Center for Environmental Information and Statistics

US Environmental Protection Agency

Major Findings from the CEIS Review of EPA'S

ACID RAIN PROGRAM'S EMISSIONS TRACKING SYSTEM (ETS) DATABASE

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Major Findings from the CEIS Review of EPA's ETS Database

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1. INTRODUCTION

The **Emissions Tracking System (ETS)** stores data collected under the auspices of the **Acid Rain Program** and the **Clean Air Act**. Title IV of the Clean Air Act requires fossil-fuel fired utility power plants and other significant SO_2 emitters to monitor and report their emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon dioxide (CO_2), and the volume and opacity of their emissions flow. The overall goal of the Acid Rain Program is to achieve significant environmental and public health benefits through reductions in the emissions of SO_2 and NO_x, the primary causes of acid rain. To achieve this goal at the lowest cost to society, the program employs both traditional and innovative market-based approaches for controlling air pollution. One of these innovative approaches is the establishment of SO_2 allowances that can be bought, sold, and traded among investors, brokers, utilities, and other significant SO_2 emitters. This program requires accurate monitoring of pollutant emissions to ensure that participants do not "spend" (emit) more than their allowances.

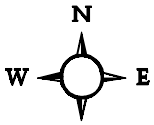
The Acid Rain Program was established under Title IV of the Clean Air Act. The program sets a cap on the total amount of SO_2 that may be emitted by electric utilities nationwide in 2010 at about one half of the amount estimated to have been emitted in 1980. The program also sets NO_x emission limitations for coal-fired electric utility units, representing about a 27% reduction from their 1990 levels. To achieve these reductions, the law requires a two-phase tightening of the restrictions placed on utility boilers and combustion turbines (referred to as "units") operated by fossil-fuel fired power plants. There are more than 2,000 units currently operating in the United States. Phase I, instituted in 1995, affects 263 units at 110 mostly coal-burning electric utility plants located in 21 Eastern and Midwestern States. Additional units may join Phase I of the program as substitution or compensating units. Phase II, which will begin in the year 2000, tightens the annual emissions limits imposed on the large, higher-emitting Phase I units and also sets restrictions on smaller, cleaner plants fired by coal, oil, and gas; Phases I and II will eventually encompass over 2,000 units. The program affects existing utility units serving generators with an output capacity of greater than 25 megawatts and all new (post-1994 start-up date) utility units. The ETS assists in tracking the progress toward the goal to reduce annual SO_2 and NO_x emissions. The ETS also contains CO_2 emissions data that will assist in assessing the nation's progress in stabilizing greenhouse gases.

Emissions Tracking System (ETS) is one of the major EPA databases that are being reviewed to characterize their overall quality and applicability.

2. SUMMARY ANSWERS TO REVIEW QUESTIONS

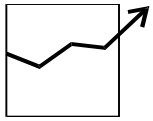
2.1. What does the database cover?

The database contains hourly emissions of SO_2, NO_x, and CO_2, as well as volumetric flow and opacity readings for boilers and turbines (referred to as "units") located primarily in Midwestern and Eastern States. These units are used primarily in the generation of electricity in thermal utility plants. The database was officially established in January 1994. While the database contains records for over 2,000 units; the exact number varies year to year since some units retire or do not operate. Additionally, due to the location of monitors, sometimes emissions from several units are combined and reported on a single record. SO_2 and NO_x emissions are reported in parts per million (ppm); the diluents CO_2 and O_2 are reported in percentage of flow, and flow is reported in cubic feet per hour. These hourly readings, collected using Continuous Emissions Monitoring (CEM) hardware, are averages derived from approximately 15 minute-interval data points. The database contains records for all units rated over 25 megawatts and new units under 25 megawatts that use fuel with a sulfur content greater than 0.5% by weight.



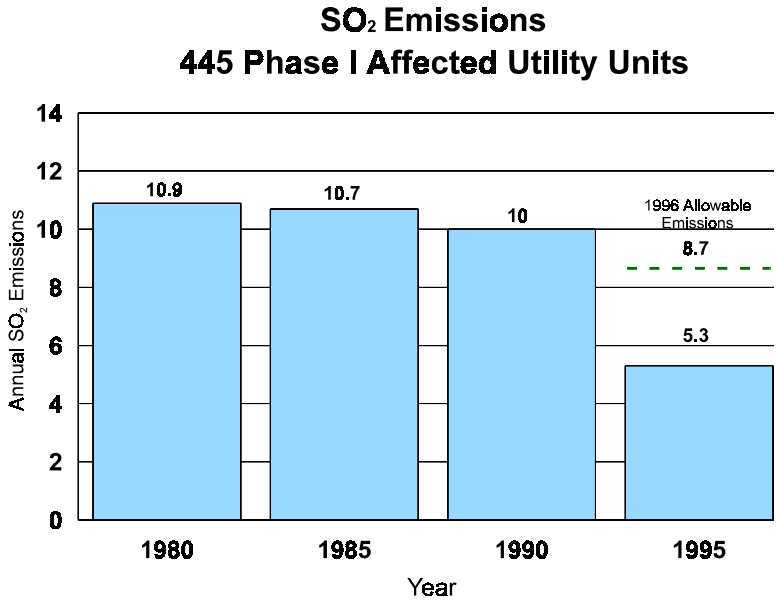
2.2. Can the database be used for spatial analysis?

Yes. Units report street addresses and ZIP codes, allowing for aggregation and analysis at levels greater than that of a ZIP code.



2.3. Can the database be used for temporal analysis?

Yes. The Emissions Tracking System contains hourly emissions information reported on a quarterly basis, allowing for inter- and intra-year analysis of data collected since 1994. Comparisons to pre-1994 data (not in ETS) rely on the use of estimated emissions based on units' reported fuel type and consumption.



Source: Acid Rain Program Website - http://www.epa.gov/acidrain/overview.html

2.4. How consistent are the variables over space and time?

Phase I units are required to collect and report data on the same variables using identical parameters and monitoring standards. Phase II units will be held to these same standards beginning in the year 2000. Missing emissions data are estimated and regenerated using established procedures.

2.5. Can data from ETS be linked with information from other databases?

Yes. The data from ETS can be linked to other data using ZIP code, city, and State identifiers.

2.6. How accurate are the data in ETS?

ETS data are some of the most accurate data in EPA. The information is collected from tightly-inspected and tested monitoring equipment, resulting in a gross error rate of approximately 1%.

2.7. What are the limitations of ETS?

ETS does not store data from units generating less than 25 megawatts that were in service prior to the program's start on January 1, 1994. Units in Hawaii and Alaska are not included because the Acid Rain Program covers only the 48 contiguous States.

2.8. How can I get information on ETS?

The public may access recent raw and summary ETS data from EPA's website. Historical records are maintained at EPA's computer center at Research Triangle Park, NC.

ETS Data Products

Product	Supplier/Contact/Order Information
Annual Compliance Report: Acid Rain Program	Acid Rain Program (202) 564-9620
Acid Rain Program Emissions Scorecards	Acid Rain Program (202) 564-9620

Accessing ETS Data Online

Data from Online Providers/Internet Site	For More Information
EPA Internet Server- Raw ETS Emissions Data *http://www.epa.gov/acidrain/ftp/rawfiles.html*	Contact Henry Clarius Telephone (202) 564-9620 clarius.henry@epa.gov

2.9. Is there documentation on ETS?

There are a number of user and systems documents available from the Acid Rain Program. Some of these are listed in the detailed answers that follow.

3. DETAILED ANSWERS TO REVIEW QUESTIONS

3.1. What does the database cover?

The **Acid Rain Program's Emission Tracking System (ETS)** contains records for over 2,000 units. A unit is defined as either a boiler or combustion turbine used in the generation of electricity. The actual number of reporting units varies annually due to units retiring or not operating. Under the Acid Rain Program, each regulated unit must continuously measure and record its emissions of SO_2, NO_x, and CO_2, as well as data on the volume and opacity of emissions flows. Hourly emissions data are electronically reported to EPA on a quarterly basis; these data are then recorded in the ETS database. The database was established in January 1994. The emissions monitoring and reporting systems are critical components in the drive to reduce these emissions. Monitoring ensures, through accurate accounting, that SO_2 and NO_x emissions reduction goals are met.

Data submitted from these units include hourly emissions readings, description of the unit system, source operating information, and operating levels. SO_2 and NO_x emissions are reported in parts per million (ppm); the diluents CO_2 and O_2 are reported in percentage of flow, and flow is reported in cubic feet per hour. Data are collected every 15 minutes, and are then aggregated to obtain an hourly reading. As a function of this intense data collection effort, the 1,800 units currently reporting data to the ETS submit 5.04 million records per quarter.

Who Must Report?

The Acid Rain Program requires units over 25 megawatts and new units rated under 25 megawatts that use fuel with a sulfur content greater than 0.5 percent to measure and report emissions. This reporting is required by Title IV of the Clean Air Act, which holds the reduction of annual SO_2 emissions to below-1980 levels as its primary goal. To achieve these reductions, the law requires a two phase tightening of the restrictions placed on fossil-fuel fired power plants.

Phase I, now in force, requires 263 units located at 110 mostly coal-burning electric utility plants in 21 Eastern and Midwestern States to report their emissions of SO_2, NO_x, and CO_2, as well as volumetric flow and opacity readings. Additional units join Phase I as substitution and compensating units; the number varies each year but is usually less than 200.

Phase II, which begins in the year 2000, will tighten the annual emissions limits imposed on these 263 large, higher-emitting plants and also set restrictions on smaller, cleaner plants fired by coal, oil, and gas, encompassing over 2,000 units.

How are data reported?

Emissions data collected and reported under the Acid Rain Program travel a multistep pathway from the initial recording of emissions to inclusion in the Emissions Tracking System. First, raw emissions data from a Continuous Emissions Monitor (CEM) is compiled by utility-based computers and formatted for

quarterly submission to EPA. EPA provides software to assist utilities in the preparation, review, and submittal of these quarterly reports. This software allows the utilities to check the format, sequence, and completeness prior to submission.

Utilities electronically transfer these reports directly to EPA's National Computer Center in Research Triangle Park, NC where the ETS is housed. Hard copy compliance certifications for each quarterly report and any quarterly reports on diskette or magnetic tape are submitted to EPA's Acid Rain Division in Washington, D.C. EPA staff then transmit the disk or tape to the Agency's computer center where it is entered into the ETS. Using the ETS mainframe software, EPA checks the quarterly reports for errors and contacts utilities to resolve data problems. This process eliminates the need to manually enter data into the database, and provides for good quality of data.

Data Elements

The Acid Rain Program's Emission Tracking System contains data in the following major subject areas:

Facility/Power Plant Data — Includes discrete plant identification codes, the calendar quarter and year of the reported data, discrete unit and stack/pipe identifiers, parameters reported, variables used, and number of records in the report.

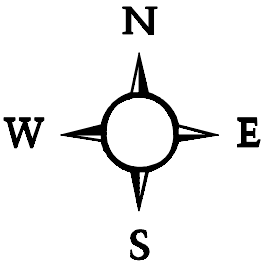
Monitoring Data — Includes information on pollutant gas concentrations (SO_2, NO_x, and CO_2), diluent gas concentrations (CO_2 and O_2), moisture data, volumetric flow data, daily calibration test data and results, and reference method backup quality assurance data (information provided as a benchmark of CEMS performance to assure quality data collection and reporting).

Unit Data — Includes data on unit operating parameters, quarterly cumulative emissions data, fuel flow for oil and gas-fired units, SO_2 mass emissions data, alternative hourly SO_2 mass emissions estimation parameters for oil and natural gas-fired units, NO_x emission rate data and alternative estimation parameters for oil and natural-gas fired units, and CO_2 mass emissions data and estimation parameters.

Control Equipment Data — Maintains data on SO_2 and NO_x control equipment operating parameters, thereby ensuring equivalent monitoring across units.

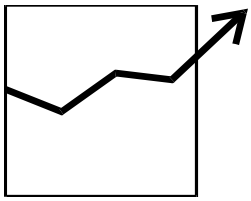
Monitoring Plan Information — Contains detailed information on reporting units, stack/pipe identifiers, monitoring systems and analytical components as a function of units and stack, formulas used, fuel flowmeter data, monitoring system recertification events, and reasons for missing data.

Certification Test Data and Results — Maintains information on calibration/error tests, linearity checks, leak checks, bias tests, cycle and response time, and fuel flow calibration.



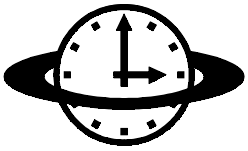
3.2. Can the database be used for spatial analysis?

Data reported to the Emissions Tracking System include the address and ZIP code of each facility, making it possible to do a spatial analysis. However, it should be noted that ETS contains data for a limited number and type of facilities and therefore cannot be used to estimate overall SO_2, NO_x or CO_2 emissions for a geographical area.



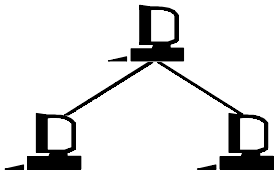
3.3. Can the database be used for temporal analysis?

For most units, a Continuous Emissions Monitoring system must be used to analyze and record data at least every fifteen minutes. All emissions and flow data are aggregated to one hour averages which are reported to the Emissions Tracking System on a quarterly basis. Data are maintained on a historical basis, allowing for temporal analysis. Data are available from January 1, 1994; comparisons to pre-1994 years must be based on estimated emissions derived outside of ETS. These estimates are derived from fuel type and consumption of operating units.



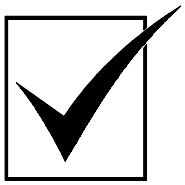
3.4. How consistent are the variables over space and time?

All sites collect information on the same variables using identical collection parameters. As units are retired, their monitoring periods cease, and as units come online, new records are added to the database. Records from the 400 units that have been retired since the inception of the program are still maintained in the database.



3.5. Can data from ETS be linked with information from other databases?

The data contained within ETS have the potential to be linked with data from other sources. ETS data may be linked through unit addresses and ZIP code. Latitude and longitude of units are not collected for submission to the ETS database.



3.6. How accurate are the data in ETS?

ETS data are self-reported by unit operators. Most operators collect data using a Continuous Emissions Monitoring System (CEMS), although some units may use an approved alternate measurement method. These CEMS and alternate systems are certified by EPA to meet the high accuracy standards required by the Acid Rain Program. CEMS are subject to semiannual accuracy checks, including a relative accuracy test audit (RATA) and bias tests. EPA produces and distributes a number of guidance documents for unit operators to help ensure proper calibration and superior maintenance of CEMS. The accuracy of CEMS are also evaluated on the basis of percentage of hours that a monitoring system is operating properly and meeting all performance standards. In recent years, median availability percentages have been above 96% for the three major parameters of SO_2, NO_x, and CO_2.

ETS incorporates several data correction procedures including the ability to resubmit erroneous data. Unit operators have write access to the database for thirty days following their submissions; EPA staff have edit access after that time. Corrections can only be made within a period not to exceed ninety days after the year of submission has ended. Data found to be erroneous after this period may be regenerated using set EPA procedures, though the facility may not resubmit data after the ninety day period. The data found in the Emission Tracking System are as accurate as can be expected given the range of monitoring issues and the diversity of the monitored units.

3.7. What are the limitations of ETS?

- Continuous emissions monitoring systems data are considerably more accurate than estimated emissions. However, CEMS are complex systems incorporating numerous subsystems and components, each of which is subject to systematic and random errors. The true accuracy of CEMS depends on the skill and experience of the CEMS manufacturer, integrator, and operator, who are responsible for minimizing biases and obtaining the best possible accuracy and precision. It is also the responsibility of the CEMS owner and operator to maintain the system to specified levels of accuracy and precision. Concerns regarding accuracy appear in the number of potential parameter biases as well as in the data acquisition and handling system's hardware. In addition, the physical location of the sampling device can have significant impacts on data accuracy.

- The ETS database currently contains data for all units producing over 25 megawatts of power and all post-1994 generators under 25 megawatts that use fuel with a sulfur content greater than 0.5 percent by weight. As such, the ETS does not receive data for sub-25 megawatt units in operation prior to the program's start on January 1, 1994.

- The ETS does not contain information on generating units located in Alaska and Hawaii, because these States are not covered by the Acid Rain Program. In addition, units are geographically coded by address and ZIP code only. These factors may limit the detail of any spatial analysis.

3.8. How can I get information on ETS?

The database resides at EPA's National Computer Center in Research Triangle Park, NC.

General information on ETS may be obtained from:

EPA
Attention: ETS
401 M Street SW
Mail Code 6204J
Washington, DC 20460

Or you may call the Acid Rain Hotline at (202) 564-9620.

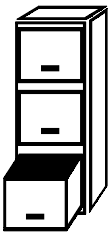
Electronic Media

ETS summary reports may be accessed from the Acid Rain Program's website at *http://www.epa.gov/acidrain/edata.html*

Raw quarterly ETS data may be obtained from the Program's website at *http://www.epa.gov/acidrain/ftp/rawfiles.html*

Raw quarterly ETS data may also be obtained from the National Technical Information Service. Interested parties can obtain a subscription with NTIS to automatically provide them with quarterly emissions data. One-time request for data from a particular quarter can also be made. There is a $96/quarter charge or an annual subscription charge of $384. Orders can be placed by calling (800) 363-2068 or via the following website address. *http://www.ntis.gov/fcpc/*

Also available from the ETS program website is software, revuedr.zip, that allows a Windows user to examine specific information in a single Electronic Data Report. The program allows users to view hourly, daily, and quarterly data, produce graphs, print reports, and export the data to a spreadsheet.



3.9. Is there documentation on ETS?

Statutory Authority

- Clean Air Act Amendments of 1990, Title IV, Acid Rain Deposition (42 U.S.C. 7651)
- 40 CFR Parts 72-78

Key Information

- Acid Rain Program Emissions Scorecard 1995: SO_2, NO_x, Heat Input, and CO_2 Emissions Trends in the Electric Utility Industry
- 1997 Compliance Report: Acid Rain Program *http://www.epa.gov/ardpublc/acidrain/cmprpt97/cr1997.htm*
- 1996 Compliance Report: Acid Rain Program *http://www.epa.gov/ardpublc/acidrain/cmprpt96/cr1996.html*
- 1995 Compliance Report: Acid Rain Program *http://www.epa.gov/ardpublc/acidrain/comprpt/cr1995.html*

Internal Consistency

- Acid Rain Program Electronic Reporting
- An Operator's Guide to Eliminating Bias in CEM Systems
- Acid Rain Program: CEMS Submission Instructions for Monitoring Plans, Certification Test Notifications, and Quarterly Reports
- Acid Rain Program: CEMS Field Audit Training Manual
- Emissions Tracking System User' Guide (v. 4.1)