Air Quality Potential-to-Emit Compliance Guide

The following document will help small businesses understand aspects of air quality compliance measures, air contaminant sources, how to conduct a facility-wide air emissions assessment and potential-to-emit calculations.

This document is not a substitute for reading and understanding Kentucky's statutes and regulations governing the applicability and issuance of environmental permits.

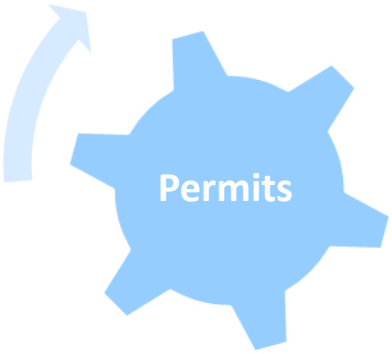
Contact

Division of Compliance Assistance
502-782-6189
envhelp@ky.gov
eec.ky.gov

June 2019

Understanding Permits

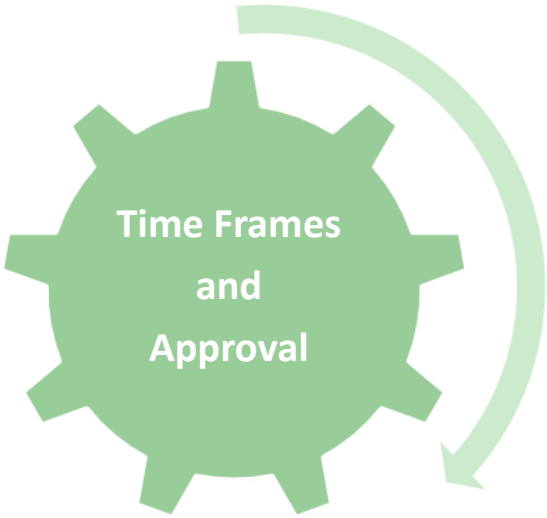
Environmental permits are required by federal, state and sometimes local governments to ensure that business and construction minimize potential impacts on human health and the local environment. The specific environmental regulations and permits that could apply to the construction and operation of a facility may vary depending on the specific location, breadth of activities and potential pollutants emitted. Permits provide a range or maximum amount of pollution that may be emitted during a specific timeframe and explain how the pollutants are to be managed.



Activities that have the potential to significantly impact the environment or pose a human health risk require an environmental permit. Even minor activities, when combined, can create the potential for significant impacts. The Kentucky Department for Environmental Protection (DEP) implements programs that control air, water and waste pollution ***sources***.

Many DEP programs require that facilities and operators obtain permits or authorizations prior to engaging in certain air, water and waste activities. Dependent on the type of permit required, some construction and/or operation activities may begin upon or shortly after submittal of a complete application. A permit application should be submitted with the knowledge of department review and approval timeframes.

The regulatory time frame for review and issuance of any permit, which covers both the construction and operation of the source, is dependent on the size and complexity of the source and the type of permit required. The regulatory time frame indicates the maximum time it should take to receive a final permitting determination from the agency, assuming a complete application has been received. The agency is committed to reviewing permit applications as rapidly as possible, while ensuring that all approvals are appropriate.



Facility Environmental Compliance Evaluation—Air Quality

Beginning an air quality assessment with a Facility Environmental Compliance Evaluation can help an organization appraise its environmental performance and compliance with its environmental responsibilities. Conducting routine facility evaluations is a critical part of identifying potential areas of noncompliance, along with verifying the implementation of corrective actions taken to correct past problems, reducing an organization's environmental liability and maximizing the organization's success.

This section provides basic questions that are applicable to most facilities. The questions highlight many of the areas of concern that are frequently identified during Department for Environmental Protection inspections and allow the user to identify areas where improvement or additional evaluation is necessary.

Answering "Partially," "No," or "Unsure" may indicate a need to contact the Division for Air Quality to ensure a facility is properly permitted. There may be other requirements that apply to a facility that are not contained in this document.

		Yes	Partially	No	Unsure	N/A
1.	Has the facility obtained a permit from the Division for Air Quality and is the facility aware of the permit's terms and conditions?	☐	☐	☐	☐	☐
2.	Has the facility completed an inventory of its actual and potential air emission points?	☐	☐	☐	☐	☐
3.	Has the facility determined if one or more chemicals listed on Kentucky's hazardous air pollutants list are used in any of its processes?	☐	☐	☐	☐	☐

		Yes	Partially	No	Unsure	N/A
4.	Does the facility prepare and submit its Semi-Annual Monitoring reports to the Division for Air Quality?	☐	☐	☐	☐	☐
5.	Does the facility prepare and submit an Annual Compliance Certification to the Division for Air Quality?	☐	☐	☐	☐	☐
6.	Does the facility appropriately maintain records related to its air emission operation as required by its permit?	☐	☐	☐	☐	☐
7.	Does the facility have established procedures to ensure proper notification for air-related events, including excursions, startups, shutdowns and malfunctions?	☐	☐	☐	☐	☐
8.	Does the facility notify the Division for Air Quality whenever new emission points are added or substantial changes to the facility's process occur?	☐	☐	☐	☐	☐
9.	Does the facility take steps to minimize emissions, including its fugitive emissions?	☐	☐	☐	☐	☐
10.	Does the facility implement practices to avoid odor problems off-site?	☐	☐	☐	☐	☐
11.	Does the facility comply with Kentucky's open burning regulations?	☐	☐	☐	☐	☐
12.	Does the facility comply with the 112(R) requirements for hazardous chemical emergency prevention and preparedness?	☐	☐	☐	☐	☐

A complete environmental compliance assessment workbook that addresses the above questions in addition to

- Waste Management Requirements
- Water Quality Requirements
- Emergency Planning
- Other Operating Practices for Successful Compliance

is available at https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/DCA Resource Document Library/ComplianceAssessmentWorkbook.pdf.

Air Quality Pollutants

A Kentucky Division for Air Quality (DAQ) permit is required for the construction and operation of an air contaminant source and its air pollution control equipment. An "air contaminant or air pollutant" includes smoke, dust, soot, carbon or any particulate matter, radioactive matter, noxious acid, fumes, gases, odor, vapor or any combination of these items.

The type of permit is dependent on the amount of air pollutants that the facility has the ***Potential-to-Emit (PTE)*** if the facility were to operate 24 hours a day, 7 days a week with all processes operating at maximum capacity. Air emissions are to be identified by the amount of ***regulated air pollutants (RAPs)*** that the entire source has the potential-to-emit.

Regulated Air Pollutants	
• Particulate Matter (PM)	• Greenhouse Gases (GHGs)
• Volatile Organic Compounds (VOCs)	• Hydrogen Sulfide (HS)
• Carbon Monoxide (CO)	• Hydrogen Fluoride (HF)
• Nitrogen Oxides (NO_x)	• Total Fluoride
• Sulfur Dioxide (SO_2)	• Hazardous Air Pollutants (HAPs)
• Lead (Pb)	

Hazardous air pollutants (HAPs) are chemicals that are known to cause or contribute to serious human health risks or adverse environmental effects. A list of all 188 HAPs can be found in 401 KAR 63:060, which is available online at https://apps.legislature.ky.gov/law/kar/401/063/060.pdf .

The Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants. This subset of the regulated air pollutants includes particulate matter, ozone, carbon monoxide, sulfur oxides, nitrogen oxides and lead. The EPA calls these pollutants ***"criteria" air pollutants*** because it regulates them by developing human health-based and/or environmentally based criteria for setting permissible levels.

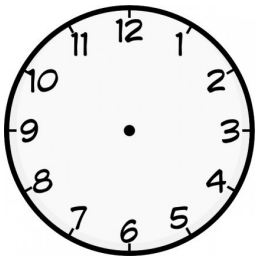
Air permitting potential emission thresholds and permit application review time frames are available on pages 11 and 13, respectively.

Step-by-Step
How to Conduct a Facility-wide Air Emissions Assessment

Step 1 *Understand Potential-to-Emit (PTE)*

A source's potential-to-emit is the ***maximum capacity*** of a business to emit a pollutant given its physical or operational design, and considering certain controls and limitations. Potential-to-emit is the core component of an air permit application, serving as a communication tool between the applicant and the permit reviewer. Air permits are based on facility-wide potential air emissions to allow for the greatest flexibility in air permitting. A facility-wide PTE summary aids in the assessment of applicable requirements and determining if the facility is capable of meeting those requirements. In the simplest of terms, PTE is a way for an entity to numerically illustrate the air quality emissions generated.

Step 2 *Actual and Potential Operating Hours*



Determine both the actual and potential operating hours. The actual operating hours are the actual number of hours a business operates during a calendar year. For example, a source that operates from 9 a.m. to 5 p.m. Monday through Friday has an actual operating time of 2,080 hours per year. A facility's potential operating hours are the time in which a source could possibly operate. This is generally 24 hours a day, 7 days a week or 8,760 hours per year. However, potential operating hours may be decreased if a ***bottleneck*** occurs within the process operations. A bottleneck is an occurrence in which the performance or capacity of a system is limited by a single or limited number of components or resources. Any bottleneck will be approved or disapproved by the Division for Air Quality Permit Review Branch.

Step 3 *Air Emission Sources*

The third step in determining a facility's PTE is to identify all possible sources of emissions. This can be accomplished by conducting a facility assessment, which involves walking through the facility while following each operation from beginning to end. An example of a walk-through can be found in Appendix B, page 16.

- Before starting your walk-through, gather all ***Safety Data Sheets (SDSs)*** to identify any materials used in any of the facility's processes that contain any criteria pollutants, VOCs or HAPs.

Step 3 *Air Emission Sources, continued*

- Each potential emissions source, including stationary items that burn fuels and/or generate dusts, vapors or odors, must be recorded. The table to the right contains some common emission sources.
- Create a layout, number each emission point and gather information regarding equipment specifications, including make, model and rated capacity. Also be sure to record any ***control devices*** that are connected to operations. A control device is an additional unit that limits the release of a pollutant into the ambient air. In addition to the obvious sources of emission, also be aware of ***fugitive dust,*** which is not emitted from definable point sources.

Common Sources	Frequently Forgotten
Boilers	Natural gas and diesel air compressors
Spray coating	Abrasive blasting
Cleanup solvents	Aerosol cans
Welding	Parts washers
Generators	Storage silos and stockpiles
Engines	Conveyors
Roadways	Water heaters
	Adhesives
	Crushers and screens
	Truck loadouts

Step 4 *Hourly Throughput*

Once all possible sources of emissions have been identified, the next step is to determine the ***maximum hourly capacity***, also known as the ***throughput***, of each piece of equipment. The maximum hourly capacity of a unit is the greatest potential amount of material a piece of equipment can process in one hour under its physical and operational design. A physical or operational limitation includes manufacturer's rated capacity of the equipment, air pollution control equipment, enforceable restrictions on hours of operation and type and amount of material combusted, stored or processed.

- The maximum capacity should be determined by the manufacturer's specifications, if available. For example, all spray guns and combustion units generally have a rated capacity.
- If the maximum hourly capacity of the process is unknown, it may be estimated by taking actual usage rates and actual hours of operation for the equipment and then adjusting it to represent potential operating scenarios.

All maximum capacity determinations will be approved or disapproved by the Division for Air Quality Permit Review Branch.

Step 5 → *Emission Factors*

The next step in preparing to calculate a facility's PTE is to determine the ***emission factor*** of all potential pollutants from each emission point. An emission factor is a numerical representation of how much pollution is emitted per unit processed, manufactured or utilized. For example, it shows the relationship between an air emission and a measure of production (e.g., pounds of SO2 per 1,000 gallons of input). It is important to use factors that are relevant for a particular production process. Emission factors should account for periods of disrupted operation as well as routine operation.

How Are Emission Factors Identified?

AP-42 and EPA WebFIRE

The EPA has developed emission factor ratings for many common industrial processes. AP-42 is a compilation of 15 chapters and appendixes of air pollutant emission factors. It is available online at https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors . Each chapter has several subsections to cover sources or industries within the chapter. In addition to the emission factors, AP 42 provides descriptions of the processes. The EPA's WebFIRE, or Factor Information REtrieval, is a web-based search engine rather than a detailed description of sources (http://cfpub.epa.gov/webfire/). There are two options for searching. One is a simple search based on keyword or ***source classification code (SCC)***. If the simple search returns too many results, a detailed search may be performed.

Stack Testing

Another way to determine emission factors is the test data method. This method can provide the most accurate estimates of emissions; unfortunately, the data needed are often expensive to obtain, particularly for businesses that emit a variety of pollutants or have a lot of fugitive emissions. Useful test data are easier to obtain when emissions come primarily from a point source, such as a smokestack. It may be necessary to collect test data over a period of time and from multiple production areas to gain a reliable measure of average emissions. Only experienced stack testers should measure emission samples and estimate total emissions.

Manufacturer Data

Equipment-specific emission factors can often be obtained from equipment vendors, especially through emission performance guarantees or from actual test data of similar equipment.

Material/Technical Data Sheets

Emission factors can be based on a percent-by-weight basis, as pollutant components are listed in a safety data sheet (SDS) or technical data sheet (TDS). This is the method most often used for wet-coat operations.

Software

There is software developed for certain operations. For example, there is software developed for tank emissions, landfill gases and glycol dehydration processes. These programs generate emission data from a series of simple input variables since the calculations can be quite complex.

Step 6 *Calculating Potential-to-Emit*

When calculating PTE, it is important to ensure that all variables are using the same units so they will "cancel out" and provide the desired end units (i.e. tons per year). Emission factors and hourly use rates are identified using SCC units, which are process-specific units. Using the variables identified in the prior steps, a source's PTE can be calculated using the following formula:

Maximum Hourly Use Rate (SCC unit/hour)	X	Potential Operating Hours (hours/year)	X	Emission Factor (lb/SCC unit)	X	Conversion Factor (ton/2000 lb)	=	Pollutant Output Emissions (tons/year)

Issues that can complicate or make PTE calculations incorrect include lack of information on the emission source, knowing when to include control devices to determine facility-wide pollutant thresholds, justification for physical or operation limitations and mathematical errors or improper use of unit conversions.

Once the potential emission calculations are completed for each process, add each pollutant to obtain the facility-wide PTE summary. In addition to noting the PTE for individual HAPs, sum the individual HAPs to develop a total HAP potential. Identify the permitting classification that is the most appropriate for the facility's activities. The final determination is made by the permit review staff at the Division for Air Quality. An example of how to calculate PTE is available in Appendix C Finding Emission Factors and Conducting Calculations.

Step 7 *Incorporating Emission Controls in PTE*

Normally, permitting decisions are based on uncontrolled emissions, yet, in some cases, a control device may be deemed integral to the operation. The way in which a piece of control equipment is viewed in terms of being integral, or not, will have an effect on what emissions are considered in reference to the type of permit category in which an applicant is applying. These determinations are made by the Division for Air Quality staff. When in doubt, assume that all control equipment is not integral.

Other controls may not be required for the process to operate, but reduce pollutants. Some controls may be required to meet certain air quality standards or must be in place as a condition of the air permit. Some controls may be required as part of a federally enforceable regulation for the process. All calculations, including integral or required controls, are subject to review and approval by DAQ.

Step 8 *State and Federal Regulations*

After completing the source's PTE summary and identifying applicable federal rules, it is possible to identify the permit type required for the facility with the aid of regulatory threshold references (see Table 1). If a facility's potential emissions do not meet the minimum thresholds for a registration and no federal rules are applicable, no permit or registration is required. However, if a facility would like official correspondence stating that they do not require a permit, they can submit a registration application. It will be reviewed by DAQ staff, who will verify calculations and rule applicability. If no permit or registration is required at the time of the application's submission, a No Permit Required letter will be issued.

Smaller sources are referred to as ***minor sources***. A Registration is the lowest form of permitting available, followed by the State Origin permit.

When a facility has the potential-to-emit more than a minor source, but the actual emissions from the operations would be less than minor source thresholds, the facility may request to have a Federally Enforceable State Operating Permit (FESOP). A FESOP allows sources to elect for federally enforceable emission limitations within the permit so that the facility does not enter major source status. Permit-required controls are often incorporated into a FESOP.

A Title V Permit is required when the emission source is a ***major source***, meaning the potential emissions are greater than minor source thresholds. A Prevention of Significant Deterioration (PSD) permit is for sources that exceed Title V thresholds and often include certain industry categories with specific limitations.

Table 1 contains the thresholds and source categories of each permit type.

Dependent on source location or industry classification, there may be additional regulatory considerations. For example, areas that are in nonattainment may have different pollutant thresholds that affect the permitting and source classification.

A ***nonattainment area*** is a locality where air pollution levels exceed National Ambient Air Quality Standards (NAAQS). These areas may be subject to additional regulatory requirements when compared to ***attainment areas***, which are those that meet NAAQS.

Kentucky Air Quality Regulations

401 KAR Chapters 50 to 65
https://apps.legislature.ky.gov/law/kar/TITLE401.HTM

Federal Rule Applicability

In addition to Kentucky's air quality regulations, there are federal air quality regulations that may apply. These rules are referred to as New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP).

New Source Performance Standards are intended to promote use of the best air pollution control technologies, taking into account the cost of such technology and any other non-air quality, health, and environmental impact and energy requirements. National Emission Standards for Hazardous Air Pollutants are stationary source standards for hazardous air pollutants.

Applicability of an NSPS or NESHAP is source-specific and pollutant-targeted and may have specific permitting implications. If a source is below registration thresholds but is subject to an NSPS or NESHAP, the submission of a registration application is required.

New Source Performance Standards (40 CFR 60) and National Emission Standards for Hazardous Air Pollutants (40 CFR 61; 40 CFR 63) may be accessed at http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40tab_02.tpl.

Table 1. Air Permitting Threshold Limits

No Source	None	PTE < 2 tpy (tons per year) of any HAP PTE < 5 tpy of combined HAPs, PTE < 10 tpy of an RAP **and** The source is **not** subject to an NSPS or NESHAP.
Minor Sources	Registration	PTE ≥ 2 but < 10 tpy of any HAP, PTE ≥5 but < 25 tpy of combined HAPs, PTE ≥10 but < 25 tpy of any RAP Source **is** subject to an NSPS or NESHAP.
	State Origin Permit	PTE <10 tpy of any HAP, PTE < 25 tpy of combined HAPs PTE ≥ 25 but <100 tpy of any RAP Source is subject to an NSPS or NESHAP.
	FESOP (Federally Enforceable State Operating Permit)	Potentially a major source, but emissions limited to minor. An artificial minor source.
Major Sources	Title V	PTE ≥ 10 tpy of any HAP, PTE ≥ 25 tpy of combined HAPs PTE ≥100 tpy of any RAP Sources PTE not limited by a permit.
	Prevention of Significant Deterioration (PSD) Permit	***Major sources above Title V thresholds or certain industry categories with specific limits that are located in attainment areas. See 401 KAR 51:017.***

The Next Step

Submitting an Air Application to Division for Air Quality

After determining your facility's potential-to-emit reaches registration or permitting levels, an air quality application will need to be submitted.

⇒ If the facility is located in Jefferson County, the air permit would be issued by the Louisville Metro Air Pollution Control District (APCD). The APCD can be contacted at 502-574-6000 or the website, https://louisvilleky.gov/government/air-pollution-control-district.

⇒ For all other counties in Kentucky, all forms can be located on the Kentucky Division for Air Quality's website: https://eec.ky.gov/Environmental-Protection/Air/Pages/Air-Permitting-Forms-and-Information.aspx

⇒ All air registration and permit applications use forms from the DEP7007 series. Both the DEP7007AI and DEP7007N forms are required for all permit applications. Other DEP7007 series forms are required based on the facility's processes. And permitting requirements

⇒ All DEP forms are available in the DEP Forms Library at https://eec.ky.gov/Environmental-Protection/resources/Pages/Forms-Library.aspx .

- ☐ Cover Letter
- ☐ DEP Forms
- ☐ PTE Calculations
- ☐ Emission Factor Basis
- ☐ Certification of Authority or Limited Partnership
- ☐ Facility Layout Map
- ☐ Flow Diagram
- ☐ Topographic Map
- ☐ SDS, Equipment Spec. Sheets, References, etc.

The application package submitted to DAQ should contain the following supporting documents:

All documents should be submitted to the Division for Air Quality at the following address:

Division for Air Quality
Permit Support Section
300 Sower Blvd., Second Floor
Frankfort, KY 40601

Time Frames and Fees

Table 2. Permit Application Fees and Time Frames

Permit Type	Application Fee	Regulatory Time Frame
Registration	$0	60 days
State Origin Permit	$0	60 days (completeness check) 60 days (final permit issuance) Total = 120 days
Federally Enforceable State Operating Permit (FESOP)	$0	60 days (completeness check) 60 days (draft issuance) 30 days (public comment) 60 days (final permit issuance) Total = 210 days
Title V Permit; Prevention of Significant Deterioration (PSD) Permit	$0	60 days (completeness check) 60 days (draft issuance) 30 days (public comment) 45 days (EPA comment period) 60 days (final permit issuance) Total = 255 days

Table 2 contains information regarding the application process for the different types of air registration and permits, including the ***regulatory time frame*** to obtain permit approval after application submission. While there is not a permit application fee, annual emission fees may be applicable after the permit is issued. Actual emission releases of up to 25 tons per year cost a flat fee of $150. Sources that emit 25 tons or greater per year receive a fee on a per ton basis.

Additional Resources

If you have any questions or concerns, please contact the Division of Compliance Assistance (DCA) at 502-782-6189, email us at envhelp@ky.gov, or visit us online at https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/default.aspx . The Division of Compliance Assistance exists to provide services that increase environmental knowledge and encourage positive behavioral changes. DCA does this to improve regulatory compliance, achieve exceptional performance and enhance the quality of Kentucky's environment and communities.

Appendix A: Plain English Definitions

Affected facility – Means an apparatus, building, operation, road or other entity or series of entities that emits or may emit an air contaminant into the outdoor atmosphere

Attainment area – A geographical area that meets National Ambient Air Quality Standards (NAAQS) for criteria air pollutants

Bottleneck – An occurrence in which the performance or capacity of an entire system is limited by a single or limited number of components or resources

Control device – Equipment such as an incinerator or carbon adsorber used to reduce, by destruction or removal, the amount of air pollutants in an air stream prior to discharge to the ambient air

Criteria air pollutant – One of six air pollutants or classes of pollutants regulated by the EPA for which National Ambient Air Quality Standards (NAAQS) have been established

Emission – Release of regulated air pollutants into the air (e.g., from a stack or duct)

Emission factor – A number that shows the relationship between an air emission of a regulated air pollutant and a measure of production (e.g., pounds of SO_2 per 1,000 gallons of input)

Fugitive emission – Emissions that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening. Common sources include open fields, roadways, storage piles, etc.

Major source – A stationary source or group of stationary sources that has a potential to emit for a regulated pollutant (or class of pollutants) that is at or greater than an emission threshold set by the regulations.

Maximum hourly capacity – The greatest potential amount of material throughput possible for a piece of equipment in one hour, under its physical and operational design

Minor source – A stationary source that emits and has the potential to emit less than the major source thresholds

Nonattainment area – A geographical area that exceeds limits for criteria air pollutants established by the National Ambient Air Quality Standards (NAAQS)

Potential-to-Emit – The maximum capacity of a stationary source to emit a pollutant under its physical and operational design where:

(a) a physical or operational limitation on the capacity of a source to emit an air

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 is enforceable as a practical matter; and

(b) this definition does not alter or affect the use of this term for other purposes of the act or the term "capacity factor" as used in the Acid Rain Program

Regulatory Time Frame – The maximum time it should take to receive a final permitting determination from the agency assuming a complete application has been received. Permits for complete applications are often issued before the maximum approval time period is reached.

Safety Data Sheet (SDS) – An document that contains information on the possible health risks associated with exposure to a potentially dangerous substance and safe working procedures for handling those products.

Stationary Source – Means one (1) or more buildings, structures, affected facilities, or installations that emits or may emit a regulated air pollutant or an air pollutant subject to regulation and is contained within a given contiguous property line, which means the property is separated only by a public thoroughfare, stream or other right of way .

Source Classification Code (SCC) – A primary identifying data element for processes that is used in the EPA's National Emission Inventory, Nation Emission Trends database, Factor Information and Retrieval database, and many state agency emission data systems

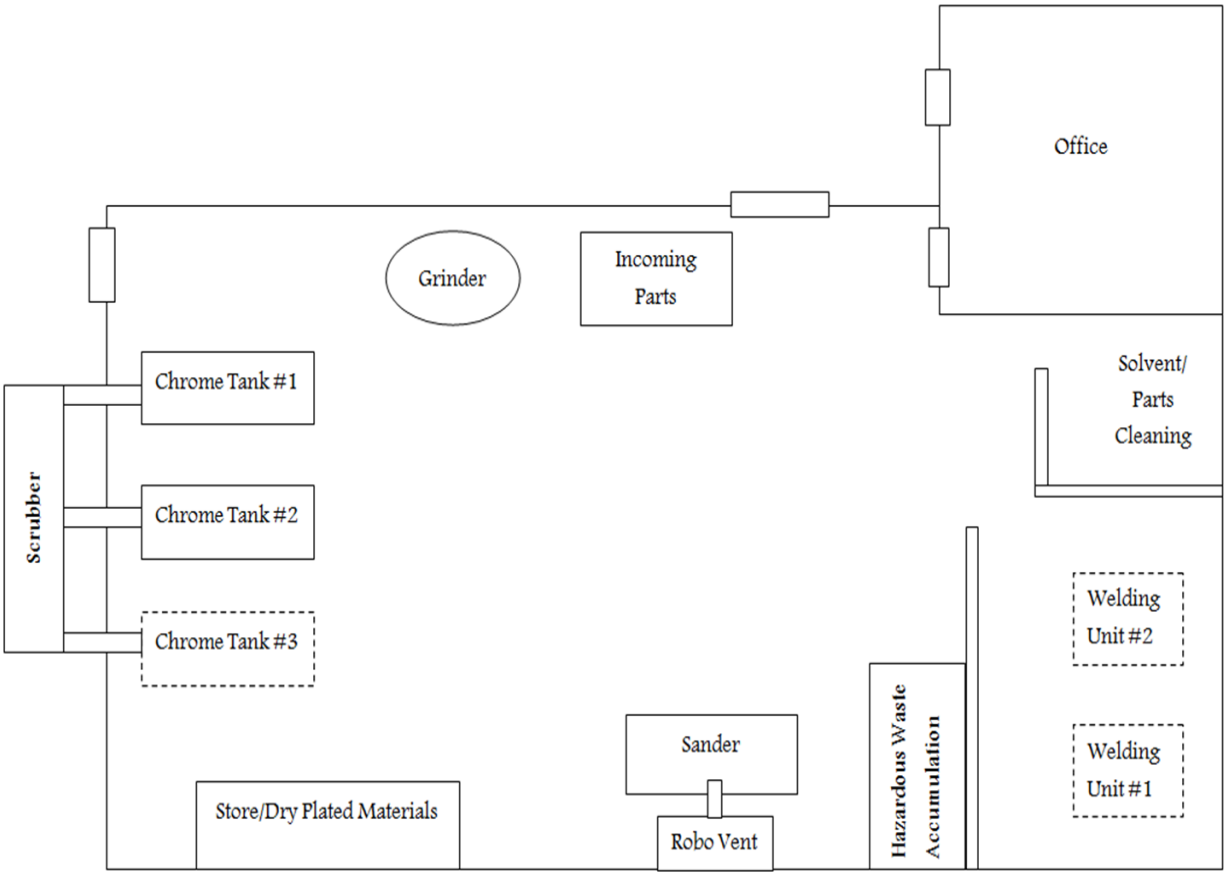
Throughput– The rate of production or rate at which something can be processed

For additional and complete regulatory definitions, please refer to the regulations.

Appendix B: Facility Assessment Example

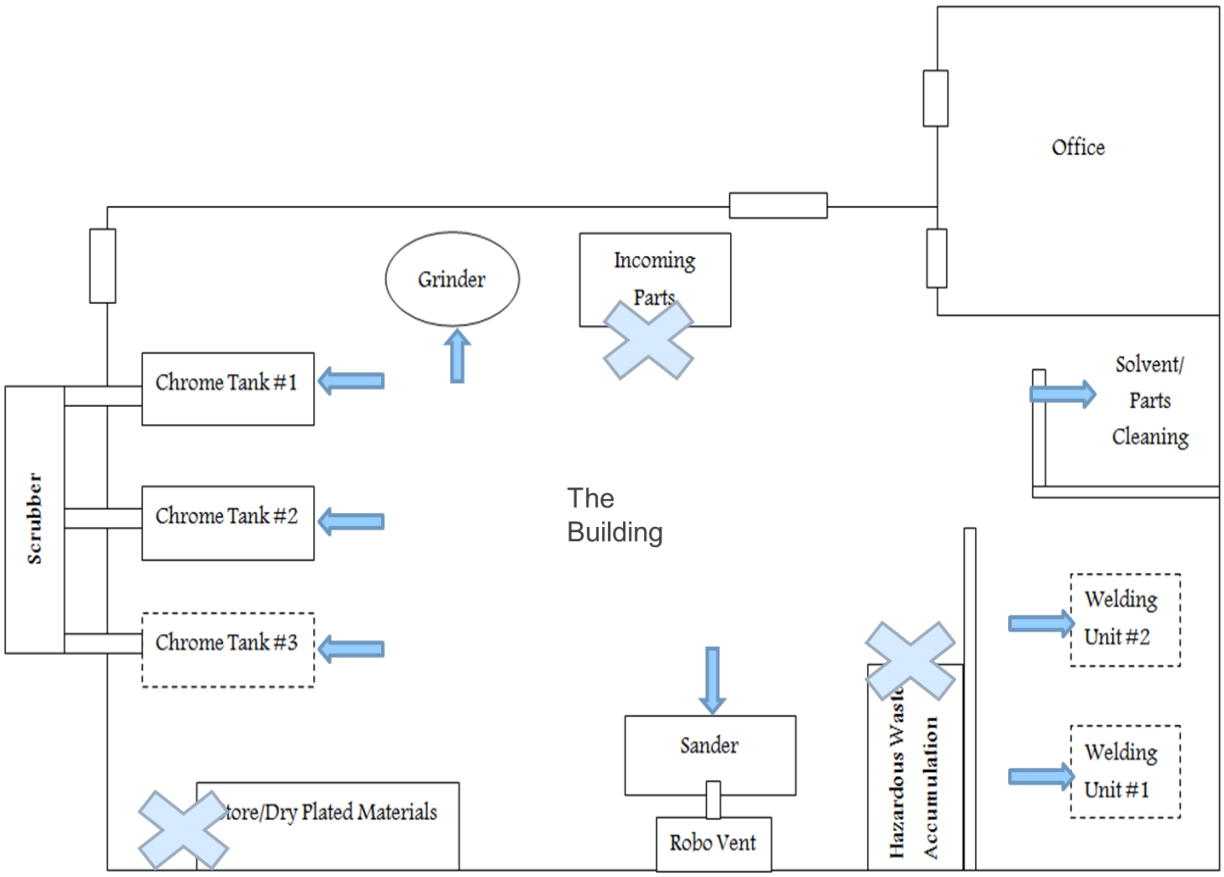
In order to determine potential-to-emit, a facility must undergo an assessment for possible sources of emissions. This involves walking through the facility while following each operation from beginning to end while recording any stationary items that burn fuels and/or generate dusts, vapors or odors. During the facility assessment, any control devices must also be recorded. Control devices are additional equipment units that are connected to operations. They limit the release of pollutants into ambient air.

In this exercise, a facility layout diagram of a fictional chrome plating company called Bright 'N Shiny Chrome Plating Co. will be used to identify potential emission sources.



Before going to the next page:

Can you identify the potential emission units within this facility?



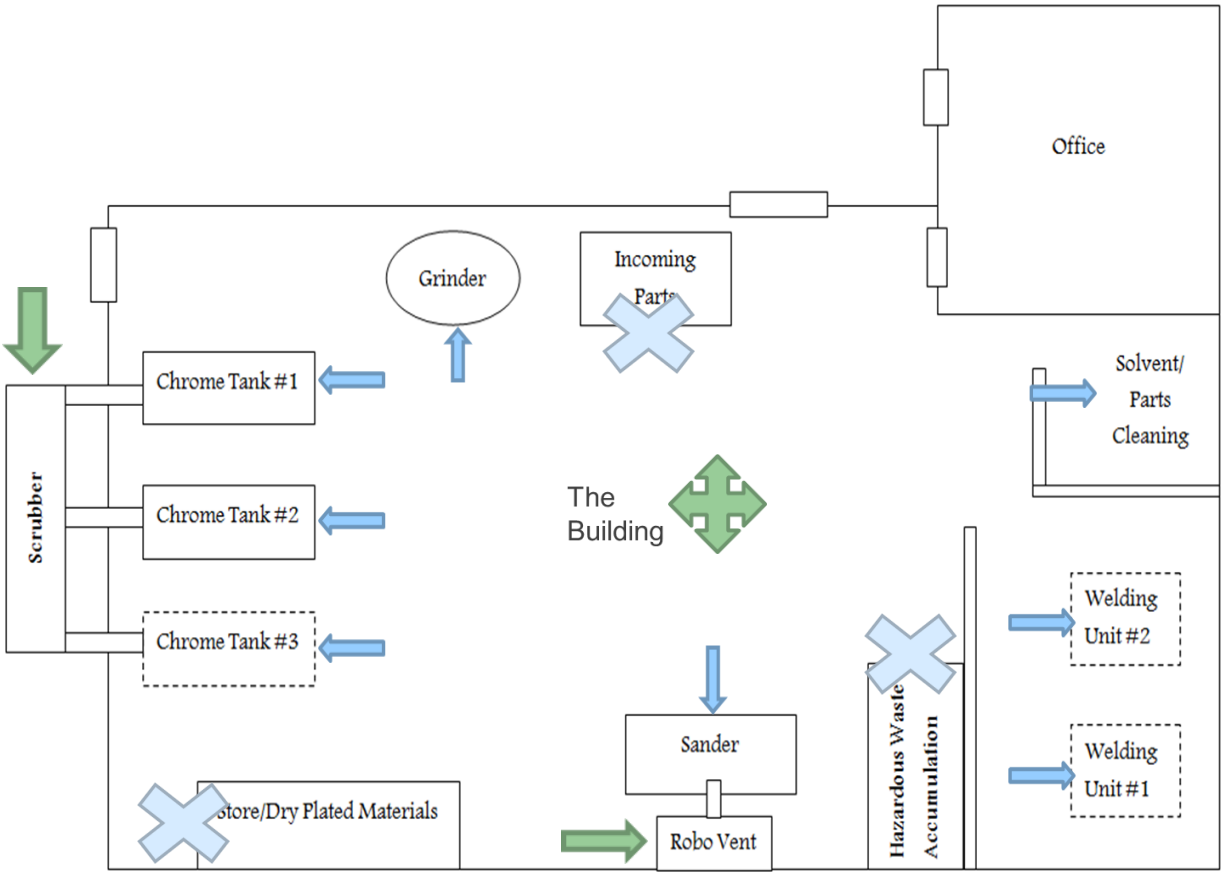
The blue arrows point to the potential emission sources. The solvent/part cleaning area, welding units, sander, grinder and chrome tanks can all potentially release dusts, vapors, or odors into the surrounding air.

- Once the emission sources are identified, they should be numbered and basic information regarding their operation, including make and model, usage rates, and hours of operation, should be recorded.
- Some facilities may also emit fugitive dust, that is dust that is not emitted from a definable point source. Fugitive dust can be emitted from an apparatus, operation or road that is not elsewhere subject to standards within the Division for Air Quality's regulations. Common sources of fugitive dust include paved and unpaved roadways, storage silos and stockpiles, crushers and screens, and truck loadouts.

The blue "X's" represent processes that do not need to be considered in the facility assessment for potential emission sources.

Before going to the next page:

What are the control devices located in Bright 'N Shiny Chrome?



The green arrows point to the control devices of the Bright 'N Shiny Chrome facility. At this facility, the Scrubber, RoboVent and building are the controls.

- A scrubber captures particulate matter, some VOCs and hazardous air pollutants. When determining the emissions for each chrome tank, the facility would determine how many pounds of chromic acid are put into each tank on a yearly basis. The information that the facility would need to gather for this emission unit is the SDS for additions to the chrome tanks and the scrubber manufacturer's specifications.
- The sanding operation has a RoboVent attached to it. This type of control device only captures particulate matter and non-VOC HAPs.
- The welding is controlled by the building or enclosure; this can be the case only if ventilation is not nearby allowing the emissions to exit into ambient air automatically. Buildings or enclosures can act as a control, as being enclosed prevents some emissions from escaping into the ambient air. Again, the building only controls the particulate matter and non-VOC HAPs.
- The solvent/parts cleaning equipment has no controls. As such, it will emit 100% of the potential VOC content of the solvent.

The following table gives a summary example of what information regarding emission sources and control devices may be recorded. Control efficiencies and emissions represented here are not universal and must be determined on a source- and unit-specific basis.

Emission Unit	Pollution Control	Control Efficiency	Captures	Material Throughput	Documents
Chrome Tanks	Scrubber	99%	Particulate Matter, some VOCs and Hazardous Pollutants	Lbs. of Chromic Acid / year	SDS of chromic acid; Scrubber specs
Sanding	RoboVent	90%	Particulate Matter	Lbs. material sanded / year	SDS of abrasive; RoboVent
Welding	Building/ Enclosure	50-70%	Particulate Matter	Lbs. welding rod / year	Welding rod SDS; Welder
Solvent	None	0%	*Emits 100%	Gallons of solvent / year	SDS

At this point in the preparation to calculate a facility's potential-to-emit, the following information should be available:

☐ A list of each unit with specifications (as applicable)

- Make and Model
- Energy Throughput: Btu/hr; scf/hr; gallons fuel
- Material Throughput: type and quantity with SDS

☐ Facility layout with each emission unit labelled

☐ A list of controls (if any)

- Type: Make and Model
- Percent control efficiency

With the facility assessment complete, the next step in preparation to calculate a facility's PTE is to determine the maximum hourly capacity of each piece of equipment. For more information on the next steps in the assessment process, go back to Step 4 on page 7.

Appendix C: Finding Emission Factors and Conducting Calculations

The following example will identify the steps of how to locate emission factors in the EPA's AP-42 and the EPA's Factor Information Retrieval, or WebFIRE, to use in emission calculations. Emission factor selection and use is subject to review and approval by the Division for Air Quality Permit Review Branch. Other options for emission factor identification are available in Step 5 on page 8.

Remember:

"Emission factors" are a numerical representation of how much of a pollutant is emitted per unit processed, manufactured or utilized.

Emission Factors: AP-42

AP-42 is a compilation of air pollutant emission factors. There are 15 chapters and appendixes. Each chapter has several subsections to cover sources or industries within the chapter. In addition to the emission factors, AP 42 provides descriptions of the processes. For example, one of the most commonly used emission factors is for external combustion sources, such as boilers. Within the chapter, there are subsections for the different types of combustion fuels.

Common Air Contaminant Sources:
Chapter 1 External Combustion Sources - Boilers
Chapter 3 Stationary Internal Combustion Sources - Reciprocating Internal Combustion Engines
Chapter 11 Mineral Products Industry - Crushed Stone, Ceramics, Concrete Batching
Chapter 12 Metallurgical Industry - Welding, Electroplating

Emission Factors: EPA WebFIRE

The EPA's WebFIRE, or Factor Information REtrieval, is a web-based search rather than a detailed description of sources. There are two options for searching. One is a simple search based on a keyword or SCC. If the simple search returns too many results, the output can be narrowed by conducting a detailed search. Conducting a detailed search allows several tiers of selections that will help you to narrow the scope of the query dependent on the process or operation.

Example: Gas Metal Arc Welding with E70S wire

This example will compare using AP-42 versus the EPA WebFIRE for identifying emission factors for gas metal arc welding using the most common E70S wire and will follow through emission calculations.

The emission factors for gas metal arc welding (GMAW) are available in AP-42 in Chapter 12, Section 19 . The document contains process descriptions for the different types of welding and the emission and controls information. The emission factors are listed in Table 1 with the particulate matter emissions and Table 2 with hazardous air pollutants.

Record ***each*** pollutant identified for the E70S GMAW.

AP-42, Ch. 12.19

12.19-4

Table 12.19-1 (Metric And English Units). PM-10 EMISSION FACTORS FOR WELDING OPERATIONS[a]

Welding Process	Electrode Type (With Last 2 Digits Of SCC)		Total Fume Emission Factor (g/kg [lb/10[3] lb] Of Electrode Consumed)[b]	EMISSION FACTOR RATIN
GMAW[d,e] (SCC 3-09-052)	ENiCrMo	(-76)[t]	11.7	C
	ENi-Cu	(-80)[u]	10.1	C
	E308L	(-12)[v]	5.4	C
	E70S	(-54)[w]	5.2	A
	ER1260	(-10)	20.5	D
	ER5154	(-26)	24.1	D
	ER316	(-20)[x]	3.2	C
	ERNiCrMo	(-76)[y]	3.9	C
	ERNiCu	(-80)[z]	2.0	C

12.19-6

Table 12.19-2. HAZARDOUS AIR POLLUTANT (HAP) EMISSION FACTORS FOR WELDING OPERATIONS[a]

Welding Process	Electrode Type (With Last 2 Digits Of SCC)		HAP Emission Factor (10^{-1} g/kg [10^{-1} lb /10^3 lb] Of Electrode Consumed)[b]					
			Cr	Cr(VI)	Co	Mn	Ni	Pb
GMAW[d,e] (SCC 3-09-052)	ENiCrMo	(-76)[r]	4.20	ND	ND	0.43	2.47	ND
	ENi-Cu-2	(-80)[s]	ND	ND	ND	2.12	4.23	ND
	E308	(-12)[t]	5.24	ND	< 0.01	3.46	1.84	ND
	E70S	(-54)[u]	0.01	ND	< 0.01	3.18	0.01	ND
	ER1260	(-10)	0.04	ND	ND	ND	ND	ND
	ER5154	(-26)	0.10	ND	ND	0.34	ND	ND
	ER316	(-20)[v]	5.28	0.10	ND	2.45	2.26	ND
	ERNiCrMo	(-76)[w]	3.53	ND	ND	0.70	12.5	ND
	ERNiCu	(-80)[x]	< 0.01	ND	ND	0.22	4.51	ND

NOTE: Pay attention to the units!

The emission factors in Table 12.19-1 versus Table 12.19-2 are in different units. Unit conversions will be required. Also, whenever the emission factor indicates less than a value, such as the cobalt does above, the emission factor used in PTE calculations will be the maximum value or, in this case, 0.01.

EPA WebFIRE—E70S

Doing a "simple search" in WebFIRE, typing "E70S" in the search window, returns five factors. The first results are chromium and cobalt with emission factors in lb. per 1000 lbs., followed by manganese, nickel and PM10 with emission factors, shown below.

SCC 30905254 Details
Industrial Processes > Fabricated Metal Products > Gas Metal Arc Welding (GMAW) > E70S Electrode
POLLUTANT Manganese NEI 7439965 CAS 7439-96-5
Primary Control / Secondary Control : UNCONTROLLED ,
Emission Factor -- 3.180E-1 Lb per 1000 Pounds Electrode Consumed;
Quality -- A Emissions Factors Applicability

SCC 30905254 Details
Industrial Processes > Fabricated Metal Products > Gas Metal Arc Welding (GMAW) > E70S Electrode
POLLUTANT Nickel NEI 7440020 CAS 7440-02-0
Primary Control / Secondary Control : UNCONTROLLED ,
Emission Factor -- 1.000E-3 Lb per 1000 Pounds Electrode Consumed;
Quality -- A Emissions Factors Applicability

SCC 30905254 Details
Industrial Processes > Fabricated Metal Products > Gas Metal Arc Welding (GMAW) > E70S Electrode
POLLUTANT PM10, filterable NEI PM10-FIL CAS
Primary Control / Secondary Control : UNCONTROLLED ,
Emission Factor -- 5.200E0 Lb per 1000 Pounds Electrode Consumed;
Quality -- A Emissions Factors Applicability

Summary of Welding Emission Factors

AP 42

Pollutant	Emission Factor	Units	Emission Factor (Converted)	Units
PM10	5.2	lb/lb_{1000}	5.2	lb/lb_{1000}
Cr	0.01	0.1 lb/lb_{1000}	0.001	lb/lb_{1000}
Co	0.01	0.1 lb/lb_{1000}	0.001	lb/lb_{1000}
Mn	3.18	0.1 lb/lb_{1000}	0.318	lb/lb_{1000}
Ni	0.01	0.1 lb/lb_{1000}	0.001	lb/lb_{1000}

Both AP-42 and WebFIRE yield the same results, so either is acceptable to use when determining emission factors.

WebFIRE

Pollutant	Emission Factor	Units
PM10	5.2	lb/lb_{1000}
Cr	0.001	lb/lb_{1000}
Co	0.001	lb/lb_{1000}
Mn	0.318	lb/lb_{1000}
Ni	0.001	lb/lb_{1000}

Calculate PTE for Each Pollutant

To calculate the potential emission of each pollutant, first the throughput rate is multiplied by the potential operating hours to yield the potential use rate in lb1000/yr. That value is then multiplied by the emission factor, and then a conversion factor (there are 2,000 lbs. in one ton) to get the potential emissions in tons per year. This must be repeated for each pollutant emitted by a source.

Throughput Rate (lb_{1000}/hr)	Potential Operating Hours	Potential Usage Rate (lb_{1000}/year)	Pollutant	Emission Factor	Units	Potential Emissions Uncontrolled (ton/year)
0.048 *	8760 =	421.15	PM10	5.2	lb/lb_{1000}	1.095
			Cr	0.001	lb/lb_{1000}	0.00021
			Co	0.001	lb/lb_{1000}	0.00021
			Mn	0.318	lb/lb_{1000}	0.06696
			Ni	0.001	lb/lb_{1000}	0.00021

$$\frac{421.15\ lb_{1000\ rod}}{yr} * \frac{5.2\ lb_{PM10}}{lb_{1000\ rod}} * \frac{Ton_{PM10}}{2{,}000\ lb_{PM10}} = \boxed{\frac{1.095\ Ton_{PM10}}{year}}$$

Worst-Case Scenario

In a situation in which multiple rods are used, or the rod is unknown, the facility may use a worst case scenario by taking the highest emission factor for each pollutant. Again, it is important to pay attention to the units.

12.19-4

Table 12.19-1 (Metric And English Units). PM-10 EMISSION FACTORS FOR WELDING

Welding Process	Electrode Type (With Last 2 Digits Of SCC)		Total Fume Emission Factor (g/kg [lb/10^3 lb] Of Electrode Consumed)[b]
GMAW[d,e] (SCC 3-09-052)	E308L	(-12)[v]	5.4
	E70S	(-54)[w]	5.2
	ER1260	(-10)	20.5
	ER5154	(-26)	24.1
	ER316	(-20)[x]	3.2
	ERNiCrMo	(-76)[y]	3.9
	ERNiCu	(-80)[z]	2.0

Table 12.19-2. HAZARDOUS AIR POLLUTANT (HAP) EMISSION FACTORS FOR WELDING OPERATIONS[a]

Welding Process	Electrode Type (With Last 2 Digits Of SCC)		HAP Emission Factor (10^{-1} g/kg [10^{-1} lb /10^3 lb] Of Electrode Consumed)[b]					
			Cr	Cr(VI)	Co	Mn	Ni	Pb
GMAW[d,e] (SCC 3-09-052)	E308	(-12)[t]	5.24	ND	< 0.01	3.46	1.84	ND
	E70S	(-54)[u]	0.01	ND	< 0.01	3.18	0.01	ND
	ER1260	(-10)	0.04	ND	ND	ND	ND	ND
	ER5154	(-26)	0.10	ND	ND	0.34	ND	ND
	ER316	(-20)[v]	5.28	0.10	ND	2.45	2.26	ND
	ERNiCrMo	(-76)[w]	3.53	ND	ND	0.70	12.5	ND
	ERNiCu	(-80)[x]	< 0.01	ND	ND	0.22	4.51	ND

Questions or Concerns?

The Division of Compliance Assistance (DCA) assists businesses, individuals and organizations in complying with environmental requirements. Contact the division for any of your environmental compliance assistance needs.

Online: eec.ky.gov

Phone: 502-782-6189

E-mail: envhelp@ky.gov

DCA staff are available to provide on-site assistance and training. Questions regarding permits may be addressed to the Environmental Compliance Assistance Program.