United States
Environmental Protection
Agency

Research and Development

Air and Energy Engineering
Research Laboratory
Research Triangle Park, NC 27711

EPA/600/SR-92/197 December 1992

EPA

Project Summary

Combustion Area Sources: Data Sources

Daniel Bowman, Scott Lowe, Jean Purple, Randy Randolph, and David Winkler

Area source emissions of particulate matter, sulfur dioxide, oxides of nitrogen, reactive volatile organic compounds, and carbon monoxide are estimated annually by the National Air Data Branch of EPA's Office of Air Quality Planning and Standards. Area sources include all mobile sources and any stationary sources that are too small, difficult, or numerous to be inventoried as point sources. The original National Emissions Data System (NEDS) area source methodology and algorithms were developed in 1973 and 1974, using 1960 census data. The NEDS methodology has remained relatively unchanged over the past 15 years. Current methods need to be updated or revised using more recent data. Due to the recent groundswell of interest in obtaining better emissions inventory data, efforts are underway to update or revise these "old" NEDS methodologies. The work discussed in this report relates to the combustion category of emissions. Information presented in this report is intended to identify, document, and evaluate data sources for stationary area sources, including solid waste and agricultural burning.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

Area source emissions of particulate matter, sulfur dioxide, oxides of nitrogen, reactive volatile organic compounds, and carbon monoxide (CO) are estimated annually by the U.S. Environmental Protection Agency's (EPA's) National Air Data Branch. Area sources include all mobile sources and any stationary sources that are too small, difficult , or numerous to be inventoried as point sources. The original National Emissions Data System (NEDS) area source methodology and algorithms were developed in 1973 and 1974, using 1960 census data. The NEDS methodology has remained relatively unchanged over the past 15 years. Current methods need to be updated or revised using more recent data.

As part of the EPA's atmospheric ozone and CO control program, state and local air pollution control agencies responsible for ozone and CO non-attainment areas must estimate emissions from point, area, and mobile sources to serve as a basis for state implementation plans (SIPs). SIP guidance for estimating stationary and mobile source emissions is found in Procedures for the Preparation of Emission Inventories for Precursors of Ozone (EPA-450/4-88-021) and Procedures for the Emission Inventory Preparation, Volume IV: Mobile Sources [EPA-450/4-81-26d (Revised)], respectively. Stationary area source guidance and data sources are, in some cases, more than 15 years old, despite recent (1992) updates to the original guidance documentation.

EPA's Joint Emissions Inventory Oversight Group (JEIOG) has placed a high priority on evaluating the stationary area

Printed on Recycled Paper

source categories and recognizes that the emissions inventory methodologies currently applied to these sources are outdated and need to be revised. This effort is one of the initial steps of the revision process.

The purpose of this effort was to identify, document, and evaluate data sources for stationary area sources, including solid waste and agricultural burning.

The following characteristics were identified for each data source: the cost and timeliness of the data, the level of detail available, the comprehensiveness and accuracy of the data, and the available data media. Section 2 of the report describes the methodology used in the data source identification, documentation, and evaluation process. Section 3 summarizes the fuel combustion data sources and describes the most promising data sources. Section 4 contains the same information for solid waste combustion. Section 5 contains information for the category, "other burning." Section 6 briefly evaluates satellite data and potential sources. The full report also includes two appendices: one contains the complete information data sheets for each data source, and the other summarizes related trade and professional associations.

Data Evaluation and Recording

Data sources were identified for three major categories of area source emissions: fuel combustion, solid waste combustion, and other combustion. In the other combustion category, the search focused on two primary subcategories, forest fires and agricultural burning. The basic technique used to search for, evaluate, record, and store the data sources was the same for each major category.

The following methods were used to identify data sources:

- Reviewing EPA library holdings and local universities' collections
- Contacting the U.S. Departments of Commerce, Energy, Agriculture, and Transportation
- Searching the National Technical Information Service (NTIS) and Government Printing Office (GPO) databases
- Contacting trade, business, and manufacturing associations

The following characteristics were identified and recorded, to the extent possible, for each source reviewed: title, author, date published, frequency of update, document number, type of data, timeliness of data, available data media, resolution of data, comprehensiveness and accuracy of the data, and a brief description of the contents of the document. A template was developed and used to record the information. A separate template was maintained for each data source identified for this effort. The completed templates were stored in computer files and are included in the full report. One of the actual sheets for a document entitled Gas Facts is included here as an example:

Area Emissions Data Source Sheet

Title:
Gas Facts

Author:
American Gas Association

Date Published:
1988

Frequency of Update:
Annual

Document Number:
AGA Catalog #F10187

Type of Data in Document:
Data on natural gas consumption, production, and price

Timeliness of Data:
Current

Available Data Media:
Paper

Cost of Data:
$10.88

Format of Data:
Tables

Resolution of Data in Document:
Data are broken down to state and regional level; statistics go back to 1965.

Comprehensiveness and Accuracy of Data:
Data cover many aspects of natural gas statistics. Data are based on a number of surveys and survey-based publications.

Abstract of Document:
This publication contains detailed statistics for 1987 and summary statistics for 1965-1986 for the gas utility industry, which, by definition, consists of companies engaged in natural gas distribution and transmission. The publication also contains relevant data on the gas producing segment of the industry and key statistics on other energy industries. To evaluate specific data sources, both the publisher of the source and the subject area that categorizes the source had to be investigated. For instance, if specific census publications were evaluated, the quality of the Census Bureau's information as a whole had to be determined, and census information in general also had to be examined. From this process, the key data sources that exist for each of the three stationary combustion area source categories (fuel, solid waste, and other) that were analyzed were ascertained.

Fuel Combustion Data Sources

Eighteen area source fuel combustion data sources were identified during this effort. The data sources listed below contain the most useful information from those sources reviewed:

- State Energy Data Report—data on energy consumption at the state and national levels
- Annual Energy Review—energy data on the census and national levels
- Gas Facts—natural gas consumption data on the national and state levels
- Gas Househeating Survey—fuel consumption and costs for natural gas househeating
- Petroleum Supply Annual, 1989, Volumes I and II—data on petroleum products consumption
- Fuel Oil and Kerosene Sales—data on sales (consumption) of fuel oil and kerosene products
- Natural Gas Annual—data on regional, state, and national levels

Additional combustion data sources were reviewed and may provide some useful information on one or more fuel consumption areas. However, the sources may be inadequate because they have been published only once. The U.S. Department of Energy (DOE) provides the highest quality of data sources for the category of fuel combustion. DOE data are updated frequently (generally monthly or annually) and are usually comprehensive and consistent. Specifically, State Energy Data Report, Annual Energy Review, and Household Energy Consumption and Expenditures are DOE publications that have quality data for multiple fuels on a national level. Several other DOE publications have data on specific fuels at regional or state levels; e.g., Natural Gas Annual and Petroleum Supply Annual. Other high quality fuel combustion information sources include the American Gas Association (Gas Facts and Gas Househeating Survey), the American Petroleum Institute, and the National Coal Association. For each of the three categories (fuel, solid waste, and other), a table was developed summarizing all of the data sources in the category.

Solid Waste Data Sources

The solid waste data source summary table is divided into two sections for ease of reference: a Census Bureau data source section and a section for other sources. Seventeen solid waste data sources were identified during this project. Seven census data sources were identified during this effort. The data sources listed below contain the most useful information from those census sources reviewed:

- Census of Retail Trade—the quantity and types of retail establishments resolved to metropolitan areas
- Summary of Population and Housing Characteristics, 1991—data resolved to county and most current data
- The County and City Data Book, 1988—comprehensive data resolved to cities
- Statistical Abstract of the U.S.—data on the social, political, and economic organization of the U.S.

The following potentially useful census data will be available in 1992 and 1993:

- General population characteristics for metropolitan statistical areas
- Social and economic characteristics
- Detailed housing characteristics

In addition, the Guide to the 1987 Economic Censuses and Related Statistics is a very useful tool for locating sources of economic activity data for retail and wholesale trade, service industries, transportation, manufacturers, mineral industries, and construction industries. Ten non-census data sources were reviewed for this effort. The data sources listed below contain the most useful information from those non-census sources reviewed:

- Characterization of Municipal Solid Waste (MSW) in the United States: 1990 Update—national MSW data
- The 1991 Resource Recovery Yearbook, Directory & Guide—all waste-to-energy projects in the U.S., broken down by region and state
- Municipal Waste Combustion (MWC) Study—MWC characterization by technology and emission control systems
- Estimates of U.S. Biofuels Consumption—energy produced from solid waste by industrial sector and region
- A Comprehensive Report on the Status of Municipal Waste Combustion—MSW annual status update

The 1990 Annual Fire Report covers only the southeastern region of the U.S. Fire reports for different regions may also be available from the National Forest Service (NFS). No organizations in the area of solid waste combustion match the DOE's quality for fuel combustion data sources. However, the Bureau of the Census has several relevant publications, and a fair number of other competent individual data sources exist. The Census' Census of Retail Trade, Summary of Population and Housing Characteristics, and The County and City Data Book all have data relevant to solid waste disaggregated in a variety of ways. The EPA's Characterization of Municipal Solid Waste in the United States has estimates and projections of MSW generation and recovery from 1960 to 2000. The 1991 Resource Recovery Yearbook, Directory & Guide, published by Governmental Advisory Associates, contains data on waste-to-energy projects.

Other Combustion Data Sources

Thirty-two area source other combustion data sources were identified during this effort. Three types of data sources were recorded: documents, organizations, and computer databases. The organizations and computer databases are listed in the full report. The document sources of other combustion data are listed below. Most of the data sources concentrate on satellite information that is relevant to forest acreage burning and potential agricultural burning. Of the data sources reviewed, those listed below contain the most promising data:

- Wildfire Statistics—state and geographic area data for state and privately owned lands
- 1990 Annual Fire Report—compilation of southeastern U.S. forest fire data
- Structural Fire Statistics—data on housing fires
- Estimates of U.S. Biofuels Consumption—energy produced from wood and alcohol by industrial sector and region
- Global Biomass Burning—compilation of satellite data on biomass burning
- Local Climatological Data: Monthly Summary—climatological data from U.S. weather stations
- Climatic Averages and Extremes for U.S. Cities—annual compilation of monthly climatological data
- Keyguide to Information Sources in Remote Sensing—summary of institutions and individuals involved with satellites and remote sensing
- Remote Sensing Yearbook—annual update of satellite and satellite related industries

The 1990 Annual Fire Report covers only the southeastern U.S. Fire reports for different regions may also be available from the National Forest Service (NFS). The other combustion area, because of its broadly defined nature, has a multitude of areas from which to draw data sources. For forest fires, satellite data sources were investigated thoroughly. This investigation determined that satellite data are currently too disorganized and expensive to be a quality data source. Several data sources for forest fires were discovered. The NFS has published data pertaining to forest fires on an annual basis. Examples of NSF documents with forest fire data are Annual Fire Report and Wildfire Statistics. Unfortunately, the nine districts of the NSF publish independently of each other, making the task of document location difficult. A one-time publication by Massachusetts Institute of Technology Press, Global Biomass Burning, contains a compilation of satellite data on biomass burning. The National Oceanic and Atmospheric Administration (NOAA) has several publications relevant to the other combustion category, e.g., Local Climatological Data: Monthly Summary and Climatic Averages and Extremes for U.S. Cities.

Remote Sensing and Image Processing

With the development of satellite technology and image processing computer systems, remote sensing has become a viable source of land cover, topographic, and interpretive data. Remote sensing is the process of deriving information through systems not in direct contact with the objects or phenomena of interest. Image processing describes the manipulation of the data produced by remote sensing systems. The combination of these technologies can yield a variety of spatial data. There are two main sources of primary remote sensing data: (1) the Earth Observation Satellite Company (EOSAT) operates the Landsat remote sensing satellite system and distributes the primary data (and some interpreted data) produced from this system, and (2) the French company, Systéme Probatoire de la Observation de la Terre (SPOT), has a satellite in orbit and a distribution office in the U.S. Due to the disorganization and the high cost of satellite data, it was determined that the use of satellite data for methodology development is not realistic at present.

*U.S. Government Printing Office: 1992 — 750-071/60156

D. Bowman, S. Lowe, J. Purple, R. Randolph, and D. Winkler are with Alliance Technologies Corp., Chapel Hill, NC 27514.
E. Sue Kimbrough is the EPA Project Officer (see below).
The complete report, entitled "Combustion Area Sources: Data Sources," (Order No. PB93-106623/AS; Cost: $19.50; subject to change) will be available only from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650

The EPA Project Officer can be contacted at:

Air and Energy Engineering Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

United States
Environmental Protection Agency
Center for Environmental Research Information
Cincinnati, OH 45268

Official Business
Penalty for Private Use
$300

EPA/600/SR-92/197

BULK RATE
POSTAGE & FEES PAID
EPA
PERMIT No. G-35