

March 30, 2017

From: MANE-VU Technical Support Committee

To: MANE-VU Air Directors

Re: Four-Factor Data Collection

Introduction

In order to submit a Long Term Strategy (LTS) every state that reasonably contributes to a Class I area must assess whether it would be reasonable to control sources or groups of sources in the next planning period by considering the following, which gets termed the Four-Factor Analysis:

- (1) costs of compliance,
- (2) time necessary for compliance,
- (3) energy and non-air quality environmental impacts of compliance, and
- (4) remaining useful life of any potentially affected sources. (40 CFR 51.308(f)(2)(i))

It is also important for Class I states to have information that will be considered by contributing states so that during the interstate consultation process they can make reasonable asks for controls to be implemented. To achieve these two ends the MANE-VU Four-Factor/Contribution Assessment Workgroup, a subset of the Technical Support Committee, worked to collect the information.

During the first regional haze planning cycle, MANE-VU through MARAMA through the contractor MACTEC documented six sectors that had emissions that were reasonable anticipated to contribute to visibility degradation in MANE-VU: Electric Generating Units (EGUs), Industrial/Commercial/Institutional Boilers (ICI Boilers), Cement Kilns, Heating Oil, Residential Wood Combustion, and Outdoor Wood Boilers.¹ For the former three sectors, information on individual point sources was also collected in addition to sector level data.

Due to resource constraints a contractor could not be hired to update the original report in its entirety nor expand upon it, but through a combination of contractor work and data collection by state staff the information needed by states for their SIP planning for the second regional haze planning period was collected. The remainder of the memorandum explains what was collected for each of the six sectors and where information is located.

Sectors that Reasonably Contribute to Visibility Impairment

EGUs

Sector level information needed to assess the four factors for EGUs were updated through a contract with SRA and has been posted to MARAMA's website for download.² As part of the contract

¹ MACTEC Federal Programs, Inc., *Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas*, July 9, 2007, http://www.marama.org/publications_folder/visibility/RPG/FinalReport/RPGFinalReport_070907.pdf.

² Ed Sabo, *2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas*, January 31, 2016,

information on the cost of controls was reviewed and some controls were updated in MARAMA's EMF system to allow for states to have access to more recent information if they opt to use EMF and the full list of control factors updated are included as an Appendix to "2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas." It should be noted that a bug was found in the EMF code during this review that as of writing had not been fixed by EPA and would need to be accounted for.

Information was also collated on the 444 EGUs that were determined following an initial round of CALPUFF modeling to warrant further scrutiny based on their emissions of SO₂ and NO_x.³ Several sources of data were available to rely on for information on the capacity and installed controls on individual units. Information from NEEDS v5.15⁴, ERTAC EGU v2.5L2⁵, data collection on NOX controls conducted by Maryland Department of Environment, and MANE-VU's "167 Stack Retrospective."⁶ The individual facility information is in the spreadsheet title "EGU Data for Four-factor Analyses (Only CALPUFF Units)."⁷ You can view the locations of the facilities in Figure 1. MANE-VU States were given the opportunity to review the data in early November of 2016.

ICI Boilers

Sector level information needed to assess the four factors for ICI boilers were updated through a contract with SRA and has been posted to MARAMA's website for download.⁸ As part of the contract information on the cost of controls was updated in MARAMA's EMF system to allow for states to have access to more recent information if they opt to use EMF and the full list of control factors updated are included as an Appendix to "2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas."

Information was also collected on the 50 facilities that according to 2011 Q/d contributed the most to visibility impact in each Class I area from sulfate.⁹ Since many of these facilities were duplicates the number of sites data was collected for totaled 82. Later in the data collection process the number of sources was limited to only sources that cumulatively contributed to 50% of the impairment. The

http://www.marama.org/images/stories/documents/publications/FINAL_Updates_to_4Factor_Reasonable_Progress_Report_2016_01_31.pdf.

³ MANE-VU Technical Support Committee, "EGU Data for Four-Factor Analyses (Only CALPUFF Units)," January 10, 2017.

⁴ US EPA, "NEEDS v.5.15 User Guide," August 2015.

⁵ ERTAC Workgroup, "Documentation of ERTAC EGU CONUS Versions 2.5 and 2.5L2," December 12, 2016, http://www.marama.org/images/stories/documents/events/Documentation_of_ERTAC_EGU_CONUS_2_5L_2017_12_10_FINAL_TO_POST_resized.pdf.

⁶ MANE-VU Technical Support Committee, *Status of the Top 167 Electric Generating Units (EGUs) That Contributed to Visibility Impairment at MANE-VU Class I Areas during the 2008 Regional Haze Planning Period*, July 25, 2016, <http://otcair.org/MANEVU/Upload/Publication/Reports/Status%20of%20the%20Top%20167%20Stacks%20from%20the%202008%20MANE-VU%20Ask.pdf>.

⁷ MANE-VU Technical Support Committee, "EGU Data for Four-Factor Analyses (Only CALPUFF Units)."

⁸ Sabo, *2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas*.

⁹ MANE-VU Technical Support Committee, *MANE-VU Updated Q/d*C Contribution Assessment*, April 6, 2016, <http://otcair.org/MANEVU/Upload/Publication/Reports/MANE-VU%20TSC%20-%20Updated%20QC%20over%20d%20Contribution%20Assessment%20-%20Final.pdf>.

facilities are listed in Table 1 with information on 2011 SO₂ emissions, number of Class I sites affected. The individual facility information is in the spreadsheet title “Industrial Source Data for Four-factor Analyses” along with data needed for base year modeling.¹⁰ The data was provided for stakeholder review, including to states in upwind Regional Planning Organizations, OTC/MANE-VU Spring Committee Meeting in Washington, DC on April 12, 2016 and then again at the OTC/MANE-VU Fall Committee Meeting in Washington, DC on September 20, 2016. You can view the locations of the facilities in Figure 1.

Table 1: 82 Industrial Sources that Impact Class I Areas

<i>State</i>	<i>Facility ID</i>	<i>Facility Name</i>	<i>2011 SO₂ Tons</i>	<i>#Sites Top 50</i>	<i>#Sites >= 50%</i>
IL	7793311	Tate & Lyle Ingredients Americas, LLC	102.90	5	3
IL	8065311	Aventine Renewable Energy Inc.	21.51	5	5
IN	3986511	Indiana Harbor East	1,332.52	5	0
IN	4553211	Indiana University	2,467.99	1	0
IN	4873211	Ball State University	1,045.58	4	0
IN	4885311	Citizens Thermal	124.94	5	4
IN	5552011	University of Notre Dame Du Lac	4,291.94	2	0
IN	7364611	Sabic Innovative Plastics Mt. Vernon, LLC	9,570.03	5	4
IN	7376411	Tate & Lyle, Lafayette South	908.83	4	0
IN	7376511	ArcelorMittal Burns Harbor Inc.	309.55	5	5
IN	8181811	Alcoa Inc., Warrick Operations	1,495.20	5	2
IN	8192011	US Steel, Gary Works	1,063.30	5	3
IN	8198511	ESSROC Cement Corp	1,516.32	1	0
IN	8223611	Eli Lilly & Co., Clinton Labs	4,434.03	2	0
KY	6096411	E I DuPont, Inc.	2,045.96	1	0
KY	7352311	Century Aluminum Sebree, LLC	1,917.99	5	2
KY	7365311	Isp Chemicals Inc.	2,207.50	1	0
MA	7236411	Solutia, Inc.	19,696.90	2	0
MD	6117011	Naval Support Facility, Indian Head	1,728.88	1	0
MD	7763811	Luke Paper Company	2,133.08	5	5
MD	8239711	Sparrows Point, LLC	2,033.07	1	1
ME	5253911	Madison Paper	1,444.64	2	0
ME	5691611	Huhtamaki Inc., Waterville	1,420.05	1	0
ME	5692011	FMC Biopolymer	992.04	2	0
ME	5974211	Woodland Pulp, LLC	680.87	2	0
ME	7764711	Verso Paper, Androscoggin Mill	1,018.69	2	0
ME	7945211	The Jackson Laboratory	1,754.70	1	0
ME	8200111	Sappi, Somerset	983.53	2	0
MI	8126511	Escanaba Paper Company	297.11	2	0
MI	8160611	St. Mary's Cement, Inc. (U.S.)	1,279.00	2	0
MI	8483611	US Steel, Great Lake Works	1,046.43	5	5
NC	7920511	Blue Ridge Paper Products, Canton Mill	2,043.68	5	5
NC	8048011	KapStone Kraft Paper Corporation	1,467.51	1	0
NC	8122511	DAK Americas, LLC	2,181.00	1	0
NH	7199811	Dartmouth College	22,024.21	1	0
NH	7866711	Gorham Paper & Tissue, LLC	2,400.59	1	0
NJ	12804611	Gerresheimer Moulded Glass	3,007.04	1	0
NJ	8093211	Atlantic County Utilities Authority Landfill	907.88	1	0
NY	7814711	Morton Salt Division	1,143.29	4	1
NY	7968211	Alcoa, Massena Operations (West Plant)	805.13	4	2
NY	7991711	International Paper Ticonderoga Mill	1,917.74	4	3
NY	8090911	Norlite Corporation	2,887.99	1	0
NY	8091511	Kodak Park Division	681.06	5	5
NY	8105211	Lafarge Building Materials, Inc.	2,102.47	5	5
NY	8176611	CARGILL SALT CO- WATKINS GLEN PLANT	1,280.09	3	0
NY	8325211	Finch Paper LLC	2,265.36	1	1
OH	15485811	Fluor-B&W Portsmouth LLC	102.90	1	0
OH	7219511	Youngstown Thermal	21.51	1	0

¹⁰ MANE-VU Technical Support Committee, “Industrial Source Data for Four-Factor Analyses,” March 30, 2017.

State	Facility ID	Facility Name	2011 SO ₂ Tons	#Sites Top 50	#Sites >= 50%
OH	7416411	Cargill, Inc., Salt Division, Akron	1,332.52	4	0
OH	7997111	Morton Salt, Inc.	2,467.99	5	5
OH	8008811	AK Steel Corporation	1,045.58	4	0
OH	8063611	BDM Warren Steel Operations, LLC	124.94	5	0
OH	8130511	Kraton Polymers U.S. LLC	4,291.94	5	1
OH	8131111	P. H. Glatfelter Company, Chillicothe Facility	9,570.03	5	5
OH	8170411	City of Akron Steam Generating	908.83	5	0
OH	8252111	The Medical Center Company	309.55	5	2
OH	9301711	DTE St. Bernard, LLC	1,495.20	3	0
PA	3186811	Penn State Univ	1,063.30	5	0
PA	3881611	Hercules Cement Co. LP, Stockertown	1,516.32	5	1
PA	4966711	United Refining Co., Warren Plant	4,434.03	2	0
PA	6463511	PPG IND, Inc., Works No. 6	2,045.96	1	0
PA	6532511	AMER REF Group, Bradford	1,917.99	3	0
PA	6582111	International Waxes, Inc., Farmers Valley	2,207.50	5	3
PA	6582211	Keystone Portland Cement, East Allen	19,696.90	3	0
PA	6652211	Philadelphia Energy SOL REF/ PES	1,728.88	1	0
PA	7409311	USS CORP, Edgar Thomson Works	2,133.08	4	0
PA	7872711	Appleton Papers, Spring Mill	2,033.07	2	0
PA	7873611	Sunoco Inc. (R&M), Marcus Hook Refinery	1,444.64	5	2
PA	8204511	USS, Clairton Works	1,420.05	4	0
PA	9248211	Team Ten, Tyrone Paper Mill	992.04	5	1
TN	3982311	Eastman Chemical Company	680.87	5	5
TN	4963011	Packaging Corporation of America	1,018.69	1	0
TN	5723011	Cargill Corn Milling	1,754.70	2	0
VA	4182011	Smurfit Stone Container Corporation, West Point	983.53	1	0
VA	4183311	GP Big Island LLC	297.11	1	0
VA	4938811	Huntington Ingalls, Inc., NN Shipbldg Div	1,279.00	1	0
VA	5039811	Roanoke Cement Company	1,046.43	4	1
VA	5748611	Radford Army Ammunition Plant	2,043.68	5	1
VA	5795511	Philip Morris USA, Inc., Park 500	1,467.51	1	0
WV	4878911	DuPont, Washington Works	2,181.00	5	1
WV	4987611	Capitol Cement, Essroc Martinsburg	22,024.21	3	1
WV	5782411	Bayer Cropscience	2,400.59	5	1

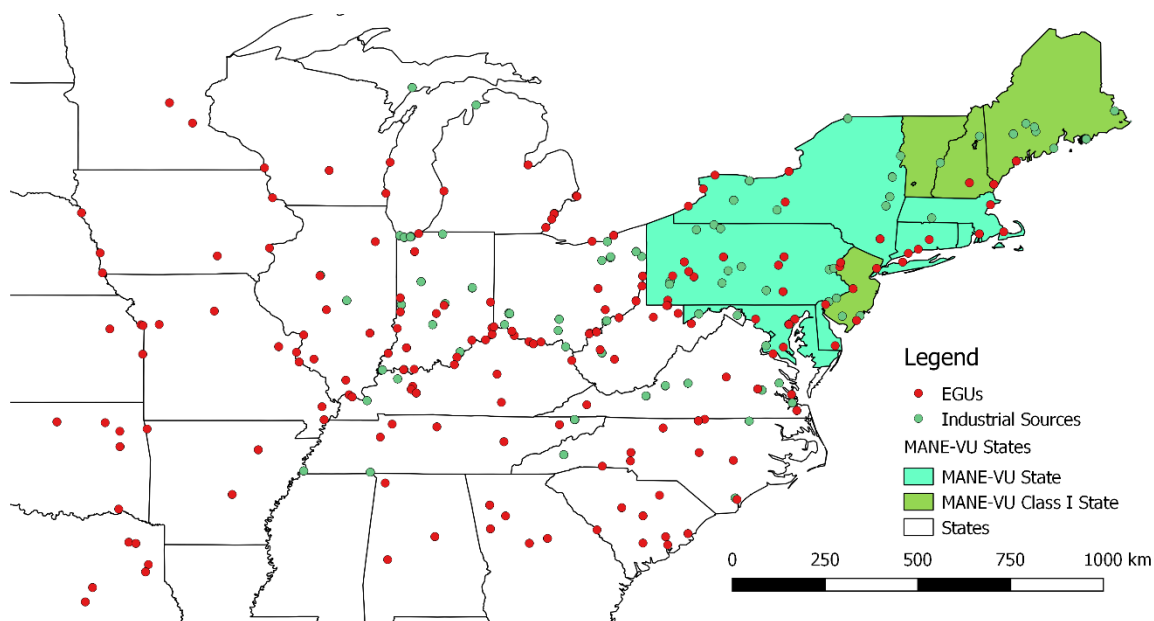
Cement Kilns

Sector level information needed to assess the four factors for cement kilns. Control factors are in MARAMA's EMF system but are those that came installed with the system and represent control costs found in EPA's CoST Manual.¹¹ Concerning data for individual point sources, cement kilns were included in the work to use Q/d to determine the industrial sources with the most impact on Class I areas. As a result data was collected on individual cement kilns and the cement kilns that were in the list of the 82 industrial sources with the most impact and individual facility information is in the spreadsheet title "Industrial Source Data for Four-factor Analyses" along with data needed for base year modeling.¹²

¹¹ US EPA, *Control Strategy Tool (CoST) Development Documentation*, June 9, 2010.

¹² MANE-VU Technical Support Committee, "Industrial Source Data for Four-Factor Analyses."

Figure 1: EGUs and Industrial Sources for which Data Collection Occurred



Heating Oil

Sector level information needed to assess the four factors for heating oil were updated through a contract with SRA and has been posted to MARAMA’s website for download.¹³ As part of the contract information on the cost of controls was updated in MARAMA’s EMF system to allow for states to have access to more recent information if they opt to use EMF and the full list of control factors updated are included as an Appendix to “2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas.” Since heating oil is an area source no specific point source data was collected.

Residential Wood Stoves (RWS)

Sector level information needed to assess the four factors for RWSs were updated through a contract with SRA and has been posted to MARAMA’s website for download.¹⁴ As part of the contract information on the cost of controls was updated in MARAMA’s EMF system to allow for states to have access to more recent information if they opt to use EMF and the full list of control factors updated are included as an Appendix to “2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas.” Since RWS is an area source no specific point source data was collected.

Outdoor Wood-fired Boilers (OWB)

Sector level information needed to assess the four factors for OWBs were updated through a contract with SRA and has been posted to MARAMA’s website for download.¹⁵ As part of the contract information on the cost of controls was updated in MARAMA’s EMF system to allow for states to have

¹³ Sabo, 2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas.

¹⁴ Ibid.

¹⁵ Ibid.

access to more recent information if they opt to use EMF and the full list of control factors updated are included as an Appendix to “2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas.” Since OWB is an area source no specific point source data was collected.

Summary

Sector	Sector Level Data		Source Level Data		CoST Data
	Update?	Location	Update?	Location	Update?
EGUs	Yes	2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas	Yes	EGU Data for Four-Factor Analyses	Yes
ICI Boilers	Yes	2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas	Yes	Industrial Source Data for Four-Factor Analyses	Yes
Cement Kilns	No	Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas	Yes	Industrial Source Data for Four-Factor Analyses	No
Heating Oil	Yes	2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas		n/a	Yes
RWS	Yes	2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas		n/a	Yes
OWB	Yes	2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas		n/a	Yes