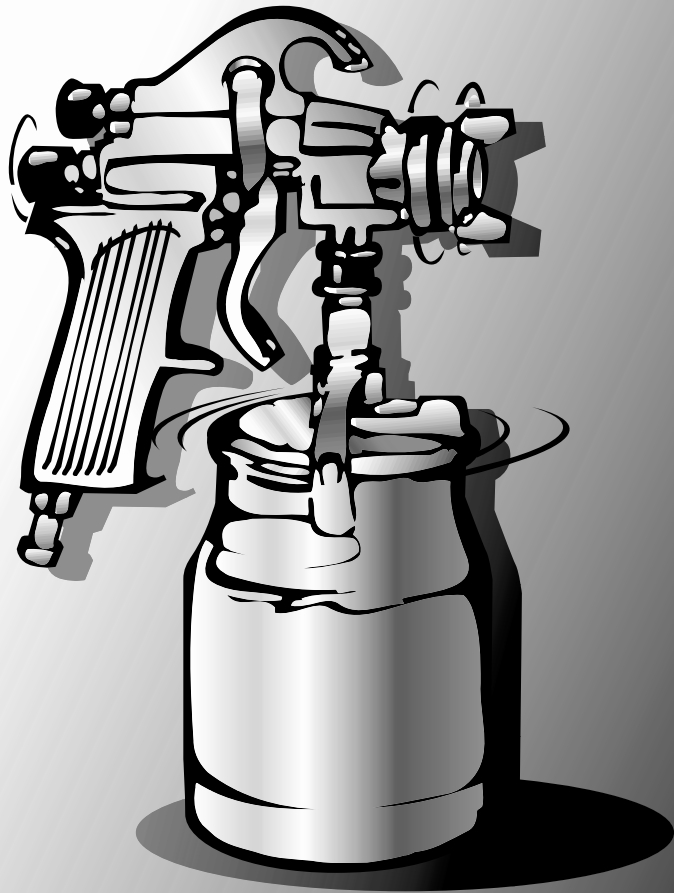
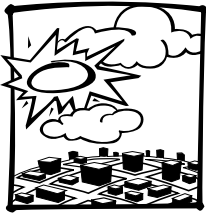


# Industrial Painting & Coating

**Regulatory  
Requirements  
and  
Pollution  
Prevention  
Ideas**





# What Is SBEAP?

The Small Business Environmental Assistance Program, SBEAP, was initiated as a result of the Clean Air Act Amendments of 1990. SBEAP helps small businesses comply with environmental regulations by providing technical assistance, introducing businesses to pollution prevention practices, and offering compliance assistance to help with environmental permitting and reporting requirements. In Kansas, the Pollution Prevention Institute at Kansas State University is the technical assistance provider for SBEAP. All SBEAP services are completely confidential, non-regulatory, and free.

Because services are free, SBEAP provides guidance in compliance and technical matters to businesses that otherwise would not have access to such help because of financial constraints. Its staff can introduce you to such practices as changes in prod-

uct design, substitution of materials, process optimization, waste minimization, and recycling—all of which can help diminish the burden of compliance and protect the environment.

SBEAP operates independently of the Kansas Department of Health and Environment, KDHE, but coordinates with the agency to ensure that SBEAP's interpretation of Kansas regulations is consistent with KDHE's intent.

To obtain technical assistance or request an on-site assessment, call 800-578-8898. SBEAP also operates a Web page at [www.sbeap.org](http://www.sbeap.org). It contains SBEAP publications, including our quarterly newsletter, Kansas AIRlines. It also has industry-specific information and a calendar of events.

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# Introduction

Paint usage has environmental impacts at all stages of its life cycle, including manufacturing, application, and eventual disposal. The purpose of this manual is to provide general background information on environmental compliance requirements for painting application operations, with specific emphasis on minimizing wastes through pollution prevention. The manual reviews various coating applications, coating types, pollution prevention opportunities, and environmental regulations. If you have questions or would like further information on materials presented here, you can contact an SBEAP specialist by calling 800-578-8898, or view any of our publications by visiting our Web site at *www.sbeap.org*.

Why paint? Paints and other surface coatings provide protection to a product, as well as being decorative and eye-catching. Generally, paint type and means of application are dependent upon what function the coating must perform. General steps for painting and coating applications typically include the following:

- substrate surface preparation
- application of the coating
- drying of the coating

Preparatory, application, and drying processes chosen depend on many factors, including your clients' demands and anticipated rate at which you have to get products finished and delivered.

# Surface Preparation

Surface preparation of the material (substrate) to be painted is very important. As high as 80% or more of all coating adhesion failures can be directly attributed to improper surface preparation.<sup>1</sup> A substrate must be clean before a coating is applied. Improper preparation can lead to a lower quality or defective product, or one that is not visually appealing. The most common forms of surface debris are oils or greases that originated from mechanical processing, or are deliberately applied for purposes of corrosion prevention during temporary storage or shipping. Other surface contaminants commonly include oxidation, rust, corrosion, heat scale, tarnish, and in some cases, old paint. Dirt, grease, or other similar materials will block the bonding surface and create an imperfection on the finished part. Proper preparation improves the

bond between the coating material and the surface, and ensures the coating is applied and adheres in a uniform manner. Examine your operations and see if there is a way to minimize the amount of cleaning required by keeping your substrate from getting dirty during storage or processing.

## Mechanical Cleaning

The first step in your preparation process should be mechanical cleaning. Wiping loose dust and dirt off your parts with a rag is an easy example. More vigorous action may be needed to remove rust or other contaminants strongly attached to the part. For wood surfaces, sanding followed by wiping with a lint-free cloth is effective. For metal substrates, metal scale and rust can be removed by brushing the part with a wire brush, a sand or grit blaster, or plastic “wool” pads.

<sup>1</sup> North Carolina Division of Pollution Prevention and Environmental Assistance, April 1998, Pollution Prevention in Metal Painting and Coating Operations

## Chemical-assisted Cleaning

Another option for preparing your parts for painting includes chemical-assisted cleaning. Traditionally, solvents have been used to remove oily-type contaminants through wiping, spraying, dipping, or vapor degreasing. But there are problems associated with solvent cleaning. Spraying can be wasteful, dip tanks can lead to large quantities of hazardous waste being generated, and vapor degreasers are regulated under environmental laws and pose a potential health hazard. Also, solvent-contaminated rags may need to be disposed of as hazardous waste.

With such issues in mind, some have switched from solvent to aqueous cleaning, which is generally more environmentally friendly. Acidic solutions effectively remove rust, scale, and oxides from metal surfaces, but can cause hydrogen embrittlement as hydrogen gas formed penetrates the metal and reduces its strength. Mild alkaline

solutions are used to clean and remove rust and scale from metal substrates because no hydrogen embrittlement results. Elevated temperature solutions are more effective for removing greases and oils, but the energy consumption needs to be considered.

## Conversion Coatings

For those working with metal substrates, a conversion coating may be applied to metal prior to painting to improve adhesion, corrosion resistance, and thermal compatibility. Conversion coatings chemically react with the metal surface to build a more complex physical surface that improves the bonding of the coating. Iron and zinc phosphate coatings are usually used for steel. Iron, zinc, and chromium phosphate are all used when it comes to coatings for aluminum, with the choice of solution largely depending on the volume of aluminum being processed.

# Coating Applications

Which paint or coating application process you choose will depend on your particular operations. What is the material you are coating? What are the chemical and physical characteristics the coating must have? What is the shape and size of the product—does it have a unique shape that might make uniform application more difficult? How many products must you paint each shift?

Several factors affect how good the paint coverage is on the piece, as well as the transfer efficiency of the application. Transfer efficiency is the relationship between the amount of paint you apply and the amount of paint actually adhering to the part being coated. The higher the transfer efficiency of your process, the more paint you are getting on your part and the less overspray you have. Your equipment and booth setup, the type of paint you're applying, the particular product you're coating, and your painting operators' skill all factor into how efficiently you're using your paint.

Coatings consist of resins, pigments, solvents, and additives. Particular types of coatings you're applying will have varying amounts of each of these constituents. Resins or binders hold all paint constituents together and enable them to cure into a thin plastic film. Resins are made up of polymers, which are chosen based on physical and chemical properties desired in the finished product. Acrylics produce a shiny, hard finish with good chemical and weather resistance. Alkyds are relatively low in cost and because of their versatility are considered a "general purpose" paint. Epoxies provide excellent water resistance and superior chemical resistance, but do lose their gloss from ultraviolet light. Urethanes combine high gloss and flexibility with chemical stain resistance, and demonstrate excellent water resistance.

Pigments are tiny particles insoluble in paint incorporated to improve the physical appearance of the coating. Additives are also used to impart specific physical or chemical properties to the coating. Some pigments or additives may contain metals which may classify any resulting solid wastes as hazardous. Paint performance may be improved by adding curing agents, defoamers, gloss modifiers, or other agents.

Solvents are used to carry the coating solids to the part being painted. They are also added to paint to aid in its application by reducing viscosity so the coating may be easily applied. Solvents are a major source of environmental concern in coating applications because as curing occurs, hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) are released.

Many of these same chemicals may cause any solid wastes generated as part of your painting operations to become hazardous wastes. Additionally, any discarded products may fall under the Resource Conservation and Recovery Act (RCRA), or hazardous waste regulations.

The next chapter goes into detail about different coating application types and technologies currently being used.

## Drying and Curing

Getting the paint or coating to your product's surface is only half of the process—the other half being how the coating will be transformed into the hard, protective, decorative finish that your clients will desire. Will your paint dry by evaporation? Will drying outside your booth be necessary due to your choice of coatings or to your product schedule?

If the resin or binder is said to be convertible, then it undergoes some form of chemical reaction to transform it to the solid film. If the resin is non-convertible, then it is only the evaporation of the solvents in the paint that causes drying and results in the desired film. Some coatings are cured by a process that can be controlled, such as baking, providing an opportunity for overspray to be collected and recycled.

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# Coating Application Types and Technologies

Besides the “conventional” method of applying coatings, many choices exist for someone who is involved in painting or coating operations. The right choice for you depends on your particular business operations—the type of pieces you coat; the finished appearance requested by customers; money available for equipment, training, and maintenance costs; and

even how much room you have in your business. The following are summaries of some available technologies. If you have specific questions, call SBEAP at 800-578-8898, and we can work with you and your vendor to determine if these systems will work for you.

## LVHP

Low-volume high-pressure spray (LVHP) is considered the conventional method of applying coatings. It depends on air-atomizing the paint at pressures of 40–70 pounds per square inch (psi). Air is supplied from an air compressor or turbine. While these spray systems create high quality finishes at high production rates, they do have several disadvantages, including extensive

overspray, increased booth cleanup costs, and increased filter use and related costs. Additionally, if a higher coating thickness is necessary, more operator passes may be necessary to get the desired mil thickness, and hence application time is increased.

# HVLP

The principle of high-volume low-pressure (HVLP) has been applied to “conventional” spray guns to apply paint with a high volume of dispersing air at low pressures. HVLP guns have nozzles with larger diameter openings for atomizing air, can be bleeder or non-bleeder types, and require air volumes of 10–30 cubic feet per minute. Air and fluid delivery to the spray gun affect the efficiency, ease of use, cost, and versatility of HVLP sprayers.

In a siphon-fed HVLP system, air pressure to the sprayer is used to pull paint from the cup located below the gun, producing a fully atomized pattern for even surface coverage. Gravity-fed HVLP systems are well adapted for higher viscosity paints, such as clears, water-based paints, high-solids paints, and epoxy primers, given the paint cup location. The cup, located at the top of the gun, allows paint to completely drain, minimizing paint waste.

HVLP guns allow operators to finish intricate parts with comparable quality to conventional sprayers. This makes them a good choice for small shops that finish smaller, more intricate parts which demand a higher level of gun control. Other advantages of the HVLP system include the following:

- transfer efficiencies, from 50 to 90 percent reported, depending on the air-delivery system used
- reduced amount of overspray, and hence material use
- reduced VOC and HAP emissions
- reduced paint booth filter use and cleanup costs
- reduced worker exposure due to high-pressure “blowback” from the spray
- good coverage of intricate parts
- finish quality comparable to conventional air sprayers

- comparable transfer efficiencies to air-assisted airless sprayers at low-fluid delivery rates, with low to medium viscosity fluids
- more efficient air atomization
- air-spray coating adaptable to any size coating operation and application rate
- equipment fittings allow for fast color changes and application of very different fluid viscosities

HVLP systems, however, do have some disadvantages, including difficulty in obtaining higher fluid delivery rates with high viscosity materials, and a lack of sufficient atomization required for some fine finishes.

# Powder Coating

Powder constituents are very similar to wet paint with resins, pigments, and additives, but lack a solvent carrier. When powder coating, powder is supplied to the spray gun by the powder delivery system. This delivery system consists of a powder storage container, or feed hopper, and a pumping device that transports a stream of powder into hoses or feed tubes. Compressed air is often used as a “pump” because it aids in separating the powder into individual particles for easier transport. Powder spray guns impart an electrostatic charge to the powder being sprayed via a charging electrode located at the front of the spray gun. Managing the electrostatic field can direct the powder’s flow and control pattern size and shape, and powder density as it is released from the gun.

All spray guns can be classified as either manual or automatic. Although basic operating principles of most guns are the same, an almost limitless variety in style, size, and shape of spray guns exists. The type

of gun chosen for a given coating line can be matched to the performance characteristics needed for the products being coated.

Powder coating became a major factor in the metal finishing industry when the electrostatic spray process (see next section) was introduced in the 1960s. Electrostatic spraying made it possible to apply thin layers of coating for higher quality decorative finishes, and allowed powders to be used on parts not suitable for dipping in a fluidized bed. As the powder coating technology continues to develop, advances have been made in powder formulations to offer a wider range of colors, glosses, and textures.

The higher transfer efficiencies associated with powder coating are partially due to the recycling and reuse of powder overspray.

# Electrostatic Paint Systems

Electrostatic paint systems deliver paint that has been atomized by various methods, such as air-atomizing, airless, or rotary. The atomized fluid droplets are given a negative charge as they leave the spray gun. The charge causes the paint particles to be “attracted” to the part, and if high enough, can cause the paint particles to actually reverse direction as they pass, coating the edges and back of the part (an effect called wrap-around), increasing transfer efficiency. In some cases, even water-based paints can be applied. An advantage of these systems is the uniform coating thickness produced.

Electrostatic systems must be properly grounded at all stages of paint delivery to reduce injuries and fire hazards that can result from shorting or sparking. Compounds or components that conduct electricity, diverting electrons from the paint circuit, decrease system efficiency. Humidity also reduces transfer efficiency.

## Airless and Air-Assisted Airless Systems

A method of atomizing paint is to increase the spray gun's fluid pressure to 500–6500 psi and redesign the fluid nozzle so paint is atomized without pressurized air flow. Airless guns are effective for applying high-viscosity coatings with relative ease since there is only one hose attached to the gun. The airless system provides high delivery rates (useful for fast-moving production lines), with the size of the nozzle determining quantity and thickness of the paint applied to the part. This system also has higher transfer efficiencies than conventional spraying. These systems do have some disadvantages, including expensive nozzles and increased maintenance, a tendency for tip plugging, increased operator training and skill due to skin-injection danger, reduced fan pattern control, and limited coating types.

Air-assisted airless sprayers look very much like air-atomizing guns. Paint is delivered to the guns at pressures of 150 to 800 psi. Air is used to shape the pattern of the fluid spray leaving the gun nozzle. The major difference between airless and air-assisted spray guns is the atomizing tip—an air nozzle allows jets of atomized air to exit from ports in small projections on each side of the tip. The air jets hit the paint stream, breaking up larger droplets of paint and atomizing it to a finer degree. While having a high capital cost, air-assisted airless spray systems have good atomization and high transfer efficiencies, are capable of reaching high production rates, can handle a wide range of fluid viscosities, have improved finish appearances as compared to airless technology, and have lower equipment maintenance due to lower operating pressures.

## Other Technologies

### Rotary Atomizers

Paint is fed to the center of a spinning disk or bell, and use centrifugal force to break the paint into droplets. These devices use electrostatic charge to guide the paint to the part being coated. Electrostatic charging also plays a key role in atomizing the paint at low speeds. Rotary atomizers are well suited for covering large, broad surfaces; have high transfer efficiencies; and have high solid, waterborne versatility. Other advantages include the creation of a spray without use of thinner and higher transfer efficiencies. These systems do have some drawbacks, including increased equipment maintenance needs and safety hazards.

### Dip Coating

Parts are coated by being dipped into vats of paint. Dip coating requires paint viscosity to remain constant to assure acceptable film quality and is not suitable for items with cavities. This process works well on parts that are always the same color and have minimum decorative finish requirements, such as agricultural equipment.

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## Flow Coating

These systems use 10 to 80 separate streams of paint that coat all the part's surfaces. Like dip coating, this process is best suited for standardized color needs with low decorative finish requirements. Paint viscosity controls coating thickness, and an area must be provided for the part to hang while dripping excess paint.

## Autodeposition

This process relies on a chemical reaction to deposit an organic coating onto iron, steel, zinc, and zinc-alloy plated materials. The part is immersed into a solution containing the coating compounds. When the part is submerged, the paint compound precipitates out of the solution and coats the part. The part is then removed from the tank, rinsed, and cured. This process does not use organic solvents, so no VOCs are emitted.

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## Electrodeposition

This system, like the autodeposition system, requires the part to be immersed in a waterborne coating. The cosolvent is typically an organic solvent. The process is very much like electroplating in that the reaction is driven by electricity. Direct current is passed through the solution and causes a reaction with the

paint resin, which deposits onto parts, creating a uniform coating. Although the coating contains some solvent, this process has low VOC emissions. Electrodeposition does have a high initial investment cost and intensive maintenance requirements. Separate tanks and rinse lines are needed for each color.

# A Comparison of Coatings

Traditionally, paint has been considered a liquid made up of several components that when applied and cured impart a thin plastic film. Paints have traditionally been organic solvent-based, with the solvents aiding in the application process. While being versatile, it has many environmental issues associated with its use, including air emissions and hazardous waste disposal. High-solids paints have a higher percentage of paint solids and contain less solvent, and while air emissions may be less, they are still present. Water-based paints, which utilize water as the solvent, also have reduced VOC emissions, as well as a reduced fire hazard. “Solid paints,” such as powder coatings and paints containing no solvents (and hence have reduced HAP and VOC emissions), are widely available. These materials have given rise to the term “coatings” instead of paints. With catalyzed or two-component coating systems, reactive resins and catalysts are mixed just before entering the application equipment. This type of coating system can also reduce solvent use.

The following provides a comparison of four different coating technologies —high-solids coatings (where the paint was modified to produce a coating with higher solids concentration and a lower VOC concentration), waterborne coatings (which mainly use water to disperse the paint resin, although some solvent is still present), powder coatings (which have become a viable alternative for decorative and functional coatings, although still predominately a metal-finishing process), and UV-cured coatings (coatings requiring UV radiation to initiate crosslinking of the resin).

# High-Solids Coatings

## **Pollution prevention benefits:**

- reduces solvent in coatings
- less overspray compared to conventional coatings
- higher transfer efficiencies

## **Operational benefits:**

- can apply thick or thin coat
- easy color blending or changing
- compatible with conventional and electrostatic application equipment

## **Energy savings:**

- reduced air flow in work spaces and curing ovens (low VOC)
- reduced energy needed for heating makeup air

## **Applications:**

- zinc-coated steel doors
- miscellaneous metal parts
- same as conventional coatings

## **Limitations:**

- solvent use not completely eliminated
- shorter pot life than conventional coatings

# Water-Based Coatings

## **Pollution prevention benefits:**

- eliminates or reduces solvent in coatings
- reduced VOC emissions and fire hazards
- reduced hazardous waste disposal
- water used for cleanup

## **Operational benefits:**

- can apply thick or thin coat
- easy color blending or changing
- compatible with conventional and electrostatic application equipment

## **Energy savings:**

- reduced air flow in work spaces (little or no VOC)
- reduced energy needed for heating makeup air

## **Applications:**

- wide range
- architectural trade finishers
- wood furniture
- damp concrete

## **Limitations:**

- coating flow properties and drying rates can change with humidity, affecting coating application
- sensitive to humidity, workplace humidity control required
- may have poor flow characteristics due to high surface tension of water
- special equipment needed for electrostatic application
- water in paint can cause corrosion of storage tanks and transfer piping, and “flash rusting” of metal substrates

# Powder Coatings

## **Pollution prevention benefits:**

- eliminates solvent in coatings
- little or no VOC emissions
- easier to recycle and reuse overspray
- reduces solvents for cleaning
- reduces need for solid paint waste disposal

## **Operational benefits:**

- can apply thick coat in one application
- no mixing or stirring
- efficient material use, possible to achieve nearly 100% transfer efficiency if a reclaim system is used

## **Energy savings:**

- little air flow needed for worker protection (no VOC)
- little energy needed for heating makeup air

## **Applications:**

- steel
- aluminum
- zinc and brass castings

## **Limitations:**

- requires handling of heated parts
- part must be electrically conductive, complex shapes difficult to coat
- difficult to apply thinner coatings
- need special equipment or extra effort to make color changes
- difficult to incorporate metal flake pigments

# Ultraviolet (UV) Radiation-Cured Coatings

## **Pollution prevention benefits:**

- eliminates solvent in coating
- allows for increased production rates
- 100% reactive liquid

## **Operational benefits:**

- can apply thin coats
- easy color blending or changing
- efficient material use, nearly 100% transfer efficiency

## **Energy savings:**

- little air flow in work spaces (no VOC)
- cure with UV instead of an oven
- little energy needed for heating makeup air

## **Applications:**

- some metal applications
- filler for chipboard
- wood
- “wet look” finishes

## **Limitations:**

- styrene volatility
- typically best applied to flat materials
- limited to thin coatings
- high capital cost of equipment
- yellow color

# Pollution Prevention for the Coating Industry

## What is Pollution Prevention?

Pollution prevention, or P2, means preventing wastes rather than using expensive treatment and control technologies on end-of-pipe wastes. P2 can decrease environmental liabilities, reduce waste disposal costs, and improve working conditions. It may be as simple as preventing spills and leaks through better housekeeping and maintenance, or as complex as switching solvent-cleaning systems.

## Development of Pollution Prevention Concepts

In 1990, beginning with the Pollution Prevention Act, EPA shifted focus from “end-of-pipe” pollution treatment and cleanup to policies, technologies, and processes that prevent and minimize the generation of pollution. The underlying theory behind P2 is that it is economically

more sensible to prevent wastes than implement expensive treatment and control technologies to ensure waste does not threaten human health and the environment.

## P2 and the Coating Industry

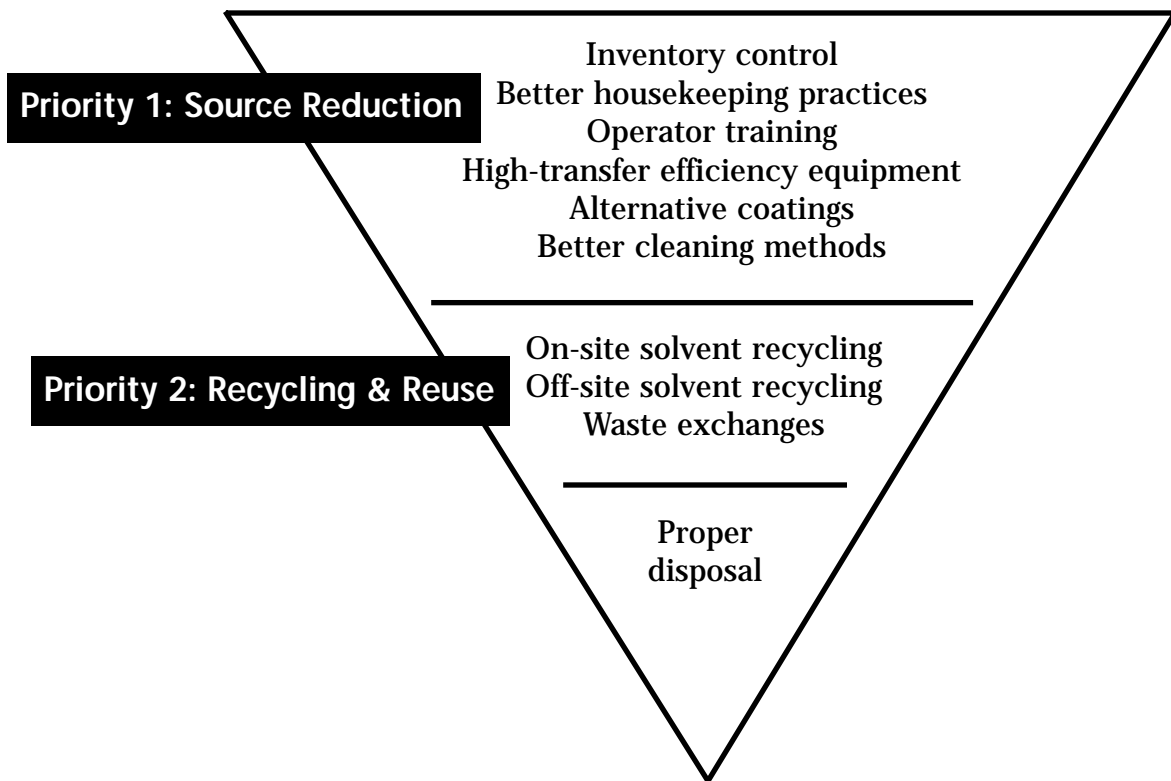
Paint application wastes include left-over paints, dirty thinner from cleaning spray guns and paint cups, air emissions of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs), dirty spray booth filters, dirty rags, and disposal of out-dated supplies. Ways to reduce these wastes include rigid inventory control, better housekeeping practices, mixing paint according to need, better operator training, proper cleaning methods, using alternative coatings, using styrofoam filters, recycling solvents on and off site, and using waste exchanges.

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Better operating practices, or “good housekeeping” applies to all waste streams and requires minimal capital investment, yet can be very effective in reducing the amount of wastes generated. Good housekeeping includes management initiatives to increase employee awareness of the need for and benefits of pollution prevention, and preventive maintenance to reduce the number of leaks and spills.

Waste assessments help identify the amounts and types of wastes generated at your facility. Knowing this makes it easier to know how waste can be reduced and where to concentrate your efforts. Any waste management program is an organized and continuous effort to systematically reduce waste generation, and should reflect the goals and policies of management. An effective program also includes the involvement and enthusiasm of employees, especially those who have an understanding of the processes being examined.

# Hierarchy of Pollution Prevention Strategies for Coating Operations



## Priority 1: Source Reduction

Source reduction techniques are designed to reduce the amount of waste initially generated. Simple housekeeping changes and conducting periodic inspections of all equipment can be less expensive than fixing malfunctions when they appear, or cleaning up a preventable spill.

### Inventory Control

Inventory control is an effective and efficient way of reducing indiscriminate use of raw materials. By reducing the amount of paint that becomes unusable, you not only save costs associated with waste disposal, but you also save costs associated with initial product purchase. Mark receiving dates on your incoming paint products, and use a “first in, first out” procedure to use older paint materials first.

Look at standardizing the paint types and colors you offer your customers. This can help minimize the number of different paint products you keep in inventory, again lessening the chance for paint product to go bad. Standardizing your paint types and colors also provides you with another benefit—it minimizes the chance that a client’s particular paint selection will provide you with a surprise and cause what may have previously been a non-hazardous waste to become a new hazardous waste for you to handle. If justified by volume demand, purchase your chief coating colors in 15-, 30-, or 55-gallon reusable drums rather than 5-gallon pails. Just be sure that product won't sit around too long.

If you have paint material that for one reason or another will not meet your clients' specifications or expectations as a finished coat, use it as an undercoat or primer; or see if you can find a business that can use the paint and sell it, even at reduced cost.

Monitor the amount of paint used by different workers to get the same jobs done. Shop owners may monitor employee operations and make verbal or written comments on product usage. Limit employee access to material storage areas, or develop some kind of accounting system to track material use.

## Better Housekeeping Practices

Basic housekeeping techniques can be very effective in reducing pollution. Many methods are available to control and minimize material losses, which can be implemented easily and at little or no cost to the operator. Specific approaches to bulk material drum location, material transfer methods, evaporation, and drum transport can effectively limit material loss.

- Keep paint and solvent containers tightly closed to reduce evaporation, emissions, and material dry-out.
- Reduce leaks and spills by placing drums at points of highest use.
- Use spigots or pumps when transferring materials from storage containers to smaller containers.
- Control evaporation by using tight-fitting lids and spigots.
- Use drip pans.
- Use secondary containment in bulk storage areas.
- Move drums carefully to prevent damage or punctures, which could lead to leaks or ruptures during future use.

## Material Preparation

Look for ways to reduce the amount of solvent used in product pre-cleaning. Examine substituting chemical cleaning for physical or mechanical cleaning when preparing the product

surface for painting application. Sand or particle blasting are some examples, although they have their own environmental issues. Plastic media has been substituted for sand in some blasting operations for both environmental and worker health issues. The plastic media can be reused once separated from the stripped-paint waste, reducing both purchasing and waste disposal costs. Dry ice is another alternative material for blasting processes. If solvent cleaning is used, reduce solvent loss due to evaporation by installing cleaning tank lids or increasing free-board space in vapor degreasers.

## Conversion Coatings

Avoid dirtying or soiling the substrate prior to the beginning of the cleaning process. Analyze water for hardness and dissolved solids. Use alkaline cleaners or phosphate compounds with hard water stabilizers where necessary. Use low-temperature, energy-conserving alkaline cleaners or phosphate compounds.

## Paint Mixing

For small jobs, the amount of paint prepared will often exceed the amount of paint actually applied. Track usage rates for different paint types. Have various sizes of paint-mixing and sprayer cups available to limit over-mixing of paint for a specific project, and to reduce the amount of solvent needed for equipment cleanup.

## Better Operator Training and Employee Participation

Operators may be very skilled at producing high quality finishes, but poorly trained in minimizing paint usage. Key points for operators include the following:

- Do not arc the spray gun and blow paint into the air.
- Maintain a fixed distance from the painted surface while triggering the gun.
- Too much or too little overlap leads to wasted paint and heavy or lightly coated areas. A 50% overlap pattern is typically recommended.

- Air pressure should be kept low—this can increase transfer efficiency from 30 to 60 percent.
- Keep the gun perpendicular to the surface being painted. Angling the gun leads to some of the spray being too far from your product surface and a decrease in transfer efficiency.

Ask your operators where they see improvements could be made—after all they work with the equipment daily and may have suggestions not previously thought about. Provide incentives to increase employee participation in whatever waste reduction or recycling program you have. One business tracked the savings in material purchases and money made from recycling activities and put this into a general employee account to be used by the workers to improve their working stations and lunchroom.

## **Maintenance and Use of High-Transfer Efficiency Equipment**

Less overspray means fewer air emissions. You can reduce the amount of waste you generate by increasing the transfer efficiency of your coating process. Remember, transfer efficiency is a measure of how much paint goes on the part, compared to how much is sprayed. Typical transfer efficiency from conventional air guns ranges from 20 to 40 percent, thus 60 to 80 percent of the paint is overspray. Overspray is a function of the design and operation of the system used and your operator application techniques. Talk to your equipment vendor about higher transfer efficiency equipment, and examine the pay-back period by switching to such equipment. It may be that the amount of material saved will justify upgrading your equipment.

Even if you've examined upgrading your equipment and have decided to continue with your current process equipment, make sure it is in good working order—your painters' per-

formance depends on the condition of their tools. Poorly maintained equipment may result in products that don't meet customer demand and can reduce the transfer efficiency of your operations.

## **Alternative Coatings**

VOC emissions are related to the type of coating used and the number of coats necessary for a high quality finish. Acrylic lacquers are typically thinned with solvent by 125 to 150 percent. With synthetic enamels, solvent thinning amounts to 15 to 33 percent. Minimize or eliminate VOC emissions by substituting solvent-based paint with waterborne paint, high-solids paint, or with medium- or low-solvent paint. Consider, however, the desired final product specifications and the type of product being coated when choosing substitute materials.

## **Proper Cleaning Methods**

Wastes resulting from cleaning of the application equipment can be reduced by more efficient cleaning methods. Reduce solvent use in equipment cleaning by scraping paint cups or tanks into a separate container before rinsing the equipment with solvent. Make use of Teflon-lined metal paint containers, which are easier to clean. Use an enclosed gun-cleaning station. Spray solvent through the gun into the cleaning station where it is captured for recovery and reuse. Schedule jobs so that large batches of items of similar color are painted, instead of small batches of custom items, to reduce the amount of dirty cleaning solvent and waste paint generated during change-out.

## Filters

Suppliers or recyclers of thinners may replace and dispose of dirty spray booth filters for a generator. It is the responsibility of the generator, however, to determine if these filters are hazardous. Filters may be characteristic hazardous waste (toxicity) if they contain enough metals or volatiles. The volatiles could come from the paint thinners used or from the paint itself. The metals typically are found in paint pigments. When cleaning paint equipment (including gun tips and hoses), solvent and/or thinners should not be sprayed on filters (or into the air in the paint

booth), as this could cause the filters to become a listed waste (and this act is considered illegal disposal). Because the filters are in a solid state rather than a liquid, they are not considered a hazardous waste in Kansas due to ignitability (D001). It is important to remember, however, that paint filters have been known to cause trash fires and that some local trash haulers and transfer stations will not allow them to be disposed in the regular trash. In this case, the filters should be segregated from the regular trash and disposed under a Special Waste Disposal Authorization from KDHE.

## Priority 2: Recycling and Reuse

Reusing and recycling can help to reduce waste disposal costs. Wastes may potentially be used as raw materials for a process, or materials may be able to be recovered before being disposed. Recovery technologies can either remove desired materials from a waste stream before disposal or can directly use waste from one process as raw material in another.

### On-Site Solvent Recycling

Several alternatives are available for recycling solvent on site. Gravity separation is inexpensive and relatively easy to implement by allowing the solvent/sludge mixture to separate under inactive conditions. The clear solvent can then be decanted with a drum pump and used for equipment cleaning, reducing the amount of wash solvent purchased. Reclaimed solvent can be used for formulating primers and base coats, but might create problems if not sufficiently pure.

For those facilities that generate larger quantities of waste solvent,

on-site distillation may provide a more cost-effective alternative. Batch distillation of all high-grade solvent wastes can virtually eliminate the need for purchasing lower quality solvents for use in preliminary painting operations and cleanup. An operator may reclaim four and one-half gallons of thinner, with one-half gallon left as sludge from five gallons of paint and thinner wastes. This ratio varies depending on the operations.

When determining the amount of hazardous waste your company generates each month (done to determine which hazardous waste generator category you fall under), remember to count any solvent that enters your distillation/solvent recycling unit, each time it is placed in the unit. So while on-site solvent recycling may help you reduce your waste disposal and solvent purchasing costs, it will not reduce your hazardous waste generation rate. Read more about properly counting your wastes in the hazardous waste regulatory section of this manual.

## Off-Site Solvent Recycling

Low-volume solvent users, or those who find it uneconomical to recycle contaminated solvents on site, usually send their waste to commercial recyclers for recovery. Commercial recyclers have versatile distillation processes and can handle large volumes and varieties of solvents.

Generally, solvent recyclers recover 70 to 80 percent of the incoming spent solvents into reusable products. Recyclers often sell reclaimed solvents back to the user.

In general, suppliers who offer recycling services include the cost of waste collection and recycling in the price of their solvent. This increases the thinner cost, but effectively eliminates separate hauling and disposal or recycling costs. It also reduces the administrative burden on the owner.

## Waste Exchanges and Donations

Find a business that can use your old or off-spec coating material, or contact a waste exchange program. Waste exchanges are organizations that manage or arrange the transfer of materials between industries, where one producer's waste becomes another industry's feed stock.

Remember, if your by-products are determined to have value as raw material to another industry, then they are not considered waste and are exempt from RCRA (hazardous waste) regulations. Most exchanges exist as information clearinghouses, which provide information on materials available for reuse.

Opportunities exist for these exchanges to oversee direct transfer of used solvent from industries requiring ultra-high-purity solvents to industries that do not have such stringent requirements.

If you can't find a business that can use your unwanted coating material, check around to see if local organizations and community groups may be able to use it.

# Proper Coating Techniques for Operators

The following text was taken from EPA pollution prevention publications.<sup>2</sup> You can see a copy of the complete publication at [www.epa.state.oh.us/opp/paints/fact23.html](http://www.epa.state.oh.us/opp/paints/fact23.html).

Techniques spray painters use during application have a definite effect on transfer efficiency and offer waste reduction potential. Fundamentals of good spray techniques consist of the following:

- proper overlap of the spray pattern
- proper gun speed
- proper distance of the gun from the part
- holding the gun perpendicular to the surface of the part
- triggering the gun at the beginning and end of each stroke

Proper overlap of spray patterns will be determined by the coating. Proper overlap may range from 50 percent to 80 percent. Greater overlap may result in wasted strokes, and less overlap may result in streaks.

Since the flow of coating from the gun is consistent, the speed of the gun as it is moved across the part should be consistent as well. Steady gun speed will help obtain a uniform thickness of coating. A gun speed higher than manufacturer specifications can distort the spray pattern and not permit the maximum amount of material to reach the surface.

The distance of the gun from the part must be consistent, since, again, the flow of material from the gun is consistent. Generally, this will be six to eight inches for non-electrostatic systems. Spray losses increase with the distance, as does solvent loss. This solvent loss is often corrected by the addition of more solvent. This does not correct the spray loss, and overspray still ends up in the spray booth.

<sup>2</sup> Ohio Environmental Protection Agency, Office of Pollution Prevention, September 1994, Pollution Prevention in Painting and Coating Operations

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Except for special conditions, the gun should be held perpendicular to the surface of the part. Arcing the gun for hard-to-reach areas wastes material by applying an uneven coat. This also may result in streaks. These areas should be compensated for by changing the positioning of the gun or operator.

If the trigger of the gun is not released at the end of a stroke, the material continues to flow and when the gun changes direction, momentary stopping of the gun results in an accumulation of coating material. To avoid this piling, the operator may spray past the edge of the surface, spraying material into the spray booth and wasting coating.

All manufacturer specifications should be checked to ensure that operators are using the proper technique for their equipment. Operator training and experience will provide operators with knowledge of various painting techniques needed to paint parts of different configurations. Different techniques are helpful when painting inside corners, outside corners, slender parts, round parts, flat parts, large parts, or small parts.

Standard operating techniques will not be fully successful if other problems exist, such as room temperature changing throughout the day (which changes the viscosity of the paint) or if equipment needs repair. Operators cannot be expected to compensate for broken gauges, worn fluid tips, or other equipment problems.

# Regulatory Issues

Pollution generated from industrial coating applications can come from a variety of sources, including spent paint, paint sludge, and paint filters. Dirty thinner from the cleaning of spray guns and paint cups, rags contaminated with cleaning or paint materials, and unused coating products are other wastes. Inefficient coating transfer operations and equipment cleaning are major sources of waste generation, and loss of hazardous air pollutants (HAPs) and volatile organic compounds (VOCs) during the application and drying processes may even cause small businesses to be classified as major sources of air pollution.

The potentially significant amount of pollution generated from these and other painting processes causes industrial coaters to fall under four major categories of environmental regulations affecting their operations: hazardous waste, air, water, and right-to-know reporting. Workplace safety must always be considered as well. This section contains brief summaries of these regulations. A list of who to contact for more information can be found at the end of this publication.

# Waste Disposal Regulations

Businesses that paint or coat use many materials in their work that typically are hazardous waste when they are no longer usable, and hence the businesses are generators of hazardous waste. Solvents in paints, thinners, and cleanup solvents, as well as metals in paints, may be sources of hazardous waste.

Paint cans and used filters may be classified as hazardous waste if the paint is hazardous. Wet materials may be classified as hazardous waste because of their solvent content.

You, therefore, should become familiar with statutes and regulations that apply to the handling and disposal of hazardous wastes. It is your responsibility to determine which of your wastes are hazardous, and to ensure that they are transported and disposed according to the law. You may want to read the *Hazardous Waste Generator Handbook* published by KDHE for more information. You may receive a free copy of the handbook by calling the SBEAP Resource Center at 800-578-8898.

## Definitions of Hazardous Waste

Tracking the movement of hazardous wastes has become a “cradle-to-grave” effort. The first step in proper waste handling is to determine if the waste is considered hazardous. EPA has defined a waste as hazardous if it has certain properties that could pose danger to human health or the environment. Waste is classified as hazardous in one of two ways, characteristic or listed. First, a waste is considered hazardous if it exhibits one of the characteristics of a hazardous waste; if it is corrosive, ignitable, reactive, or toxic.



### Corrosive:

The pH of the substance is less than or equal to 2, or greater than or equal to 12.5.

### Ignitable:

The substance has a flashpoint less than 140°F.



### Reactive:

The material vigorously reacts with air or water, has a tendency to explode, or produces toxic gases.

### Toxic:

It is deemed toxic according to approved toxicity tests.



Paint and related solvent wastes often display ignitable or toxic characteristics. While oil- or solvent-based paint wastes are usually ignitable, some water-based paints can also be ignitable because of the drying agents they contain.<sup>3</sup> These wastes may also contain a regulated metal pigment such as chromium or lead.

Waste material can also be considered hazardous if it is on EPA's list of hazardous wastes (F-list, K-list, P-list, and U-list), found on pages 24 through 45 of the *Hazardous Waste Generator Handbook*. Check your material safety data sheets to see if your paints, paint thinners, or cleaners contain any of these wastes.

Common solvents in painting operations are classified as hazardous and are found in the F001 to F005 waste number categories (page 24).

Examples of such solvents include xylene, acetone, methanol, methyl isobutyl ketone, toluene, methyl ethyl ketone, and benzene, among others.

## Categories of Hazardous Waste Generators

What generator class you are in is dependent upon how much waste is generated at your facility. In Kansas, three classes exist—small quantity, Kansas, and EPA. You must determine your generator category to determine which regulations apply to you. Your facility may change its status from one category to another, depending on how much waste it generates in a given period.

In determining your status as a hazardous waste generator, count all quantities of hazardous waste that you generate in a given month.

Reduce your quantity of hazardous waste by separating hazardous waste and non-hazardous waste. A mixture of these two types of wastes must be treated as hazardous.

<sup>3</sup> Minnesota Pollution Control Agency, September 1997, Evaluating Paint and Ink Wastes

## Do not count wastes that

- are specifically exempt (page 3 of the *Hazardous Waste Generator Handbook*)
- may be left in the bottom of containers that have been completely emptied by conventional means such as pouring and pumping.

Containers are considered empty if no more than one inch of residue remains on the bottom, or no more than three percent by weight of the contents remain inside a container that is 110 gallons or less, or no more than 0.3 percent by weight of the contents remains inside a container than is larger than 110 gallons. If the container contained a P-listed waste, it must be triple-rinsed before being considered empty.

- are managed in an elementary neutralizing unit, a totally enclosed treatment unit, or a permitted wastewater treatment unit
- are legally allowed to be discharged directly to a publicly owned treatment works (POTW)

## Small Quantity Generator

If the following criteria is met, the state of Kansas considers you a small quantity generator (SQG):

- The facility generates no more than 55 lbs of hazardous waste, or no more than 2.2 lbs of acutely hazardous (P-listed) waste in a calendar month.
- The facility accumulates no more than 2,200 lbs of hazardous waste or no more than 2.2 lbs of acutely hazardous waste, or no more than 55 lbs of debris and contaminated materials from the cleanup of spillage of acutely hazardous waste.

SQG's are required to handle hazardous waste they generate in an environmentally sound manner and are not subject to any notification or reporting requirements. Small quantity generators may use any of the following alternatives to handle their hazardous wastes when disposed of in quantities less than 55 pounds: recycling, reuse, reclamation, disposal at a permitted sanitary landfill, neutralization and discharge to the sanitary sewer only with permission of the city and in conformance to any applicable EPA pretreatment requirements, and disposal at a permitted hazardous waste disposal facility.

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However, when, as a small quantity generator, you accumulate more than 55 pounds, you must do the following:

- Package, label, mark, and placard all shipments of hazardous waste. All containers of hazardous waste must be marked with the words “Hazardous Waste.”
- Follow the dating and marking requirements for containers and tanks.
- Document weekly inspections of hazardous waste storage sites.

Small quantities of hazardous waste may NOT be disposed of by dumping on the surface of the ground or into surface waters, burying in the ground at an unpermitted site, or by using wastes such as solvents for killing weeds.

## Kansas Generator

Each of the following criteria must be met to be considered a Kansas generator:

- The facility generates 55 lbs or more of hazardous waste but less than 2,200 lbs in a calendar month, and the facility does not generate 2.2 lbs or more of acutely hazardous waste or 55 lbs or more of debris and contaminated materials from the cleanup of spillage of acutely hazardous waste.
- The facility accumulates no more than 2,200 lbs of hazardous waste or 2.2 lbs of acutely hazardous waste, and no more than 55 lbs of debris and contaminated materials from the cleanup of spillage of acutely hazardous waste.

Kansas generators must comply with the following regulatory requirements:

- a) Determine which wastes generated by the facility are hazardous
- b) Obtain an EPA identification number by submitting a hazardous waste notification form to the Kansas Department of Health and Environment. (This form is available in Appendix B of the *Hazardous Waste Generator Handbook*.)
- c) Prepare a manifest for all shipments of hazardous waste. Package, label, mark, and placard all shipments of hazardous waste in accordance with pre-transportation requirements. (This form can be found in Appendix C of the *Hazardous Waste Generator Handbook*.)

- d) Prepare and maintain the following records for three years:
  - 1) a signed copy of all manifests initiated
  - 2) manifest exception report(s)
  - 3) hazardous waste analyses
  - 4) weekly inspection reports
- e) Meet all storage requirements for containers and/or tanks.
- f) Meet emergency preparedness requirements.
- g) Report all international shipments of hazardous waste to the Kansas Department of Health and Environment and the Environmental Protection Agency.

The above list is an abbreviated version of compliance requirements. For a complete listing of requirements associated with hazardous waste, please consult the *Hazardous Waste Generator Handbook*, the Kansas Statutes Annotated, Chapter 65—Article 34, and the Administrative Regulations, Article 31.

## EPA Generator

An EPA generator is one who fulfills any one of the following:

- The facility generates in any single month or accumulates at any time 2,200 lbs or more of hazardous waste, or generates in any single month or accumulates at any time 2.2 lbs of acutely hazardous waste.
- The facility generates or accumulates at any time more than 55 lbs of debris and contaminated materials from the cleanup of spillage of acutely hazardous waste.

EPA generators are subject to all regulations for Kansas generators, except for the emergency preparedness requirements, as well as the following additional requirements:

- a) Provide a personnel training program to ensure that facility personnel are able to respond effectively to a hazardous waste emergency. The program must include the following:
  - 1) a director trained in hazardous waste procedures
  - 2) instruction which teaches facility personnel about the location of emergency response and monitoring equipment; maintenance and operation of such equipment; communications procedures and response procedures for fires, explosions, and contamination incidents (training must be completed within six months after the date an employee enters a position)
  - 3) an annual review of the initial training

- 4) development of job titles and descriptions, a description of training to be given each job title, and a record of all training which occurs
- b) Adequately provide for preparedness and prevention with the following precautions:
- 1) proper maintenance of facilities to minimize releases of hazardous waste
  - 2) where appropriate for the type of waste generated, provide an internal communications or alarm system, a telephone or two-way radio, and fire extinguishing and control equipment (all required equipment must be tested and maintained to ensure proper operation)
  - 3) provide personnel working directly with hazardous waste with immediate access to communications and alarm equipment
  - 4) maintain aisle space sufficient to allow passage of personnel and fire, spill control, and decontamination equipment
  - 5) make arrangements with the local hospital, police department, fire department, and emergency response team to familiarize them with the plant layout and hazards involved with the wastes generated (such arrangements should be documented)
- c) Prepare a contingency plan and implement emergency procedures to ensure that releases of hazardous waste are properly handled. The contingency plan must provide for:
- 1) a description of actions facility personnel must take to respond to a release
  - 2) a description of arrangements made with local authorities for emergency services
  - 3) designation of primary and secondary emergency coordinators and listing of their addresses and phone numbers
  - 4) a list of all emergency equipment on site, including capabilities and locations

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- 5) an evacuation plan where potential need for evacuation exists
  - 6) copies of the contingency plan to be maintained at the facility and submitted to the local police department, fire department, hospital, and emergency response team
  - 7) a contingency plan that is to be periodically reviewed and current

The above list is an abbreviated version of compliance requirements. For a complete listing of requirements associated with hazardous waste, please consult the *Hazardous Waste Generator Handbook*, the Kansas Statutes Annotated, Chapter 65 —Article 34, and the Administrative Regulations, Article 31.

## Shipping Wastes Off Site

The three most important things to remember when shipping hazardous wastes off site are

- Choosing a reputable hauler and facility with EPA ID numbers. If you have questions about who to call to determine if they are “reputable,” contact SBEAP at 800-578-8898.
- Packaging and labeling all wastes appropriately.
- Preparing hazardous waste manifest.

You must ensure that your transporter and waste facility meet applicable state and federal regulations. Disposal facilities must have permits issued by EPA or the state in which the facility is located. Under state and federal law, you may only use authorized hazardous waste transporters and disposal facilities that have been assigned EPA identification numbers.

The hauler you choose will transport your waste, and the waste management facility will be its final destination. But remember, you are still responsible for the wastes you produce.

# Air Regulations

With the enactment of the Clean Air Act Amendments (CAAA) in 1990, the way air emissions are regulated was reorganized. One change was regulated hazardous air pollutants (HAPs). The current list of HAPs contains 187 chemicals and can be found on the internet at [www.epa.gov/ttn/atw/orig189.html](http://www.epa.gov/ttn/atw/orig189.html).

Many paints contain significant quantities of HAPs such as toluene, xylene, methyl ethyl ketone (MEK), or methyl isobutyl ketone (MIBK). The amount of HAPs or volatile organic compounds (VOCs) your facility has the potential to release or emit will determine if your business is required to obtain an operating permit and/or comply with other regulatory requirements.

## Air Operating Permits

In January 1995, the Kansas Department of Health and Environment, KDHE, adopted regulations to implement provisions of the CAAA of 1990. The new clean air rules specify three different types of air operating permits, depending on whether a

facility has the potential to emit more than the above stated amount of HAPs or VOCs, or if it falls under specific air regulations or national emission standards for hazardous air pollutants (NESHAPs).

## Major Sources

Painters and coaters are subject to limits on their VOC and HAP emissions from solvents used in paints, paint stripping, or cleaning. Your facility is defined as a major source of air pollution if it has the potential to emit:

- 10 tons of any single HAP
- 25 tons of any combination of HAPs
- 100 tons or more of any other regulated air pollutant in a single year. Such pollutants include nitrous oxides, sulfur oxides, particulate matter less than 10 microns, or VOCs.

There are other regulated pollutants that typically don't apply to coating processes but may affect your facility if painting is only one part of your total operation.

## Class I Permits

The Class I operating permit is a single document that contains all air quality requirements your facility has to meet. If your facility is defined as a major source, then it will need a Class I permit. As stated above, Class I status is based on your business' potential to emit various air pollutants.

Your potential to emit, or PTE, is based on the maximum amount of air pollution your facility would emit if

- each process unit is operated at 100 percent of its physical and operational design capacity
- materials that emit the most air pollutants are used 100 percent of the time
- all of the equipment is operating 24 hours per day, 365 days per year
- no pollution control equipment is used

The Class I permit application process can be very involved, time consuming, and expensive. Once KDHE receives your application, it has 60 days to determine whether it is complete. Both the public and the U.S. Environmental Protection Agency can participate in the application review process. Once issued, your permit is good for five years, and you will need to submit a renewal application at least six months before it expires.

## Class II Permits

If your facility's actual emissions are less than the major source thresholds, but the potential emissions still exceed them, then your facility may qualify for a Class II permit, which is less expensive and time consuming to complete than the Class I permit. The Class II permit allows you to specify how you will limit your potential emissions to below the major source threshold and thus avoid the need for a Class I permit.

The Class II permit application asks for information KDHE needs to determine your facility's potential-to-emit, such as material safety data sheets and chemical usage rates, and how you will limit your potential to emit. Both the public and EPA can review the permits, in addition to KDHE. Once issued, the permit remains valid with no required renewal unless it is revoked or you are unable to limit your potential emissions to below the major source thresholds. Air emission limits and material tracking requirements may be part of a Class II permit. By June 1 of each year, you will need to submit operating information, such as material usage rates and MSDSs for the previous year, so KDHE can recalculate your air emissions.

## Class III Permits

The Class III permit is primarily a registration form that needs to be completed if you are not required to obtain a Class I or Class II permit, but are subject to a National Emission Standard Hazardous Air Pollutants (NESHAP), are located in Johnson or Wyandotte counties and are subject to VOC regulations, have an incinerator, or are subject to a new source performance standard (NSPS). New sources required to obtain a Class III permit have one year from start-up to submit their application.

## Other Restrictions

Certain counties have additional restrictions. In Kansas, facilities in Johnson and Wyandotte counties are restricted to using coatings with low VOC content. Current regulations mainly affect surface coating of miscellaneous metal parts and products and metal furniture, at facilities with have potential VOC emissions greater than three tons per year. For example, regulations limit the VOC content to 3.5 pounds per gallon for coatings.

## Air Construction Permits and Approvals

So you are putting in a new paint booth. Do you need a permit before you begin construction? Will you need a permit to operate your booths now? During a pre-construction review, the Kansas Department of Health and Environment (KDHE) ensures that proposed construction projects at new facilities and modifi-

cations at existing facilities can meet applicable Kansas and federal air quality requirements.

You need a construction permit if your potential to emit, or your increase in potential to emit, exceeds the levels shown below, or if the construction activity includes an incinerator.

Pollutant	Construction permit PTE threshold
Lead	0.6 tons per year
PM10	15 tons per year
PM	25 tons per year
SO <sub>x</sub>	40 tons per year
VOC	40 tons per year
NO <sub>x</sub>	40 tons per year
CO	100 tons per year
HAPs (individual)	10 tons per year
HAPs (any combination)	25 tons per year

If you are not required to obtain a construction permit, you may need a construction approval if you will be a new or modified source and

- you are subject to a New Source Performance Standard (NSPS)
- your facility is subject to a maximum achievable control technol-

ogy (MACT) standard or a national emission standard for hazardous air pollutants (NESHAP)

- your potential to emit (or your increase in potential-to-emit) equals or exceeds the following thresholds

Pollutant	Construction approval PTE threshold
Lead or lead compounds	0.1 pounds per hour
SO2 or SO3	2 pounds per hour
PM10	2 pounds per hour
PM	5 pounds per hour
NOx	50 pounds per 24 hours
CO	50 pounds per 24 hours
<b>(In Wyandotte and Johnson counties)</b>	
VOCs	3 pounds per hour 15 pounds per 24 hours
<b>(Areas Except for Wyandotte and Johnson counties)</b>	
VOCs	50 pounds per 24 hours

The primary difference between a construction permit and a construction approval is that the permit requires an application fee while the approval does not. The fee is equivalent to 0.05% of the capital cost of the proposed activity.

If you need to obtain an operating permit or construction permit/approval form, visit the KDHE Bureau of Air and Radiation's Web site at [www.kdhe.state.ks.us/bar/index.html](http://www.kdhe.state.ks.us/bar/index.html), or call SBEAP at 800-578-8898.

## Do I Need an Air Permit for My Oven/Incinerator?

First you need to decide whether the device you're using is classified as an incinerator. If it uses a direct flame and burns anything in addition to paint hooks, it is an incinerator. If it is an oven type, it still may be classified as an incinerator. If the device is classified as an incinerator, you need a permit. Otherwise, an individual evaluation must be done to determine the types of air emissions, and a potential-to-emit calculation must be performed to determine whether the oven exceeds any permitting threshold.

If the incinerator has been approved to burn non-hazardous paint filters, you may use it for that purpose. If it hasn't been approved, you need to request a modification to your permit. Please note that hazardous waste paint filters can't be incinerated without a hazardous waste treatment, storage, and disposal facility permit. If the paints used in your business contain metals, there are hazardous waste considerations as well. Always review the material safety data sheets (MSDSs) for the products you use. If you are baking off paint hooks and have been using a paint containing chromium, for example, evaluate the residue metals content.

## Sample Calculation for Your Potential to Emit (PTE)

A facility should conduct an emissions inventory to know what kind of permit is needed. Information on calculating potential solvent emissions, including solvent emissions from painting and cleaning, follow.

Air emissions that result from evaporation of solvents—such as those in paints - can be calculated using a material balance approach. What comes in to the facility is considered to be emitted into the air. The amount of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) in each product (such as coatings and solvents) can be calculated and totaled for an entire year. The potential to emit (PTE)—what would be emitted if the facility operated at maximum design capacity, 24 hours a day, 365 days per year, or 8760 hours per year - can be calculated by multiplying actual emissions of HAPs and VOCs by the ratio:

$$(8760 \text{ hours}) \div (\text{actual operating hours})$$

Actual emissions of HAPs and VOCs can be determined if you know the

total quantity of product used annually, density of the product, and weight percent of HAPs or VOCs. This information will allow you to calculate the amount of HAPs and VOCs in the product.

The quantity of product used can be taken from purchasing records, provided you maintain an essentially constant inventory. If you are disposing of waste materials and have records to show the amount of HAPs or VOCs in the waste, that amount can be subtracted from the total used since it was not emitted into the air.

Typically, total density of the product can be found on the MSDS sheet. Either the density will be specifically listed as pounds per gallon, or it will be given as specific gravity. If specific gravity is given, multiplying the reported number by 8.3 pounds per gallon will give the density of the product.

$$\text{density} = (\text{specific gravity}) \times (8.3 \text{ lbs/gal})$$

Often times, the weight percent of HAPs or VOCs are also given on the MSDS. If your MSDS happens to give you volume percents rather than weight percents, you will have to do a quick calculation to get the weight percent of the particular pollutant.

$$\text{HAP wt\%} = (\text{HAP density}) \times (\text{product volume}) \times (\text{HAP volume\%}) \div 100$$

Determining your VOC weight percent is a little different, because VOCs are contributed to by many chemicals in your product. The easiest way to calculate your VOC weight percent is by the following:

$$\text{Wt\% VOC} = 100 - (\text{wt\% of solids}) - (\text{wt\% of water}) - (\text{wt\% of any exempt VOCs})$$

Acetone is an example of a VOC which is exempt. Now that you have all your information, you can calculate your actual and potential emissions for your pollutants of concern.

$$\text{Actual emissions} = (\text{product volume used annually}) \times (\text{product density}) \times (\text{wt\% of pollutant})$$

$$\text{Potential emissions} = (\text{actual emissions}) \times (8760 \text{ hours}) \div (\text{actual operating hours})$$

The Kansas Small Business Environmental Assistance Program, SBEAP, has several publications to help you understand the air regulations and can assist you in determining your potential air emissions. SBEAP's toll free number is 800-578-8898, and you can visit our Web site at [www.sbeap.org](http://www.sbeap.org).

# Wastewater Regulations

The primary objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical and biological integrity of the nation's surface waters. Pollutants regulated under the CWA are classified as "priority" pollutants. These include various toxic pollutants; "conventional" pollutants, such as biochemical oxygen demand (BOD), total suspended solids (TSS), fecal chloroform, oil and grease, and pH; and "non-conventional" pollutants, including any pollutant not identified as either conventional or priority.

Under the Clean Water Act, point sources of wastewater (discharge pipes or sewers) discharging to waterways require a National Pollutant Discharge Elimination System (NPDES) permit. Permits, issued by the Kansas Department of Health and Environment—Bureau of Water, specify levels of toxicity and other characteristics that must be achieved prior to discharge. Some businesses discharge wastewaters from phosphating processes or waterfall paint booth units via their

NPDES permit. Treatment of the wastewater is generally necessary. Wastewater generated from coating applications might be regulated because of the presence of organic solvents or heavy metals.

Use of wastewater treatment systems which do not discharge or direct waste to a POTW are also regulated by KDHE. Wastewater ponds which do not discharge are not regulated under the NPDES program but will still require a Kansas water pollution control permit. Wastewater ponds which receive industrial waste have special requirements regarding their construction and permitting. KDHE should be consulted.

Another type of discharge regulated by the Clean Water Act is one that goes to a publicly owned treatment works (POTW). The national pretreatment program controls the indirect discharge of pollutants to POTWs by industrial users.

Facilities regulated under this program must meet certain pretreatment standards. Recent rules require facilities that utilize the phosphating process and discharge to a POTW be permitted due specifically to this type of discharge. If discharging to a POTW, contact KDHE to determine the applicability of pretreatment requirements and permitting requirements.

The goal of the pretreatment program is

- to protect municipal wastewater treatment plants from damage that can occur when hazardous, toxic, or other wastes are discharged into a sewer system
- to protect the quality of sludge generated by these plants

Directing industrial waste to a septic tank is prohibited. Contact KDHE or SBEAP if you have questions.

Reduced water use is the primary waste reduction option for phosphating. Water needed to maintain the bath solution can be reduced by monitoring temperature, chemical concentration, and the pH level. Reuse solution or rinse water from one bath to others when possible. What is your source of water? Is it deionized or tap water? City water can bring in considerable amounts of dissolved solids, and these contaminants can vary seasonally. Properly matching the phosphating chemicals with the metal substrate is another key issue in minimizing waste from phosphating operations. This can significantly minimize sludge generation.<sup>4</sup>

<sup>4</sup> N.C. Division of Pollution Prevention and Environmental Assistance. Pollution Prevention in Metal Painting and Coating Operations—A Manual for Pollution Prevention Technical Assistance Providers. April 1998

# Water Regulations

If the facility is served by a municipal or rural water district line, there are no public water supply program issues to address. If the facility utilizes its own source of water or

potable consumption, and serves 25 people more than 60 days per year, the facility is considered a public water supply and needs to be permitted by KDHE.

# Community Right-to-Know Regulations

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), generally known as the “Superfund” law, requires businesses to report spills of hazardous materials; requires reports and notification of local authorities on the use, storage, and release of hazardous materials; and requires reports on the release of certain toxic substances. These requirements combine those in the original CERCLA law and those added through the Emergency Planning and Community Right-to-Know Act (EPCRA). Following is a short summary of the primary requirements.

## Reporting Spills

Spills of hazardous substances must be reported to the appropriate authority if “reportable quantities” are spilled. These quantities range from 1 to 5,000 pounds of substances spilled within a 24-hour period. Reportable quantities are often found on the MSDS provided with the material. In many cases, local authorities require facilities to report smaller spills. The number for the U.S. EPA National Response Center is 800-424-8802. The 24-hour spill response number for the Kansas Department of Health and Environment (KDHE) is 785-296-0614.

## Reporting Use, Storage, and Disposal of Hazardous Materials

EPCRA Section 302 requires a facility to notify the state emergency response commission (SERC) if the company exceeds the threshold planning quantity for any extremely hazardous substance. Section 304 requires a facility to report any potentially dangerous release of any hazardous substance to the SERC and local emergency response committee, in addition to reporting such a release to the federal authorities.

In Section 311 of EPCRA, facilities are required to submit material safety data sheets (MSDSs) or a list of MSDSs for each extremely hazardous substance or OSHA hazardous material that exceeds a certain threshold. This information is to be submitted to the USEPA (they prefer a list), the SERC, the local emergency response committee, and the local fire department.

### Kansas Tier II

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Section 312 of EPCRA requires facilities to submit an inventory of the hazardous chemicals stored on site, if threshold quantities are met. Facilities required to submit MSDSs under Section 311 are required to comply with this section for the chemicals they report under 311. The inventory must be submitted on Tier II reporting forms. The Kansas Department of Health and Environment (KDHE) has the form on its Web site at [www.kdhe.state.ks.us](http://www.kdhe.state.ks.us). This information is to be submitted to KDHE, your local emergency response com-

mittee, and your local fire department. These forms contain more detailed information on the chemicals stored onsite and the locations of those chemicals at the facility. The Tier II form is an annual form due March 1.

You must file a Kansas Tier II form if

- you have at your facility more than 10,000 lbs of any chemical OSHA requires you to have a MSDS for; or
- you have either 500 lbs or the threshold quantity, whichever

is smaller, of an extremely hazardous substance (EHS). Some common EHS include nitric acid, sulfuric acid, and ammonia.

A complete EHS list can be obtained by calling SBEAP at 800-578-8898.

## Form R

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The aspect of EPCRA that has gotten the most publicity is the requirement under Section 313 whereby facilities that “routinely” and/or accidentally release a defined set of chemicals must report annually on those releases. Compilation of this information is called the toxics release inventory, or TRI. Reports are due to the EPA, with copies sent to KDHE, by July 1 of each year. Facilities required to report have the following characteristics:

- be classified in SIC codes 10 (except 1011, 1081, 1094), 12 (except 1241), 20-39, 4911, 4931, 4939, 4953, 5169, 5171, or 7389;

- have ten or more full time employees;
- and
- use any of the designated chemicals at a rate of 10,000 lbs or more a year;
- or
- manufacture and process any of the designated chemicals at a rate of 25,000 lbs or more a year.

Because the list of chemicals to which the TRI requirements apply is revised periodically, it is important to get an approved list from KDHE or by calling SBEAP at 800-578-8898.

# Health and Safety

The Occupational Safety and Health Administration (OSHA) regulates all aspects of workplace safety, including personal protective equipment, paint booth design, fire and explosion precautions, emergency response, and worker protection.

Further information on OSHA regulations may be obtained from one of the following contacts:

- If you are located in Kansas, an excellent resource for businesses with OSHA-related questions is the Kansas Department of Human Resources—Industrial Safety Division. They will conduct free, voluntary OSHA audits if requested by the facility owner. Businesses participating in this program are required to correct any serious violations found. They can be reached at 785-296-4386.
- The regional office for OSHA (for Kansas, Nebraska, Missouri, and Iowa) can be reached at 816-426-5861.
- In Kansas, the Wichita OSHA office can be reached at 316-269-6644.

# Where to Find Help

Remember, the Small Business Environmental Assistance Program can help your business with all environmental regulatory or pollution prevention issues. Our services are free and confidential.

## General Information

SBEAP (Small Business Environmental Assistance Program):	800-578-8898
KDHE:	785-296-1500
Public advocate	800-357-6087

## Air

Air Permits and Emission Calculations	
KDHE:	785-296-1593
Technical Assistance with Air Emissions	
SBEAP:	800-578-8898

## Waste

Waste Management Requirements	
KDHE:	785-296-1600

## Wastewater

Wastewater Requirements		
KDHE:	For cities:	785-296-5525
KDHE:	For industry:	785-296-5547
KDHE:	Pretreatment requirements:	785-296-5551
KDHE:	Industrial waste to septic tanks:	785-296-5560

## Water

Water Requirements		
KDHE:	Public water supply:	785-296-5503

## Storage Tanks

KDHE: 785-296-1660  
Fire Marshal: 785-296-3401

## Right-to-Know

KDHE: 785-296-1689

## Pollution Prevention

### Technical Assistance—Free and Non-regulatory

SBEAP: 800-578-8898

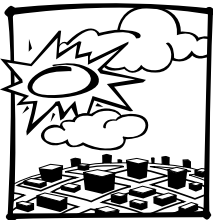
## OSHA-Related Questions

OSHA regional office 816-426-5861  
Wichita OSHA office 316-269-6644  
Kansas Department of Human Resources 785-296-4386



This publication was created by Kansas State University's Pollution Prevention Institute through the Small Business Environmental Assistance Program (SBEAP). SBEAP's mission is to help Kansas small businesses comply with environmental regulations and identify pollution prevention opportunities. SBEAP is funded through a contract with the Kansas Department of Health and Environment. SBEAP services are free and confidential. For more information, call 800-578-8898, send an e-mail to SBEAP@ksu.edu, or visit our web site at <http://www.sbeap.org>. Kansas State University is an EEO/AA provider.

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