MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Public Comment Period for Revisions to the Michigan State Implementation Plan

The Michigan Department of Environment, Great Lakes, and Energy (EGLE) opened a public comment period for revisions to the Michigan State Implementation Plan (SIP) on May 17, 2021, which will remain open until 9:00 p.m. EDT on June 30, 2021. The purpose of the public comment period and virtual public hearing, if requested, are to allow all interested parties an opportunity to comment on the proposed SIP revision.

Proposed SIP Revision:

- State Implementation Plan Submittal for Regional Haze Second Planning Period.

In the proposed SIP revision, EGLE is demonstrating compliance with the requirement for an updated Regional Haze plan to comply with the Clean Air Act.

The public is encouraged to review the proposed SIP revision and present comments through the end of the public comment period. All statements received during the public comment period will be considered by the Air Quality Division (AQD) prior to submitting the SIP revision to the United States Environmental Protection Agency. Once all comments are considered, EGLE may submit the SIP revision as written, submit it with minor changes, or make major changes that require an additional public comment period.

Submitting Comments:
There are several ways to submit comments on the proposed SIP revisions.

Email your comment to irviner@michigan.gov. Please include "Comments on SIP Revision" in the subject line.

Mail your comment to Robert Irvine, EGLE, Air Quality Division, SIP Development Unit, P.O. Box 30260, Lansing, Michigan 48909-7760.

At a public hearing, if held.

If requested in writing by June 8, 2021, a virtual public hearing will be held on June 15, 2021 at 6:00 p.m., with information on how to attend posted on the AQD's webpage at Michigan.gov/Air. If requested, the virtual public hearing will be preceded by an informational session.

NOTE: The comment period deadline was extended from June 15th to June 30th per a request.

Individuals without internet access and who are interested in receiving printed copies of the documents related to the proposed SIP revision or who need accommodations or other assistance to effectively participate in the hearing should contact Lorraine Hickman at 517-582-3494 or HickmanL@michigan.gov.

This public notice is given in accordance with federal regulations for the SIP.

NOTE: The Department of Environment, Great Lakes, and Energy (EGLE) has closed its offices and other facilities to visits from the public to help mitigate the spread of COVID-19. Necessary public meetings/hearings will be postponed to the extent possible or held virtually. When held virtually, every attempt will be made to accommodate and include individuals from diverse groups, including, but not limited to translation for those with limited English proficiency and provide call in numbers for those without internet access. Other options will also be considered on a case-by-case basis.

Michigan's Environmental Justice Policy promotes the fair, non-discriminatory treatment and meaningful involvement of Michigan's residents regarding the development, implementation, and enforcement of environmental laws, regulations, and policies by this state. Fair, non-discriminatory treatment intends that no group of people, including racial, ethnic, or low-income populations, will bear a disproportionately greater burden resulting from environmental laws, regulations, policies, and decision-making. Meaningful involvement of residents ensures an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health.

Michigan Department of Environment, Great Lakes, and Energy

Air Quality Division

STATE IMPLEMENTATION PLAN SUBMITTAL

FOR

REGIONAL HAZE

SECOND PLANNING PERIOD

Michigan Department Environment, Great Lakes, and Energy
Air Quality Division
P.O. Box 30260
Lansing, Michigan 48909-7760

http://www.michigan.gov/air

May 2021

Table of Contents

LIST OF ACRONYMS

Acronym	Description
AFGD	Advanced flue gas desulfurization
AOI	Area of influence
ASOA	Anthropogenic secondary organic aerosol
AQD	Air Quality Division
B20%	Best 20 percent (days of visibility)
BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
BC	Boundary conditions
Bext	Light extinction
BOWA, BWCA	Boundary Waters Canoe Area Wilderness
BSOA	Biogenic secondary organic aerosol
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CALPUFF	California Puff Model
CAMR	Clean Air Mercury Rule
CAMx	Comprehensive Air Quality Model with extensions
CEED	Center for Energy and Economic Development
CENRAP	Central Regional Air Planning Association
CFR	Code of Federal Regulations
CM	Coarse mass
CMAQ	Community Multiscale Air Quality Modeling System
Commission	Grand Canyon Visibility Transport Commission
DAA	Dry absorption addition
DSI	Dry Sorbent Injection
EC	Elemental carbon
ECR	EC/R Incorporated consulting firm
EFGR	External flue gas recirculation
EGU	Electric generating unit
EIMP	Empire Iron Mining Partnership
ENVIRON	ENVIRON International Corporation
EPA	United States Environmental Protection Agency
EPC	Escanaba Paper Company
FGD	Flue gas desulfurization
f(RH)	Relative Humidity adjustment factor
FLM	Federal Land Manager
FPRM	Primary particulate (i.e., soil, crustal and metals)
FS	Forest Service
FWS	Fish and Wildlife Service
HAPs	Hazardous Air Pollutants
ICI	Institutional, commercial, and industrial
IDF	Indirect firing system
IFGR	Induced flue gas recirculation
IMPROVE	Interagency Monitoring of Protected Visual Environments
1PM	Integrated Planning Model
ISLE1	Isle Royale National Park

Acronym	Description
LADCO	Lake Michigan Air Directors Consortium
LNB	Low NOx Burner
LTO	Low temperature oxidation
km	kilometers
LTS	Long-term strategy
MACT	Maximum Achievable Control Technology
MANE-VU	Mid-Atlantic, Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
DNRE	Michigan Department of Natural Resources and Environment
MDOT	Michigan Department of Transportation
Mm-1	Inverse Megameters
MM5	Mesoscale Meteorological Model, 5th Generation (developed by Pennsylvania State University / National Center for Atmospheric Research PSU/NCAR)
MMBtu	Million British thermal units
MOBILE6	MOBILE Vehicle Emission Modeling Software Version 6
MPCA	Minnesota Pollution Control Agency
MRPO	Midwest Regional Planning Organization
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NESCAUM	Northeast State for Coordinated Air Use Management
NH4	Ammonium
N03	Nitrate
NOx	Nitrogen oxides
NOV	Notice of Violation
non-EGU	Non-electrical generating units
NPS	National Parks Service
NS	New Source Review
obs	Observed
oc	Organic carbon
OMC	Organic mass carbon
OTB	On-the-books
p80	80th percentile
PJFF	Pulse jet fabric filter
PM	Particulate matter
PM10	Particulate matter with aerodynamic diameters less than 10 microns
PM2.5	Particulate matter with aerodynamic diameters less than 2.5 microns
PMF	Positive matrix factorization method
POC	Particulate organic matter
PSAT	Particulate Matter Source Apportionment Technology
PSD	Prevention of Significant Deterioration
Q/D	Emissions over distance (to Class 1 area)
REMSAD	Regional Modeling Systems for Modeling and Deposition
RH	Relative Humidity
RHR	Regional Haze Rule
ROG	Reactive Organic Gases
ROP	Renewable operating permit
RPG	Reasonable progress goal

Acronym	Description
RPO	Regional Planning Organization
RRF	Relative response factor
RVP	Reid Vapor Pressure
SCR	Selective catalytic reduction
SDA	Spray dryer absorption
SENEY	Seney Wilderness Area
SESARM	Southeast State Air Resource Managers, Inc.
SIP	State Implementation Plan
SMC	St. Mary's Cement
SMP	Smoke Management Plan
SNCR	Selective non-catalytic reduction
SO2	Sulfur dioxide
SO4	Sulfate
SOA	Secondary organic aerosol
SSCC	Smurfit Stone Container Corporation
TIP	Tribal Implementation Plan
TMC	Tilden Mining Company
tpy	Tons per year
TSD	Technical Support Document
URP	Uniform rate of progress
VIP	Visibility impairing pollutant
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile organic compounds
VOYA	Voyageurs National Park
W20%	Worst 20 percent (days of visibility)
WRAP	Western Regional Air Partnership
WWESP	Wet walled electrostatic precipitator

Executive Summary

Michigan is subject to requirements in the U. S. Environmental Protection Agency (EPA) Regional Haze Rule (RHR) as described in 40 CFR 51.308(f). The first planning period for Regional Haze spanned years 2008-2018, and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) submitted that State Implementation Plan (SIP) in 2010. The Haze Rule requires states to update the SIP for subsequent 10-year planning periods, and this SIP document represents the period from 2018-2028. The SIP is required to be submitted to the EPA by July 31, 2021.

The RHR's aim is to provide for natural visibility levels by 2064 at specified Class 1 areas. Michigan has two Class 1 areas subject to the requirements in the Haze Rule; Isle Royale National Park and Seney Wilderness Area, both located in Michigan's Upper Peninsula. In developing this SIP, EGLE followed the most recent guidance as found in the EPA's "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period," published in August 2019 (RH Guidance). This guidance allows states to develop a SIP that is reasonable, both in assessing whether visibility improvements are needed at the two Class 1 areas as well as in determining whether additional emission reductions are needed at stationary sources potentially impacting the Class 1 areas.

Visibility levels at Michigan's two Class 1 areas are determined by federal air monitors in the general vicinity of the Class 1 areas. EGLE relied on this data, and on modeling and data analysis provided by the Lake Michigan Air Directors Consortium (LADCO) to develop much of the core analysis in this SIP document. LADCO has provided detail on their work in their Technical Support Document (TSD), which can be found in Appendix A to this document. The modeling and data analysis information in this document is taken from the TSD including some figures, tables, and text.

This SIP document provides a picture of past, current, and projected future visibility at Isle Royale and Seney Class 1 areas, and shows what if any additional emissions reductions are needed on stationary sources potentially impacting the areas during this 10-year planning period. In this document EGLE provides a clear demonstration of: 1) monitoring data for Isle Royale and Seney that has shown and continues to show visibility remaining below the level needed to demonstrate reasonable progress in meeting the natural condition goal in 2064. 2) LADCO modeling projecting visibility at the Class 1 areas to remain below the reasonable progress level in 2028. 3) For these reasons, it is unreasonable for EGLE to require additional emission reductions from the potentially impacting sources identified with the Q/D analysis.

Figures 2 and 3 in Section 2 of this document depict the relationship between the actual monitoring values, projected modeling values for 2028, and the reasonable progress line (referred to as glidepath in this document) extending to the natural conditions targets for 2064.

1 Introduction

1.1 General Background

Section 169A of the 1977 amendments to the Clean Air Act (CAA) established a visibility protection program for the nation's areas of "great scenic importance," otherwise known as Class 1 areas. CAA Section 169A established as a national goal the "prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class 1 Federal areas which impairment results from man-made air pollution."

In 1999, the EPA promulgated the Regional Haze Rule (RHR) to establish more comprehensive visibility protections in the nation's Class 1 areas. The RHR required all states submit regional haze SIPs every 10 years, and to review these SIPs every 5 years. For haze SIPs, the Clean Air Act sets "as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in Class 1 areas which impairment results from man-made air pollution." There are 156 Class 1 areas, including four in the LADCO region: Isle Royale National Park and Seney National Wildlife Refuge in Michigan; and Boundary Waters Canoe Area and Voyageurs National Park in Minnesota. The EPA's visibility rule (64 FR 35714, July 1, 1999) requires reasonable progress in achieving "natural conditions" by year 2064.

In January 2017, the EPA issued a final rule updating the regional haze program, including revising portions of the visibility protection rule promulgated in 1980 and the RHR. The 2017 rule clarifies obligations of the states and EPA during the second haze implementation period, which tracks progress in improving visibility out to year 2028.

EGLE developed the technical basis for the SIP in conjunction with LADCO and other member states (Minnesota, Wisconsin, Illinois, Indiana, and Ohio). LADCO provides technical support to its member states and EGLE relied on LADCO photochemical modeling to support this Regional Haze SIP. The data analysis of the monitoring data for Class 1 areas is also provided by LADCO. This SIP document contains LADCO modeling and data analysis as well as detailed descriptions of large emission sources in the state that are estimated to have impacts on the two Class 1 areas in Michigan.

1.2 Michigan's Regional Haze Class 1 Areas

Isle Royale National Park, Michigan's largest wilderness area, is an island 571,790 acres in size, located in Lake Superior. Isle Royale was established as a national park in 1940 by President Franklin D. Roosevelt and in 1976 was designated part of the National Wilderness Preservation System. In 1981, Isle Royale was designated an International Biosphere Reserve by the United Nations, giving it global scientific and educational significance. Well known for its timber wolves and moose, Isle Royale is the site of the longest running large mammal predator-prey study in the world.

Seney Wilderness Area is 25,150 acres in size, and is located in the western portion of Seney National Wildlife Refuge in Michigan's Upper Peninsula. The Refuge was established in 1935 and the Wilderness Area was designated by the U.S. Congress in 1970. Seney's "string bogs" provide a unique habitat to a large variety of birds, mammals, and unusual plants.

1.3 EGLE's Reasonable Approach – 2018-2028 Planning Period

The RHR and guidance provides states with flexibility in the approach to Regional Haze SIP development.

EGLE recognizes the overall purpose of the Regional Haze program is to meet natural visibility conditions at Class 1 areas by 2064 or show for each 10-year planning period reasonable controls have been implemented or will be implemented even though the natural visibility conditions cannot be met by 2064. For Michigan's two Class 1 areas, monitoring data continues to show visibility remains below the level needed to demonstrate reasonable progress in meeting the natural condition goal in 2064 (see Figures 2 and 3). This fact serves as the basis for the approach, taken by EGLE, that **no additional controls are needed on affected sources for this 10-year planning period.** This conclusion is reinforced by the fact that several coal-fired Electric Generating Units (EGUs) will be shutting down before and shortly after the end of this planning period in 2028, accounting for large additional reductions in SO_2 and NOx in the state.

Excerpts from the RH Guidance are provided below in italics, followed by EGLE commentary highlighting how the guidance provides EGLE with the flexibility described above. EGLE has put key concepts in bold text.

> *"The purpose of this guidance document is to help states[1] develop approvable regional haze state implementation plans (SIPs) to protect visibility in mandatory Class 1 Federal areas.[2] This guidance document in particular applies to the SIPs that are due to be submitted to the Environmental Protection Agency (EPA) by July 31, 2021, for the second implementation period ending in 2028.[3] The required content of these SIPs is specified in 40 CFR 51.308(f), which was revised in 2017.[4] This document supports key principles of program implementation, including supporting states in developing SIPs for complying with the Clean Air Act's (CAA) visibility requirements;* ***reducing state planning burdens****; and leveraging emission reductions achieved through CAA and other programs that further improve visibility in protected areas."*

EGLE emphasizes the EPA's intent to reduce state planning burdens. EGLE has taken the approach in this SIP that additional controls on affected sources are not necessary for this planning period and taking this approach will reduce state planning burdens.

> *"Importantly, this guidance is intended to provide information about EPA's understanding of the discretion and flexibilities states have within the statutory and regulatory requirements to develop Regional Haze SIPs, even where states' approaches differ from those provided in this document. States retain the discretion to develop Regional Haze SIP revisions that differ from the recommendations in this guidance; however, states must ensure the Regional Haze SIPs are consistent with applicable requirements of the CAA and EPA regulations, and are the product of* ***reasoned decision-making****."*

The concept described in the paragraph above is a key to the approach taken by EGLE in developing this SIP for the second Regional Haze planning period; the Regional Haze program provides for a high level of flexibility to states in developing a SIP that is reasonable. EGLE is taking the approach that the existing levels of control at affected facilities, as well as future emissions reductions at EGUs, will result in continued improvement in monitored visibility through 2028.

> *"****Reasoned decision-making*** *is a core component of the Regional Haze program, and thus of states' Regional Haze SIP submissions. The EPA will evaluate a state's SIP revision to determine whether the state has REASONABLY conducted the required analyses and engaged with the requisite considerations in a manner that is consistent with the statutory visibility goal."*

As seen in Figures 2 and 3, EGLE continues to demonstrate reasoned decision-making in preparing a SIP that does not impose unnecessary additional regulatory burdens on affected facilities when current levels of emission control are adequate to meet reasonable progress throughout the planning period. The RH Guidance highlights as a basis of Regional Haze SIPs that states allow for reasonableness in development of the SIP. The paragraph below from the RH Guidance strongly emphasizes flexibility and reasonable decision-making as key concepts of the Haze program.

> *"The CAA and the Regional Haze Rule provide a process for states to follow to determine what is necessary to make reasonable progress in Class 1 areas. As a general matter, this process involves a state evaluating what emission control measures for its own sources, groups of sources, and/or source sectors[13] are necessary in light of the four statutory factors, five additional considerations specified in the Regional Haze Rule,[14] and possibly other considerations (e.g., visibility benefits of potential control measures, etc.). States have discretion to balance these factors and considerations in determining what control measures are necessary to make reasonable progress. The preamble to the 1999 Regional Haze Rule stated: "The flexibility for State discretion is, of course, exactly what the regional haze rule provides." 64 FR 35760. This guidance is intended to help states exercise their discretion in SIP development for the second implementation period.* ***"Importantly, there is no specified outcome or amount of emission reduction or visibility improvement that is directed as the reasonable amount of progress for any Class 1 area."***

This SIP documents EGLE's analysis of the continued improvements in visibility at Isle Royale and Seney Class 1 areas and the modeled improvement in 2028. To suggest additional controls may be appropriate at the affected facilities to potentially further lower visibility impacts, ignores the reality that these sources have been and are facing negative financial impacts from the COVID-19 downturn and normal market stresses for these types of industries. For years, the paper industry has struggled to remain afloat because of international competition. In fact, many such operations have closed in Michigan over the last several decades. The steelmaking industry likewise has struggled for many years because of foreign competition, marginalizing the need for iron ore mining. Under these conditions, **the most reasonable approach for addressing visibility in this planning period is taken by EGLE; focusing on the past, current, and future visibility levels remaining below the reasonable progress glidepath and not evaluating additional controls at the affected facilities.**

2 Specific Components of the SIP

The following are key steps in developing a Regional Haze SIP for the second implementation period as delineated in the RH Guidance. Excerpts from the guidance are italicized. Following each stated step requirement, EGLE provides the necessary information to address the requirement.

A. 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 1 area within the state. 40 CFR 51.308(f)(1).*

Figure 1 shows the visibility trends at the Isle Royale and Seney Class 1 areas over the past 18 years. The four upper lines represent the most impaired days and the four lower lines are the clearest days. Trends for the most impaired days are significantly downward and trends for the clearest days are moderately downward. This can be largely attributed to reductions in sulfate and nitrate levels resulting from power plants reducing their coal combustion. Further reductions in these pollutants are expected to occur through 2028 and beyond as more coal-fired power plants in the region shut down.

Figure 1 - Visibility Trends at Class 1 Areas in the LADCO Region

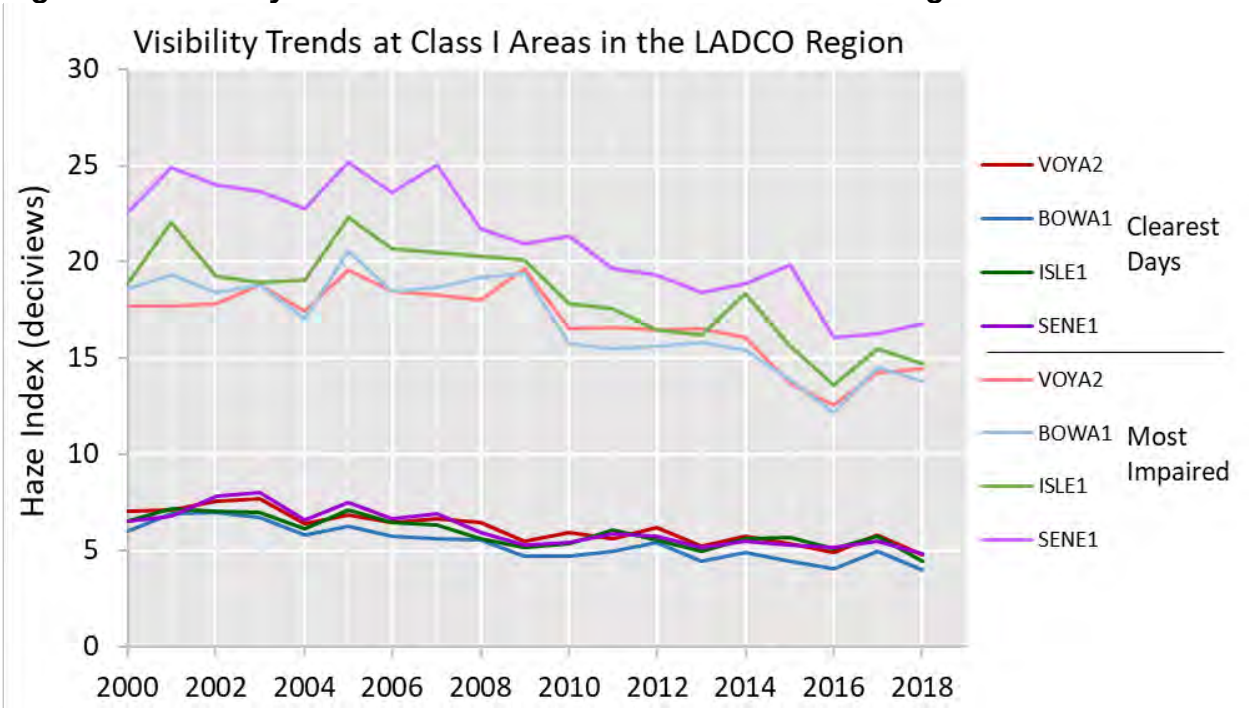


Table 1 contains the deciview values for baseline, current, and natural conditions visibility for the 20 percent most impaired days at Isle Royale and Seney. Isle Royale values are 19.63, 15.54, and 10.17, respectively. The Seney values are 23.58, 17.57, and 11.11, respectively.

Table 1 - 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 1 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 20% Most Impaired Days (dv) (B)	2028 Unadjusted Impairment (dv) (A-B)
ISLE1	10.17	19.63	15.54	14.97	15.85	-0.88
SENE1	11.11	23.58	17.57	16.94	18.59	-1.65

Table 2 contains the deciview values for baseline, current, and natural conditions visibility for the cleanest days at Isle Royale and Seney. The Isle Royale values are 6.77, 5.3, and 3.72, respectively. The Seney values are 7.14, 5.27, and 3.74, respectively.

Table 2 - Natural conditions, 2000-2004 baseline visibility, observed 2014-2018 visibility, 2028 projected visibility, and 2028 unadjusted glidepath value on the 20% Cleanest days at Isle Royale and Seney Class 1 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)	2028 Unadjusted Glidepath 20% Clearest Days (dv) (B)	2028 Unadjusted Impairment (dv) (A-B)
ISLE1	3.72	6.77	5.3	5.1	2.84	2.26
SENE1	3.74	7.14	5.27	5.05	2.96	2.09

B. Determination of Affected Class 1 Areas in Other States

• *Determine which Class 1 area(s) in other states may be affected by the state's own emissions.*

EGLE does not significantly impact Class 1 areas in other states. LADCO has performed source apportionment modeling that shows Michigan's visibility impacts at Class 1 areas in other parts of the country in 2028. The two closest Class 1 areas are in Minnesota; Voyageurs, and Boundary Waters. Michigan impacts on visibility at these two areas is only 2 percent each, which is shaded in Table 3.

Table 3 - Source Apportionment Modeling Results - Upper Midwest

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 (Mm-1)	50.5	60.7	45.3	47.7		100%	100%	100%	100%
Rayleigh	12.0	12.0	11.0	12.0		24%	20%	24%	25%
Sea salt (SS)	0.2	0.2	0.1	0.2		0%	0%	0%	1%
Biogenic	3.2	3.7	2.9	3.0		6%	6%	7%	6%
ICBC	10.0	11.1	8.9	8.9		20%	18%	20%	19%
Fire	1.5	1.1	1.6	2.5		3%	2%	3%	5%
Int'l anthro emis	2.0	2.4	1.5	1.6		4%	4%	3%	3%
Tribal	0.0	0.0	0.0	0.0		0%	0%	0%	0%
Offshore	0.1	0.1	0.0	0.0		0%	0%	0%	0%
West	0.6	0.8	0.8	0.7		1%	1%	2%	1%
Northeast	0.4	1.2	0.2	0.2		1%	2%	0%	0%
Southeast	0.2	0.5	0.1	0.1		0%	1%	0%	0%
IL	2.3	3.4	0.8	1.0		5%	6%	2%	2%
WI	3.5	4.5	2.2	1.7		7%	7%	5%	4%
IN	1.2	2.9	0.5	0.6		2%	5%	1%	1%
OH	0.6	1.5	0.4	0.5		1%	3%	1%	1%
MN	2.4	1.7	6.2	6.5		5%	3%	14%	14%
MI	3.3	6.5	0.8	0.7		7%	11%	2%	2%
IA	1.3	1.3	1.8	1.7		3%	2%	4%	4%
MO	1.4	1.3	0.8	0.9		3%	2%	2%	2%
AR	0.3	0.4	0.2	0.3		1%	1%	1%	1%
LA	0.1	0.1	0.1	0.0		0%	0%	0%	0%
TX	1.3	0.5	1.2	1.0		3%	1%	3%	2%
OK	0.4	0.2	0.6	0.6		1%	0%	1%	1%
KS	0.3	0.4	0.5	0.5		1%	1%	1%	1%
NE	0.9	0.8	0.9	1.0		2%	1%	2%	2%
ND	0.7	0.7	0.8	0.9		1%	1%	2%	2%
SD	0.2	0.2	0.3	0.3		0%	0%	1%	1%
WV	0.1	0.3	0.1	0.1		0%	1%	0%	0%
KY	0.3	0.8	0.1	0.2		1%	1%	0%	0%
RPO and other aggregated groups									
Natural	4.7	4.9	4.5	5.5		9%	8%	10%	11%
LADCO	13.2	20.6	10.9	11.1		26%	34%	24%	23%
WRAP	0.6	0.8	0.8	0.7		1%	1%	2%	1%
CenSARA	6.0	5.0	6.0	6.0		12%	8%	13%	13%
VISTAS	0.6	1.7	0.3	0.4		1%	3%	1%	1%

Michigan emission impacts at other more distant Class 1 areas in the states of Kentucky, Tennessee, West Virginia, Virginia, New Jersey, New Hampshire, Vermont, and Maine are also minimal, in the 1 to 3 percent range. The basis of this information is in the LADCO TSD in Appendix A of this document.

The Mid-Atlantic/Northeast Visibility Union (MANE-VU) organization is comprised of a number of eastern states. They sent a letter to Michigan and other upwind states in 2017 identifying large emission sources in the states that MANE-VU wanted further controlled as a response to the RHR. The intent is to improve visibility at Class 1 areas in MANE-VU states. MANE-VU identified the Belle River and St. Clair Power Plants in Michigan.

Section 8a of the RH Guidance notes a downwind state with a Class 1 area may request an upwind state adopt specific measures that the downwind state believes are reasonable. The guidance goes on to state such requests do not by themselves obligate the other state to take the requested action for its SIP submission to be approvable. In response to the MANE-VU letter, EGLE points out all of the emissions from the St. Clair Power Plant will be eliminated in 2022 when the facility shuts down. This large reduction in emissions more than addresses any small impacts Michigan sources have on visibility at Class 1 areas in MANE-VU. The MANE-VU letter is found in Appendix C of this SIP document.

C. 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 bases 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.*

EPA guidance provides several methods for determining sources of emissions that may be impacting Michigan's Class 1 areas' visibility. EGLE relied on the Q/D method to identify sources in the state that were subject to review for possible 4-factor analysis. LADCO did the analysis for EGLE and the other LADCO states, and the methodology is described in a LADCO memo, located in Appendix B.

Because of the large number of sources in the state, EGLE screened out those not significantly impacting the two monitors by only looking at sources with a Q/D value of 4 tons per year per kilometer (tpy/km) and greater. This cutoff represents approximately 80 percent of emissions from Michigan sources impacting Michigan's two Class 1 areas. The sources identified by the Q/D analysis are three paper manufacturing facilities, a lime kiln facility, an iron ore mine, and a cement manufacturer. The paper manufacturers are Neenah in Munising, Verso in Quinnesec, and Verso in Escanaba. The lime facility is Graymont in Gulliver, and the cement facility is St. Marys in Charlevoix. Several power plants are also covered; DTE Monroe in Monroe, DTE Belle River in St. Clair, Consumers Energy Campbell in West Olive, and Consumers Energy Karn in Essexville.

Emissions from each of these sources generally total several hundred tons per year of SO_2 and/or NOx. At each emission source there are one or more emission units. The emission units found at these sources as listed below are boilers, recovery furnaces, lime kiln, grate kiln, cement kiln, and EGUs. The units represent the large emission points at the affected Q/D sources. There may be other units at these sources that have small amounts of emissions and are therefore not further analyzed.

Neenah
Boilers

Neenah paper mill has two boilers that are used to produce steam, Boiler #1 and Boiler #2.

Boiler #1 is a spreader stoker boiler that can burn coal and natural gas. The boiler capacity is 202 million British thermal units per hour (MMBTU/hr) heat input. The boiler was installed on 01/01/1958 and modified in 1997 and on 05/01/2015.

A new baghouse was installed on this boiler in 1996 to meet the 0.30 pound per 1,000 pound particulate limit. A spray dry absorber (SDA) was installed on the boiler in 2015 to reduce emissions of acid gas hazardous air pollutants (HAPs). The boiler is a Compliance Assurance Monitoring (CAM) subject emission unit subject to the requirements of 40 CFR Part 64.

Boiler #2 is a Riley Stoker boiler only capable of burning #2 fuel oil. Boiler capacity is 202 MMBTU/hr heat input. The boiler produces 150,000 lbs. of steam per hour and was installed in 1970. The unit is considered “limited use” and is used only as a backup to Boiler #1 if it becomes unavailable for any reason.

Verso Quinnesec
Boilers

Verso uses two power boilers; the Waste Fuel Boiler and the Package Boiler. The boilers produce steam for energy generation and to provide heat for the pulping and paper making processes. The mill operates steam-driven turbines to produce a portion of the electricity required by the facility.

Waste Fuel Boiler – The boiler was installed in 1981 with nominal rated heat input capacity of 625 MMBtu/hr. It is a combination fuel boiler capable of burning wood refuse, coal, and natural gas to produce steam which is supplied to the steam turbines and processes at the mill. The Waste Fuel Boiler is equipped with an oxygen (O_2) trim system to maintain excess air at the desired level in the boiler. The waste fuel boiler is also an incineration device for dilute vent gases and/or. concentrated vent gases.

The Waste Fuel Boiler is an existing source with respect to Boiler MACT in the subcategory of stokers/sloped grate/other units designed to burn wet biomass/bio-based solid fuel. It is controlled with electrostatic precipitator, multicyclone collector, flue gas recirculation, and over-fired air.

Package Boiler – The boiler was installed in 1989 with a nominal rated heat input capacity of 419 MMBtu/hr. It is a natural gas-fired boiler that supplies steam to the steam turbine and mill processes. The Package Boiler is designed to combust natural gas and is equipped with an O_2 trim system to maintain excess air at the desired level in the boiler. The Package Boiler is typically used as a backup boiler and is not run continuously. The Package Boiler is an existing source with respect to Boiler MACT in the subcategory of units designed to burn gas 1 fuels. As such, the Package Boiler is not subject to emissions limits or operating limits under the Boiler MACT.

Recovery Furnace

Chemical Recovery Furnace – The furnace burns organic or lignin laden filtrates (black liquor) from the pulp digester and pulp washing processes to recover pulp cooking chemicals. The Recovery Furnace also produces steam for energy generation and heat for the pulp and paper making processes. It is rated for 600,000 pounds of steam per hour (1036 MMBtu per hour heat input). The furnace is also capable of burning salt cake/electrostatic precipitator (ESP) hopper solids and natural gas. It is also an incineration point for vent gases (containing total reduced sulfur [TRS] compounds) from the pulping processes. Emissions are controlled by an ESP.

Verso Escanaba

Boilers

Verso uses four power boilers to produce steam for energy generation and to provide heat for the pulping and papermaking processes; #7, #8, #9, and #11. The mill operates steam-driven turbines to produce a portion of the electricity required by the facility.

The #7 Boiler is a Riley boiler rated for 150,000 pounds of steam per hour (approximately 154 million BTU per hour heat input) that provides steam for mill processes. The #7 Boiler burns natural gas and fuel oil. It was installed in 1947.

The #8 Boiler is a Combustion Engineering boiler rated for 450,000 pounds of steam per hour (approximately 594 million BTU per hour heat input) that provides steam for mill processes and steam turbine-generator sets for producing electricity. A Flue Gas Recirculation system was installed on the # 8 Boiler in 2003 for compliance with the NOx emission limitations specified in Michigan Air Pollution Control Rule 336.1801. The #8 Boiler burns natural gas and fuel oil. It was installed in 1968 and was modified in 1978. It was subject to best available retrofit technology (BART) in the previous Regional Haze SIP per 40 CFR 52.1183(i).

The #9 Boiler is a Babcock & Wilcox boiler rated for 250,000 pounds of steam per hour (approximately 360 million BTU per hour heat input) that provides steam for mill processes and steam turbine-generator sets for producing electricity. The #9 Boiler burns primarily wood residue but may also burn natural gas and paper cores. The #9 Boiler emissions are controlled by a multicyclone dust collector and two wet scrubbers. It was installed in 1970. It was subject to BART in the previous Regional Haze SIP per 40 CFR 52.1183(i).

The #11 Boiler is an ABB Combustion Engineering combination fuel boiler rated for 750,000 pounds of steam per hour (approximately 1,040 million BTU per hour heat input) that provides steam for mill processes and steam turbine-generator sets for producing electricity. The #11 Boiler burns natural gas and pulverized coal from four tangentially located windboxes. The boiler also burns wood residue, wastewater treatment plant residuals, and tire-derived fuel from a traveling grate located at the bottom of the unit. Emissions are controlled by an over-fired air system, multiclone dust collector, and an ESP. It was installed in 1981 and modified in 1986 and 2012.

Recovery Furnace

The #10 Chemical Recovery Furnace is used to regenerate chemicals used in the Kraft process. The #10 Recovery Furnace is rated for 565,000 pounds of steam per hour (approximately 950 million BTU per hour heat input), and burns black liquor, natural gas, #6 fuel oil, ultra-low sulfur diesel, and used oil. Also, the #10 Recovery Furnace receives and incinerates high volume low concentration noncondensable gases from the Digester System, Brownstock System, Evaporator System, and Chemical Recovery Furnace System. The secondary air forced-draft air handling fan on the Recovery Furnace has been modified. It is controlled by an ESP. The furnace was subject to BART in the previous Regional Haze SIP per 40 CFR 52.1183(i).

Graymont

Lime Kiln

Kiln #1 is a single rotary kiln with preheater and Neimis style cooler. The kiln is fired with a mixture of coal and petroleum coke. The preheater/cooler acts as a sulfur dioxide absorption device. Several fabric filter baghouses are used at the plant for particulate matter control. The plant can produce no more than 584,000 tons of limestone feed per year based upon a 12-month rolling time period. The kiln was installed in 2007.

Tilden Mine

Grate Kilns

Grate Kiln #1 Indurating Furnace dries and preheats pellets on a traveling grate and heats the pellets in a rotary kiln for final induration. The kiln is fired with coal, natural gas, or used oil. Dry ESPs provide control for particulate matter. The main burners are rated at 590 million BTU per hour heat input. Kiln #1 was built in 1974 and is subject to a federal implementation plan requiring compliance with federal visibility protection regulations that require BART per 40 CFR 52.1183(k)(1)(i).

Grate Kiln #2 Indurating Furnace dries and preheats pellets on a traveling grate and heats the pellets in a rotary kiln for final induration. Grate Kiln #2 is fired with coal, natural gas, or used oil. Dry ESPs provide control for particulate matter. Kiln #2 main burners are rated at 590 million BTU per hour heat input. Kiln #2 was built in 1978.

St. Marys Cement
Cement Kiln

The in-line kiln system, which includes a preheater tower and rotary kiln, was recently modified pursuant to a Permit to Install issued in 2016. Materials from the silo are fed to the preheater tower and calcined. The source of heat for this reaction is generated in both the calciner and kiln. The kiln is the location where the feed is heated to a point where the calcined feed is melted and then cooled to start the formation of clinker. A tertiary duct transfers hot exhaust gases from the clinker cooler to the calciner portion of the preheater tower.

Prior to the precalciner and kiln, the in-line Raw Mill kiln system uses a proportioning system for grinding and mixing sources of iron, silica, calcium, and alumina. These raw materials are added to the Raw Mill where the material is ground, and heated creating a kiln feed mixture, which is conveyed to EUBLENDSILO for blending and storage. The kiln feed is transferred from EUBLENDSILO via the kiln feed belt scale, elevator, and fed to the upper stages of the pre-heating tower.

Control equipment associated with the in-line kiln system includes conditioning towers prior to downstream equipment (for modulating temperatures), selective non-catalytic reduction (SNCR), the main stack baghouse, bypass stack baghouse and other smaller baghouses. The calciner and kiln have been designed to use traditional solid and liquid fuels and various alternative fuels including asphalt flakes, plastic, and small quantities of cellulose fiber. The kiln was subject to BART in the previous Regional Haze SIP per 40 CFR 52.1183(h).

DTE Belle River (1 & 2)
Electric Generating Units

The Belle River Power Plant operates under Renewable Operating Permit (ROP) No. MI-ROP-B2796-2015b. The Belle River Power Plant has two EGUs, No. 1 and No. 2. Pulverized coal is the primary fuel for both boilers. Boiler No. 1 and Boiler No. 2 are each 697 megawatt (MW) nominally rated, dry bottom coal-fired boilers equipped with low NOx burners, over-fire air, dry cold-side ESP, dry sorbent injection (DSI), and activated carbon injection (ACI). Particulate emissions from the power plant are controlled through the use of ESPs and baghouses. continuous emissions monitoring systems (CEMS) are installed to measure gas flow, sulfur dioxide, carbon dioxide, nitrogen oxides and opacity.

Other SO_2 emission sources at Belle River are the Peaking Units consisting of five 2.5 MW each diesel electric generators and three 82.4 MW each combustion turbine electric generators. Also, there are the East China Peaking Units consisting of four 82.4 MW each combustion turbine electric generators. All these units are other sources of SO_2 emissions at the power plant but are miniscule compared to Unit Nos. 1 and 2.

Consumers Energy Campbell (1, 2, 3)
Electric Generating Units

The Campbell Power Plant operates under ROP No. B2835-2020. There are 3 boilers that together produce approximately 1,450 megawatts (net) per hour.
Boiler #1 is a 2,490 MMBTU per hour pulverized coal dry bottom, tangential-fired boiler with fuel oil startup capabilities. Emissions are currently controlled by low-NOx burners, sorbent injection (ACI or other sorbent for mercury control), DSI (hydrated lime or other sorbent), and a pulse-jet fabric filter (PJFF) baghouse. This boiler was installed in1958.

Boiler #2 is a 3560 MMBTU per hour pulverized coal wall-fired (converted from cell burner) boiler with fuel oil startup capability. Emissions are controlled by low-NOx burners, SCR, sorbent injection (ACI or other sorbent for mercury control), DSI (hydrated lime or other sorbent), and a PJFF baghouse. This boiler was installed in 1963.

Boiler #3 is an 8,240 MMBTU per hour pulverized coal dry bottom, wall-fired boiler with fuel oil startup capability. Emissions are controlled by low-NOx burners, selective catalytic reduction (SCR), sorbent injection (ACI or other sorbent for mercury control), spray dryer absorption (SDA), and PJFF baghouse. This boiler was installed in 1974.

DTE Monroe (1-4)
Electric Generating Units

The Monroe Power Plant operates, under MI-ROP-B2816-2019, four coal-fired cell burner boilers, which have a total nominal capacity of 3,280 megawatts at a maximum heat input of 7,624 MMBtu per hour for each unit on a fuel input basis. A low NOx burner system was installed in the boilers in 1994 and a new generation of low-NOx burners were installed on Units 1, 2, 3, and 4 in March 2006, March 2005, August 2006, and November 2005, respectively. Low-NOx burners, over-fire air, reduced emissions fuel sorbent system, SCR, dry wire ESP, and wet flue gas desulfurization systems control the emissions from each boiler. In addition, each stack is equipped with a continuous emission monitoring system for the measurement of SO_2, NOx, particulate matter, and carbon dioxide emissions.

Consumers Energy Karn (1-4)

The Karn Power Plant operates under MI-ROP-B2840-2014c. Boilers #1 and #2 are each 2,500 million BTU per hour, dry bottom tangential coal-fired boilers with fuel oil startup capabilities and supplemental co-firing for flame stabilization and mill outages. Low NOx burners were installed in 1998. Particulate emissions are currently controlled by PJFFs, which replaced two ESPs (in series). To comply with the NOx Budget Trading Program/CAIR Program, SCR and/or the accumulation of adequate NOx allowances are utilized. An SDA and sorbent injection control SO_2, mercury, acid gases, and air toxics.

Boiler #3 is a 7,290 million BTU per hour natural gas and fuel oil-fired boiler (i.e., dual fuel), and Boiler #4 is an 8,030 million BTU per hour natural gas and fuel oil-fired boiler;

i.e., dual fuel. SO_2 emissions from Boilers #3 and #4 are controlled via fuel blending, and NOx emissions are controlled via low NOx burner technology.

D. 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.*

EGLE has been working on the 2021 Haze SIP in conjunction with LADCO and the LADCO states. A LADCO workgroup has been having calls since 2018, looking at modeling and considering which sources in each state have the most impact on one or more of the Class 1 areas in the region. As stated in the previous section, this evaluation begins with a Q/D analysis for each stationary source in the state. Some of the states, including Michigan, are using the value of 4 tpy/km and above as the cutoff for sources to consider for analysis.

The next step for considering whether additional controls are reasonable for the affected source is a 4-factor analysis on large emission units within each of the sources above the Q/D cutoff. The RHR describes the 4-factors as remaining useful life of the unit, cost to further control the unit, time needed to implement control, and energy/non-air quality environmental impacts to further control the unit.

The units listed in the previous section are the units that were evaluated. Only the units that had several hundred tons of NOx and/or SO_2 per year were evaluated via the 4-factors because smaller units at a source would contribute little to haze issues at the Class 1 areas.

In the following part of this report, more recent data from 2018, is used in the descriptions of emissions at the large units located at the facilities. The age of each unit is given; the majority of the affected units are 30 or more years old. Adding additional controls to these older units may not be reasonable. However, the primary reason EGLE has chosen not to evaluate the affected units for further control is current and future visibility at Isle Royale and Seney Class 1 areas remains below the glidepath (see Figures 2 and 3). EGLE more fully describes taking this reasonable approach in Section 2.3 of this document.

Neenah

Boilers

Boiler #1 emissions in 2018 were 258 tons of NOx and 475 tons of SO_2, qualifying this boiler for further 4-factor analysis because of the large emission total. The analysis follows:

Remaining Useful Life – Boiler #1 was installed on 01/01/1958, making it 62 years old. Therefore, the remaining useful life may be minimal and is evaluated by the company on a year-to-year basis.

Cost to Further Control – Boiler #1 was modified in 1997 with a baghouse to control particulates. On 05/01/2015 another modification was made to install an SDA control for HCl and some SO_2. The boiler's age and low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – Because no additional control is considered reasonable for this boiler, this factor is nonapplicable (NA).

Energy/non-air Quality Environmental Impacts - NA

Boiler #2 emissions in 2018 were 0 because it did not operate. The boiler is considered "limited use" and is used only as a backup to Boiler #1 if it becomes unavailable for any reason. For this reason, the boiler does not qualify for further 4-factor analysis. Further, this boiler was installed in 1970, making it a 50-year-old boiler, and any further control may be considered unreasonable for purposes of the Regional Haze SIP.

Verso Quinnesec

Boilers

WASTE FUEL BOILER emissions in 2018 were 429 tons of NOx and 145 tons of SO_2, qualifying this boiler for further 4-factor analysis review because of the large emission total. The analysis follows:

Remaining Useful Life – The boiler was installed in 1981, making it 39 years old. Therefore, the remaining useful life may be minimal and is evaluated by the company on a year-to-year basis.

Cost to Further Control – The boiler is controlled with electrostatic precipitator, multicyclone collector, flue gas recirculation, and over-fired air. The age of the boiler and the low haze levels suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

PACKAGE BOILER emissions in 2018 were 15 tons of NOx because it operated very little, and it therefore does not qualify for further 4-factor analysis. Further, this boiler was installed in 1989, making it a 31-year-old boiler. The boiler's age and low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Recovery Furnace

CHEMICAL RECOVERY FURNACE emissions were 642 tons of NOx in 2018, qualifying this recovery furnace for further 4-factor analysis review because of the large emission total. The analysis follows:

Remaining Useful Life – The furnace was installed in 1981, making it 39 years old. Therefore, the remaining useful life may be minimal and is evaluated by the company on a year-to-year basis.

Cost to Further Control – The chemical recovery furnace is controlled by an ESP. The furnace employs staged combustion air – primary through quaternary – to aid in minimizing NOx emissions. The age of the furnace and the low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

Verso Escanaba

Boilers

#7 BOILER emissions in 2018 were 9 tons of NOx, because it is a backup boiler and is operated very little. For this reason, it does not qualify for further 4-factor analysis. Further, this boiler was installed in 1947, making it a 73-year-old boiler, and any further control may be considered unreasonable for purposes of regional haze.

#8 BOILER emissions in 2018 were 254 tons of NOx, qualifying this boiler for further 4-factor analysis review because of the large emission total. This boiler was a BART unit in the 2010 Regional Haze SIP. The 4-factor analysis follows:

Remaining Useful Life - #8 Boiler was installed in 1968 and was modified in 1978, making it 52 years old. Therefore, the remaining useful life may be minimal and is evaluated by the company on a year-to-year basis.

Cost to Further Control – A Flue Gas Recirculation system was installed on the #8 Boiler in 2003 for compliance with the NOx emission limitations specified in Michigan Air Pollution Control Rule 336.1801. This boiler was a BART unit in the prior Regional Haze SIP and has undergone a FIP analysis by the EPA. Because of the age of the boiler and recent BART requirements it is unreasonable to require further control.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

#9 BOILER emissions in 2018 were 165 tons of NOx, qualifying this boiler for further 4-factor analysis review because of the emission total. This boiler was a BART unit in the 2010 Regional Haze SIP. The 4-factor analysis follows:

Remaining Useful Life – #9 Boiler was installed in 1970, making it 50 years old. Therefore, the remaining useful life may be minimal and is evaluated by the company on a year-to-year basis.

Cost to Further Control – #9 Boiler emissions are controlled by a multicyclone dust collector and two wet scrubbers. This boiler was a BART unit in the prior Regional Haze SIP and has undergone a FIP analysis by the EPA. Because of the boiler's age and recent BART requirements, it is unreasonable to require further control.
Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

#11 BOILER emissions in 2018 were 530 tons of NOx and 700 tons of SO_2, qualifying this boiler for further 4-factor analysis review because of the large emission total. The analysis follows:

Remaining Useful Life – #11 Boiler was installed in 1981, making it 39 years old. It was modified in 1986 and 2012. Therefore, the remaining useful life may be minimal and is evaluated by the company on a year-to-year basis.

Cost to Further Control – #11 Boiler emissions are controlled by an over-fired air system, multicyclone dust collector, and ESP. The age of the boiler and the low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

Recovery Furnace

#10 RECOVERY FURNACE emissions in 2018 were 479 tons of NOx and 15 tons of SO_2, qualifying this furnace for a 4-factor analysis. The analysis follows:

Remaining Useful Life – The furnace was installed in 1972 and was updated in 1994 and 2014, making it 49 years old. Therefore, the remaining useful life may be minimal and is evaluated by the company on a year-to-year basis.

Cost to Further Control – The secondary air forced-draft air handling fan on the Recovery Furnace has been modified. The age of the furnace and the low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts- NA

Graymont
Lime Kiln

The SINGLE ROTARY KILN emissions in 2018 were 275 tons of NOx and 24 tons of SO_2, qualifying this furnace for a 4-factor analysis. The analysis follows:

Remaining Useful Life – The kiln was installed in 2007, so it can be considered to have a reasonable remaining useful life.

Cost to Further Control – The kiln includes a preheater and Neimis style cooler. The preheater/cooler acts as an SO_2 absorption device. Several fabric filter baghouses are used at the plant for particulate matter control. The low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

Tilden Mine
Grate Kilns

GRATE KILN #1 was subject to a BART analysis in the 2008-2018 haze SIP planning period. It is currently undergoing FIP compliance based on EPA evaluations, and therefore, EGLE is not doing an assessment on Kiln #1 for this second planning period.

GRATE KILN #2 emissions in 2018 were 4,500 tons of NOx and 322 tons of SO_2, qualifying this kiln for a 4-factor analysis. The analysis follows:

Remaining Useful Life – The kiln was installed in 1978, which makes it 42 years old. The company states the kilns represent a substantial capital investment and are maintained to preserve their useful life as long as there is economically available ore for Tilden to process. Per Cliffs' 2020 SEC 10k report, Tilden has proven and probable reserves to support at least another 25 years of operation at full operating capacity. These values may be extended based on identification of future economically available ores and/or operating years at less than full capacity.

Cost to Further Control – Existing controls on the kiln are dry ESPs. The low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

St. Marys Cement
Cement Kiln

The in-line kiln system emissions in 2018 were 1,322 tons of NOx and 2,031 tons of SO_2, qualifying this emission unit for a 4-factor analysis. The analysis follows:

Remaining Useful Life – The in-line kiln system has been modified since 2016, so it can be considered to have a long-term remaining useful life.

Cost to Further Control – Control equipment associated with the in-line kiln system includes conditioning towers prior to downstream equipment (for modulating temperatures), SNCR, the main stack baghouse, bypass stack baghouse, and other smaller baghouses. The kiln system is subject to emission limits that satisfy recent New Source Review permitting requirements under the 2016 permit. This kiln system also was a BART unit in the prior Regional Haze SIP and has undergone a FIP analysis by the EPA. For these reasons and the low haze levels in this 10-year SIP cycle, no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

DTE Belle River (Units 1 & 2)
Electric Generating Units

The emissions in 2018 were 24,023 tons of SO_2 and 8,252 tons of NOx, qualifying these EGUs for a 4-factor analysis. The analysis follows:

Remaining Useful Life – The Belle River Power Plant has been operational since 1984. According to the DTE Integrated Resource Plan, Unit 1 is scheduled for retirement in 2029 and Unit 2 is scheduled for retirement in 2030.

Cost to Further Control – Existing controls on Boiler No. 1 are low NOx burners, over-fire air, dry cold-side ESP, DSI, and ACI. Boiler No. 2 is also equipped with low NOx burners, over-fire air, dry cold-side ESP, DSI, and ACI. In addition, each stack is equipped with a CEMS for the measurement of SO_2, NOx, PM, and carbon dioxide emissions. The low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

Consumers Energy Campbell (Units 1, 2, 3)
Electric Generating Units

The emissions in 2018 were 5,012 tons of SO_2 and 2,840 tons of NOx, qualifying these EGUs for a 4-factor analysis. The analysis follows:

Remaining Useful Life – Unit 1 was installed in 1958, Unit 2 was installed in 1963, and Unit 3 was installed in 1974. As documented in Consumers Energy's integrated resource plan (IRP), Units 1 and 2 are scheduled for retirement in 2031, and Unit 3 is scheduled for retirement in 2039.

Cost to Further Control – Unit 1 emissions are currently controlled by low-NOx burners, sorbent injection (ACI or other sorbent for mercury control), DSI (hydrated lime or other sorbent), and a PJFF baghouse. Unit 2 emissions are controlled by low-NOx burners, SCR, sorbent injection (ACI or other sorbent for mercury control), DSI (hydrated lime or other sorbent), and a PJFF baghouse. Unit 3 emissions are controlled by low-NOx burners, SCR, sorbent injection (ACI or other sorbent for mercury control), SDA, and PJFF baghouse. The low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time on these units to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

DTE Monroe (Units 1-4)
Electric Generating Units

The emissions in 2018 were 3,854 tons of SO_2 and 5,728 tons of NOx, qualifying these EGUs for a 4-factor analysis. The analysis follows:

Remaining Useful Life – The plant began operation in 1971. As documented in the DTE IRP, Units 1-4 are scheduled for retirement in 2040.

Cost to Further Control – A low NOx burner system was installed in the boilers in 1994 and a new generation of Low-NOx burners were installed on Units 1, 2, 3, and 4 in March 2006, March 2005, August 2006, and November 2005, respectively. Low-NOx burners, overfire air, SCR, dry wire ESP, and wet flue gas desulfurization systems control the emissions from each boiler. In addition, each stack is equipped with a CEMS for the measurement of SO_2, NOx, PM, and carbon dioxide emissions. These controls are generally considered state-of-the-art for retrofitted EGUs. The low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time on these units to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

Consumers Energy Karn (Units 1-4)
Electric Generating Units

The emissions in 2018 from Units 1 and 2 were 683 tons of SO_2 and 660 tons of NOx, total. The emissions from Units 3 and 4 were 78 tons of SO_2 and 176 tons of NOx, total. These totals qualified these EGUs for a 4-factor analysis. The analysis follows:

Remaining Useful Life – Units 1 and 2 were installed in 1959 and 1961, respectively. Units 3 and 4 were installed in 1957 and 1977, respectively. As documented in the Consumers Energy IRP, Units 1 and 2 are scheduled for retirement in 2023, and Units 3 and 4 are scheduled for retirement in 2031.

Cost to Further Control – Units 1 and 2 are currently controlled by pulse jet fabric filters, which replaced two electrostatic precipitators (in series). To comply with the NOx Budget Trading Program/CAIR Program, SCR and/or the accumulation of adequate NOx allowances are utilized. An SDA and sorbent injection were installed in 2016 for removal of SO_2, mercury and acid gas, and air toxics. For Units 3 and 4, SO_2 emissions are controlled via fuel blending, and NOx emissions are controlled via low NOx burner technology. The low haze levels in this 10-year SIP cycle suggest no additional controls are needed at this time on these units to address regional haze.

Time Needed to Implement Control – NA

Energy/non-air Quality Environmental Impacts – NA

E. 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.*

As described in Section 1.3, EGLE determined reasonable progress is occurring for this 2018-2028 SIP period in both of Michigan's Class 1 areas without the need for additional control measures at Michigan's affected sources. This determination is informed by years of monitoring values at the two Class 1 areas' monitoring sites being well below the natural conditions' glidepath, as well as recent LADCO modeling showing this to be the case in 2028, the end of this planning period.

F. Regional scale modeling of the Long-term Strategy (LTS) to set the reasonable progress goals (RPG) for 2028.

• *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.*

LADCO serves as the forum EGLE uses to participate in interstate consultation. Each LADCO state is currently developing their Regional Haze SIP and determining if any new control measures will be implemented as their LTS. LADCO has modeled all such state inventory information that is available in time to be included in the LTS modeling. Figures 2 and 3, below, show the modeled 2028 visibility projections for Isle Royale and Seney, respectively, to be below the adjusted glidepath. The modeling, including

information on adjusting the glidepath, is described in detail in the LADCO TSD in Appendix A.

Figure 2 - Visibility Glidepath at Isle Royale for the 20% Most Impaired Days

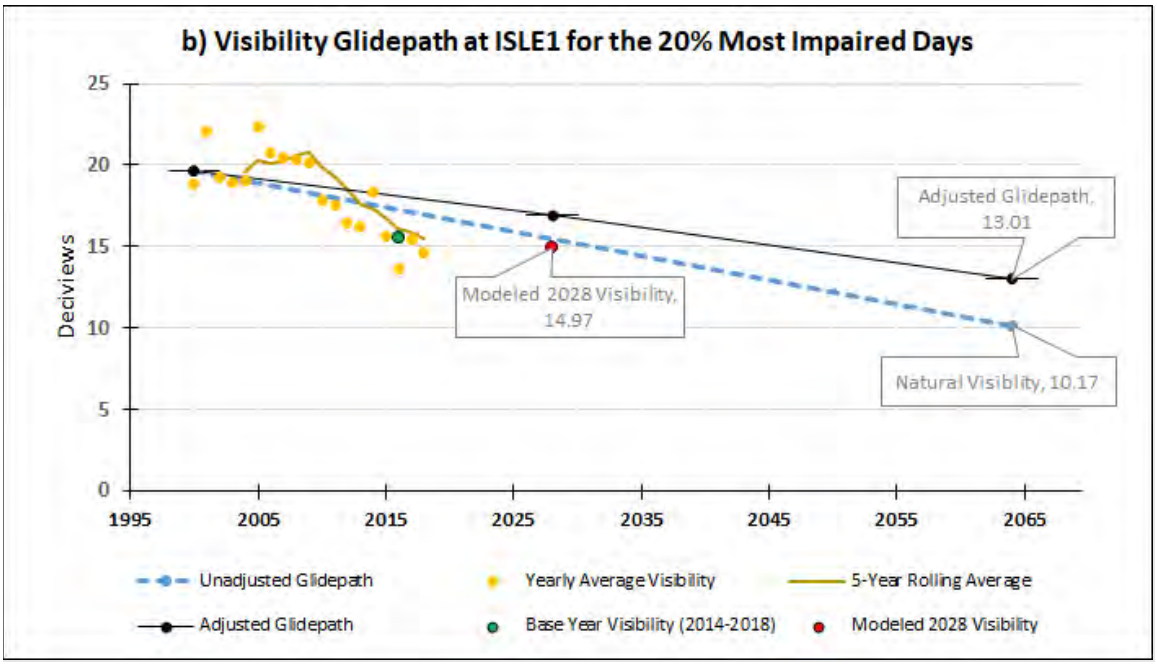
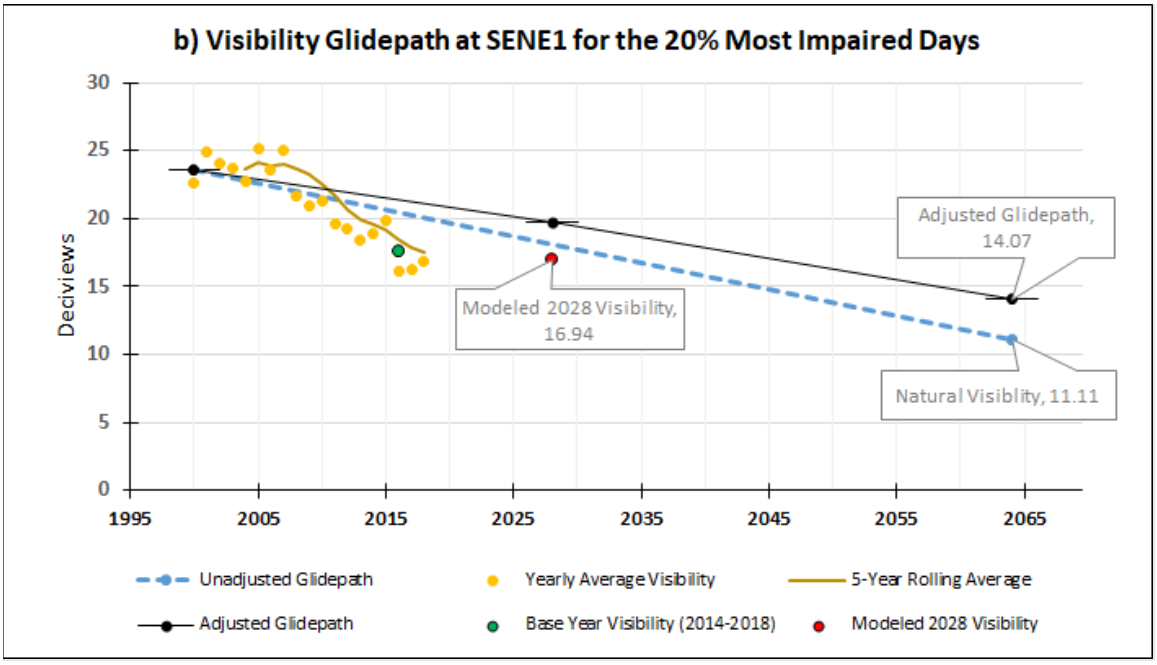


Figure 3 - Visibility Glidepath at Seney for the 20% Most Impaired Days



G.1 Progress, degradation, and uniform rate of progress (URP) glidepath checks

• *Demonstrate that there will be an improvement on the 20 percent most anthropogenically impaired days in 2028 at the in-state Class 1 area, compared to 2000-2004 conditions. 40 CFR 51.308(f)(3).*

Figures 2 and 3 show this for Isle Royale and Seney, respectively. Table 4 shows monitored deciview values for the base period at Isle Royale and Seney for the 20 percent clearest days and 20 percent most impaired days. The table also includes modeled deciview values for 2028 at Isle Royale and Seney for the 20 percent clearest days and the 20 percent most impaired days. Of interest to this section of the SIP document is the visibility levels on the clearest days for the base year and year 2028 at Isle Royale and Seney. The table shows a drop of **.**20 deciviews and **.**22 deciviews at Isle Royale and Seney, respectively.

Table 4. Base and future year deciview values on the 20% most impaired days at Class 1 areas within the LADCO region for the base model period (2014-2018) and future year (2028) and compared to 2000-2004 conditions

	Impaired Days					
IMPROVE Site ID	Base Period 20% Most impaired Days (dv)	Future Year 20% Most Impaired Days (dv)	Change in Deciviews (2028 -2016)	2000-2004 Conditions Most Impaired Days (dv)	Future Year 20% Most Impaired Days (dv)	Change in Deciviews (2028 -2016)
ISLE1	5.30	5.10	-0.20	19.63	14.97	-4.66
SENE1	5.27	5.05	-0.22	23.58	16.44	-7.14

• *Demonstrate that there will be no degradation on the 20 percent clearest days in 2028 at the in-state Class 1 area, compared to 2000-2004 conditions. 40 CFR 51.308(f)(3).*

Table 5 shows monitored deciview values for the model base period and the 2000-2004 period at Isle Royale and Seney for the 20 percent clearest days as well as modeled values for 2028. There is clear improvement in visibility conditions.

Table 5. Base and future year deciview values on the 20% clearest days at Class 1 areas within the LADCO region for the base model period (2014-2018) and future year (2028) and compared to 2000-2004 conditions

	Clearest Days					
IMPROVE Site ID	Base Period 20% Clearest Days (dv)	Future Year 20% Clearest Days (dv)	Change in Deciviews (2028 -2016)	2000-2004 Conditions Clearest Days (dv)	Future Year 20% Clearest Days (dv)	Change in Deciviews (2028-2002)
ISLE1	5.30	5.10	-0.20	6.77	5.10	-1.67
SENE1	5.27	5.05	-0.22	7.14	5.05	-1.13

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

Figures 2 and 3 depict this information for Isle Royale and Seney, respectively, with two glidepaths; one adjusted for international anthropogenic impacts and the other not adjusted.

• *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 1 area. If the RPG is above the URP glidepath, demonstrate 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 1 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.*

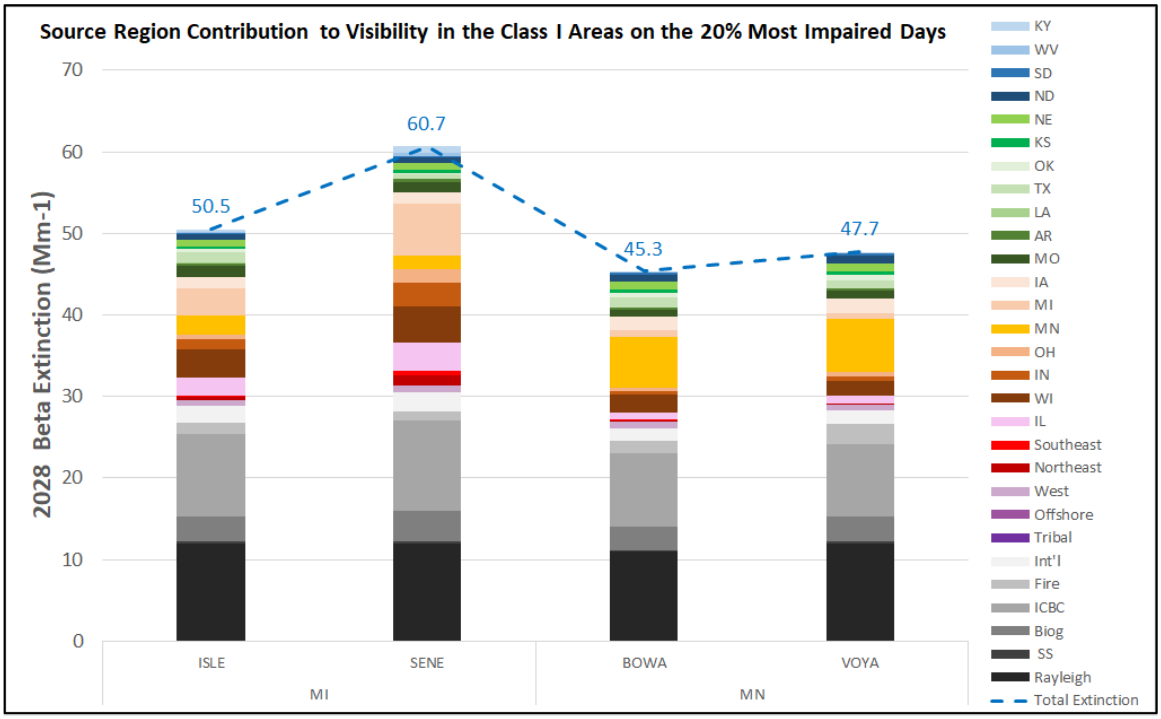
LADCO modeling provides the information required to address this requirement, and a detailed description of the modeling and results are in the TSD in Appendix A. Figures 2 and 3 show the RPG and glidepath for Isle Royale and Seney, respectively. Monitoring data to date and the 2028 modeling results continue to show visibility impacts at Michigan's two Class 1 areas remain well below the glidepath. This is the basis for EGLE determining no additional controls are reasonable on the affected sources for this 2018-2028 time period.

G.2 URP glidepath check

• *If the RPG for the 20 percent most anthropogenically impaired days for the affected Class 1 area in another state is above the URP glidepath, the state preparing the SIP must demonstrate that there are no additional emission reduction measures for anthropogenic sources or groups of sources in the state whose emissions may reasonably be anticipated to contribute to visibility impairment in the Class 1 area that would be reasonable to include in the LTS.*

LADCO has performed source apportionment modeling showing Michigan emission sources have little impact on visibility levels at Class 1 areas in other states. Results of this modeling are described in Section 2B of this document. Figure 4 also provides this information in graphical form for the two Class 1 areas in Minnesota, which are the closest Class 1 areas to Michigan.

Figure 4 - Source Region Contribution to Visibility in Class 1 Areas on the 20% Most Impaired Days



H. Additional requirements for SIPs

• *Provide additional information necessary to ensure that other requirements of the Regional Haze Rule are met. 40 CFR 51.308(f)(4), (5), and (6).*

The RHR elaborates on this requirement by specifying the following areas to address, including consultation and discussions with other parties, progress report elements, and monitoring strategy/other elements.

H.1 Consultation and discussions with other parties

The RHR requires EGLE to consult and discuss the development of this Regional Haze SIP with other parties including other states, EPA, federal land managers (FLM), and tribes.

EGLE met this requirement through LADCO and its haze workgroup, which has been meeting monthly since 2019. Workgroup participants included other LADCO states as well as Iowa, several FLM representatives, and EPA Region 5. Tribes were invited to participate as well.

The workgroup, in conjunction with LADCO staff, developed the Q/D analysis used by LADCO states for identifying affected sources on which to perform 4-factor evaluations. The workgroup reviewed and evaluated the LADCO modeling work which led to predictions for visibility impacts in 2028 at Isle Royale and Seney Class 1 areas in Michigan, as well as other Class 1 areas in the region and beyond. The workgroup provided a forum where the FLMs and the EPA provided information to the LADCO states in the SIP development, and the states were able to ask questions that arose throughout the process.

Minutes of the workgroup meetings are available at the LADCO website for anyone interested in more detail of the workgroup activities.

H.2 Progress report elements

The RHR requires that this SIP provide information on regional haze levels at Isle Royale and Seney Class 1 areas during the years following the last required progress report up through the current time. EGLE submitted its progress report for the first Regional Haze planning period in 2016 and addressed visibility values through 2014. Figures 2 and 3 show the visibility values graphically for the ensuing years at the representative monitors for Isle Royale and Seney, respectively. The specific monitoring values are available in the LADCO TSD in Appendix A.

H.3 Monitoring strategy/other elements

The RHR requires that EGLE describe how it supports the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring program, which measures visibility levels at Regional Haze Class 1 areas nationally.

EGLE supports the program directly through operation of an IMPROVE monitor at EGLE's Allen Park monitoring station.

The other element the RHR addresses is emission inventories. This SIP development enlists the modeling resources of LADCO including development of the inventories needed for the modeling. All required inventory parameters are used in this process. Details of LADCO modeling and inventories are in the LADCO TSD in Appendix A. Also, EGLE produces inventories that are in compliance with Air Emissions Reporting Requirements in 40 CFR Part 51 Subpart A.

Appendix A
LADCO Modeling and Data Analysis TSD

LADCO Second Haze Implementation Period Draft TSD

Appendix B
LADCO Q/d analysis

To: LADCO Regional Haze Workgroup

Date: October 14, 2020

Subject: Description of the Sources and Methods Used to Support Q/d Analysis for the 2nd Regional Haze Planning Period

---

This memo describes the data and methods used by LADCO to screen emissions source impacts on Class 1 areas for the 2nd regional haze planning period. The surrogate analysis of tons/year emissions (Q) divided by distance in kilometers (d) from the Class 1 areas, known as Q/d, is used to screen emissions source impacts at downwind receptors in lieu of air quality modeling results. LADCO created Q/d results for industrial point sources using preliminary 2016 emissions inventory data. LADCO completed the Q/d calculations in March 2018 using the best available inventories at that time.

Inventory Sources

Starting in 2017 LADCO began producing Q/d analyses for use by the LADCO member states for round 2 regional haze planning. The first Q/d versions used 2011-based emissions inventories and included 2011, 2018, and 2028 data. LADCO also computed Q/d values for point sources from different versions of inventories for Canada and Mexico. As LADCO and the LADCO member states learned of new electricity generating unit (EGU) shutdown announcements that were made since the release of the 2011 inventories, the LADCO members requested that the Q/d analyses be redone with newer data.

In January 2018, state and federal participants in the LADCO regional haze technical workgroup agreed to use the latest available 2016 inventory for a new Q/d analysis by LADCO. The National Emissions Inventory Collaborative 2016 alpha inventory represented the best estimate of 2016 point emissions at the time[1]. Table 1 shows the point source components of the 2016 alpha inventory that LADCO used for the Q/d analysis.

[1]https://www.epa.gov/air-emissions-modeling/2016v71-alpha-platform

Table 1. Point source inventory components used for the 2016 alpha Q/d analysis

Sector	Filename	Description
Electricity Generating Unit (EGU) point	ptegu_2016NEIv2_composite.csv	2016 emissions from the National Emissions Inventory (NEI) along with integration with CEM (continuous emissions monitoring) hourly data.
Non-EGU industrial point	ptnonipm_2016alpha_POINT_ 03apr2018_nf_v3.csv	2016 emissions of non-EGU industrial point sources.
Point oil and gas	2028el_marama_pt_oilgas_2011neiv2 _ point_20140913_02dec2016_v1.csv	2028 emissions for oil and gas sources. In April of 2018 no 2016 oil and gas inventory was available. We chose to use MARAMA's 2011-based projected 2028 oil and gas inventory that included many new oil and gas fields and sites**.**
Non-US point	canada_mexico.ff10.csv	2013 and 2025 point inventories from Environment and Climate Change Canada were interpolated to year 2016. 2008 inventories for Mexico were projected to the years 2014 and 2018, and then those emissions were interpolated to the year 2016.

Control Information Spreadsheet

LADCO developed a utility in R (QD_2028_V2.1.R) to extract the inventory data, calculate Q/d for each facility, and format the data for Microsoft Excel. The emissions totals extracted included SO_2, NOX, NH3, and PM2.5 and filtered out all facilities with emissions lower than .1 Tons/Year of any of the pollutants. The program calculated the kilometer distance from each facility to a single point at the center of the Class 1 area and then selected the distance to the Class 1 area that was closest to the facility. To better evaluate the emissions contributions to each Class 1 area, LADCO modified the Q/d analysis in June 2019. Because a four factor analysis requires a list of sources at the process (Source Classification Code) level, LADCO updated the Q/d utility to generate a list of all facilities that have 80% of the cumulative Q/d values for each Class 1 area. From those top 80% facilities, the program further filters out those processes with emissions less than 1 ton/year.

LADCO created an Excel spreadsheet from the new report and tagged the facility processes with four factor analysis group codes. LADCO used facility NAICS codes to generate a list of facilities that belong to each of 7 four factor groups with help from the

LADCO member states and stakeholders. Table 2 shows the NAICS codes and the four factor groups with counts of facilities and units in each group.

Table 2. Four factor groups used for the LADCO Q/d analysis

Proposed 4-factor group	naics	naics name	number_of_facilities	facility_tot_qd	Number_of_units
1	221112	Fossil Fuel Electric Power Generation	81	2690	210
2	212210	Iron Ore Mining	9	374	58
3	322121	Paper (except Newsprint) Mills	16	182	36
3	311221	Wet Corn Milling	5	45	13
3	311313	Beet Sugar Manufacturing	3	14	6
3	322110	Pulp Mills	2	9	4
3	322130	Paperboard Mills	3	7	3
4	327310	Cement Manufacturing	10	104	28
4	327410	Lime Manufacturing	8	45	13
5	331110	Iron and Steel Mills and Ferroalloy Manufacturing	9	77	33
6	486210	Pipeline Transportation of Natural Gas	16	77	40
6	221210	Natural Gas Distribution	2	4	2
7	324199	All Other Petroleum and Coal Products Manufacturing	6	47	12
7	324110	Petroleum Refineries	5	9	6

The spreadsheets and emissions data files used for the Q/d analysis are available on the LADCO Regional Haze webpage.

Appendix C
MANE-VU 2017 letter to upwind states

MANE-VU Inter-Regional Ask Final 8-25-2017.pdf

Appendix D
Public and FLM Comments and EGLE Responses