NEBRASKA

DEPT. OF ENVIRONMENT AND ENERGY

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What is Potential to Emit (PTE)?

Nebraska Administrative Code Title 129 – Nebraska Air Quality Regulations adopts the federal definition of Potential to Emit (PTE), found at 40 CFR § 51.165(a)(1)(iii), as follows:

> *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. Secondary emissions do not count in determining the potential to emit of a stationary source.*

In other words, in the absence of federally enforceable limits, PTE is the most air pollution a stationary source is capable of emitting if:

- Source is operated at 100% of design capacity
- Materials that emit the most air pollution are processed 100% of the time
- Source is operated 24 hours per day and 365 days per year (i.e. 8,760 hrs/yr)
- Air pollution control equipment is not used (or is shut off)

PTE only applies to stationary sources; mobile sources are regulated under other parts of the Clean Air Act. Title 129, Chapter 1, Section 002.99, defines “stationary source” as follows:

> *any building, structure, facility, or installation which emits or may emit any air pollutant subject to regulation under this Title*.

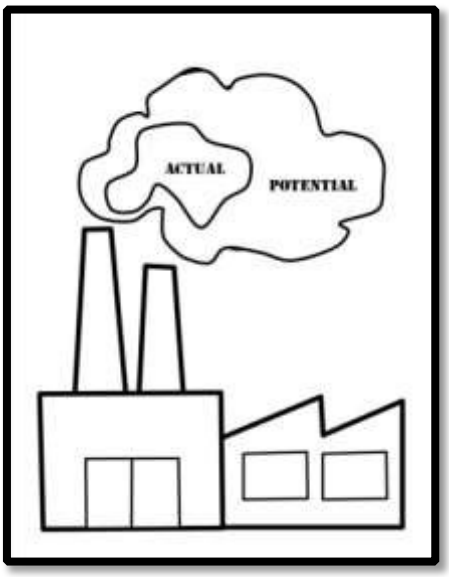
How is PTE Used?

PTE is used for a variety of purposes. As previously stated, PTE is the maximum amount of air pollution a source can emit; in some cases PTE takes into account federally enforceable limits. Limits are discussed in more detail later in this document. PTE is used to determine:

- Classification of a stationary source in federal programs such as Prevention of Significant Deterioration (PSD), Title V and National Emission Standards for Hazardous Air Pollution (NESHAP);
- Construction permit application fee category, and
- If dispersion modeling is required with a construction permit application.

Title 129, Chapter 3, Section 001.03 defines the thresholds that determine if a source needs to apply for a construction permit in Nebraska. A source is required to apply for a construction permit if the PTE of the proposed project meets or exceeds the thresholds. It is important to note that PTE CANNOT be restricted by proposed permit limits when determining whether or not a construction permit is required. This is because emission, operational, and production limits are not federally enforceable until they have been incorporated into a permit.

Why can't I use actual emissions when determining applicability?



State and federal rules are based on a source's PTE, not its actual emissions. PTE is a way to categorize facilities using consistent criteria that do not change unless equipment is added (or removed) or operational characteristics have changed. Actual emissions, conversely, can fluctuate due to changes in a facility's production rates, changes in the type or quality of materials used, or other process variables. PTE is the maximum amount of air pollution a stationary source could emit, not a prediction of the actual emissions a stationary source will emit.

As a result, it is possible for a facility that maintains actual emissions below major source thresholds to be subject to major source requirements if the facility's PTE meets or exceeds major source thresholds. The owner or operator of a facility may propose permit limits to keep PTE below certain thresholds; permit limits are discussed more in depth later in this guide.

Actual emissions are used in emissions inventories. For sources categorized as major under Title V (Class I facilities), actual emissions are used to determine emissions fees. Note that PTE must always be used to determine if a source is major (Class I) under Title V.

Which air pollutants are included in PTE?

The Clean Air Act contains regulations for air pollutants that are detrimental to human health or the environment. Table 1 lists the pollutants that must be included when calculating a source's PTE but pollutants the source is incapable of emitting do not have to be included in PTE calculations.

Criteria air pollutants are pollutants for which National Ambient Air Quality Standards (NAAQS) have been set based on the latest scientific information regarding their effects

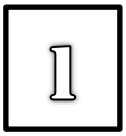
on health or welfare. Hazardous air pollutants (HAPs) are pollutants known to cause cancer and other serious health impacts. Other regulated pollutants are identified in Table 1.

Table 1: Regulated Air Pollutants

Criteria Air Pollutants	Hazardous Air Pollutants	Other
• Ground-level ozone [includes Volatile Organic Carbons (VOCs) and Nitrogen Oxides (NO_x)]	• The full list of HAPs regulated in Nebraska (NE) is found in Appendix I of Title 129.	• Total Reduced Sulfur (TRS) (regulated in NE)
• Particulate Matter (PM) [includes PM-10 microns or less (PM_{10}) and PM-2.5 microns or less ($PM_{2.5}$)]	• Some HAPs are also considered VOCs and should be included in PTE calculations for both.	• Greenhouse Gases (GHG); GHG are currently only regulated under PSD and Title V[1]
• Carbon Monoxide (CO)	• Some HAPs are also considered PM, PM_{10} or $PM_{2.5}$ and should be included in PM, PM_{10} or $PM_{2.5}$ PTE as well as HAPs PTE.	• Regulated NSR pollutants under PSD (if your facility is subject to PSD)
• Lead (Pb)		
• Nitrogen Dioxide (NO_2)		
• Sulfur Dioxide (SO_2)		

[1] Currently (as of March 2018), GHG emissions must be addressed in PSD permit applications (both new PSD sources and applications from sources that are already classified as PSD major). All sources of GHG emissions must be included in the analysis, including biogenic sources. Under the amended Tailoring Rule, only 'anyways' sources are required to have carbon pollution limits in their PSD permits. Sources are not required to obtain a PSD construction permit on the basis of GHG emissions alone. Similarly, under Title V, applications must address GHGs if they must address GHGs in their PSD permit or if the source exceeds thresholds established in the Tailoring Rule. Like PSD, sources are not required to obtain a Title V Class I permit on the basis of GHGs alone. A full PSD discussion is outside the scope of this document; please contact NDEE if you have questions about PSD.

How to Calculate PTE: New Facilities



Identify all units and processes that could potentially emit air pollutants and identify all types of regulated air pollutants potentially emitted at the facility

Identify all potential air emissions at the facility. Include emissions from units that have stacks or vents such as boilers, engines, and dryers. Include units that do not have stacks such as welding and grain unloading. Include ancillary activities such as cleanup.

There is no such thing as an insignificant activity in the CP program. In the OP program, emissions from insignificant activities must be included in the PTE calculations (even though insignificant activities are not included in the permit conditions). Examples of insignificant activities include some small boilers and heaters.

Fugitive Emissions are emissions that cannot reasonably pass through a stack, chimney, vent, or other functionally equivalent opening, and include dust from haul roads, storage pile emissions, and leaks from flanges and pumps. Fugitive emissions must be included in the PTE only if:

1. The fugitive emissions are HAPs;
2. Your facility falls into one of the source categories listed in Table 2, in which case all fugitive emissions of all regulated air pollutants must be included;
3. Your facility is subject to a New Source Performance Standard (NSPS) or NESHAP promulgated on or before August 7, 1980.

Table 2: Source Categories that Must Include Fugitive Emissions

Coal cleaning plants (with thermal dryers)	Sulfur recovery plants
Kraft pulp mills	Carbon black plants (furnace process)
Portland cement plants	Primary lead smelters
Primary zinc smelters	Fuel conversion plants
Iron and steel mills	Sintering plants
Primary aluminum ore reduction plants	Secondary metal production plants
Primary copper smelters	Chemical process plants (does NOT include ethanol plants that produce ethanol by natural fermentation included in North America Industry Classification System (NAICS) codes 325193 or 312140)
Municipal incinerators capable of charging more than 250 tons of refuse per day	Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input
Hydrofluoric, sulfuric, or nitric acid plants	Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels
Petroleum refineries	Taconite ore processing plants
Lime plants	Glass fiber processing plants
Phosphate rock processing plants	Charcoal production plants

Coke oven batteries	Fossil fuel-fired steam electric plants of more than 250 British thermal units per hour heat input

Once you have identified all potential sources of air emissions, identify the type of pollutants that may be emitted according to the categories found in Table 1. Note that although there are currently 188 HAPs listed, the actual number of HAPs is larger because many of the pollutants are identified as compound groups that have many individual pollutants in the compound group. For HAPs that are listed as a compound group, such as glycol ethers, the aggregate of all compounds in that compound group are considered a single pollutant for purposes of the 10 ton per year (TPY) major source threshold.

Emissions Unit

Title 129, Chapter 1, Section 002.37, defines "Emissions unit" as follows:

> *any part or activity of a stationary source, which emits or would have the potential to emit any regulated air pollutant or any pollutant listed in Appendix I.*

In other words, an emissions unit is the equipment, process, or location where emissions are generated. An emission point is where emissions enter the atmosphere. Note that the term "emission point" may refer to nonpoint source pollution, such as fugitive dust. Examples of emission points include stacks, vents, exhausts and fugitive release points. It is possible for one emissions unit to have more than one emission point, such as a paint booth with two stacks. Conversely, it is possible for one emission point to vent emissions from more than one emission unit, such as emissions from multiple fermentation tanks and distillation columns all routed to the same scrubber and then vented from the scrubber stack.

Identify legally enforceable limitations

Before calculating your facility's PTE, first identify all legally enforceable limitations you plan to include in your permit application. There may be a number of ways to legally limit your facility's PTE. In general, limits must meet all three of the following conditions in order to legally restrict PTE:

1. The restriction on PTE must be quantifiable, AND
2. Your facility must be able to meet its business needs (at the time of permit issuance) while operating under the conditions required by the permit, AND
3. The limit must be practically enforceable.

The following restrictions are *examples* of legally and practically enforceable limits that may be used to restrict PTE:

- Limits on the type and amount of material to be used
- Limits on the type and amount of fuel to be used
- Limits on operating hours
- Limits on production (e.g., quantity of product per day/month/year)

- Requirements to operate air pollution control device, including operational requirements to address efficiency
- Emission rate (e.g., lb/hr) limits; must be used with a production or operation limit in most cases

The limits listed above are generally used to restrict PTE for one reason or another, such as staying minor for PSD or Title V, avoiding modeling, or avoiding the requirement to implement Best Available Control Technology (BACT) under Title 129, Chapter 13. There are two additional types of limits that may be in your permit: short-term effects-based limits that protect Ambient Air Quality Standards and technology-based limits placed as a result of applicable NSPS or NESHAP regulations or as a result of a BACT analysis. Further discussion on types of limits is outside of the scope of this document. Please contact NDEE if you have questions about how to appropriately limit your facility's PTE.

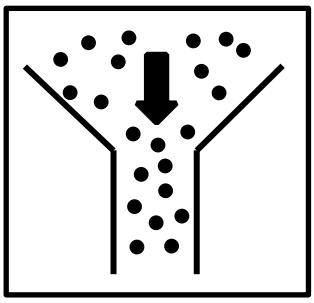
All proposed limits are subject to approval by NDEE and must specify a compliance demonstration methodology and recordkeeping requirements. A facility that is subject to NSPS or NESHAP regulations is subject whether or not NDEE identifies it as subject; therefore, emission and operational limits imposed on a facility by an NSPS or NESHAP regulation may be used to legally limit PTE, even if the limit(s) is (are) not in the state permit. In other words, if a facility is subject to a specific, federally enforceable standard, such as NSPS or NESHAP, that standard is to be considered in the worst case calculation. However, if the underlying regulation changes or the facility is no longer subject to the underlying regulation, the PTE of the facility changes and you must evaluate whether or not a permit revision is required.

Calculate the PTE for each emission point

There are many ways to calculate PTE. In Step 1, you identified all the emission points at your facility, including point sources, nonpoint sources, and fugitive sources, if applicable. In Step 2, you identified ways to restrict your facility's PTE, if necessary. Now you are ready to determine the PTE of each regulated pollutant for each emission point at your facility.

Depending on your facility, you may have to perform numerous calculations for each emission point; it is usually helpful to keep the calculations, data, and assumptions for each point or process separate. Additionally, when calculating PTE, be sure to show your work. When reviewing your permit application, the NDEE will review how your PTE was calculated. Identifying the sources of data used in the calculations, the calculation methodology, and assumptions used to calculate PTE will help ensure the permit review process is as efficient as possible.

Bottlenecks



When calculating PTE, be sure to account for any inherent physical limitations in your processes and facility that would limit PTE. When a process is limited by the capacity or rate of one piece of equipment or process, that unit or process is considered a bottleneck. To include the effect of a bottleneck on your PTE, the limitation must be unavoidable such that it would be impossible to operate at a higher rate than the bottleneck rate. You should be prepared to demonstrate that the bottleneck exists and is unavoidable. If you want to make a change that alters a bottleneck after you get a permit, first recalculate your PTE as a change to your bottleneck may be considered a modification that would require a permit application and permit issuance prior to making the change..

PTE Calculation Methodology: Emission Factor

$$PTE = EF \times PR \times [1-(CoE/100)] \times T \times SF$$

Equation 1: PTE

where:

PTE = potential to emit
EF = emission factor
PR = physical or operational design rate
CoE = control efficiency (if established by permit) of an associated control device
T = operating time (8,760 hours per year unless the permit established a lower rate)
SF = safety factor (optional)

Equation 1 is one of the most common methods of calculating PTE. An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors are the result of testing that has been done for several similar processes or pieces of equipment and are usually expressed in units of mass of pollutant per mass of material used or produced, or mass of pollutant per unit of energy consumed.

Capture efficiency is the percentage of pollutants that are captured and routed to the control device. Most control devices are assumed to have a capture efficiency of 100%. However, if there is a reason that less than 100% of pollutants from a controlled unit or process will be captured, the capture efficiency must be included in your PTE and uncaptured emissions must be quantified. In this case, use Equation 2 below.

Equation 2 calculates both controlled PTE, as in Equation 1, and uncaptured PTE and adds those values together. All terms are the same as Equation 1 with the addition of CaE = Capture Efficiency. Please note that if your facility's PTE exceeds modeling thresholds, the uncaptured emissions should be kept separate from the controlled emissions when submitting calculations, as the uncaptured emissions will need to be modeled separately from the controlled emissions released at the emission point.

PTE = (EF x PR x [(CaE/100)*(1-[CoE/100])] x T x SF) + (EF x PR x [1-(CaE/100)] x T x SF)

Equation 2: PTE with Capture Efficiency

Where:

PTE = potential to emit
EF = emission factor
PR = physical or operational design rate
CoE = control efficiency (if established by permit) of an associated control device
T = operating time (8,760 hours per year unless the permit established a lower rate)
SF = safety factor (optional)
CaE = capture efficiency

Emission factors are sometimes based on performance test data to generate a site-specific emission factor for your facility. Performance test data may include valid stack test data, continuous emission monitoring (CEM) data, or manufacturer testing data. Performance test data must be revised to reflect the maximum hourly operating rate of your process and the worst-case scenario if your equipment was not operating at its maximum during the test.

Emission factors for air pollutants are also compiled in publications such as the U.S. Environmental Protection Agency (EPA)'s *"AP-42, Compilation of Air Pollutant Emission Factors (AP-42)"* or *"EPA's Factor Information Retrieval (WebFIRE) database.* You can access AP-42 and WebFIRE online. You can also download the WebFIRE database. When selecting emission factors to use for PTE calculations, make sure the factor you select is appropriate for your process. Some of the factors are expressed as post-control

numbers, so if your process has no control, or uses a different control device, you will have to back-calculate the uncontrolled emission rate in order to use that emission factor. Finally, double-check that the units of your process and the emission factor balance.

Safety Factor

Some emission factors have safety factors built in, such as most manufacturer's guarantees, and do not need to be accounted for in the PTE equation. In other cases, such as stack test results and the use of AP-42 emission factors, a safety factor may be included in the PTE calculation. The magnitude of the safety factor should be based on the uncertainty associated with the method used to estimate the factor. In general, the more actual emissions data collected under conditions similar to the conditions under which the unit is expected to operate, the smaller the magnitude of uncertainty. Therefore, when proposing a safety factor, both the amount of data the emission factor is based on and the representativeness of that data should be taken into consideration.

PTE Calculation Methodology: Mass Balance

A mass balance approach to calculating PTE may be used in place of Equation 1. When utilizing this approach, assume the weight of raw materials going into a process equals the sum of the weight of the product and waste material leaving the process. Mass balance PTE calculations assume that all regulated pollutants contained in the raw materials are emitted. This approach is usually the best way to calculate emissions from processes that contain solvent evaporation, such as surface coating and printing operations. An advantage to this approach is that fugitive emissions do not need to be calculated separately since they are automatically included.

Common Mistakes When Calculating PTE

One common mistake made when calculating PTE is **multiplying factors without balancing units**. For example, the units in the following equation do not balance, resulting in an erroneous emission rate:

$$\frac{0.02\ lbs\ PM}{hr} \neq \frac{0.002\ lb\ PM}{1{,}000\ lb\ product} \times \frac{10{,}000\ tons\ product}{year}$$

The correct equation balances the units of all the terms by using conversion factors (in bold):

$$\frac{0.005\ lbs\ PM}{hr} = \frac{0.002\ lb\ PM}{1{,}000\ lb\ product} \times \frac{\mathbf{2{,}000\ lbs}}{\mathbf{ton}} \times \frac{10{,}000\ tons\ product}{year} \times \frac{\mathbf{1\ year}}{\mathbf{8{,}760\ hours}}$$

Another mistake made is **taking credit for non-enforceable permit limits**. For example, if your facility's unrestricted PTE for CO is 250 tons or more per year and you propose a permit limit of 245 tons per year, this is not enforceable without either a CO CEMS or an additional operational limit that corresponds to 245 tons per year, such as a fuel limit. Another example of a nonenforceable permit limit is using an OP limit to stay minor for PSD because OP limits expire and CP limits do not, so limits to stay minor for PSD must be taken in a CP.

Finally, another common mistake is **not using maximum capacities of units or processes**. For example, your facility has the potential to operate at 100 tons/hr but you incorrectly calculate PTE at 25 tons/hr because you never plan to operate higher than 25 tons/hr. While the result may reflect your planned operations, this is NOT the facility's PTE.

Significant Figures

Significant figures (also referred to as significant digits) are the number of digits in a number that carry meaningful information. Based on EPA policy and significant figure rules, NDEE's policy is to allow for an unlimited number of digits in intermediate calculations. Once the final emission rate is determined, the emission rate is rounded to two digits past the decimal point. If you are using site-specific emission factors based on performance testing, take care to use standard significant figure rules when establishing the emission rate so that the emission rate does not carry more precision than the testing instruments are capable of producing.

Calculate the Facility-Wide PTE

After you have calculated the PTE for each emission point (including nonpoint sources and applicable fugitive sources), sum up the PTE for all emission points at the source
for each pollutant and calculate facility-wide PTE pollutant-by-pollutant. Remember to sum both total HAPs and each individual HAP. On your summary PTE page, you only need to display the total HAP sum and the individual HAP with the highest sum.

How to Calculate PTE: Existing Facilities

If you are modifying an existing facility, either by modifying equipment already permitted or adding new equipment, you must evaluate the PTE of the new project. Modifying equipment includes, but is not limited to, making physical changes to the equipment as well as making changes to how the equipment is operated, such as changing fuel type, throughput, or control efficiency. Sometimes your proposed project will require a construction permit revision (minor permit revision or significant permit revision) and sometimes it will require an off permit change to legally incorporate the project into your operating permit (Title 129, Chapter 9, Section 007).

Adding New Equipment

If you are adding new equipment to your facility, evaluate the PTE of your facility with the new equipment by going through steps 1 through 4 for new facilities above. If your existing facility took any bottlenecks into account in the PTE calculations, you must also evaluate if the new equipment will cause any 'debottlenecking' thereby increasing the PTE of existing equipment. After you have determined your proposed new facility wide PTE, including your new equipment and debottleneck effects, if applicable, then subtract

the existing facility wide PTE from the new proposed facility wide PTE. The existing PTE is the PTE that was calculated for your most recent permit (whether Construction or Operating), unless you've added projects since issuance of your last permit.

No Permit Required (NPR) - if your facility has added or modified equipment after issuance of your most recent permit that did not meet or exceed Construction Permit thresholds found in Chapter 3, Section 001.03A, then you must include the PTE from any NPR projects in your Pre-Project PTE. Add the PTE from all NPR projects undertaken since issuance of your most recent permit to the post-project PTE of your most recent permit. This is now your pre-project PTE.

The difference between existing and new PTE is the PTE attributable to your project. If the PTE attributed to your project meets or exceeds Chapter 3, Section 001.03A thresholds, Title 129 requires that you must receive a construction permit before commencing construction except for activities allowed under Chapter 3, Sections 001.01 and 001.02. Remember you cannot take limits into account when evaluating the PTE of new equipment.

Modifying Existing Equipment and/or Operations

If you plan to modify existing equipment (including operational changes), first determine whether or not any bottlenecks that were used in previous PTE calculations will be affected. If so, evaluate the PTE of the modification by modifying the bottleneck calculations, along with any emission points affected by the bottleneck. If the modification does not affect any bottlenecks, you only need to evaluate the change in PTE of the units being modified. Similarly, to adding new equipment, when evaluating whether or not a permit is required, limits may be used to restrict PTE only if they are already federally enforceable, which includes being practically enforceable.

Do NOT use actual emissions when calculating the PTE due to a modification at your facility. If you have actual data, you may use it as a basis for your PTE calculations, but the numbers must be appropriately scaled up to represent maximum rates and capacities and the worst-case scenarios.

Frequently Asked Questions

Do I have to include PTE from insignificant activities?

Title 129 does not include any exemptions for insignificant activities when calculating PTE. Therefore, all potential emissions from stationary sources must be included when determining your facility's PTE. In the Construction Permit program, insignificant activities

do not exist. In the Operating Permit program, insignificant activities are exempt from permit requirements, but they still must be included in facility-wide PTE.

What are secondary emissions?

40 CFR Part 51 defines "Secondary emissions" as follows:

> *Emissions which occur as a result of the construction or operation of a major stationary source or major modification but do not come from the major stationary source or major modification itself. Secondary emissions must be specific, well defined, quantifiable, and impact the same general area as the stationary source or modification which causes the secondary emissions. Secondary emissions include emissions from any offsite support facility which would not be constructed or increase its emissions except as a result of the construction or operation of the major stationary source or major modification. Secondary emissions do not include any emissions which come directly from a mobile source, such as emissions from the tailpipe of a motor vehicle, from a train, or from a vessel.*

Do I have to include both condensable and filterable particulate matter emissions when calculating the PTE of PM, PM_{10} and $PM_{2.5}$?

On October 12, 2012, the EPA issued final amendments to its rules for the Clean Air Act NSR permitting program regarding the definition of "regulated NSR pollutant." This action clarifies when condensable particulate matter should be measured. The amendment states that condensable particulate matter must be included in calculations for PM_{10} and $PM_{2.5}$. It also clarified that condensable particulate matter does not have to be included in PM calculations. Filterable particulate emissions must still be included for all PM calculations, including PM, PM_{10} and $PM_{2.5}$.

Filterable PM is directly emitted from the stack and is captured on a filter during performance testing. Condensable PM exists as a gas in the exhaust stream and then condenses to form particulate matter once the exhaust gas stream exits the stack and cools.

Resources

If you have questions regarding calculating your PTE or your construction project, contact the Air Quality Program at NDEE.AirQuality@nebraska.gov or (402) 471-2186.

For more information concerning construction permits and air quality regulations, see the guidance document entitled Construction Permits in the Air Quality Publication Section at http://DEE.ne.gov.