INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
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Eric J. Holcomb
Governor

Brian C. Rockensuess
Commissioner

December 22, 2021

Paul Miller
Lead Manager
Mid-Atlantic/Northeast Visibility Union Regional Planning Organization
89 South Street, Suite 602
Boston, MA 02111

Re: Response to the Mid-Atlantic/Northeast Visibility Union Consultation ASKs for the Regional Haze State Implementation Plan Second Implementation Period

Dear Mr. Paul Miller:

October 16, 2017, the Indiana Department of Environmental Management (IDEM) received a request from the Mid-Atlantic/Northeast Visibility Union (MANE-VU) regional planning organization to facilitate reasonable progress in protecting visibility at its region's Class I areas. MANE-VU identified Indiana emissions as significantly contributing to Class I areas in the MANE-VU region. In addition, MAN-VU submitted a comment letter on November 5, 2021 to Indiana's draft Regional Haze State Implementation Plan (RH SIP) for the second implementation period, which was received during the draft RH SIP public notice period.

The comment letter iterated that Indiana had failed to address the MANE-VU Asks from several years ago. Supporting information and hyperlinks supplied by MANE-VU in its letter also referenced information and data analysis conducted in 2016 and 2017 by MANE-VU and its member states. Based on these analyses from four years ago, MANE-VU developed its Asks of all upwind states (including Indiana) that were found to contribute, at that time, to visibility impairment at MANE-VU Class I areas. These determinations were based on 2015 actual emissions for EGUs and 2011 emissions for all other sources. These Asks included:

1) EGUs greater than 25 MW with installed controls, ensure that controls are run year round
2) For emission sources having a 3.0- Mm-1impact or greater at MANE-VU Class I area, perform a four-factor analysis
3) Adopt an ultra-low sulfur fuel oil standard
4) For EGUs and other large sources, pursue enforceable mechanisms to lock in lower emission rates
5) Encourage and promote energy efficiency and clean technologies

Indiana has relied on more current emissions, data analysis and modeling to determine visibility impacts from its sources on Class I areas and is providing responses to MANE-VU's five Asks. It should be noted that section-specific comments MANE-VU made on Indiana's draft RH SIP that will be addressed by Indiana in its responses to public comments document that will be included in the final RH SIP submittal.

The Lake Michigan Air Directors Consortium (LADCO) regional planning organization conducted emissions analyses and photochemical modeling in support of its member states to assist with the development of their Regional Haze RH SIPs. Final source apportionment modeling results from LADCO were not available to IDEM in order to formulate an adequate response to the MANE-VU request until June of 2021.

The results of LADCO's modeling exercise as well as emissions evaluations for MANE-VU's five Asks are detailed in Indiana's response to the MANE-VU planning organization's request within the attached document. Indiana's response emphasizes that LADCO's modeling results and the emissions analyses do in fact support Indiana's position that the state is meeting its RH obligations to the surrounding states with Class I areas and no further analysis is necessary for the issues listed in MANE-VU's five Asks.

This response consists of one (1) hard copy of the requested information and electronic versions of the response to the MANE-VU planning organization's request in PDF format sent to the MANE-VU planning organization and member states. Thank you for initiating consultation on this important matter. If you have any questions or need additional information, please contact Jean Boling, Environmental Engineer, Air Quality Planning Section, Office of Air Quality, at (317) 232-8228 or jboling@idem.IN.gov.

Sincerely,

Matt Stuckey
Assistant Commissioner
Office of Air Quality

MS/sd/md/sb/jb
Enclosures

1. MANE-VU ASKs for the RH SIP Second Implementation Period
2. State of Indiana's Response to the MANE-VU Organizations' Request for RH Second Implementation Period Consultation, Electric Generating Units Nitrogen Oxides and Sulfur Dioxide Reasonable Progress Emissions Reduction and Visibility Analysis

cc: Sharon Davis, New Jersey Department of Environmental Protection
David Healy, New Hampshire Department of Environmental Services
Zac Adelman, Lake Michigan Air Directors Consortium (w/ enclosures)
Matt Stuckey, IDEM-OAQ (no enclosures)
Scott Deloney, IDEM-OAQ (no enclosures)
Mark Derf, IDEM-OAQ (w/ enclosures)
Susan Bem, IDEM-OAQ (w/ enclosures)
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File Copy

STATE OF INDIANA'S RESPONSE

TO THE

MID-ATLANTIC/NORTHEAST VISIBILITY UNION PLANNING ORGANIZATION'S REQUEST

FOR

REGIONAL HAZE STATE IMPLEMENTATION PLAN FOR THE SECOND IMPLEMENTATION PERIOD CONSULTATION

Electric Generating Units
Nitrogen Oxides and Sulfur Dioxide
Reasonable Progress Emissions Reduction and Visibility Analysis

Prepared by:
The Indiana Department of Environmental Management
December 2021

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GRAPHS

ACRONYMS/ABBREVIATIONS LIST

CAA	Clean Air Act
EGU	Electric Generating Units
EPA	United States Environmental Protection Agency
ERTAC	Eastern Regional Technical Advisory Committee
IDEM	Indiana Department of Environmental Management
IMPROVE	Interagency Monitoring of Protected Visual Environments
LADCO	Lake Michigan Air Directors Consortium
NG	Natural Gas
NO_x	Nitrogen Oxides
MANE-VU	Mid Atlantic- Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
RH	Regional Haze
RPGs	Reasonable Progress Goals
SCR	Selective Catalytic Reduction
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
tons/yr	Tons Per Year
URP	Uniform Rate of Progress

1.0 BACKGROUND

The Indiana Department of Environmental Management (IDEM) received a request from the Mid-Atlantic/Northeast Visibility Union (MANE-VU) to facilitate reasonable progress in protecting visibility at its Class I areas. MANE-VU identified Indiana emissions as significantly contributing to Class I areas in the MANE-VU region. This process was initiated by MANE-VU with a request for consultation dated October 16, 2017. Following Indiana's consultations with MANE-VU which took place in 2017 and early 2018 over a series of conference call and webinars, MANE-VU submitted five specific Asks to Indiana at that time. Meanwhile, the United States Environmental Protection Agency (EPA) issued a final rule updating the Regional Haze (RH) program (82 Federal Register (FR) 3078), including revising portions of the visibility protection rule promulgated in 1980 (45 FR 80084) and the RH Rule promulgated in 1999 (82 FR 3078) in January of 2017. The revised rule governs states' obligations and EPA's review of periodic SIPs developed for the second and subsequent implementation periods. Part of the revision was extending the due date for the second implementation period RH State Implementation Plans (SIPs), from July 31, 2018, to July 31, 2021. This extension of time allowed for more current emissions and modeling information to be generated in order to make more informed and appropriate decisions on visibility contributions and responsible actions to take to address regional haze. U.S. EPA released supporting documentation for the second implementation period. "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period" dated August 2019 supported key principles of program implementation such as complying with visibility requirements, reducing state planning burdens and leveraging emission reductions achieved through the Clean Air Act and other programs to further improve visibility in Class I areas. MANE-VU did not re-engage its consultation with Indiana after the revised Regional Haze rule and revised guidance were finalized.

MANE-VU submitted a comment letter on November 5, 2021, to Indiana's draft Regional Haze State Implementation Plan (RH SIP) for the second implementation period, which was received during the draft RH SIP public notice period. The comment letter iterated that Indiana had failed to address the MANE-VU Asks from several years ago. Supporting information and hyperlinks supplied by MANE-VU in its letter also referenced information and data analysis conducted by MANE-VU and its member states in 2016 and 2017. MANE-VU conducted analyses referenced in its "Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) States Concerning a Course of Action in Contributing States Located Upwind of MANE-VU Toward Assuring Reasonable Progress for the Second Regional Haze Implementation Period (2018-2028), dated August 25, 2017. Based on these analyses from four years ago, MANE-VU developed its Asks of all upwind states (including Indiana) that were found to contribute, at that time, to visibility impairment at MANE-VU Class I areas. These determinations were based on 2015 actual emissions for EGUs and 2011 emissions for all other sources. These Asks included:

1) EGUs greater than 25 MW with installed controls, ensure that controls are run year round
2) For emission sources having a 3.0- Mm^{-1} impact or greater at MANE-VU Class I area, perform a four-factor analysis
3) Adopt an ultra-low sulfur fuel oil standard
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5) Encourage and promote energy efficiency and clean technologies

Indiana has relied on more current emissions, data analysis and modeling to determine visibility impacts from its sources on Class I areas and is providing responses to MANE-VU's five Asks. In addition, MANE-VU made section-specific comments on Indiana's draft RH SIP that will be addressed by Indiana in its responses to public comments document that will be included in the final RH SIP submittal.

2.0 MANE-VU'S ASK #1 - EGUS GREATER THAN 25 MW WITH INSTALLED CONTROLS, ENSURE THAT CONTROLS ARE RUN YEAR ROUND

MANE-VU's first Ask focused on Indiana's EGUs with power generation at or greater than 25 megawatts; the request is these facilities should be required to run their installed emission controls all year round, not just during ozone season. MANE-VU believes IDEM's approach of deferring analysis of the EGU sector to later implementation periods is inconsistent with MANE-VU's Inter-RPO Ask.

Indiana Response: IDEM enforces all permit conditions for the power plant facilities and all other permitted emission sources throughout the state for which the state has authority. Appendix F of the RH SIP submittal details the emission control units on Indiana's EGUs and control efficiencies. Indiana has determined that these EGUs are well-controlled and continue to reduce emissions to lessen their visibility impacts on surrounding Class I areas.

Several federal measures such as the Mercury and Air Toxics Standard (MATS) and the Cross State Air Pollution Rule (CSAPR) have specifically targeted NO_x and SO_2 emission reductions from EGUs that will continue to reduce emissions in the future.

3.0 MANE-VU'S ASK #2 - PERFORM A FOUR-FACTOR ANALYSIS FOR EMISSION SOURCES HAVING A 3.0 MM^{-1} IMPACT OR GREATER AT MANE-VU CLASS I AREAS

MANE-VU had identified one Indiana power plant in its screening analysis to determine possible contribution to visibility impairment at one or more of MANE-VU's Class I areas. MANE-VU requests a four-factor analysis be performed for Michigan Power Company, dba American Electric Power (AEP) - Rockport Generating Station.

Indiana Response: Due to flexibility afforded to states in EPA's "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period" document, dated August 20, 2019, Indiana decided the EGU source category would not be chosen to have four-factor analyses conducted for the second implementation period; however, these sources were not exempt from being evaluated. These sources were evaluated using other factors that are reasonable to consider. Since the EGU sector contributed to a significant portion of the progress made over the last implementation period due to the Mercury and Air Toxics Standard (MATS) and the Cross State Air Pollution Rule (CSAPR) that specifically targeted NO_x and SO_2 emission

reductions from this source category, a reasonable progress analysis for these units was conducted in lieu of four-factor analyses. Indiana's reasonable progress analysis for these units consists of a quantitative analysis of statewide NO_x and SO_2 emission reductions from Indiana's EGU fleet for 2007-2019; photochemical modeling using 2016 NO_x and SO_2 base-year modeled emissions for all existing Indiana EGUs in 2016 to projected 2028 emissions; and source apportionment modeling to assess visibility impacts by tagging all EGUs in Indiana.

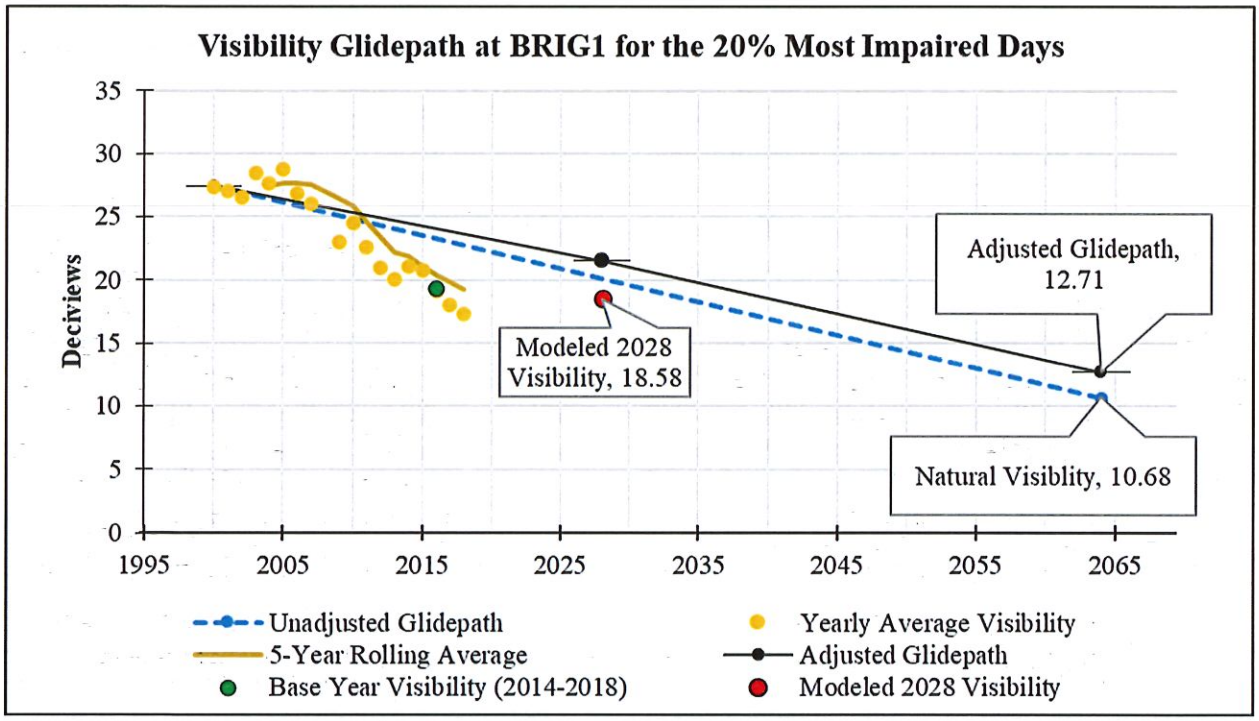
Indiana believes that conducting four-factor analyses for the EGUs in the next implementation period would result in a better use of resources due to the fact that numerous modifications have been made to Indiana's EGU fleet in the form of upgrades to existing emissions control equipment and the installation of new add-on control devices to comply with MATS and CSAPR. In addition, numerous units have retired or are scheduled for shutdown over the course of the next implementation period. As such, Indiana believes that conducting four-factor analyses for the EGUs in the next implementation period would result in a better use of resources.

In order to address the modeled visibility impacts, Indiana wishes to review the MANE-VU request. As previously mentioned in this document, MANE-VU has supplied their Asks relying on outdated emissions and modeling information. MANE-VU conducted CALPUFF dispersion modeling for its contribution analysis in 2017. The MANE-VU screening results showed visibility impacts from only one Indiana source: AEP - Rockport Generating Station with visibility impairment measured in light extinction above 3.0 inverse megameters (Mm^{-1}) at one or more of its Class I areas. While this type of screening helps to narrow the focus on potential source contributions, IDEM does not feel it represents current and realistic visibility contributions from individual sources or states. In addition, review of the MANE-VU Ask shows the screening results were not updated from its initial Ask dated August 25, 2017, therefore emission reductions and updates in regional haze guidance and modeling techniques have not been taken into account.

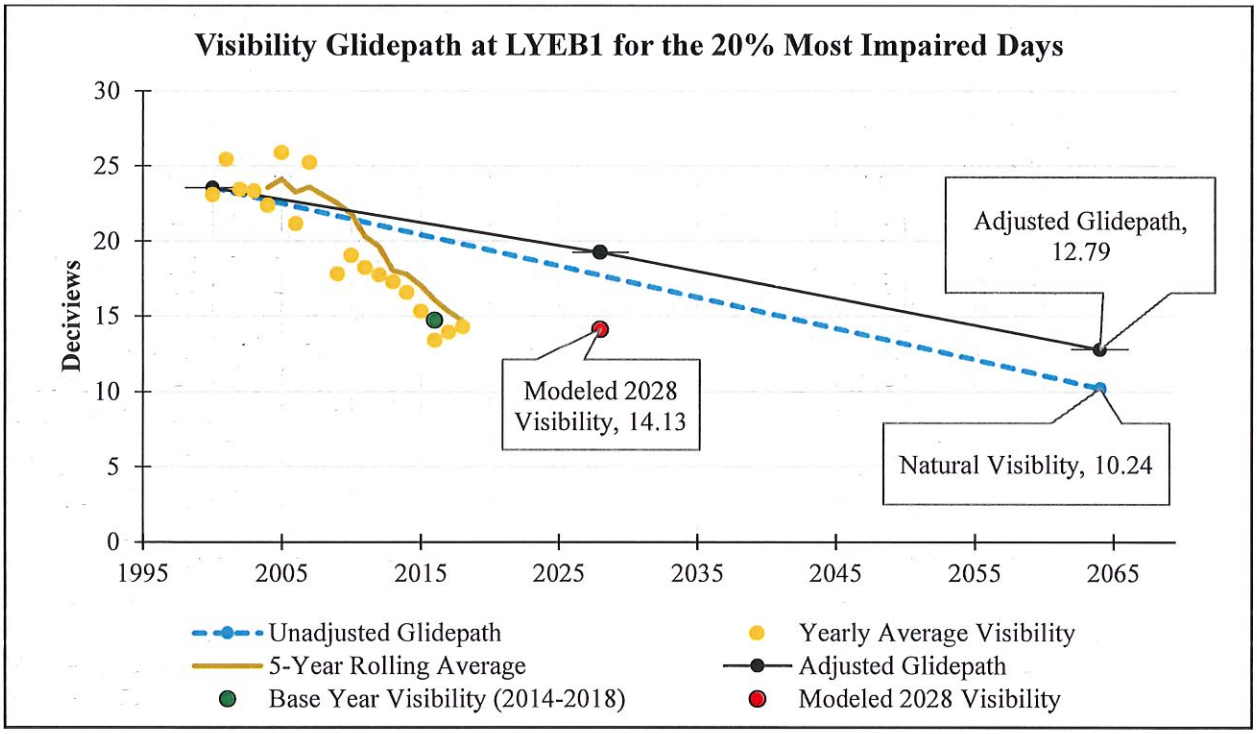
IDEM has worked with LADCO to conduct current photochemical modeling to determine up-to-date visibility impacts. This work has shown marked improvement in both emissions reductions from not only Rockport but all Indiana EGUs as well as visibility impact improvements from Indiana emission sources. As MANE-VU identified Rockport as a possible contributor to visibility impairment at one or more of MANE-VU's Class I areas, IDEM will address overall visibility assessment at the MANE-VU Class I areas and Rockport's modeled visibility impacts.

LADCO conducted photochemical modeling to determine visibility impacts, based on base-year 2016 emissions. The resulting glidepaths, shown below in Graphs 3-1 and 3-2, include the IMPROVE monitoring data to determine visibility impacts on the 20% most anthropogenically impaired days at the two nearest MANE-VU Class I areas, Brigantine Wilderness Area in New Jersey and Lye Brook Wilderness Area in Vermont. As can be seen, the IMPROVE monitoring data from 2014-2018 showed tremendous visibility progress with visibility on the 20% most anthropogenically impaired days well below the glidepath and nearly equal to modeled 2028 visibility.

Graph 3-1 URP Glidepath for Brigantine Wilderness Area



Graph 3-2 URP Glidepath for Lye Brook Wilderness Area



Visibility modeling results for the MANE-VU Class I areas analyzed show 2014-2018 baseline monitored values, as determined through the IMPROVE monitoring data, are near the modeled visibility impacts at each of the MANE-VU Class I areas for 2028, based on the 2011 emissions

and within 0.75 deciviews to the modeled results from the base-year 2016 future year 2028 modeling. Table 3-1 shows the marked improvement of visibility at Class I areas from both the monitored data from 2000 through 2018 and the modeling data from base-year 2011 to base-year 2016 with projected emissions to 2028.

Table 3-1 Comparison of Monitored and Modeled Visibility for MANE-VU Class I Areas

Site	2000-2004 Monitored Baseline (dv)	2009-2013 Monitored Baseline (dv)	2014-2018 Monitored Baseline (dv)	2011 base - 2028 Modeled Results (dv)	2016 base - 2028 Modeled Results (dv)
Brigantine	27.43	22.25	19.31	18.97	18.58
Lye Brook	23.57	18.06	14.73	15.02	14.13
Great Gulf/ Presidential Range-Dry River	21.88	15.40	13.07	12.95	12.37
Acadia	22.01	16.84	14.54	14.98	13.95
Moosehorn/Roosevelt Campobello	20.65	15.80	13.32	14.26	12.84

The significance of the 2014-2018 monitoring period marks the end of the first implementation period of the Regional Haze Program with much-improved visibility progress at all Class I areas. This visibility improvement emphasizes the emission reductions that have occurred in Indiana and throughout the country. The emission reductions have realized monitored visibility benefits, and the reasonable progress goals are well ahead of future projections of visibility at the Class I areas for 2028. It is worth noting that Indiana's modeled visibility impacts, based on 2011 emissions was higher, thus showing emission reductions from 2011 to 2016 reduced the visibility impacts. This fact is confirmed in the decrease in monitored visibility impairment over this period of time. The steady decline of visibility impacts at the Class I areas from anthropogenic emissions over the past decade or more is significant and indicates that Indiana, as well as all other states, are taking the necessary steps to remain ahead of schedule in attaining natural visibility conditions at all Class I areas by 2064.

LADCO conducted updated source apportionment photochemical modeling with 2016 emissions projected to 2028 in which several Indiana source categories and two Indiana EGU sources were tagged to determine their individual modeled visibility impacts. The details of this modeling effort are found in Indiana's Regional Haze SIP and LADCO "Modeling and Analysis for Demonstrating Reasonable Progress for the RH Rule 2018-2028 Planning Period" Technical Support Document, dated June 17, 2021. The visibility impact results for the MANE-VU Class I areas are shown below in Table 3-2. The results are based on Indiana's modeled 2028 total light extinction value based on 2016 emissions and include Indiana's EGUs and all other anthropogenic sources' overall visibility contributions and the total light extinction at each of the MANE-VU Class I areas. Comparing the modeled results show the visibility impacts from all Indiana EGUs and all other Indiana sources cumulatively are very low, well below the 3.0 Mm^{-1} threshold MANE-VU had established for requesting four-factor analyses.

Table 3-2 Indiana's Modeled Visibility Impacts on MANE-VU Class I Areas

Class I Area	All Indiana EGUs Contribution to 2016-2028 Total Light Extinction (Mm^{-1})	All Indiana Sources Contribution to 2016-2028 Total Light Extinction (Mm^{-1})	MANE-VU Class I Area 2016-2028 Total Light Extinction (Mm^{-1})
Brigantine	0.48	1.62	69.40
Lye Brook	0.4	1.0	42.86
Great Gulf/Presidential Range/Dry River	0.23	0.51	36.40
Acadia	0.14	0.36	41.90
Moosehorn/Roosevelt Campobello	0.1	0.22	37.33

As mentioned, LADCO's source apportionment modeling looked at the individual visibility impacts from Rockport. Additional expected emission reductions before 2028 will reduce the monitored visibility impacts even further. In Table 3-3, Rockport's contribution to total sulfate visibility impacts was 0.62% at Lye Brook Wilderness Areas, all other sulfate visibility contributions were modeled at 0.3% or less. Rockport's contribution to total nitrate visibility impacts were approximately 0.1% or less at all MANE-VU Class I areas. Overall modeled visibility impact results show Rockport contributes well below 0.3% to total light extinction at all MANE-VU Class I areas. Indiana believes an appropriate representation of visibility impairments on the 20% most anthropogenically impaired days is to consider the total light extinction and compare with the source's combined emissions impact on visibility. As stated previously, overall visibility modeling demonstrates reasonable progress goals are being met and the reasonable progress goals are well below the uniform rate of progress for all MANE-VU Class I areas of concern.

Table 3-3 Rockport's Modeled Visibility Impacts on MANE-VU Class I Areas

Class I Area	Rockport Nitrate Impact (Mm^{-1})	Total Nitrate Impact (Mm^{-1})	Rockport Nitrate Impact (%)	Rockport Sulfate Impact (Mm^{-1})	Total Sulfate Impact (Mm^{-1})	Rockport Sulfate Impact (%)	Total Class I Light Extinction (Mm^{-1})	Rockport Total Impact (%)
BRIG	0.006	18.71	0.03%	0.07	21.03	0.3%	69.40	0.1%
LYBR	0.01	9.15	0.11%	0.09	14.55	0.62%	42.86	0.22%
GRGU/ PRRA	0.002	3.0	0.1%	0.04	14.07	0.3%	36.40	0.1%
ACAD	0.003	5.41	0.06%	0.026	13.79	0.2%	41.90	0.05%
MOOS/ ROCA	0.002	3.81	0.05%	0.02	13.13	0.1%	37.33	0.25%

In summary, the source apportionment modeling conducted by LADCO confirms the overall visibility improvement realized by all MANE-VU Class I areas. Contributions from Rockport are small percentages of the overall visibility impairment and well below MANE-VU's threshold of 3.0 Mm^{-1} for requesting four-factor analyses. In fact, visibility impacts from all Indiana emission sources, based on current monitoring and modeling results, are very low and decreasing each year. Further retirements of boilers and anticipated emission reductions in Indiana and

throughout the country will continue to drive the visibility impairment lower at the MANE-VU Class I areas and will realize continued improved visibility.

4.0 MANE-VU ASK #3 - ADOPT AN ULTRA-LOW SULFUR FUEL OIL STANDARD

MANE-VU requests Indiana adopt ultra-low sulfur fuel oil standards as part of its long-term strategy or demonstrate why it would not be feasible.

Indiana Response: Indiana has incorporated ultra-low sulfur fuel oil emission limits into its state implementation plan in order to comply with the 1-hour SO_2 National Ambient Air Quality Standard (NAAQS); several sources located in 1-hour SO_2 nonattainment areas were required to switch to ultra-low sulfur fuel oil. This along with other state and federal emission reduction measures, helped to achieve compliance with the 1-hour SO_2 standard in several of the state's modeled attainment demonstrations. As a result, Indiana has addressed all its monitored 1-hour SO_2 nonattainment areas and brought each of these areas into attainment. Indiana does not believe adopting additional ultra-low sulfur fuel oil standards offers the amount of emission reductions that would make appreciable visibility improvements at Class I areas, especially those located in the MANE-VU region. Furthermore, Indiana does not have existing regulatory authority to require ultra-low sulfur fuel oil state-wide. A national control strategy calling for ultra-low sulfur fuel oil would be more equitable to provide consistent and meaningful emissions reductions that are more appropriate to address regional haze issues throughout the country.

5.0 MANE-VU ASK #4 - PURSUE ENFORCEABLE MECHANISMS TO LOCK IN LOWER EMISSION RATES FOR EGUS AND OTHER LARGE SOURCES

MANE-VU notes that although IDEM has documented EGU emissions reductions in the draft RH SIP, MANE-VU requests IDEM directly address Ask #4 to pursue enforceable regulatory mechanisms to ensure lower emissions rates.

Indiana Response: The RH Rule was designed to be implemented with respect to reasonable visibility progress to natural conditions by the year 2064 with several implementation periods to measure and assess reasonable progress towards the natural visibility conditions. The uniform rate of progress (URP) for each Class I area, especially in the eastern half of the country, shows the visibility progress made during the last implementation period represents another positive step towards attaining natural conditions at all Class I areas by 2064, if not much sooner.

IDEM stands by its assertion that emissions reductions due to federal and state regulations, fuel conversion switches, control upgrades and add-on modifications and retirements have led to tremendous visibility impairment improvements and further reductions are anticipated. To incorporate new emission limits into Indiana's SIP, a new rule must be developed and adopted. The state's rulemaking process takes three to four years to complete. As such, there was not sufficient time to complete a new rulemaking. Furthermore, the cost of resources and time required to evaluate selected sources for unit-specific emission controls and emission limits compared to the visibility benefits realized to address transport emissions at this time was not warranted.

Indiana has determined existing emission controls are adequate to address regional haze for sources throughout the state based on the tremendous visibility progress made to date along with current "on-the-books" regulatory measures expected to continue improvement into the future. IDEM maintains that it makes no sense to evaluate EGUs at this time when the outcome of compliance with other CAA regulations, such as the Revised CSAPR Update Rule and new wastewater regulations for coal ash, are not fully in place. Implementation of the Revised CSAPR Update Rule will reduce EGU NO_x Ozone Season budgets, which will cause the EGUs to restrict emissions even further. More stringent federal wastewater guidelines are also causing EGUs to move away from coal or shut down. These regulations require power plants to clean coal ash and toxic heavy metals such as mercury, arsenic, and selenium from plant wastewater before it is dumped into streams and rivers.

6.0 MANE-VU ASK #5 - ENCOURAGE AND PROMOTE ENERGY EFFICIENCY AND CLEAN TECHNOLOGIES

MANU-VU asks IDEM consider and report measures and programs under consideration or currently operating in Indiana that reduce emissions by encouraging energy efficiency and promote cleaner energy technologies.

Indiana Response: Clean energy technology, including wind farms, solar, bioenergy and other clean forms of energy resources, are available for power plants to actively pursue. However, there is no legal authority for IDEM to require these types of operational changes to any facility's method of energy production. IDEM and other Indiana state agencies work closely with all utilities in the state and have found that overall plans for most if not all power plants are to move to a more diversified clean energy portfolio in the near future.