

The Basics of Estimating Air Emissions

Facilities reporting emission inventories to NC Division of Air Quality (NCDAQ) are required to use the 'best available information' when estimating emissions for their emission inventory submittal. However, there are varied methodologies for estimating emissions. The most common methodologies are continuous emissions monitoring, equations using emission factors from assorted sources, material balance equations and/or modeling or emission estimation software/tools. Facilities must analyze the emission estimation methodologies in terms of availability of data required, practicality of the proposed methodology for a specific emission source, the accuracy of the methodology and the time available to determine the best available estimation method.

Some large facilities in NC, primarily power plants, have continuous emission monitors or CEMs installed on their emission release points or stacks. This instrumentation continuously monitors and records emissions from specific pollutants. These data can be used to report the emission recorded and estimate the emissions when the instrumentation was not operating.

Most facilities use the emission estimation equation which includes the variables; activity or annual throughput, an emission factor which is the ration of the activity to emissions and if there is a control device(s) associated with the emission unit, control efficiency. The general equation is emissions estimation equals the activity/annual throughput times the emission factor times the control efficiency. The facility can obtain emission factor from numerous sources including a source-specific testing of their emission release point or stack, trade association publications and online emission factor databases such as US Environmental Protection Agency's (EPA) WebFire and AP-42. Emission factors generated from source specific emissions testing yield a snapshot of emission or an emissions to activity ratio at a specific point in time. These emission factors will not reflect changes in operating conditions but will provide a reasonable estimation of emissions from that source. Some trade associations have conducted source specific emission testing on several similar sources at member facilities. The average of the activity to emission ration has then been published for use by member facilities with like sources. EPA has conducted source specific testing at like sources in stalled at specific facility types throughout the country, averaged the testing results and reported the documentation and results online as AP-42. EPA's WebFire allows the user to retrieve the emission factors from these tests based on specific search parameters. Emission factors can be generated with or without considering control devices associated with an emission source. If the source testing is conducted downstream or between the control device and the end of the release point then no control efficiency should be used in the equation. Many control devices are tested for efficiency by the manufacturer and these efficiencies are published. EPA has identified default efficiencies for common control devices. AP-42 contains emission factors with and without including control measures.

For those emission sources where no emission factors, source test data or other estimation methods are available, emissions may be estimated by using a mass balance equation. This method requires that the facility knows the amount of material that enters the process, the amount that leaves or evaporates

during the process and the amount bound in the facility's product. Material balance equations should not be used on processes where secondary products or significant chemical changes to the material are produced. The basic material balance equation is total emissions equals (amount of material entering minus the amount of material leaving and the amount bound in the product) times the concentration of the pollutant in the material.

NCEM developed emission estimation spreadsheets for combustion sources, asphalt plants, cotton gins, concrete batching, crematories, feed mills, stone quarries and crushing and woodworking. The user of these spreadsheets has to enter minimal source data and the emissions are generated using this information and predominately AP-42 emission factors. These spreadsheets are available online and should be used with caution as NCEM does not guarantee the accuracy of the information contained within them. These spreadsheets are subject to continual revision and updating and it is the user's responsibility to be aware of the most current information available.

EPA has developed and provided online emission estimation tools that facilities can access from EPA's website and use. Two of these emission estimation tools are TANKS for reporting emissions from fixed- and floating roof storage tanks and LandGEM which is used for estimating emissions from landfills. These tools require the user to input the necessary data then emissions estimations are reported.