

Calculating Potential-To-Emit

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Jacob Harrington, Consultant



trinityconsultants.com

Introduction to Potential to Emit (PTE)

- ▶ Determining a facilities PTE is one of the most important topics in the permitting world.
- ▶ Understanding what the PTE is and how to calculate it for any given pollutant is critical for:
 - Understanding whether a plant is a major source and what type of operating permit is needed.
 - Determining whether a change at your plant requires construction permitting prior to the changes.
- ▶ The methods of calculating PTE vary greatly, so it is important to understand how to approach calculating emissions.



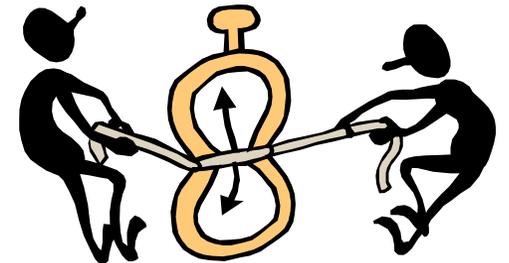
Potential to Emit Definition

- ▶ Potential to emit means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.



Potential to Emit

- ▶ PTE is the potential uncontrolled emission rate for a piece of equipment based on the maximum design capacity and unlimited operation of the equipment.
- ▶ PTE can be reduced by
 - Addressing physical limitations to a piece of equipment operating at maximum capacity
 - Use of air pollution control equipment
 - Restrictions on hours of operation
 - Restrictions on raw materials and fuel usage
- ▶ **Limitations must be federally and practically enforceable**



Estimating Emissions and Control Devices

- ▶ If a control device is not federally enforceable, then PTE calculations are calculated as uncontrolled.
- ▶ In situations where actual emissions are calculated, a facility may account for the effect of the control device and calculate controlled emissions.



Control Devices

- ▶ A control device means equipment, other than inherent process equipment, that is used to destroy or remove air pollutant(s) prior to discharge to the atmosphere.
 - Dust collector
 - Thermal oxidizer
 - Scrubber
 - Adsorption devices (carbon beds)



Inherent Process Equipment

- ▶ Equipment that is necessary for the proper or safe functioning of the process, or material recovery equipment that is installed and operated primarily for purposes other than compliance with air pollution regulations.
- ▶ This type of equipment is not considered a control device.
 - Do not need to consider uncontrolled emissions from these units.

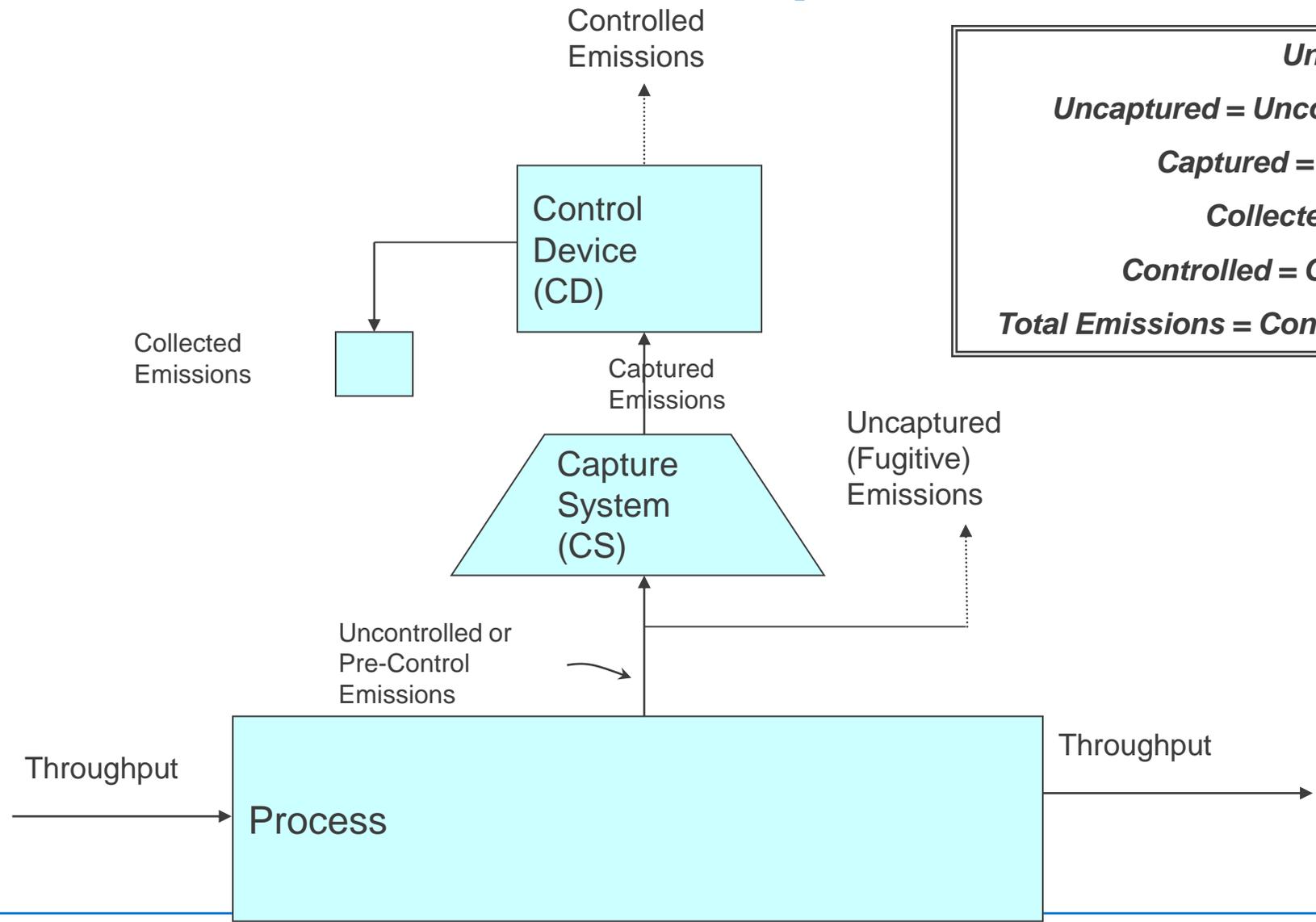


Inherent Process Equipment Example

A facility operating a bin vent/dust collector on a cement product storage silo. The following requirements must be met:

- ▶ Is the primary purpose of the equipment to control air pollution?
 - Primary purpose of the dust collector is to prevent loss of cement, which is recovered.
- ▶ Where the equipment is recovering product, how do the cost savings from the product recovery compare to the cost of the equipment?
 - The cost of the cement recovered is larger than the cost of the dust collector.
- ▶ Would the equipment be installed if no air quality regulations are in place?
 - The dust collector would be installed regardless to prevent the loss of cement.

Emission Calculation Concepts



$$\begin{aligned}
 \text{Uncontrolled} &= TP \times EF \\
 \text{Uncaptured} &= \text{Uncontrolled} \times (1 - CE_{CS}) \\
 \text{Captured} &= \text{Uncontrolled} \times CE_{CS} \\
 \text{Collected} &= \text{Captured} \times CE_{CD} \\
 \text{Controlled} &= \text{Captured} \times (1 - CE_{CD}) \\
 \text{Total Emissions} &= \text{Controlled} + \text{Uncaptured}
 \end{aligned}$$

Emission Calculation Concepts

- ▶ Emission calculations are easy!
 - Almost all emission calculations can be reduced to the following:

$$[Throughput (TP)] \times [Emission Factor (EF)]$$

- Almost all emission calculations for sources with capture systems and control devices can be reduced to the following:

$$[TP] \times [EF] \times [Capture Efficiency] \times [1 - Control Efficiency] + [TP] \times [EF] \times [1 - Capture Efficiency]$$

Baghouse PTE

- ▶ Emission calculations are based on filter specification:
 - Grain Loading Rates (gr/acf)
 - Air Flow Rate (acfm)
- ▶ One common method:
 $[\text{Air Flow (acfm)}] \times [\text{Outlet Grain Loading (gr/acf)}]$
- ▶ Another method:
 $[\text{Air Flow (acfm)}] \times [\text{Inlet Grain Loading (gr/acf)}] \times [1 - \text{Control Efficiency}]$
- ▶ Common Pitfall:
 - Air flow can be given in units of actual volume, standard volume, and either dry standard or dry actual volume ... the units on the grain loading must be the same!

Preferred Methods for Calculating Emissions

1. Mass Balance
2. Actual test data (from CEMS or stack tests)
3. Similar sources for which test data is available (e.g., sources at a sister facility)
4. Manufacturer's guarantees (for engines, boilers, etc.)
5. Empirical equations or software incorporating such (e.g., Breeze TankESP)
6. Trade association research (e.g., NCASI, API)
7. EPA's AP-42 factors

AP-42 Emission Factors

Table of Contents, AP 42, Volume I, Fifth Edition

Cover page and Contents	Cover page, detailed Table of Contents, Publications in Series, Insertion Instructions, and Key Word Index (PDF 128K). This is current through the Fifth Edition, Supplement C of AP 42. For sections and chapters added after November 1997, see the chapter web pages below.
Introduction	Introduction to AP 42, Volume I, Fifth Edition - January 1995 (PDF 40K)
Chapter 1	External Combustion Sources
Chapter 2	Solid Waste Disposal
Chapter 3	Stationary Internal Combustion Sources
Chapter 4	Evaporation Loss Sources
Chapter 5	Petroleum Industry
Chapter 6	Organic Chemical Process Industry
Chapter 7	Liquid Storage Tanks
Chapter 8	Inorganic Chemical Industry
Chapter 9	Food and Agricultural Industries
Chapter 10	Wood Products Industry
Chapter 11	Mineral Products Industry
Chapter 12	Metallurgical Industry
Chapter 13	Miscellaneous Sources
Chapter 14	Greenhouse Gas Bioqenic Sources
Chapter 15	Ordnance Detonation
Appendix A	Miscellaneous Data & Conversion Factors -- September 1985 (PDF 103K)
Appendix B.1	Particle Size Distribution Data and Sized Emission Factors for Selected Sources -- October 1986 (PDF 2M)
Appendix B.2	Generalized Particle Size Distributions -- September 1996 (PDF 137K)
Appendix C.1	Procedures for Sampling Surface/Bulk Dust Loading -- July 1993 (PDF 65K)
Appendix C.2	Procedures for Laboratory Analysis of Surface/Bulk Dust Loading Samples -- July 1993 (PDF 42K)

AP-42 Example

- ▶ AP-42 factors may be based on several inputs based on the facility.
- ▶ For example, aggregate material handling and storage pile emission factors are based on the following:
 - Wind speed
 - Material moisture content
 - Silt content
- ▶ While silt content does not appear in the emission factor equation, there is a recommended range that the silt content must be to use the equation.



AP-42 Example

- ▶ In some cases when using AP-42 for PTE calculations, there may be more than one “applicable factor” for a unit.
- ▶ Always pay attention to the source (and rating) of an AP-42 factor as well as the material associated with the factor.
- ▶ For example, we recently permitted equipment for the transfer of meal.
 - There is a factor in AP-42 specifically for meal loadout.
 - ◆ This factor has an “E” quality rating.
 - ◆ Additionally, the source of the factor stated “no emission factor data was available for meal loading. However, observations of these observations indicates that it may be about the same as loading grain at elevators”.
 - The aggregate drop point equation in AP-42 was used instead for PTE calculations.
 - ◆ Permitting agency agreed on the use of the drop point equation.

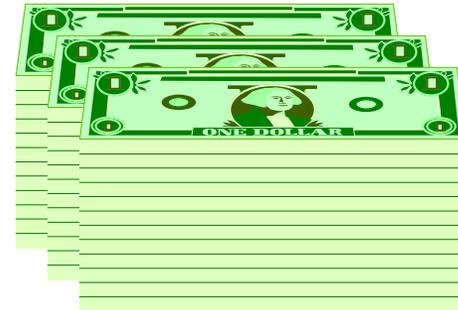
A Word of Caution from the EPA

- ▶ EPA released a memo in November 2020 regarding inappropriate uses of AP-42 factors.
- ▶ AP-42 factors are based on an average of a range of emission rates.
 - Half of subject sources will have an emission rate greater than the emission factor (and vice-versa).
 - Even highly rated factors with grades of “A” and “B” are based on averages of data.
- ▶ Using AP-42 factors as a source-specific limit for permitting is not recommended.



A Word of Caution from the EPA

- ▶ Avoid AP-42 factors when site specific data is available.
 - For emission inventories, facilities may be under or over reporting emissions.
 - Facilities or equipment may be unpermitted when they do require permitting from testing emissions.
- ▶ Under reporting emissions may lead to enforcement action if discovered by EPA or state.
 - Civil penalties have been issued by the EPA anywhere from 40,000 dollars to 1.1 million dollars.



In Conclusion

- ▶ Understanding the methods of calculating PTE will provide ease with future permitting.
- ▶ Remember that control devices must be permitted if a facility wants to take credit for the emissions reduction.
- ▶ Understanding the correct methods to calculate emissions will lead to a more accurate account of emissions from the facility and avoid possible violations.



Questions



Contact Info:

Jacob Harrington

(913) 894-4500

jharrington@trinityconsultants.com