

**FINAL REPORT**

**DEVELOPMENT OF THE  
DRAFT 2002 VISTAS EMISSION INVENTORY  
FOR REGIONAL HAZE MODELING**

**POINT SOURCES**

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## **INTRODUCTION**

This report summarizes the procedures used in developing the final 2002 VISTAS emission inventory for regional haze modeling. The inventory was developed in two Phases, as described below.

### **Draft Version of Point Source Inventory**

The starting point was the EPA's 1999 National Emission Inventory, Version 2 Final (referred to in this document as NEI99V2). The inventory development process consisted of the following activities:

1. Processing of State/local inventory submittals for either calendar year 1999, 2000, or 2001; preparation of initial quality assurance reports; and incorporation of corrections/updates in response to initial quality assurance reports.
2. Updates to the emission estimates for selected large ammonia facilities (greater than 100 tons per year), as provided by the State/local agencies.
3. Incorporation of "preliminary" annual 2002 SO<sub>2</sub> and NO<sub>x</sub> emissions, based on CEM data for utilities as reported to the EPA's Clean Air Markets Division.
4. Projection of emissions estimates to calendar year 2002 using projections factors from EPA's Economic Growth Analysis System (EGAS).
5. Addition of PM<sub>10</sub> and PM<sub>25</sub> particulate matter emissions, using the EPA's PM data augmentation methodology.
6. Identification of potentially suspect stack data or fugitive release heights for large sources (i.e. sources emitting over 500 tons per year).
7. Identification of remaining issues to be addressed by State/local agencies.
8. Preparation of data summaries and raw data files for review.

The draft version of the point source inventory was released in June of 2003. Each of the activities associated with developing the draft inventory is discussed in this report.

### **Final Version of Point Source Inventory**

The starting point was the Version 1 of the 2002 VISTAS inventory that was released in July, 2003. The following activities were conducted to create the Final inventory:

1. Correction to the PM data augmentation methodology used in Version 1 to fix a few isolated anomalies where PM<sub>25</sub>-PRI emissions exceeded PM<sub>10</sub>-PRI emissions.
2. Processing of State/local inventory submittals that incorporated State/local responses to Version 1 of the inventory. In general, these submittals resolved issues that were identified in Version 1, identified plants that did not operate in 2002, and provided updated 2002 emissions data for selected facilities.

3. Incorporation of “final” 2002 SO<sub>2</sub> and NO<sub>x</sub> emissions, based on CEM data for utilities as reported to the EPA’s Clean Air Markets Division, for those facilities where States did not supply their own emissions data.
4. Conversion of the database to NIF 3.0 format.
5. Additional QA/QC of the database using the EPA’s Basic Format and Content Checker.
6. Preparation of data summaries and raw data files for review.

The Final version of the point source inventory was released in February of 2004. Each of the activities associated with developing the final inventory is discussed in this report.

## **PROCESSING OF STATE/LOCAL POINT SOURCE SUBMITTALS**

The initial effort was to obtain updated 1999 or post-1999 point source inventories from State/local agencies to better represent episodes in the 2000-2002 time frame. We used these submittals to replace the 1999 NEI data with more recent State/local data for PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, VOC, NH<sub>3</sub>, and CO.

We conducted an initial quality assurance review of each point source submittal and documented the results in a report submitted to each agency. The quality assurance/quality control (QA/QC) report for each agency described the data submitted by the agency and how it compared to the NEI99V2 inventory. We described the results of the using EPA’s QA/QC software program on the inventory to identify format errors, missing data required in mandatory fields, duplicate records, and other referential integrity problems. Next, we presented the results of a series of checks to compare facility level emissions and assess the quality of stack parameters, temporal allocation factors, and geographic coordinates.

Several State/local agencies provided corrections and updates in response to the initial QA/QC reports. Table 1 summarizes the data submitted by the State/local agencies and their response to the initial QA/QC reports.

## **REVIEW AND UPDATES TO THE AMMONIA EMISSION ESTIMATES**

VISTAS has recognized that ammonia emissions are an important component of the inventory and that the point source emissions have considerable uncertainty. As a consequence, VISTAS was interested in obtaining information concerning point source ammonia emissions in the Southeast. We prepared an EXCEL spreadsheet that listed all facilities that have reported more than 100 tons per year of ammonia emissions in any one of four databases – the 1999 National Emission Inventory Version 2, the 1999 Toxic Release Inventory, the 2000 Toxic Release Inventory, or the recent inventory submittals to VISTAS for the 2002 inventory. We provided State/local agencies with the ammonia emissions comparison and asked the States/local agencies to review the emission

**TABLE 1 – SUMMARY OF STATE AND LOCAL AGENCY POINT SOURCE SUBMITTALS**

State	Agency	Comments on Original Submittal	Year	Response to Initial QA/QC Checks
AL	AL DEM	Sent 1999 NEI data, both the original submittal and selected revisions, for all counties in Alabama except Jefferson County.	1999	Data passed cleanly through EPA's QA/QC software, except for a couple of referential integrity issues. AL DEM provided corrections and responses to issues raised in the QA/QC report.
AL	Jefferson County	Year 2000 data was provided for major sources only. Data for non-major sources were obtained from the NEI99V2 and merged with 2000 major source data. 11 minor facilities were removed since they have been permanently shut down.	2000 (majors) 1999 (minors)	Data passed rather cleanly through EPA's QA/QC software. Jefferson County provided corrections to out-of-range or missing stack parameters.
FL	FL DEP	Sent 2001 point source data for all counties in the State.	2001	EPA's QA/QC software identified a few errors. FL DEP provided corrected NIF files for 17 facilities with errors.
GA	GA DNR	Sent 1999 data for 29 counties in the Atlanta area (VOC, NOx, CO only). Indicated that the 1999 NEI should be used for other counties. GA DNR sent the same submittal to EPA for inclusion in 1999 NEI Version 3 Draft. Rather than processing the submittal twice, we used the 1999 NEI Version 3 Draft, which includes the submittal for VOC, CO, and NOx data for the Atlanta area.	1999	Data passed cleanly through EPA's QA/QC software, except for six out-of-range messages for stack or location data. GA DNR supplied corrected data. GA DNR also identified plants that have closed and should not be included in the VISTAS inventory.
KY	KY DEP	Sent 2001 inventory. However, the EPA QA/QC software identified thousands of referential integrity problems, which precluded its use. We used the NEI99V2 data for all counties in Kentucky except Jefferson County.	1999	EPA's QA/QC software identified thousands of referential integrity problems with the 2001 submittal. KY DEP is attempting to regenerate the submittal to correct these problems.
KY	Jefferson County	Sent 1999 data in NIF format	1999	Data passed rather cleanly through EPA's QA/QC software. Jefferson County provided corrections to issues raised.

**TABLE 1 (cont.)**

State	Agency	Comments on Original Submittal	Year	Response to Initial QA/QC Checks
MS	MS DEQ	Year 2001 data was provided for major sources only. Data for non-major sources were obtained from the 1999 NEI Version 2 Final and merged with the 2001 major source data.	2001 (majors) 1999 (minors)	EPA's QA/QC software identified several invalid SCCs, missing stack parameters, and out-of-range stack parameters. We replaced invalid area source SCCs with corresponding point source SCCs. We also assigned "dummy" fugitive release records using county centroid (or location from another stack at the site) for missing Emission Release records.
NC	NC DENR	Year 2000 data was provided for major sources only (i.e., 421 Title V and PSD facilities). Data for non-major sources were obtained from 1999 NEI Version 2 Final and merged with the 2000 major source data. Data for Buncombe and Forsythe Counties are included, but data for Mecklenburg County is not included.	2000 (majors) 1999 (minors)	EPA's QA/QC software identified a few invalid SCCs and SIC codes and several out-of-range geographic coordinates. NC DENR supplied corrected SCCs/SICs and UTM coordinates.
NC	Forsyth County	Agency instructed MACTEC to use NEI99V2 data, which was included with the DENR data mentioned above.	1999	None required.
NC	Mecklenburg County	Agency cannot create NEI format from their database. Data for county appear to be missing from NEI99V2.	?	None.
NC	Western NC Regional	Sent a spreadsheet with minor updates to the five major sources in Buncombe County. Updates were included with the DENR data mentioned above	1999	None required.
SC	SC DHEC	Sent 1999 data in NIF format for all counties in the State.	1999	Initial QA/QC showed thousands of missing emission release records and other errors. SC DHEC provided revised submittal that corrected most problems. We also assigned "dummy" fugitive release records using county centroid (or location from another stack at the site) for missing Emission Release records.

**TABLE 1 (cont.)**

State	Agency	Comments on Original Submittal	Year	Response to Initial QA/QC Checks
TN	TN DEC	Sent 1999 data for all counties in State except Davidson, Hamilton, Knox, and Shelby	1999	Data passed cleanly through EPA's QA/QC software, except for numerous out-of-range messages for stack or location data. TN DEC supplied corrections.
TN	Chattanooga-Hamilton County	No submittal made. We used NEI99V2 for Hamilton County.	1999	None required.
TN	Knox County	Sent 1999 data in NIF ACCESS format	1999	EPA's QA/QC software identified numerous referential integrity issues that could not be resolved. We used NEI99V2 for Knox County.
TN	Memphis-Shelby County	Sent 1999 point source data in NIF format	1999	EPA's QA/QC software identified numerous referential integrity issues that could not be resolved. We used NEI99V2 for Shelby County.
TN	Nashville Metro (Davidson County)	Sent 1999 point source data in NIF format	1999	Data passed cleanly through EPA's QA/QC software, except for a few out-of-range messages for stack or location data. Agency confirmed that several facilities have been closed.
VA	VA DEQ	Sent 2001 inventory for all counties/cities and for all facilities emitting more than 10 tons/year.	2001	Data passed cleanly through EPA's QA/QC software, except for a few out-of-range messages for stack or location data. VA DEQ has not supplied corrections to the QA/QC issues raised.
WV	WV DEP	Sent 1999 inventory for all sources; sent 2000 inventory for major Title V point sources.	2000 (majors) 1999 (minors)	Data passed cleanly through EPA's QA/QC software, except for numerous out-of-range messages for stack or location data. WV DEP provided corrections to the issues raised.

estimates for the facilities identified and attempt to assemble an improved ammonia inventory for those facilities. We received the following responses:

- Georgia DNR provided emission updates for nine facilities based on a recent inventory prepared by Georgia Tech. The biggest change in ammonia emissions occurred at PCS Nitrogen Fertilizer L.P. (Site ID 13-245-0002), where emissions changed from 11,840 tons per year in the NEI99V2 to 637 tons per year in the VISTAS draft 2002 inventory.
- Kentucky DEP provided an emission update for CTA Acoustics (Site ID 21-125-00036). The new estimate is 173 tons per year, compared to zero tons per year in the NEI99V2.
- Louisville, Kentucky, provided emission updates for two facilities. The revised emission estimate for Sud-Chemie South Plant (Site ID 21-111-0036) was 161 tons per year, compared to zero tons per year in the NEI99V2. The revised emission estimate for Sud-Chemie West Plant (Site ID 21-111-0042) was 234 tons per year, compared to zero tons per year in the NEI99V2.
- Mississippi DEQ provided emission updates for two facilities. The revised emission estimate for Misschem Nitrogen L.L.C. (Site ID 28-163-00010) was 514 tons per year, compared to 27,041 tons per year in the NEI99V2. The revised emission estimate for Mississippi Phosphates Corp. (Site ID 28-059-00044) was 28 tons per year, compared to zero in the NEI99V2.
- North Carolina DENR provided emission updates for the four facilities with over 100 tons per year of ammonia emissions: PCS Phosphate Co, Inc. (Site ID 37-013-00071), International Paper (37-047-00036), Blue Ridge Paper Products (Site ID 37-087-00159), and Weyerhaeuser Co. (Site ID 37-117-00069).
- Forsyth County, North Carolina, provided an emission update for RJR Tobacco Whitaker Park (Site ID 37-067-00339) based on new stack test data from the company.
- South Carolina DHEC confirmed the emission rate of 860 tons per year for Devro-Teepak, Inc. (Site ID 45-017-0460-0003), the only source that emits over 100 tons per year of ammonia in South Carolina.
- Tennessee DEC provide an emission update for Inland Paperboard & Packaging (Site ID 47-085-0010). Ammonia emissions changed from zero in the NEI99V2 to 62 tons per year in the VISTAS draft 2002 inventory.
- Shelby County, Tennessee, provided emission updates for three facilities that had zero ammonia emissions in the NEI99V2. The revised estimates were 1,921 tons per year for PCS Nitrogen Fertilizer L.P. (Site ID 47-157-146), 79 tons per year for Crompton Corporation (Site ID 47-157-0150), and 43 tons per year for Enenco Incorporated (Site ID 47-157-0160).

Table 2 summarizes how the point source ammonia emissions have changed as a result of input from the State/local agencies. For the VISTAS region, ammonia emissions decreased from 53,310 tons per year as reported in NEI99V2 to 21,317 tons per year.

**TABLE 2**  
**COMPARISON OF NEI99V2 AND VISTAS DRAFT 2002**  
**NH3 EMISSIONS (tons per year)**

<b>State</b>	<b>NEI99V2 Final</b>	<b>VISTAS Draft 2002<sup>(1)</sup></b>
Alabama	4,016	4,275
Florida	1,677	2,191
Georgia	15,794	5,167
Kentucky	579	772
Mississippi	27,867	1,156
North Carolina	950	1,854
South Carolina	1,053	1,237
Tennessee	113	2,452
Virginia	777	1,637
West Virginia	486	576
<b>Total</b>	<b>53,312</b>	<b>21,317</b>

(1) Includes changes from State/local updated 1999/2000/2001 inventories; changes made in response to the comparison with the emission estimates reported in EPA's Toxic Release Inventory, and growth of 1999/2000/2001 emissions to 2002.

## INCORPORATION OF PRELIMINARY 2002 CEM DATA

We obtained CEM data files that contain summary emissions information for electric utilities regulated by the Acid Rain Program. Each Acid Rain affected unit is required to report hourly data describing emissions and operation to the EPA at the end of each calendar quarter. The EPA then compiles and releases *preliminary* summary data in the form of Summary Emissions Reports (see: [EPA's Clean Air Markets - Description of Preliminary Summary Emissions Reports](#)). The EPA has not quality assured these data, so these are preliminary reports. Sources are still allowed to resubmit these data. Quality assured data for 2002 will not be available until the fall of 2003.

VISTAS has decided that NOX and SO2 emissions data collected by the EPA's Clean Air Market Division are more reliable and accurate than State/local reported data. As a consequence, the NOX and SO2 emissions from the electric generation utilities inventory were added where the Preliminary Summary Emissions Reports data for 2002 were available.

We used the EPA crosswalk table to match boilers (for which emissions are reported to the Clean Air Markets Division) in its EGU inventory to sites and emission units in the State/local supplied inventories. Process-level NOX and SO2 emissions in S/L inventories were adjusted by the ratio of acid rain emissions-to-S/L emission unit-level emissions. By using this approach, site, emission unit, and process identifications (IDs) and SCCs are not changed in State/local inventories.

If an electric generating unit was not in the EPA's Preliminary Summary Emissions Reports data for 2002, the SO2 and NOx emissions from the 1999/2000/2001 State/local inventories were grown to 2002 using the EGAS projection factors discussed previously.

Tables 3 and 4 compares SO2 and NOx emissions from the NEI99V2 and the 2002 draft VISTAS inventory. For SO2, emissions from the 10-state VISTAS region are about 18% less in the preliminary 2002 CEM data compared to the NEI99V2. A similar difference was found for NOx, where emissions for the VISTAS region are about 17% less in the preliminary 2002 CEM data compared to the NEI99V2. Similar differences were found on a state-by-state basis for all States except North Carolina, which had significantly more SO2 emissions in the 2002 data than in the NEI99V2.

As part of the QA/QC process, we compared plant level utility emissions from the 2002 draft VISTAS inventory and the NEI99V2 to identify potentially missing sources or facilities that had large emission differences. Since the 2002 draft VISTAS inventory contains the preliminary 2002 CEM data, we asked the State/local agencies to review this list and provide any necessary corrections to the 2002 draft VISTAS inventory.

**TABLE 3**  
**COMPARISON OF NEI99V2 AND VISTAS DRAFT 2002**  
**UTILITY SO<sub>2</sub> EMISSIONS (tons per year)**

<b>State</b>	<b>NEI99V2 Final</b>	<b>VISTAS Draft 2002<sup>(1)</sup></b>
Alabama	542,657	448,603
Florida	741,336	467,427
Georgia	513,541	512,434
Kentucky	662,812	493,289
Mississippi	142,500	91,194
North Carolina	380,687	468,760
South Carolina	228,515	207,215
Tennessee	473,921	334,266
Virginia	234,568	244,040
West Virginia	697,614	510,375
<b>Total</b>	<b>4,618,151</b>	<b>3,777,603</b>

**TABLE 4**  
**COMPARISON OF NEI99V2 AND VISTAS DRAFT 2002**  
**UTILITY NO<sub>x</sub> EMISSIONS (tons per year)**

<b>State</b>	<b>NEI99V2 Final</b>	<b>VISTAS Draft 2002<sup>(1)</sup></b>
Alabama	186,387	170,181
Florida	336,362	264,783
Georgia	175,996	148,318
Kentucky	307,077	197,524
Mississippi	81,394	67,103
North Carolina	139,160	150,558
South Carolina	93,227	89,020
Tennessee	189,137	163,257
Virginia	103,783	79,697
West Virginia	287,444	253,955
<b>Total</b>	<b>1,899,967</b>	<b>1,584,396</b>

Represents data from EPA's 2002 Preliminary Summary Emissions Report and changes to other utilities resulting from updated 1999/2000/2001 State/local inventories and growth of 1999/2000/2001 emissions to 2002.

## PROJECTION OF EMISSIONS TO 2002

As mentioned above, State and local agencies submitted their most recent inventory for inclusion in developing the VISTAS inventory to support preliminary modeling of regional haze episodes occurring in the 2000-2002 timeframe. Some inventories represented calendar year 1999, while others represented 2000 or 2001. To provide a common base year, we applied projection factors to develop emission estimates for the 2002 baseline year.

We used the EPA's Economic Growth Analysis System Version 4 (EGAS 4.0) growth factors to project emissions to 2002. These growth factors represent the ratio of a projection year's activity level to the 1996 activity level. We used the growth factors for 1996, 1999, 2000, 2001, and 2002 to grow the emission estimates for the several different years in the State/local agency inventories. For example, to get a growth factor that would project emissions from 1999 to 2002, we used the ratio of the 2002/1999 values in the database.

We compared the emission estimates for 2002 to the emissions in the State/local submittal and the NEI99V2. We did not identify any unreasonable values as a result of the emission projection.

## ADDITION OF PM-RELATED EMISSIONS

Particulate matter emissions can be reported in many different forms, as follows:

<b>PM Category</b>	<b>Description</b>
PM-PRI	Primary PM (includes filterables and condensibles)
PM-CON	Primary PM, condensible portion only (all less than 1 micron)
PM-FIL	Primary PM, filterable portion only
PM10-PRI	Primary PM10 (includes filterables and condensibles)
PM10-FIL	Primary PM10, filterable portion only
PM25-PRI	Primary PM25 (includes filterables and condensibles)
PM25-FIL	Primary PM25, filterable portion only

State/local agencies did not report PM emissions in a consistent manner. The State/local inventories submitted for the VISTAS included emissions data for either PM-FIL, PM-PRI, PM10-FIL, PM10-PRI, PM25-FIL, PM25-PRI, and/or PM-CON. From any one of these pollutants, EPA has developed augmentation procedures to estimate PM10-PRI, PM10-FIL, PM25-PRI, PM25-FIL, and PM-CON. If not included in a State/local inventory, PM10-PRI and PM25-PRI were calculated by adding PM10-FIL and PM-CON or PM25-FIL and PM-CON, respectively.

The procedures for augmenting point source PM emissions are documented in detail in Appendix C of *Documentation for the Draft 1999 National Emissions Inventory (Version 3) for Criteria Air Pollutants and Ammonia* (March 2003). Briefly, the PM data augmentation procedure includes the following five steps:

- Step 1: Prepare S/L/T PM and PM10 Emissions for Input to the PM Calculator
- Step 2: Develop and Apply Source-Specific Conversion Factors
- Step 3: Prepare Factors from PM Calculator
- Step 4: Develop and Apply Algorithms to Estimate Emissions from S/L/T Inventory Data
- Step 5: Review Results and Update the NEI with Emission Estimates and Control Information.

Please refer to the EPA ftp site for complete description of the PM augmentation procedures (see: [ptdoc\\_99nei\\_draftv3\\_0303.pdf on ftp.epa.gov](ftp://ftp.epa.gov/99neidraftv3/0303.pdf)).

EPA notes that there are several uncertainties associated with the PM augmentation procedures applied to populate the inventory with condensable, filterable, and primary PM10 and PM25. Among the uncertainties identified by EPA are:

- Lack of particle-size-specific emission factors for uncontrolled sources and controlled sources for various types of control equipment combinations. The particle-size-specific emission factors for uncontrolled and controlled stationary external and internal fuel combustion sources in AP-42 are good. However, good data for other SCCs are lacking.
- The PM augmentation procedure relies on the use of the PM Calculator. Although the PM Calculator uses particle size data available in AP-42 and FIRE, it will not provide estimates that will be as accurate as applying the emission factors to the activity, operating schedule, and control equipment data for individual sources.
- The PM Calculator does not contain particle size data for several SCCs and control devices for which State/local agencies reported PM, PM10, and/or PM25 emissions in their inventories. For these SCCs and control devices, a generic default profile was assigned.

Table 5 compares the PM10-PRI and PM25-PRI emission estimates from the NEI99V2 and the draft 2002 VISTAS emission inventory. The draft 2002 VISTAS inventory includes changes resulting from updated 1999/2000/2001 State/local inventories, growth of 1999/2000/2001 emissions to 2002, and augmentation of PM10/PM25 emissions using EPA's NEI PM data augmentation procedures.

We identified emission processes with more than 500 tons per year of either PM10-PRI or PM25-PRI. We asked the State/local agencies to review this list and provide any necessary corrections unreasonable emission estimates in the 2002 draft VISTAS inventory.

**TABLE 5**  
**COMPARISON OF NEI99V2 AND VISTAS DRAFT 2002**  
**PM10-PRI AND PM25-PRI EMISSIONS (tons per year)**

State	PM10-PRI		PM25-PRI	
	NEI99V2	VISTAS 2002 <sup>(1)</sup>	NEI99V2	VISTAS 2002 <sup>(1)</sup>
Alabama	37,128	38,974	27,149	28,881
Florida	70,583	75,541	54,238	60,769
Georgia	55,495	371,588 <sup>(2)</sup>	41,645	291,996 <sup>(2)</sup>
Kentucky	28,816	29,014	17,553	19,159
Mississippi	41,156	45,434	29,793	33,457
North Carolina	34,866	42,922	22,519	28,635
South Carolina	17,897	32,590	11,941	38,579
Tennessee	35,718	46,356	27,241	35,326
Virginia	18,364	17,512	12,657	11,545
West Virginia	17,169	27,541	12,128	20,066
<b>Total</b>	<b>357,192</b>	<b>727,472</b>	<b>256,864</b>	<b>568,413</b>

(1) Includes changes resulting from updated 1999/2000/2001 State/local inventories, growth of 1999/2000/2001 emissions to 2002, and augmentation of PM10/PM25 emissions using EPA's NEI PM data augmentation procedures.

(2) PM emissions for Georgia from the draft Version 3 of the NEI (which were used in developing the draft 2002 VISTAS inventory) were abnormally high compared to other States. Georgia should review the generated PM, correct values as necessary and the resulting PM will be reaugmented during preparation of the next version of the VISTAS 2002 inventory.

## REVIEW OF STACK PARAMETERS

For use in the VISTAS air quality modeling exercises, the inventory must contain accurate and complete emission release characteristics, especially for larger sources. We conducted range checks of sources that emitted more than 500 tons per year of any pollutant to identify potentially suspect data.

For non-fugitive emission release points, we compared existing stack parameters against a set of the following ranges thought to be representative of the minimum and maximum values allowable for most emission release points:

Stack Height (ft):	0.1 to 1,000
Stack Temperature (°F):	50 to 1,800
Stack Diameter (ft):	0.1 to 50
Stack Velocity (ft/sec):	0.1 to 560
Stack Flow (cu ft/sec)	0.001 to 1,100,000

Appendix C lists those emission process emitting more than 500 tons per year that did not meet these criteria.

For fugitive emission release points, we first compared the existing release height against a range thought to be representative of the minimum and maximum values allowable for most fugitive emission release points (i.e., 0.1 to 100 feet). Appendix D lists those emission process emitting more than 500 tons per year that did not meet this criterion.

We asked the State and local agencies to review the stack data and provide corrections to the stack data or fugitive release heights as appropriate. Any remaining missing or out-of-range stack parameters will be augmented for the final VISTAS 2002 inventory according to EPA's *NEI Quality Assurance and Data Augmentation Steps for Point Sources* ([http://www.epa.gov/ttn/chief/emch/invent/qaaugmentationmemo\\_99nei\\_60603.pdf](http://www.epa.gov/ttn/chief/emch/invent/qaaugmentationmemo_99nei_60603.pdf)).

## IDENTIFICATION OF REMAINING ISSUES

We are asking that State/local agencies address the following issues to help generate the next version of the VISTAS 2002 emission inventory. Some issues should be addressed by all agencies, while other issues apply only to a specific agency.

### All Agencies

- Review the comparison of SO<sub>2</sub> and NO<sub>x</sub> emissions in the draft 2002 VISTAS inventory (which contains the preliminary 2002 CEM data from EPA's Clean Air Markets Division, and provide any necessary corrections to the utility SO<sub>2</sub> and NO<sub>x</sub> emission for 2002.
- Review the list of emission processes with more than 500 tons per year of either PM<sub>10</sub>-PRI or PM<sub>25</sub>-PRI. We asked the State/local agencies to review this list and provide any necessary corrections unreasonable PM<sub>10</sub>-PRI or PM<sub>25</sub>-PRI emission estimates in the 2002 draft VISTAS inventory.

- Please review potentially suspect stack parameters and fugitive release heights and provide corrections to the stack data or fugitive release heights as appropriate.
- Please review the emission data summaries and assess whether the emissions appear reasonable for your State.

### **Alabama**

- Please confirm the ammonia emission rate for El Dorado Chemical Company (Site ID 01-033-0013). Emissions are 3,506 tons per year in the NEI99V2, but there were no ammonia emissions reported to the EPA's TRI database.

### **Georgia**

- PM emissions from the draft Version 3 of the NEI (which were used in developing the draft 2002 VISTAS inventory) were abnormally high compared to other States. Please review the generated PM, correct values as necessary and the resulting PM will be reaugmented during preparation of the next version of the VISTAS 2002 inventory.

### **Kentucky**

- EPA's QA/QC software identified thousands of referential integrity problems with the 2001 submittal. KY DEP is attempting to regenerate the submittal to correct these problems. If the 2001 data are acceptable, we will incorporate them into the next version of the VISTAS 2002 inventory.

### **Virginia**

- Please confirm ammonia emission rate for Honeywell Intl – Hopewell (Site ID 51-670-00026). Emissions in State submittal were 15 tons per year, while the EPA's TRI database has 2,077 tons per year in 2000.

### **Mecklenburg County, North Carolina**

- The agency could not create the NIF format from their database. In addition, data for the county appears to be missing from NEI99V2. Please indicate whether agency will be able to provide data in NIF format.

### **Knox County, Tennessee**

- EPA's QA/QC software identified numerous referential integrity issues that could not be resolved. We used NEI99V2 for Knox County, except for electric utility data which came from EPA's CEM database. Please indicate whether agency will be able resolve problems identified by EPA's QA/QC software.

### **Shelby County, Tennessee**

- EPA's QA/QC software identified numerous referential integrity issues that could not be resolved. We used NEI99V2 for Shelby County, except for electric utility data which came from EPA's CEM database. Please indicate whether agency will be able resolve problems identified by EPA's QA/QC software.

## **CORRECTIONS TO PM-RELATED EMISSIONS**

In developing Version 1 of the VISTAS inventory, we used the procedures for augmenting point source PM emissions as documented in Appendix C of *Documentation for the Draft 1999 National Emissions Inventory (Version 3) for Criteria Air Pollutants and Ammonia* (March 2003). Two States (SC and WV) reported anomalous results in Version 1 for certain facilities where the PM<sub>25</sub>-PRI emissions were calculated to be higher than the PM<sub>10</sub>-PRI emissions. We investigated the problem and found an error in our PM augmentation software that caused this miscalculation. We corrected the problem and updated the database with the correct PM<sub>25</sub>-PRI and PM<sub>25</sub>-FIL emissions. We verified that all PM<sub>25</sub>-PRI emission estimates were less than the PM<sub>10</sub>-PRI emission estimate.

## **PROCESSING OF STATE/LOCAL POINT SOURCE CORRECTIONS**

After reviewing Version 1 of the VISTAS 2002 inventory, State and local agencies provided data to resolve issues that were identified in Version 1, identify plants that did not operate in 2002, and provide updated 2002 emissions data for selected facilities. The following paragraphs discuss the specific data submitted by each agency.

### **Alabama**

Alabama identified 76 facilities that ceased operation since 1999 – these were removed from the 2002 database. Alabama reviewed the 2002 utility emissions data and provided updated emission estimates where 2002 data were available. Corrections were made to fugitive release heights for selected sources. Some records that were previously reported as fugitive were changed to provide updated stack data. Several other updates were provided to correct stack data flagged in the Version 1. For ammonia emissions from selected large sources, emission estimates from the Toxic Release Inventory were used instead of the EPA generated estimate for the 1999 NEI.

Alabama also provided updates for Southern Company facilities in the state. These updates consisted of corrections to stack parameters, updated 2002 emission rates, and identification of new units that operated in 2002 but were not included in Version 1 of the VISTAS inventory.

Finally, Alabama provided a draft calendar year 2002 inventory; however, this inventory had numerous referential integrity problems that could not be resolved. This submittal was not included in Version 2 of the VISTAS inventory.

### **Florida**

No specific comments were provided. Florida indicated that they plan on submitting the 2002 CERR inventory in March.

## **Georgia**

In developing Version 1 of 2002 VISTAS inventory, we used the draft Version 3 of the 1999 NEI as the starting point inventory for Georgia. PM emissions were abnormally high and unreasonable when compared to other VISTAS States. Georgia recommended that we use Version 2 of the 1999 NEI to completely replace the data contained in Version 1 of the VISTAS inventory. We obtained that data and then performed several updates to grow the data from 1999 to 2002 and make updates to ammonia records (as described in the Version 1 documentation).

Georgia also provided updated information for three facilities. The 2002 annual emissions were updated for the Shorewood Packaging and Caraustar Industries facilities. A Georgia Pacific source near Savannah was not previously included in Version 1 of the VISTAS inventory and was added during this update..

Georgia also provided updates for Southern Company facilities in the state. These updates consisted of corrections to stack parameters, updated 2002 emission rates, and identification of new units that operated in 2002 but were not included in Version 1 of the VISTAS inventory.

## **Kentucky**

Kentucky sent a complete replacement inventory containing 2001 data for the entire state (except for Jefferson County). These data were submitted in NIF 2.0 format and were used to completely replace the data contained in Version 1 of the VISTAS inventory. We ran the 2001 data through the EPA's QA/QC tool – there were no referential integrity problems and the data passed the QA/QC checks. We then grew the emissions from 2001 to 2002, and performed the ammonia and PM augmentation routines.

### **Kentucky – Louisville Metro**

The Louisville Metro APCD verified the emission rates for the two Louisville Gas & Electric facilities in Jefferson County, provided updated PM emissions for Eckart Aluminum, and provided corrected stack data for stacks flagged in Version 1 of the VISTAS inventory.

## **Mississippi**

Mississippi provided corrections to emission rates and stack parameters for 19 emission units that were flagged in Version 1 of the VISTAS inventory. Mississippi also identified four facilities that closed in 2000/2001 and were removed from the VISTAS 2002 inventory.

Mississippi confirmed the emission rate for the Entergy (Gerald Andrus) facility. The SO<sub>2</sub> and NO<sub>x</sub> emission rates in EPA's 2002 final CEM database differed markedly from the emissions in the VISTAS Version 1 inventory. Mississippi confirmed that the utility

used natural gas in 2002 rather than fuel oil as they had been using in the past. Mississippi confirmed that the EPA 2002 final CEM emission rates were correct and should be used in Version 2 of the VISTAS inventory.

Mississippi also provided updates for Southern Company facilities in the state. These updates consisted of corrections to stack parameters, updated 2002 emission rates, and identification of new units that operated in 2002 but were not included in Version 1 of the VISTAS inventory.

### **North Carolina**

North Carolina provided revised stack data for all source in the state. We used these data to completely replace the data in the ER file. North Carolina also provided updated 2002 for the International Paper Riegelwood facility.

We also identified and corrected an error in the emission rates for the Duke Energy Belews Creek Station. SO<sub>2</sub> and NO<sub>x</sub> emissions were inadvertently double-counted in Version 1 of the inventory.

### **North Carolina – Buncombe County**

The Western NC Regional Air Quality Agency sent a complete replacement inventory containing 2001 data for Buncombe County. These data were submitted in NIF 2.0 format and were used to completely replace the data contained in Version 1 of the VISTAS inventory. We ran the 2001 data through the EPA's QA/QC tool – there were no referential integrity problems and the data passed the QA/QC checks. We then grew the emissions from 2001 to 2002, and performed the ammonia and PM augmentation routines.

### **South Carolina**

South Carolina identified several errors in the PM<sub>25</sub>-PRI emissions data in Version 1 of the VISTAS inventory. Most of these errors were corrected when we corrected the PM augmentation methodology as discussed earlier. South Carolina also provided a corrected PM emission estimate for the Santee Cooper Jeffries facility which had abnormally high PM<sub>25</sub>-PRI emissions in Version 1.

South Carolina provided actual 2002 facility level NO<sub>x</sub>, SO<sub>2</sub>, and PM-PRI emissions for seven SCE&G facilities. The NO<sub>x</sub> and SO<sub>2</sub> emissions agreed reasonably well with the EPA CEM emissions. The PM-PRI emissions were used with the PM augmentation routine to calculate PM<sub>10</sub>-PRI and PM<sub>25</sub>-PRI emissions.

South Carolina identified 16 facilities that were closed in 2002 and we removed those facilities from the inventory. Data were provided for 14 new facilities that operated in 2002 but were not in Version 1 of the VISTAS inventory. Revised emissions were

provided for the Westvaco Kraft facility which had significant emission reductions since 2000. Revised emissions were also provided for the International Paper Eastover Mill. Missing stack data was provided for two stacks with large emission rates.

### **Tennessee**

Tennessee reviewed the facility-level emission summaries for the TVA plants and indicated that the VISTAS inventory contained the correct values.

### **Virginia**

Virginia indicated that eight facilities should be deleted since they did not operate in 2002. Revised stack data was provided for 36 stacks with large emission rates. Ammonia emissions were added for the Honeywell facility in Hopewell. Revised emissions were provided for an additional 10 plants.

### **West Virginia**

West Virginia provided updated stack data to fill in gaps or missing data in Version 1 of the VISTAS inventory. MACTEC confirmed that the requested changes were made.

## **INCORPORATION OF FINAL 2002 CEM DATA**

We obtained CEM data files that contain summary emissions information for electric utilities regulated by the Acid Rain Program. For Version 1 of the VISTAS inventory, we used the *preliminary* summary data which EPA had not completely quality assured. For Version 2 of the VISTAS inventory, we used the *final* quality assured SO<sub>2</sub> and NO<sub>x</sub> emissions data for 2002.

Three States (AL, GA, and MS) provided updated 2002 emissions data for electric utilities owned and operated by the Southern Company. Two other States (SC and VA) provided emission updates for selected utilities. We used these State-supplied emissions data for these facilities instead of the EPA data, as the States considered these data to be more accurate.

## **CONVERSION OF DATABASE TO NIF 3.0 FORMAT**

Version 1 of the VISTAS database was in NIF 2.0 format, which has subsequently been replaced by NIF 3.0. We converted the database to NIF 3.0 format. This involved minor changes to the database to add a tribal code field, merge the state and county FIPs codes into a single code, changed the length of certain fields, and other minor modifications.

For the ER table, EPA has added several fields describing how the location coordinates were derived. These new fields are mandatory. Lacking State-specific data, we populated these fields in the following manner:

- HORIZONTAL COLLECTION METHOD CODE – used code 027 (information is not known)
- HORIZONTAL ACCURACY MEASURE – used 100 meters as the default value
- HORIZONTAL REFERENCE DATUM CODE – used code 002 (North American Datum of 1983) as the default
- REFERENCE POINT CODE – used code 106 (Point where a substance is released) as the default
- SOURCE MAP SCALE NUMBER – used blanks as the default
- COORDINATE DATA SOURCE CODE – used State FIPS code as the default

## RESULTS OF QA/QC CHECKS

We used the EPA's Basic Format & Content Checker 3.0 software to check the database for referential integrity, field properties, acceptable codes, and acceptable numeric ranges. Results from the software are contained in each state's database, which can be accessed on the MACTEC ftp site.

We corrected any referential integrity problems detected by the Checker software. Most of the records flagged by the Checker software contain messages that are inconsequential for emissions modeling (i.e., invalid zip codes, invalid material process codes, etc.).

The only consequential error messages generated were related to stack parameters. After reviewing Version 1 of the VISTAS database, State and local agencies provided corrections to errors in stack parameters for larger sources. However, the Checker software continues to detect numerous missing data elements in stack parameters for smaller sources. Any remaining missing or out-of-range stack parameters will be augmented during the emission modeling process according to EPA's *NEI Quality Assurance and Data Augmentation Steps for Point Sources* ([http://www.epa.gov/ttn/chief/emch/invent/qaaugmentationmemo\\_99nei\\_60603.pdf](http://www.epa.gov/ttn/chief/emch/invent/qaaugmentationmemo_99nei_60603.pdf)).

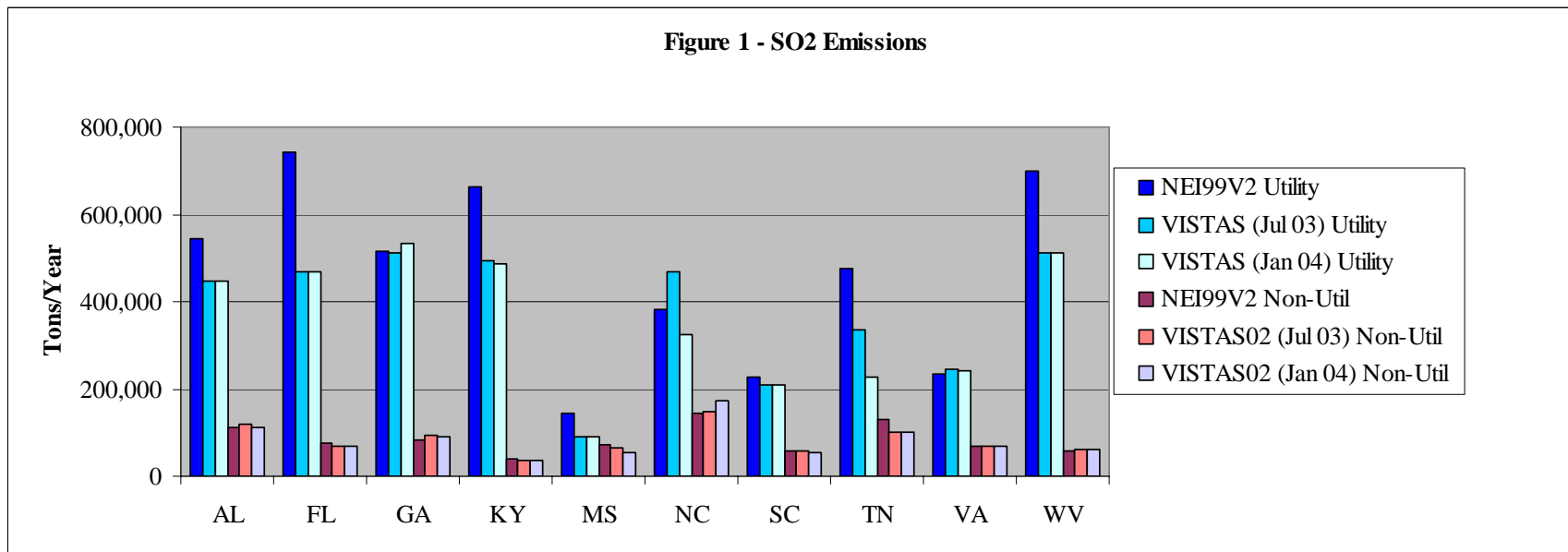
## DATA SUMMARY AND FILES

We prepared a series of tables and figures to show how point source emissions have changed as a result of the activities discussed previously in this report. Tables 6-12 and Figures 1-7 summarize the point source emissions by State for the seven pollutants that will be input to the emission modeling system: SO<sub>2</sub>, NO<sub>x</sub>, VOC, CO, PM<sub>10</sub>-PRI, PM<sub>25</sub>-PRI, and NH<sub>3</sub>. Each table shows the original NEI99V2 emissions that served as the starting point for the VISTAS inventory, the VISTAS Version 1 emission estimates, and the revised Version 2 emission estimates for 2002. Each table shows the total point source emissions and a breakout by utility versus non-utility emissions.

**TABLE 6 - SUMMARY OF POINT SOURCE SO2 EMISSIONS BY STATE**

STATE	All Point Sources			Utilities			Non-Utility		
	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final
AL	653,198	566,434	560,060	542,657	448,603	448,248	110,541	117,831	111,812
FL	815,639	534,441	540,169	741,336	467,427	473,155	74,303	67,014	67,014
GA	596,291	607,180	604,894	513,541	512,434	514,277	82,750	94,746	90,617
KY	701,844	528,999	521,590	662,812	493,289	484,434	39,032	35,710	37,156
MS	213,125	157,196	121,944	142,500	91,194	67,545	70,625	66,002	54,399
NC	525,264	615,497	510,459	380,687	468,760	337,900	144,577	146,737	172,559
SC	285,933	263,635	261,498	228,515	207,215	205,842	57,418	56,420	55,656
TN	604,652	436,231	423,709	473,921	334,266	323,036	130,731	101,965	100,673
VA	304,139	313,770	309,716	234,568	244,040	239,991	69,571	69,730	69,725
WV	755,387	572,934	573,137	697,614	510,375	510,579	57,773	62,559	62,558
<b>VISTAS</b>	<b>5,455,472</b>	<b>4,596,317</b>	<b>4,427,176</b>	<b>4,618,151</b>	<b>3,777,603</b>	<b>3,605,007</b>	<b>837,321</b>	<b>818,714</b>	<b>822,169</b>

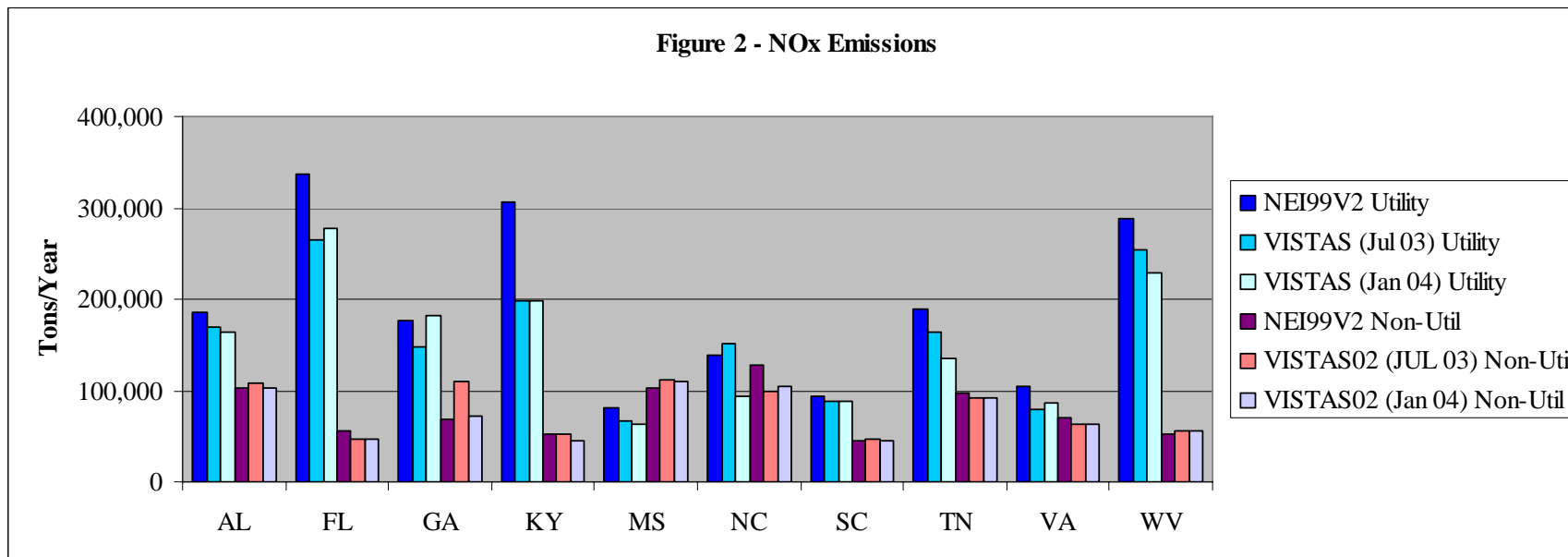
Figure 1 - SO2 Emissions



**TABLE 7 - SUMMARY OF POINT SOURCE NO<sub>x</sub> EMISSIONS BY STATE**

STATE	All Point Sources			Utilities			Non-Utility		
	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final
AL	288,834	279,043	265,433	186,387	170,181	163,522	102,447	108,862	101,911
FL	391,589	312,156	329,312	336,362	264,783	281,939	55,227	47,373	47,373
GA	244,631	257,699	220,524	175,996	148,318	148,005	68,635	109,381	72,519
KY	359,896	249,854	244,226	307,077	197,524	198,909	52,819	52,330	45,317
MS	184,415	179,247	167,215	81,394	67,103	56,887	103,021	112,144	110,328
NC	267,689	248,834	203,342	139,160	150,558	98,321	128,529	98,276	105,021
SC	138,236	135,242	133,876	93,227	89,020	88,220	45,009	46,222	45,656
TN	286,098	255,628	257,882	189,137	163,257	165,685	96,961	92,371	92,197
VA	174,564	143,563	150,867	103,783	79,697	87,024	70,781	63,866	63,843
WV	339,371	308,926	283,295	287,444	253,955	228,324	51,927	54,971	54,971
<b>VISTAS</b>	<b>2,675,323</b>	<b>2,370,192</b>	<b>2,255,972</b>	<b>1,899,967</b>	<b>1,584,396</b>	<b>1,516,836</b>	<b>775,356</b>	<b>785,796</b>	<b>739,136</b>

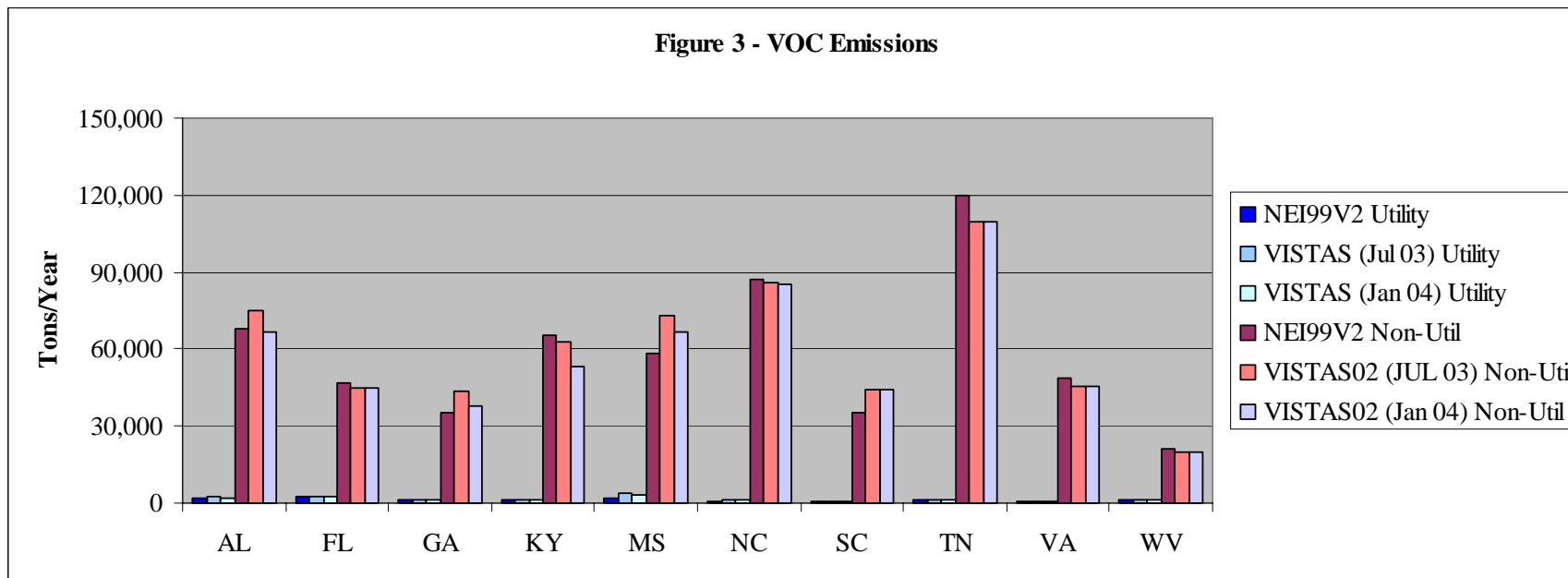
**Figure 2 - NO<sub>x</sub> Emissions**



**TABLE 8 - SUMMARY OF POINT SOURCE VOC EMISSIONS BY STATE**

STATE	All Point Sources			Utilities			Non-Utility		
	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final
AL	70,359	77,267	69,136	2,235	2,378	2,160	68,124	74,889	66,976
FL	49,003	47,633	47,632	2,519	2,556	2,556	46,484	45,077	45,076
GA	36,069	44,939	39,214	1,009	1,221	1,212	35,060	43,718	38,002
KY	66,892	63,979	54,700	1,401	1,467	1,490	65,491	62,512	53,210
MS	60,732	76,964	70,081	2,134	3,650	3,294	58,598	73,314	66,787
NC	87,675	86,691	86,270	808	976	980	86,867	85,715	85,290
SC	35,386	44,918	44,821	418	497	500	34,968	44,421	44,321
TN	120,993	110,915	110,915	1,068	1,396	1,396	119,925	109,519	109,519
VA	49,716	46,205	46,102	735	785	785	48,981	45,420	45,317
WV	22,433	20,814	20,814	1,162	1,188	1,188	21,271	19,626	19,626
<b>VISTAS</b>	<b>599,258</b>	<b>620,325</b>	<b>589,685</b>	<b>13,489</b>	<b>16,114</b>	<b>15,561</b>	<b>585,769</b>	<b>604,211</b>	<b>574,124</b>

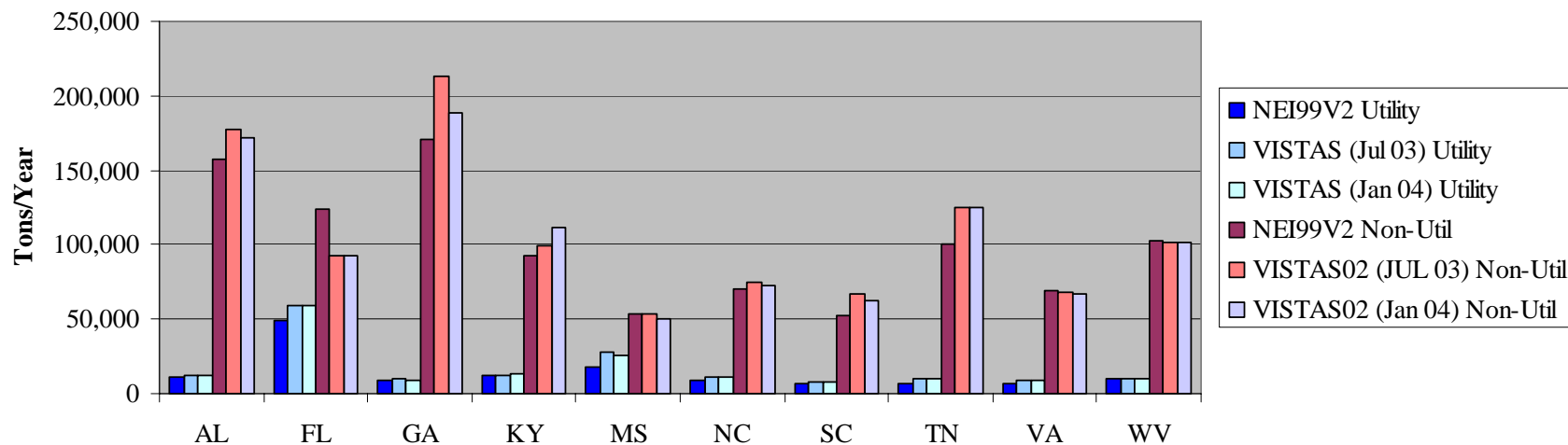
**Figure 3 - VOC Emissions**



**TABLE 9 - SUMMARY OF POINT SOURCE CO EMISSIONS BY STATE**

STATE	All Point Sources			Utilities			Non-Utility		
	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final
AL	168,456	189,715	184,309	11,515	12,694	12,042	156,941	177,021	172,267
FL	172,444	151,962	151,961	48,648	59,105	59,105	123,796	92,857	92,856
GA	178,723	223,644	198,539	8,404	10,574	10,502	170,319	213,070	188,037
KY	105,054	111,480	124,678	11,973	12,411	12,879	93,081	99,069	111,799
MS	70,401	82,083	75,857	17,300	28,459	26,017	53,101	53,624	49,840
NC	79,461	85,703	83,822	8,753	11,380	11,375	70,708	74,323	72,447
SC	58,907	74,042	70,223	6,656	7,594	7,728	52,251	66,448	62,495
TN	108,030	135,212	135,212	7,219	10,426	10,426	100,811	124,786	124,786
VA	76,011	76,775	76,715	7,244	9,213	9,213	68,767	67,562	67,502
WV	112,572	112,442	112,842	10,154	10,398	10,398	102,418	102,044	102,444
<b>VISTAS</b>	<b>1,130,059</b>	<b>1,243,058</b>	<b>1,214,158</b>	<b>137,866</b>	<b>172,254</b>	<b>169,685</b>	<b>992,193</b>	<b>1,070,804</b>	<b>1,044,473</b>

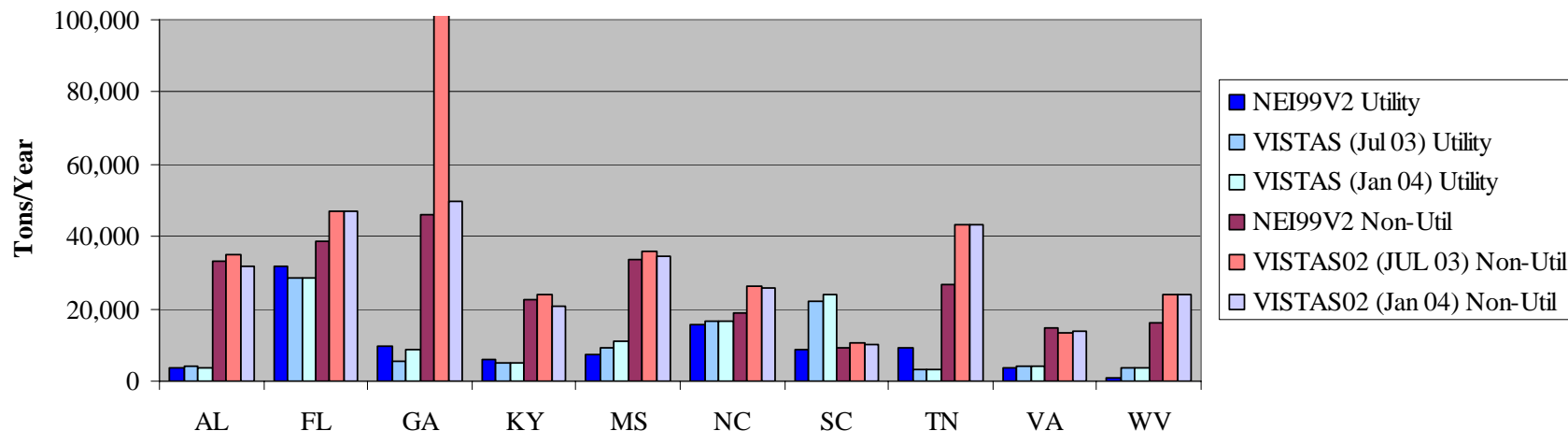
**Figure 4 - CO Emissions**



**TABLE 10 - SUMMARY OF POINT SOURCE PM10-PRI EMISSIONS BY STATE**

STATE	All Point Sources			Utilities			Non-Utility		
	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final
AL	37,128	38,974	35,627	3,764	3,962	3,870	33,364	35,012	31,757
FL	70,583	75,541	75,541	31,883	28,401	28,401	38,700	47,140	47,140
GA	55,495	371,588	53,752	9,493	5,368	4,035	46,002	366,220	49,717
KY	28,816	29,014	25,757	6,184	4,957	5,123	22,632	24,057	20,634
MS	41,156	45,434	45,340	7,438	9,430	10,627	33,718	36,004	34,713
NC	34,866	42,922	42,496	15,762	16,459	16,689	19,104	26,463	25,807
SC	17,897	32,590	32,555	8,729	22,075	22,460	9,168	10,515	10,095
TN	35,718	46,356	46,356	9,219	3,245	3,245	26,499	43,111	43,111
VA	18,364	17,512	17,681	3,558	4,220	4,058	14,806	13,292	13,623
WV	17,169	27,541	27,541	895	3,782	3,782	16,274	23,759	23,759
<b>VISTAS</b>	<b>357,192</b>	<b>727,472</b>	<b>402,646</b>	<b>96,925</b>	<b>101,899</b>	<b>102,290</b>	<b>260,267</b>	<b>625,573</b>	<b>300,356</b>

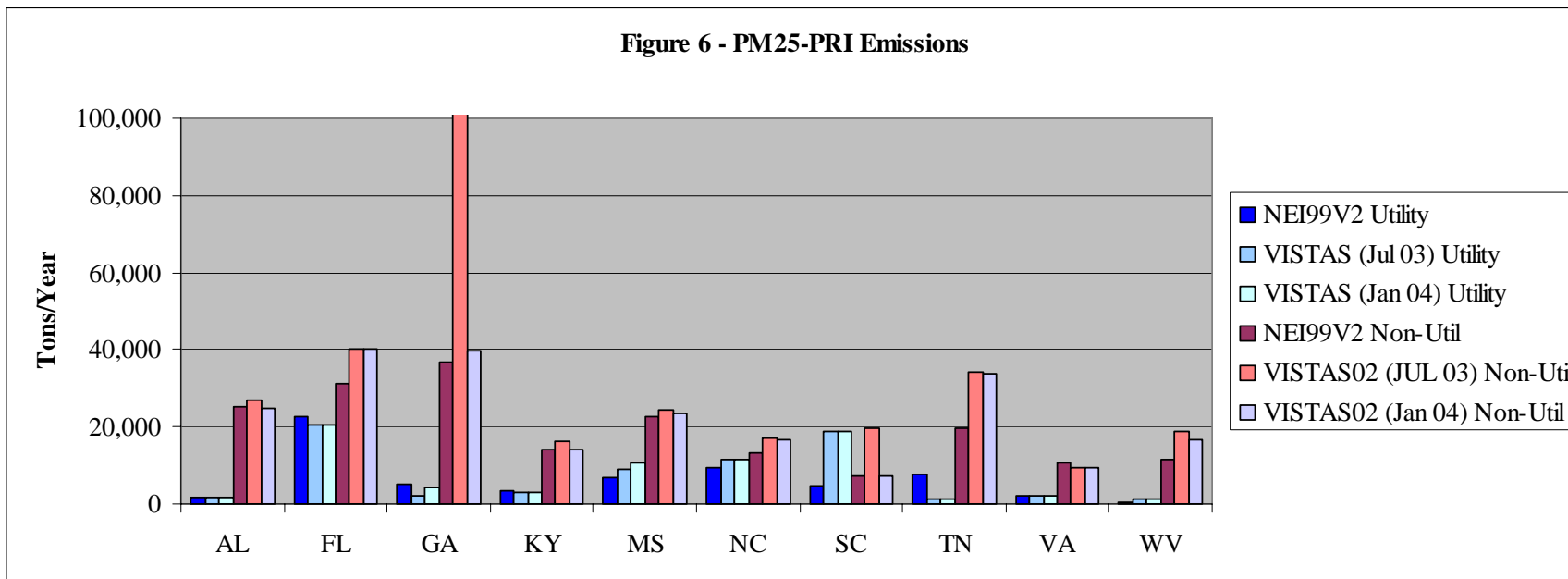
**Figure 5 - PM10-PRI Emissions**



**TABLE 11 - SUMMARY OF POINT SOURCE PM25-PRI EMISSIONS BY STATE**

STATE	All Point Sources			Utilities			Non-Utility		
	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final
AL	27,149	28,881	26,423	1,743	1,833	1,840	25,406	27,048	24,583
FL	54,238	60,769	60,590	22,847	20,508	20,508	31,391	40,261	40,082
GA	41,645	291,996	41,123	4,929	2,109	1,380	36,716	289,887	39,743
KY	17,553	19,159	17,109	3,571	2,904	3,054	13,982	16,255	14,055
MS	29,793	33,457	33,638	6,974	8,918	10,271	22,819	24,539	23,367
NC	22,519	28,635	27,971	9,454	11,415	11,498	13,065	17,220	16,473
SC	11,941	38,579	24,961	4,770	18,940	17,743	7,171	19,639	7,218
TN	27,241	35,326	35,302	7,732	1,342	1,342	19,509	33,984	33,960
VA	12,657	11,545	11,594	2,157	2,105	2,007	10,500	9,440	9,587
WV	12,128	20,066	18,138	435	1,379	1,379	11,693	18,687	16,759
<b>VISTAS</b>	<b>256,864</b>	<b>568,413</b>	<b>296,849</b>	<b>64,612</b>	<b>71,453</b>	<b>71,022</b>	<b>192,252</b>	<b>496,960</b>	<b>225,827</b>

**Figure 6 - PM25-PRI Emissions**



**TABLE 12 - SUMMARY OF POINT SOURCE NH3 EMISSIONS BY STATE**

STATE	All Point Sources			Utilities			Non-Utility		
	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final	NEI99V2	VISTAS 2002 Draft	VISTAS 2002 Final
AL	4,015	4,275	947	16	4	50	3,999	4,271	897
FL	1,677	2,191	2,190	1,176	863	863	501	1,328	1,327
GA	15,794	5,167	5,147	35	37	76	15,759	5,130	5,071
KY	579	772	729	16	13	6	563	759	723
MS	27,867	1,156	1,207	5,618	266	327	22,249	890	880
NC	950	1,854	1,815	14	33	36	936	1,821	1,779
SC	1,053	1,237	1,386	9	1	1	1,044	1,236	1,385
TN	113	2,452	2,452	10	1	1	103	2,451	2,451
VA	777	1,637	3,783	86	68	68	691	1,569	3,715
WV	486	576	576	16	4	4	470	572	572
<b>VISTAS</b>	<b>53,311</b>	<b>21,317</b>	<b>20,232</b>	<b>6,996</b>	<b>1,290</b>	<b>1,432</b>	<b>46,315</b>	<b>20,027</b>	<b>18,800</b>

**Figure 7 - NH3 Emissions**

