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January 9, 2008

Email and Overnight Delivery
Ms. Angela King
Environmental Planner
Mid-Atlantic Regional Air Management Association, Inc.
8600 LaSalle Road, Suite 636
Towson, Maryland 21286

Re: Comments on draft MANE-VU report entitled "MANE-VU Modeling for Reasonable Progress Goals"

Dear Ms. King:

Reliant Energy, Inc. and our contractor ENSR Corporation appreciate the opportunity to comment on the draft MANE-VU report entitled "MANE-VU Modeling for Reasonable Progress Goals – Model Performance Evaluation, Pollution Apportionment and Control Measure Benefits" as prepared by Northeast States Coordinated Air Use Management (NESCAUM). Reliant Energy owns and/or operates many power plants in the United States including 18 in the Commonwealth of Pennsylvania and four in the State of New Jersey, and we are dedicated to operating all of our plants in compliance with all applicable environmental regulations and permits. We take seriously our responsibility for environment stewardship and exercise care for the communities that we are members of and serve. Details of Reliant Energy's comments to the aforementioned report are provided in the attached document – our comments can be summarized as follows:

1. Further emission reductions beyond "on-the-book / on-the-way" (OTB/OTW) regulations are unnecessary for achieving the 2018 Regional Haze Rule (RHR) milestones. Before any further emission reductions are mandated, Reliant Energy recommends that U.S. EPA plan a comprehensive assessment of the effects on measured visibility of the first RHR implementation period and a reassessment of model performance at that time.

2. A critical input to the models is the air emissions inventory. There are significant differences in the base year 2002 inventory as prepared by the various stakeholders. There also appears to be implausible estimates of sulfur dioxide (SO_2), nitrogen oxides (NOx) and fine particulate matter (primary $PM_{2.5}$) emissions in the future year's inventories. Reliant Energy welcomes the opportunity to work with MANE-VU and NESCAUM to develop a mutually-agreeable 2002 emissions inventory for our facilities, especially those located in New Jersey, Ohio and Pennsylvania, and to thoroughly

investigate and critically review the assumptions used to develop the future year's inventories. With regards to the future year's inventories, Reliant Energy understands that these do not incorporate recent New Source Review settlements that have specified the installation of control equipment and the permanent retirement of allowances which would be made available through the operation of this emissions control equipment.

3. The results from various future year model runs are presented in the draft report. In several instances, the conclusions deduced by NESCAUM do not appear to be supported by model runs.

I wish to thank-you again for your assistance in locating supporting documents to the subject report. Reliant Energy appreciates your attention to these comments as an important stakeholder in the regulatory process. If you have any questions or comments regarding this submittal, please contact me via telephone or email as listed above.

Very truly yours,

John P. Shimshock

John P. Shimshock
Sr. Air Environmental Specialist

Attachments

Cc: Mr. Robert Paine, ENSR Corporation

Comments on "MANE-VU Modeling for Reasonable Progress Goals – Model Performance Evaluation, Pollution Apportionment, and Control Measure Benefits"

Submitted by Reliant Energy, Inc. and ENSR Corporation

January 9, 2008

Reliant Energy and our contractor ENSR Corporation appreciate this opportunity to comment on a draft MANE-VU report entitled "MANE-VU Modeling for Reasonable Progress Goals" that is dated December 10, 2007 and available at http://filesharing.nescaum.org/download.php?file=31Modeling%20for%20Reasonable%20Progress%2012.10.07.doc. The Northeast States Coordinated Air Use Management (NESCAUM) has prepared the aforementioned draft report for the Mid-Atlantic / Northeast Visibility Union (MANE-VU) Regional Planning Organization (RPO) to assist states in developing strategies to address regional visibility and fine particle ($PM_{2.5}$) issues. Air quality simulations for calendar years 2002 (base year) and several future years (including 2009 and 2018, a Regional Haze Rule [RHR] milestone year) have been performed using the following widely used regional models:

- Community Multi-Scale Air Quality (CMAQ) modeling system
- Regional Modeling System for Aerosols and Deposition (REMSAD)

Reliant Energy's comments can be summarized as follows:

1. Further emission reductions beyond "on-the-book / on-the-way" (OTB/OTW) regulations are unnecessary for achieving the 2018 RHR milestones. Before any further emission reductions are mandated, Reliant Energy recommends that EPA plan a comprehensive assessment of the effects on measured visibility of the first RHR implementation period and a reassessment of model performance at that time.

2. A critical input to the models is the air emissions inventory. There are significant differences in the base year 2002 inventory as prepared by the various stakeholders. There also appears to be implausible estimates of sulfur dioxide (SO_2), nitrogen oxides (NOx) and fine particulate matter (primary $PM_{2.5}$) emissions in the future year's inventories. Reliant Energy welcomes the opportunity to work with MANE-VU and NESCAUM to develop a mutually-agreeable 2002 emissions inventory for our facilities, especially those located in New Jersey, Ohio and Pennsylvania, and to thoroughly investigate and critically review the assumptions used to develop the future year's inventories. With regards to the

future year's inventories, Reliant Energy understands that these do not incorporate recent New Source Review settlements that have specified the installation of control equipment and the permanent retirement of allowances which would be made available through the operation of this emissions control equipment.

3. The results from various future year model runs are presented in the draft report. In several instances, the conclusions deduced by NESCAUM do not appear to be supported by model runs.

4. A general format comments is that the report's pagination is not consistent and some figures are out of place or repeated in Section 2.

Details of Reliant Energy's comments are organized by section and presented below.

Comments on Section 1

Section 1 of the draft MANE-VU report describes the model pre-processing steps involving 2002 meteorological data, emissions preparation, and the modeling platforms. Section 1.3 describes emission scenarios that were modeled. A critical input to the regional models is the emissions inventory. A 2002 base year inventory was developed to assess model performance and to serve as a point of comparison for future year projections in terms of emissions reductions and air quality improvement. For emission sources located within MANE-VU region, the 2002 inventory was prepared by MANE-VU, which relied primarily on U.S. EPA's National Emissions Inventory (NEI). Future year emission inventories for all U.S. states were developed using EPA's Integrated Planning Model (IPM). Projected emission inventories for 2009 and 2018 incorporated "on the books / on the way" (OTB/OTW) emission control regulations. Other projected emission inventories for 2018 were also developed using additional emission control regulations ("beyond on the way" or BOTW) – the BOTW regulations includes the following scenarios:

- Reduced fuel oil sulfur content – maximum 500 ppmw for S-1 fuel oil strategy and maximum 15 ppmw for S-2 fuel oil strategy
- Best Available Retrofit Technology (BART) for 14 BART-eligible facilities located in the MANE-VU region
- "167 EGU Strategy" – 90 percent SO_2 control on 167 electric generating units (EGUs) located throughout the U.S

Comment #1 on Section 1 : There are significant differences in the 2002 emissions inventories as prepared by industrial facilities, local regulatory agencies, U.S. EPA and MANE-VU.

Industrial facilities submitted their 2002 emissions inventories to their pertinent regulatory agencies in early 2003. The agencies reviewed and often modified the emission estimates per their internal procedures. The agencies then forwarded the inventories to U.S. EPA, who reviewed and often modified the emission estimates per their internal procedures for ultimate compilation in the National Emissions Inventory (NEI). It is important to note the NEI included estimates of condensable PM emissions (a component of primary $PM_{2.5}$), which were not usually required to be reported by the agencies. Lastly, MANE-VU reviewed and possibly revised the emission estimates reported in the NEI for compilation in their emissions inventory. As such, it is possible that four similar, but different, inventories were generated for the same industrial facility. It is expected that there are significant differences in condensable PM emissions as estimated by the various stakeholders. Reliant Energy welcomes the opportunity to work with MANE-VU and NESCAUM to develop a mutually-agreeable 2002 emissions inventory for our facilities, especially those located in New Jersey, Ohio and Pennsylvania.

Comment #2 on Section 1: *A critical review of the 2009 and 2018 projected emissions inventories needs to be performed.*

Reliant Energy understands that the projected emissions for calendar years 2009 and 2018 were derived from U.S. EPA's Integrated Planning Model (IPM). Although time constraints prevented Reliant Energy from completing a thorough review of the IPM runs, we understand that the IPM runs were conducted in accordance with the 2002 emissions inventory (which likely overestimates $PM_{2.5}$ emissions from EGUs) and the following model assumptions (reference the telephone conversation between Ms. Julie McDill of MARAMA and Mr. John Shimshock of Reliant Energy on 12-07-2007):

- Activation of new electrical generation from small sources not included in the 2002 inventory – many of these sources were assumed to be fired using renewal fuels (e.g., landfill gases, waste to energy plants
- Fuel switching from natural gas to coal for existing EGUs
- Electrical generation load switching from the Midwest to the East

A comparison of the MANE-VU 2002 inventories with the 2009 and 2018 (OTB/OTW) inventories for SO_2, NOx and primary $PM_{2.5}$ (defined as the sum of filterable $PM_{2.5}$ and condensable PM fractions) for EGUs located in New Jersey, Ohio and Pennsylvania is presented below (copies of the pertinent summaries are provided separately).

Table 1 List of EGU Emission Inventories for 2002, 2009 and 2018

New Jersey EGUs

Year	SO_2		NOx		Primary $PM_{2.5}$	
	(tons)	% change from prior model year	(tons)	% change from prior model year	(tons)	% change from prior model year
2002	51,137		29,416		1286	
2009	27,509	- 46 %	12,066	- 59 %	3259	+ 153 %
2018	32,495	+ 18 %	13,636	+ 13 %	3515	+ 8 %

Ohio EGUs

Year	SO_2		NOx		Primary $PM_{2.5}$	
	(tons)	% change from prior model year	(tons)	% change from prior model year	(tons)	% change from prior model year
2002	Not prepared by MANE-VU					
2009	475,671		109,254		47,712	
2018	215,501	- 55 %	83,129	- 24 %	33,323	- 30 %

Pennsylvania EGUs

Year	SO_2		NOx		Primary $PM_{2.5}$	
	(tons)	% change from prior model year	(tons)	% change from prior model year	(tons)	% change from prior model year
2002	904,609		207,388		7156	
2009	242,071	- 73 %	102,313	- 51 %	32,883	+ 360 %
2018	135,946	- 44 %	82,881	- 19 %	23,756	- 28 %

Reliant Energy asserts that a 153% and a 360% percent increase in $PM_{2.5}$ emissions in 2009 from NJ and PA EGUs, respectively, is absolutely implausible considering that emissions of SO_2 and NOx are predicted to decrease by at least 46 percent. The installation of emission control devices required to achieve the predicted SO_2 and NOx reductions would also lead to co-beneficial $PM_{2.5}$ emission reductions. Consequently, primary $PM_{2.5}$ emissions should show a decrease as do $PM_{2.5}$

precursors. Importantly, the projected $PM_{2.5}$ emission increases, as predicted by the IPM, would have certainly triggered prevention of significant deterioration (PSD) or new source review (NSR) requirements for existing major sources that elected to conduct changes in their methods of operation and for new sources. Additionally, new or modified major sources located in non-attainment areas would be required to obtain emission offsets from that area at a ratio greater than one to one which would cause an overall decrease in emissions. This is especially true for sources located in the Ozone Transport Commission (OTC) region – note that the IPM inexplicably predicts a 13 percent increase in NOx emissions from 2009 to 2018 from EGUs located in New Jersey. Reliant Energy is not aware of any sources or groups of existing sources that would cause an increase in the emissions of the magnitude represented. New sources subject to NSR permitting could not conceivably result in the projected emissions increase. Reliant Energy welcomes the opportunity to work with MANE-VU and NESCAUM to thoroughly investigate and critically review the assumptions used to develop the future year's inventories.

<u>Comments on Section 2</u>

Section 2 of the draft MANE-VU report discusses performance evaluation findings.

<u>Comment #1 on Section 2</u>: Poor modeled meteorological performance during the summer period has significant implications for conclusions regarding source attribution for regional haze impacts.

The meteorological evaluation indicates that the MM5 performance is poorest during summer conditions (June-August), which is a period that corresponds to many of the worst-case regional haze days (as noted from a review of the IMPROVE data from the web site at http://vista.cira.colostate.edu/views/). Therefore, attribution of targeted emission sources that may contribute to the worst 20% days (many of which occur in summer; for example, see Figure 1) is uncertain due to the poor modeled meteorological performance (particularly with regards to the trajectory analysis). It should also be noted that the modeled meteorological performance was poorest for the southern U.S. and interior portions of the U.S. East Coast (NESCAUM states) as compared with other areas included in the model domain. This may have consequences for the accuracy of the efficacy of the BOTW regulations that are advocated by the NESCAUM report.

Figure 1 Composition Plot of Regional Haze at Lye Brook Wilderness Area, 2005

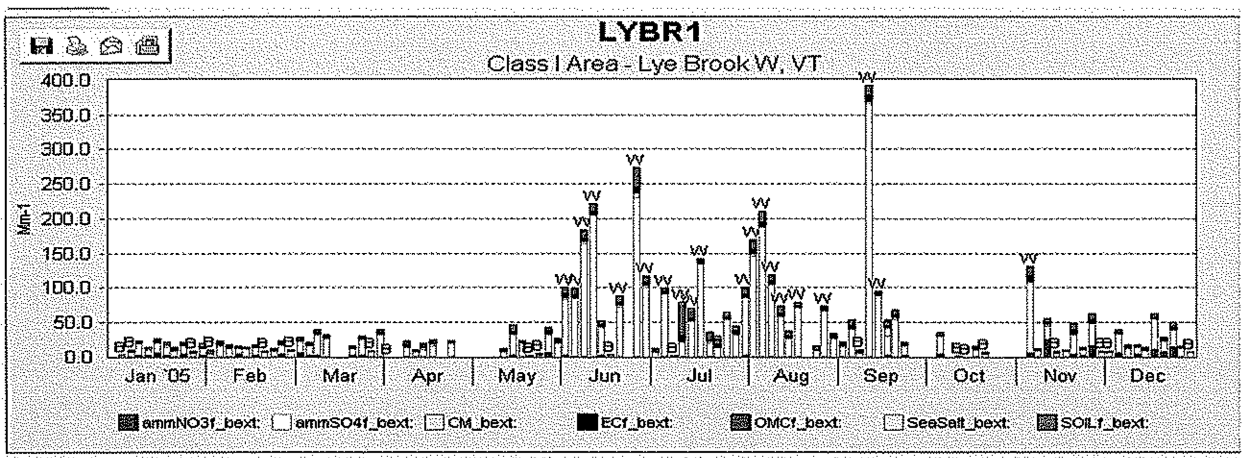


Figure 1. Title - Site: LYBR1. **Series** - Parameter: aerosol_bext, ammNO3f_bext, ammSO4f_bext, CM_bext, ECf_bext, OMCf_bext, SeaSalt_bext, SOILf_bext. **Metadata** - Program: IRHR2, Method: RHR Dataset, Poc: 1, Aggregation: Not aggregated

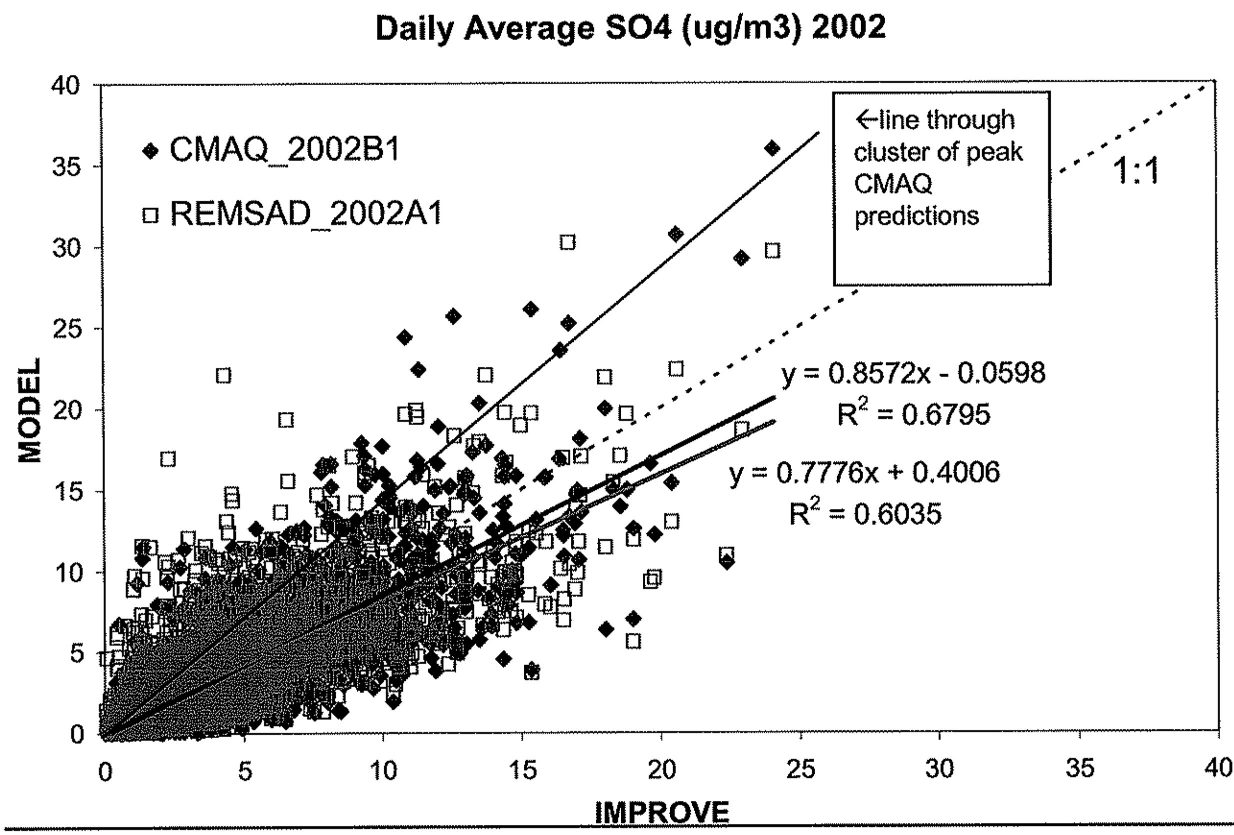
Comment #2 on Section 2: There are several areas of less than acceptable wind speed and direction correlation between modeling and measurements, especially during summer months.

Page 2-24 of the document describes quarterly correlation coefficients in the range of 0.5-0.7 as being "acceptable." Correlation coefficients below 0.5 are not described, but can be presumed to be "less than acceptable". A review of Figures 2-3 and 2-4 shows several areas of grey squares associated with these poor performances. As noted above, poor modeled meteorological performance yields uncertainty with regards to the trajectory analysis and attribution of targeted emission sources that may contribute to the worst 20% days. Reliant Energy requests NESCAUM to address the confidence of the transport of emissions through these areas, especially with regards to emissions from the EGUs included in the "167 EGU Strategy" list.

Comment #3 on Section 2: The regression lines and slopes attributed to the model performance plots do not match the peak prediction areas in some cases.

Some of the figures presented in the report (components of Figure 2-11 and Figure 2-16) have best fit lines drawn in the figures that do not appear to match the line one would eyeball that would pass through the peak values. Since the peak values are most important in determining the trend of the worst 20% regional haze days, it makes sense to reconsider the best-fit lines for this purpose. For example, Figure 2 shows the sulfate particulate predictions vs. observations from the report's Figure 2-11. The blue best fit line far from the area of peak predictions, which are better matched by an alternative line added to Figure 2.

Figure 2 $PM_{2.5}$ Sulfate Performance Plot from Draft MANE-VU Report



Similar eyeballed best-fit lines through the peak CMAQ predictions are added to Figures 3 and 4. These alternative slopes lead to conclusions that the CMAQ model's peak predictions are too high (i.e., the model is over-responding, especially on the worst 20% regional haze days), and can result in a conclusion that certain emission components have an exaggerated effect on visibility.

Figure 3 $PM_{2.5}$ Elemental Carbon Performance Plot from Draft MANE-VU Report

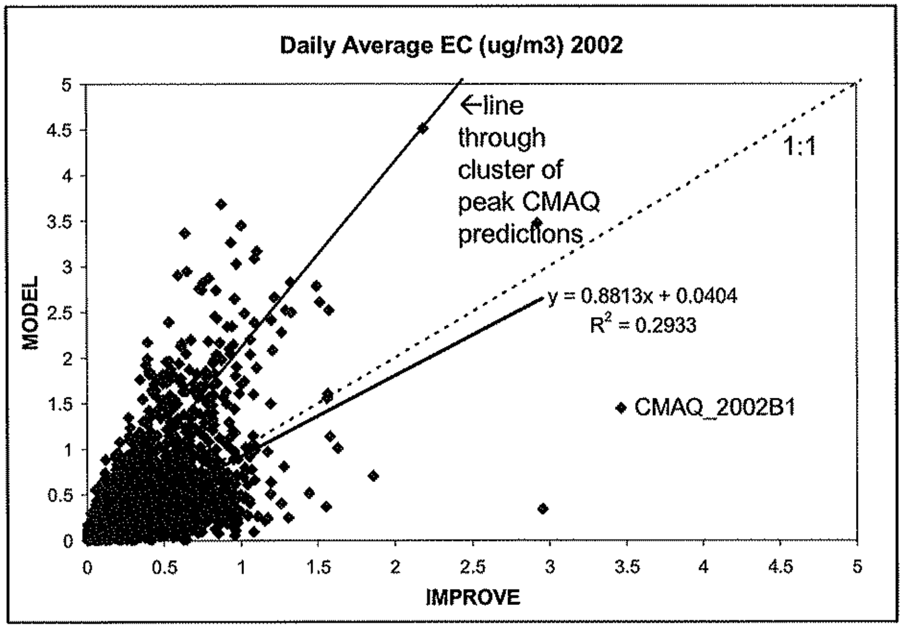
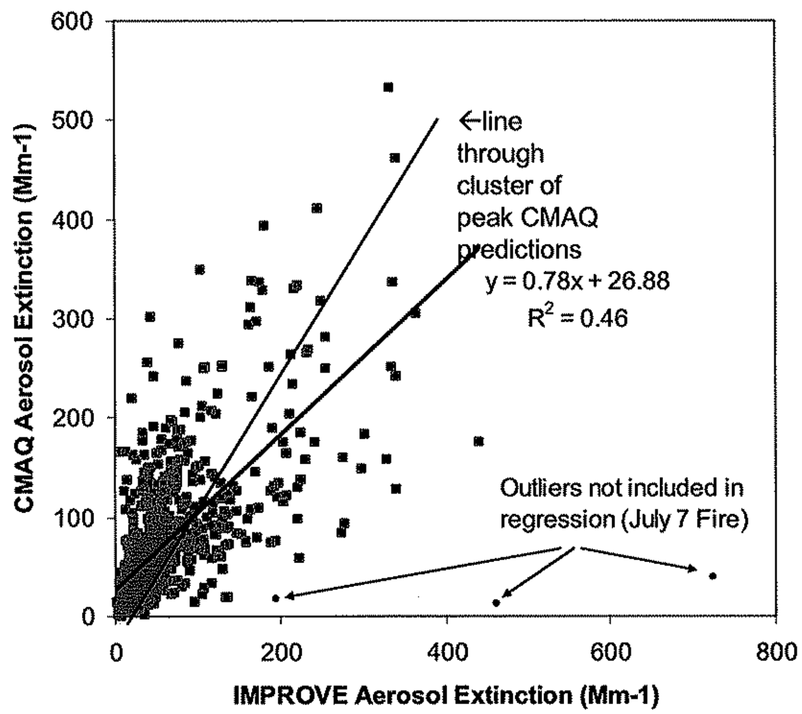


Figure 4 Paired Comparison of Extinction Coefficient Plot from Draft MANE-VU Report



Comments on Section 3

The report shows projected improvement in visibility for the BOTW-1 emission scenario at several Northeastern and Mid-Atlantic sites in Figures 3-1 and 3-2 of the report. The report also shows the projected improvement in visibility for the OTB/OTW scenario in Figures 5-6 through 5-13, and these figures indicate that the visibility improvement by the year 2018 is in excess of the uniform rate of progress "glidepath."

Comment #1 on Section 3: Further emission reductions beyond OTB/OTW are unnecessary for achieving the 2018 RHR milestones. Before any further emission reductions are mandated, a review of the actual visibility improvements attained and the performance of the prediction models needs to be conducted based upon the OTB/OTW emission reductions.

The visibility improvement by 2018 represents the results of substantial SO_2 and NOx (and co-beneficial $PM_{2.5}$) emission control strategies targeted toward EGUs. As noted previously, reductions in $PM_{2.5}$ precursor emissions should also result in a decrease in primary $PM_{2.5}$ emissions. U.S. EPA and other regional analyses have shown that control strategies targeted to reduce SO_2 and NO_x emissions are most effective at reducing $PM_{2.5}$. These OTB/OTW emission control strategies include the following:

- Clean Air Interstate Rule (CAIR)
  - CAIR Phase I NOx reductions in 2009 with both ozone season and non-ozone season budgets
  - CAIR Phase I SO_2 reductions from 2002 budget by 50% in 2010 through 2:1 allowance surrender ratio
  - CAIR Phase II NOx reduced in 2015
  - CAIR Phase II SO_2 reduced from 2002 budget by 65% in 2015 through 2.86:1 allowance surrender ratio
- NOx SIP Call – Effective in 2003, built upon the progress achieved by OTC
- Clean Air Mercury Rule (CAMR) and the more stringent state specific Mercury (Hg) Rules – Phase I Hg reductions begin in 2010, Phase II Hg reductions begin in 2015
- NSR settlements and state programs – The various NSR settlements have specified the installation of control equipment and the permanent retirement of allowances which would be made available through the operation of this emissions control equipment. Additionally, there are state programs, such as North Carolina's "Clean Smokestacks" program that require the surrender of allowances made available due to the installation of control equipment which are part of a rate base.

Due to the large model uncertainties and biases shown in Section 2 of the draft NESCAUM report, inevitable improvements in emission control equipment over the next few years, and the need re-evaluate future regional models with better meteorological databases <u>after</u> the initial visibility improvements are in place, Reliant Energy recommends that EPA plan a comprehensive assessment of the effects on measured visibility of the first RHR implementation period and a reassessment of model performance at that time. This periodic evaluation is required under the RHR – please reference 40 CFR 51.306 as summarized below:

§ 51.306 - Long-term strategy requirements for reasonably attributable visibility impairment

(a)(1) For the purposes of addressing reasonably attributable visibility impairment, each plan must include a long-term (10–15 years) strategy for making reasonable progress toward the national goal specified in § 51.300(a).

(c) The plan must provide for periodic review and revision, as appropriate, of the long-term strategy for addressing reasonably attributable visibility impairment.

(e) The State must consider, at a minimum, the following factors during the development of its long-term strategy:

(1) Emission reductions due to ongoing air pollution control programs,
(2) Additional emission limitations and schedules for compliance,

<u>Comment #2 on Section 3</u>: The issue of how natural background is determined for the PSD Class I areas should be re-evaluated.

The draft NESCAUM report indicates that ammonium sulfate is identified as the largest contributor to haze at MANE-VU Class I areas. Virtually all ammonium sulfate is apparently assumed to be the result of man-made emissions. However, the contribution of natural biogenic sources of ammonia, organic carbon and sulfates may not be properly considered in the determination of naturally-occurring background visibility. Natural decay of the abundant vegetation in saltwater marshes such as those at Brigantine can release significant quantities of ammonia as a result of the reducing environment and the anaerobic biodegradation that takes place in the soils and marine sediments. Likewise, sulfates are released in large quantities from both sea water (where sulfate ions comprise 7.7 wt% of the total salts present in all seawater) and from phytoplankton that release large amounts of sulfates to the atmosphere. These and other related components of natural background should be properly accounted for and represented before any further RHR milestone assessments are attempted.

<u>Comments on Section 4</u>

Section 4 discusses 2002 vs. 2018 apportionment of source area contributions to regional haze.

<u>Comment #1 on Section 4</u>: Results from both CMAQ and REMSAD are shown, but there is little discussion regarding the consistency of these modeling results.

<u>Comment #2 on Section 4</u>: An important "region" for Acadia especially is "SE_BC", but the meaning of this term and others in the figures needs more explanation.

<u>Comments on Section 5</u>

This section presents an evaluation of the effects of various control strategies, as noted above.

<u>Comment #1 on Section 5</u>: There may be double-counting of benefits with the "167 EGU Strategy"

The OTB/OTW emissions scenario <u>should</u> include CAIR SO_2 and NO_x reductions for large EGUs in CAIR states. The CAIR states include multiple states upwind of the MANE-VU region. The discussion does not present sufficient details about the specific controls in items 1 and 5 listed in Section 1.3.5 of the draft report to determine whether item 5 double counts controls already accounted for in CAIR (i.e., several of the EGUs identified in the 167 EGU strategy have elected to install SO_2 and NOx emission control devices in response to Phase I CAIR) . We suspect that this is the case, and if so, the benefits claimed for the "167 Stack Strategy" are overestimated.

<u>Comment #2 on Section 5</u>: All of the control strategies tested result in insignificant changes in $PM_{2.5}$ concentrations, even though the report mentions that the 167 EGU emission reductions will result in "significant reductions."

NESCAUM has suggested that 24-hour average $PM_{2.5}$ concentrations less than 0.13 and 2.0 $\mu g/m^3$ for Class I and Class II areas, respectively, should be considered as "insignificant" per permitting of new sources (see <u>http://www.nescaum.org/topics/permit-modeling</u>). This means that emission changes that result in changes in daily average $PM_{2.5}$ concentrations less than 2.0 $\mu g/m^3$ in Class II areas provide insignificant changes. All of the figures in Section 5 of the MANE-VU draft report show changes in $PM_{2.5}$ concentrations that are less than 2.0 $\mu g/m^3$. Additionally, the projected changes are less than 0.15 $\mu g/m^3$ in most cases and areas in the NESCAUM states. As noted in other comments, the modeled effectiveness of the 167 EGU strategy is likely to be overstated because of double-counting of CAIR emission reductions and also because the CMAQ model overpredicts peak visibility impacts.

<u>Comment #3 on Section 5</u>: The projected rates of visibility improvement do not appear to account for SO_2 and NOx emission reductions required under Phase II CAIR.

The NESCAUM report includes multiple summaries that present the projected rates of visibility improvement at selected Class I areas (please reference Figures 5-6 through 5-14). In all summaries, the projected rate of visibility improvement for the 2002 through 2009 time period, which apparently accounts for the OTB/OTW emission control strategies, exceeds the target uniform rate of visibility improvement (i.e., there is a steeper slope of visibility improvement). However, for the 2009 through 2018 time period, there is a significant retarding in the rate of visibility improvement (i.e., the slope of the line decreases, at some Class I areas the slope is less than the uniform rate). It appears that the model runs do not account for the decreases in SO_2 and NOx (and co-beneficial $PM_{2.5}$) emissions required under <u>Phase II CAIR</u> (begins January 1, 2015). In their support of the CAIR regulations, U.S. EPA has projected a decrease in the number and severity of ozone and $PM_{2.5}$ non-attainment areas in 2015 as compared with 2010 (please see the summary presented in the following link: <u>http://www.epa.gov/cair/charts_files/nonattain_maps.pdf</u>). Nearly all of these emission reductions are projected to occur in states located immediately upwind of the MANE-VU region. Reliant Energy requests NESCAUM to provide a detailed explanation regarding these model runs.

Comment #4 on Section 5: For the "167 EGU Strategy", there are apparent inconsistencies between the average change in 24-hour $PM_{2.5}$ concentrations and projected visibility improvement at selected Class I areas located in the northern NESCAUM states.

NESCAUM conducted a model run in which incorporated a 90 percent control of SO_2 emissions from 167 target EGUs. One-half (83 of 167) of the 167 target EGUs are located in the upwind Ohio River Valley states (Indiana, Kentucky, Ohio, Pennsylvania and West Virginia). The results of the 2018 model run, which are presented in Figure 5-5 of the NESCAUM report, show that the largest change in average 24-hour $PM_{2.5}$ concentrations are projected to occur in those Ohio River Valley States. Ambient air monitoring data collected under U.S. EPA's Clean Air Status and Trends Network (CASTNET) appears to support these model results – ambient air concentrations of SO_2 and particulate sulfate are higher in these areas as compared with the NESCAUM states (please reference the 2005 CASTNET annual report presented in the following link: http://www.epa.gov/castnet/library/annual05/annual_report_2005.pdf). However, although the model results as presented in Figure 5-5 show little or no change in average 24-hour $PM_{2.5}$ concentrations in the northern NESCAUM states and New Brunswick - Canada, the visibility improvement at some selected Class I areas, such as Acadia National Park, is projected to be large (~ 0.5 deciview change) and comparable to that in more southern areas such as Brigantine National Wildlife Refuge – see Figures 5-6 and 5-7. Reliant Energy requests NESCAUM to provide a detailed explanation regarding these apparently inconsistent modeling results.

Comment #5 on Section 5: The NESCAUM report should note that the U.S. EPA has determined that CAIR satisfies the BART requirements for SO_2 and NO_x.

The Pennsylvania Department of Environmental Protection (PA DEP) identified five Reliant Energy facilities located in Pennsylvania that were considered to be BART-eligible. The PA DEP agrees with U.S. EPA that participation in the CAIR trading program satisfies the SO_2 and NO_x BART requirements for Pennsylvania EGUs. With regards to PM_{10} emissions from Reliant Energy's BART-eligible facilities, the PA DEP agrees with our conclusion that additional emissions controls for PM_{10} are not warranted considering the insignificant impacts these sources have on visibility in Class I areas. PA DEP is a participating member of MANE-VU and MARAMA.

Comment #6 on Section 5: There are insufficient details regarding the modeling runs, such as those conducted under a reduced sulfur fuel content control strategy.

The NESCAUM report does not provide details regarding the number and location of sources potentially impacted by an emissions control strategy that limits fuel oil sulfur content to a maximum of 500 parts per million by mass. (In general, the details of emissions inputs to all of the modeling runs described in the report need to be made available to the public.) The results of the 2018 model run, as presented in Figures 5-1 and 5-2, show the largest change in average 24-hour $PM_{2.5}$ concentrations are projected to occur in Delaware and coastal New England, while other populated areas inexplicably show much lower impacts. In the absence of details regarding the number and location of sources potentially impacted by this strategy, it is impossible to gauge the plausibility of the modeled results. As such, Reliant Energy requests NESCAUM to provide a detailed explanation regarding these puzzling modeling results.

2002 MANE-VU Emissions Inventory Summary for PM25 Emissions – New Jersey

Source Category	SCC	Source Type	ANNUAL	
			Emissions (tons/year)	Percent of Total
Stationary Source Fuel Combustion-Residential	2104	Area	11,088	35
Paved Roads	2294	Area	2,570	8
Off-highway Vehicle Diesel	2270	Nonroad	2,376	8
Industrial Processes-Food and Kindred Products: SIC 20	2302	Area	2,226	7
Miscellaneous Area Sources-Other Combustion	2810	Area	1,367	4
External Combustion Boilers-Electric Generation	1010	Point	1,286	4
Highway Vehicles-Gasoline	2201	Onroad	1,264	4
Highway Vehicles-Diesel	2230	Onroad	1,205	4
Off-highway Vehicle Gasoline, 2-Stroke	2260	Nonroad	781	2
Stationary Source Fuel Combustion-Commercial/Institutional	2103	Area	773	2
Marine Vessels, Commercial	2280	Nonroad	732	2
Industrial Processes-Miscellaneous Manufacturing Industries	399	Point	709	2
Pleasure Craft	2282	Nonroad	604	2
Industrial Processes-Mineral Products	305	Point	518	2
Internal Combustion Engines-Electric Generation	2010	Point	476	2
Mobile Sources-Unpaved Roads	2296	Area	428	1
Industrial Processes-Mining and Quarrying: SIC 14	2325	Area	413	1
Top Categories			28,817	90.0
Total PM25-PRI Emissions			**31,595**	**100**

2002 MANE-VU Emissions Inventory Summary for SO2 Emissions – New Jersey

Source Category	SCC	Source Type	ANNUAL	
			Emissions (tons/year)	Percent of Total
External Combustion Boilers-Electric Generation	1010	Point	51,137	56
Marine Vessels, Commercial	2280	Nonroad	11,444	13
Stationary Source Fuel Combustion-Residential	2104	Area	6,901	8
Industrial Processes-Petroleum Industry	306	Point	4,281	5
Stationary Source Fuel Combustion-Commercial/Institutional	2103	Area	3,348	4
Off-highway Vehicle Diesel	2270	Nonroad	3,198	4
Highway Vehicles-Gasoline	2201	Onroad	2,759	3
Industrial Processes-Chemical Manufacturing	301	Point	1,864	2
External Combustion Boilers-Industrial	1020	Point	1,137	1
Top Categories			86,069	96.0
Total SO2 Emissions			**91,295**	**100**

2002 MANE-VU Emissions Inventory Summary for NOx Emissions – New Jersey

Source Category	SCC	Source Type	ANNUAL	
			Emissions (tons/year)	Percent of Total
Highway Vehicles-Gasoline	2201	Onroad	111,610	38
Highway Vehicles-Diesel	2230	Onroad	40,466	14
External Combustion Boilers-Electric Generation	1010	Point	29,416	10
Off-highway Vehicle Diesel	2270	Nonroad	25,558	9
Stationary Source Fuel Combustion-Residential	2104	Area	15,685	5
Marine Vessels, Commercial	2280	Nonroad	10,981	4
Stationary Source Fuel Combustion-Commercial/Institutional	2103	Area	9,232	3
LPG	2267	Nonroad	6,920	2
Off-highway Vehicle Gasoline, 4-Stroke	2265	Nonroad	6,705	2
Railroad Equipment	2285	Nonroad	5,721	2
Internal Combustion Engines-Electric Generation	2010	Point	5,211	2
Top Categories			267,504	91.0
Total NOx Emissions			**293,840**	**100**

State Level Summary of Annual, Summary and Winter Season, and Summer Day Emissions for Scenario #M02

NJ

StateLevelSummaryM02.xls -- Emissions, 08/04/05

FIPS State	Pollutant Code	Start Date	End Date	"NIF" Emissions	"NoNIF" Emissions	Total Emissions	Emission Unit
34	CO	20090101	20091231	3,645.28	1,828.07	5,473.35	TON
34	CO	20090501	20090930	1,535.00	627.94	2,162.94	TON
34	CO	20090721	20090721	14.42	6.33	20.75	TON
34	CO	20091001	20090430	2,110.23	1,200.07	3,310.30	TON
34	NH3	20090101	20091231	254.18	142.97	397.15	TON
34	NH3	20090501	20090930	106.47	49.06	155.53	TON
34	NH3	20090721	20090721	0.99	0.48	1.47	TON
34	NH3	20091001	20090430	147.68	93.87	241.55	TON
34	NOX	20090101	20091231	11,284.63	781.71	12,066.34	TON
34	NOX	20090501	20090930	4,921.94	308.40	5,230.34	TON
34	NOX	20090721	20090721	43.05	3.13	46.18	TON
34	NOX	20091001	20090430	6,362.75	473.35	6,836.10	TON
34	PM10-PRI	20090101	20091231	3,610.96	147.16	3,758.12	TON
34	PM10-PRI	20090501	20090930	1,546.78	50.59	1,597.37	TON
34	PM10-PRI	20090721	20090721	13.20	0.53	13.73	TON
34	PM10-PRI	20091001	20090430	2,064.17	96.58	2,160.75	TON
34	PM25-PRI	20090101	20091231	3,112.21	147.16	3,259.37	TON
34	PM25-PRI	20090501	20090930	1,326.96	50.59	1,377.55	TON
34	PM25-PRI	20090721	20090721	11.34	0.53	11.87	TON
34	PM25-PRI	20091001	20090430	1,785.24	96.58	1,881.82	TON
34	SO2	20090101	20091231	27,509.10	0.00	27,509.10	TON
34	SO2	20090501	20090930	11,819.89	0.00	11,819.89	TON
34	SO2	20090721	20090721	100.27	0.00	100.27	TON
34	SO2	20091001	20090430	15,689.22	0.00	15,689.22	TON
34	VOC	20090101	20091231	248.42	46.78	295.20	TON
34	VOC	20090501	20090930	106.91	16.07	122.98	TON
34	VOC	20090721	20090721	0.90	0.13	1.03	TON
34	VOC	20091001	20090430	141.48	30.73	172.21	TON

NJ

StateLevelSummaryM01.xls -- Emissions, 07/29/05

FIPS State	Pollutant Code	Start Date	End Date	"NIF" Emissions	"NoNIF" Emissions	Total Emissions	Emission Unit
34	CO	20180101	20181231	4,790.82	2,820.34	7,611.16	TON
34	CO	20180501	20180930	2,332.89	1,278.44	3,611.33	TON
34	CO	20180721	20180721	22.63	12.83	35.46	TON
34	CO	20181001	20180430	2,457.91	1,541.99	3,999.90	TON
34	NH3	20180101	20181231	343.43	220.59	564.02	TON
34	NH3	20180501	20180930	168.61	99.98	268.59	TON
34	NH3	20180721	20180721	1.59	0.97	2.56	TON
34	NH3	20181001	20180430	174.86	120.59	295.45	TON
34	NOX	20180101	20181231	12,438.77	1,197.46	13,636.23	TON
34	NOX	20180501	20180930	5,833.00	598.67	6,431.67	TON
34	NOX	20180721	20180721	52.41	6.06	58.47	TON
34	NOX	20181001	20180430	6,605.74	598.77	7,204.51	TON
34	PM10-PRI	20180101	20181231	3,789.59	227.03	4,016.62	TON
34	PM10-PRI	20180501	20180930	1,694.58	102.92	1,797.50	TON
34	PM10-PRI	20180721	20180721	14.51	0.97	15.48	TON
34	PM10-PRI	20181001	20180430	2,095.02	124.12	2,219.14	TON
34	PM25-PRI	20180101	20181231	3,288.30	227.03	3,515.33	TON
34	PM25-PRI	20180501	20180930	1,472.67	102.92	1,575.59	TON
34	PM25-PRI	20180721	20180721	12.62	0.97	13.59	TON
34	PM25-PRI	20181001	20180430	1,815.63	124.12	1,939.75	TON
34	SO2	20180101	20181231	32,495.10	0.00	32,495.10	TON
34	SO2	20180501	20180930	14,384.13	0.00	14,384.13	TON
34	SO2	20180721	20180721	122.06	0.00	122.06	TON
34	SO2	20181001	20180430	18,110.97	0.00	18,110.97	TON
34	VOC	20180101	20181231	279.79	72.21	352.00	TON
34	VOC	20180501	20180930	129.28	32.70	161.98	TON
34	VOC	20180721	20180721	1.06	0.32	1.38	TON
34	VOC	20181001	20180430	150.52	39.52	190.04	TON

State Level Summary of Annual, Summary and Winter Season, and Summer Day Emissions for Scenario #M02

OH

StateLevelSummaryM02.xls -- Emissions, 08/04/05

FIPS State	Pollutant Code	Start Date	End Date	"NIF" Emissions	"NoNIF" Emissions	Total Emissions	Emission Unit
39	CO	20090101	20091231	11,400.84	8,837.55	20,238.39	TON
39	CO	20090501	20090930	4,901.06	3,784.63	8,685.69	TON
39	CO	20090721	20090721	33.98	39.56	73.54	TON
39	CO	20091001	20090430	6,499.81	5,053.21	11,553.02	TON
39	NH3	20090101	20091231	684.50	590.35	1,274.85	TON
39	NH3	20090501	20090930	294.24	252.76	547.00	TON
39	NH3	20090721	20090721	2.00	2.73	4.73	TON
39	NH3	20091001	20090430	390.11	337.06	727.17	TON
39	NOX	20090101	20091231	71,741.01	37,512.63	109,253.64	TON
39	NOX	20090501	20090930	29,583.42	14,955.58	44,539.00	TON
39	NOX	20090721	20090721	204.67	106.96	311.63	TON
39	NOX	20091001	20090430	42,157.56	22,557.09	64,714.65	TON
39	PM10-PRI	20090101	20091231	36,927.57	20,711.16	57,638.73	TON
39	PM10-PRI	20090501	20090930	15,627.65	8,426.39	24,054.04	TON
39	PM10-PRI	20090721	20090721	108.06	59.34	167.40	TON
39	PM10-PRI	20091001	20090430	21,299.81	12,284.12	33,583.93	TON
39	PM25-PRI	20090101	20091231	30,083.47	17,628.39	47,711.86	TON
39	PM25-PRI	20090501	20090930	12,668.16	7,116.04	19,784.20	TON
39	PM25-PRI	20090721	20090721	87.61	50.28	137.89	TON
39	PM25-PRI	20091001	20090430	17,415.21	10,511.68	27,926.89	TON
39	SO2	20090101	20091231	312,348.12	163,322.62	475,670.74	TON
39	SO2	20090501	20090930	130,313.71	66,581.17	196,894.88	TON
39	SO2	20090721	20090721	901.38	460.56	1,361.94	TON
39	SO2	20091001	20090430	182,034.41	96,741.46	278,775.87	TON
39	VOC	20090101	20091231	1,354.34	768.67	2,123.01	TON
39	VOC	20090501	20090930	580.92	326.73	907.65	TON
39	VOC	20090721	20090721	3.98	2.56	6.54	TON
39	VOC	20091001	20090430	773.43	441.88	1,215.31	TON

State Level Summary of Annual, Summary and Winter Season, and July Day Emissions for Scenario #M01

StateLevelSummaryM01.xls -- Emissions, 07/29/05

OH

FIPS State	Pollutant Code	Start Date	End Date	"NIF" Emissions	"NoNIF" Emissions	Total Emissions	Emission Unit
39	CO	20180101	20181231	12,252.98	11,579.25	23,832.23	TON
39	CO	20180501	20180930	5,379.33	4,664.14	10,043.47	TON
39	CO	20180721	20180721	37.39	49.29	86.68	TON
39	CO	20181001	20180430	6,873.68	6,915.23	13,788.91	TON
39	NH3	20180101	20181231	860.00	912.50	1,772.50	TON
39	NH3	20180501	20180930	375.50	366.22	741.72	TON
39	NH3	20180721	20180721	2.58	3.79	6.37	TON
39	NH3	20181001	20180430	484.31	545.74	1,030.05	TON
39	NOX	20180101	20181231	51,597.98	31,531.21	83,129.19	TON
39	NOX	20180501	20180930	22,349.70	13,538.08	35,887.78	TON
39	NOX	20180721	20180721	154.74	98.92	253.66	TON
39	NOX	20181001	20180430	29,248.28	17,993.20	47,241.48	TON
39	PM10-PRI	20180101	20181231	27,405.02	15,349.01	42,754.03	TON
39	PM10-PRI	20180501	20180930	11,982.87	6,676.27	18,659.14	TON
39	PM10-PRI	20180721	20180721	82.83	47.41	130.24	TON
39	PM10-PRI	20181001	20180430	15,422.08	8,672.27	24,094.35	TON
39	PM25-PRI	20180101	20181231	20,794.14	12,528.73	33,322.87	TON
39	PM25-PRI	20180501	20180930	9,072.77	5,433.37	14,506.14	TON
39	PM25-PRI	20180721	20180721	62.72	38.85	101.57	TON
39	PM25-PRI	20181001	20180430	11,721.25	7,094.94	18,816.19	TON
39	SO2	20180101	20181231	135,078.02	80,423.05	215,501.07	TON
39	SO2	20180501	20180930	58,398.14	34,993.39	93,391.53	TON
39	SO2	20180721	20180721	403.97	242.07	646.04	TON
39	SO2	20181001	20180430	76,679.93	45,429.68	122,109.61	TON
39	VOC	20180101	20181231	1,401.50	852.64	2,254.14	TON
39	VOC	20180501	20180930	615.83	363.11	978.94	TON
39	VOC	20180721	20180721	4.21	2.82	7.03	TON
39	VOC	20181001	20180430	785.71	489.32	1,275.03	TON

2002 MANE-VU Emissions Inventory Summary for PM25-PRI Emissions – Pennsylvania

Source Category	SCC	Source Type	ANNUAL Emissions (tons/year)	ANNUAL Percent of Total
Stationary Source Fuel Combustion-Residential	2104	Area	14,034	13
Mobile Sources-Paved Roads	2294	Area	12,478	11
Miscellaneous Area Sources-Agricultural Production-Crops	2801	Area	10,074	9
Open Burning-Waste Disposal, Treatment, and Recovery	261	Area	9,505	9
Mobile Sources-Unpaved Roads	2296	Area	8,317	8
Industrial Processes-Construction: SIC 15-17	2311	Area	7,695	7
External Combustion Boilers-Electric Generation	1010	Point	7,156	7
Industrial Processes-Mineral Products	305	Point	3,990	4
Off-highway Vehicle Diesel	2270	Nonroad	3,792	3
Highway Vehicles-Diesel	2230	Onroad	3,474	3
Industrial Processes-Mining and Quarrying: SIC 14	2325	Area	3,201	3
Industrial Processes-Food and Kindred Products: SIC 20	2302	Area	3,045	3
Stationary Source Fuel Combustion-Commercial/Institutional	2103	Area	2,829	3
External Combustion Boilers-Industrial	1020	Point	2,108	2
Top Categories			91,698	85.0
Total PM25-PRI Emissions			**108,812**	**100**

2002 MANE-VU Emissions Inventory Summary for SO2 Emissions – Pennsylvania

Source Category	SCC	Source Type	ANNUAL	
			Emissions (tons/year)	Percent of Total
External Combustion Boilers-Electric Generation	1010	Point	904,609	84
External Combustion Boilers-Industrial	1020	Point	39,296	4
Stationary Source Fuel Combustion-Residential	2104	Area	30,333	3
Industrial Processes-Mineral Products	305	Point	21,907	2
Stationary Source Fuel Combustion-Commercial/Institutional	2103	Area	19,235	2
Top Categories			1,015,381	95.0
Total SO2 Emissions			**1,077,693**	**100**

2002 MANE-VU Emissions Inventory Summary for NOx Emissions – Pennsylvania

Source Category	SCC	Source Type	ANNUAL	
			Emissions (tons/year)	Percent of Total
External Combustion Boilers-Electric Generation	1010	Point	207,388	26
Highway Vehicles-Gasoline	2201	Onroad	181,610	23
Highway Vehicles-Diesel	2230	Onroad	164,861	21
Off-highway Vehicle Diesel	2270	Nonroad	39,321	5
Industrial Processes-Mineral Products	305	Point	32,817	4
Railroad Equipment	2285	Nonroad	29,292	4
Stationary Source Fuel Combustion-Residential	2104	Area	22,495	3
External Combustion Boilers-Industrial	1020	Point	17,830	2
Stationary Source Fuel Combustion-Commercial/Institutional	2103	Area	14,169	2
LPG	2267	Nonroad	12,893	2
Top Categories			722,676	92.0
Total NOx Emissions			**795,266**	**100**

State Level Summary of Annual, Summary and Winter Season, and Summer Day Emissions for Scenario #M02

StateLevelSummaryM02.xls -- Emissions, 08/04/05

FIPS State	Pollutant Code	Start Date	End Date	"NIF" Emissions	"NoNIF" Emissions	Total Emissions	Emission Unit
42	CO	20090101	20091231	33,781.33	6,688.89	40,470.22	TON
42	CO	20090501	20090930	14,282.02	2,844.84	17,126.86	TON
42	CO	20090721	20090721	103.15	20.82	123.97	TON
42	CO	20091001	20090430	19,499.32	3,844.04	23,343.36	TON
42	NH3	20090101	20091231	915.29	732.76	1,648.05	TON
42	NH3	20090501	20090930	393.31	311.87	705.18	TON
42	NH3	20090721	20090721	2.81	1.20	4.01	TON
42	NH3	20091001	20090430	522.01	420.90	942.91	TON
42	NOX	20090101	20091231	89,296.30	13,016.72	102,313.02	TON
42	NOX	20090501	20090930	38,053.12	5,657.07	43,710.19	TON
42	NOX	20090721	20090721	274.62	9.08	283.70	TON
42	NOX	20091001	20090430	51,243.17	7,359.74	58,602.91	TON
42	PM10-PRI	20090101	20091231	39,767.15	801.48	40,568.63	TON
42	PM10-PRI	20090501	20090930	17,013.85	341.75	17,355.60	TON
42	PM10-PRI	20090721	20090721	122.22	1.29	123.51	TON
42	PM10-PRI	20091001	20090430	22,753.32	459.70	23,213.02	TON
42	PM25-PRI	20090101	20091231	32,151.32	731.58	32,882.90	TON
42	PM25-PRI	20090501	20090930	13,682.05	311.47	13,993.52	TON
42	PM25-PRI	20090721	20090721	98.27	1.27	99.54	TON
42	PM25-PRI	20091001	20090430	18,469.24	420.11	18,889.35	TON
42	SO2	20090101	20091231	241,357.14	714.19	242,071.33	TON
42	SO2	20090501	20090930	101,525.83	316.14	101,841.97	TON
42	SO2	20090721	20090721	729.73	2.27	732.00	TON
42	SO2	20091001	20090430	139,831.29	398.05	140,229.34	TON
42	VOC	20090101	20091231	1,662.19	186.10	1,848.29	TON
42	VOC	20090501	20090930	721.65	78.90	800.55	TON
42	VOC	20090721	20090721	5.15	0.40	5.55	TON
42	VOC	20091001	20090430	940.49	107.21	1,047.70	TON

State Level Summary of Annual, Summary and Winter Season,
and July Day Emissions for Scenario #M01

StateLevelSummaryM01.xls -- Emissions, 07/29/05

PA

FIPS State	Pollutant Code	Start Date	End Date	"NIF" Emissions	"NoNIF" Emissions	Total Emissions	Emission Unit
42	CO	20180101	20181231	33,351.26	8,094.22	41,445.48	TON
42	CO	20180501	20180930	15,022.89	3,795.39	18,818.28	TON
42	CO	20180721	20180721	109.11	28.22	137.33	TON
42	CO	20181001	20180430	18,328.30	4,298.98	22,627.28	TON
42	NH3	20180101	20181231	947.48	842.84	1,790.32	TON
42	NH3	20180501	20180930	430.87	386.32	817.19	TON
42	NH3	20180721	20180721	3.14	1.84	4.98	TON
42	NH3	20181001	20180430	516.68	456.50	973.18	TON
42	NOX	20180101	20181231	69,291.66	13,589.07	82,880.73	TON
42	NOX	20180501	20180930	30,281.79	6,047.42	36,329.21	TON
42	NOX	20180721	20180721	220.42	12.63	233.05	TON
42	NOX	20181001	20180430	39,009.83	7,541.81	46,551.64	TON
42	PM10-PRI	20180101	20181231	30,665.89	914.51	31,580.40	TON
42	PM10-PRI	20180501	20180930	13,355.00	418.19	13,773.19	TON
42	PM10-PRI	20180721	20180721	95.99	2.00	97.99	TON
42	PM10-PRI	20181001	20180430	17,310.87	496.30	17,807.17	TON
42	PM25-PRI	20180101	20181231	22,911.09	844.61	23,755.70	TON
42	PM25-PRI	20180501	20180930	9,935.47	387.91	10,323.38	TON
42	PM25-PRI	20180721	20180721	71.42	1.98	73.40	TON
42	PM25-PRI	20181001	20180430	12,975.62	456.71	13,432.33	TON
42	SO2	20180101	20181231	135,231.53	714.19	135,945.72	TON
42	SO2	20180501	20180930	58,270.92	316.14	58,587.06	TON
42	SO2	20180721	20180721	418.85	2.27	421.12	TON
42	SO2	20181001	20180430	76,960.55	398.05	77,358.60	TON
42	VOC	20180101	20181231	1,697.33	222.26	1,919.59	TON
42	VOC	20180501	20180930	751.10	103.25	854.35	TON
42	VOC	20180721	20180721	5.37	0.55	5.92	TON
42	VOC	20181001	20180430	946.19	118.95	1,065.14	TON