

Conversion of Task 2A 2028 Point Source Modeling Files for Emissions Processing with SMOKE (Task 3A)

Prepared for:
Southeastern States Air Resource Managers, Inc.
205 Corporate Center Dr., Suite D
Stockbridge, GA 30281-7383

Under Contract No. V-2018-03-01

Prepared by:
Alpine Geophysics, LLC
387 Pollard Mine Road
Burnsville, NC 28714

and

Eastern Research Group, Inc.
1600 Perimeter Park Dr., Suite 200
Morrisville, NC 27560

October 12, 2020

Alpine Project Number: TS-527
ERG Project Number: 4133.00.006

This page is intentionally blank.

Contents

	Page
1.0 Introduction.....	1
2.0 Emissions Data.....	3
3.0 Annual File Preparation	5
3.1 Non-EGU Point Sources	5
3.2 EGU Point Sources	6
4.0 Hourly Scaling – EGU Point Sources Only	8
5.0 Additional Data for Small EGUs	11
6.0 Quality Assurance of PTHOUR Files.....	12
Appendix A Southeastern VISTAS II Regional Haze Project: Documentation of 2028 Mass Emissions Inventory for Small Electricity Generating Units (EGUs) for States not included in the VISTAS II Region	
Appendix B Task 6 – Benchmark Run #7 Report Review and 2028 elv3 Reassessment	

TABLES

Table 4-1. Plant Scherer 2028 Seasonal NO _x Emissions at Units 1-4.....	9
Table 6-1. Comparison of Modeled Emissions vs. Expected Emissions.....	13

FIGURES

Figure 4-1. Scherer Unit-Level, Monthly NO _x Emissions Distribution by Month.....	10
--	----

Abbreviations/Acronym List

Alpine	Alpine Geophysics, LLC
CEM	Continuous Emissions Monitoring
CenRAP	Central Regional Air Partnership
EGU	Electricity Generating Unit
EPA	United States Environmental Protection Agency
ERG	Eastern Research Group, Inc.
ERTAC	Eastern Regional Technical Advisory Committee
FF10	Flat File 2010
FIPS	Federal Information Processing System
FTP	File Transfer Protocol
GA	Georgia
GADNR	Georgia Department of Natural Resources
IPM	Integrated Planning Model
LADCO	Lake Michigan Air Directors Consortium (LADCO)
MANE-VU	Mid-Atlantic and Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association, Inc.
MMBTU/hr	Million British thermal units per hour
MW	Megawatts
NCDAQ	North Carolina Division of Air Quality
NO _x	Oxides of nitrogen
ORIS	Plant identifier issued by U.S. Department of Energy
PSAT	Particulate Source Apportionment Technology
QA/QC	Quality Assurance/Quality Control
RHR	Regional Haze Rule
SCC	Source Classification Code
SCR	Selective catalytic reduction
SESARM	Southeastern States Air Resource Managers, Inc.
SIPS	State Implementation Plans
SMOKE	Sparse Matrix Operator Kernel Emissions
SO ₂	Sulfur dioxide
tpy	Tons per year
VISTAS	Visibility Improvement – State and Tribal Association of the Southeast
WRAP	Western Regional Air Partnership (WRAP)

1.0 INTRODUCTION

Southeastern States Air Resource Managers, Inc. (SESARM) has been designated by the United States Environmental Protection Agency (EPA) as the entity responsible for coordinating regional haze evaluations for the ten Southeastern states of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. The Eastern Band of Cherokee Indians and the Knox County, Tennessee local air pollution control agency are also participating agencies. These parties are collaborating through the Regional Planning Organization known as Visibility Improvement - State and Tribal Association of the Southeast (VISTAS) in the technical analyses and planning activities associated with visibility and related regional air quality issues. VISTAS' analyses support the VISTAS states in their responsibility to develop, adopt, and implement their State Implementation Plans (SIPs) for regional haze.

The state and local air pollution control agencies in the Southeast are mandated to protect human health and the environment from the impacts of air pollutants. They are responsible for air quality planning and management efforts including the evaluation, development, adoption, and implementation of strategies controlling and managing all criteria air pollutants including fine particles and ozone as well as regional haze. This project focused on regional haze and regional haze precursor emissions. Control of regional haze precursor emissions will have the additional benefit of reducing criteria pollutants as well.

The 1999 Regional Haze Rule (RHR) identified 18 Class I Federal areas (national parks greater than 6,000 acres and wilderness areas greater than 5,000 acres) in the VISTAS region. The 1999 RHR required states to define long-term strategies to improve visibility in Federal Class I national parks and wilderness areas. States were required to establish baseline visibility conditions for the period 2000-2004, natural visibility conditions in the absence of anthropogenic influences, and an expected rate of progress to reduce emissions and incrementally improve visibility to natural conditions by 2064. The original RHR required states to improve visibility on the 20% most impaired days and protect visibility on the 20% least impaired days.¹ The RHR

¹ RHR summary data is available at: <http://vista.cira.colostate.edu/Improve/rhr-summary-data/>

requires states to evaluate progress toward visibility improvement goals every five years and submit revised SIPs every ten years.

This report documents the processing of 2028 mass emissions inventory data for input to photochemical grid modeling that were used to support Particulate Source Apportionment Technology (PSAT) modeling, as well as initial modeling of 2028 visibility impacts (elv3) for each Class I Federal area. The 2028 projection data used in the PSAT modeling were based on 2028 emissions in the "el" platform projected from a 2011 base year that VISTAS states updated based on best available knowledge of in-state Electricity Generating Unit (EGU) and non-EGU point facilities.

After completion of this analytical work, additional updates to the 2028 inventory were needed to include more recent 2028 emissions data, newer Eastern Regional Technical Advisor Committee (ERTAC) EGU projections using 2016 continuous emissions monitoring (CEM) data as the base year input, and other significant point source inventory changes. These subsequent changes to mass emissions were included in updated 2028 emissions projections (elv5) and documented in the Task 2B report for the SESARM states. Revisions to the 2028 mass emissions for the non-SESARM states and processing of the 2028 mass emissions inventory data for both the SESARM and non-SESARM states to support the elv5 modeling is documented in the Task 3B report.

This report documents the steps taken by Alpine Geophysics, LLC (Alpine) in preparing Sparse Matrix Operator Kernel Emissions (SMOKE)-ready point source input files from the SESARM adjusted 2028 EGU and non-EGU point source emissions data provided to Alpine by Eastern Research Group, Inc. (ERG). ERG completed the point EGU and point non-EGU emissions data under Task 2 of VISTAS Contract No. V-2018-03-01, entitled "Southeast VISTAS II Regional Haze Analysis Project". Alpine prepared these datasets under ERG subcontract 4133.00.001/01.

2.0 EMISSIONS DATA

Under Task 3 of the VISTAS Contract, specifically Subtasks 3.1 (Create Photochemical Model Ready EGU Emission Files for 2028), 3.1.2 (Scale Hourly SMOKE Emissions for EGUs), and 3.2 (Create Photochemical Model Ready Non-EGU Point Source Emission Files for 2028), ERG tasked Alpine with preparing SMOKE-ready input files for processing point source emissions to support the 2028 regional haze base case. For these tasks, Alpine created SESARM state inputs (based on ERG provided data), as well as non-SESARM state files to generate national modeling inventories for these categories consistent with the 2011 meteorology associated with the base year modeling platform.

On June 30, 2018, ERG provided Alpine, via project File Transfer Protocol (FTP), with two emissions inventory files for use in this task:

- VISTAS_2028_FF10_EGU.zip – EGU emissions estimates for the 2028 regional base case.
- VISTAS_2028_FF10_NON_EGU.zip – Non-EGU emissions estimates for the 2028 regional base case.

These files represent the SESARM state EGU and non-EGU point source emissions, respectively, and replace the EGU and non-EGU source files for the SESARM states from the EPA 2028el modeling platform. No 2028 adjustments were made to the other sector files (e.g., nonpoint, nonroad, onroad, biogenic, etc.) used in modeling the future year.

Upon receipt of these files, Alpine first confirmed that the files were in the documented Flat File 2010 (FF10) format and that all states in the SESARM region were represented in each file. As a second step, Alpine compared the emission files with the summary files by Federal Information Processing System (FIPS) code, source classification code (SCC), and pollutant that were provided by ERG and confirmed that the annual emission totals of both files matched the summary file totals. A final pre-use quality assurance/quality control (QA/QC) step was to confirm that all required fields for modeling were populated and that all sources had latitude and longitude data within the boundaries of the SESARM state domain.

Additionally, Alpine obtained the Eastern Regional Technical Advisory Committee (ERTAC) EGU forecast tool, version 2.7, emission projections to 2028 that were prepared by the ERTAC EGU workgroup² and made available through a FTP transfer to Alpine from ERG on May 1, 2018. These EGU projections were used for non-SESARM states.

² SESARM received permission from J. McDill of Mid-Atlantic Regional Air Management Association, Inc. (MARAMA) on April 27, 2018 to allow SESARM to use the ERTAC EGU forecast tool, version 2.7 emission projections for year 2028 for this project. As such, ERG downloaded this data from a North Carolina Division of Air Quality (NCDAQ) secure FTP site (<ftp.daq.ncdenr.org>) for Task 2 activities and provided the data to Alpine for Task 3 activities.

3.0 ANNUAL FILE PREPARATION

After the above noted initial QA/QC steps were conducted, Alpine prepared annual emissions inventory data for emissions modeling.

3.1 Non-EGU Point Sources

Since no issues were identified in Alpine's cursory QA/QC review of the "VISTAS_2028_FF10_NON_EGU" file provided by ERG, Alpine prepared a new FF10-formatted file with new header information indicating what emissions were included in the file and that it was to be used in the SESARM 2028 regional haze modeling analysis. The resulting file was prepared and is named "ff10_point_nonegu_sesarm_2028.csv". Alpine confirmed that emissions totals matched the provided emissions totals.

As a second step, Alpine developed non-SESARM state non-EGU point source emissions files to compliment the SESARM-only file prepared by ERG. For this purpose, Alpine reviewed the EPA list of non-EGU point source emissions for SMOKE processing³ to determine which files were necessary for us to review and extract non-SESARM state data. From these files, Alpine determined that the following files were needed to extract non-SESARM state data to fully represent non-EGU point sources consistent with EPA's 2028el modeling platform:

- 2023el_from_refueling_2011NEIv2_POINT_20140913_20sep2016_v1.csv
- 2023_MARAMA_Point_Offsets_2016_08_24_04oct2016_v1.csv
- Biodiesel_Plants_2018_ff10_11apr2013_v0.csv
- 2023el_from_ethanol_plants_2011NEIv2_POINT_20141123_20sep2016_v0.csv
- Illinois_WV_new_sources_NODA_29aug2016_v2.csv
- MARAMA_2028_ptnonipm_2011NEIv2_POINT_20140913_revised_20150115_mar_18nov2016_v3.csv
- MARAMA_2028el_refueling_2011NEIv2_POINT_20140913_18nov2016_v1.csv
- MARAMA_2028el_pt_oilgas_2011NEIv2_POINT_20140913_mar_21nov2016_v1.csv

³ The "ptinv_ptnonipm_2028el_cb6v2_v6_11g.lst" and "ptinv_pt_oilgas_2028el_cb6v2_v6_11g.lst" were extracted from: ftp://ftp.epa.gov/EmisInventory/2011v6/v3platform/2028emissions/2028el_cb6v2_v6_11g_inputs_point.zip

- 2028el_pt_oilgas_2011NEIv2_POINT_20140913_02dec2016_v1.csv

These files were concatenated to develop a single non-EGU point source file of national coverage and to be consistent with the ERG-provided SESARM-only non-EGU point source files. From this single file, Alpine removed all records associated with SESARM state sources. The remaining file was reconfigured as a new FF10 formatted input file and is named “ff10_point_nonegu_nonsesarm_2028el.csv”. Since these emissions inventory files were confirmed for use by EPA in their modeling platform, no additional QA/QC beyond removal of SESARM state records was conducted by Alpine.

Both non-EGU point source files were prepared with annual emissions and no additional temporal file preparation (daily or hourly input format) was conducted consistent with EPA’s 2011el modeling configuration.

3.2 EGU Point Sources

Alpine obtained the ERTAC EGU forecast tool, version 2.7, emission projections to 2028 that were prepared by the ERTAC EGU workgroup⁴ and made available through an FTP transfer to Alpine from ERG on May 1, 2018. As a first step, Alpine concatenated the individual region input files and created a single, national file of EGU emissions as included in each of the following ERTAC v.2.7 files:

- FsS_WESTAR_WAORWYIDMTNDSDCANVAZUTNMCO_ff10_future.csv
- FsS_CENSARA_ARIAKSLAMOOKNETX_ff10_future.csv
- FsS_SESARM_ALFLGAKYMSNCSTNWV_ff10_future.csv
- FsS_LADCO_INILMIMNOHWI_ff10_future.csv
- FsS_MANE-VUVA_CTDEDCMEMDMANHNJNYPARIVTVA_ff10_future.csv

From this single file, Alpine removed all records associated with SESARM state sources (no matching to EPA’s Integrated Planning Model (IPM) data for the same 2023 scenario was

⁴ SESARM received permission from J. McDill of MARAMA on April 27, 2018 to allow SESARM to use the ERTAC EGU forecast tool, version 2.7 emission projections for year 2028 for this project. As such, ERG downloaded this data from a NCDAQ secure FTP site (<ftp.daq.ncdenr.org>) for Task 2 activities and provided the data to Alpine for Task 3 activities.

conducted on these files to determine if there were units missing in the non-SESARM states).⁵ The remaining file was reconfigured as a new FF10 formatted input file and used as a working file for non-SESARM state EGU file development. Similar to the non-EGU cursory QA/QC, Alpine confirmed that all required fields for modeling were populated and that all sources had latitude and longitude data within the boundaries of the modeling domain and outside of SESARM states.

For ease of data management, processing, and resulting QA/QC, Alpine then concatenated the SESARM-only EGU file provided by ERG to the working file to create a single, national, annual emissions file for all EGU emission sources (both SESARM and non-SESARM states). The file is called “ptegu_2028_12july2018.csv”.

This file was then configured with new header information to indicate the national coverage of the inputs and documented to note the file’s use in SESARM’s 2028 regional haze modeling.

⁵ Since we did not prepare the original ERTAC files, we included all obtained files in the case that the ERTAC group may have included/excluded SESARM sources in any one of the other files.

4.0 HOURLY SCALING – EGU POINT SOURCES ONLY

As outlined in subtask 3.1.2 of the work plan, the next step was to create hourly emission files consistent with the temporal distribution of EPA’s 2011el modeling platform for EGUs that report continuous emissions monitoring (CEM) data to EPA. The main purpose of this step was to ensure that emissions simulated in 2028 occur in the same timelines as the emissions were simulated in the 2011 modeling, preventing fabricated emissions increases or decreases between the two years simply as a result of the temporal profile. For example, Alpine wanted to ensure that a unit operating during hour 14 of June 12th in the 2011 simulation is also operating at a comparable level on hour 14 of June 12th in the 2028 simulation with the only difference being in the absolute level of emissions between the two years.

In order to accomplish this step, Alpine first obtained EPA’s hourly distribution files of CEM-based EGU emissions from the 2011/2028el modeling platforms. These files present hourly emissions of oxides of nitrogen (NO_x) and sulfur dioxide (SO₂) emissions, as well as provide an hourly distribution of heat input for the annual episode simulated (e.g., the 2011 calendar year).

Using these files, Alpine generated an hourly-to-annual ratio of NO_x, SO₂, and heat input for each unit identified by EPA within the VISTAS_12 domain. Alpine used ratio preparation methods originally identified and applied for VISTAS in past regional haze studies.⁶ These ratios were then matched to the new annual EGU file “ptegu_2028_12july2018.csv” where the NO_x ratios were used to scale annual NO_x emissions, the SO₂ ratios were used to scale SO₂ emissions, and heat input was used to scale all other pollutant emissions from annual to hourly distribution. When the “EPA HOUR” files did not have associated NO_x or SO₂ ratios (because of missing or incomplete data), Alpine used heat input as the scalar for all pollutants.

For cases where ORIS facility and unit ID were not provided in either the SESARM EGU file or the non-SESARM ERTAC EGU file, no hourly emission distribution was calculated, and default temporal profiles were used in the emissions processing of these sources.

⁶ [ftp://ftp.epa.gov/EmisInventory/ei_conference/EI14/session11/stella.pdf](http://ftp.epa.gov/EmisInventory/ei_conference/EI14/session11/stella.pdf)

The sole exception to this procedure was the Scherer facility located in Georgia (GA). In 2011-2014, Plant Scherer installed selective catalytic reduction (SCR) NO_x controls on Units 1-4. These SCR controls are only required to be run from May 1 to September 30. GA Department of Natural Resources (GA DNR) provided episodic (January-March, April-September, and October-December) emission aggregates for each of four boilers at this facility, as presented in Table 4-1.

Table 4-1. Plant Scherer 2028 Seasonal NO_x Emissions at Units 1-4.

UNIT	Jan-April	May-Sept	Oct-Dec	TOTAL
1	1,529.6	640.0	1,654.4	3,824.0
2	1,161.5	765.2	585.9	2,512.6
3	1,542.9	753.1	1,046.0	3,342.0
4	945.1	781.0	1,342.6	3,068.7

Alpine used the following steps to integrate this profile data:

1. Step 1 – Alpine allocated the episodic emissions to months using a day in month per season ratio (e.g., 31 days in January per 90 days in Jan-Mar period or 31/90*episodic emissions) for each unit and pollutant provided.
2. Step 2 – Alpine prepared ratios of hourly distribution per month using EPA’s CEM data profiles. These new hour-to-month ratios were then applied to the Scherer unit’s monthly emissions to create month-specific hourly distribution of emissions. Since Units 1 and 2 demonstrated sporadic operations during certain months in meteorological year 2011, the hour-to-month ratios for Unit 3 were used to distribute emissions at these two units.
3. Step 3 – Alpine confirmed that the sum of the month-specific hourly distribution of emissions matched the annual emissions.
4. Step 4 – The file was then appended to the remaining hourly distribution files and monthly, hour specific inputs were prepared for the SMOKE processing step for all four units.

Figure 4-1 presents the original 2011 (blue), 2028 emissions with 2011 distribution (red), and resulting 2028 monthly distributions with the modified approach (green) detailed above.

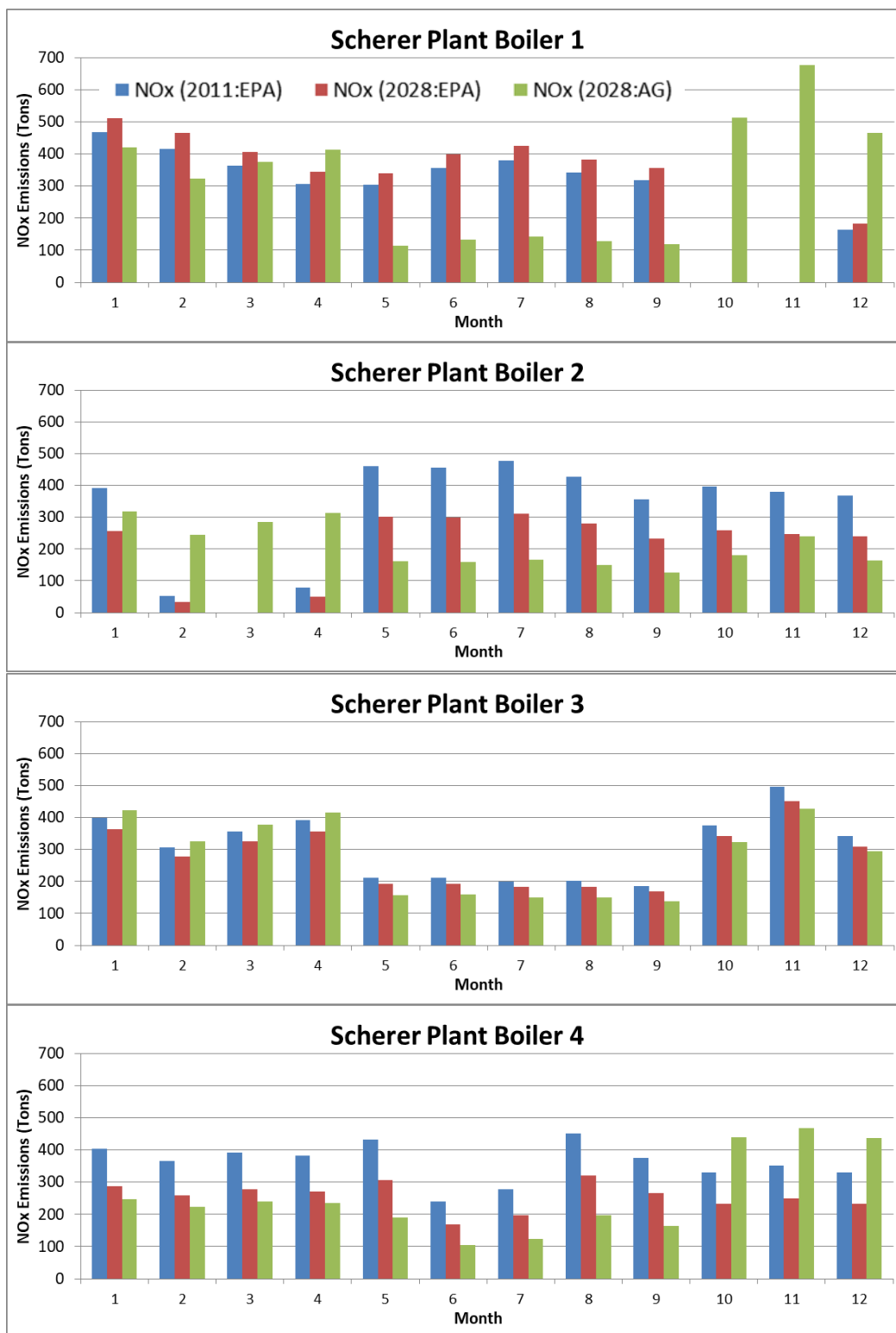


Figure 4-1. Scherer Unit-Level, Monthly NO_x Emissions Distribution by Month.

5.0 ADDITIONAL DATA FOR SMALL EGUS

The ERTAC tool includes EGUs that burn fossil fuel with ≥ 25 megawatts (MW) of generation capacity or ≥ 250 million British thermal units per hour (MMBtu/hr) of heat input and generate electricity for the power grid. EPA's Integrated Planning Model (IPM) forecast includes the same fossil fuel units as those included in ERTAC, plus small EGUs with < 25 MW of generation capacity or < 250 MMBtu/hr of heat input and may or may not produce electricity for the power grid. Therefore, it was necessary to develop a 2028 projection year inventory for the small EGUs that are included in IPM but not in ERTAC to include in the VISTAS II modeling platform to ensure complete accounting of emissions from small EGUs. Appendix A is the documentation for developing the small EGU inventory and the QA/QC steps conducted to develop the small EGU inventory.⁷

The small EGU FF10 files were finalized in early-November 2018,⁸ and sent to ALPINE for emissions processing. Processing concluded on December 9, 2018.

⁷ Memorandum: "Southeastern VISTAS II Regional Haze Project: Documentation of 2028 Mass Emissions Inventory for Small Electricity Generating Units (EGUs) for States not included in the VISTAS II Region." Prepared by the North Carolina Division of Air Quality (NCDAQ). December 7, 2018.

⁸ Final data files submitted to SESARM by NCDAQ on November 12, 2018.

6.0 QUALITY ASSURANCE OF PTHOUR FILES

As a final step, Alpine prepared summaries of the hourly files, by unit, month, and pollutant, and aggregated the twelve monthly emission files to generate a reconstituted annual emission summary by unit. These summaries were then compared back to the annual emission file and confirmation was made of the tonnage conversions from annual to hourly distribution. The resulting national, month-specific hourly files are called:

- pthour_2028_12july2018_01.csv – January 2028 hourly emissions;
- pthour_2028_12july2018_02.csv – February 2028 hourly emissions;
- pthour_2028_12july2018_03.csv – March 2028 hourly emissions;
- pthour_2028_12july2018_04.csv – April 2028 hourly emissions;
- pthour_2028_12july2018_05.csv – May 2028 hourly emissions;
- pthour_2028_12july2018_06.csv – June 2028 hourly emissions;
- pthour_2028_12july2018_07.csv – July 2028 hourly emissions;
- pthour_2028_12july2018_08.csv – August 2028 hourly emissions;
- pthour_2028_12july2018_09.csv – September 2028 hourly emissions;
- pthour_2028_12july2018_10.csv – October 2028 hourly emissions;
- pthour_2028_12july2018_11.csv – November 2028 hourly emissions; and
- pthour_2028_12july2018_12.csv – December 2028 hourly emissions

The hourly emissions were the basis for the elv3 emissions modeling occurring in subsequent tasks.

Addendum to the elv3 Emissions Processing

Since the completion of the elv3 emissions processing and subsequent modeling efforts (October 2019), SESARM concluded that the 2028 point EGU and non-EGU emissions needed to be reviewed and updated for selected sources. These include data review from:

- Point source emissions updates identified in the Area of Influence report;
- Updated EGU emissions developed by ERTAC;
- EPA's 2028 point source emissions based on the 2016 modeling platform; and
- Additional facility emission updates after Particulate Source Apportionment Technology (PSAT) analysis from other regional planning organizations with states in the VISTAS modeling domain, such as the Central Regional Air Partnership (CenRAP); the Lake Michigan Air Directors Consortium (LADCO); the Mid-Atlantic and Northeast Visibility Union (MANE-VU); and the Western Regional Air Partnership (WRAP).

Specific revisions related to development of the 2028 emissions inventory updates for re-modeling are documented in the Task 2B report for the SESARM states and Task 3B for non-SESARM states.

When comparing emissions processing results from the elv3 modeling and the subsequent modeling (elv4), several problems were identified within the elv3 modeling framework, including differences in modeled emissions being higher than expected emissions (i.e., the mass emissions ERG provided to Alpine for processing through the SMOKE emissions processor vs. after processing). Table 6-1 presents these differences for states in the VISTAS domain.

Table 6-1. Comparison of Modeled Emissions vs. Expected Emissions.

State	Modeled NO _x Emissions (tpy)	Modeled SO ₂ Emissions (tpy)	Expected NO _x Emissions (tpy)	Expected SO ₂ Emissions (tpy)	Percent Difference, NO _x (%)	Percent Difference, SO ₂ (%)
SESARM States						
Alabama	84,809	89,233	80,528	87,896	4%	2%
Florida	71,763	63,344	68,110	63,596	5%	1%
Georgia	84,069	89,233	80,528	87,896	1%	<1%
Kentucky	71,763	64,344	68,110	63,596	1%	<1%
Mississippi	67,854	37,270	67,309	37,121	1%	<1%
North Carolina	67,070	75,281	66,321	75,197	7%	3%
South Carolina	52,978	20,831	52,709	20,815	5%	2%
Tennessee	70,746	36,441	65,949	35,270	1%	<1%
Virginia	37,834	30,119	36,117	29,652	8%	2%
West Virginia	46,470	23,524	45,976	23,480	<1%	<1%
SESARM Totals	46,940	20,260	43,283	19,883	3%	1%
Non-SESARM States						
Arkansas	75,165	89,284	74,454	87,557	1%	2%
Colorado	87,539	17,040	88,107	17,742	-1%	-4%
Connecticut	4,337	463	5,032	504	-14%	-8%
Delaware	4,787	4,757	4,152	3,531	15%	35%
District of Columbia	556	21	556	21	0%	0%
Illinois	112,950	169,260	106,617	144,967	6%	17%
Indiana	151,208	195,574	138,970	188,159	9%	4%
Iowa	44,962	54,514	43,846	51,396	3%	6%
Kansas	43,991	30,445	43,299	30,429	2%	<1%
Louisiana	167,539	137,710	160,058	141,305	5%	-3%
Maine	14,000	2,845	11,711	2,504	20%	14%

Table 6-1. Comparison of Modeled Emissions vs. Expected Emissions.

State	Modeled NO _x Emissions (tpy)	Modeled SO ₂ Emissions (tpy)	Expected NO _x Emissions (tpy)	Expected SO ₂ Emissions (tpy)	Percent Difference, NO _x (%)	Percent Difference, SO ₂ (%)
Maryland	27,710	44,692	27,481	44,667	1%	<1%
Massachusetts	18,213	2,706	13,421	1,930	36%	40%
Michigan	99,760	86,580	93,486	80,950	7%	7%
Minnesota	64,221	32,872	55,909	28,319	15%	16%
Missouri	67,880	180,622	65,162	171,837	4%	5%
Montana	22,796	17,468	23,639	19,588	-4%	-11%
Nebraska	46,813	76,573	46,829	76,569	<-1%	<1%
New Hampshire	3,876	2,402	3,693	2,383	5%	1%
New Jersey	17,688	4,305	17,081	4,131	4%	4%
New Mexico	70,497	26,630	70,476	26,628	<1%	<1%
New York	60,432	39,786	52,641	32,272	15%	23%
North Dakota	51,689	55,279	51,268	55,007	1%	<1%
Ohio	110,479	189,262	107,788	172,265	2%	10%
Oklahoma	120,411	53,571	116,468	49,591	3%	8%
Pennsylvania	124,445	190,614	111,502	180,793	12%	5%
Rhode Island	1,667	895	1,666	895	<1%	0%
South Dakota	13,462	1,199	13,426	1,195	<1%	<1%
Texas	364,551	413,170	359,997	411,482	1%	<1%
Vermont	1,079	130	731	128	48%	2%
Wisconsin	48,486	47,217	47,295	46,153	3%	2%
Wyoming	118,851	60,990	115,810	60,985	3%	<1%
Non-SESARM Totals	2,159,040	2,228,876	2,072,571	2,135,883	4%	4%
Totals	2,769,877	2,689,607	2,663,981	2,592,218	4%	4%

Appendix B (APP_B_EL3_REASSESSMENT.zip) contains a memorandum and supporting attachments summarizing the problems with the elv3 modeling, which include:

- Differences in model spin-up days;
- Molecular weight differences in CAMx Reporting;
- Stack characteristic changes (presented in Attachment A of Appendix B);
- Temporal variability configuration and processing of small boiler files (presented in Attachment B-1 of Appendix B); and
- EGU boiler unit double count in 2028 elv3 (presented in Attachments B-2 and B-3 of Appendix B).

It is important to note that these issues only occurred with the elv3 modeling and were corrected in the final elv5 modeling.

Appendix A

Southeastern VISTAS II Regional Haze Project: Documentation of 2028 Mass Emissions Inventory for Small Electricity Generating Units (EGUs) for States not included in the VISTAS II Region

(see APP_A_Small_EGU_Emissions_Inventory_Documentation_120718.pdf)

This page is intentionally left blank.

Appendix B

Task 6 – Benchmark Run #7 Report Review and 2028 elv3 Reassessment

(see APP_B_EL3_REASSESSMENT.zip)

This page is intentionally left blank.