
Conversion of the Task 2B 2028 Point Source Remodeling Files for Emissions Processing with SMOKE (Task 3B)

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Under Contract No. V-2018-03-01

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Abbreviations/Acronym List

Alpine	Alpine Geophysics, LLC
CEM	Continuous Emissions Monitoring
CenRAP	Central Regional Air Planning
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
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
QA/QC	Quality Assurance/Quality Control
RHR	Regional Haze Rule
RPO	Regional Planning Organization
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
VISTAS	Visibility Improvement – State and Tribal Association of the Southeast
WRAP	Western Regional Air Partnership

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

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

This report documents the processing of 2028 mass emissions inventory data for input to photochemical grid modeling that were used to model the final 2028 visibility impacts (elv5) for each Class I Federal area. This report documents the steps taken by Alpine Geophysics, LLC (Alpine) in preparing SMOKE-ready point source input files from the SESARM adjusted 2028 Electricity Generating Unit (EGU) and non-EGU point source emissions data (2028elv4) 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.

1.1 Emissions Update

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

- Point source emissions updates identified in the Area of Influence report;
- Updated EGU emissions developed by the Eastern Regional Technical Advisory Committee (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 are presented throughout the remainder of this report, and Appendix A. While specific updates to 2028 emissions for non-SESARM states within the VISTAS domain are described in this report, emissions updates related to the SESARM states were presented in the revised Task 2B report (September 2020).

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 future year modeling. 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.

For the June 2018 effort (original modeling), ERG directed Alpine to develop 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 processing² to determine which files were necessary for 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_ptnonipm_2011NEIv2_POINT_20140913_revised_20150115_20sep2016_v2.csv
- 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

² 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

- MARAMA_2028el_pt_oilgas_2011NElv2_POINT_20140913_mar_21nov2016_v1.csv
- 2028el_pt_oilgas_2011NElv2_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.

For the EGUs, ERG directed Alpine to replace the 2028 EPA EGU emissions with the ERTACv2.7 emissions. 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 B is the documentation for developing the small EGU inventory and the QA/QC steps conducted to develop the small EGU inventory.³

The small EGU FF10 files were finalized in early-November 2018,⁴ and sent to Alpine for emissions processing. Processing concluded on December 9, 2018.

³ 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.

⁴ Final data files submitted to SESARM by NCDAQ on November 12, 2018.

March 2020 Emissions Update

As part of the emissions inventory update and for remodeling, SESARM directed ERG to develop the non-SESARM states point EGU and non-EGU emissions inventory files based on updated information. Specific updates include:

- Versions 16.0 and 16.1 of the ERTAC EGU emissions;⁵
- Select facility updates from the Area of Influence analysis;
- Select facility updates from the PSAT analysis; and the SESARM made the following decisions:
 - No point source changes to states outside the VISTAS modeling domain (e.g., Alaska, Arizona, California, Hawaii, Idaho, Nevada, Oregon, Utah, and Washington);
 - Replace the ERTACv2.7 EGU emissions for LADCO states (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin) with ERTACv16.1 EGU emissions;
 - Replace the ERTACv2.7 EGU emissions for CenSARA, MANE-VU, and WRAP states in the VISTAS domain with ERTACv16.0 EGU emissions; and
 - Update select facilities based on AOI and PSAT analysis.

For the non-SESARM states, Table 2-1 and Table 2-2 show the original modeled and remodeled 2028 point source emissions, respectively, by Regional Planning Organization (RPO) and state. Table 2-3 provides a summary of non-SESARM emission changes by RPO and state. Table 2-4 provides a summary of emission changes by Data Source/Reason.

⁵ Point source emission from Version 16 of the 2028 ERTAC Projection Tool were provided to R. Oommen/ERG from D. McLeod/VDEQ on March 11, 2028.

Table 2-1. Non-SESARM Original Modeled Point Sources Emissions

State	CO	NH ₃	NO _x	PM ₁₀ - PRI	PM _{2.5} - PRI	SO ₂	VOC
	tpy						
CENRAP RPO States							
Arkansas	49,574	1,284	74,310	11,138	7,236	87,523	22,725
Iowa	33,338	3,708	43,678	10,792	7,461	51,354	20,593
Kansas	35,809	1,953	42,974	9,678	6,153	30,410	16,010
Louisiana	124,663	6,726	159,627	54,385	46,204	141,044	57,861
Missouri	115,378	1,654	65,094	14,411	9,692	171,745	14,221
Nebraska	21,143	916	46,819	7,691	4,127	76,558	5,926
Oklahoma	81,621	6,385	116,107	11,745	8,048	49,539	47,308
Texas	289,440	7,715	355,488	54,951	41,141	404,777	119,950
CENRAP Total	750,967	30,341	904,098	174,791	130,063	1,012,950	304,594
LADCO RPO States							
Illinois	93,802	1,807	106,521	26,181	16,351	144,869	46,028
Indiana	316,427	1,278	138,482	30,952	19,686	187,959	36,681
Michigan	81,241	1,539	93,300	13,349	9,465	80,873	26,325
Minnesota	35,789	1,560	55,754	24,083	15,678	28,284	19,875
Ohio	266,094	4,240	107,621	38,210	31,442	172,147	30,894
Wisconsin	52,098	1,088	47,188	12,265	8,440	46,055	21,926
LADCO Total	845,451	11,511	548,867	145,040	101,062	660,186	181,729
MANE-VU RPO States (not including Virginia and West Virginia)							
Connecticut	3,649	399	4,864	442	351	497	938
Delaware	4,983	206	4,147	1,111	1,011	3,528	2,267
District of Columbia	465	0	554	39	38	21	71
Maine	14,568	570	11,688	2,899	2,248	2,499	3,409
Maryland	36,046	482	27,439	5,122	3,977	44,601	3,059
Massachusetts	14,136	545	13,399	1,639	1,391	1,928	3,623
New Hampshire	6,076	355	3,689	722	617	2,380	682
New Jersey	17,517	1,220	16,716	4,284	3,911	4,123	8,290
New York	75,736	2,102	52,537	8,409	6,188	29,915	11,168
Pennsylvania	110,660	2,056	107,212	31,666	23,507	180,371	26,036
Rhode Island	2,698	61	1,602	214	99	890	1,211
Vermont	2,511	21	730	235	163	127	492
MANE-VU Total	289,045	8,017	244,576	56,782	43,499	270,880	61,247
WRAP RPO States (in the VISTAS Domain)							
Colorado	73,644	468	88,225	18,969	9,339	18,236	92,210
Montana	11,492	90	23,782	8,670	4,006	20,170	5,084
New Mexico	30,231	455	70,477	4,828	3,102	26,597	7,025
North Dakota	17,758	6,102	51,241	5,815	4,254	54,978	3,913
South Dakota	4,648	76	13,427	871	825	1,194	3,253
Wyoming	72,505	576	115,668	35,046	15,646	60,946	28,254
WRAP Total	210,278	7,767	362,820	74,199	37,173	182,122	139,739
Totals	2,095,741	57,636	2,060,360	450,813	311,797	2,126,139	687,309

Table 2-2. Non-SESARM Remodeled Point Sources Emissions

State	CO	NH ₃	NO _x	PM ₁₀ - PRI	PM _{2.5} - PRI	SO ₂	VOC
	tpy						
CENRAP RPO States							
Arkansas	47,257	1,765	49,710	9,973	6,687	39,528	22,443
Iowa	33,509	3,833	39,573	9,868	6,110	42,524	20,554
Kansas	29,515	1,776	32,733	8,649	5,443	9,898	15,902
Louisiana	116,427	7,841	165,713	53,151	44,322	116,582	58,055
Missouri	103,442	1,660	62,692	12,533	7,752	137,402	14,036
Nebraska	24,435	1,047	28,911	6,359	2,842	52,637	5,805
Oklahoma	87,202	6,780	105,800	11,018	7,389	36,155	47,133
Texas	290,005	7,500	306,266	47,080	39,040	186,595	119,388
CENRAP Total	731,792	32,202	791,398	158,630	119,586	621,321	303,315
LADCO RPO States							
Illinois	91,480	2,663	104,208	22,866	14,177	116,578	46,287
Indiana	312,429	2,195	104,240	25,239	17,446	113,473	36,314
Michigan	80,716	1,737	85,269	13,760	9,819	67,781	26,258
Minnesota	34,480	1,845	56,167	22,992	15,546	28,636	19,887
Ohio	265,489	5,529	96,967	26,505	22,400	130,998	30,795
Wisconsin	54,199	2,576	44,494	11,100	6,043	40,705	22,090
LADCO Total	838,794	16,545	491,345	122,463	85,431	498,172	181,631
MANE-VU RPO States (not including Virginia and West Virginia)							
Connecticut	3,658	471	5,070	520	414	346	949
Delaware	4,779	148	3,401	763	665	2,472	2,233
District of Columbia	465	0	554	39	38	21	71
Maine	14,699	586	11,622	2,881	2,195	2,492	3,398
Maryland	37,901	584	25,141	5,674	4,049	27,168	3,076
Massachusetts	17,385	735	13,741	1,671	1,313	2,250	3,724
New Hampshire	5,836	340	2,827	637	608	1,373	692
New Jersey	17,563	2,056	16,703	4,888	4,095	3,618	8,189
New York	73,752	1,885	52,232	8,028	5,688	16,965	11,300
Pennsylvania	141,583	3,929	89,260	30,800	19,408	91,713	24,999
Rhode Island	3,367	28	1,712	249	138	895	1,220
Vermont	2,511	21	730	235	163	127	492
MANE-VU Total	323,499	10,784	222,991	56,383	38,774	149,440	60,342
WRAP RPO States (in the VISTAS Domain)							
Colorado	68,099	575	78,556	19,000	9,320	15,621	92,168
Montana	10,459	89	18,879	8,008	3,532	13,271	5,023
New Mexico	32,011	405	56,575	3,647	2,265	20,407	7,130
North Dakota	15,580	6,074	47,716	4,887	4,002	47,976	3,853
South Dakota	4,457	76	4,281	755	704	1,590	3,240
Wyoming	71,149	421	95,427	31,075	13,703	36,619	28,036
WRAP Total	201,755	7,640	301,433	67,373	33,526	135,483	139,450
Totals	2,095,839	67,172	1,807,167	404,849	277,317	1,404,416	684,739

Table 2-3. Non-SESARM Point Sources Emissions Adjustments for the Remodel

State	CO	NH ₃	NO _x	PM ₁₀ - PRI	PM _{2.5} - PRI	SO ₂	VOC
	tpy						
CENRAP RPO States							
Arkansas	-2,317	481	-24,601	-1,166	-549	-47,995	-282
Iowa	171	125	-4,105	-924	-1,351	-8,829	-40
Kansas	-6,294	-177	-10,241	-1,029	-711	-20,512	-109
Louisiana	-8,236	1,115	6,087	-1,235	-1,882	-24,461	194
Missouri	-11,936	6	-2,402	-1,878	-1,940	-34,343	-185
Nebraska	3,292	130	-17,909	-1,332	-1,285	-23,922	-121
Oklahoma	5,581	396	-10,306	-728	-659	-13,384	-175
Texas	564	-215	-49,222	-7,870	-2,100	-218,182	-562
CENRAP Total	-19,175	1,861	-112,700	-16,161	-10,477	-391,629	-1,278
LADCO RPO States							
Illinois	-2,321	856	-2,313	-3,316	-2,174	-28,291	259
Indiana	-3,998	918	-34,242	-5,713	-2,240	-74,486	-367
Michigan	-525	198	-8,031	411	354	-13,091	-66
Minnesota	-1,309	285	413	-1,091	-132	352	11
Ohio	-605	1,289	-10,655	-11,705	-9,043	-41,148	-99
Wisconsin	2,101	1,488	-2,694	-1,165	-2,397	-5,350	165
LADCO Total	-6,657	5,034	-57,522	-22,578	-15,631	-162,015	-97
MANE-VU RPO States (not including Virginia and West Virginia)							
Connecticut	10	72	206	78	63	-151	11
Delaware	-205	-57	-746	-348	-346	-1,057	-35
District of Columbia	0	0	0	0	0	0	0
Maine	131	16	-66	-18	-53	-8	-11
Maryland	1,855	102	-2,298	551	72	-17,433	16
Massachusetts	3,249	190	342	32	-77	323	101
New Hampshire	-240	-15	-862	-86	-8	-1,007	10
New Jersey	47	836	-13	603	185	-505	-101
New York	-1,984	-217	-305	-381	-500	-12,949	131
Pennsylvania	30,922	1,873	-17,952	-866	-4,099	-88,658	-1,038
Rhode Island	669	-33	110	36	39	6	9
Vermont	0	0	0	0	0	0	0
MANE-VU Total	34,453	2,767	-21,585	-399	-4,725	-121,440	-905
WRAP RPO States (in the VISTAS Domain)							
Colorado	-5,545	107	-9,668	31	-19	-2,615	-42
Montana	-1,032	-2	-4,904	-662	-474	-6,899	-61
New Mexico	1,780	-49	-13,903	-1,181	-837	-6,191	105
North Dakota	-2,178	-28	-3,525	-928	-252	-7,002	-60
South Dakota	-191	0	-9,146	-116	-121	396	-13
Wyoming	-1,356	-155	-20,241	-3,971	-1,943	-24,327	-218
WRAP Total	-8,523	-127	-61,386	-6,826	-3,647	-46,639	-289
Totals	98	9,535	-253,193	-45,964	-34,479	-721,723	-2,570

Table 2-4. Non-SESARM Point Source Adjustments by Data Source/Reason

Data Source / Reason	CO	NH ₃	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
	tpy						
AOI Analysis	-168	2	-379	-4,954	-3,814	-13,250	-20
ERTAC 16.0	9,563	4,601	-173,595	-22,171	-18,616	-507,500	-2,175
ERTAC 16.1	-1,445	5,054	-22,764	-6,652	-4,764	-64,638	437
PSAT Update	-6,526	-74	-44,026	-11,671	-7,196	-115,318	-661
State Update	-1,327	-47	-12,428	-515	-90	-21,017	-151
Totals	98	9,535	-253,193	-45,964	-34,479	-721,723	-2,570

Appendix A presents point source-specific emissions updates for 2028 and the source for the updated emissions.

On March 31, 2020, ERG provided Alpine, via project File Transfer Protocol (FTP), with four emissions inventory files for use in this task:

- VISTAS 2028 FF10 EGU 20200331.zip – EGU emissions estimates for the 2028 regional base case for the SESARM states.
- VISTAS 2028 FF10 NON_EGU 20200331.zip – Non-EGU emissions estimates for the 2028 regional base case for the SESARM states.
- NON_VISTAS 2028 FF10 EGU 20200331.zip – EGU emissions estimates for the 2028 regional base case for the non-SESARM states in the VISTAS domain.
- NON_VISTAS 2028 FF10 NON_EGU 20200331.zip – Non-EGU emissions estimates for the 2028 regional base case for the non-SESARM states in the VISTAS domain.

These files replace the EGU and non-EGU source files for the SESARM and non-SESARM states in the VISTAS domain 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 VISTAS domain 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.

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" and the "NON_VISTAS_2028_FF10_NON_EGU" files 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_2028_1apr2020". Alpine confirmed that emissions totals matched the provided emissions totals.

This non-EGU point source file was 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

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 "ff10_ptegu_remodel_2028_2apr2020.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 2028elv4 regional haze modeling.

June 2020 File Preparation Update

In June 2020, while reviewing the Benchmark #7 report associated with the remodeled 2028 inventories, it was discovered that the emissions associated with non-SESARM states, as well as limited emissions in Georgia, were not being passed from the emissions processing phase into the CAMx input files. Thorough investigation pointed in part to the inclusion of monthly emissions data in the ERTAC 16.0/16.1 derived emission files for non-SESARM sources and cross-reference (facility to boiler data) changes made between the ERTAC 2.7 data used in 2028v3 and the ERTAC 16.x data used in 2028v4. These differences in the files appeared to create a lookup conflict in the SMOKE emissions processor when continuous emissions monitoring (CEM)-based PTHOUR files were also associated with the annual and monthly emissions in the ERTAC input files.

Ultimately, work around processing steps were implemented that required the zeroing out of the monthly emissions from the EGU annual input file and further review and update to multiple unit-level cross-reference characteristics for non-SESARM facilities taken directly from the ERTAC model output. No annual emissions, stack characteristics, nor locational parameters were changed in this step, nor did any PTHOUR files generated for the modeling have to be modified for the 2028elv5 modeling.

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 2028elv5 regional haze modeling.

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 CEM data to EPA. The main purpose of this step was to ensure emissions that were 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), 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 “ff10_ptegu_remodel_2028_2apr2020.csv” where the:

- NO_x ratios were used to scale annual NO_x emissions;
- 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.

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

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.

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**

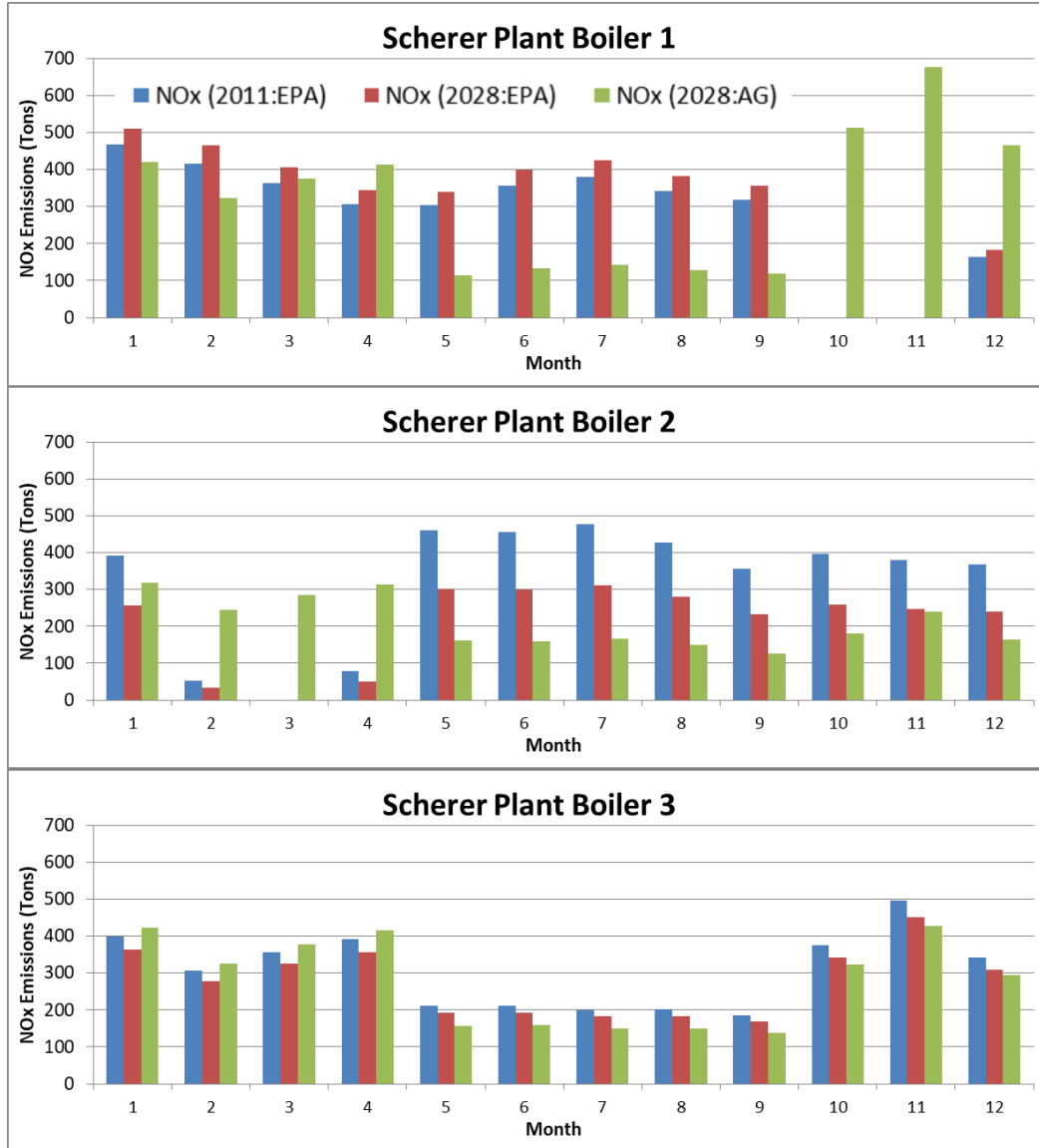
UNIT	Jan-April	May-Sept	Oct-Dec	TOTAL
1	1,529.6	640.0	1,654.4	3,824.0
2	1,161.5	765.2	585.9	2,512.6
3	1,542.9	753.1	1,046.0	3,342.0
4	945.1	781.0	1,342.6	3,068.7

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.



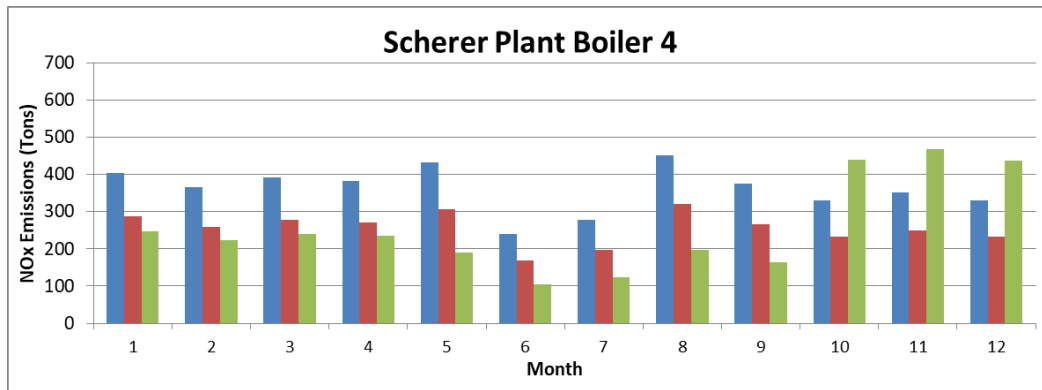


Figure 4-1. Scherer Unit-Level, Monthly NO_x Emissions Distribution by Month

5.0 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 conservations from annual to hourly distribution. The resulting national, month-specific hourly files are called:

- pthour_remodel_2028_01_final.csv – January 2028 hourly emissions;
- pthour_remodel_2028_02_final.csv – February 2028 hourly emissions;
- pthour_remodel_2028_03_final.csv – March 2028 hourly emissions;
- pthour_remodel_2028_04_final.csv – April 2028 hourly emissions;
- pthour_remodel_2028_05_final.csv – May 2028 hourly emissions;
- pthour_remodel_2028_06_final.csv – June 2028 hourly emissions;
- pthour_remodel_2028_07_final.csv – July 2028 hourly emissions;
- pthour_remodel_2028_08_final.csv – August 2028 hourly emissions;
- pthour_remodel_2028_09_final.csv – September 2028 hourly emissions;
- pthour_remodel_2028_10_final.csv – October 2028 hourly emissions;
- pthour_remodel_2028_11_final.csv – November 2028 hourly emissions; and
- pthour_remodel_2028_12_final.csv – December 2028 hourly emissions

Appendix A.

Updated Point Source Emissions for Non-SESARM States in the VISTAS Modeling Domain

(see APP_A_NON_SESARM_ORIG_REMODELED_FACILITY_EMISSION_UPD.xlsx)

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Appendix B

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_B_Small_EGU_Emissions_Inventory_Documentation_120718.pdf)

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