The Emission Inventory and Air Quality Home Page

Frank Divita, Manish Salhotra, Patricia Horch, and Stephen Connolly
E.H. Pechan & Associates, Inc.
5528 Hempstead Way
Springfield, VA 22151

and

Barry Gilbert
Ozone Policy and Strategies Group
OAR, OAQPS, AQSSD, MD 15
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

ABSTRACT

The "Emission Inventory and Air Quality Home Page" has been developed by E.H. Pechan & Associates, Inc.(Pechan) and the U.S. Environmental Protection Agency (EPA) to support EPA and state efforts related to the National Ambient Air Quality Standard for ozone. Two copies of this web site are currently maintained - one on EPA's server (http://www.epa.gov/ttn/rto/areas/) and one on Pechan's server; both sites can be accessed from http://www.pechan.com/areas/. The site contains nearly a hundred thousand interlinked pages that provide summaries, charts, maps, and tables of emission inventory and air quality data. This paper will focus mainly on the emission inventory data contained in the site. Other data (air quality and modeling) will be briefly discussed. All readers are strongly encouraged to visit the site and "surf" it firsthand. The web site should be considered a working draft since the pages are continuously being updated as the data that form the basis of these summaries are updated and corrected.

INTRODUCTION

A publicly accessible web site, "The Emission Inventory and Air Quality Home Page", has been developed to provide detailed emission inventory and air quality data to support EPA's efforts related to the National Ambient Air Quality Standard (NAAQS) for ozone. Two copies of this web site are currently maintained - one on EPA's server (http://www.epa.gov/ttn/rto/areas/) and one on E.H. Pechan & Associates' (Pechan's) server; both sites (each more than 2.4 gigabytes) can be accessed from http://www.pechan.com/areas/. Pechan's version often contains draft materials in addition to the data provided at the EPA mirror site.

The site presents detailed emission summaries based on the data contained in Version 3.12 of the 1996 National Emission Trends Inventory (NET 96). The site also contains hourly Emission Tracking System/Continuous Emissions Monitoring (ETS/CEM) data, air quality, census related data and hundreds of color maps showing the locations and emissions of major sources. The site is organized into the following four major areas which are also depicted in Figure 1:

- **Emission Inventory Data** - This area contains state, consolidated/metropolitan statistical area (C/MSA), county, and source category emission summaries, as well as detailed plant-level data and various charts and graphs for the NET 96 inventory. Also presented in this section are the

Clean Air Markets Division's ETS/CEM hourly data.

- **Air Quality Monitoring, Modeling and Related Data** - The data presented in this area include recent ozone design values, lists of and links to maps of ozone monitoring site locations, modeled 4th daily maximum 8-hour average ozone concentrations, wind roses, and information on spatial clustering of ambient ozone in the Eastern United States. Also included is a link to EPA's current list of nonattainment areas for criteria pollutants.

- **State and Area Maps** - The maps presented in this area depict the NET 96 inventory data in a visual format that provides the locations of important pollutant sources, ozone monitors, and C/MSAs.

- **Other Data of Interest** - Data presented in this area include census data, projected population data, C/MSA information, and maps of vehicle miles traveled by county.

The sections below provide some examples of the data contained on the web site and describes how it can be used to quickly access criteria pollutant emissions and air quality data.

EMISSION INVENTORY DATA

Data presented in this section include NET 96 state, C/MSA, county, plant, and source category emission summaries. A major portion of this section is also dedicated to the Clean Air Markets Division's hourly ETS/CEM data. Figure 2 overviews these pages.

1996 National Emission Trends (NET 96)

The NET 96 inventory was prepared by EPA's Emission Factor and Inventory Group with input from state and local environmental agencies. The database contains annual and ozone season daily emission estimates for criteria pollutants (VOC, NO_x, CO, SO_2, PM_{10}, $PM_{2.5}$, and NH_3) from three source categories: stationary point sources which include electric generating units (EGUs), area and off-road sources, and on-road mobile sources. Emissions from point sources are provided at the state-county-plant-point-source classification code (SCC) level, while area and mobile source emissions are provided at state-county-SCC level. The site uses Version 3.12 of the NET 96 inventory (May 2000).

Summaries are presented within two subset categories: State and C/MSA. Each emissions summary provided in this section is available for both subset categories (hereafter referred to as "State/MSA"). The NET 96 emissions data is accessed through links contained on State/MSA portal pages (see Figures 3 and 4 for examples). The C/MSA summaries and reports are presented because EPA has recommended to states that MSAs or the C/MSAs serve as the presumptive boundary for 8-hour NAAQS nonattainment areas.

C/MSA boundaries include entire counties except for some C/MSAs in New England (EPA Region I). Maps and web pages are on a whole-county basis. The detailed city and township boundaries were not used since the emissions are on a county basis and the sources are not identified by township. Also, the New England States are relatively small, containing just a few counties, only one or two C/MSAs, and one or two ozone 1-hour nonattainment areas. Since ozone is seen over a large area, it did not seem necessary to present detail below the county level. Some counties have portions that lie within 2 or more C/MSAs. For example, both the Boston C/MSA and Portland MSA contain portions of York County, Maine.

County-level emissions by State/MSA are available in tons per year for VOC, NO_x, CO, SO_2, and

PM_{10} and in tons per day of ozone season VOC and NO_x. Emissions by county as a percent of an entire State/MSA are also available. County-level emission summaries also include data for vehicle miles traveled (VMT), population, and number of registered vehicles. These data can be downloaded in database format. Bar graphs comparing State/MSA annual and ozone season VOC and NO_x emissions by county are also at hand.

Emission Inventory Tier 1 and Tier 3 reports (referred to as EI T-1 and EI T-3) are accessible by State/MSA or by county. These summaries show emissions by source category, or Tier. Tier 1 is the most general, see Table 1, and Tier 3 is the most detailed. Tier l level VOC and NO_x emission bar graph comparisons are also available.

Table 1. Tier 1 source categories.

Tier 1	Tier 1 Name
01	Fuel Comb. Elec. Utility
02	Fuel Comb. Industrial
03	Fuel Comb. Other
04	Chemical & Allied Product Mfg
05	Metals Processing
06	Petroleum & Related Industries
07	Other Industrial Processes
08	Solvent Utilization
09	Storage & Transport
10	Waste Disposal & Recycling
11	Highway Vehicles
12	Off-Highway
13	Natural Sources
14	Miscellaneous

Plant-level emissions are detailed by county, including map IDs that correspond to the sites located on various maps. Only sources with VOC or NOx emissions exceeding 100 tons/year are shown. Each of the 53,000 plants identified in the NET 96 inventory is represented with a detailed description page that provides emissions, SCCs, stack parameters, seasonal throughput, capacities, heat input, and controls for each stack unit. Complimenting these pages are bar graphs of the top 25 emitters of VOC, NO_x, SO_2, CO and PM_{10} for the specific State/MSA. Additional links on the State/MSA portal pages are associated with the Clean Air Markets Division's ETS/CEM data, maps, air quality data and wind roses as described below.

Clean Air Markets Division's Emissions Tracking System/Continuous Emissions Monitoring (ETS/CEM)Data

Under Title IV of the Clean Air Act Amendments of 1990 (CAAA), Congress established a program using emissions trading and similar incentive-based regulatory strategies to reduce emissions from electric utilities. This program also requires the utilities to monitor and report hourly NO_x emission rates, SO_2 and CO_2 emissions, and heat input data to EPA.

As of January 1, 1994, the large coal-fired units, designated Phase I units, were required to report hourly emissions data to EPA's ETS/CEM database. Starting in January 1, 1995, Congress also required reporting by all the other units affected by Title IV, designated Phase II units; EPA made exceptions by

providing six month extensions to units reporting NO_x emissions by oil- and gas-fired units and for units located in ozone nonattainment areas; and one year extensions to units located in ozone attainment areas. Note that NO_x data may not be complete for 1995, in light of these extensions.

Coal-fired units are required to use CEMs to monitor emissions. However, other units can use alternate methods to measure their emissions. Oil- and gas-fired units have the option to use CEMs or to measure fuel flow hourly and estimate SO_2, CO_2, and heat input based on fuel sampling; for NO_x, only oil- and gas-fired peaking units are allowed to use hourly estimation procedures (based on heat input) instead.

Hourly, quarterly, and annual data are reported quarterly to EPA's Emission Tracking System in ASCII files formatted according to the requirements contained in the Electronic Data Reporting (EDR) V1.3. Because the reporting requirements are new and complicated, it takes time for the reporting to be completely accurate; each year, the data quality improves over the previous year.

ETS/CEM data is available for 1998, 1997, 1996 and 1995. The data includes state, plant and boiler level NO_x emissions, heat input and NO_x emission rates. Heat input is a measure of utilization and can be calculated by multiplying the quantity of fuel by the fuel's heat content. The unit of measure is usually MMBtu (million British thermal units). Heat input is reported directly to ETS at the monitor level. The NO_x emission rate, in lbs per MMBtu, can be measured by a continuous emissions monitor or calculated by dividing the NO_x emissions (in tons) by the heat input (in MMBtu) and then multiplying by 2000 lbs per ton. For these reports, the hourly NO_x emission rate is that which was reported to ETS at the monitor level. Daily, monthly, ozone season, and annual NOx emission rates are calculated by dividing the NO_x emissions (in tons) for the period by the heat input with the appropriate unit conversions.

AIR QUALITY, MONITORING AND RELATED DATA

This area of the site contains data related to ambient ozone concentrations. Data presented includes 8-hour ozone design values for counties and monitoring sites. Also presented are wind rose data and information on spatial clustering of ambient ozone in the Eastern United States. The site also contains modeling information in the Eastern United States (this section is under development). A link to EPA's list of nonattainment areas for criteria pollutants is available. Other data of interest in this are include census data, projected population data, C/MSA information, and maps of vehicle miles traveled by county.

STATE AND AREA MAPS

Five types of maps are available for viewing and downloading. These characterize the NET 96 inventory in a visual format that pinpoints the locations of important pollutant sources, ozone monitors, and areas of interest. Downloadable versions are available in GIF, Windows Meta File (which can be imported into Power Point) and Freelance formats. These maps are as follows:

- **MSA Maps** - A map of the entire state depicting the counties and shaded metropolitan statistical areas.

- **Point Source Locations** - A map of the entire state depicting the location of NO_x and VOC emitting sources having emissions greater than 100 tons per year.

- **Ozone Monitoring Site Locations** - A map of the entire state depicting the locations of ozone monitoring sites. For each state, the monitor labels are keyed to tables that provide air

quality data.

- **Complete State Maps** - A map of the entire state depicting everything from the MSA, point source, and ozone monitoring site location maps.

- **Area Maps** - MSAs within the state that are also areas of interest are enlarged and presented. Each area map shows all of the same components as the Complete State Maps.

Also available for downloading are the maps presented in other areas of the report. They include maps of county VOC and NO_x emissions, modeled 4th daily maximum 8-hour averages for ozone and 1997-99 8-hour air quality design values. Additional maps provided for viewing only include color shaded relief maps of each state with county boundaries. These relief maps were provided by Ray Sterner of The Johns Hopkins University Applied Physics Laboratory.

OTHER DATA OF INTEREST

This site has additional data that may be found useful. 1996 vehicle miles traveled (VMT) plotted on a U.S. map and VMT growth estimates are available by state and county. Various census data can be found or linked to, including populations, counties in MSAs and distance to counties in MSAs. Links to state population projections by county are also accessible.

CONCLUSION

The "Emission Inventory and Air Quality Home Page" has been developed for EPA. It is available to the public and can be used to research emission inventory and air quality issues. Two copies of this web site are currently maintained - one on EPA's server (http://www.epa.gov/ttn/rto/areas/) and one on Pechan's server; both sites can be accessed from http://www.pechan.com/areas/. The site consists of nearly a hundred thousand interlinked pages that provide summaries, charts, maps, and tables of emission inventory and air quality data. All readers are strongly encouraged to visit the site and provide comments and suggestions for its improvement. When visiting the site, be sure to read the document "Corrections, Caveats, Explanations, Known Problems and FAQ".

The site currently presents detailed emission summaries based on the data contained in Version 3.12 of the NET 96 inventory and will be updated upon EPAs release of Version 4. Additionally, we expect to provide 1999 Emission Tracking System/Continuous Emissions Monitoring data when is become available.

Figure 1. Overview of four major areas of the emissions and air quality data web page.

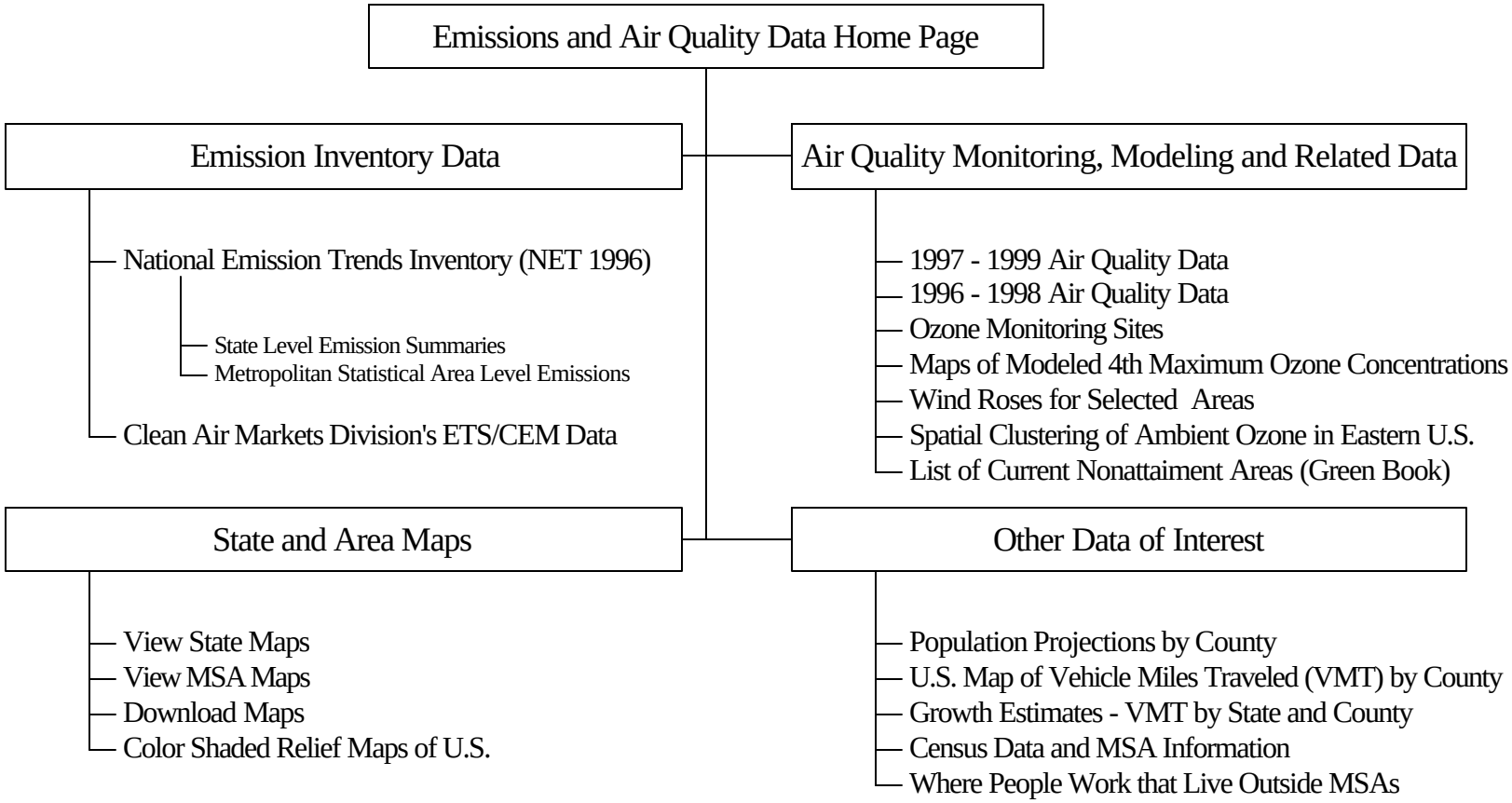

Figure 2. Overview of emission inventory data.

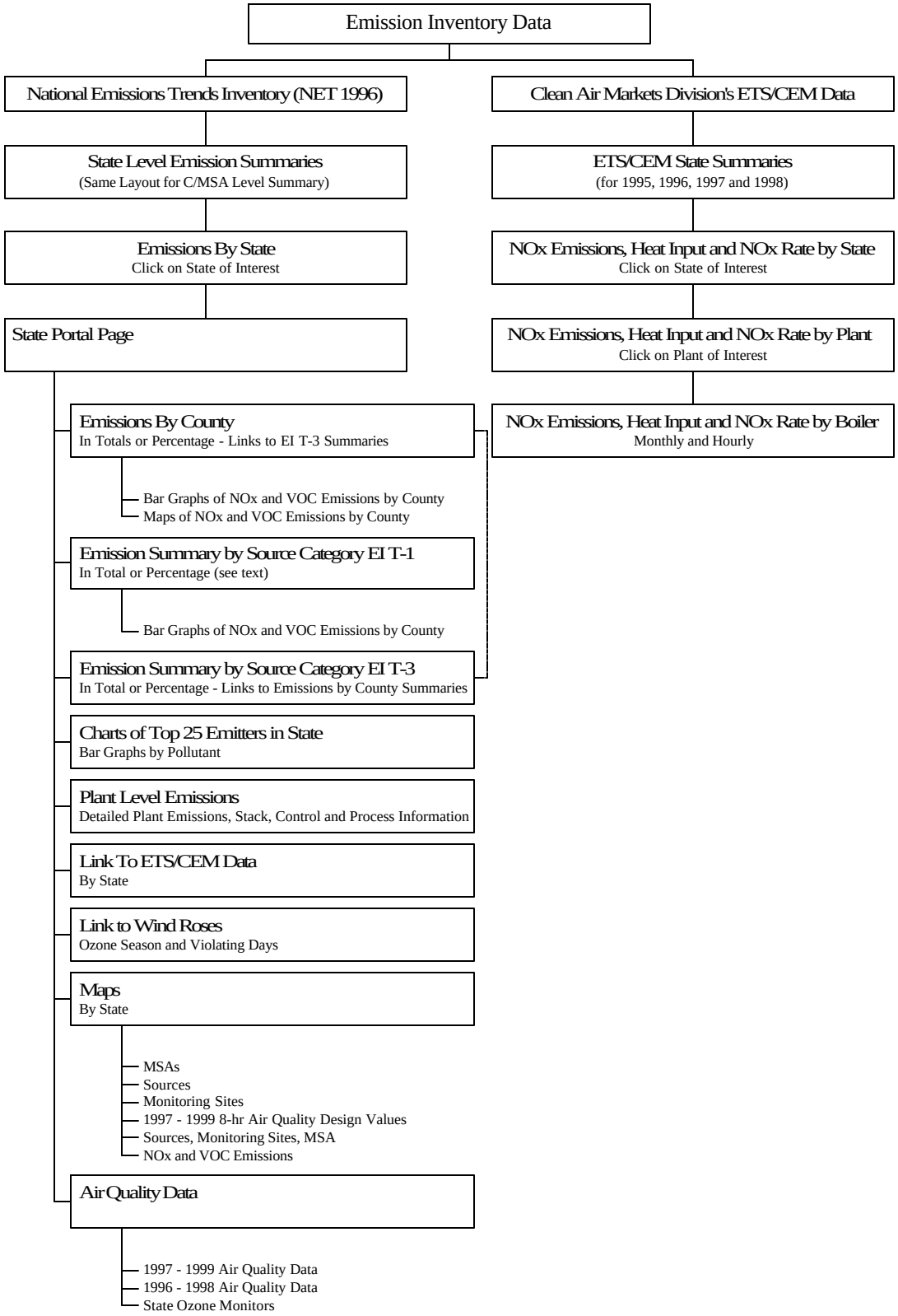

Figure 3. State portal page for California.

California

Select from the emission summaries, reports, charts and maps below.

- **Emissions By County**
  - Emissions in Percentage
  - Bar Graph of Emissions - NOx
  - Bar Graph of Emissions - VOC
  - Bar Graph of Emissions - NOx - Ozone Season Daily
  - Bar Graph of Emissions - VOC - Ozone Season Daily
  - Map of VOC Emissions
  - Map of NOx Emissions
- **Emission Summary by Source Category EI T-1**
  - Emissions in Percentage
  - Bar Graph of Emissions - NOx
  - Bar Graph of Emissions - VOC
  - Bar Graph of Emissions - NOx - Ozone Season Daily
  - Bar Graph of Emissions - VOC - Ozone Season Daily
- **Emission Summary by Source Category EI T-3 (More Detailed than EI T-1)**
  - Emissions in Percentage
  - Emissions by County
- **Charts (bar graphs) of Top 25 Emitters in State**
  - VOC Sources
  - NOx Sources
  - SO2 Sources
  - CO2 Sources
  - PM10 Sources
- **All Plant Level Emissions in State by County**

  Select a plant to link to detailed emissions, stack, control, and process information.
  - Plants listed by Map Code (only larger sources are on map)
  - All NOx Plants
  - All VOC Plants
- **Acid Rain Dividion's 1995, 1996, 1997, and 1998 Emission Tracking System/Continuous Emission Monitoring (ETS/CEM) data by State.**
- **Windroses**

  Ozone Season and Violating Days
- **Maps**
  - California MSA's
  - California Sources
  - California Monitoring Sites
  - California 1997-99 8hr Air Quality Design Values
  - California Sources, Monitoring Sites, MSA
  - Map of VOC Emissions
  - Map of NOx Emissions
- **Air Quality Data**
  - 1997-99 Air Quality Data
  - 1996-98 Air Quality Data
  - State Ozone Monitors
  - Map of Monitoring Sites
  - MSA's and County Names
  - California 1997-99 8hr Air Quality and Design Values

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Figure 4. MSA portal page for Atlanta, GA.

Atlanta, GA MSA

Select from the emission summaries, reports, charts and maps below.

- **Emissions By County**
  - Emissions in Percentage
  - Bar Graph of Emissions - NOx
  - Bar Graph of Emissions - VOC
  - Bar Graph of Emissions - NOx - Ozone Season Daily
  - Bar Graph of Emissions - VOC - Ozone Season Daily
- **Emission Summary by Source Category EI T**-1
  - Emissions in Percentage
  - Bar Graph of Emissions - NOx
  - Bar Graph of Emissions - VOC
  - Bar Graph of Emissions - NOx - Ozone Season Daily
  - Bar Graph of Emissions - VOC - Ozone Season Daily
- **Emission Summary by Source Category EI T-3 (More Detailed than EI T-1)**
  - Emissions in Percentage
  - Emissions by County
- **All Plant Emissions in Area by County**

  Select a plant to link to detailed emissions, stack, control, and process information.
  - Plants listed by Map Code (only larger sources are on map)
  - All NOx Plants
  - All VOC Plants
- **Acid Rain Dividion's 1995, 1996, 1997, and 1998 Emission Tracking System/Continuous Emission Monitoring (ETS/CEM) data by State.**
- **Windroses**

  Ozone Season
- **Maps**
  - Atlanta, GA MSA
  - Map Index Page
- **Air Quality Data**
  - State Ozone Monitor Index
  - 1996-98 Air Quality Data for Area

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KEYWORDS

Emission Inventory
National Emission Trends Inventory
Plant-level Data
ETS/CEM
Point Source Maps
Ozone Monitoring Site Locations
Data Management
Web Page