

ESTIMATION METHODS: PROJECTION INPUT DATA

ACTIVITY DATA FOR PROJECTIONS

Control strategy projections are estimates of future year emissions that also include the expected impact of modified or additional control regulations. State and local planners should determine if any future scheduled regulations, whether at the federal, state, or local level, apply to sources in their area.

Future year emissions may also be affected by fuel switching, fuel efficiency improvements, improvements in performance due to economic influences, or any occurrence that alters the emission producing process. Programs other than those aimed at reducing the emissions of the criteria pollutants of interest may affect the future year emissions. These may include energy efficiency programs, pollution prevention programs, and greenhouse gas or global warming initiatives. These should all be reflected in the projections through the future year control factor, emission factor, or in some cases, by adjusting the activity growth forecast.

Control factors and emission factors vary by source category and are continuously being revised and improved based on field and laboratory measurements. State and local agencies should maintain close coordination with the appropriate EPA regional office to ensure that all factors reflect current EPA guidance. States must also examine the future year control factor or emission factor in relation to the base year value to ensure any existing controls are not double-counted by taking additional credit in the future year. The control factor and emission factor may also be a weighted composite in some cases, such as diesel construction engines versus each individual equipment type within the category.

Technical documents from EPA, including Alternative Control Techniques (ACT) documents and Control Techniques Guidelines (CTG) documents, are collected at the Clean Air Technology Center on EPA's TTN web site:

<http://www.epa.gov/ttn/catc/products.html>. ACT documents provide technical information, based on data collected from model plants, for use by state and local agencies to develop and implement regulatory programs to control emissions. The model plants in the ACT documents represent typical emitters; area-specific factors may cause discrepancies and deviations and should be accounted for when comparing ACT document costs to actual performance. CTG documents provide federal guidelines to state and local agencies to assist those areas when formulating a plan to meet federal air quality requirements.

In determining the future year control factor or emission factor, three basic parameters must be quantified: regulation control, rule effectiveness, and rule penetration. Regulation control is the level of reduction expected by assuming a fully complied measure. Rule effectiveness accounts for the level of expected compliance with the regulation. Rule penetration indicates the fraction of emissions within a source category which are subject to the regulation, accounting for size cutoffs and other exemptions.

Emissions from area sources are nearly always estimated using some type of calculation procedure. Direct measurement of area source emissions is hardly ever practical because of technical and cost considerations.

There are four basic approaches for developing an area source emission estimate:

- Extrapolation from a sample set of the sources (surveys, permit files, or other databases);
- Material balance method
- Mathematical models; and
- Emission factors applied to activity levels.

The calculation procedures determine what data is used to estimate the area source emissions. The activity data is in the “Episode Activity Data Workbook” available upon request from UDAQ. This data are used in the calculations to estimate emissions for area sources. Section 2.c iii.A lists the data tables and reference documents used in the area source calculations.

Included in the Annual Emission Episode Workbooks are emissions for January 2009 and December 2009. This is included because in April of 2009, petroleum companies and gas stations in certain counties were required to begin using Stage 1 in the gasoline process. Because there were potential episodes in the beginning of 2009 and the end of 2009, summary tables for January 2009 without Stage 1 in some counties and December 2009 with Stage 1 in the additional counties were developed.

Since one of the episodes that was analyzed for this SIP extended over two calendar years, an average of the emissions from December 2009 and 2010 was input into the model to account for the changes in the annual numbers. This was done to prevent the entire change in annual emissions to be attributed to December 31, 2009, and January 1, 2010. The Episodic Annual Summary Workbook includes the average emissions of these two sets of data.

Area sources collectively represent individual sources that have not been inventoried as specific point or mobile sources. These sources are typically too small, numerous, or difficult to inventory using the methods for the other classes of sources. Area sources represent a collection of emission points for a specific geographic area, most commonly at the county level; however, any area can be used to define the boundaries of an area source.

Area sources are both natural and manmade sources of pollution and can encompass such wide ranging activities as consumer solvents, agricultural burning, roadway paving, residential heaters, wildfires, and wind erosion. Area source emissions are typically identified at the county level by its Source Classification Code (SCC). EPA’s *Compilation of Air Pollutant Emission Factors* (AP-42) contains extensive data on area sources (referred to in the document as “miscellaneous sources”), including types of area sources and pollutants produced by them, and can be found at:

<http://www.epa.gov/ttn/chief/ap42/index.html>. Further information on area sources can be found at the EIIP site: <http://www.epa.gov/ttn/chief/eiip/>.

3.1 OVERVIEW OF PROJECTION METHODS

Emission projections for area sources depend upon the change in source level activity and changes in the emission factor applicable to the source. For area sources, the most appropriate equation used to project emissions is:

$$E_{fy} = E_{by} * G * C \text{ (Equation 3.1-1)}$$

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where E_{fy} = projection year emissions

E_{by} = base year emissions

G = growth factor

C = control factor, accounting for changes in emission factors or controls

The base year activity (fuel use, employment, population) will vary depending on the source category. The growth activity indicator should align with the base year activity indicator as closely as possible. The above equation is only an example of the necessary calculation for emission projections; further complicating factors required for an accurate projection may require the development of a more vigorous equation.

3.1.1 GROWTH FACTOR

As with point sources, area source projections can be made using local studies or surveys or through surrogate growth indicators, such as E-GAS, to approximate the rise and fall in expected activity. The most commonly used surrogate growth indicators are those parameters typically projected by local metropolitan planning organizations (MPOs) such as population, housing, land use, and employment.

The Overview Chapter references several common surrogate growth indicators. Area sources rarely have detailed information based on surveys of individual emitters. Generally surrogate growth rates, as characterized by source type, must be used. While surrogate growth indicators such as GSP, employment, and population are reasonable estimators of future air pollution generating activity for traditional area source emitters (manufacturing, population-based activities), other indicators may be more appropriate for non-traditional emitters. Policy changes which may lead to increased or decreased activity in a category must also be considered. For example, future emissions from agricultural tilling will be affected by trends towards conservation tillage as well as total acres tilled. Projections of total acres tilled may not trend with agricultural earnings or GSP as operations due to changes in crop yields. The amount of prescribed burning which takes place each year is driven by the policy of Federal and State forest and land management agencies. For these nontraditional area source emitters, Federal, State, and local trade associations and agencies should be consulted to identify the best indicators of future activity.

Table 3.1-1 references specific growth indicators for projecting emissions for various area source categories.

3.1.2 CONTROL FACTORS

The projection year control factor for area sources should account for both changes in emissions due to new levels of control required by regulations and process modifications or technology improvements. Emitters in the manufacturing sector, such as industrial, commercial, and institutional fuel combustion, may be assigned a traditional control measure to limit emissions. However, for many area sources, conventional control methods are often inapplicable; instead, control of area source emissions may involve process modifications such as limiting agricultural burning practices, paving with emulsified asphalt or concrete, or stabilization of dirt roads. The control factors should also account for market-driven process changes, such as the move toward lower-solvent or water-based paints (this can be both market and regulatory-driven) and conservation tillage.

Technical documents from EPA, including Alternative Control Techniques (ACT) documents and Control Techniques Guidelines (CTG) documents, are collected at the Clean Air Technology Center on EPA's TTN web site:

<http://www.epa.gov/ttn/catc/products.html>.

ACT documents provide technical information, based on data collected from model sites, for use by State and local agencies to develop and implement regulatory programs to control emissions. The model sites in the ACT documents represent typical emitters; area-specific factors may cause discrepancies and deviations and should be accounted for when comparing ACT document costs to actual performance. CTG documents provide federal guidelines to State and local agencies to assist those areas in planning and meeting federal air quality requirements.

Area source projections should account for Federal, State, and local regulations. For federally mandated controls, the EPA documents and the models referenced in the following sections will be the best available resources for determining the appropriate emission factor to apply in projected inventories. The latest regulatory actions from the Office of Air and Radiation (OAR) can be found at:

<http://www.epa.gov/ttn/oarpg/new.html>. OAR also provides a page devoted to policy, guidance, and regulations, sorted by the Title of the Clean Air Act Amendments (CAAA) to which they apply: **<http://www.epa.gov/ttn/oarpg/amend.html>**.

3.1.3 OTHER CONSIDERATIONS

Spatial issues may also impact area source projections. Urban sprawl may result in decreases in area source emissions related to farming, such as agricultural tillage and managed burning. Conversely, urban sprawl may then result in increases in other area source emissions associated with residential areas, such as dry cleaning and consumer solvent use.

3.1.4 AVAILABLE MODELS AND RESOURCES

Table 3.1-2 delineates available resources and models related to area source emission projections.

3.2 ALTERNATIVE METHODS

Area sources are normally calculated using a variety of estimation procedures that include related, but cumbersome, estimation tools to derive either a “top-down” estimate or a county-level “bottom-up” emissions inventory for area sources.

3.3 REFERENCES

ERG, 1996: Eastern Research Group, Inc., *Introduction to Area Source Emission Inventory Development*, Eastern Research Group, Inc., Prepared for: Area Sources Committee, Emission Inventory Improvement Program, August 1996.

EPA, 1991b: U.S. Environmental Protection Agency, *Procedures for Preparing Emissions Projections*, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, July 1991.

EPA, 1993: U.S. Environmental Protection Agency, *Guidance for Growth Factors, Projections, and Control Strategies for the 15 Percent Rate-of-Progress Plans*, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, March, 1993.

EPA, 1995: U.S. Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors: Fifth Edition*, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, January 1995. 3-5

Pechan-Avanti, 1997: The Pechan-Avanti Group, *The Emission Reduction and Cost Analysis Model for NOx (ERCAM-NOx)*, E.H. Pechan & Associates, Inc, prepared for the U.S. Environmental Protection Agency, Ozone Policy and Strategies Group, September 1997.

TABLE 3.1-1

GROWTH INDICATORS FOR PROJECTING EMISSIONS FOR AREA SOURCE CATEGORIES **Source Category Growth Indicators Information Sources**

Gasoline Marketing projected gasoline consumption MOBILE5 fuel consumption model

Dry Cleaning population; retail service employment; solvent suppliers; trade associations
Degreasing (Cold Cleaning) industrial employment trade associations,
Architectural Surface Coating population or residential dwelling units local MPO
Automobile Refinishing industrial employment BEA or E-GAS
Small Industrial Surface Coating industrial employment BEA or E-GAS
Graphic Arts population state planning agencies; local MPO
Asphalt Use - Paving consult industry consult industry
Asphalt Use - Roofing industrial employment local industry representatives
Pesticide Applications historical trends in agricultural operations state department of agriculture; local MPO
Commercial/Consumer Solvent Use population local MPO; state planning agencies
Publicly Owned Treatment Works (POTWs) site-specific information state planning agencies
Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs) state planning forecasts state planning agencies; local MPO
Municipal Solid Waste Landfills state waste disposal plan local MPO; state planning agencies
Residential Fuel Combustion residential housing units or population local MPO
Commercial/Institutional Fuel Combustion commercial/institutional employment; population local MPO; land use map projections
Industrial Fuel Combustion industrial employment; or industrial land use local MPO; land use projections; state planning agencies
On-site Incineration based on information gathered from local regulatory agencies local regulating agencies and MPO; state planning agencies
Open Burning based on information gathered from local regulatory agencies local regulating agencies and MPO; state planning agencies
Fires: Managed Burning, Agricultural Field Burning, Frost Control (Orchard Heaters) areas where these activities occur U.S. Forest Service, state agricultural extension office
Forest Wildfires historical average local, state, and federal forest management officials
Commercial Bakeries population U.S. Census Data
Paved Roads/Unpaved Roads Vehicle Miles Traveled (VMT) U.S. Census Data
Agricultural Tilling historical trends in agricultural operations state department of agriculture; local MPO
Construction Activity construction employment local MPO; consult industry
Structural Fires population local MPO; state planning agencies

TABLE 3.1-2

AVAILABLE MODELS AND RESOURCES

Resource Where To Go Brief Description

National Air Pollutant Emission Trends Report (Trends)

<http://www.epa.gov/ttnchie1/trends/Report> contains a general approach for developing projections estimates for national criteria pollutants.