

DRAFT REPORT

**REVIEW OF 1999 NEI VERSION 2 FINAL
AND
RECOMMENDATIONS FOR DEVELOPING
THE 2002 VISTAS INVENTORY FOR REGIONAL HAZE MODELING
AREA AND POINT SOURCES**

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SECTION 1

EXECUTIVE SUMMARY

INTRODUCTION

This report presents the results of a review of existing or developing efforts to support the development of a 2002 emission inventory for the VISTAS region to support regional haze planning. This review focused on area and point sources (the review for non-road equipment and highway vehicles is presented in a separate report prepared by E.H. Pechan). This report has three objectives:

1. Summarize the 1999 National Emission Inventory (NEI), Version 2 Final, to provide an indication of the relative importance of each type of source in the 10-state VISTAS region (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia).
2. Identify on-going emission inventory improve efforts that are being conducted by other Regional Planning Organizations, the U.S. EPA, and other Federal agencies.
3. Provide recommendations for short-term improvements that can be accomplished by September 2003 to produce a preliminary 2002 inventory and for longer-term efforts to further improve the inventory in calendar year 2004.

This Executive Summary summarizes the recommendations for area and point source improvements. Section 2 looks at the relative magnitude of emissions from all sources in the VISTAS area, including point, area, highway vehicles, and nonroad equipment. Section 3 examines area sources and Section 4 examines point sources. Appendices A and B contain state-by-state emission summary tables for area and point sources, respectively.

RECOMMENDATIONS FOR AREA SOURCE IMPROVEMENTS

Listed below are our short-term recommendations for developing the area source component of the preliminary 2002 VISTAS regional emission inventory. This is followed by our longer-term recommendations for making future improvements to the inventory. Our recommendations are based on our review of the 1999 NEI Version 2 Final and the various on-going emission inventory improvement activities discussed in Section 3 of this report. The short-term recommendations can be accomplished over the next six months, resulting in a preliminary 2002 inventory that can be fed into an emission model to produce the episode-specific inputs needed for preliminary atmospheric modeling. The longer-term activities can likely be accomplished over the next 2-3 years.

Recommendations for Short-term Activities to Produce VISTAS Preliminary 2002 Area Source Inventory

1. Obtain updated activity data related to fugitive dust sources, primarily paved and unpaved roads, livestock activities and agricultural activity (tilling). Updating the agricultural activity will also assist in the development of ammonia emissions. In addition, these source categories are not as amenable to using growth factors as some other less important categories so the improvement from obtaining activity data would have a greater impact. Finally, the emission factors for these categories in the NEI tends to change less dramatically from year to year so changes in activity data will provide the greatest impact on estimating emissions in 2002.
2. Obtain updated activity data for fire sources. In particular, activity (and fuel data if available) will provide for updated estimates for wildfires, prescribed burns, residential combustion, and land clearing operations. Each of these sources is important for fine particulate. None of these sources is easily projected using growth factors.
3. Obtain updated activity data for animal operations. Use that data with the CMU ammonia model to provide updated estimates of ammonia from animal operations. Determine (in conjunction with VISTAS) if any of the State supplied data for ammonia emissions should be used to replace ammonia emissions calculated with the CMU model.
4. Conduct QA/QC of State/local agency area source submittals. Review area source submittals to determine how much information submitted matches with the current NEI and to determine if there are significant missing sources. Evaluate the pollutants that are missing that will need to be estimated using alternative means. Evaluate whether or not the State/local submittals provide any new information related to temporal profiles. Work with the point source inventory to assess potential double counting of sources.
5. Provide State/local agencies with the comparison of emissions reported in the 1999 NEI Version 2 Final and the State/local supplied data. Identify gaps and logical inconsistencies. Ask States/local agencies to provide feedback on large scale inconsistencies and on missing sources. Update database with State/local supplied revisions.
6. Review speciation information to determine if there are gaps in the data required to develop a speciated emission inventory. In addition, review older version of NEI to determine speciation factors used to prepare elemental and organic carbon estimates (never published).
7. Convert preliminary 2002 VISTAS inventory from NIF format to format required by the selected emission modeling system.

These short-term activities are generally consistent with the activities identified in our Final Work Plan (November 25, 2001), and can be completed within the contract budget and time schedules identified in the Work Plan for area sources. For those sources not

specifically updated with revised activity data or estimates from State/local agencies, growth factors will be produced to provide 2002 emission estimates.

Recommendations for Longer-term Activities to Produce VISTAS Final 2002 Area Source Inventory

1. Establish on-going long term mechanism to collect activity, fuel and other data related to fires. This work may be carried out in conjunction with other agencies.
2. Establish on-going long term mechanism to collect activity data related to unpaved roads. This work may be carried out in conjunction with other agencies.
3. Update ammonia emissions when new emission factors become available from EPA or other agencies for important source categories.
4. Update PM_{2.5} emissions as new emission factors are prepared by EPA.

These longer-term activities are beyond the scope of the activities identified in our Final Work Plan (November 25, 2001). We would be glad to prepare a cost estimate and time schedule for completing these activities to produce the Final 2002 area source inventory.

RECOMMENDATIONS FOR POINT SOURCE IMPROVEMENTS

Listed below are our short-term recommendations for developing the preliminary 2002 VISTAS regional emission inventory. This is followed by our longer-term recommendations for making future improvements to the inventory. Our recommendations are based on our review of the 1999 NEI Version 2 Final and the various on-going emission inventory improvement activities discussed in Section 4 of this report. The short-term recommendations can be accomplished over the next six months, resulting in a preliminary 2002 inventory that can be fed into an emission model to produce the episode-specific inputs needed for preliminary atmospheric modeling. The longer-term activities can likely be accomplished over the next 2-3 years.

Recommendations for Short-term Activities to Produce VISTAS Preliminary 2002 Point Source Inventory

1. Obtain post-1999 point source inventories from State/local agencies to better represent episodes in the 2000-2002 time frame. Replace 1999 NEI data with more recent State data for PM₁₀, SO₂, NO_x, VOC, and CO. Augment State data with PM_{2.5} and ammonia from 1999 NEI. "Grow" the 1999/2000/2001 to 2002.
2. Conduct QA/QC of State/local agency point source submittals. Review point source physical parameters, temporal profiles, and locations needed for modeling. Focus on large sources and provide States/local agencies with parameters to review and possibly correct. Incorporate State/local agency corrections and updates. Supplement with default stack characteristics and county-level locations.
3. Compare facility-level emissions in 1999 NEI to State/local submittals to identify potentially missing or new sources and to flag facilities with large emission

changes. Ask States to verify whether facilities any large emitters have closed, whether new sources began operation in 2002, and whether any large emission changes are reasonable.

4. Provide State/local agencies with the comparison of ammonia emissions reported in the 1999 NEI Version 2 Final and the 1999/2000 Toxics Release Inventory. Identify gaps and logical inconsistencies. Ask States/local agencies to target largest emitters to obtain information on emissions, stack characteristics, seasonal variations, etc. Update database with State/local updates.
5. Obtain and incorporate “preliminary” annual 2002 CEM data for utilities from EPA’s Clean Air Markets Division.
6. Help States/local agencies conduct surveys of selected point sources to obtain any missing information identified in the above tasks. Coordinate with State/local agency in developing information request, and if deemed appropriate by the State/local agency, contact the facility to attempt to obtain the requested information. Augment database with the collected survey data.
7. Apply existing speciation factors to create estimates of elemental carbon, organic carbon, and other species required for modeling.
8. Convert preliminary 2002 VISTAS inventory from NIF format to format required by the selected emission modeling system.

These short-term activities are generally consistent with the activities identified in our Final Work Plan (November 25, 2001), and can be completed within the contract budget and time schedules identified in the Work Plan for point sources.

Recommendations for Longer-term Activities to Produce VISTAS Final 2002 Point Source Inventory

1. Obtain and incorporate “final” CEM data (Fall 2003).
2. Apply improved SPECIATE factors (Fall 2003).
3. Update ammonia emissions when new emission factors are available from EPA (2004) for important source categories.
4. Update PM_{2.5} emissions when new emission factors are prepared by EPA (2004).
5. Obtain “official” 2002 point source inventories required by the Consolidated Emissions Reporting Rule (June 2004).

These longer-term activities are beyond the scope of the activities identified in our Final Work Plan (November 25, 2001). We would be glad to prepare a cost estimate and time schedule for completing these activities to produce the Final 2002 point source inventory.

SECTION 2

SUMMARY OF 1999 NEI (VERSION 2 FINAL)

The first component of our review looks at the relative magnitude of emissions from all source in the VISTAS area, including point, area, highway vehicles, and nonroad equipment. Tables 2-1 through 2-7 provide information on the emissions by source category, including the percentage of total emissions and cumulative percentage of total emissions for seven pollutants: particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), sulfur dioxide (SO₂), nitrogen oxides (NO_x), ammonia (NH₃), carbon monoxide (CO), and volatile organic compounds (VOCs). Data for these tables was derived from Version 2 Final of the 1999 National Emission Inventory (NEI). These tables provide an indication of the relative importance of each type of source in the 10-state VISTAS region (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia).

PM10/PM2.5

Tables 2-1 and 2-2 clearly show that the most important source categories for PM10 and PM2.5 are the fugitive dust categories. Paved and unpaved roads, agricultural crop/livestock activities, and construction activities comprise over 75 percent of the total inventory for PM10 and slightly over 40 percent of the inventory for PM2.5. For PM2.5, various area source burning categories become more important with wildfires, prescribed, and open burning being important categories, representing between 4-8 percent of the inventory each. Other types of fuel combustion (utility, industrial, residential wood, off-highway vehicles, highway vehicles) also become relatively more important for PM2.5, representing between 2-5 percent of the inventory each. Non-combustion point source industrial processes are relatively minor contributors to the overall PM10/PM2.5 emissions, contributing about 4% of the total PM10 and 8% of the total PM2.5 emissions.

SULFUR DIOXIDE

Table 2-3 shows that utility coal combustion is far and away the most important source category in the VISTAS states for SO₂. Utility coal combustion accounts for 70% of regionwide SO₂ emissions. Other types of utility and industrial fuel combustion account for another 17% of the total SO₂. The industrial component is a “blended” category (with both point and area source components - the actual contributions to these categories from each component will be shown in later tables).

OXIDES OF NITROGEN

For NO_x, Table 2-4 shows no single source category stands out. Rather, four types of sources are predominant – utility coal combustion, diesel highway vehicles, gasoline highway vehicles, and nonroad equipment. These four categories account for over 75%

over the total NO_x emissions in the VISTAS region. Other types of fuel combustion (utility, industrial, and residential) 14% of the total NO_x emissions.

AMMONIA

Table 2-5 provides an overview of emissions for NH₃ in the VISTAS region. That table clearly shows that the majority of NH₃ emissions are from area sources with livestock activities, crops (fertilizer application) and wastewater treatment processes representing over 85 percent of the total emissions in the VISTAS area. Agricultural chemical manufacturing is the primary ammonia point source category according to the NEI.

CARBON MONOXIDE

Table 2-6 summarizes CO emissions in the VISTAS region. As would be expected, gasoline combustion in highway vehicles and off-road equipment account for most of the CO emissions (over 75%). However, area sources also play an important role in CO emissions in the region, especially the different types of fire categories and residential wood combustion. Point sources have a relatively small contribution in relation to the other source categories

VOLATILE ORGANIC COMPOUNDS

Table 2-7 summarizes VOC emissions in the VISTAS region. All source categories play a major role in VOC emissions in the region. Highway vehicles and nonroad equipment are clearly important. Solvent utilization and volatile liquid storage/transport have both point and area source components, and account for 32% of the total VOC. For the “pure” area sources, the major category contributors to VOC emissions are the burning categories (wildfires, prescribed burning, residential wood combustion, etc.). These burning categories account for over 14 % of the emissions in the VISTAS area. “Pure” point sources contribute about 7% of the total VOC emissions.

TABLE 2-1**PM10 EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Source Type	Emissions (tons/year)	Percent of Total	Cumulative Percent of Total
Fugitive Dust - Unpaved Roads	Area	1,338,464	31.9	31.9
Fugitive Dust - Paved Roads	Area	811,377	19.3	51.3
Agriculture Crops/Livestock	Area	549,040	13.1	64.3
Fugitive Dust - Construction	Area	337,997	8.1	72.4
Fugitive Dust - Other	Area	166,110	4.0	76.4
Fires - Slash/Prescribed Burning	Area	126,360	3.0	79.4
Fuel Combustion - Electric Generation	Point	96,929	2.3	81.7
Open Burning - Land Clearing Debris	Area	93,790	2.2	83.9
Fuel Combustion - Industrial	Point/Area	89,118	2.1	86.0
Fires - Forest Wildfires	Area	81,737	1.9	88.0
Fuel Combustion - Residential Wood	Area	69,600	1.7	89.7
Off-highway Vehicles	Nonroad	64,588	1.5	91.2
Open Burning - Residential	Area	58,515	1.4	92.6
Wood, Pulp & Paper	Point	51,475	1.2	93.8
Highway Vehicles - Diesel	Highway	39,454	0.9	94.8
Metals Processing	Point	38,398	0.9	95.7
Fires - Agricultural	Area	30,709	0.7	96.4
Mineral Products	Point	29,318	0.7	97.1
Other Industrial Processes	Point/Area	23,613	0.6	97.7
Highway Vehicles - Gasoline	Highway	23,370	0.6	98.2
Storage and Transport	Point	21,450	0.5	98.7
Fuel Combustion - Other	Point/Area	20,724	0.5	99.2
Chemical and Allied Product Mfg.	Point	11,818	0.3	99.5
Other	Area	10,175	0.2	99.8
Petroleum and Related Industries	Point	4,926	0.1	99.9
Other Open Burning	Area	3,797	0.1	100.0
Solvent Utilization	Point/Area	1,663	0.0	100.0
Total for VISTAS States		4,194,515	100.0	

TABLE 2-2

**PM2.5 EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Source Type	Emissions (tons/year)	Percent of Total	Cumulative Percent of Total
Fugitive Dust - Paved Roads	Area	203,162	14.1	14.1
Fugitive Dust - Unpaved Roads	Area	202,508	14.1	28.2
Fires - Forest Wildfires	Area	114,283	7.9	36.2
Agriculture Crops/Livestock	Area	103,946	7.2	43.4
Open Burning - Land Clearing Debris	Area	93,790	6.5	49.9
Fires - Slash/Prescribed Burning	Area	73,851	5.1	55.0
Fuel Combustion - Residential Wood	Area	69,600	4.8	59.9
Fugitive Dust - Construction	Area	67,599	4.7	64.6
Fuel Combustion - Industrial	Point/Area	66,865	4.6	69.2
Fuel Combustion - Electric Generation	Point	64,616	4.5	73.7
Off-highway Vehicles	Nonroad	59,153	4.1	77.8
Open Burning - Residential	Area	53,588	3.7	81.6
Wood, Pulp & Paper	Point	42,791	3.0	84.5
Highway Vehicles - Diesel	Highway	34,967	2.4	87.0
Fugitive Dust - Other	Area	33,152	2.3	89.3
Metals Processing	Point	32,354	2.2	91.5
Fires - Agricultural	Area	27,917	1.9	93.5
Fuel Combustion - Other	Point/Area	17,728	1.2	94.7
Mineral Products	Point	16,803	1.2	95.9
Highway Vehicles - Gasoline	Highway	13,503	0.9	96.8
Storage and Transport	Point	12,374	0.9	97.7
Other Industrial Processes	Point/Area	10,660	0.7	98.4
Chemical and Allied Product Mfg.	Point	9,843	0.7	99.1
Other	Area	6,657	0.5	99.6
Other Open Burning	Area	3,764	0.3	99.8
Petroleum and Related Industries	Point	2,582	0.2	100.0
Total for VISTAS States		1,438,056	100.0	

TABLE 2-3

**SO2 EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Source Type	Emissions (tons/year)	Percent of Total	Cumulative Percent of Total
Fuel Combustion - Electric Generation - Coal	Point	4,134,176	70.5	70.5
Fuel Combustion - Industrial – Coal	Point/Area	420,855	7.2	77.7
Fuel Combustion - Electric Generation - Oil	Point	315,809	5.4	83.0
Fuel Combustion - Industrial – Oil	Point/Area	125,019	2.1	85.2
Fuel Combustion - Electric Generation - Gas	Point	118,469	2.0	87.2
Off-highway Vehicles	Nonroad	84,431	1.4	88.6
Petroleum and Related Industries	Point	80,696	1.4	90.0
Wood, Pulp & Paper	Point	71,109	1.2	91.2
Fuel Combustion - Comm/Inst – Oil	Point/Area	67,927	1.2	92.4
Chemical and Allied Product Mfg.	Point	67,317	1.1	93.5
Highway Vehicles – Gasoline	Highway	52,915	0.9	94.4
Fuel Combustion - Electric Generation - Other	Point	49,699	0.8	95.3
Metals Processing	Point	48,502	0.8	96.1
Fuel Combustion - Industrial – Gas	Point/Area	47,873	0.8	96.9
Mineral Products	Point	44,506	0.8	97.7
Fuel Combustion - Industrial – Other	Point/Area	34,529	0.6	98.3
Highway Vehicles – Diesel	Highway	28,241	0.5	98.7
Fuel Combustion - Comm/Inst – Coal	Point/Area	19,880	0.3	99.1
Other Industrial Processes	Point/Area	19,815	0.3	99.4
Fuel Combustion - Residential - All Fuels	Area	17,885	0.3	99.7
Fuel Combustion - Comm/Inst – Gas	Point/Area	7,287	0.1	99.9
Waste Disposal and Recycling	Point/Area	5,656	0.1	99.9
Storage and Transport	Point	1,747	0.0	100.0
Other	Area	1,349	0.0	100.0
Total for VISTAS States		5,865,692	100.0	

TABLE 2-4**NO_x EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Source Type	Emissions (tons/year)	Percent of Total	Cumulative Percent of Total
Fuel Combustion - Electric Generation - Coal	Point	1,653,624	26.9	26.9
Highway Vehicles - Diesel	Highway	1,097,875	17.8	44.7
Highway Vehicles - Gasoline	Highway	1,049,145	17.1	61.8
Off-highway Vehicles	Nonroad	928,350	15.1	76.9
Fuel Combustion - Industrial - Coal	Point/Area	230,668	3.7	80.6
Fuel Combustion - Industrial - Int Comb	Point/Area	191,686	3.1	83.7
Fuel Combustion - Industrial - Gas	Point/Area	174,549	2.8	86.6
Fuel Combustion - Electric Generation - Oil	Point	98,112	1.6	88.2
Fuel Combustion - Residential - All Fuels	Area	97,713	1.6	89.8
Fuel Combustion - Electric Generation - Gas	Point	86,831	1.4	91.2
Mineral Products	Point	80,070	1.3	92.5
Fires	Area	64,896	1.1	93.5
Fuel Combustion - Electric Generation - Other	Point	61,401	1.0	94.5
Fuel Combustion - Industrial - Other	Point/Area	54,360	0.9	95.4
Fuel Combustion - Comm/Inst - Gas	Point/Area	49,699	0.8	96.2
Wood, Pulp & Paper	Point	49,550	0.8	97.0
Waste Disposal and Recycling	Point/Area	46,245	0.8	97.8
Fuel Combustion - Industrial - Oil	Point/Area	42,670	0.7	98.5
Chemical and Allied Product Mfg.	Point	24,917	0.4	98.9
Other	Area	15,562	0.3	99.1
Metals Processing	Point	13,945	0.2	99.4
Fuel Combustion - Comm/Inst - Oil	Point/Area	12,231	0.2	99.6
Petroleum and Related Industries	Point	11,229	0.2	99.7
Fuel Combustion - Comm/Inst - Coal	Point/Area	7,205	0.1	99.9
Other Industrial Processes	Point/Area	6,991	0.1	100.0
Solvent Utilization	Point/Area	2,207	0.0	100.0
Total for VISTAS States		6,151,731	100.0	

TABLE 2-5

**NH3 EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Source Type	Emissions (tons/year)	Percent of Total	Cumulative Percent of Total
Agriculture Livestock	Area	656,346	73.4	73.4
Agriculture Crops	Area	94,911	10.6	84.0
Highway Vehicles - Gasoline	Highway	64,214	7.2	91.1
Agricultural Chemical Mfg.	Point	38,504	4.3	95.4
Wastewater Treatment	Area	15,695	1.8	97.2
Off-highway Vehicles	Nonroad	6,628	0.7	97.9
Fuel Combustion - Electric Generation - Int Comb	Point	5,507	0.6	98.5
Fuel Combustion - Industrial	Point/Area	5,144	0.6	99.1
Other Industrial Processes	Point/Area	1,934	0.2	99.3
Highway Vehicles - Diesel	Highway	1,627	0.2	99.5
Fuel Combustion - Electric Generation - Ext Comb	Point	1,492	0.2	99.7
Fuel Combustion - Other	Point/Area	1,057	0.1	99.8
Metals Processing	Point	750	0.1	99.9
Other	Area	574	0.1	100.0
Petroleum and Related Industries	Point	425	0.0	100.0
Total for VISTAS States		894,808	100.0	

TABLE 2-6**CO EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Source Type	Emissions (tons/year)	Percent of Total	Cumulative Percent of Total
Highway Vehicles - Gasoline	Highway	16,615,022	59.2	59.2
Off-highway Vehicles	Nonroad	5,444,825	19.4	78.6
Fires - Slash/Prescribed Burning	Area	1,491,954	5.3	83.9
Open Burning - Land Clearing Debris	Area	932,387	3.3	87.2
Fires - Forest Wildfires	Area	880,244	3.1	90.4
Fuel Combustion - Residential Wood	Area	738,833	2.6	93.0
Highway Vehicles - Diesel	Highway	318,149	1.1	94.1
Fuel Combustion - Industrial	Point/Area	301,076	1.1	95.2
Wood, Pulp & Paper	Point	238,196	0.8	96.0
Fires - Agricultural	Area	217,585	0.8	96.8
Metals Processing	Point	180,465	0.6	97.5
Open Burning - Residential	Area	152,608	0.5	98.0
Fuel Combustion - Electric Generation	Point	137,867	0.5	98.5
Chemical and Allied Product Mfg.	Point	136,405	0.5	99.0
Fuel Combustion - Other	Point/Area	65,496	0.2	99.2
Mineral Products	Point	53,708	0.2	99.4
Solvent Utilization	Point/Area	50,646	0.2	99.6
Petroleum and Related Industries	Point	44,260	0.2	99.7
Other	Area	31,250	0.1	99.9
Other Industrial Processes	Point/Area	21,035	0.1	99.9
Other Open Burning	Area	17,096	0.1	100.0
Storage and Transport	Point	1,058	0.0	100.0
Total for VISTAS States		28,070,165	100.0	

TABLE 2-7**VOC EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Source Type	Emissions (tons/year)	Percent of Total	Cumulative Percent of Total
Highway Vehicles - Gasoline	Highway	1,378,207	28.3	28.3
Solvent Utilization	Point/Area	1,240,964	25.5	53.8
Off-highway Vehicles	Nonroad	617,622	12.7	66.5
Storage and Transport	Point/Area	333,597	6.9	73.3
Fuel Combustion - Residential Wood	Area	272,507	5.6	78.9
Fires - Forest Wildfires	Area	169,353	3.5	82.4
Chemical and Allied Product Mfg.	Point	150,949	3.1	85.5
Fires - Slash/Prescribed Burning	Area	131,352	2.7	88.2
Wood, Pulp & Paper	Point	77,619	1.6	89.8
Other Industrial Processes	Point/Area	75,417	1.5	91.3
Highway Vehicles - Diesel	Highway	65,408	1.3	92.7
Open Burning - Land Clearing Debris	Area	63,998	1.3	94.0
Open Burning - Residential	Area	53,864	1.1	95.1
Agriculture, Food, Kindred Products	Point	51,802	1.1	96.2
Other Open Burning	Area	40,386	0.8	97.0
Fuel Combustion - Industrial	Point/Area	38,301	0.8	97.8
Petroleum and Related Industries	Point	31,526	0.6	98.4
Fires - Agricultural	Area	24,246	0.5	98.9
Metals Processing	Point	15,353	0.3	99.2
Fuel Combustion - Electric Generation	Point	13,492	0.3	99.5
Fuel Combustion - Other	Point/Area	12,683	0.3	99.8
Other	Area	11,325	0.2	100.0
Total for VISTAS States		4,869,971	100.0	

SECTION 3

AREA SOURCES

This section discussing area sources is divided into three subsections. First, we provide a summary of the NEI for area sources and describe the important source categories for each pollutant. Second, we summarize the on-going efforts to improve the area source emission estimates that are being conducted by other Regional Planning Organizations, the U.S. EPA, and other Federal agencies. Finally, based on what we learned from the NEI review and the on-going emission improvement activities, we recommend specific short-term and long-term activities that can be undertaken to improve the area source emission inventory in the VISTAS region.

EMISSION SUMMARY

The tables that follow (Tables 3-1 to 3-14) provide information on emissions and the ranking of each Tier 3 category within each State in the VISTAS region. The tables that show emissions provide information solely from area sources in the VISTAS region and for each individual VISTAS State. The data presented in these tables is shown by Tier 3 category. The Tier 3 resolution of these tables is slightly more detailed than that presented in Tables 2-1 through 2-7. For instance in Tables 2-1 and 2-2, information was presented for PM10 and PM2.5 concerning Agricultural Crops/Livestock. In actuality the Agricultural Crops/Livestock category in Tables 2-1 and 2-2 represents Agricultural Crops and Agricultural Livestock which are two separate Tier 3 categories and are presented as such in the tables that follow.

Emission tables for each individual VISTAS State are presented in Appendix A. These tables show the emissions for each pollutant by Tier 3 source category along with the cumulative percentage of total area source emissions for that State. Each table in the appendix is presented in the same pollutant order as those presented above.

PM10

Table 3-1 shows the PM10 emissions for all area sources across the VISTAS region at the Tier 3 level. This table clearly shows that over 95 percent of the PM10 is found in 10 categories with the majority of those emissions in fugitive dust categories. The remaining categories are all combustion related and are primarily open burning/combustion processes (slash/prescribed, land clearing, wildfires, and residential open burning). Commercial/institutional and industrial sources play minor roles in the overall emission levels of PM10 in the VISTAS region.

Table 3-2 shows the ranking of each Tier 3 category within each State in the VISTAS region. This table clearly shows that paved or unpaved roads are the most important emission categories with the exception of AL (prescribed burning is most important). For all other States in the VISTAS region, either paved or unpaved road emissions are the

most important PM10 emission source. Frequently these two source categories are among the top four categories with the exception of NC and TN where unpaved roads rank 10th and 6th respectively.

PM2.5

Table 3-3 shows the PM2.5 emissions for all area sources across the VISTAS region. This table clearly shows that over 95 percent of the PM2.5 emissions come from 13 categories. These categories are either fugitive dust or burning activities. The rise in importance of burning activities relative to the information shown in Table 3-1 for PM10 is simply an indication of the change in particle size. Burning activities produce particles that are predominantly in the PM2.5 or smaller range while mechanical activities produce primarily larger particles. Thus the relative importance of fugitive categories (while still important overall) is lessened while burning activities are greater than for PM10.

Table 3-4 provides information on the State-by-State ranking of emission categories for PM2.5. The table shows similar results to the one for PM10. Again, paved or unpaved roads are the most important source for all States except AL. Both categories are among the top 4 in all cases except for NC and TN where unpaved roads again rank 10th and 6th respectively.

Sulfur Dioxide

Table 3-5 shows the emissions for SO2 from area sources in the VISTAS region. This table clearly shows that the majority of emissions come from area source fuel combustion. Over 95 percent of all SO2 emissions from area sources come from coal or oil fuel combustion, primarily from the commercial/institutional or residential sectors.

Table 3-6 shows the ranking of sources by State for the VISTAS region for SO2. Table 3-6 indicates that for 4 of the 10 VISTAS States, small scale coal combustion (Coal – other) is the highest emitting source, while for 3 of the 10, commercial/institutional coal combustion is the highest emissions source. Distillate or residual oil combustion from either residential or other sources are the highest emitters for the remaining States.

Oxides of Nitrogen

Table 3-7 shows the emissions for NOx from area sources in the VISTAS region. This table clearly indicates that, like SO2, the majority of emissions come from area source fuel combustion. However, unlike SO2, natural gas combustion accounts for over 50 percent of these emissions with coal and oil primarily contributing the remainder. Most of the emissions are centered in either the commercial/institutional or residential sectors.

Table 3-8 details the Tier 3 category rankings for NOx from the VISTAS States. The top ranked source categories are fairly evenly split between miscellaneous natural gas combustion (GA, KY), other coal combustion (SC, VA), miscellaneous other combustion (AL, FL, MS), and residential natural gas (NC, TN, WV).

Ammonia

NH₃ emissions for the VISTAS region are shown in Table 3-9. NH₃ emissions are predominantly derived from two primary source categories, agricultural livestock operations and fertilizer application on crops. Over 97 percent of all NH₃ emissions come from these source categories.

The State-by-State ranking of sources in Table 3-10 indicates two things. First, that for all States in the VISTAS region, NH₃ emission ranks are identical to that shown for the VISTAS region as a whole, with livestock operations ranked first in all States followed by fertilizer application on crops. Second, the reason that this information so closely matches for each State is due to the magnitude of these sources compared to other NH₃ sources as well as the fact that few State have their own NH₃ inventories, thus the methods used to estimate emissions for the 1999 NEI are the same for all States in the VISTAS region.

Carbon Monoxide

As would be expected, over 95 percent of emissions of CO are from burning sources, primarily open burning sources and residential wood combustion. Table 3-11 shows that for the VISTAS region, over 30 percent of all area source CO emissions come from prescribed burning. Burning for land clearing purposes and forest wildfires account for approximately 40 percent of the emissions.

The data presented in Table 3-12 illustrates that open burning sources consistently rank highly in all of the VISTAS States. For example, prescribed burning is ranked either 1, 2 or 3 in all VISTAS States except WV and open burning for land clearing purposes is consistently in the top three.

Volatile Organic Compounds

VOC emissions from area sources in the VISTAS region are shown in Table 3-13. This table shows that VOC emissions arise from a number of categories, however, the majority of emissions are from solvent use, burning, surface coating operations, and fuels handling. Over 70 percent of the area source VOC emissions in the VISTAS region arise from these types of source categories.

Table 3-14 shows the rankings of the various categories that contribute to the VOC emissions in the VISTAS region. Consumer solvent usage rates as number 1 or 2 except for FL, SC and WV. Some combustion sources show wide variability (forest wildfires range from second to 47th), while others are fairly closely spaced (residential wood combustion in fireplaces ranges from first to 14th).

TABLE 3-1**PM10 AREA SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Fugitive Dust-unpaved roads	1,334,224	36.0%
Fugitive Dust-paved roads	810,575	57.8%
Agriculture & Forestry-agricultural crops	431,805	69.5%
Fugitive Dust-construction	337,997	78.6%
Fugitive Dust-other	165,017	83.0%
Other Combustion-slash/prescribed burning	126,360	86.4%
Agriculture & Forestry-agricultural livestock	117,235	89.6%
Open Burning-land clearing debris	93,790	92.1%
Other Combustion-forest wildfires	81,737	94.3%
Open Burning-residential	58,515	95.9%
Residential Wood-woodstoves	37,574	96.9%
Other Combustion-agricultural fires	30,709	97.7%
Residential Wood-fireplaces	26,526	98.4%
Coal-other	10,562	98.7%
Residential Other-other	9,269	99.0%
Incineration-other	5,560	99.1%
Residential Wood-other	5,501	99.3%
Gas-natural	5,190	99.4%
Commercial/Institutional Oil-other	3,843	99.5%
Open Burning-other	3,666	99.6%
Miscellaneous Industrial Processes-other	3,621	99.7%
Agriculture, Food, & Kindred Products-other	3,147	99.8%
Commercial/Institutional Gas-other	2,970	99.9%
Oil-distillate	1,199	99.9%
Oil-residual	1,038	99.9%
Other Combustion-structural fires	719	100.0%
Commercial/Institutional Coal-other	554	100.0%
Other-wood/bark waste	289	100.0%
Other-other	274	100.0%
Misc. Fuel Comb. (Except Residential)-other	221	100.0%
Other Combustion-other	133	100.0%
Total for VISTAS States	3,709,819	

TABLE 3-2

**STATE-BY-STATE RANKING OF PM10 AREA SOURCE EMISSIONS AT THE
TIER 3 CATEGORY LEVEL FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Agriculture & Forestry - agricultural crops	6	11	4	2	2	2	5	2	10	10
Agriculture & Forestry - agricultural livestock	10	12	13	12	11	13	12	11	12	9
Agriculture, Food, & Kindred Products - other	27	25	24		18	27	23	25	27	
Coal - other	21			20		16	21	19	13	24
Commercial/Institutional Coal - other	28	24	25	23		21	22	24	26	22
Commercial/Institutional Gas - other	20	16	16	18	15	20	17	12	20	13
Commercial/Institutional Oil - other	13	14	20	21	19	18	16	18	18	18
Fugitive Dust - construction	7	6	5	5	5	6	8	3	4	4
Fugitive Dust - other	9	13	11	8	8	11	11	9	8	7
Fugitive Dust - paved roads	4	1	2	1	3	1	2	1	1	3
Fugitive Dust - unpaved roads	2	2	1	4	1	10	1	6	3	1
Gas - natural	14	18	19	14		22	18	23	11	17
Gas - process	25							26		
Incineration - other	16	23	18	15		19		16	16	
Misc. Fuel Comb. (Except Residential) - other						26			21	20
Miscellaneous Industrial Processes - other	19	21	17	17	16	17	15	14		12
Oil - distillate	24	22	23	19		24	20	21	23	15
Oil - residual	29	17	22					22	25	
Open Burning - land clearing debris	5	5	3	9	7	3	3	4	2	6
Open Burning - other	18	19	15	16	14	15	14	15	17	14
Open Burning - residential	8	9	8	6	20	4	6	5	6	5
Other - other	26								19	
Other - wood/bark waste						23		27	22	19
Other Combustion - agricultural fires	15	8	7		6	7				
Other Combustion - forest wildfires	3	3	9	3	9	14	9	17	15	8
Other Combustion - other	22									21
Other Combustion - slash/prescribed burning	1	4	6	7	4	5	4	7	5	16
Other Combustion - structural fires	23	20	21	22	17	25	19	20	24	23
Residential Other - other	17	15	14	13	13	12	13	13	14	11
Residential Wood - fireplaces	12	10	12	11	12	9	10	10	9	
Residential Wood - other										2
Residential Wood - woodstoves	11	7	10	10	10	8	7	8	7	

TABLE 3-3**PM2.5 AREA SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Fugitive Dust-paved roads	202,645	18.9%
Fugitive Dust-unpaved roads	200,134	37.5%
Other Combustion-slash/prescribed burning	114,283	48.2%
Open Burning-land clearing debris	93,790	56.9%
Agriculture & Forestry-agricultural crops	86,361	64.9%
Other Combustion-forest wildfires	73,851	71.8%
Fugitive Dust-construction	67,599	78.1%
Open Burning-residential	53,588	83.1%
Residential Wood-woodstoves	37,574	86.6%
Fugitive Dust-other	33,006	89.7%
Other Combustion-agricultural fires	27,917	92.3%
Residential Wood-fireplaces	26,526	94.8%
Agriculture & Forestry-agricultural livestock	17,585	96.4%
Residential Other-other	8,439	97.2%
Residential Wood-other	5,501	97.7%
Gas-natural	4,567	98.1%
Open Burning-other	3,666	98.5%
Commercial/Institutional Gas-other	2,924	98.7%
Incineration-other	2,756	99.0%
Commercial/Institutional Oil-other	2,627	99.2%
Miscellaneous Industrial Processes-other	2,509	99.5%
Coal-other	2,277	99.7%
Oil-distillate	872	99.8%
Other Combustion-structural fires	654	99.8%
Oil-residual	480	99.9%
Commercial/Institutional Coal-other	310	99.9%
Other-wood/bark waste	289	99.9%
Other-other	274	100.0%
Misc. Fuel Comb. (Except Residential)-other	221	100.0%
Other Combustion-other	121	100.0%
Agriculture, Food, & Kindred Products-other	83	100.0%
Gas-process	37	100.0%
Total for VISTAS States	1,073,466	

TABLE 3-4

**STATE-BY-STATE RANKING OF PM2.5 AREA SOURCE EMISSIONS AT THE
TIER 3 CATEGORY LEVEL FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Agriculture & Forestry - agricultural crops	6	11	4	2	2	2	5	2	10	10
Agriculture & Forestry - agricultural livestock	10	12	13	12	11	13	12	11	12	9
Agriculture, Food, & Kindred Products - other	27	25	24		18	27	23	25	27	
Coal - other	21			20		16	21	19	13	24
Commercial/Institutional Coal - other	28	24	25	23		21	22	24	26	22
Commercial/Institutional Gas - other	20	16	16	18	15	20	17	12	20	13
Commercial/Institutional Oil - other	13	14	20	21	19	18	16	18	18	18
Fugitive Dust - construction	7	6	5	5	5	6	8	3	4	4
Fugitive Dust - other	9	13	11	8	8	11	11	9	8	7
Fugitive Dust - paved roads	4	1	2	1	3	1	2	1	1	3
Fugitive Dust - unpaved roads	2	2	1	4	1	10	1	6	3	1
Gas - natural	14	18	19	14		22	18	23	11	17
Gas - process	25							26		
Incineration - other	16	23	18	15		19		16	16	
Misc. Fuel Comb. (Except Residential) - other						26			21	20
Miscellaneous Industrial Processes - other	19	21	17	17	16	17	15	14		12
Oil - distillate	24	22	23	19		24	20	21	23	15
Oil - residual	29	17	22					22	25	
Open Burning - land clearing debris	5	5	3	9	7	3	3	4	2	6
Open Burning - other	18	19	15	16	14	15	14	15	17	14
Open Burning - residential	8	9	8	6	20	4	6	5	6	5
Other - other	26								19	
Other - wood/bark waste						23		27	22	19
Other Combustion - agricultural fires	15	8	7		6	7				
Other Combustion - forest wildfires	3	3	9	3	9	14	9	17	15	8
Other Combustion - other	22									21
Other Combustion - slash/prescribed burning	1	4	6	7	4	5	4	7	5	16
Other Combustion - structural fires	23	20	21	22	17	25	19	20	24	23
Residential Other - other	17	15	14	13	13	12	13	13	14	11
Residential Wood - fireplaces	12	10	12	11	12	9	10	10	9	
Residential Wood - other										2
Residential Wood - woodstoves	11	7	10	10	10	8	7	8	7	

TABLE 3-5**SO2 AREA SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Coal-other	85,293	34.9%
Commercial/Institutional Oil-other	65,928	61.8%
Oil-distillate	21,707	70.7%
Oil-residual	20,914	79.2%
Other-other	10,454	83.5%
Commercial/Institutional Coal-other	9,419	87.4%
Residential Other-distillate oil	7,913	90.6%
Residential Other-bituminous/subbituminous coal	6,167	93.1%
Commercial/Institutional Gas-other	6,002	95.6%
Gas-other	4,250	97.3%
Open Burning-other	1,540	97.9%
Other Combustion-other	1,271	98.4%
Incineration-other	1,003	98.9%
Residential Wood-other	980	99.3%
Incineration-industrial	902	99.6%
Residential Other-other	606	99.9%
Miscellaneous Industrial Processes-other	231	100.0%
Misc. Fuel Comb. (Except Residential)-other	72	100.0%
Total for VISTAS States	244,654	

TABLE 3-6

**STATE-BY-STATE RANKING OF SO₂ AREA SOURCE EMISSIONS AT THE
TIER 3 CATEGORY LEVEL FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Coal - other	2			1		1	1	1	2	5
Commercial/Institutional Coal - other	4	8	13	4		4	4	5	13	3
Commercial/Institutional Gas - other	15	9	4	10	7	15	12	2	16	12
Commercial/Institutional Oil - other	1	1	1	5	2	6	2	3	3	4
Gas - other	12	11	2	7		16	13	4	10	14
Incineration - industrial	5	14	14	9		13		10	5	
Incineration - other	7	12	11	12		9		14	4	
Misc. Fuel Comb. (Except Residential) - other			15	17				16	17	15
Miscellaneous Industrial Processes - other	13	13	16		4	12	11	15		10
Oil - distillate	3	3	9	2		7	3	7	8	1
Oil - residual	16	2	6	16				6	1	
Open Burning - other	6	6	5	11	8	8	7	11	6	8
Other - other			12	14		2		12	12	2
Other Combustion - other	9	5	3	13	3	11	9	18	11	11
Residential Other - bituminous/subbituminous coal	8			3		5	6	9	14	7
Residential Other - distillate oil	11	4	7	6	1	3	5	8	9	6
Residential Other - other	14	10	10	8	6	14	10	17	15	13
Residential Wood - other	10	7	8	15	5	10	8	13	7	9

TABLE 3-7**NO_x AREA SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)		Cumulative Percent of Total
Gas-natural	89,248	89,248	22.3%
Residential Other-natural gas	79,916	169,164	42.2%
Other Combustion-other	64,896	234,060	58.4%
Coal-other	45,172	279,232	69.6%
Open Burning-other	38,358	317,590	79.2%
Commercial/Institutional Gas-other	26,032	343,622	85.7%
Commercial/Institutional Oil-other	10,718	354,339	88.4%
Oil-distillate	9,369	363,708	90.7%
Oil-residual	7,870	371,578	92.7%
Residential Wood-other	6,956	378,534	94.4%
Residential Other-distillate oil	5,795	384,330	95.8%
Residential Other-other	5,046	389,375	97.1%
Incineration-other	4,467	393,842	98.2%
Commercial/Institutional Coal-other	2,588	396,430	98.9%
Other-other	2,282	398,712	99.4%
Misc. Fuel Comb. (Except Residential)-other	804	399,516	99.6%
Other-wood/bark waste	783	400,300	99.8%
Miscellaneous Industrial Processes-other	559	400,859	100.0%
Gas-process	168	401,027	100.0%
Landfills-other	14	401,041	100.0%
Total for VISTAS States	401,041		

TABLE 3-8

**STATE-BY-STATE RANKING OF NO_x AREA SOURCE EMISSIONS AT THE
TIER 3 CATEGORY LEVEL FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Coal - other	16		5	2			1	3	1	12
Commercial/Institutional Coal - other	17	15	15	8			14	11	15	9
Commercial/Institutional Gas - other	5	6	6	5	4	5	7	2	7	3
Commercial/Institutional Oil - other	12	4	9	11	8		9	8	16	11
Gas - natural	15	2	1	1		4	4	5	2	2
Gas - process	14							18		
Incineration - other	10	14	12	10		7		13	5	
Landfills - other		16								
Misc. Fuel Comb. (Except Residential) - other	11	11	14	16				17	17	16
Miscellaneous Industrial Processes - other	13	17	17		7		13	15		15
Oil - distillate	4	9	11	4			10	10	8	6
Oil - residual	7	7	7	15			3	12	14	
Open Burning - other	3	5	2	6	3	3	2	4	3	4
Other - other	9	12	13	14				16	11	13
Other - wood/bark waste								19	13	14
Other Combustion - other	1	1	4	3	1	2	5	7	9	8
Residential Other - distillate oil	18	8	16	12	5		11	14	6	7
Residential Other - natural gas	2	3	3	7	2	1	6	1	4	1
Residential Other - other	6	13	10	13			12	6	10	5
Residential Wood - other	8	10	8	9	6	6	8	9	12	10

TABLE 3-9**NH3 AREA SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)		Cumulative Percent of Total
Agriculture & Forestry-agricultural livestock	656,346	656,346	85.3%
Agriculture & Forestry-agricultural crops	94,911	751,257	97.7%
POTW-wastewater treatment	15,695	766,952	99.7%
Gas-other	867	767,819	99.8%
Residential Other-other	595	768,415	99.9%
Commercial/Institutional Oil-other	299	768,713	100.0%
Oil-other	179	768,892	100.0%
Commercial/Institutional Gas-other	110	769,002	100.0%
Miscellaneous Industrial Processes-other	17	769,019	100.0%
Coal-other	1	769,020	100.0%
Commercial/Institutional Coal-other	0	769,020	100.0%
Total for VISTAS States	769,020		

TABLE 3-10

**STATE-BY-STATE RANKING OF NH₃ AREA SOURCE EMISSIONS AT THE
TIER 3 CATEGORY LEVEL FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Agriculture & Forestry - agricultural crops	2	2	2	2	2	2	2	2	2	2
Agriculture & Forestry - agricultural livestock	1	1	1	1	1	1	1	1	1	1
Coal - other	9			9		9	10	8	9	
Commercial/Institutional Coal - other				10						
Commercial/Institutional Gas - other	8	8	6	7	5	8	8	5	7	7
Commercial/Institutional Oil - other	5	5	7	8	6	6	6	6	6	8
Gas - other	4	4	4	4		4	4		5	6
Miscellaneous Industrial Processes - other		7					9			
Oil - other	7	9		5		7	7	7	8	4
POTW - wastewater treatment	3	3	3	3	3	3	3	3	3	3
Residential Other - other	6	6	5	6	4	5	5	4	4	5

TABLE 3-11**CO AREA SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Other Combustion-slash/prescribed burning	1,491,954	32.7%
Open Burning-land clearing debris	932,387	53.1%
Other Combustion-forest wildfires	880,244	72.4%
Residential Wood-fireplaces	433,484	81.9%
Residential Wood-woodstoves	265,189	87.7%
Other Combustion-agricultural fires	217,585	92.5%
Open Burning-residential	152,608	95.9%
Residential Wood-other	40,160	96.7%
Residential Other-other	35,022	97.5%
Coal-other	22,348	98.0%
Gas-other	19,250	98.4%
Open Burning-other	16,796	98.8%
Other-other	14,992	99.1%
Other Combustion-other	8,673	99.3%
Commercial/Institutional Gas-other	8,284	99.5%
Incineration-commercial/institutional	5,715	99.6%
Incineration-industrial	4,219	99.7%
Other Combustion-structural fires	3,993	99.8%
Oil-other	3,050	99.9%
Incineration-other	2,532	99.9%
Commercial/Institutional Oil-other	1,638	100.0%
Commercial/Institutional Coal-other	1,282	100.0%
Miscellaneous Industrial Processes-other	359	100.0%
Misc. Fuel Comb. (Except Residential)-other	311	100.0%
Landfills-other	46	100.0%
Total for VISTAS States	4,562,123	

TABLE 3-12

**STATE-BY-STATE RANKING OF CO AREA SOURCE EMISSIONS AT THE
TIER 3 CATEGORY LEVEL FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Coal - other	20		17	8			13	7	5	16
Commercial/Institutional Coal - other	21	22	16	14			16	18	15	17
Commercial/Institutional Gas - other	9	14	11	15	9	13	10	10	18	10
Commercial/Institutional Oil - other	17	13	18	17	12		14	17	20	13
Gas - other	18	10	7	7		10	7	12	11	9
Incineration - commercial/institutional	11	21	13	12		11		15	10	
Incineration - industrial	10	19	12	11				13	14	
Incineration - other		16						11	13	
Landfills - other		17								
Misc. Fuel Comb. (Except Residential) - other	19	18	20	19				21	19	15
Miscellaneous Industrial Processes - other	14	23	21		11		15	19		18
Oil - other	12	15	15	13			11	16	16	11
Open Burning - land clearing debris	3	2	1	2	2	2	2	1	1	2
Open Burning - other	8	11	9	10	7	9	9	9	12	8
Open Burning - residential	5	7	6	6	13	6	4	5	7	4
Other - other	16	20	19	18				20	6	6
Other Combustion - agricultural fires	7	5	10		3	3				
Other Combustion - forest wildfires	2	1	3	1	4	7	5	8	8	3
Other Combustion - other	15	8								14
Other Combustion - slash/prescribed burning	1	3	2	3	1	1	3	2	2	7
Other Combustion - structural fires	13	12	14	16	10	12	12	14	17	12
Residential Other - other	6	9	8	9	8	8	8	6	9	5
Residential Wood - fireplaces	4	6	5	5	6	5	1	4	4	
Residential Wood - other										1
Residential Wood - woodstoves		4	4	4	5	4	6	3	3	

TABLE 3-13

**VOC AREA SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Nonindustrial-consumer solvents	201,918	9.1%
Residential Wood-fireplaces	176,828	17.1%
Other Combustion-slash/prescribed burning	169,353	24.8%
Other Combustion-forest wildfires	131,352	30.8%
Surface Coating-architectural	122,744	36.3%
Service Stations: Stage II-other	118,908	41.7%
Service Stations: Stage I-other	104,221	46.4%
Degreasing-other	89,620	50.5%
Nonindustrial-pesticide application	64,370	53.4%
Open Burning-land clearing debris	63,998	56.3%
Surface Coating-other	60,166	59.0%
Residential Wood-woodstoves	59,272	61.7%
Open Burning-residential	53,864	64.1%
Nonindustrial-adhesives	51,165	66.4%
Polymer & Resin Mfg-synthetic fiber	48,889	68.6%
Surface Coating-wood furniture	47,578	70.8%
Bulk Terminals & Plants-area source: gasoline	46,495	72.9%
Nonindustrial-cutback asphalt	46,364	75.0%
Graphic Arts-other	41,026	76.9%
Residential Wood-other	36,408	78.5%
Surface Coating-industrial adhesives	33,779	80.0%
Surface Coating-metal furniture	29,823	81.4%
Dry Cleaning-petroleum solvent	28,043	82.7%
Surface Coating-auto refinishing	25,671	83.8%
Other Combustion-agricultural fires	24,246	84.9%
Surface Coating-maintenance coatings	23,603	86.0%
Surface Coating-metal cans	23,094	87.0%
Surface Coating-traffic markings	21,911	88.0%
Petroleum Refineries & Related Industries-other	18,897	88.9%
Surface Coating-autos & light trucks	18,725	89.7%
Dry Cleaning-perchloroethylene	16,222	90.5%
Surface Coating-electronic & other electrical	15,870	91.2%
Organic Chemical Mfg-socmi fugitives	13,697	91.8%
Service Stations: Breathing & Emptying-other	13,249	92.4%
Agriculture, Food, & Kindred Products-bakeries	13,018	93.0%
Surface Coating-metal coil	10,474	93.5%
Petroleum & Petroleum Product Transport-other	10,026	93.9%
Surface Coating-large ships	10,013	94.4%
Petroleum & Petroleum Product Storage-other	9,942	94.8%
Surface Coating-large appliances	8,575	95.2%
Agriculture & Forestry-other	7,521	95.5%
Other-other	7,464	95.9%

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Other Industrial-rubber & plastics mfg	7,222	96.2%
Surface Coating-machinery	6,698	96.5%
POTW-other	6,573	96.8%
Residential Other-other	6,530	97.1%
Solvent Utilization NEC-other	5,951	97.4%
Nonindustrial-other asphalt	5,496	97.6%
Surface Coating-paper	5,407	97.9%
Dry Cleaning-other	4,861	98.1%
TSDf-other	4,485	98.3%
Landfills-other	4,208	98.5%
Surface Coating-flatwood products	4,051	98.7%
Incineration-other	3,421	98.8%
Open Burning-other	3,133	99.0%
Oil & Gas Production-other	2,994	99.1%
Bulk Terminals & Plants-other	2,532	99.2%
Other Combustion-other	2,220	99.3%
Coal-other	2,218	99.4%
Miscellaneous Industrial Processes-other	1,656	99.5%
Gas-other	1,605	99.6%
Pharmaceutical Mfg-other	1,422	99.6%
Commercial/Institutional Gas-other	1,081	99.7%
Surface Coating-aircraft	939	99.7%
Graphic Arts-lithographic	925	99.8%
Agriculture, Food, & Kindred Products-other	881	99.8%
Other Combustion-structural fires	732	99.8%
Other-other	648	99.9%
Catastrophic/Accidental Releases-other	519	99.9%
Surface Coating-misc. metal parts	452	99.9%
Surface Coating-railroad	430	99.9%
Oil-other	371	99.9%
Commercial/Institutional Oil-other	233	99.9%
Industrial Waste Water-other	204	100.0%
Graphic Arts-flexographic	202	100.0%
Graphic Arts-letterpress	157	100.0%
Graphic Arts-gravure	152	100.0%
Rubber & Miscellaneous Plastic Products-other	133	100.0%
Commercial/Institutional Coal-other	125	100.0%
Nonindustrial-other	100	100.0%
Misc. Fuel Comb. (Except Residential)-other	80	100.0%
Inorganic Chemical Mfg-other	11	100.0%
Organic Chemical Storage-other	4	100.0%
Total for VISTAS States	2,209,462	

TABLE 3-14

**STATE-BY-STATE RANKING OF VOC AREA SOURCE EMISSIONS AT THE
TIER 3 CATEGORY LEVEL FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Agriculture & Forestry - other				13				21		
Agriculture, Food, & Kindred Products - bakeries	38	34	23	26	40	28	34	29	38	32
Agriculture, Food, & Kindred Products - other		43	46					69	50	
Bulk Terminals & Plants - area source: gasoline	9	15	16	9	3		12	20	21	9
Bulk Terminals & Plants - other		66		41				37	39	
Catastrophic/Accidental Releases - other		44						59	54	
Coal - other	67		64	54			50	53	29	
Commercial/Institutional Coal - other	68	67	63	58			55	65	49	61
Commercial/Institutional Gas - other	56	51	53	56	48	44	48	52	48	53
Commercial/Institutional Oil - other	66	50	67	62	52		54	60	53	60
Degreasing - other	4	7	9	7	16	10	3	7	18	5
Dry Cleaning - other	34		24						33	
Dry Cleaning - perchloroethylene	25	25	32	33	28	26	23	27		31
Dry Cleaning - petroleum solvent	18	18	26	25	24	18	17	17		24
Gas - other	64	48	50	38		42	44	57	46	52
Graphic Arts - flexographic			51							
Graphic Arts - gravure			56							
Graphic Arts - letterpress			55							
Graphic Arts - lithographic			36							
Graphic Arts - other	17	9	27	19	22	22	10	18	15	17
Incineration - other	48	62	47	55		40		46	28	
Industrial Waste Water - other				47						
Inorganic Chemical Mfg - other								64		
Landfills - other	49	45	69	49				40	24	59
Misc. Fuel Comb. (Except Residential) - other	63	60	70	64				67	52	58
Miscellaneous Industrial Processes - other	51	55	58	48	43		52	44		36
Nonindustrial - adhesives	29	5	14	10	15	14	28	9		27
Nonindustrial - consumer solvents	5	1	1	1	2	2	7	1	1	4
Nonindustrial - cutback asphalt	14	14	17	16	12	17	15	19	6	
Nonindustrial - other	52								55	
Nonindustrial - other asphalt	46		60						14	
Nonindustrial - pesticide application	8	24	11	14	4	16	25	16	2	12
Oil - other	60	61	65	51			51	61	51	49
Oil & Gas Production - other	42	56	71	34	34		53	56		21
Open Burning - land clearing debris	11	11	3	17	17	12	11	14	9	10
Open Burning - other	47	46	42	42	41	38	38	51	44	37
Open Burning - residential	15	23	13	11	53	15	4	13	16	8
Organic Chemical Mfg - socmi fugitives	20	42	30	21	42		20	23		14
Organic Chemical Storage - other								68		
Other - other	126	112	134	102		47		77	84	86
Other Combustion - agricultural fires	40	21	43		9	8				
Other Combustion - forest wildfires	3	2	5	2	10	33	14	47	32	6
Other Combustion - other	59	30								57

Tier	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV
Other Combustion - slash/prescribed burning	1	17	2	23	18	1	22	31	26	51
Other Combustion - structural fires	57	49	59	57	47	45	49	55	47	55
Other Industrial - rubber & plastics mfg	44	37	39	36	37	29	27	38		40
Petroleum & Petroleum Product Storage - other	58	53	15	44		49		43	19	50
Petroleum & Petroleum Product Transport - other	55	19	61	53		43		54	20	56
Petroleum Refineries & Related Industries - other	41		62	15	1			36		41
Pharmaceutical Mfg - other	54	57	48		39		41	49		54
Polymer & Resin Mfg - synthetic fiber	21	10	19		49		2	6		
POTW - other	53	39	29	37	44		43	42	30	35
Residential Other - other	35	38	41	45	46	32	42	39	40	28
Residential Wood - fireplaces	2	8	6	3	14	5	1	5	4	
Residential Wood - other										1
Residential Wood - woodstoves		13	8	8	19	9	9	10	8	
Rubber & Miscellaneous Plastic Products - other		54								
Service Stations: Breathing & Emptying - other	31	28	31	31	29	30	29	35	27	29
Service Stations: Stage I - other	22	6	12	6	7	3	6	3	7	2
Service Stations: Stage II - other	7	4	7	4	6	20	5	2	3	7
Solvent Utilization NEC - other	13									13
Surface Coating - aircraft	43	58	54	61	51	48	46	62		46
Surface Coating - architectural	6	3	4	5	8	4	8	4	5	3
Surface Coating - auto refinishing	10	20	18	28	32	27	31	32	22	26
Surface Coating - autos & light trucks	23	33	34	29	21	23	26	25	25	19
Surface Coating - electronic & other electrical	28	31	33	27	31	24	21	30	35	47
Surface Coating - flatwood products	27	52	49	59	45	41	36	58	34	33
Surface Coating - industrial adhesives	19	22	20	18	20	13	13	15		22
Surface Coating - large appliances	30	63	37	22	35	36	45	26	42	38
Surface Coating - large ships	50	36	44	50	27	39	40	50	12	39
Surface Coating - machinery	39	40	45	46	36	34	30	45	37	25
Surface Coating - maintenance coatings	24	27	22	24	25	19	24	24	23	23
Surface Coating - metal cans	32	29	21	32	23	21	39	33	11	16
Surface Coating - metal coil	33	32	35	35	30	31	32	34	36	34
Surface Coating - metal furniture	36	35	38	40	13	11	19	22	10	43
Surface Coating - misc. metal parts										30
Surface Coating - other	12	12	10	12	11	6	18	8	17	15
Surface Coating - paper	45	41	40	52	33	35	33	41		45
Surface Coating - railroad	62	64	57	60	50	46	47	63		48
Surface Coating - traffic markings	26	16	28	20	26	25	35	28	31	20
Surface Coating - wood furniture	16	26	25	30	5	7	16	12	13	11
TSDF – other	37	59	52	43	38	37	37	48	45	18

ON-GOING EFFORTS TO IMPROVE AREA SOURCE INVENTORY

Implications of the NEI Review on Development of Emission Estimates for the VISTAS Region

The data presented above indicates that for a number of source categories, “typical” growth factors may not be sufficient to project the emissions from those sources. With source categories like fugitive dust, wildfires and prescribed burning and agricultural sources representing major components of the emissions of several regional haze pollutants, different types of growth or projection indicators will be needed to develop the 2002 inventory.

On-Going Work By Other RPOs That May Impact VISTAS Emission Inventory Development

MARAMA

MARAMA has started work on a survey designed to update and enhance the current methods for estimating residential wood combustion and open burning activity data. This work was initiated in 2001. A survey design document (dated July 2001) has been developed and is available on the MARAMA website at the following web address:

http://www.marama.org/visibility/combustion_project.pdf

For open burning activity (primarily yard waste) MARAMA’s contractor developed a survey instrument and surveyed local fire wardens and chiefs to collect as much information as possible related to activity data as recommended by the EIIP method (e.g., how many households in a jurisdiction are burning their household or yard waste, how much, and how often, and how does it vary throughout the year, etc.). They also obtained information on rule effectiveness in those areas where open burning was prohibited. A test survey and work plan are available on the MARAMA website at the following web address:

http://www.marama.org/visibility/techmemo_Jan31.pdf

However the final results of the survey have not been posted to the MARAMA website as of the date of this report (the final update of the report was completed in December 2002). Nor has the work related to residential wood combustion been posted. If information on the survey results is available, it may be useful in assisting with developing emissions estimates for these sources for VISTAS, however it will need to be reviewed for applicability to the VISTAS emission inventory effort.

Since ammonia is of particular interest to VISTAS, MARAMA completed a contract with Carnegie Mellon University (CMU) in March 2002 that resulted in an updated version of the CMU ammonia inventory model. That model will be used to develop the emission estimates for this work. The model can be found at the following link:

<http://www.envinst.cmu.edu/nh3/nh3inven.zip>

The user's manual can be found at the following link:

<http://www.envinst.cmu.edu/nh3/cmuh3userguide.pdf>

CenSARA/CenRAP

Current status of work in the CenRAP RPO is unclear at this point. They are currently working on an emission inventory but the status is unclear as is the applicability of the inventory work to the area source component of the VISTAS inventory.

MANE-VU

MANE-VU is affiliated with many of the States in the MARAMA region (as well as NESCAUM and the OTC). A revised Test Survey and Work Plan for Open Burning Emission Inventory development was prepared for MANE-VU and submitted in January 2002. This work is associated with the work discussed in the MARAMA section. The information on the MANE-VU website does not provide additional information on the current status of the work.

WRAP

WRAP has been active in working on several emission inventory issues. In particular their fire emissions committee has been looking at updated information on estimating emissions from prescribed, agricultural, and wildfire emissions. Some of the information developed by WRAP may be applicable and available for use by VISTAS. However, because of the differences in types of fuels and fuel loadings, these data may have limited applicability to VISTAS States.

In addition, WRAP currently has a project underway that is designed to estimate primary particulate emissions from vacant lands in the western U.S. The approach being developed for that work is to use wind tunnel studies to characterize the emission factors along with the soil characteristics of the vacant lands in order to develop a classification scheme that will be used to provide a corresponding emission factor for each vacant land area. Emission estimates will then be developed using these factors and corresponding meteorological information. Estimates of emissions from this category are currently missing from the NEI. It is unlikely that this information will be available in the timeframe required for VISTAS. In addition, since the study will only be looking at wind tunnel studies in the western U.S. and for western soils the applicability to the VISTAS area may be limited. One component of the work that may have some applicability to VISTAS would be information on cropping schedules.

WRAP has also performed an evaluation of fugitive dust sources. The results of the expert panel convened to evaluate fugitive dust sources was published on the WRAP website. The link for that report is:

<http://www.wrapair.org/forums/RDev/projects/dust/FugativeDustFinal.doc>

As a consequence of the WRAP expert panel findings, EPA has been actively working on developing fugitive dust “attenuation “ factors for use by modelers. These factors are designed to take into account the reduction of emissions via impaction and deposition between the emission release point and the actual measurement at ambient monitoring locations. These factors are best applied during emissions modeling, rather than being applied to the inventory itself, but it is possible to apply them to the inventory. Application to the inventory would require additional data on land use and plant species information.

EPA Improvements to the NEI

EPA considers the 1999 NEI version 2 final inventory to be suitable for general use at this time. However, this inventory is not the last 1999 criteria emissions inventory EPA plans to issue. EPA is still working a draft of version 3 of this inventory, which will incorporate data received too late for this version 2, after which EPA will seek comments and corrections and issue a final version 3. Some of the states for which 1999 data were not available when version 2 final was compiled have now provided EPA with their data, and EPA is working to incorporate this data into the next versions. Among the VISTAS states, this includes for area sources Georgia, Mississippi, Tennessee (Davidson county), and Virginia. These data will be incorporated into 1999 version 3 for criteria pollutants.

Also, the 1999 NEI version 2 final inventory includes some estimates by EPA which EPA has since decided to reconsider. Specifically, the estimates for construction related soil dust emissions and for open burning of debris from land clearing for road and building construction will be reconsidered, especially for urban areas. Possibly, the next version of the criteria emissions inventory will incorporate recent or forthcoming emission estimates by the Western Regional Air Partnership for wildfires, prescribed burning, agricultural burning, and unpaved road dust. There may be other revisions at EPA’s initiative.

Potential Remaining Weaknesses with Current Emission Inventories

While reviewing the 1999 NEI and current work being performed by RPOs we looked at the recommendations made for MARAMA as part of the “Assessment of Emissions Inventory Needs for Regional Haze Plans” document to help determine where progress had been made and where needs still exist for inventory improvement. In the executive summary of that report, a number of recommendations for improvement were made. Those recommendations were:

1. Develop an accepted source monitoring method or methods to accurately measure the filterable and condensable fractions of fine particulate matter from additional types of combustion sources;

2. Improve the scientific understanding of the mechanisms that alter or decrease the mass of primary fine particulate matter from fugitive dust sources;
3. Obtain better information about the chemical mechanisms and reactions that control gas-to-particle conversion processes;
4. Develop better emissions factors for ammonia sources;
5. Improve scientific understanding of the nature of ammonia sinks and the interactions between sources and sinks under varying ambient concentrations;
6. Develop improved speciation factors for sources of organic and fine particulate pollutants.

With respect to these areas for improvement, the current 1999 NEI Version 2 evaluated here has addressed item #1 since it now includes limited information concerning both filterable and condensable fractions of fine PM. The PM numbers presented here represent combined estimates of filterable and condensable. Work by WRAP and EPA had started to address item #2, but (as indicated above) should normally be applied during modeling rather than directly to the inventory. Little new work has been performed on items #3, 4, 5 or 6. Most of the work to address weaknesses in the current inventories, especially as it relates to the area source component has focused on improvements to the activity data associated with the emission sources.

Significant changes in the way emissions are estimated for some burning sources have been made in the NEI. In particular emissions from burning of debris for land clearing purposes and residential yard waste burning have resulted in increased emissions from these categories relative to earlier versions of the inventory. Other changes have been made in how some of the fugitive dust categories have been estimated however these categories still represent a substantial fraction of the overall emissions.

RECOMMENDATIONS FOR IMPROVING THE AREA SOURCE INVENTORY

Listed below are our short-term recommendations for developing the area source component of the preliminary 2002 VISTAS regional emission inventory. This is followed by our longer-term recommendations for making future improvements to the inventory. Our recommendations are based on our review of the 1999 NEI Version 2 Final and the various on-going emission inventory improvement activities discussed in Section 4 of this report. The short-term recommendations can be accomplished over the next six months, resulting in a preliminary 2002 inventory that can be fed into an emission model to produce the episode-specific inputs needed for preliminary atmospheric modeling. The longer-term activities can likely be accomplished over the next 2-3 years.

Recommendations for Short-term Activities to Produce VISTAS Preliminary 2002 Area Source Inventory

1. Obtain updated activity data related to fugitive dust sources, primarily paved and unpaved roads, livestock activities and agricultural activity (tilling). Updating the

agricultural activity will also assist in the development of ammonia emissions. In addition, these source categories are not as amenable to using growth factors as some other less important categories so the improvement from obtaining activity data would have a greater impact. Finally, the emission factors for these categories in the NEI tends to change less dramatically from year to year so changes in activity data will provide the greatest impact on estimating emissions in 2002.

2. Obtain updated activity data for fire sources. In particular, activity (and fuel data if available) will provide for updated estimates for wildfires, prescribed burns, residential combustion, and land clearing operations. Each of these sources is important for fine particulate. None of these sources is easily projected using growth factors.
3. Obtain updated activity data for animal operations. Use that data with the CMU ammonia model to provide updated estimates of ammonia from animal operations. Determine (in conjunction with VISTAS) if any of the State supplied data for ammonia emissions should be used to replace ammonia emissions calculated with the CMU model.
4. Conduct QA/QC of State/local agency area source submittals. Review area source submittals to determine how much information submitted matches with the current NEI and to determine if there are significant missing sources. Evaluate the pollutants that are missing that will need to be estimated using alternative means. Evaluate whether or not the State/local submittals provide any new information related to temporal profiles. Work with the point source inventory to assess potential double counting of sources.
5. Provide State/local agencies with the comparison of emissions reported in the 1999 NEI Version 2 Final and the State/local supplied data. Identify gaps and logical inconsistencies. Ask States/local agencies to provide feedback on large scale inconsistencies and on missing sources. Update database with State/local supplied revisions.
6. Review speciation information to determine if there are gaps in the data required to develop a speciated emission inventory. In addition, review older version of NEI to determine speciation factors used to prepare elemental and organic carbon estimates (never published).
7. Convert preliminary 2002 VISTAS inventory from NIF format to format required by the selected emission modeling system.

For those sources not specifically updated with revised activity data or estimates from State/local agencies, growth factors will be produced to provide 2002 emission estimates.

Recommendations for Longer-term Activities to Produce VISTAS Final 2002 Area Source Inventory

1. Establish on-going long term mechanism to collect activity, fuel and other data related to fires. This work may be carried out in conjunction with other agencies.

2. Establish on-going long term mechanism to collect activity data related to unpaved roads. This work may be carried out in conjunction with other agencies.
3. Update ammonia emissions when new emission factors become available from EPA or other agencies for important source categories.
4. Update PM2.5 emissions as new emission factors are prepared by EPA.

SECTION 4

POINT SOURCES

This section discussing point sources is divided into three subsections. First, we provide a summary of the NEI for point sources and describe the important source categories for each pollutant. Second, we summarize the on-going efforts to improve the point source emission estimates that are being conducted by other Regional Planning Organizations, the U.S. EPA, and other Federal agencies. Finally, based on what we learned from the NEI review and the on-going emission improvement activities, we recommend specific short-term and long-term activities that can be undertaken to improve the point source emission inventory in the VISTAS region.

EMISSION SUMMARY

Table 4-1 summarizes point source emissions for each state in the VISTAS region. The table has three summaries – total emissions, utility emissions, and non-utility emissions. The table shows that emissions of SO₂ and NO_x are predominantly generated by utilities, while the non-utility sector generates most of the PM₁₀, PM_{2.5}, CO, VOC and ammonia.

Tables 4-2 to 4-8 provide information on emissions and the ranking of each Tier 3 category within each State in the VISTAS region. The tables show emissions solely from point sources, grouped by EPA Tier 3 category. The Tier 3 resolution of these tables is more detailed than that presented earlier in Tables 2-1 through 2-7. Emission tables for each individual VISTAS State are presented in Appendix B. Each table in the appendix is presented in the same pollutant order as those presented here.

PM₁₀

Table 4-1 shows the PM₁₀ emissions for all point sources across the VISTAS region. This table shows that there are a variety of important fuel combustion and industrial process point source categories. While utility coal combustion is the largest single category, other utility fuel combustion (oil, natural gas, internal combustion) and industrial fuel combustion (coal, oil, wood, natural gas, bagasse) are also significant. In total, utility fuel combustion accounts for 27% of the total point source PM₁₀ emissions, while industrial fuel combustion accounts for 20% of the total. Several industrial process categories are also significant – pulp & paper, mineral products, ferrous metals, non-ferrous metals, and chemical manufacturing/storage.

PM_{2.5}

Table 4.2 shows the PM_{2.5} emissions for all point sources across the VISTAS region. The important PM_{2.5} source categories are the same as the important PM₁₀ source categories. Utility fuel combustion accounts for 25% of the total point source PM_{2.5} emissions, while industrial fuel combustion accounts for 22% of the total. Several

industrial process categories are also significant – pulp & paper, mineral products, ferrous metals, non-ferrous metals, and chemical manufacturing/storage.

Sulfur Dioxide

Table 4-3 shows the emissions for SO₂ from area sources in the VISTAS region. This table clearly shows that the majority of emissions (about 75%) come from coal combustion at electric utilities. Other combustion at utilities accounts for another 9% of the total. Industrial fuel combustion accounts for about 9% of the total SO₂.

Oxides of Nitrogen

Table 4-4 shows the emissions for NO_x from area sources in the VISTAS region. Coal combustion at electric utilities again is the dominant source category, accounting for 62% of the total NO_x emissions. Other combustion at utilities accounts for another 9% of the total. Industrial fuel combustion, including internal combustion units, accounts for about 20% of the total NO_x.

Ammonia

NH₃ emissions for the VISTAS region are shown in Table 4-5. NH₃ emissions are predominantly derived from the manufacture of agricultural chemicals. Over 72% of all point source NH₃ emissions come from this source category. Smaller but significant amounts of ammonia are emitted from utility and industrial internal combustion units, presumably resulting from “ammonia slip” from use of selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) to reduce emissions of NO_x from stationary sources. As will be discussed later, there is a large degree of uncertainty associated with point source ammonia emissions.

Carbon Monoxide

CO emissions from point sources in the VISTAS region are summarized in Table 4-6. This table shows that there are a variety of important fuel combustion and industrial process point source categories. The wood products/pulp & paper industry is the largest source category, accounting for 21% of the total CO emissions. Industrial fuel combustion (wood and bagasse) and chemical manufacturing are the next largest source categories, each accounting for roughly 12% of the total CO. Utility coal combustion and several industrial process categories are also significant – chemical manufacturing, non-ferrous metals, ferrous metals, and mineral products.

Volatile Organic Compounds

VOC emissions from point sources in the VISTAS region are shown in Table 4-7. This table shows that VOC emissions arise from a number of categories. Surface coating is the largest VOC-emitting category, accounting for about 25% of the total VOC. But there are also a wide variety of other industrial processes that are important.

TABLE 4-1

**SUMMARY OF POINT SOURCE EMISSIONS BY STATE
FROM 1999 NEI VERSION 2 FINAL**

All Point Sources (tons/year)							
State	SO2	NOx	VOC	CO	PM2.5	PM10	NH3
AL	653,198	288,834	70,359	168,456	27,149	37,128	4,015
FL	815,639	391,589	49,003	172,444	54,238	70,583	1,677
GA	596,291	244,631	36,069	178,723	41,645	55,495	15,794
KY	701,844	359,896	66,892	105,054	17,553	28,816	579
MS	213,125	184,415	60,732	70,401	29,793	41,156	27,867
NC	525,264	267,689	87,675	79,461	22,519	34,866	950
SC	285,933	138,236	35,386	58,907	11,941	17,897	1,053
TN	604,652	286,098	120,993	108,030	27,241	35,718	113
VA	304,139	174,564	49,716	76,011	12,657	18,364	777
WV	<u>755,387</u>	<u>339,371</u>	<u>22,433</u>	<u>112,572</u>	<u>12,128</u>	<u>17,169</u>	<u>486</u>
Total	5,455,472	2,675,323	599,258	1,130,059	256,864	357,192	53,311
Utility Point Source Emissions (tons/year)							
State	SO2	NOx	VOC	CO	PM2.5	PM10	NH3
AL	542,657	186,387	2,235	11,515	1,743	3,764	16
FL	741,336	336,362	2,519	48,648	22,847	31,883	1,176
GA	513,541	175,996	1,009	8,404	4,929	9,493	35
KY	662,812	307,077	1,401	11,973	3,571	6,184	16
MS	142,500	81,394	2,134	17,300	6,974	7,438	5,618
NC	380,687	139,160	808	8,753	9,454	15,762	14
SC	228,515	93,227	418	6,656	4,770	8,729	9
TN	473,921	189,137	1,068	7,219	7,732	9,219	10
VA	234,568	103,783	735	7,244	2,157	3,558	86
WV	<u>697,614</u>	<u>287,444</u>	<u>1,162</u>	<u>10,154</u>	<u>435</u>	<u>895</u>	<u>16</u>
Total	4,618,151	1,899,967	13,489	137,866	64,612	96,925	6,996
Non-Utility Point Source Emissions (tons/year)							
State	SO2	NOx	VOC	CO	PM2.5	PM10	NH3
AL	110,541	102,447	68,124	156,941	25,406	33,364	3,999
FL	74,303	55,227	46,484	123,796	31,391	38,700	501
GA	82,750	68,635	35,060	170,319	36,716	46,002	15,759
KY	39,032	52,819	65,491	93,081	13,982	22,632	563
MS	70,625	103,021	58,598	53,101	22,819	33,718	22,249
NC	144,577	128,529	86,867	70,708	13,065	19,104	936
SC	57,418	45,009	34,968	52,251	7,171	9,168	1,044
TN	130,731	96,961	119,925	100,811	19,509	26,499	103
VA	69,571	70,781	48,981	68,767	10,500	14,806	691
WV	<u>57,773</u>	<u>51,927</u>	<u>21,271</u>	<u>102,418</u>	<u>11,693</u>	<u>16,274</u>	<u>470</u>
Total	837,321	775,356	585,769	992,193	192,252	260,267	46,315

TABLE 4-2

**PM10 POINT SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Utility – coal	59,701	16.7
Wood, Pulp & Paper	51,469	31.1
Industrial - other fuel (wood, bagasse)	36,738	41.4
Mineral Products	29,307	49.6
Utility – oil	20,160	55.3
Ferrous Metals Processing	17,879	60.3
Non-Ferrous Metals	16,884	65.0
Industrial - natural gas	13,120	68.7
Other Chemical Storage	11,952	72.0
Industrial – coal	10,312	74.9
Utility - int. comb.	9,541	77.6
Chemical Manufacturing	9,485	80.2
Petroleum Storage/Transport	9,478	82.9
Industrial - oil	8,713	85.3
Miscellaneous	8,104	87.6
Agriculture/Food Products	7,334	89.6
Utility - natural gas	6,716	91.5
Petroleum Refineries	4,889	92.9
Metals Processing	3,627	93.9
Misc. Industrial Process	3,173	94.8
Machinery Products	3,025	95.6
Misc fuel combustion	2,459	96.3
Agricultural Chemical Mfg	2,293	97.0
Rubber	2,219	97.6
Industrial - int. comb.	1,632	98.0
Surface Coating	1,365	98.4
Incineration	1,337	98.8
Textiles/Leather/Apparel	985	99.1
Utility - other fuel	807	99.3
Comm/Inst - nat gas	659	99.5
Comm/Inst - coal	491	99.6
Landfills	318	99.7
Comm/Inst - oil	256	99.8
Other Solvent Use	157	99.8
Open Burning	131	99.9
Graphic Arts	124	99.9
Transportation Equipment	92	99.9
Waste Disposal - Other	91	100.0
All Other Point Sources	179	100.0
PM10 Total	357,192	

TABLE 4-3

**PM2.5 POINT SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Wood, Pulp & Paper	42,779	16.7
Utility - coal	32,578	29.3
Industrial - other fuel	32,356	41.9
Mineral Products	16,784	48.5
Ferrous Metals Processing	15,806	54.6
Utility - oil	15,433	60.6
Non-Ferrous Metals	13,254	65.8
Industrial - natural gas	12,718	70.7
Utility - int. comb.	9,519	74.4
Chemical Manufacturing	8,079	77.6
Petroleum Storage/Transport	6,827	80.3
Industrial - oil	6,581	82.8
Utility - natural gas	6,501	85.3
Other Chemical Storage	5,528	87.5
Industrial - coal	4,794	89.4
Miscellaneous	4,792	91.2
Agriculture/Food Products	3,568	92.6
Metals Processing	3,284	93.9
Petroleum Refineries	2,546	94.9
Misc fuel combustion	2,089	95.7
Machinery Products	1,834	96.4
Agricultural Chemical Mfg	1,731	97.1
Industrial - int. comb.	1,602	97.7
Rubber	1,600	98.3
Incineration	1,064	98.7
Textiles/Leather/Apparel	709	99.0
Comm/Inst - nat gas	649	99.3
Utility - other fuel	581	99.5
Comm/Inst - coal	297	99.6
Misc. Industrial Process	266	99.7
Landfills	206	99.8
Comm/Inst - oil	168	99.9
Open Burning	98	99.9
Transportation Equipment	68	99.9
Waste Disposal - Other	48	100.0
Oil & Gas Production	32	100.0
Pharmaceutical Mfg	25	100.0
Industrial Waste Water	25	100.0
All Other Point Sources	45	100.0
PM2.5 Total	256,863	

TABLE 4-4

**SO2 POINT SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions	Cumulative
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	(tons/year)	Percent of Total
Utility – coal	4,134,176	75.8
Industrial - coal	335,562	81.9
Utility - oil	315,809	87.7
Utility - natural gas	118,469	89.9
Industrial - oil	82,398	91.4
Wood, Pulp & Paper	71,109	92.7
Chemical Manufacturing	66,644	93.9
Oil & Gas Production	55,710	94.9
Mineral Products	44,506	95.8
Industrial - natural gas	43,622	96.6
Utility - int. comb.	36,213	97.2
Non-Ferrous Metals	27,460	97.7
Petroleum Refineries	24,986	98.2
Industrial - other fuel	23,026	98.6
Misc. Industrial Process	17,881	98.9
Ferrous Metals Processing	16,503	99.2
Utility - other fuel	13,485	99.5
Comm/Inst - coal	10,461	99.7
Metals Processing	4,539	99.8
Misc fuel combustion	2,146	99.8
Incineration	2,003	99.8
Comm/Inst - oil	1,998	99.9
Petroleum Storage/Transport	1,575	99.9
Agriculture/Food Products	1,297	99.9
Comm/Inst - nat gas	1,284	100.0
Industrial - int. comb.	1,048	100.0
Agricultural Chemical Mfg	355	100.0
Pharmaceutical Mfg	318	100.0
Textiles/Leather/Apparel	267	100.0
Landfills	181	100.0
Other Chemical Storage	165	100.0
Machinery Products	134	100.0
Surface Coating	83	100.0
Industrial Waste Water	21	100.0
Graphic Arts	14	100.0
Other Solvent Use	7	100.0
Service Stations	5	100.0
All Other Point Sources	12	100.0
SO2 Total	5,455,473	

TABLE 4-5**NO_x POINT SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Utility – coal	1,653,624	61.8
Industrial - int. comb.	191,686	69.0
Industrial – coal	185,496	75.9
Utility – oil	98,112	79.6
Utility - natural gas	86,831	82.8
Industrial - natural gas	85,132	86.0
Mineral Products	80,070	89.0
Industrial - other fuel	51,293	90.9
Wood, Pulp & Paper	49,550	92.8
Utility - int. comb.	42,521	94.4
Industrial - oil	25,431	95.3
Comm/Inst - nat gas	23,667	96.2
Utility - other fuel	18,881	96.9
Chemical Manufacturing	17,736	97.6
Misc fuel combustion	14,429	98.1
Ferrous Metals Processing	11,649	98.5
Petroleum Refineries	9,623	98.9
Agricultural Chemical Mfg	7,124	99.2
Misc. Industrial Process	4,680	99.3
Comm/Inst - coal	4,618	99.5
Incineration	2,814	99.6
Non-Ferrous Metals	2,149	99.7
Surface Coating	2,017	99.8
Oil & Gas Production	1,606	99.8
Comm/Inst - oil	1,513	99.9
Agriculture/Food Products	952	99.9
Landfills	455	99.9
Textiles/Leather/Apparel	324	99.9
Machinery Products	322	100.0
Graphic Arts	175	100.0
Metals Processing	147	100.0
Bulk Terminal/Plants	136	100.0
Rubber	129	100.0
Petroleum Storage/Transport	74	100.0
Other Chemical Storage	69	100.0
Waste Disposal - Other	63	100.0
Pharmaceutical Mfg	57	100.0
All Other Point Sources	170	100.0
NO_x Total	2,675,321	

TABLE 4-6**AMMONIA POINT SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Agricultural Chemical Mfg	38,504	72.2
Utility - int. comb.	5,507	82.6
Industrial - natural gas	2,618	87.5
Industrial - int. comb.	1,163	89.6
Agriculture/Food Products	1,046	91.6
Utility - oil	815	93.1
Ferrous Metals Processing	743	94.5
Wood, Pulp & Paper	539	95.5
Utility - natural gas	449	96.4
Petroleum Refineries	423	97.2
Chemical Manufacturing	346	97.8
Industrial - oil	218	98.2
Utility - coal	209	98.6
Misc. Industrial Process	198	99.0
Mineral Products	65	99.1
Surface Coating	62	99.2
Industrial - other fuel	57	99.3
Textiles/Leather/Apparel	55	99.4
Industrial Waste Water	49	99.5
Graphic Arts	39	99.6
Comm/Inst - nat gas	37	99.7
Industrial - coal	37	99.8
Bulk Terminal/Plants	29	99.8
Pharmaceutical Mfg	25	99.9
Utility - other fuel	16	99.9
Rubber	11	99.9
Other Solvent Use	10	99.9
Comm/Inst - oil	9	99.9
Misc fuel combustion	6	99.9
Other Chemical Storage	4	100.0
Non-Ferrous Metals	4	100.0
Incineration	4	100.0
TSDF	4	100.0
Machinery Products	3	100.0
Petroleum Storage/Transport	3	100.0
Metals Processing	3	100.0
Oil & Gas Production	1	100.0
Comm/Inst - coal	1	100.0
NH3 Total	53,310	

TABLE 4-7

**CO POINT SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Wood, Pulp & Paper	238,196	21.1
Industrial - other fuel	140,330	33.5
Chemical Manufacturing	134,451	45.4
Non-Ferrous Metals	98,350	54.1
Utility - coal	69,508	60.2
Ferrous Metals Processing	59,491	65.5
Mineral Products	53,708	70.3
Surface Coating	50,568	74.7
Industrial - int. comb.	34,763	77.8
Petroleum Refineries	34,498	80.9
Industrial - natural gas	33,712	83.9
Utility - oil	30,659	86.6
Industrial - coal	24,556	88.7
Metals Processing	22,624	90.7
Utility - int. comb.	18,199	92.4
Misc. Industrial Process	15,040	93.7
Utility - other fuel	11,155	94.7
Misc fuel combustion	10,263	95.6
Oil & Gas Production	9,761	96.4
Utility - natural gas	8,344	97.2
Industrial - oil	8,072	97.9
Comm/Inst - nat gas	5,926	98.4
Agriculture/Food Products	4,717	98.8
Incineration	3,525	99.1
Landfills	2,452	99.4
Comm/Inst - coal	2,321	99.6
Agricultural Chemical Mfg	1,879	99.7
Other Chemical Storage	830	99.8
Comm/Inst - oil	447	99.8
Machinery Products	328	99.9
Transportation Equipment	328	99.9
Open Burning	299	99.9
Textiles/Leather/Apparel	150	99.9
Bulk Terminal/Plants	131	100.0
Rubber	106	100.0
All Other Point Sources	373	100.0
CO Total	1,130,060	

TABLE 4-8

**VOC POINT SOURCE EMISSION SUMMARY FOR VISTAS STATES
FROM 1999 NEI VERSION 2 FINAL**

Source Category	Emissions (tons/year)	Cumulative Percent of Total
Surface Coating	151,401	25.3
Chemical Manufacturing	84,296	39.3
Wood, Pulp & Paper	77,618	52.3
Agriculture/Food Products	37,902	58.6
Graphic Arts	33,974	64.3
Misc. Industrial Process	26,087	68.6
Rubber	18,186	71.7
Other Solvent Use	17,925	74.7
Industrial - other fuel	15,735	77.3
Petroleum Storage/Transport	13,527	79.5
Textiles/Leather/Apparel	12,724	81.7
Industrial - int. comb.	8,826	83.1
Utility - coal	8,604	84.6
Petroleum Refineries	7,664	85.9
Landfills	7,626	87.1
Bulk Terminal/Plants	7,619	88.4
Mineral Products	7,554	89.7
Non-Ferrous Metals	7,284	90.9
Machinery Products	7,270	92.1
Ferrous Metals Processing	7,269	93.3
Industrial - natural gas	6,540	94.4
Other Chemical Storage	6,447	95.5
Degreasing	3,598	96.1
Comm/Inst - nat gas	2,766	96.5
Utility - int. comb.	2,642	97.0
Oil & Gas Production	1,971	97.3
Agricultural Chemical Mfg	1,846	97.6
Misc fuel combustion	1,500	97.9
Transportation Equipment	1,446	98.1
Industrial - coal	1,318	98.3
Waste Disposal - Other	1,261	98.5
Utility - oil	1,207	98.7
Industrial - oil	1,036	98.9
POTW	801	99.0
Metals Processing	799	99.2
Pharmaceutical Mfg	785	99.3
Service Stations	625	99.4
Incineration	620	99.5
All Other Point Sources	2,959	99.6
VOC Total	599,259	

ON-GOING EFFORTS TO IMPROVE POINT SOURCE INVENTORY

EPA Improvements to the NEI

EPA considers the 1999 NEI Version 2 Final inventory to be suitable for general use at this time. However, this inventory is not the last 1999 criteria emissions inventory EPA

plans to issue. EPA is still working a draft of Version 3 of this inventory, which will incorporate data received too late for this Version 2, after which EPA will seek comments and corrections and issue a final Version 3. Some of the states for which 1999 data were not available when Version 2 Final was compiled have now provided EPA with their data, and EPA is working to incorporate this data into the next versions. Among the VISTAS states, this includes Georgia and Tennessee for point sources. Also, the 1999 NEI Version 2 Final inventory includes some estimates by EPA which EPA has since decided to reconsider. However, none of these revaluations by EPA appear to affect point sources. Since we have received more recent point source submittals from both Georgia and Tennessee, it appears that EPA's work on Version 3 of the 1999 inventory will not impact the development of VISTAS point source inventory.

EPA is also beginning work on the development of the 2002 inventory. Our current understanding of the schedule is as follows.

- December 2003 – EPA plans to release preliminary 2002 NEI based on emissions projected to 2002 (from 99NEI V3), 2002 CEM Utility Data (SO₂ and NO_x), and 2002 Onroad/Nonroad emissions from OTAQ.
- June 2004 - state submissions under Consolidated Emission Reporting Rule, States are required to submit a comprehensive (point, area, mobile) three year inventory for the year 2002.
- Fall 2004 – EPA incorporates CERR data and releases draft final 2002 NEI .

The final 2002 NEI is not likely to be completed until June 2005.

Availability of Point Source Data from the States

As mentioned above, States are not required to submit 2002 point source inventory data to EPA until June 2004. Most States will receive 2002 submittals from industry in the Spring of 2003, and will need some time to process and quality assure the submittals. Some States may be able to provide 2002 point source available prior to the June 2004 reporting deadline. However, it is unlikely that quality assured 2002 point source data would be available from the States until late in calendar year 2003, at the earliest.

In lieu of 2002 data, States were asked to submit their most recent inventory for inclusion in developing the VISTAS inventory to support preliminary modeling of regional haze episodes occurring in the 2000-2002 time frame. The submittals received are identified in Table 4-9.

TABLE 4-9**STATE AND LOCAL AGENCY POINT SOURCE SUBMITTALS
FOR THE PRELIMINARY 2002 VISTAS EMISSION INVENTORY**

State	Agency	Comments	Year
AL	AL DEM	Sent 1999 NEI data, both the original submittal and selected revisions.	1999
AL	City of Huntsville	Sent data in an XLS; not in NIF format. May be able to use data to update larger sources manually.	2000
AL	Jefferson County	Indicated that we should use 1999 NEI for smaller sources and provided 2000 data for large (>250 tpy) sources.	2000
FL	FL DEP	Sent 2001 point source for entire State	2001
GA	GA DNR	Sent 1999 data for Atlanta area (VOC, NOx, CO only) and 1999 data for three GA areas (Augusta, Columbus, Macon). Indicated that the 1999 NEI should be used for other counties.	1999
KY	KY DEP	Sent 2001 inventory	2001
KY	Jefferson County	Sent 1999 data in NIF format	1999
MS	MS DEQ	Sent point source file for 2001 in NIF format	2001
NC	NC DENR	Provided 2000 data for major sources only, use 1999 for other sources with permits.	2000
NC	Forsyth County	Use 1999 NEI	1999
NC	Mecklenburg County	Cannot create NEI format; need to contact after looking at 1999 NEI	
NC	Western NC Regional	Sent an XLS; not in NIF format, may be able to use to update larger sources.	
SC	SC DHEC	Sent 1999 data in NIF format	1999
TN	TN DEC	Carol Norman UT Knoxville sent file in NIF format	1999
TN	Chattanooga-Hamilton County	Nothing	
TN	Knox County	Sent data in NIF ACCESS format	1999
TN	Memphis-Shelby County	Sent 1999 point source data in NIF format	1999
TN	Nashville Metro	Sent 1999 point source data in NIF	1999

State	Agency	Comments	Year
		format	
VA	VA DEQ	Sent 2001 inventory in NIF .txt format; all facilities >10 tpy; no PM2.5 or ammonia	2001
WV	WV DEP	Sent 1999 inventory for all sources; sent 2000 inventory for major Title V point sources	2000

CEM Data Availability

The following describes EPA's plan for making CEM data available (obtained from [EPA's Clean Air Markets - Description of Preliminary Summary Emissions Reports](#))

- Each quarter electric utilities are required to submit a data file to the EPA. This file contains detailed hourly information on SO₂, NO_X, and CO₂ emissions, unit heat input (the caloric value of the fuel burned), operating parameters, plant configuration, and continuous emission monitor (CEM) quality assurance. This file also contains summary emissions and heat input data.
- These data files are subjected to automated quality screening when they are submitted to the EPA. If a serious reporting problem is detected, the file is rejected and the utility is required to correct the problem and resubmit the file. "Serious" problems are ones that do not allow EPA to read or interpret the meaning of the data.
- During the screening process, many calculations and summations included in the reports are checked for accuracy. If there is an inconsistency between a utility calculation and an EPA calculation, generally EPA "accepts" the higher of the different values. These accepted values are the numbers included in the Summary Emissions Reports.
- The Clean Air Markets Division makes every attempt to have these Summary Emissions Reports posted on the Clean Air Markets Division's web page 21 days after the reporting deadline for utilities. At the end of each calendar quarter, the utilities are given 30 days to compile and submit their data files. Adding another 20-21 days for EPA to process the data and assemble the summary reports means that preliminary 2002 data would be posted on February 21, 2003 at the earliest. The data may be posted slightly later if unforeseen complications arise.
- Once the EPA can perform rigorous quality assessment of the reported data, the final reports are released as "scorecards" and "compliance reports." For 2002 data, these final reports will be released in the October/November time frame.

Thus, preliminary data to update the VISTAS inventory with 2002 CEM data may be available as early as the end of February. The final data will not be released until the fall of 2003.

Raw hourly data is also available from the Clean Air Markets Division. However, we do not envision obtaining the hourly data since we will be compiling annual emissions. Hourly data from the CEM database are typically extracted during the emissions modeling process once specific episodes have been selected. The RPOs have been working on developing data exchange protocols for hourly CEM data to provide all necessary modeling information for ozone, PM-2.5, Regional Haze and acid rain

modeling by combining the NEI and ETS/CEM data sets (see: <http://www.ladco.org/emis/protocol/manevu cems.pdf>).

Ammonia Emissions

Although the 1999 NEI contains ammonia emissions for point sources, it is generally thought that these emission estimates are inadequate. Most of the ammonia point source emission estimates were originally developed for the 1985 NAPAP inventory, and have been continually “grown” to the current year.

Comparing the 1999 NEI ammonia emissions with the 1999 ammonia emissions reported in the EPA’s Toxic Release Inventory (TRI) demonstrates the considerable uncertainty associated with point source ammonia emissions. Table 4-10 summarizes the ammonia emissions for large point sources (i.e., facilities with ammonia emissions greater than 100 tons/year as reported in either the 1999 NEI Version 2, the 1999 TRI, or the 2000 TRI). There seems to be little or no correspondence between the emission estimates in the 1999 NEI and the 1999/2000 TRI. There are four very large sources in 1999 NEI with ammonia emissions greater than 3,000 tons/year, yet the TRI reported ammonia emissions for these facilities are much lower. Likewise, there are many facilities reporting more than 100 tons/year of ammonia emissions to TRI that have little or no ammonia emissions in the 1999 NEI.

EPA recognizes the need to provide better ammonia emissions estimates. Resources from the Emission Inventory Improvement Program (EIIP) will be used to conduct this project. Roy Huntley of EPA provided the following description of the project:

- “The project requires updating information in Chapter 4 (*Ammonia Emissions in Industry*) and Chapter 5 (*Ammonia Emissions from Combustion*) of the Battye Report (*Development and Selection of Ammonia Emission Factors* dated August 1994 by EC/R). This will involve consulting the literature, working with state and local agencies across the country to update NH₃ emissions for stationary source categories identified in these chapters, and extracting information from EPA’s Toxics Release Inventory System (TRIS). The TRI is expected to be a valuable resource since many sources and updated emissions information are expected to have been added since publication of the Battye report. Particular attention should be paid to information presented in Table 4-6 [*List of Discrete Major Sources (>90.72 Mg or >100 tons) of Ammonia with No Applicable Emission Factors*]. One goal of this project is to update Table 4-6 by identifying newly available emission factors for these sources and source types. When updating Chapter 5, one area of focus should be on Section 5.4 regarding “ammonia slip” from use of selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) to reduce emissions of NO_x from stationary sources.”

Mr. Huntley is leading this project, which is scheduled to begin in January 2003. Improved emission factors are not likely to be available until the fall of 2003, at the earliest.

TABLE 4-10

**COMPARISON OF AMMONIA EMISSIONS (tons/year)
FOR LARGE POINT SOURCES**

STATE	COUNTY	FACILITY NAME	SIC	1999 NEI	1999 TRI	2000 TRI
AL	COLBERT	EL DORADO CHEMICAL COMPANY CHEROKEE	2873	3,506	0	0
AL	COLBERT	TVA ENVIRONMENTAL RESEARCH CENTER	8733	103	0	0
AL	COLBERT	WISE ALLOYS L.L.C. - ALABAMA R	3341	0	361	306
AL	ETOWAH	GULF STATES STEEL	3312	129	3	0
AL	MOBILE	KIMBERLY-CLARK TISSUE	2621	116	25	0
AL	MONROE	ALABAMA RIVER PULP CO. INC.	2611	0	150	165
AL	RUSSELL	MEAD COATED BOARD INC.	2631	5	102	99
AL	RUSSELL	OWENS-CORNING HT INC.	3296	0	93	120
FL	BROWARD	FLORIDA POWER & LIGHT (PPE)	4911	119	0	0
FL	HAMILTON	PCS PHOSPHATE - WHITE SPRINGS	2819	0	152	122
FL	HILLSBOROUGH	CF INDS. INC., PLANT CITY PHOS	2874	98	101	122
FL	HILLSBOROUGH	NITRAM, INC.	2873	52	177	161
FL	MANATEE	FLORIDA POWER & LIGHT (PMT)	4911	133	0	0
FL	PASCO	FLORIDA POWER COMPANY	4911	107	0	0
FL	POLK	CF IND. INC. BARTOW PHOSPHATE	2874	9	295	190
FL	POLK	FARMLAND HYDRO L.P.	2819	15	370	350
FL	POLK	IMC-AGRICO CO. NEW WALES PLANT	2874	14	505	400
FL	POLK	U.S. AGRI-CHEMICALS CORP.	2874	113	98	93
FL	SANTA ROSA	AIR PRODS. & CHEMICALS INC.	2869	85	240	220
FL	TAYLOR	BUCKEYE FLORIDA L.P.	2611	0	106	100
GA	BARROW	JOHNS MANVILLE INTL.	3296	0	80	107
GA	BIBB	RIVERWOOD INTL. CORP.	2611	4	105	90
GA	CHATHAM	PCS NITROGEN FERTILIZER L.P.	2873	3,044	5	0
GA	CHATHAM	UNION CAMP CORP.	2611	0	82	1,068
GA	CLARKE	CERTAINTED CORP.	3296	0	239	148
GA	DECATUR	ENGELHARD CORP. ATTAPULGUS OPS	2873	1	1,506	1,448
GA	DECATUR	IMC AGRIBUSINESS INC.	2873	655	0	0
GA	FLOYD	INLAND PAPERBOARD & PACKAGING	2611	16	247	256
GA	FULTON	OWENS-CORNING	3296	0	152	131
GA	GLYNN	GEORGIA-PACIFIC CORP. BRUNSWIC	2611	0	103	106
GA	RICHMOND	INTERNATIONAL PAPER	2631	17	180	175
GA	RICHMOND	PCS NITROGEN FERTILIZER L.P.	2873	11,840	751	767
GA	WAYNE	RAYONIER, SPECIALTY PULP PRODS	2611	3	125	135
KY	BOYD	MARATHON ASHLAND PET LCC	2911	345	0	0
KY	JEFFERSON	S_D-CHEMIE INC. SOUTH PLANT	2819	0	234	123
KY	JEFFERSON	SUD-CHEMIE INC. WEST PLANT	2819	0	161	86

Note: Includes all facilities in the VISTAS region with ammonia emissions of 100 tons per year or greater, as reported in either the 1999 NEI Version 2, the 1999 TRI, or the 2000 TRI.

TABLE 4-10 (continued)

STATE	COUNTY	FACILITY NAME	SIC	1999 NEI	1999 TRI	2000 TRI
MS	ADAMS	ETHYL CORP.	2869	0	158	85
MS	JACKSON	CHEVRON USA	2911	567	24	0
MS	JACKSON	MISSISSIPPI PHOSPHATES CORP.	2874	0	20	166
MS	MONROE	KERR-MCGEE CHEMICAL L.L.C. ELE	2816	0	81	146
MS	PERRY	LEAF RIVER FOREST PRODS.	2611	0	204	194
MS	WARREN	ERGON REFINING INC.	2911	0	651	327
MS	YAZOO	MISSCHEM NITROGEN L.L.C.	2873	27,041	384	545
NC	BEAUFORT	PCS PHOSPHATE CO. INC. AURORA	2819	0	765	665
NC	COLUMBUS	INTERNATIONAL PAPER	2611	149	191	121
NC	FORSYTH	R.J.R. TOBACCO CO., WHITAKER P	2111	0	2	116
NC	HAYWOOD	BLUE RIDGE PAPER PRODS. INC.	2621	59	250	250
NC	MARTIN	WEYERHAEUSER CO., PLYMOUTH NC	2611	108	170	195
SC	CALHOUN	DEVRO-TEEPAK, INC.	2013	860	855	765
TN	HUMPHREYS	INLAND PAPERBOARD & PACKAGING	2611	0	205	90
TN	SHELBY	ENENCO INC.	2843	0	108	111
TN	SHELBY	PCS NITROGEN FERTILIZER L.P.	2873	0	2,133	1,510
TN	SHELBY	WITCO CORP.	2099	0	107	185
VA	ALLEGHANY	WESTVACO OF VIRGINIA. INC.	2631	0	135	145
VA	BUCHANAN	JEWEL COKE COMPANY LLP	3312	379	0	0
VA	CHESTERFIELD	CARTER-WALLACE INC.	3069	0	235	262
VA	HOPEWELL CITY	HONEYWELL INTL. INC. HOPEWELL	2819	16	2,248	2,077
VA	ISLE OF WIGHT	INTERNATIONAL PAPER FRANKLIN	2611	3	85	115
VA	RICHMOND CITY	PHILIP MORRIS USA - BL/LPF/TQA	2141	0	600	460
VA	YORK	BP AMOCO YORKTOWN REFY.	2911	243	109	65
WV	BOONE	HOBET MINING INC.	1221	0	95	232
WV	BROOKE	WHEELING-PITTSBURGH STEEL	3312	340	31	0
WV	KANAWHA	CATENARY COAL CO.	1221	0	143	269

Note: Includes all facilities in the VISTAS region with ammonia emissions of 100 tons per year or greater, as reported in either the 1999 NEI Version 2, the 1999 TRI, or the 2000 TRI.

PM2.5 Emission Factors

For the most part, PM2.5 emissions in the 1999 NEI Version 2 were calculated by EPA using its data augmentation procedure (see Appendix A of [Pt_doc99v2_Oct02.pdf on ftp.epa.gov](#) for details). EPA states that the most significant uncertainty associated with the PM augmentation procedures is the 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 is lacking. Thus, S/L/T agencies should conduct research to prioritize source categories of fine PM emissions and focus on improving the data needed to estimate fine PM emissions for the highest priority categories.

EPA is initiating work to improve PM2.5 emission factors. According to Roy Huntley, a scoping study has been completed that recommends which AP-42 source categories could be revised based on the availability of new PM_{2.5} and condensible PM emission test data. The second purpose is to recommend which source categories would be good candidates for future emission testing programs.

(see: <http://www.epa.gov/ttn/chief/ap42/AP42Scopingstudymemo.pdf>)

There are four categories where EPA believes sufficient data exists to update AP-42. These are coal-fired boilers, natural gas-fired boilers, fiberglass manufacturing, and process heaters. Since this activity is just being initiated, it is unlikely that draft AP-42 emission factors would be available before the fall of 2003.

In addition, EPA recommended 11 source categories for future testing. Utility diesel internal combustion engines, process gas-fired boiler and refinery-gas-fired boilers were the top three sources recommended for future testing. Other point source categories include copper smelting, grey iron foundries, carbon black production, ammonia nitrate production, ammonia production, and nitric acid production. Also included were two area source categories – residential charbroiling and commercial charbroiling. Results from these testing efforts would be available in 2004, at the very earliest.

Speciation Profiles

State point sources inventories typically contain emission estimates for criteria (PM₁₀, SO₂, NO_x, VOC, and CO) and hazardous air pollutants. EPA's 1999 NEI also includes estimates for ammonia and PM_{2.5}. In order to be properly modeled for chemical transformations and deposition, both organic gases and particulate matter emissions estimates, and to a lesser extent SO_x and NO_x estimates, must be split, or speciated, into more defined compounds. The number and types of compounds depends upon the atmospheric model (CMAQ, CAMx, REMSAD) that is being used.

MACTEC is expecting to begin work on project for Ron Ryan at OAQPS to extract new speciation data from published literature and incorporate the data into the SPECIATE database. The Work Assignment has been delayed due to funding uncertainty, and work

will not begin until February 2003. The results of this work will not be available until the fall of 2003.

RECOMMENDATIONS FOR IMPROVING THE POINT SOURCE INVENTORY

Listed below our short-term recommendations for developing the preliminary 2002 VISTAS regional emission inventory and longer-term recommendations for making future improvements to the inventory. Our recommendations are based on our review of the 1999 NEI Version 2 Final and the various on-going emission inventory improvement activities discussed above. The short-term recommendations can be accomplished over the next six months, resulting in a preliminary 2002 inventory that can be fed into an emission model to produce the episode-specific inputs needed by the atmospheric models. The longer-term activities can likely be accomplished over the next 2-3 years.

Recommendations for Short-term Activities to Produce VISTAS Preliminary 2002 Point Source Inventory

1. Obtain post-1999 point source inventories from State/local agencies to better represent episodes in the 2000-2002 time frame. Replace 1999 NEI data with more recent State data for PM10, SO₂, NO_x, VOC, and CO. Augment State data with PM_{2.5} and ammonia from 1999 NEI. “Grow” the 1999/2000/2001 to 2002.
2. Conduct QA/QC of State/local agency point source submittals. Review point source physical parameters, temporal profiles, and locations needed for modeling. Focus on large sources and provide States/local agencies with parameters to review and possibly correct. Incorporate State/local agency corrections and updates. Supplement with default stack characteristics and county-level locations.
3. Compare facility-level emissions in 1999 NEI to State/local submittals to identify potentially missing or new sources and to flag facilities with large emission changes. Ask States to verify whether facilities any large emitters have closed, whether new sources began operation in 2002, and whether any large emission changes are reasonable.
4. Provide State/local agencies with the comparison of ammonia emissions reported in the 1999 NEI Version 2 Final and the 1999/2000 Toxics Release Inventory. Identify gaps and logical inconsistencies. Ask States/local agencies to target largest emitters to obtain information on emissions, stack characteristics, seasonal variations, etc. Update database with State/local updates.
5. Obtain and incorporate “preliminary” annual 2002 CEM data for utilities from EPA’s Clean Air Markets Division.
6. Help States/local agencies conduct surveys of selected point sources to obtain any missing information identified in the above tasks. Coordinate with State/local agency in developing information request, and if deemed appropriate by the State/local agency, contact the facility to attempt to obtain the requested information. Augment database with the collected survey data.

7. Apply existing speciation factors to create estimates of elemental carbon, organic carbon, and other species required for modeling.
8. Convert preliminary 2002 VISTAS inventory from NIF format to format required by the selected emission modeling system.

These short-term activities are generally consistent with the activities identified in our Final Work Plan (November 25, 2001), and can be completed within the contract budget and time schedules identified in the Work Plan for point sources.

Recommendations for Longer-term Activities to Produce VISTAS Final 2002 Point Source Inventory

1. Obtain and incorporate “final” CEM data (Fall 2003).
2. Apply improved SPECIATE factors (Fall 2003).
3. Update ammonia emissions when new emission factors are available from EPA (2004) for important source categories.
4. Update PM_{2.5} emissions when new emission factors are prepared by EPA (2004).
5. Obtain “official” 2002 point source inventories required by the Consolidated Emissions Reporting Rule (June 2004).
6. Obtain and incorporate “final” CEM data (Fall 2003).