TCEQ REGULATORY GUIDANCE
Small Business and Environmental Assistance Division
RG-404 ● February 2011

Surface Coating Facilities

A Guide for Obtaining Air Authorization in Texas

Contents

Introduction

This document is tailored to the surface coating industry, excluding auto body shops, and contains general information about air regulations. Surface coaters prepare and coat (paint) items that may be made out of metal, wood, plastic, porcelain, or any of several other materials. Processes associated with cleaning and coating emit air contaminants. As part of its role in protecting public health and the environment, the Texas Commission on Environmental Quality (TCEQ) requires you to get proper air authorization for these emissions. Under the law, you are required to obtain authorization before you build, modify, or begin operations at your facility.

Even if your site is already in operation, you still need an air authorization. You should begin steps to obtain authorization as soon as you become aware that this regulation applies to you. For more information on how to proceed if you find yourself in this situation, call the Small Business and Local Government Assistance (SBLGA) program at 800-447-2827 for confidential assistance. You can also contact the Air Permits Division at 512-239-1250 for technical assistance.

Which Air Authorization Applies to You?

The type of authorization you qualify for will depend on the materials and chemicals you use, the processes that you conduct, and the amount of air contaminants your facility creates. In Texas, you have three options for obtaining authorization to emit air contaminants from your surface coating facility. You must either

- qualify for *de minimis* status, or
- obtain authorization through a
  - permit by rule (PBR), or
  - New Source Review (NSR) permit.

In addition, you may be required to obtain coverage under a Title V Federal Operating Permit if your emissions exceed certain levels. Ultimately, you must decide which type of authorization applies to your business and if it needs to meet any other requirements to comply with state and federal laws.

De Minimis

De minimis sites emit very small amounts of air contaminants. If your site qualifies as *de minimis*, you do not need to register with the TCEQ. However, you do need to keep records to prove that you meet the *de minimis* requirements. Even if your site is *de minimis*, you may have to comply with other state and federal regulations—see "Other Requirements," on page 8. The rules that explain the *de minimis* criteria appear at 30 Texas Administrative Code (TAC) Chapter 116, Subchapter B, Division 1, Section 116.119.

There are several ways that you can meet the *de minimis* criteria. To find out whether you can claim *de minimis* status:

- **Check the *De Minimis* Facilities or Sources List [30 TAC 116.119(a)(1)].**

Any facility on the *De Minimis* Facilities or Sources List is considered *de minimis* by the TCEQ. This list is available online at <www.tceq.texas.gov/goto/de_minimis>.

- **Check the Materials and Usage List [30 TAC 116.119(a)(2)(A–F)].**

  If the total, site-wide use per year of the following materials is below the thresholds listed, the site is considered *de minimis*:

  - cleaning and stripping solvents, 50 gallons per year
  - coatings (excluding plating materials), 100 gallons per year
  - dyes, 1,000 pounds per year
  - bleaches, 1,000 gallons per year
  - fragrances (excluding odorants), 250 gallons per year
  - water-based surfactants and detergents, 2,500 gallons per year.

- **Review Your Emission Rates and Check the Effects Screening level (ESL) List or Ask for a Case-by-Case Review.**

  There are two additional ways that you can claim *de minimis* status. You can review the ESL list and emission rate caps [30 TAC 116.119(a)(3)] or ask for a case-by-case review [30 TAC 116.119(a)(4)]. For more information on these options, contact the Air Permits Division at 512-239-1250.

De minimis sites cannot be in violation of any TCEQ rule, permit, order, or statute. If a business is found to be in violation, it will no longer be considered *de minimis* and must obtain authorization through a PBR or an NSR permit.

Permit by Rule

Many surface coaters obtain authorization by qualifying for a PBR. PBRs have specific, non-negotiable conditions that your business must meet. PBRs are approved more quickly than NSR permits and less documentation is required for approval. It is important that you keep accurate records and documents to verify that you continually meet the conditions of your PBR.

In addition, more than one PBR may apply to your site. For example, you might sandblast an object and then paint it. You would need to obtain authorization under the PBRs both for dry abrasive cleaning and for surface coating. You can find more on surface preparation at the SBLGA's website, <www.TexasEnviroHelp.org>.

Review 30 TAC Chapter 106 to find all appropriate PBRs that may be applicable to your site. The most common PBRs for surface coating facilities are listed in Appendix A.

Who Can Register Under a PBR?

General Requirements (30 TAC 106.4)

Facilities that are sources of air contaminants may claim a PBR as long as they can meet the general requirements and emission limits in 30 TAC Chapter 106, Subchapter A, Section 106.4 and meet the specific requirements for the PBR that they are claiming. You will need to calculate your air emissions to determine if you meet the conditions

of a PBR. If you need help with these calculations, review Appendixes C through E. If you use heaters or ovens at your facility, you can reference Appendix I for help determining the emissions from those activities. You can also use the compliance worksheet in Appendix K to help you gather all of the information you will need to get started.

The general air emission limits, explained in 30 TAC Chapter 106, Subchapter A, Section 106.4, are:

- No more than 25 tons per year (sitewide) of:
  - volatile organic compounds (VOCs),
  - sulfur dioxide (SO_2),
  - particulate matter (PM_{10}) that is small enough to be inhaled, or
  - any other air contaminant (including exempt solvents)—except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen.
- No more than 250 tons per year (sitewide) of:
  - carbon monoxide (CO), or
  - nitrogen oxides (NO_x).

Overview of Requirements for Surface Coating Facilities (30 TAC 106.433)

The PBR for surface coating facilities, found in 30 TAC Chapter 106, Subchapter S, Section 106.433, has more stringent emission limits and requirements than the general requirements in 30 TAC Chapter 106, Subchapter A, Section 106.4. It is important to note that this PBR covers the use of coatings that contain metal pigments, but does not cover the application of molten metals.

The facility must maintain good housekeeping practices, clean up spills promptly, use exhaust fans when in operation, and properly store and dispose of new and used coatings and solvents. If you use ovens to dry or cure paint at your facility, you must either use an electric oven or ensure that the maximum heat input does not exceed 40 million British thermal units per hour. The rule also specifies the appropriate type of fuel that may be used for these ovens.

The specific air emission limits for surface coating operations performed **indoors**, in a booth, or in an enclosed work area, as explained in 30 TAC 106.433(6), are no more than:

- 6 pounds of VOCs per hour, averaged over a five-hour period (see Appendix E for help with this calculation), and
- 500 pounds of VOCs per week per booth or enclosed work area.
  - You must ensure that your VOC emissions do not exceed 13 tons of VOCs per year per booth or enclosed work area. This value comes from the following equation:

$$\frac{500\ \cancel{lb}\ VOC}{\cancel{week}} \times \frac{52\ \cancel{weeks}}{year} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \frac{13\ tons\ VOC}{year}$$

In addition to the emission limits, enclosed operations must ensure that:

- all exhaust stacks extend at least 1.5 times the building height above the ground. (See Appendix J for more on stack design.)
- there is a minimum face velocity of 100 feet per minute (ft/min) at the intake opening of each booth or work area,
- the filter velocity does not exceed 250 ft/min. (See Appendix G for face velocity and filter velocity calculation.)
- the emissions of particulate matter from spraying operations are controlled by either a wash-water system or a dry filter system with a 95 percent removal efficiency.

Surface coating operations performed **outdoors** or in a non-enclosed work area must comply with the same VOC emission limits as enclosed operations (6 lb/hr and 500 lb/week). The VOC limits may be more stringent if the operation sprays coatings with metallic pigments containing chromates, lead, cadmium, selenium, strontium, or cobalt. Review 30 TAC 106.433(7)(B) if this applies to your business. Outdoor spray operations must also ensure that:

- all coating operations are conducted at least 50 feet from the property line and 250 feet from the nearest off-property structure, and that
- the TCEQ has given written site approval before construction.

The site-wide limits from coating and cleanup solvents, explained in 30 TAC 106.433(4), apply to both indoor and outdoor operations. All facilities must ensure that their site-wide emissions are no more than:

- 25 tons per year of VOC and 10 tons per year of exempt solvents, and
- 30 pounds per hour of VOC and 5.0 pounds per hour of exempt solvents.

Exempt solvents, such as acetone and methylene chloride, are defined as those carbon compounds or mixtures of carbon compounds used as solvents that have been excluded from the definition of VOC. The definition of VOC can be found in 40 CFR, Part 51.100.

This is an overview of the rule requirements. **You must thoroughly review the PBR, 30 TAC 106.433, to make certain that you understand and comply with all of the emission limits, record-keeping responsibilities, and notification requirements.** We have included a copy of the rule in Appendix B for your convenience. If you begin approaching the limits in the PBR, contact the Air Permits Division at 512-239-1250 to discuss your permitting options.

How Do I Obtain Coverage Under a PBR?

Some of the PBRs, including 30 TAC 106.433, require you to register with the TCEQ, while others require no registration. Registration requirements are specified in the rule. If any PBR requires registration, follow these general procedures:

1. Make sure your facility meets the general requirements for claiming the PBRs found in 30 TAC Chapter 106, Subchapter A, Section 106.4. You can complete the PBR Applicability Quick Checklist, Form TCEQ-10150 to help you determine if you

meet the requirements. The appendixes to this publication will help you with the calculations you will need to complete in order to determine compliance.

2. Make sure your facility meets the conditions of any PBR you intend to claim. Be sure to read the PBR(s) in 30 TAC Chapter 106 before you make this determination. If registration checklists are available for the PBRs you are claiming, it is recommended that you use the checklists to demonstrate compliance with the rule. See Appendix A for registration checklist form numbers.
3. Complete Form TCEQ-10228, "Registration for Permits by Rule (PI-7)," or Form TCEQ-20182, "Certification and Registration for Permits by Rule (PI-7-CERT)."

Should I use a PI-7 or a PI-7-CERT?

The PI-7 and PI-7-CERT forms request administrative and technical information needed by the Air Permits Division to evaluate PBR claims. The PI-7-CERT form also establishes federally enforceable emission limits for individual pollutants. Use caution when setting the emission limit, as the facility may not exceed that limit. If changes occur at a site and the emission limit needs to be updated, you must submit Form TCEQ-10489 (APD-CERT).

An example of a beneficial use of the PI-7-CERT form would be when the potential to emit (PTE) at a facility exceeds major-source thresholds, but the actual emissions from the facility are below the major-source thresholds. The emission limit established under a PI-7-CERT form would allow the site to be considered a "synthetic minor" and would not require a Title V federal operating permit. You can find additional information regarding PTE in Appendix F.

4. Submit the following items for review with your registration form:
   - **Distance information.** Include the distance from the facility's emission release point to the nearest property line and off-property structure.
   - A **process flow diagram** or **process description.** Include a step-by-step description of what you do with each material that comes into your business and how the final product moves out the door.
   - **Emissions data and calculations.** Include emission rates for each air contaminant and supporting calculations.
   - **Equipment specifications.** Filter efficiencies, spray-gun specifications and literature, and gun-washer and booth specifications.
   - **Usage rates of coatings and solvents** in gallons per hour and gallons per year.
   - **Operation schedules.** Hours of operation.
   - **Material Safety Data Sheets.** Identify the chemicals used specifically at your site and supply MSDS, technical data sheets, environmental sheets, air quality data sheets, or equivalent supporting documents for all mixtures that contain potential air contaminants.

This information will help permit reviewers understand how your business operates and will help them verify that the emission calculations are correct and that the applicable rules are met.

5. Pay a registration fee and submit your proof of payment with your registration form. See Form TCEQ-10228 (PI-7) or TCEQ-20182 (PI-7-CERT) to determine the specific fee amount.

> *Note:* You do not need to submit a separate form or pay a separate fee for each PBR. You can apply for multiple PBRs using only one form and paying one fee.

6. Complete Form TCEQ-10400, the TCEQ Core Data Form. If you are a new customer of the TCEQ and have not been issued a regulated-entity number (RN) and customer reference number (CN), you will need to complete this form. If you are an existing customer and have made changes to your customer or site information, you will need to submit an updated form.

Check all applicable PBRs to determine if site approval is required before you begin construction. If no PBR requires site approval from the TCEQ, you may begin construction (or the activity) once the TCEQ has received your application and supporting documentation. However, if any PBR requires written site approval from the TCEQ, do not begin construction until you receive approval in writing. The PBR specific to surface coating, 30 TAC 106.433, requires written site approval from the TCEQ.

New Source Review Permit

If your business cannot qualify for *de minimis* or a PBR you must obtain an NSR permit. An NSR permit has a more complex application process that is beyond the scope of this document. It is best to contact the Air Permits Division at 512-239-1250 and ask to speak to a coating-permit engineer who can help you determine how to proceed with obtaining proper authorization. Generally, in order to obtain an NSR permit, you will be required to:

- submit the most current version of Form TCEQ-10252 (PI-1),
- pay a fee of at least $900 fee, and
- submit additional information about your specific facility.

You will also have to publish two public notices in a prominent newspaper and post signs (often in more than one language). A public hearing may also be required in order to determine whether you should receive a permit.

Once your application is approved and you have received your permit, you may begin to modify or construct your facility. If you have questions about permitting, or have already started construction without authorization, please call SBLGA at 800-447-2827.

Title V Federal Operating Permit

Any business classified as a "major source" of air contaminants must obtain a Title V federal operating permit, in addition to a PBR or NSR permit, and comply with additional regulations. A site can be considered major because of the amount of different types of emissions, such as VOCs, NO_x, or hazardous air pollutants (HAPs).

In general, sites are considered to be major sources of air contaminants if they have the potential to emit 10 tons per year of a single HAP or 25 tons per year of any

combination of HAPs. EPA maintains an up-to-date list of HAPs at <www.epa.gov/ttn/atw/orig189.html>.

Additionally, facilities that are located in attainment counties and have the potential to emit 100 tons per year or more of any other contaminant (including VOCs) are considered "major sources."

Facilities that are located in near-nonattainment and nonattainment counties have lower thresholds for certain air contaminants. This information can be found in 30 TAC Chapter 122, Subchapter A, Section 122.10. To determine the attainment status for the county in which you operate, visit <www.tceq.texas.gov/goto/attainment>.

You can find additional information on potential to emit in Appendix F. If you believe that your facility is a major source of air contaminants, you should contact the Air Permits Division at 512-239-1250 to set up a meeting to discuss your permitting options.

Other Requirements

General Air Quality Rules (30 TAC 101)

Nuisance Emissions

No facility in Texas may create "nuisance" emissions "that adversely affect human health or welfare, animal life, vegetation, or the normal use and enjoyment of property" (30 TAC Chapter 101, Subchapter A, Section 101.4). Nuisance conditions often associated with surface coating include odor and paint overspray.

Emissions Inventory

You may have to send the TCEQ an annual air emissions report, called an "emissions inventory," detailing the actual annual emissions of air pollutants released at your site if:

- your business is a "major source" of air emissions or
- it is located in a nonattainment area and emits 10 tons per year or more of VOCs.

These reports help track and plan the state's progress in reducing air pollution. Emissions Inventory reporting requirements appear in 30 TAC Chapter 101, Subchapter A, Section 101.10. For more information, visit <www.tceq.texas.gov/goto/air_pollution_sources>.

Fees

Certain facilities in Texas will be required to pay an inspection fee or an emissions fee each year—see 30 TAC Chapter 101, Subchapter A, Sections 101.24 (Inspection Fees) and 101.27 (Emission Fees).

Emissions Banking and Trading Program

The Emissions Banking and Trading Team administers several programs, including the Mass Emissions Cap and Trade (MECT) program. If your facility is located in the Houston-Galveston-Brazoria eight-hour ozone nonattainment area, you will need to evaluate whether the facility is subject to MECT. For additional information regarding MECT, see 30 TAC Chapter 101, Subchapter H, Division 3 or visit <www.tceq.texas.gov/goto/ebt>.

Nonattainment and Near-Nonattainment Areas (30 TAC 115)

If your coating operation is located in a nonattainment or near-nonattainment county, as defined at 30 TAC 115.10, there are limits on the VOC content of the paints and coatings you may use. These requirements appear in 30 TAC Chapter 115, Subchapter E, Division 2, Sections 115.420–29.

You have several options for complying with the special requirements for nonattainment and near-nonattainment areas. You can use compliant coatings that are below the required VOC content limits, use coatings that are compliant under a daily weighted average, or qualify for an exemption.

VOC Content Limits (30 TAC 115.421)

The following limits are given in pounds of VOC per gallon of coating, *minus water and exempt solvent*. See Appendix H for help with these calculations. These VOC limits must be followed by **all sources** in nonattainment or near-nonattainment areas that do not meet one of the exemptions listed in the rule (30 TAC 115.427).

There are specific VOC-content limits for coating various materials including large appliances, metal furniture, coils, paper, fabric, vinyl, cans, vehicles, aerospace coatings, mirror backing, wood parts and products, wood furniture, and marine coatings. For more information on VOC-content limits for surface coating these materials, see 30 TAC 115.421.

Surface coaters often apply coatings to metal. Therefore, we have outlined the VOC content limits for miscellaneous metal parts and products below.

Coating limits for miscellaneous metal parts and products [30 TAC 115.421(a)(9)]:

- *4.3 pounds per gallon for clear coats and interior protective coating for pails and drums,*
- *3.5 pounds per gallon for low-bake coatings that utilize air or forced air driers,*
- *3.5 pounds per gallon for extreme performance coating, including chemical milling maskants,*
- *3.0 pounds per gallon for all other coating applications that pertain to miscellaneous metal parts and products, including high-bake coatings.*

Refer to 30 TAC 115.420 for the definition of each coating type.

Can I Use a Coating Above the VOC Content Limits?

Yes; instead of providing the VOC content of each of your coatings, you may demonstrate that the *daily weighted average* of the content for each coating type, line, or operation does not exceed the VOC content limit indicated in 30 TAC Chapter 115, Subchapter E, Division 2, Section 115.421. In addition, your coating operation could meet one of the exemptions at 30 TAC Chapter 115, Subchapter E, Division 2, Section 115.427. If you need help in calculating the daily weighted average, review Appendix H.

In order to demonstrate compliance with emission limits in the rule, maintain records such as MSDS. The MSDS or product label for each coating should indicate the VOC content expressed in units of mass/volume, normally pounds per gallon (lb/gal) or grams per liter (g/liter).

Exemptions (30 TAC 115.427)

Exemptions depend on where your facility is located and the type of facility you operate.

- For the Beaumont–Port Arthur, Dallas–Fort Worth, El Paso, and Houston-Galveston-Brazoria areas, a facility can be exempt because:
  - its VOC emissions are less than 3 pounds per hour and 15 pounds in any consecutive 24-hour period **or**
  - its total coating and solvent usage is less than 150 gallons per year.
- For Gregg, Nueces, and Victoria counties, a facility can be exempt because:
  - its VOC emissions are less than 550 pounds in any continuous 24-hour period.

Additional exemptions exist for various business types. For example, aerosol coatings (spray paint) are exempt from this requirement. Please review 30 TAC 115.427 for a complete list of exemptions in your area.

New Source Performance Standards (40 CFR, Part 60)

New Source Performance Standards (NSPS) dictate the amount of air contaminants that a new stationary source may produce. Several NSPS regulations apply to specific surface coating facilities. For a link to these rules, visit the TCEQ's Web page at <www.tceq.texas.gov/goto/40_cfr_60>.

National Emission Standards for Hazardous Air Pollutants (40 CFR, Part 63)

National Emission Standards for Hazardous Air Pollutants (NESHAPs), also known as Maximum Achievable Control Technology (MACT) standards, set limits on emissions of hazardous air pollutants. There are NESHAPs for both major sources and area (or minor) sources. The rules for NESHAPs that affect surface coaters can be found in 40 CFR, Part 63 and include specific requirements that surface coating industries must follow to reduce emissions of these pollutants.

Common NESHAPs for surface coating operations include:

- Surface Coating of Miscellaneous Metal Parts and Products, 40 CFR, Part 63, Subpart MMMM
- Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources, 40 CFR, Part 63, Subpart HHHHHH

To locate additional information on NESHAPs that affect surface coaters, and to review other subparts that may apply to your facility, visit the EPA's Web page <www.epa.gov/ttn/atw/mactfnlalph.html>, visit the SBLGA's website at <www.TexasEnviroHelp.org> and click "NESHAP Assistance Tools," or call 800-447-2827.

Common Air Violations for Surface Coaters

Investigations by the TCEQ find that the most common air violations include the following:

- The business is creating a nuisance condition.
- The business has no air authorization but should have a PBR or an NSR permit.
- The business is using coatings that exceed VOC-content limits for nonattainment or near-nonattainment areas.
- The business is not following the conditions of its permit or PBR.
- The facility has not been constructed to comply with the PBR as required.
- The business has failed to maintain paint-booth filters.
- The business has inadequate records and therefore cannot prove that the site meets the conditions of its air authorization.

For More Information

This guide discusses air regulations. There are water and waste regulations that may also apply to your facility. Visit <www.TexasEnviroHelp.org> and click on "Surface Coating" for additional tools and information to assist you.

To download forms from the TCEQ website <www.tceq.texas.gov>, click on "Forms," and search by keyword or by the form number.

To get a copy of a TCEQ publication: go to the TCEQ's website, at <www.tceq.texas.gov/goto/publications>; fax orders to the TCEQ's Publications Unit at 512-239-4488, or order by telephone at 512-239-0028; or write to TCEQ Publications, MC 195, PO Box 13087, Austin, TX 78711-3087.

This document does not take the place of the full, official TCEQ rules. It is intended only as a general explanation about selected parts of the rules. You can find TCEQ rules in the Texas Administrative Code at the Secretary of State's website, <http://www.sos.state.tx.us/tac/index.shtml>. To access the Code of Federal Regulations, visit <www.gpoaccess.gov/cfr/>. For additional assistance, contact the Small Business and Local Government Assistance section of the TCEQ at 800-447-2827.

Appendix A: Common Permits by Rule for Surface Coating Facilities

General Topic	Number	Relevant Equipment and Processes	Paperwork Required
Soldering, Brazing, Welding	106.227	"Brazing, soldering, or welding equipment, except those which emit 0.6 ton per year or more of lead, are permitted by rule."	No registration required
Manufacturing, Refinishing, and Restoring Wood Products	106.231	"Facilities, including drying or curing ovens, and hand-held or manually operated equipment, used for manufacturing, refinishing, and/or restoring wood products" must meet certain control and material usage limits.	Purchase receipts for coatings, solvents, and stripping agents must be available
Hand-held and Manually Operated Machines	106.265	"Hand-held or manually operated equipment used for buffing, polishing, carving, cutting, drilling, machining, routing, sanding, sawing, surface grinding, or turning of ceramic art work, ceramic precision parts, leather, metals, plastics, fiber board, masonry, carbon, glass, graphite, or wood is permitted by rule."	No registration required
Milling and Grinding of Coatings and Moldings Compounds	106.431	"Equipment used exclusively to mill or grind coatings and molding compounds where all materials charged are in a paste form is permitted by rule."	No registration required
Dipping Tanks and Containers	106.432	"Containers, reservoirs, or tanks used exclusively for dipping operations for coating objects with oils, waxes, or greases where no organic solvents, diluents, or thinners are used; or dipping operations for applying coatings of natural or synthetic resins which contain no organic solvents are permitted by rule."	No registration required
Surface Coating	106.433	Though there is a site-wide limit of 25 tpy VOC, this PBR limits hourly and annual VOC emissions depending on certain aspects of your business. Specific design requirements are required. Metal spraying or metalizing operations may not use this PBR. Outdoor facilities or booths that do not meet the definition of being fully enclosed require site approval before construction. See the rule for additional information.	PI-7 or PI-7-CERT Surface Coating Facility PBR Checklist (TCEQ-10137)
Powder Coating	106.434	"Surface coating operations utilizing powder coating materials with the powder applied by an electrostatic powder spray gun or an electrostatic fluidized bed are permitted by rule."	No registration required
Wet Blast Cleaning	106.451	"Blast cleaning equipment using a suspension of abrasives in water is permitted by rule."	No registration required
Dry Abrasive Cleaning	106.452	Sandblasting and other dry-abrasive cleaning processes performed indoors that meet certain restrictions are permitted by rule. Outdoor sandblasting requires site approval before construction begins.	Outdoor Blasting: PI-7 or PI-7-CERT Dry Abrasive Cleaning: PBR Checklist (TCEQ-10139)
Washing and Drying of Glass and Metal	106.453	"Equipment used for washing or drying products fabricated from metal or glass is permitted by rule, provided no volatile organic materials are used in the process and no oil or solid fuel is burned."	No registration required
Degreasing Units	106.454	Surface coaters that use degreasing units may use this PBR if they meet specific requirements about equipment dimensions and location, operating procedures, solvent use and storage, ventilation, and record keeping. They must use less than 660 gallons per year of chlorinated solvents and their use of all other solvents cannot exceed 1,500 gallons per year.	Certain Units: PI-7 or PI-7-CERT Degreasing Units: PBR Checklist (TCEQ-10140)

Appendix B: Surface Coating Permit by Rule (30 TAC 106.433)

Surface coating or stripping facilities, excluding vehicle repair and refinishing shops, shall meet the following conditions of this section to be permitted by rule.

(1) This section does not cover metalizing (spraying molten metal onto a surface to form a coating). However, this section does cover the use of coatings which contain metallic pigments.

(2) All facilities covered by this section at a site shall implement good housekeeping procedures to minimize fugitive emissions, including the following.

(A) All spills shall be cleaned up immediately.

(B) The booth or work area exhaust fans shall be operating when cleaning spray guns and other equipment.

(C) All new and used coatings and solvents shall be stored in closed containers. All waste coatings and solvents shall be removed from the site by an authorized disposal service or disposed of at a permitted on-site waste management facility.

(3) Drying or curing ovens shall either be electric or meet the following conditions:

(A) The maximum heat input to any oven must not exceed 40 million British thermal units per hour (Btu/hr).

(B) Heat shall be provided by the combustion of one of the following: sweet natural gas; liquid petroleum gas; fuel gas containing no more than 5.0 grains of total sulfur compounds (calculated as sulfur) per 100 dry standard cubic foot; or Number 2 fuel oil with not more than 0.3 percent sulfur by weight.

(4) No add-on control equipment shall be used to meet the emissions limits of this section. The total uncontrolled emissions from the coating materials (as applied) and cleanup solvents shall not exceed the following for all operations:

(A) 25 tons per year (tpy) of volatile organic compounds (VOC) and ten tpy of exempt solvents for all surface coating and stripping operations covered by section at a site;

(B) 30 pounds per hour (lb/hr) of VOC and 5.0 lb/hr of exempt solvents for all surface coating and stripping operations covered by this section at a site;

(C) if emissions are less than 0.25 lb/hr of VOC and/or exempt solvents, a facility is exempt from the remaining requirements of this section, including paragraphs (5)–(9) of this section.

(5) Opacity of visible emissions shall not exceed 5.0 percent. Compliance shall be determined by the United States Environmental Protection Agency Method 9 averaged over a six-minute period.

(6) The following conditions apply to surface coating operations performed indoors, in a booth, or in an enclosed work area:

(A) no more than six lb/hr of VOC emissions, averaged over any five-hour period, and 500 pounds per week per booth or enclosed work area;

(B) minimum face velocity at the intake opening of each booth or work area is 100 feet per minute (ft/min). Emissions shall be exhausted through elevated stacks that extend at least 1.5 times the building height above ground level. All stacks shall discharge vertically; rain protection shall not restrict or obstruct vertical flow;

(C) for spraying operations, emissions of particulate matter must be controlled using either a water wash system or a dry filter system with a 95 percent removal efficiency as documented by the manufacturer. The face velocity at the filter shall not exceed 250 ft/min or that specified by the filter manufacturer, whichever is less. Filters shall be replaced whenever the pressure drop across the filter no longer meets the manufacturer's recommendation.

(7) For surface coating operations that are performed outdoors or in a non-enclosed work area, or for indoor operations that do not meet the conditions of paragraph (6) of this section, the following conditions apply.

(A) No more than six lb/hr of VOC emissions, averaged over any five-hour period, and 500 pounds per week shall be emitted at any time for all operations authorized by this paragraph.

(B) If coatings applied with spray equipment contain more than 0.1 percent by weight of chromates, lead, cadmium, selenium, strontium, or cobalt, then total VOC emissions shall be further limited to 240 pounds per week and 2,000 pounds per year. If coatings are applied with non-spray equipment (such as brushes, rollers, dipping or flow coating), the additional restrictions in this paragraph do not apply.

(C) Coating operations shall be conducted at least 50 feet from the property line and at least 250 feet from any recreational area, residence, or other structure not occupied or used solely by the owner or operator of the facility or the owner of the property upon which the facility is located.

(D) Before construction of the facility begins, written site approval shall be received from the appropriate regional office of the commission or any local program having jurisdiction.

(8) The following records shall be maintained at the plant site for the most recent 24 months and be made immediately available to the commission or any pollution control agency with jurisdiction:

(A) Material Safety Data Sheets for all coating materials and solvents;

(B) data of daily coatings and solvent use and the actual hours of operation of each coating or stripping operation;

(C) a monthly report that represents actual hours of operation each day, and emissions from each operation in the following categories:

(i) pounds per hour;

(ii) pounds per day;

(iii) pounds per week; and

(iv) tons emitted from the site during the previous 12 months;

(D) examples of the method of data reduction including units, conversion factors, assumptions, and the basis of the assumptions.

(9) Before construction begins, the facility shall be registered with the commission using Form PI-7.

Effective September 4, 2000

Appendix C: Volatile Organic Compound (VOC) and Exempt-Solvent Content per Gallon of Coating

In order to determine compliance with surface coating rules and regulations, including Title 30 Texas Administrative Code, Chapter 106, you will need to calculate the amount of volatile organic compounds (VOCs) and exempt solvents that are emitted from your operation. The first step is to determine how much of these contaminants are in 1 gallon of each coating that you will apply.

If your coating is ready to apply, and is not mixed, you can determine the coating VOCs and exempt-solvent contents from the technical data sheets, paint supplier, or MSDS. However, if you mix or thin your coatings, you will need to calculate the VOC and exempt-solvent content in your mixed (combined or "as applied") coating. You will need to determine the VOC and exempt-solvent content for each component in your coating and determine the appropriate mixing and thinning ratios. In some cases the material-safety or technical data sheets include the "as mixed" VOC and exempt-solvent contents. Those values can be used if the mixing instructions are followed exactly. Note that 1 gallon = 4 quarts = 8 pints = 128 fluid ounces.

In the following examples, we will mix three different coatings. Coating A is a single-component coating with thinner. Coating B is a multiple-component coating, and Coating C is a multiple-component coating with thinner. The data shown below will be used for each example.

Example Data:

Component A VOC content	2.8 pounds per gallon
Component A exempt-solvent content	0.5 pounds per gallon
Component B VOC content	1.2 pounds per gallon
Component B exempt-solvent content	0.8 pounds per gallon
Thinner VOC content	7.3 pounds per gallon
Thinner exempt-solvent content	0.0 pounds per gallon
Mixing ratio	2 parts Component A to one part Component B
Thinning ratio	10 parts of coating to 1 part thinner

Example: Coating A—Single Component Coating with Thinner

You check your MSDS and determine that the VOC content for Component A is 2.8 pounds of VOC per gallon, and the VOC content for your thinner is 7.3 pounds of VOC per gallon. The exempt solvent content for Component A is 0.5 pounds per gallon. You also learn from the paint supplier that, in order to get the right blend, you will need to use 10 parts of coating to 1 part of thinner (10:1 ratio). In this example, you will use 5 gallons of Component A and 0.5 gallons of thinner, for a total of 5.5 gallons of mixed coating.

VOC Calculations

Now you need to determine how many pounds of VOC are in the mixed coating and thinner.

Multiply 2.8 pounds of VOC per gallon by 5 gallons to get 14 pounds of VOC for Component A.

$$\frac{2.8\ lb\ VOC}{\cancel{gal}} \times 5\cancel{gal} = \mathbf{14\ lb\ VOC}$$

Then multiply 7.3 pounds of VOC per gallon by 0.5 gallon to get 3.65 pounds of VOC for the thinner.

$$\frac{7.3\ lb\ VOC}{\cancel{gal}} \times 0.5\ \cancel{gal} = \mathbf{3.65\ lb\ VOC}$$

Add the two amounts together to get the pounds of VOC in the mixed coating.

$$14\ lb\ VOC + 3.65\ lb\ VOC = \mathbf{17.65\ lb\ VOC}$$

Then divide the total pounds of VOC by the total gallons of mixed coating and thinner to get the pounds of VOC per gallon.

$$\frac{17.65\ lb\ VOC}{5.5\ gal} = \frac{\mathbf{3.21\ lb\ VOC}}{\mathbf{gal}}$$

Exempt-Solvent Calculations

Now you need to determine how many pounds of exempt solvent are in the mixed coating and thinner. Multiply 0.5 pounds per gallon of exempt solvent by 5 gallons to get 2.5 pounds of exempt solvents for Component A.

$$\frac{0.5\ lb\ ES}{\cancel{gal}} \times 5\ \cancel{gal} = \mathbf{2.5\ lb\ ES}$$

The ES content in the thinner is 0.0 lb. You add the two amounts together to get the pounds of exempt solvents in the mixed coating.

$$2.5\ lb\ ES + 0.0\ lb\ ES = \mathbf{2.5\ lb\ ES}$$

You then divide the total pounds of exempt solvents by the total gallons of mixed coating and thinner to get the pounds of ES per gallon.

$$\frac{2.5\ lb\ ES}{5.5\ gal} = \frac{\mathbf{0.45\ lb\ ES}}{\mathbf{gal}}$$

Example: Coating B—Multiple-Component Coating

In this example, the paint supplier has recommended a mixing ratio of 2 parts of Component A to 1 part of Component B (2:1 ratio). In this case, you will mix 1 gallon of Component A and 0.5 gallons of Component B for a total of 1.5 gallons of mixed coating.

VOC Calculations

To determine the pounds of VOC in Component A, multiply 2.8 pounds of VOC per gallon (from the MSDS) by 1.0 gallons.

$$\frac{2.8\ lb\ VOC}{\cancel{gal}} \times 1.0\ \cancel{gal} = \mathbf{2.8\ lb\ VOC}$$

To determine the pounds of VOC in Component B, multiply 1.2 pounds of VOC per gallon (from the MSDS) by 0.5 gallons.

$$\frac{1.2\ lb\ VOC}{\cancel{gal}} \times 0.5\ \cancel{gal} = \mathbf{0.6\ lb\ VOC}$$

Add the two amounts together to get the pounds of VOC in the multiple component coating.

$$2.8\ lb\ VOC + 0.6\ lb\ VOC = \mathbf{3.4\ lb\ VOC}$$

Then divide the total pounds of VOC by the total gallons of mixed coating to get the pounds of VOC per gallon.

$$\frac{3.4\ lb\ VOC}{1.5\ gal} = \frac{\mathbf{2.27\ lb\ VOC}}{\mathbf{gal}}$$

Exempt -Solvent Calculations

Now you need to determine how many pounds of exempt solvent are in the mixed coating. Multiply 0.5 pounds per gallon of exempt solvent by 1 gallon to get 0.5 pounds of exempt solvents for Component A.

$$\frac{0.5\ lb\ ES}{\cancel{gal}} \times 1\ \cancel{gal} = \mathbf{0.5\ lb\ ES}$$

To determine the pounds of exempt solvent in Component B, multiply 0.8 pounds of exempt solvent per gallon (from the MSDS) by 0.5 gallons to get 0.4 pounds of exempt solvent.

$$\frac{0.8\ lb\ ES}{\cancel{gal}} \times 0.5\ \cancel{gal} = \mathbf{0.4\ lb\ ES}$$

Add the two amounts together to get the pounds of exempt solvent in the multiple-component coating.

$$0.5\ lb\ ES + 0.4\ lb\ ES = \mathbf{0.9\ lb\ ES}$$

Then divide the total pounds of exempt solvent by the total gallons of mixed coating to get the pounds of ES per gallon.

$$\frac{0.9\ lb\ ES}{1.5\ gal} = \frac{\mathbf{0.6\ lb\ ES}}{\mathbf{gal}}$$

Example: Coating C—Multiple-Component Coating with Thinner

In this example, the paint supplier has recommended a mixing ratio of 2 parts of Component A to 1 part of Component B (2:1 ratio). In this case, you will mix 1 gallon of Component A and 0.5 gallons of Component B for a total of 1.5 gallons of coating.

The recommended thinning ratio is 10 parts of coating with 1 part thinner (10:1 ratio). In this example, 1.5 gallons of coating will be mixed with 0.15 gallons of thinner for a total of 1.65 gallons of mixed coating.

VOC Calculations

You know from the previous example, that there are 2.8 lb VOC in 1 gallon of Component A and 0.6 lb VOC in 0.5 gallon of Component B.

We determine the VOC content for the thinner by multiplying 7.3 pounds of VOC per gallon by 0.15 gallon.

$$\frac{7.3\ lb\ VOC}{\cancel{gal}} \times 0.15\ \cancel{gal} = \mathbf{1.09\ lb\ VOC}$$

Add the VOC content from Component A, Component B, and the thinner together to get the pounds of VOC in the multiple component coating and thinner.

$$2.8\ lb\ VOC + 0.6\ lb\ VOC + 1.09\ lb\ VOC = \mathbf{4.49\ lb\ VOC}$$

Then divide the total pounds of VOC by the total gallons of mixed coating to get the pounds of VOC per gallon.

$$\frac{4.49\ lb\ VOC}{1.65\ gal} = \frac{\mathbf{2.72\ lb\ VOC}}{\mathbf{gal}}$$

Exempt-Solvent Calculations

You know from the previous example that there is 0.5 lb ES in 1 gallon of Component A and 0.4 lb ES in 0.5 gallon of Component B. The ES solvent content in the thinner is 0.0 lb ES.

You add the ES content from Component A, Component B, and the thinner together to get the pounds of exempt solvents in the mixed coating.

$$0.5\ lb\ ES + 0.4\ lb\ ES + 0.0\ lb\ ES = \mathbf{0.9\ lb\ ES}$$

Then divide the total pounds of exempt solvent by the total gallons of mixed coating to get the pounds of ES per gallon.

$$\frac{0.9\ lb\ ES}{1.65\ gal} = \frac{\mathbf{0.55\ lb\ ES}}{\mathbf{gal}}$$

Appendix D: Calculating Maximum Hourly and Annual Emission Rates

Now that you know how much VOC each of your coatings contain, you can determine the maximum hourly and annual emission rates. These rates need to be calculated for each coating used at your site to determine if the limits of a PBR can be met, to set the maximum yearly allowable emission rate in a permit, or to determine if federal rules, such as 40 CFR Part 63 (NESHAP), apply to your site.

The maximum hourly and annual emission rates need to be calculated independently. Dividing a maximum yearly emission rate by the yearly operating schedule will result in an average hourly emission rate, not a maximum emission rate. Multiplying a maximum hourly emission rate by the yearly operating schedule will likely result in an emission rate that is too large. This may result in your site being subject to a number of rules that it should not.

Maximum Hourly and Annual Emission Rate Calculations—Coatings

To calculate the maximum hourly and annual emission rates, you will need to determine the maximum practical hourly application rate based on company records or company employees. If you are spraying, this is always less than the maximum hourly spray rate provided by the spray-equipment supplier. The employees cannot keep the trigger pulled for an hour since they need to mix paint, move parts and—if their technique is good—release the trigger at the end of each pass over the part. In addition, you will need to determine the maximum amount of each coating that you intend to use in a year. This can be based on company records for a very busy year or on projected sales volumes.

We determine that the coating from Appendix C with the highest VOC content is Coating A, and that Coating B contains the highest amount of exempt solvents.

Example Data:

Coating A VOC content	3.21 pounds per gallon
Coating B exempt-solvent content	0.6 pounds per gallon
Maximum hourly coating usage	6.0 gallons
Maximum yearly coating usage	4,750 gallons

Based on this information, you will need to calculate the maximum VOC emission rate and the maximum exempt solvent emission rate in pounds per hour and tons per year.

Maximum Hourly VOC Emission Rate

To calculate the maximum hourly VOC emission rate, you multiply the highest VOC coating content (3.21 pounds per gallon for Coating A) by the maximum number of gallons used in one hour (6.0 gallons per hour).

$$\frac{3.21\ lb\ VOC}{\cancel{gal}} \times \frac{6.0\ \cancel{gal}}{hr} = \frac{\mathbf{19.26\ lb\ VOC}}{\mathbf{hr}}$$

See Appendix E to learn how to average over any five-hour period if your maximum hourly VOC emission rate is greater than 6 pounds of VOC per hour.

Maximum Hourly Exempt-Solvent Emission Rate

To calculate the maximum hourly exempt solvent emission rate, you multiply the highest exempt solvent coating content (0.6 pounds per gallon for Coating B) by the maximum number of gallons used in one hour (6.0 gallons per hour).

$$\frac{0.6\ lb\ ES}{\cancel{gal}} \times \frac{6.0\ \cancel{gal}}{hr} = \mathbf{\frac{3.6\ lb\ ES}{hr}}$$

Maximum Yearly VOC Emission Rate

In order to calculate the maximum yearly VOC emission rate, you will need to multiply the highest VOC coating content (3.21 pounds per gallon for Coating A) by the maximum yearly coating usage (4,750 gallons per year).

$$\frac{3.21\ lb\ VOC}{\cancel{gal}} \times \frac{4{,}750\ \cancel{gal}}{yr} = \mathbf{\frac{15{,}248\ lb\ VOC}{yr}}$$

You will then need to convert it into tons of VOC per year by multiplying by 1 ton per 2,000 pounds.

$$\frac{15{,}248\ \cancel{lb}\ VOC}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{\frac{7.62\ tons\ VOC}{yr}}$$

Maximum Yearly Exempt-Solvent Emission Rate

To calculate the maximum yearly exempt-solvent emission rate, you will multiply the highest exempt-solvent content (0.6 pounds per gallon for Coating B) by the maximum yearly coating usage (4,750 gallons per year).

$$\frac{0.6\ lb}{\cancel{gal}} \times \frac{4{,}750\ \cancel{gal}}{yr} = \mathbf{\frac{2{,}850\ lb}{yr}}$$

You will then need to convert it into tons of exempt solvent per year by multiplying by 1 ton per 2,000 pounds.

$$\frac{2{,}850\ \cancel{lb}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{\frac{1.43\ tons\ ES}{yr}}$$

Maximum Hourly and Annual Emission Rate Calculations—Cleanup

At the end of each coating operation, the application equipment such as brushes, spray guns, and paint pots must be cleaned up so that it may be used for the next job. This is often carried out by circulating solvent through the equipment until clean or by placing the spray gun in an enclosed gun washer. Both the maximum hourly and annual emission rates must be calculated for cleanup operations.

Air emissions are best estimated from cleanup by determining the amount of solvent that evaporates during cleaning. Using company records of solvent purchased will overestimate the rates, since a great deal of the solvent will end up in the waste drum for off-site disposal. Purchase records and waste-disposal records will usually give you a reasonably accurate yearly emission rate.

To calculate the emission rates from your cleanup activities, you will need to determine the VOC content of your thinner or cleaning solvent by referring to your

MSDS or technical data sheets, or by contacting your coating supplier. You will also need to determine the maximum hourly and yearly thinner or cleaning-solvent usage from company records, the gun-washer service company, or company employees.

Example Data:

Solvent VOC content	7.3 pounds per gallon
Solvent exempt solvent content	0.0 pounds per gallon
Maximum hourly solvent usage	2.0 gallons
Maximum hourly solvent waste	1.5 gallons
Maximum yearly solvent usage	500 gallons
Maximum yearly solvent waste	375 gallons
Clean up time	1 hour

Based on this information, you will need to calculate the maximum VOC emission rate for the cleanup activity in pounds per hour and tons per year.

Maximum Hourly VOC Emission Rate

In order to calculate your maximum hourly VOC emission rate for cleanup activities, you need to determine how much of your solvent evaporates each time you clean your equipment. You first subtract the number of gallons of dirty solvent from the number of gallons of clean solvent used each time you clean your equipment.

$$\frac{2.0\ gal}{hour} - \frac{1.5\ gal}{hour} = \mathbf{\frac{0.5\ gal}{hour}}$$

In this case, you know that 0.5 gallons of solvent have evaporated every time you clean your equipment. Now you can determine how much VOC emissions result from each cleanup event by multiplying the number of evaporated gallons by the VOC content in 1 gallon of solvent.

$$\frac{0.5\ \cancel{gal}}{hour} \times \frac{7.3\ lb\ VOC}{\cancel{gal}} = \mathbf{\frac{3.65\ lb\ VOC}{hour}}$$

Since cleanup is completed in an hour, the maximum VOC emission rate from cleanup is 3.65 pounds of VOC per hour.

Maximum Yearly VOC Emission Rate

In order to determine the maximum yearly VOC emission rate for cleanup activities, you need to determine how much solvent evaporates in a year by subtracting the amount of solvent wasted per year from the total amount purchased.

$$\frac{500\ gal}{yr} - \frac{375\ gal}{yr} = \mathbf{\frac{125\ gal}{yr}}$$

In this case, you know that 125 gallons of solvent evaporated in a year. To determine how many pounds of VOCs were emitted in that year multiply 125 gallons per year by the VOC content of the solvent (7.3 pounds per gallon).

$$\frac{125\ \cancel{gal}}{yr} \times \frac{7.3\ lb\ VOC}{\cancel{gal}} = \mathbf{\frac{912.5\ lb\ VOC}{yr}}$$

You will then need to convert it into tons of VOC per year by multiplying by 1 ton per 2,000 pounds.

$$\frac{912.5\ \cancel{lb}\ VOC}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \frac{\mathbf{0.46\ tons\ VOC}}{\mathbf{yr}}$$

Maximum Hourly and Total Annual Emission Rates for VOC and Exempt Solvent

As a final step, the maximum hourly emission rates need to be determined as well as the total annual VOC and exempt-solvent emission rates. You will need to gather all of the hourly and annual emission rates for VOC and exempt solvents for each coating line. The maximum hourly emission rate will be the largest of all the painting rates. The total annual emission rate can be found by adding up all of the yearly painting emissions and the yearly cleanup emissions.

Example:

You compare all of the hourly emission rates in the summary chart below and determine that Coating A has the maximum hourly VOC emission rate (19.26 pounds VOC per hour) and Coating B has the maximum exempt-solvent emission rate (3.6 pounds ES per hour).

You then add the annual VOC emissions rates from Coating A, Coating B, Coating C, and the cleanup solvent to determine the total annual VOC emission rate.

$$\frac{7.62\ tons\ VOC}{yr} + \frac{5.39\ tons\ VOC}{yr} + \frac{6.46\ tons\ VOC}{yr} + \frac{0.46\ tons\ VOC}{yr} = \frac{\mathbf{19.93\ tons\ VOC}}{\mathbf{yr}}$$

Next, add all of the annual exempt-solvent emission rates to determine the total annual ES emission rate.

$$\frac{1.07\ tons\ ES}{yr} + \frac{1.43\ tons\ ES}{yr} + \frac{1.31\ tons\ ES}{yr} + \frac{0.00\ tons\ ES}{yr} = \frac{\mathbf{3.81\ tons\ ES}}{\mathbf{yr}}$$

Example Summary Chart

	Hourly VOC Emission Rate pounds per hour	**Annual VOC Emission Rate tons per year**	**Hourly ES Emission Rate pounds per hour**	**Annual ES Emission Rate tons per year**
Coating A	19.26 lb VOC/hr	7.62 tons VOC/yr	2.7 lb ES/hr	1.07 tons ES/yr
Coating B	13.62 lb VOC/hr	5.39 tons VOC/yr	3.6 lb ES/hr	1.43 tons ES/yr
Coating C	16.32 lb VOC/hr	6.46 tons VOC/yr	3.3 lb ES/hr	1.31 tons ES/yr
Cleanup Solvent	3.65 lb VOC/hr	0.46 ton VOC/yr	0.0 lb ES/hr	0.00 ton ES/yr
Emission Rates	Max = 19.26 lb VOC/hr	**Total = 19.93 tons VOC/yr**	Max = 3.6 lb ES/hr	**Total = 3.81 tons ES/yr**

Appendix E: Emission Rate Averaged Over a 5-Hour Period

The surface coating PBR, 30 TAC 106.433(6)(A), states that a facility is limited to no more than 6 pounds of VOC emissions, averaged over any 5-hour period, and 500 pounds per week per booth or enclosed work area. That means the rule allows the emissions from batch painting to be averaged over a 5-hour period. As long as the total emissions over a 5-hour period average less than 6 pounds per hour, the facility meets the emission limit of the PBR.

Many surface coaters do not apply coatings continuously and often coat one large piece of equipment or a limited number of parts over a short time period. This often results in an emission rate exceeding the limit specified in the rule.

Example:

You decide to paint a large part in one hour and allow it to dry in the paint booth. During that hour, you use 6 gallons of Coating A with a VOC emission rate of 19.26 pounds per hour (from our example in Appendix D). For the remaining four hours, you do not conduct any additional surface coating activities.

To calculate the pounds per hour over a 5-hour averaging period, you divide the pounds of VOC emitted by the total number of hours passed (not to exceed 5 hours) from the beginning of painting until painting is to take place again.

$$\frac{19.26\ lb\ VOC}{5\ hrs} = \mathbf{3.85\ lb\ VOC\ per\ hour}\ (\mathbf{averaged\ over\ a\ 5\text{-}hour\ period})$$

The average emission rate is less than the limit specified in the rule.

Note: Averaging **cannot** be used in case-by-case NSR permit applications.

Appendix F: Potential to Emit

Potential to emit is defined at Title 30 Texas Administrative Code, Chapter 122, Subchapter A, Section 122.10 as the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design or configuration.

Essentially, this means you need to determine the maximum amount of air pollutants that can be generated at your facility. PTE will be used to determine whether you need to obtain a Title V Operating permit, or comply with certain federal rules.

There are two methods that a facility can use to determine PTE:

1. Calculate the maximum emissions of each pollutant assuming that the facility operates continuously, at its maximum rate, for an entire year (8,760 hours per year); or

2. Use the usage rates of coatings and solvents from the facility's busiest year to calculate the maximum emissions of each pollutant.

Method 1 Example:

According to the manufacturer, your spray gun is capable of spraying a maximum of 15 gallons per hour. You check your records and determine that the coating with the highest VOC content that may be used at the facility has a VOC content of 3.2 pounds per gallon. The PTE would be calculated as follows:

$$\frac{15\ \cancel{gal}}{\cancel{hr}} \times \frac{3.2\ \cancel{lb}\ VOC}{\cancel{gal}} \times \frac{8{,}760\ \cancel{hr}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{210.24\ tons\ VOC}{\mathbf{yr}}$$

In this example, the facility would be considered a major source, since the PTE is over 100 tons of VOCs per year. This facility would need to obtain a Title V operating permit. It would also be subject to additional federal regulations that apply to major sources.

Method 2 Example (Recommended Method):

You review your purchase records and have never used, or expect to use, more than 8,000 gallons of coatings in a year. The PTE would be calculated as follows:

$$\frac{3.2\ \cancel{lb}\ VOC}{\cancel{gal}} \times \frac{8{,}000\ \cancel{gal}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{12.8\ tons\ VOC}{\mathbf{yr}}$$

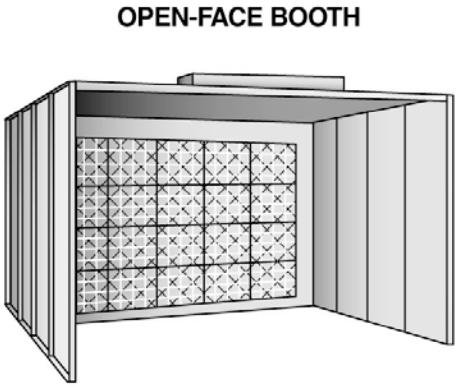
In this example, the facility can make this PTE a federally enforceable limit on a PBR application by using the PI-7-CERT form, and the site would be considered a "synthetic" minor source because its PTE is below the major-source thresholds.

Appendix G: Calculation of Booth or Work-Area and Filter and Face Velocities

Face velocities and filter velocities are specified at 30 TAC 106.433(6) as well as a number of rules in 40 CFR Part 63.

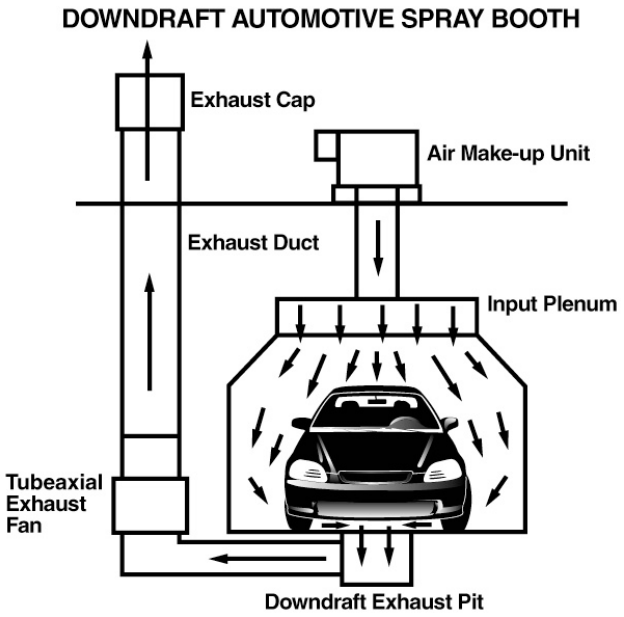
- Face-velocity requirements ensure that enough air is moving at a sufficient speed to capture both particulate matter and solvent emissions and direct them through the filters and out the exhaust stack.
- Filter-velocity requirements ensure that air is moving slowly enough through the filters that they can capture the particulate matter as well as maintain an acceptable pressure drop across the filters.

Before attempting any face- or filter-velocity calculations, we need to clearly define "face." The face is the area through which the intake air flows. The face is in different locations for different types of booths, as shown in each of the drawings below.



For an open-face booth, the face to be used in calculating the velocity is simply the open side of the booth. Air flows into this opening past the painter and the part and into the filters.

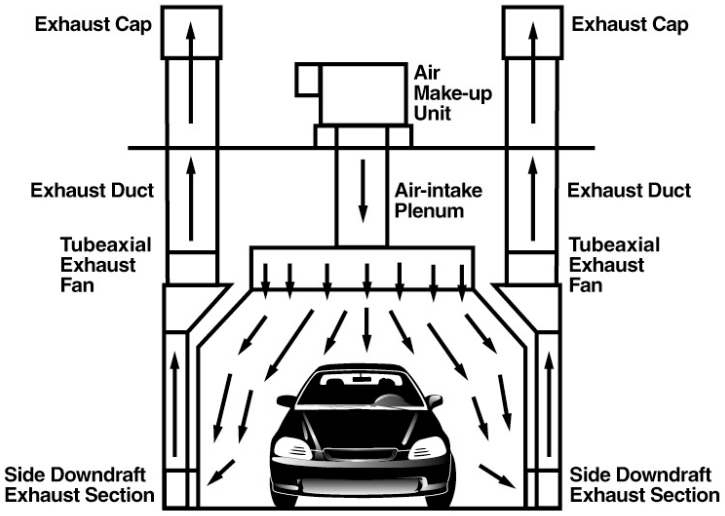
For a cross- or end-draft booth the face is the entry-door openings.



For a downdraft booth the face is the intake of the air-makeup unit which is usually mounted on the top of the booth.

A semi-downdraft paint booth has a similar arrangement to a downdraft booth in that the face is the air-intake plenum, which is usually mounted on the top of the booth.

SIDE DOWNDRAFT AUTOMOTIVE SPRAY BOOTH



A side downdraft booth has the same face as the downdraft booth, which is the intake of the air-makeup unit that is usually mounted at the top of the booth.

Calculating Face Velocity

The TCEQ face-velocity requirement in 30 TAC 106.433(6) is 100 feet per minute, at a minimum. However, some federal rules, such as 40 CFR, Part 63, Subpart MMMM, require a face velocity of 200 feet per minute. Your facility must meet the most stringent regulations that apply.

In order to calculate face velocity, three pieces of information are required:

1. the flow rate of the exhaust fan in cubic feet per minute (cfm or ft^3/min)
2. the flow rate of the air makeup unit fan in cubic feet per minute
3. the area of all the booth openings that are normally open when the booth is in operation

The flow rates for the fans may be printed on their rating plates or available in the manuals that came with the booth or from the booth vendor. As a last resort, you can estimate the flow rate using a similar fan (diameter, number of blades, and horsepower). This information is often available in industrial supply catalogs.

The area of the face may be determined from the manuals that came with the booth or by measuring the openings.

The area of a square or rectangular opening may be determined as follows:

$$Length\ (ft) \times Width\ (ft) = Area\ (ft^2)$$

The area of a circular opening may be determined as follows:

$$\pi \times r^2 = Area$$

($\pi = 3.14$ and r = radius of air intake opening)

$$3.14 \times r\ (ft) \times r\ (ft) = Area\ (ft^2)$$

If the booth has more than one opening, then the areas of each opening need to be added together.

$$Intake\ Area\ 1(ft^2) + \ Intake\ Area\ 2(ft^2) + \ Intake\ Area\ 3(ft^2) = Total\ Intake\ Area(ft^2)$$

If the booth has an exhaust fan and an air-makeup unit, the flow rate from the air-makeup unit will need to be subtracted from the exhaust-fan flow rate.

$$Exhaust\text{-}Fan\ Flow\ Rate\ (ft^3/min) - Air\text{-}Makeup\text{-}Unit\ Flow\ Rate\ (ft^3/min) = Flow\ Rate\ (ft^3/min)$$

Face velocity can be calculated by dividing the flow rate by the intake area as follows:

$$\frac{Flow\ Rate\ (ft^3/min)}{Total\ Intake\ Area\ (ft^2)} = \boldsymbol{Face\ Velocity\ (ft/min)}$$

Even if you do not have a booth, the face-velocity requirements may still apply to your work areas to meet the requirements in 30 TAC 106.433(6). The calculation is the same as for a booth except the room or work-area fan flow rates and intake areas are used in the calculation.

Calculating Filter Velocity

The TCEQ filter velocity requirement in 30 TAC 106.433(6) is 250 feet per minute, at a maximum. In order to calculate filter velocity, two pieces of information are required:

1. the flow rate of the exhaust fan in cubic feet per minute (cfm or ft^3/min)
2. the area of all the booth filters

If the booth has more than one filter opening, then the area of each filter opening needs to be added together.

$$Filter\ Area\ 1\ (ft^2) + Filter\ Area\ 2\ (ft^2) + Filter\ Area\ 3\ (ft^2) = \boldsymbol{Total\ Filter\ Area\ (ft^2)}$$

If the booth has an exhaust fan and an air makeup unit, the flow rate from the exhaust fan will be used since all the air that enters the booth will pass through the exhaust fan.

$$ExaustFan\ Flow\ Rate\ (ft^3/min) = \boldsymbol{Flow\ Rate\ (ft^3/min)}$$

Filter velocity can be calculated by dividing the flow rate by the filter area as follows:

$$\frac{Flow\ Rate\ (ft^3/min)}{Total\ Filter\ Area\ (ft^2)} = \boldsymbol{Filter\ Velocity\ (ft/min)}$$

Appendix H: VOC Content Minus Water and Exempt Solvents

If your facility is located in one of the ozone nonattainment or near-nonattainment counties in Texas, you may be subject to rules found in 30 Texas Administrative Code (TAC), Chapter 115, Subchapter E. These rules include stringent VOC-content limits that apply to businesses that apply coatings. Your business may be exempt from the rule, so review 30 TAC 115.427 to determine if your operation is subject to these regulations.

If you are subject to the regulations, you will need to calculate the VOC content of each of your coatings minus water and exempt solvent (ES) in order to determine if your business is in compliance. This information may be available from your supplier, so check before you perform the calculations.

Example: Coating D—Single-Component Coating Minus Water and Exempt Solvent

$$\textit{Pounds of VOC per gallon of coating (minus water and exempt solvent)} = \frac{W_v}{V_m - V_w - V_{es}}$$

Where:
W_v = weight of VOC, in pounds, contained in V_m gallons of coating
V_m = volume of coating, generally assumed to be 1 gallon
V_w = volume of water, in gallons, contained in V_m gallons of coating
V_{es} = volume of exempt solvents, in gallons, contained in V_m gallons of coating

This calculation requires some data that may not be readily available on the MSDS. You may need to contact your paint supplier in order to obtain some of this information.

Example:

In this example, you contact your paint supplier and determine that the VOC content (W_v) is 2.8 pounds of VOC per gallon, the water content is 1.0 pound per gallon, the exempt solvent content is 0.5 pounds per gallon.

You know that one gallon of water weighs 8.34 pounds and one gallon of exempt solvent weighs 6.64 pounds. You will need to calculate the volume of water (V_w) and volume of exempt solvents (V_{es}).

Data for 1 Gallon of Coating

VOC content (W_v)	2.8 lb VOC per gal coating
Coating volume (V_m)	1.0 gal
Water content	1.0 lb water per gal coating
Water density	8.34 lb water per gal water
Water volume (V_w)	Calculate
Exempt-solvent content	0.5 lb exempt-solvent per gal coating
Exempt-solvent density	6.64 lb exempt-solvent per gal exempt solvent
Exempt-solvent volume (V_{es})	Calculate

First, you need to determine the volume of water in 1 gallon of coating. You know that there is 1.0 pound of water per gallon of coating. You also know that 1 gallon of water weighs 8.34 pounds. If you multiply them, the pounds cancel out and leave you with the gallons of water in one gallon of coating.

$$V^w = \frac{1.0\ \cancel{lb\ water}}{gal\ coating} \times \frac{gal\ water}{8.34\ \cancel{lb\ water}} = \mathbf{\frac{0.12\ gal\ water}{gal\ coating}}$$

So now that you know how much of your coating is water, you need to determine the volume of exempt solvent (V_{es}) in 1 gallon of coating. You know that there is 0.5 pounds of exempt solvent per gallon of coating. You also know that 1 gallon of exempt solvent weighs 6.64 pounds. If you multiply them, the pounds cancel out and leave you with the gallons of exempt solvent in one gallon of coating.

$$V_{es} = \frac{0.5\ \cancel{lb\ ES}}{gal\ coating} \times \frac{gal\ ES}{6.64\ \cancel{lb\ ES}} = \mathbf{\frac{0.075\ gal\ ES}{gal\ coating}}$$

We can now complete the calculation to determine the pounds of VOC per gallon of coating (minus water and exempt solvent):

$$\frac{W_v}{V_m - V_w - V_{es}} = \frac{2.8\ lb\ VOC}{1\ gal - 0.12\ gal - 0.075\ gal} = \mathbf{\frac{3.47\ lb\ VOC}{gallon(minus\ water\ and\ ES)}}$$

Daily Weighted Average—Determining Compliance with 30 TAC 115

If you determine that your coatings do not meet the VOC content limits established at 30 TAC, Chapter 115, Subchapter E, you can either replace them with compliant coatings or calculate the daily weighted average for all coatings combined in each individual coating line. A coating line consists of a series of applications that include coating, drying, and curing.

The daily weighted average option is defined at 30 TAC 115.420(6) as:

The total weight of VOC emissions from all coatings subject to the same emission standard in Section 115.421 of this title (relating to Emission Specifications), divided by the total volume of those coatings (minus water and exempt solvent) delivered to the application system each day. Coatings subject to different emission standards in 30 TAC 115.421 may not be combined for calculating the daily weighted average.

If the daily weighted average still does not demonstrate compliance with the rule, then you will have to change coatings. Just adding more water and exempt solvent to the coating will not fix the problem. In fact, it will just make the problem worse, and increase the VOC content.

Example Data:

Coating D VOC content	3.47 lb VOC/gal (minus water and exempt solvent)
Coating E VOC content	4.00 lb VOC/gal (minus water and exempt solvent)
Coating F VOC content	2.52 lb VOC/gal (minus water and exempt solvent)

You check your MSDS and determine that the VOC content is 3.47 pounds of VOC per gallon for Coating D, 4.00 pounds of VOC per gallon for Coating E, and 2.52 pounds of VOC per gallon for Coating F. You review your records and determine that you use 22

gallons per day of Coating D, 6.0 gallons per day of Coating E, and 5.0 gallons per day of Coating F, for a total of 33 gallons per day.

One out of the three coatings listed above is not compliant with the coating VOC-content limit of 3.5 pounds per gallon (minus water and exempt solvent). Therefore, you will need to calculate the daily weighted average in order to determine if you can continue to use this coating.

First, you need to determine how many pounds of VOC are emitted from all of the coatings combined each day. Multiply 3.47 pounds of VOC per gallon by 22 gallons per day to get 76.34 pounds of VOC per day for Coating D.

$$\frac{3.47 \text{ lb VOC}}{\text{gal}} \times \frac{22 \text{ gal}}{\text{day}} = \frac{76.34 \text{ lb VOC}}{\text{day}}$$

Next, multiply 4.00 pounds of VOC per gallon by 6.0 gallons per day to get 24.00 pounds of VOC per day for Coating E.

$$\frac{4.00 \text{ lb VOC}}{\text{gal}} \times \frac{6.0 \text{ gal}}{\text{day}} = \frac{24.00 \text{ lb VOC}}{\text{day}}$$

Then multiply 2.52 pounds of VOC per gallon by 5.0 gallons per day to get 12.6 pounds of VOC per day for Coating F.

$$\frac{2.52 \text{ lb VOC}}{\text{gal}} \times \frac{5.0 \text{ gal}}{\text{day}} = \frac{12.6 \text{ lb VOC}}{\text{day}}$$

You then add these values together to determine the total VOC emissions in pounds per day.

$$\frac{76.34 \text{ lb VOC}}{\text{day}} + \frac{24.00 \text{ lb VOC}}{\text{day}} + \frac{12.6 \text{ lb VOC}}{\text{day}} = \frac{112.94 \text{ lb VOC}}{\text{day}}$$

Then divide the pounds per day by the total number of gallons used in a day to determine the pounds of VOC in 1 gallon of coating.

$$\frac{112.94 \text{ lb}}{\text{day}} \times \frac{\text{day}}{33.0 \text{ gal}} = \frac{3.42 \text{ lb VOC}}{\text{gal}}$$

The daily weighted average VOC content is 3.42 pounds of VOC per gallon (minus water and exempt solvent) for the day. As a result, the facility has achieved compliance with the limit of 3.5 pounds per gallon of VOC.

Appendix I: Calculations for Emissions of Products of Combustion from Heaters and Ovens

Some facilities will use heaters or ovens to speed up the drying of the coatings. If the unit is electrically powered, there will be no emissions from producing the heat itself. If the source of the heat is one of the fuels allowed in 30 TAC 106.433(3), products of combustion such as nitrogen oxides (NO_X), carbon monoxide (CO), particulate matter (PM), sulfur dioxide (SO_2), and volatile organic compounds will be emitted.

Emissions of products of combustion are easily estimated by using the burner rating on the heater or oven name plate or by contacting the oven or heater supplier. The ratings will typically appear as one of the following:

MMBtu/hr—million British thermal units per hour
MBtu/hr—thousand British thermal units per hour
SCF/hr—standard cubic feet per hour

In order to estimate emissions, you will need the heating value of the fuel in British thermal units per standard cubic foot (Btu/scf). This may be obtained from your supplier. For this example, a typical value of 1,020 Btu/scf for natural gas may be used in calculating emissions.

Finally, you will need to estimate how many hours per year that you will use the oven or heater.

The information that you have collected so far will be used along with the emission factors from the EPA Compilation of Air Pollutant Emission Factors (AP-42), Section 1.4. This portion of the document is available on the EPA's website at <http://www.epa.gov/ttnchie1/ap42/>.

The emission factors for natural gas units are as follows:

Air Contaminant	Firing Rate Less Than 0.3 MMBtu/hr (lb/10^6 scf)	Firing Rate Between 0.3 MMBtu/hr (lb/10^6 scf) and 100 MMBtu/hr (lb/10^6 scf)
NO_x	94	100
CO	40	84
PM	7.6	7.6
VOC	5.5	5.5
SO_2	0.6	0.6

As you can see, the emission factor units are in lb/10^6 scf, which can be rewritten as lb/million scf or lb/MMscf.

Example:

You have a natural gas–fired drying oven with a firing rate of 2.1 MMBtu/hr that you use to dry parts at your shop. You've determined that the oven has been used a maximum of 2,500 hours in a year. You find your emission factors at the EPA's website. Now you are ready to calculate your hourly (short-term) emissions as well as your annual (long-term) emissions.

Multiply the emission factor of the contaminant (lb/MMscf) by 1/heating value of fuel (Btu/scf) by the firing rate (from the name or rating plate) in MMBtu/hr to get the hourly (short-term) emissions. Multiply the hourly (short-term) emission (lb/hr) by the yearly hour of operation (hr/yr), then divide by 2,000 lb to convert to tons to get the annual (long-term) emissions.

Hourly (Short-term) Emissions in Pounds per Hour

Nitrogen Oxides

$$\frac{100\ lb\ NO_x}{\cancel{MMscf}} \times \frac{\cancel{scf}}{1{,}020\ \cancel{Btu}} \times \frac{2.1\ \cancel{MMBtu}}{hr} = \mathbf{\frac{0.206\ lb\ NO_x}{hr}}$$

Carbon Monoxide

$$\frac{84\ lb\ CO}{\cancel{MMscf}} \times \frac{\cancel{scf}}{1{,}020\ \cancel{Btu}} \times \frac{2.1\ \cancel{MMBtu}}{hr} = \mathbf{\frac{0.173\ lb\ CO}{hr}}$$

Particulate Matter

$$\frac{7.6\ lb\ PM}{\cancel{MMscf}} \times \frac{\cancel{scf}}{1{,}020\ \cancel{Btu}} \times \frac{2.1\ \cancel{MMBtu}}{hr} = \mathbf{\frac{0.016\ lb\ PM}{hr}}$$

Volatile Organic Compounds

$$\frac{5.5\ lb\ VOC}{\cancel{MMscf}} \times \frac{\cancel{scf}}{1{,}020\ \cancel{Btu}} \times \frac{2.1\ \cancel{MMBtu}}{hr} = \mathbf{\frac{0.011\ lb\ VOC}{hr}}$$

Sulfur Dioxide

$$\frac{0.6\ lb\ SO_2}{\cancel{MMscf}} \times \frac{\cancel{scf}}{1{,}020\ \cancel{Btu}} \times \frac{2.1\ \cancel{MMBtu}}{hr} = \mathbf{\frac{0.001\ lb\ SO_2}{hr}}$$

Annual (Long-term) Emissions in Tons per Year

Nitrogen Oxides

$$\frac{0.206\ \cancel{lb}\ NO_x}{\cancel{hr}} \times \frac{2{,}500\ \cancel{hr}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{\frac{0.257\ ton\ NO_x}{yr}}$$

Carbon Monoxide

$$\frac{0.173\ \cancel{lb}\ \mathrm{CO}}{\cancel{hr}} \times \frac{2{,}500\ \cancel{hr}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{\frac{0.216\ ton\ CO}{yr}}$$

Particulate Matter

$$\frac{0.016\ \cancel{lb}\ \mathrm{PM}}{\cancel{hr}} \times \frac{2{,}500\ \cancel{hr}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{\frac{0.020\ ton\ PM}{yr}}$$

Volatile Organic Compounds

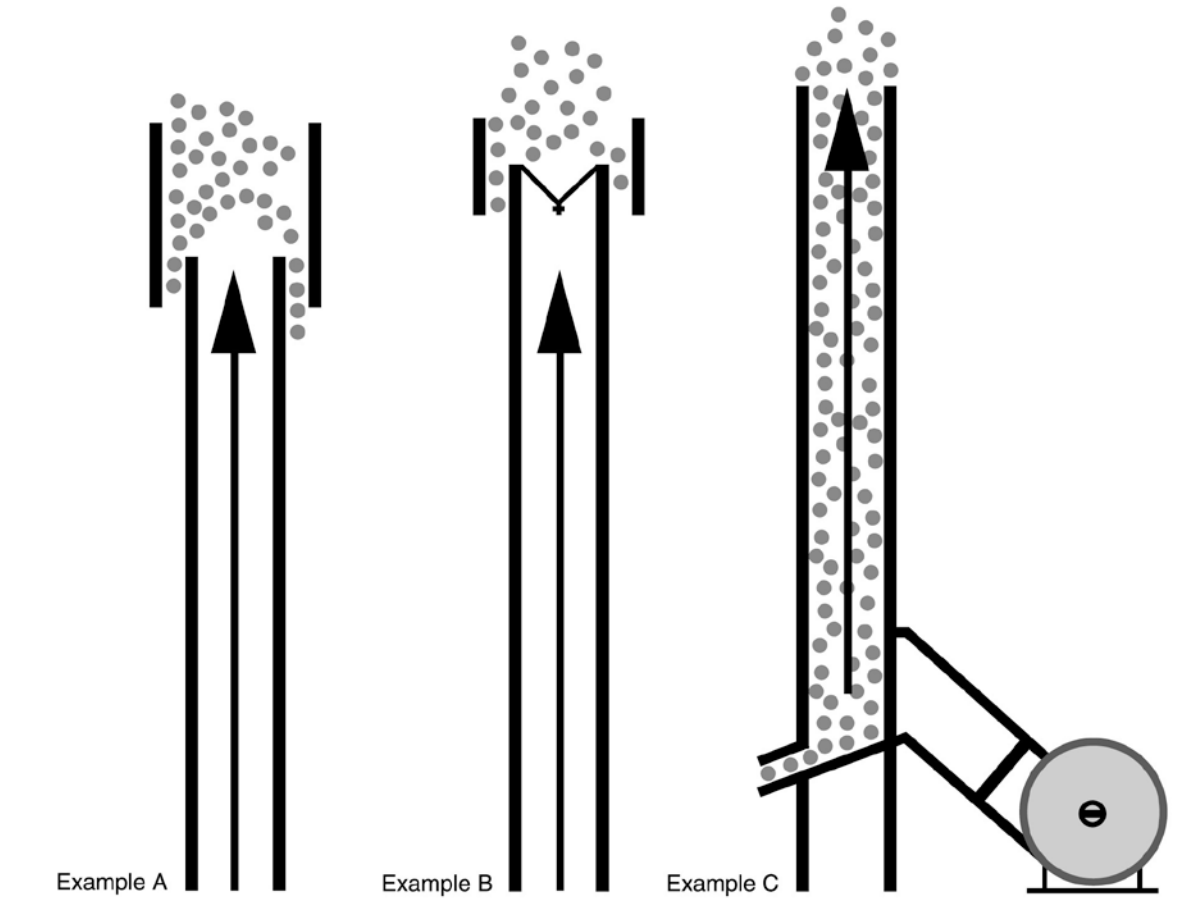
$$\frac{0.011\ \cancel{lb}\ \mathrm{VOC}}{\cancel{hr}} \times \frac{2{,}500\ \cancel{hr}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{\frac{0.014\ ton\ VOC}{yr}}$$

Sulfur Dioxide

$$\frac{0.001\ \cancel{lb}\ \mathrm{SO_2}}{\cancel{hr}} \times \frac{2{,}500\ \cancel{hr}}{yr} \times \frac{1\ ton}{2{,}000\ \cancel{lb}} = \mathbf{\frac{0.0013\ ton\ SO_2}{yr}}$$

If you need help completing these calculations, feel free to contact the Air Permits Division at 512-239-1250.

Appendix J: Examples of Acceptable Stack Designs



The example stacks on this page offer rain protection without obstructing air flow. In example A and B, rain water will hit the inside wall of the outer sleeve and run down. In example B, the flaps are pushed up when the fan is on. Stack C is designed so that water drains out the side of the stack.

Appendix K: Compliance Worksheet

You will need to gather information about your business from your records, your paint supplier, Material Safety Data Sheets (MSDS), or technical data sheets in order to complete calculations and determine compliance with various regulations. Answering the following questions will help you get started.

Materials Usage

How many gallons of cleaning and stripping solvents do you use per year?

_____ gallons

How many gallons of coatings, excluding plating materials, do you use per year?

_____ gallons

How many pounds of dye do you use per year?

_____ pounds

How many gallons of bleach do you use per year?

_____ gallons

How many gallons of fragrance, excluding odorants, do you use per year?

_____ gallons

How many gallons of detergents (water-based surfactants) do you use per year?

_____ gallons

VOC and Exempt-Solvent Content per Gallon of Coating

If you mix your coatings, what is the VOC and exempt-solvent content in each component of your mixed coating?

Component A:	_____ pounds VOC per gallon	_____ pounds ES per gallon
Component B:	_____ pounds VOC per gallon	_____ pounds ES per gallon
Thinner:	_____ pounds VOC per gallon	_____ pounds ES per gallon

If you mix your coatings, what is the mixing ratio for your mixed coating?

_____:_____ ratio

If you thin your coatings, what is the thinning ratio for your mixed coating?

_____:_____ ratio

Coating Activities

What is the VOC and exempt solvent content in each mixed coating and thinner?

Coating A: _____ pounds VOC per gallon _____ pounds ES per gallon

Coating B: _____ pounds VOC per gallon _____ pounds ES per gallon

Coating C: _____ pounds VOC per gallon _____ pounds ES per gallon

Thinner: _____ pounds VOC per gallon _____ pounds ES per gallon

What is the maximum amount of coating you apply hourly and annually?

_____ gallons per hour _____ gallons per year

Cleanup Activities

What is the VOC content in your cleanup solvent?

_____ pounds VOC per gallon

What is the maximum amount of cleanup solvent you use hourly and annually?

_____ gallons per hour _____ gallons per year

How much of the used solvent is discarded after the cleanup is complete?

_____ gallons

Booth Specifications

What is the flow rate of your exhaust fan in cubic feet per minute?

_____ cubic feet per minute

What is the flow rate of the air makeup unit fan in cubic feet per minute?

_____ cubic feet per minute

What is the area of all the booth openings that are normally open when the booth is in operation?

_____ square feet