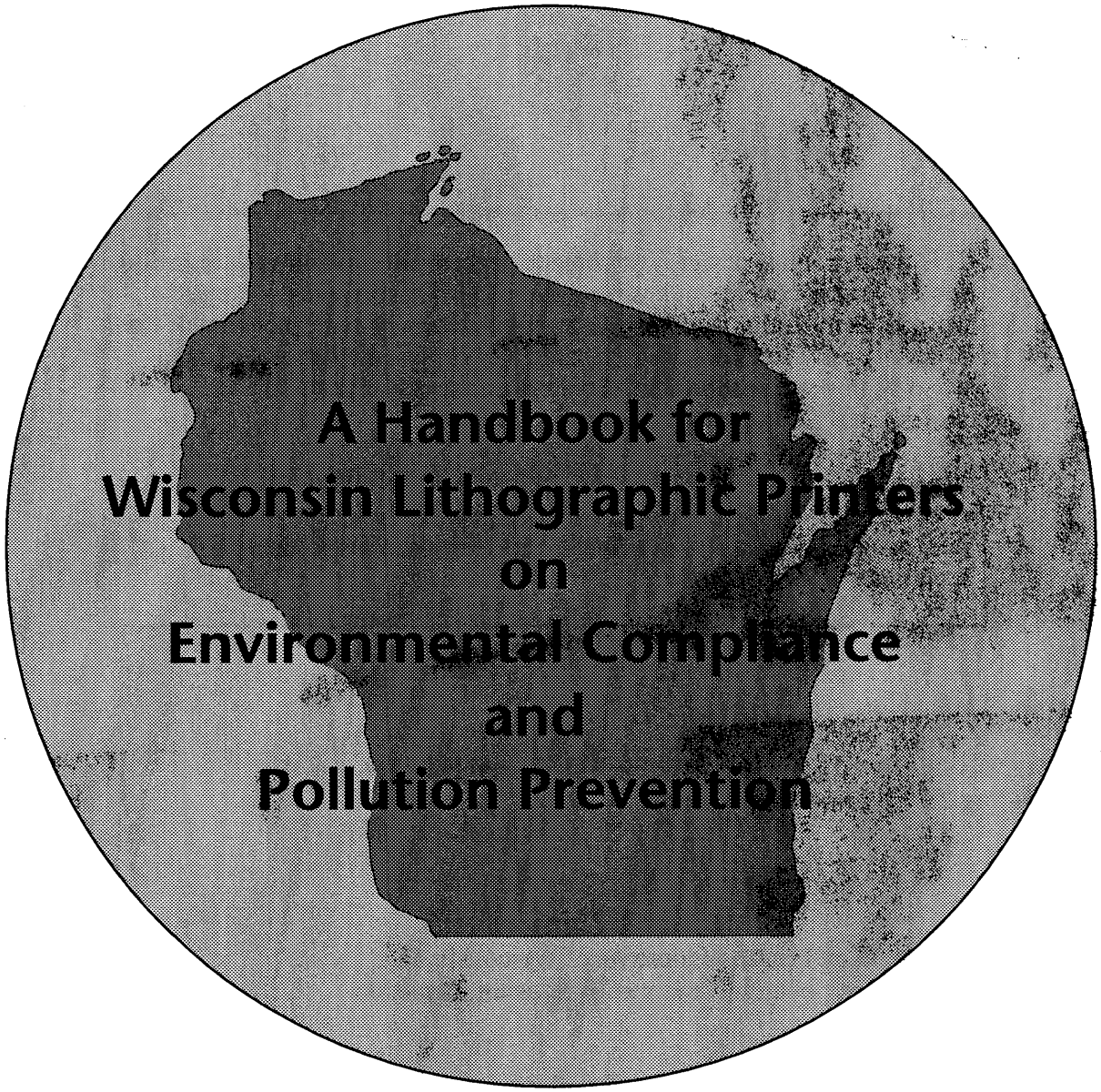
PRINT WI$eR



A Handbook for Wisconsin Lithographic Printers on Environmental Compliance and Pollution Prevention

Printed by a WISCONSIN GREAT PRINTER

Printed on Recycled Paper

This publication is designed to provide general information with regard to subject matter covered. It has been assembled and reviewed by experts from industry and government to promote accuracy and timeliness of the material presented. Although prepared and reviewed by knowledgeable persons, this publication should not be used as a substitute for professional service in specific situations.

The contents of this manual reflect the views of the authors and reviewers. PIW disclaims any and all responsibility for how the information is used. This handbook does not constitute a standard, specification, or regulation.

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How To Use This Handbook

In an attempt to make this Handbook as "user-friendly" as possible, it has been formatted so that the information is "at your fingertips" — in text, sidebars, worksheets and appendices. As an example, each chapter begins with a summary in the sidebar of what is covered in the chapter. This will help you determine whether or not you should continue or proceed to the next chapter. Nevertheless, for every user, it will take time and effort to get the most out of the Handbook, but your reward will be *knowing* that you are in compliance and that you are benefiting from applicable pollution prevention practices.

As you read and work through the material presented, you will see that the primary focus of the Handbook is to help you determine the regulatory compliance status of your printing operations. It will also help you to become more familiar with what you may have to do additionally as your operations expand and grow. Knowing where you stand with respect to regulatory limits and thresholds allows you to work smarter by applying pollution prevention principles and choosing products and activities that can help keep you below these limits and thresholds or help you comply with them.

After the introductory chapter there are five chapters dealing with key regulatory issues, beginning with air issues for printers. These are followed by two chapters covering environmental management, pollution prevention and waste reduction. The Handbook format includes sidebar information, visual aids, worksheets, and appendices.

Sidebar material (right-hand column) highlights the important points in the text and is designed to help you find key information more quickly.

Visual aids, such as tables and charts, are used throughout the Handbook to help you better understand the information presented.

Worksheets have been specifically designed for printers to help you collect, organize and manage the data you need to help meet regulatory requirements.

Appendices are designed to include the information most printers need to understand and comply with environmental regulations, including a glossary of terms used in the Handbook and many references for where you can get additional information and help.

You can help make this Handbook better. As you know, regulations and useful practices are continuously changing. The plan is to periodically update the Handbook and send out revised pages. This is the purpose of the three-ring-binder format so material can be added or removed as needed. If you have suggestions for making the Handbook more useful and easier to understand, please take the time to let us know.

We encourage your comments, suggestions and questions. Please contact Printing Industries of Wisconsin (PIW) at (414)785-9090, or UW-Extension, Solid & Hazardous Waste Education Center (SHWEC) at (608)262-0385, to work with us on this.

PRINT WI$eR

Table of Contents

Chapter 1: Introduction to PRINT WI$eR

Welcome to PRINT WI$eR — "A Handbook for Wisconsin Lithogrphic Printers on Environmental Compliance and Pollution Prevention" from Printing Industries of Wisconsin (PIW). PRINT WI$eR represents a PRINTers' initiative in WIsconsin that is cost effective ($) and environmentally sound, and that seeks to comply with applicable Regulations. It emphasizes the concept of continuous improvement.

Printers use chemicals, emit air pollutants, run machine tools, operate presses and vehicles, generate solid and hazardous wastes and contribute to a common problem that is subject to regulation. Ask yourself:

- Do you know if you are in compliance with environmental regulations?
- Do you know which regulations apply to your operations?
- If you don't need to comply with a regulation, can you prove it?
- Are your material costs as low as they can be?
- Do the costs of your wastes (generation, storage, disposal, reporting) need improvement?

This Handbook is intended to:

- help you sort through the maze of environmental regulations that may apply to your shop, and
- help you understand how to comply with these regulations.

It centers on the theme of being and staying in compliance, which is built on:

- principles of pollution prevention, and
- a continuous effort of making environmental improvement.

PIW has prepared this Handbook in cooperation with the UW-Extension Solid and Hazardous Waste Education Center (SHWEC) and the Wisconsin Department of Natural Resources (WDNR). This effort is part of the Wisconsin Great Printers Project which includes PIW, SHWEC, WDNR, and Wisconsin Citizens for a Better Environment (CBE) as partners.

For more help as you use this Handbook, contact:

- PIW 414/785-9090
- SHWEC 608/262-0385
- DNR 608/355-0811 (printing sector specialist)

What's in this Handbook?

- Rules you need to know and apply
- Steps to determine compliance
- Worksheets to confirm status
- Suggestions for further improvements
- Guidelines for an "environmentally sound" operation

1. The Great Printers Project

What is the Great Printers Project? It is an outgrowth of joint efforts between the printing industry, Great Lakes Governors, and environmental organizations.

The purpose of the project is to make waste reduction the primary choice of the lithographic printing industry in meeting and exceeding its environmental and human health protection responsibilities throughout the Great Lakes region.

This Handbook has been prepared to make compliance with regulations more understandable and to help information flow between printers, suppliers and customers.

What must you do to be a Wisconsin Great Printer?

You must show your customers and your community a commitment to continuous improvement and to the environment. As a Great Printer you do your best to comply with environmental, health and safety laws.

You agree to look for and try to use materials, methods, and equipment that offer economic and environmental advantages over current practices.

A Great Printer follows the Great Printing Principles. This entails a periodic evaluation and reevaluation of your current business and compliance status in order to track your progress.

What is the process for becoming a Wisconsin Great Printer?

A printer must complete a commitment form which is available from PIW and its partners. For your convenience a copy has been included in Appendix A. This commitment must be renewed annually. Once the commitment has been signed, the printer will receive assistance in the form of:

- an environmental compliance checklist to be completed and returned to PIW.
- a certificate for display from the Great Printers Project.
- pollution prevention checklist to be completed and returned to PIW.
- brochures to encourage your customers to ask about the Great Printers principles.
- access to educational workshops.

Great Printers Principles

The goals of a Great Printer are:

- Comply with applicable environmental, health, and safety laws.
- Go beyond compliance by employing the most environmentally sound practices consistent with the following management principles:
  1) Maximize source reduction.
  2) Reuse/recycle waste that can't be prevented.
  3) Maximize energy efficiency in shop.
- Seek continuous environmental improvement through periodic assessment of operations, materials, and products by drawing on information from employees, suppliers, consumers, and neighbors.

2. Compliance — Do it Right the First Time and Save!

This Handbook provides the fundamentals you need to know to make certain your shop is in compliance with environmental regulations. Compliance with regulations is an important first step towards being a Wisconsin Great Printer, but the competitive opportunities for printers go beyond compliance.

As the industrialist Henry Ford once said, "If it doesn't produce value, it's waste." This holds true for all manufacturers, including printers. Prevention of waste cuts your raw material costs, cuts the cost of managing and disposing wastes, reduces liabilities and risks, and relieves the regulatory hassles of disposing or releasing waste. Your customers will be the ultimate beneficiary of lower costs and your environmental stewardship.

One may be tempted to say that Henry Ford's philosophy is great, but he did not have to deal with all of today's regulations. One might be overwhelmed and confused by the complexity of the environmental regulations that affect the printing industry. Understanding and complying with regulations may be particularly difficult for the many printers who do not enjoy the services of a full-time environmental professional.

For those printers who want to do the right thing but don't know exactly what "the right thing" is, this Handbook provides specific information to help you understand the regulations and how to comply. **Chapters 2 through 6 of this Handbook address the major compliance issues faced by the departments in your shop**. By completing the worksheets provided you will have established a baseline understanding of current waste generation and emissions and the regulations that apply to your shop. **Plus**, you will be poised to take the next steps towards reducing waste as Ford suggested.

This Handbook provides the fundamentals you need to know to make certain your shop is in compliance with environmental regulations.

"If it doesn't produce value, it's a waste."
- Henry Ford

To get started, complete the worksheets in:

Chapter 2: Air Issues for Printers

Chapter 3: Hazardous Waste Management

3. Your Shop Can PRINT WI$eR

Doing the right thing can be "green" both in terms of environmental benefits and in terms of profitability. By understanding your compliance requirements and your wastes you will have taken a major step towards an effective **Environmental Management System (EMS)**.

An EMS contains all the elements and objectives of existing management systems, but adds an environmental dimension. It contains a documented set of policies, procedures and methods of operation that will help your shop achieve its goals. In addition to a conventional system, an EMS provides a mechanism for being compliant with environmental regulations, reducing liabilities, incorporating **pollution prevention** practices and techniques, having better community relations and a real possibility of bottom line savings.

Pollution prevention is a source reduction concept that should not be confused with pollution control. Pollution prevention involves changes in behavior, materials, processes and other waste generating factors that reduce or eliminate a waste. Pollution prevention adds value to the product, whereas pollution control takes value away from a product. Pollution control treats a waste after it is already a fact.

Every printer should strive to run an "environmentally sound operation." You don't have to be an engineer — or a lawyer — to make your shop's operation environmentally sound. But you do have to care about saving raw materials while reducing waste; you have to care about providing a cleaner, safer workplace for your employees and neighbors; and you have to care about reducing your exposure to civil and criminal penalties.

Pollution prevention adds value to a product, whereas, pollution control takes value away from a product.

For more information on EMS and pollution prevention, see Chapters 7 and 8.

You can be green *and* profitable!

Chapter 2: Air Issues for Printers

Lithographic printers in Wisconsin and throughout the United States are faced with a variety of air regulations. The press room is the greatest source of air emissions from a printing facility. The inks, fountain solutions, and solvents used in offset printing contain volatile organic compounds (VOCs), which when emitted to the atmosphere contribute to ground-level ozone, or smog. Even so-called environmentally friendly products, such as soy inks, aqueous coatings, and alcohol replacements contain some VOCs.

Although most individual print shops contribute very little to the degradation of air quality, the industry as a whole can have a significant impact. Therefore, air regulations and policies necessary for tracking and reducing air pollution have been developed for the printing industry. However, many of these regulations do not affect smaller print shops in the state, which brings us to two very important questions.

1. Do you know if you are among those print shops that are affected by air regulations?

2. What can you do, regardless of your regulated status, to reduce emissions from your printing operations?

These are two very important questions that some printers may have had difficulty answering in the past. This Handbook will take you through the steps that are necessary to determine where you stand with respect to air regulations in the state of Wisconsin. In addition, this Handbook will provide you with information that will allow you to assess the benefits of reducing emissions from your printing operations, regardless of your regulated status.

There are many benefits to addressing both of these questions right now! For instance, many printers will **claim** to have too small of an operation to be regulated, **but they don't really know for sure** where they stand with respect to regulatory thresholds that could put them into a regulated status. This assumption can become particularly risky for those shops that are experiencing incremental growth… it becomes difficult for them to know at what point they change from being a smaller unregulated printer to a larger regulated printer that needs to be aware of and be in compliance with air regulations.

Two questions need to be considered:

- Do you know if you are among those print shops that are affected by air regulations?
- What can you do regardless of your regulated status to reduce emissions from your printing facility?

Air issues for printers are described in the following sections:

Now, you can stop worrying about your liability — about whether or not you are following regulations and doing the "right thing" for the environment. This Handbook is intended to make it easier for you to know which regulations apply to you, and which ones don't.

If you do have to follow some regulations, you will want to know exactly what compliance options are available to you. This Handbook will identify options, and you may be surprised about one of them: pollution prevention.

Even if you aren't in a highly regulated status, you will want to consider the pollution prevention opportunities available to you. The waste minimization and pollution prevention recommendations provided in this Handbook can help you remain within a non-regulated status, even with incremental growth. Pollution prevention activities can help you enjoy the full benefits of growth with less worries about how your growth is affecting your regulatory status.

The pollution prevention recommendations provided within this Handbook will not only help you reduce your air emissions, but may also lessen your production costs, and as such, improve the competitiveness of your printing operation.

By addressing these issues RIGHT NOW a printer can

- reduce its regulatory uncertainty and liability
- reduce emissions

This Handbook will inform you :

- Which regulations you have to follow and which you don't
- Your compliance options when confronted with the need to comply with air regulations
- Pollution prevention opportunities for reducing air emissions

1. How Do Printers Affect Air Quality?

Printers use products that contain volatile organic compounds (VOCs), also known as reactive organic gases (ROGs). Principle sources of VOCs include inks, varnishes, coatings, fountain solutions, blanket/roller wash, and cleanup solvents.

When VOCs are released from printing plants, they impact air quality. VOCs can combine with nitrogen oxides found in automobile exhaust to produce smog. This reaction must take place in the presence of sunlight, which is why smog (ozone) alert days occur most frequently during the summer within highly populated areas where heavy traffic causes high concentrations of auto exhaust.

Companies in many industries that emit VOCs are **required to report their emissions** to the Wisconsin Department of Natural Resources (WDNR) in order for scientists to better understand the relationship between smog (ozone) alert days and industrial emissions. Printers that emit greater than 3 tons of VOCs per year are required to complete these annual reports. Do you know the quantity of VOC emissions from your printing plant?

In addition to VOC emissions, printers may also be emitting air contaminants known as hazardous air pollutants (HAPs). Common sources of HAPs in printing include: (1) fountain solution concentrates that contain alcohol substitutes, such as glycol ethers, (2) metering roller cleaners that contain methylene chloride, and (3) inkjet printing fluids that contain methyl ethyl ketone.

Although sometimes present in the products mentioned above, HAPs are generally not a big factor for most printers. As a general rule, organic HAPs content in printing products is usually less than total VOC content. Therefore, if you know your printing plant's level of VOC emissions, you have begun to identify the maximum level at which you could be emitting HAPs.

To run an environmentally sound printing operation, it is important to know <u>what</u> and <u>how much</u> you are emitting from your facility.

Printers use products that contain Volatile Organic Compounds:
- inks/varnishes/ coatings
- fountain solutions
- blanket/roller washes

VOCs combine with NOx, a component of auto-exhaust, in the presence of sunlight to create smog.

Offset printers may find Hazardous Air Pollutants in the products that they use:
- fountain solution concentrates/alcohol substitutes may contain ethylene-based glycol ethers
- metering roller cleaners may contain methylene chloride
- inkjet printing fluids may contain methyl ethyl ketone

Know your products and how you are affecting the environment!

2. Pre-press, Pressroom, Finishing: Air Issues Summary

Pre-Press

Air pollution is not a significant issue in the pre-press department of most printers. If you operate a pre-press "house" where you develop films and make plates in very large quantities, you will have to be more concerned with air emissions. Pre-press chemicals are more of a health concern for employees than an emission concern for the printing plant. The VOCs in pre-press chemistries typically remain in solution and do not contribute to overall VOC emissions from the printing plant. Tips, recommendations and opportunities to reduce VOC emissions and the amount of chemicals that are used in pre-press operations can be found in Chapter 8, section 5.

If you operate a pre-press "house" where you develop films and make plates in very large quantities, you will have to be more concerned with air emissions.

Pressroom

The sources of VOC emissions from the pressroom include: ink, varnish, coatings, fountain solution (alcohol, alcohol substitutes, etch, etc.), and automatic and manual blanket and roller washes. For a complete understanding of the air issues affecting printers, read all of Chapter 2.

Most air emissions from printing actually occur during the cleanup process. As the blanket wash, roller wash and other cleanup solvents are being used they evaporate into the printing plant. This evaporation can result in the loss of tons of solvents each year from a medium sized printer. In addition, these products are costly to replace. One way to reduce emissions and costs associated with blanket/roller washes is to use solvents with a low vapor pressure. According to Jeff Adrian of The John Roberts Company, buying blanket/roller wash with a low vapor pressure can save money. They currently use a cleaning solvent blend with a vapor pressure of less than 4 mm Hg. Other tips for reducing VOC emissions from make-ready and printing can be found in Chapter 8, section 6.

The largest contributor of air emissions from printing actually occurs during the cleanup process.

Finishing

You should be aware of emissions from post-press activities in the bindery. If ink jet printing is performed as part of post-press operations, it can be a significant source of VOC emissions. You should also be sure to check your Material Safety Data Sheets (MSDSs) for adhesives to identify any health concerns from glue emissions. To reduce VOC emissions from the finishing department, use low or no-VOC adhesives, such as water-based glues, rather than solvent-based glues.

If ink jet printing is performed as part of post-press operations, it can be a significant source of VOC emissions.

Use low or no-VOC adhesives, such as water-based glues, rather than solvent-based glues

3. How Do I Determine My Plant's VOC Emissions?

First of all, you may be asking yourself: *"Why do I need to determine my plant's VOC emissions?"*

The answer is quite simple: *"If you don't know the quantity of VOC emissions from your printing plant, you run the risk of being out of compliance with WDNR air regulations."*

Your level of emissions determines which requirements you need to comply with, as summarized below:

Emissions level lbs/year (tons/yr)	Summary of Regulatory Implication
6,000 (3 TPY)	Report air emissions annually
10,000 (5 TPY)	Pay fees on a per ton basis for emissions
20,000 (10 TPY)	Apply for a Non-part 70 (minor source) operation permit
20,000 (10 TPY) MTE in ozone nonattainment area	Comply with RACT Requirements (MTE = maximum theoretical emissions)
50,000 (25 TPY) in ozone nonattainment area	Apply for a Major Source Operation Permit

Note: TPY = tons per year.

If your printing facility's VOC emissions exceed 6,000 pounds per year (3 TPY), you need to report your level of emissions annually to WDNR. If your emissions are greater than 10,000 pounds per year (5 TPY), you will need to become familiar with the additional requirements described above.

Don't worry if these requirements are not familiar to you. **This Handbook will describe each requirement in detail.** If you have questions, you can always contact PIW, but first take the time to read through this chapter.

An approach for calculating your VOC emissions is presented in the Air Emission Worksheets (Worksheets 2-1 through 2-8) included in Appendix 2A. You can use this method or choose another, but make sure you identify and quantify emissions from your printing plant.

If you already know your facility's level of VOC emissions, you can skip Worksheets 2-1 through 2-7. You should complete Worksheet 2-8, however.

If you don't know the quantity of VOC emissions from your printing plant, you run the risk of being out of compliance with WDNR air regulations.

This Handbook will walk you through the steps of determining your emissions and your compliance requirements.

Printers that have completed an annual air emissions inventory should have an accurate accounting of their VOC emissions. Most web printers fall into this category; therefore, guidelines for calculating the VOC emissions from a web printer have not been included in this Handbook. However, web printers and sheetfed printers alike are encouraged to review the WDNR document in Appendix 2B (Guidelines for Determining Emissions from Lithographic Printing Facilities) to ensure that their method of calculating emissions is consistent with the emission factors and assumptions used by WDNR.

In addition to clarifying the air permitting issue, calculating your VOC emissions will help you to identify sources of pollution from your printing plant. This will present opportunities to evaluate these sources in light of pollution prevention recommendations made in this Handbook.

It is **recommended** that **all sheetfed printers** complete all the Air Emission Worksheets in Appendix 2-B, but small shops may want to make a **rough estimate** of their emissions first.

Table 1 on the following page is designed to allow a small printer to estimate its emissions. If the estimate returns a result of 4000 pounds per year or more, you are advised to complete the Worksheets (Forms 2-1 through 2-8) to determine the exact level of your air emissions and which regulations you have to follow.

If your rough estimate is 4000 pounds per year or less, you can safely assume that you are too small to be regulated by WDNR air regulations. Nonetheless, you are encouraged to complete the Worksheets (Worksheets 2-1 through 2-8) in order to obtain a better understanding of the relationship between product consumption and VOC emissions.

Understanding which products *generate* VOC emissions can help you to understand which pollution prevention recommendations may help you *reduce* VOC emissions.

PIW strongly recommends that every printing plant — regardless of size — have **written documentation of its actual emissions**. Table 1 on the following page or the Air Emission Worksheets in Appendix 2A provide such documentation.

Sheetfed Printers should complete Table 1: "Rough" Estimate of VOC Emissions, before continuing!

Table 1: Rough Estimate of VOC Emissions (from sheetfed printers)

(An example of how to fill in Table 1 is provided on the next page.)

Type of Product	Annual Use		Multiplier		Lbs. VOC emitted
Ink/ varnish (lbs)		x	0.01	=[1]	
Water-based coatings (gals.)		x	1.0	=[2]	
Isopropyl alcohol (gals.)		x	6.7	=[3]	
Alcohol substitute (gals.)		x	1.25	=[4]	
Blanket/roller wash or other solvents (gals.)		x	4.5	=[5]	
			Total	=	

If your rough estimate equals 4000 pounds or less, completing Worksheets 2-1 through 2-7 is optional, but recommended in order to obtain a better understanding of the source of VOC emissions from your facility.

HINT: If you already know your printing facility's actual and maximum theoretical annual air emission levels, review Appendix 2B to ensure that your estimate is consistent with WDNR assumptions. Then skip to Worksheet 2-8 to confirm that you are complying with applicable regulations.

[1] Factor of 0.01 based on 20% VOCs with 95% retention.
[2] Factor of 1.0 based on 8.34 lb/gallon weight and 12% VOCs; no retention with water-based coatings.
[3] Factor of 6.7 represents VOCs in lbs/gallon.
[4] Factor of 1.25 based on 8.34 lb/gallon weight and 15%VOCs.
[5] Factor of 4.5 based on 7.5 lb/gal VOCs and 40% retention of solvent in shop towels shipped offsite.

Sheetfed printers should complete Table 1 on the previous page to obtain a rough estimate of VOC emissions.

The Example table below provides guidance on how to complete Table 1.

Annual usage of products used in this example:
- 20,000 pounds of ink used
- 5 drums of water-based coatings (275 gallons)
- 3 drums of Isopropyl alcohol (165 gallons)
- 75 gallons of alcohol substitutes
- 15 drums of press wash (875 gallons)

Example Table 1: Rough Estimate of VOC Emissions (for sheetfed printers)

Type of Product	Annual Use		Multiplier		Lbs. VOC emitted
Ink/ varnish (lbs)	*20,000*	x	0.01	=[1]	*200*
Water-based coatings (gals.)	*275*	x	1.0	=[2]	*275*
Isopropyl alcohol (gals.)	*165*	x	6.7	=[3]	*1105.5*
Alcohol substitute (gals.)	*75*	x	1.25	=[4]	*93.75*
Blanket/roller wash or other solvents (gals.)	*825*	x	4.5	=[5]	*3712.5*
			Total	=	*5386.75*

We have provided a "blueprint" for you to calculate and document your VOC emissions. If your emissions estimate is larger than 4000 pounds per year, or you want a better understanding of the relationship between consumptive use of printing products and air emissions, **work through and complete the Air Emission Worksheets in Appendix 2A.** The following information will be needed: Material Safety Data Sheets (MSDSs) for the products that you use and invoices for a 12-month period of purchases of inks, varnishes, coatings and pressroom chemicals such as alcohol, alcohol substitutes, blanket/roller wash, etc. Your supplier should be able to help you obtain any missing MSDSs, and may be able to summarize for you the quantities that you have purchased.

[1] Factor of 0.01 based on 20% VOCs with 95% retention.
[2] Factor of 1.0 based on 8.34 lb/gallon weight and 12% VOCs; no retention with water-based coatings.
[3] Factor of 6.7 represents VOCs in lbs/gallon.
[4] Factor of 1.25 based on 8.34 lb/gallon weight and 15%VOCs.
[5] Factor of 4.5 based on 7.5 lb/gal VOCs and 40% retention of solvent in shop towels shipped offsite.

Gather this information in order to complete the Worksheets in Appendix 2A:

- Material Safety Data Sheets (MSDSs) for the products that you use
- Invoices for a 12-month period of purchases of inks, varnishes, coatings and pressroom chemicals such as alcohol, alcohol substitutes, blanket/roller wash, etc.

4. The U.S. Clean Air Act

Air pollution in the United States has been regulated on the federal level since the early 1970s. In 1970 Congress passed a law, the Clean Air Act, that required the states to enact air pollution control programs. The Clean Air Act represented a partnership between federal and state agencies.

Under the Clean Air Act, the federal government sets air quality standards for specific pollutants, known as National Ambient Air Quality Standards (NAAQS). States develop a plan, known as a state implementation plan, to bring all areas of the state into compliance with the air pollution standards.

The underlying strategy of the Clean Air Act is to bring "dirty" air areas into compliance with the federal standards while at the same time preventing "clean" air areas from becoming dirty. To implement this strategy, the Clean Air Act has been periodically amended. The most recent revisions occurred in 1990. The 1990 Clean Air Act Amendments resulted in significant changes to the federal air program.

Under the Clean Air Act, "clean air" is defined in terms of a numerical standard. By having such standards, the act essentially divided the country into "clean" and "dirty" air areas. In clean air areas (called attainment areas), the existing air quality is better than the standard. As stated above, air quality in attainment areas is not allowed to deteriorate. In dirty air areas (called nonattainment areas), the existing air quality is worse than the standard. These areas are more strictly regulated so that they will eventually meet the established air quality standards.

An area, for the purposes of air regulation, generally consists of one or more counties. Each area can be clean or dirty for any one of six pollutants: sulfur dioxide, particulate matter (PM10), carbon monoxide, ozone, nitrogen oxide, and lead. Printers emit VOCs which contribute to the generation of ground level ozone, or smog. **Printers need to know if they are located in an attainment or nonattainment area for ozone because nonattainment areas are more heavily regulated.**

In Wisconsin, the ozone nonattainment area currently includes the following counties:

Milwaukee
Washington
Ozaukee
Racine
Kenosha
Waukesha
Manitowoc

For purposes of RACT applicability, **Kewaunee and Sheboygan** are also added to this list.

The Clean Air Act of 1970 required states to develop air pollution control programs. The 1990 Amendments required the adoption of a permit program for air pollution sources, including medium and large printers.

The DNR implements the clean air program in Wisconsin.

Attainment areas are “clean” air areas where air quality is better than the federal standard.

Nonattainment areas are “dirty” air areas where air quality does not meet the federal standard.

For the ozone standard, nonattainment areas are further classified into categories that are based on how far the area deviates from the air quality standard. These categories are termed: marginal, moderate, serious, severe, and extreme.

To bring nonattainment areas into compliance with the federal standard, Wisconsin has developed emissions control programs that reduce air pollution from medium and large existing sources and limit new pollution sources. The **Lithographic Printing RACT Rule**, which affects printers in the nonattainment counties of Southeastern Wisconsin, is one example of a state regulation that targets an area of the state that does not meet the federal air quality standards for ozone. More information is provided about the RACT Rule in section 5 of this chapter.

One element of the Clean Air Act Amendments of 1990 that affects printers is the mandate for a series of regulations requiring **operation permits** for both new and existing air pollution sources. In the permitting process, printers located in nonattainment areas face stricter regulations than those in attainment areas of the state, if they are major sources. Printers that have VOC emissions of 25 tons or more per year are major sources in severe ozone nonattainment areas, while printers in attainment areas do not become major sources until VOC emissions reach 100 tons or more per year. Because of this size classification, smaller printers can be major sources in nonattainment areas.

In general, major sources are the most highly regulated, minor sources are less strictly controlled, and exempt sources are relieved from many regulatory requirements. Finally, to fund air management programs in states, fees are collected for emissions released as well as for agency review of permit applications and issuance of permits.

The **Lithographic Printing RACT Rule** is a state regulation that targets an area of the state that does not meet the federal air quality standards for ozone.

Clean Air Act Amendments of 1990 requir es printers to get operation permits for both new and existing air pollution sources.

Nonattainment areas within the state are more strictly regulated than attainment areas.

5. Air Regulations that Affect Printers

This section contains a brief synopsis of the existing air regulations which may impact lithographic printers (SIC 2752) in the State of Wisconsin. Some of these regulations are general in nature and do not require specific actions on behalf of printers. If you have completed the Air Emissions Worksheets, including Worksheet 2-8, you will begin to have an idea of whether your level of VOC emissions requires you to comply with those regulations under which specific actions need to be taken.

Table 2 lists WDNR Air Regulations that may affect lithographic printers. Tables 3 and 4 describe to what extent these regulations are applicable to printers, based on geographic location (attainment vs. non-attainment area) and size (quantity of VOC emissions per calendar year). A narrative summary of these regulations follows the tables.

Table 2. Names of NR 400 Series WDNR Air Regulations for Printers.

Administrative Code	Name of NR 400 Series Regulation
NR 404	Ambient Air Quality
NR 405	Prevention of Significant Deterioration
NR 406	Construction Permits
NR 407	Operation Permits
NR 408	Construction Permits for Direct Major Sources in Nonattainment Areas
NR 410	Air Permit, Emission and Inspection Fees
NR 415	Control of Particulate Emissions
NR 419	Control of Organic Compound Emissions
NR 422	Control of Organic Compound Emissions from. . . Printing . . . Operations
NR 424	Control of Organic Compound Emissions from Process Lines
NR 425	Compliance Schedules, Delays, Exceptions and Internal Offsets for Organic Compound Emission Sources in Chs. NR 419 to 424
NR 429	Malodorous Emissions and Open Burning
NR 431	Control of Visible Emissions
NR 438	Air Contaminant Emission Inventory Reporting Requirements
NR 439	Reporting, Recordkeeping, Testing, Inspection and Determination of Compliance Requirements
NR 445	Control of Hazardous Pollutants

Table 3. WDNR Air Regulations for Printers Located In Ozone Nonattainment Counties (Kenosha, Milwaukee, Ozaukee, Manitowac, Racine, Washington, and Waukesha – and for RACT applicability, Sheboygan and Kewaunee are included).

Applicability Table for Printers (SIC 2752)

Administrative Code	Very Small Printer (3 or less tons of VOC emissions)	Small Printer (more than 3, but less than 10 tons of VOC emissions)	Medium Printer (more than 10, but *less than 25* tons of VOC emissions)	Large Printer (*more than 25* tons of VOC emissions)
NR 404			4	4
NR 405				
NR 406			4	44
NR 407			44	444
NR 408			4	444
NR 410		4	4	4
NR 415			4	4
NR 419	4	4	4	4
NR 422		4	44	44
NR 424	4	4	4	444
NR 425		4	4	4
NR 429		4	4	444
NR 431		4	4	4
NR 438	4	4	4	44
NR 439	4	4	4	44
NR 445			4	444

Note: Number of checks (4) indicates relative importance of regulation to printers of different sizes.

A narrative description of how these regulations affect printers follows these tables. Also see section 6.

Table 4. WDNR Air Regulations for Printers Located In Ozone Attainment Counties.[1]

Applicability Table for Printers (SIC 2752)

Administrative Code	Very Small Printer (3 or less tons of VOC emissions)	Small Printer (more than 3, but less than 10 tons of VOC emissions)	Medium Printer (more than 10, but *less than 100* tons of VOC emissions)	Large Printer (*more than 100* tons of VOC emissions)
NR 404			4	4
NR 405				4
NR 406			4	44
NR 407			44	444
NR 408				
NR 410		4	4	4
NR 415			4	4
NR 419	4	4	4	4
NR 422				
NR 424	4	4	4	444
NR 425		4	4	4
NR 429		4	4	444
NR 431		4	4	4
NR 438	4	4	4	44
NR 439	4	4	4	44
NR 445			4	444

Note: Number of checks (4) indicate relative importance of regulation to printers of different sizes.

[1] Almost all counties in Wisconsin have good air quality for ozone. If you are located in Southeastern Wisconsin, you should review the previous table (Table 3) to determine if you are located in an ozone nonattainment county.

Narrative Description of WDNR Air Regulations

Ambient Air Quality (NR 404)

This section lists the various air quality control regions within the state and identifies ambient air quality standards for six criteria pollutants: carbon monoxide, lead, sulfur dioxide, particulate matter, nitrogen oxides and ozone. These are federal standards over which the state has no control. This section also outlines allowable increases in the criteria pollutants. In circumstances where a large printer is required to undertake ambient air quality monitoring (by DNR), this section also outlines the manner in which the monitoring is to be done.

Prevention of Significant Deterioration (NR 405)

This section deals with the Prevention of Significant Deterioration or PSD. This will apply to only those very large facilities whose emissions are typically greater than 250 tons per year in attainment areas. The section outlines allowable emission increases and the steps which need to be taken for permitting.

Construction Permits (NR 406)

This section requires that all sources of air emissions, whose emissions are over certain levels, obtain an air pollution control construction permit before any construction begins.

Under this regulation, each printing press is considered a separate source. For a project such as the installation of a new press to be exempt from this regulation, at least one of the following conditions must be met:

- Emissions (before control devices) from the proposed project are less than 1,666 pounds of VOCs per month.
- Maximum Theoretical Emissions (MTE) from the proposed project are less than 5.7 pounds per hour of VOCs.

Some regulations provide general information, others require printers to take very specific actions. This section summarizes both types of regulations.

NR 404: Lists **federal standards** for criteria pollutants. These standards help the DNR determine which areas of the state are attainment areas (clean air areas) and which areas are nonattainment areas (dirty air areas).

NR 405: Only affects the **largest printers** in the State; those with emissions greater than 250 tons per year.

NR 406: Before installing a new press, you have to determine whether the quantity of air (VOC) emissions expected from that press exceeds the regulatory threshold, above which a press is required to be permitted.

If a press is required to be permitted, construction/ installation of that press cannot begin until a construction permit is obtained.

If the printer is not exempted by the 1,666 lbs/month of VOCs threshold, the maximum theoretical emissions (MTE) should be calculated for the new press to determine if it is exempted by the 5.7 pounds per hour threshold. When air emissions are to be calculated using MTE as the basis, it means that a printer would calculate emissions based on using the press for 24 hours per day and 365 days per year (8,760 hours) without control devices; unless there are physical limitations which do not allow the operation for this amount of time. Common types of limitations are periodic maintenance, inability to store that amount of printed material, or bindery operations that are unable to keep up with press output.

Maximum Theoretical Emissions (MTE) are the theoretical emissions that would result from operating your printing plant 24 hours/day, 365 days/year, without control devices.

New presses that will not emit more than 1,666 pounds per month of uncontrolled VOCs, or will not have a MTE for VOCs of greater than 5.7 pounds per hour, are not required to be permitted under NR 406. If you are installing a new press, review: "What You Have to Do to Comply With NR 406" in section 6.

If you are installing a new press, review: "What You Have To Do To Comply With NR 406" in section 6.

Operation Permits (NR 407)

This section requires that all facilities which have air emissions above a certain level obtain an operation permit from WDNR. NR 407 is a new program with a phased-in approach to submitting operation permit applications. The initial Part 70 (major source) operation permit application period is over; however, if you determine that you are a Part 70 source, you should submit an application as soon as possible. The initial Non-part 70 (minor source) operation permit application period extends from July 1, 1997, through December 1, 1998. After the initial phase-in periods, applications will continue to be required prior to the operation of new and modified facilities.

NR 407: If your printing plant's VOC emissions exceed 10 tons per year, then you must apply for a facility-wide Non-part 70 operation permit.

See section 6 for details about what you have to do to **comply** with NR 407, and see Appendix 2C for a schedule of **application deadlines**.

Printing facilities that do not emit more than 1,666 pounds per month of VOCs before control devices are not required to be permitted under NR 407. The emissions from the entire facility need to be taken into consideration when determining whether you have to file an application with WDNR for an operation permit. Hazardous Air Pollutants (HAPs) are also considered
here and a table of HAPs is presented in the regulation.

Review Worksheet 8. Are your printing plant's uncontrolled emissions higher than the threshold of 1,666 pounds per month?

- If yes: See section 6 for details about what you have to do to comply with NR 407.
- If no: You are exempt from this regulation. Ensure that you calculate your actual air emissions annually to determine if your compliance status changes as a result of incremental growth.

Construction Permits for Direct Major Sources in Nonattainment Areas (NR 408)

This section deals with the construction of a major source in a nonattainment area for ozone or a designated ozone transport region. In Wisconsin, this area is generally those counties which are adjacent to Lake Michigan and those within the boundaries of the Southeast Region. This section also deals with emission offsets. If the construction of a new source will cause an increase in emissions, those emissions must be offset by a reduction elsewhere. These "offsets" can come from within the company or can be purchased from another company that has reduced its emissions.

Note: Major sources are those sources (printers) that emit greater than 25 tons of VOCs per year in severe ozone nonattainment areas and 100 tons of VOCs per year in the rest of the state. In Wisconsin, the following counties are in the ozone nonattainment area: Milwaukee, Washington, Ozaukee, Racine, Kenosha, Waukesha, and Manitowoc. If you are a major source and need compliance assistance contact Printing Industries of Wisconsin (PIW).

Air Permit, Emission, and Inspection Fees (NR 410)

This section applies to the fee structure associated with the annual air emission inventory and construction permits.

Control of Particulate Emissions (NR 415)

This section deals with the emission of particulate matter. With *heatset* presses, the oven drives off heavy solvents which may condense in the atmosphere if not controlled. WDNR treats the condensing droplets as particulate matter. There is a specific section which deals with *heatset* presses.

Control of Organic Compound Emissions (NR 419)

This section deals with general limitations regarding VOC emissions. It addresses the disposal of VOC waste, as well as the storage of organic compounds in tanks and the transferring of organic materials. All printers are subject to the general limitation os this regulation.

Control of Organic Compound Emissions from . . . Printing . . . Operations (NR 422).

The part of this code which applies to lithographic printers is commonly referred to as RACT or Reasonably Available Control Technology (NR 422.142). This deals only with those lithographic printers in the ozone nonattainment areas (or those who elect to have this section apply under NR 424, with DNR approval).

The rule specifically identifies the following counties where RACT applies: **Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha.**

NR 408: Major sources located in a non-attainment area need to obtain a construction permit for each new press prior to beginning installation/
construction. Contact an environmental consultant that has experience working with printers to find out more about how to apply for such permits.

NR 410: Describes fees associated with permitting air emission sources and reporting air emissions.

NR 415: One section applies primarily to condensible particulate matter emissions from heatset web presses.

NR 419: This section deals with general controls for VOC emissions.

NR 422: The Lithographic Printing RACT Rule establishes specific requirements for control of VOCs in a nine-county area. A printer must be located in this area, and have MTE of VOCs greater than 1,666 pounds/ month, in order for limitations described in this regulation to apply.

RACT appliesin: **Keno-sha, Kewaunee, Mani-towoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washing-ton, and Waukesha counties.**

Printers are exempt from this rule if they have MTE of VOCs less than 1,666 lbs/month. MTE can be calculated by adjusting your actual emissions level upward to reflect a 24 hour/day, 365 day/year operating schedule.

Review Worksheet 8. Is your printing plant located in one of the counties where the RACT rule specifically applies *AND* is your printing plant's MTE of VOCs (lbs/month) higher than the threshold of 1,666 pounds per month?

- If yes: See section 6 for details about what you have to do to comply with NR 422.142.
- If no: You are exempt from this regulation. Be sure to calculate your actual and MTE air emissions annually to determine if your compliance status changes as a result of incremental growth.

A section of NR 422 deals with methods of compliance and includes an equation for calculating emissions which deals with the operation and efficiency of capture systems for printing operations.

It is possible for a small printer to opt out of the RACT rule requirements if MTE are greater than 1,666 pounds per month, but actual emissions are well below 1,666 pounds per month. This is done bytaking voluntary liits on VOC-containing product usage to keep actual VOC emissions below 1,666 pounds per month. An Elective Operation Permit application (Forms 4530-145 and 4530-146) must be prepared and submitted to the WDNR. A copy of the Elective Operation Permit Application, with instructions, is provided in Appendix 2F.

Control of Organic Compound Emission from Process Lines (NR 424)

While Chapter 422 only applies to those printers in the nonattainment area, this chapter deals with all printers in the state. If there are more than 15 pounds of VOCs emitted in any day from a single process line (press), the printer is required to demonstrate 85% control of VOC emissions, or the printer must show that it is technologically (or economically) infeasible and accept LACT (Lowest Available Control Techniques) limitations.

When considering each press as a "process line" for purposes of calculating daily emissions from a single press, it is important to only consider emissions from inks, varnishes, water-based coatings, and fountain solutions, and automatic blanket washes only if used while the press is running (on-line). These are the only chemicals that are consumed in the "process" of printing. Emissions from manual cleanup operations and automatic blanket washing operations that are used while the press is not running (off-line) should not be counted here.

If you are affected by the RACT Rule, see “What You Have to Do to Comply With NR 422.142” in section 6.

NR 424: This section requires 85% control of VOC emissions for any process line (press) that emits more than 15 lbs/day VOC, unless technologically (or economically) infeasible.

If you are affected by this regulation, see “What You Have to Do to Comply With NR 424” in section 6.

To determine if NR 424 is applicable, a printer needs to calculate daily emissions from each process line (press). Review Forms 2, 3, and 4 for a description of how to calculate emissions from your entire facility, keeping in mind that you need to adjust this information to reflect the emissions from each press. Are your daily emissions from any one press ever greater than 15 pounds of VOCs?

- If yes: See section 6 for details about what you have to do to comply with NR 424.
- If no: Be sure to recalculate your emissions on a press-by-press basis annually to see if your compliance status has changed.

Compliance Schedules, Delays, Exceptions and Internal Offsets for Organic Compound Emission Sources in Chapters NR 419 to 424. (NR 425)

For those printers who are regulated under Chapters 422 to 424, this Chapter sets out compliance dates by which time emission control equipment was to be installed or alternate compliance schedules established. This section also deals with existing sources that may seasonally operate a control device and use of internal offsets in determining compliance with ink solvent content limitations on the inks used.

Malodorous Emissions and Open Burning (NR 429)

For printers, this section deals with odors associated with ink and solvents. Although this section applies to all odors, it is more common to be an issue for *heatset* operations than nonheatset or sheetfed printers because of stack emissions.

Control of Visible Emissions (NR 431)

Again, this section is most applicable to those printers who use *heatset* inks. Heatset printing uses heat to drive ink solvents from the web as it passes through the dryer. Using a dryer to evaporate the ink solvents may lead to the formation of condensed droplets of ink oils which results in visible emissions when the ambient temperature is cool and the ink oil vapor is not controlled or the control device is not working properly.

Air Contaminant Emission Inventory Reporting Requirements (NR 438)

This section applies to all air pollution sources in the state. This chapter identifies who is to report air emissions. Unless exempt, printers that emit Volatile Organic Compounds (VOCs), or any other material included on a list of air contaminants, are required to report to WDNR. Printers with actual VOC emissions of 6,000 lbs/year (3 tons) or more are required to file an Annual Air Emissions Inventory with WDNR.

If emissions of any air contaminant or HAP exceed the reporting level shown in Table 1 in NR438, it must be reported individually in the Annual Air Emissions Inventory Report.

NR 425: This section establishes compliance deadlines for printers that are covered under any of the regulations listed in NR 422 through 424.

NR 429: This section primarily affects heatset operations having difficulties controlling odors from inks and solvents.

NR 431: This section applies to heatset web printers that are having difficulties controlling visible emissions.

NR 438: This section requires printers with 3 tons or more of VOC emissions per year to file an annual air emissions inventory report with WDNR.

If you are affected by this regulation, see “What You Have to Do to Comply With NR 438” in section 6.

Review Air Emission Worksheet 8. Are your printing plant's emissions higher than the threshold of 6,000 pounds per year?

- If yes: See section 6 for details about what you have to do to comply with NR 438.
- If no: You are exempt from this regulation. Be sure to calculate your actual air emissions annually to determine if your compliance status changes as a result of incremental growth and/or the installation of ansource of VOC emissions.

Reporting, Recordkeeping, Testing, Inspection and Determination of Compliance Requirements (NR 439)

This is another chapter that impacts all air emission sources in the state. This chapter outlines all requirements for reports, recordkeeping, testing, inspection and compliance determinations for a facility. It should be noted that WDNR employees have been given statutory authority to come onto the premises any time during normal working hours in the performance of their duties. Visits may be announced or unannounced.

NR 439: This section applies to all regulated printers. It describes reporting, recordkeeping, testing, inspections, etc. that need to be conducted.

Control of Hazardous Pollutants (NR 445)

This chapter deals with all Hazardous Air Pollutants (HAPs). There are five tables or categories of chemicals. This list is longer than the EPA's list of Hazardous Air Pollutants. Acceptable emission rates are based on two stack heights. When the emission limits are exceeded, technology-based controls must be used. Best Available Control Technology (BACT) is required when the emission levels for *suspected* carcinogens (cancer causing agents) are exceeded. Lowest Achievable Emission Rate (LAER) technologies are required when emissions exceed minimum levels for *known* carcinogens. LAER is the most stringent emission standard required by the state. However, variances from LAER can be obtained.

NR 445: This section deals with Hazardous Air Pollutants (HAPs). Most printers do not emit HAPs in quantities that would require complying with this section, but larger printers should be familiar with this regulation.

The WDNR Air Regulations described above are found in the Wisconsin Administrative Code, Chapter NR 400 and can be ordered from:

Wisconsin Department of Administration
Document Sales Unit
PO Box 7840
202 South Thornton Ave.
Madison, WI 53707-7840
608/266-3358

Request item: AI 52, EN-Air Pollution Control (NR 400-).

6. What You Have to Do to Comply With WDNR Air Regulations

Many printers have to comply with the following regulations. If you've already completed the worksheets in Appendix 2A, and read through the previous section about WDNR air regulations that affect printers, you should have a good idea about which of the following regulations you need to give the closest attention.

What You Have to Do to Comply With NR 406–Construction Permits

This Rule Applies to You

If you are planning on **adding a new press** (source) to your plant and the uncontrolled emissions of VOCs from the press exceed the 1,666 pounds/month applicability threshold.

What You Have to Do

4 Apply for and receive a **construction permit** before commencing any installation or construction activities.

You can obtain construction permit application forms (paper and electronic formats) from the Wisconsin Department of Natural Resources' Madison headquarters or one of the regional/district offices. The address of the Madison headquarters is:

Wisconsin Department of Natural Resources
Bureau of Air Management
PO Box 7921
Madison, WI 53707
608/266-7718

If you have questions about the construction permitting process, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 or the Wisconsin Department of Commerce's Small Business Clean Air Assistance Program at 608/267-9214.

Compliance Options

You don't have many choices if the press that you are going to install will have VOC emissions that exceed the 1,666 pounds per month applicability threshold.

However, if you plan to use products such as alcohol substitutes and low VOC blanket/roller wash, you may be able to reduce your actual emissions and demonstrate the ability to operate a new press without the need for a construction permit.

If you are required to obtain a construction permit, you are also responsible for complying with **NR 407 - Operation Permits.**

WARNING — be sure an operation permit application has been filed prior to the expiration of the construction permit, which is typically 18 months after the date issued.

What You Have to Do to Comply With NR 407-Operation Permits

This Rule Applies to You

If your printing plant's uncontrolled emission of VOCs is **greater than 1,666 pounds per month**, or if you've been issued a construction permit for the installation/construction of a new/modified press.

What You Have to Do

- If you are an existing source and this is your first operation permit, **apply** by the application filing date. See Appendix 2C, Table 1 from Chapter NR 407).

- If a construction permit has been issued for a new press installation at your printing plant, **apply** for an operation permit at least 120 days prior to its expiration.

- If you are exempt from being required to obtain an operation permit, **keep and maintain records** documenting that you qualify for the exemption.

You can obtain operation permit application forms (paper and electronic formats) from the Wisconsin Department of Natural Resources' Madison headquarters or one of the regional/district offices. The address of the Madison headquarters is:

Wisconsin Department of Natural Resources
Bureau of Air Management
PO Box 7921
Madison, WI 53707
608/266-7718

If you have questions about the operation permitting process, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 or the Wisconsin Department of Commerce's Small Business Clean Air Assistance Program at 608/267-9214.

Compliance Options

You don't have many choices if you have already exceeded the 1,666 pounds per month applicability threshold. However, if you are currently below this threshold, it is recommended that you implement pollution prevention alternatives that will help keep you in this exempt status. Keep in mind that you are required to keep records documenting your exempt status.

What You Have to Do to comply with NR 422.142-Lithographic Printing RACT Rule

This Rule Applies to You

If your printing plant's MTE of VOCs is **greater than 1,666 pounds per month, AND** you are located in one of the following counties: Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington or Waukesha.

What You Have to Do

It depends on whether you are a sheetfed (SF), non-heatset web (NHSW), or heatset web (HSW)printer. See the table below.

RACT Rule Requirement	SF	NHSW	HSW
Maintain negative pressure within the dryer (compared to the press room pressure)			4
Achieve 90% destruction efficiency over press dryer exhaust, unless you use a catalytic converter that was installed prior to 01/01/82, in which case the 85% efficiency is required.			4
Conduct emission tests every 48 months to verify destruction efficiency.			4
Limit the VOC content of your fountain solution to no more than:			
• 1.6% by weight, if a restricted alcohol is used			4
• 3.0% by weight, if a restricted alcohol is used, but it is refrigerated (to 60˚ F or less)			4
• 5.0 % by weight, with no restricted alcohols		4	4
• 5.0 % by weight, with or without restricted alcohols	4		
• 8.5% by weight, if your fountain solution is refrigerated (to 60º F or less)	4		
• 13.5% by weight, if you are printing on metal, metal-foil or plastic substrates, and you use a refrigerated (to 60˚ F or less) fountain solution	4		
Use low VOC (no greater than 30% by weight) or low vapor pressure (no greater than 10 mm of Hg at 68˚ F) blanket/roller wash.	4	4	4
• If you print on plastic you can use up to 165 gallons/year of blanket/roller wash that does not meet the low VOC or low vapor pressure criteria described above	4	4	4
• If you do not print on plastic, you can only use up to 55 gallons/year of non-compliant blanket/roller wash.	4	4	4
Keep records of the following for at least 5 years (see Appendix 2D)			
• Temperature – of refrigerated fountain solutions once each 8-hour shift, if they contain restricted alcohols (e.g., IPA).	4	4	4
• Fountain solution – VOC % by weight as applied, and name of each restricted alcohol used.	4	4	4
• Blanket/roller wash – VOC % by weight, or vapor pressure of each VOC component.	4	4	4
• Volume of any non-compliant blanket/roller wash used (towards the allowance of 55 gallons/year for non-plastic printing, or 165	4	4	4

gallons/year for plastic). • Information regarding control devices for each day of operation.			4
Certify that you are in compliance with the RACT Rule (see Appendix 2E)	4	4	4

If your facility's MTE of VOCs exceeds 1,666 pounds per month, but your actual VOC emissions are less than this amount, you can apply for an elective operation permit that limits your emissions to 1,666 lbs/mo. or less, which will exempt you from the RACT requirements described above (see Appendix 2F).

What You Have to Do to Comply With NR 424-Control of Organic Compound Emissions From Process Lines

This Rule Applies to You

If VOC emissions from any one of your presses **exceeds 15 pounds per day**. Note: when calculating your emissions level for purposes of determining whether NR 424 applies to your presses, keep in mind that only emissions from the following sources should be included:

- inks, varnishes, and coatings
- fountain solutions
- automatic blanket washes (provided the press is not printing during this operation)

Note: Sheetfed presses are normally not operating when automatic blanket washes are used.

For purposes of determining whether NR 424 applies to any one of your printing presses, you do not count emissions from manual cleanup of presses. Blanket/roller washes and other solvents are not emissions from process lines, unless they are dispensed from an automatic blanket washer while the press is in operation.

What You Have to Do

4 **Control emissions** of VOCs by 85%. A control device may be an appropriate choice for a heatset web press printer.

4 *Elect* to comply with the Lithographic Printing RACT Rule, rather than install a control device. This is often an appropriate alternative for sheetfed press and non-heatset web press printers,

or

4 Demonstrate that 85% control is **technologically (or economically) infeasible** and use LACT and operating practices demonstrating best current technology (WDNR approval is required).

If this rule applies to one or more of your presses, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 for a more complete description of compliance alternatives.

What You Have to Do to Comply With NR 438-Air Contaminant Emission Inventory Reporting Requirements

This Rule Applies to You

If your printing plant's actual emissions of VOCs are equal to or **greater than 6,000 pounds per year**.

What You Have to Do

1. **Complete** an Annual Air Emission Inventory Report prior to March 1 for the preceeding calendar year's emissions.

2. **Report** emissions of Hazardous Air Pollutants in addition to VOC emissions if the reporting level is exceeded.

Note: Hazardous Air Pollutants (HAPs) can be found in alcohol substitutes, blanket and roller wash, and other cleanup solvents. The Annual Air Emission Inventory Report includes a listing of Hazardous Air Pollutants. If you identify any of these pollutants in the products that you use, you need to determine whether they are being emitted above the reporting level. Generally speaking, the HAPs in products used by lithographic printers are also VOCs. Furthermore, the reporting levels for most HAPs used by printers is 6,000 pounds per year. Therefore, you should be able to determine whether you need to report HAPs based on the amount of VOCs being emitted from your printing plant during a calendar year.

The key to knowing whether you need to report HAPs is gaining a good understanding of what quantity of VOC is emitted from each printing product that you use. Once you have an idea of which *products* are emitting more than 6,000 pounds per year of VOCs, you can begin to identify which *products* need to be closely scrutinized to determine if they contain any HAPs. Also, changing to other products with fewer or no HAPs may eliminate the need to report HAPs.

You can obtain Annual Air Emission Inventory Reporting forms from the Wisconsin Department of Natural Resources' Madison headquarters or one of the regional/district offices. The address of the Madison headquarters is:

Wisconsin Department of Natural Resources
Bureau of Air Management
PO Box 7921
Madison, WI 53707
608/266-7718

The Annual Air Emission Inventory Reporting forms have now been been included in a consolidated reporting package developed as part of the "Great Printers Project" effort. It can be completed electronically on any computer operating under DOS or Windows (versions 3.1 or 95). You should be aware that the consolidated reporting package also includes the Annual Hazardous Waste Activity Report, and Form R for reporting toxic chemical releases under SARA Title III. Most printers do not have to be concerned about the Form R report; however, if you are not currently completing an annual hazardous waste activity report, you should carefully review Section 3: Hazardous Waste Management.

If you have questions about the Annual Air Emissions Inventory Report, or the consolidated reporting package, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 or the Wisconsin Department of Commerce's Small Business Clean Air Assistance Program at 608/266-7718.

Chapter 2: Air Issues for Printers

Lithographic printers in Wisconsin and throughout the United States are faced with a variety of air regulations. The press room is the greatest source of air emissions from a printing facility. The inks, fountain solutions, and solvents used in offset printing contain volatile organic compounds (VOCs), which when emitted to the atmosphere contribute to ground-level ozone, or smog. Even so-called environmentally friendly products, such as soy inks, aqueous coatings, and alcohol replacements contain some VOCs.

Although most individual print shops contribute very little to the degradation of air quality, the industry as a whole can have a significant impact. Therefore, air regulations and policies necessary for tracking and reducing air pollution have been developed for the printing industry. However, many of these regulations do not affect smaller print shops in the state, which brings us to two very important questions.

1. Do you know if you are among those print shops that are affected by air regulations?

2. What can you do, regardless of your regulated status, to reduce emissions from your printing operations?

These are two very important questions that some printers may have had difficulty answering in the past. This Handbook will take you through the steps that are necessary to determine where you stand with respect to air regulations in the state of Wisconsin. In addition, this Handbook will provide you with information that will allow you to assess the benefits of reducing emissions from your printing operations, regardless of your regulated status.

There are many benefits to addressing both of these questions right now! For instance, many printers will **claim** to have too small of an operation to be regulated, **but they don't really know for sure** where they stand with respect to regulatory thresholds that could put them into a regulated status. This assumption can become particularly risky for those shops that are experiencing incremental growth… it becomes difficult for them to know at what point they change from being a smaller unregulated printer to a larger regulated printer that needs to be aware of and be in compliance with air regulations.

Two questions need to be considered:

- Do you know if you are among those print shops that are affected by air regulations?
- What can you do regardless of your regulated status to reduce emissions from your printing facility?

Air issues for printers are described in the following sections:

Now, you can stop worrying about your liability — about whether or not you are following regulations and doing the "right thing" for the environment. This Handbook is intended to make it easier for you to know which regulations apply to you, and which ones don't.

If you do have to follow some regulations, you will want to know exactly what compliance options are available to you. This Handbook will identify options, and you may be surprised about one of them: pollution prevention.

Even if you aren't in a highly regulated status, you will want to consider the pollution prevention opportunities available to you. The waste minimization and pollution prevention recommendations provided in this Handbook can help you remain within a non-regulated status, even with incremental growth. Pollution prevention activities can help you enjoy the full benefits of growth with less worries about how your growth is affecting your regulatory status.

The pollution prevention recommendations provided within this Handbook will not only help you reduce your air emissions, but may also lessen your production costs, and as such, improve the competitiveness of your printing operation.

By addressing these issues RIGHT NOW a printer can

- reduce its regulatory uncertainty and liability
- reduce emissions

This Handbook will inform you :

- Which regulations you have to follow and which you don't
- Your compliance options when confronted with the need to comply with air regulations
- Pollution prevention opportunities for reducing air emissions

1. How Do Printers Affect Air Quality?

Printers use products that contain volatile organic compounds (VOCs), also known as reactive organic gases (ROGs). Principle sources of VOCs include inks, varnishes, coatings, fountain solutions, blanket/roller wash, and cleanup solvents.

When VOCs are released from printing plants, they impact air quality. VOCs can combine with nitrogen oxides found in automobile exhaust to produce smog. This reaction must take place in the presence of sunlight, which is why smog (ozone) alert days occur most frequently during the summer within highly populated areas where heavy traffic causes high concentrations of auto exhaust.

Companies in many industries that emit VOCs are **required to report their emissions** to the Wisconsin Department of Natural Resources (WDNR) in order for scientists to better understand the relationship between smog (ozone) alert days and industrial emissions. Printers that emit greater than 3 tons of VOCs per year are required to complete these annual reports. Do you know the quantity of VOC emissions from your printing plant?

In addition to VOC emissions, printers may also be emitting air contaminants known as hazardous air pollutants (HAPs). Common sources of HAPs in printing include: (1) fountain solution concentrates that contain alcohol substitutes, such as glycol ethers, (2) metering roller cleaners that contain methylene chloride, and (3) inkjet printing fluids that contain methyl ethyl ketone.

Although sometimes present in the products mentioned above, HAPs are generally not a big factor for most printers. As a general rule, organic HAPs content in printing products is usually less than total VOC content. Therefore, if you know your printing plant's level of VOC emissions, you have begun to identify the maximum level at which you could be emitting HAPs.

To run an environmentally sound printing operation, it is important to know <u>what</u> and <u>how much</u> you are emitting from your facility.

Printers use products that contain Volatile Organic Compounds:
- inks/varnishes/ coatings
- fountain solutions
- blanket/roller washes

VOCs combine with NOx, a component of auto-exhaust, in the presence of sunlight to create smog.

Offset printers may find Hazardous Air Pollutants in the products that they use:
- fountain solution concentrates/alcohol substitutes may contain ethylene-based glycol ethers
- metering roller cleaners may contain methylene chloride
- inkjet printing fluids may contain methyl ethyl ketone

Know your products and how you are affecting the environment!

2. Pre-press, Pressroom, Finishing: Air Issues Summary

Pre-Press

Air pollution is not a significant issue in the pre-press department of most printers. If you operate a pre-press "house" where you develop films and make plates in very large quantities, you will have to be more concerned with air emissions. Pre-press chemicals are more of a health concern for employees than an emission concern for the printing plant. The VOCs in pre-press chemistries typically remain in solution and do not contribute to overall VOC emissions from the printing plant. Tips, recommendations and opportunities to reduce VOC emissions and the amount of chemicals that are used in pre-press operations can be found in Chapter 8, section 5.

If you operate a pre-press "house" where you develop films and make plates in very large quantities, you will have to be more concerned with air emissions.

Pressroom

The sources of VOC emissions from the pressroom include: ink, varnish, coatings, fountain solution (alcohol, alcohol substitutes, etch, etc.), and automatic and manual blanket and roller washes. For a complete understanding of the air issues affecting printers, read all of Chapter 2.

Most air emissions from printing actually occur during the cleanup process. As the blanket wash, roller wash and other cleanup solvents are being used they evaporate into the printing plant. This evaporation can result in the loss of tons of solvents each year from a medium sized printer. In addition, these products are costly to replace. One way to reduce emissions and costs associated with blanket/roller washes is to use solvents with a low vapor pressure. According to Jeff Adrian of The John Roberts Company, buying blanket/roller wash with a low vapor pressure can save money. They currently use a cleaning solvent blend with a vapor pressure of less than 4 mm Hg. Other tips for reducing VOC emissions from make-ready and printing can be found in Chapter 8, section 6.

The largest contributor of air emissions from printing actually occurs during the cleanup process.

Finishing

You should be aware of emissions from post-press activities in the bindery. If ink jet printing is performed as part of post-press operations, it can be a significant source of VOC emissions. You should also be sure to check your Material Safety Data Sheets (MSDSs) for adhesives to identify any health concerns from glue emissions. To reduce VOC emissions from the finishing department, use low or no-VOC adhesives, such as water-based glues, rather than solvent-based glues.

If ink jet printing is performed as part of post-press operations, it can be a significant source of VOC emissions.

Use low or no-VOC adhesives, such as water-based glues, rather than solvent-based glues

3. How Do I Determine My Plant's VOC Emissions?

First of all, you may be asking yourself: *"Why do I need to determine my plant's VOC emissions?"*

The answer is quite simple: *"If you don't know the quantity of VOC emissions from your printing plant, you run the risk of being out of compliance with WDNR air regulations."*

Your level of emissions determines which requirements you need to comply with, as summarized below:

Emissions level lbs/year (tons/yr)	Summary of Regulatory Implication
6,000 (3 TPY)	Report air emissions annually
10,000 (5 TPY)	Pay fees on a per ton basis for emissions
20,000 (10 TPY)	Apply for a Non-part 70 (minor source) operation permit
20,000 (10 TPY) MTE in ozone nonattainment area	Comply with RACT Requirements (MTE = maximum theoretical emissions)
50,000 (25 TPY) in ozone nonattainment area	Apply for a Major Source Operation Permit

Note: TPY = tons per year.

If your printing facility's VOC emissions exceed 6,000 pounds per year (3 TPY), you need to report your level of emissions annually to WDNR. If your emissions are greater than 10,000 pounds per year (5 TPY), you will need to become familiar with the additional requirements described above.

Don't worry if these requirements are not familiar to you. **This Handbook will describe each requirement in detail.** If you have questions, you can always contact PIW, but first take the time to read through this chapter.

An approach for calculating your VOC emissions is presented in the Air Emission Worksheets (Worksheets 2-1 through 2-8) included in Appendix 2A. You can use this method or choose another, but make sure you identify and quantify emissions from your printing plant.

If you already know your facility's level of VOC emissions, you can skip Worksheets 2-1 through 2-7. You should complete Worksheet 2-8, however.

If you don't know the quantity of VOC emissions from your printing plant, you run the risk of being out of compliance with WDNR air regulations.

This Handbook will walk you through the steps of determining your emissions and your compliance requirements.

Printers that have completed an annual air emissions inventory should have an accurate accounting of their VOC emissions. Most web printers fall into this category; therefore, guidelines for calculating the VOC emissions from a web printer have not been included in this Handbook. However, web printers and sheetfed printers alike are encouraged to review the WDNR document in Appendix 2B (Guidelines for Determining Emissions from Lithographic Printing Facilities) to ensure that their method of calculating emissions is consistent with the emission factors and assumptions used by WDNR.

In addition to clarifying the air permitting issue, calculating your VOC emissions will help you to identify sources of pollution from your printing plant. This will present opportunities to evaluate these sources in light of pollution prevention recommendations made in this Handbook.

It is **recommended** that **all sheetfed printers** complete all the Air Emission Worksheets in Appendix 2-B, but small shops may want to make a **rough estimate** of their emissions first.

Table 1 on the following page is designed to allow a small printer to estimate its emissions. If the estimate returns a result of 4000 pounds per year or more, you are advised to complete the Worksheets (Forms 2-1 through 2-8) to determine the exact level of your air emissions and which regulations you have to follow.

If your rough estimate is 4000 pounds per year or less, you can safely assume that you are too small to be regulated by WDNR air regulations. Nonetheless, you are encouraged to complete the Worksheets (Worksheets 2-1 through 2-8) in order to obtain a better understanding of the relationship between product consumption and VOC emissions.

Understanding which products *generate* VOC emissions can help you to understand which pollution prevention recommendations may help you *reduce* VOC emissions.

PIW strongly recommends that every printing plant — regardless of size — have **written documentation of its actual emissions**. Table 1 on the following page or the Air Emission Worksheets in Appendix 2A provide such documentation.

Sheetfed Printers should complete Table 1: "Rough" Estimate of VOC Emissions, before continuing!

Table 1: Rough Estimate of VOC Emissions (from sheetfed printers)

(An example of how to fill in Table 1 is provided on the next page.)

Type of Product	Annual Use		Multiplier		Lbs. VOC emitted
Ink/ varnish (lbs)		x	0.01	=[1]	
Water-based coatings (gals.)		x	1.0	=[2]	
Isopropyl alcohol (gals.)		x	6.7	=[3]	
Alcohol substitute (gals.)		x	1.25	=[4]	
Blanket/roller wash or other solvents (gals.)		x	4.5	=[5]	
			Total	=	

If your rough estimate equals 4000 pounds or less, completing Worksheets 2-1 through 2-7 is optional, but recommended in order to obtain a better understanding of the source of VOC emissions from your facility.

HINT: If you already know your printing facility's actual and maximum theoretical annual air emission levels, review Appendix 2B to ensure that your estimate is consistent with WDNR assumptions. Then skip to Worksheet 2-8 to confirm that you are complying with applicable regulations.

[1] Factor of 0.01 based on 20% VOCs with 95% retention.
[2] Factor of 1.0 based on 8.34 lb/gallon weight and 12% VOCs; no retention with water-based coatings.
[3] Factor of 6.7 represents VOCs in lbs/gallon.
[4] Factor of 1.25 based on 8.34 lb/gallon weight and 15%VOCs.
[5] Factor of 4.5 based on 7.5 lb/gal VOCs and 40% retention of solvent in shop towels shipped offsite.

Sheetfed printers should complete Table 1 on the previous page to obtain a rough estimate of VOC emissions.

The Example table below provides guidance on how to complete Table 1.

Annual usage of products used in this example:
- 20,000 pounds of ink used
- 5 drums of water-based coatings (275 gallons)
- 3 drums of Isopropyl alcohol (165 gallons)
- 75 gallons of alcohol substitutes
- 15 drums of press wash (875 gallons)

Example Table 1: Rough Estimate of VOC Emissions (for sheetfed printers)

Type of Product	Annual Use		Multiplier		Lbs. VOC emitted
Ink/ varnish (lbs)	*20,000*	x	0.01	=[1]	*200*
Water-based coatings (gals.)	*275*	x	1.0	=[2]	*275*
Isopropyl alcohol (gals.)	*165*	x	6.7	=[3]	*1105.5*
Alcohol substitute (gals.)	*75*	x	1.25	=[4]	*93.75*
Blanket/roller wash or other solvents (gals.)	*825*	x	4.5	=[5]	*3712.5*
			Total	=	*5386.75*

We have provided a "blueprint" for you to calculate and document your VOC emissions. If your emissions estimate is larger than 4000 pounds per year, or you want a better understanding of the relationship between consumptive use of printing products and air emissions, **work through and complete the Air Emission Worksheets in Appendix 2A.** The following information will be needed: Material Safety Data Sheets (MSDSs) for the products that you use and invoices for a 12-month period of purchases of inks, varnishes, coatings and pressroom chemicals such as alcohol, alcohol substitutes, blanket/roller wash, etc. Your supplier should be able to help you obtain any missing MSDSs, and may be able to summarize for you the quantities that you have purchased.

[1] Factor of 0.01 based on 20% VOCs with 95% retention.
[2] Factor of 1.0 based on 8.34 lb/gallon weight and 12% VOCs; no retention with water-based coatings.
[3] Factor of 6.7 represents VOCs in lbs/gallon.
[4] Factor of 1.25 based on 8.34 lb/gallon weight and 15%VOCs.
[5] Factor of 4.5 based on 7.5 lb/gal VOCs and 40% retention of solvent in shop towels shipped offsite.

Gather this information in order to complete the Worksheets in Appendix 2A:

- Material Safety Data Sheets (MSDSs) for the products that you use
- Invoices for a 12-month period of purchases of inks, varnishes, coatings and pressroom chemicals such as alcohol, alcohol substitutes, blanket/roller wash, etc.

4. The U.S. Clean Air Act

Air pollution in the United States has been regulated on the federal level since the early 1970s. In 1970 Congress passed a law, the Clean Air Act, that required the states to enact air pollution control programs. The Clean Air Act represented a partnership between federal and state agencies.

Under the Clean Air Act, the federal government sets air quality standards for specific pollutants, known as National Ambient Air Quality Standards (NAAQS). States develop a plan, known as a state implementation plan, to bring all areas of the state into compliance with the air pollution standards.

The underlying strategy of the Clean Air Act is to bring "dirty" air areas into compliance with the federal standards while at the same time preventing "clean" air areas from becoming dirty. To implement this strategy, the Clean Air Act has been periodically amended. The most recent revisions occurred in 1990. The 1990 Clean Air Act Amendments resulted in significant changes to the federal air program.

Under the Clean Air Act, "clean air" is defined in terms of a numerical standard. By having such standards, the act essentially divided the country into "clean" and "dirty" air areas. In clean air areas (called attainment areas), the existing air quality is better than the standard. As stated above, air quality in attainment areas is not allowed to deteriorate. In dirty air areas (called nonattainment areas), the existing air quality is worse than the standard. These areas are more strictly regulated so that they will eventually meet the established air quality standards.

An area, for the purposes of air regulation, generally consists of one or more counties. Each area can be clean or dirty for any one of six pollutants: sulfur dioxide, particulate matter (PM10), carbon monoxide, ozone, nitrogen oxide, and lead. Printers emit VOCs which contribute to the generation of ground level ozone, or smog. **Printers need to know if they are located in an attainment or nonattainment area for ozone because nonattainment areas are more heavily regulated.**

In Wisconsin, the ozone nonattainment area currently includes the following counties:

Milwaukee
Washington
Ozaukee
Racine
Kenosha
Waukesha
Manitowoc

For purposes of RACT applicability, **Kewaunee and Sheboygan** are also added to this list.

The Clean Air Act of 1970 required states to develop air pollution control programs. The 1990 Amendments required the adoption of a permit program for air pollution sources, including medium and large printers.

The DNR implements the clean air program in Wisconsin.

Attainment areas are “clean” air areas where air quality is better than the federal standard.

Nonattainment areas are “dirty” air areas where air quality does not meet the federal standard.

For the ozone standard, nonattainment areas are further classified into categories that are based on how far the area deviates from the air quality standard. These categories are termed: marginal, moderate, serious, severe, and extreme.

To bring nonattainment areas into compliance with the federal standard, Wisconsin has developed emissions control programs that reduce air pollution from medium and large existing sources and limit new pollution sources. The **Lithographic Printing RACT Rule**, which affects printers in the nonattainment counties of Southeastern Wisconsin, is one example of a state regulation that targets an area of the state that does not meet the federal air quality standards for ozone. More information is provided about the RACT Rule in section 5 of this chapter.

One element of the Clean Air Act Amendments of 1990 that affects printers is the mandate for a series of regulations requiring **operation permits** for both new and existing air pollution sources. In the permitting process, printers located in nonattainment areas face stricter regulations than those in attainment areas of the state, if they are major sources. Printers that have VOC emissions of 25 tons or more per year are major sources in severe ozone nonattainment areas, while printers in attainment areas do not become major sources until VOC emissions reach 100 tons or more per year. Because of this size classification, smaller printers can be major sources in nonattainment areas.

In general, major sources are the most highly regulated, minor sources are less strictly controlled, and exempt sources are relieved from many regulatory requirements. Finally, to fund air management programs in states, fees are collected for emissions released as well as for agency review of permit applications and issuance of permits.

The **Lithographic Printing RACT Rule** is a state regulation that targets an area of the state that does not meet the federal air quality standards for ozone.

Clean Air Act Amendments of 1990 requir es printers to get operation permits for both new and existing air pollution sources.

Nonattainment areas within the state are more strictly regulated than attainment areas.

5. Air Regulations that Affect Printers

This section contains a brief synopsis of the existing air regulations which may impact lithographic printers (SIC 2752) in the State of Wisconsin. Some of these regulations are general in nature and do not require specific actions on behalf of printers. If you have completed the Air Emissions Worksheets, including Worksheet 2-8, you will begin to have an idea of whether your level of VOC emissions requires you to comply with those regulations under which specific actions need to be taken.

Table 2 lists WDNR Air Regulations that may affect lithographic printers. Tables 3 and 4 describe to what extent these regulations are applicable to printers, based on geographic location (attainment vs. non-attainment area) and size (quantity of VOC emissions per calendar year). A narrative summary of these regulations follows the tables.

Table 2. Names of NR 400 Series WDNR Air Regulations for Printers.

Administrative Code	Name of NR 400 Series Regulation
NR 404	Ambient Air Quality
NR 405	Prevention of Significant Deterioration
NR 406	Construction Permits
NR 407	Operation Permits
NR 408	Construction Permits for Direct Major Sources in Nonattainment Areas
NR 410	Air Permit, Emission and Inspection Fees
NR 415	Control of Particulate Emissions
NR 419	Control of Organic Compound Emissions
NR 422	Control of Organic Compound Emissions from. . . Printing . . . Operations
NR 424	Control of Organic Compound Emissions from Process Lines
NR 425	Compliance Schedules, Delays, Exceptions and Internal Offsets for Organic Compound Emission Sources in Chs. NR 419 to 424
NR 429	Malodorous Emissions and Open Burning
NR 431	Control of Visible Emissions
NR 438	Air Contaminant Emission Inventory Reporting Requirements
NR 439	Reporting, Recordkeeping, Testing, Inspection and Determination of Compliance Requirements
NR 445	Control of Hazardous Pollutants

Table 3. WDNR Air Regulations for Printers Located In Ozone Nonattainment Counties (Kenosha, Milwaukee, Ozaukee, Manitowac, Racine, Washington, and Waukesha – and for RACT applicability, Sheboygan and Kewaunee are included).

Applicability Table for Printers (SIC 2752)

Administrative Code	Very Small Printer (3 or less tons of VOC emissions)	Small Printer (more than 3, but less than 10 tons of VOC emissions)	Medium Printer (more than 10, but *less than 25* tons of VOC emissions)	Large Printer (*more than 25* tons of VOC emissions)
NR 404			4	4
NR 405				
NR 406			4	44
NR 407			44	444
NR 408			4	444
NR 410		4	4	4
NR 415			4	4
NR 419	4	4	4	4
NR 422		4	44	44
NR 424	4	4	4	444
NR 425		4	4	4
NR 429		4	4	444
NR 431		4	4	4
NR 438	4	4	4	44
NR 439	4	4	4	44
NR 445			4	444

Note: Number of checks (4) indicates relative importance of regulation to printers of different sizes.

A narrative description of how these regulations affect printers follows these tables. Also see section 6.

Table 4. WDNR Air Regulations for Printers Located In Ozone Attainment Counties.[1]

Applicability Table for Printers (SIC 2752)

Administrative Code	Very Small Printer (3 or less tons of VOC emissions)	Small Printer (more than 3, but less than 10 tons of VOC emissions)	Medium Printer (more than 10, but *less than 100* tons of VOC emissions)	Large Printer (*more than 100* tons of VOC emissions)
NR 404			4	4
NR 405				4
NR 406			4	44
NR 407			44	444
NR 408				
NR 410		4	4	4
NR 415			4	4
NR 419	4	4	4	4
NR 422				
NR 424	4	4	4	444
NR 425		4	4	4
NR 429		4	4	444
NR 431		4	4	4
NR 438	4	4	4	44
NR 439	4	4	4	44
NR 445			4	444

Note: Number of checks (4) indicate relative importance of regulation to printers of different sizes.

[1] Almost all counties in Wisconsin have good air quality for ozone. If you are located in Southeastern Wisconsin, you should review the previous table (Table 3) to determine if you are located in an ozone nonattainment county.

Narrative Description of WDNR Air Regulations

Ambient Air Quality (NR 404)

This section lists the various air quality control regions within the state and identifies ambient air quality standards for six criteria pollutants: carbon monoxide, lead, sulfur dioxide, particulate matter, nitrogen oxides and ozone. These are federal standards over which the state has no control. This section also outlines allowable increases in the criteria pollutants. In circumstances where a large printer is required to undertake ambient air quality monitoring (by DNR), this section also outlines the manner in which the monitoring is to be done.

Prevention of Significant Deterioration (NR 405)

This section deals with the Prevention of Significant Deterioration or PSD. This will apply to only those very large facilities whose emissions are typically greater than 250 tons per year in attainment areas. The section outlines allowable emission increases and the steps which need to be taken for permitting.

Construction Permits (NR 406)

This section requires that all sources of air emissions, whose emissions are over certain levels, obtain an air pollution control construction permit before any construction begins.

Under this regulation, each printing press is considered a separate source. For a project such as the installation of a new press to be exempt from this regulation, at least one of the following conditions must be met:

- Emissions (before control devices) from the proposed project are less than 1,666 pounds of VOCs per month.
- Maximum Theoretical Emissions (MTE) from the proposed project are less than 5.7 pounds per hour of VOCs.

Some regulations provide general information, others require printers to take very specific actions. This section summarizes both types of regulations.

NR 404: Lists **federal standards** for criteria pollutants. These standards help the DNR determine which areas of the state are attainment areas (clean air areas) and which areas are nonattainment areas (dirty air areas).

NR 405: Only affects the **largest printers** in the State; those with emissions greater than 250 tons per year.

NR 406: Before installing a new press, you have to determine whether the quantity of air (VOC) emissions expected from that press exceeds the regulatory threshold, above which a press is required to be permitted.

If a press is required to be permitted, construction/ installation of that press cannot begin until a construction permit is obtained.

If the printer is not exempted by the 1,666 lbs/month of VOCs threshold, the maximum theoretical emissions (MTE) should be calculated for the new press to determine if it is exempted by the 5.7 pounds per hour threshold. When air emissions are to be calculated using MTE as the basis, it means that a printer would calculate emissions based on using the press for 24 hours per day and 365 days per year (8,760 hours) without control devices; unless there are physical limitations which do not allow the operation for this amount of time. Common types of limitations are periodic maintenance, inability to store that amount of printed material, or bindery operations that are unable to keep up with press output.

Maximum Theoretical Emissions (MTE) are the theoretical emissions that would result from operating your printing plant 24 hours/day, 365 days/year, without control devices.

New presses that will not emit more than 1,666 pounds per month of uncontrolled VOCs, or will not have a MTE for VOCs of greater than 5.7 pounds per hour, are not required to be permitted under NR 406. If you are installing a new press, review: "What You Have to Do to Comply With NR 406" in section 6.

If you are installing a new press, review: "What You Have To Do To Comply With NR 406" in section 6.

Operation Permits (NR 407)

This section requires that all facilities which have air emissions above a certain level obtain an operation permit from WDNR. NR 407 is a new program with a phased-in approach to submitting operation permit applications. The initial Part 70 (major source) operation permit application period is over; however, if you determine that you are a Part 70 source, you should submit an application as soon as possible. The initial Non-part 70 (minor source) operation permit application period extends from July 1, 1997, through December 1, 1998. After the initial phase-in periods, applications will continue to be required prior to the operation of new and modified facilities.

NR 407: If your printing plant's VOC emissions exceed 10 tons per year, then you must apply for a facility-wide Non-part 70 operation permit.

See section 6 for details about what you have to do to **comply** with NR 407, and see Appendix 2C for a schedule of **application deadlines**.

Printing facilities that do not emit more than 1,666 pounds per month of VOCs before control devices are not required to be permitted under NR 407. The emissions from the entire facility need to be taken into consideration when determining whether you have to file an application with WDNR for an operation permit. Hazardous Air Pollutants (HAPs) are also considered
here and a table of HAPs is presented in the regulation.

Review Worksheet 8. Are your printing plant's uncontrolled emissions higher than the threshold of 1,666 pounds per month?

- If yes: See section 6 for details about what you have to do to comply with NR 407.
- If no: You are exempt from this regulation. Ensure that you calculate your actual air emissions annually to determine if your compliance status changes as a result of incremental growth.

Construction Permits for Direct Major Sources in Nonattainment Areas (NR 408)

This section deals with the construction of a major source in a nonattainment area for ozone or a designated ozone transport region. In Wisconsin, this area is generally those counties which are adjacent to Lake Michigan and those within the boundaries of the Southeast Region. This section also deals with emission offsets. If the construction of a new source will cause an increase in emissions, those emissions must be offset by a reduction elsewhere. These "offsets" can come from within the company or can be purchased from another company that has reduced its emissions.

Note: Major sources are those sources (printers) that emit greater than 25 tons of VOCs per year in severe ozone nonattainment areas and 100 tons of VOCs per year in the rest of the state. In Wisconsin, the following counties are in the ozone nonattainment area: Milwaukee, Washington, Ozaukee, Racine, Kenosha, Waukesha, and Manitowoc. If you are a major source and need compliance assistance contact Printing Industries of Wisconsin (PIW).

Air Permit, Emission, and Inspection Fees (NR 410)

This section applies to the fee structure associated with the annual air emission inventory and construction permits.

Control of Particulate Emissions (NR 415)

This section deals with the emission of particulate matter. With *heatset* presses, the oven drives off heavy solvents which may condense in the atmosphere if not controlled. WDNR treats the condensing droplets as particulate matter. There is a specific section which deals with *heatset* presses.

Control of Organic Compound Emissions (NR 419)

This section deals with general limitations regarding VOC emissions. It addresses the disposal of VOC waste, as well as the storage of organic compounds in tanks and the transferring of organic materials. All printers are subject to the general limitation os this regulation.

Control of Organic Compound Emissions from . . . Printing . . . Operations (NR 422).

The part of this code which applies to lithographic printers is commonly referred to as RACT or Reasonably Available Control Technology (NR 422.142). This deals only with those lithographic printers in the ozone nonattainment areas (or those who elect to have this section apply under NR 424, with DNR approval).

The rule specifically identifies the following counties where RACT applies: **Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha.**

NR 408: Major sources located in a non-attainment area need to obtain a construction permit for each new press prior to beginning installation/
construction. Contact an environmental consultant that has experience working with printers to find out more about how to apply for such permits.

NR 410: Describes fees associated with permitting air emission sources and reporting air emissions.

NR 415: One section applies primarily to condensible particulate matter emissions from heatset web presses.

NR 419: This section deals with general controls for VOC emissions.

NR 422: The Lithographic Printing RACT Rule establishes specific requirements for control of VOCs in a nine-county area. A printer must be located in this area, and have MTE of VOCs greater than 1,666 pounds/ month, in order for limitations described in this regulation to apply.

RACT appliesin: **Keno-sha, Kewaunee, Mani-towoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washing-ton, and Waukesha counties.**

Printers are exempt from this rule if they have MTE of VOCs less than 1,666 lbs/month. MTE can be calculated by adjusting your actual emissions level upward to reflect a 24 hour/day, 365 day/year operating schedule.

Review Worksheet 8. Is your printing plant located in one of the counties where the RACT rule specifically applies *AND* is your printing plant's MTE of VOCs (lbs/month) higher than the threshold of 1,666 pounds per month?

- If yes: See section 6 for details about what you have to do to comply with NR 422.142.
- If no: You are exempt from this regulation. Be sure to calculate your actual and MTE air emissions annually to determine if your compliance status changes as a result of incremental growth.

A section of NR 422 deals with methods of compliance and includes an equation for calculating emissions which deals with the operation and efficiency of capture systems for printing operations.

It is possible for a small printer to opt out of the RACT rule requirements if MTE are greater than 1,666 pounds per month, but actual emissions are well below 1,666 pounds per month. This is done bytaking voluntary liits on VOC-containing product usage to keep actual VOC emissions below 1,666 pounds per month. An Elective Operation Permit application (Forms 4530-145 and 4530-146) must be prepared and submitted to the WDNR. A copy of the Elective Operation Permit Application, with instructions, is provided in Appendix 2F.

Control of Organic Compound Emission from Process Lines (NR 424)

While Chapter 422 only applies to those printers in the nonattainment area, this chapter deals with all printers in the state. If there are more than 15 pounds of VOCs emitted in any day from a single process line (press), the printer is required to demonstrate 85% control of VOC emissions, or the printer must show that it is technologically (or economically) infeasible and accept LACT (Lowest Available Control Techniques) limitations.

When considering each press as a "process line" for purposes of calculating daily emissions from a single press, it is important to only consider emissions from inks, varnishes, water-based coatings, and fountain solutions, and automatic blanket washes only if used while the press is running (on-line). These are the only chemicals that are consumed in the "process" of printing. Emissions from manual cleanup operations and automatic blanket washing operations that are used while the press is not running (off-line) should not be counted here.

If you are affected by the RACT Rule, see “What You Have to Do to Comply With NR 422.142” in section 6.

NR 424: This section requires 85% control of VOC emissions for any process line (press) that emits more than 15 lbs/day VOC, unless technologically (or economically) infeasible.

If you are affected by this regulation, see “What You Have to Do to Comply With NR 424” in section 6.

To determine if NR 424 is applicable, a printer needs to calculate daily emissions from each process line (press). Review Forms 2, 3, and 4 for a description of how to calculate emissions from your entire facility, keeping in mind that you need to adjust this information to reflect the emissions from each press. Are your daily emissions from any one press ever greater than 15 pounds of VOCs?

- If yes: See section 6 for details about what you have to do to comply with NR 424.
- If no: Be sure to recalculate your emissions on a press-by-press basis annually to see if your compliance status has changed.

Compliance Schedules, Delays, Exceptions and Internal Offsets for Organic Compound Emission Sources in Chapters NR 419 to 424. (NR 425)

For those printers who are regulated under Chapters 422 to 424, this Chapter sets out compliance dates by which time emission control equipment was to be installed or alternate compliance schedules established. This section also deals with existing sources that may seasonally operate a control device and use of internal offsets in determining compliance with ink solvent content limitations on the inks used.

Malodorous Emissions and Open Burning (NR 429)

For printers, this section deals with odors associated with ink and solvents. Although this section applies to all odors, it is more common to be an issue for *heatset* operations than nonheatset or sheetfed printers because of stack emissions.

Control of Visible Emissions (NR 431)

Again, this section is most applicable to those printers who use *heatset* inks. Heatset printing uses heat to drive ink solvents from the web as it passes through the dryer. Using a dryer to evaporate the ink solvents may lead to the formation of condensed droplets of ink oils which results in visible emissions when the ambient temperature is cool and the ink oil vapor is not controlled or the control device is not working properly.

Air Contaminant Emission Inventory Reporting Requirements (NR 438)

This section applies to all air pollution sources in the state. This chapter identifies who is to report air emissions. Unless exempt, printers that emit Volatile Organic Compounds (VOCs), or any other material included on a list of air contaminants, are required to report to WDNR. Printers with actual VOC emissions of 6,000 lbs/year (3 tons) or more are required to file an Annual Air Emissions Inventory with WDNR.

If emissions of any air contaminant or HAP exceed the reporting level shown in Table 1 in NR438, it must be reported individually in the Annual Air Emissions Inventory Report.

NR 425: This section establishes compliance deadlines for printers that are covered under any of the regulations listed in NR 422 through 424.

NR 429: This section primarily affects heatset operations having difficulties controlling odors from inks and solvents.

NR 431: This section applies to heatset web printers that are having difficulties controlling visible emissions.

NR 438: This section requires printers with 3 tons or more of VOC emissions per year to file an annual air emissions inventory report with WDNR.

If you are affected by this regulation, see “What You Have to Do to Comply With NR 438” in section 6.

Review Air Emission Worksheet 8. Are your printing plant's emissions higher than the threshold of 6,000 pounds per year?

- If yes: See section 6 for details about what you have to do to comply with NR 438.
- If no: You are exempt from this regulation. Be sure to calculate your actual air emissions annually to determine if your compliance status changes as a result of incremental growth and/or the installation of ansource of VOC emissions.

Reporting, Recordkeeping, Testing, Inspection and Determination of Compliance Requirements (NR 439)

This is another chapter that impacts all air emission sources in the state. This chapter outlines all requirements for reports, recordkeeping, testing, inspection and compliance determinations for a facility. It should be noted that WDNR employees have been given statutory authority to come onto the premises any time during normal working hours in the performance of their duties. Visits may be announced or unannounced.

NR 439: This section applies to all regulated printers. It describes reporting, recordkeeping, testing, inspections, etc. that need to be conducted.

Control of Hazardous Pollutants (NR 445)

This chapter deals with all Hazardous Air Pollutants (HAPs). There are five tables or categories of chemicals. This list is longer than the EPA's list of Hazardous Air Pollutants. Acceptable emission rates are based on two stack heights. When the emission limits are exceeded, technology-based controls must be used. Best Available Control Technology (BACT) is required when the emission levels for *suspected* carcinogens (cancer causing agents) are exceeded. Lowest Achievable Emission Rate (LAER) technologies are required when emissions exceed minimum levels for *known* carcinogens. LAER is the most stringent emission standard required by the state. However, variances from LAER can be obtained.

NR 445: This section deals with Hazardous Air Pollutants (HAPs). Most printers do not emit HAPs in quantities that would require complying with this section, but larger printers should be familiar with this regulation.

The WDNR Air Regulations described above are found in the Wisconsin Administrative Code, Chapter NR 400 and can be ordered from:

Wisconsin Department of Administration
Document Sales Unit
PO Box 7840
202 South Thornton Ave.
Madison, WI 53707-7840
608/266-3358

Request item: AI 52, EN-Air Pollution Control (NR 400-).

6. What You Have to Do to Comply With WDNR Air Regulations

Many printers have to comply with the following regulations. If you've already completed the worksheets in Appendix 2A, and read through the previous section about WDNR air regulations that affect printers, you should have a good idea about which of the following regulations you need to give the closest attention.

What You Have to Do to Comply With NR 406–Construction Permits

This Rule Applies to You

If you are planning on **adding a new press** (source) to your plant and the uncontrolled emissions of VOCs from the press exceed the 1,666 pounds/month applicability threshold.

What You Have to Do

4 Apply for and receive a **construction permit** before commencing any installation or construction activities.

You can obtain construction permit application forms (paper and electronic formats) from the Wisconsin Department of Natural Resources' Madison headquarters or one of the regional/district offices. The address of the Madison headquarters is:

Wisconsin Department of Natural Resources
Bureau of Air Management
PO Box 7921
Madison, WI 53707
608/266-7718

If you have questions about the construction permitting process, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 or the Wisconsin Department of Commerce's Small Business Clean Air Assistance Program at 608/267-9214.

Compliance Options

You don't have many choices if the press that you are going to install will have VOC emissions that exceed the 1,666 pounds per month applicability threshold.

However, if you plan to use products such as alcohol substitutes and low VOC blanket/roller wash, you may be able to reduce your actual emissions and demonstrate the ability to operate a new press without the need for a construction permit.

If you are required to obtain a construction permit, you are also responsible for complying with **NR 407 - Operation Permits.**

WARNING — be sure an operation permit application has been filed prior to the expiration of the construction permit, which is typically 18 months after the date issued.

What You Have to Do to Comply With NR 407-Operation Permits

This Rule Applies to You

If your printing plant's uncontrolled emission of VOCs is **greater than 1,666 pounds per month**, or if you've been issued a construction permit for the installation/construction of a new/modified press.

What You Have to Do

- If you are an existing source and this is your first operation permit, **apply** by the application filing date. See Appendix 2C, Table 1 from Chapter NR 407).

- If a construction permit has been issued for a new press installation at your printing plant, **apply** for an operation permit at least 120 days prior to its expiration.

- If you are exempt from being required to obtain an operation permit, **keep and maintain records** documenting that you qualify for the exemption.

You can obtain operation permit application forms (paper and electronic formats) from the Wisconsin Department of Natural Resources' Madison headquarters or one of the regional/district offices. The address of the Madison headquarters is:

Wisconsin Department of Natural Resources
Bureau of Air Management
PO Box 7921
Madison, WI 53707
608/266-7718

If you have questions about the operation permitting process, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 or the Wisconsin Department of Commerce's Small Business Clean Air Assistance Program at 608/267-9214.

Compliance Options

You don't have many choices if you have already exceeded the 1,666 pounds per month applicability threshold. However, if you are currently below this threshold, it is recommended that you implement pollution prevention alternatives that will help keep you in this exempt status. Keep in mind that you are required to keep records documenting your exempt status.

What You Have to Do to comply with NR 422.142-Lithographic Printing RACT Rule

This Rule Applies to You

If your printing plant's MTE of VOCs is **greater than 1,666 pounds per month, AND** you are located in one of the following counties: Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington or Waukesha.

What You Have to Do

It depends on whether you are a sheetfed (SF), non-heatset web (NHSW), or heatset web (HSW)printer. See the table below.

RACT Rule Requirement	SF	NHSW	HSW
Maintain negative pressure within the dryer (compared to the press room pressure)			4
Achieve 90% destruction efficiency over press dryer exhaust, unless you use a catalytic converter that was installed prior to 01/01/82, in which case the 85% efficiency is required.			4
Conduct emission tests every 48 months to verify destruction efficiency.			4
Limit the VOC content of your fountain solution to no more than:			
• 1.6% by weight, if a restricted alcohol is used			4
• 3.0% by weight, if a restricted alcohol is used, but it is refrigerated (to 60˚ F or less)			4
• 5.0 % by weight, with no restricted alcohols		4	4
• 5.0 % by weight, with or without restricted alcohols	4		
• 8.5% by weight, if your fountain solution is refrigerated (to 60º F or less)	4		
• 13.5% by weight, if you are printing on metal, metal-foil or plastic substrates, and you use a refrigerated (to 60˚ F or less) fountain solution	4		
Use low VOC (no greater than 30% by weight) or low vapor pressure (no greater than 10 mm of Hg at 68˚ F) blanket/roller wash.	4	4	4
• If you print on plastic you can use up to 165 gallons/year of blanket/roller wash that does not meet the low VOC or low vapor pressure criteria described above	4	4	4
• If you do not print on plastic, you can only use up to 55 gallons/year of non-compliant blanket/roller wash.	4	4	4
Keep records of the following for at least 5 years (see Appendix 2D)			
• Temperature – of refrigerated fountain solutions once each 8-hour shift, if they contain restricted alcohols (e.g., IPA).	4	4	4
• Fountain solution – VOC % by weight as applied, and name of each restricted alcohol used.	4	4	4
• Blanket/roller wash – VOC % by weight, or vapor pressure of each VOC component.	4	4	4
• Volume of any non-compliant blanket/roller wash used (towards the allowance of 55 gallons/year for non-plastic printing, or 165	4	4	4

gallons/year for plastic). • Information regarding control devices for each day of operation.			4
Certify that you are in compliance with the RACT Rule (see Appendix 2E)	4	4	4

If your facility's MTE of VOCs exceeds 1,666 pounds per month, but your actual VOC emissions are less than this amount, you can apply for an elective operation permit that limits your emissions to 1,666 lbs/mo. or less, which will exempt you from the RACT requirements described above (see Appendix 2F).

What You Have to Do to Comply With NR 424-Control of Organic Compound Emissions From Process Lines

This Rule Applies to You

If VOC emissions from any one of your presses **exceeds 15 pounds per day**. Note: when calculating your emissions level for purposes of determining whether NR 424 applies to your presses, keep in mind that only emissions from the following sources should be included:

- inks, varnishes, and coatings
- fountain solutions
- automatic blanket washes (provided the press is not printing during this operation)

Note: Sheetfed presses are normally not operating when automatic blanket washes are used.

For purposes of determining whether NR 424 applies to any one of your printing presses, you do not count emissions from manual cleanup of presses. Blanket/roller washes and other solvents are not emissions from process lines, unless they are dispensed from an automatic blanket washer while the press is in operation.

What You Have to Do

4 **Control emissions** of VOCs by 85%. A control device may be an appropriate choice for a heatset web press printer.

4 *Elect* to comply with the Lithographic Printing RACT Rule, rather than install a control device. This is often an appropriate alternative for sheetfed press and non-heatset web press printers,

or

4 Demonstrate that 85% control is **technologically (or economically) infeasible** and use LACT and operating practices demonstrating best current technology (WDNR approval is required).

If this rule applies to one or more of your presses, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 for a more complete description of compliance alternatives.

What You Have to Do to Comply With NR 438-Air Contaminant Emission Inventory Reporting Requirements

This Rule Applies to You

If your printing plant's actual emissions of VOCs are equal to or **greater than 6,000 pounds per year**.

What You Have to Do

1. **Complete** an Annual Air Emission Inventory Report prior to March 1 for the preceeding calendar year's emissions.

2. **Report** emissions of Hazardous Air Pollutants in addition to VOC emissions if the reporting level is exceeded.

Note: Hazardous Air Pollutants (HAPs) can be found in alcohol substitutes, blanket and roller wash, and other cleanup solvents. The Annual Air Emission Inventory Report includes a listing of Hazardous Air Pollutants. If you identify any of these pollutants in the products that you use, you need to determine whether they are being emitted above the reporting level. Generally speaking, the HAPs in products used by lithographic printers are also VOCs. Furthermore, the reporting levels for most HAPs used by printers is 6,000 pounds per year. Therefore, you should be able to determine whether you need to report HAPs based on the amount of VOCs being emitted from your printing plant during a calendar year.

The key to knowing whether you need to report HAPs is gaining a good understanding of what quantity of VOC is emitted from each printing product that you use. Once you have an idea of which *products* are emitting more than 6,000 pounds per year of VOCs, you can begin to identify which *products* need to be closely scrutinized to determine if they contain any HAPs. Also, changing to other products with fewer or no HAPs may eliminate the need to report HAPs.

You can obtain Annual Air Emission Inventory Reporting forms from the Wisconsin Department of Natural Resources' Madison headquarters or one of the regional/district offices. The address of the Madison headquarters is:

Wisconsin Department of Natural Resources
Bureau of Air Management
PO Box 7921
Madison, WI 53707
608/266-7718

The Annual Air Emission Inventory Reporting forms have now been been included in a consolidated reporting package developed as part of the "Great Printers Project" effort. It can be completed electronically on any computer operating under DOS or Windows (versions 3.1 or 95). You should be aware that the consolidated reporting package also includes the Annual Hazardous Waste Activity Report, and Form R for reporting toxic chemical releases under SARA Title III. Most printers do not have to be concerned about the Form R report; however, if you are not currently completing an annual hazardous waste activity report, you should carefully review Section 3: Hazardous Waste Management.

If you have questions about the Annual Air Emissions Inventory Report, or the consolidated reporting package, it is recommended that you contact Printing Industries of Wisconsin (PIW) at 414/785-9090 or the Wisconsin Department of Commerce's Small Business Clean Air Assistance Program at 608/266-7718.

Appendix 2A: Air Emission Worksheets

Instructions

It is important to complete these Air Emission Worksheets so that you know the quantity of VOCs being emitted from your printing plant. Once you know your VOC emissions in lbs/year, or tons/year, you will know which WDNR requirements you have to follow, as well as those regulations from which you are exempt. In addition to knowing your actual air emissions, you will also have to determine your maximum theoretical emissions (MTE), or the VOC emissions that would be expected if you operated your plant 24 hours/day, 365 days per year. WDNR uses MTE as a basis for determining whether you have to comply with some regulations.

Worksheets 2-1 through 2-8 can also help you identify those products that contribute the most to VOC emissions from your facility. By identifying these products, finding substitute products that can help you to reduce emissions will be easier.

Web printers should complete the following worksheets:

- Worksheet 2-1 – Listing of presses
- Worksheet 2-8 – Exemptions from WDNR Air Regulations (It is assumed that web printers are already calculating VOC emissions annually. Web printers should review Appendix 2B: "Guidelines for Determining Emissions from Lithographic Printing Facilities" to be sure that they are calculating their emissions accordingly).

Sheetfed printers should complete the following worksheets:

- Worksheet 2-1 – List of presses
- Worksheet 2-2 – Sheetfed Press Inks and Varnishes
- Worksheet 2-3 – Sheetfed Press Coatings
- Worksheet 2-4 – Fountain Solutions
- Worksheet 2-5 – Blanket/Roller Washes
- Worksheet 2-6 – Actual Air Emissions and MTE for Sheetfed Presses
- Worksheet 2-7 – VOC Emissions per press (process line)
- Worksheet 2-9 – Exemptions from WDNR Air Regulations

Completing the Air Emissions Worksheets will help you determine which WDNR requirements apply to your printing plant, and will help you identify those requirements from which you are exempt.

It is important to complete these Air Emission Worksheets so that you know the quantity of VOCs being emitted from your printing plant and which WDNR regulations apply to you.

Examples of completed worksheets follow the blank copies.

The Air Emissions Worksheets will help you compute:

- Actual VOC Emissions
- Maximum Theoretical Emissions of VOCs

Web printers are encouraged to review Appendix 2B: "Guidelines for Determining Emissions…" to be sure that they are calculating their VOC emissions accordingly.

.

Example Worksheet 2-1: List of Presses

(summarizes data on printing presses)

Company Name: *ABC Commercial Printing Company*
Date Prepared: *August 7, 1997*

(1) Press (Manufacturer and Model No.)	(2) Facility's Name for Press	(3) Press Type	(4) No. of Print Units	(5) Coating Unit (Y or N)	(6) Auto Blanket Wash (Y or N)	(7) Hours Operated per year
Harris L638	*L638*	*SF*	*5*	*Y*	*N*	*4160*
Heidelberg MOVP	*MOVP*	*SF*	*5*	*Y*	*N*	*4160*
Heidelberg SORSZ	*SORSZ*	*SF*	*2*	*N*	*N*	*4160*
Miehle 238	*Miehle*	*SF*	*2*	*N*	*N*	*4160*
Miller TP-38	*TP-38*	*SF*	*2*	*N*	*N*	*4160*
Komori L528	*Komori*	*SF*	*5*	*Y*	*N*	*4160*

Total Print Units=	*21*

16 hours/day x 5 days/week x 52 weeks/year = 4160 hours/year
5 days/week x 52 weeks/year = 260 days/year

Instructions

Column 1: Identify each press by listing the manufacturer and model number.
Column 2: Indicate the facility's name for each press (e.g. the name that you and your press operators call each press).
Column 3: Indicate each press type (e.g., sheetfed (SF), heatset web (HSW), or non-heatset web (NHSW)).
Column 4: Indicate the number of printing units on each press, not counting coating units.
Column 5: Indicate those presses which are equipped with a coating unit.
Column 6: Indicate those presses which are equipped with an automatic blanket wash system.
Column 7: Indicate how many hours each press is operated per year, based on the number of shifts that your plant operates. For Example -- 2 shifts per week day. 1 shift on Saturday. 8 hours per shift.
(2 x 8 x 5) + (1 x 8 x 1) = 88 hours /wk.
52 wks/yr x 88 hrs/wk = 4576 hrs/yr.

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Worksheet 2-1: List of Presses

(summarizes data on printing presses)

Company Name: _____
Date Prepared: _____

(1) Press (Manufacturer and Model No.)	(2) Facility's Name for Press	(3) Press Type	(4) No. of Print Units	(5) Coating Unit (Y or N)	(6) Auto Blanket Wash (Y or N)	(7) Hours Operated per year
		Total Print Units=				

Instructions

Column 1: Identify each press by listing the manufacturer and model number.
Column 2: Indicate the facility's name for each press (e.g., the name that you and your press operators call each press).
Column 3: Indicate each press type (e.g., sheetfed (SF), heatset web (HSW), or non-heatset web (NHSW)).
Column 4: Indicate the number of printing units on each press, not counting coating units.
Column 5: Indicate those presses which are equipped with a coating unit.
Column 6: Indicate those presses which are equipped with an automatic blanket wash system.
Column 7: Indicate how many hours each press is operated per year, based on the number of shifts that your plant operates. For Example -- 2 shifts per week day. 1 shift on Saturday. 8 hours per shift.
(2 x 8 x 5) + (1 x 8 x 1) = 88 hours /wk.
52 wks/yr x 88 hrs/wk = 4576 hrs/yr.

Example Worksheet 2-2: Sheetfed Press Inks and Varnishes

(summarizes data on inks/varnishes)

Company Name: *ABC Commercial Printing Company*
Date Prepared: *August 7, 1997*

(1) Ink/Varnish Name	(2) Usage (lbs/yr)	(3) VOC content (% by wt.)[1]	(4) Emission Factor (0.05)[2]	(5) Total VOCs Emitted (lbs VOC/yr)
Peacock B-60K	*2600*	*.35*	*.05*	*45.5*
Superior Challenger	*1500*	*.22*	*.05*	*16.5*
Vanguard Ink	*5270*	*.18*	*.05*	*47.4*
Superior Supertech	*1900*	*.16*	*.05*	*15*
Handschy Encompass	*560*	*.08*	*.05*	*2*
Handschy Varnish	*790*	*.025*	*.05*	*1*
			Subtotal =	*127.4*
			Credit for Waste Ink Shipped Off-Site=	*9*
			Total =	*118.4*

Instructions

Hint: To simplify the completion of this form and calculation, it is recommended that you identify the six inks that you use most frequently, or in greatest quantities. Once you have identified these inks, you have an idea of the range of VOC contents that apply to the inks that you use. Then identify which ink has the highest VOC content and use this VOC content to calculate the VOC emissions from all other inks that you use. Varnishes can be calculated individually or similarly lumped together under the highest VOC content for these materials.

Column 1: Record each type of ink/varnish used.
Column 2: Record the quantity used in a 12-month period.
Column 3: Record the VOC content.
Column 4: Include the emission factor (0.05) in your calculation.
Column 5: Calculate the VOC emissions from each type of ink/varnish that you use by multiplying Col. 2 x Col. 3 x Col. 4.

Take "credit" for any waste ink shipped off-site. Remember that only 5% of the ink VOC, when used, is emitted.

[1] If the % VOC content by weight is 18%, the multiplier is 0.18. VOC content should be listed on the Material Safety Data Sheet (MSDS) for each ink/varnish. This information can also be requested from your ink supplier or manufacturer. Confirm that EPA method 24 was used by the manufacturer to determine the VOC content.
[2] The emission factor for inks/varnishes is 5% or 0.05. This factor is based on the retention factor for sheetfed press inks which is 95%, meaning that 95% of the VOCs in the ink or varnish remains on the substrate.

Worksheet 2-2: Sheetfed Press Inks and Varnishes

(summarizes data on inks/varnishes)

Company Name: _____
Date Prepared: _____

(1) Ink/Varnish Name	(2) Usage (lbs/yr)	(3) VOC content (% by wt.)[1]	(4) Emission Factor (0.05)[2]	(5) Total VOCs Emitted (lbs VOC/yr)
			Subtotal =	
			Credit for Waste Ink Shipped Off-Site=	
			Total =	

Instructions

Hint: To simplify the completion of this form and calculation, identify the six inks that you use most frequently, or in greatest quantities. Once you have identified these inks you have an idea of the range of VOC contents that apply to the inks that you use. Then identify which ink has the highest VOC content, and use this VOC content to calculate the VOC emissions from all other inks that you use. Varnishes can be calculated individually or similarly lumped together under the highest VOC content for these materials.

Column 1: Record each type of ink/varnish used.
Column 2: Record the quantity used in a 12-month period.
Column 3: Record the VOC content.
Column 4: Include the emission factor (0.05) in your calculation.
Column 5: Calculate the VOC emissions from each type of ink/varnish that you use by multiplying Column 2 x Column 3 x Column 4.

[1] If the % VOC content by weight is 18%, the multiplier is 0.18. VOC content should be listed on the Material Safety Data Sheet (MSDS) for each ink/varnish. This information can also be requested from your ink supplier or manufacturer. Confirm that EPA method 24 was used by the manufacturer to determine the VOC content.
[2] The emission factor for inks/varnishes is 5% or 0.05. This factor is based on the retention factor for sheetfed press inks which is 95%, meaning that 95% of the VOCs in the ink or varnish remains on the substrate.

Take “credit” for any waste ink shipped off-site. Remember that only 5% o the ink VOC, when used, is emitted.

Example Worksheet 2-3: Sheetfed Press Coatings

(summarizes data on water-based coatings)

Company Name: *ABC Commercial Printing Company*
Date Prepared: *August 7, 1997*

(1) Coating Name	(2) Usage (lbs/yr)	(3) VOC content (% by wt.)[1]	(4) Emission Factor (100%)[2]	(5) Total VOCs Emitted (lbs VOC/yr)
Acqueous Coating	*26290*	*.025*	*1.0*	*657.2*
			Total =	*657.2*

Instructions

Column 1: Record the names of water-based coatings that you use.
Column 2: Record the amount used per calendar year in pounds. Because water-based coatings are often purchased in gallons, you may have to convert units of gallons to pounds by multiplying the number of gallons consumed by the density of the product in lbs/gallon.
Column 3: Record the VOC content (% VOC by weight) for each coating.
Column 4: Use 100% (1.0) as the emission factor because there is not a retention factor for water-based coatings.
Column 5: Calculate the total VOC emissions per year from coatings by multiplying Column 2 x Column 3 x Column 4.

HINT: Water-based coatings are becoming increasingly popular; however, they can also increase your VOC emissions because the emission factor is higher. The VOCs in water-based coatings do not remain on the substrate. Consider UV-coatings or aqueous coatings with very low VOC contents as a way of reducing VOC emissions from coatings.

[1] If the % VOC content by weight is 4%, the multiplier is 0.04. VOC content should be listed on the Material Safety Data Sheet (MSDS) for each water-based coating. This information can also be requested from your coatings supplier or manufacturer. Confirm that EPA method 24 was used by the manufacturer to determine the VOC content.
[2] The emission factor for VOCs in water-based (aqueous) coatings is 100%, meaning that all of the VOCs in these coatings are emitted. The retention factor for water-based coatings is 0% meaning that none of the VOCs in water-based coatings remain on the substrate.

Worksheet 2-3: Sheetfed Press Coatings

(summarizes data on water-based coatings)

Company Name: _____
Date Prepared: _____

(1)	(2)	(3)	(4)	(5)
Coating Name	Usage (lbs/yr)	VOC content (% by wt.)[1]	Emission Factor (100%)[2]	Total VOCs Emitted (lbs VOC/yr)
			Total =	

Instructions

Column 1: Record the names of water-based coatings that you use.
Column 2: Record the amount used per calendar year in pounds. Because water-based coatings are often purchased in gallons, you may have to convert units of gallons to pounds by multiplying the number of gallons consumed by the density of the product in lbs/gallon.
Column 3: Record the VOC content (% VOC by weight) for each coating.
Column 4: Use 100% (1.0) as the emission factor because there is not a retention factor for water-based coatings.
Column 5: Calculate the total VOC emissions per year from coatings by multiplying Column 2 x Column 3 x Column 4.

HINT: Water-based coatings are becoming increasingly popular; however, they can also increase your VOC emissions, because the emission factor is higher. The VOCs in water-based coatings do not remain on the substrate. Consider UV-coatings or aqueous coatings with very low VOC contents as a way of reducing VOC emissions from coatings.

[1] If the % VOC content by weight is 4%, the multiplier is 0.04. VOC content should be listed on the Material Safety Data Sheet (MSDS) for each water-based coating. This information can also be requested from your coatings supplier or manufacturer. Confirm that EPA method 24 was used by the manufacturer to determine the VOC content.
[2] The emission factor for VOCs in water-based (aqueous) coatings is 100%, meaning that all of the VOCs in these coatings are emitted. The retention factor for water-based coatings is 0%, meaning that none of the VOCs in water-based coatings remain on the substrate.

Example Worksheet 2-4: Fountain Solutions

(summarizes data on fountain solutions)

Company Name: *ABC Commercial Printing Company*
Date Prepared: *August 7, 1997*

(1) Fountain Solution Product Name (list alcohol, alcohol-substitutes, fountain solution concentrates, etch, etc.)	(2) Usage (gal./yr)	(3) VOC content (lbs/gal.)[1]	(4) Total VOC Emissions (lbs/yr)
Isopropanol (Isopropyl Alcohol)	*1535*	*6.7*	*10284*
Alcohol substitute	*650*	*.975*	*634*
Etch	*200*	*0.35*	*70*
		Total=	*10988*

Instructions

Column 1: Record all undiluted fountain solution products used (e.g., etch, alcohol, alcohol substitutes, etc.)
Column 2: Record number of gallons used per calendar year for each product.
Column 3: Record the VOC content in pounds/gallon for each product.
Column 4: Calculate the total VOC emissions from fountain solution products by multiplying Column 2 x Column 3.

HINT: If the VOC content is not listed on the MSDS, contact the manufacturer to request this value or compute VOC content (lbs/gallon) from the specific gravity for the product and % VOC by weight, provided that this information is available on the MSDS.

For example: If a product is 80%VOC by weight and the product has an overall specific gravity of 1.02, you can calculate the VOC in lbs/gallon as follows:
1.02 (specific gravity) x 8.34 (lbs/gallon water) x 0.80 (VOC content) = 6.8 lbs/gal VOC.

[1] VOC content should be listed on the Material Safety Data Sheet (MSDS) for each fountain solution product (e.g.,VOC content of IPA is approximately 6.7 lbs/gallon). VOC content information can also be requested from your chemicals supplier. Confirm that EPA method 24 was used by the manufacturer to determine the VOC content.

Worksheet 2-4: Fountain Solutions

(summarizes data on fountain solutions)

Company Name: _____
Date Prepared: _____

(1) Fountain Solution Product Name (list alcohol, alcohol-substitutes, fountain solution concentrates, etch, etc.)	(2) Usage (gal./yr)	(3) VOC content (lbs/gal.)[1]	(4) Total VOC Emissions (lbs/yr)
		Total=	

Instructions

Column 1: Record all undiluted fountain solution products used (e.g., etch, alcohol, alcohol substitutes, etc.)
Column 2: Record number of gallons used per calendar year for each product.
Column 3: Record the VOC content in pounds/gallon for each product.
Column 4: Calculate the total VOC emissions from fountain solution products by multiplying Column 2 x Column 3.

HINT: If the VOC content is not listed on the MSDS, contact the manufacturer to request this value or compute VOC content (lbs/gallon) from the specific gravity for the product and % VOC by weight, provided that this information is available on the MSDS.

For example: If a product is 80% VOC by weight and the product has an overall specific gravity of 1.02, you can calculate the VOC in lbs/gallon as follows:
1.02 (specific gravity) x 8.34 (lbs/gallon water) x 0.80 (VOC content) = 6.8 lbs/gal VOC.

[1] VOC content should be listed on the Material Safety Data Sheet (MSDS) for each fountain solution product (e.g., VOC content of IPA is approximately 6.7 lbs/gallon). VOC content information can also be requested from your chemicals supplier. Confirm that EPA method 24 was used by the manufacturer to determine the VOC content.

Example Worksheet 2-5: Blanket/Roller Washes

(summarizes data on cleanup materials)

Company Name: *ABC Commercial Printing Company*
Date Prepared: *August 7, 1997*

(1) Press Wash Name (list blanket and roller washes, and cleaners/solvents)	(2) Usage (gals./yr)	(3) Vapor Pressure (mm/Hg)	(4) VOC (%)	(5) VOC Content (lbs/gal)	(6) Emission Factor (0.5 or 0.6)[1]	(7) Total VOCs Emitted (lbs/year)
Blanket Wash #2	*705*	*60*	*100*	*5.8*	*0.6*	*2453*
ACF Blanket wash	*460*	*10*	*100*	*6.8*	*0.5*	*1564*
Rogersol Digger	*105*	*10*	*70*	*5.0*	*0.5*	*262*
Rogersol Dugout	*60*	*10*	*100*	*6.5*	*0.5*	*195*
Varn-120	*120*	*9*	*100*	*6.8*	*0.5*	*408*
Varn-253	*230*	*9*	*100*	*6.8*	*0.5*	*782*
					Subtotal =	*5664*
					Credit for Waste Press Wash Ink Shipped Off-Site =	*385*
					Total =	*5279*

Instructions

Column 1: Record all cleanup materials used.
Column 2: Record the number of gallons of each product used per year.
Column 3: Record the vapor pressure (mm Hg) for each product.
Column 4: Record the products VOC content (%VOC).
Column 5: Record the VOC content of each product in pounds per gallon. If VOC content is not listed on the MSDS, contact the manufacturer for this information.
Column 6: Refer to the footnote and use the information in Columns 3 and 4 to determine the emission factor.
Column 7: Calculate the total VOC emissions (lbs/year) by multiplying Column 2 x Column 5 x Column 6.

NOTE: The "Credit for Recovered Waste Solvent Shipped Off-site" recognizes the fact that VOCs in solvents shipped off-site are not emitted from the printing facility. To calculate this credit, you must know the VOC content of the waste or product from which the waste is derived. Multiply the total weight shipped off-site in one calendar year by the VOC content. Then reduce this amount by 50% (or 40% as appropriate) to adjust for the shop towel retention factor. The value you arrive at is the credit for waste solvent shipped off-site.

[1] The retention factor in shop towels for a cleanup solvent/product is 50% provided that the VOC content is less than 30% or the vapor pressure of the product is less than 10 mm Hg at 68° F. It is assumed that 50% of the VOCs are carried off-site in properly managed shop towels; therefore 50% (or 0.50) is emitted. If the vapor pressure is greater than 10 mm Hg, and the VOC content is greater than 30%, then the retention factor in shop towels is reduced to 40%, meaning that 60% (or 0.60) of the VOCs are emitted.

Worksheet 2-5: Blanket/Roller Washes

(summarizes data on cleanup materials)

Company Name: _____
Date Prepared: _____

(1) Press Wash Name (list blanket and roller washes, and cleaners/solvents)	(2) Usage (gals./yr)	(3) Vapor Pressure (mm/Hg)	(4) VOC (%)	(5) VOC Content (lbs/gal)	(6) Emission Factor (0.5 or 0.6)[2]	(7) Total VOCs Emitted (lbs/year)
Subtotal =						
Credit for Waste Press Wash Ink Shipped Off-Site =						
Total =						

Instructions

Column 1: Record all cleanup materials used.
Column 2: Record the number of gallons of each product used per year.
Column 3: Record the vapor pressure (mm Hg) for each product.
Column 4: Record the products VOC content (%VOC).
Column 5: Record the VOC content of each product in pounds per gallon. If VOC content is not listed on the MSDS, contact the manufacturer for this information.
Column 6: Refer to the footnote, and use the information in columns 3 and 4 to determine the emission factor.
Column 7: Calculate the total VOC emissions (lbs/year.) by multiplying Column 2 x Column 5 x Column 6.

NOTE: The "Credit for Recovered Waste Solvent Shipped Off-site" recognizes the fact that VOCs in solvents shipped off-site are not emitted from the printing facility. To calculate this credit, you must know the VOC content of the waste or product from which the waste is derived. Multiply the total weight shipped off-site in one calendar

[2] The retention factor in shop towels for a cleanup solvent/product is 50% provided that the VOC content is less than 30% or the vapor pressure of the product is less than 10 mm Hg at 68° F. It is assumed that 50% of the VOCs are carried off-site in properly managed shop towels; therefore 50% (or 0.50) is emitted. If the vapor pressure is greater than 10 mm Hg, and the VOC content is greater than 30%, then the retention factor in shop towels is reduced to 40%, meaning that 60% (or 0.60) of the VOCs are emitted.

year by the VOC content. Then reduce this amount by 50% (or 40% as appropriate) to adjust for the shop towel retention factor. The value you arrive at is the credit for waste solvent shipped off-site.

Example Worksheet 2-6: Actual Air Emissions and MTE for Sheetfed Presses

(summarizes total actual VOC emissions and Maximum Theoretical Emissions)

Company Name: *ABC Commercial Printing Company*
Date Prepared: *August 7, 1997*

Table 1. Total Actual VOC Emissions	VOCs Emitted (lbs/year)
Worksheet 2-2 - Sheetfed Press Inks and Varnishes	*118.4*
Worksheet 2-3 - Sheetfed Press Coatings	*657.2*
Worksheet 2-4 - Fountain Solutions	*10988*
Worksheet 2-5 - Blanket / Roller Washes	*5279*
Total VOC Emissions (lbs/year)	*17042.6*
Monthly VOC Emissions (lbs/month)	*1420*

Table 2: MTE Factor

Max Operating Hours / Year	*8760*
Actual Operating Hours / Year	*4160*
MTE Factor	*2.1*

Table 3: MTE of VOCs

MTE Factor	*2.1*
Actual Emissions	*17042.6*
MTE (lbs/year)	*35789*
MTE (lbs/month)	*2982*

Instructions: Calculating actual VOC emissions

Table 1: Total Actual VOC Emissions — Carefully add up the total VOCs emitted (lbs/year) from Worksheets 2-2 through 2-5. Then determine VOC emissions in lbs/month by dividing the total VOC's (lbs/year) by 12.

Table 2: MTE Factor -— Record actual operating hours for sheetfed presses. (See Worksheet 2-1).

Table 3: Maximum Theoretical Emissions (MTE) of VOCs. An initial estimate of your MTE can be calculated by adjusting your actual VOC emissions upward to reflect the theoretical amount of emissions that would result from operating your plant 24 hours/day, 365 days per year. This upward adjustment can be accomplished by using an MTE factor that is based on actual hours of operation. Multiply actual emissions by MTE factor to get MTE. Divide MTE (lbs/year) by 12 to get MTE (lbs/month).

Note: The method for determining MTE demonstrated here gives you an estimated MTE. For permitting purposes, WDNR may require that a more complicated method of computing MTE be used. WDNR's proposed method is included in Appendix 2-G.

Worksheet 2-6: Actual Air Emissions and MTE for Sheetfed Presses

(summarizes total actual VOC emissions and Maximum Theoretical Emissions)

Company Name: _____
Date Prepared: _____

Table 1. Total Actual VOC Emissions	VOCs Emitted (lbs/year)
Worksheet 2-2 – Sheetfed Press Inks and Varnishes	
Worksheet 2-3 – Sheetfed Press Coatings	
Worksheet 2-4 – Fountain Solutions	
Worksheet 2-5 – Blanket / Roller Washes	
Total VOC Emissions (lbs/year)	
Monthly VOC Emissions (lbs/month)	

Table 2: MTE Factor	
Max Operating Hours / Year	8760
Actual Operating Hours / Year	
MTE Factor	

Table 3: MTE of VOCs	
MTE Factor	
Actual Emissions	
MTE (lbs/year)	
MTE (lbs/month)	

Instructions

Table 1: Total Actual VOC Emissions — Carefully add up the total VOC's emitted (lbs/yr.) from Worksheets 2-2 through 2-5. Then determine VOC emissions in lbs/month by dividing the total VOCs (lbs/year) by 12.

Table 2: MTE Factor — Record actual operating hours for sheetfed presses. (See Worksheet 2-1).

Table 3: Maximum Theoretical Emissions (MTE) of VOCs. An initial estimate of your MTE can be calculated by adjusting your actual VOC emissions upward to reflect the theoretical amount of emissions that would result from operating your plant 24 hours/day, 365 days per year. This upward adjustment can be accomplished by using an MTE factor that is based on actual hours of operation. Multiply actual emissions by MTE factor to get MTE. Divide MTE (lbs/year) by 12 to get MTE (lbs/month).

NOTE: The method for determining MTE demonstrated here gives you an estimated MTE. For permitting purposes, WDNR may require that a more complicated method of computing MTE be used. WDNR's proposed method is included in Appendix 2-G.

Example Worksheet 2-7: VOC Emissions Per Press

VOC emissions per press need to be computed in units of lbs/day per press. For purposes of determining whether WDNR air regulations for process lines (presses) apply to your facility, you have to estimate emissions from individual presses. One way of estimating these emissions is included here. Note that emissions from process lines (presses) includes emissions of ink, varnish, coatings, fountain solution, and automatic blanket washes if used while the press is running or on-line (but not manual cleaning solvents).

Company Name: *ABC Commercial Printing Company*
Date Prepared: *August 7, 1997*

Table 1. Total Process Line Emissions

Process/chemical[1] (from Table 1, Worksheet 2-6)	Process Line VOCs emitted (lbs/year)
Ink/varnish	*118.4*
Coatings	*657.2*
Fountain Solution)	*10988*
Auto-blanket Washes (estimate)	*0*
Total =	*11764*

Table 2. Emissions from largest press

(1) Total No. of Print units	(2) Total VOCs emitted (lbs/year)	(3) VOCs emitted per print unit (lbs/year)	(4) VOCs emitted by largest press (lbs/year)
21	*11764*	*560*	*2800 (5 units)*

Table 3. VOCs emitted (lbs/day) per press

(1) VOCs emitted by largest press (lbs/year)	(2) Days operated per year	(3) VOCs emitted (lbs/day) for press
2800	*260*	*11*

If the value in Column 3 is over 15 lbs/day per press, repeat this calculation for second largest press in your plant.

Instructions

Table 1: Process line emissions — Refer to Worksheet 2-6, Table 1 for total emissions from processes: ink/varnish; coatings; fountain solution; and automatic blanket wash (if used on-line).
If you have an automatic blanket wash system, estimate the amount of blanket wash that is used in the system per year, then estimate the amount of VOC emissions to attribute to the blanket wash used in the auto-blanket wash system while the press is running.

Table 2: Emissions from largest press — Record the total number of print units from all presses in Column 1 (see Worksheet 2-1). In Column 2, record total yearly process line VOC emissions from Table 1. Divide Column 2 by Column 1 and record VOCs emitted per print unit in Column 3. Identify VOC emissions from your largest press by multiplying emissions per print unit (Column 3) by the number of print units on the largest press (see Worksheet 2-1). Record this amount in Column 4.

[1] Process chemicals include ink, varnish, coatings, fountain solutions, and automatic blanket washes (if used while the press is running). Manually applied blanket/roller washes or solvents and automatic blanket washes used when the press is not running or off-line should not be included here.

Table 3: VOCs emitted (lbs/day) for press — Copy the value in Column 4 of Table 2 to Column 1 of Table 3. Record days operated per year in Column 2 (for example 52 weeks x 5 days/week = 260 days/year). Divide Column 1 by Column 2 and record VOCs emitted (lbs/day) for press in Column 3.

Worksheet 2-7: VOC Emissions Per Press

VOC emissions per press need to be computed in units of lbs/day per press. For purposes of determining whether WDNR air regulations for process lines (presses) apply to your facility, you have to estimate emissions from individual presses. One way of estimating these emissions is included here. Note that emissions from process lines (presses) include emissions of ink, varnish, coatings, fountain solution, and automatic blanket washes if used while the press is running or on-line (but not manual cleaning solvents).

Company Name: _____ Date Prepared: _____

Table 1. Total Process Line Emissions

Process/chemical[1] (from Table 1, Worksheet 2-6)	Process Line VOCs emitted (lbs/year)
Ink/varnish	
Coatings	
Fountain Solution	
Auto-blanket Washes (estimate)	
Total =	

Table 2. Emissions from largest press

(1) Total No. of print units	(2) Total VOCs emitted (lbs/year)	(3) VOCs emitted per print unit (lbs/year)	(4) VOCs emitted by largest press (lbs/year)

Table 3. VOCs emitted (lbs/day) per press

(1) VOCs emitted by largest press (lbs/year)	(2) Days operated per year	(3) VOCs emitted (lbs/day) for press

If the value in Column 3 is over 15 lbs/day per press, repeat this calculation for second largest press in your plant.

Instructions

Table 1: Process line emissions — Refer to Worksheet 2-6, Table 1 for total emissions from processes: ink/varnish; coatings; fountain solution; and automatic blanket wash (is used on-line).
If you have an automatic blanket wash system, estimate the amount of blanket wash that is used in the system per year, then estimate the amount of VOC emissions to attribute to the blanket wash used in the auto-blanket wash system while the press is running.

Table 2: Emissions from largest press — Record the total number of print units from all presses in Column 1 (see Worksheet 2-1). In Column 2, record total yearly process line VOC emissions from Table 1. Divide Column 2 by Column 1 and record VOCs emitted per print unit in Column 3. Identify VOC emissions from your largest press by multiplying emissions per print unit (Column 3) by the number of print units on the largest press (see Worksheet 2-1). Record this amount in Column 4.

[1] Process chemicals include ink, varnish, coatings, fountain solutions, and automatic blanket washes (if used while the press is running). Manually applied blanket/roller washes or solvents and automatic blanket washes used when the press is not running or off-line should not be included here.

Table 3: VOCs emitted (lbs/day) for press — Copy the value in Column 4 of Table 2 to Column 1 of Table 3. Record days operated per year in Column 2 (for example 52 weeks x 5 days/week = 260 days/year). Divide Column 1 by Column 2 and record VOCs emitted (lbs/day) for press in Column 3.

Example Worksheet 2-8: Exemptions from DNR Air Regulations

Many smaller printers will be exempt from some of the main WDNR Air Regulations because they do not emit VOCs at levels that exceed the applicability thresholds of the regulations. Table 2 below describes regulatory exemption thresholds for some air regulations that apply to printers in Wisconsin. Based on the VOC emissions information you've calculated from the Air Emissions Worksheets (2-6 and 2-7) you will be able to determine if you are exempt from the air regulations identified below.

Table 1. Actual VOC emissions and MTE

	Actual VOC emissions	MTE of VOCs
lbs/year	*17042.6*	---
lbs/mo.	*1420*	*2982*
lbs/day per press	*11*	---

Table 2. Applicability Thresholds

Chapter:	Rule:	Actual VOC Emission threshold	MTE of VOCs threshold	Exempt (Yes or No)
NR 406	Construction permit	1,666 lbs/mo. per press	---	Yes
NR 407	Operation permit	1,666 lbs/mo. per facility	---	Yes
NR 422.142	Reasonably available control technology	---	1,666 lbs/mo. per facility	No
NR 424	Emissions from process lines (presses)	15 lbs/day per press	---	Yes
NR 438	Air contaminant emission inventory	6000 lbs/yr. Per facility	---	No

In addition to the regulations described above, there are WDNR air regulations and policies that potentially affect all printers. To learn more about WDNR air regulations review section 5: Air Regulations That Affect Printers. Keep in mind which thresholds you exceed, and which ones you are under.

Instructions

Table 1: Record your VOC calculations from Worksheets 2-6 and 2-7.

Table 2: By inspection, determine whether you have exceeded any of the applicability thresholds in this table (Table 2).

See also Chapter 2, section 6 for more information about these regulations:

NR 406 – Construction Permits
NR 407 – Operation Permits
NR 422.142 – RACT Rule
NR 424 – Process Lines
NR 438 – Annual Air Inventory

NOTE: Hazardous Air Pollutant (HAP) emissions are addressed with NR 438, in Chapter 2, section 6: What to You Have to Do to Comply with Air Regulations.

Worksheet 2-8: Exemptions from DNR Air Regulations

Many smaller printers will be exempt from some of the main WDNR Air Regulations because they do not emit VOCs at levels that exceed the applicability thresholds of the regulations. Table 2 below describes regulatory exemption thresholds for some air regulations that apply to printers in Wisconsin. Based on the VOC emissions information you've calculated from the Air Emissions Worksheets (2-6 and 2-7) and placed in Table 1 you will be able to determine if you are exempt from the air regulations identified in Table 2.

Table 1. Actual VOC emissions and MTE

	Actual VOC emissions	MTE of VOCs
lbs/year		—
lbs/mo.		
lbs/day per press		—

Table 2. Applicability Thresholds

Chapter	Rule	Actual VOC emission threshold	MTE of VOCs threshold	Exempt (Yes or No)
NR 406	Construction permit	1,666 lbs/mo. per press	—	
NR 407	Operation permit	1,666 lbs/mo. per facility	—	
NR 422.142	Reasonably available control technology	—	1,666 lbs/mo. per facility	
NR 424	Emissions from process lines (presses)	15 lbs/day per press	—	
NR 438	Air contaminant emission inventory	6000 lbs/yr. per facility	—	

In addition to the regulations described above, there are WDNR air regulations and policies that potentially affect all printers. To learn more about WDNR air regulations, review section 5: Air Regulations That Affect Printers. Keep in mind which thresholds you exceed and which ones you are under.

Instructions

Table 1: Record your VOC calculations from Worksheets 2-6 and 2-7.

Table 2: By inspection, determine whether you have exceeded any of the applicability thresholds in this table. Enter "yes" or "no" in the Exempt column.

See also Chapter 2, section 6 for more information about these regulations:

NR 406 – Construction Permits
NR 407 – Operation Permits
NR 422.142 – RACT Rule
NR 424 – Process Lines
NR 438 – Annual Air Inventory

NOTE: Hazardous Air Pollutant (HAP) emissions are addressed with NR 438, in Chapter 2, section 6: What to You Have to Do to Comply with Air Regulations.

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Appendix 2B: WDNR Memo

Correspondence/Memorandum State of Wisconsin

Date: August 21, 1997
To: All Air Management Staff
From: Lloyd L. Eagan
Subject: Guidelines for Determining Emissions from Lithographic Printing Facilities

Introduction

DNR staff, in conjunction with representatives of the lithogrphic printing industry, have examined the issue of how to determine volatile organic compound air emissions from lithographic printing facilitites. The group examined EPA documents, technical articles, stack test results and utilized DNR's and the printing industry's experience and expertise to determine appropriate methods to calculate these emissions. Participants in these discussions have included DNR staff Jim Crawford, Bob Eckdale, Dean Packard, Joe Brehm, Joe Perez, Mike Sloat, Dan Johnston, Marcia Penner and Caroline Garber. Printing industry representatives included Hank Handzel and Bill Johnson representing Printing Industries of Wisconsin and Gary Jones of the Graphic Arts Technical Foundation. The group was able to reach consensus on guidelines for estimating emissions from lithographic printing facilities. Input on these issues was obtained from Ron VanMersbergen (EPA, Region V) and Dave Salman (EPA, Office of Air Quality Planning and Standards).

The purpose of this document is to provide guidelines for calculating air emissions from lithographic printing facilities. Accurate emissions information is needed for various purposes, including for compliance demonstrations with emissions limits, for permit applicability and categorization and for emission inventories and fee calculations. These guidelines should be used for all of these purposes, except as noted below.

A lithographic facility should always be given the option of conducting tests to demonstrate what its emissions are, as noted in the body of this memo. If the facility does not wish to conduct tests, the values set forth in this memo should be used to calculate emissions. However, if a facility decides to conduct tests, the test results should be utilitzed rather than the guidelines in this memo.

These guidelines apply to all lithographic printers in Wisconsin. However, it should be noted that certain facilities are regulated under s. NR 422.142, Wis. Adm. Code, which contains the Reasonably Available Control Technology (RACT) rules for lithographers located in certain counties of the state. Those rules apply to facilities covered by the applicability section, s. NR 422.142(1), Wis. Adm. Code. To the extent that those rules govern facilities, they should be applied as written. However, if the RACT rules do not address an issue, then the guidelines in this memo should be used.

This document is intended solely as guidance, and does not contain any mandatory requirements, except where requirements found in statutes or administrative rules are referenced. This guidance does not establish or affect legal rights or obligations, and is not finally determinative of any of the issues addressed. This guidance cannot be relied upon and does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the DNR in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

I. Capture Efficiency Factors for Heatset Web Offset Presses

A. Ink VOC Capture Efficiency:

1. 100%—Provided the conditions in a), b), or c) are met:

a) The press dryer is operated at negative pressure relative to the surrounding pressroom and the dryer is equipped with an extended smoke tunnel*.

b) The press dryer is operated at negative pressure relative to the surrounding pressroom and dryer technology eliminates the need for a smoke tunnel. Examples of current dryer technology that eliminates the need for smoke tunnels are (1) dryers with distinct drying zones in which the final zone cools the web; and (2) dryers with an integral control device that captures emissions before the web exits the dryers.

c) The press dryer is operated at negative pressure relative to the surrounding pressroom and there are no visible emissions directly attributable to the press or dryer.

Note: Visible emissions are allowed at start-up. "Start-up" is defined as the period of time occurring after the press starts to operate, but prior to an acceptable product being saved.

*The term "extended smoke tunnel" is defined as a smoke tunnel extended to the point of web contact with the first chill roll.

2. 92%—Provided that the press dryer is operated at negative pressure relative to the surrounding pressroom and there are visible emissions directly attributable to the press or dryer.

3. 0%—If neither of the above options in 1. or 2. are met.

The printer always has the option of testing to determine their own specific ink VOC capture efficiency.

B. Automatic Blanket Wash VOC Capture Efficiency:

1. 40%—provided both of the following conditions are met:

a) VOC composite vapor pressure is 10 mm Hg @ 68˚F or less, or the automatic blanket wash contains less than 30% by weight VOC, and

b) The press dryer is operated at negative pressure relative to the surrounding pressroom.

2. 35%—provided both of the following conditions are met:

a) VOC composite vapor pressure is greater than 10 mm Hg but less than 25 mm Hg @ 68˚F, or the automatic blanket wash contains more than 30% by weight VOC, and

b) The press dryer is operated at negative pressure relative to the surrounding pressroom.

3. 0%—If neither of the above options are met.

The printer always has the option of testing to determine their own specific automatic blanket wash VOC capture efficiency.

C. Fountain Solution VOC Capture Efficiency:

1. 70%—Provided both of the following conditions are met:

   a) The fountain solution does not contain a restricted alcohol, and

   b) The press dryer is operated at negative pressure relative to the surrounding pressroom.

2. 50%—Provided both of the following conditions are met:

   a) The fountain solution contains a restricted alcohol and is refrigerated to ≤ 60 ˚F, and

   b) The press dryer is operated at negative pressure relative to the surrounding pressroom.

3. 0%—If neither of the above options are met.

The printer always has the option of testing to determine their own specific fountain solution VOC capture efficiency.

II. Ink VOC Retention Factors on Paper Substrate

A. Heatset Web

15% of the VOCs are retained on the web.

B. Nonheatset Web and Sheet Fed Ink

95% of the VOCs are retained on the web or sheet.

The printer always has the option of testing to determine their own specific web retention factors.

III. Retention Factors for Cleanup Solvent on Shop Towels

A. 50%—Provided all of the following conditions are met:

1. VOC composite vapor pressure is 10 mm Hg @ 68˚F or less, or the cleanup solvent contains less than 30% by weight VOC;

2. Shop towels are handled properly, laundered, incinerated, or disposed of following all appropriate regulations; and

3. Soiled towels are kept in closed containers both on site and during transport off site.

B. 40%—Provided all of the following conditions are met:

1. VOC composite vapor pressure is greater than 10 mm Hg but less than 25 mm Hg @ 68˚F or the cleanup solvent contains more than 30% by weight VOC;

2. Shop towels are handled properly, laundered, incinerated, or disposed of following all appropriate regulations; and

3. Soiled towels are kept in closed containers both on-site and during transport off-site.

C. 0%—If neither of the above conditions are met.

The printer always has the option of testing to determine their own specific cleanup solvent retention factor.
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Appendix 2C: Application Filing Dates for Non-part 70 Source Air Pollution Operation Permits

County of Location	Filing Date	County of Location	Filing Date
Adams	August 1, 1997	Manitowoc	April 1, 1998
Ashland	August 1, 1997	Marathon	July 1, 1998
Barron	May 1, 1998	Marinette	October 1, 1997
Bayfield	August 1, 1998	Marquette	July 1, 1998
Brown	July 1, 1998	Menominee	September 1, 1997
Buffalo	December 1, 1997	Milwaukee,	
Burnett	February 1, 1998	south of Wisc. Ave.	June 1, 1998
Calumet	July 1, 1997	north of Wisc. Ave.	September 1, 1998
Chippewa	August 1, 1998	Monroe	May 1, 1998
Clark	May 1, 1998	Oconto	September 1, 1997
Columbia	July 1, 1997	Oneida	July 1, 1997
Crawford	July 1, 1997	Outagamie	January 1, 1998
Dane	November 1, 1998	Ozaukee	September 1, 1997
Dodge	July 1, 1998	Pepin	February 1, 1998
Door	November 1, 1997	Pierce	August 1, 1997
Douglas	August 1, 1998	Polk	May 1, 1998
Dunn	October 1, 1997	Portage	January 1, 1998
Eau Claire	February 1, 1998	Price	July 1, 1997
Florence	October 1, 1997	Racine	March 1, 1998
Fond du Lac	November 1, 1997	Richland	October 1, 1997
Forest	August 1, 1997	Rock	April 1, 1998
Grant	October 1, 1997	Rusk	February 1, 1998
Green Lake	July 1, 1998	Sauk	August 1, 1997
Green	April 1, 1998	Sawyer	February 1, 1998
Iowa	March 1, 1998	Shawano	August 1, 1997
Iron	February 1, 1998	Sheboygan	December 1, 1997
Jackson	May 1, 1998	St. Croix	October 1, 1997
Jefferson	January 1, 1998	Taylor	February 1, 1998
Juneau	August 1, 1997	Trempealeau	December 1, 1997
Kenosha	March 1, 1998	Vernon	February 1, 1998
Kewaunee	November 1, 1997	Vilas	July 1, 1997
La Crosse	November 1, 1998	Walworth	July 1, 1997
Lafayette	March 1, 1998	Washburn	February 1, 1998
Langlade	August 1, 1997	Washington	August 1, 1997
Lincoln	October 1, 1997	Waukesha	December 1, 1998

Waupaca	November 1, 1997	Winnebago	October 1, 1998
Waushara	November 1, 1997	Wood	April 1, 1998

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Appendix 2D: Example Recordkeeping Forms

Example Recordkeeping Form for All Fountain Solutions

Lithographic Printing

NR422.142, Wis. Adm. Code

For all fountain solutions used, record the percent by weight VOC content as applied, and the chemical name of each restricted alcohol.

Type of Press: **q Heatset Web** **q Non-Heatset Web** **q Sheet-Fed**
Check one

Fountain Solution Used	Percent by Weight VOC Content, as Applied	Chemical Name of Each Restricted Alcohol

Example Recordkeeping Form for Refrigerated Fountain Solutions

Lithographic Printing

NR422.142, Wis. Adm. Code

For refrigerated fountain solutions used in compliance with the emission limits, record the temperature of the fountain solutions for each eight-hour shift of operation. (The fountain solution must be refigerated at 60 F or less.)

Date and Time	Fountain Solution Used	Temperature

Example Recordkeeping Form for Blanket or Roller Washes

Lithographic Printing

NR422.142, Wis. Adm. Code

Form 1: If you do not meet the blanket or roller wash exemption, record the VOC content and the vapor pressure of all blanket or roller washes you use.

Blanket or Roller Wash Used	Percent by Weight VOC Content, as Applied	Vapor Pressure

Example Recordkeeping Form for Blanket or Roller Washes

Lithographic Printing

NR422.142, Wis. Adm. Code

Form 2: If you meet the blanket or roller wash exemption, record the volume of all blanket or roller washes you use for each month of operation.

Printing done on: q Plastic Substrate q Not a Plastic Substrate
Check one

Month of Operation	Volume of All Blanket or Roller Wash Used

Appendix 2E: Compliance Certification with the Lithographic Printing RACT

WI DNR Form 4500-159 (REV. 6/97)

Submit this certification to:
WI DNR Bureau of Air Management
101 S. Webster Street
P.O. Box 7921 (AM/7)
Madison, WI 53707
Attn: RACT Notification Coordinator

This certification should be submitted by the following dates, depending on the type of press you have and when you installed it:

	Submit by ...
• All lithographic printing presses installed on or before July 1, 1996	September 1, 1996
• Heatset web lithographic printing presses installed after July 1, 1996	60 days after the compliance emission test, which must be conducted within 180 days, after installation
• Other lithographic printing presses installed after July 1, 1996	180 days after installation

For more information about the requirements of the lithographic printing rule, requests *Facts About Lithographic Printing RACT* from your DNR air inspector or the Small Business Clean Air Assistance Program at (608) 264-6153 or (608) 267-9214. You can also refer to s. NR 422.142, Wis. Adm. Code.

It is not the Department's intention to use any personally identifiable information from this form for any other purpose.

Names of Business _____

Mailing Address _____

Location Address _____

City State _____ Zip Code _____

Plant FID# _____
(if applicable)

Phone Number _____

Contact Person/Title _____

(over)

Print of type the name and title of the Responsible Official for the plant:

_____ _____

(Name) (Title)

I certify that all lithographic printing operations located at the above address are in compliance with s. NR 422.142, Wis. Adm. Code. The following documentation to demonstrate compliance is attached (check the appropriate box(es):

q Compliance test results.

q Recordkeeping for fountain solution, blanket and roller wash, and/or temperature monitoring.

q Documentation of negative pressure in dryer.

_____

(Signature of Responsible Official) (Date)

Appendix 2F: Elective Operation Permit Application (2 Forms)

State of Wisconsin Department of Natural Resources

Elective Operation Permit Application

Lithographic Printing Operations

Facility Identification

Form 4530-145 1-96

SEE INSTRUCTIONS ON REVERSE SIDE Information Attached? __ (y/n)

1. Facility name and mailing address
   Name_____
   Street or Route _____
   City, State Zip Code _____

2. Facility location
   Street Address_____
   City, County _____

3. Responsible official
   Name_____
   Title_____
   Telephone _____

4. Permit contact person
   Name_____
   Title_____
   Telephone _____

5. Facility identification number (see instructions):_____

6. Total actual VOC emissions from lithographic printing operations in previous calendar year:
   _____Tons per year

7. List all lithographic printing presses at this facility:

a. Make and Model	b. Press Type (see instructions)	c. Installation Date	d. Number of Printing units	e. Automatic Blanket Wash
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No

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Elective Operation Permit Application Instructions
Lithographic Printing Operations Form 4530-145 01/96

NOTE: Use of this form is required by the Department for an application for an elective air pollution permit filed pursuant to ss. 144.391(2)(b) and 144.3925, Wis. Stats., for lithographic printing operations. These facilities would be applying for an elective permit because they are exempt by rule from being required to file an application for an air operation permit. Lithographic printing facilities which are not exempt from the requirement to apply for an air operation permit or which prefer to use the standard application forms should proceed to complete Air Pollution Control Permit Application forms 4530-100 through 4530-135. The Department will not consider or act upon your elective operation permit application unless you complete and submit two copies of this application form. The Department may use information on this form to identify facilities required to file annual emission inventory reports under ch. NR 438, Wis. Adm. Code. It is not the Department's intention to use any personally identifiable information from this form for any other purpose.

The elective operation permit for lithographic printing operations will limit a facility's maximum theoretical VOC emissions from lithographic printing to less than 1666 pounds per month. Lithographic printing facilities with maximum theoretical VOC emissions of less than 1666 pounds in any month are not subject to the requirements of s. NR 422.142, Wis. Adm. Code Section NR 422.142., Wis. Adm. Code, applies only to lithographic printing presses located in the county of Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington or Waukesha.

Item 1 Provide full business name and address of corporation, company, association, society, firm, partnership, individual or political subdivision of the state submitting the application.

Item 2 Street address where the air pollution sources are located.

Item 3 Responsible official means one of the following (s. NR 400.02 (80e), Wis. Adm. Code):

(a) For a corporation

1. A president, secretary, treasurer or vice-president of the corporation in charge of a principal business function;
2. Any other person who performs similar policy or decision-making functions for the corporation; or
3. A duly authorized representative of a person listed in items 1 or 2 if the representative is responsible for the overall operation of one or more manufacturing, production or operating facilities applying for or subject to a permit and the representative is approved in advance by the Department. Prior to filing the application, if you want the Department to approve your choice of responsible official you may send a letter to the Department describing that person's authority in the company, requesting the Department's approval and signed by a person listed in items 1 or 2.

(b) For a partnership or sole proprietorship: a general manager or the proprietor, respectively;

(c) For a municipality, or a state, federal or other public agency: either a principal executive officer or ranking elected official.

Item 4 Individual to contact for additional information concerning the air polluting sources during the permitting process.

Item 5 Please provide the facility identification number (FID) that has been assigned by the Department for this plant. If you do not have an FID, you may leave this item blank and an FID will be assigned by the department processing your permit. **NOTE: WHEN YOU HAVE AN FID, ALL CORRESPONDENCE FOR THIS PLANT SHOULD ALSO INCLUDE THE FID NUMBER ALONG WITH ANY PLANT NAME THAT IS USED BY THE PERMITTEE.**

Item 6 Calculate your total actual VOC emissions from lithographic printing operations for the most recent calendar year.

Item 7 Complete the table for each lithographic printing press at the facility.

a. Make and model: Provide the make and model, if known, for each press. If unknown, indicate with the term "unknown." If built rather than purchased indicate with the term "shop."

b. Press Type: Indicate whether the press is: 1) Heatset Web; 2) Non-Heatset Web; or 3) Non-Heatset Sheetfed.

c. Installation: Indicate the date that installation of the press occurred, or the date the press was last modified. If the date can only be estimated, then enclose the date in parentheses.

d. Number of printing units: Indicate the number of printing units on each press.

e. Automatic Blanket Wash: Indicate whether the press is equipped with an automatic blanket wash system.

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State of Wisconsin Department of Natural Resources

Elective Operation Permit Application

Material Usage Requirements

Form 4530-146 1-96

SEE INSTRUCTIONS ON REVERSE SIDE Information Attached? __ (y/n)

1. Facility Name _____

2. Facility Identification No._____

3. Material Usage Restriction (See Instructions):

a. Material	b. Proposed Usage Restriction	c. Units	d. VOC Content	e. Units	f. VOC Emissions (pounds/month)
Non-Heatset Ink		pounds per month		% by weight	
Heatset Ink		pounds per month		% by weight	
Fountain Solutions		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
Cleaning Solutions		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
				Total Monthly VOC emissions:	

If VOC emissions based on the usage restrictions and VOC contents listed above are greater than or equal to 1666 pounds per month, then this lithographic printing facility would not avoid applicability of s. NR 422.142, Wis. Adm. Code, through issuance of an elective operation permit based on this application.

4. Signature of Responsible Official

I have reviewed this application in its entirety and, based on the information and belief formed after reasonable inquiry, I certify that the statements and information contained in this application are true, accurate and complete.

Printed or Typed Name _____ Title_____

Signature _____ Date Signed _____

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Elective Operation Permit Application Instructions
Lithographic Printing Operations Form 4530-146 01-96

NOTE: Use of this form is required by the Department for an application for an elective air pollution permit filed pursuant to ss. 144.391(2)(b) and 144.3925, Wis. Stats., for lithographic printing operations. These facilities would be applying for an elective permit because they are exempt by rule from being required to file an application for an air operation permit. Lithographic printing facilities which are not exempt from the requirement to apply for an air operation permit or which prefer to use the standard application forms should proceed to complete Air Pollution Control Permit Application forms 4530-100 through 4530-135. The Department will not consider or act upon your elective operation permit application unless you complete and submit two copies of this application form. The Department may use information on this form to identify facilities required to file annual emission inventory reports under ch. NR 438, Wis. Adm. Code. It is not the Department's intention to use any personally identifiable information from this form for any other purpose.

The elective operation permit for lithographic printing operations will limit a facility's maximum theoretical VOC emissions from lithographic printing to less than 1666 pounds per month. Lithographic printing facilities with maximum theoretical VOC emissions of less than 1666 pounds in any month are not subject to the requirements of s. NR 422.142, Wis. Adm. Code Section NR 422.142., Wis. Adm. Code, applies only to lithographic printing presses located in the county of Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington or Waukesha.

Item 1 Provide full business name and address of corporation, company, association, society, firm, partnership, individual or political subdivision of the state submitting the application.

Item 2 Please provide the facility identification number (FID) that has been assigned by the Department for this plant. If you do not have an FID, you may leave this item blank and an FID will be assigned by the department when processing your permit. **NOTE: WHEN YOU HAVE AN FID, ALL CORRESPONDENCE FOR THIS PLANT SHOULD ALSO INCLUDE THE FID NUMBER ALONG WITH ANY PLANT NAME THAT IS USED BY THE PERMITTEE.**

Item 3 Complete the table to propose monthly limits on non-heatset inks, heatset inks, fountain solutions, and cleaning solutions used for lithographic printing at your facility. **These limits will become an enforceable part of your facility's permit.**

b. The amounts you propose should result in VOC emissions of less than 1666 pounds per month. For purposes of calculating your restrictions, assume that 5% of the VOC content of non-heatset ink is emitted, and that 80% of the VOC content of heatset ink is emitted. Assume that 100% of the VOC content of fountain solutions and cleaning solutions is emitted, unless you can document a credit for recovered or collected materials.

d. List the VOC content of the inks, fountain solutions, and cleaning solutions that you company uses. If you use several different fountain solutions or cleaning solutions, use a different line for each product.

Example: A printer uses materials with the following VOC contents:

Non-heatset ink:	30% by weight VOC
Fountain solution:	6.70 pounds per gallon VOC
Cleaning solution:	7.36 pounds per gallon VIC

The printer proposes the following material usage restrictions:

Nonheatset ink:	2000 pounds/month x 30% VOC x 5% emitted	= 30 pounds/month
Fountain solutions:	20 gallons/month x 6.7 pounds per gallon VOC	= 134 pounds/month
Cleaning solution:	200 gallons/month x 7.36 pounds per gallon VOC	= 1472 pounds/month
	TOTAL:	1636 pounds/month

f. Calculate monthly VOC emissions from each material by multiplying the numbers in column b, by the numbers in column d. Remember to take into account the appropriate percentage of VOC content emitted by heatset and nonheatset inks. Add together VOC emissions from all materials to get a monthly total.

Item 4 Signature of the responsible official identified in Item 3 on Form 4530-145.

Appendix 2F: Elective Operation Permit Application (2 Forms)

State of Wisconsin Department of Natural Resources

Elective Operation Permit Application

Lithographic Printing Operations

Facility Identification

Form 4530-145 1-96

SEE INSTRUCTIONS ON REVERSE SIDE Information Attached? __ (y/n)

1. Facility name and mailing address
   Name_____
   Street or Route _____
   City, State Zip Code _____

2. Facility location
   Street Address_____
   City, County _____

3. Responsible official
   Name_____
   Title_____
   Telephone _____

4. Permit contact person
   Name_____
   Title_____
   Telephone _____

5. Facility identification number (see instructions):_____

6. Total actual VOC emissions from lithographic printing operations in previous calendar year:
   _____Tons per year

7. List all lithographic printing presses at this facility:

a. Make and Model	b. Press Type (see instructions)	c. Installation Date	d. Number of Printing units	e. Automatic Blanket Wash
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No
				q Yes q No

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Elective Operation Permit Application Instructions
Lithographic Printing Operations Form 4530-145 01/96

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Item 2 Street address where the air pollution sources are located.

Item 3 Responsible official means one of the following (s. NR 400.02 (80e), Wis. Adm. Code):

(a) For a corporation

1. A president, secretary, treasurer or vice-president of the corporation in charge of a principal business function;
2. Any other person who performs similar policy or decision-making functions for the corporation; or
3. A duly authorized representative of a person listed in items 1 or 2 if the representative is responsible for the overall operation of one or more manufacturing, production or operating facilities applying for or subject to a permit and the representative is approved in advance by the Department. Prior to filing the application, if you want the Department to approve your choice of responsible official you may send a letter to the Department describing that person's authority in the company, requesting the Department's approval and signed by a person listed in items 1 or 2.

(b) For a partnership or sole proprietorship: a general manager or the proprietor, respectively;

(c) For a municipality, or a state, federal or other public agency: either a principal executive officer or ranking elected official.

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Item 6 Calculate your total actual VOC emissions from lithographic printing operations for the most recent calendar year.

Item 7 Complete the table for each lithographic printing press at the facility.

a. Make and model: Provide the make and model, if known, for each press. If unknown, indicate with the term "unknown." If built rather than purchased indicate with the term "shop."

b. Press Type: Indicate whether the press is: 1) Heatset Web; 2) Non-Heatset Web; or 3) Non-Heatset Sheetfed.

c. Installation: Indicate the date that installation of the press occurred, or the date the press was last modified. If the date can only be estimated, then enclose the date in parentheses.

d. Number of printing units: Indicate the number of printing units on each press.

e. Automatic Blanket Wash: Indicate whether the press is equipped with an automatic blanket wash system.

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State of Wisconsin Department of Natural Resources

Elective Operation Permit Application

Material Usage Requirements

Form 4530-146 1-96

SEE INSTRUCTIONS ON REVERSE SIDE Information Attached? __ (y/n)

1. Facility Name _____

2. Facility Identification No._____

3. Material Usage Restriction (See Instructions):

a. Material	b. Proposed Usage Restriction	c. Units	d. VOC Content	e. Units	f. VOC Emissions (pounds/month)
Non-Heatset Ink		pounds per month		% by weight	
Heatset Ink		pounds per month		% by weight	
Fountain Solutions		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
Cleaning Solutions		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
		gallons per month		pounds per gallon	
				Total Monthly VOC emissions:	

If VOC emissions based on the usage restrictions and VOC contents listed above are greater than or equal to 1666 pounds per month, then this lithographic printing facility would not avoid applicability of s. NR 422.142, Wis. Adm. Code, through issuance of an elective operation permit based on this application.

4. Signature of Responsible Official

I have reviewed this application in its entirety and, based on the information and belief formed after reasonable inquiry, I certify that the statements and information contained in this application are true, accurate and complete.

Printed or Typed Name _____ Title_____

Signature _____ Date Signed _____

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Elective Operation Permit Application Instructions
Lithographic Printing Operations Form 4530-146 01-96

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Item 3 Complete the table to propose monthly limits on non-heatset inks, heatset inks, fountain solutions, and cleaning solutions used for lithographic printing at your facility. **These limits will become an enforceable part of your facility's permit.**

b. The amounts you propose should result in VOC emissions of less than 1666 pounds per month. For purposes of calculating your restrictions, assume that 5% of the VOC content of non-heatset ink is emitted, and that 80% of the VOC content of heatset ink is emitted. Assume that 100% of the VOC content of fountain solutions and cleaning solutions is emitted, unless you can document a credit for recovered or collected materials.

d. List the VOC content of the inks, fountain solutions, and cleaning solutions that you company uses. If you use several different fountain solutions or cleaning solutions, use a different line for each product.

Example: A printer uses materials with the following VOC contents:

Non-heatset ink:	30% by weight VOC
Fountain solution:	6.70 pounds per gallon VOC
Cleaning solution:	7.36 pounds per gallon VIC

The printer proposes the following material usage restrictions:

Nonheatset ink:	2000 pounds/month x 30% VOC x 5% emitted	= 30 pounds/month
Fountain solutions:	20 gallons/month x 6.7 pounds per gallon VOC	= 134 pounds/month
Cleaning solution:	200 gallons/month x 7.36 pounds per gallon VOC	= 1472 pounds/month
	TOTAL:	1636 pounds/month

f. Calculate monthly VOC emissions from each material by multiplying the numbers in column b, by the numbers in column d. Remember to take into account the appropriate percentage of VOC content emitted by heatset and nonheatset inks. Add together VOC emissions from all materials to get a monthly total.

Item 4 Signature of the responsible official identified in Item 3 on Form 4530-145.

Appendix 2G: Outline For Small Printing Facilities to Calculate Maximum Theoretical Emissions for Determining Applicability of the Lithographic Printing Rule

The following guide outlines one method for estimating a small facility's maximum theoretical emissions (MTE) to determine if the lithographic printing regulation applies. Facilities are not bound to this methodology; but it is one method that the Department will accept. This guide is not all inclusive, and individual variations in printing operations may need to be considered. This guide may not be appropriate for determining MTE for other regulatory purposes, such as for permitting. All calculations do not include consideration of control devices, such as catalytic or thermal incinerators.

This guide is divided into three sections: non-heatset web presses, heatset web presses, and sheet-fed non-heatset presses. Complete the appropriate section for each individual press, then total the results from all the presses. This total is the Maximum Theoretical Emissions for you entire printing operation.

All of the calculations utilize the volatile organic compound (VOC) content of a material. Information about the VOC content, expressed as pounds VOC per gallon OR as percent VOC of an ink, coating or solution can usually be found on the accompanying Material Safety Data Sheet (MSDS), through your distributor or supplier, or from the label on the container. In some cases where a solution is mixed on site, the VOC content of the solution may have to be calculated by hand. For this guide, it has been assumed that the VOC content of inks (also called coatings) is typically expressed as a percentage, and that the VOC content of solutions or washes are typically expressed as pounds VOC per gallon (lbs VOC/gal).

For determining the maximum usage of fountain solution or blanket/roller wash for one press, simply apply a ratio of (maximum ink usage)/(actual ink usage) to the actual usage of fountain solution or blanket/roller wash. Maximum ink usage should be calculated as outlined below. Actual usage of fountain solutions and blanket/roller washes can be determined from purchase records, or from other recordkeeping. If the fountain solutions or blanket/roller washes are in a closed, automated type system, then this method for determining actual usage may need to be modified.

Non-heatset Web Presses

Maximum web width		_____	in	(1)
Maximum ink coverage per print deck		_____	lbs of ink/in^2	(2)
How many print decks?		_____		(3)
Maximum line-speed		_____	in/hr	(4)
Multiply (1)x(2)x(3)x(4)	=	_____	lbs of ink/hr	(5)
Maximum VOC content ink		_____	% VOC (by weight)	(6)
Multiply (0.05x(5)x(6))/100	=	_____	lbs VOC/hr	(7)
Multiply (7)x 730 hrs.mo*	=	_____	lbs VOC/mo	(8)
Maximum fountain solution usage per month		_____	gal/mo	(9)
Maximum VOC content		_____	lbs VOC/gal	(10)
Multiply (9)x(10)	=	_____	lbs VOC/mo	(11)
Maximum blanket/roller wash usage per month		_____	gal/mo	(12)
Maximum VOC content		_____	lbs VOC/gal	(13)
Multiply (12)x(13)	=	_____	lbs VOC/mo	(14)
Add (8)+(11)+(14)	=	_____	lbs VOC/mo MTE	(15)

Heatset Web Presses

Maximum web width		_____	in	(1)
Maximum ink coverage per print deck		_____	lbs of ink/in^2	(2)
How many print decks?		_____		(3)
Maximum line-speed		_____	in/hr	(4)
Multiply (1)x(2)x(3)x(4)	=	_____	lbs of ink/hr	(5)
Maximum VOC content ink		_____	% VOC (by weight)	(6)
Multiply (0.80x(5)x(6))/100	=	_____	lbs VOC/hr	(7)
Multiply (7)x 730 hrs/mo*	=	_____	lbs VOC/mo	(8)

* Note: 24 hrs/day x 365 days/yr divided by 12 mo/yr = 730 hrs/mo

Maximum fountain solution usage per month			gal/mo	(9)
Maximum VOC content			lbs VOC/gal	(10)
Multiply (9)x(10)	=		lbs VOC/mo	(11)
Maximum blanket/roller wash usage per month			gal/mo	(12)
Maximum VOC content			lbs VOC/gal	(13)
Multiply (12)x(13)	=		lbs VOC/mo	(14)
Add (8)+(11)+(14)	=		lbs VOC/mo MTE	(15)

Sheet-fed Presses

Maximum sheet size			in^2	(1)
Maximum ink coverage per print deck			lbs of ink/in^2	(2)
How many print decks?				(3)
Maximum line-speed			sheets/hr	(4)
Multiply (1)x(2)x(3)x(4)	=		lbs of ink/hr	(5)
Maximum VOC content ink			% VOC (by weight)	(6)
Multiply (0.05x(5)x(6))/100	=		lbs VOC/hr	(7)
Multiply (7)x 730 hrs/mo*	=		lbs VOC/mo	(8)
Maximum fountain solution usage per month			gal/mo	(9)
Maximum VOC content			lbs VOC/gal	(10)
Multiply (9)x(10)	=		lbs VOC/mo	(11)
Maximum blanket/roller wash usage per month			gal/mo	(12)
Maximum VOC content			lbs VOC/gal	(13)
Multiply (12)x(13)	=		lbs VOC/mo	(14)
Add (8)+(11)+(14)	=		lbs VOC/mo MTE	(15)

* Note: 24 hrs/day x 365 days/yr divided by 12 mo/yr = 730 hrs/mo

Example
(1 facility with 5 presses)

Press #1: Sheet-fed Press

Maximum sheet size		864	in^2	(1)
Maximum ink coverage per print deck		0.000032	lbs of ink/in^2	(2)
How many print decks?		6		(3)
Maximum line-speed		20	sheets/hr	(4)
Multiply (1)x(2)x(3)x(4)	=	3.32	lbs of ink/hr	(5)
Maximum VOC content ink		30	% VOC (by weight)	(6)
Multiply (0.05x(5)x(6))/100	=	0.05	lbs VOC/hr	(7)
Multiply (7)x 730 hrs/mo*	=	36	lbs VOC/mo	(8)
Maximum fountain solution usage per month		12	gal/mo	(9)
Maximum VOC content		6.7	lbs VOC/gal	(10)
Multiply (9)x(10)	=	80	lbs VOC/mo	(11)
Maximum blanket/roller wash usage per month		20	gal/mo	(12)
Maximum VOC content		7.36	lbs VOC/gal	(13)
Multiply (12)x(13)	=	147	lbs VOC/mo	(14)
Add (8)+(11)+(14)	=	263	lbs VOC/mo MTE	(15)

Facility Summary:

Press #1 Sheet-fed Non-heatset	263
Press #2 Sheet-fed Non-heatset	220
Press #3 Sheet-fed Non-heatset	250
Press #4 Non-heatset	550
Press #5 Non-heatset	625
Total facility MTE =	1908 lbs VOC/mo MTE for facility

Chapter 3: Hazardous Waste Management

Lithographic printers need to be knowledgeable of appropriate hazardous waste management practices and disposal regulations. Blanket wash, roller wash, and other cleaning solvents used by printers can become hazardous wastes. In addition, pre-press chemicals used in photo and plate-developing activities can be hazardous.

Hazardous wastes pose a threat to human health and the environment. If not properly disposed of, these wastes can impact the water quality of streams and rivers, and eventually contaminate drinking water sources. It is because of these potential effects that hazardous wastes need to be managed appropriately.

Disposal of hazardous waste may have significant financial ramifications, too. You have to be careful about who you choose to handle your wastes. If your wastes ever contribute to a contamination problem, you can be held liable under "Superfund" for all or a portion of the cleanup costs. Superfund is the common name for the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which was adopted in 1980 and amended in 1986. Under CERCLA, the cost of remediation of a contaminated site is allocated to those that have contributed to the problem. For example, if a landfill leaks, and you had disposed of inks in that landfill, you can be held responsible for all or a portion of the cleanup costs. CERCLA has cost some printers hundreds of thousands of dollars.

To reduce your liability from hazardous waste activities, it is best to reduce the amount of hazardous waste that you generate. Implementing pollution prevention opportunities now may save big dollars in avoiding long-term liability. However, as long as you generate hazardous waste, you need to be aware of the following:

1. The Do's and Don'ts of managing printing wastes.

2. How to identify which of your wastes are hazardous.

3. How to determine your generator status, which is based on the amount of hazardous waste that your printing plant generates and accumulates on site:
   - Very small quantity generator (generates less than 220 lbs. of hazardous waste per month and accumulates less than 2205 lbs. on site at any one time).
   - Small quantity generator (generates between 220 and 2205 lbs./month and accumulates less than 13,230 lbs. on site at any one time).
   - Large quantity generator (generates more than 2205 lbs./month or accumulates more than 13,230 lbs. on site at any one time).

4. How to meet standards for managing hazardous waste that are specific to your generator status.

Hazardous wastes from printing may include:

- blanket wash
- roller wash
- cleaning solvents
- photo developer/ fixer
- plate developer/ processor

These important topics, and other waste issues will be addressed in the following sections:

1. Managing Printing Wastes That May Be Hazardous
2. Identifying and Documenting Hazardous Wastes
3. Determining Your Generator Status
4. Meeting Regulatory Standards for Generating Hazardous Wastes
5. Before You Send Your Waste Off-Site
6. Non-hazardous Wastes, Recycling, Special Wastes and Other Waste Issues
7. Hazardous Waste Issues for Pre-press, Pressroom and Facility-Wide
8. Sources of Additional Information

Appendices

3A. Hazardous Waste Identification
3B. Information About Hazardous Wastes
3C. Hazardous Waste Program Requirements VSQGs, SQGs, and LQGs.
3D. Manifest Form and Landban Notification

1. Managing Printing Wastes That May Be Hazardous

The following points describe how to manage wastes that may be hazardous:

Do

1. Collect and containerize any excess blanket wash, roller wash or other press-room solvents used for cleaning. These chemicals should not be dumped down drains.

2. Clean rollers and press parts over a parts cleaner or tray. When cleaning presses, empty overflow collection trays into a waste solvent storage drum.

3. Identify blanket wash, roller wash, and cleaning solvents which you use that may be hazardous wastes (this Handbook will help you distinguish between hazardous

and non-hazardous wastes). Keep hazardous wastes separate from non-hazardous wastes, such as lube oils and most inks.

4. Collect non-hazardous waste inks separate from hazardous blanket wash, roller wash and cleaning solvents.

Hazardous printing wastes cannot be tossed out with trash. Keep all cleaning products and materials used for cleaning separate from regular waste.

Don't

1. Dump blanket wash, roller wash or other cleaning solvents into containers of shop towels.

2. Dump blanket wash, roller wash or other cleaning solvents down any drain. Don't clean rollers or other press-parts over a utility sink unless the solvents can be collected and containerized.

3. Mix waste ink with solvents or place waste ink in solvent drums that are not emptied of all solvent. Ink is usually a non-hazardous waste and can be disposed of more economically if it is not mixed with hazardous solvent wastes.

4. Try to dilute hazardous wastes with non-hazardous wastes — it is an inappropriate (illegal) waste management technique.

Don't mix or dilute hazardous waste with non-hazardous waste. It's dangerous and illegal.

If you have been following the points above for some time now, you are more than likely managing your wastes appropriately. If you are doing some of these activities for the first time, you may be just beginning to accumulate wastes in drums. The next step is to identify which of these wastes are hazardous.

2. Identifying and Documenting Hazardous Wastes

Hazardous wastes require specific handling, disposal and record keeping procedures. It is critical to know if any of the waste materials produced or "generated" in your operations are hazardous wastes. Any waste that falls into one of the categories below needs to be managed as a hazardous waste.

Ignitable wastes. Prone to starting fires, these wastes have a flash point that is less than 140ºF. The flash point of a product or waste is determined through a laboratory test. This information is often reported by chemical manufacturers on Material Safety Data Sheets (MSDSs) for their products. Many of the solvents in blanket/roller wash are ignitable.

Corrosive wastes. Acidic or "basic," these wastes have a pH of less than or equal to 2 or greater than or equal to 12.5. Some chemicals used in pre-press operations are corrosive.

Reactive wastes. These wastes react violently with water or other chemicals. The reaction can generate toxic gases, vapor or fumes. Waste bleaches can be reactive. Very few chemicals used in printing are reactive.

Toxic wastes. Containing one or more toxic contaminants from a list of 40, these wastes often need to be tested using a technique called the Toxicity Characteristic Leaching Procedure (TCLP) to determine whether the toxic contaminants are present in levels above those specified in the hazardous waste regulations. Silver is one of the 40 toxic contaminants listed in the regulations. If waste fixer contains silver in concentrations of 5 parts per million (ppm) or more, it is hazardous.

Listed wastes. Representing a category of chemicals/contaminants that are known to be hazardous to human health or the environment, these wastes are listed in the hazardous waste regulations for easy recognition. Printers should be familiar with a portion of this list of wastes that includes solvents described as "hazardous wastes from non-specific sources" (F-listed wastes). This portion of the list, as well as a more detailed description of the different categories of hazardous wastes, can be found in Appendix 3B.

When blanket wash, roller wash, and other cleaning solvents have a flash point that is less than 140°F, they are ignitable (hazardous wastes).

Hazardous wastes require specific handling, disposal and record keeping procedures.

What is "Hazardous" Anyway?

- Ignitable, can start fires
- Corrosive, eats through things
- Reactive, makes fumes when mixed with water or other chemicals
- Toxic, containing any of 40 dangerous contaminants, such as silver
- Listed in the regulations, see Appendix 3B

Some waste solvents may not be hazardous, depending upon the formulation of the cleaner. It is just as important to know which of the wastes that you generate are non-hazardous as it is to know which ones are hazardous. You don't want to combine hazardous and non-hazardous wastes because you may have to manage the total amount of material as a hazardous waste. This larger hazardous waste stream will cost you considerably more in terms of disposal fees.

Not all solvents are hazardous. Know the difference so you don't mix non-hazardous with hazardous waste.

In addition to the wastes already mentioned (e.g., blanket/roller wash, solvents, pre-press chemicals, fixer, etc.), the following wastes may also need to be managed as hazardous wastes:

- Specialty sheetfed inks containing heavy metals.
- Shop wipers/rags disposed of rather than laundered; and
- Residues and absorbents generated from cleaning up spills of hazardous solvents or other chemicals.

These waste streams will be discussed in detail in Chapter 7.

After you determine which of your wastes are hazardous and which are non-hazardous, you are required to keep documentation of this determination for at least three years. Complete the Hazardous Waste Identification Worksheet in Appendix 3A to determine which of your waste blanket washes, roller washes and cleanup solvents need to be managed as hazardous wastes.

Complete the Hazardous Waste Identification Worksheet in Appendix 3A to determine which of your waste blanket wash, roller wash and cleanup solvents need to be managed as hazardous wastes.

3. Determining Your Generator Status

After identifying "your" hazardous wastes, you need to keep track of the total amount generated in pounds per month to determine your generator "status," as described below.

Table 3-1 Generator Status (VSQG, SQG or LQG)

	Very Small Quantity Generator (VSQG)	Small Quantity Generator (SQG)	Large Quantity Generator (LQG).
Monthly generation of hazardous waste	less than 220 lbs.	between 220 and 2205 lbs.	more than 2205 lbs.
Amount stored on site	less than 2205 lbs.	less than 13,230 lbs.	time is limited, not quantity. Waste can be stored up to 90 days

Keep in mind the following items when determining your generator status:

1. Your generator status is **not** based on an **average** monthly generation rate, but is based on **actual** generation rates. Thus, your category for the year will be determined by the single month in which you generated the largest amount of hazardous waste.

2. Your generator status is based on the **total amount** of all hazardous wastes that are generated at your site. Consider all of the sources of hazardous waste from your business, and don't forget to count hazardous wastes generated from one-time activities like the removal of contaminated soils from cleaning up a spill or the removal of underground storage tanks.

3. If you generate hazardous wastes from pre-press operations, you need to include this quantity when determining your generator status. For example, fixer and rinsewater shipped off-site for silver recovery should be manifested as a hazardous waste and counted towards your monthly total. See Chapter 4 for more information about managing wastewater from pre-press operations.

If you are a VSQG, you don't have to comply with many Wisconsin Department of Natural Resources (WDNR) requirements, but you should still be familiar with them so that you are prepared to comply if you ever become a SQG or LQG.

Keep track of the total amount generated in pounds per month to determine your “generator status.”

Your generator status is **not** based on an **average** monthly generation rate, but is based on **actual** generation rates.

Your generator status is based on the **total amount** of all hazardous wastes
that are generated at your site.

If you generate hazardous wastes from pre-press operations, include this quantity when determining your generator status.

4. Meeting Regulatory Standards for Generating Hazardous Wastes

At this point you should know whether you are a very small quantity generator (VSQG), small quantity generator (SQG), or large quantity generator (LQG). The standards imposed on your operation depend upon your generator status.

If you are a SQG or LQG, the first thing you need to know is how to store your hazardous wastes appropriately. Below you will find a description of how to store hazardous wastes. In addition to this information about waste storage, additional requirements for VSQGs, SQGs, and LQGs can be found in Appendix 3C.

VSQGs and SQGs have to make sure that hazardous wastes are collected and stored appropriately. There are two kinds of waste collection areas. One, an optional means of managing your wastes, is called a **satellite accumulation area**. The other is called a **generator's accumulation area.**

At a **satellite accumulation area** you are allowed to collect up to 55 gallons of hazardous waste with no limit on the amount of time to fill the drum. In order to use a satellite accumulation area, the waste being generated must be under the control of the operator of a process that produces the waste. A pressman that cleans a press and then transfers excess presswash into a drum within "sight" is allowed to use the satellite accumulation area option.

The satellite accumulation area provides flexibility in gathering small quantities of hazardous waste before transferring the waste into the generator's accumulation area or "full-drum storage area." In this way, you can think of the satellite accumulation area as the first stage in a two-stage process. Although satellite accumulation areas provide some flexibility, they are optional. SQGs and LQGs can only store hazardous waste on site for a limited amount of time:

- SQG is limited to 180 days, unless you have to ship your wastes greater than 200 miles, in which case you can store hazardous waste on-site for 270 days.
- LQG is limited to 90 days.

Satellite accumulation areas do not have to be used; they just offer an opportunity to collect wastes without triggering the beginning of the storage time limit. With satellite accumulation areas, the accumulation start date is written on the drum immediately after the 55 gallon limit is reached. Satellite accumulation area drums are required to be moved to the generator accumulation area within three days of being filled, and generator accumulation area standards, as described below, must be followed.

The standards imposed on your operation depend upon your generator status.Find out if you are VSQG, SQG, or LQG.

VSQGs and SQGs can collect and store waste in a satellite accumulation area
or a generator's accumulation area.

The satellite accumulation area provides flexibility in gathering small quantities of hazardous waste before transferring the waste into the generator's accumulation area.

A **generator accumulation area** is the location that hazardous waste is stored at your facility prior to being shipped off-site. In this Handbook, we've referred to this area as the "full-drum storage area," even though a drum may be located here that is in the process of being filled. All drums in this area must be labeled and identified with an accumulation start date on the first day that hazardous waste is placed into them. It is important that you make sure to ship your hazardous waste off-site before the time limit is exceeded (e.g., 90 to 270 days depending on generator status as explained above). The "time limit" starts with the accumulation start date.

Additional requirements apply to storage of drums in the gen-erator accumulation area. These requirements are described along with other hazardous waste management requirements for each class of generator in Appendix 3C. Be sure to see this Appendix for a description of the requirements with which you have to comply. If you are unsure of your generator status, go back to section 3, or contact PIW for additional help at 414/785-9090.

5. Before You Send Your Waste Off-Site…

Sending waste off-site for disposal, treatment or recycling is potentially a very expensive venture. Drums have to be properly marked for shipment off site, paperwork must be completed, and a system for record keeping must be developed.

In order to send hazardous waste off-site, all SQGs and LQGs must obtain a USEPA identification number. (So must VSQGs who choose to manifest their waste.) The identification numbers are **location specific,** so if you have two facilities and each is involved in regulated waste activities, you will need two separate identification numbers.

In order to obtain an identification number, complete an EPA Notification of Regulated Waste Activity Form (EPA Form 8700-12., Rev. 11-30-93) which may be obtained from your WDNR Regional Hazardous Waste Management contact. For more information, see section 8.

Drums being shipped off-site must be transported by properly permitted transporters. Drums must be labeled and comply with Department of Transportation (DOT) regulations. Hazardous waste drums must be accompanied by a shipping paper called a Uniform Hazardous Waste Manifest form or "manifest," and a landban notification form. A sample manifest and landban notification form are included in Appendix 3D. Your transporter and hazardous waste disposal company should be able to help you comply with DOT requirements and complete the manifests and associated paperwork, but keep in mind that the ultimate responsibility for compliance rests with you, the hazardous waste generator.

A **generator accumulation area**
Is the location that hazardous waste is stored at your facility prior to being shipped off-site.

Sending waste off-site for disposal, treatment or recycling is potentially a very expensive venture. Know the regulations.

Remember that you have a limited amount of time to keep full drums of waste on-site, unless you are a VSQG. Make arrangements early with your disposal company to take care of your wastes before you exceed the waste storage time limit:

- SQG is limited to 180 days, unless you have to ship your wastes greater than 200 miles, in which case you can store hazardous waste on-site for 270 days.
- LQG is limited to 90 days.

Selecting a reputable disposal company is critical, and it may be worthwhile to obtain professional assistance in evaluating disposal and recycling options.

6. Non-Hazardous Wastes, Recycling, Special Wastes and Other Waste Issues

While the focus of this section has been on hazardous waste, printers should also be concerned with non-hazardous solid wastes that they generate because these wastes are also regulated by Wisconsin Department of Natural Resources (WDNR) and can have a negative impact on the environment. The following business wastes are subject to state and local recycling regulations: office paper, corrugated cardboard, newsprint, magazines, plastic containers, glass containers, polystyrene foam packaging aluminum containers, steel containers, bi-metal containers, waste tires, used motor oil, lead-acid vehicle batteries, and major appliances.

Recycling may be viable for many of the wastes you are currently putting into the dumpster for disposal. Pay attention to what is getting thrown out and consult with your suppliers, peers in the graphic arts industry, Printing Industries of Wisconsin (PIW), or University of Wisconsin – Extension, Solid and Hazardous Waste Education Center (SHWEC) to identify recycling opportunities.

Tips in Identifying Whether Wastes are Hazardous or Non-Hazardous

The following wastes generated by printers can be hazardous or non-hazardous. The accompanying tips should be helpful in determining whether these wastes are hazardous or not.

Empty Containers and Drums. Containers and drums are "empty" when they have less than one inch of residue (or no more than 3% of the original content remaining). Ink kits, after being scraped out in the normal course of removing ink, can be disposed of as "regular" trash.

Although not a hazardous waste, empty drums should be properly managed to avoid future liability. While OSHA requires "empty" drums to retain markings that identify the drum's prior chemical contents, any references to your company's name or address should be removed.

Non-hazardous solid wastes are also regulated by Wisconsin Department of Natural Resources (WDNR) and can have a negative impact on the environment.

Recycling may be viable for many of the wastes you are currently putting into the dumpster for disposal.

When using drums, it is preferable to arrange for your chemical supplier to provide "deposit" drums, which they will take back for reuse. If you must dispose of empty drums, carefully select a drum reconditioner or metal recycler.

Inks. Heatset and Nonheatset offset inks are normally non-hazardous, unless they have been intentionally mixed with a hazardous waste (like waste solvent). Sheetfed inks are also usually non-hazardous unless they are specialty inks that contain toxic levels of heavy metals from pigments.

Laundering Shop Towels. WDNR allows shop towels containing cleanup solvent that may be hazardous to be managed as a non-hazardous waste whenever they are being sent to a commercial laundry or dry cleaner provided: 1) the towels do not contain any free liquids (i.e., dripping wet); and 2) the towels will be cleaned and then reused.

Disposable Shop Towels. Shop towels disposed of (or thrown away) are not hazardous unless they contain: 1) free liquids that have a flash point below 140°F; or 2) a listed solvent (F001-F005) was used on the towel for cleaning.

Discharges to Sewer. Although there is a "domestic sewage exclusion" that makes hazardous waste combined with sanitary waste going to a local wastewater treatment plant or publicly owned treatment works (POTW) non-hazardous, you are still required to notify your POTW if you discharge hazardous waste into the sanitary sewer. Examples of this would be a spent fixer with an elevated silver concentration (e.g., silver in solution over 5 ppm is a hazardous waste), or extreme pH solutions (e.g., pH less than 2 or greater than or equal to 12.5).

Note: the numerical limits described above establish whether a wastewater discharge is hazardous or not for purposes of reporting such discharges to the local POTW. Your POTW may have additional discharge limits within a local wastewater discharge ordinance. Wastewater discharges are addressed in greater detail in Chapter 4. See that section for additional information about meeting local wastewater discharge limits.

Special Wastes. There is a category of wastes that may be hazardous, but that are deemed non-hazardous as long as they are recycled in a manner that is acceptable to WDNR. These wastes are referred to as special wastes and include the following materials.

- Mercury switches, thermostats, thermometers and devices containing elemental mercury as the only hazardous waste component
- Fluorescent, incandescent, and mercury or sodium vapor lamps
- Cathode ray tubes
- Pesticides
- Dry cell batteries

Tips on identifying
non-hazardous wastes:

- Empty containers and drums with less than 1” of residue are non-hazardous.
- Some companies exchange used empty drums for clean ones
- Heatset and Nonheatset inks are non-hazardous if they haven’t been mixed with other inks.
- Shop towels can be commercially cleaned and reused.
- Shop towels are non-hazadous if they don’t have an ignitable or “listed” solvent on them.
- Some hazardous waste can be mixed with sanitary waste. Check with you local POTW for discharge limits.
- Some hazardous wastes can be recycled:
  - devices containing mercury
  - fluorescent light tubes
  - pesticides
  - dry cell batteries
  - used oil

Check for a recycling option to keep down your hazardous waste disposal costs.

If you need to dispose of any of the special wastes listed above, contact local recyclers and ask them whether they manage these wastes in accordance with all WDNR policies and regulations.

Residues and absorbent materials. When hazardous wastes are spilled, they create hazardous waste residues. Cleanup activities generate absorbents and other cleanup materials that may also be hazardous. The "mixture rule" states that any "listed" hazardous waste which comes in contact with other materials results in the entire mixture being a "listed" hazardous waste.

This rule applies to residues and absorbent materials; therefore, it is important to know if any wastes that you generate are "listed" hazardous wastes. It is also important to consider whether residuals from a characteristic hazardous waste, such as an ignitable hazardous waste, will be ignitable as well, and need to be managed as a hazardous waste. Each residue you generate and each cleanup situation you face should be addressed carefully, on a case-by-case basis.

Used Oil. Used oil which is recycled and is not mixed with hazardous waste is exempt from regulation under the WDNR's Hazardous Waste Management Code. If you burn used oil on-site in a boiler or furnace; you should order the following publication: "Used Oil Burning" (4 pages) PUBL-SW-104 89. This publication can be ordered from:

Clearinghouse Specialist, WDNR
Hazardous Waste Minimization Program
PO Box 7921
Madison, WI 53707-7921
(608) 267-3763

7. Hazardous Waste Issues for Pre-press, Pressroom and Facility-wide

Pre-press

Pree-press operations can generate hazardous wastes. When chemicals used in pre-press operations need to be disposed, they may have to be managed as hazardous wastes. Waste fixer is typically a hazardous waste because of the high silver content (greater than 5 ppm). Recovering silver from fixer and rinse water not only makes good economic sense, but it helps a printer to comply with both hazardous waste regulations, and waste water discharge regulations.

If you do not perform silver recovery activities on-site, but instead ship your fixer to an off-site silver recoverer, you will have to count this waste stream as hazardous wastes towards your monthly total to determine your generator status. Recall that your generator status is based on the total generation of hazardous waste from your printing plant:

- Very small quantity generator (VSQG) generates less than 220 lbs./month of hazardous waste;

If you do not perform silver recovery activities on-site, but instead ship your fixer to an off-site silver recoverer, you will have to count this waste stream as hazardous wastes towards your monthly total to determine your generator status.

- Small quantity generator (SQG) generates between 220 and 2205 lbs./month of hazardous waste;
- Large quantity generator (LQG) generates more than 2205 lbs./month of hazardous waste.

Some printers have found that managing their fixer off-site puts them into a higher generator category (e.g., going from a SQG to a LQG).

Keep in mind that if you ship photo processing chemicals off-site, you are also required to containerize, label, store and ship these materials in accordance with the hazardous waste generator requirements that apply to your generator status category. For more information about alternatives for managing fixer and rinse water, see Chapter 4 and Chapter 8, section 5.

In addition to concerns over fixer and rinse water, which are often toxic hazardous wastes due to their silver content, pre-press operations may also be generating corrosive hazardous wastes. Etches and other plate and film processing chemicals can be acidic or extremely basic. Recall that any waste with a pH less than 2.0 or greater than or equal to 12.5 must be managed as a corrosive hazardous waste.

You need to determine whether your discharges of photo-processing and plate making chemistries are acceptable to your local wastewater treatment plant or Publicly Owned Treatment Works (POTW) prior to putting them down the drain.

Pressroom

The cleanup of presses usually generates hazardous waste. You need to determine which of your waste blanket wash, roller wash and cleaning solvents are hazardous. Once you have made this determination, you need to make sure that these materials, if collected, are handled in accordance with hazardous waste regulations specific to your generator status.

At no time should you be dumping excess solvents into a container of soiled shop towels or into a garbage can of non-hazardous materials. Hazardous waste solvents need to be drummed or otherwise containerized, labeled and shipped off-site by a licensed hazardous waste hauler to a hazardous waste treatment and recycling/disposal facility.

Furthermore, non-hazardous wastes of all sorts should be kept away from and not mixed with hazardous wastes. This is especially true of non-hazardous inks. Mixing non-hazardous waste of any kind with hazardous waste solvents just increases the quantity of hazardous waste that you need to manage. Ultimately these increases become an unnecessary expense and you pay more than desired for your waste disposal services.

Also, not keeping non-hazardous wastes away from hazardous wastes may increase your generator status category unnecessarily. As one progresses from a very small quantity generator (VSQG)

Etches and other plate and film processing chemicals can be acidic or extremely basic. Any waste with a pH less than 2.0 or greater than or equal to 12.5 must be managed as a corrosive hazardous waste.

Determine whether your discharges of photo-processing and plate making chemistries are acceptable to your local wastewater treatment plant.

Determine which of your waste blanket wash, roller wash and cleaning solvents are hazardous and make sure that these materials are handled properly.

to a small quantity generator (SQG) to a large quantity generator (LQG), one's regulatory burden increases.

Finally, contaminating non-hazardous wastes with hazardous wastes further reduces your ability to recycle either original waste stream. For example, inks may be recycled or reblended into black; however, your ink supplier may not accept your ink if there is a large amount of solvent present in the ink.

For a description of tips, recommendations, and opportunities to reduce the amount of hazardous waste that the pressroom generates, see Chapter 8, section 6.

Facility-wide

A facility-wide approach to managing hazardous wastes is recommended because these wastes can be generated in many different places by many different operations. However, a facility-wide approach should not de-emphasize responsibility for hazardous waste management at the specific department in which the wastes are generated. Everyone working with hazardous wastes needs to know how to properly manage these materials. Even employees of the finishing department, where hazardous waste is not typically generated, should be careful to evaluate any waste stream generated to determine those wastes that are hazardous and those that are not. The finishing department should focus on recycling even if it is not faced with hazardous waste issues.

8. Sources of Additional Information

Guidebooks. WDNR has published a practical hazardous waste generator booklet: "Managing Your Hazardous Waste: A Guide for Wisconsin Small Quantity Generators." Copies are available by contacting the WDNR at 608/267-9523 and requesting publication PUBL-SW-071, 93REV.

WDNR Hazardous Waste Management Regulations. WDNR's hazardous waste management regulations are found in Chapter NR 600. These regulations can be ordered from:

Wisconsin Department of Administration
Document Sales Unit
PO Box 7840
202 South Thornton Avenue
Madison, WI 53707-7840 608/ 266-3358

Notification of Regulated Waste Activity. WDNR now assumes all responsibilities for assigning EPA Identification Numbers and for direct maintenance of facility notification records. Mail completed Facility Notification Forms (EPA Form 8700-12) and related correspondence to:

Notification
Processing SW/3
WDNR
PO Box 7921
Madison, WI
53707-7921
608/267-7567

Hazardous wastes can come from many areas of your facility. Each department is responsible for its own waste, but facility-wide awareness and knowledge is necessary.

Appendix 3A: Hazardous Waste Identification Worksheet

List all blanket washes, roller washes and other solvents that you collect for disposal. Then identify the flash point by looking in the MSDS for the product, or by contacting your chemical products supplier. If a product's flash point is less than 140°F you have to manage collected waste amounts of that solvent as hazardous waste.

If a product is not hazardous, because its flash point is 140°F, or above, you must then determine if it may be hazardous due to the presence of a toxic contaminant, or a chemical that is identified as a hazardous waste from non-specific sources (F001 - F005). See Appendix 3B for a list of hazardous wastes often found in the printing industry.

Blanket Wash, Roller Wash, and Cleaning Solvents	Flash point (from MSDS or manufacturer)	Hazardous Waste Determination: Is Flash Point less than 140˚F? [1]	
		Yes	No
		Yes	No
		Yes	No
		Yes	No
		Yes	No

Note

Hazardous wastes should be kept separate from non-hazardous wastes. When hazardous wastes are combined with non-hazardous wastes the entire mixture needs to be managed as a hazardous waste.

This rule also holds true for the cleanup of spills. If a (hazardous) solvent is spilled, any contaminated residue or absorbents generated in the cleanup should be managed as hazardous waste.

[1] Wastes with a flash point below 140°F are ignitable (hazardous wastes). These wastes are identified as D001. Only use a licensed hazardous waste hauler to manage this waste stream. A licensed hauler can also help you determine if other hazardous waste codes (such as F001- F005) will apply to your waste stream.

Appendix 3B: Information about Hazardous Wastes

Hazardous wastes are classified by the EPA and Wisconsin Department of Natural Resources (WDNR) based on the harm that could occur if they are improperly managed. To be a hazardous waste, a material must be **both:**

- A waste: This term includes solids, liquids and confined gases that may no longer be used for their intended purpose (without being treated or cleaned up) and are to be discarded, disposed of or recycled;

and

- Meet one of the following criteria:
- Characteristic Wastes
- Listed Wastes
- Waste Mixtures and "Derived From" Wastes

You are not obligated to have your waste stream tested in a laboratory to determine if it is hazardous, if you can make this determination on the basis of your knowledge. Information from an MSDS or vendor/supplier data sheet can be used to assist in making the determination about whether a waste is hazardous. You are required to keep such documentation on file for three years.

Each type of hazardous waste is assigned an EPA Waste Number. The waste number is used in labeling, shipping and reporting hazardous waste activities to WDNR. Hazardous waste may have more than one waste number; include all applicable numbers.

Characteristic (Waste Number)	Criteria	Examples of Printing-related Hazardous Waste
Ignitability (D001)	Flash point below 140ºF	Blanket/roller wash, solvents, solvent contaminated materials, etc.
Corrosivity (D002)	pH less than 2 or greater than or equal to 12.5	Photo/plate processing chemicals, acids and cleaners.
Reactivity (D003)	Unstable, reacts with water, etc.	Waste bleaches and oxidizers.
Toxicity (D004-D0043)	Contains specific contaminants above threshold levels. Toxic Characteristic Leaching Procedure (TCLP) testing may be necessary to determine if waste is hazardous. See NR 605.08.[2]	Blanket/roller wash, solvents, photo/plate processing chemicals, etc. Heatset inks containing (metals) pigments: Barium over 100 mg/l (ppm) Chromium over 5 mg/l (ppm) Cadmium over 1 mg/l (ppm) Lead over 5 mg/l (ppm) Silver over 5 mg/l (ppm)

[2] NR 605.08 can be found in the WDNR hazardous waste regulations, Chapter 600, Section 605: Identification and Listing of Hazardous Waste.

Listed Wastes

Listed wastes include specific chemicals or production process waste streams. There are three lists of listed hazardous wastes: non-specific sources, specific sources, and commercial chemical products.

- **Non-specific sources**: Referred to as the "F" listed wastes (waste numbers F001-F039) and found in WDNR Hazardous Waste Management Regulations (Chapter NR 605.09, Table II). Printers primarily need to be concerned with pure solvents of any of the following. Non-specific sources also include all mixtures and blends of solvents containing a total of 10% or more by volume (before use) of any of the following:

"F" - Waste Number	Hazardous Waste Components
F001 spent halogenated solvents used in degreasing	tricloroethylene, methylene chloride, 1,1,1-trichloroethane, or carbon tetrachloride.
F002 spent halogenated solvents	tricloroethylene, methylene chloride, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,2,2-trifluoroethane, or chlorobenzene.
F003 spent non-halogenated solvents	xylene, acetone, methanol, methyl isobutyl ketone
F005 spent non-halogenated solvents	toluene, methyl ethyl ketone (MEK), carbon disulfide, benzene

- **Specific sources**: Includes wastes from specific industrial processes that normally do not include printing operations. These specific source wastes are referred to as "K" wastes with waste numbers of K001-K136 and may be found WDNR Hazardous Waste Management Regulations (Chapter NR 605.09, Table III).

- **Commercial chemical products**: Includes specific chemical commercial products, manufacturing intermediates and off-specification chemical commercial products. These wastes are referred to as "U" and "P" wastes with waste numbers of P001-P123 and U001-U359. Printers shouldn't have to be concerned with these listed wastes unless they are trying to dispose of a technical grade "product" (e.g., pure, not a mixture, and not contaminated from a cleaning operation). It is recommended that printers return any unused portions of products to the manufacturer/supplier rather than have to manage these products as wastes or hazardous wastes. A complete list of the "U" and "P" wastes can be found in WDNR Hazardous Waste Management Regulations (Chapter NR 605.09, Tables IV and V).

Waste Mixtures and "Derived From" Wastes

Mixtures of a listed waste and a non-hazardous waste normally result in the entire mixture becoming a hazardous waste. You should keep each waste separated from other waste streams and obtain professional assistance if you believe your mixture of hazardous waste and non-hazardous waste is entirely non-hazardous. Remember, **"dilution is not the solution to pollution."** For example, purposely adding water to a waste fixer solution in order to reduce the silver concentration below 5.0 mg/l is not allowed (or legal!). Waste derived from hazardous wastes, through disposal, treatment, or storage of a listed waste may also be a hazardous waste.

Cleaning up a spill of a listed waste will normally result in all of the contaminated debris becoming a hazardous waste. This is another area that may require you to seek professional assistance for clarification.

Appendix 3C: Hazardous Waste Management Program Requirements For VSQGs, SQGs, and LQGs

Very Small Quantity Generator (VSQG) Requirements for Hazardous Waste Activities in Wisconsin

VSQG generates less than 220 lbs. of hazardous waste per month (VSQG < 220 lbs/mo) and does not accumulate more than 2205 lbs. of hazardous waste on-site at any one time.

VSQGs need to comply with the following requirements of the Wisconsin Department of Natural Resources (WDNR) Hazardous Waste Management Program:

1. Determine if the wastes that they generate are hazardous. Document how the determination was made. Keep records of quantities of waste generated per month.

2. Store the hazardous waste in leak proof containers. Keep the containers closed, except when adding or removing waste from them.

3. Mark the container as "Hazardous Waste" or otherwise identify the contents as hazardous waste.

4. Ship the waste to a permitted/licensed solid or hazardous waste disposal facility.

5. If the shipment is to be manifested, then the VSQG must obtain an EPA identification number by filing EPA Form 8700-12 (Rev. 11-30-93) with WDNR.

6. Package the waste to meet shipping requirements established by the Wisconsin Department of Transportation for hazardous materials, including hazardous wastes.

In addition to the requirements above, it is recommended that VSQGs follow the requirements below for SQGs. This recommendation is based on the fact that a VSQG can quickly become a SQG due to slight increases in hazardous waste generation activities, and due to the fact that many of the requirements of SQGs represent best management practices in the area of hazardous waste management.

Small Quantity Generator (SQG) Requirements for Hazardous Waste Activities in Wisconsin

SQG generates at least 220 lbs. of hazardous waste per month, but less than 2205 lbs./month and does not accumulate more than 13,230 pounds of hazardous waste on-site at any one time.

SQGs need to comply with the following requirements of the WDNR Hazardous Waste Management Program:

1. Determine if the wastes that they generate are hazardous. Document how the determination was made. Keep records of quantities of waste generated per month.

2. Before placing hazardous waste in storage, mark each container with the words, "Hazardous Waste" or otherwise identify the contents as hazardous waste.

3. Store hazardous wastes in leak proof containers. Keep containers closed except when adding or removing waste. Store hazardous wastes in a manner or location such that spills and discharges will not occur.

4. Be sure that you do not store hazardous waste for more than 180 days, unless the disposal/recycling facility that you use is more than 200 hundred miles away, in which case you can store hazardous waste on-site for up to 270 days. Extensions to these storage time limits can be obtained by WDNR if requested in writing with a complete explanation as to why the extension is necessary.

5. Record the date that the current period of accumulation began on each container. This is referred to as the "accumulation start date." This date should be the first date that hazardous waste is initially placed in the empty drum, unless you are using a satellite accumulation area drum, in which case the accumulation start date is considered the date on which the drum was filled and moved to the accumulation area (or full-drum storage area).

6. Inspect the container storage area at least weekly. Inspections are required to be documented on an inspection log that includes the following information:
    - Date and time of inspection;
    - Name of the inspector;
    - A notation about the condition of the containers and reference to any needed or completed repairs on containers or the container storage area.

    Note: These records are required to be maintained for at least 3 years.

7. Obtain a hazardous waste generator identification number for use in shipping hazardous waste off-site. To obtain an ID. Number, complete EPA Form 8700-12 (Rev. 11-30-93) and file it with WDNR.

8. Use a manifest form when shipping any quantity of hazardous wastes off site.

9. When completing a manifest form, be sure to certify that you have a good faith effort to minimize your waste generation and you have selected the best waste management method that is available to you.

(more)

10. Before transporting hazardous waste off-site, mark each container:

> HAZARDOUS WASTE
> State and federal law prohibits improper disposal. If found, contact the nearest police department, the division of emergency government or the Department of Natural Resources.
> Generator's name and address _____
> Manifest Document number _____

11. Only use a licensed hazardous waste hauler when shipping hazardous wastes off-site, and meet all requirements established by the Wisconsin Department of Transportation (WisDOT) for the transport of hazardous wastes.

12. Be prepared to offer the shipping company the appropriate WisDOT placard for your hazardous waste, if the truck is not equipped with one.

13. If you do not receive a hand written signed copy of the manifest from the owner or operator of the disposal facility within 45 days of shipping hazardous waste off-site, then submit an exception report that includes the following information to WDNR:
    - A legible copy of the manifest;
    - A note indicating that you did not receive confirmation of delivery of the hazardous waste to the disposal facility; and,
    - A letter describing the efforts undertaken to locate the hazardous waste, and the results of such efforts.

14. Complete a Land Disposal Restriction notification. For example, ignitable wastes (D001) cannot be land disposed, instead these wastes should be fuel blended for incineration. When manifesting an ignitable hazardous waste, such as a hazardous blanket wash (flash point less than 140°F), you need to provide an additional written notification. Include the following in writing to satisfy the land ban regulations:
    - EPA hazardous waste number;
    - A description of the required treatment standard (such as fuel blending for incineration);
    - Manifest number associated with the shipment of waste; and
    - Waste analysis data (if available; if not available, it is not required).

    Note: The generator must keep a copy of this notification for at least 5 years.

15. Complete an Annual Hazardous Waste Activity Report before March 1 of each year for hazardous waste activities conducted during the previous calendar year.

16. Assign one individual to be the Emergency Coordinator (EC) or lead person assigned to responding to emergencies involving hazardous wastes. Alternates should also be identified. An EC is required to be "on call" at all times.

17. Post emergency response information near telephones. Emergency response is also covered in Section 5 of this handbook. The required information includes the following:
    - name and telephone number of the Emergency Coordinator or procedure for contacting that person;
    - location of fire extinguishers, spill control materials, and if applicable, fire alarms; and,
    - telephone number of the fire department.

18. Train all employees in the proper handling of hazardous wastes and what to do in the event of an emergency involving hazardous wastes. Document all training sessions.

(more)

19. Maintain the following equipment operable for use in notifying personnel of and responding to an emergency:
    - an internal communication or alarm system, such as a public address (PA) system;
    - an external communication system, such as telephones;
    - portable fire extinguishers, spill control equipment, and adequate water for emergency response.

If a SQG accumulates more than 2205 lbs. of hazardous waste on-site, it has to comply with the following additional requirements:

1. A written description of the hazardous waste and emergency response training needs to be developed and maintained.
2. All employees that are required to be trained in hazardous waste activities and emergency response need to be provided with an annual refresher.
3. Records documenting who received training, what topics were covered and when training was provided need to be maintained.

Large Quantity Generator (LQG) Requirements for Hazardous Waste Activities in Wisconsin

LQG generates at least 2205 lbs. of hazardous waste per month (LQG > 2205 lb/mo)

LQGs need to comply with the following requirements of the WDNR Hazardous Waste Management Program:

1. Determine if the wastes that they generate are hazardous. Document how the determination was made. Keep records of quantities of waste generated per month.

2. Before placing hazardous waste in storage, mark each container with the words "Hazardous Waste" or otherwise identify the contents as hazardous waste.

3. Store hazardous wastes in leak-proof containers. Keep containers closed except when adding or removing waste. Store hazardous wastes in a manner or location such that spills and discharges will not occur.

4. Store containers of ignitable or reactive hazardous waste at least 50 feet from the site's property line.

5. Be sure that you do not store hazardous waste on site for more than 90 days. Extensions to this storage time limit of up to 30 days may be obtained from WDNR on a case-by-case basis if requested in writing with a complete explanation as to why the extension is necessary.

6. Record the date that the current period of accumulation began on each container. This is referred to as the "accumulation start date." This date should be the first date that hazardous waste is initially placed in the empty drum unless you are using a satellite accumulation area drum, in which case the accumulation start date is considered the date on which the drum was filled and moved to the accumulation area (or full-drum storage area.)

7. Inspect the container storage area at least weekly, looking for evidence of leakage, corrosion or deterioration of the containers or discharge confinement structures, such as dikes. Inspections are required to be documented on an inspection log that includes the following information:
    - Date and time of inspection;
    - Name of the inspector; and,
    - A notation about the condition of the containers and reference to any needed or completed repairs on containers or the container storage area.

    These records are required to be maintained for at least 3 years.

8. Obtain a hazardous waste generator identification number for use in shipping hazardous waste off-site. To obtain an ID. Number, complete EPA Form 8700-12 (Rev. 11-30-93) and file it with WDNR.

9. Use a manifest form when shipping any quantity of hazardous wastes off site.

10. When completing a manifest form, be sure to certify that you have a good faith effort to minimize your waste generation and you have selected the best waste management method that is available to you.

(more)

11. Before transporting hazardous waste off site, mark each container:

> HAZARDOUS WASTE
> State and federal law prohibits improper disposal. If found, contact the nearest police department, the division of emergency government or the Department of Natural Resources.
> Generator's name and address _____
> Manifest Document number _____

12. Only use a licensed hazardous waste hauler when shipping hazardous wastes off-site and meet all requirements established by the Wisconsin Department of Transportation (WisDOT) for the transport of hazardous wastes.

13. Be prepared to offer the shipping company the appropriate WisDOT placard for your hazardous waste, if the truck is not equipped with one.

14. If you do not receive a hand written signed copy of the manifest from the owner or operator of the disposal facility within 60 days of shipping hazardous waste off-site, then submit an exception report that includes the following information to WDNR:
    - A legible copy of the manifest;
    - A note indicating that you did not receive confirmation of delivery of the hazardous waste to the disposal facility; and,
    - A letter describing the efforts undertaken to locate the hazardous waste, and the results of such efforts.

15. Complete a Land Disposal Restriction notification if necessary. For example, ignitable wastes (D001) cannot be land disposed, instead these waste should be fuel blended for incineration. When manifesting an ignitable hazardous waste, such as a hazardous blanket wash (flash point less than 140°F), you need to provide an additional written notification, including the following in writing to satisfy the land ban regulations:
    - EPA hazardous waste number;
    - A description of the required treatment standard (such as fuel blending for incineration)
    - Manifest number associated with the shipment of waste; and
    - Waste analysis data (if available; if not available, it is not required).

    Note: The generator must keep a copy of this notification for at least 5 years.

16. Complete an Annual Hazardous Waste Activity Report before March 1 of each year for hazardous waste activities conducted during the previous calendar year.

17. Assign one individual to be the Emergency Coordinator (EC) or lead person assigned to responding to emergencies involving hazardous wastes. Alternates should also be identified. An EC is required to be "on call" at all times.

18. Post emergency response information near telephones. Emergency response is also covered in Section 5 of this handbook. The required information includes the following:
    - name and telephone number of the Emergency Coordinator or procedure for contacting that person;
    - location of fire extinguishers, spill control materials, and if applicable, fire alarms; and,
    - telephone number of the fire department.

(more)

19. Train all employees in the proper handling of hazardous wastes, and what to do in the event of an emergency involving hazardous wastes. Document all training sessions. All employees that are required to be trained in hazardous waste activities and emergency response need to be provided with an annual refresher.

20. Maintain the following equipment operable for use in notifying personnel of and responding to an emergency:
    - an internal communication or alarm system, such as a public address (PA) system
    - an external communication system, such as telephones
    - portable fire extinguishers, spill control equipment, and adequate water for emergency response

21. Keep records of the following:
    - A description of hazardous waste and emergency response training.
    - Documentation of who received training, what topics were covered and when training was provided.

22. Develop a Waste Minimization Plan with the goal of reducing the volume or quantity and toxicity of hazardous waste, as economically practical. Include descriptions of the following in the plan:
    - Top management support
    - Characterization of waste generation and waste management costs
    - Periodic waste minimization assessments
    - A cost allocation system
    - How technology transfer is encouraged
    - Program implementation and evaluation

Chapter 4: Water and Wastewater

Printers use water in processes such as film developing, plate processing, and as the primary component of fountain solution. Water use results in the generation of wastewater that needs to be treated. Wastewater can leave a printing plant via many paths, some of which do not provide adequate treatment, and as such, can be harmful to the environment.

Do you know where the wastewater, process chemicals and liquid wastes that your printing plant discharges end up?

Just because a chemical or wastewater is dumped into a floor drain or utility sink does not mean that it is being properly treated. Sinks and drains are usually connected to a sanitary sewer system, which in turn discharges to a locally operated wastewater treatment plant, also known as a Publicly Owned Treatment Works (POTW). However, sinks and drains may also be connected to storm sewer systems that dump their contents directly into the nearest ditch, creek, stream or river.

It is important for you to recognize that there is a difference between sanitary sewers and storm sewers and to determine exactly what types of sewer systems are connected to your printing plant. Some printers may have both types of sewers, or even a combination sewer system. It is designed to carry both storm water and sanitary sewage to a POTW, except during storm events when these types of systems overflow.

Printing plants located in rural areas may not be connected to a sanitary sewer system. These plants may be served by a septic tank system or drainfield. As stated earlier, printers need to be sure that their wastewater is adequately treated. Without such treatment you are exposing yourself and your company to an unnecessary source of environmental and fiscal liability. Septic systems and storm sewer systems do not provide the level of treatment that is required for wastewater generated by printing plants. If your printing plant is not connected to the local sanitary sewer system, you have to be very careful about how you manage your wastewater.

POTWs are designed to treat sanitary wastes that are produced by residences, not commercial and industrial wastewaters. Wastewater generated in printing plants contains a greater variety of contaminants than residential wastewater. Therefore, printers may have to "pre-treat" their wastewater.

For example, POTWs do not effectively remove metals; therefore, printers are responsible for removing silver from fixer used in film developing. In addition, many solvents cannot be effectively removed by POTWs and just pass right through them. Therefore, it is important to prevent solvents from being discharged down drains at your printing plant. More information about silver recovery will be provided herein.

Wastewater can leave a printing plant via many paths, some of which do not provide adequate treatment, and as such, can be harmful to the environment.

Other topics addressed within Chapter 4 include:

1. Managing Wastewater Appropriately
2. Identifying What is Discharged Where
3. Discharges to POTWs, Septic Tank Systems, and the Environment.
4. Storm Water Discharges
5. Supplying Water to Your Operation
6. Pre-press, Pressroom and Facility-wide: Summary of Water and Wastewater Issues
7. Sources of Additional Information

1. Managing Wastewater Appropriately

Wastewater needs to be managed appropriately to protect the environment and our drinking water sources. The following rules describe appropriate wastewater discharge practices:

Do:

- Recover silver from photo developing wastewater and waste fixer (and make some money!).
- Discharge printing plant wastes to a POTW, not a septic tank system.
- Be sure that only sanitary wastewater from bathrooms and washrooms, not pressrooms and utility rooms, is discharged to septic tank systems.
- Move drum storage areas (even for empty drums) inside or under a protective cover to prevent storm water contact. Keep shipping pallets, waste paper and recyclable material, as well as trash dumpsters, under cover to prevent contact with precipitation and water.
- Cover floor drains in the vicinity of oil and process chemical storage areas to prevent an accidental spill from reaching the drain. Temporary covers can be used to prevent accidents – they should only be removed when the drain is needed during cleaning or mopping.

Don't:

- Discharge wastewater from printing or pre-press processes into a septic tank system.
- Put solvents or oils, such as press lubricating or motor oils, down a floor drain or sink or otherwise allow these materials to be discharged to a POTW. These wastes will not be effectively treated and may pass through the POTW into the environment.

For printers, managing wastewater appropriately means removing silver from fixer and rinsewater when necessary. Wastewater treatment for silver recovery is the most serious wastewater issue facing printers. Wastewater from a printing plant will not meet POTW discharge limits and State laws unless the silver is removed. The silver contained in wastewater from printers with film developing operations is at such high concentrations that the fixer would be considered a hazardous waste if the silver was not removed.

The simplest silver removal treatment is to use metallic replacement cartridges. Normally, two cartridges in series are connected directly to the fixer discharge from your film developing unit. Larger film developing operations may find an electrolytic silver recovery unit economical. However, electrolytic silver recovery units do not take all the silver out of solutions. In fact, 200–1,000 ppm of silver can normally be expected to remain in the discharge from these units.

Wastewater treatment for silver recovery is the most serious wastewater issue facing printers.

The simplest silver removal treatment is to use metallic replacement cartridges.

Two "piggyback" or in-series metallic replacement cartridges should be used to treat the discharge from an electrolytic unit and normally will reduce silver concentration to below 5 ppm. This should allow you to discharge to your local POTW.

Keeping a running total of the amount of fixer mixed for your developer can help you determine when your cartridges need to be replaced. When replacing cartridges in a two-cartridge-in-series arrangement:

1. Remove the first cartridge.
2. Move the second cartridge up to the first position.
3. Add a new cartridge as the second treatment unit.

If you don't already have a silver recovery system in place, contact local vendors of such equipment. PIW can assist you in identifying suppliers of silver recovery equipment.

If you don't already have a silver recovery system in place, contact local vendors of such equipment. PIW can assist you in identifying suppliers of silver recovery equipment.

Recovered silver should be sold to a precious metal refiner. If you are shipping the metallic silver off-site, it doesn't have to be managed as a hazardous waste. On the other hand, if you are shipping your photo-developing chemistries off-site in bulk, to have the silver removed at an off-site location, you will have to consider this entire shipment a hazardous waste.

See Chapter 8, section 5 for more information about silver recovery options available to lithographic printers.

2. Identifying What is Discharged Where

Do you know what is in your wastewater and where your wastewater goes? It is crucial that you can answer "yes" to this question. "Mystery" discharges can damage the environment and expose your operation to potential liability.

Most printers with water supplied by a local water utility are also served by a local sanitary sewer system. This system is connected to the local POTW. After treating the wastewater, the POTW discharges the treated water into a river, lake, stream or other water body.

Printers need to be concerned if their wastewater is not being discharged to a POTW. In other words, if wastewater is discharged directly from the print shop to a ditch, stream, river, or other water body, additional regulations apply and a permit will need to be obtained. You also need to be concerned if your wastewater is discharged to a septic tank and leach field system since pollutants, such as silver, will accumulate over time in the soils around your leaching drain pipes. If you discharge anything to a septic system other than domestic sanitary wastewater, you also need to obtain a discharge permit.

To confirm where your discharges go, you need to physically walk through your operation and identify the various machines or processes that use water and generate wastewater. For larger facilities, a master plumbing diagram will show sanitary sewer lines and storm sewer piping. Storm sewer piping is meant for rainwater or possibly to drain fire sprinkler water in a manufacturing area. Floor drains are routed to either the storm sewer or sanitary sewer.

Walk around the perimeter of your facility and look for any water flowing or evidence of previously flowing water from your operation. It is best to do this on a dry day so you are not confused by storm water. You should look for water flowing directly onto the ground from a pipe or other structure or water flowing from a pipe into a creek, stream, river, pond or other water body. Only clean storm water should be allowed to discharge to a ditch, stream or water body. Wastewater discharges need to be treated.

If you discover that you have been discharging untreated wastewater to the ground or a creek, stream, river, pond, etc., you must stop such a discharge immediately and provide for an appropriate means of wastewater collection and treatment.

Often it is better to eliminate a wastewater discharge that requires a discharge permit than to apply for and obtain a permit. After all, a permit may require periodic testing and it does not remove your environmental liability. Obtaining the assistance of a consultant in the environmental sciences is recommended if you need to eliminate a discharge that does not go to a POTW or if you need to develop a wastewater storage, treatment, and discharge system.

“Mystery” discharges can damage the environment and expose your operation to potential liability.

To confirm where your discharges go, you need to physically walk through your operation and identify the various machines or processes that use water and generate wastewater.

Often it is better to eliminate a wastewater discharge that requires a discharge permit than to apply for and obtain a permit.

3. Discharges to POTWs, Septic Tank Systems, and the Environment

By now you should know the sources of wastewater from your printing plant and where your wastewater is being discharged. Issues associated with wastewater management are described below under typical discharge scenarios faced by a printer. It is recommended that you review each scenario below.

Wasteware Discharged to POTW. If you discharge wastewater from sources other than toilets and bathroom sinks to a POTW, you need to determine whether a permit or special authorization is required from the POTW. Some POTWs require permits from commercial/industrial facilities while *others do not.*

It is recommended that you contact the POTW and ask for a copy of their local industrial wastewater discharge ordinance. The ordinance will describe any discharge limitations on wastewater and should clarify whether a permit is required. The ordinance will also describe limits on the types and amounts of pollutants that may be discharged to the POTW. For example, the following discharges are usually prohibited by such ordinances:

- Discharges that pose a fire or explosion hazard.
- Discharges with extreme pH values (generally below 5 or above 9).
- Discharges that pose a health hazard;
- Discharges with excessive petroleum or mineral oil concentrations.
- Discharges at elevated temperature (generally above 104°F).
- Discharges with metals present (such as lead, silver, copper, etc.).

You will need to become familiar with what contaminants are present in your wastewater to be sure that you are meeting local discharge limits for specific contaminants. You also need to be sure that you are not discharging any hazardous wastes into your wastewater.

Wastewater Discharged to a Septic Tank System. Printers installing a new septic tank system or discharging to an existing one need to be concerned with contaminants like silver, chromium or other metals in their wastewater that can build up over time and pose a future cleanup liability. You should only discharge sanitary wastewater to septic tank systems. All process wastewater needs to be effectively treated; septic systems are not effective with process wastewaters. Printers with discharges directly to a septic tank system should obtain professional guidance.

Wastewater Discharged to the Environment (a creek, river or other body of water). Wastewater from your operation should not be discharged directly into a storm sewer, creek, river, stream, pond, lake, ditch or other land or water body. If you have such a discharge, it is recommended that you contact a consultant in the environmental sciences for immediate assistance with establishing a means of wastewater collection, storage and treatment.

It is recommended that you contact your local water treatment facility and ask for a copy of their local discharge ordinance.

Don’t discharge printing wastewater to a septic tank system.

Don’t discharge printing wastewater into a stream, lake, or ditch.

If such a discharge cannot be avoided, a Wisconsin Pollution Discharge Elimination System (WPDES) permit is required. Contact the WDNR Division of Water, Discharge Permit Coordination Section at (608) 266-1494 or obtain professional guidance to assist in completing and submitting the required paperwork and application forms.

4. Storm Water Discharges

Printers are required to apply for a storm water permit if there is a possibility that storm water, rainfall, or snow melt water will come into contact with any of the following and as such have the potential of contaminating storm water:

- material handling equipment or activities
- raw materials
- intermediate products
- final products
- waste materials
- by products, or
- industrial machinery

Most printers will *not* have to obtain storm water permits. Printers that store their products, chemicals, and wastes indoors are not required to apply for a storm water discharge permit.

Printers should move drum storage areas (even for empty drums) inside or under a protective cover to prevent storm water contact. Items such as shipping pallets, waste paper and recyclable material should also be kept under cover. Trash dumpsters should either be moved under cover or equipped with effective lids to prevent contact with storm water precipitation and runoff from exiting the dumpster.

For any new construction or construction projects, a storm water permit is required if the project encompasses five or more acres. If you are planning on an expansion of five or more acres, be sure that your construction contractor has obtained the required approvals, including a general storm water discharge permit.

In the event that you do need to obtain a storm water permit, obtain professional assistance by contacting a consultant in the environmental sciences, calling your local WDNR representative, or WDNR's central office at (608) 266-2621.

Most printers will *not* have to obtain storm water permits. Printers that store their products, chemicals, and wastes indoors are not required to apply for a storm water discharge permit.

5. Supplying Water to Your Operation

Most printers in Wisconsin receive water from a local water utility or municipality. Domestic water hookups usually include a backflow preventor, which keeps water flowing out of your facility from getting back into the municipal system. Some locations require periodic testing of backflow preventors. Check with your water supplier or local plumbing inspector to determine if such tests are required of you.

If you get your water from a private source or on-site well, it is recommended that you test the water periodically to make sure that it is potable (suitable for drinking and washing). If you have an on-site well, and you provide water to over 25 persons at your facility, then you are also subject to requirements designed to assure that the well water is fit for human consumption. Contact your county department of health with questions regarding on-site wells.

If you have water fountains (coolers) in your facility, you should check if these units were built with lead solder because water passing through these units may pick up low concentrations of lead. You should consider replacing water coolers that contain lead.

6. Pre-press, Pressroom and Facility-wide: Summary of Water and Wastewater Issues

Pre-press operations create the greatest level of concern for wastewater issues. Silver needs to be removed from fixer so it doesn't have to be managed as a hazardous waste and so the effluent can be discharged into the sanitary sewer system.

If you ship your fixer off-site for recovery of silver, then you need to manage the entire volume of your shipment as a hazardous waste. This method of having the silver removed may be convenient, but it will increase the amount of hazardous waste that you generate. See Chapter 3 for more information about requirements for hazardous waste generators.

In addition to removing silver, pre-press departments also need to be concerned with the chemistries that they may be discharging "down the drain." First, you must know what type of drain you are using. Is it a drain that leads to a storm sewer system, or to a sanitary sewer system, or to a septic system? Process chemicals should never be discharged to a storm sewer or septic system.

Next, you need to know what contaminants are present in the chemical products that you may be discharging as well as to be familiar with the characteristics of the products that you are using. Discharge of acidic (low pH) solutions is typically prohibited by discharge ordinances because these solutions can corrode the sanitary sewer system piping and equipment. If you have any concerns about your wastewater disposal practices, discuss them with an environmental consultant or your local POTW operator.

If you get your water from a private source or on-site well, it is recommended that you test the water periodically to make sure that it is potable (suitable for drinking and washing).

Know where your silver goes.

Know where your chemicals go.

Keep your hazards contained.

Pressroom personnel do not have to be as concerned with wastewater issues as employees in the pre-press department. Press operators should be careful that fountain solutions are only discharged to a sanitary sewer system. Pressroom personnel should also be careful not to discharge blanket/roller wash or other solvents into a utility sink or floor drain. Oils and lubricants should also be prohibited from disposal in utility sinks and floor drains. Care should be taken to cover any floor drains except when the press room is being cleaned or mopped. Covers will minimize the risk of a spill of solvents or other contaminants
from reaching the floor drains or sanitary sewer system.

Facility-wide inspections should be conducted periodically to ensure that industrial wastewater is not being discharged to septic systems, storm water systems or the environment.

7. Sources of Additional Information

Your local wastewater treatment plant (POTW) or city/county offices are the best source of information about industrial wastewater discharges. The POTW, or city/county in which it is located, usually has ordinances regulating the level of contaminants in industrial wastewater that is being discharged to it.

The county may also administer programs that regulate the use of septic systems.

If you have questions about wastewater issues at your facility, it is recommended that you contact PIW, UW-Extension, or WDNR. See Appendix C for contact information.

Consult your local water facility to be sure you are in compliance. Your employees and your community rely on you to provide safe water by not polluting.

Chapter 5: Health and Safety

Providing a healthy and safe work place should be the goal of every plant operator that values keeping employees productive and reducing lost-time accidents. Proactively addressing health and safety issues can also result in lower insurance costs.

This Chapter of the handbook identifies Occupational Safety and Health Administration (OSHA) requirements that apply to printers. This handbook is not intended to be a comprehensive source of information about OSHA programs; instead this handbook focuses on those OSHA programs that are related to other environmental programs administered by the EPA and Wisconsin Department of Natural Resources (WDNR).

This Chapter includes the following sections:

1. Emergency Preparedness
2. Contingency Planning and Emergency Response
3. HAZCOM – Hazard Communication Program
4. Lockout/Tagout Program
5. Sources of Additional Information

1. Emergency Preparedness

Emergency situations and accidents do occur and you need to be prepared for such occurrences.

Emergency Action Plan. Under OSHA, printers are required to develop and maintain an emergency action and fire prevention plan. If your facility has 10 or fewer employees, you do not have to develop a written plan, but it is recommended. Whether the plan is written or delivered orally in the case of small printers with 10 employees or less, it needs to describe the following:

- Evacuation routes and locations of exits.
- The plant's alarm system (e.g., public address (PA) system).
- Fire hazards, including sources of heat or areas where flammable/ignitable products are stored or used.
- The location of fire protection equipment, including fire extinguishers, water or fire hoses, areas served by overhead sprinkler systems, etc. (See Emergency Equipment below).
- Individual responsibilities during an emergency, including the identification of an Emergency Coordinator (See Emergency Coordinator below).
- The emergency notification list (See Emergency Notification List below).

To be prepared for emergencies, your should have:

- An Emergency Action Plan
- An Emergency Coordinator
- Emergency Equipment
- An Emergency Notification list

A detailed description of the components of an emergency action plan may be found at 29 CFR 1910.38.

It is recommended that facility maps be used to identify much of the information in the plan, such as the locations of evacuation routes, exits, equipment, etc.

Emergency Coordinator. At least one employee (it is a good idea to have two alternates) must have the responsibility of being the "Emergency Coordinator." Typically, the Emergency Coordinator is responsible for notifying external agencies or authorities and is the person in charge during emergency situations.

Emergency Equipment. The following equipment needs to be available for use during an emergency:

- An alarm system or public address (PA) system.
- An external communication system, such as a telephone.
- Portable fire extinguishers and water in adequate volume and pressure for use by fire fighters.
- Spill cleanup materials, such as absorbents.
- An eyewash station.
- Personal protective equipment (PPE) such as gloves, safety glasses, etc.
- Additional equipment, as you see necessary.

Make sure all employees know where emergency equipment is and how to use it.

Emergency Notification List. Compile an Emergency Notification List and post this information at appropriate locations to save time in an emergency.

Post an Emergency Notification List near the phones and near the hazardous waste.

The Emergency Notification list should include:

- Name and telephone number of the Emergency Coordinator
- Location of fire and spill control equipment
- Telephone number of local Fire Department
- Telephone number of the Wisconsin spill hotline:
  1-800-943-0003

It is recommended that the notification list be posted at the facility's main phones, near the hazardous waste storage area, and in other locations where you think it would be helpful (e.g., close to other telephones at the plant.)

You may also choose to include information about your local hospital or emergency medical service provider as well as local police and county emergency management personeel. (See Chapter 6 for more information about reporting emergencies and spill events.)

After developing the emergency action and fire prevention plan, make it available to all employees so that they can become familiar with it. Then train them in the plan so that they know what to do in the event of an emergency.

2. Contingency Planning and Emergency Response

Chemical products (hazardous chemicals) may be spilled periodically. Printers need to be prepared to quickly and properly manage these situations, which involve spill cleanup and reporting (if required).

Contingency planning is required under both environmental and safety regulations in Wisconsin. The Hazardous Waste Management Chapter in this handbook describes the requirements for emergency management that need to be followed by small quantity generators (SQGs) and large quantity generators (LQGs) of hazardous waste.

Keep in mind that you can use one emergency response plan to satisfy the requirements for emergency response under both OSHA and the hazardous waste management program, provided that individual requirements under both programs are incorporated into the plan.

A Spill Prevention Control and Countermeasure (SPCC) Plan may also be required if your operation meets one of the following conditions:

- Storage capacity of oil is greater than 1,320 gallons
- Storage capacity of any single container of oil exceeds 660 gallons
- Storage capacity of oil in underground (buried) tanks is greater than 42,000 gallons

The average printer will likely not exceed the threshold values that require an SPCC Plan. But, if you think that you will need an SPCC plan, review the requirements found at 40 CFR Part 112, Oil Pollution Prevention, or contact PIW for assistance.

Spill Cleanup. Employees may clean up "incidental" spills of hazardous chemicals provided their hazard communication training (required by OSHA) properly addresses the safe handling and health and safety hazards of the chemical. OSHA defines "*incidental spills"* as those that *"can be absorbed, neutralized or otherwise controlled at the time of the release (spill) by employees in the immediate release area or by maintenance personnel."* OSHA also allows employees to clean up spills where "no potential safety or health hazard (e.g., fire, explosion, chemical exposure)" exists.

Absorbents or other spill control materials/equipment should be readily available to each work station and/or employee in the facility. Personal protective equipment (such as rubber gloves and safety glasses) appropriate for the hazards associated with the chemical products used in a work area should also be available with the spill control equipment.

Contingency planning for spills is required under both environmental and safety regulations in Wisconsin.

OSHA defines "**incidental spills**" as those that "can be absorbed, neutralized or otherwise controlled at the time of the release (spill) by employees in the immediate release area or by maintenance personnel."

Larger spills that are not “incidental,” or ones that pose a safety or health hazard can be controlled and cleaned up only by specially trained personnel.

Larger spills that are not "incidental," or ones that pose a safety or health hazard can be controlled and cleaned up only by specially trained personnel. Printers are not required to specially train personnel (emergency responders) provided, in the case of a non-incidental spill, employees are evacuated from the spill hazard area and off-site emergency responders are called to control and clean up the spill.

Further information on the requirements for emergency response training may be found in 29 CFR 1910.120 (OSHA's standards for emergency responders).

3. HAZCOM – Hazard Communication Program

OSHA requires that printers make their employees aware of any hazards of the job and what to do to minimize exposure to chemicals or safety risks. All employees need to be informed about hazardous substances that are used in the printing plant. Employees also need to be informed of the proper handling and use of these materials.

MSDS Inventory. The first step in setting up a Hazard Communication (HAZCOM) program is to create a list or inventory of all hazardous substances used in the printing plant.

The next step is to make sure that you have a Material Safety Data Sheet (MSDS) for each product/substance listed on the inventory. These MSDSs have to be made available to employees for their review and should be kept accessible as a reference in the case of a spill or other emergency.

The MSDS inventory and MSDSs are also valuable tools for assessing what types of products you are using in your printing plant. Careful review of MSDSs will let you know if you are using products that contain toxic or hazardous substances that can be replaced by more environmentally friendly substitutes.

Before you accept any product or sample from a chemical supplier, it is recommended that you review the MSDS for the substance to ensure that it is acceptable to you and your staff. Reviewing MSDSs for product content information is described in more detail in Chapter 8, section 6.

Training. After establishing an MSDS inventory and file or book, employees need to be trained in the basics of how to read and understand MSDSs. Training must also cover proper handling and use of hazardous substances and labeling requirements.

Labeling. Another important aspect of the HAZCOM program is the labeling and identification of hazards for each substance used on site. A label that identifies the substance and any hazards associated with the substance needs to be affixed to each product used in the printing plant.

All employees need to be informed about hazardous substances that are used in the printing plant. Employees also need to be informed of the proper handling and use of these materials.

Creating a HAZCOM program requires:

- MSDS Inventory of all hazardous substances on site.
- Training of employees in understanding the MSDS.
- Labeling of hazards both in their containers, and in pipes that hold the substances.

Many printers choose to use a Hazardous Materials Identification System (HMIS) consisting of a combination of colors, numbers, and letters to describe the nature and hazards associated with a substance as well as any personal protective equipment (PPE) that should be worn to minimize exposure to the substance. For more information about HMIS, contact PIW.

In addition to labeling containers, it is recommended that any pipes which convey hazardous substances be labeled with a description of their content and associated hazards.

Finally, keep in mind that all containers of hazardous substances need to be labeled unless they are only used for one work shift. Small bottles of solvent and safety cans should be checked frequently to ensure that their labels haven't become detached or otherwise unreadable through contact with solvents and other cleaners.

Written Program. To bring the site-specific aspects of the HAZCOM program together, a written program must be developed, implemented and maintained at your printing facility. This program should, at a minimum, describe how the criteria listed above, related to labels and other forms of warning, MSDSs, and employee information and training, will be met. The written program should also contain the list of hazardous chemicals known to be present at the plant and currently in use. It should also include the methods that are used to inform employees of the hazards of non-routine tasks, if hazardous chemicals are involved. (Routine tasks would be covered under standard training activities.)

For help in developing and implementing a HAZCOM program and preparing a written program for your plant, contact PIW at 414/785-9090.

4. Lockout/Tagout Program

OSHA regulations require a lockout/tagout program to reduce the potential for injury or death of repair service personnel resulting from the sudden release of electrical and mechanical energy that is present or stored in printing presses and bindery/finishing equipment. OSHA has a special lockout/tagout procedure for printing presses that includes the proper use of jogger switches to prevent injuries during routine cleaning of press blankets and rollers called the "inch, safe, service methods."

The lockout/tagout program needs to include the following:

- energy control procedures
- employee training
- inspection procedures
- development of a written program

For help in developing and implementing a lockout/tagout program for your printing plant, contact PIW.

OSHA has a special lockout/tagout procedure for printing presses to protect employees from electrical accidents. Contact PIW for help creating such a program at 414/785-9090.

5. Sources of Additional Information

For more information about Health and Safety Programs, contact the following organizations:

Wisconsin Department of Health & Human Services
Division of Health
1414 E. Washington Ave., Room 112
Madison, WI 53703 608/266-8579

Wisconsin Department of Workforce Development
Bureau of Safety Inspections
401 Pilot Court, Suite C
Waukesha, WI 53188 414/521-5188

US Department of Labor – OSHA
2618 North Ballard Road
Appleton, WI 54915 414/734-4521

US Department of Labor – OSHA
4802 East Broadway
Madison, WI 53716 608/264-5388

US Department of Labor – OSHA
310 West Wisconsin Ave., Suite 1180
Milwaukee, WI 53203 414/291-3315

Chapter 6: Emergency Planning and Community Right-To-Know

Inks, alcohols, solvents, oils and other chemicals used in the printing industry can be harmful to the environment if they are spilled. Many solvents used in printing are ignitable and can be a source of fire. Spills and fires are not planned. They are often the result of accidents or unforeseen situations.

The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, also known as SARA Title III, authorized the development of federal regulations that address emergency planning for accidental chemical releases.

The emergency planning component of EPCRA requires businesses that use and store chemicals in quantities that have the potential of being dangerous to report these activities to State and local emergency response agencies. This information can then be used to prepare emergency responders for potential threats at each business. For example, the local fire department is informed of any dangerous or explosive chemicals that may be present at a business to which they may respond to a fire call.

The community right-to-know component of EPCRA, which includes the Toxic Release Inventory (TRI) Program, requires businesses to report activities that result in releases of large amounts of toxic chemicals to the air, water and land. These reports are then made available to the public so that concerned citizens can be informed about chemicals being used and released in their community. Wisconsin's Hazardous Substances Information and Emergency Planning Act implements EPCRA in the State of Wisconsin.

This Chapter of PRINT WI$eR will describe what you are required to do in the event of a spill and when to report information about product use or storage to local and state emergency response agencies and to the Wisconsin Department of Natural Resources (WDNR).

There are important federal regulations requiring printers who use dangerous chemicals to local emergency response agencies such as fire departments.

Community citizens have a right to know when a hazardous substance has been spilled in large amounts.

This Chapter covers:

1. When Do Spills Need to Be Reported?
2. Who Has to Be Notified of a Spill?
3. Emergency Planning Notification
4. Community Right-to-Know Program
5. Sources of Additional Information

Appendices

6A. Chemicals Used in Printing with RQs
6B. Emergency/Spill Notification Requirements
6C. Extremely Hazardous Chemicals in Printing
6D. Chemicals that May Trigger Form R-TRI Reporting

1. When Do Spills Need to be Reported?

A spill can occur at any time. Printers need to be prepared to quickly and properly manage these situations. The typical spills that most printers experience are small and manageable by on-site personnel. It is important for the printing plant's employees or spill responders to contain the spill as much as possible and begin an appropriate cleanup. Cleanup operations should only be initiated if the spill responders are familiar with the material that has been spilled and are not endangering themselves by initiating cleanup activities.

Even though a printer may be able to manage a spill by itself, reporting of the spill may still be required. Spills must be reported when both of the following criteria are met:

1. The spill releases a chemical into the environment (i.e., into a river, stream, ditch, storm sewer, ground or air); and
2. The quantity released into the environment exceeds chemical specific threshold levels (known as Reportable Quantities, or RQs).

These two criteria will be described in more detail below.

Spill Releases a Chemical into the Environment. For a spill to be "reportable," it must be released into the environment. Spills that are contained or confined in a manufacturing area (either by a concrete floor, berm, or other barrier) are not "releases into the environment" and, therefore, are not reportable.

Spill Reporting Thresholds. Spills above certain quantities require reporting. These quantities are called spill reporting thresholds. The federal government established spill reporting thresholds in the form of reportable quantities (RQs). If you spill more than the reportable quantity of a hazardous substance, you are required to notify the National Response Center (NRC).

The Wisconsin spill reporting rules are similar. Wisconsin requires the reporting of all discharges of hazardous substances that adversely impact or threaten to adversely impact public health, welfare, or the environment. If a substance is listed in federal regulations with a reportable quantity and the amount of the discharge is less than the RQ, it meets the "de minimus" exemption of the Wisconsin spill rule and does not have to be reported. In addition, Wisconsin allows some "de minimus" exemptions from reporting for petroleum product spills:

- Less than 1 gallon of gasoline does not have to be reported;
- Less than 5 gallons of other petroleum products do not have to be reported.

Only discharges "to the environment" require notification to the WDNR.

See Appendix 6A for a list of chemicals, with Rqs, used in printing. A complete list of CERCLA hazardous substances and their reportable quantities can be found at 40 CFR 302.4 (Reportable Quantities for Hazardous Substances). Information is also available from the CERCLA/Superfund Hotline (800)535-0202.

Don’t start cleanup operations unless spill responders are familiar with the material that has been spilled and are not endangering themselves by initiating cleanup activities.

Even if you clean a spill yourself, you have to report it if the quanitity exceeds specific levels and it is released into the environment.

2. Who Has to be Notified of a Spill?

Initially, a hazardous substance spill should be reported by calling the WDNR's 24-hour hotline number **1-800-943-0003**. The WDNR person answering the call will ask questions to determine the seriousness of the spill and advise which other emergency groups to call. These could include the NRC, the LEPC, and/or the local fire department.

Also, see Appendix 6B for a list of spill notification requirements, including what information may need to be provided over the telephone and within written spill reports.

See Appendix 6B to know who has to be informed of a spill.

3. Emergency Planning Notification

Most printers don't have to comply with emergency planning notification requirements, but you do have to know whether or not this rule applies to you.

Printers that use extremely hazardous substances (EHSs) need to determine if they store these substances on-site in quantities above the threshold planning quantity (TPQ). See Appendix 6C for a list of EHSs potentially found in the printing industry.

If you store one of these substances on-site in quantities greater than the TPQ, you need to provide information about the use and storage of this substance to the local fire department, local (county) emergency planning committee, and state emergency response board. These agencies then make this information available to the public under the "Community Right-to-Know" program. Contact PIW (414/785-9090) or the Division of Emergency Government (608/242-3232) for information about the forms to use to satisfy this reporting requirement.

See Appendix 6C to determine if you have to comply with emergency planning notification requirements.

4. Community Right-To-Know Program

The Community Right-To-Know Program was developed so that members of the public could have access to information about the chemicals that were being used in businesses within their locality. The federal and state Community Right-to-Know program has two important components, Chemical Inventory Reporting and Toxic Chemical Release Reporting, as described below.

Chemical Inventory Reporting (Tier Two). Wisconsin printers may be required to file an annual chemical inventory or Tier Two report with Wisconsin Department of Emergency Government if they have chemicals on-site in amounts greater than chemical-specific threshold quantities. Most printers do not exceed the reporting thresholds, but you have to know whether or not you do.

The thresholds are tied to fees that the State Emergency Response Board collects to fund activities at the County level, or the Local Emergency Planning Committee (LEPC). Do not be surprised if you are inspected or visited by your LEPC and asked about your chemical inventory submittal.

You are required to file a chemical inventory if:

- You stored a hazardous chemical (as identified by OSHA) in excess of 10,000 pounds at any time at your facility.
- You stored an Extremely Hazardous Substance (EHS) in excess of 500 pounds or the Threshold Planning Quantity (TPQ), whichever is less, at any time in the preceding calendar year.

Printers that trigger the filing requirements for a chemical inventory usually have one or more of the following:

- 10,000 lbs or more of ink on-hand, such as ink totes for process colors
- Storage tanks or tote storage for large volume materials, such as blanket wash and fountain solution, that contains hazardous chemicals
- Ammonia chillers or other ammonia storage over 500 lbs (Ammonia TPQ is 500 lbs)
- Metal etching plate developing processors (acids commonly used, such as nitric acid, have 500 lb TPQs)

The Tier Two report must be filed with the:

- State Emergency Response Board
- Local (County) Emergency Planning Committee (LEPC)
- Local Fire Department

The chemical inventory or Tier Two report is due annually by March 1st for the prior calendar year period. Contact Wisconsin Emergency Management at 608/242-3221 to obtain an Inventory Fee Statement and Tier Two (chemical inventory) Reporting Form.

You should know if you have chemicals in large enough quantities that require you to notify the state Department of Emergency Government.

Ink totes for process colors, storage tanks of blanket wash or fountain solution, ammonia chillers, or metal etching plate developing processors my require you to file a chemical inventory.

Toxic Chemical Release Reporting (Form R). EPA and WDNR require an annual report for releases of certain toxic chemicals. Most printers will likely not exceed the reporting threshold, but you do need to determine if this rule applies to you.

Reporting is required if:

- Facility is in SIC codes 20-39 (printing is included);
- Facility has 10 or more full-time employees; and
- Facility manufactures or processes over 25,000 pounds, or otherwise uses over 10,000 pounds of a listed toxic chemical in a year. (If the amount actually released is less than 500 pounds, a simplified Form A may be filed in place of the Form R).

Reporting for lithographic printers is normally triggered by toxic chemicals present in either blanket and roller wash and/or fountain solution (alcohol substitutes). As an indicator, you would need to use approximately 1,400 gallons (25 drums) a year of a regulated solvent cleaner that contains an undiluted regulated toxic chemical (e.g., 100% of the cleaner is a regulated material) to approach the 10,000 pound threshold. If your solvent cleaner contains a regulated toxic chemical at 5% by weight, you would need to use approximately twenty times (20x) as much solvent, 500 drums per year, to trigger the TRI Reporting requirement.

If you use 1,400 or more gallons of a regulated solvent cleaner with an undiluted regulated toxic chemical in one year, you may have to file Form R. If the chemical is diluted, the limits are higher.

Appendix 6D lists some chemicals used by printing operations that could trigger this reporting requirement if they were used in excess of 10,000 pounds.

See Appendix 6D for chemicals used by printers that could require Form R reporting.

Usage/releases of listed chemicals in quantities over the 10,000 pound threshold limit during a calendar year must be reported to U.S. EPA and WDNR before July 1st of the following year.

Reporting is to be completed on U.S. EPA's Toxic Chemical Release Inventory "Form R." A copy of the report as submitted to the U.S. EPA is to be submitted also to WDNR. It should also be noted that "Form R" is included in WDNR's Consolidated Reporting Package, which consists of the Annual Air Emissions Inventory Report, the Annual Hazardous Waste Activity Report, and Form R, the TRI Report. The Consolidated Reporting Package can be used to generate Form R for submittal to both EPA and WDNR, if required.

5. Sources of Additional Information

The Community Right-to-Know Program is found at
- 40 CFR Part 302 – Designation of Reportable Quantities and Notification;
- 40 CFR Part 355 – Emergency Planning and Notification;
- 40 CFR Part 370 – Hazardous Chemical Reporting and Community Right-to-Know; and,
- 40 CFR Part 372 – Toxic Chemical Release Reporting.

U.S. EPA publishes an annual Toxic Chemical Release Workbook. The latest copy is:

Toxic Chemical Release Inventory Reporting Form R and Instructions. Revised 1996 version. Section 313 of the Emergency Planning and Community Right-to-Know Act. U.S. Government Printing Office, Washington, DC. Document EPA 745-K-97-001 (May 1997).

Contacts

Emergency Hotline. 1-800-943-0003 (24-hour hotline for reporting a hazardous substance spill).

Answered by:
WDNR

Managed by:
State Emergency Response Board
Division of Emergency Government
PO Box 7865
2400 Wright Street
Madison, WI 53707
1-608-242-3232

Wisconsin Emergency Management. For information about your local emergency planning commission contact people and to obtain forms for annual chemical inventory reporting, call 608/242-3221.

Other Emergency Numbers

EPA National Response Center (NRC): **1-800-424-8802**

Chemtrec-Emergency Response: **1-800-242-9300**

Appendix 6A: Chemicals Used in Printing with RQs

Chemical, RQ (in pounds)

Acetone, 5000
Ammonia, 100
Benzene, 10
Cadmium & compounds, 1
Carbon tetrachloride, 10
Chloroform, 10
Chromium & compounds, 1
Cumene, 5000
Cyclohexane, 1000
Dibutyl Phthalate, 10
Ethanol, 2-ethoxy, 1000
Ethyl acetate, 5000
Ethylbenzene, 1000
Formaldehyde, 100
Hydrochloric acid, 5000
Hydroquinone, 1
Isophorone, 5000
Lead and compounds, 1
Methyl chloroform, 1000
Methylene chloride, 1000
Methanol, 5000
Methyl ethyl ketone, 5000
Methyl isobutyl ketone, 5000
Perchloroethylene, 100
Phosphoric acid, 5000
Propylene oxide, 100
Sulfuric acid, 1000
Toluene, 1000
2,4-Toluene diisocyanate, 100
1,1,1-Trichloroethane, 1000
1,1,2-Trichloroethane, 100
Trichloroethylene, 100
Vinyl chloride, 1
Xylene (mixed), 1000

Appendix 6B: Emergency/Spill Notification Requirements

If a spill requires reporting, an immediate (within 30 minutes) verbal notification must be made to:

Wisconsin's Emergency Government Office/WDNR 1-800-943-0003

When you make this initial call, you will be told whether or not you have to contact the NRC (1-800-424-8802), LEPC, and local fire department. To Find out the telephone number of your Local Emergency Planning Committee (LEPC) call: (608) 242-3221 (Wisconsin Emergency Management) and ask them to tell you who the LEPC contact person is for your county.

When you make the initial emergency/spill notification call, be prepared to provide the following:
- Name and phone number of person in your organization to contact for further information;
- Location and source(s) of the spill and release or discharges into the environment;
- Chemical name or identity of any substance involved in the release or discharge;
- Estimate of the quantity (gallons or pounds of substances) discharged into the environment;
- Time and duration of release or discharge;
- Potential health effects associated with the release or discharge of the substance;
- Precautions taken, including evacuation, remediation, or other proposed response action;

Document who you talked with and the time of your call. At the time of making the initial notification, you may be told whether or not a follow-up, written, emergency notice report is required.

A written follow-up report needs to be completed within 30 days, and submitted to the Wisconsin Department of Emergency Government and the LEPC. This report should include:
- General spill information (time, date and duration of the spill as well as corrective actions);
- Spill number assigned by WDNR or National Response Center case number;
- Location of the release (county, township and city);
- Chemical name or identity of any substance involved in the release or discharge;
- Estimate of the quantity (gallons or pounds of substance) discharged into the environment;
- Time and duration of release or discharge;
- Environmental impact of the release (land, air or water contamination);
- Impact on human health and safety (evacuations, injuries or exposures);
- Monitoring and detection of releases (monitoring of wind direction, etc. for large releases);
- Efforts to recover or neutralize the release;
- Plans to prevent recurrence of the release (e.g., employee training, replacement of equipment, construction or security measures);
- Any known or anticipated acute and chronic health risks to exposure of spilled material;
- Any permanent permit numbers (e.g., air permit number for air release from permitted source);
- Chronological review of the incident (include all communications with authorities);
- Any extenuating circumstances that may have caused the discharge.

If any additional information becomes available regarding the spill or release up to one year from the date the report is filed, an updated written notice should be submitted within three days of discovering the new information.

Appendix 6C: Extremely Hazardous Substances (EHSs) Used In Printing

The following EHSs may be used by printers. The threshold planning quantity for each chemical is also provided below.

Extremely Hazardous Chemical, TPQ (in pounds)

- Ammonia, 500
- Formaldehyde, 500
- Propylene oxide, 10,000
- Sulfuric acid, 1,000
- 2-4-Toluene diisocyanate, 500

A complete list of EHSs is available by calling Wisconsin Emergency Management at: (608) 242-3221.

Appendix 6D: Chemicals Used in the Printing Industry that May Trigger the Need to Complete Form R - Toxic Release Inventory Report

Ammonia
Barium
Cadmium
Copper (except copper phthalocyanine pigments)
Cumene
Cyclohexane
Methanol
Methylene chloride
Methyl ethyl ketone
Ethylbenzene
Ethylene glycol
Ethylene oxide
Formaldehyde
Freon 113
Glycol Ethers
Hydrochloric acid
Hydroquinone
Lead
Methanol
Methyl ethyl ketone
Methyl isobutyl ketone
Phosphoric acid
Silver
Sulfuric acid
Tetrachloroethylene
Toluene
Trichloroethylene
1,1,1-Trichloroethane
Xylene

A complete list of the Toxic Chemical Release Inventory chemicals may be found at 40 CFR 372.65(a).

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Chapter 7: Environmental Management: It's About Reducing Risk and Cost in the Pursuit of Quality

1. Reaching Beyond Compliance for Competitive Opportunity

Now that you have assessed your compliance status and examined emission rates, hazardous waste and wastewater discharges, you have a good idea of what your basic environmental performance is or needs to be. Chances are you have arrived at this point by yourself or, perhaps, you sought input from press and prepress departments to determine some of the information that you needed.

If your printing shop is like most other printers and other industries, there is one person who is primarily responsible for making sure that the business is in compliance with environmental regulations. Very often that person is also responsible for purchasing or other functions within the shop. This most common model of environmental responsibility suffers from some serious limitations and lost opportunities.

Environmental compliance is most efficiently achieved when all employees participate in the process of managing or reducing waste streams and are aware of compliance responsibilities. In spite of the fact that one person is often the primary compliance contact, one person is usually not prepared in terms of training or being knowledgeable to adequately address all the opportunities.

A key element to the implementation of an **Environmental Management System (EMS)** is to delegate responsibility among staff who can impact decisions or actions that affect the environmental performance of the printer. The plant manager provides the needed management support, each department generates several types of waste, the custodian knows what is being thrown away, and the accountant can employ full cost accounting methods that include the costs of poor environmental performance.

So what is an EMS?

An EMS can vary from one company to another. The most commonly known EMS program has been developed as a part of the International Standards Organization (ISO) system of standards.

ISO has been setting various business performance standards for the international commuity, the best known being the ISO 9000 series of standards for quality management systems. Many U.S. companies, particularly in the auto industry, cannot sell their products or compete in a world market without having ISO 9000 certification.

The ISO 14000 series was developed to address environmental management standards and it appears to be gaining acceptance as another international standard in the export marketplace.

This Chapter will help you with the following information:

1. Reaching Beyond Compliance for Competitive Opportunity
2. Why Bother with Environmental Management?
3. Benefits of an Environmentally Sound Operation
4. Be "PRINT WI$eR" and Do Your Own EMS Thing
5. Sources of Additional Information

Even though you may have one person in charge of compliance, all employees need to be aware of how they can reduce waste and be compliant.

The EMS "Team"

- plant manager
- environmental manager
- photo processor
- plate processor
- press operator
- finishing operator
- clerical staff
- custodian
- purchaser
- accountant

The ISO 14000 series was developed to address various areas such as environmental auditing, environmental managment, life cycle assessment and product labeling. The guidance for EMS has been completed in ISO 14001 which addresses commitment, planning, implementation, correction of deficiencies and management review. While the specific dimensions of an EMS as defined by ISO 14001 may not always be the best route for individual printers, some form of an EMS has advantages for everyone.

2. Why Bother with Environmental Management?

It takes time and effort to fully understand the impact your printing operation can have on the environment and the costs of unnecessary waste generation. And it's a real effort to understand — and avoid— the potential liabilities you face as an individual as well as a business if you ignore environmental impact.

Environmental liabilities (such as cleanup costs for improper waste disposal or fines for violating regulatory requirements) can negatively impact or even cripple any printing operation. You should be aware of the aggressive approach taken by regulatory agencies toward businesses and individuals thought to be breaking environmental laws and regulations. Penalties imposed by enforcement agencies can cost more than money; they can cost personal freedom. Enforcement agencies can seek not only large civil penalties, but also criminal convictions for those they believe willingly and knowingly violated environmental regulations.

Do not underestimate the probability of your operation being inspected. Remember, inspections are often the result of a complaint (which could be from a neighbor) or "referrals" from a disgruntled or recently fired employee. Failure to file necessary reports or filing inconsistent information can also lead to inspections.

Aside from the incentives to avoid penalties of non-compliance, the fundamental drive to stay competitive in the printing industry means keeping focused on quality products with modern, efficient technology. As the Japanese demonstrated so clearly with their advances in total quality management systems (TQM) in the 1980s, the drive to produce quality goods resulted in substantial reductions in material and energy consumption. This in turn lowered production costs and fueled a competitive advance in the U.S. marketplace.

Michael Porter and Claas van der Linde wrote in the September-November, 1995, Harvard Business Review that "pollution equals inefficiency." They contend that regulations should be used by government and viewed by industry as incentives to innovate new and creative ways to reduce waste generation. The implication is that rather than rely on pollution control, compliance can often be more effectively achieved by reducing or eliminating the regulated waste streams.

Penalties for non-compliance are severe. It *is* worthwhile to spend the time to ensure compliance. Criminal convictions are possible for those who knowingly ignore regulations.

3. Benefits of an Environmentally Sound Operation

There's a lot to be gained from an "environmentally sound operation." There are strong incentives beyond merely complying with legal requirements. At the same time, it should be acknowledged that there are distinct barriers or obstacles that could easily discourage a printer or be a convenient excuse not to change what it has been doing. The challenge presented here is to understand both sides of the equation and to recognize when the benefits outweigh the barriers.

Major benefits of implementng an effective EMS with a waste reduction emphasis at your printing plant include:

1. **Reduced Regulatory Burden**. Implementation of waste reduction projects can reduce regulatory exposure of a printer, and, in some cases, may eliminate the need for permits, manifesting, monitoring and reporting.

2. **Reduced Operating Costs**. Waste reduction activities can save money for a printer over time, offsetting the cost of project development and implementation. The lower operating costs can result from a variety of sources such as lower disposal costs, reduced materials costs, and improved operating efficiency.

3. **Reduced Liability**. Printers that use hazardous or toxic materials have greater risk of liability in several respects. Disposal of hazardous waste from these materials can carry with it long-term liability to pay for environmental damages of failed disposal facilities. Environmental regulations could result in stiff fines or criminal penalties for companies and individuals in those companies where mismangement of hazardous materials has been documented. Civil litigation related to environmental damages could extend well into the future, even for some materials that may not be currently regulated as hazardous.

4. **Improved Worker Safety**. Reduced use of toxics and hazardous materials in the work place can have a direct, positive impact on the safety of the work environment. There is a direct relationship between workers' compensation costs and risks with the amount and toxicity of hazardous materials used and produced in the work place. Improved worker safety translates into better labor relations, lower insurance rates, reduced paperwork and worker training on the use of hazardous materials, and reduced use of sometimes cumbersome personal protective equipment or apparel. Several Wisconsin printers have already been acknowledged for good environmental performance through programs such as the Governor's Waste Reduction Award, Wisconsin Manufacturers and Commerce Business Friends of the Environment Award, and Wisconsin Department of Natural Resources Prevention/ Environment/Prosperity (P/E/P) Award. Such recognition, along with participation in the Wisconsin Great Printers Project, is used to gain marketing advantage

The resistance to change is an everpresent challenge. Companies that are willing to change can reap the benefits at the expense of competitors who think change is not necesssary or not worth the effort. Everyone has heard the commercial trademark “Body by Fisher” in reference to automobile bodies. Fisher was a buggy manufacturer that was willing to change to meet new market demands, but who remembers Cooper Wagon Works? Cooper was a major U.S. manufacturer of wagons and buggies that rejected an offer from Henry Ford to convert their plant to automobile manufacturing.

Benefits of an
Effective EMS

- reduced regulation
- reduced costs
- reduced liability
- improved safety
- productivity
- quality
- public image

5. **Improved Productivity**. Waste reduction is achieved through more efficient use of raw materials, improvements in processes and operations, including good maintenance and better employee training and involvement. Small improvements in processes may increase product yield with less waste and better quality.

6. **Effective Quality Management Systems.** Waste reduction or pollution prevention strategies parallel total quality management and related continuous improvement systems. These systems use employees and team techniques to improve access to information and ideas and to gain wider support for implementation.

7. **Improved Public Image and Environmental Protection**. Printers can gain goodwill from the community and the state when there is a clear commitment to waste reduction and pollution prevention. Important tangible benefits in terms of supporting future growth plans for a printer in a community may be a direct outcome of good employee morale which can extend to the community.

Implementation of waste reduction strategies or pollution prevention isn't always easy. Barriers to waste reduction that a printer may face include:

1. **Immediate Production Needs.** As with any other change in the printing industry processes, the best ideas may be delayed or discouraged when customer demands must be met. Use scheduled shut downs or known slow periods for planning, analysis and implementation.

2. **Production Time Impacts**. Some process or material changes could result in longer production times. Changing to low VOC inks or low VOC cleaning solvents that require longer drying time is a common concern.

3. **Customer Specifications and Acceptance**. Sometimes customer specifications for a job may require a paper or ink that is not entirely compatible with your primary production runs. For some customers the specifications are very exact, for others it may be a matter of customer education to reduce the use of odd combinations of materials that increase the risk of start-up waste. Make sure that specified materials are compatible when new paper or inks are used. Customer demand for "green" options for paper and inks creates some of these potential problems, but it can also be used as an opportunity to try new materials or process modifications while being paid for the job.

Potential Barriers to an Effective EMS

- production needs
- production time
- customer specs
- inertia and time
- no expertise
- regulations
- project capital

Customer demand for “green” options for paper and inks can be an opportunity to try new materials or process modifications while being paid for the job.

4. **Inertia, Time and Resistance**. Good ideas, even when favorable economics are in plain view, are not always implemented. Projects must overcome the "if it isn't broken, don't fix it" thinking, which is a major hurdle. One might say, "if the quality is good now, why risk customer dissatisfaction by making changes?" Such hurdles require senior management's commitment to search for opportunities and to implement effective pollution prevention behaviors as well as materials and processes.

5. **Lack of Expertise**. Smaller printing companies may not have in-house expertise or may not know where to turn for help. Trade organizations such as PIW and pollution prevention technical assistance experts such as the Solid and Hazardous Waste Eduction Center (SHWEC) are available and can help.

If you are a small printer without in-house experts, call PIW or SHWEC for assistance.

6. **Regulatory Issues.** When using processes that are regulated or that require a permit, it may be necessary to modify the permit for a new process. This can be time-consuming and costly, involving trial periods, inspections and tests. Regulatory agencies are allowing more flexibility to help companies innovate to reduce regulated waste streams. The Wisconsin Department of Natural Resources has established a printing industry sector specialist to help printers address these concerns and to look for reasonable options.

The Wisconsin Department of Natural Resources has established a printing industry sector specialist to help printers address these concerns and to look for reasonable options.

7. **Project Capital**. Projects with significant capital requirements face serious funding challenges. Many good pollution prevention options do not require significant capital expenditures, but some pollution prevention may be achieved by expensive process and equipment changes requiring additional justification (such as direct to plate image technology).

4. Be "PRINT WI$ER" and Do Your Own EMS Thing

This Handbook can be a blueprint for developing an "environmentally sound operation." You have been given many potential reasons to think about why your shop may benefit from an active EMS program.The key is to actively develop and maintain an efficient, cost-effective program that fits your particular needs. It may be that ISO 14001 or something similar will suit your situation. You also know details related to your waste streams and your compliance requirements. Now you can do a brief check of your facility's overall environmental program.

Do you have the makings of an EMS program already?

To get started on an EMS for your shop, you may wish to conduct a simple self-evaluation of what you already know about your environmental program or activities and your waste streams. **Appendix 7A** (Self-Assessment Environmental Guide for Print Shop Owners or Managers) offers a quick evaluation of your present status. (A Worksheet is at the end of the chapter.) It asks some basic facility-level environmental program questions, including some information that you should have completed in your initial review of the air, solid waste and waste water chapters.

This information should be helpful as a baseline summary of information for the EMS "team" members who will need to be involved in developing and implementing appropriate elements of an EMS for your shop. The following program elements are consistent with ISO 14001 and are given as example guidance. You may want to modify or enhance these elements to best serve your needs and ultimately the needs of your customers.

Elements of the EMS

A. Generating Commitment and Establishing Policy

Management **commitment** is essential: A strong environmental program starts at the top of your organization. You must make it clear that an environmentally sound operation is desired, expected and supported. One individual should be assigned the lead responsibility for the company's environmental program, but that person needs to be supported by a team. A company that is not committed to taking quick, corrective action after uncovering non-compliance activities, runs the risk of a serious enforcement action—they knew something was wrong and chose not to fix it.

Management's support should be clearly and simply stated in **written policy** that is communicated to all employees as well as customers, suppliers and the public. Preferrably, the policy should be developed with input from members of the EMS "team."
The policy cannot be completed overnight, but will be greatly simplified if your operation makes the most of the information in the policy.

What is your EMS starting point?
Take a quick sample with Appendix 7A.

EMS Elements
- commitment/policy
- planning
- implementation
- checking/correcting
- management review

You must have top management commitment in a written policy.

The policy statement should include the printer's commitment to be fully compliant with environmental regulations as well as a commitment to make waste reduction and pollution prevention important priorities for all parts of the facility operations, from the front office to the loading dock. A sample commitment form and policy statement are given in Appendices 7B and 7C, respectively, at the end of this chapter.

Written policy should be communicated to:
- employees
- customers
- suppliers
- public

Environmental management requires a modified state of mind from conventional production management thinking. Environmental management recognizes the impact of waste through multiple dimensions of cost and implements a waste reduction component to its systems.

Environmental management is a process, not an outcome or result.

There will always be some degree of waste generated and occasional errors during the printing process. While the waste or error in production reduces your productivity, the consequences are far more significant if they result in fines or delays in the installation of a new printing press. Environmental management requires a "preventive maintenance"
mind-set— fix it **before** it breaks!

B. Planning to Meet Requirements and to Set Goals and Objectives

The policy statement is generally a short statement of overall commitments and objectives. A written **plan** provides a more detailed explanation of the policy and gives a strategy for accomplishing objectives. The plan for your print shop does not have to be a long and complicated document, but rather a concise tool that can be used by employees in your facility. The plan should address how your shop will determine or monitor its regulatory obligations, establish program goals and objectives, define strategies for meeting goals and requirements, and define the components of your environmental management program.

Plan
- compliance
- goals & objectives
- strategies
- EMS system

The plan should make it possible for employees to understand, the environmental impacts of various operations or processes. This may be illustrated by process flow diagrams.

C. EMS Program Implementation and Operation

Each employee should understand what his or her **responsibilities** are in relation to your shop's environmental performance. Some employees are in strategic positions by virtue of their responsibility for waste generating processes or because of management level responsibility. To some extent, everyone in the facility has a role and a set of responsibilities in implementing an EMS.

Getting all employees to participate makes the critical difference in success or failure. Share successes and failures with your employees and be sure to **communicate** your expectations and hold employees accountable for results. Stress the importance of pollution prevention as a method of reducing costs and improving your operation's impact on the environment.

It may be necessary to modify your company's culture and environmental competence through **training** and awareness development. It is extremely difficult, if not impossible, to develop an environmentally sound operation in a loose operating environment that allows employees to use chemicals in any manner they wish, with no regard for the consequences for usage, spillage, emissions or disposal. Good work practices must be identified and taught.

Compliance, quality improvement, waste reduction, measured success against goals all require **documentation**: Small printers feel less regulatory impact than their larger counterparts, but it is unlikely they will ever experience zero regulation. While relief from regulations is available in various forms to small printers (i.e., permit exemptions, less stringent reporting requirements, etc.) it is critical that you have documentation to prove your case. The burden of proof is yours. You will save time, money, and needless aggravation through consistent documentation and recordkeeping. Documentation should also include operational controls or procedures and preparedness to deal with emergencies.

Documentation may take the form of the worksheets provided in this Handbook, or may involve reports of pollution prevention activities, employee training, permits, recordkeeping, and correspondence with regulatory agencies.

The success of the environmental program will be defined by how you choose to run your operation. Written procedures on how to perform tasks (such as when and how to replace silver recovery equipment for photo processors, or labeling for hazardous waste drums) are extremely useful in controlling your environmental program. The lack of written procedures may allow employees to "wing it" in determining what constitutes compliance. Written procedures are not enough—they must be understood and enforced.

Implementation:
- responsibilities
- communication
- training
- documentaion

Wisconsin Case Study

NCL Graphic Specialties, Inc. used several basic EMS techniques to prevent pollution. NCL inventoried all chemicals used and removed 35% of all chemicals stored on-site. New products are used only if they offer environmental advantages over existing products. NCL is a 1997 Governor's Award recipient for hazardous waste reduction.

- Alcohol was eliminated from press room fountain solutions.
- VOC's were significantly reduced.
- A fountain solution recycling system was installed.
- Hazardous waste was reduced by 85% and water use dropped by 8,000 gallons.

Total annual savings in waste removal is $32,000.

Housekeeping is another critical concern for "environmentally sound operations." If the place looks sloppy, the operation is presumed to be sloppy. Regulatory inspectors often determine the scope and duration of their inspection during the first 10 minutes in a facility. A messy, cluttered workplace solicits closer scrutiny than one that is neat and orderly and one whose personnel can quickly access permits, programs, and related documentation.

D. Checking on Progress and Making Course Corrections

You have spent time, effort and money to establish an environmentally sound operation. As with any system, it must be monitored and evaluated for progress towards meeting goals and objectives. Has the plan been successful? Are there goals, including regulatory obligations that haven't been met? This self-assessment phase of the EMS gives you the opportunity to identify potential non-compliance and to take corrective actions or to improve on the prevention measures that were implemented. One of the concerns that printers may have is what happens when a self-audit reveals a noncompliance situation. Legal counsel may be hepful in developing this phase of the system to ensure that the EMS system provides appropriate self-review without undue exposure to legal liabilities.

E. Management Review Keeps the Commitment in View

Management commitment is an ongoing component of the EMS. Periodic reviews of the EMS program by management reinforces the importance placed upon the program. To keep employees involved in the process, keep them informed and involved in the review. Recognize and reward employees for environmental successes and for taking risks to improve your process (trying new, preferred chemicals). One of the mitigating factors considered by enforcement agencies in determining environmental penalties is whether the environmental program had a system in place which promoted an atmosphere of diligent and responsible performance, including individual accountability.

5. Sources of Additional Information

"Hazard Communication Manual; A Model Program for Printing Plants," Printing Industries of America, Inc.

"Regulatory Concerns for the Printer: A Checklist," Graphic Arts Technical Foundation.

"Environmental Management Program," 3M\PIA, distributed by Printing Industries of America, Inc.

"Green and Profitable Printing," Videoconference Course Notebook, Wisconsin Edition, UW-Extension, Solid & Hazardous Waste Education Center, Madison (May 1996).

"Green and Profitable Printing Video Training Series," UW-Extension, Solid & Hazardous Waste Education Center, Madison (October 1996).

You will keep your environmentally sound operation alive through ongoing *pollution prevention* programs. Communicate and celebrate the success stories: money saved through pollution prevention, wastes diverted from disposal into recycling, permit exemptions available as a result of process modifications or chemical substitutions.

For more information about environmental management, contact the Solid and Hazardous Waste Education Center of UW Extension at
608/262-0385

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Appendix 7A: Self-Assessment Environmental Guide for Print Shop Owners or Managers

Commitment

- How have you demonstrated your environmental goals and objectives to employees (actions, memos, posters etc.)?_____
- Which materials or chemical products have been targeted for pollution prevention or waste minimization activities (paper, cleanup solvent, isopropyl alcohol, etc.)?_____
- What specific measurable goals have been established for environmental activities (i.e., obtain PTI for new press, eliminate using isopropyl alcohol in six months)?_____

Communication

- By what means (*HAZCOM* training, informal department meetings, etc.) have you discussed the importance, and benefits, of reducing chemical product usage, lowering emissions and reducing waste disposal amounts?__
- When (and how) was the last time an employee was recognized for his/her environmental efforts?
  _____
- What would your employees tell an inspector about your environmental program?
  _____

Training

- Which employee training programs explain your expectation for environmental performance, *pollution prevention*, or waste minimization? _____
- What initial and ongoing training is provided to employees who have been assigned environmental responsibilities? _____

Baseline Assessment

- Do you know your total facility (and press-by-press) VOC emissions over the last 12 months? _____
- Do you know the *potential emissions* of hazardous air pollutants (*HAP*s) from your facility? _____
- Which chemical products (cleanup solvent, ink, isopropyl alcohol, etc.) have experienced a decrease in usage over the last two years? _____
- Do you know which operations (plate processing, film processing, fountain solution, etc.) discharge to a *POTW* (the sanitary sewer) versus discharge to a stream or ditch on your property? _____
- Which materials are disposed or recycled off-site (and where are they disposed/recycled)? _____
- Do you generate *hazardous wastes*? (Are you sure?) _____
- If you generate *hazardous waste*, how much per month? _____

Documentation

- When was the last time your operation was inspected by a regulatory agency? _____
- What system do you have to track and record chemical product usage? _____
- Where are records kept to document permits or exemptions for every printing press? _____
- What systems do you have for updating and tracking *MSDS*s for every chemical product? _____

Operational Discipline

- Have employees, customers or visitors commented on odors (from inks, solvent or other chemical products)? _
- What materials, wastes, equipment, etc. are stored, staged or kept outside your facility?_____
- How would you rate the overall housekeeping (inside and outside) of your facility?
  Excellent / Good / Needs Improving

Appendix 7B: Sample Great Printers Project Commitment Form

Great Printers Project Commitment Form

Please complete and return this form if you are interested in receiving more information about the Great Printers Project.

If at this time you would like to commit to the Great Printers Project, please sign and date the statement found at the bottom of this page.

Name Betty White

Title Offset Press Operator

Company Name White Way Printing

Address 123 Main Street

City/State/Zip Anytown, WI 12345

No. of Employees 6

E-mail Address white.betty@address.org

Phone (999)555-1234 Fax (999)555-1235

We agree to be part of the Great Printers Project. We understand that this agreement requires our company to work with customers, suppliers, and employees to improve the environment through waste reduction. We commit ourselves to the Great Printers Principles and agree to subscribe to current environmental practices. Furthermore, we agree to evaluate our environmental performance during the next year and to provide a report of improvement to PIW when we reconfirm our participation as a Great Printer.

Authorizing Official Brenda White

Signature Betty White Date 7/25/97

Appendix 7C: Example EMS Policy Statements

Policy Statement Example 1

"(Your Company Name) is committed to excellence and leadership in protecting the environment. In keeping with this policy, our objective is to reduce waste and emissions. We strive to minimize adverse impact on the air, water, and land through pollution prevention and energy conservation. By successfully preventing pollution at its source, we can achieve cost savings, increase operational efficiencies, improve the quality of our products and services, maintain a safe and healthy workplace for our employees, and improve the environment. (Your Company Name)'s environmental guidelines include the following:

- Environmental protection is everyone's responsibility. It is valued and displays commitment to (Your Company Name).
- We will commit to including pollution prevention and energy conservation in the design of all new products and services.
- Preventing pollution by reducing and eliminating the generation of waste and emissions at the source is a prime consideration in research, process design, and plant operations. (Your Company Name) is committed to identifying and implementing pollution prevention opportunities through encouraging and involving all employees.
- Technologies and methods which substitute non-hazardous materials and use other source reduction approaches will be given top priority in addressing all environmental issues.
- (Your Company Name) seeks to demonstrate its responsible corporate citizenship by adhering to all environmental regulations. We promote cooperation and coordination between industry, government, and the public toward the shared goal of preventing pollution at its source."

Policy Statement Example 2

"At (Your Company Name), protecting the environment is a high priority. We are pledged to eliminate or reduce our use of toxic substances and to minimize our use of energy and generation of all wastes, whenever possible. Prevention of pollution at the source is the preferred alternative. When waste cannot be avoided, we are committed to recycling, treatment, and disposal in ways that minimize undesirable effects on air, water, and land."

Adapted from: Waste Reduction Institute for Training and Applications Research, Inc. (WRITAR), *Survey and Summaries*, 1991, Minnesota Office of Waste Management, Feb. 1991, *Minnesota Guide to Pollution Prevention Planning*).

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Chapter 8: Pollution Prevention and Waste Reduction

This chapter describes how to take the first steps toward using pollution prevention opportunities as a means of complying with environmental regulations. Pollution Prevention practices also contribute to environmental performance and overall cost competitiveness.

The first three sections of this chapter give background information on general pollution prevention concepts and how to get started. Section 4 provides contact information and technical resources for more information. Sections 5, 6 and 7 are intended to be pullouts for distribution to appropriate departments or personnel. These department sepcific sections, combined with the appended checklists can be targeted towards personnel most familiar with these areas of your facility.

In this Chapter:

1. What is Pollution Prevention?

Historically, printers and regulators focused on pollution (and waste) **after** it was generated, relying on "end-of-pipe" controls or treatment (e.g., incinerator). Businesses now realize that efforts to reduce or eliminate waste **before it is created** (termed "pollution prevention") often result in handsome cost savings. Adding money to your bottom line and protecting the environment are two powerful reasons for all printers to incorporate pollution prevention in their day-to-day thinking.

Pollution Prevention
- Eliminates waste before it's created
- Reduces the need to treat, dispose or recycle
- Saves you money
- Reduces liability
- Reduces regulatory requirements

Pollution prevention has close ties to the quality movement. Just as quality management strives for "zero defects," pollution prevention targets "zero discharge" of pollutants. The extent to which your operation will benefit from pollution prevention activities will depend on your control and knowledge of your own processes. Pollution prevention requires a neat, orderly, efficient operation. Those businesses with operational discipline will likely succeed in changing materials and practices with minimum disruptions.

Compare your operation to Table 8-1.

If you aren't sure that all this talk about pollution prevention applies to you, review Table 8-1 "Where Are You on the Spectrum?" Determine if your practices fall under the "Environmentally Sound Operation" or "Wasted Money and Resources" heading (or somewhere in between). If your facility displays practices that fall "in between" or under "Wasted Money and Resources," this chapter contains specific methods that should be feasible for saving money and protecting the environment.

Pollution Prevention Emphasizes
- Source reduction
- Reuse or reclamation
- Efficient use of water and energy

Rather than controlling waste, you avoid it.

Table 8-1: Where Are You on the Spectrum?

(Identify where you fit on this listing of environmental and waste reduction activities)

Process Equipment or Operation	***Where Are you on the Spectrum?*** Environmentally Sound Operation ⇔ Wasted Money and Resources		
Film Processing			
Fixer	Closed-loop recycling of fixer, with silver recovery	Silver recovery without recycling of fixer solution	Discharge fixer solution to *POTW*, septic tank. May exceed hazardous waste limits
Developer	Aware of hydroquinone in developer, unused developer may be hazardous waste		Discharge unused (old) developer to *POTW*, or septic tank. May exceed hazardous waste limits
Rinse Water	Counter current rinsing, variable flow rate for rinse		Continuous flow of rinse water
Film	Recycling scrap film and recovered silver; Direct plate technology		Throw away scrap or old films
Plate Processing	Recycling aluminum plates; Reuse of plates (back side)	Recycling aluminum plates	Throw used plates in dumpster
	Digital printing systems		Discharge metal etching solutions directly to sewer
	Closed loop recycling, with off-site metal reclamation, for metal etching solutions		
Fountain Solution	Low or Zero-VOC fountain solutions	Replace isopropyl alcohol (IPA) with alcohol substitutes	Non-refrigerated fountain solution with IPA
	Waterless printing		
Blanket and Roller Wash (Cleanup Solvent)	Low vapor pressure (<10 mm Hg at 20°C) materials (slow to evaporate) or water miscible solvents	Low vapor pressure materials for blanket washes. Higher vapor pressure (faster to evaporate) materials to hard clean roller (spot cleaning)	Use of only higher vapor pressure materials
	No hazardous air pollutants (e.g.,toluene, MEK, trichloroethane)		
	Automatic blanket washers	Off-site solvent reclamation	"Type" Wash; Use of acetone, MEK, toluene
	On-site reclamation of solvent		Off-site disposal of waste solvent
Parts Washers	Non-hazardous waste solvent (flash point >140°F)	Kerosene or mineral spirits	Soak in type wash or other flammable solvents
Shop Towels (Cleanup Rags)	Centrifuge (or other equipment or methods) to remove excess solvent before laundering	Managed laundry service to clean towels	Disposal of used shop towels
Ink	Blending and reuse of inks		Off-site disposal of waste ink
Paper	Recycle waste paper and office paper		Dispose of waste office paper
Housekeeping	Facility is clean, neat and well lighted		Aisles crowded and unkept; Messy floors
Chemical Management	System to track current chemical inventory (chemical inventory)		No tracking of historical chemical usage
	Emphasis on spill prevention		Sloppy handling

(From PIO's ENVIROPRINT Guidebook)

Pollution prevention conserves raw materials (e.g., paper, film, ink, etc.) through source reduction, reuse or reclamation, responsible chemical management, and efficient energy and water use. Preventing waste from being created eliminates the need to treat, dispose or recycle wastes.

Preventing waste from being created eliminates the need to treat, dispose or recycle wastes.

Source reduction methods include process modifications (e.g., automatic blanket washer), material substitutions (e.g., alcohol substitutes) and product modifications (i.e., redesigning a printed product to reduce its impact on the environment).

Reuse and reclamation involve reintroducing waste materials back into the production process. Filtering cleanup solvent for reuse, or the blending of excess ink to make black ink, are examples of reclamation and reuse.

Congress, via the 1990 Pollution Prevention Act, established a national hierarchy (ranking system) for evaluating various approaches to managing wastes. This ranking system established pollution prevention as the most desirable and beneficial approach to managing wastes.
The complete hierarchy for managing wastes includes:

- Prevention
- Recycling
- Treatment
- Disposal

Congress Set the National Hierarchy of Waste Management

- Prevention
- Recycling
- Treatment
- Disposal

Your goal is to move up the hierarchy as you evaluate and implement different approaches to managing wastes.

The goal is to move up the hierarchy in your EMS program.

What Pollution Prevention Isn't. Pollution prevention, as explained in the preceding paragraphs, incorporates prevention and some types of recycling (reuse or reclamation). Pollution prevention **does not include** other types of recycling (e.g., burning waste cleanup solvent for energy recovery), treatment (e.g., neutralizing an acidic waste, incinerating exhaust air from a heatset press), or disposal (e.g., landfill).

While pollution prevention is the most desirable approach to managing wastes, this section will also address recycling and waste reduction activities that will benefit printing operations.

2. How Will Pollution Prevention Benefit Your Operation?

Some printers may implement pollution prevention practices because it's the right thing to do for the environment and for their employees. **All printers** should be interested in pollution prevention since it also provides an opportunity to reduce costs. Pollution prevention not only makes good environmental sense, it makes good business sense. It is a "win-win" approach.

What are the benefit types offered by pollution prevention?

Economic. Reduced disposal and treatment costs; manpower and financial savings from reducing regulatory requirements (e.g., permits, reporting, etc.); increased production through efficient operation of equipment; and lower raw material costs when reusing waste.

Environmental. Reduced emissions, releases or disposal of wastes and hazardous chemicals. Conservation of natural resources.

Human Health. Reduced employee exposures and safety risks from handling or working with wastes or hazardous chemicals.

Regulatory Compliance. Reduced permitting, reporting and recordkeeping requirements.

Liability. Reduced liability associated with waste disposal, employee exposure, and regulatory enforcement.

Public Relations. Reduced publicity associated with chemical release reporting, emergencies or accidents. Offers "environmentally friendly" operations and products to customers.

3. How to Start Preventing Pollution

Be Committed: Commitment is important to establish your overall environmental management program and is essential if you want to develop and/or sustain a pollution prevention culture. In formal settings, upper management usually will demonstrate a commitment to pollution prevention via a written policy statement. This statement may explain the company's desire to find pollution prevention opportunities and eliminate wastes to the greatest extent practical (See Chapter 7 for guidance on EMS policy statements.)

Wisconsin Case Study:
Marathon Press Company, Inc. of Wausau is a 1993 Governor's Award recipient for excellence in hazardous waste reduction. Marathon implemented programs to reduce waste throughout the facility.

- In the press room ink disposal was reduced through a tracking and reuse system and soy ink usage was increased.
- In the proofing and platemaking departments hazardous chemical usage was reduce and an alcohol substitute was used, resulting in less hazardous waste and VOCs.
- A plant-wide recycling program reduced scrap paper landfilling and has resulted in $1,200 in revenue per month and a reduction in landfill fees by $180 per month.

It is crucial that you take steps to convey to your employees the importance of incorporating pollution prevention in day-to-day thinking.

Identify Opportunities for Pollution Prevention. Enough discussion. Let's focus on the real task at hand — identifying opportunities in your facility.

- With your employees, review the worksheets that were completed in Chapters 2 through 4 which evaluate the process operations, materials used and wastes generated during printing operations.
- Review where wastes are generated at your facility, and determine how they are discharged and/or disposed (e.g., emitted into air, flushed down the drain, hauled to landfill, etc.).
- Compare the information you assembled in Chapters 2 through 4 with the attributes of an Environmentally Sound Operation (see Table 8-1 of this chapter). Highlight the pollution prevention and waste reduction attributes in Table 8-1 that you are interested in evaluating for possible implementation at your operation.

Prioritize Your Opportunities. Now you may have a number of good ideas to test. Hopefully, you have several new ideas of your own as well. To help prioritize those opportunities offering the greatest potential for saving money and benefiting the environment, look for wastes that are:

- **Generated in High Volumes.** Pick out your largest waste streams. Also look for wastes generated in quantities greater than 25 percent of the purchase amount (from data developed in Chapters 2 through 4).
- **Costly to Dispose.** Evaluate your waste streams and identify those with the highest annual disposal and/or treatment costs.
- **Highly Toxic or Pose a Significant Health Hazard.** May include extremely corrosive or reactive wastes, solvents with low flashpoints, and wastes that contain hazardous air pollutants (HAPs) (e.g., butyl cellosolve, MEK, toluene, xylene).
- **Heavily Regulated.** May include wastes that contain HAPs, hazardous wastes, toxic chemicals that must be reported.

Appendix A3 (Pollution Prevention Checklists for Departments) allow you to compile many pollution prevention and waste minimization opportunities available to printing operations. Review this list and identify opportunities feasible for you. Prioritize these available opportunities. Look for the one(s) that make the most sense and offer the greatest benefit to your organization — and get busy implementing them.

The pollution prevention checklists also include recycling and disposal methods to consider. Although these methods are not "pollution prevention" in the true sense of the word, they still may be an improvement over your current practices and should be evaluated.

How to Start Preventing Pollution

- Be Committed
- Identify Opportunities for Pollution Prevention
- Prioritize Your Opportunities

Wisconsin Case Study

Quad/Graphics, Inc. of Pewaukee was a 1991 recipient of the Governor's Award for excellence in hazardous waste reduction. Quad has had an ongoing program of continuous improvement through employee education and process controls. Their accomplishments include:

- Reducing hazardous waste disposal of inks and solvents.
- Recovery of cleaning solvents though rag centrifugation.
- Recycling paper to reduce landfilled waste.
- Ink recovery and reuse.
- Reducing emissions from ink jet systems.

The cumulative savings for Quad is now in the millions of dollars. The ink recovery and reuse program saves over $500,000 per year in raw materials disposal costs.

Involve Employees and Suppliers: Involve your employees in this selection process, especially if they are directly affected. If you are looking to switch to a less toxic blanket wash, try and get your pressman to take a lead role in contacting vendors, setting up tests, and evaluating the various products.

Track and Communicate Progress. Use the pollution prevention checklists as a starting point for tracking your progress. Make sure that you document your plans and commitments and follow through with before and after data to document the impact of the change in practices.

Remember to share your progress with all employees. Think about setting up a bulletin board for environmental information (it could be done in conjunction with safety) and posting your worksheets.

Calculate the Cost Benefit. Many pollution prevention ideas will save money. Where possible, it will be beneficial for you to document these cost savings. In cases where a capital investment is required, you stand a much better chance of obtaining funding if you can document a short payback period for the investment.

While some savings are obvious and easy to quantify (such as avoided disposal costs or lower raw material purchases), many times the savings are very tough, if not impossible, to quantify. **The Pollution Prevention Checklist in Appendix A** is provided for your use in estimating the cost benefit associated with a pollution prevention opportunity.

Overcoming Obstacles. You have to avoid obstacles or pitfalls along the way, such as:

- Regulatory Impacts. Especially for larger operations, evaluate the impact a material substitution or process modification may have on your permitting status;
- Superfund Liability. Check out reclamation and/or recycling operations before making an initial shipment. You can be held liable if they are shoddy. Contact Ohio EPA or others who have visited and evaluated the operation.
- Capital Constraints. Use Appendix A to perform a cost/benefit analysis and determine the investment's payback period;
- Specifications and Quality Concerns. Concerns over

introducing a waste material into a production process are valid.

- Attempt to perform small scale, controlled tests to objectively judge the effect on quality.

To Prioritize Your Opportunities

- Consider waste volumes
- Consider disposal costs
- Consider toxicity
- Consider regulatory burden

When you prevent pollution, you may avoid regulation.

Avoid Obstacles by Thinking Through Your Process Changes

- Consider impact on permitting
- Check out recyclers and reclaimers before you ship
- Determine your investment payback in advance
- Consider impact on product specification

See technical assistance resources on the next page.

4. Where to Go for Help

Technical Assistance

There are a number of sources of assistance that can easily be accessed. Many of these are free, or available at a nominal charge.

Printing Industries of Wisconsin, P.O. Box 126, Elm Grove, WI 53122 414/785-9090.

Solid & Hazardous Waste Education Center, 610 Langdon Street, Madison, WI 53703 608/262-0385.

Wisconsin Department of Natural Resources, Printing Sector Specialist, Devil's Lake Park, S5975 Park Road, Baraboo, WI 53913-9299 608/355-0811.

Printers National Environmental Assistance Center (hotline to be announced); world wide web address is www.pnaec.org.

Graphic Arts Technical Foundation, 4615 Forbes Avenue, Pittsburgh, PA 15213 412/621-6941.

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5. Pollution Prevention for Prepress

This unit is intended to be removed and made available to prepress staff for purposes of a quick review of process wastes, pollution prevention ideas, and a should be used in conjunction with the pollution prevention practices checklists of Appendix A.

Prepress operations have typically used **image processing** and **image transfer** that involve similar chemical processing techniques. Image processing includes preparation of art or copy, typesetting, and photoprocessing while image transfer involves platemaking. In most lithographic shops this has meant that film is exposed and processed and then the negative or positive image is used to create a plate that serves as the image carrier.

Electronic technologies are changing the way many shops process and transfer images and they will be considered briefly at the end of this section.

Image processing and plate making will both be considered here because of their similarities. These two processes are distinctive from each other, however, in terms of the specific chemistries used and the **wastes that are generated**. It should be emphasized that since the chemistries and their waste streams differ in these two areas, the resulting wastes should remain segregated to enhance recycling, reuse or other management strategies.

Getting It Right From the Start

Before a new job begins its way through the prepress area, it is helpful for staff to think about their role in the team that is working with or for the customer in making sure that the customer gets the product quality and colors that they want. Some of the key tips to consider include working with the customer to determine what papers and inks are expected or acceptable. Prepress and press departments can coordinate to make sure that a run can meet expectations before time and materials are committed. Make sure that you have the color the customer wants the first time.

Establish prepress process controls to keep equipment in proper working order and to minimize the potential for creating waste. This includes the establishment of a regular program of inspections and maintenance of prepress operations. While there are many opportunities to reduce waste or prevent pollution, the point is to think and act on the opportunity in advance.

Image Processing Wastes

- Exposed and waste film
- Spent fixer and developer (waste water)
- Outdated materials
- Waste proofs
- Silver
- Toner and spent cartridges
- Water and energy
- Empty chemical containers

Plate Making Wastes

- Spent processing chemicals (wastewater)
- Water and energy
- Used plates
- Empty chemical containers

Before a new job begins its way through the prepress area, staff should think about their role in the team that will make sure the customer gets the product quality and colors that they want.

Establish prepress process controls to keep equipment in proper working order and to minimize the potential for creating waste.

The following ideas are designed to help you explore in more depth where you are on the pollution prevention spectrum and what some of your opportunities are to reduce waste, improve compliance and save money.

Materials Management and Selection

Image processing offers significant opportunities for pollution prevention, particularly where electronic technology has not been fully implemented to eliminate chemical processing. The opportunities here are very accessible in part because they are generally low cost practices that do not require expensive equipment modification or replacement. The emphasis is instead placed on best management practices related to **inventory control** and material storage, **photographic chemicals management**, and **selection of materials** to use.

Inventory Control and Storage. The quantity and variety of chemicals used in image processing and plate making can result in significant waste of materials through spoilage or outdated products. Many image processing and plate making chemicals have very specific storage requirements because of their sensitivity to light and temperature. Photographic papers may also be adversely affected by humidity. Make sure that all photographic materials are stored according to the specifications given by the manufacturer.

Date materials and use "first-in/first out" inventory control procedures and consider the use of inventory control software. Buy only what you need. For those materials that you use in large quantities, talk to your vendor about bulk shipments with returnable or refillable containers.

When making purchases, make sure that what you receive is what you have ordered and that it is in acceptable condition. Any unacceptable or damaged materials should be returned to the vendor. If the vendor supplies you with a different product to try, avoid hazardous materials when possible and make sure that the vendor will take back any unused portion of the material.

Photographic Chemicals Management (for manual processing systems). Chemicals should not be changed until they are no longer effective. Developer and fixer should be monitored to determine when they need to be changed. The process bath life can be extended by adding ammonium thiosulfate which will double the allowable silver concentration in the bath. The pH can be kept low by using an acid stop bath and by adding acetic acid to the fixer.

Quick Tips for Inventory Control

- Avoid buying more than can be consumed prior to the expiration date.
- Work with vendors on consignment basis to minimize overstock or spoilage.
- Buy bulk in returnable totes when possible.
- Test outdated materials before disposal.
- Store materials and keep storage area clean.

Quick Tips for Photographic Chemistry

- Monitor incoming water quality.
- Monitor chemical replenishment.
- Use marbles in chemical storage containers to reduce air and lessen oxidation.
- Install floating lids on containers to reduce oxidation.
- Properly maintain automated processing systems to maximize photochemical life.
- Properly maintain rollers in developers to prevent contamination.
- Reuse color developer and desilvered fixer, adjusting or replenishing as needed.

Air emissions from photoprocessing tanks and contamination of chemicals can be reduced by keeping the containers covered. Since developers have volatile contents ranging up to 85% and fixers have volatile contents up to 65%, the potential for loss is significant. Various techniques have been used to reduce evaporation including tank covers or lids, floating lids in some cases. Oxidation of the chemicals is another concern that can be reduced with the floating lid system or addition of marbles with a tank cover that can eliminate air from the system.

Material Substitution. The key for material substitution is to work with your vendors. There are a variety of alternatives to conventional film chemistry that can reduce or eliminate hazardous materials from your prepress operations. A variety of silverless films are available which will eliminate associated processing that potentially results in a hazardous waste. Electrostatic films which use an electrostatic charge to create light sensitivity, for example, have speeds and resolutions comparable to silver-based films. Photopolymer films have a carbon black base instead of silver and its process chemistry can be neutralized to make it non-hazardous prior to discharge. Other film alternatives include diazo and vesicular films with a polyester base and a light sensitive diazonium salt have also been in use for some time as a silverless alternative.

Vendors can also help you look for non-hazardous or less hazardous intensifiers and reducers. They may be able to serve you with recycled fixers and developers that are compatible with automatic processors. Non-toxic developers and finishers are available with flash points in excess of 200° F.

Silver Recovery

Silver is the light sensitive component of conventional films and papers that forms the image. During processing silver enters solution into the fixer or bleach-fixer solution. In color processing nearly 100% of the silver in the film is lost in solution while in black and white processing up to 80% of the silver is lost. This produces a silver rich solution. Smaller concentrations of silver are found in rinse water following the fixer.

Silver is removed from solution and recovered from scrap film because of its value as a non-renewable resource and because sewage treatment plants (POTW's) restrict its discharge in wastewaters. Silver removal also allows for reuse of the fixer and developer with some chemical adjustment which further reduces waste discharges. Recirculating silver recovery systems allow fixer life to be extended up to 90 percent.

For Manual Processing Systems

- Extend bath life by adding ammonium thiosulfate.
- Use an acid stop bath prior to fixing.
- Add acetic acid to fix bath.
- Use squeegees for hand development.

Quick Tips for Material Substitution

- Work with vendors to identify non-hazardous substitutes for intensifiers and reducers that contain mercury or cyanide salts.
- Work with vendors to identify non-hazardous developers and finishers.
- Do not accept vendor samples unless the vendor will take it back.
- Use dry positive proofs or aqueous developed proofs.
- Consider silver-free films such as diazo, vesicular, photopolymer, electrostatic or selenium-based.
- Use presensitized lithographic plates to reduce processing.

There are two approaches to regulating silver discharge: concentration-based limits and performance-based limits. **Concentration-based** limits have been the traditional approach used by regulatory agencies. This approach has been criticized for its conflict with water conservation initiatives in the industry, varying standards across the country, sampling point differences and variations in access to cost-effective technology to meet local rules. The Silver Council prefers a performance based system which spells out the limits as a percentage of silver that must be recovered from discharges.

The **performance-based** approach has been defined in the Code of Management Practice which categorizes commercial imaging facilities into one of four categories based on amount of discharge and the percentage efficiency of silver recovery. This system, while preferred by the Silver Council, has not been adopted as a compliance standard for the industry by the regulatory community. For more information on the performance-based model, refer to the Code of Management Practice for Commercial Imaging (see section 4 for contact information).

Silver may be recovered on-site or off-site, the latter being attractive to many smaller printers. On-site recovery often involves at least one of two or more processes. **Electrolytic recovery** uses a low voltage across carbon and steel electrodes, with the silver depositing on the steel cathode. Electrolytic unit effectiveness is better with higher silver concentrations, and depends on the type of fixer, line voltage and pH. Your vendor can provide guidance on the specifications.

The other common method, often used in conjunction with electrolytic systems or independently, is metallic replacement often referred to as the metallic or **chemical recovery cartridge** (CRC). This system uses steel wool or other active metal that will replace the silver when spent fixer passes through the canister.

Ion exchange is a third treatment option that should be reserved for low concentrations of silver, such as in polishing silver-bearing rinse water. This method is effective at removing low concentrations of silver resulting in effluent levels as low as 0.1ppm. This system will quickly clog if used with silver-rich solutions.

Quick Tips for Silver Recovery

- Install terminal electrolytic unit followed by chemical replacement cartridge with manufacturer specified flow control.
- Use two chemical recovery canisters in series with manufacturer specified flow control.
- Alternatively, store silver-rich solutions for off-site management and silver recovery.
- Use an automated recirculating silver recovery, water recovery and chemical replenishment system.
- For large volumes of water, install an ion exchange unit.
- Recycle spent film and negatives.

The “Code of Management Practice Guide for Commercial Imaging” provides guidance on various configurations of these systems for small, medium and large printers.

Equipment Modifications

After implementing good management practices that have little or no cost, further pollution prevention can be accomplished through equipment modifications with low to moderate capital expenditure. The goal is to increase processing efficiency and reduce the wastes that are being generated.

Automatic wash baths can be used to reduce water usage to the times when film is being processed and results in less wastewater. **Counter current washing** reduces water usage and reduces the transfer of contaminants to processing solutions. In this system fresh water is introduced in the last rinse tank and it moves upstream toward the initial rinse tank where most contaminants are removed.

Automatic water flow controls reduce wastewater by turning off fresh water input except during processing. These electronic valves can be easily set up as wall-mounted controls for flow and temperature control. These controls can be used with rinse **bath agitators** to improve the rate of fixer removal.

Photoprocessor standby options are available on new equipment to save energy and can be retrofitted to some older units to keep the system shut down except for bath temperature maintenance.

Quick Tips for Equipment Modifications

- Where possible make sure your system has countercurrent rinsing.
- Recirculate rinse water.
- Use automatic flow controls for rinse water.
- Use rinse-bath agitators.
- Use standby options.

Platemaking Alternatives

In addition to the general guidance for chemistry in image processing and platemaking that have been combined for brevity in this section, several developments have taken place for platemaking that will reduce wastewater and hazardous wastes. Platemaking is a photographic process that transfers an image to a plate. The plate must be developed and finished. Current plate processing equipment is much like film processing systems with automated chemical replenishment and automatic water flow controls for the finishing rinse. While some newer technology virtually eliminates waste by using dry imaging or direct-to-plate methods, small shops may not be able to justify the cost of the more advanced systems at this time.

Quick Tips for Platemaking Alternatives

- Presensitized plates
- Electrostatic plates
- Bimetallic plates
- Polymer plates
- Paper plates
- Relief plates
- Aqueous plate developer
- Keep bath solution clean

The most common platemaking system is the photomechanical system which uses an aluminum base with a light sensitive coating such as diazo compounds and photopolymer resins. After an image has been transferred to the plate using a transparency and UV radiation, the plate is then developed to harden the image and prepare the surface for transferring ink from the ink roller to the blanket. There are a variety of alternative plate technologies including presensitized, electrostatic (paper), bimetallic, polymer, paper, and relief plates.

Accessible technology includes the use of **presensitized plates** which have been adopted by many shops. They generate small volumes of spent developer which is usually nonhazardous and can be reused and recycled. If your shop hasn't already employed this technology check with your vendor and your equipment specifications to make sure that your current platemaking equipment can process these plates.

Many processors have also switched to **aqueous plate developers** which can sometimes be discharged to the sewer (check with local POTW) rather than being managed as a hazardous waste. You are still responsible to determine whether there is a hazard and your vendor can help you gather information you need. This system can be adapted to your existing operation with operational costs at or below conventional chemistry. Check with your vendor for more information. Manufacturers develop presensitized plates and aqueous developers that may not be compatible with those of other manufacturers. Plate quality also depends on **keeping the bath solution clean.**

Good Housekeeping and Prepress Process Controls

Preventive maintenance is one of the keys to pollution prevention. Keep chemical storage and work areas clean and wipe up spills to reduce the potential for contamination of working materials. Periodically check the air filtration system and humidity control equipment to make sure that conditions remain optimal for material storage and spoilage is reduced.

Good process controls in the prepress area help to keep everything running and right the first time. All prepress electronic systems and measuring tools should be periodically calibrated.
All films and plates should be checked for errors or defects and keep plate and film processors clean. Plate exposures should be monitored regularly with gray scale strips. Color viewing lights can change over time and should be replaced periodically.

Quick Tips for Good Housekeeping

- Keep storage areas clean.
- Check air filration and humidity controls.
- Keep equipment properly calibrated to avoid waste.

New and Emerging Electronic Technologies

The computer age has brought with it tremendous new technology and opportunity for printers that can dramatically reduce waste, enhance the speed of image development, enhance creative integration of files, and save costs associated with labor, materials and time. The down side of that equation is the cost of getting started such as $30,000 or more to get a **desktop publishing system** in place with **scanners** and **digital cameras**. For some printers, a combination of desktop and conventional capabilities has worked well, but this is a system that requires an investment of time and energy to research and implement.

Another step in reducing waste comes with digital technologies that can eliminate plate related processing wastes. One option is **direct-to-plate** which allows the printer to transfer a computer image directly to the plate. This system combines high digital image quality with reduced labor and material costs and the elimination of prepress waste. Some of the problems with this system include managing the correct color through the system and plate problems that require re-imaging. **Direct-to-press** technology uses an electrostatic charge to image a plate on the press. While direct-to-press presses generally are waterless and alcohol free, eliminating hazardous waste and air emissions, they have advantages and disadvantages similar to direct-to-plate systems.

Digital proofing offers reduced costs in labor and materials, but it too has a high capital investment requirement. While customers may have more faith in traditional technology for final proofs, digital proofs for type approval, position and color breaks are quicker and cheaper. Digital proofing is also an advantage for short runs when the customer may not want to invest much in proofing costs.

Evaluating Your Pollution Prevention Opportunities

Many of the pollution prevention options for traditional imaging and image transfer processes have already been adopted by printers. The pollution prevention checklist in Appendix A can be used to check what you have already accomplished and what opportunities are yet to be considered. These checklists provide some of the practices, materials and equipment that have been presented and you may want to add more suggestions to the list. Some of the pollution prevention options may not be applicable to your operation, depending on what technology applies, the size of your operation and the cost of the option.

Use these checklists as a preliminary yardstick of your progress and as a planning tool for future considerations in your operations. This information will provide a baseline of your status for pollution prevention efforts by department or by facility.

While an individual may complete the worksheet that applies to his or her departmentor work station, the development of a plan of action is best served through team efforts with management support.

Quick Tips for Good New Technologies

- Replace photomechanical systems with scanners and digital cameras.
- Use direct-to-plate printers to eliminate prepress waste.
- Ese direct-to-press electrostatic technology on waterless presses.
- Use digital proofing to reduce labor and materials waste.

Use the pollution prevention checklist in Appendix A to check what you have already accomplished and what opportunities are yet to be considered.

6. Pollution Prevention for the Pressroom

This unit is intended to be removed and made available to pressroom staff for purposes of a quick review of process wastes, pollution prevention ideas, and a checklist of pollution prevention practices.

Pressroom operations can be looked at in terms of **make-ready**, **production** and **cleanup** stages. During make-ready the press is prepared by attaching plates, adding ink and fountain solution, and making the necessary adjustments to the press to make sure that the print registration is correct and that the product meets customer expectations. This stage results in the generation of material waste (ink, paper, fountain solution) and time, but is essential to achieving an acceptable product.

The production phase includes the consumption of inks, fountain solution and cleaning solvents. From this stage waste ink, waste paper, used fountain solution, packaging or containers, waste oil and antifreeze, air emissions and energy are all part of the waste reduction opportunity. Cleaning the presses, both during and after jobs creates additional waste ink, waste solvent, dirty shop towels, empty solvent containers, more VOCs and more wastewater. This section examines opportunities to reduce waste or waste related issues and associated costs in pressroom operations.

Pressroom Wastes

- waste ink (waste and recyclable)
- waste paper
- used fountain solution
- waste plates
- empty containers
- used cleaning solvent
- used shop towels
- VOC air emissions
- used press oils and antifreeze
- wastewater
- waste energy

Planning and Scheduling

You can save time and money by planning and scheduling your jobs to reduce waste, cleaning and color changes. This means taking the time to coordinate with prepress folks on the jobs that are being prepared and making sure that you know what each job requires before it gets to the pressroom. Take time to help your customer think about ink and paper options and consider all the costs, including wastes, in helping the customer to make a decision. Waste ink can be reduced by accurately estimating copy and coverage and leftover inks can be reused or recycled depending on customer requirements. Press time can be reduced by increasing ganging and rework can be reduced by confirming proper job imposition.

Quick Tips for Planning and Scheduling

- plan ahead with prepress
- accurately estimate copy and coverage
- increase ganging
- confirm proper job imposition
- group jobs with similar ink colors
- run from light to dark colors
- designate presses or days for certain colors

Solvent use and wasted time can be reduced from press cleanup by modifying job scheduling. This can be achieved by grouping jobs with similar ink colors and running jobs from light colors to darker colors.

If possible, designate some presses to run certain colors. If schedules permit or certain jobs consistently require a particular color, run certain colors on given days.

Make-ready: Are you getting it right the first time?

Before you get started **is your press ready**? Check the "preventive maintenance" section, later in this chapter for some quick tips. Keep the dampening system in good working order by cleaning and conditioning frequently. Maintain accurate plate-to-press registration and do your press set-up by the numbers. Document the press used and all the press settings on the job jacket. Make sure the impression pressure is at the proper level and make sure that you have the proper settings for ink and water fountain, using recorded settings for reruns or standard settings for first runs. Before you load the paper, make sure the your ink and paper selections are compatible.

Make-ready is an inherent waste generating process in the lithographic shop. A key is to get the job to specifications for the customer as quickly as possible, since customer rejected products can be very expensive. Make sure that customer requirements are clearly established and documented. Those requirements must be clearly communicated within the shop and appropriate process controls must be in place to ensure quality.

It is important to try to **"nail the color the first time."** You should have a color sample from the customer for an immediate evaluation of the make-ready samples. At press, check the color with a spectrophotometer and densitometer. Use industry-standard lighting sources and change bulbs at recommended intervals to avoid color shift from your light source. Punch holes in color swatches or customer samples to confirm a match with your make-ready print. In electronic prepress, obtain a colorimeter reading to enable replication in the future. Use standard systems such as PMS to identify colors and use standardized testing to identify personnel best able to make color decisions.

On reruns be sure to use the same ink and paper. For sheetfed presses, save paper that has been used on one side for future make-ready use until both sides have been fully used a multiple of times, then recycle. In order to cut make-ready waste in subsequent runs to near zero, make sure that all water, ink and press settings are recorded. Press operators may track make-ready waste as a percent of the printed product and set goals for future reduction.

Quick Tips for Make-ready

- maintain a clean dampening system
- have accurate plate-to-press registration
- do press setup by the numbers
- document and reuse proper press settings
- paper and ink must be compatible
- have color sample from customer
- check color with spectrophotometer and densitometer
- use industry standard light sources
- change light sources at recommended intervals
- punch holes in color swatches for match evaluation
- use standard systems like PMS to identify colors
- use same ink and paper on reruns
- record water, ink and settings for future runs

Printing Inks

Traditional lithographic printing has relied on the balancing act of using alcohol and water based systems in conjunction with oil-based inks. The solvents used in the oil-based ink system, along with alcohol, have been contributing pollutant sources in terms of air emissions, and hazardous wastes. The oil-based systems have been largely petroleum derived oils, but ink manufacturers are producing more vegetable oil as a component of the "vehicles" or "carriers" for the pigments. The oil-based materials and pigments are both potential sources of regulatory concerns in terms of VOCs, toxics and EPA listed heavy metals.

Other standards may be more stringent than USEPA regulations on heavy metals content or other toxics, particularly when printing on plastics. For example, the Source Reduction Council of the Coalition of Northeastern Governors model toxics in packaging standard, the ASTM F963-91 toy safety standard, and standards of Hasbro Toys and Mattel Toys.

There are an increasing number of alternative inks available on the market, but the traditional oil-based system often has some advantages such as faster press speeds, longer cylinder wear, and sometimes better ink transfer. When these advantages are deemed important over available alternatives, steps must be taken to reduce regulated waste generation, to reclaim and, where possible, reuse or recycle materials.

There are a variety of options for reducing the regulated waste stream that range from implementing best management practices to implementing process changes and material substitutions. All of these options require a commitment of time and effort, both from management and pressroom staff. Various options should be reviewed with your vendor and technical support resources to make cost effective decisions that deliver the quality that you need.

Best management practices. In making the best use of your ink inventory, increase the accuracy of your ink estimating techniques and increase your use of existing inventory. Use your existing stock whenever possible for in-house jobs. Keep good records on your existing stock to enable recall and reuse and make sure that older inks are used first. Minimize the purchase of inks into your inventory that require management as a hazardous material or waste. Know whether you have components in your inks that would cause your ink to be classified as a hazardous material. Most modern inks are not considered hazardous, but check with your vendor and your MSDS sheets to be certain.

Improve your ink handling techniques to reduce waste. For example, keep ink containers sealed and dated with ink contents leveled and cover the ink surface with wax paper or plastic to minimize oxidation. Spray the ink with an anti skinning agent. When removing ink from its container, scrape or "squeegee" as much as possible out of the tin for use and recycle the container.

Quick Tips for Ink Best Management Practices

- increase accuracy of ink estimating techniques
- increase use of existing inventory
- use existing stock for in-house jobs
- keep good records on stock for recall and reuse
- use first-in, first-out approach to ink management
- minimize hazardous ink inventory
- keep hazardous waste segregated for proper disposal
- designate a press for hazardous inks
- keep containers sealed and dated
- use antiskinning agents
- squeegee all possible ink out of tin for use
- consider mixing small batches of PMS colors from open inventory
- recycle light color inks into darker inks
- offer customers reduced price for selecting leftover colors
- use additives to fine tune quality of recycled ink
- reformulate leftovers into a black ink
- return unused, excess ink to supplier

Make that ink go as far as possible before you give it up as a waste and even then look for alternatives. Consider mixing small quantities of needed PMS colors from existing, partially used ink tins. When exact color is not as critical for the customer, offer a reduced price for use of leftover ink colors. If you decide to blend colors into a darker color, it may be necessary to use additives to fine tune the color quality. Consider having leftover inks processed and reformulated into a recycled black ink or segregate waste ink colors for recycling. Another alternative to disposal is to return unused, excess ink to the manufacturer. Check with your suppliers for information on some of these options. On-site recycling can have the dual advantage of producing a usable ink and saving the cost of lost raw material and disposal.

Process and equipment modifications. Some of the discussion regarding ink recycling, particularly if it is done in-plant, will require require use of mobile recyclers to come on-

site to reblend the leftover inks for reuse. The alternative is to ship off site for recycling and an option to purchase reblended inks. Purchase of on-site equipment for reblending may be more cost effective for large printers.

When mixing PMS colors, use a computer controlled mixing program with a digital scale. In-house mixing programs give the printer more flexibility in colors and quantities to be mixed and can reduce the amount of inventory needed. Also use a digital scale to measure ink for jobs to improve accuracy and reduce waste. In addition to the use of anti-skinning agents in sheetfed presses to prevent oxidation of the ink in the ink fountain, the installation of an ink agitator on the ink tray can help prevent premature ink oxidation. Automatic ink levelers also ensure that the ink is distributed evenly across the press ink tray.

Material Substitution. Lithographers have a substantial range of options for inks in terms of carriers and pigments. The selection of an alternative can decrease the amount of waste ink and can often provide the quality that is needed for the job. Selection of an alternative ink will depend on the papers or other substrate to be used, the print process, the end use, and customer specifications. The most common alternative inks include soy/vegetable oil, waterless inks, ultraviolet curable (UVC), and electron beam curable (EBC).

Quick Tips for Process Modifications

- use computer - controlled mixing program with digital scale
- use digital scale to measure ink for jobs
- use ink agitator in ink tray to prevent oxidation
- use antiskinning agents in ink tray
- consider automatic ink leveler for even distribution

Vegetable oil-based ink uses a combination of vegetable or soy oil and petroleum-based oils, with 20 to 40 percent of the carrier composed of soy oil. Soy oil inks may provide some advantages such as reduced VOC emissions and easier cleaning with water and detergents which results in less use of solvents for cleaning. Other benefits attributed to soy inks include improved transfer and coverage, bright color transfer, less make-ready waste because of quicker start-ups. These advantages may vary depending on the ink, paper used and press conditions.

The most common disadvantage to soy oil inks is the longer drying time which has been overcome by using custom dryers and drying powders. Toning on plates may occur more quickly necessitating more frequent cleaning. Soy inks also tend to cost slightly more than petroleum-based inks, but colors can be recycled using on-site or private services that will return a lower cost, recycled ink. As with any change in process or material, it takes some time for operator training and experience to reach a level of comfort with product performance and quality.

Waterless inks must be used with special presses or modified lithographic presses that use waterless plates and have temperature control systems. The principle of the waterless ink system is to use a higher viscosity ink that is repelled from the silicone non-image area of the plate. This system does not use the ink/water balance system that requires fountain solution, but rather uses temperature control to maintain the proper viscosity of the ink so that it will be repelled from the non-image area. A chilling system prevents the rollers from getting too warm which reduces ink viscosity.

A waterless system requires significant initial capital investment, on the same order of magnitude as conversion to UV curing systems. While raw material costs may be higher than petroleum-based inks, the absence of a dampening system as well as reduced make-ready time and waste can result in an overall lower operating cost that will offset the initial investment. Dust or dirty pressroom conditions can be a serious problem because the absence of a fountain solution permits dust on the plate to show on the product and the silicone rubber surface of the plates is easily scratched.

There are distinct advantages to this newer ink technology that may make the disadvantages well worth the effort. There is no wastewater and VOCs are reduced by about half. Ink transfers with a higher density (and less material) because there is no water and the paper characteristics are not diminished by water (as in conventional lithography). This system requires less time and labor for make-ready and delivers a high quality color finish with less waste.

Quick Tips for Ink Substitution

Vegetable Oil-Based
- may reduce VOCs and use less solvents
- may have longer drying time

Waterless Inks
- no fountain solution used
- reduced make-ready time and waste
- no wastewater
- VOCs cut in half
- may be more sensitive to dust problems

Ultraviolet curable ink systems have similar advantages and disadvantages to EBC systems. UVC inks must be exposed to ultraviolet radiation in order to cure and have the same extended ink fountain life and lack of a solvent (low VOCs). Other advantages include less press cleaning, less floor space used for drying, high speed runs, and adaptability to both web and sheetfed systems. There are a wide range of UVC inks available for a wide range of substrates. While startup costs are high, it is much more affordable than EBC and has been fairly widely used in the printing industry.

In addition to the startup costs, other problems that have been noted with this system include ozone generation and shielding needed against the UV radiation. Smaller printers may not enjoy cost benefits of this system on short runs. Performance problems relate to color matching and opacity, outdoor durability and recyclability of printed materials.

Electron beam curable inks have no solvents (and low VOCs) and do not cure until exposed to an electron beam from a vacuum tube. This means that the inks can remain in the ink fountain for extended periods reducing cleanup in terms of frequency and the lack of solvents. Another advantage is high speed press runs and low to moderate operating costs. Some of the drawbacks on this system include high startup costs which are generally beyond the reach of small printers, potential worker exposure to X-rays, and paper degradation.

Fountain Solution

Fountain solution is used in the dampening system to make the non-image area of the pate nonreceptive to ink. It is composed of a number of materials including water, an acid or base, gum or synthetic resin, corrosion inhibitors and a wetting agent which has most often been isopropyl alcohol (IPA). While the exact constituency of the fountain solution will vary depending on the type of ink, paper, press speed, plates, temperature and humidity, some lithographers until recent years had used 15 to 20 percent IPA-based solution.

The IPA has been the focus of much attention because it is a significant source of VOCs for printers and known to contribute to ozone formation which is a major smog factor. IPA is toxic and flammable, even at a 25 percent solution in water. It also is hard on rollers and causes them to dry and crack more quickly.

IPA is a popular wetting agent because it offers a number of important advantages to the lithographer. Since IPA evaporates quickly, it helps to keep the solution cool in a warm shop and it causes water to evaporate more quickly from the plate and rollers. By reducing the amount of water used on the rollers and reducing the amount of water reaching the paper, there is less emulsification of the inks which improves color and the ink will dry faster. The IPA allows a thinner film of water to be used in the dampening system which conserves the overall consumption of fountain solution. In spite of all these advantages, lithographic shops are under increasing regulatory pressure to lower alcohol use or to switch to non-alcohol fountain solutions.

More Quick Tips for
Ink Substitution

UV Curable
- no solvents and low VOCs
- less press cleaning
- less drying space used
- extended fountain solution life
- benefits greater for larger printers
- may have color matching, durability, and recyclability problems

Electron Beam Curable
- no solvents and low VOCs
- reduced cleanup
- extended fountain solution life
- may have high startup costs and paper degradation problems

Pollution prevention. Basic pollution prevention strategies for fountain solution include reducing the concentration of IPA, switching to alcohol substitutes, extending fountain solution life (with filters, chillers, recirculating systems), and carefully monitoring and maintaining proper pH and conductivity. It has been shown that IPA or its substitute will still work effectively at concentrations of 5 percent or less, which is substantially lower than the average concentration that has been used by the industry. Small shops with manual dampening systems may consume three times as much fountain solution as compared to automated recirculating systems. Refrigeration of the fountain solution will also reduce the rate of evaporation and reduce VOC emission.

The benefits of switching to alcohol free substitutes include lowering the VOC emissions, eliminating the alcohol odor in the pressroom, and reducing the risk of fire. Cost can be reduced because the glycol substitutes can be used at much

lower concentrations and they do not evaporate which eliminates replenishment. Product quality can also benefit with brighter colors that are not adversely affected by the alcohol and better dot quality that results from less ink and water on the paper that could cause runs or blurred definition of the dots.

The decision to switch to a low or no VOC alternative from IPA such as a glycol ether or ethylene glycol will depend on a number of factors including the dampening system, press, papers used, inks, ink roller wash and blanket wash. You should review all these factors with your ink, plate, and fountain solution suppliers when considering what alternatives may work for the needs of your shop. It will be important to keep records of all press settings, fountain solution concentrations, temperatures, pH, and conductivity to check or evaluate changes during a trial and error period in order to achieve an optimum operating performance.

Measurements. The **pH** and **conductivity** should be monitored at least daily, preferrably each shift. Both factors can change in response to variations in paper acidity and water supply, for example. The pH needs to be kept at proper levels and buffer solutions can aid in this process. If the pH increases (becomes more alkaline) you may experience more scumming on the plates and if the pH decreases (becomes more acidic) the performance of the ink dryer is diminished.

Conductivity is an important indicator of fountain solution performance and variations in conductivity could adversely affect IPA substitutes. Calcium deposits from hard water can be eliminated with a water softener, deionizing unit or reverse osmosis. Water softeners only replace the calcium with sodium and do not change the original alkalinity or hardness of the water. Deionizing and reverse osmosis systems are more comprehensive in removing such materials as salts, minerals and organics from the water supply and require new readings for pH and conductivity to determine the fountain additive.

Quick Tips for Fountain Solution

- reduce IPA concentration
- switch to alcohol free substitutes
- monitor and maintain conductivity daily
- monitor pH daily and use buffers
- use filters and recirculation systems
- install chillers with automatic temperature control
- use water softener for calcium removal from source water
- install deionizer or reverse osmosis on source water

The **pH** and **conductivity** should be monitored at least daily, preferrably each shift.

The viscosity of glycol substitutes for IPA will depend on **temperature** which will in turn affect ink transfer. Temperature should be checked to make sure that glycol materials are functioning at an optimal performance. For those printers still using IPA, regulations on VOCs may require that chillers be installed to limit evaporative losses where RACT rules apply. Contaminants and ink residue can be removed by use of filtration systems with charcoal, polypropylene or other media so that fountain solution life can be extended. An automatic mixing system will also enhance your ability to maintain the proper concentration of materials in your fountain solution. In the event of foaming with some substitutes, foam-free recirculating systems are available to solve the problem without the use of chemical agents.

Preventive Maintenance and Cleaning

Preventive maintenance is one of the principles of pollution prevention, since defects and malfunctions result in poor quality and reject product. Cleaning is an ongoing process in the pressroom, both as a part of preventive maintenance and as a necessary part of completing or changing jobs. It begins during make-ready adjustments, occurs during runs, between jobs and at the end of the operating day.

Good maintenance. An effective preventive maintenance program begins with knowing your equipment. You should maintain a file of all equipment manuals and use that information to develop an ongoing maintenance program. It is helpful to have a checklist to know **what** should be done, **when** it should be done, when it is done, and **who** did it.

An effective program pays because it reduces down time, reduces waste from make-ready, minimizes defective runs and reduces product variation.

Presses should be kept clean and free of hazards. They should be lubricated on daily, weekly or monthly basis as required by specifications and usage. All press cylinders need to be cleaned and maintained and the vacuum system must be clean and oiled. Press and related equipment manuals will provide details of other manufacturer recommended maintenance.

All dampening rollers and systems should be checked and fountains cleaned. At least once a month check all roller durometer readings and visually inspect rollers. To aid in this process keep a current chart of roller locations, installation dates, initial durometer readings, and striping/gap settings between rollers. Deep clean, deglaze and recondition rollers and thoroughly clean blankets. Heavily glazed, pitted or out-of-round rollers should be replaced. The correct gap settings between rollers should be measured and maintained and damaged or worn rollers should be replaced. Rollers can be protected with an opaque cover when not in use.

Quick Tips for Maintenance

- keep a maintenance checklist
- keep presses clean and free of hazards
- lubricate presses daily or as needed
- keep vacuum system clean and oiled
- keep all rollers clean and deglazed
- check rollers with durometer monthly
- recondition rollers
- keep blankets clean
- maintain correct gap settings between rollers
- protect rollers not in use with opaque covers

Cleaning. The cleaning solutions are generally petroleum based, such as toluene, trichloroethane or naptha, but may also include methanol. These solvent-based materials may be up to 100 percent VOCs and have toxic and flammable properties. Low VOC substitutes are available and continue to be developed and improved. They often still contain some of the traditional ingredients such as naptha with 30 percent VOC by weight.

Factors to consider in the selection and management of the cleanup solvents include:

- cost of purchasing, storing and disposal
- quantity of material needed for cleanup
- liability related to use and disposal
- environmental regulations (VOCs)
- restrictions imposed by launderers
- employee exposure and sick time
- product effectiveness

Remember that ink selection has a bearing on your choice of cleaners. In making your selections, make sure you have pre-identified all cleaning applications in the shop so that you can consolidate the number of types of cleaners in use. Give priority to the mildest cleaner that effectively does the task and reserve aggressive, quick drying solvents only for tasks that absolutely require their use.

Finally, make sure that press operators are involved in the decision making process and that appropriate instruction or training is given in the use of alternative materials.

Material Safety Data Sheets or MSDSs can be a source of useful information in making your selection of cleaning agents. For example, they give numerical scores from 0 to 4 for health, fire, explosion and reactivity hazards. To minimize the potential for hazardous chemical usage and hazardous waste generation, preference should be given to materials with lower scores. VOC content can also be obtained from the MSDS or your supplier. Look for lower VOC materials or lower **vapor pressure** materials which evaporate more slowly. You will effectively lower your VOC emissions by choosing low vapor pressure materials, even if they don't have a significantly lower VOC content. The MSDS can also be helpful in checking federal reporting requirements for the materials or health risks. You will also find **flash point** information on the MSDS, and should give preference to higher flash point materials (greater than 140°F).

Rollers and plates are cleaned with solvents, but excess residual ink should be removed from the rollers with the roller blade. Blankets have typically been cleaned with solvent-wetted rags, although automatic blanket washers on larger presses have been shown to greatly reduce solvent usage, reduce use of rags, and reduce employee exposure. Parts washers used in shops can be fitted with filter systems and recirculating solvents to extend solvent life and reduce hazardous waste. Recovered solvent from shop towels can be used in parts washers to reduce solvent consumption. Parts washers are also available with d-limonine as a petroleum solvent substitute.

Quick Tips for Cleaning

- pre-identify all cleaning applications in the shop
- consolidate the number of cleaners in use
- give priority to the mildest cleaners
- limit aggressive cleaners to essential use
- involve press operators in decisions on cleaners
- look for low hazard scores on MSDS sheet
- look for low VOC, low vapor pressure materials
- give preference to higher flashpoint materials (>140°F)
- recover solvent from shop rags and reuse solvent
- use scrapers or blades at proper angles to remove excess ink
- install automatic blanket washer
- use parts washer with filter and recirculation
- use solvent recovered from shop towels in parts washer

Shop rags and wipes, if not properly managed, can contribute unnecessarily to your costs and liabilities. If you are using cloth or launderable towels, make sure that you recover solvent by draining, wringing or centrifuging before laundering. Solvent recovery before laundering helps you and the launderer. The launderer has less potential hazardous waste and associated liabilities, and your shop may be able to reuse recovered solvent in some application such as the parts washer. If you use disposable towels, you may still want to recover excess solvent for reuse, but you must also make sure that the towels are disposed through a properly permitted incineration facility.

If you are trying to decide between using launderable towels or disposable towels, consider that reusable towels eliminate landfill liabilities, result in less solid waste, and you can recover solvent. Solvents left in the towels may create problems for the laundry through the POTW or downstream.

Disposable towels, in contrast, eliminate laundry wastewater problems and wipes can be sent with higher solvent content to a fuel blender for incineration. If wipes are sent to the landfill, there remains a potential liability for the lithographer.

Evaluating Your Pollution Prevention Opportunities

Many of the pollution prevention options for the pressroom have already been adopted by printers. Appendix A (see sections corresponding to the Pressroom) can be used to help you check what you have already accomplished and what opportunities are yet to be considered. These checklists provide some of the practices, materials and equipment that have been presented and you may want to add additional suggestions to the list. Some of the ideas may not be applicable to your operation depending on what inks and press technology is in your shop, the size of your shop and the cost of the option.

See Appendix A for checklists to help you see your pollution prevention opportunities.

Use these checklists as an initial yardstick of your progress and as a planning tool for future consideration in your operations. Some of the information regarding pollution prevention tips is more detailed in the text sections above. Note particularly that planning and make-ready suggestions are not addressed in the following checklists, but are equally important for you to consider. This information will provide a baseline of your status for pollution prevention efforts by department or by facility. While an individual may complete the checklist that applies to his or her department or work station, the development of a plan of action is best served through team efforts with management support.

7. Pollution Prevention for Finishing and General Facility Practices

This unit is intended to be removed and made available to the finishing department and others in the shop who have a general interest or responsibility for environmental performance of the facility. Checklists are provided in Appendix A to briefly examine current practices and opportunities to reduce waste for the finishing department and in general for the whole facility. Many of the ideas presented here are important for all staff to be aware of and to take individual responsibility.

Finishing Department

The post-press operations or finishing department can be a significant source of paper and trimming waste as well as a source of some VOCs depending on the method of binding. Activities include trimming, collating, folding, laminating, embossing and binding. Binding can be accomplished mechanically or with various types of adhesives, including solvent-based or water-based materials.

Match paper size carefully to minimize trimming waste.

Trimming and packaging should be recycled whenever possible, but the first priority is to minimize the generation of such wastes. If paper size is matched carefully to reduce trimming and packaging is designed to reduce or eliminate scrap generation, less purchased material will be lost as a waste. Good maintenance of machinery and operator training is another important opportunity to make sure that break-downs and damaged product are kept to a minimum. Break-downs are costly in terms of lost product, waste and rerun costs, and time.

Maintain equipment to ensure accuracy and reduce wasteful breakdowns.

The second major area of opportunity for the finishing department is to minimize the use of solvent-based adhesives as binders. These materials contribute to VOCs and also offer some potential additional health risk for employee exposure. Whenever possible low or no-VOC adhesives, such as water based glues, should be used. If mechanical binding is acceptable to the customer it will also help to reduce use of VOC materials.

Minimize the use of solvent-based adhesives as binders and reduce VOCs.

General Facility Practices

Appendix A provides checklists for finishing and general facility operations and policies. This information offers some general guidelines that everyone should be aware of and actively participate in using to reduce or avoid potential wastes and costs. To determine how your facility is doing review the checklist sections on:

- Finishing Department
- Facility Management and Communications Policies
- Customer Relations
- General Raw Materials
- Good Housekeeping
- Chemical Product Inventory and Tracking

Good housekeeping practices are not just a matter of cleanliness, but for printers are important in reducing the potential for contamination of printing jobs. Whether looking at specific processes or implementing general guidelines for the whole shop, communication and commitment are essential ingredients at all levels. How does your shop assure that its commitment to be compliant and to be a good environmental performer is realized? You may see ideas for future training and teaming.

Chapter 9: Important Considerations for Expanding Businesses

Printers that are expanding their business can be considered fortunate to be succeeding in this competitive industry, but growth can also result in the need to increase your understanding of environmental requirements and commitment to compliance. It is important to be aware of any new regulatory responsibilities that result from the growth of your business.

This section of the Handbook is a summary of information that should be reviewed as part of expansion or relocation planning. For smaller printers, expansion and incremental growth can result in the need to obtain permits or start keeping records for the first time.

Issues resulting from the following activities are addressed in the sections below.

1. Installing New Presses
2. Expanding Building Size
3. Relocating Within Wisconsin
4. Relocating to Wisconsin

1. Installing New Presses

If you are thinking about installing a new press, you need to determine the quantity of Volatile Organic Compound (VOC) emissions that will result from the make and model of the press that you are considering. Often, you can base your estimate of the amount of VOC emissions that you expect from a new press on information that you have collected about actual VOC emissions from your existing presses. If you are unsure about how to determine your VOC emissions, review Section 2: Air Issues.

If you are thinking about installing a new press, you need to determine quantity of Volatile Organic Compound (VOC) emissions that will result from the make and model of the press that you are considering.

If you know what your actual VOC emissions are currently, or can estimate what they will be once you expand or relocate, then you can determine whether or not specific reporting or permitting requirements established by the Wisconsin Department of Natural Reosources (WDNR) are applicable.

You need to be aware of the following:

1. If your total actual annual facility VOC emissions exceed 6,000 pounds/year (3 tons/year) you must report VOC emissions to WDNR annually, prior to March 1st for the previous year's emissions.

2. If your total actual annual facility VOC emissions exceed 20,000 pounds/year (10 tons/year) you must apply for and obtain a Non-Part 70 (state or minor source) Operation Permit. Once you obtain an Operation Permit, you will need to modify it for each new press that you install by filing a construction permit application.

3. If your estimated level of actual uncontrolled VOC emissions from a new press is expected to exceed 20,000 pounds/year (10 tons/year), you must apply for and obtain a construction permit prior to initiating any construction or installation activities for the new press.

4. If your facility's total actual annual uncontrolled VOC emissions exceed 25 tons/year, and you are located within one of the southeastern Wisconsin severe ozone non-attainment area counties[1], you need to obtain a construction permit for each new press that you install regardless of the amount of VOC emissions that you expect from the new press. In other words, if your facility becomes a major source it needs to obtain construction permits for each addition or modification to the facility that results in an increase in VOC emissions, regardless of the size of the new source.

2. Expanding Building Size

If you are expanding the size of your building, it is important to obtain all required building permits and zoning authorizations, as necessary. If you will be acquiring an adjacent site to facilitate expansion, an environmental assessment should be conducted before property acquisition to identify any environmental liabilities, such as leaking underground storage tanks or other sources of contamination.

If you operate permitted presses and control devices, and this equipment will be relocated after building expansion, you need to apply for a new construction/operation permit to reflect the new location/ configuration within the expanded facility. If the expansion is being made to house an existing source or a new source of air emissions that requires a construction permit, you will need the construction permit before building begins.

If your building expansion activities will include construction activities that "disturb" more than 5 acres of land, you are required to obtain a storm water control permit. It is recommended that you discuss the need for such a permit with your construction contractor.

It is also recommended that any on-site wetlands in the potential path of expansion be identified and protected, as required. If you will be extending a sanitary sewer line into the expanded portion of the facility, and you do not currently have a copy of your local wastewater treatment plant's wastewater discharge ordinance, you should request a copy of and comply with it.

[1] The severe ozone non-attainment area includes the following counties for VOCs: Kenosha, Milwaukee, Ozaukee, Racine, Washington and Waukesha.

The severe ozone
non-attainment area includes the following counties for VOCs:

Kenosha
Milwaukee
Ozaukee
Racine
Washington
Waukesha

If you move your presses that have operation permits,
you need to update the permits to reflect the new locations.
Get the permits *before* building begins.

Building expansion is a good time to check the compliance of
storage tanks and wastewater systems.

3. Relocating Within Wisconsin

If you are relocating within the state of Wisconsin, you should carefully assess your new site by conducting an environmental assessment before property acquisition. More importantly, if you are a permitted facility with respect to air emissions, you will be considered a "new source of air emissions" at the new location and you will be responsible for obtaining a construction/operation permit prior to beginning the relocation.

You may also have some administrative duties. For example, if you currently file annual hazardous waste activity reports or annual air emission inventory reports with WDNR, you will have to up-date your address information with the agency.

It is also recommended that you contact a WDNR representative to identify any additional information needs to be updated as a result of your relocation.

4. Relocating to Wisconsin

If you are relocating to the State of Wisconsin and need assistance with understanding the State's regulatory climate, contact PIW.

It is also recommended that you obtain the publication: Expanding Industry in Wisconsin – a guide to meeting air quality requirements (PUBL-AM-055, September 1993). This publication clearly describes the air permitting process. It is available from WDNR by calling the Bureau of Air Management, New Source Review Unit Supervisor, at 608/266-7718.

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Appendix A: Wisconsin Great Printers Project Commitment Form and Checklists

This Appendix includes:

- A Sample Certificate of Membership
- A blank copy of theWisconsin Great Printers Project Commitment Form
- The Wisconsin Great Printers Project Annual Review Form, which includes:
    - Annual Environmental Compliance Checklist
    - Pollution Prevention Checklist

Great Printers Project Commitment Form

Please complete and return this form if you are interested in receiving more information about the Great Printers Project.

If at this time you would like to commit to the Great Printers Project, please sign and date the statement found at the bottom of this page.

Name_____

Title_____

Company Name _____

Address _____

City/State/Zip _____

No. of Employees _____

E-mail Address _____

Phone _____ Fax_____

We agree to be part of the Great Printers Project. We understand that this agreement requires our company to work with customers, suppliers, and employees to improve the environment through waste reduction. We commit ourselves to the Great Printers Principles and agree to subscribe to current environmental practices. Furthermore, we agree to evaluate our environmental performance during the next year and to provide a report of improvement to PIW when we reconfirm our participation as a Great Printer.

Authorizing Official _____

Signature_____ Date _____

Wisconsin Great Printers Project Annual Review Form

Complete the attached Annual Environmental Compliance Checklist and the Pollution Prevention Checklist. Return a copy of the completed checklists with a signed copy of this form to:

Great Printers Project Annual Review
c/o Printing Industries of Wisconsin
13005 W. Bluemound Road
P.O. Box 126
Elm Grove, WI 53122

Your Company

Company Name: _____

Address: _____

_____

Standard Industrial Classification (SIC) Code: _____

Number of Employees at this location: _____

Certification

I, or an employee under my supervision, have completed the attached Environmental Compliance and Pollution Prevention Checklists. These forms have been completed to enable my company to renew its participation in the Wisconsin Great Printers program for another year.

1. Based on use of the Environmental Compliance Checklist (please check one of the following two responses),

   r I verify that my company's printing facility is in compliance with applicable environmental rules and regulations.

   r There are some remaining compliance questions that I would like addressed. I would like PIW to call to discuss these questions and/or my facility's plans for action.

2. Based on use of the Pollution Prevention Checklist and/or other sources of information,

   My company plans to take the following "beyond compliance" pollution prevention actions to reduce wastes and/or emissions within the next 12 months (these may be from, but are not restricted to, items checked as "needs attention" on completed checklist).

   1. _____
   2. _____
   3. _____
   4. _____

My company will report its progress in implementing these actions as part of next year's Great Printers Project renewal.

I understand that these forms will be retained in confidence by Printing Industries of Wisconsin (PIW). The information in these forms may only be released as part of a collective summary that does not allow others to identify information provided by individual firms. This information is provided with the understanding that confidentiality will be protected, regardless of whether my company is a member of PIW.

Signature: _____

Name: _____

Title: _____

Date: _____ Phone No. _____

r I would appreciate a follow-up call from PIW to discuss questions I have regarding compliance or opportunities to reduce wastes or emissions. Specific questions I would like to discuss include:

1. _____
   _____
2. _____
   _____
3. _____
   _____

PRINT WI$eR

Wisconsin Great Printers Project Annual Environmental Compliance Checklist

Company: _____
Completed by: _____
Date: _____

Instructions

Consider each of the following questions as it applies to your printing facility. If a question needs further discussion or analysis before you can respond, circle it for follow-up, and then continue to answer the remaining questions. Before submitting the Annual Environmental Compliance Checklist to Printing Industries of Wisconsin (PIW) as part of your Great Printers Project annual certification, try your best to work through the unanswered questions. Feel free to call Printing Industries of Wisconsin (414/785-9090), the Wisconsin Department of Natural Resources Printing Sector Specialist (608/355-0811) or the UW-Extension's Solid and Hazardous Waste Education Center (608/262-0910) for help.

If you are still having trouble answering a question, place a question mark beside the item and note what is still unclear in the space provided at the end of the cover sheet. Then submit your Annual Environmental Compliance Checklist to PIW. A representative of PIW will call to help you complete your answer.

1. Air Issues

	Yes	No
1.1 Have you determined your annual air emissions level for VOCs for the last calendar year?	r	r
1.2 Are your facility's actual VOC emissions greater than 6,000 pounds per year (3 tons)?	r	r
A. If no, do you keep records of your VOC emissions calculations to demonstrate that you are below this limit?	r	r
B. If yes, did you submit an annual air emissions inventory to WDNR for last year's VOC emissions?	r	r
1.3 Are your facility's uncontrolled (before pollution control equipment) VOC emissions greater than 20,000 pounds per year (10 tons)?	r	r
A. If no, do you keep records of your VOC emissions calculations?	r	r
B. If yes, have you applied or do you intend to apply for a Title V Operation Permit (Non-part 70, or minor source) with WDNR?	r	r

	Yes	No
1.4 Is your facility a major source of VOC emissions? (Major sources have potential VOC emissions of 25 tons per year in six severe ozone non-attainment area counties[1] and 100 tons per year in the rest of the state.)	r	r
If yes, have you applied for a Title V Operation Permit (Part 70, or major source) with Wisconsin DNR?	r	r
1.5 Is your facility located in one of the nine southeastern counties[2] of the state where the Lithographic Printing RACT Rule applies?	r	r
A. If no, the RACT Rule does not apply to you.		
B. If yes, what is the applicability of the RACT Rule to you? (Check appropriate box.)		
r The facility is exempt from RACT.		
r The facility operates under limitations of an elective operating permit.		
r RACT is applicable.		
C. If RACT is applicable, have you submitted a certification of compliance to Wisconsin DNR?	r	r
1.6 Did you determine whether a construction permit was required prior to installing your last press? (In general, construction permits are required when uncontrolled emissions from a new press are expected to exceed 20,000 pounds per year.)	r	r
1.7 Are used towels/wipes containing cleanup solvents stored in covered containers?	r	r

2. Water and Wastewater

	Yes	No
2.1 Is your industrial wastewater (wastewater from uses other than washrooms, lunch/breakroom sinks, showers, etc.) discharged to a municipal wastewater treatment system? (Industrial wastewater should not be discharged to a septic system or to a stormwater system; such discharges are typically illegal.)	r	r
2.2 Are you familiar with local regulations affecting allowable wastewater discharges from your operations?	r	r
2.3 Do you know what the applicable limits are for industrial wastewater contaminants and characteristics in your wastewater discharge? (Examples include: silver, copper, zinc, cadmium, chromium, oil/grease, pH, etc.)	r	r
2.4 Have you confirmed that your wastewater discharges comply with these limits?	r	r
If yes, have you confirmed that by: (Check appropriate box)		
r Sampling and testing.		

[1] The severe ozone non-attainment area includes the following counties: Kenosha, Milwaukee, Ozaukee, Racine, Washington and Waukesha.

[2] The RACT Rule specifically applies in the following nine southeastern Wisconsin counties: Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, and Waukesha.

r Reviewing MSDSs for chemicals discharged to wastewater.

	Yes	No
2.5 Do you have photographic processes that produce silver-containing wastewater?	r	r

If yes, what procedures are used to remove silver? (Check appropriate box)

- r Installed equipment recovers silver on-site.
- r Silver containing wastes are collected and shipped off-site through a waste service contractor.

2.6 Are you preventing the discharge of inks and solvents to the wastewater treatment system?	r	r
2.7 Do you periodically test the discharge from the silver recovery unit(s) to confirm the quality of the discharge?	r	r

If yes, at what frequency do you test? (Check appropriate box)

- r once or more per day
- r weekly
- r monthly
- r less frequently than monthly

3. Hazardous Wastes

	Yes	No
3.1 Do you understand what makes a waste a "hazardous waste"?	r	r
3.2 Have you identified which of the wastes that are regularly or occasionally generated at your plant are hazardous?	r	r
3.3 Have you checked the characteristics and content of all solvents to determine if they are hazardous wastes?	r	r
3.4 Have you checked to be sure that waste solvents are collected and managed separately from garbage or used towels/wipes?	r	r
3.5 Have you checked the content of your inks to ensure that none are hazardous wastes and must be managed as such? (Most lithographic inks do not qualify as hazardous wastes.)	r	r

3.6 What is the generator status of your facility? (Check appropriate box.)

- r No hazardous wastes are generated.
- r Very Small Quantity Generator (VSQG).
- r Small Quantity Generator (SQG).
- r Large Quantity Generator (LQG).

3.7 If you checked VSQG above, do you comply with requirements for:

Labeling containers?	r	r
Keeping containers closed except when adding/removing waste?	r	r

	Yes	No
3.8 If you checked SQG or LQG above, do you comply with requirements for:		
Submitting an annual hazardous waste activity report to WDNR?	r	r
Proper collection, labeling, and storage of hazardous waste containers?	r	r
Keeping containers closed except when adding/removing waste?	r	r
Inspecting containers and documenting inspections?	r	r
Manifesting shipments of hazardous waste?	r	r
Emergency preparedness?	r	r
Training employees in hazardous waste management?	r	r
Developing a hazardous waste minimization plan?	r	r
3.9 Do you manage the following wastes/materials in accordance with Wisconsin DNR requirements?		
Launderable solvent contaminated towels/wipes?	r	r
Disposable solvent contaminated towels/wipes?	r	r
Empty containers?	r	r
Special wastes (mercury switches, fluorescent lamps, etc.)?	r	r
Residues and absorbents?	r	r
Used oil?	r	r

4. Solid Waste

	Yes	No
4.1 State regulations state that the following types of business wastes must be recycled: office paper, corrugated cardboard, newsprint, magazines, plastic containers, glass containers, polystyrene foam packaging, aluminum containers, steel containers, bi-metal containers, waste tires, used motor oil, lead-acid vehicle batteries, and major appliances. Are you complying with local ordinances that specify how business are to meet the state recycling requirements?	r	r

5. Stormwater

	Yes	No
5.1 Have you identified what happens to stormwater runoff from the facility's site? (For example, have you identified storm sewer drains and discharges into ditches, streams, ponds, lakes, etc.?)	r	r
5.2 Do you store all products, chemicals and wastes indoors or under cover to prevent storm water (rain, snow, etc.) from becoming contaminated by those materials?	r	r
5.3 Is there a potential for site stormwater to become contaminated by coming in contact with process materials or process wastes?	r	r
A. If no, applying for a stormwater discharge permit is not required.		
B. If yes, have you applied for a stormwater discharge permit?	r	r
5.4 Does your facility have a stormwater discharge permit?	r	r

If yes, are you in compliance with permit conditions? r r

6. Health and Safety

	Yes	No
6.1 Have the following written plans/programs been prepared:		
Emergency action or preparedness plan? (If 10 or fewer employees, the plan may be communicated orally.)	r	r
Hazard Communication program?	r	r
Lockout/Tagout program?	r	r
6.2 Are Material Safety Data Sheets (MSDSs) for all chemical products currently in use available at the plant and readily accessible to employees?	r	r
6.3 Have employees received training in reading and understanding MSDSs?	r	r
6.4 Have key plant personnel been trained in how to respond to hazardous chemical spills and emergencies, including who to notify in the event of a spill?	r	r
6.5 Are all containers of hazardous materials properly labeled?	r	r
6.6 Is personal protective equipment (PPE) provided to employees as needed?	r	r

7. Emergency Planning and Community Right-to-Know

	Yes	No
7.1 Do you know when spills of hazardous materials need to be reported? (For example, the quantity of a spill for particular chemicals used on-site that would require reporting)?	r	r
7.2 Do you know who has to be notified when a spill occurs?	r	r
7.3 In the past year, did you experience a reportable spill?	r	r
If yes, did you meet all requirements for reporting, responding to, and cleaning up the spill?	r	r
7.4 Do you know whether Emergency Planning Notification requirements apply to your facility (that is, do you store products on-site in excess of their threshold planning quantities – TPQs)?	r	r
7.5 In the past year, did you ever have on hand at one time more than 10,000 pounds of a hazardous substance, or more than 500 pounds of an extremely hazardous substance?	r	r
A. If no, you are exempt from Tier II reporting.		
B. If yes, did you complete an annual chemical inventory (Tier II form)?	r	r
7.6 In the past year, did you use more than 10,000 pounds of a listed toxic substance?	r	r
A. If no, you are exempt from Toxic Release Inventory (TRI) reporting.		

B. If yes, did you complete an annual TRI report (Form R)? r r

PRINT WI$eR

Wisconsin Great Printers Project Pollution Prevention Checklist

Company: _____
Completed by: _____
Date: _____

Instructions

The Great Printers Principles include seeking continuous environmental improvement, going beyond compliance by employing the most environmentally sound practices, maximizing the reduction of waste at the source, and reusing or recycling waste that can't be prevented. The emphasis is on pollution prevention activities that will help you continue to produce high-quality products with minimal environmental impact.

This checklist contains a menu of pollution prevention activities for you to consider applying at your shop, organized by printing operation or substance used, e.g., film developing, plate processing, etc. Within each of these categories, basic recommended practices are given in bold, followed by intermediate recommended practices which require operating changes on some modest investment. Alternative technologies, in italics, cover practices that require investment in new equipment.

The first step in completing this checklist is to move through the list in each category, placing checks in the appropriate boxes. After you have reviewed the entire checklist, go back and identify the three activities or projects you would like to do next year and list them in the space provided on the Annual Review Form.

You are not limited to this list in choosing your projects--we encourage you to identify a pollution prevention activity or project which does not appear on the list that will help you reduce your wastes and/or environmental impact. In future years, this checklist will also ask you to let us know which projects you actually did and how well they worked.

If you have any questions or comments about this Great Printers Project Pollution Prevention Checklist or if you need some help in filling it out, please call the UW-Extension's Solid & Hazardous Waste Education Center at 608-262-0910, or Printing Industries of Wisconsin at 414-785-9090. SHWEC and PIW staff are also available to provide technical assistance as you implement your pollution prevention activities and projects.

Pollution Prevention Opportunities: Film Developing

Best Management Practice	Done	Needs Attn.	Not Applicable
Recycle scrap film.	r	r	r
Keep chemical baths covered to prevent oxidation and contamination of chemicals, and to reduce emissions.	r	r	r
Ensure that no photochemicals are discharged to a septic system. These should either be collected and sent off-site for treatment and disposal or treated as necessary and discharged to a sanitary sewer system.	r	r	r
Recover silver from used fixer by either:			
• **Installing equipment to recover silver from pre-press wastewater discharge on-site; or**	r	r	r

- **Contracting with a service for shipment and treatment of silver-containing wastewater.**

Best Management Practice	Done	Needs Attn.	Not Applicable
The following assume that you recover silver on-site:			
Check that your installation and operation meet the practices recommended by the Silver Council (call 301-664-5156 for a copy of the Code of Management Practice).	r	r	r
Verify that the flow rate through your silver recovery system does not exceed the flow rate recommended by the manufacturer.	r	r	r
Implement procedures to ensure that discharge from your on-site silver recovery system meets sewer code requirements including:			
• **Employees are trained on proper system operation, and maintenance**	r	r	r
• **Discharge from the system is checked at least weekly with test strips to ensure proper performance.**	r	r	r
• **A log is maintained documenting system checks and results.**	r	r	r
If you use chemical recovery cartridges (CRCs), verify that you have two cartridges, installed in series, and clear tubing between units (brown liquid in tubing indicates need to change first unit).	r	r	r
Check pH of solution entering CRCs with pH operating range recommended by manufacturer (usually 4.5 to 5.5). Typical fixer is in the range of 4.5 to 6.5 and may not need adjustment, depending on CRC specifications.	r	r	r
Train employees for proper changeout of CRC units. Second unit should be moved to the first position and the new unit installed in the second position (after filling new CRC unit with water to prevent channeling and premature failure).	r	r	r
Use a terminal electrolytic silver recovery unit in front of CRC units for initial silver recovery and then pump to a holding tank where the partially desilvered solution can be metered into the CRC system.	r	r	r
Use in-line electrolytic silver recovery to permit reuse of fixer in addition to developer. Use replenishers and bath extenders according to supplier recommendations.	r	r	r
Make certain that automated processing equipment is properly maintained to ensure maximum life of chemicals and minimal waste.	r	r	r
Install “squeegees” (cannot be installed on all developers) to remove excess chemicals prior to immersing film in a different chemical bath. This will reduce chemical carryover and extend bath life.	r	r	r

Best Management Practice	Done	Needs Attn.	Not Applicable
Use photochemical recycling services provided by suppliers or other vendors.	r	r	r
Save water by using intermittent rinsewater flow (no flow when processor is on idle).	r	r	r
Consider silver-free film (diazo, vesicular, photopolymer, electrostatic, or selenium-based).	r	r	r
Consider direct-to-plate (computer-to-plate) systems.	r	r	r
Consider digital proofing technology.	r	r	r

Pollution Prevention Opportunities: Plate Processing

Best Management Practice	Done	Needs Attn.	Not Applicable
Recycle aluminum plates.	r	r	r
Recycle or treat metal etching developer solution to remove metals.	r	r	r
Extend life of plate developer through use of monitoring and replenishing.	r	r	r
Use recycling service for depleted plate developer.	r	r	r
Use countercurrent rinsing techniques.	r	r	r
Use presensitized aqueous plates.	r	r	r
Use non-hazardous plate developers.	r	r	r
Save water by using “intermittent” rinsewater flow (no flow when processor is on idle).	r	r	r
Use digital printing systems (direct-to-press).	r	r	r

Pollution Prevention Opportunities: Make-ready and Process Control

Best Management Practice	Done	Needs Attn.	Not Applicable
Set goals to minimize make-ready waste. Regularly track and compare make-ready wastes (as a percentage of acceptable printed product) with goals.	r	r	r
Establish and follow standard procedures for checking plate-to-press registration.	r	r	r
Develop and document recommended press settings for each press, for most common paper and ink combinations.	r	r	r
Record paper, ink, press, and press settings for all possible re-run jobs, to reduce make-ready on subsequent runs.	r	r	r
Establish a regular schedule for cleaning dampening fountains.	r	r	r
Establish and follow standard procedures for mixing fountain solution. Check concentration by measuring pH and conductivity prior to use.	r	r	r
Implement an effective program to ensure that color requirements of the customer are thoroughly understood and can be tracked throughout prepress and production.	r	r	r
Check paper and ink for compatibility before initiating make-ready. Record problems and solutions with ink/paper matches to reduce future problems and wastes.	r	r	r
Use job scheduling to reduce press cleanup by running lighter colors, then darker colors, whenever possible.	r	r	r
Dedicate a press or presses to running the same colors, as much as required colors for jobs permit, to reduce press cleanup.	r	r	r
Implement a comprehensive roller maintenance program that includes recorded, regularly scheduled visual inspections, checks on roller durometer, deglazing, and reconditioning.	r	r	r
Establish a checklist to spell out requirements for basic maintenance of all presses, including what should be done, when it will be done, who should do it, and procedures for documenting that it has been done.	r	r	r
Use industry-standard light sources for checking color match, and change lights at manufacturer-prescribed intervals.	r	r	r

Check color during make-ready and production with spectrophotometer and densitometer. r r r

Pollution Prevention Opportunities: Inks

Best Management Practice	Done	Needs Attn.	Not Applicable
Review ink estimation methods to assure minimal ink waste.	r	r	r
When adding ink to fountain, add only enough ink as is required to complete the scheduled job (reduces waste and cleanup).	r	r	r
Schedule work on presses with a goal to minimize color changes and print station cleanups.	r	r	r
Evaluate waste ink management practices to assure that no inks are improperly disposed and that potential liabilities are minimized.	r	r	r
Eliminate lead, mercury, cadmium, and chromium-based pigments.	r	r	r
Increase use of vegetable oil based inks (such as soy oils). Vegetable oils have lower VOC contents than petroleum oils.	r	r	r
Spray anti-skin on ink fountains overnight; keep ink kits sealed to prevent oxidation. Use date labels on tins.	r	r	r
Reduce waste ink by increasing use of existing ink inventories whenever possible, especially for in-house jobs.	r	r	r
Return unused ink to supplier, if possible.	r	r	r
Keep good records on stock for recall and reuse, and maintain a first-in, first-out use plan.	r	r	r
Reblend inks to black (either on-site or off-site) for internal or external use.	r	r	r
Blend leftover inks into required or requested PMS colors using software designed to generate colors from existing inventory.	r	r	r
Consider automatic ink levelers for even distribution and ink agitators to help reduce oxidation of inks in the tray.	r	r	r
Consider computer-controlled ink mixing with digital scales.	r	r	r
Consider ultraviolet (UV) and electron beam (EB) curable inks.	r	r	r

Pollution Prevention Opportunities: Fountain Solutions

Best Management Practice	Done	Needs Attn.	Not Applicable
Reduce the concentration of IPA in your fountain solution.	r	r	r
Carefully maintain proper conditions for the solution by checking pH and conductivity of fountain solution at least once per shift.	r	r	r
If you are using IPA, refrigerate (to about 60° F or less) to reduce evaporative loss of isopropyl alcohol.	r	r	r
Train all press operators in understanding how conductivity and pH relate to problems at press and how to maintain conductivity and pH within prescribed ranges for the fountain solution.	r	r	r
Eliminate the use of IPA by switching to low-VOC alcohol replacements or substitutes for your fountain solution.	r	r	r
When selecting your IPA substitute, minimize the concentration of hazardous air pollutants (HAPs) and SARA reportable chemicals. Check MSDSs and talk with your supplier to identify reportable chemicals.	r	r	r
To facilitate IPA elimination, check roller durometers to make sure that they are appropriate for the fountain solution that you are using, and keep rollers maintained.	r	r	r
Install recirculating and automatic mixing units for fountain solution.	r	r	r
Use in-line filters in your recirculating units to reduce or eliminate the need to discharge or dispose of fountain solution prematurely.	r	r	r
Monitor the consistency of your incoming makeup water over an extended period of time. Since most fountain solutions are mixed to achieve a target conductivity and pH, swings in the incoming water's conductivity, pH, and mineral content can greatly affect the performance of your fountain solution.	r	r	r
Consider waterless printing technology.	r	r	r
Consider a reverse osmosis or deionization system for source water.	r	r	r

Pollution Prevention Opportunities: Blanket and Roller Wash

Best Management Practice	Done	Needs Attn.	Not Applicable
Dispense solvent from safety cans that deliver a controlled amount of solvent to a shop towel, and keep containers closed.	r	r	r
Use pre-used shop towels for the initial cleaning, then use clean towels for the final cleaning.	r	r	r
Use parts washer to clean press trays.	r	r	r
Check the condition of roller cleanup blades and ensure blade angles are properly set.	r	r	r
Eliminate use of "type wash" cleaners or cleaners that contain hazardous air pollutants such as toluene, MEK, and xylene (or use only on hard-to-clean spots).	r	r	r
Collect and reuse cleaning solvent. Used solvent may be perfectly acceptable for initial cleaning applications like cleaning out an inktray. After the majority of the ink is removed, clean solvent may be used for the final cleaning.	r	r	r
Recover solvent from shop towels for reuse or recycling using hand wringer or centrifuge equipment.	r	r	r
Ensure that used solvents and solvent-saturated towels or wipes are not disposed with the trash.	r	r	r
Keep shop towels in closed containers while on-site.	r	r	r
Reduce the VOC emissions from cleanup solvents you use, by using reduced VOC content cleaners or by using lower vapor pressure solvents. Use solvents with vapor pressures of 10 mm of Hg (millimeters of mercury) or less, as measured at 20°C (Celsius) or 68°F (Fahrenheit).	r	r	r
Send solvents that can't be reused off-site for recycling.	r	r	r
Conduct training on proper cleaning methods to assure success when using new materials and practices.	r	r	r
Consider installing automating blanket washers.	r	r	r
Consider installing a centrifuge to recover solvents from shop towels and wipes for reuse.	r	r	r

Pollution Prevention Opportunities: Finishing

Best Management Practice	Done	Needs Attn.	Not Applicable
Replace solvent-based adhesives with water-based adhesives when possible.	r	r	r
Avoid or minimize use of coatings and adhesives that interfere with recyclability of the finished product.	r	r	r
Use mechanical binding in place of chemical adhesives when acceptable to the customer.	r	r	r
Properly size paper to reduce cutting waste, and recycle cuttings and cardboard.	r	r	r
Maintain good inventory practices, including use of older binding materials, to avoid waste from outdated or unusable materials.	r	r	r

Pollution Prevention Opportunities: Facility Management/Customer Relations

Best Management Practice	Done	Needs Attn.	Not Applicable
Facility Management			
Establish, communicate, and demonstrate to employees a management commitment to the concept of pollution prevention.	r	r	r
Have a clearly defined, written pollution prevention policy that is accessible to every employee.	r	r	r
Positively acknowledge pollution prevention initiatives by company personnel.	r	r	r
Positively acknowledge personnel interest and achievement in pollution prevention activities.	r	r	r
Provide ongoing education and training for employees to enhance both quality and environmental performance.	r	r	r
Incorporate pollution prevention or environmental performance into performance standards and appraisals for managers and production personnel.	r	r	r
Link environmental performance and quality team objectives; recognize the common attributes.	r	r	r
Customer Relations			
Review and maintain communications, both internally and externally; know what your customers want so that you get the order right the first time and minimize waste.	r	r	r

Work with customers during the job design to show how to modify layout to minimize trim wastes.

Best Management Practice	Done	Needs Attn.	Not Applicable
Survey your customers to better understand their needs and expectations. You can avoid carrying excess options in inks, papers, and coatings that contribute to additional waste generation.	r	r	r
Follow-up on customer jobs to sample satisfaction with products. You can better understand the perceptions and performance issues related to alternative inks and papers that will reduce waste and promote recycled-content usage.	r	r	r
Work with customers (offer discounts) to encourage use of existing inventory of inks, inks reblended from stock, recycled ink, or paper that may be left over from other jobs. Find other incentives for customers that foster the reduction in waste generation at your facility.	r	r	r
Work with customers to modify selection of ink, coatings or adhesives to reduce hazardous waste or VOCs.	r	r	r
Work with customers in the selection of paper type to increase recycled content of paper, increase selection of chlorine-free paper, and reduce paper basis weight.	r	r	r
Provide training to staff to help them recognize the opportunities in working with customers to reduce waste and emissions.	r	r	r

Pollution Prevention Opportunities: General Raw Materials/Good Housekeeping/Chemicals

Best Management Practice	Done	Needs Attn.	Not Applicable
General Raw Materials			
Recycle waste (and scrap) paper.	r	r	r
Work with one or more vendors to see how they can help you reduce VOCs, hazardous waste, and other waste materials.	r	r	r
Recycle paper cores.	r	r	r
Use returnable containers or drums when possible; for others, recycle.	r	r	r
Require a review of all new material purchase requests to minimize or eliminate the use of hazardous materials.	r	r	r

Best Management Practice	Done	Needs Attn.	Not Applicable
Good Housekeeping			
Segregate hazardous wastes from nonhazardous waste.	r	r	r
Ensure facility is clean, neat, and well lighted.	r	r	r
Install and maintain a system to prevent unintentional spills or leaks from entering sanitary sewers (for example, seal floor drains and/or install leakproof berms around chemical storage areas).	r	r	r
Chemical Product Inventory and Tracking			
Use oldest materials first.	r	r	r
Limit samples to smallest required amount. Ask supplier to take back unused trial chemicals.	r	r	r
Inspect incoming materials. Refuse delivery of damaged or improperly labeled containers or materials.	r	r	r
Make sure materials are properly stored and managed to minimize the potential for damage to inventory, resulting in additional wastes.	r	r	r
Reduce container waste by ordering bulk purchases (ink, solvent) if high volume usage is occurring.	r	r	r
Centralize responsibility for ordering and distributing solvents.	r	r	r
Track chemical purchases and maintain good inventory records to facilitate reporting, and identification of material use reduction opportunities.	r	r	r

Appendix B: Glossary

Actual Operating Hours Per Year – Actual hours of operation of a press or printing facility. Calculated by multiplying the number of shifts that are operated per day, by the number of hours of each shift, by the days per week and weeks per year worked. Example: 2 shifts/day x 8 hours/shift x 5 days per week x 52 weeks per year = 4,160 actual operating hours per year.

Air Emission Inventory Report – Commercial/industrial facilities, including printers, that have annual actual VOC emissions of 6,000 pounds per year (3 tons per year) or more are required to complete an air emission inventory report and submit it to the WDNR annually, by March 1st for the previous year's emissions. The air emission inventory report has been included in the WDNR's consolidated reporting system.

Ambient Air Quality – The quality of air in a region prior to consideration of the effects of a new air emissions source.

Annual Hazardous Waste Activity Report – Generators of hazardous waste (SQGs and LQGs) are required to submit an annual hazardous waste activity report to WDNR by March 1st for the previous calendar year's hazardous waste generation activities. The annual hazardous waste activity report has been included in WDNR's consolidated reporting system.

Attainment Areas – Those areas (counties) in the state where the air quality is better than federal air quality standards established for: sulfur dioxide, particulate matter, carbon monoxide, ozone, nitrogen oxide and lead.

BACT – Best Available Control Technology – for any specific source, the necessary technology that would produce the greatest reduction of each pollutant regulated by the Clean Air Act, taking into account energy, environmental, economic and other costs.

BAT – Best Available Technology – The best economically achievable technology.

CAA - Clean Air Act – 1970 legislation including amendments in 1977 and 1990.

Capture Efficiency – The weight per unit time of an air contaminant entering a capture system and delivered to a control device divided by the weight per unit time of the air contaminant generated by the source, expressed as a percentage.

Capture System – The equipment (including hoods, ducts, fans, etc.) used to contain, capture, or transport an air contaminant to a control device.

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (1980) – commonly known as "Superfund."

Characteristic Waste – A waste classified as hazardous because it is ignitable, corrosive, reactive or toxic (as determined by the TCLP test) is a characteristic waste. It has a waste code in the range "D001" to "D0043." Each of these four characteristics are defined in section NR 605.08, Wis. Admin. Code.

Commence Construction – To engage in a program of on-site construction, including a site clearance, grading, dredging or landfilling specifically designed for a stationary source in preparation for the fabrication, erection or installation of the building components of the stationary source.

Conductivity – A physical measurement of electrical resistance of the fountain solution liquid that is used to establish an acceptable operating range for the work being printed.

Consolidated Reporting System – The Wisconsin-specific electronic version of a consolidated reporting package that includes the WDNR annual hazardous waste activity report, the WDNR annual air emissions inventory report, and the USEPA toxic release inventory report.

Construction Permit – A permit that is required by the WDNR prior to commencing construction, reconstruction, replacement, relocation, or modification of a stationary source, unless the source is exempt from the requirement to obtain a permit under NR 406.

Control Device – Equipment used to destroy or remove air contaminants in a gas stream exiting a capture system.

Control Efficiency – The weight per unit of time of an air contaminant exiting a control device divided by the weight per unit of time of the air contaminant entering the control device, expressed as a percentage.

Controlled Emissions – Emissions exiting a control device; emissions are reduced based on the destruction or collection efficiency of the control device, expressed as a percentage of uncontrolled emissions.

Corrosive Waste – A hazardous waste that has a pH of less than or equal to 2 or greater than or equal to 12.5

CRC – Chemical Recovery Cartridge – A component of a photographic silver recovery system which recovers silver from used fixer solution.

CRS – (see Consolidated Reporting System)

Days Operated Per Year – The number used in the formula for determining the number of hours operated per year (see Actual Operating Hours Per Year).

DEG – (see Division of Emergency Government)

Division of Emergency Government – The State of Wisconsin agency which, together with the WDNR, has the responsibility of carrying out the EPCRA (SARA Title III) programs.

DOT – Department of Transportation – US Department of Transportation or Wisconsin Department of Transportation (WDOT).

Emergency Action – Usually refers to an established plan to action that is followed in the event of an emergency that could impact human health or the environment.

EBC – Electron Beam Curable – refers to inks that can be "set" by an electron beam light.

EC – Emergency Coordinator – a designated person at a facility who is on the premises or on call at all times and who will coordinate the response to an emergency including appropriate notification and reporting.

Emergency Government Office – (see Division of Emergency Government)

Ethylene Based Glycol Ethers – (see glycol ethers)

Emissions – Releases to the atmosphere of any contaminant, whether released directly or indirectly.

Emission Factor – Used in estimating the MTE of VOCs. The emission factor is a ratio of maximum operating hours per year to actual operating hours per year.

EHS – Environmental Health and Safety – refers to requirements established by OSHA.

EHS – Extremely Hazardous Substance – refers to a list of chemicals classified as extremely hazardous that have been established under EPCRA.

EMS – Environmental Management System

EPA – (see USEPA)

EPA Identification Number – A 12-character number assigned by EPA to each generator, transporter and treatment, storage, or disposal facility. Facilities which are not generators but anticipate possible generation activity must also apply for and receive an EPA ID number.

EPCRA – Emergency Planning and Community Right-To-Know-Act.

Flash Point – The lowest temperature at which a liquid produces enough vapor to form an ignitable mixture with air. A test used to determine whether or not a waste is a hazardous (ignitable) waste. If a waste's flash point less than 140°F, the waste is a hazardous (ignitable) waste.

F-Waste – A waste code given to hazardous wastes that are described as generated by "non-specific sources."

Generator – (see Hazardous Waste Generator)

Glycol Ethers – Glycol ethers is a generic trademark for hundreds of solvents. There are two major families of glycol ethers: ethylene- and propylene-based. WDNR reporting requirements apply only to the ethylene-based versions; including mono- and di- ethers of ethylene, diethylene, and triethylene glycol. There are six specific compounds that are glycol ethers: 2-Butoxyethanol (EGBE), 2-Methoxyethanol (EGME), 2-Ethoxyethanol (EGEE), Isopropoxyethanol, 2-Methoxyethyl acetate (EGMEA), and 2-Ethoxyethyl acetate (EGEEA). If a specific glycol ether's emissions are greater than or equal to their source-wide reporting levels, it is to be reported separately. The sum of all glycol ether emissions, which would include these six specific compounds, should also be reported.

GPP – Great Printers Project – (see a full description in the Introduction of this Handbook).

HAP(s) – Hazardous Air Pollutant(s) – air pollutants which are not covered by ambient air quality standards but which, as defined in the Clean Air Act, may reasonably be expected to cause or contribute to irreversible illness or death.

HAZCOM – Hazard Communication Standard – an OSHA regulation that ensures 1) that the hazards of all chemicals produced or imported by chemical manufacturers or importers are evaluated, and 2) that information concerning their hazards are communicated to affected employers and employees, that are users of the chemicals.

Hazardous Substance – Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive. Also, any substance designated by USEPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or if otherwise released into the environment.

Hazardous Chemical – Any material that is a physical hazard or health hazard.

Hazardous Waste – A solid waste that can pose a substantial or potential hazard to human health or the environment when improperly managed. It possesses at least one of four characteristics or appears on special WDNR lists. The regulatory definition of hazardous waste is found in s. NR 605.04, Wis. Admin. Code.

Hazardous Waste Generator – a facility or mobile source whose actions or processes produce hazardous wastes.

Hazardous Waste Generator Identification Number – (see EPA Identification Number)

Hazardous Waste Manifest – The shipping document that needs to be completed and signed by the generator and accompany each shipment of hazardous waste sent off site by a SQG or LQG.

Hazardous Waste Treatment – Means any method, technique, or process, including neutralization, which follows generation and which is designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the hazardous waste, or so as to recover energy or material resources from the waste, or so as to render the waste nonhazardous for transport amenable for recovery, amenable for storage, or reduced in volume. Treatment includes incineration.

Hg – The elemental symbol for mercury. Vapor pressure measurements are expressed in terms of millimeters of mercury at a given temperature, for example 10 mm Hg at 68˚F.

HMIS – Hazardous Material Information System – A common labeling method that uses color coding, numbers, and letters to explain health, flammability, and reactivity hazards, and to identify proper personal protective equipment.

HSW – Heatset Web – A lithographic offset printing process in which the printed image is applied to a continuous substrate (web) passing through the printing units of the press and heat is used to set/dry the ink as the web passes through a dryer.

Ignitable Waste – A waste that is deemed to be a hazardous waste because its flash point is below 140°F.

Image Transfer – The process of transferring the printed image from the image carrier to the substrate. With offset lithography the image transfer is indirect, from plate (image carrier) to blanket to substrate.

IPA – Isopropyl Alcohol (Isopropanol) – A chemical that has been widely used in the past as a fountain solution component because of its unique chemical properties.

ISO 14000 – International Standards Organization, Standard 140000: Environmental Management System

LACT – Lowest Available Control Techniques

LAER – Lowest Achievable Emission Rate

Land Disposal Restriction – Also known as landban, the restriction requires every generator of hazardous wastes to notify the disposal facility to which the waste is being sent if the waste can be land disposed or needs to be otherwise treated.

Lb. or Lbs. – pounds

LEPC – Local Emergency Planning Committee – A county-level unit of government, operating in each of the 72 counties in Wisconsin, established under the State Emergency Response Board (SERB) by EPCRA.

Listed Wastes – Those wastes that are listed as hazardous in WDNR Hazardous Waste Management Regulations. Hazardous wastes with F-, K-, P-, and U-hazardous waste numbers are listed wastes.

Lithographic Printing RACT Rule – (see RACT)

Lockout/Tagout Program – An OSHA regulation that is intended to reduce the potential for injury or death of service personnel resulting from the sudden release of energy (such as electrical or mechanical energy) that is present or stored in equipment being serviced.

LQG – Large Quantity Generator – A hazardous waste generator that produces (generates) in one or more months during the calendar year, 2205 pounds or more of hazardous waste and accumulates hazardous waste for 90 days or less..

MACT – Maximum Achievable Control Technology

Major Source – a stationary source which emits or has the potential to emit: (1) 25 tons per year or more of VOCs in a severe ozone non-attainment area; (2) 100 tons per year or more of VOCs in rural transport, marginal, or moderate ozone non-attainment areas; (3) 10 tons per year or more of a single HAP, or; (4) 25 tons per year or more of any combination of HAPs.

Manifest – (see Hazardous Waste Manifest)

Manifest System – Tracking of hazardous wastes from “cradle to grave” (generation through disposal) with accompanying documents known as hazardous waste manifests.

Maximum Operating Hours Per year – The maximum hours of operation theoretically possible for a press or printing facility. Calculated by multiplying the maximum hours per day (24) by the maximum number of days per year (365) which equals 8760 hours per year.

Minor Source – A stationary source of air emissions which is not a major source.

mm Hg – millimeters of mercury – measurement units used to describe vapor pressure at a given temperature.

MSDS – Material Safety Data Sheet – a compilation of information required under the OSHA’s Hazard Communication Standard for each chemical product sold and used about the identity of hazardous chemicals, health, and physical hazards, exposure limits, and other precautions.

MTE – Maximum Theoretical Emissions – Means the quantity of air contaminants that theoretically could be emitted by a stationary source without control devices based on the design capacity or maximum production capacity of the source. When determining annual maximum theoretical emissions, a source shall be presumed to operate 8,760 hours per year unless its physical design precludes 8,760 hours of operations per year. Where a source's physical design restricts the number of hours it may operate, annual maximum theoretical emissions shall be calculated taking this restriction into account. In determining the maximum theoretical emissions of VOCs for a source, the design capacity or maximum production capacity shall include the use of raw materials, coatings and inks with the highest VOC content used in practice by the source. Realistic operating conditions shall be taken into account in determining emissions.

NAAQS – National Ambient Air Quality Standards

NHSW – Non Heatset Web – A lithographic offset printing process in which the printed image is applied to a continuous substrate (web) passing through the printing units of the press. The ink dries without heat (non heatset) by oxidation and absorption into the substrate.

Non-attainment Area – An area that does not meet one or more of the national ambient air quality standards for the criteria pollutants designated in the Clean Air Act.

Non-Part 70 Operation Permit – A permit that is required for any printing facility that was not required to file for a Part 70 Operation Permit, but which has actual VOC emissions measured prior to entering any pollution control device of 1666 pounds per month (equivalent to 20,000 pounds per year or 10 TPY). Application dates are from July 1997 through December 1998, depending on the county in which the facility is located.

NR 400-Series Regulations – WDNR regulations related to Air Pollution Control.

NRC – National Response Center

NSPS – New Source Performance Standards – Uniform national EPA air emission and water effluent standards which limit the amount of pollution allowed from new sources or from modified existing sources.

NSR – New Source Review – A Clean Air Act requirement that requires state implementation plans to include a permit review that applies to the construction and operation of new and modified major stationary sources in non-attainment areas to assure attainment of the national ambient air quality standards.

Offset – A process whereby emissions from a proposed new or modified stationary source are balanced, or offset, by reductions from existing sources to stabilize total emissions in non-attainment areas.

Organic Compound – A compound of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, metallic carbonates and ammonium carbonate.

OSHA – Occupational Safety and Health Administration

Ozone – Found in two layers of the atmosphere, the stratosphere and the troposphere. In the stratosphere (the atmospheric layer 7 to 10 miles or more above the earth's surface) ozone is a natural form of oxygen that provides a protective layer shielding the earth from ultraviolet radiation. In the troposphere (the layer extending 7 to 10 miles from the earth's surface) ozone is a chemical oxidant and major component of photochemical smog. It can seriously impair the respiratory system and is one of the most widespread of all the criteria pollutants for which the Clean Air Act required EPA to set standards.

Ozone Season – The period in Wisconsin from May 1 through September 30 of any year.

P2 – Pollution Prevention – The active process of identifying areas, processes, and activities which create excessive waste byproducts for the purpose of substitution, alteration, or elimination of the process to prevent waste generation.

Part 70 Operation Permit – A permit that is required for any printing facility that is a major source (see Major Source). Application dates for existing sources were in 1994 and 1995.

Particulate – Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog found in air or emissions.

% by wt. – Percent by weight – A common unit of measure used to describe the VOC content of products and chemicals.

pH – An indication of the acidity or alkalinity of an aqueous solution. Values range from 0 to 14. A pH of 2 indicates a strong acid; a pH of 7 indicates neutrality; and a pH of 13 indicates strong alkalinity.

PIW – Printing Industries of Wisconsin – A State trade association representing printing, graphic arts, and allied industries.

POTW – Publicly Owned Treatment Works – A municipal waste water treatment plant and sewerage system owned by a municipality or the state.

Pollution Prevention – (see P2)

ppb – Parts per Billion – A unit of measurement that indicates a ratio, such as parts of a contaminant per billion parts of air (also see ppm).

PPE – Personal Protective Equipment – Devices worn by the worker to protect against hazards in the work- place. Respirators, gloves, goggles, and safety shoes are examples of PPE.

ppm – Parts per Million – A unit of measurement that indicates a ratio such as parts of a contaminant per million parts of air. For liquids, ppm can be expressed in terms of milligrams per liter (mg/l).

Process Line – Means one or more actions or unit operations which must function simultaneously or in sequence in order to manufacture or modify a product (e.g., a sheetfed press with feeder and stacker are considered a process line).

Process Line Emissions – Emissions from a process line.

PSD – Prevention of Significant Deterioration – A USEPA program in which state and/or federal permits are required in order to restrict emissions from new or modified sources in places where air quality already meets or exceeds primary and secondary ambient air quality standards.

PTE – Potential To Emit – Maximum capacity of a source to emit a pollutant under the source's physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restriction on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation is federally enforceable.

RACT – Reasonably Available Control Technology – Technology which provides the lowest emissions rate that a particular source is capable of achieving by the application of control technology that is reasonably available considering technological and economic feasibility. Such technology may previously have been applied to similar, but not necessarily identical, source categories.

Reactive Waste – A hazardous waste that has any of a number of properties, some of which are 1) it is normally unstable and readily undergoes violent changes without detonating; 2) it reacts violently with water; and 3) it forms potentially explosive mixtures with water.

Recycling – The beneficial use, reuse or legitimate recovery or reclamation of a hazardous waste. Recycling also includes the recovery of energy from hazardous waste. Recycling can be performed on site or off site, after the waste has been generated.

Release – Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, dumping, or disposing into the environment of a hazardous or toxic chemical or substance. A release can be intentional or accidental.

ROG – Reactive Organic Gas – similar to VOC, but includes only those organic gases that are reactive and participate in photochemical reactions in the atmosphere (also see VOC).

RQ – Reportable Quantity

Sanitary Sewers – An underground piping system that carries off only domestic or industrial waste, not stormwater.

SARA Title III – Title III of the Superfund Amendments and Reauthorization Act of 1986 – an extensive recordkeeping and notification program for hazardous substances established under EPCRA.

Satellite Accumulation Area – An area at or near the place of hazardous waste generation where up to 55 gallons of hazardous waste may be accumulated and which will be exempt from the 180-day shipping provision until the total is accumulated and moved to the on-site storage area.

Septic System – An onsite system designed to treat and dispose of domestic sewage. A typical septic system consists of a tank that receives waste from a residence or business and a system of tile lines or a pit for disposal of the liquid effluent. The sludge (solids) that remains after decomposition of the sewage by bacteria in the tank must be pumped out periodically.

SF – Sheet-fed – A lithographic offset printing process in which the printed image is applied to sheets of substrate (sheet-fed) passing through the printing units of the press. The ink dries by oxidation and polymerization on the substrate.

SHWEC – Solid and Hazardous Waste Education Center – a part of the University of Wisconsin, offering educational assistance in hazardous waste management and pollution prevention.

SIC – Standard Industrial Classification – the SIC code for Printing, Publishing, and Allied Industries as a group is 2700; Commercial Printing, Lithographic has the SIC code of 2752.

SIP – State Implementation Plan

Solvent – Organic materials which are liquid at standard conditions and which are used as dissolvers, viscosity reducers, or cleaning agents.

SPCC – Spill Prevention Control and Countermeasure

Storm Sewer – A system of underground pipes (usually separate from sanitary sewers) that carries only water runoff from buildings and land surfaces.

SQG – Small Quantity Generator – A facility that generates less than 2205 pounds of hazardous waste per month for every single month in the calendar year. A SQG stores less than 13,230 pounds of hazardous waste on-site at any one time and accumulates hazardous waste for 180 days or less (or 270 days or less depending on distance transported).

Stack – Any device or opening designed or used to emit air contaminants to the ambient air. A stack may be real or fictitious for purposes of air emissions inventory reporting.

Superfund – The program operated under the legislative authority of CERCLA and SARA that funds and carries out USEPA solid waste emergency and long-term removal and remedial activities.

Synthetic Minor – A source with its potential to emit limited to below "major source" thresholds by having "federally enforceable" limitations in place. A permit for a synthetic minor source is referred to as a Federally Enforceable State Operating Permit (FESOP).

TCLP – Toxicity Characteristic Leaching Procedure

Toxic Waste – A hazardous waste which when subjected to the TCLP produces an extract that contains one or more of the 40 toxic contaminants at concentrations above regulatory levels.

TPQ – Threshold Planning Quantity

TPY – Tons per Year

TRI – Toxic Release Inventory – The inventory requirement established by EPCRA under SARA Title III, Section 313, for toxic releases with reporting submitted to USEPA on Form R, if applicable.

Transporter – A company that carries hazardous waste from a facility to a disposal site. Also known as a hazardous waste hauler.

Treatment – (see Hazardous Waste Treatment)

TQM – Total Quality Management

Uncontrolled Emissions – Emissions exiting a source directly (fugitive emissions) or exiting a capture system, but prior to entering a control device, if present (stack emissions).

Uniform Hazardous Waste Manifest form – (see Hazardous Waste Manifest)

USEPA – United States Environmental Protection Agency

Vapor Pressure – A measure of how readily a material will evaporate and an indication of how volatile a liquid is. The lower the vapor pressure, the slower it evaporates and the longer it takes to build up toxic or explosive concentrations or contribute to air emissions.

VOC – Volatile Organic Compound – Any organic compound which participates in atmospheric photochemical reactions. This includes any such organic compound other than the following compounds, which have been determined to have negligible photochemical reactivity:

a) Methane
b) Ethane
c) Methylene chloride (Dichloromethane)
d) 1,1,1-Trichloroethane (Methyl chlorofom)
e) Trichlorogluoromethane (CFC-11)
f) Dichlorodifluoromethane (CFC-12)
g) Chlorodifluoromethane (HCFC-22)
h) Trifluoromethane (HFC - 23)
i) 1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)
j) 1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC-114)
k) Chloropentafluoroethane (CFC-115)
l) 1,1,1-Trifluoro-2,2-dichloroethane (HCFC-123)
m) 2-Chloro-1,1,1,2-tetrafluoroethane (HCFC-124)
n) Pentafluoroethane (HFC-125)
o) 1,1,2,2-Tetrafluoroethane (HFC-134)
p) 1,1,1,2-Tetrafluoroethane (HFC-134a)
q) 1,1-Dichloro-1-fluoroethane (HCFC-141b)
r) 1-Chloro-1,1-difluoroethane (HCFC-142b)
s) 1,1,1-Trifluoroethane (HFC-143a)
t) 1,1-Difluoroethane (HFC-152a)
u) Parachlorobenzotrifluoride (PCBTF)
v) Cyclic, branched or linear completely methylated siloxanes
w) Acetone
x) Perfluorocarbon compounds which fall into the following classes:
   1. Cyclic, branched or linear completely fluorinated alkanes
   2. Cyclic, branched or linear completely fluorinated ethers with no unsaturations.
   3. Cyclic, branched or linear completely fluorinated tertiary amines with no unsaturations.
   4. Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

VSQG – Very Small Quantity Generator – A facility that generates less than 220 pounds of hazardous waste during every single month during the calendar year. A VSQG stores less than 2205 pounds of hazardous waste on-site at any one time and has no accumulation time requirements.

Waste Minimization – The reduction, to the extent feasible, of hazardous waste that is generated and subsequently treated, stored, or disposed of. It includes any source reduction or recycling activity undertaken by a generator that results in:

- the reduction of total volume or quantity of hazardous waste.
- the reduction of toxicity of hazardous waste.
- the reductionof both, as long as the reduction is consistent with the goal of minimizing present and future threats to human health and the environmen t.

Wisconsin Administrative Code – A compilation of regulations developed by the many different state agencies, including the WDNR codes relating to natural resources management and environmental issues.

WPDES – Wisconsin Pollution Discharge Elimination System

WDNR – Wisconsin Department of Natural Resources

WGPP – Wisconsin Great Printers Project – (see GPP)

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Appendix C: Additional Information Available to You

CERCLA – Comprehensive, Environmental Response, Compensation, and Liability Act; Superfund Hotline: 1-800-535-0202

Chemtrec Emergency Response: 1-800-242-9300

EPA NRC – Environmental Protection Agency's National Response Center

Spill Reporting Hotline: 1-800-424-8802

Graphic Arts Technical Foundation (GATF) – National trade association which provides educational opportunities and technical assistance for printers.

GATF
200 Deer Run Road
Sewickley, PA 15143-2600
412/741-6860
http://www.gatf.lm.com

Printers' National Environmental Assistance Center (PNEAC) This national compliance assistance center, funded by EPA, provides environmental information and assistance specific to printing. PNEAC is operated through a partnership of SHWEC, GATF, PIA, and the Illinois Waste Management and Research Center. http://www.pneac.org

Printing Industries of Wisconsin, Inc. (PIW) Wisconsin trade association for printers affiliated with Printing Industries of America.

PIW
13005 W. Bluemound Road
PO Box 126
Elm Grove, WI 53122
414/785-9090

Publications and fact sheets with information on environmental issues generally or specifically applicable to printers are available from :

Wisconsins DNR
UWEX Solid & Hazadous Waste Education Center
Department of Commerce Clean Air Assistance Program

Check individual addresses and phone numbers in this listing for more information regarding publications.

The Silver Council – A national group focussed on the environmentally sound management of silver derived from the processing of photographic images. It is supported by photographic chemical and eequipment manufacturers.

The Silver Council
5454 Wisconsin Avenue, Suite 1510
Chevy Chase, MD 20815
301/664-5150
Web Page:
http://www.silvercouncil.org

Solid and Hazardous Waste Education Center (SHWEC), University of Wisconsin. Provides technical assistance regarding waste minimization and pollution prevention.

SHWEC, UW-Madison/Extension
610 Langdon Street, Rm. 529
Madison, WI 53703
608/262-0385

Wisconsin Department of Commerce Small Business Clean Air Assistance Program – Provides environmental compliance and permitting assistance to small businesses.

PO Box 7970
Madison, WI 53707
608/267-9214

Wisconsin Department of Health and Human Services

Division of Health
1414 E. Washington Ave., Room 112
Madison, WI 53703
608/266-8578

Wisconsin Department of Natural Resources – WDNR

Spill Reporting Hotline: 1-800-943-0003

WDNR – Printing Sector Specialist
608/355-0811

WDNR - Bureau of Air Management
PO Box 7921
Madison, WI 53707
608/266-7718

WDNR - Hazardous Waste Management Program
PO Box 7921
Madison, WI 53707
608/266-2111

WDNR – Division of Water
Discharge Permit Coordination Section
PO Box 7921
Madison, WI 53707
608/266-1494

WDNR – Clearinghouse Specialist
Hazardous Waste Minimization Program
PO Box 7921
Madison, WI 53707
608/267-3763

WDNR Web Page: http://www.dnr.state.wi.us/

WDNR gopher: gopher.dnr.state.wi.us

Wisconsin Department of Workforce Development
Bureau of Safety Inspections
401 Pilot Court, Suite C
Waukesha, WI 53188
414/521-5188

Wisconsin Environmental Regulations can be ordered from:
Wisconsin Department of Administration
Document Sales Unit
PO Box 7840
202 South Thornton Ave.
Madison, WI 53707 - 7840
608/266-3358

Wisconsin Emergency Management
608/242-3221

Wisconsin State Emergency Response Board (SERB)
Division of Emergency Government
PO Box 7865
2400 Wright Street
Madison, WI 53707
608/242-3232

US Department of Labor – OSHA
OSHA
2618 North Ballard Road
Appleton, WI 54915
414/734-4521

OSHA
4802 East Broadway
Madison, WI 53716
608/264-5388

OSHA
310 West Milwaukee Ave., Suite 1180
Milwaukee, WI 53203
414/291-3315

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