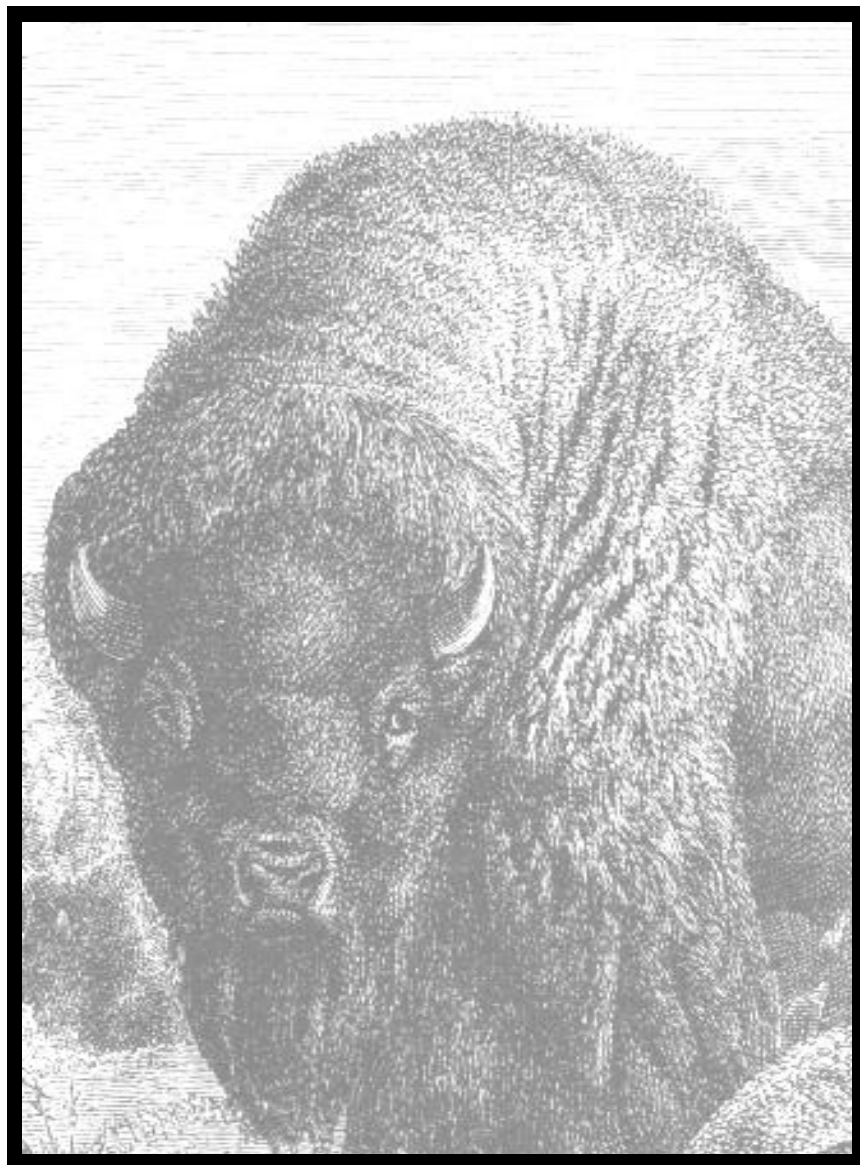


# Data Sources for Air Indicators





## Data Sources for Air Indicators

Air emissions and ambient air quality data used to support environmental indicators are drawn mainly from state sources and gathered into federal reports. Two sources of data presented here are:

- Aerometric Information Retrieval System (AIRS); and,
- Toxic Release Inventory (TRI).

A summary of the AIRS database is presented as well as a description of two reports based on AIRS: *National Air Quality and Emissions Trends Report, 1993*, and *National Air Pollutant Emission Trends, 1900-1993*. The TRI database is described through its annual report, the *Toxic Release Inventory*.

Information includes:

- how to get the data,
- description of the database,
- limitations of the data,
- where do the data come from,
- how the data are shown, and,
- how can the data be used.

### Summary Evaluation of the Databases

#### ***Aerometric Information Retrieval System (AIRS)***

This database has the most air information available for indicator support and development. However, the emissions reported in AIRS may be only a fraction of actual emissions in the states due to reporting criteria which does not require reporting from all sources of emissions. Where data was not available, estimations have been made.

The methods used to retrieve, estimate, and calculate emissions are rendered to give an accurate picture of air emissions today and with consideration to other influences such as vehicle miles traveled and inspection/maintenance programs. Estimations are made using standard methodologies and verified by scientific analysis. The data and the methodology is also open to public access for review and comment. Access to the data via computer may be the major drawback though; some difficulty was experienced in accessing the data and finding data that was usable (such as a timeline series) for indicator development.

The data is presented and available on a number of scales, including city, county, state, regional, and seasonal, and presented with some yearly trends. The data is shown indicating past and present conditions. States could use the indicators presented as a model to copy or as a tool to design their own set. Access to and assistance in using the data is available by mail, by phone, and by computer on-line sources (Telnet and Internet) at either no charge or minimal cost.

### ***Toxic Release Inventory (TRI)***

This database compiles information on the releases of toxic chemicals from manufacturing facilities. In existence since 1987, users can readily identify trends of chemical releases. However, the releases reported in the TRI may be only a fraction of actual releases in the states due to reporting criteria. The TRI captures only a portion of all toxic chemical releases nationwide. Facilities with fewer than ten employees and facilities that do not meet chemical thresholds are not required to file TRI reports. The TRI also does not cover non-manufacturing facilities or toxic emissions from automobiles and other non-industrial sources.

For the data that is collected, the USEPA conducts a three percent data quality review of TRI data (see TRI report), during which a sample of input forms are compared to the database. In 1993, data entry accuracy rate was 99.87 percent; release value accuracy rate was 99.91 percent. This shows the data entered into the TRI is statistically sound. The findings are published and open for public review and comment.

The data is presented and available on a number of scales, including chemical category, source of release, and release by state. Data is also comparable across a number of scales, and presented in yearly trends. The way the data is presented indicates past and present conditions. States can use the indicators as a model to copy or as a tool to design their own set. Access to and assistance in using the data is available by mail, by phone, and by computer on-line sources (Telnet and Internet) at either no charge or minimal cost.

## ***Air Data Source One:*** **Aerometric Information Retrieval System (AIRS)**

### ***How to Get the Data***

There is assistance available on the AIRS Helpline at (800) 334-2405. AIRS information requests can also go by mail to:

AIRS Information Request  
USEPA  
Office of Air Quality Planning and Standards  
Information Transfer and Program Integration Division (MD-12)  
Research Triangle Park, North Carolina 27711

AIRS data may be obtained directly from AIRS if the user has an account on the USEPA IBM computer and a IBM-3270 terminal or equivalent. The Internet address for the USEPA mainframe computer is:

**<http://www.epa.gov/docs/airs/airs.html>**

The Telnet address for the USEPA mainframe computer is:

**[epaibm.rtpnc.epa.gov](http://epaibm.rtpnc.epa.gov)**

Data can also be retrieved through the AIRS bulletin board on USEPA's *Technology Transfer Network*.

To access the AIRS electronic bulletin board system, users may telnet to:

**[TTNBBS.rtpnc.epa.gov](http://TTNBBS.rtpnc.epa.gov)**

Another option is to use the AIRS telephone number for telnetting with communications software: (919) 541-5742

Once the user is connected:

Logon to TTNBBS

Enter "T" to select Gateway to TTN Technical Areas (Bulletin Boards)

Enter "J" to select the AIRS bulletin board.

### ***Description of the Database***

AIRS is a large, computer-based repository of information about airborne pollution that is administered by the USEPA's Office of Air Quality Planning and Standards (OAQPS), Information Transfer and Program Integration Division (ITPID). It is the main data source for many reports, such as *National Air Quality and Emissions Trends Report, 1993*, and, *National Air Pollutant Emission Trends, 1900-1993*. The OAQPS established the standards for measuring pollutants. National Ambient Air Quality Standards (NAAQS) and the Clean Air Act require every state to establish a network of air monitoring stations for these pollutants. The criteria for location and operation of stations is also set by the OAQPS. States must provide

annual summary of monitoring results from State and Local Air Monitoring Stations (SLAMS), as well as the National Air Monitoring Stations (NAMS).

Supplemental information is supplied by mandatory reports called State Implementation Plans (SIPs). These include a state's inventory of where existing sources of air pollution are and estimates of the amount of pollution emitted. The AIRS database was established by OAQPS as a place for states to report their data without the burden of creating their own database. The states have free access to reformat, reorganize, and use the data in the database. OAQPS benefits by being able to compare and use the data from different states within one database. The AIRS database is updated every week.

The AIRS database is divided into five parts. The *Air Quality Subsystem* contains the measurements from the 10,000 monitoring stations around the country. The *AIRS Facility Subsystem* contains data on point sources. The *Geographic, Common, and Maintenance Subsystem* contains reference data shared by the other subsystems. The *AIRS Graphics* subsystem maps and charts the data. The *AIRS Executive* contains a select subset of data extracted from the entire database.

There are three ways to retrieve data from the database via telnet. The *online browse* option displays data for which the user specifies the criteria. The *standard batch* generates printed reports and/or data files. The user specifies criteria for data selection and sorting, and chooses options that affect the report format. The *ad hoc* method is for the user to specify which data fields. It is for a more specialized user.

#### *Air Quality Subsystem (AQS)*

This subsystem provides monitoring site descriptions, raw data values in 1-hour or 24-hour averages, summary data, and a precision and accuracy analysis of air quality monitors. Data comes from the SLAMS and NAMS air monitors and is first loaded into a "screening" file provided by AQS. The screening file checks the validity of the data and corrects any errors. The state or other organization submitting the data then notifies AIRS that the data is ready for inclusion in the main database.

#### *AIRS Facility Subsystem (AFS)*

The AFS subsystem contains emissions, compliance data, and permit data for stationary sources. Types of data included are the physical plant-level data, stack measurements, point-source data, and segment data, such as fuel combustion which is used in the computation of emissions. AFS contains the annual emission estimates for criteria pollutants. The emission estimates are usually calculated for each segment of the plant while also accounting for operating schedule, type of fuel/material used, and emissions factors developed by the USEPA.

#### *Geocommon Subsystem (GCS)*

This subsystem is shared by AQS and AFS and contains reference information such as geographic information, air quality standards, emission factors, and collection and analysis methods for air samples.

#### *AIRS Graphics System (AG)*

The AG subsystem can integrate data from the other subsystems and display them in graphs and charts. A user can create a map showing the location of NAMS sites within a state or a

region, or point source emissions of particular pollutants. The AG subsystem will pull monitoring data from AQS, emissions and compliance data from AFS, and reference data from Geo-Common to make a "Ready-to-View" or "Create-Your-Own-Graphics" map or chart. These graphics can be saved on the user's disk.

#### *AIRS Executive*

This subsystem is a very useful tool built to provide quick access to a subset of air pollution information. Unlike the other subsystems, it is select information from the mainframe which cannot be manipulated, but the *Executive* does allow the user several formats to choose from. *Executive* is updated monthly. In addition to telnetting, users may have better success obtaining *Executive* via the Internet:

(<http://www.epa.gov/airs/aexec2.html>)

or by contacting Virginia Ambrose of the Information Management Group:

Telephone: (919) 541-5454

Fax: (919) 541-7674

E-mail: [ambrose.virginia@epamail.epa.gov](mailto:ambrose.virginia@epamail.epa.gov)

#### **Hardcopy reports from the AIRS Database**

There are two hardcopy reports from the AIRS database included in this Catalog: the National Air Quality and Emissions Trends Report, 1993, and National Air Pollutant Emissions Trends, 1900-1993. These were the most current annual reports available from the AIRS database at the time of review.

### **National Air Quality and Emissions Trends Report**

The *National Air Quality and Emissions Trends Report, 1993* was the 21st annual report of air pollution trends in the United States. The report was prepared by the technical support division of the USEPA and directed toward both a technical and general audience. The report describes trends in the six NAAQS criteria air pollutants, visibility trends throughout the country, information on air toxics, a list of selected 1993 air quality summary statistics for every metropolitan statistical area (MSA) in the nation, and trends in the Pollutant Standard Index (PSI) for 89 cities with populations of at least 500,000. The PSI is widely used in the air pollution field to report daily air quality to the general public. The PSI was established under the Clean Air Act to help monitor daily air quality in urban areas exceeding 200,000 in population. A separate sub-index is computed for each criteria pollutant. The index numbers are on a scale from zero to 500, with an index value greater than 100 corresponding to an unhealthy range.

The report focuses on the primary standards in effect in 1993 and tracks two kinds of trends: air concentrations, based on actual direct measurements of pollutant concentrations in the air at selected sites throughout the country; and emissions, which are estimates of the total tonnage of these pollutants released into the air annually.

#### **How to Get the Data**

For additional assistance with the report contact:

Warren Freas, (MD14)

U.S. Environmental Protection Agency  
Emissions Monitoring and Analysis Division  
Research Triangle Park, North Carolina, 27711  
Telephone: (919) 541-5469  
Fax : (919) 541-1903

For help in accessing the Technology Transfer Network, dial (919) 541-5384

### ***Description of the Report***

The ambient air quality data presented in the AIRS database are direct measurements of pollutant concentrations at monitoring stations throughout the nation. These stations are managed by both state and local governments. The USEPA and other federal agencies also maintain monitoring sites for air pollution research studies. In 1993, more than 4,400 monitoring sites reported air quality data to AIRS for one or more of the six NAAQS pollutants. A majority of these measurements came from the heavily populated urban areas of the nation.

The national monitoring network has uniform criteria for monitor siting, instrumentation, and quality assurance with each site classified into one of three categories: National Air Monitoring Stations (NAMS), State and Local Air Monitoring Stations (SLAMS), and Special Purpose Monitors (SPMs). The National Air Monitoring Stations (NAMS) were established to guarantee a long-term national network for urban area ambient air monitoring and to provide a regular and consistent data base for comparing air quality and analyzing trends. Specifically, NAMS meet stricter criteria than SLAMS, location of monitoring sites remains consistent, and data are submitted at least quarterly. The State and Local Air Monitoring Stations (SLAMS) allow state or local governments to implement networks for their immediate monitoring needs. Sites may remain at the same locations, or move to other areas. However, all SLAMS continue to follow uniform criteria and standard procedures. SLAMS data comprises most of the data found in the Air Quality Subsystem (AQS) of the Aerometric Information Retrieval System (AIRS) database. Special Purpose Monitors (SPMs) fulfill very specific or short-term monitoring goals and are often used as point-source monitors rather than monitors which reflect the overall urban air quality.

Data from the monitoring network are classified into primary and secondary standards. Primary standards are intended to protect public health. Secondary standards protect public welfare, such as the effects of air pollution on vegetation, materials and visibility.

Data are collected and analyzed for completeness and adaptability to three observational methods: a one-year analysis, a regional comparison, or a ten-year trend analysis. Data for each year must satisfy annual data completeness criteria that are appropriate to a pollutant and measurement methodology. For a regional comparison, the monitoring site must report data in each of the last three years to be included in the analysis.

To be included in the national ten-year trend analysis, monitoring sites must have complete data for at least eight of ten years (the current period is 1984 to 1993).

The air quality data are compiled into two groups: 24-hour measurements and continuous one-hour measurements. 24-hour measurements are used to measure Particulate Matter (PM10) and Lead (Pb). The measurements come from monitoring instruments that produce

one measurement for every 24-hour period. These measurements are sampled once every six days, or 61 samples per year.

For PM<sub>10</sub>, the frequency of sampling can increase to every day or every other day. Only PM<sub>10</sub> weighted annual arithmetic means that meet the AIRS annual summary criteria are considered valid for trends purposes. For lead (Pb), data are required to have at least six samples per quarter in at least three of the four calendar quarters. Monthly composite Pb data are used if at least two monthly samples are available for at least three of the four calendar quarters.

One-hour averages are obtained from continuously operating monitors that produce a measurement every hour. For continuous hourly data, a valid annual mean for trends requires at least 4,380 hourly observations. Because of a different selection criteria, the number of sites used to produce daily SO<sub>2</sub> statistics may differ from the number of sites used to produce annual SO<sub>2</sub> statistics. The SO<sub>2</sub> standard-related daily statistics requires 183 or more daily measurements. Sites monitoring for ozone meet the annual trends data completeness requirement if they have at least 50 percent of the daily data available for the ozone season, which can vary by state.

Emission trends are estimated using best available engineering calculations. These are derived from many factors which consider the level of industrial activity, technology changes, fuel consumption, vehicle miles of travel, and other activities that cause air pollution. The trends also reflect changes in air pollution regulations and the installation of emission controls. The estimates of emissions in the 1993 report differ from those reported in previous years because of improvements in emission estimation methodologies.

### ***Limitations of the Data***

Because of changes in the methodology used to obtain emission estimates, 1993 estimations should not be compared with earlier years. Changes include: the use of the MOBILE5a model; state and county level estimates for vehicle miles traveled (VMT) mix; in-use Reid vapor pressure (RVP); use of oxygenated fuels; and inspection/maintenance (I/M) programs. Updates were made in a number of categories such as the estimates of forest fire emissions included in the miscellaneous category. These changes in estimation methodology should allow for a more accurate portrayal of emissions in the future.

### ***Measuring for SO<sub>2</sub>***

There are three NAAQS for SO<sub>2</sub>: an annual arithmetic mean of 0.03 ppm (80 ug/m<sup>3</sup>); a 24-hour level of 0.14 ppm (365 ug/m<sup>3</sup>); and a three-hour level of 0.50 ppm (1300 ug/m<sup>3</sup>). The first two standards are primary (health-related) standards, while the three-hour NAAQS is a secondary (welfare-related) standard. The annual mean standard is not to be exceeded, while the short-term standards are not to be exceeded more than once per year.

For SO<sub>2</sub>, dispersion models are commonly used to assess ambient problems around point sources due to the impracticality associated with setting up enough monitors to provide a complete air quality assessment. USEPA is considering new regulations to target high short-term SO<sub>2</sub> emitters for monitoring. Trends are reported from continuous monitoring instruments which can measure as many as 8,760 hourly values per year. These measurements result in a variety of statistics.

### ***How the Data are Presented For SO<sub>2</sub> in The Report***

Several methods/indicators are used to show the data reported, including:

- Trends in annual mean sulfur dioxide concentrations at 474 sites, 1984-1993;
- Trends in second highest 24-hour average sulfur dioxide concentrations at 469 sites, 1984-1993 (56);
- National Sulfur Oxides Emission Estimates, 1984-1993; and,
- Regional comparisons of the 1991, 1992, and 1993 composite averages of the annual sulfur dioxide concentrations.

### ***Measuring for Nitrogen Dioxide (NO<sub>2</sub>)***

Nitrogen Dioxide (NO<sub>2</sub>) is measured using a continuous monitoring instrument that can collect as many as 8,760 hourly observations per year. Only annual means based on at least 4,380 hourly observations were considered in the trends analyses. A total of 201 sites were selected for the 10-year period, and 269 sites were selected for the three-year data base. NAMS sites for NO<sub>2</sub> are located only in urban areas with populations of one million or greater. NO<sub>x</sub> emissions are also beginning to be measured more in efforts to reduce ozone.

### ***How the Data Are Presented For NO<sub>2</sub> in The Report***

Several methods/indicators are used to show the data reported, including:

- National NO<sub>x</sub> Emission Estimates;
- Comparisons of trends in annual mean nitrogen dioxide concentrations at 201 sites; and,
- Regional comparisons of composite averages.

### ***Measuring for Carbon Monoxide (CO)***

The CO network is collected in one-hour and eight-hour averages and is mainly mobile source oriented. Therefore, reductions in CO are strongly tied to reduction in highway vehicle emissions. The monitoring network that met all acceptable criteria were: 314 sites for the ten-year 1984-93 period, 394 sites for the three-year 1991-93 period, 96 NAMS sites in the ten year data base, and 115 NAMS in the 3 year data base. A tabulation of the composite averages for the 314 CO trend sites and the subset of 96 NAMS sites can be found in the Data Appendix to the *Trends 1993* report.

### ***How the Data Are Presented For CO in The Report***

Several methods/indicators are used to show the data reported, including:

- Trends in second highest non-overlapping eight-hour average carbon monoxide concentrations at 314 sites, 1984-1993;
- Estimated number of exceedances of the eight-hour CO NAAQS, at both NAMS and all sites with 95-percent confidence intervals, 1984-93;
- Ten-year 1984-93 trend in national CO emission estimates<sup>1</sup>;

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<sup>1</sup> The source categories are fuel combustion from electric utilities, from industrial, and from other; chemical and allied product manufacturing, metals processing, petroleum and related industries, and other industrial processes; solvent utilization, storage and transport, and waste disposal and recycling; highway vehicles, off-highway, natural sources, and miscellaneous. The MOBILE5a model was used to estimate highway vehicle emissions, including revised state and county level estimates for vehicle miles traveled (VMT) mix, in-use Reid Vapor Pressure (RVP), oxygenated fuels, and inspection/maintenance (I/M) programs. Miscellaneous category includes forest fire emissions estimates.

- Comparison of trends in total national vehicle miles traveled (VMT) and national highway vehicle carbon monoxide emissions (10 years); and,
- Regional comparisons of 1991, 1992, and 1993 composite averages of the second highest non-overlapping eight-hour average carbon monoxide concentrations.<sup>2</sup>

### *Measuring for Particulate Matter (PM10)*

The PM10 monitoring network is relatively new. Analyses are based on sites with data in five of the six years during the 1988-93, instead of the eight of ten years. The PM10 annual and 24-hour standards specify an expected annual arithmetic mean not to exceed 50 ug/m<sup>3</sup> and an expected number of 24-hour concentrations greater than 150 ug/m<sup>3</sup> per year not to exceed one. Samples are collected at a frequency of every day, every other day, or every sixth day depending on the conditions in a particular monitoring area.

Several instruments have been approved by USEPA for sampling PM10. First, a high volume sampler, or Hi-Vol, has a size selective inlet (SSI) that collects suspended particles up to 10 microns in diameter. This sampler uses an inert quartz filter. The second instrument is a “dichotomous” sampler. It uses a different PM10 inlet, operates at a lower flow rate, and produces two separate samples: 2.5 to 10 microns and less than 2.5 microns, each collected on a Teflon filter. There are also some relatively new particulate matter samplers which have the capability of producing hourly values of PM10 on a continuous basis. These continuous samplers are beginning to be introduced into monitoring networks across the country, but it will be a few years before they produce enough data to generate trends.

PM10 emissions for 1985 to the present are based on a 1990 county-level emission inventory using methods similar to those developed for Clean Air Act modeling requirements. Years prior to and following 1990 were backcast and forecast using economic growth factors for most source categories.

### ***How the Data Are Presented For PM10 in The Report***

Several methods/indicators are used to show the data reported, including:

- Trends in weighted annual mean PM10 concentrations at 799 sites, 1988-1993<sup>3</sup>;
- Trends in the 90th percentile of 24-hour PM10 concentrations at 799 sites, 1988-1993<sup>4</sup>;
- Regional comparisons of the 1991, 1992, and 1993 composite averages of the weighted annual mean PM10 concentrations;
- National PM10 Emission Estimates, 1985-1993; and,
- Miscellaneous and Natural Source Particulate Matter Emission Estimates, 1985-1993.<sup>5</sup>

<sup>2</sup> Because the mix of monitoring sites may vary from one area to another, EPA does not intend for this to indicate regional differences. (31)

<sup>3</sup> Used to reflect average air quality over an extended period of time. It is called “weighted” because an average is first taken for each quarter of a year and then the four quarterly averages are averaged. This ensures that each part of the year is weighted equally, even if more measurements are taken during one part of a year than another.

<sup>4</sup> 90th percentile statistics are used because PM10 sampling frequency varies among sites and may change from one year to the next at some sites. This statistic is less sensitive to changes in sampling frequency than are the maximum or second maximum peak values.

<sup>5</sup> Natural and miscellaneous sources are presented in separate tables because the year to year variability which some of them exhibit makes them more difficult to use to show trends in PM10. Agricultural activity is a major source in specific regions, also wildfires, managed burning, and wind erosion;

*Measuring Visibility*

Since the 1977 amendment to the Clean Air Act, good visibility is a standard to keep in pristine

particulate matter. Cameras and special particulate matter samplers are present at each site location to monitor characteristics that will help to describe and define visibility over time.

280 stations across the U.S. since 1960, are measurements of visual range, or the maximum distance at which an observer can discern the outline of an object.

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emissions due to wind erosion are very sensitive to regional soil conditions and year-to-year changes in

### ***How the Data Are Presented For Visibility in The Report***

Indicators are used to show the data reported, including:

- Annual average light extinction (fine particles with less than 2.5 micrometers contribute greatly to the scattering and absorption of light, or light extinction); and,
- Visual Range Airport Data Monitoring Sites.

### ***Measuring for Ozone (O<sub>3</sub>)***

The ozone National Ambient Air Quality Standards (NAAQS) are defined in terms of the daily maximum. This is the highest hourly average for the day and it specifies that the expected number of days per year with values greater than 0.12 ppm should not be greater than one.

There are 532 sites in the 1984-1993 long-term trends data base, and 722 sites with data in each of the last three years 1991-1993. The NAMS is composed of 197 long-term sites and 220 three-year sites.

Since ozone is predominantly a warm-weather problem, seasonal emissions inventories are being developed for use in future trends assessments. USEPA has also announced plans to review the current ozone NAAQS and to examine options for implementing alternative NAAQS that account for meteorological influences.

### ***How the Data Are Presented in The Report***

Several methods/indicators are used to show the data reported, including:

- Annual second highest daily maximum one-hour ozone concentration at 532 sites, 1984-1993;
- National trend in the estimated number of daily exceedances of the Ozone NAAQS in the ozone season at both NAMS and all sites with 95% confidence intervals, 1984-93;
- Comparison of meteorological adjusted, and unadjusted trends in the composite average of the second highest maximum one-hour ozone concentration for 43 MSAs, 1984-93;
- National volatile organic compound emission estimates, 1984-93; and,
- Regional comparisons of the 1991, 1992, and 1993 composite averages of the second-highest daily one-hour ozone concentrations.

### ***Measuring for Lead (Pb)***

USEPA's lead attainment strategy targets airborne emissions from stationary sources. Monitoring networks are being expanded around sources of concern and followed by inspections of any facility where violations are detected. Regulations issued in the early 1970's required gradual reduction of the Pb content of all gasoline over a period of many years. Eventually, the Pb content in leaded gasoline was reduced from an average of 1.0 gram/gallon to 0.1 gram/gallon. Thus, lead measurements decreased even though vehicle miles traveled rose. The focus of new monitoring initiatives is on point sources of lead emissions, such as lead primary and secondary smelters.

Sites selected for long-term trend analysis must satisfy annual data completeness criteria of at least eight out of 10 years of data and have at least three of the four quarterly averages from a given year available. Sites located near point sources of lead emissions were excluded from the urban trend because the increased levels at these sources could mask the underlying urban trends.

In recent years, the number of lead (Pb) monitoring sites have dropped because of the elimination of some Total Suspended Particulate (TSP) monitors from state and local air are obtained. The USEPA contends that while further loss of some monitoring sites may occur, the core network of NAMS Pb sites together with supplementary state and local sites

### ***How the Data Are Presented in The Report***

Several methods/indicators are used to show the data reported, including:

- Trends in maximum quarterly average lead concentrations at 204 sites;
- lead concentrations at urban and point-source oriented sites;
- National Pb emission estimates;
- Regional comparisons of the 1991, 1992, and 1993 composite average of the maximum quarterly average lead concentrations; and,
- Trends in ambient lead concentrations in urban areas and total lead emissions.

### ***How Can the Data be Used?***

“hotspots” are present, and if so, whether they are improving or declining. The data can also be used to evaluate the success of existing regulations. The data can be used to track the of reporting facilities or monitoring sites, the data can be used in conjunction with census tract data as an indicator of potential environmental justice concerns.

Toxic air pollutants are defined as the 189 hazardous air pollutants (HAPs) identified in Title III of the 1990 CAAA. They are listed as HAPs because they

*but not limited to, substances which are known to be, or may reasonable be anticipated to be, carcinogenic, mutagenic, teratogenic, neurotoxic, which adverse environmental effects whether through ambient concentrations, bioaccumulation, deposition, or otherwise,...*”

Toxic air pollutants are covered in the *Emissions Trends* analysis and review of this data is found in the *Toxic Release Inventory* (description). Toxic air pollutants account for hundreds of other pollutants besides the criteria air pollutants that are focused on in this report. The ambient concentration data for air toxics is significantly limited because air toxics tend to be observed at low ambient concentrations often localized pollution problems as opposed to the common urban and regional scale

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<sup>6</sup> This is the definition referenced in the *Emissions Trends Report, 1993*, from the *Amendments of 1990, U.S. Code*

environmental issues associated with many criteria pollutants. Regulation of toxic air pollutants has been a relatively recent phenomenon.

### ***Limitations of the Data***

There are significant limitations in the TRI depiction of overall HAP emissions. Facilities with Standard Industrial Classification (SIC) codes outside the range of 20 to 39 are not required to report their emissions. This includes manufacturing facilities such as mining operations, electric utilities, and oil and gas production operations. In addition, emissions from small manufacturing facilities (those with fewer than ten employees) as well as mobile, commercial, residential, and consumer sources are not included in the TRI.

Problems may arise from the reporting process. TRI data are self-reported and do not require facilities to perform any actual monitoring or testing to develop their TRI estimates. Therefore, the accuracy of the data may vary from facility to facility and year-to-year. Efforts are underway to expand the TRI database by types of facilities reporting and to increase the list of chemicals to be reported from 173 to the 189 HAPs that were originally identified by the Clean Air Act Amendment.

### ***Where Do the Data Come From***

Two types of estimates of air toxic emissions are presented. The first are summaries of releases of hazardous air pollutants (HAPs) as represented in USEPA's Toxic Release Inventory (TRI). The TRI summaries provide both an indication of the trend in air toxics emissions and an overall picture of the hot spots within the nation. The TRI is currently the primary source of comprehensive information on emissions of air toxics. Authorized by the Emergency Planning and Community Right to Know Act (EPCRA) of 1986, the TRI requires manufacturing facilities with 10 or more employees meeting thresholds for manufacturing, processing or otherwise using listed chemicals to submit annual reports to USEPA on their releases. Data for the TRI has been collected since 1987.

The second estimate of toxics is derived from source-specific toxic inventories. Information from formal information-gathering letters and meetings with industry, plant visits, and exploring existing state and local information on the sources are used. Engineering estimates of these emissions are then made by specific source category.

### ***How the Data Are Presented For Hazardous Air Pollutants in the Report***

Several methods/indicators are used to show the data reported, including:

- Top 10 hazardous air pollutants;
- Industry categories reporting highest total HAP releases;
- Total air releases, HAP species by state;
- Percent change in HAP air releases; and,
- Changes in HAP air releases for top five states.

Data are additionally categorized into specific source profiles. For example, HAP emissions from aerospace manufacturing. For further information on hazardous air pollutants, please refer to the *1993 Toxic Release Inventory*.

### ***How States Can Use the Data***

States can use the data to compare facilities or geographic areas, and to identify whether “hotspots” are improving or declining. The data can also be used to evaluate the success of existing environmental programs and whether large or unsuspected releases are an indicator of the need for new or revised regulation. The data can be used to track air releases and progress in reduction. Finally, since the data includes some source-specific releases, HAPs indicators can be used in conjunction with census tract data as an indicator of potential environmental justice concerns.

## **National Air Pollutant Emission Trends, 1900-1993**

The *National Air Pollutant Emission Trends, 1900-1993*, is the companion report to the *National Air Quality and Emissions Trends Report, 1993*, previously discussed. It is the third in a series of reports that tracks additional emission estimates. It is statistically valid and has a more detailed description of the estimation methodology. This report gives a detailed account of emissions by pollutant, source category, state, nonattainment area, county, and season, and by a listing of top-emitting facilities.

### ***How to Get the Report***

For additional assistance with the report contact:

Sharon V. Nizich, Project Officer (MD-14)  
U.S. Environmental Protection Agency  
Emission Factor and Inventory Group  
Research Triangle Park, North Carolina 27711  
Telephone: (919) 541-2825  
Fax: (919) 541-0684  
or  
David Misenheimer (MD-14)  
Telephone: (919) 541-5473

### ***Limitations of the Data***

The report relies on the emissions data from the AIRS database. The majority of the data are reported for sources within a nonattainment area or for sources emitting greater than 100 short tons<sup>7</sup> per year, because this is the only information the states are required to report. States are not required to develop or submit statewide emission inventories for all source categories, and nonattainment area emission inventories are not required to be submitted and approved in a time frame to support USEPA modeling programs. USEPA is currently involved in projects to gather data from other databases to fill the gaps and improve modeling efforts.

A number of changes in the methodology have also been incorporated. Section Six of the document discusses the changes in estimation methodology that have been enacted over the past several years. Changes include the method used to estimate pre-1985 to the present emissions, recalculation of mobile source emissions using an updated emissions model, use of certain years' estimates for trends only, modification of the method used to calculate particulate matter emissions, and use of other years' estimates as both trend and absolute indicators.

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<sup>7</sup> 1.1 million short tons equals 1 million metric tons.

### ***Where Do the Data Come From***

*National Air Quality*  
with some exceptions. Besides using state data categories that include all human-created sources from 1900 to 1984. Therefore, other state are also used. As discussed earlier, the ambient air quality data presented in the AIRS throughout the nation. These stations are managed by both state and local governments. The studies. In 1993, more than 4,400 monitoring sites reported air quality data for one or more of populated urban areas of the nation.

quality assurance with each site classified into one of three categories: National Air Monitoring Monitors (SPMs).

national network for urban area ambient air monitoring and to provide a regular and consistent criteria than SLAMS, location of monitoring sites remains consistent, and data are submitted at governments to implement networks for their immediate monitoring needs. Sites may remain uniform criteria and standard procedures. SLAMS data comprises most of the data found in database. Special Purpose Monitors (SPMs) fulfill very specific or short-term monitoring goals urban air quality.

The report is broken into sections which show different measurements of the data. Section of national emission trends. For each criteria pollutant, trends from 1940 through 1993 are transportation (highway vehicles and off-highway); and remaining sources. Section Four gives pollutant.

The data includes Toxic Release Inventory (TRI) summaries, national inventories for specific (MACT) status.

States can use the data to compare facilities or geographic areas, and to identify whether

existing environmental programs and whether large or unsuspected emissions are an indicator of the need for new or revised regulation. The data can be used to track air releases and progress in reduction. Finally, since the data includes some source-specific emissions, HAPs indicators can be used in conjunction with census tract data as an indicator of potential environmental justice concerns.

## *Air Data Source Two:* **Toxic Release Inventory**

The Toxic Release Inventory (TRI) is a database which is reported annually to provide information to the public about releases of toxic chemicals from manufacturing facilities into the environment. The TRI was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded under the Pollution Prevention Act of 1990. Facilities report their TRI information annually to the USEPA and to the state agency in which they are located.

Reports are available for data collected from 1988 to 1993. First data collection began in 1987. Data collection for 1988 is considered the baseline year because of data quality concerns from 1987. Some components of TRI reporting began in different years. Transfers for treatment and disposal of toxic chemicals began reporting in 1987, while transfers for recycling and energy recovery have been reported since 1991. The Pollution Prevention Act of 1990 started requiring TRI to collect data on the management, transfer, and reduction activities of TRI chemicals in waste. At the time of reviewing, the 1993 report was the most current and is the focus of this database description.

### ***How to Get the Report***

To request copies of TRI and EPCRA, contact the Emergency Planning and Community Right-to-Know Information Hotline at 1-800-535-0202. Other potential sources of TRI information include the state EPCRA section 313 contact, the USEPA Regional Office, or the facility itself.

The TRI User Support Service can provide assistance in accessing and using the TRI data. Telephone number is (202) 260-1531.

For specific questions dealing with the air content of the TRI, users may contact:

Al Rush  
Office of Air and Radiation  
USEPA  
401 M Street, SW  
Mail Code 6301  
Washington, DC 20460  
Telephone: (202) 260-6002  
Fax: (202) 260-0451

The on-line computer database and the CD-ROM version of the database contain the data collected for all years. The TRI data are available in a variety of common computer and hard copy formats, to ensure that everyone can easily use the information. The complete TRI database is accessible to the public via on-line telecommunications through the National Library of Medicine's TOXNET system and through the Right-to-Know Network.

The data are also available on diskette, CD-ROM, and computer bulletin boards.

#### *Internet Access*

Database: Toxic Release Inventory System (TRIS)

Address: [http://www.epa.gov/enviro/html/tris/tris\\_overview.html](http://www.epa.gov/enviro/html/tris/tris_overview.html)

#### *Telnet*

Address One: [ftp.epa.gov](ftp://ftp.epa.gov) (USEPA ftp server)

Address Two: [gopher.epa.gov](gopher://gopher.epa.gov) (USEPA gopher server)

#### ***Description of the Internet Database***

The TRI database contains the information as described in the hardcopy report. The database is broken down into five subject areas: activities, businesses, facilities, releases, and toxic chemicals. The activities tables report the activities and uses of toxic chemicals at TRI facilities. The businesses tables contain information about the parent company, mailing address, etc., of the TRI facility. The facilities tables describe the history, monitoring program, and submissions. Releases report the media by which the toxic was released: air, land, underground injection, water discharge, or transfer. The toxic chemicals database includes the quantity of the chemical recycled, used for energy recovery, etc.

#### ***Limitations of the Data***

The TRI requires the reporting of estimated data and does not mandate that facilities monitor their releases; hence, various estimation techniques are used where monitoring data are not available.<sup>8</sup> The use of different estimation techniques also impairs the ability to make comparisons of releases between different plants and locations. There is a possibility that some facilities may also not be fully complying with the reporting requirements.

Though the TRI data are useful as a starting point in identifying potential risks, other information is required to evaluate the risk in a particular area. A determination of risk depends on many factors, including: the toxicity of the chemical, the extent of exposure, the type of release, and the conditions of the environment. For example, small releases of highly toxic chemicals may present a greater risk than large releases of less toxic chemicals. Direct releases, such as air emissions, may pose a greater threat to human health and the environment than more contained releases, such as underground injection.

Lastly, the TRI captures only a portion of all toxic chemical releases nationwide. Facilities with fewer than ten employees and facilities that do not meet chemical thresholds are not required to file TRI reports. The TRI also does not cover non-manufacturing facilities or toxic emissions from automobiles and other non-industrial sources.

Nevertheless, the data the USEPA receives is useful in identifying trends in releases. Additionally, the USEPA conducts a three percent data quality review of TRI data, during which a sample of input forms are compared to the database. In 1993, data entry accuracy rate was 99.87 percent; release value accuracy rate was 99.91 percent. This shows the data entered into the TRI is statistically significant.

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<sup>8</sup> EPA has published estimation guidelines for states and facilities to use.

### ***Where Do the Data Come From***

emissions to the air, discharges to bodies of water, releases at the facility to land, as well as stack or fugitive emission. Stack emissions are releases to air that occur through confined air are not released through a confined air stream. Fugitive emissions include equipment leaks, ventilation systems.

changes have occurred since TRI reporting began in 1987. Some chemicals have been recent May 1996 federal district court ruling upheld a November 1994 USEPA action adding The manufacturing and processing thresholds for chemicals began at 75,000 pounds in 1987, resulted in an increase of the number of facilities reporting. Reporting criteria for certain including mandatory reporting of additional waste management such as recycling and pollution 1993.

manufacture, process, or use in excess of reporting thresholds. More than 23,000 facilities released in 1993. Reports for each calendar year are due by July 1 of the following year. available to the public in printed reports, in a computer database, and through a variety of

A facility must report to TRI if it: conducts manufacturing operations within Standard Industrial manufactures or processes more than 10,000 pounds of any listed chemical during the chemical released to the environment at the facility; amounts of each chemical shipped from each chemical recycled, burned for energy recovery, or treated at the facility; maximum conducted at the facility involving the toxic chemical, source reduction activities undertaken to

### ***How the Data Are Presented***

and Transfers. Chapter Two covers Prevention and Management of TRI Chemicals in Waste. discusses the TRI Reporting Profiles for 33/50 Program Chemicals. Since the report focuses

on all toxic releases and not just air, much of the data are intermingled. Nevertheless, measurements used for air include:

- Total releases by state;
- Top 10 Facilities for Largest Total TRI Releases;
- Top 10 Chemicals Air;
- Top 10 Facilities for Largest TRI Releases to Air, Water, and Land, 1993;
- Carcinogen Releases to Air/Water/Land, 1993<sup>9</sup>;
- Top 10 Chemicals Treatment;
- Top 10 Chemicals Release/Disposal;
- Change in Total Releases;
- Change in Total Releases by Industry; and,
- Top 50 US Counties for Air/Water/Land Releases.

The TRI also measures the success of toxic release regulations by comparing data and trends for the years collected. For example, the changes in chemical releases from 1988-1993 that are targeted under the 33/50 Program indicate a steady decline in the amount of releases and transfers. Other year to year comparisons include:

- Changes in Total TRI Releases by State, 1988-1993,
- TRI Underground Injection, 1988-1993 (millions of pounds), and
- Changes in Total TRI Releases by Industry, 1988-1993.

### ***How States Can Use the Data***

States can use the data to compare facilities or geographic areas, and to identify whether “hotspots” are improving or declining. The data can also be used to evaluate the success and failures of existing environmental programs and whether large or unsuspected releases are an indicator of new or revised regulation. The data can be used to track pollution control and waste reduction progress. Finally, since the data includes location of facilities, the TRI can be used as an indicator of potential environmental justice concerns (for example, location of TRI facilities to minority neighborhoods). The TRI data used in conjunction with census tract data will indicate populations and demographics at risk to exposure.

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<sup>9</sup> TRI designates 118 chemicals as carcinogens based on criteria set forth in the Occupational Safety and Health Administration’s Hazard Communication Standards. Some of these chemicals, such as benzene or asbestos, are known to cause cancer in humans.