Discussion of Potential to Emit

Permit type is largely dependent on the potential emissions (or the potential to emit (PTE)) of the existing installation and of the proposed project. Potential emissions are different from actual emissions. Generally, potential emissions are the maximum emissions that would result from operating the facility at full capacity 24 hours a day, 365 days a year taking into consideration federally enforceable requirements. Actual emissions are emissions produced by a facility, based on actual operating times and actual operating conditions.

Potential emissions are calculated using the maximum design capacity of the equipment assuming continuous year-round operation, 8,760 hours per year, regardless of hours of operation or limitations of workforce. Potential emissions must be calculated separately for each pollutant. Emission factors, capture efficiencies and control efficiencies used to calculate the potential to emit are based upon EPA sources, stack testing and/or engineering data approved by the Air Pollution Control Program. The most common source for this type of information is the EPA document AP-42 *Compilation of Air Pollutant Emission Factors*, which can be found at the following website: http://www.epa.gov/ttn/chief/ap42/index.html.

The PTE calculation takes into account reductions achieved by the use of control devices and other process limitations if they are included as a condition or limitation in a federally enforceable permit. For instance, if a facility has an existing construction permit that limits the amount of material a facility can process per hour, the facility can base their PTE calculation on the limited amount of material processed.

Process limitations and physical limitations, such as a bottleneck in the process, will be considered and should be documented in the application for approval. A process limitation is a constraint for a process that limits its throughput. A bottleneck is an activity or process that restricts the capacity of another process step.

> Process Limitation Example: The coating of parts requires a dry time before moving to the next step, excluding the dry time would make the parts not salable. Examples of things that are not process limitations are storage space, number of employees, and normal working hours.
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> Bottleneck Example: A grain elevator dryer has a capacity of 45,000 bushels per hour (bu/hr). The facility has one conveyor leg that feeds grain to the dryer. The leg has a capacity of 30,000 bu/hr. Since the leg physically limits the amount of grain that can be dried, it is a bottleneck and 30,000 bu/hr can be used to calculate the PTE for the dryer.

In describing the PTE of a project, the terms emission unit and emission point are often used. An emission unit is any equipment or activity at a stationary source that emits or would have the potential to emit any regulated air pollutant. An installation could have one or more emission units. An emission point is the point at which emissions discharge into the atmosphere. An emission point is commonly a vent or stack, but may also be a door or a window. The emissions from more than one emission unit may be released through the same emission point. For construction permits, each emission unit and each emission point should be identified in the permit application.

Example PTE Calculation

Determining the PTE for nitrogen oxide (NO_X) emissions, from a 50 million Btu per hour (MMBtu/hr) natural gas fired boiler.

1. Maximum Hourly Design Rate (MHDR) = 50 MMBtu/hr
2. NO_X emission factor from AP-42 = 100 pounds (lbs) of NO_X emitted per million cubic feet ($MMft^3$) of natural gas burned
3. Heating value of natural gas = 1,050 Btu/$ft^3$of natural gas
4. Convert MHDR units = (50 MMbtu /hr)/(1,050 Btu/$ft^3$of natural gas) = 47,619 $ft^3$of natural gas/hr
5. Annual operating hours = (365 days/year)*(24 hours/day) = 8,760 hours/year **(Note: Annual operating hours is always 8760 hours per year, it does not represent the actual or expected hours of operation.)**
6. Annual natural gas usage = (8760 hr/yr) * (47,619 $ft^3$of natural gas/hr) = 417.14 $MMft^3$of natural gas/year
7. Annual NO_X PTE = (417.14 $MMft^3$ natural gas/yr) * (100 lbs NO_X /yr) = (41,714 lbs of NO_X/yr)/(2,000 lbs/ton) = 20.86 tons NO_X /year