

Chapter 1: Air Pollution

Every printing facility emits some air pollution. Depending on the amount of pollution emitted, your facility may have to comply with requirements issued by the US Environmental Protection Agency (EPA) and/or Wisconsin Department of Natural Resources (DNR).

The most common emissions from printing facilities are volatile organic compounds (VOCs) and hazardous air pollutants (HAPs). These pollutants along with nitrogen oxides, sulfur oxides, carbon monoxide, and particulate matter—which are called **criteria pollutants**—are regulated by EPA and DNR.

VOCs are chemicals that contribute to the formation of ground-level ozone, a component of smog. Ground level ozone is also regulated as a criteria pollutant. HAPs are compounds that are considered hazardous to public health and the environment when emitted. Refer to the Cyan Ink Room section of this document for a list of HAPs regulated by EPA and DNR.

Where do VOCs and HAPs come from?

In printing, VOCs and HAPs primarily originate from inks, fountain solution additives (e.g., alcohols, alcohol substitutes), solvent-based plate making, cleaning solvents, coatings, and adhesives. Generally, VOCs and HAPs evaporate into the air, causing pollution.

Acetone, methyl acrylate, and t-butyl acetate are chemicals that can be used in printing operations and are among the compounds **not** regulated as VOCs. Make note of these compounds, as you do not have to include them in VOC emission calculations.

Where do the other pollutants come from?

Combustion of fossil fuels like natural gas and fuel oil produce criteria pollutants, such as nitrogen oxides, sulfur oxides, carbon monoxide and particulate matter. Common fuel combustion units used in printing operations include boilers, heaters, furnaces, large hot water heaters, press dryers, and oxidizers.

Particulate matter is solid matter or condensable organic matter that can form an aerosol. At a printing facility, particulate matter emissions are released from press dryers as a result of the combination of ink and the combustion of fuel by the dryer. Also, if a waste paper handling system is used for trimming or similar operations, dust or particulate matter emissions may result. Some sheetfed operations may also use a spray power in the operations, which emit particulate matter.

For those printers who are under the thresholds shown in Section A of the **Introduction**, the following pages address emission standards with which all printers must comply.

Section A: Emission Standards

Since VOCs are the primary pollutants emitted by printers, the VOC emission standards will be reviewed first. Standards for emissions vary, and this workbook groups them based on the size of a printing operation. Size is determined by the amount of materials used. The more VOC-containing materials used, the greater the emissions.

How do I determine the Size Category?

If your facility qualifies based on product usage, refer to the Facility VOC Size Categories table below. Compare the amount of materials used at your facility with the numbers in the table below to determine whether your facility is a Very Small, Small, or Medium printer.

Facility VOC Size Categories			
Press Type	Size Category (based on Gallons of Solvent Containing Materials)		
	Very Small	Small	Medium
Sheetfed/ Non-heatset Lithographic	852 gallons of cleaning solvent and fountain solution additives	2,840 gallons of cleaning solvent and fountain solution additives	7,100 gallons of cleaning solvent and fountain solution additives
Heatset Web Offset Lithographic	6,000 lbs of ink, cleaning solvent and fountain solution additives	20,000 lbs of ink, cleaning solvent and fountain solution additives	50,000 lbs of ink, cleaning solvent and fountain solution additives
Digital Printing	727 gallons of solvent from inks and clean-up solutions	2,425 gallons of solvent from inks and clean-up solutions	6,000 gallons of solvent from inks and clean-up solutions
Screen Printing	855 gallons of solvent from inks and clean-up solutions	2,850 gallons of solvent from inks and clean-up solutions	7,100 gallons of solvent from inks and clean-up solutions
Flexographic (Water-based and UV)	24,000 pounds of water-based inks, coatings, adhesives	80,000 pounds of water-based inks, coatings and adhesives	200,000 pounds of water-based inks, coatings and adhesives
Flexographic (Solvent)	6,000 pounds of solvent from inks, dilution solvents, coatings and adhesives	20,000 pounds of solvent from inks, dilution solvents, coatings and adhesives	50,000 pounds of solvent from inks, dilution solvents, coatings and adhesives

If you **calculated actual VOC emissions**, compare your total emissions from the previous calendar year with the following thresholds to determine the appropriate Size Category as follows. If you emitted:

1. less than 6,000 pounds, you are a **Very Small printer**
2. at least 6,000 pounds, but less than 20,000 pounds, you are a **Small printer**
3. at least 20,000 pounds, but less than 50,000 pounds, you are a **Medium printer**

Question A.1	What is your facility's VOC Size Category?	<input type="checkbox"/> Very Small <input type="checkbox"/> Small <input type="checkbox"/> Medium
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Section A1: VOC Emission Standards

Once you have determined your facility's VOC Size Category, you are able to determine which VOC emission standard you must meet. **Printers that are Very Small or Small with a control device that have calculated their actual emissions to determine their size MUST meet the requirements of Medium printers as well as those listed for their respective size category below.**

ALL Printers

All printers in the state must meet the following VOC emission requirements.

VOC material handling requirements:

- Keep clean-up solution containers closed, except when dispensing or filling
- Keep shop towels that are soiled with inks and clean-up solutions in closed containers when not in use
- Cover fountain solution mixing and storage tanks, except when adding or draining solution
- Contain (i.e., store in closed container) all VOC-containing materials and waste to prevent evaporation

These VOC material handling requirements are based on the general organic compound requirements in NR 419. By continuing to meet the thresholds for Very Small and Small printers, there are no other emissions standards you will be required to meet.

Cold cleaning (i.e., parts washer) units:

- Each cold cleaning unit is exempt from VOC requirements if less than 1.5 gallons per day of solvent are added to it.
- To determine if you are exempt, take the number of gallons added and divide by the number of days since the last addition of solvent
- If you are not exempt, each cold cleaning unit must meet certain design and operating requirements (refer to the Cyan Ink Room section for detailed requirements)

Small Printers

In addition to the previous conditions for ALL printers, there are VOC emissions standards that apply to **Small** printers. The limits are shown in the VOC Emission Standards for Small Printers tables on page A-3 to A-4.

VOC Emission Standards for <u>Small</u> Lithographic Printers		
Material	<u>Non-Heatset</u> Offset	<u>Heatset</u> Web Offset
Fountain Solution	Web-fed: ≤ 5.0% VOC by weight (bw) and no restricted alcohols Sheet-fed: ≤ 5.0% VOC bw ≤ 8.5% VOC bw if refrigerated to 60°F or less	≤ 1.6% VOC bw if contains restricted alcohols and not refrigerated to 60°F or less ≤ 3.0% VOC bw if contains restricted alcohols and is refrigerated to 60°F or less ≤ 5.0% VOC bw and no restricted alcohol

VOC Emission Standards for <u>Small</u> Lithographic Printers		
Material	<u>Non-Heatset</u> Offset	<u>Heatset</u> Web Offset
Press clean-up solvents	$\leq 70\%$ VOC bw Or ≤ 10 mm Hg vapor pressure at 68°F	

Presses exempt from the fountain solution requirements in the table above include:

- sheet-fed presses with a maximum sheet size of up to 11 inches by 17 inches, or
- any lithographic press with a reservoir less than 1 gallon.

VOC Emission Standards for Other <u>Small</u> Printers	
Material	Letterpress
Press clean-up solvents	$\leq 70\%$ VOC bw OR ≤ 10 mm Hg vapor pressure at 68°F

In addition, any printer may use up to 110 gallons, on a 12-consecutive month rolling basis, of clean-up solvents that have VOC content above the clean-up solvent limits.

Question A.2	Are you meeting all VOC emission requirements listed in this section?	<input type="checkbox"/> Yes. Very Small and Small Printers skip to <u>Requirements for Fuel Combustion</u> , unless you determined your size category by calculating actual emissions and have a control device.
		<input type="checkbox"/> No. Contact SBEAP for assistance.

Medium Printers

Medium printers must meet the previous standards listed for all printers and for Small printers. Very Small and Small printers who use a control device also have to meet these standards. In addition, Medium Printers must meet the emission standards in all VOC Emission Standards tables that follow.

Emission standards for Medium printers are specific to each process:

- non-heatset offset lithographic printing
- heatset web offset lithographic printing
- gravure and flexographic printing, including flexible packaging
- screen printing
- letterpress printing

NOTE: Fountain solution standards may be calculated on a monthly rolling basis.

Calculation examples in the Cyan Ink Room section of this workbook include fountain solution averaging and material VOC content and vapor pressures.

If your printing operations include two or more types of printing, the performance standards in the VOC Emission Standards tables apply to **each** of the corresponding operations.

All calculations necessary to determine whether you meet the VOC emission standards can be found in the Cyan Ink Room section of this workbook. The calculation examples include fountain solution averaging and material VOC content and vapor pressures.

VOC Emission Standards for <u>Medium</u> Lithographic Printers		
Material	<u>Non-Heatset</u> Offset	<u>Heatset</u> Web Offset
Fountain Solution	<p><u>Web-fed:</u> ≤ 5.0% VOC by weight (bw) and no restricted alcohol ≤ 13.5% VOC bw if printing on metal or plastic and refrigerated</p> <p><u>Sheet-fed:</u> ≤ 5.0% VOC bw if not refrigerated ≤ 8.5% VOC bw if refrigerated ≤ 13.5% VOC bw if printing on metal or plastic, contains restricted alcohol and refrigerated</p>	≤ 1.6% VOC bw if not refrigerated ≤ 3.0% VOC bw if refrigerated ≤ 5.0% VOC bw and no restricted alcohol ≤ 13.5% VOC bw if printing on metal or plastic, contains restricted alcohol and refrigerated
Press Clean-up Solvents	≤ 70% VOC bw OR ≤ 10 mm Hg vapor pressure at 68°F	

The following operations are exempt from the **fountain solution requirements** in the table above:

- any lithographic press with a total fountain solution reservoir of less than one gallon
- sheet-fed presses with a maximum sheet size of up to 11 inches by 17 inches

Dryer Exhaust VOC Controls for Lithographic and Letterpress

The following dryer exhaust control requirements for lithographic and letterpress presses would **not** apply for printers with coverage under the Type C or Type A Registration Operation Permit (ROP) as their emission would be sufficiently restricted below the thresholds that trigger the requirements. However, if a printer switched their coverage to a Type B ROP, the dryer exhaust controls may be required. In addition, a printer obtaining a Type B ROP should not use this information as the sole source of compliance assistance materials as their requirements would not be sufficiently covered by the information in this workbook. See Section E on Permit Requirements.

- Heatset web offset lithographic presses operating in certain counties may be required to install controls on the dryer exhaust. The controls must meet:
 - Devices first installed prior to May 1, 2010: ≥ 90% destruction of VOCs, or outlet concentration of ≤ 20 ppmv as Carbon
 - Devices first installed after May 1, 2010: ≥ 95% destruction of VOCs, or outlet concentration of ≤ 20 ppmv as Carbon
- Letterpress presses operating in certain counties may be required to install controls on the dryer exhaust. The controls must meet:
 - Devices first installed prior to February 1, 2012: ≥ 90% destruction or outlet concentration of ≤ 120 ppmv of VOC as carbon, minus methane and ethane
 - Devices first installed after February 1, 2012: ≥ 95% destruction or outlet concentration of ≤ 120 ppmv of VOC as carbon, minus methane and ethane

The following are always exempt from any of the dryer exhaust control requirements listed here:

- printing of books on any heatset lithographic press;
- heatset lithographic presses with a maximum web width of up to 22 inches.

VOC Emission Standards for Other <u>Medium</u> Printers		
Material	Gravure and Flexographic	Screen
Printing Ink	(1) Volatiles in ink <25% VOC by volume (bv) and ≥ 75% bv of water; OR (2) ink, minus water, ≥ 60% nonvolatile material bv; OR (3) ≥ 90% destruction of VOCs bw, and overall control: a) ≥ 75% for publication rotogravure, b) ≥ 65% for packaging rotogravure, or c) ≥ 60% for flexographic.	≤ 400 g VOC/l (3.3 lbs VOC/gal)
Special Purpose Inks and Roll Coatings	NA	≤ 800 g VOC/l (6.7 lbs VOC/gal)
Industrial Cleaning	(1) Product cleaning or surface prep during manufacturing; repair or maintenance cleaning; ink application equipment cleaning: ≤ 50 g VOC/L (0.42 lb VOC/gal); (2) Except for the following ink application equipment cleaning: a) Publication rotogravure, except UV: ≤100 g VOC/L (0.83 lb VOC/gal); b) UV: ≤650 g VOC/L (5.4 lb VOC/gal); AND (3) Follow device and method requirements listed below the table.	(1) Product cleaning or surface prep during manufacturing: ≤ 50 g VOC/l (0.42 lb VOC/gal); (2) Repair or maintenance cleaning and Ink application equipment cleaning: ≤ 500 g VOC/l (4.2 lb VOC/gal); AND (3) Follow device and method requirements listed below the table; OR (4) Control VOC emissions by: ≥ 85% overall reduction of VOCs, with ≥ 90% capture of VOC and an outlet concentration of ≤ 50 ppmv as Carbon

In addition to the requirements in the tables above, **gravure, flexographic and screen printing** operations shall use the following **devices and methods** while conducting industrial solvent cleaning:

- 1) physically rub surface with a porous applicator such as rag, paper, sponge, or cotton swab moistened with solvent
- 2) closed containers or hand held spray bottles without propellant
- 3) cleaning equipment that is closed when in use, other than when depositing or removing objects to be cleaned
- 4) remote reservoir cleaner where:
 - a) cover or valve prevents solvent from evaporating
 - b) flow of solvent does not allow splashing
 - c) not used for porous or absorbent materials
 - d) all containers, including associated pumps, piping, and flanges, are free from leaks
 - e) used solvents are collected with a non-atomized flow method
 - f) flushing of used solvent into closed container in a manner that does not atomize the solvent

VOC Emission Standards for Other <u>Medium</u> Printers	
Material	Flexographic Packaging
Printing Ink	(1) 0.8 kg VOC/kg solids (0.8 lb VOC/lb solids) applied; OR (2) 0.16 kg VOC/kg material (0.16 lb VOC/lb material) applied; OR (3) Overall control efficiency of any capture and control device, on a) presses installed before March 14, 1995, and 1. controlled by device installed before August 1, 2009: 65% VOC bw, measured as Carbon (C) 2. controlled by device installed on or after August 1, 2009: 70% VOC bw, as C b) presses installed on or after March 14, 1995, and 1. controlled by device installed before August 1, 2009: 75% VOC bw, as C 2. controlled by device installed on or after August 1, 2009: 80% VOC bw, as C

Notwithstanding the limits in the tables above, a printer may use:

- up to 55 gallons **combined**, in any 12-month period, of inks, coatings, or clean-up solvents with a higher VOC content or vapor pressure than specified in the tables above
- if **printing on plastic**, up to 165 gallons of clean-up solvents with higher VOC or vapor pressure
- up to 110 gallons of **clean-up solvents** above the clean-up solvent limits on a 12-consecutive month rolling basis

My facility uses a control device to minimize emissions. What requirements apply?

If you are using a control device either to fit a VOC threshold by calculating actual emissions or to meet a VOC Emission Standard, then you must follow these requirements as they relate to operation and maintenance of the control device:

- **Operation:** Monitor the operation of all control devices to ensure they are operating properly.
 1. Thermal oxidizers – monitor combustion temperature once every 15 minutes.
 2. Catalytic oxidizers
 - a. monitor inlet temperature either once every 15 minutes, and
 - b. monitor catalyst bed reactivity based on the manufacturer's recommended methods.
 3. Calibrate or inspect measurement instruments. All instruments used to measure operational variables for air pollution control equipment shall be calibrated yearly or at a frequency based on good engineering practice as established by operational history, whichever is more frequent. When calibration is not appropriate, equipment must be inspected for proper operation.
- **Maintenance:** Maintain control devices as recommended by the manufacturer, or at a frequency based on good engineering practice as established by operational history, whichever is more frequent.
- **Records:** Temperature logs shall be kept electronically or on continuous hard copy printout at

the frequency indicated. Keep a log recording when maintenance takes place and provide details related to what actions were taken.

What must be done if a control device malfunctions or is not operating?

You must notify DNR by the next business day following any event that causes you to operate any part of your printing operation connected to a control device without operating the control device.

Operation without the control device may cause the facility to exceed emission standards unless they are:

1. operating without the control device to prevent explosions solely during cold start-up of the equipment, or
2. if the device is out of service, using only materials that meet the emission standards as applied until the device is back in service.

Records: Keep a log of when a control device has been shut down and restarted while the unit is still in operation. This information may be necessary to calculate actual emissions.

My facility cannot meet the VOC Emission Standards. What must be done?

Some facilities are able to meet the VOC emission standards by changing the materials used. Contact your supplier to see if materials that meet these standards are compatible with your operations.

If you cannot meet these standards, contact your trade association for assistance or the DNR's SBEAP.

Question A.3	<u>Medium Printers (and Small or Very Small printers calculating actual emissions and using a control device to determine size):</u> Are you meeting all applicable VOC emission standards listed in this section?	<input type="checkbox"/> Yes. Go to the next section. <input type="checkbox"/> No. Contact SBEAP for assistance.
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Section A2: Requirements for Fuel Combustion

Units used for plant heat, dryers, process steam, pollution control devices (such as oxidizers), or to run a generator and that burn fuels like natural gas, gasoline, distillate or diesel fuel oil have some additional requirements. In addition to state rules, there are two EPA regulations that may apply to boilers and reciprocating internal combustion engines (RICE).

My facility uses a heating unit that burns fossil fuels. What requirements apply?

Stacks for boilers or furnaces used for building and process heat that are vented outside must meet the following criteria:

- have upward *unobstructed* discharge points that are within 10 degrees of *vertical*
- are taller than all buildings, including the building to which the stack is connected, within a horizontal distance equal to five times the building height

Unobstructed stack means a stack without a rainhat or other cap. Valves designed to open and close at the point of discharge are not considered to be obstructions if they are open at the time of emission.

Vertical discharge means that a stack exhaust must be directed upwards, to within 10° of vertical.

These stack criteria are required in the Registration Operation Permit (ROP) for printers to protect ambient air quality standards. It is highly recommended that ALL printers meet these criteria if they have a stack that vents a fuel combustion unit. Roof top heating units or those that are hung from the roof inside a building are not subject to this requirement.

To determine if a stack meets the height criterion, multiply the building height by 5 and measure the height of any building within that distance.

For example: If you had a 25 foot stack on a 20 foot building, multiple 20 times 5. ($20 \times 5 = 100$ feet) In this example, the stack must be higher than any building within 100 feet in any direction.

If you meet the stack criteria and burn only natural gas or distillate fuel oil, your facility should be in compliance with the state rules.

EPA Boiler Rule

Beyond the stack criteria, boilers may be affected by the EPA Boiler Rule. By meeting the HAP thresholds listed previously in this chapter, you are considered an “area source” for the EPA Boiler Rule. An area source with boilers that only burn natural gas or only use fuel oil for back up (used less than 48 hours per year) does not have to meet the Boiler Rule. If you use fuels like wood or fuel oil for more than 48 hours per year, then you have to meet the requirements of the rule. EPA created a compliance guide for small entities complying with the Boiler Rule, found at:

<https://www.epa.gov/sites/production/files/2017-01/documents/area-boiler-compliance-guide.pdf>. You may still qualify under the ROP if you have to comply with the Boiler Rule. Contact SBEAP with questions.

EPA RICE Rule

If you do not have any generator engines on site, you can skip down to answer question A.5 below before moving on to the next section.

Facilities with emergency generators or other generators that are used to power the facility operations in case of an outage or upon request from the local electric utility, will have to comply with the EPA RICE Rule. The RICE Rule covers both HAP emissions standards (NESHAP) and New Source Performance Standards (NSPS). Different sections of the rule will affect the engines based on their size (horsepower), age, fuels (gasoline, diesel, natural gas) and intended use (limited, emergency, peak demand, etc). The rule only applies to stationary engines. You can learn more about these engine rules here: <https://www.epa.gov/stationary-engines/regulatory-actions-stationary-engines>.

To help you understand how emergency engines might be affected, follow the flowchart in Figure 1 below. A larger version of the flowchart is in the Cyan Ink Room section of this workbook.

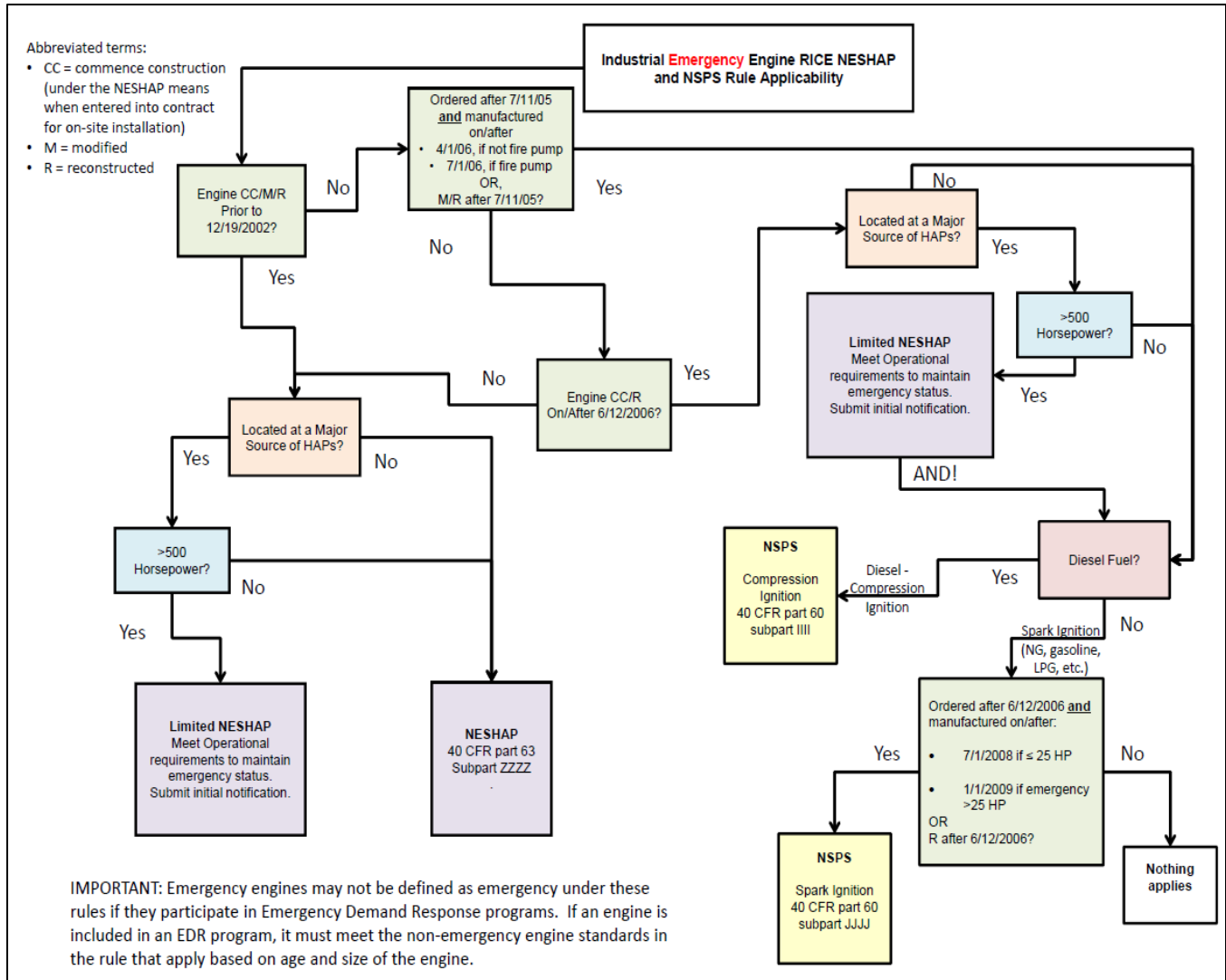


Figure 1: Industrial Emergency Engine RICE NESHAP and NSPS Applicability Flowchart

<p>Question A.4</p>	<p>Can you meet the requirements for fuel burning units?</p>	<p><input type="checkbox"/> Yes. Go to the next section.</p> <p><input type="checkbox"/> No. Contact SBEAP for assistance.</p>
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Section A3: Requirements for Particulate Matter Emissions Sources

Particulate matter (PM) is released from:

- heatset web offset press emissions due to ink oil, which is a condensable organic compound classified as particulate matter
- cutting and trimming operations, or from paper or other scrap collection systems
- spray powder ducted from sheetfed offset lithographic presses

What PM requirements apply if I have heatset web offset presses?

Heatset web offset presses use inks that release condensable organic materials as they pass through a dryer. These condensable organic materials form aerosols after they exit the dryer. These aerosols

are PM emissions. PM emissions from heatset web offset presses are significantly lower when a control device such as an oxidizer (incinerator) is used.

It is necessary to calculate the hourly PM emissions to determine if they protect the ambient air quality standards established by US EPA. Any press with emissions less than 0.5 lb/hr of PM from ink oil does not require modeling. Most controlled heatset presses should be able to meet that emission rate. Uncontrolled heatset presses may still be able to meet that rate, but only under limited conditions. The DNR has developed a special method to calculate the amount of the condensable PM released from heatset web offset presses.

How do I calculate my PM emissions from heatset web offset inks?

To simplify the calculations, a spreadsheet titled WI_HeatsetPMCalcs.xls is available at: http://dnr.wi.gov/topic/AirPermits/documents/WI_HeatsetPMCalc.xls. The spreadsheet calculates:

- ink usage rates and airflow from the dryer at which an uncontrolled press will have emissions below 0.5 lb/hr, and
- the control efficiency that must be achieved to keep emissions below 0.5 lb/hr

Refer to the calculations in the **Cyan Ink Room** section of this workbook to determine your emissions. The spreadsheet WI_HeatsetPMCalcs.xls is available electronically from the SBEAP. To contact the SBEAP for assistance call 1-855-889-3021.

I calculated my PM emissions. Now what?

Based on the results of your calculations, determine if your PM emissions are within the following parameters:

- PM emissions are below 0.5 lb/hr from each press exhaust stack
- Total actual PM emissions are less than 5 TPY, excluding those emissions from any heatset stack that is less than 0.5 lb/hr

If your emissions meet both criteria, your emissions fall below the level of the ambient standards, and nothing more must be done. If your emissions do not meet the criteria, proceed with one of the following options:

- Install a control device that meets the appropriate control efficiency shown in the worksheet
- Contact the SBEAP for assistance with determining additional actions you can take

Question A.5	Do you meet the requirements for PM from heatset presses?	<input type="checkbox"/> Yes. Go to the next section. <input type="checkbox"/> No. Contact SBEAP for assistance. <input type="checkbox"/> NA. We don't have heatset presses.
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Do you have a centralized waste paper handling system?

Most paper trim operations include collection devices, such as cyclones and vacuum pumps. The best way to minimize dust emissions is to use a cyclone and/or baghouse, if appropriate. When dust is removed from the air stream, the exhaust may be safely directed back into the building, and no additional requirements apply. An added benefit is a savings on heating costs in the winter.

If the air is not directed back into the facility, two actions are **recommended** to ensure that emissions to the ambient (outside) air from a paper trim system are minimized:

1. Use a fabric filter collection device as the final collector for fine paper dust
2. Incorporate the following design considerations into your final exhaust stack. (Refer back to page A-8 for details.)

- The stack should be taller than any building within a distance of five times the building height.
- Emissions should be directed upwards within 10 degrees of vertical.
- The stack should have an unobstructed opening for the exhaust.

If the paper trim system exhaust is directed inside the building all year, it is not considered a source of air pollution. If this is how your facility is designed, you may want to confirm that you meet any OSHA requirements that may apply.

NOTE: If you want to analyze your internal air quality, to protect your workers, you can receive a free inspection to measure how you comply with OSHA requirements for worker protection by contacting the Wisconsin Safety Consultation (WiSCon) Program at 1- 800-947-0553.

Do you have a sheetfed lithographic press using spray powder?

Most sheetfed presses will not capture the emissions from spray powder with a hood, so the PM emissions will remain indoors and not be regulated by EPA or DNR. Indoor emissions are regulated by OSHA as mentioned above for the paper trim systems.

If you do collect the emissions from spray powder on a sheetfed press, similar recommendations to those for the paper trim system would help to minimize the PM emissions.

Question A.6	Have you applied the recommended actions to minimize particulate matter?	<input type="checkbox"/> Yes. Go to the next section. <input type="checkbox"/> No. Apply recommended actions.
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Section A4: Requirements for Visible Emissions

Emissions from processes that can be seen are called visible emissions. These emissions may come from dust, fumes, mist, liquid, smoke, other particulate matter, vapor, gas or any combination of those materials. Steam is not considered a visible emission.

There are limits on how much light those visible emissions can block, or in other words, how much they obscure the view of an object in the background. The amount of light that is blocked is called "opacity." Operations older than April 1, 1972 can have up to 40% opacity, while newer operations can only have 20% opacity. Opacity can be measured through visual observation by trained individuals.

While the person doing the visual observations for opacity should be trained in the USEPA Method 9 for measuring visible emissions, these observations do not need to follow all the test criteria of Method 9.

What requirements apply to visible emissions?

Periodic observations should be conducted on a quarterly to annual basis, depending on the size of the printer and the amount of emissions, to determine if there are visible emissions. Visual observations should check for visible emissions from cyclone collectors used for dust collection from a paper trim system and for visible emissions from uncontrolled heatset web offset presses. If your facility has any detectable visible emissions, you may be required to perform a test to accurately measure the opacity.

- Very Small and Small Printers:** Visual observations are recommended at least once a year.
- Medium Printers:** If your facility's total PM emissions from uncontrolled heatset web offset presses are greater than 5 TPY, visual observations should be performed quarterly. Annual observations are acceptable for those with lower emissions.

Question A.7	Do you meet the visible emission requirements?	<input type="checkbox"/> Yes. Go to the next section. <input type="checkbox"/> No. Contact SBEAP for assistance.
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Section B: Hazardous Air Pollutants and State and Federal Rules

Hazardous Air Pollutants (HAPs) are VOCs, toxic metal compounds, or other chemicals emitted to the air that are considered hazardous to the environment and public health. Both EPA and DNR regulate HAPs. Refer to the Cyan Ink Room section for the list of regulated HAPs.

How do you know if you have any HAPs?

Review the SDS for each material used. In the section called “Hazardous Ingredients” on the SDS, all compounds determined to be hazardous by OSHA are listed. This list should include the amount of the HAP in the material, in percent by weight. If the material is listed in percent by volume, ask the supplier to convert it to percent by weight for you. HAPS may also be listed on SDS under a section called SARA Section 313 or Toxic Release Inventory. However, not all chemicals reportable under SARA Section 313 are state or federal HAPs.

Federal HAPs

To use this workbook, printers must meet the HAP thresholds listed in the Introduction. These threshold levels are no more than 50% of the major source threshold for federal HAPs. Printers that continue to meet those thresholds will meet federal HAP requirements. Nothing more is needed to show compliance with the federal HAP requirements.

State HAPs

The State of Wisconsin has enacted rules regulating HAPs. **All printers** must comply with these rules. The DNR lists 550+ chemicals determined to cause adverse health effects. As a result, facilities must reduce emissions if the emission thresholds of any of these chemicals are exceeded. Many printing inks, coatings, adhesives, and clean-up solvents can contain chemicals on the state HAP list. When these materials are used, HAPs might be emitted. Consult your SDS, as well as your manufacturer, to obtain information on these specific state HAPs. Continue reading for information on how to comply with the state HAPs.

My facility uses stacks to discharge emissions from printing presses. What state HAP requirements apply?

The state HAP rule lists thresholds based on stack height. To meet these thresholds, stacks must be *unobstructed* and have a *vertical* discharge point.

- **Unobstructed** stack: a stack without a rainhat or other cap. Valves designed to open and close at the point of discharge are not considered to be obstructions if they are open at the time of emission.
- **Vertical** discharge: a stack exhaust upwards, to within 10° of vertical.

If your stacks do not meet these criteria, you can either modify the stacks to make them vertical and unobstructed or you can run a computer model to determine if your emissions will meet the air quality standards established in the rule.

My facility doesn't use stacks; instead, presses are located in a large, open building with ventilation fans. What state HAP requirements apply?

If presses are all located in an open, warehouse-style building using general ventilation fans instead of stacks, those fugitive emissions are exempt from the state HAP requirements entirely. For facilities with a combination of general ventilation and presses vented to hoods and stacks, those vented to hoods and stacks still need to comply with the state HAP requirements. Some situations may not allow the indoor fugitive emissions to be exempt, so it may require a discussion with the DNR to confirm:

- when emissions are confined to a small area and do not mix with clean air from the larger open space, or
- when emissions are driven out of the building by fans or other forces before mixing with the clean indoor air.

If all your facility's HAP emissions are exempt, skip to the Reporting and Record Keeping Requirements in Section C.

Do I have to calculate state regulated HAP emissions from my fuels?

Fuel burning operations using fuels like natural gas, propane and distillate fuel oil are exempt from the state HAP rule requirements. If you use any other fuels at your facility, this workbook does not fit your printing operation. Printers using other fuels must obtain a traditional or General Operation Permit for their facility.

Section B1: Very Small Printers

Determining Compliance with State HAP Emission Standards

Very Small printers are required to meet only the Incidental Emission Standards, as outlined below.

Incidental Emission Standards

Refer to page A-2 for the Facility VOC Size Categories for Very Small Printers. The state HAP rule defines a category of Incidental Emitter as a facility with less than 3 TPY of VOC emissions, including controls. The category of Very Small Printers has the same threshold. Therefore, it can be said that a Very Small Printer is an Incidental Emitter under the state HAP rule. Information on the state HAP rule can be found at: <http://dnr.wi.gov/topic/airquality/toxics.html> under the State rule tab. There you can find a link to chapter NR 445 and some fact sheets to explain how to comply with the rule.

As an Incidental Emitter, a printer is only required to evaluate 80 compounds from the regulated list of over 550 to determine whether the facility is in compliance with the rule. The 80 compounds designated for evaluation by Incidental Emitters can be found in the HAP list in the Cyan Ink Room with an "E" in the "State HAP?" column. The HAPs Usage Threshold table starting on page A-16 lists regulated HAPs commonly found at printing facilities. HAPs that are solid, like Barium and Chromium, are NOT likely to be emitted from printing facilities' press operations. Therefore, thresholds are not given for these HAPs in the table below.

For each of the 80 HAPs selected, you must:

- determine the total normal usage of all materials containing that HAP
 - Normal usage might be measured in amounts used per hour, per 24-hour day, or per year.
 - Refer to the table below to determine the duration of measurement for each HAP.
- compare total usage with standards for that HAP shown on the table
- calculate usage for each HAP emitted at the facility

You must comply with the requirements for each HAP emitted at the facility. If usage totals for a HAP are less than amounts listed in the table, your facility is in compliance with the state rule for that HAP. If usage totals for a HAP are more than the amounts listed in the table, you may still be in compliance. Details on how to comply when a HAP is over the thresholds listed is described in the next section. For printers, if a HAP is not found in the materials used at the facility it is unlikely to be created in the process.

The total usage of a HAP-containing material at our facility exceeds the amount listed in the table. How do I determine if our facility is in compliance?

Even if your facility uses more of a HAP-containing material than the level in the HAPs Usage Threshold table, your facility might still meet state rule standards.

To determine if you still comply with state rule standards:

- determine which HAPs exceed usage thresholds in the list
- determine your total usage for all materials containing those HAPs
- determine the actual percentage of HAP content in your materials using data from SDSs
- calculate the actual emissions of each HAP emitted by the facility using the following equations
- compare the actual emissions to the thresholds listed in the table

The HAPs Usage Threshold table assumes the percentage of each HAP is 100%. If your HAPs content is less than 100%, the following calculation will determine the actual usage of the HAP that may show that usage is below the listed threshold.

$$\text{HAP Usage (gal/unit time)} = \text{Material usage (gal/unit time)} \times \% \text{ HAP in materials} / 100 \times \text{Emission factor}$$

If you are using a control device to reduce emissions, that equation gives you the uncontrolled HAP Usage. To calculate the controlled HAP Usage, use the result of the previous calculation and then use this equation:

$$\text{HAP Usage Controlled (gal/unit time)} = \text{HAP Usage Uncontrolled (gal/unit time)} \times [1 - (\text{capture efficiency} \times \text{destruction/removal efficiency})]$$

If the actual emissions of each HAP is less than the thresholds in the table, you are in compliance with the rule. Keep records on file that show how you performed the calculations.

If the emissions are still not below the thresholds, you will need additional assistance and possibly specific limits in an air permit to allow you to comply. Contact SBEAP for details.

HAPs Usage Threshold (assuming 100% HAP in material)			
NOTE: The value "gal/24 hr avg" in the table indicates the maximum number of gallons you may use in a 24 hour period and still not exceed the hourly average value in the rule.			
Chemical Name	CAS Number	Stacks < 25 ft	Stacks ≥ 25 ft to <40 ft
Compounds applicable to ALL printers:			
Acetaldehyde	75-07-0	0.48 gal/hr	1.52 gal/hr
		115.42 gal/yr	474.00 gal/yr
Acrylamide	79-06-1	0.0048 gal/ 24 hr avg	0.021 gal/24 hr avg
		0.1957 gal/yr	0.8029 gal/yr
Acrylic acid	79-10-7	1.087 gal/ 24 hr avg	42.1 gal/ 24 hr avg
		25.42 gal/yr	104.28 gal/yr

HAPs Usage Threshold (assuming 100% HAP in material)			
NOTE: The value "gal/24 hr avg" in the table indicates the maximum number of gallons you may use in a 24 hour period and still not exceed the hourly average value in the rule.			
Chemical Name	CAS Number	Stacks < 25 ft	Stacks ≥ 25 ft to <40 ft
Compounds applicable to ALL printers:			
Benzene	71-43-2	32.57 gal/yr	133.71 gal/yr
Cadmium and cadmium compounds	7440-43-9	Not emitted	Not emitted
Chromium (VI): Chromic acid mists and dissolved aerosols	7440-47-3	Not emitted	Not emitted
Chromium (VI): compounds and particulates	7440-47-3	Not emitted	Not emitted
Cobalt, elemental, and inorganic compounds	7440-48-4	Not emitted	Not emitted
Formaldehyde	50-00-0	19.57 gal/yr	80.28 gal/yr
Hydrogen chloride (Hydrochloric acid; Muriatic acid)	7647-01-0	0.0796 gal/hr	0.2529 gal/hr
		507.71 gal/yr	2085.71 gal/yr
Manganese, elemental and inorganic compounds, as Mn	7439-96-5	Not emitted	Not emitted
Methylene chloride (Dichloromethane)	75-09-2	31.98 gal/ 24 hr avg	124.11 gal/ 24 hr avg
		540.14 gal/yr	2218.85 gal/yr
Nitric acid	7697-37-2	0.95 gal/ 24 hr avg	3.70 gal/ 24 hr avg
Perchloroethylene (Tetrachloroethylene)	127-18-4	31.23 gal/ 24 hr avg	121.37 gal/ 24 hr avg
		43.0 gal/yr	176.71 gal/yr
Phosphoric acid	7664-38-2	0.185 gal/ 24 hr avg	0.71 gal/ 24 hr avg
		253.85 gal/yr	1042.85 gal/yr
2,4-/2,6-Toluene diisocyanate (TDI)	584-84-9	0.007 gal/ 24 hr avg	0.26 gal/ 24 hr avg
		23.14 gal/yr	94.85 gal/yr

Question A.8	Very Small Printers: Are your HAP emissions below all the thresholds for the compounds listed in the table on A-15 to A-16?	<input type="checkbox"/> Yes. <input type="checkbox"/> No. Contact SBEAP for assistance.
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Section B2: Small and Medium Printers

Determining Compliance with State HAP Emission Standards

Small and Medium printers must meet Incidental Emission Standards and additional requirements, as outlined below.

All Small and Medium printers must follow the procedures outlined above for Very Small Printers, but you must review the entire list of HAPs in the HAPs Usage Threshold table. Refer to page A-2 for the definitions of Small and Medium Printers.

If materials used by Small and Medium printers contain HAPs not included in the HAPs Usage Threshold table, those printers must review the full list of regulated HAPs found in the Cyan Ink Room section of this workbook.

Review each of your SDS in either Section 3, the Composition/Ingredients section, or Section 15, the Regulatory section, and compare compounds listed there to the list of compounds regulated by the state. For each compound on the SDS that is also listed on the state HAP list, you must calculate the emissions and compare them with the thresholds found in the state HAP rule. You will find spreadsheets in the Cyan Ink Room section of this workbook to help you with the calculations. Keep copies of all calculations you perform for this purpose.

HAPs Usage Threshold (assuming 100% HAP in material)			
NOTE: The value "gal/24 hr avg" in the table indicates the maximum number of gallons you may use in a 24 hour period and still not exceed the hourly average value in the rule.			
Chemical Name	CAS Number	Stacks < 25 ft	Stacks ≥ 25 ft to <40 ft
Compounds applicable to Small and Medium Printers ONLY:			
Ammonia	7664-41-7	3.20 gal/24 hr avg	12.44 gal/24 hr avg
		2538.42 gal/yr	10,428.57 gal/yr
Barium, soluble compounds, as Ba	7440-39-3	Not emitted	Not emitted
n-Butyl alcohol (n- Butanol)	71-36-3	1.61 gal/hr	5.14 gal/hr
Chloroform	67-66-3	8.98 gal/24 hr avg	34.96 gal/24 hr avg
		11.04 gal/yr	45.28 gal/yr
Copper and compounds, fume, as Cu	7440-50-8	Not emitted	Not emitted
Cumene (Isopropyl benzene)	98-82-8	45.25 gal/24 hr avg	175.88 gal/24 hr avg
Cyclohexanone	108-94-1	17.72 gal/24 hr avg	68.90 gal/24 hr avg
Dibutyl phthalate (Di-n- butyl phthalate)	84-74-2	0.921 gal/24 hr avg	3.566 gal/24 hr avg
Diethanolamine	111-42-2	0.367 gal/24 hr avg	1.43 gal/24 hr avg

HAPs Usage Threshold (assuming 100% HAP in material)			
NOTE: The value "gal/24 hr avg" in the table indicates the maximum number of gallons you may use in a 24 hour period and still not exceed the hourly average value in the rule.			
Chemical Name	CAS Number	Stacks < 25 ft	Stacks ≥ 25 ft to <40 ft
Compounds applicable to Small and Medium Printers ONLY:			
EGBE (2-Butoxyethanol; Ethylene glycol monobutyl ether; butyl cellosolve)	111-76-2	17.79 gal/24 hr avg	69.25 gal/24 hr avg
		329,990 gal/yr	1,355,700 gal/yr
EGEE (2-Ethoxyethanol; Ethylene glycol monoethyl ether; cellosolve)	110-80-5	3.39 gal/24 hr avg	13.20 gal/24 hr avg
		5076.85 gal/yr	20857.14 gal/yr
EGEEA (2-Ethoxyethyl acetate; Ethylene glycol monoethyl ether acetate; Cellosolve acetate)	111-15-9	4.97 gal/24 hr avg	19.33 gal/24 hr avg
Ethyl benzene	100-41-4	79.88 gal/24 hr avg	310.62 gal/24 hr avg
		25,384 gal/yr	104,285 gal/yr
Ethylene glycol vapor and aerosol	107-21-1	1.067 gal/hr	3.40 gal/hr
Glycol ethers	Not applicable	2857.14 gal/yr	2857.14 gal/yr
n-Hexane	110-54-3	32.46 gal/24 hr avg	126.17 gal/24 hr avg
		5076.85 gal/yr	20,857.14 gal/yr
Hydroquinone	123-31-9	0.367 gal/24 hr avg	1.43 gal/ 24 hr avg
Isobutyl alcohol	78-83-1	27.91 gal/ 24 hr avg	108.34 gal/ 24 hr avg
Isophorone	78-59-1	0.3014 gal/hr	0.9600 gal/hr
Lead compounds	7439-92-1	Not emitted	Not emitted
Methanol	67-56-1	2857.14 gal/yr	2857.14 gal/yr
Methyl chloroform (1,1,1- Trichloroethane; TCA)	71-55-6	2857.14 gal/yr	2857.14 gal/yr
Methyl isobutyl ketone (MIBK; Hexone)	108-10-1	37.71 gal/ 24 hr avg	146.40 gal/ 24 hr avg
Naphthalene	91-20-3	9.66 gal/ 24 hr avg	37.37 gal/ 24 hr avg
Phenol	108-95-2	3.53 gal/ 24 hr avg	13.78 gal/ 24 hr avg
Propylene oxide	75-56-9	8.74 gal/ 24 hr avg	33.97 gal/ 24 hr avg
		68.57 gal/yr	281.85 gal/yr
Stoddard Solvent	8052-41-3	105.60 gal/ 24 hr avg	408.00 gal/ 24 hr avg
Toluene	108-88-3	34.63 gal/ 24 hr avg	134.74 gal/ 24 hr avg
		10153.57 gal/yr	41714.28 gal/yr
Trimethyl benzene	25551-13-7	22.63 gal/ 24 hr avg	87.77 gal/ 24 hr avg

HAPs Usage Threshold (assuming 100% HAP in material)			
NOTE: The value "gal/24 hr avg" in the table indicates the maximum number of gallons you may use in a 24 hour period and still not exceed the hourly average value in the rule.			
Chemical Name	CAS Number	Stacks < 25 ft	Stacks ≥ 25 ft to <40 ft
Compounds applicable to Small and Medium Printers ONLY:			
Vinyl acetate	108-05-4	6.48 gal/ 24 hr avg	25.20 gal/ 24 hr avg
		5076.85 gal/yr	20857.14 gal/yr
Xylenes	1330-20-7	79.88 gal/ 24 hr avg	310.63 gal/ 24 hr avg

Compliance Check: Have you met the state HAP rule standards?

- Are all your HAP-containing materials or HAP usage amounts less than those listed in the table? OR
- Are your HAP emissions below threshold amounts in the rule?

If you answered yes to one of the questions above, you are in compliance, and you can continue to complete the self-evaluation form in this workbook. If you answered no, contact the SBEAP for assistance.

Question A.9	Small and Medium Printers: Are your HAP emissions below all the table thresholds shown on pages A-15 to -16 and A-17 to -19?	<input type="checkbox"/> Yes. <input type="checkbox"/> No. Contact SBEAP for assistance.
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Section C: Reporting and Record Keeping Requirements

Very Small, Small and Medium printers have different reporting and record keeping requirements.

Section C1: Reporting

To demonstrate eligibility for the ERP, all printers are required to report either your annual materials usage or actual emissions for the previous calendar year. Emissions must be reported through the DNR Switchboard. Learn more about the reporting system here: <https://dnr.wi.gov/topic/AirEmissions/>. Resources on the page provide information on how to enter emissions data. Contact SBEAP for assistance in getting set up in the DNR's reporting system.

Question A.10	Are you reporting air emissions via DNR's CRS?	<input type="checkbox"/> Yes. Go to next section. <input type="checkbox"/> No. Contact SBEAP for assistance.
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Section C2: Record Keeping Requirements

Printers in all size categories must keep all records onsite for at least five years and have them readily available for a DNR or EPA inspection. Maintain copies of Safety Data Sheets (SDS) on file for all VOC and HAP-containing materials used. Very Small and Small printers must keep basic records. Medium printers must keep more detailed records.

OSHA requires you to keep SDS for all products purchased or stored at your facility, not only press materials.

Very Small and Small printers must:

- keep purchase or usage records for the materials identified in the size category chart on page A-9 for the appropriate materials, such as inks, clean-up solutions, fountain solutions, fountain solution additives, coatings, and adhesives
- determine usage of all VOC and HAP-containing materials or calculate emissions on a calendar year basis

A sample record keeping format is available in the Cyan Ink Room section of this workbook.

Medium printers must:

- keep purchase or usage records for the materials identified in the size category chart on page A-9 for the appropriate materials, such as inks, clean-up solutions, fountain solutions, fountain solution additives, coatings, and adhesives
- determine usage of all VOC and HAP-containing materials or calculate emissions on a calendar year basis
- demonstrate that VOC emissions standards on page A-11 through A-14 are met, including records for control device monitoring if controls are used

If using the averaging method to determine fountain solution VOC content, keep specific records of the averages for each press.

To demonstrate that certain VOC emissions standards are met, Medium printers must use the VOC content or the vapor pressure measured in mmHg for the materials. This information is usually available on a SDS. However, if that information is not provided on a SDS, printers must either calculate those values and retain records of those calculations or request the information from the vendor. For guidance on alternative methods to calculate the VOC content and vapor pressure, see the Cyan Ink Room section of this workbook where calculation examples are provided.

Question A.11	Are you maintaining all records required for your size printer?	<input type="checkbox"/> Yes. Go to the next section. <input type="checkbox"/> No. Contact SBEAP for assistance.
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Section D: Permit Requirements

Facilities that emit air pollution and are not otherwise exempt are required to obtain some form of air pollution permit from DNR to operate or to change operations by adding new equipment or modifying current equipment.

Based on the permit rules as of August 2017, printers that fit in the Very Small and Small printer categories are exempt from permit requirements. Submitting the *Facility Details and Permit Actions Air Pollution Control Application* form, 4530-100, will satisfy the permit requirements for those printers. The form can be found on the Air Permit and Compliance Forms page <http://dnr.wi.gov/topic/AirPermits/Forms.html> or at the direct link <http://dnr.wi.gov/files/PDF/forms/4500/4530-100.pdf>.

Only Medium printers are required to have some form of permit. The following permits may be required:

Type C Registration Operation Permit for Printers (ROP-C)

Medium printers might be covered by the Type C Registration Operation Permit for Printers (ROP-C), if the facility meets all eligibility criteria. The ROP-C allows facilities to construct or modify operations without obtaining a separate construction permit, as long as actual emissions of all pollutants (VOCs,

HAPs and criteria pollutants) remain below the eligibility thresholds during each calendar year.

ROP-C

- A copy of the ROP-C is available at: <http://dnr.wi.gov/topic/AirPermits/documents/ROPRCPTtypeCFinal.pdf>.
- If a Medium Printer has any existing permits, these permits would be revoked prior to being issued coverage under the ROP-C. Contact **the Registration Permit Coordinator at DNR** for assistance with this process.
- Completing the ERP self-evaluation checklist will satisfy DNR requirements for annual permit compliance certification under the ROP-C.

There are two other ROP permits available, Type A and Type B, which lack some of the printer specific conditions. Lacking those printer conditions does not preclude a printer from being eligible for either ROP-A or ROP-B. Other differences should be carefully considered before applying for coverage:

- ROP-A has a lower threshold for HAP emissions, which may not provide sufficient capacity for use of certain inks or solvents
- ROP-B has a higher threshold for both criteria pollutants and HAP emissions, but has more stringent recordkeeping requirements

Could new or modified operations affect how my facility uses this workbook?

Yes. If a project to construct or modify operations causes emissions to exceed the thresholds for Medium printers, your facility would be ineligible for the ROP-C. However, if the construction or modification does not cause the facility to exceed the Medium printer thresholds, you can continue using the ROP-C and this workbook to comply with air pollution requirements.

Prior to beginning any work on such a project, you **MUST**:

1. Review the emissions from the project, and compare the project emissions as well as the facility emissions expected after the project to determine whether the facility will still fit in the Medium printer category or below and retain eligibility with the ROP-C or ROP-A.
2. If the facility will be considered a Medium printer (and ROP-C or ROP-A) after completing the construction project, you may proceed with the project and continue using this workbook.
3. If the facility will exceed the thresholds for a Medium printer, then you must apply for and receive a final Air Pollution Construction Permit before proceeding with the project:
 - a. Contact the DNR for information on the permit options, or go to the DNR website to view a list of available permits: <http://dnr.wi.gov/topic/AirPermits/Options.html>
 - b. You may have the option of applying for a traditional permit or a General Construction Permit.
 - c. Follow the conditions in the new Air Pollution Permit to demonstrate compliance, and discontinue using this workbook as your primary source of compliance assistance materials.

Question A.12	Have you applied for the appropriate permit or are you exempt?	<input type="checkbox"/> Yes. Go to the next section. <input type="checkbox"/> No. Contact SBEAP for assistance. <input type="checkbox"/> Not applicable. Facility is exempt.
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Section E: Best Management Practices

The following items are recommended best management practices (BMPs). Use the following checklist to review your progress on each item.

Process or procedure	Done	Needs Attention	Not Applicable
Do you reuse clean-up solvents?			
Do you recycle/reuse inks?			
Do you use water-based or other alternative inks?			

Question A.13	Have you adopted any of the recommended BMPs?	<input type="checkbox"/> Yes. Continue to the next chapter. <input type="checkbox"/> No. Consider recommended BMPs.
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