



Colorado Department
of Public Health
and Environment

PSD Increment Tracking System¹

February 26, 2001 (updated 12/28/05)

Air Pollution Control Division / Technical Services Program

In general, the Air Pollution Control Division (APCD) recommends following U.S. Environmental Protection Agency (EPA) procedures to assemble emission inventories and estimate Prevention of Significant Deterioration (PSD) increment² consumption and expansion (e.g., Appendix W of 40 CFR 51; USEPA, 1990; USEPA, 1991; USEPA, 1993). The EPA's guidance documents do not specify how increment-related data for PSD baseline areas (*Figure 1*) should be tracked by an agency. The main purposes of this guidance are:

- To explain the regulations that give the APCD the authority to require PSD increment consumption modeling (and submission of increment-related data) for major and minor sources seeking construction permits;
- To explain how the APCD tracks PSD increment-related emissions data;
- To explain how to use increment-related data in dispersion modeling for new sources and modifications seeking construction permits;
- To explain the APCD's plans for conducting the periodic increment consumption modeling studies that are required by regulations.

This document contains information and procedures that do not have the force and effect of a rule and are not intended to supersede statutory or regulatory requirements or recommendations of the U.S. Environmental Protection Agency (EPA). For general modeling guidance and procedures, refer to the *Colorado Modeling Guideline for Air Quality Permits*.

¹ Revised 2/26/01 to add recently triggered minor source baseline dates to Table 1. Revised 12/28/05 to update Regulation No. 3 citations; remove outdated references to AIRS code SD07; remove references to "technical guidance series."

² "A PSD increment...is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant. The baseline concentration is defined for each pollutant (and relevant averaging time) and, in general, is the ambient concentration existing at the time that the first complete PSD permit application affecting the area is submitted." (USEPA, 1990)

The Prevention of Significant Deterioration (PSD) regulations require each State and local agency administering the PSD increments program to conduct periodic assessments of increment status [Regulation No. 3, Part D, Section X.A.4³; 40 CFR 51.166(a)(4)]. While the primary focus of the periodic studies will be on NO₂ increments, the guidance in this document also addresses particulate matter and SO₂.

Federal regulations [40 CFR 52.21] and Colorado Air Quality Control Commission (AQCC) Regulation No. 3 require major sources subject to PSD review to demonstrate to the Air Pollution Control Division (APCD) that allowable emission increases from the proposed source or modification in conjunction with all other emissions increases or reductions (including secondary emissions) will not cause or contribute to concentrations of air pollutants in the ambient air in violation of PSD increments.

1.1. Minor Source Increment Modeling for Construction Permits

According to the Attorney General's office, rule making would be necessary before the APCD could require a compliance demonstration with PSD increments during the permit review process for minor sources or minor modifications. Therefore, increment consumption from minor source growth is determined during the impact analysis process for major sources subject to PSD review or during periodic increment studies. Nevertheless, since minor source growth can consume PSD increment, minor sources seeking construction permits are encouraged to voluntarily demonstrate compliance with applicable increments.

³ Section X.A.4 states that "the division shall, on a periodic basis, review the adequacy of this Regulation No. 3 for preventing significant deterioration of air quality. Within thirty days after any information becomes available and there is cause to believe that an applicable increment is being violated, the division shall present the cause for such belief to the commission. If the commission concurs that there is cause to believe that an increment is being violated, it or the commission, shall hold a hearing to determine whether an increment violation exists....Should the commission determine that an increment violation exists, the division shall review all sources affecting the area of increment violation and ensure that all sources are in compliance with all applicable permit conditions and state and local regulations. Within thirty days after completing such a review, the division shall recommend revisions, if necessary, to the commission to correct the violation...."

2. The APCD's PSD Increment Tracking System

The APCD's PSD increment tracking system described here applies to PM₁₀, NO₂, and SO₂. EPA has numerous documents that explain the concept of increment consumption and the methods that should be used to calculate increment consuming/expanding emissions. Thus, the focus of this section is to present APCD's increment tracking system, not to replicate existing EPA guidance.

2.1. The APCD's Emissions-Related Data Tracking System

The APCD's emission inventory system tracks the emissions-related data necessary to compute changes in actual emissions since the applicable major or minor baseline date (*Table I*). Because differences in actual emissions vary with the project date or target date for an increment consumption study, changes in emissions must be computed on an as-needed basis. The methods discussed here apply to existing sources. Refer to the *Colorado Modeling Guideline* for guidance on determining increment consuming emissions from proposed sources or modifications.

Estimates of actual baseline date⁴ emissions and emissions-related data are archived in files and/or in relational databases maintained by the APCD. The files and/or databases maintained by the APCD's Stationary Sources Program archive stationary sources data for all sources that file Air Pollution Emission Notices (APENs) with the APCD. The files and/or databases maintained by the APCD's Technical Services Program archive baseline year and more recent activity data such as demographic data that may be used to compute baseline year emissions for area and mobile sources.

The components of the tracking system for emissions-related data are discussed in the following sections.

⁴ "Baseline date" and current "date" emissions are not emissions as of a specific date. Instead, as stated in EPA guidance (USEPA, 1990), the emissions reflect operation over the preceding two (2) years of operation. For increments with annual averaging periods, the average rate is generally calculated over the previous 2-year period. For short-term averaging periods (24-hours and less), the maximum actual emission rate is used (i.e., the highest occurrence for that averaging period during the previous 2 years of operation).

Table 1. PSD Baseline dates in Colorado. ^b			
Pollutant	Major Source Baseline Date	Minor Source Baseline Date	Baseline Area
Nitrogen Dioxide (NO ₂)	February 8, 1988	March 30, 1989	Entire State
Sulfur Dioxide (SO ₂)	January 6, 1975	October 12, 1977	Entire State
Particulate Matter	January 6, 1975	November 1, 1988	AQCR 1
Particulate Matter	January 6, 1975	November 17, 1980	AQCR 2
Particulate Matter	January 6, 1975	November 14, 2000	AQCR 3
Particulate Matter	January 6, 1975	November 1994	AQCR 4
Particulate Matter	January 6, 1975	November 9, 2000	AQCR 5
Particulate Matter	January 6, 1975	June 19, 1989	AQCR 6
Particulate Matter	January 6, 1975	April 1994	AQCR 7
Particulate Matter	January 6, 1975	Not Triggered ^a	AQCR 8
Particulate Matter	January 6, 1975	Not Triggered ^a	AQCR 9
Particulate Matter	January 6, 1975	August 20, 1984	AQCR 10
Particulate Matter	January 6, 1975	October 12, 1977	AQCR 11
Particulate Matter	January 6, 1975	July 1983	AQCR 12
Particulate Matter	January 6, 1975	Not Triggered ^a	AQCR 13
Not triggered as of January 3, 2001.			
A similar table is attached to Regulation No. 3. Contact the APCD's Stationary Sources Program for more recent information.			

2.1.1. Comparison of APCD's Old and New Increment Tracking Systems

Since sufficient information and staff resources are not available to switch from the old increment tracking system to a more robust one in a short time period, a method has been designed to allow a gradual transition to occur. Thus, the data available for modeling will vary for different geographic areas of the state and for different pollutants.

For stationary sources required to file APENs:

- The **old approach** used by the APCD relied on comparing the permit approval date of an existing source with the major or minor source baseline date. If the approval date was more recent than the baseline date, the emissions were assumed to be increment consuming. For major sources that already existed on the baseline date, changes in emissions were determined on a case-by-case basis by making conservative assumptions or by reviewing APCD files.
- The goal of the **new approach** is to archive emissions-related data for both minor and major sources in EPA's Aerometric Information Retrieval System (AIRS) or in an APCD relational database for each baseline date.⁵ To determine changes in emissions or other parameters (e.g., stack parameters) that affect increment consumption and expansion, compare the baseline date inventory with the current date inventory using the following procedures:
 - For sources that do not exist in the baseline inventory but do exist in the current year inventory, assume the emissions are increment consuming.
 - For sources that exist in the baseline inventory but do not exist in the current inventory, assume the emissions are retired baseline emissions that expand increment.
 - For sources that exist in BOTH the baseline inventory and the current year inventory, compare the stack parameters (e.g., stack height, exit velocity, stack diameter, stack gas exit temperature) and geographic coordinates to make sure they are identical. If they are, then calculate the difference in actual emissions between the

⁵ For sources that file APENs, estimates of actual emissions and related stack parameters are archived in AIRS from 1992 or 1993 onward. Data for older baseline dates are or will be archived in APCD files and/or in APCD or EPA databases.

baseline date and current date to determine emissions increases (increment consumption) or decreases (increment expansion).⁶

- For sources that exist in BOTH the baseline inventory and the current year inventory but have different stack parameters, assume that the baseline configuration expands increment (i.e., model the baseline emissions with a negative emission rate using the baseline stack parameters) and that the current year configuration consumes increment (i.e., model the current year emissions with a positive emission rate using the current year stack parameters).
- For sources that exist in BOTH the baseline inventory and current year inventory but have different geographic source coordinates, study the situation to determine the most appropriate approach. In some cases, the current inventory may have more accurate data. In other cases, the differences may be real. For example, some sources (e.g., crushers) may move from one location to another in a mining operation. If the coordinates have actually changed, assume that the baseline location represents retired baseline emissions (i.e., increment expansion) and that the emissions from the current location are increment consuming.

For mobile sources and small stationary sources not required to submit APENs (area sources):

- The ***old approach*** used by the APCD relied on collecting emissions-related data on a case-by-case basis and then following appropriate EPA guidance (e.g., USEPA, 1993).
- The ***new approach*** relies on the APCD's Geographical Information System (GIS)-based emission inventory system that is used for regional modeling studies such as those associated with State Implementation Plan (SIP) elements in nonattainment areas. The APCD maintains databases and GIS coverages with activity data such as demographic data, Vehicle Miles Traveled (VMT) data, and other types of activity data that are necessary to estimate emissions from a wide variety of source categories. In addition, the APCD has GIS coverages for roads, land use, railroad tracks, and other geographic information that can be used to spatially allocate emissions. SIP inventory databases also contain information that can be used to temporally allocate emissions.

The APCD plans to follow applicable EPA guidance (e.g., USEPA, 1993) when appropriate. When refined inventory information is

⁶ Increment expansion is estimated in a model by entering a negative emission rate.

required, the basic approach is to generate gridded inventories for a given area for the baseline year and the current year. For most area and mobile source categories, it is not realistic to determine actual emissions activity data averaged over the previous two-year period. Therefore, annual activity data are assumed to be representative of the applicable baseline year and current year. The grid-cell-by-grid-cell differences in emissions between the two inventories represent increment consuming/expanding emissions.

The APCD does not intend to maintain baseline year emission inventories for area and mobile sources because the models and methodologies for estimating emissions change with time. Instead, the plan is to maintain baseline year and current year databases with activity data, emission factors, and historic GIS coverages of roadways and other networks. This will allow inventories to be calculated using the most up-to-date inventory system on a case-by-case basis. Professional judgement will be used to determine the emission factors, activity data, and GIS coverages that are most appropriate for a given inventory.

2.1.2. Recommended Procedures for Preparing PSD Increment Emission Inventories (Transition Guidance)

The APCD encourages all NO_x, PM₁₀, and SO₂ sources that existed on or before applicable major and minor source baseline dates to provide increment-related data to the APCD on a *voluntary* basis if current APCD files do not have data regarding baseline date emissions. Use the list in Appendix A to help determine what types of information should be submitted.

Refer to the *Colorado Modeling Guideline* and other APCD and EPA documents for guidance on determining which PSD increment consuming/expanding sources to include in the model.

In general, the methods presented here should result in a conservative estimate of increment consuming emissions. If there is a modeled increment violation at one or more receptors, the inventory process should be revisited to obtain more reliable data such as data on retired baseline sources that expand increment.

Three steps are necessary to create the emission inventories for major PSD source modeling and for periodic increment modeling studies.

Appropriate sources from an inventory created with the following methodology are selected to include in the air quality model(s):

- **Step 1.** Until adequate baseline data are available for a given baseline area, the **permit approval date** should be used to identify major and minor sources that consume increment. Major and minor sources with a permit approval date greater than the minor source baseline date are assumed to be increment consuming. In addition, major sources with a permit approval date greater than the major source baseline date are assumed to be increment consuming.⁷
- **Step 2.** Major sources (i.e., current year actual emissions over 100 tons per year) with a permit approval date equal to or less than the major source baseline date are assumed to be baseline sources. For these sources, obtain data from APCD files and/or databases to calculate the difference in actual emissions between the minor source baseline date and the current date. If suitable data are not available from the APCD, the APCD should contact the source and request the necessary data. The letter should explain why the data are needed. If the APCD requests data from a source and the source does not comply with the request in a timely manner, the APCD can make a conservative determination regarding the percentage of the current actual emissions that are increment consuming. In some cases, the APCD may assume that all emissions from the source are increment consuming. If the modeling analysis based on conservative emissions shows compliance with increments, then the analysis is finished. But if the modeling shows an increment violation AND if a source that did not comply with the data request causes or contributes to the modeled violation, then the APCD will contact the source and request the data again. If the source cannot provide data or refuses to comply with the request, then the APCD may be required to follow the procedures in Regulation No. 3, Section X.A.4 to address the violation.
- **Step 3.** Follow the EPA guidance (e.g., USEPA, 1993) to prepare the increment-consuming inventory for area and mobile sources. Before

⁷ According to EPA guidance, only the actual emissions changes resulting from a physical change or change in the method of operation since the major source baseline date consume increment. The simplifying assumption in step 1 is intended to save time and staff resources. It may be necessary to obtain more appropriate estimates on a case-by-case basis.

estimating emissions, contact the APCD's Technical Services Program to obtain activity data, emission factors, and related data. In some baseline areas, the APCD can provide a comprehensive baseline year inventory and a suitable recent year inventory from which to calculate changes in emissions.

2.2. The APCD's PSD Increment Concentration Tracking System

The APCD maintains a relational database (*Figure 2*) that archives the maximum modeled PSD increment concentration in Class II areas and the maximum modeled concentration in Class I areas. The data are primarily extracted from modeling studies submitted by major sources subject to PSD review. These data are used to identify hot spots where increments may be in jeopardy. The data are also used as one of the factors in selecting areas for periodic increment modeling studies.

Field Name	Data Type	Description
ID	Number	
PROJECT_ID	Text	Project ID
UTM_E	Number	UTM easting
UTM_N	Number	UTM northing
ARCUTM_N	Number	UTM northing with 4,000,000 meters subtracted
UTM_Z	Number	UTM zone
NO2_ANN	Number	maximum modeled annual NO2 concentration
PM_ANN	Number	maximum modeled annual PM10 concentration
PM_24HR	Number	maximum modeled 24-hour PM10 concentration
SO2_ANN	Number	maximum modeled annual SO2 concentration
SO2_24HR	Number	maximum modeled 24-hour SO2 concentration
SO2_3HR	Number	maximum modeled 3-hour SO2 concentration
RECP_DSCRIP	Text	receptor description
DATE_OF_EI	Date/Time	date of emission inventory
TYPEIMPACT	Text	type of impact analysis (e.g. single source analysis, cumulative impact analysis)
MODELNAMES	Text	name of model used to estimate concentrations
MET_DATA	Text	description of meteorological data used in the model
COMMENTS	Text	comments

Figure 2. Database fields used by APCD to track PSD increment concentration estimates from major source modeling submittals.

2.3. Overview of Periodic Increment Modeling Studies

The APCD plans to use the inventory techniques discussed earlier in this document to assemble inventories to perform periodic increment consumption modeling studies in Colorado. Increment consumption/expansion varies spatially and temporally since it is a receptor-based concentration that can change from year-to-year, for example, in response to variations in actual emissions and meteorology. Consequently, modeling studies only provide snap-shots of increment consumption/expansion.

2.3.1. Growth Analysis Phase

During the *growth analysis phase*, the APCD uses a variety of applications (e.g., GIS analysis) and data to study areas in Colorado where there has been significant growth since applicable minor source baseline dates. This phase considers growth from all sources, including stationary sources (point and area) and mobile sources. The data used in this analysis may include statewide or regional data sets (e.g., demographics, vehicle miles traveled, emission density analyses) or more localized information such as data from major PSD source modeling studies or Environmental Impact Statements. Based on available data and knowledge of meteorology and pollution transport, air quality modeling domains are identified and prioritized. The size of the domains will be dependent on the goals of the modeling and the type of model being used.

2.3.2. Protocol Development Phase

Once an approximate modeling domain has been identified and selected for a periodic increment modeling study, the APCD will develop a modeling protocol. APCD will send the draft protocol to EPA Region VIII and to affected federal land managers for comments.

2.3.3. Modeling Phase

Once comments have been received from EPA Region VIII and affected land managers, the APCD will conduct modeling to assess increment consumption for selected pollutants. In most cases, a given modeling study will focus on a single pollutant because of the time necessary to prepare inventories for each pollutant.

Once the modeling is complete a report will be written that summarizes the modeling methods and presents results. The reports will be available for

review. If increment violations are found, the procedures in Regulation No. 3, Part D, Section X.A.4 will be followed.

References

USEPA, 1990. *New Source Review Workshop Manual*. Draft Report by the U.S. Environmental Protection Agency, Research Triangle Park, NC.

USEPA, 1991. *Technical Guidance on Emission Inventory and Modeling for the NO₂ PSD Increments*. Draft Report by Eric Noble, New Source Review Section, Permits Programs Branch, U.S. Environmental Protection Agency, Research Triangle Park, NC.

USEPA, 1993. Procedures to Estimate NO_x Emission Increases from Mobile and Area Sources for PSD NO₂ Increment Applications. EPA-452/R93-004. U.S. Environmental Protection Agency, Research Triangle Park, NC.

APPENDIX A

Data Elements for PSD Baseline Date Inventories

This appendix outlines the emission related data that are necessary to determine increment consumption/expansion. All sources that were operating in a given baseline area at the time the minor source baseline date was triggered are encouraged to provide the following historic data to the Division. Major sources should also provide data on any modifications since the major source baseline date that may affect increments. It also would be helpful to obtain information about any units at the facility that have been shut down (retired) since the baseline date. Also provide information regarding changes in stack parameters (e.g., stack height), changes in source location within a facility, and other factors (e.g., construction of new buildings or demolition of baseline buildings) that might change the ground-level pollutant concentration.

1. PROVIDE ACTUAL EMISSION RATES FOR THE PSD MINOR SOURCE BASELINE DATE

For each point/area/volume⁸ source that existed on the minor source baseline date, provide the actual emission rate in appropriate units (tons per year, pounds per hour, pounds per day) for the two years of operation that precede the PSD minor source baseline date.⁹ The emission estimate should be appropriate for the averaging period of the applicable increment. Explain if emissions are calculated with a different assumption.

⁸ POINT sources are usually stacks, isolated vents, and similar sources. AREA sources refer to low level or ground releases with no plume rise (e.g., storage piles, slag dumps, roads). VOLUME sources refer to a variety of releases such as roof monitors, multiple vents, conveyor belts, and roads. Some sources such as haul roads can be modeled with either AREA or VOLUME sources.

⁹ According to EPA guidance (USEPA, 1990), the emissions should reflect operation over the preceding two (2) years of operation. For increments with annual averaging periods, the average rate is generally calculated over the previous 2-year period. For short-term averaging periods (24-hours and less), the maximum actual emission rate is used (i.e., the highest occurrence for that averaging period during the previous 2 years of operation).

2. DATE FIELDS TO DETERMINE PSD INCREMENT STATUS

Provide startup/shutdown dates for sources so a source history can be compiled. These data are used to determine if emissions from a source are increment consuming, baseline, or retired baseline:

- a) start-up/shut-down dates for the POINT, AREA, or VOLUME source;
- b) for major sources, provide the date of any physical change or change in the method of operation since the major source baseline date.

3. MODELING-RELATED STACK PARAMETERS FOR POINT SOURCES

Provide the following emission parameters (as they existed on the baseline date) for each source at the facility:

POINT SOURCES

geographic coordinates for each emission point (e.g., lat/long, UTM coordinates)

stack base elevation (feet or meters) [if available]

stack height (meters)

stack diameter (meters)

stack gas exit velocity (meters/second)

stack gas exit temperature (Kelvin)

building dimensions (length, width, height)

building corner UTM coordinates

AREA SOURCES

Geographic coordinate (Lat/Long or UTM) for southwest corner of AREA source

Length and width of source area (meters)

Release height (meters)

VOLUME SOURCES

Geographic coordinate (Lat/Long or UTM) for center of source

Initial lateral (width) dimension of volume source (meters)

Initial vertical (height) dimension of volume source (meters)

Release height (center of volume above ground) (meters)

4. PRECISION OF UTM COORDINATES

If possible, provide geographic coordinates to a resolution of 1 meter. It is sometimes necessary to resolve stack locations to the nearest meter (1 meter). Even if the UTM's are not accurate to 1 meter, they are often used to reflect the relative locations of stacks and buildings so that buildings and multiple stack impacts can be modeled more realistically.

5. METADATA (METHODS)

Provide a description of the methods used obtain the data. In particular, describe the methods used to obtain geographic coordinates and elevations. In addition, describe the methods used to estimate historic emissions. In some cases, a facility and the APCD may not have reliable information about historic operations. If reliable data are not available, please attempt to provide realistic estimates of historic baseline date emission-related data and justify any assumptions. The assumptions will be archived as metadata (data describing data) to help decide how best to use the data in decision-making.

6. ADDITIONAL DATA

Provide any additional information that might be useful in determining historic baseline date activity or conditions at the facility.