

AIR PROGRAM • EMISSIONS INVENTORY

Fundamentals

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This document provides a quick overview of the fundamentals of air emissions inventory (EI). The Department of Natural Resource (DNR) Air Program will continue to offer assistance through the facility-assigned compliance inspector and stationary source emissions inventory coordinator, as well as the instructions and tutorials available on DNR's website: dnr.wi.gov, search: Air Reporting Tutorials.

EI Concepts

1. **Devices:** a device is the physical equipment or equipment line where a process occurs. There are three device families:
 - a. **Emissions units** – there are six device categories:
 - 1) boiler/furnaces
 - 2) incinerators
 - 3) miscellaneous
 - 4) painting/coating
 - 5) printing
 - 6) storage tanks
 - b. **Controls** – there are nine device categories:
 - 1) adsorbers
 - 2) baghouses
 - 3) catalytic or thermal oxidization
 - 4) condensers
 - 5) cyclone/settling chambers
 - 6) electrostatic precipitators
 - 7) fabric filters
 - 8) miscellaneous
 - 9) wet collection systems
 - c. **Stacks** – there is only one device category: stack
2. **Processes** - a process is an activity that occurs at a device (e.g. combustion, coating, crushing etc.). Every device must have at least one process associated with it.
 - a. All active processes at emission units create emissions.
 - b. Controls have one controlling process and, sometimes, a second process that generates emissions such as fuel combustion at flares.
 - c. Stacks have only one process which is a discharging process.
 - d. Source Classification Codes (SCCs) describe specific types of emissions generating processes and are associated with each emissions-generating process.
3. **Streams** - Streams specify the effluent in and out of a process.
 - a. Effluent can be partitioned into multiple streams.
 - b. There are no incoming streams for emissions generating processes.

- c. Streams from emissions generating processes can go to controlling processes or discharging processes.
- d. Streams from controls can go to other controlling processes or discharging processes.
- e. There are no outgoing streams for stacks.

Calculations

EI reporting requires facilities to calculate emissions originating from the facility. The explanations below will assist submitters with this task.

1. **Emission factors** - an emission factor is a value relating the generated pollutant emissions to the activity/process creating the emissions. It is expressed as the weight of pollutant emitted per unit of throughput (e.g. lbs. of sulfur dioxide emitted per ton of coal burned). The basis for an emission factor ranges from site-specific testing to published emission factors.

In most cases, an emission factor is simply an average of available data of acceptable quality that are generally assumed to be representative of long-term averages for all processes described by a specific SCC.

Selected emission factors should be representative and reasonably conservative to reduce the risks of adverse environmental effects and regulatory outcomes; and to be consistent with methods specified by a permit or requirement.

There are two groups of emission factors:

- a. **Generic emission factors** are associated with specific SCCs. They are drawn from U.S. EPA databases or emissions inventory agreements specific to industry groups such as rock crushers.
 - b. **Source specific emission factors** are based on better quality data than generic emissions often specific to an individual process. They are based on a variety of sources such as mass balance, stack tests or Safety Data Sheets (SDS).
2. **Capture efficiency** - The weight of a pollutant entering a capture system and delivered to a control device divided by the weight of total pollutant generated by an emissions-generating process, expressed as a percentage.
 3. **Control efficiency** - The percentage by which a control device or technique reduces the emissions.
 4. **General emissions calculation formula** – use the following formula for calculating general emissions.

$$E = Q \times EF \times [(CAPT \times (1 - CNTL)) + (1 - CAPT)]$$

E = emissions in lbs.

Q = annual throughput (e.g. tons of coal)

EF = emission factor (e.g. lbs. SO₂/ton coal)

CAPT = capture efficiency (values range between 0 and 1)

CNTL = control efficiency (values range between 0 and 1)