



Simplifying the Air Permitting Process

Construction Permitting



BUREAU OF AIR QUALITY
Engineering Services Division

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Disclaimer

This booklet is produced by the South Carolina Department of Health and Environmental Control (DHEC) - Bureau of Air Quality. The intent of this booklet is to provide a basic overview of the construction permit and application process.

This booklet is not a substitute for applicable federal and South Carolina laws and regulations.



Introduction

Two questions often asked by businesses in South Carolina are:

- Do I need an air permit?
- What is involved in the air permitting process?

Our purpose in creating this construction permit guide is to:

- Provide you with basic information on how to determine if a permit is needed, and
- Explain how to submit a proper and complete construction permit application.

The booklet includes a step-by-step guide on completing a construction permit application.

Although our publication will provide you with some basic information, you may find you need additional technical assistance. [Hiring a consultant](#) experienced in handling air permit applications can help you with the process.

Should you have any questions, feel free to contact DHEC's Bureau of Air Quality (BAQ) Engineering Services Division at (803) 898-4123.

Note: *Simplifying the Air Permitting Process — Exemptions* (www.scdhec.gov/library/CR-010877.pdf) is a separate DHEC publication that can help you determine if your process qualifies for an exemption. It also provides examples of emission source and emission level exemptions.

What is an Air Permit?

An air permit is a legal document that details how you comply with state and federal air pollution regulations.

The conditions of your permit are based on:

- The regulated air pollutants that are emitted from your process or equipment
- The type of manufacturing process you use, and
- Applicable laws.

Permit types include construction, operating, and registration.

Which Air Pollutants are Regulated?

Criteria pollutants are those pollutants that have known health impacts and are emitted in relatively large quantities by a variety of sources such as vehicles and industrial activities. The U.S. Environmental Protection Agency (EPA) uses these pollutants as indicators of air quality.

The regulated criteria pollutants are:

- Particulate Matter (PM), PM less than 10 micrometers in diameter (PM₁₀), and PM less than 2.5 micrometers in diameter (PM_{2.5})
- Nitrogen Oxides (NO_x)
- Sulfur Dioxides (SO₂)
- Carbon Monoxide (CO)
- Ozone (as Volatile Organic Compounds (VOC) and NO_x), and
- Lead (Pb).

Hazardous Air Pollutants (HAP): The federal list of 187 pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. (Visit the EPA website for more information on HAP at www.epa.gov/ttn/atw/pollsour.html)

Toxic Air Pollutants (TAP): South Carolina's list of 258 pollutants (including the federal HAP list) are those that readily cause or may cause reversible or irreversible changes or permanent injury or death. (See South Carolina's toxic air pollutants regulation at www.scdhec.gov/environment/baq/docs/regs/pdf/r61-62_5S8.pdf#page=2)

What is a Construction Permit?

A construction permit is an air permit required for a facility that plans to construct, alter, or add to a source of air pollution. It is also needed if you plan to install an air pollution control device.

If it is determined that your facility needs a construction permit, you will need to obtain the services of a South Carolina-registered Professional Engineer (PE). SC Regulation 61-62.1, Section II (C)(2) outlines exemptions to the PE signature requirement.

What Permit Types are Issued by BAQ?

1. Construction Permits:

Depending on a facility's process operation and/or emissions, the BAQ may require one of three construction permits:

- [Minor permit](#)
- [Synthetic Minor](#) permit, or
- [Major Source](#) permit (which includes Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review). The BAQ provides you with an opportunity to request an expedited permit application review when applying for an air permit. Most minor, synthetic minor, and PSD construction projects are currently eligible for expedited review. Visit www.scdhec.gov/Environment/AirQuality/ConstructionPermits/ExpeditedReviewofPermits for more information.

2. Registration Permits

The BAQ issues [registration permits](#) for specific source categories, such as crematory and textile operations.

3. Operating Permits

Any source that is required to obtain an air quality construction permit issued by the BAQ must obtain an operating permit when the new or altered source is placed into operation. The BAQ requires certification that the construction covered by the application has been completed in accordance with the specifications agreed upon in the construction permit issued. The BAQ issues 3 types of operating permits based on the type of construction permit issued. Operating permit types include the:

- [State Minor](#) permit
- [Conditional Major](#) permit, or
- [Title V](#) permit.

What is a Registration Permit?

You may not need a construction permit if you qualify for a registration permit. Registration permits are issued to sources where equipment similarities and simplicity remove the need for in-depth site-specific

review. Additionally, these permits contain the same emission limits and monitoring requirements as the construction and operating permit for that source category. The registration permitting process is, in essence, a dual permitting process — construction and operating combined into one permit.

To determine if your facility qualifies for a registration permit review, please read the description and associated criteria for registration permit types on the DHEC website at www.scdhec.gov/Environment/AirQuality/RegistrationPermits.

How Do I Request Coverage Under a Registration Permit?

Now that you have determined your facility meets the criteria covered by a registration permit, you can download the registration permit application and instructions from DHEC at www.scdhec.gov/Environment/AirQuality/RegistrationPermits.

Read the instructions prior to completing all information requested on the appropriate Registration Permit Application. Flowcharts and emission estimators have been developed to help in the use of estimating emissions. (See emission estimator tools at www.scdhec.gov/Environment/AirQuality/ComplianceandReporting/EmissionsInventory/EmissionEstimatingTools)

If your facility chooses to use a calculation method other than the one provided by the BAQ, please submit detailed emission calculations to include all the necessary data, equations, etc. as part of your application. Please list the potential emissions from the emission calculations in the application.

Do I Need a Construction Permit?

In *[Simplifying the Air Permitting Process – Exemptions](#)*, you are taken through the steps of identifying equipment, sources of air emissions, and calculating air emissions to determine if your process is exempt based on either the type of source or a source's potential to emit (PTE). If your facility does not meet the exemption criteria or qualify for a registration permit, you will need a construction permit.

Note Regarding Exempt Sources — You must include exempt sources in your project emissions. If project potential emissions are at or above major source permitting thresholds a permit is required. (See Emission Threshold table at www.scdhec.gov/library/CR-011244.pdf)

What Activities are Allowed Before a Permit is Issued?

Construction prior to permit issuance is restricted. However, some activities are allowed before receiving an issued permit. These allowed activities depend on the type of construction permit needed. These activities are taken at the facility's risk and do not guarantee permit issuance.

Minor construction permit - for information, refer to [S.C. Regulation 61-62.1, Section II\(A\)\(1\)\(c\)\(d\)](#).

Synthetic Minor and Prevention of Significant Deterioration (PSD) - no activities permanent in nature are allowed until the permit is issued.

If the operations covered by any construction permits involve land-disturbing activities in one of the eight coastal counties of the coastal zone under the jurisdiction of DHEC Ocean and Coastal Resource Management (OCRM) (Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry and Jasper), then a coastal zone consistency certification may be required prior to conducting land-disturbing activities. (For more information on coastal zone consistency laws, visit www.scdhec.gov/Environment/WaterQuality/Stormwater/CoastalZoneConsistency)

How Do I Hire the Right Consultant?

Hiring a consultant should be treated like any other business decision you make. The right consultant will calculate emissions, assess regulatory requirements, guide you through the permit process and most importantly create a technically complete application that reduces your permit issuance wait time. While we cannot recommend a specific consultant, we do encourage you to interview prospective consultants to make sure they are the right fit for your project and your facility. A S.C. registered professional engineer must review and sign the construction permit application.*

Tips for hiring the right consultant:

- Interview more than one consultant.
- Ask for references from previous clients; follow up with those clients.
- Ask what experience they have in dealing with air quality regulations specific to your project/facility.

*Some exceptions apply. Visit www.scdhec.gov/Agency/docs/air-regs/r61-62_1.pdf#page=17 to view S.C. Regulation 62.1 for P.E. exemptions.

The Construction Permit Application

Step 1: Identify Equipment and Processes Emitting Air Pollutants

Prior to any onsite construction, draw a map of your facility and list all equipment to be used at the site. This includes raw material and product storage and emergency generators. Identify the equipment that can potentially emit air pollution. A source of air pollution can be a single piece of equipment, such as a boiler, or a process line that contains multiple pieces of equipment. Consult with the technical adviser/engineer in charge of the planned operation, the equipment manufacturer and the raw material supplier to determine if air pollutants can potentially be released. Review the Material Safety Data Sheet (MSDS). Another good source is the [EPA's AP-42 - Compilation of Air Pollutant Emission Factors](#) clearinghouse. This clearinghouse identifies common industrial operations that emit air pollutants. View [this example of a completed application](#) on our training webpage for more information.

Step 2: Calculate Air Emissions

How do I calculate emissions from my planned equipment?

Potential to Emit (PTE) is defined by regulation as the maximum capacity of a source to emit a regulated air pollutant under its physical and operational design. When a facility's operation is not restricted by existing permit conditions or a physical equipment restriction (bottleneck), the PTE is the highest amount of regulated pollutants your business could release into the air when operating at full capacity for 8,760 hours per year. The PTE calculation does not take into account air pollution control devices (that comes later). Don't be alarmed if the PTE calculation shows much higher emissions than your source will emit - this is not unusual.

What is the significance of potential to emit?

PTE will determine whether a facility is a "major" or a "minor" source. (See our Emission Threshold and Permitting Table at www.scdhec.gov/library/CR-011244.pdf.) Because they typically emit more air pollution, major sources are often subject to more stringent emission limits and control requirements. Complex permits may be required.

Major facilities can request permit restrictions, such as the use of control devices, to reduce emissions to minor source levels. Minor sources emit less air pollution and are thus subject to fewer air quality regulatory requirements and have a less complex permit than major sources.

You can visit www.scdhec.gov/Environment/AirQuality/Training to view flowcharts to determine the type of permit needed. View www.scdhec.gov/library/CR-011244.pdf for information on permitting timelines.

How do I calculate potential to emit?

Step 2.1 - Identify all of your emission sources, including exempt equipment.

Step 2.2 - Identify all air pollutants emitted by each source.

Step 2.3 - Determine the maximum amount of each pollutant emitted from each source. Assume that the equipment operates at maximum capacity every hour of the year (8,760 hours per year) with no controls.

As you choose your method of emissions calculations, keep in mind that different methods are available for different types of emissions and processes. Some methods of determining emissions may be more appropriate than other methods for that particular source.

It is important to use reliable and accurate data supported by documented calculations and emission factors. Common estimation methods include stack test data, manufacture vendor data, AP-42 emission factors, mass balance, engineering judgment, etc. An example of how to calculate PTE can be found in *Appendix A– Facility Calculating PTE Example*. In addition, the EPA's "Potential to Emit: A Guide for Small Businesses," provides more detailed explanations of all the steps necessary to calculate PTE. (The EPA's emission guide for small businesses can be found at www.epa.gov/ttn/atw/1998sbapptebroc.pdf.)

Once you have calculated the PTE for each pollutant for each source, single process, and exempt sources or activities, determine your facility-wide PTE. Go to Step 2.4.

Step 2.4 - For each pollutant, add the maximum emissions from all production processes/equipment, including exempt equipment, at the facility. Each HAP and/or TAP should be calculated separately then summed in total. Include fugitive emissions if required. This is your facility-wide PTE.

If the facility-wide PTE is at or above the tons per year thresholds listed in the Emission Level-Exemption column, a construction permit is needed. (For more information on exemption-level thresholds, see www.scdhec.gov/library/CR-011244.pdf.)

The PTE will be used to determine what type of construction permit is needed if you do not qualify for an exemption. (See our Air Permitting Exemption Guide at www.scdhec.gov/library/CR-010877.pdf for more information.)

Also See Appendix A (Facility Calculating PTE Example)

Step 2.5 - What Type of Construction Permit do I Need?

The type of construction permit needed is based on project PTE and facility-wide PTE.

Step 3: Completing the Application Forms

Submitting a complete application fully describing the project and its equipment, the emissions and the regulatory review, is critical to receiving a timely permit. Don't skip a step here!

Step 3.1: Identify all Forms Needed in the Application Package.

Download these forms:

- [D-2566, Facility Information](#)
- [D-2567, Equipment/Processes](#)
- [D-2569, Emissions](#)
- [D-2570, Regulatory Review](#)
- [D-2573, Emission Point Information.](#)

See [Construction Permit Application Example](#).

Step 3.2: Read and Organize Information

Read the instructions to ensure you have the information readily available prior to completing the forms. Organize your data, Equipment/Process/Control Device descriptions, capacity, PTE calculations, list of raw materials and supporting information used to calculate the facility's PTE. Review your PTE calculations to verify you have included any manufacturer's data, such as MSDS and emission factors used for your calculations.

Step 3.3: Complete the Forms

FORM D-2566 - FACILITY INFORMATION FORM

[This form](#) identifies your facility, and verifies the facility physical address, primary products or services provided, and ownership information.

A common error in the application is failure to provide the Federal Tax Identification Number (FTIN) or Employer Identification Number (EIN). This number is also known as the Federal Identification Number (FIN) or IRS Tax Identification Number, or Taxpayer Identification Number (TIN). (See the IRS website for more information on Federal Tax ID numbers at www.irs.gov/Businesses/Small-Businesses-&Self-Employed/Employer-ID-Numbers-EINs.)

Include the signature and stamp of a South Carolina registered PE, if applicable.

FORM D-2567- EQUIPMENT/PROCESS FORM

The information provided in [this form](#) identifies the equipment/control devices and processes that will be added, removed or modified at the facility, including the size and type, along with the make and model, and any associated control devices and/or emission points.

Include an attachment of the process flow diagram and/or production process layout of all new or altered sources. Include any manufacturer specifications and ratings, engineering design and operating characteristics, projected capture and destruction, and control or removal efficiencies.

A common error in the application is failure to provide a full make and model description.

FORM D-2569 – EMISSIONS FORM

The information in [this form](#) will compare before and after emissions and provide a “Summary of Projected Change in Facility-Wide Potential Emissions” calculated at maximum design capacity. A greenfield site (new facility) will not have “before project” emissions. This form must include a breakdown of potential emission rates at maximum design capacity for all equipment and processes that are being added, removed, or modified.

Thoroughly explain emission calculations and facility-wide impacts to existing sources. On each application, note and explain if any emission changes have occurred on existing units. Explain when PTE is not based on the standard (8,760 hours/year, maximum capacity, no controls). Provide

source tests if you rely on source tests that have not been approved by the BAQ.

Include in an attachment supporting information and sample calculations, including emission factors and manufacturer's data used to calculate emissions. You should include all information and sample calculations used in calculating your PTE.

FORM D-2570 – REGULATORY REVIEW FORM

The information in [this form](#) will provide a complete regulatory review of all applicable and non-applicable state and federal regulations, including all emission limitations, monitoring, recordkeeping, and reporting requirements.

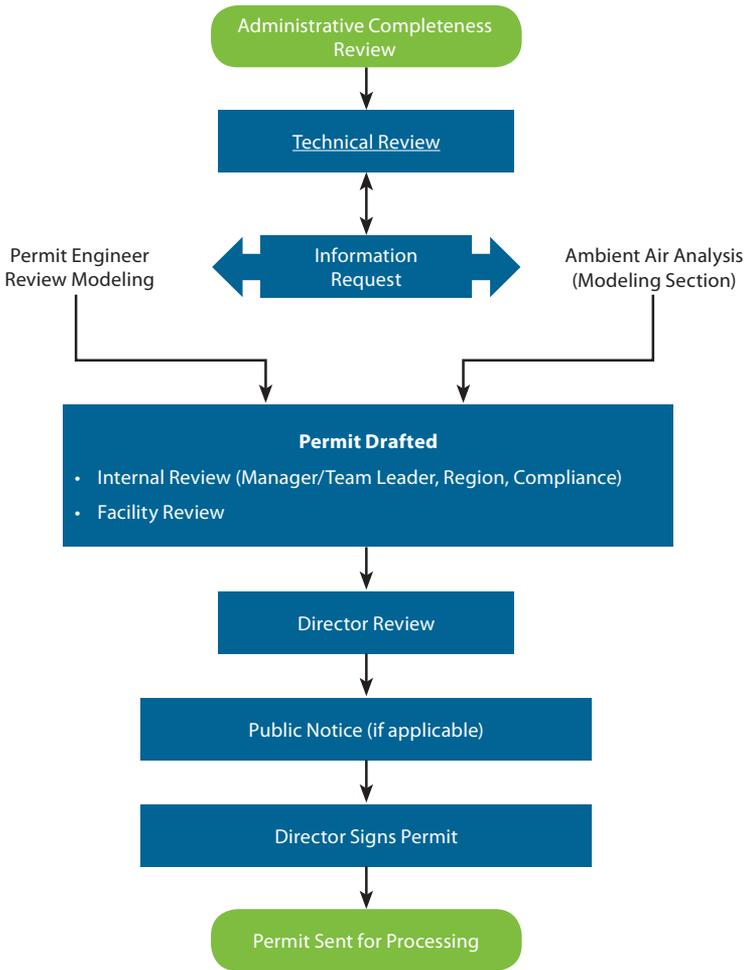
A common error in the application is failure to include a detailed discussion of how compliance will be demonstrated. Also, remember to include an explanation of applicability when a source is not subject to a regulation, but reasonably could be.

FORM D-2573 – EMISSION POINT INFORMATION FORM

The information in [this form](#) will provide Source (Stack) Dispersion Parameters for any new sources (stacks) or any revised sources (stacks).

A common error in the application is failure to provide a detailed explanation of how all applicable ambient air standards have been addressed, including any exemptions, deferrals, assumptions, limits, etc. Explain any differences in modeled emission rates from those in the PTE application section.

What is the Permitting Process?



Before the BAQ can issue a construction permit, staff must review the permit application to determine which state and federal regulations may apply to the facility. Applicable regulations may contain requirements such as monitoring, recordkeeping, or limiting of emissions. The flowchart provides a brief overview of the BAQ construction permit review process.

Read the Construction Permit Emission Threshold and Permitting Table at www.scdhec.gov/library/CR-011244.pdf for an overview of the construction permitting process.

I Received My Construction Permit, What Now?

It is important for you to read the permit carefully and understand the conditions. The Construction Permit issued to your facility contains emission limits and may require compliance monitoring reporting and/or recordkeeping, and operations and maintenance logs.

The Technical Management Section (TMS) is located in the Compliance Management Division of the BAQ. The TMS reviews reports to determine compliance with permit conditions. The TMS looks for timeliness, completeness, accuracy, and compliance status. Contact the TMS at (803) 898-4123 to understand the reporting period and accuracy required for reporting VOCs and emission limit exceedances. The TMS has developed guidance, spreadsheets and forms to assist facilities in submitting reports. Visit www.scdhec.gov/Environment/docs/12MonthRollingSum.pdf for more information on 12-month rolling sum.

Be proactive in complying with your permit. Coordinate with your DHEC environmental team to understand your permit and establish a comprehensive monitoring plan to ensure compliance with all permit conditions. Additionally, get to know your regional DHEC environmental contact.

South Carolina is divided into four Environmental Quality Control (EQC) Regions. Visit the DHEC website to see local EQC regional contact and location information at www.scdhec.gov/HomeAndEnvironment/DHECLocations.

Need Help or Have a Question?

Please contact the Bureau of Air Quality at (803) 898-4123.

Appendix A – Facility Calculating PTE Example

Best Machine Manufacturing company paints and coats various pieces of machinery designed to meet their customer's specification.

This is a new facility with no previous construction permits.

Step #1- Identify sources of air emissions

Spray Booth - Pollutants: PM, PM₁₀, PM_{2.5}, VOC, TAP, and HAP.

Step #2- Review the construction permit source exempt list

Go to www.scdhec.gov/Environment/docs/NewExemptions.pdf and obtain the latest air permitting exemptions list. This list is periodically updated so it is important to use the latest version.

Spray Booth – The facility uses more than 3 gallons per day of HAP containing surface finishing material. Therefore, it does not qualify for the surface coating source-specific exemption.

Step #3 - Calculate the potential to emit

The spray coating operation is a manual process that will utilize one (1) conventional spray gun which will be used to apply various coatings to the metal boxes. The maximum weight of the metal box is 300 pounds. The spray booth can process one metal box at a time. Each box requires at least a 20 minutes process time which will include set up, coating, and air drying of the coating. Each box requires a maximum of half a gallon of coating. Exhaust will be conveyed outside through a dry filter bank which will capture overspray particles. With these bottlenecks, assumptions and givens, the emissions from the spray booth were calculated.

Spray Booth calculations by material balance:

1) Preparing for Emissions Data

To prepare for calculating PTE, you will need to obtain an MSDS (Material Safety Data Sheet) or Technical Data Sheet (TDS) for each product used in the spray booth. Many compounds, mainly solvents, are VOCs. However, some VOC-like compounds have negligible smog-forming effects and

are known as “exempt VOCs.” [EPA defines volatile organic compound](#) and includes a list of those compounds not considered as VOCs. For example, acetone, methylene chloride, and many Chlorofluorocarbon (CFC) refrigerants are not VOCs. When used in coating formulations, these exempt VOCs are commonly referred to as “exempt solvents.”

Many common solvents, such as xylene, toluene, and methyl isobutyl ketone are HAP. In addition, pigment solids containing lead, cadmium, chromium, lead or other heavy metal compounds are also HAP. A complete listing of all 187 HAP can be found at www.epa.gov/ttn/atw/orig189.html

Identify the MSDS for the three paint products used in the painting operation:

[Product Number: M60B8 Product Name: OPEX M60 Black Lacquer, Semi Gloss Black MFG: The Sherwin Williams Co.](#)

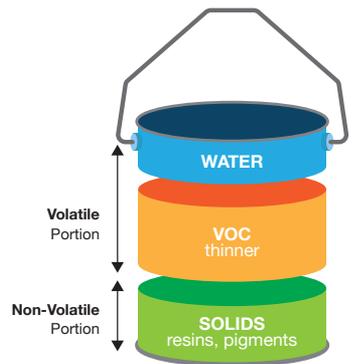
[Product Number: L61XXB5989-2223 Product Name: OPEX L61 Production Lacquer, PN 19 Black Splatter MFG: The Sherwin Williams Co.](#)

[Product Number: K119-SW Product Name: R7K119 Lacquer Thinner MFG: The Sherwin Williams Co.](#)

How to Estimate VOC Emissions

The use of a **mass balance** approach is the easiest way to calculate VOC, HAP, and TAP emissions from a coating operation. This method uses paint formulation data and assumes that all of the VOCs contained in the liquid coating are emitted into the air after the coating is applied and dried.

To use the mass balance approach, you must know how many pounds of VOC are in a gallon of coating and the total gallons of coating used during the time frame of interest, i.e., hour, day, month, etc. It is very important that you include any diluents, thinners, or reducers added to the coating before application. These materials generally increase the VOC content of the applied coating. With this basic information, VOC emissions can be calculated.



What data do I need from the MSDS or Technical Data Sheet?

For air emission calculations, the information you need is usually found in Section 2 and 9 of a typical MSDS or similar sections of technical data sheet. Contact your coating supplier and ask for the VOC and HAP content information if it is not listed on the MSDS or other data sheets.

Understanding the MSDS Ingredient/Composition Section

This section of the MSDS typically contains a list of the material's hazardous ingredients, their Chemical Abstract System (CAS) numbers, and their percent by weight or by volume. This section will help you identify if there are any HAP or TAP in the material. Sometimes a data sheet will list a range (e.g. Ethylbenzene 1-5% wt.) instead of an exact percentage. In such instances, contact the supplier for the precise value or simply use the highest value in the range listed.

Be aware that any chemical may have several common names, so make special note of the CAS number typically listed on the data sheet beside each chemical. You can positively identify each chemical by using its unique CAS number.

This section of the MSDS contains some information about the material that is useful for air emission calculations. The key pieces of information are:

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS				
% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
4	64742-89-8	LL Aliphatic Hydrocarbon Solvent	100 PPM	53 mm
		ACGIH TLV	100 PPM	
		OSHA PEL	100 PPM	
13	64742-89-8	V. M. & P. Naphtha	300 PPM	12 mm
		ACGIH TLV	300 PPM	
		OSHA PEL	300 PPM	
		OSHA PEL	400 PPM STEL	
14	108-88-3	Toluene	20 PPM	22 mm
		ACGIH TLV	100 ppm (Skin)	
		OSHA PEL	150 ppm (Skin) STEL	
		OSHA PEL	150 ppm (Skin) STEL	
0.3	100-41-4	Ethylbenzene	20 PPM	7.1 mm
		ACGIH TLV	100 PPM	
		OSHA PEL	125 PPM STEL	
		OSHA PEL	125 PPM STEL	
2	1330-20-7	Xylene	100 PPM	5.9 mm
		ACGIH TLV	150 PPM STEL	
		OSHA PEL	100 PPM	
		OSHA PEL	150 PPM STEL	
10	67-63-0	2-Propanol	200 PPM	33 mm
		ACGIH TLV	400 PPM STEL	
		OSHA PEL	400 PPM	
		OSHA PEL	400 PPM	
6	78-83-1	2-Methyl-1-propanol	50 PPM	8.7 mm
		ACGIH TLV	50 PPM	
		OSHA PEL	50 PPM	
3	111-76-2	2-Butoxyethanol	20 PPM	0.88 mm
		ACGIH TLV	25 PPM	
		OSHA PEL	25 PPM	
4	67-64-1	Acetone	500 PPM	180 mm
		ACGIH TLV	750 PPM STEL	
		OSHA PEL	1000 PPM	
		OSHA PEL	1000 PPM	
7	78-93-3	Methyl Ethyl Ketone	200 PPM	90.6 mm
		ACGIH TLV	300 PPM STEL	
		ACGIH TLV	200 PPM	
		OSHA PEL	300 PPM STEL	
		OSHA PEL	300 PPM STEL	
13	110-19-0	Isobutyl Acetate	150 PPM	12.5 mm
		ACGIH TLV	150 PPM	
		OSHA PEL	150 PPM	
2	1333-86-4	Carbon Black	3.5 MG/M3	
		ACGIH TLV	3.5 MG/M3	
		OSHA PEL	3.5 MG/M3	

Physical/Chemical Properties Section

This section of the MSDS contains some information about the material that is useful for air emission calculations. The key pieces of information in the diagram below are identified to assist you in your emission calculations. It is recommended that you obtain weight percentages (% by weight) for the solids, VOC, HAP, and TAP in each product. Percent by weight and percent by volume are not the same thing. If not listed as percent by weight on the MSDS or other technical data sheet, contact your supplier and ask for this information.

Specific gravity: Sometimes used in place of material density, this dimensionless number compares the material's density to the density of water. A specific gravity less than 1.0 means the material is less dense (lighter) than water, greater than 1.0 means the material is more dense (heavier) than water.

Product Weight or Material Density: This is how much one gallon of the material weighs – it is not the VOC content.

OTHER PRECAUTIONS

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	7.30 lb/gal	875 g/l
SPECIFIC GRAVITY	0.88	
BOILING POINT	132 - 343 °F	55 - 172 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	83%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	Not Available	
VOLATILE ORGANIC COMPOUNDS (VOC Theoretical • As Packaged)	5.60 lb/gal 671 g/l	Less Water and Federally Exempt Solvents Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

VOC content (typically expressed as % by weight, % by volume, lbs VOC/gal, lbs VOC/gal less water, or grams/liter). This number represents how much VOC is in one gallon of the material.

Volatile content: This number, typically expressed as % by weight or % by volume, represents how much of the material evaporates. It typically includes water, all VOCs, and "exempt VOCs" combined.

2) Calculating Emissions from the painting operation

Example Equations Used for Calculating Paint Emissions:

There are various ways to calculate paint emissions based on information provided in the MSDS. This method was chosen because the pollutant content, weight and % content was provided. The BAQ has developed a [Surface Finishing Emission Calculator spreadsheet](#) that may help you in determining your paint emissions.

$$\text{VOC} \left(\frac{\text{pounds}}{\text{hour}} \right) = \text{Pollutant Content} \left(\frac{\text{pounds}}{\text{gallon}} \right) \times \text{Usage} \left(\frac{\text{gallons}}{\text{minute}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right)$$

$$\text{HAP} \left(\frac{\text{pounds}}{\text{hour}} \right) = \text{Product Weight} \left(\frac{\text{pounds}}{\text{gallon}} \right) \times \text{Pollutant Content} (\%) \times \text{Usage} \left(\frac{\text{gallons}}{\text{minute}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right)$$

$$\text{Uncontrolled PM} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left[\text{Product Weight} \left(\frac{\text{pounds}}{\text{gallon}} \right) - \text{VOC Pollutant Content} \left(\frac{\text{pounds}}{\text{gallon}} \right) \right] \times \text{Usage} \left(\frac{\text{gallons}}{\text{minute}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) \times [1 - \text{Transfer Efficiency} (\%)]$$

$$\text{Controlled PM} \left(\frac{\text{pounds}}{\text{hour}} \right) = \text{Uncontrolled PM} \left(\frac{\text{pounds}}{\text{hour}} \right) \times [1 - \text{Control Efficiency} (\%)]$$

$$\text{Pollutant} \left(\frac{\text{tons}}{\text{year}} \right) = \text{Pollutant} \left(\frac{\text{pounds}}{\text{hour}} \right) \times \left(\frac{8760 \text{ hours}}{\text{year}} \right) \times \left(\frac{\text{ton}}{2000 \text{ pounds}} \right)$$

Calculate Emission for each pollutant (VOC, HAPs, PM) for HC Black Splatter Paint:

VOCS (LB/HR) FOR PAINT HC BLACK SPLATTER:

Given:

- Pollutant content for VOCs: [5.36 lb/gal](#)
- Usage: 0.5 gallons of paint used in 20 minutes (based on processing and drying times)

$$\text{VOC} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{5.36 \text{ pounds}}{\text{gallon}} \right) \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) = 8.04$$

HAP (LB/HR) FOR PAINT HC BLACK SPLATTER:

Given:

- Product Weight: [7.3 lb/gal](#)
- Usage: 0.5 gallons of paint used in 20 minutes (based on processing and drying times)
- Pollutants Content: As provided on the MSDS

$$\text{Xylene [H, T, V]} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{7.3 \text{ pounds}}{\text{gallon}} \right) \times 2\% \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) = 0.22$$

$$\text{MEK [T, V]} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{7.3 \text{ pounds}}{\text{gallon}} \right) \times 7\% \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) = 0.77$$

$$\text{Toluene [H, T, V]} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{7.3 \text{ pounds}}{\text{gallon}} \right) \times 14\% \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) = 1.53$$

$$\text{Ethylbenzene [H, T, V]} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{7.3 \text{ pounds}}{\text{gallon}} \right) \times 0.3\% \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) = 0.033$$

$$\text{2 - Butoxyethanol [T, V]} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{7.3 \text{ pounds}}{\text{gallon}} \right) \times 3\% \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) = 0.33$$

$$\text{Glycol Ethers [H, T, V]} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{7.3 \text{ pounds}}{\text{gallon}} \right) \times 3\% \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) = 0.33$$

PM, PM₁₀, AND PM_{2.5} (LB/HR) FOR PAINT HC BLACK SPLATTER:

Given:

- Product Weight: [7.3 lb/gal](#)
- Pollutant content for VOCs: [5.36 lb/gal](#)
- Usage: 0.5 gallons of paint used in 20 minutes (based on processing and drying times)
- The HVLP transfer efficiency is 75%, meaning 25% is considered overspray was assumed because the coating material will be applied to a flat, solid surface. Typical transfer efficiencies are listed below.
- The paint booth is equipped with a dry filter control device with a control efficiency of 98.94% is based on manufactures test data

$$\text{Uncontrolled PM}/\text{PM}_{10}/\text{PM}_{2.5} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left[\left(\frac{7.3 \text{ pounds}}{\text{gallon}} \right) - \left(\frac{5.36 \text{ pounds}}{\text{gallon}} \right) \right] \times \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) \times [1 - 75\%]$$

$$\text{Uncontrolled PM}/\text{PM}_{10}/\text{PM}_{2.5} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{1.94 \text{ pounds}}{\text{gallon}} \right) \left(\frac{0.50 \text{ gallons}}{20 \text{ minutes}} \right) \times \left(\frac{60 \text{ minutes}}{\text{hour}} \right) \times (25\%) = 0.73$$

$$\text{Controlled PM} \left(\frac{\text{pounds}}{\text{hour}} \right) = \left(\frac{0.73 \text{ pounds}}{\text{hour}} \right) \times (1 - 98.94\%) = 0.0077$$

3) Using the same calculations as above the uncontrolled & controlled emissions for the other paints used are listed:

Flat Black Lacquer Product #M60B8		
Pollutant	Uncontrolled Emissions (lb/hr)	Controlled Emissions (lb/hr)
VOC (total)	8.09	No controls
MEK (T,V)	0.896	No controls
Toluene (H,T,V)	1.12	No controls
Ethylbenzene (H,T,V)	0.0224	No controls
2-Butoxyethanol (T,V)	0.336	No controls
Glycol Ethers (H,T,V)	0.336	No controls
PM/PM ₁₀ /PM _{2.5}	0.78	0.008

Lacquer Thinner Product #K119-SW		
Pollutant	Uncontrolled Emissions (lb/hr)	Controlled Emissions (lb/hr)
VOC (total)	7.95	No controls
Toluene (H,T,V)	3.32	No controls
Ethylbenzene (H,T,V)	0.0905	No controls
Xylene (H,T,V)	0.503	No controls
Methanol (H,T,V)	0.402	No controls
Glycol Ethers (H,T,V)	0.101	No controls
PM/PM ₁₀ /PM _{2.5}	0.525	0.0056

4) Paint Booth Operation PTE

Total the uncontrolled and controlled emissions from each paint.

Pollutant	Uncontrolled Emissions (TPY)	Controlled Emissions (TPY)
PM/PM10/PM2.5	8.90	0.094
VOC (total)	105.4	--
Xylene (H,T,V)	3.16	--
MEK (T,V)	7.28	--
Toluene (H,T,V)	26.1	--
Ethylbenzene (H,T,V)	0.638	--
2-Butoxyethanol (T,V)	2.91	--
Glycol Ethers (H,T,V)	3.35	--
Methanol (H,T,V)	1.76	--
HAP (Toluene, single greatest)	26.1	--
HAP (total)	38.0	--

The PM, PM₁₀, PM_{2.5} uncontrolled emissions are each above the exemption threshold of 5 TPY, the VOC (105.45 TPY = 17,575 pounds per month), the MEK (7.28 TPY = 1213 pounds per month) and the Toluene (26.15 TPY = 4358 pounds per month) uncontrolled emissions are each above the [exemption threshold](#) of 1000 pounds per month. Therefore, the paint booth does not qualify for emission level-based exemption.

Facility-wide PTE:

Since the only emission source is the paint booth, its emissions are also the facility-wide potential to emit. See the excel spreadsheet, [Section 2 - Emissions Calculations](#) in the Example Construction Permit Application. The facility-wide potential to emit will determine what type of construction permit you need or provide other options to request coverage under another type of permit.

Your PTE is above major source threshold and your facility is requesting federally enforceable limits to avoid being a major source. Therefore you cannot obtain a minor source construction permit, but must instead obtain a [synthetic minor construction permit](#) in which the federally enforceable

limits will be established. You are a major source of emissions with respect to [Title V](#) for VOCs and HAP.

Pollutant	Uncontrolled Emissions (lb/hr)	Uncontrolled Emissions (TPY)	Controlled Emissions (lb/hr)	Controlled Emissions (TPY)	Limited Emissions (TPY)
PM/PM10/PM2.5	2.03	8.90	0.022	0.094	--
VOC (total)	24.1	105.4	--	--	<100
Xylene (H,T,V)	0.722	3.16	--	--	--
MEK (T,V)	1.66	7.28	--	--	--
Toluene (H,T,V)	5.97	26.1	--	--	--
Ethylbenzene (H,T,V)	0.146	0.638	--	--	--
2-Butoxyethanol (T,V)	0.665	2.91	--	--	--
Glycol Ethers (H,T,V)	0.765	3.35	--	--	--
Methanol (H,T,V)	0.402	1.76	--	--	--
HAP (Toluene, single greatest)	5.97	26.1	--	--	<10
HAP (total)	8.67	38.0	--	--	<25

Appendix B – Useful Links

DHEC Links (www.scdhec.gov)

Bureau of Air Quality

www.scdhec.gov/HomeAndEnvironment/Air/

DHEC's Regions

www.scdhec.gov/HomeAndEnvironment/DHECLocations

EQC Forms and Exempt Source Log (D-0721)

www.scdhec.gov/Environment/PermitCentral/ApplicationForms/#Air

Non-PSD Like for Like Guidance

www.scdhec.gov/Environment/AirQuality/ConstructionPermits/Exemptions/

Air Quality Modeling Guidelines

www.scdhec.gov/environment/baq/docs/modeling/modguide.pdf

BAQ Tools To Understanding the Permitting Process

Simplifying the Air Permitting Process – Construction Permit Application

www.scdhec.gov/library/CR-010651.pdf

Simplifying the Air Permitting Process – Prevention of Significant Deterioration (PSD)

www.scdhec.gov/library/CR-010731.pdf

Simplifying the Air Permitting Process – Exemptions

www.scdhec.gov/library/CR-010877.pdf

Construction Permit Emission Threshold & Permitting Table

www.scdhec.gov/library/CR-011244.pdf

Construction Permit for Existing Permitted Facilities Flow Chart

www.scdhec.gov/Library/CR-011224.pdf

Construction Permit for New Facility Flow Chart

www.scdhec.gov/Library/CR-011225.pdf

Prevention of Significant Deterioration (PSD) Construction Permits Flow Chart

www.scdhec.gov/Library/CR-011226.pdf

Simplifying the Air Permitting Process - Public Notices (Brochure)

www.scdhec.gov/library/CR-011349.pdf

External Links

SIC and NAICS Codes

https://www.osha.gov/pls/imis/sic_manual.html
www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2012

Federal Employer Identification Number

www.irs.gov

EPA Quality Planning and Standards

www.epa.gov

EPA Technology Transfer Network Clearinghouse for Inventories
& Emission Factors

www.epa.gov

EPA Technology Transfer Network AP-42 Emission Factors

www.epa.gov

EPA Technology Transfer Air Toxics Web Site

www.epa.gov

EPA Tanks Emission Estimation Software

www.epa.gov/ttnchie1/software/tanks/

EPA Applicability Determination Index

cfpub.epa.gov/adi

EPA Federal Register

www.federalregister.gov/agencies/environmental-protection-agency



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