits on a facility-wide tons per year limit and 12-month rolling SO_X and NO_X limits at the Alpena Plant. *See* Consent Decree between Lafarge Midwest, Inc., the United States, the State of Michigan and other states and jurisdictions (USA, USEPA, Michigan, et al. v. Lafarge; U.S. District Court Civil Action No. 3:10-cv-00044-JPG-CJP) entered March 18, 2010. A copy of the Consent Decree is available at:
https://www.epa.gov/sites/default/files/documents/lafarge-cd.pdf (*See* Appendix 17).

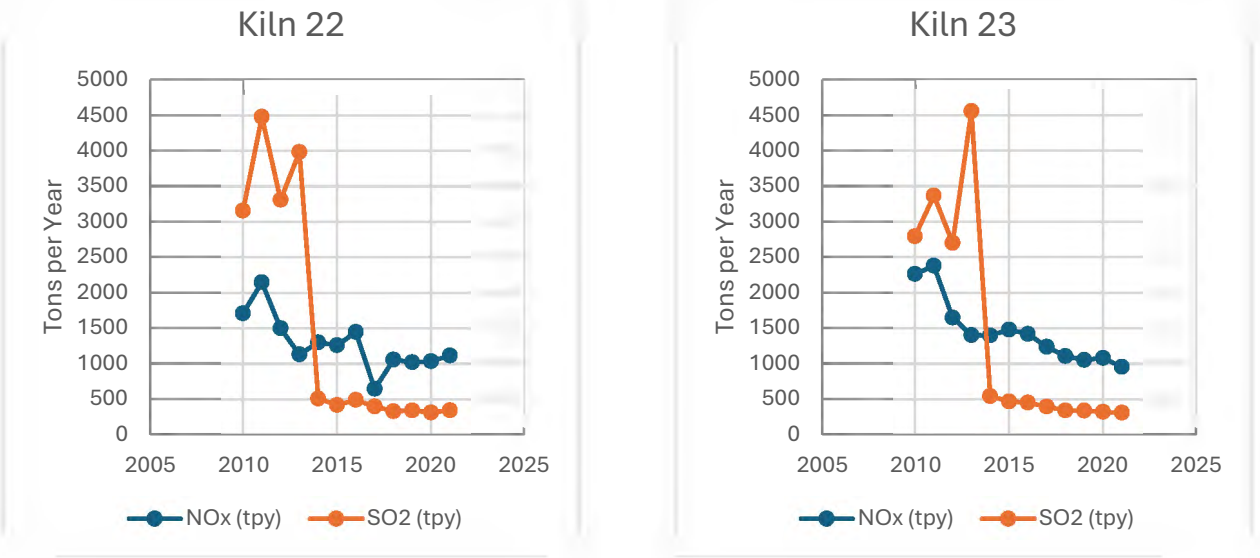
In 2012, Lafarge Midwest was also subject to a BART analysis, which accepted the Consent Decree requirements as BART. *See* 77 FR 46912 (August 6, 2012).
https://www.govinfo.gov/content/pkg/FR-2012-08-06/pdf/2012-19039.pdf.

As described in greater detail in Section 8.3.1 below regarding the Status of Control Strategies, Lafarge installed SNCR NO_X controls on each kiln, along with dry absorbent addition (DAA) for SO_2 control on Kilns 19, 20, 21, and wet flue gas desulfurization (FGD) SO_2 control on Kilns 22 and 23. The limits and other requirements of the Consent Decree and the selected SO_2 and NO_X control systems were incorporated in Permit to Install (PTI) No. 195-10B, issued on September 13, 2013 (*See* Appendix 18).

Based on the requirements and limits set in the federal Consent Decree, the BART analysis, and installation of SNCR controls, as well as an examination of the facility limits, declining

historic emission rate trends and projected emissions, EGLE has concluded that Kiln 22 and Kiln 23 are effectively controlled and that the existing measures are not necessary for reasonable progress for the second implementation period to prevent future emission increases and future visibility impairment.

Figure 9: Holcim (US), Inc. DBA Lafarge Alpena Plant, Kiln 22 and Kiln 23: Annual Emission Rates (2010 – 2021)



Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

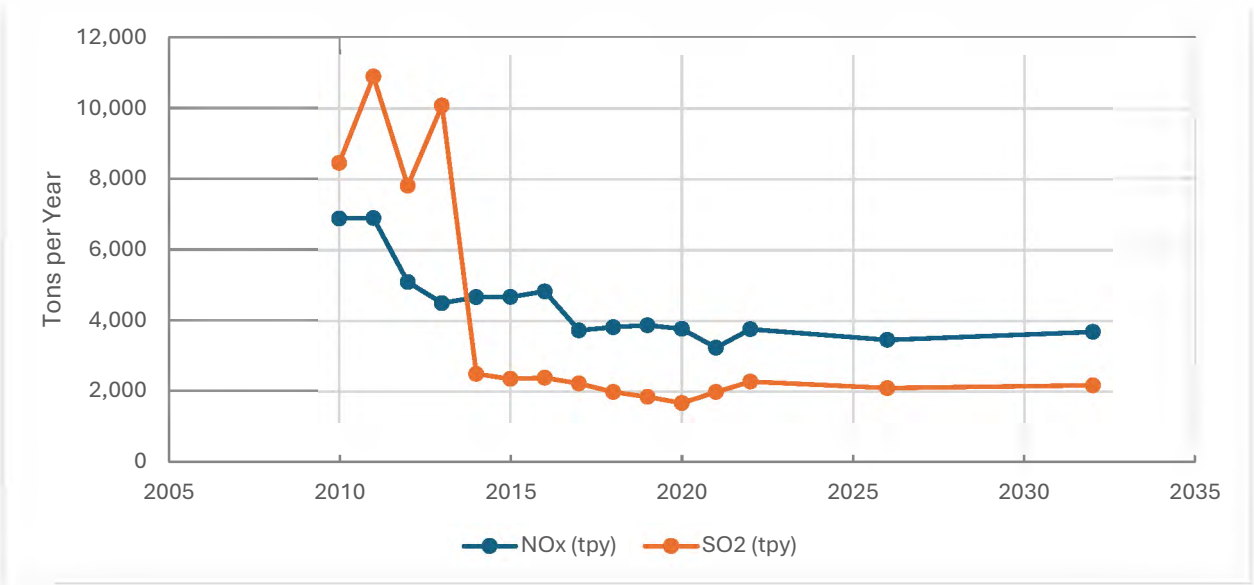
Table 15: Holcim (US), Inc. DBA Lafarge Alpena Plant, Kiln 22 and Kiln 23: Annual Emission Rates (2010 – 2021)

Lafarge Kiln 22		
Year	NO_X (tpy)	SO_2 (tpy)
2010	1710	3156
2011	2147	4479
2012	1499	3310
2013	1132	3983
2014	1301	510
2015	1259	418
2016	1448	490
2017	646	398
2018	1056	331
2019	1021	342
2020	1035	313
2021	1116	345

Lafarge Kiln 23		
Year	NO_X (tpy)	SO_2 (tpy)
2010	2262	2794
2011	2379	3367
2012	1650	2701
2013	1403	4555
2014	1398	543
2015	1480	469
2016	1419	453
2017	1239	396
2018	1106	343
2019	1053	339
2020	1081	321
2021	956	311

Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Figure 10: Holcim (US), Inc. DBA Lafarge Alpena Plant: Facility-wide Actual and Projected Emissions (2010 – 2032)



Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform
https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

Table 16: Holcim (US), Inc. DBA Lafarge Alpena Plant: Facility-wide Actual and Projected Emissions (2010 – 2032)

Year	NO_X (tpy)	SO_2 (tpy)
2010	6,894	8,466
2011	6,907	10,905
2012	5,102	7,820
2013	4,504	10,087
2014	4,673	2,504
2015	4,677	2,364
2016	4,834	2,397
2017	3,734	2,232
2018	3,825	1,994
2019	3,880	1,858
2020	3,778	1,681
2021	3,246	1,994
2022	3,767	2,287
2026	3,466	2,104
2032	3,692	2,180

Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform
https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

3.3.3.5 Neenah Paper – Michigan, Inc. – Munising

- Boiler 1, Q/d SO_2: 10.7

Neenah Paper – Michigan, Inc. Boiler 1 is described in detail in Michigan's 2021 Region Haze SIP on pages 10, 15, and16. (*See* Appendix 1.)

EGLE examined Boiler 1 from two different angles by providing a demonstration of existing effective controls and by considering the potential exclusion of nearby sources from selection for the sake of reference.

Demonstration of Existing Effective Controls:
Boiler 1 is capable of burning bituminous coal or natural gas. As shown in Table 17 below, SO_2 emissions result primarily from the burning of the bituminous coal compared to natural gas. SO_2 emissions are restricted by the ROP for Neenah Paper (MI-ROP-B1470-2013), which requires that the coal burned in Boiler 1 (Emission Unit ID EU05) shall not exceed a maximum sulfur content of 1.5 percent by weight calculated on the basis of 12,000 BTUs per pound of coal. This condition is federally enforceable and was established pursuant to Michigan Rule 201(1)(a).

In its ROP, Neenah Paper – Michigan, Inc. is also subject to the CAA Section 112 National Emission Standards for Hazardous Air Pollutants (NESHAP) since the facility is a source of HAP emissions. In May 2015, a spray dry absorber (SDA) was installed on Boiler 1 to reduce facility-wide hazardous air pollutants (HAP) to less than major source thresholds, in time to reclassify

the facility as a minor HAP source to comply with the federal Boiler Generally Available Control Technologies (GACT) regulations before the effective date within the GACT regulation. Neenah Paper – Michigan, Inc. requested limits be placed on its HAP potential to emit for the entire mill to levels below the applicable major source thresholds, i.e., less than 10 tpy for a single HAP and less than 25 tpy for all HAPs combined. With the HAP emission limits in place, Boiler 1 has operated as an area source of HAPS since February 2016 and is subject to 40 CFR Part 63, Subpart JJJJJJ, NESHAP: Industrial, Commercial and Institutional Boilers.

The SDA on Boiler 1 is used to reduce HAPs, mainly hydrogen chloride (HCl) acid gas; however, the SDA also provides collateral removal of SO_2. In June 2016, Neenah Paper – Michigan, Inc. submitted a PTI Application to make enhancements to the SDA to improve the operation of the system and the control efficiency. (*See* https://www.egle.state.mi.us/aps/downloads/srn/B1470/B1470_RVN_20170825.pdf.) The permit application stated that SDA performance to date had "proven effective for both HCl and SO_2 removal," but the SDA scrubber modifications would further improve reliability. The enhancements were expected to be complete and ready for stack testing by January 31, 2017, and the permit application noted, "The SDA will effectively reduce SO_2 emissions…" The permit application referenced the restriction in the ROP limiting the sulfur content of the coal and noted, "The SO_2 requirement in Rule 201 also applies to Boiler 1; the use of SDA control technology will enhance Boiler 1's ability to comply with this Rule. Furthermore, the current sulfur content of the coal used in Boiler 1 is less than 1%."

After the SDA system was installed and later enhanced in 2017, SO_2 emissions from Boiler 1 decreased sharply as Neenah Paper – Michigan, Inc. improved the operation and efficiency of the SDA system to better control HAPs, took limits on its HAP potential to emit, and used more natural gas instead of coal. As shown in Table 17 and Figure 11 below, SO_2 emissions from Boiler 1 decreased from 810 tpy in 2010 to 270 tpy in 2021, with a sharp, sustained decrease occurring in 2019, after the SDA enhancements, to half the level it was in 2016.

Neenah Paper – Michigan, Inc.'s strategy to reduce HAP emissions to meet the NESHAPs has also resulted in reduced SO_2 emissions. Calculating a revised Q/d using more recent SO_2 emissions for Boiler 1 from 2019 to 2021, rather than 2016 as used in the LADCO analysis, results in a pollutant specific unit Q/d of 4.9 or less, which would rank it below Michigan's Q/d threshold of 6. With the existing measures resulting in consistent annual SO_2 emissions over the past 5 years of 270 tpy or less, an evaluation would likely result in the conclusion that there is a low likelihood that additional controls would provide further reductions.

The 2019 Regional Haze Guidance provides that, "If a source owner has recently made a significant expenditure that has resulted in significant reductions of visibility impairing pollutants at an emissions unit, it may be reasonable for the state to assume that additional controls for that unit are unlikely to be reasonable for the upcoming implementation period." (*See* 2019 Regional Haze Guidance, pages 22 and 23). As such, the investment by Neenah Paper – Michigan, Inc. in installing the SDA system in 2015 and making enhancements in 2017 to improve the operation of the system and control efficiency, for both HAPs and SO_2, constitutes a significant recent expenditure that has resulted in effective reductions of SO_2 from Boiler 1, such that additional controls are unlikely to provide further reductions.

Based on the Boiler 1's existing measures and enforceable requirements described above, as well as the most recent 5 years of emission rate data available provided below in Figures 11 and 12 and Table 17 and 18, Neenah Paper – Michigan, Inc. is projected to continue to implement the existing measures for Boiler 1 and not to increase its emission rate through 2032. As such, EGLE has determined that the existing measures are not necessary to include in the LTS or the

regulatory portion of the SIP to prevent future emission increases and future visibility impairment.

Consideration for Excluding Nearby Sources from Selection

Boiler 1 was selected for further analysis based on its pollutant specific unit Q/d of 10.7 for SO_2, which was calculated using the 2016 emissions of 588 tons and a 55-km distance to the nearest Class I area: Seney Wilderness Area. The relatively high Q/d compared to other Michigan sources is a result of being located closer to a Class I area. Other Michigan sources with a pollutant specific unit Q/d less than that of Neenah Paper – Michigan Inc.'s Boiler 1 include large power plants because of the nature of their locations farther away from a Class I area. For example, St. Clair Boiler 6 was ranked with a Q/d of 6.3 using the 2016 SO_2 emissions of 3,020 tons, an amount 5 times greater than the 2016 SO_2 emissions from Neenah Paper's Boiler 1, because it is located much farther away – 479 km from the nearest Class I area. Similarly, Presque Isle Boiler 6 emitted 922 tons SO_2 in 2016, nearly 2 times more than Neenah Paper's Boiler 1, resulting in a lower pollutant specific unit Q/d of 8.2 based on its location 113 km from the nearest Class I area.

For the sake of reference, a Q/d screening method for establishing a threshold for excluding nearby sources from source selection has been used to evaluate NAAQS under the USEPA's rules for PSD. (*See* "EPA Nearby Source Selection Guidance," Minnesota Pollution Control Agency, November 2023, https://gaftp.epa.gov/aqmg/SCRAM/conferences/2023_13th_Conference_On_Air_Quality_Modeling/Presentations/1-18_Nearby%20Source%20Selection%20Guidance%20Whitepaper%20MPCA.pdf.)

For the short-term NAAQS, such as the 24-hour NAAQS, the USEPA described an approach for an applicant of a PSD permit to determine the impact of various sources.

> "In determining which emission sources in the screening area should be added to the emissions inventory, the applicant should consider three criteria: (1) annual emissions of the source, (2) degree of ambient impact, and (3) distance from the impact area. For example, a 100-ton-per-year source located 10 kilometers from the impact area generally can be excluded from the inventory because its effect on air quality in the impact area is expected to be insignificant. However, a 10,000-ton-per-year source located 40 kilometers from the impact areas would probably have to be accounted for in the increment analysis." (*See* USEPA's "Prevention of Significant Deterioration Workshop Manual," 450280081. Office of Air, Noise, and Radiation, Office of Air Quality Planning and Standards (Research Triangle Park, NC, 1980): page I-C-18, https://www.epa.gov/sites/default/files/2015-07/documents/1980wman.pdf.)

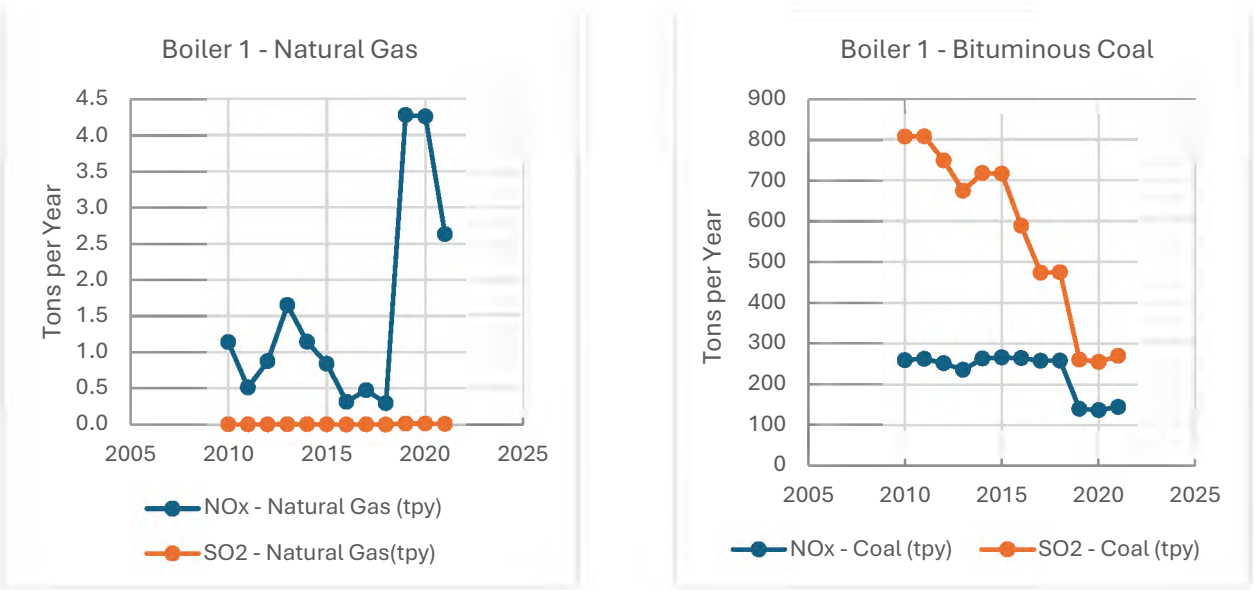
Based on this screening technique, the State of North Carolina's PSD permitting program developed a "20D" threshold, which received USEPA concurrence. For the short-term NAAQS, North Carolina's 20D approach excludes nearby sources that have potential allowable emissions 'Q' in tpy that are less than 20 times the distance 'd' between the nearby source and the source under review. (*See* Eldewins Haynes, Meteorologist, Air Permits Unit, State of North Carolina Department of Natural Resources and Community Development, to Lewis Nagler, Air Management Branch, USEPA Region IV, Atlanta, Georgia, July 22, 1985, A screening method for PSD.)

Although intended for NAAQS and PSD purposes, the 20D approach gives a sense of the magnitude of influence for the sake of nearby source selection for determining impacts at Class I areas. In the case of Neenah Paper – Michigan, Inc., Boiler 1 would be evaluated based on its potential to emit and its distance from the nearest Class I area: Seney Wilderness Area.

The potential of Boiler 1 to emit SO_2 is derived from its 202 MMBtu/hr capacity and its ROP permit limitation on sulfur content of 1.5 percent by weight calculated on the basis of 12,000 BTU/lb coal, resulting in a potential to emit of 1,105 tpy SO_2. The distance to Seney Wilderness Area is 55 km, and 20 times the distance of 55 km would be 1,100 km. Using the 20D approach, this places the potential to emit of 1,105 tpy SO_2 nearly equivalent to the 20D value of 1,100 km, which would be used to exclude this source from consideration in an air quality modeling demonstration for PSD.

Overall Determination:
Based on the recent significant investment in the SDA by Neenah Paper – Michigan, Inc. that has resulted in effective reductions of SO_2, the sulfur and HAP limitations in the ROP permit, Boiler 1's declining SO_2 emission rates over the past 5 years, and the facility's declining projected emissions for SO_2 through 2032, EGLE has concluded that Boiler 1 is effectively controlled and that the existing measures are not necessary for reasonable progress for the second implementation period to prevent future emission increases and future visibility impairment.

Figure 11: Neenah Paper – Michigan, Inc., Boiler 1: Annual Emissions from Natural Gas and Coal (2010 – 2021)



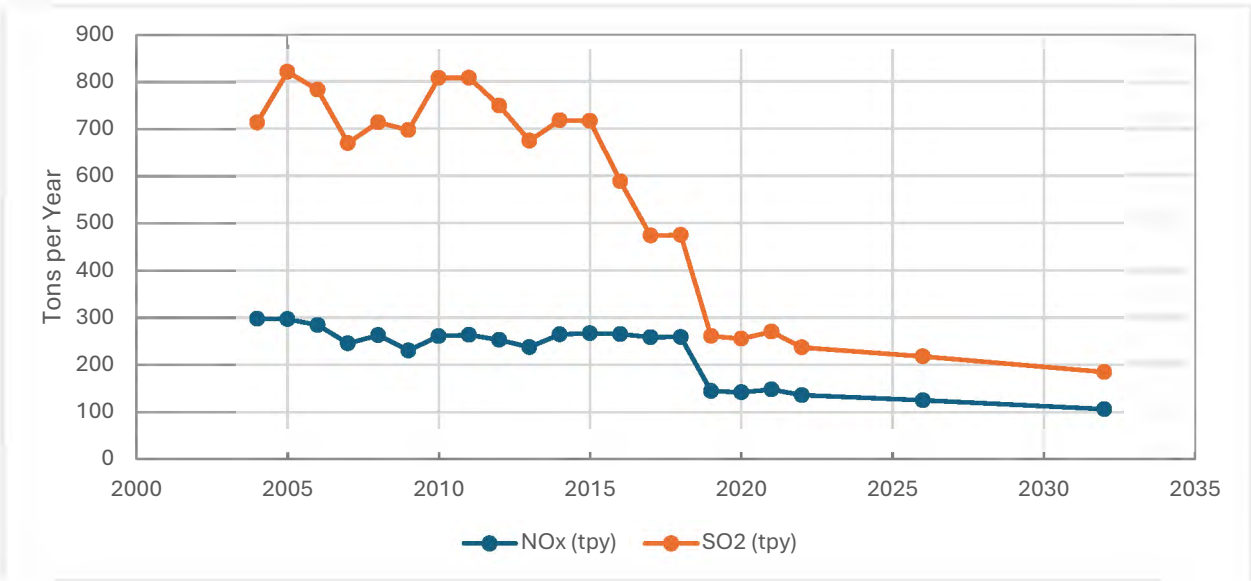
Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 17: Neenah Paper – Michigan, Inc., Boiler 1: Annual Emissions from Natural Gas and Coal (2010 – 2021)

Year	NO_X - Natural Gas (tpy)	SO_2 - Natural Gas (tpy)	NO_X - Coal (tpy)	SO_2 - Coal (tpy)
2010	1.1	0.0	260	807
2011	0.5	0.0	263	808
2012	0.9	0.0	252	748
2013	1.7	0.0	236	674
2014	1.1	0.0	263	718
2015	0.8	0.0	266	716
2016	0.3	0.0	265	588
2017	0.5	0.0	258	474
2018	0.3	0.0	258	475
2019	4.3	0.0	140	261
2020	4.3	0.0	137	255
2021	2.6	0.0	145	270

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Figure 12: Neenah Paper – Michigan, Inc.: Facility-wide Actual and Projected Annual Emission Rates (2004 – 2032)



Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform (https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform)

Table 18: Neenah Paper – Michigan, Inc.: Facility-wide Actual and Projected Annual Emission Rates (2004 – 2032)

Year	NO_X (tpy)	SO_2 (tpy)
2004	297.5	712.7
2005	296.7	819.9
2006	284.2	782.2
2007	245.3	669.4
2008	262.7	713.2
2009	230.3	696.7
2010	260.8	807.1
2011	263.3	807.6
2012	252.8	748.5
2013	237.4	674.3
2014	264.4	717.6
2015	266.9	716.1
2016	264.9	588.4
2017	258.4	473.6
2018	258.8	474.9
2019	144.6	260.9
2020	141.7	255.2
2021	147.9	270.1
2022	135.78	236.84
2026	124.93	217.89
2032	106.26	184.74

Source: MAERS Annual Pollutant Totals Query https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform (https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform)

3.4 Source Flagged by FLMs but not Selected

During the FLM consultation process, the FLMs recommended EGLE also select EES Coke Battery LLC, Midland Cogeneration Venture, L'Anse Warden Electric Company, and US Steel Great Lakes Works for further analysis. As show in Table 8, emissions for these sources were below the pollutant specific unit Q/d>6 threshold and beyond EGLE's 80 percent target. Each of these facilities had Q/d on a facility-wide basis for the sum of NH_3, NO_X, $PM_{2.5}$, and SO_2 of 6.2 or less, except for Midland Cogeneration Venture, which had a facility-wide Q/d of 11.6.

Since the facility-wide Q/d for Midland Cogeneration Venture was higher relative to the other three facilities recommended by the FLMs, EGLE provides additional information below to describe the units, emission rates, and emission controls at Midland Cogeneration Venture without making an assessment as to whether the existing controls or new controls would be necessary to make reasonable progress.

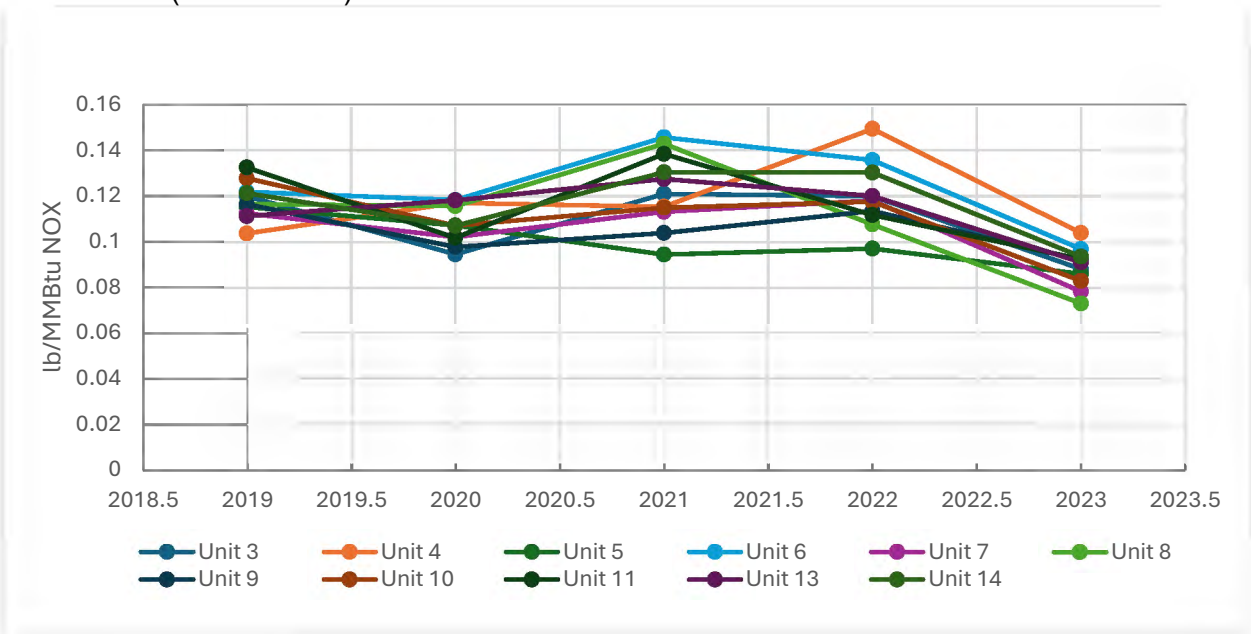
3.4.1 Midland Cogeneration Venture

There are 11 emission units at Midwest Cogeneration Venture that comprise the facility-wide Q/d of 11.6 based on emissions of NH_3, NO_X, $PM_{2.5}$, and SO_2. Each of the emission units has a pollutant specific unit Q/d of 1.0 to 1.1 for NO_X and almost zero for SO_2. These 11 emission units are combined cycle gas turbines fueled by pipeline natural gas.

Each unit uses steam injection to control NO_X emissions in a process where steam is introduced into the combustor, lowering the flame temperature of the combustion reaction and, in turn, lowering the thermal production and output of NO_X.

Over the most recent 5-year period from 2019 – 2023, NO_X emission rates from the USEPA's Clean Air Markets Program Data (CAMPD) are depicted in Figure 13 and Table 19 below.

Figure 13: Midland Cogeneration Venture: Trends in Unit Annual Emission Rates (2019 – 2023)



Source: Clean Air Markets Program Data
https://campd.epa.gov/

Table 19: Midland Cogeneration Venture: Trends in Unit Annual Emission Rates (2019 – 2023)

YEAR	Annual Emission Rate NO_X (lb/MMBtu)										
UNIT ID	3	4	5	6	7	8	9	10	11	13	14
2019	0.120	0.104	0.115	0.122	0.113	0.117	0.117	0.128	0.133	0.111	0.121
2020	0.095	0.117	0.107	0.118	0.102	0.116	0.098	0.107	0.102	0.118	0.107
2021	0.121	0.115	0.095	0.146	0.113	0.143	0.104	0.115	0.138	0.128	0.130
2022	0.120	0.149	0.097	0.136	0.118	0.108	0.114	0.118	0.112	0.120	0.130
2023	0.088	0.104	0.086	0.097	0.079	0.073	0.092	0.083	0.093	0.091	0.094

Source: Clean Air Markets Program Data
https://campd.epa.gov/

3.5 Sources Selected for Four-factor Analysis

As documented in Section 3.3.1 above, using the pollutant specific unit Q/d>6 threshold, EGLE screened out units that had retired or have enforceable mechanisms to retire by 2028. EGLE also addressed a source that has been indefinitely idled in Section 3.3.2. Then, in Section 3.3.3, EGLE screened out units with existing effective control measures. With three remaining sources, EGLE then proceeded with four-factor analysis for specific units at the following three facilities:

Table 20: Units Selected for a Four-factor Analysis

Facility Name	Sector	Facility Unit ID	Q/d Unit (sum)	Q/d NO_X	Q/d SO_2	Q/d Facility (sum)
TILDEN MINING COMPANY LC	NON-EGU	EU Kiln 2–gas fired	42.8	42.3	0.0	108.6
		EU Kiln 2–coal fired	12	11.0	0.9	
Verso Escanaba LLC (Now Billerud Escanaba LLC)	NON-EGU	Recovery Furnace 10	7.2	3.1	0.1	22.5
		No. 11 Power Boiler	12.7	3.0	3.4	
GRAYMONT WESTERN LIME, INC.	NON-EGU	EU Kiln 1	8.1	7.1	0.5	8.1

3.6 Documentation of the Source Selection Process and Result

As described above in Section 2, EGLE identified Class I areas where Michigan contributes more than 1 percent to the 2028 modeled total light extinction based on LADCO's 2028 modeled projections using the 2016 base year and responded to MANE-VU's asks regarding Class I areas affected outside Michigan.

In Section 3.1, EGLE determined which pollutants to consider for an evaluation of control measures based on the analyses in LADCO's 2021 Technical Support Document of the IMPROVE monitoring data, which found that NO_X and SO_2 emissions lead to the formation of the particulate species of nitrate and sulfate that currently contribute more to visibility impairment in the LADCO region Class I areas than $PM_{2.5}$, NH_3, and VOC.

Under Section 3.2, EGLE estimated baseline visibility impacts for source selection by relying on LADCO's Q/d analysis. EGLE identified over 80 units with Q/d of 1.0 or greater using a 2016 base year, including NH_3, NO_X, $PM_{2.5}$, and SO_2 in the summation of 'Q' and the closest Class I area to the sources for the value of 'd.'

As recommended in the 2019 Regional Haze Guidance, EGLE then evaluated Q/d metrics on an individual pollutant basis, since inclusion of the other haze precursors ($PM_{2.5}$, VOC, and ammonia) in the Q/d analysis would not reflect NO_X and SO_2 as the dominant species contributing to visibility impairment in the LADCO Class I areas. Additionally, EGLE relied on a unit pollutant level Q/d approach recognizing that the evaluation of control measures would take place at the unit level and that addressing NOx and SO_2 emissions would entail entirely different control systems.

To capture 80 percent of emissions of NO_X and SO_2 collectively, and to identify units for further evaluation and possible four-factor analyses, an incremental evaluation led to a pollutant specific unit Q/d>6 for NO_X and SO_2 separately. A pollutant specific unit Q/d>6 threshold

captured 70 percent of NO_X and 85 percent of SO_2 emissions, and 79 percent of both NO_X and SO_2, collectively.

Using the pollutant specific unit Q/d>6 threshold, EGLE first screened out units that had retired or have enforceable mechanisms to retire by 2028 as listed in Section 3.3.1. EGLE identified 44 EGUs from 17 different Michigan power plants that retired during 2016 – 2023, as well as units that have enforceable mechanisms under a Consent Decree to retire:

- Consumers Energy – J.H. Campbell Plant: Units 1, 2, and 3 on or before May 31, 2025.
- Consumers Energy – Dan E. Karn: Units 3 and 4 on or before May 31, 2031

In Section 3.3.2, EGLE also addressed a source that has been indefinitely idled. Then, in Section 3.3.3, EGLE screened out units with existing effective controls and provided weight-of-evidence demonstrations in determining whether those measures were necessary for reasonable progress. With three remaining sources identified, EGLE then proceeded with four-factor analysis for specific units at:

- Billerud Escanaba LLC
- Graymont Western Lime, Inc.
- Tilden Mining Company LC

4. Step 4: CHARACTERIZATION OF FACTORS FOR EMISSION CONTROL MEASURES
Identify potential emission control measures for the selected sources, develop data on the four statutory factors and on visibility benefits if they will be considered. See 40 CFR 51.308(f)(2).

The four statutory factors set out in the Regional Haze Rule are:

- Cost of compliance
- Time necessary for compliance
- Energy and non-air environmental impacts
- Remaining useful life of the source

After having re-done the Q/d analysis used to support the source-selection process within the initial 2021 Regional Haze SIP submittal, EGLE found Billerud Escanaba LLC, Graymont Western Lime, Inc., and Tilden Mining Company LC to meet the criteria for requiring a four-factor analysis to determine whether additional control measures should be implemented to achieve reasonable progress during the second planning period.

EGLE submitted Request for Information (RFI) Letters (*attached in* Appendices 19, 20, and 21) to each of the three reselected sources to gather the source specific four-factor analysis information that was needed for EGLE staff to make a decision on whether to adopt a new control measure into its LTS.

Table 21: Units Selected for a Four-factor Analysis, Pollutant Specific Q/d, and Control Measures Considered

Facility Name	Sector	Facility Unit ID	Q/d NO_X	Q/d SO_2	Control Measures Evaluated
Verso Escanaba LLC (Now Billerud Escanaba LLC)	NON-EGU	No. 11 Power Boiler		3.4	• Fuel Substitution • Dry sorbent injection (DSI) • Dry FGD (dry scrubbing) • Wet FGD (wet scrubbing)
GRAYMONT WESTERN LIME, INC.	NON-EGU	EU Kiln 1	7.1		• SNCR • Selective Catalytic Reduction (SCR)
TILDEN MINING COMPANY LC	NON-EGU	EU Kiln 2 gas-fired	42.3		• Low NO_X Burner (LNB) • Over-fire Air System (OFA) • Fuel Substitution
		EU Kiln 2 coal-fired	11.0		

4.1 Four-factor Analysis: Billerud Escanaba LLC, No. 11 Power Boiler

Billerud Escanaba LLC (formerly Verso Escanaba) was described in detail in Michigan's 2021 Regional Haze SIP Submittal on pages 11, 12, 17, and18 (*See* Appendix 1). This SIP supplement provides a full four-factor analysis (*See* Appendix 22) and further elaboration on EGLE's evaluation of potential control measures necessary for reasonable progress during the second implementation period.

Although the No. 11 Power Boiler had a pollutant specific unit Q/d of 3.4 for SO_2 and 3.0 for NO_X, which was under EGLE's threshold of 6, EGLE selected this unit for a four-factor analysis because the FLMs requested it and because the No. 11 Power Boiler is not subject to SO_2 controls or an SO_2 limit that is equal to or more stringent than SO_2 BACT limits for other similar/identical units.

For NO_X, the No. 11 Power Boiler must maintain compliance with PSD emission limits for NO_X (0.70 lb /MMBtu (30-day rolling average, when firing solid fuels)) in its ROP (MI-ROP-A0884-2021b) (per 40 CFR 52.21) and NO_X limitations established in Part 8 of Michigan's Air Pollution Control Rules (R 336.1801). Additionally, in June 2023, the USEPA finalized its "Good Neighbor Rule" FIP for the 2015 Ozone NAAQS, which included NO_X emissions limitations and control requirements for existing large, multi-fueled boilers (>100 MMBtu/hr) at paper mills that are set to become enforceable at the beginning of the 2026 ozone season.

EGLE found that evaluating and/or pursing additional NO_X control devices would not be necessary at this time since the No. 11 Power Boiler is expected to eventually become subject to a more stringent federal NO_X emissions requirements under the Good Neighbor Rule during the second implementation period (2018 – 2028) of the Regional Haze Rule. Although the Supreme Court recently granted a request to stay the Good Neighbor Rule (*See* Ohio et al v. USEPA et al, Case No. 23A349, Supreme Court of the United States, June 27, 2024), EGLE still considers this as the first option, and will revisit the need to evaluate NO_X controls if the more stringent NO_X emission requirements are not implemented at the federal level.
For SO_2, the No. 11 Power Boiler is currently subject to PSD emission limits for SO_2 (1.2 lb/MMBtu (10-day rolling average, when firing solid fuels)) in its (MI-ROP-A0884-2021b) (per 40 CFR 52.21).

EGLE found it necessary to evaluate and/or pursue SO_2 control devices since the No. 11 Power Boiler is not equipped with abatement technology, nor is it subject to an emissions limitation for SO_2 that is equal to or more stringent than SO_2 BACT limits for other similar/identical units. (*See* RACT/BACT/LAER Clearinghouse Basic Information at https://www.epa.gov/catc/ractbactlaer-clearinghouse-rblc-basic-information.)

In an RFI letter sent to Billerud Escanaba LLC on April 24, 2024, EGLE requested that Billerud Escanaba LLC conduct a four-factor analysis, and submit a subsequent report, of four different types of SO_2 control measures for Billerud Escanaba LLC's No. 11 Power Boiler (*See* Appendix 19).

Billerud Escanaba LLC provided a full four-factor analysis as EGLE requested. Table 22 provides a summary of the four-factor analysis, which is attached as Appendix 22.

Table 22: Summary of Four Factor Analysis for Billerud Escanaba LLC, No. 11 Power Boiler, SO_2 Emissions

Verso Escanaba LLC (Now Billerud Escanaba LLC): No. 11 Power Boiler, SO_2 Emissions				
Control Measures Evaluated	**Cost Effectiveness**	**Time for Compliance**	**Energy and Non-Air Impacts**	**Remaining Useful Life of Source**
Fuel Substitution	$5,734/ton SO_2	A few months for sale of remaining fuel plus time for new permits.	Annual Energy Usage: NA	Billerud Escanaba LLC plans to continue operation of the No. 11 Power Boiler for the foreseeable future.
DSI	$10,727/ton SO_2	4 years	Annual Energy Usage: 26,920 MWh/yr New waste streams would result in increased operating costs and additional regulatory requirements.	
Dry FGD (dry scrubbing)	$22,281/ton SO_2	4 years	Annual Energy Usage: 12,798 MWh/yr New waste streams would result in increased operating costs and additional regulatory requirements.	
Wet FGD (wet scrubbing)	$30,082/ton SO_2	4 years	Annual Energy Usage: 14,182 MWh/yr New waste streams would result in increased operating costs and additional regulatory requirements. Wastewater generated by wet FGD systems would likely contain metals associated with wood, such as arsenic, beryllium, cadmium, chromium, mercury, lead, selenium, and copper, as well as other pollutants such as cyanide, ammonia, phosphorus, nitrogen, and total suspended solids. Additional wastewater treatment may be required, and these costs have not been quantified within this analysis.	

4.2 Four-factor Analysis: Graymont Western Lime, Inc., EU Kiln 1 – NOX emissions

Graymont Western Lime, Inc., EU Kiln 1 was described in detail in Michigan's 2021 Regional Haze SIP Submittal on pages 12 and 19 (*See* Appendix 1). This SIP supplement provides a full four-factor analysis (*See* Appendix 23) and further elaboration on EGLE's evaluation of potential control measures necessary for reasonable progress during the second implementation period.

Graymont Western Lime, Inc. operates EU Kiln 1 with LNBs and a Low Excess Air Firing System to comply with BACT-PSD emission limits for NO_X (132.6 lb/hr [24-hour rolling average] and 532 tpy [12-month rolling time period]) specified in its most recent PTI (No. 26-04) (per 40 CFR 52.21).

EGLE selected this unit for a four-factor analysis because EU Kiln 1 had a pollutant specific unit Q/d of 7.1 and because this unit has not undergone a BACT review since 2004.

In an RFI letter sent to Graymont Western Lime, Inc. on April 24, 2024, EGLE requested that Graymont Western Lime, Inc. conduct a four-factor analysis, and submit a subsequent report, of three different types of NO_X control measures for Graymont's line 1 rotary preheater lime kiln (EU-Kiln #1). (*See* Appendix 20.)

Graymont Western Lime, Inc. provided a full four-factor analysis as EGLE requested. Table 23 below provides a summary of the four-factor analysis that was prepared by Trinity Consultants, which is attached as Appendix 23.

Table 23: Summary of Four-Factor Analysis for Graymont Western Lime, Inc., EU Kiln 1, NO_X Emissions

Graymont Western Lime, Inc.: EU Kiln 1, NO_X Emissions				
Control Measures Evaluated	**Cost Effectiveness**	**Time for Compliance**	**Energy and Non-Air Impacts**	**Remaining Useful Life of Source**
Fuel Substitution	NA	NA	NA There is insufficient natural gas supply in the region, and switching fuels would not appreciably improve NO_X emissions.	The remaining useful life of EU Kiln 1 is anticipated to be at least as long as the capital cost recovery period for the measures evaluated.
SCR	$14,433/ton NO_X	3 years	Electricity Cost: $75,821 The additional electrical demand is an energy intensive process that also generates high amounts of greenhouse gases.	
SNCR	$16,372/ton NO_X	3 years	Electricity Cost: $2,517 The additional electrical demand is an energy intensive process that also generates high amounts of greenhouse gases.	

4.3 Four-factor Analysis: Tilden Mining Company LC, EU Kiln 2 – NO_X emissions

Tilden Mining Company LC, Kiln 2 was described in detail in Michigan's 2021 Regional Haze SIP Submittal on pages 12 and 19 (*See* Appendix 1). This SIP supplement provides a full four-factor analysis (*See* Appendices 24 and 25) and further elaboration on EGLE's evaluation of potential control measures necessary for reasonable progress during the second implementation period.

Kiln 2 is identical to Kiln 1; however, it was not subject to the NO_X limits set under the 2016 Revised Taconite BART FIP like Kiln 1. This is due to Kiln 2 being installed in 1978 and therefore not considered as a BART unit during the first planning period. (*See* 81 FR 21672, April 12, 2016: Taconite Federal Implementation Plan Establishing BART for Taconite Plants, https://www.govinfo.gov/content/pkg/FR-2016-04-12/pdf/2016-07818.pdf.)

EGLE selected this unit for a four-factor analysis because EU Kiln 2 had a pollutant specific unit Q/d of 53.3 and because Kiln 2 does not operate NO_X abatement technology and is not subject to NO_X emission limits under PSD, Michigan's Part 8 rules, or any federal program.

In an RFI letter sent to Tilden Mining Company LC on April 24, 2024, EGLE requested that the company conduct a four-factor analysis, and submit a subsequent report, of three different types of NO_X control measures for the company's line 2 indurating (grate/kiln) furnace (EU KILN 2) (*See* Appendix 21).

Tilden Mining Company LC provided a full four-factor analysis as EGLE requested. Table 24 provides a summary of the four-factor analysis that was prepared by Barr Engineering Co., which is attached as Appendices 24 and 25.

Table 24: Summary of Four-Factor Analysis for Tilden Mining Company LC, EU Kiln 2, NO_X Emissions

Tilden Mining Company LC: Kiln 2 – NO_X emissions				
Control Measures Evaluated	**Cost Effectiveness**	**Time for Compliance**	**Energy and Non-Air Impacts**	**Remaining Useful Life of Source**
Fuel Substitution	$2,645/ton NO_X	3 years	The switch from natural gas to coal would result in increased truck traffic and greenhouse gas emissions as well as SO_2 emissions.	The remaining useful life of EU Kiln 2 is anticipated to be at least as long as the control measures evaluated.
LNB	$694/ton NO_X	5 years	LNB can increase CO and VOC emissions.	
OFA	NA	NA	NA OFA is technically infeasible for Kiln 2 as the NO_X formation front is not stationary in an indurating furnace. Therefore, OFA is not included in this analysis.	

5. Step 5: DECISIONS ON WHAT CONTROL MEASURES ARE NECESSARY TO MAKE REASONABLE PROGRESS

Consider the four statutory factors, the five required factors listed in section 51.308(f)(2)(iv) (if not already considered when selecting sources), and, optionally, visibility benefits, and decide on emission controls for incorporation into the LTS. Consider measures adopted by other contributing states, including all measures that have been agreed upon through interstate consultation. See 40 CFR 51.308(f)(2).

5.1 Evaluation of the Four Statutory Factors

The four statutory factors set out in the Regional Haze Rule are:

- Cost of compliance
- Time necessary for compliance
- Energy and non-air environmental impacts
- Remaining useful life of the source.

Of the four statutory factors, characterizing the cost of compliance relied upon previous regulatory impact analyses for both federal and state rules. To facilitate Michigan's decision in considering a cost-effectiveness threshold of potential new add-on controls that would promote Michigan's efforts in setting reasonable progress goals for the second implementation period, past findings of cost-effectiveness thresholds for various emission control technologies were informative. The following sources served as possible reference points from other CAA requirements for similar existing point sources, which included the following cost per ton thresholds for pollutant control, as listed without adjustment for inflation:

- **Revised Cross-State Air Pollution Rule (CSAPR) Update for the 2008 Ozone NAAQS:**
  $1,800/ton

  Source: "Regulatory Impact Analysis for the Final Revised Cross-State Air Pollution Rule (CSAPR Update for the 2008 Ozone NAAQS," EPA-452/R-21-002, March 2021, https://www.epa.gov/sites/default/files/2021-03/documents/revised_csapr_update_ria_final.pdf.

- **Regional Haze – Best Available Retrofit Technology (BART) for SO_2:**
  $400 - $2000/ton

  Source: 70 FR 39132, July 6, 2005, https://www.govinfo.gov/content/pkg/FR-2005-07-06/pdf/05-12526.pdf.

- **Michigan NO_X Reasonably Available Control Technology (RACT):**
  $400 - $1600/ton

  Source: Michigan Office of Administrative Hearings and Rules, Administrative Rules Division, "Regulatory Impact Statement and Cost-Benefit Analysis," regarding Emission Limitations and Prohibitions – Oxide of Nitrogen.

  Source: ARS Public - RFR Transaction

- **EGU NO_X Mitigation Strategies Final Rule:**
  $6,700/ton
  for SNCR retrofit for coal units less than 100 MW lacking post-combustion NO_X control technology.

  Source: Technical Support Document for the Final Federal Good Neighbor Plan for the 2015 Ozone National Ambient Air Quality Standards," USEPA, Office of Air and Radiation, March 2023, https://www.epa.gov/system/files/documents/2023-03/EGU%20NOX%20Mitigation%20Strategies%20Final%20Rule%20TSD.pdf.

- **Good Neighbor Plan for the 2015 8-hour Ozone NAAQS:**
  $1,800/ton ($2016)
  for optimizing existing NO_X Controls and installing state-of-the art combustion controls.
  $11,000/ton ($2016)
  for installation of SCR and SNCR post-combustion controls for coal units of 100 MW or greater capacity that do not have post-combustion NO_X control technology.
  $7,500/ton
  for the purposes of the non-EGU screening assessment.

  Source: 88 FR 36654, June 5, 2023, https://www.govinfo.gov/content/pkg/FR-2023-06-05/pdf/2023-05744.pdf.

  "Economic Impact Assessment for the Proposed Supplemental Federal "Good Neighbor Plan" Requirements for the 2015 8-hour Ozone National Ambient Air Quality Standard," USEPA, Office of Air Quality Planning and Standards, Health and Environmental Impacts Division, November 2023,

https://www.epa.gov/system/files/documents/2024-01/san-11159_gn-plan-supplemental-proposed-eia_231218_eo-12866-clearance2_clean.pdf.

TABLE V.C.2–3—BY INDUSTRY, EMISSIONS UNIT TYPE, ASSUMED CONTROL TECHNOLOGIES, AND ESTIMATED AVERAGE COST PER TON BY CONTROL TECHNOLOGY ACROSS ALL NON-EGU EMISSIONS UNITS

Industry/industries	Emissions unit type	Assumed control technologies that meet final emissions limits	Average cost/ton values (2016$)
Pipeline Transportation of Natural Gas	Reciprocating Internal Combustion Engine	NSCR or Layered Combustion, Layered Combustion, SCR, NSCR.	4,981
Cement and Concrete Product Manufacturing	Kiln	SNCR	1,632
Iron and Steel Mills and Ferroalloy Manufacturing	Reheat Furnaces	LNB	3,656
Glass and Glass Product Manufacturing	Furnaces	LNB	939
Iron and Steel Mills and Ferroalloy Manufacturing	Boilers	SCR or LNB + FGR	8,369
Metal Ore Mining			14,595
Basic Chemical Manufacturing			11,845
Petroleum and Coal Products Manufacturing			14,582
Pulp, Paper, and Paperboard Mills			14,134
Solid Waste Combustors and Incinerators	Combustors or Incinerators	ANSCR or LN™ and SNCR	7,836
Overall Average Cost/Ton			5,339

- On June 27, 2024, the Supreme Court granted states and industry applicants' request to stay the USEPA's Good Neighbor Rule for the 2015 8-hour Ozone NAAQS while legal challenges continue, including arguments from states and industry groups regarding costs. *See* Ohio et al v. USEPA et al, Case No. 23A349, Supreme Court of the United States, June 27, 2024.
  Source:
  https://www.supremecourt.gov/opinions/23pdf/23a349_0813.pdf
  https://www.scotusblog.com/2024/06/supreme-court-blocks-epas-good-neighbor-air-pollution-rule/.

5.1.1 Determination of Measures Necessary to Make Reasonable Progress

When evaluating the results of a four-factor analysis, the 2021 Clarifications Memo explains,

> "When the outcome of a four-factor analysis is a new measure, that measure is needed to remedy existing visibility impairment and is necessary to make reasonable progress. When the outcome of a four-factor analysis is that no new measures are reasonable for a source, the source's existing measures are generally needed to prevent future visibility impairment; i.e., to prevent future emission increases; and thus necessary to make reasonable progress. Measures that are necessary to make reasonable progress must be included in the SIP. However, there may be circumstances in which a source's existing measures are not necessary to make reasonable progress." (2021 Clarifications Memo, Section 4.1.)

As described in Section 3.3 above, to support a determination that a source's existing measures are not necessary to make reasonable progress, the USEPA described a weight-of-evidence approach based on the source's most recent 5-year historical emission rate, projected emissions and emission rate, and enforceable limits related to its existing measures to demonstrate that "the source has consistently implemented its existing measures and has achieved, using those measures, a reasonably consistent emission rate" that will not increase in the future. *See* 2021 Clarifications Memo, Section 4.1.

EGLE's evaluation of each of the four-factor analyses is presented below.

5.1.2 Billerud Escanaba LLC, No. 11 Power Boiler, SO_2

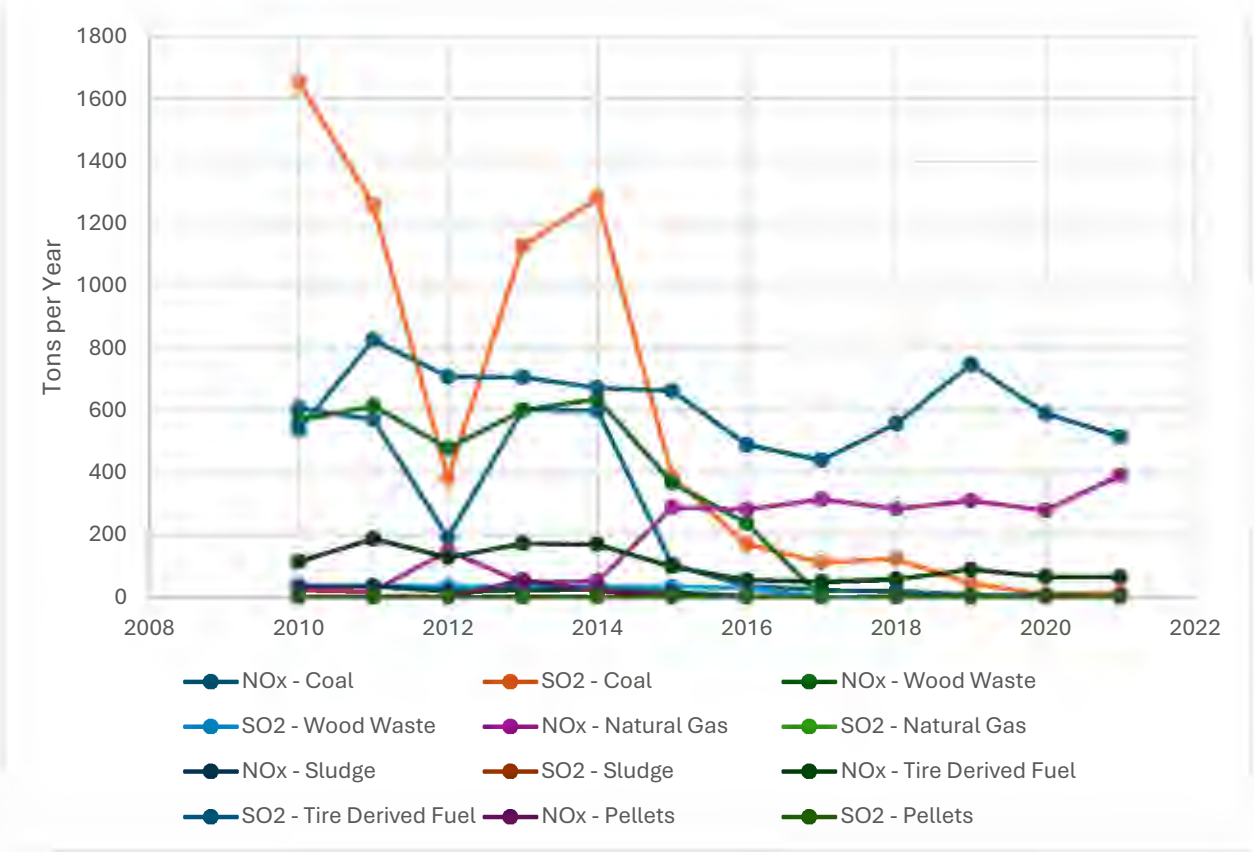
EGLE considered each of the four statutory factors in evaluating the outcome of the four-factor analysis that was performed for Billerud Escanaba LLC, No. 11 Power Boiler. The time to compliance would be achievable by 2028 within the remainder of the second implementation period. The remaining useful life of the No. 11 Power Boiler does not appear to be a limiting factor since Billerud Escanaba LLC plans to continue operation into the foreseeable future. However, the energy and non-air impacts would impose significant drawbacks resulting from additional power consumption, waste production, and wastewater compliance issues, including additional costs not captured in the cost-effectiveness estimations for potential new controls.

The cost-effective values found under the CSAPR, BART, and RACT rulemakings generally establish a lower frame of reference compared to the higher values in the Good Neighbor Rule that was stayed by the Supreme Court. Relying on references to the currently implemented USEPA rules as a rough threshold for what could be considered cost-effective for point sources in Michigan for the second implementation period, the cost-effectiveness values determined in the four-factor analysis for Billerud Escanaba LLC were found to be considerably outside those ranges.

Based on the data pertaining to the cost-effectiveness ($/ton of SO_2 abatement) of implementing and/or retrofitting the No. 11 Power Boiler with the four different SO_2 control mechanisms, it was found that all options surpass the ‘cost-effectiveness’ values under other currently implemented USEPA rules described in Section 5.1 above, which EGLE considered for determining whether a control measure is necessary for reasonable progress. While there are drawbacks to the energy and non-air impacts factor, cost-effectiveness was the most decisive factor, and EGLE was able to eliminate all four SO_2 control options evaluated as being necessary to make reasonable progress through adoption into Michigan’s LTS.

Just as no new measures were found necessary to make reasonable progress, EGLE has found that the existing measures for the No. 11 Power Boiler are also not necessary to make reasonable progress. Consistent with the demonstration described in the 2021 Clarifications Memo in Section 4.1, Tables 25 and 26 and Figures 14 and 15 below illustrate the reasonably consistent and declining trends in facility-wide actual NO_X and SO_2 emissions for No. 11 Power Boiler from 2010 – 2021. Additionally, Figure 15 and Table 26 illustrate the expectation that the unit’s emission rate will not increase in the future based on projected emissions from the facility as a whole through 2032 using the USEPA’s 2022v1 Emissions Modeling Platform. Based on the No. 11 Power Boiler’s existing measures and enforceable requirements described above as well as the most recent 5 years of emission rate data available provided below, Billerud Escanaba LLC is projected to continue to implement the existing measures for the No. 11 Power Boiler and not to increase its emission rate. As such, EGLE has determined that the existing measures are not necessary to include in the LTS or the regulatory portion of the SIP to prevent future emission increases and future visibility impairment.

Figure 14: Billerud Escanaba LLC, No. 11 Power Boiler Annual Emissions (2010 – 2021)



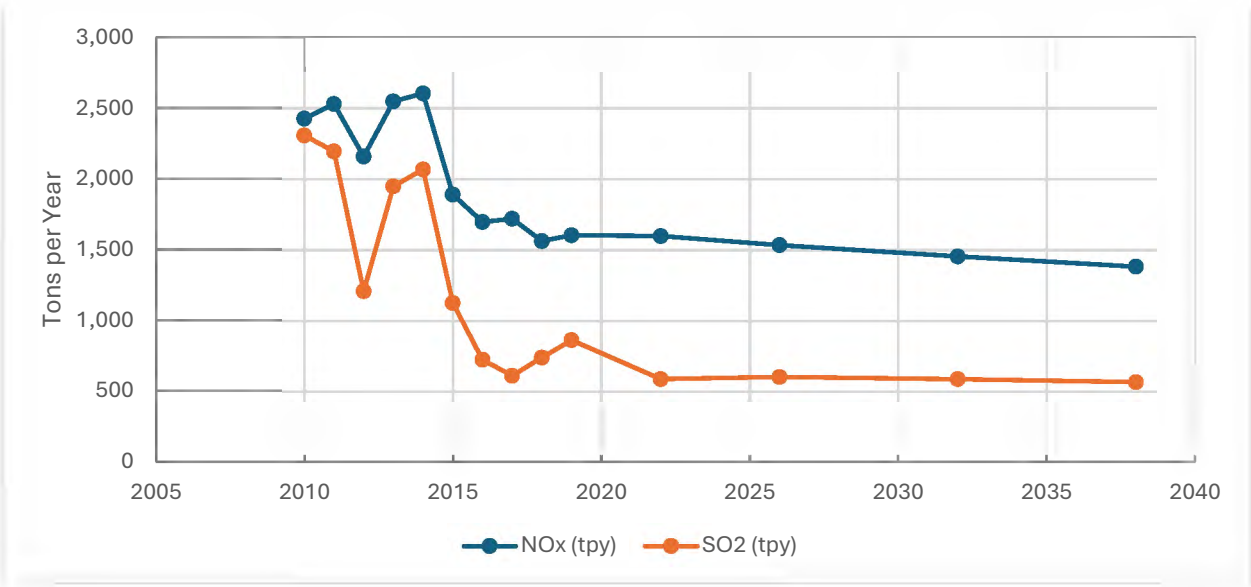
Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 25: Billerud Escanaba LLC, No. 11 Power Boiler: Annual Emissions (2010 – 2021)

Year	NO_X - Coal	SO_2 - Coal	NO_X - Wood Waste	SO_2 - Wood Waste	NO_X - Natural Gas	SO_2 - Natural Gas	NO_X - Sludge	SO_2 - Sludge	NO_X - Tire Derived Fuel	SO_2 - Tire Derived Fuel	NO_X - Pellets	SO_2 - Pellets
2010	606	1657	567	35	24	0	35	2	114	537	0	0
2011	570	1260	614	36	18	0	35	2	187	826	0	0
2012	192	380	478	35	148	0	18	1	127	708	0	0
2013	601	1128	600	33	47	0	24	1	171	705	55	3
2014	599	1281	636	33	51	0	25	1	169	672	21	1
2015	104	386	367	33	288	1	15	1	97	662	1	0
2016	35	170	236	28	281	1	3	0	54	489	0	0
2017	23	111	0	0	314	1	0	0	49	439	0	0
2018	19	122	0	0	283	1	3	0	57	557	0	0
2019	6	43	0	0	309	1	4	1	88	748	0	0
2020	3	9	0	0	278	1	6	1	65	589	0	0
2021	5	14	0	0	391	1	2	0	63	515	0	0

Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Figure 15: Billerud Escanaba LLC: Facility-wide Actual and Projected Emissions (2010 – 2032)



Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform
https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

Table 26: Billerud Escanaba LLC: Facility-wide Actual and Projected NO_X and SO_2 Emissions (2010 – 2032)

Year	NO_X (tpy)	SO_2 (tpy)
2010	2,428	2,309
2011	2,530	2,196
2012	2,160	1,210
2013	2,549	1,950
2014	2,605	2,069
2015	1,892	1,127
2016	1,699	727
2017	1,721	614
2018	1,564	742
2019	1,605	865
2022	1,599	591
2026	1,535	605
2032	1,455	590

Source: MAERS Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform
https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

5.1.3 Graymont Western Lime, Inc., EU Kiln 1 – NO_X emissions

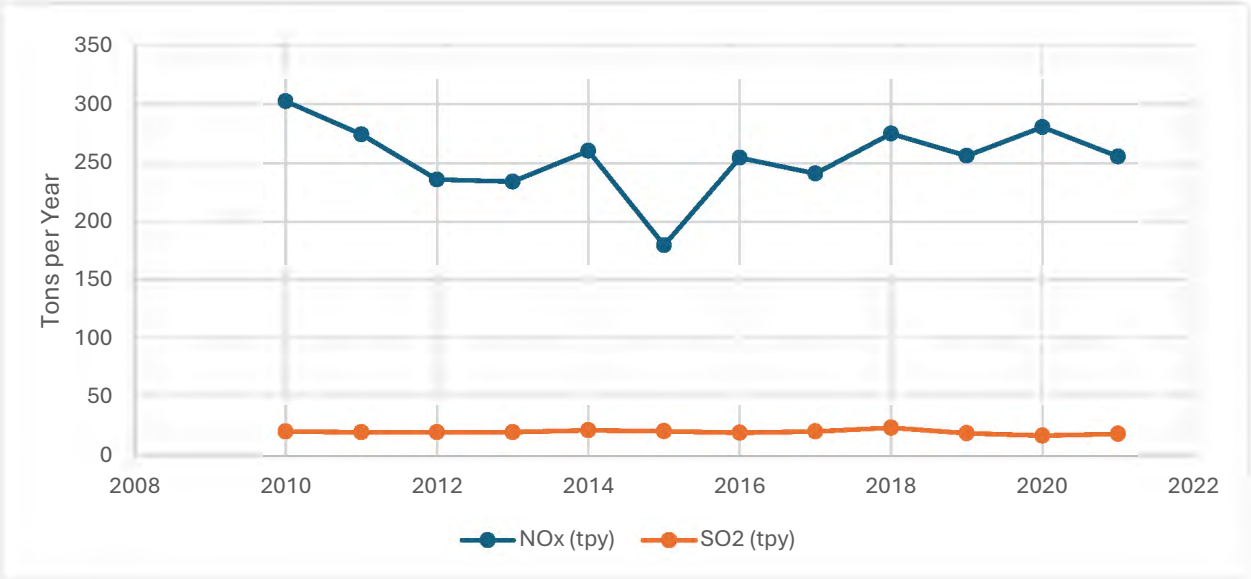
EGLE considered each of the four statutory factors in evaluating the outcome of the four-factor analysis that was performed for Graymont Western Lime, Inc., EU Kiln 1. The time to compliance would be achievable by 2028 within the remainder of the second implementation period. The remaining useful life of the EU Kiln 1 does not appear to be a limiting factor since Graymont Western Lime, Inc. plans to continue operation into the foreseeable future. However, the energy and non-air impacts would impose significant drawbacks resulting from additional power consumption and greenhouse gas production, including additional costs not captured in the cost-effectiveness estimations for potential new controls.

The cost-effective values found under the CSAPR, BART, and RACT rulemakings generally establish a lower frame of reference compared to the higher values in the Good Neighbor Rule that was stayed by the Supreme Court. Relying on references to the currently implemented USEPA rules as a rough threshold for what could be considered cost-effective for point sources in Michigan for the second implementation period, the cost-effective values determined in the four-factor analysis for Graymont Western Lime, Inc., EU Kiln 1 were found to be considerably outside those ranges.

Based on the data pertaining to the cost-effectiveness ($/ton of NO_X abatement) of implementing and/or retrofitting EU Kiln #1 with the three different NO_X control mechanisms, it was found that two options, SCR and SNCR, surpass the ‘cost-effectiveness’ described in Section 5.1 that EGLE considered for determining whether a control measure is necessary for reasonable progress. The remaining control option (fuel substitution from coal to natural gas usage) was determined to have either a minimal, or potentially unfavorable, impact on total annual NO_X emissions. With the drawbacks to the energy and non-air impacts and cost-effectiveness factors as well as the impracticability of fuel substitution, EGLE was able to eliminate all three NO_X control mechanisms as being necessary to make reasonable further progress through adoption into Michigan’s LTS.

Just as no new measures were found necessary to make reasonable progress, EGLE has found that the existing measures for EU Kiln 1 are also not necessary to make reasonable progress. Consistent with the demonstration described in the 2021 Clarifications Memo in Section 4.1, Tables 27 and 28, and Figures 16 and 17 illustrate the reasonably consistent and declining trends in facility-wide actual NO_X and SO_2 emissions for EU Kiln 1 from 2010 – 2021. Additionally, Figure 17 and Table 28 illustrate the expectation that the unit’s emission rate will not increase in the future based on projected emissions from the facility as a whole through 2032 using the USEPA’s 2022v1 Emissions Modeling Platform. Based on EU Kiln 1’s existing measures and enforceable requirements described above as well as the most recent 5 years of emission rate data available provided below, Graymont Western Lime, Inc. is projected to continue to implement the existing measures for EU Kiln 1 and not to increase its emission rate. As such, EGLE has determined that the existing measures are not necessary to include in the LTS or the regulatory portion of the SIP to prevent future emission increases and future visibility impairment.

Figure 16: Graymont Western Lime, Inc., EU Kiln 1: Annual Emission Rates (2010 – 2021)



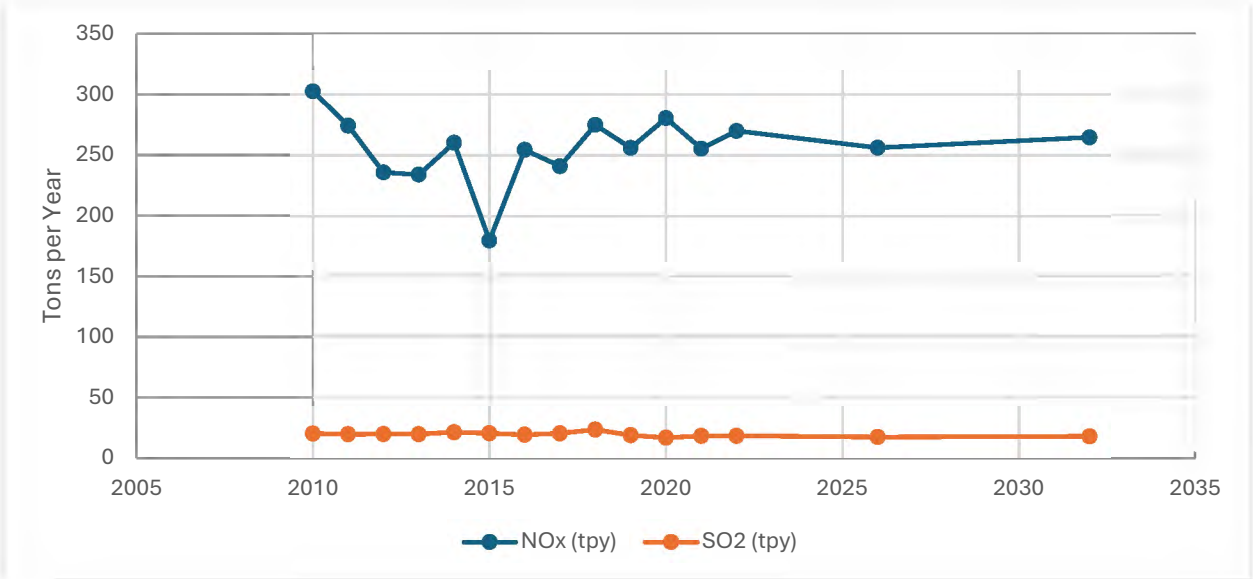
Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 27: Graymont Western Lime, Inc., EU Kiln 1: Annual Emission Rates (2010 – 2021)

Year	NO_X (tpy)	SO_2 (tpy)
2010	302.51	20.58
2011	274.36	19.99
2012	235.97	20.07
2013	234.1955	20.04
2014	260.3325	21.63
2015	180.2	20.76
2016	254.48	19.57
2017	241.09	20.67
2018	274.969	23.721
2019	256.1	19.14
2020	280.5	17.18
2021	255.532	18.616

Source MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Figure 17: Graymont Western Lime, Inc.: Facility-wide Actual and Projected NO_X and SO_2 Emissions (2010 – 2032)



Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform
https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

Table 28: Graymont Western Lime, Inc.: Facility-wide Actual and Projected NO_X and SO_2 Emissions (2010 – 2032)

Year	NO_X (tpy)	SO_2 (tpy)
2010	302.5	20.58
2011	274.4	19.99
2012	236	20.07
2013	234.2	20.04
2014	260.3	21.63
2015	180.2	20.76
2016	254.5	19.57
2017	241.1	20.67
2018	275	23.72
2019	256.1	19.14
2020	280.5	17.18
2021	255.5	18.62
2022	270	18.68
2026	256.23	17.73
2032	264.72	18.31

Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform
https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

5.1.4 Tilden Mining Company LC, EU Kiln 2

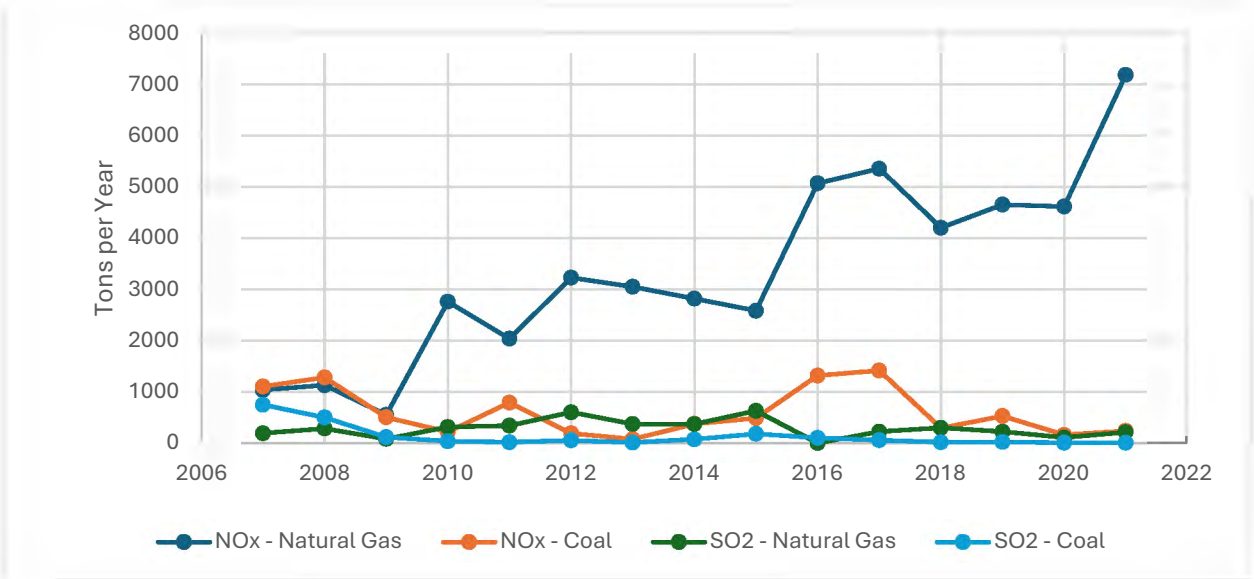
Based on the provided information pertaining to the technical feasibility of implementing and/or retrofitting EU KILN 2 with the three different NO_X control mechanisms, it was found that one option (overfire air system) is technically infeasible for EU KILN 2, as the NO_X formation front is not stationary in an indurating furnace. This option was therefore removed from further analysis. Additionally, the fuel substitution option for EU KILN 2 was found to be inadequate by both Tilden Mining Company LC and EGLE for the purposes of reducing visibility impairment at Michigan's Class I areas considering that natural gas would need to be replaced by solid fuel (coal), which would result in higher SO_2 emissions – although NO_X emissions would be reduced. The remaining control option (low NO_X burner technology) was determined to be technically feasible and cost-effective; however, through a visibility and emissions modeling analysis (as shown on pgs. 17-22 in Appendices 24 and 25), Tilden Mining Company LC concluded that any significant reduction in NO_X emissions from the company's EU KILN 2 would likely result in a negligible visibility improvement at both Isle Royale and Seney. It was also noted in the company's four-factor analysis report that "LNB technology would require significant resources and a time period of approximately five years to engineer, permit, and install the equipment," (as shown on pgs. 14-15 in Appendices 24 and 25). If EGLE were to revise its 2021 Regional Haze SIP to include a more stringent NO_X limit based on the reduction capacity and application of LNB technology to EU KILN 2 and submit this revision to the USEPA in early 2025, EGLE recognizes that the engineering, permitting, and installation of the LNB technology for EU KILN 2 would not be complete until at least 2030 – well into the third planning period of the Regional Haze Program. Through these evaluations and determinations, EGLE was able to eliminate all three NO_X control mechanisms as being necessary to make reasonable further progress through adoption into Michigan's LTS.

EGLE is also relying on the additional justification provided in the following subsection (5.2) to support its determination that LNB technology for EU KILN 2 does not need to be incorporated into Michigan's LTS in order to make reasonable further progress towards "natural visibility conditions" at either Seney National Wildlife Refuge or Isle Royale National Park during the second planning period. The justification (*see* pg. 60) also bolsters EGLE's decision that an additional control measures evaluation (four-factor analysis) for EU KILN 1 would not be appropriate to conduct during this planning period.

The four-factor analysis by Barr Engineering Co. notes, "The estimated 2028 baseline NO_X emissions for this evaluation is 9,005 tpy for Kiln 2. The 2028 baseline emission assumes a production rate of 4,000,000 long-tons of pellets and emissions assuming natural gas firing. Tilden Mining Company LC determined the projected 2028 production rate by reviewing 2000 through 2023 facility-wide (Kiln 1 and Kiln 2) production rates and distributing production equally across each kiln." (*See* Appendices 24 and 25)

Tables 29 and 30 and Figures 18 and 19 below depict the annual emission rates for EU Kiln 2 from 2007 – 2021, as well as the actual and projected emissions for the overall facility from 2010 – 2032.

Figure 18: Tilden Mining Company LC, EU Kiln 2: Annual Emission Rates for NO_X and SO_2 (2007–2021)



Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 29: Tilden Mining Company LC, EU Kiln 2: Annual Emission Rates for NO_X and SO_2 (2007–2021)

Year	NO_X - Natural Gas	NO_X - Coal	SO_2 - Natural Gas	SO_2 - Coal
2007	1040	1108	195	752
2008	1133	1285	288	504
2009	554	507	84	118
2010	2762	221	317	39
2011	2040	792	344	21
2012	3231	194	605	56
2013	3053	80	375	15
2014	2821	378	375	77
2015	2586	490	633	185
2016	5071	1321	3	105
2017	5357	1419	227	60
2018	4204	297	302	21
2019	4657	531	228	26
2020	4618	164	111	10
2021	7188	241	217	10

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Figure 19: Tilden Mining Company LC: Facility-wide Actual and Projected NO_X and SO_2 Emissions (2007 – 2032)

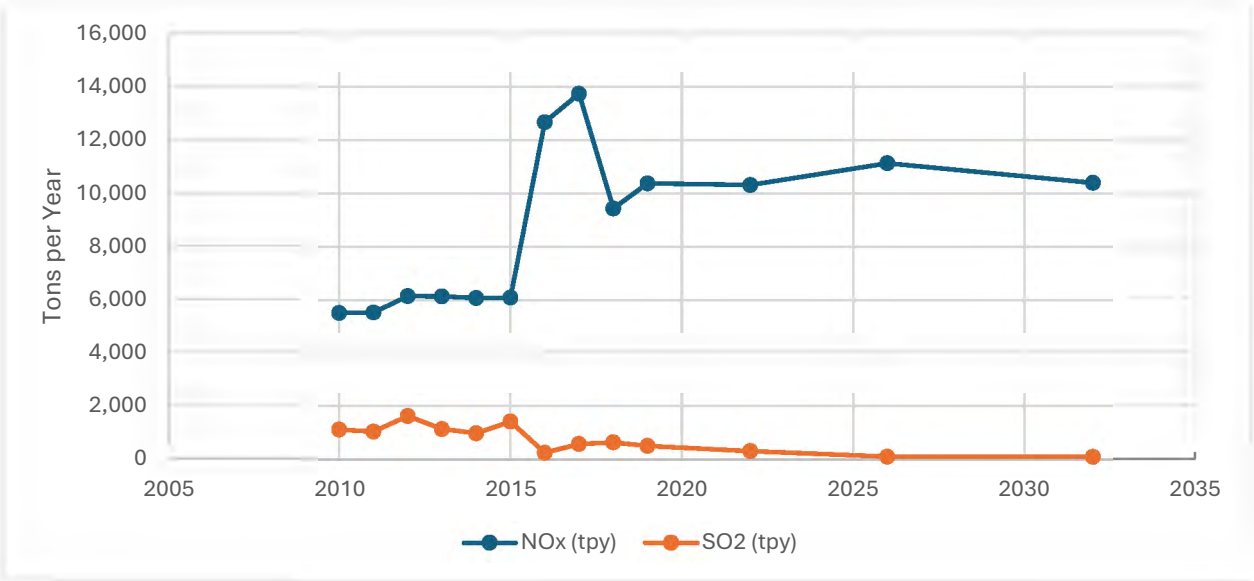


Table 30: Tilden Mining Company LC: Facility-wide Actual and Projected NO_X and SO_2 Emissions (2007–2032)

Year	NO_X (tpy)			SO_2 (tpy)		
	Natural Gas	Coal	Total	Natural Gas	Coal	Total
2007	1039.93	1108.31	2148.24	194.95	751.52	946.47
2008	1133.23	1284.70	2417.93	288.30	503.75	792.05
2009	554.49	506.95	1061.44	84.08	118.48	202.57
2010	2762.09	220.62	2982.71	316.89	39.01	355.90
2011	2040.07	791.87	2831.94	343.87	20.78	364.65
2012	3230.56	193.59	3424.15	605.16	55.89	661.06
2013	3053.04	80.38	3133.42	374.55	15.20	389.75
2014	2821.20	377.71	3198.91	375.33	77.45	452.79
2015	2585.75	490.47	3076.22	633.20	185.12	818.32
2016	5071.28	1320.57	6391.85	3.26	105.44	108.70
2017	5357.45	1419.12	6776.57	227.13	60.17	287.30
2018	4204.20	296.66	4500.86	301.67	21.29	322.96
2019	4656.55	531.35	5187.91	227.57	25.97	253.54
2020	4618.21	163.90	4782.11	111.22	9.89	121.11
2021	7187.87	240.93	7428.80	216.71	9.94	226.65
	TOTAL NO_X (tpy)			TOTAL SO_2 (tpy)		
2022	10,320			310.45		
2026	11,136			101.37		
2032	10,400			94.56		

Source: MAERS Annual Pollutant Total Query
https://www.egle.state.mi.us/maers/emissions_query.asp

USEPA's 2022v1 Emissions Modeling Platform
https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

5.2 Updates to Michigan's Long-term Strategy: Establishing emission limitations, compliance schedules, and other measures necessary to make reasonable progress

EGLE initially addressed its LTS in Michigan's 2021 Regional Haze SIP submittal on pages 22 – 23 (*See* Appendix 1).

EGLE further developed Michigan's LTS after additional consideration of the ambient data, Michigan's contribution to visibility impairment at Class I areas within and outside of the state, the selection of sources for evaluation, the statutory four factors, and EGLE's determination of control measures necessary to make reasonable progress as documented in this SIP Supplement.

Given these considerations, EGLE concludes that the following on-the-books and on-the-way controls in Table 31 below are the measures necessary to make reasonable progress in the second implementation period. All of these controls are already federally enforceable.

The determination that the vast number of retirements at Michigan EGUs (*as shown* in Table 31) that have occurred - and will occur - during the second planning period are the only measures necessary to make reasonable progress towards "natural visibility conditions" through adoption into Michigan's LTS is supported by the refining language included within the 2021 Clarifications Memo, which states "another potentially reasonable approach might be for a state that identifies cost-effective new controls at a multitude of sources to choose to require controls at only a subset of those sources that constitute the vast majority of the visibility benefit. In this case, the state could rely on visibility benefits to prioritize which sources would receive new controls," (*See* 2021 Clarifications Memo, pg. 13.). Based on the 2016 emissions inventory, Michigan EGU retirements that have already occurred during the second implementation period between 2018 and 2024 account for reductions amounting to 17,417 tpy (NO_X) and 42,655 tpy (SO_2), which Michigan concludes constitutes the vast majority of the visibility benefit that could be achieved even with the application of additional new control measures on units that comprise any individual source category.

At the source category (sector) level, those facilities that can be grouped under code 221112 (Fossil Fuel Electric Power Generation) of the 2022 North American Industry Classification System (NAICS)[5] – also known as Fuel Combustion Electric Utilities (EGUs) – constituted the largest percentage of the total statewide emissions of NOx and SO_2 in 2016 (*see* Table 8). EGLE inferred that, due to the shear amount of NOx and SO_2 emissions from the EGU sector, that the vast majority of the anthropogenic visibility impairment at Seney and Isle Royale measured at the beginning of the second planning period could be attributed to this sector as well. EGLE also determined that out of all sectors classified under the NAICS, the application of control measures to those facilities that fell under the Fossil Fuel Electric Power Generation source category would lead to the greatest overall improvement to visibility at Michigan's

[5] North American Industry Classification System (NAICS) U.S. Census Bureau

Class 1 Areas – compared to all other feasible control measure options that could be applied to the non-EGU source categories.

Through this SIP supplement, EGLE is incorporating the retirements of 31 EGUs from 13 different Michigan power plants (*see* Table 10), which have occurred between 2018 and 2024, into its LTS as on-the-books controls. A Retired Unit Exemption Form filed with the USEPA, certifying the retirement by the owner/operator, has been attached for each unit that EGLE is adopting into the LTS (*See* Appendix 33).

For on-the-way controls, EGLE is also incorporating the Federal Consent Decree for DTE – Belle River, Units 1 and 2, which requires DTE to "retrofit, refuel, or repower" Belle River by December 31, 2030 (*See* Appendix 8).

Table 31: Elements of Michigan's Long-term Strategy for the Second Implementation Period

MICHIGAN CONTROLS

On-the-Books Controls

VOC RACT/Control Techniques Guidelines under Michigan Air Pollution Control Rules

Retirements

Facility Name	Facility Unit ID	Retirement Date
ST. CLAIR / BELLE RIVER POWER PLANT	St. Clair Boiler 7	5/31/2022
	St. Clair Boiler 3	5/31/2022
	St. Clair Boiler 2	5/31/2022
	St. Clair Boiler 1	3/27/2019
	St. Clair Boiler 6	5/31/2022
	St. Clair Boiler 4	11/13/2017
WISCONSIN ELECTRIC POWER COMPANY, Marquette – Presque Isle	Boiler 9	4/8/2019
	Boiler 7	4/8/2019
	Boiler 8	4/8/2019
	Boiler 6	4/8/2019
	Boiler 5	4/8/2019
DTE - Electric Company TRENTON CHANNEL	Boiler 9A	7/8/2022
DTE - Electric Company RIVER ROUGE	Unit 1	6/7/2021
	Unit 3	6/1/2021
Lansing Board of Water & Light (LBWL), Erickson Station	Unit 1	11/28/2022
LBWL, Eckert Station	Unit 1	12/31/2020
	Unit 3	12/31/2020
	Unit 4	5/31/2021
	Unit 5	12/31/2020
	Unit 6	12/31/2020
Consumers Energy – D.E. Karn Facility	Karn 1	6/1/2023
	Karn 2	6/1/2023
MARQUETTE BOARD OF LIGHT & POWER - Shiras	Boiler 3	4/29/2019
Michigan Hub Plant	Unit 1	9/30/2017
DTE – Pontiac North LLC	EUBHB9	1/10/2017
Graphic Packing International, Inc. - Kalamazoo	Unit BLR08	10/07/2024
J B Sims	Unit 3	6/1/2020
James De Young	Unit 5	6/1/2017
Consumers Energy - Thetford	Unit 2	6/1/2019
	Unit 3	4/1/2018
	Unit 4	6/1/2019

On-the-Way Control

DTE – Belle River, Units 1 and 2:
Federal Consent Decree requiring DTE to "retrofit, refuel, or repower" Belle River by December 31, 2030. *See* United States v. DTE Energy, Case No. 2:10-cv-13101-BAF-RSW (E.D. Mich)., Consent Decree filed May 14, 2020. (*See* Appendix 8). https://www.justice.gov/enrd/consent-decree/file/1276421/download)

NATIONAL CONTROLS
On-the-Books Controls
Revised CSAPR Update (40 CFR 97, Subpart GGGGG)
NESHAP for Reciprocating Internal Combustion Engines
Federal Oil and Natural Gas Industry Standards
NESHAPs for Industrial, Commercial, and Institutional Area Source Boilers, Major Source Boilers (40 CFR 63) (Boiler MACT)
New Source Performance Standards (NSPS) for Commercial and Industrial Solid Waste Incinerators (40 CFR 60 Subpart CCCC, 40 CFR 60 Subpart DDDD)
NSPS for New Residential Wood Heaters (40 CFR 60 Subpart AAA)
SO_2 Data Requirements Rule (40 CFR 51)
Control of Hazardous Air Pollutants from Mobile Sources (also known as the Federal Mobile Source Air Toxics Rules, MSAT2)
Federal Onroad Mobile Source Regulations: - Passenger vehicles, SUVs, and light duty trucks (40 CFR 85, and 86) - Light-duty trucks and medium duty passenger vehicles (40 CFR 86) - Heavy-duty highway compression engines (40 CFR 86) - Heavy-duty spark ignition engines (40 CFR 86) - Motorcycles (40 CFR 86) - Mobile Source Air Toxics (40 CFR 59, 80, 85, and 86) - Light-duty vehicle corporate average fuel economy standards
Federal Nonroad Mobile Source Regulations: - Aircraft (40 CFR 87 and 1068) - Compression Ignition (40 CFR 89 and 1039) - Large Spark Ignition (40 CFR 1048) - Locomotive Engines (40 CFR 1033) - Marine Compression Ignition (40 CFR 1042) - Marine Spark Ignition (40 CFR 1045) - Recreational Vehicle (40 CFR 1051) - Small Spark Ignition Engine

6. Step 6: REASONABLE PROGRESS GOALS FOR 2028 AS ESTABLISHED THROUGH REGIONAL SCALE MODELING OF THE LONG-TERM STRATEGY

Determine the visibility conditions in 2028 that will result from implementation of the LTS and other enforceable measures to set the RPGs for 2028. Typically, a state will do this through regional scale modeling, although the Regional Haze Rule does not explicitly require regional scale modeling. See 40 CFR 51 Submittal.*308(f)(3).*

As provided for in Michigan's 2021 Regional Haze SIP Submittal, EGLE's reasonable progress goals were arrived at by implementing the various controls accounted for in the USEPA inventory, which LADCO modeled, providing the 2028 projected visibility levels at the Seney and

Isle Royale Class I areas in Michigan. LADCO's modeling process is described above under Step 2: Determination of Affected Class I Areas in Other States.

The values included in Tables 1 and 2 and Figures 2 and 3 of Michigan's 2021 Regional Haze SIP Submittal were based on LADCO's modeling for 2028 using a 2011 base year. Reflecting LADCO's more recent modeling for the 2028 projections with 2016 base year, updated tables and figures appear below to depict EGLE's 2028 reasonable progress goals for Isle Royale and Seney under the projected 2028 deciviews (dv) on the 20 percent most impaired and clearest days. For Isle Royale, the 2028 reasonable progress goals were 5.23 dv on the 20 percent clearest days, which is 0.07 dv below the observed visibility impairment in 2014 – 2018, and 14.83 dv on the 20 percent most impaired days, which is 0.71 dv less than the observed visibility impairment in 2014 – 2018 and 1.02 dv below the glidepath. For Seney, the 2028 reasonable progress goals were 5.17 dv on the 20 percent clearest days, which is 0.10 dv less than the observed visibility impairment in 2014 – 2018, and 16.67 dv on the 20 percent most impaired days, which is 0.90 dv less than the observed visibility impairment in 2014 – 2018 and 1.92 dv below the glidepath.

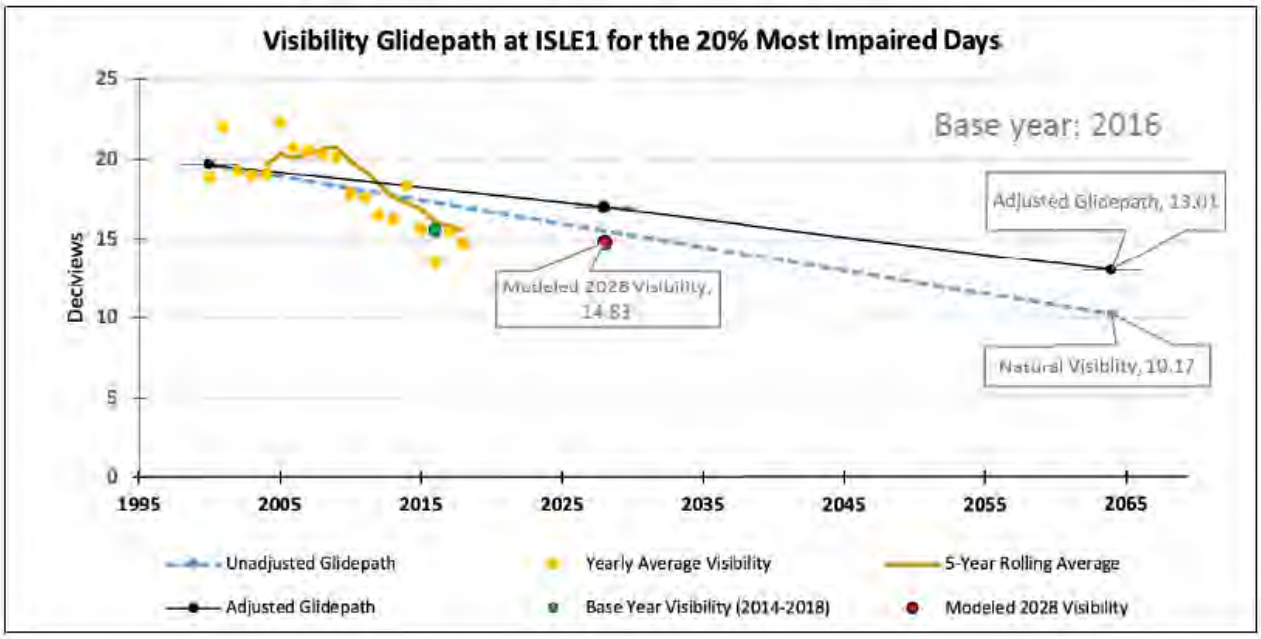
Table 32: Natural Conditions, 2000 – 2004 Baseline Visibility, Observed 2014 – 2018 Visibility, 2028 Projected Visibility, and 2028 Unadjusted Glidepath Value on the 20% Most Impaired Days at Isle Royale and Seney Class I Areas

IMPROVE Site ID	Natural Conditions 20% Most Impaired Days (dv)	Observed 2000-2004 Baseline 20% Most Impaired Days (dv)	Observed 2014-2018 20% Most Impaired Days(dv)	Projected 2028 20% Most Impaired Days (dv) (A)	2028 Unadjusted Glidepath (dv) (B)	2028 Impairment Relative to Unadjusted Glidepath (dv) (A-B)
ISLE1, Isle Royale	10.17	19.63	15.54	14.83	15.85	-1.02
SENE1, Seney	11.11	23.58	17.57	16.67	18.59	-1.92

Table 33: Natural Conditions, 2000 – 2004 Baseline Visibility, Observed 2014 – 2018 Visibility, 2028 Projected Visibility on the 20% Clearest Days at Isle Royale and Seney Class I Areas

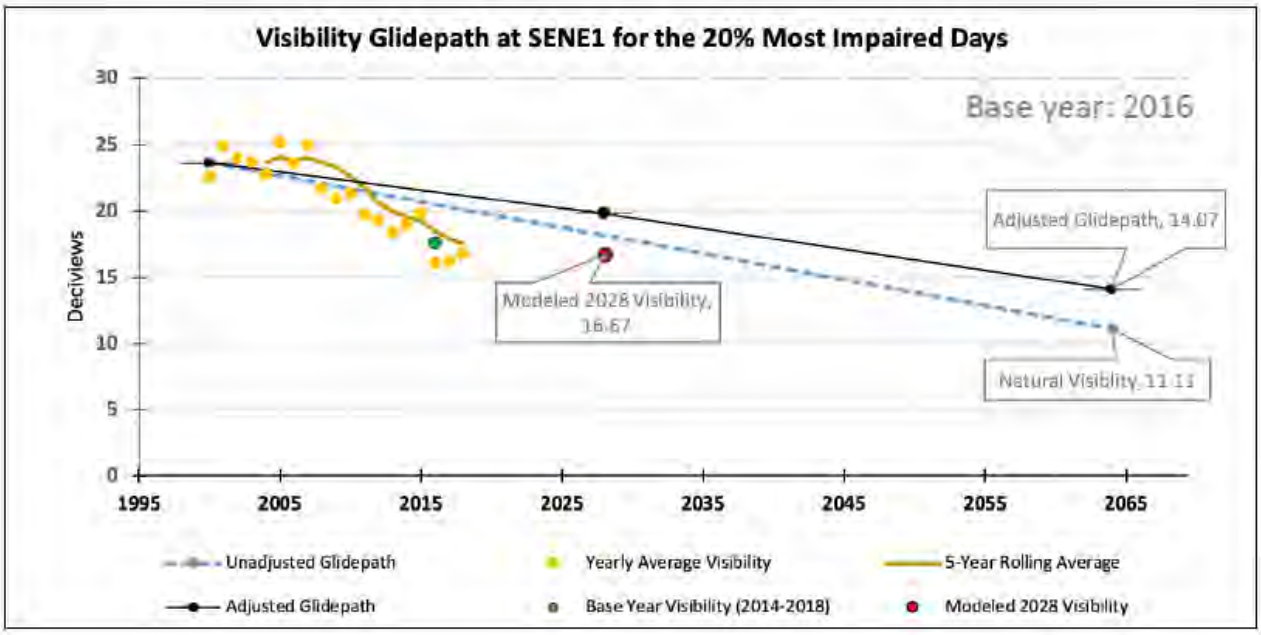
IMPROVE Site ID	Natural Conditions 20% Clearest Days (dv)	Observed 2000-2004 Baseline 20% Clearest Days (dv)	Observed 2014-2018 20% Clearest Days(dv)	Projected 2028 20% Clearest Days (dv) (A)
ISLE1, Isle Royale	3.72	6.77	5.30	5.23
SENE1, Seney	3.74	7.14	5.27	5.17

Figure 20: Visibility Glidepath and 2028 Modeled Visibility at Isle Royale for the 20% Most Impaired Days



Source: LADCO's 2021 Technical Support Document, Figure 7-2

Figure 21: Visibility Glidepath and 2028 Modeled Visibility at Seney for the 20% Most Impaired Days



Source: LADCO's 2021 Technical Support Document, Figure 7-3

7. Step 7: PROGRESS, DEGRADATION, AND URP GLIDEPATH CHECKS

7.1 Checking for improvement in visibility on the 20 percent most impaired days

Demonstrate that there will be an improvement on the 20 percent most anthropogenically impaired days in 2028 at the in-state Class I area, compared to 2000-2004 conditions. See 40 CFR 51.308(f)(3).

This requirement is addressed in Michigan's 2021 Regional Haze SIP submittal on page 25 (*See* Appendix 1).

7.2 Checking for no visibility degradation on the 20 percent clearest days

Demonstrate that there will be no degradation on the 20 percent clearest days in 2028 at the in-state Class I area, compared to 2000-2004 conditions. See 40 CFR 51.308(f)(3).

This requirement is addressed in Michigan's 2021 Regional Haze SIP submittal on page 25 (*See* Appendix 1).

7.3 URP glidepath check

Determine the URP that would achieve natural conditions at the in-state Class I area in 2064. The URP may be adjusted for international anthropogenic impacts and certain wildland prescribed fires subject to USEPA approval as part of USEPA's action on the SIP submission. 40 CFR 51.308(f)(1).

This requirement is addressed in Michigan's 2021 Regional Haze SIP submittal on page 26 (*See* Appendix 1).

7.4 Calculation of the Number of Years it would take to Attain Natural Visibility Conditions

Compare the 2028 RPG for the 20 percent most anthropogenically impaired days to the 2028 point on the URP glidepath for the in-state Class I area. If the RPG is above the URP glidepath, demonstrate that there are no additional emission reduction measures for anthropogenic sources or groups of sources in the state that may reasonably be anticipated to contribute to visibility impairment in the Class I area that would be reasonable to include in the LTS. If the RPG is above the URP glidepath, also provide the number of years needed to reach natural conditions. See 40 CFR 51.308(f)(3)(ii)(A).

This requirement is addressed in Michigan's 2021 Regional Haze SIP submittal on page 26 (See Appendix 1).

8. Step 8: ADDITIONAL REQUIREMENTS FOR REGIONAL HAZE SIPs

8.1 Reasonably Attributable Visibility Impairment

Reasonably Attributable Visibility Impairment (RAVI) is defined as visibility impairment that is caused by the emission of air pollutants from one or a small number of sources. In 2017, the USEPA updated and simplified the provisions for RAVI and extended it to all states, not just those with Class I areas. 40 CFR 51.302 provides:

> "The affected Federal Land Manager may certify, at any time, that there exists reasonably attributable visibility impairment in any mandatory Class I Federal area and identify which single source or small number of sources is responsible for such impairment. The affected Federal Land Manager will provide the certification to the State in which the impairment occurs and the State(s) in which the source(s) is located." 40 CFR 51.302

Michigan does not have any sources for which an FLM has provided a RAVI certification.

8.2 Monitoring Strategy and Other Elements

EGLE's monitoring strategy and other elements were addressed in Michigan's 2021 Regional Haze SIP submittal under Section H.3 on page 29 (*See* Appendix 1).

8.3 Five-Year Progress Report for Second Half of First Planning Period

The 1999 Regional Haze Rule required each state to submit progress reports, in the form of SIP revisions, every 5 years after the date of the state's initial SIP submission. *See* 40 CFR 51.308(g). The Regional Haze first implementation period covered the period of 2007 – 2018. Michigan submitted its SIP revision for the first implementation on November 5, 2010, and it was partially approved and partially disapproved on November 26, 2012. *See* 77 FR 71533, December 3, 2012, https://www.govinfo.gov/content/pkg/FR-2012-12-03/pdf/2012-29014.pdf. The USEPA then promulgated a FIP that imposed NO_X and SO_2 limits mandating BART for St. Marys Cement – Charlevoix, controls for SO_2 and NO_X for the Lafarge Midwest – Alpena Plant, and NO_X limits mandating BART for Boilers 8 and 9 at Escanaba Paper (now Billerud – Escanaba LLC). Michigan's BART determination for Tilden Mining taconite plant was addressed in different actions.

Michigan's Regional Haze mid-period progress report for the first half of the first implementation period was submitted on January 12, 2016, and was approved as a SIP revision on May 16, 2018. *See* 83 FR 25375, June 1, 2018, https://www.govinfo.gov/content/pkg/FR-2018-06-01/pdf/2018-11566.pdf.

For the second half of the first implementation period, progress reports are to be submitted as part of the SIP revision for the second implementation period. The 2019 Regional Haze Guidance recommends that the progress report elements cover a time period approximately from the first full year that was not in the previous progress report through a year that is as close as possible to the submission date of the SIP revision. For Michigan, this means that the relevant time period to address for each of the elements of 40 CFR 51.308(g)(1)-(5) is roughly 2015 through 2019. The specific elements of 40 CFR 51.308(g)(1)-(5) are discussed in more detail below.

8.3.1 Status of Control Strategies

40 CFR 51.308(g)(1) requires a description of the status of emission reduction measures:

> *A description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for mandatory Class I Federal areas both within and outside the State.*

Five non-EGU sources in Michigan were identified in the 2010 Regional Haze SIP submittal as being subject to BART. These sources are evaluated below in terms of Haze SIP control measures/limits and status relative to compliance deadlines. This part also describes how three of the five Michigan BART sources are now required to apply additional or more stringent controls beyond those required in the Michigan BART determinations due to USEPA disapprovals of the Michigan BART determinations and issuance of FIPs.

8.3.1.1 Holcim (US), Inc. DBA Lafarge Alpena Plant (referenced in Michigan's 2010 Regional Haze SIP Submittal as Lafarge Midwest, Inc. — Alpena Plant)

A Federal Consent Decree between Lafarge Midwest, Inc., the United States, the State of Michigan and other states and jurisdictions (USA, USEPA, Michigan, et al. v. Lafarge; U.S. District Court Civil Action No. 3:10-cv-00044-JPG-CJP) was entered March 18, 2010, requiring NO_X and SO_2 control for the Alpena plant and other Lafarge plants (*See* Appendix 17) A copy of the Consent Decree is available at: https://www.epa.gov/sites/default/files/documents/lafarge-cd.pdf.

The Consent Decree allowed Lafarge to apply NO_X and SO_2 control measures or to retire or replace any of their five kilns according to a specified schedule to achieve specified facility-wide tpy limits. The control program also set demonstration-phase facility-wide, 12-month rolling limits of 4.89 pounds NO_X per ton of clinker and 3.68 pounds SO_2 per ton of clinker for a period during which individual limits were also to be set for each kiln based on emission testing. These Consent Decree requirements had previously been accepted as BART in the 2010 Regional Haze SIP submittal.

Lafarge opted to install SNCR NO_x control on each kiln, along with DAA for SO_2 control on Kilns 19, 20, 21, and wet FGD SO_2 control on Kilns 22 and 23. The limits and other requirements of the Consent Decree and the selected SO_2 and NO_X control systems were incorporated in PTI No. 95-10B (*copy attached as* Appendix 18), issued on September 13, 2013.

The interim facility-wide, 12-month rolling limits of the Consent Decree are listed below. Annual actual facility-wide emission rates for 2020 (3,778 tpy NO_X and 1,681 tpy SO_2) were well below the Consent Decree 2011 interim 12-month rolling limits.

Consent Decree Deadlines/Limits – USA, USEPA, Michigan, et al. v. Lafarge; U.S. District Court Civil Action No. 3:10-cv-00044-JPG-CJP.

NO_X

- Interim Limit (facility-wide 12-month rolling): 8,650 tons by January 1, 2011
- Install SNCR Control on 3 KG5 Kilns by December 1, 2011
- Install SNCR Control on 2 KG6 Kilns by January 1, 2012.

SO_2

- Interim Limit (facility-wide 12-month rolling): 13,100 tons by January 1, 2011
- Install DAA Control on 3 KG5 Kilns by March 1, 2014
- Install Wet FGD on 2 KG6 Kilns by March 1, 2014.

Compliance Status: Current status as of August 13, 2020, listed in the Michigan Air Compliance and Enforcement System (MACES), indicates compliance with applicable permits, which include the Consent Decree requirements, and Michigan rules. Also, no current enforcement action was found in MACES.

8.3.1.2 Billerud Escanaba LLC

The 2010 Regional Haze SIP submittal indicated that EGLE had accepted Billerud Escanaba LLC's existing PM, NO_X, and SO_2 emission limits as representing BART for their subject equipment. The USEPA later issued a final rule effective on January 2, 2013, disapproving the portion of Michigan's Regional Haze SIP that applied to the BART determination for the company's Boilers 8 and 9 (77 FR 71533, December 3, 2012). The final rule also included a FIP for the company's Boilers 8 and 9 that imposed NO_X BART limits.

The Federal Register publication of the USEPA disapproval action and the FIP can be accessed at: https://www.federalregister.gov/documents/2012/12/03/2012-29014/approval-and-promulgation-of-air-quality-implementation-plans-michigan-regional-haze-state. The USEPA noted in their final rulemaking that Billerud Escanaba LLC had already implemented improvements in combustion control for its boilers and that the limits in the FIP required that the current levels of NO_X control be maintained.

The Boiler 8 NO_X limit was changed by the USEPA to a fixed, rolling 30-day average limit of 0.35 lb. of NO_X per MMBtu, rather than a weighted average of separate limits for oil firing and gas firing. A continuous emission monitor (CEM) system was the required means of compliance determination for Boiler 8. The Boiler 9 NO_X limit was set by the FIP at 0.27 lb. per MMBtu with compliance determination by means of emission testing.

Compliance Status: The most recent inspection that addressed Boilers 8 and 9 was completed on December 11, 2019, through which EGLE's AQD determined Billerud Escanaba LLC to be in compliance with the NO_x FIP limits adopted in PTI No. 127-11D (*copy attached as* Appendix 26), as well as the other applicable Michigan Air Pollution Control Rules.

8.3.1.3 St. Marys Cement – Charlevoix Plant

Michigan's 2010 Regional Haze SIP indicated that EGLE had accepted the St. Marys Cement – Charlevoix Plant existing permitted PM, NO_X, and SO_2 emission limits as representing BART for their subject equipment. The USEPA later issued a final rule effective on January 2, 2013, disapproving the portion of Michigan's Regional Haze SIP that applied to the NO_X and SO_2 BART determination for the cement kiln and associated equipment at St. Marys Cement (77 FR 71533, December 3, 2012). The final rule also included a FIP for this equipment that imposed NO_X and SO_2 BART limits. The Federal Register publication of the USEPA disapproval action and FIP can be accessed at: Federal Register: Approval and Promulgation of Air Quality Implementation Plans; Michigan; Regional Haze State Implementation Plan; Federal Implementation Plan for Regional Haze

The USEPA noted in their final rulemaking, that their BART determination for the facility includes operation of SNCR and a 50 percent reduction in NO_X emissions. The following NO_X emission limits were set in the FIP effective January 1, 2017, along with testing, monitoring, reporting, and recordkeeping requirements:

- 2.80 lbs. NO_X per ton of clinker (30-day rolling average as NO_2);
- 2.40 lbs. NO_X per ton of clinker (12-month average as NO_2); and
- 7.50 lbs. SO_2 per ton of clinker (12-month average).

The USEPA also concluded in the rulemaking that add-on SO_2 control was not warranted as BART set an SO_2 limit of 7.5 lbs. per ton of clinker.

These NO_X and SO_2 BART limits have been federally enforceable through St. Marys Cement – Charlevoix Plant's most recently approved ROP since coming into effect on August 20, 2014 (MI-ROP-B1559-2014) (*copy attached as* Appendix 27).

MI-ROP-B1559-2014 includes a condition that specifies the permittee shall comply with all applicable requirements of the Regional Haze Regulations requiring BART, as specified through 40 CFR 52.1183(h), effective January 1, 2017.

Compliance Status: Through a recent inspection on August 18, 2020, St. Marys Cement - Charlevoix Plant was determined to be in compliance with the applicable NO_X and SO_2 BART conditions under MI-ROP-B1559-2014. No current enforcement action was found in MACES.

8.3.1.4 Smurfit-Stone Container Corporation

Michigan's 2010 Regional Haze SIP indicated that the Smurfit-Stone Container Corporation plant had been shut down since February 2010. The company was listed as American Iron & Metal (SRN A5754) in MAERS as of 2004. No emissions were recorded in MAERS after 2010 and no active permits for the facility were found in the Michigan records of PTIs and ROPs. An inspection on August 27, 2010, indicates the mill had been closed since Autumn 2009. The Smurfit-Stone Ontonagon Mill was sold to Rock-Tenn Company effective May 27, 2011. The name of the new company will be RockTenn CP LLC, per a note in MACES filed by the EGLE District staff. No new air permits were found in the Michigan permit system for the new owner.

As expected, there have been no reported emissions since the shutdown reported for late 2009 or early 2010.

8.3.1.5 Tilden Mining Company LC

Michigan's 2010 Regional Haze SIP submittal indicated that EGLE had accepted the Tilden Mining Company LC existing permitted PM emission limits based on the taconite Maximum Achievable Control Technology (MACT) as representing BART for the indurating furnace/grate-kiln (EU KILN 1), EU PRIMARY CRUSHER, EU COOLER 1, EU DRYER 1, EU BOILER 1, and EU BOILER 2. Michigan's 2010 Regional Haze SIP submittal also accepted the Tilden Mining Company LC cost analysis showing that all technically feasible SO_2 control measures evaluated as BART were not cost-effective. Finally, Michigan's SIP submittal accepted a Tilden Mining Company LC proposal to set a BART NO_X limit for EU KILN 1 before December 31, 2012, based on "good combustion practices" and emission testing.

The USEPA subsequently issued a final rule effective on March 8, 2013, that specified a FIP for certain equipment that imposed NO_X limits for EU KILN 1 (78 FR 8706, February 6, 2013). The Federal Register publication of the USEPA disapproval action and FIP can be accessed at: https://www.federalregister.gov/documents/2013/02/06/2013-01473/approval-and-promulgation-of-air-quality-implementation-plans-states-of-minnesota-and-michigan.

After subsequent litigation, a settlement was entered in April, 2015. These changes to the limits were included in the proposed FIP Rule that was published in the Federal Register on October 22, 2015 (80 FR 64160, October 22, 2015). The Federal Register publication can be accessed at: https://www.govinfo.gov/content/pkg/FR-2015-10-22/pdf/2015-25023.pdf.

On June 8th, 2016, Cliffs Natural Resources, Inc. (owner of Tilden Mining Company LC) petitioned the United States Court of Appeals for review of the final rule ("Air Plan Approval; Minnesota and Michigan; Revision to 2013 Taconite Federal Implementation Plan Establishing BART for Taconite Plants") promulgated by the USEPA and published in the Federal Register on April 12, 2016 (81 FR21672, April 12, 2016). The Federal Register publication can be accessed at: https://www.govinfo.gov/content/pkg/FR-2016-04-12/pdf/2016-07818.pdf. The petition for review was consolidated in the United States Court of Appeals for the Eighth Circuit under lead Case No. 16-2643.

On April 23, 2024, the USEPA published a proposed settlement agreement in Cleveland-Cliffs, Inc. v. Environmental Protection Agency, Case No. 16-2643, which was published in the Federal Register (89 FR 30360), https://www.govinfo.gov/content/pkg/FR-2024-04-23/pdf/2024-08612.pdf (*See* Appendices 13 and 14). If finalized, the proposed settlement agreement would set forth revised NO_X BART limits for EU Kiln 1 in a FIP that would be incorporated into the company's ROP at the state level.

Compliance Status: Although the alternative NO_X and SO_2 BART limits established through the 2015 FIP have not yet come into effect, Tilden Mining Company LC was determined to be in compliance with PTI No. 148-12A (*copy attached as* Appendix 28) and ROP MI-ROP-B4885-2017b *(copy attached as Appendix 29)* through the most recent onsite inspection conducted on August 22, 2019. No current enforcement action was found in MACES.

8.3.2 Emissions Reductions from Regional Haze SIP Strategies

40 CFR 51.308(g)(2) requires a summary of the emissions reductions from regional haze SIP strategies:

> *A summary of the emissions reductions achieved throughout the State through implementation of the measures described in [40 CFR 51.308(g)(1)].*

As in Michigan's 2021 Regional Haze SIP submittal, EGLE continues to believe that SO_2 and NO_X emissions are the most important contributors to haze formation that impact the Class I areas at Isle Royale National Park and Seney Wilderness Area. As illustrated in Figure 5, SO_2 and NO_X emissions lead to the formation of the particulate species of sulfate and nitrate that make up a significant portion of the contribution to visibility impairment at these Class I areas. Accordingly, the following evaluations of emission reductions from SIP and non-SIP LTS control measures and programs have been limited to include only SO_2 and NO_X.

This part of the Progress Report addresses the facility-wide emission reductions from the five first planning period BART sources over the 2015 – 2019 period resulting from the Regional

Haze SIP control measures based on actual emission information and provides a comparison with the emissions from the actual facility-wide emissions from the evaluation done for the 2010 – 2014 period. This type of evaluation is necessary to show the emissions reductions that have occurred since the majority of the compliance deadlines have been reached for the BART FIP limits from the first planning period (except for Tilden Mining Company LC). In the 2016 Progress Report, emissions reductions that were demonstrated for the five first planning period BART sources were not entirely reflective of the BART limits due to the fact that a few of the sources' control measure implementation deadlines had not yet been reached.

8.3.2.1 Holcim (US), Inc. DBA Lafarge Alpena Plant

The interim, facility-wide 12-month rolling limits of the federal/state Consent Decree (Consent Decree Limits – USA, USEPA, Michigan, et al. v. Lafarge; U.S. District Court Civil Action No. 3:10-cv-00044-JPG-CJP) are listed below:

- NO_X
  Interim Limit (facility-wide 12-month rolling): 8,650 tons by January 1, 2011.

- SO_2
  Interim Limit (facility-wide 12-month rolling): 13,100 tons by January 1, 2011.

The actual annual facility-wide emissions for 2010 – 2019 appear in Table 34 below. Annual actual facility-wide emission rates for 2011 (6,907 tpy NO_X and 10,905 tpy SO_2) were well below the Consent Decree 2011 interim 12-month rolling limits. Annual actual facility-wide emission rates for 2014 were further reduced for NO_X (to 4,673 tpy); additionally, 2014 actual SO_2 emissions decreased (2,504 tpy) and continued to remain below the Consent Decree interim limit. In 2015, actual facility-wide NO_X and SO_2 emissions were reported to be 4,677 and 2,364 tpy, respectively. While NO_X emissions decreased by approximately 796 tpy between 2015 (4,677 tpy) and 2019 (3,880 tpy), SO_2 emissions were reduced by approximately 506 tpy over the 5-year time period.

Figure 22: Holcim (US), Inc. DBA Lafarge Alpena Plant: Facility-wide Actual Emissions (2010 – 2019)

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 34: Holcim (US), Inc. DBA Lafarge Alpena Plant: Facility-wide Actual Emissions (2010 – 2019)

Year	NO_X (tpy)	SO_2 (tpy)
2010	6,894	8,466
2011	6,907	10,905
2012	5,102	7,820
2013	4,504	10,087
2014	4,673	2,504
2015	4,677	2,364
2016	4,834	2,397
2017	3,734	2,232
2018	3,825	1,994
2019	3,880	1,858

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

8.3.2.2 Billerud Escanaba LLC

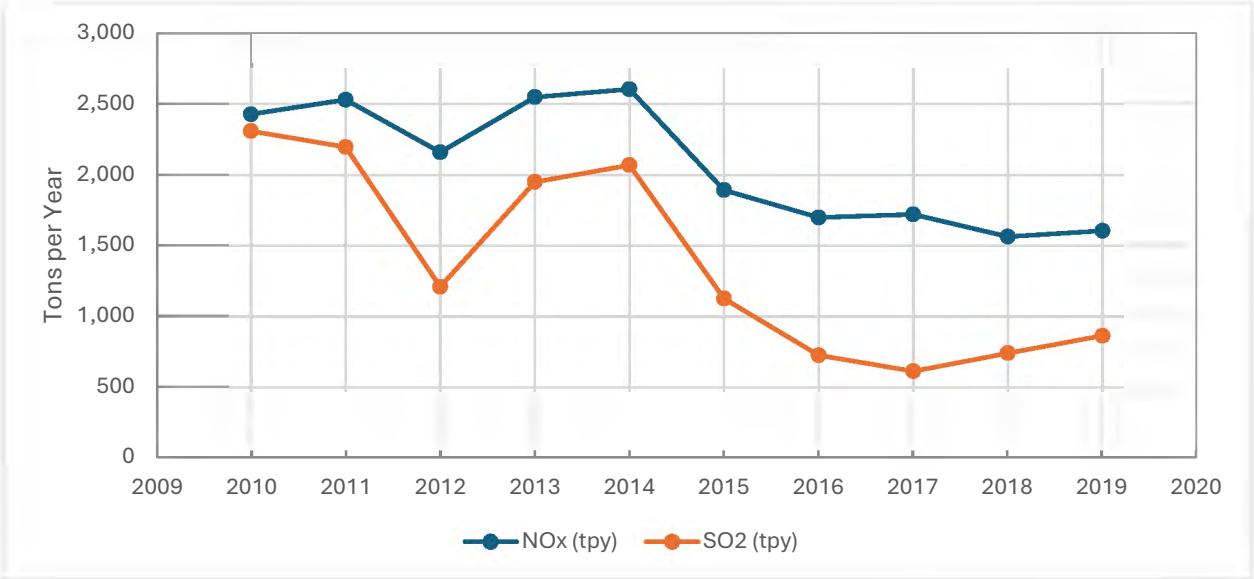
The USEPA issued a final rule effective on January 2, 2013, imposing a FIP for Billerud Escanaba LLC's Boilers 8 and 9 that specified NO_X BART limits (77 FR 71533, December 3, 2012). The Boiler 8 NO_X limit was changed by the USEPA to a fixed, rolling 30-day average limit

of 0.35 lb. of NO_X per MMBtu, rather than a weighted average of separate limits for oil-firing and gas-firing. A CEM system was the required means of compliance determination for Boiler 8. The Boiler 9 NO_X limit was set by the FIP at 0.27 lb. per MMBtu with compliance determination by means of emission testing.

Annual actual facility-wide emission rates for 2010 through 2019, for NO_X and SO_2 are provided in Figure 23 and Table 35. The annual emission data demonstrate significant reductions (on average) for NO_X and SO_2 between 2010 and 2019.

Annual actual facility-wide emission rates for 2013 were reported to be 2,549 tpy for NO_X and 1,950 tpy for SO_2. In 2015, actual facility-wide NO_X and SO_2 emissions were reported to be 1,892 and 1,127 tpy, respectively. While SO_2 emissions decreased by 262 tons between 2015 (1,127 tpy) and 2019 (865 tpy), NO_X emissions were similarly reduced by 287 tpy over the 5-year time period.

Figure 23: Billerud Escanaba LLC: Facility-wide Actual Emissions (2010 – 2019)



Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 35: Billerud Escanaba LLC: Facility-wide Actual Emissions (2010 – 2019)

Year	NO_X (tpy)	SO_2 (tpy)
2010	2,428	2,309
2011	2,530	2,196
2012	2,160	1,210
2013	2,549	1,950
2014	2,605	2,069
2015	1,892	1,127
2016	1,699	727
2017	1,721	614
2018	1,564	742
2019	1,605	865

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

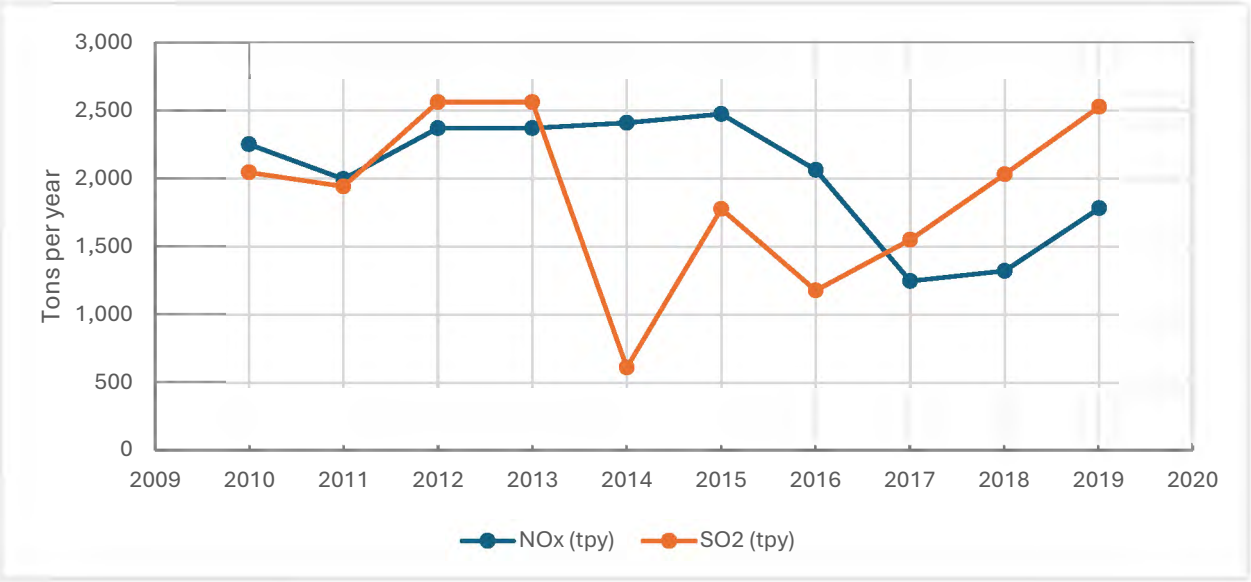
8.3.2.3 St. Marys Cement – Charlevoix Plant

The USEPA imposed a FIP setting BART SO_2 and NO_X limits that became effective on January 1, 2017 (77 FR 71533, December 3, 2012). The ROP was then modified to add a requirement specifying that St. Marys Cement – Charlevoix Plant must comply with applicable BART by the USEPA deadline. Following this, EGLE re-opened the ROP to incorporate the specific FIP BART requirements.

Annual actual facility-wide emission rates for 2010 through 2019 for NO_X and SO_2 are provided in Figure 24 and Table 36.

Annual actual facility-wide emission for 2013 were reported to be 2,369 tpy for NO_X and 2,560 tpy for SO_2. In 2015, actual facility-wide NO_X and SO_2 emissions were reported to be 2,473 and 1,777 tpy, respectively. While SO_2 emissions increased by 748 tons between 2015 (1,777 tons) and 2019 (2,525 tons), NO_X emissions decreased by 691 tons over the 5-year time period.

Figure 24: St. Marys Cement – Charlevoix Plant: Facility-wide Actual Emissions (2010 – 2019)



Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 36: St. Marys Cement – Charlevoix Plant: Facility-wide Actual Emissions (2010 – 2019)

Year	NO_X (tpy)	SO_2 (tpy)
2010	2,251	2,045
2011	1,996	1,942
2012	2,369	2,560
2013	2,369	2,560
2014	2,408	614
2015	2,473	1,777
2016	2,063	1,179
2017	1,248	1,551
2018	1,322	2,031
2019	1,782	2,525

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

8.3.2.4 Smurfit-Stone Container Corporation

The 2010 Regional Haze SIP indicated that the Smurfit-Stone Container Corporation plant has been shut down since February 2010. No emissions were recorded in MAERS after 2010, and no active permits for the facility were found in the Michigan records of PTIs and ROPs. An inspection on August 27, 2010, indicates the mill had been closed since Autumn 2009.

Smurfit-Stone Container Corporation's annual actual facility-wide emission rates for 2009 through 2010, as well as for 2015 through 2019, for NO_X and SO_2 are provided in Table 37. As expected, there have been no reported emissions since the shutdown reported for late 2009 or early 2010.

Table 37: Smurfit-Stone Container Corporation: Facility-wide Actual Emissions (2009 – 2019)

Year	NO_X (tons/year)	SO_2 (tons/year)
2009	208	1,231
2010	2.23	0.01
2015		
2016		
2017		
2018		
2019		

8.3.2.5 Tilden Mining Company LC

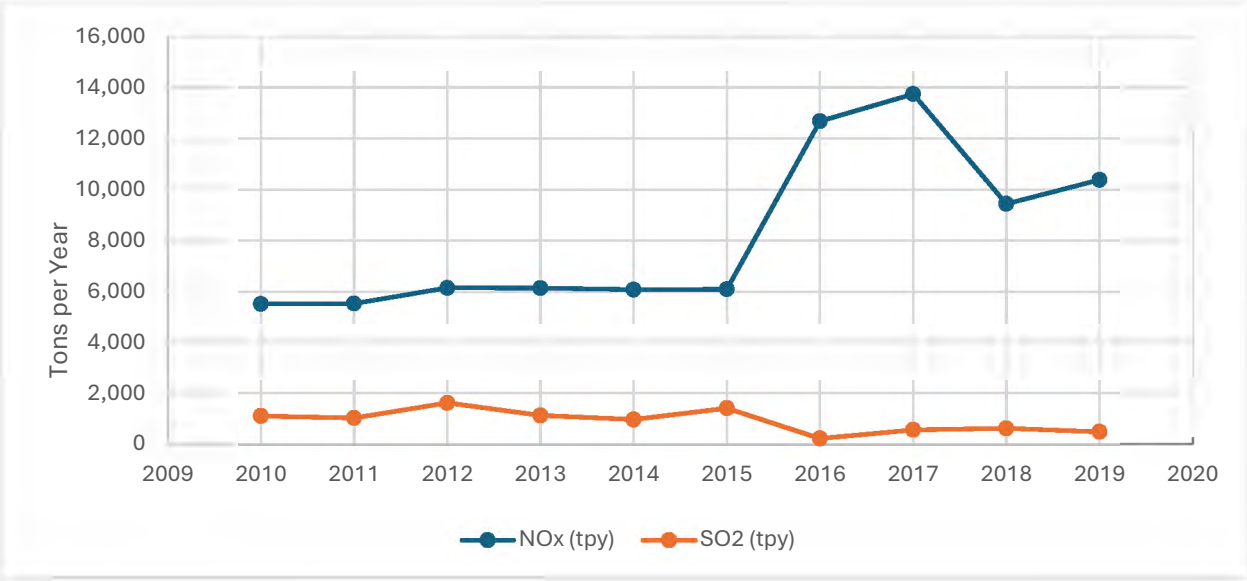
Despite the ongoing litigation surrounding the NO_X/SO_2 BART limits established in the 2015 FIP Rule, Tilden Mining Company LC's ROP has been modified to add a condition specifying that the facility must comply with the applicable requirements of 40 CFR Part 52, Approval and Promulgation of Implementation Plans, Subpart X—Michigan, Section 52.1183 Visibility Protection, which would include the newly proposed BART limits for EUKILN1 beginning 30 days after the date of publication in the Federal Register. EGLE would then re-open the ROP and incorporate the FIP BART limits into the ROP in accordance with the renewal schedule.

Annual actual facility-wide emission rates for 2010 through 2019, for NO_X and SO_2 are provided in Figure 25 and Table 38. The annual emission data demonstrates a relatively significant increase (on average) in NO_X emissions facility-wide, while also showing a reduction (on average) in SO_2 emissions between 2010 and 2019).

Annual actual facility-wide emission rates for 2013 were reported to be 6,142 tons for NO_X and 1,132 tons for SO_2. In 2015, actual facility-wide NO_X and SO_2 emissions were reported to be 6,097 and 1,412 tons, respectively. While SO_2 emissions decreased by 911 tons between 2015 (1,412 tons) and 2019 (501 tons), NO_X emissions increased by 4,282 tons over the 5-year time period. In an effort to understand how NO_X and SO_2 emissions have changed since the implementation of NO_X and SO_2 BART limits for this kiln through the FIP, EGLE calculated the difference between the 5-year annual average NO_X and SO_2 emissions rates for the 2015 – 2019 evaluation period and the 5-year annual average NO_X and SO_2 emissions rates for the 2010 – 2014 evaluation period. This comparison showed the relative change in emissions

from the 2010 – 2014 period to the 2015 – 2019 period with NO_X emissions higher by 4,582 tpy and SO_2 emissions lower by 501 tpy.

Figure 25: Tilden Mining Company LC: Facility-wide Actual Emissions (2010 – 2019)



Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

Table 38: Tilden Mining Company LC: Facility-wide Actual Emissions (2010 – 2019)

Year	NO_X (tpy)	SO_2 (tpy)
2010	5,520	1,112
2011	5,535	1,036
2012	6,149	1,617
2013	6,142	1,132
2014	6,079	976
2015	6,097	1,412
2016	12,677	245
2017	13,741	575
2018	9,440	636
2019	10,379	501

Source: MAERS Annual Pollutant Totals Query
https://www.egle.state.mi.us/maers/emissions_query.asp

8.3.3 Visibility Progress

40 CFR 51.308(g)(3) requires an assessment of visibility conditions and changes for each Class I area within the state:

> *For each mandatory Class I Federal area within the State, the State must assess the following visibility conditions and changes, with values for most impaired, least impaired and/or clearest days as applicable expressed in terms of 5-year averages of these annual values. The period for calculating current visibility conditions is the most recent 5-year period preceding the required date of the progress report for which data are available as of a date 6 months preceding the required date of the progress report.*
>
> *(i)(A) …the current visibility conditions for the most impaired and least impaired days.*
>
> *(ii)(A) …the difference between current visibility conditions for the most impaired and least impaired days and baseline visibility conditions.*
>
> *(iii)(A) …the change in visibility impairment for the most impaired and least impaired days over the period since the period addressed in the most recent plan required under [40 CFR 51.308(f)].*

For the Isle Royale and Seney Class I area sites, EGLE's AQD acquired the following IMPROVE visibility data from the FLM Environmental Database (https://views.cira.colostate.edu/fed/).

Michigan's most impaired days have continued to improve since the 2016 Progress Report update. In 2019, the IMPROVE monitor at Isle Royale National Park (ISLE1) demonstrated a 5-year average light extinction of 14.9 dv, down from 17.3 dv in 2014. Seney National Wildlife Refuge (SENE1) improved from 19.5 dv to 17.1 dv over the same time period.

Clearest days have also improved during this implementation period. Isle Royale's clearest days have reduced average light extinction from 5.5 dv in 2014 to 5.1 dv in 2019. Seney improved from 5.5 dv to 5.1 dv over the same time period.

8.3.4 Emissions Progress

40 CFR 51.308(g)(4) requires an analysis of emissions changes since the last regional haze SIP revision:

> *An analysis tracking the change over the period since the period addressed in the most recent plan required under [40 CFR 51.308(f)] in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes should be identified by type of source or activity. With respect to all sources and activities, the analysis must extend at least through the most recent year for which the state has submitted emission inventory information to the Administrator in compliance with the triennial reporting requirements of [40 CFR Part 51, Subpart A] as of a date 6 months preceding the required date of the progress report. With respect to sources that report directly to a centralized emissions data system operated by the Administrator, the analysis must extend through the most recent year for which the Administrator has provided a State level summary of such reported data or an internet-based tool by which*

the State may obtain such a summary as of a date 6 months preceding the required date of the progress report. The State is not required to back cast previously reported emissions to be consistent with more recent emissions estimation procedures and may draw attention to actual or possible inconsistencies created by changes in estimation procedures.

8.3.4.1. NO_X and SO_2 Statewide Point Source Emissions

Statewide point source emissions for Michigan were determined for both 2014 and 2019 for the progress report element of the second planning period SIP. Actual NO_X and SO_2 emission data for this comparison was derived from MAERS, which was accessed at: EGLE - Michigan Air Emissions Reporting System (MAERS) - Annual Pollutant Totals Query

The 2014 and 2019 actual NO_X and SO_2 data is summarized in Table 39. The data indicates substantial reductions over the 6-year evaluation period for both NO_X (33,442 tons) and SO_2 (111,459 tons), representing a decrease in statewide point source emissions over the 6-year period from 2014 to 2019 of 29 percent for NO_X and 63 percent for SO_2.

Table 39: 2014 vs 2019 Statewide Actual NO_X and SO_2 Emissions for All Michigan Point Sources Statewide

Source Category	2014 NO_X Actual Emissions (tons)	2019 NO_X Actual Emissions (tons)	NO_X Emissions Change: 2014 vs 2019 tons	2014 SO_2 Actual Emissions (tons)	2019 SO_2 Actual Emissions (tons)	SO_2 Emissions Change: 2014 vs 2019 tons
All Michigan Point Sources, Statewide*	113,605	80,163	-33,432	176,704	65,245	-111,459

*Does not include transportation, residential, and small stationary sources.

Source: MAERS Annual Pollutant Totals Query https://www.egle.state.mi.us/maers/emissions_query.asp

8.3.4.2 NO_X and SO_2 Total Statewide Emissions

2014 and 2019 statewide emissions trends data for NO_X and SO_2 was acquired from the USEPA Air Emissions Inventories Website at: https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data. The emissions data were broken down into 14 emissions source categories that capture point, area, mobile, and event sources.

As expected, and as depicted in Figure 26 and Table 40, total statewide SO_2 emissions decreased by approximately 118,000 tons across the 6-year evaluation period (2014 – 2019), while total statewide NO_X emissions were reduced by approximately 112,000 tons. The most substantial decrease across all emissions source categories is for SO_2 emissions from the Fuel Combustion Electric Utility (EGU) category (103,324 tons) (*as shown in* Table 40). NO_X emissions from Highway Vehicles (*as show in* Table 41) sources also showed a large decrease

across the 6-year timespan (68,411 tons). Across the 14 emissions source categories, 5 saw minimal increases in SO_2 emissions between 2014 and 2019, while 4 demonstrated insignificant increases in NO_X emissions.

Table 40: SO_2 Statewide Emissions Trends by Category (2014 and 2019)

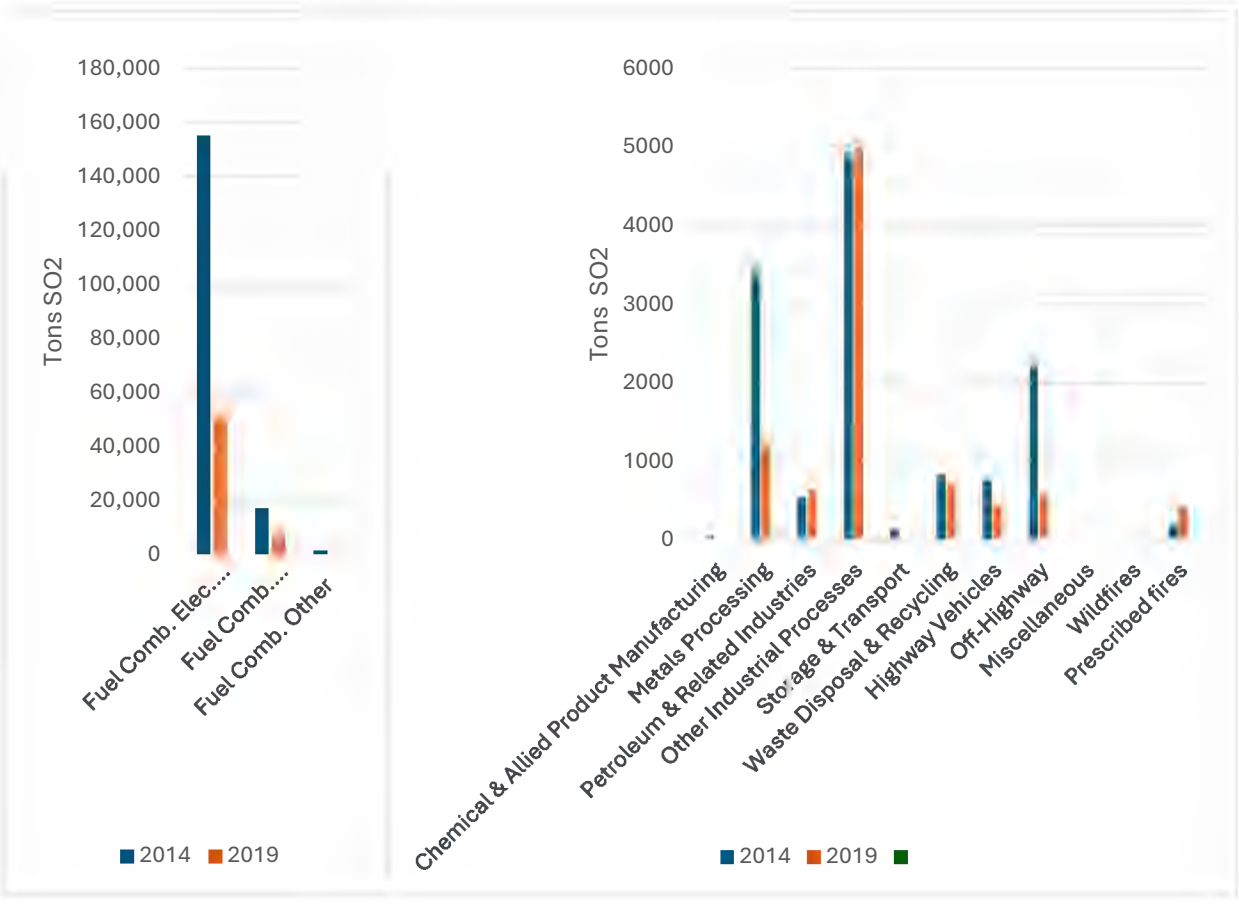
Category	Pollutant	emissions2014 (tons)	emissions2019 (tons)	Change in Emissions (2014-2019) (tons)
Fuel Comb. Elec. Util.	SO_2	155,180	51,856	-103,324
Fuel Comb. Industrial	SO_2	17,323	7,766	-9,557
Fuel Comb. Other	SO_2	1,737	883	-854
Chemical & Allied Product Manufacturing	SO_2	37	10	-27
Metals Processing	SO_2	3,406	1,213	-2,193
Petroleum & Related Industries	SO_2	533	650	117
Other Industrial Processes	SO_2	4,917	4,974	57
Storage & Transport	SO_2	123	0	-123
Waste Disposal & Recycling	SO_2	817	705	-112
Highway Vehicles	SO_2	745	436	-309
Off-Highway	SO_2	2,223	580	-1,643
Miscellaneous	SO_2	6	15	9
Wildfires	SO_2	1	11	10
Prescribed fires	SO_2	196	432	236
Total	SO_2	187,244	69,531	-117,713

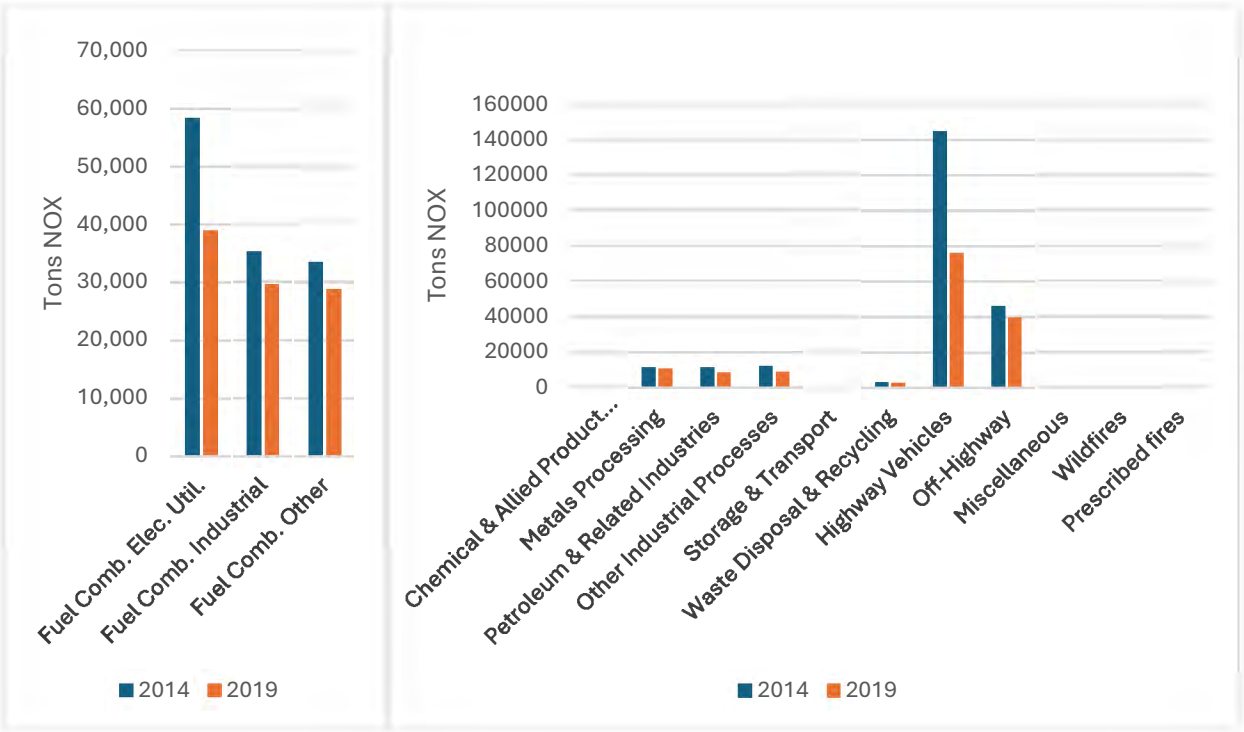
Table 41: NO_X Statewide Emissions Trends by Category (2014 and 2019)

Category	Pollutant	emissions2014 (tons)	emissions2019 (tons)	Change in Emissions (2014-2019) (tons)
Fuel Comb. Elec. Util.	NO_X	58,306	38,911	-19,395
Fuel Comb. Industrial	NO_X	35,227	29,518	-5,709
Fuel Comb. Other	NO_X	33,385	28,741	-4,644
Chemical & Allied Product Manufacturing	NO_X	70	46	-24
Metals Processing	NO_X	11,188	10,660	-528
Petroleum & Related Industries	NO_X	11,480	8,433	-3,047
Other Industrial Processes	NO_X	12,040	8,722	-3,318

Category	Pollutant	emissions2014 (tons)	emissions2019 (tons)	Change in Emissions (2014-2019) (tons)
Storage & Transport	NO_X	12	12	0
Waste Disposal & Recycling	NO_X	3,169	2,518	-651
Highway Vehicles	NO_X	144,675	76,264	-68,411
Off-Highway	NO_X	46,182	39,443	-6,739
Miscellaneous	NO_X	11	62	51
Wildfires	NO_X	1	20	19
Prescribed Fires	NO_X	284	678	394
Total	NO_X	356,030	244,028	-112,002

Figure 26: 2014 vs 2019 Statewide Actual NO_X and SO_2 Emissions by Category





8.3.4.3 Assessment of Changes Impeding Visibility Progress

40 CFR § 51.308(g)(5) requires an assessment of changes impeding visibility progress:

> *An assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred since the period addressed in the most recent plan required under [40 CFR § 51.308(f)] including whether or not these changes in anthropogenic emissions were anticipated in that most recent plan and whether they have limited or impeded progress in reducing pollutant emissions and improving visibility.*

Michigan has not identified, nor does it anticipate any significant changes in either in-state or out-of-state emissions that would impede visibility progress at its Class I areas. Although a number of source categories within Michigan and other bordering states (Indiana, Illinois, etc.) demonstrated increases in NO_X and/or SO_2 emissions between 2014 and 2019 (according to the information published to the USEPA's Air Pollutant Emissions Trends Data Webpage (https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data), EGLE does not consider this a significant issue impeding visibility progress for the Michigan Regional Haze SIP given that substantial NO_X and SO_2 reductions have occurred from other anthropogenic sources that vastly outweigh the impacts of these minor NO_X/SO_2 emissions increases within the Midwest region of the United States.

8.4 Consultation and Discussions with Other Parties

8.4.1 FLM Consultation

EGLE facilitated a consultation period with the FLMs from December 19, 2024, to February 14, 2025, to discuss EGLE's draft SIP Supplement, providing at least 60 days before holding a public hearing or announcing a public comment opportunity as required under 40 CFR 51.308(i)(2). Appendix 30 contains the comments received from the FLMs. Appendix 32 contains Michigan's response to all comments received during this process.

8.4.2 Public Comment

After consideration of FLM comments, Michigan provided a comment period and the opportunity for a public hearing on the proposed SIP Supplement for the Regional Haze second implementation period from March 10, 2025 to April 8, 2025. Appendix 31 contains the public notice and comments received during that comment period. Appendix 32 contains Michigan's response to all comments received during this process.

APPENDICES

(Please note: Appendices A – E are contained in Michigan's August 23, 2021 Regional Haze SIP submittal. For reference, Michigan's August 23, 2021 Regional Haze SIP submittal is included in full as Appendix 1 in this SIP Supplement).