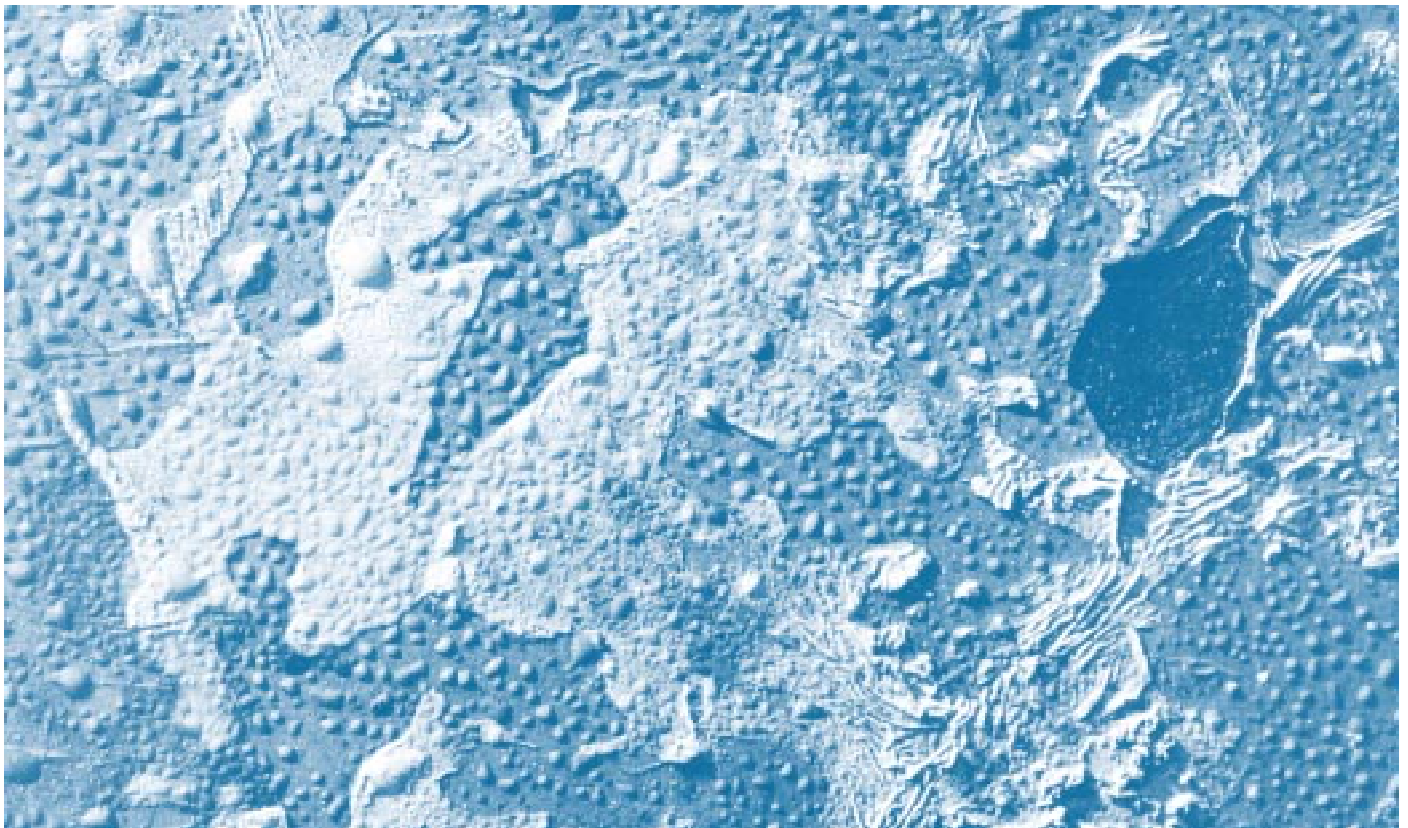
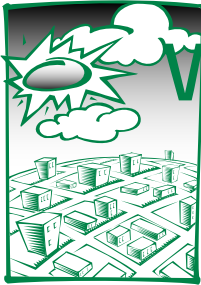


# Autobody Shops

## A Primer on Environmental Regulation and Pollution Prevention

Kansas Small Business Environmental Assistance Program





## What Is SBEAP?

The Clean Air Act Amendments of 1990 affect many small businesses that previously were unregulated. As a result, Congress mandated that every state provide free nonregulatory technical assistance to its small businesses. In Kansas, this assistance is provided by the Small Business Environmental Assistance Program (SBEAP). All SBEAP services are completely confidential, nonregulatory, and free.

SBEAP provides guidance in compliance and technical matters to businesses that otherwise would not have access to such help because of financial constraints. SBEAP emphasizes assistance designed to diminish the burden of compliance. Its staff can introduce you to pollution prevention practices such as

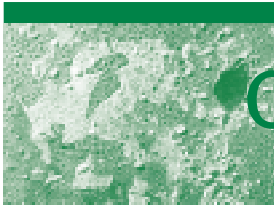
changes in product design, substitution of materials, process optimization, waste minimization, and recycling.

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 air quality regulations is consistent with KDHE's intent.

The consortium operating SBEAP is composed of the University of Kansas' Center for Environmental Education and Training (CEET), Kansas State University's Pollution Prevention Institute (PPI), and Wichita State University's Center for Technology Application (CTA).

Significant contributions to the content of this pamphlet were made by Ray Carter, Dennis Lane, Tim Piero, Felice Stadler, and Jean Waters. Printed May 1996.

The University of Kansas, Kansas State University, and Wichita State University comply with provisions of federal, state, and local regulations to ensure that no employee or applicant for employment is discriminated against because of race, religion, color, sex, national origin, age, or disability. For information contact Dennis Murphey, Director, Center for Environmental Education and Training, 913-864-8500.



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## Where to Turn

For general information, fact sheets, *Kansas AIRLines* newsletter, or other SBEAP publications:

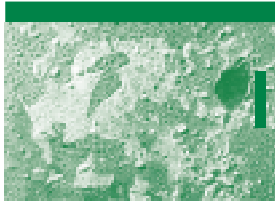
SBEAP Resource Center  
913-864-3968

For assistance with audits, technical information, or permits:

SBEAP Hotline  
800-578-8898

If you have a complaint, a question, or are unsure of whom to call:

Office of the Public Advocate  
800-357-6087 (in Topeka, 296-0669)



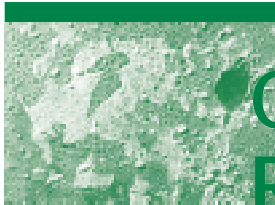
# Introduction

## Overview of Industry

Most air emissions from autobody shops are volatile organic compounds (VOCs), which cause ground-level ozone (smog). Some of these compounds are also among the 189 substances listed by the U.S. Environmental Protection Agency (EPA) as hazardous air pollutants (HAPs). Air emissions are generated from surface prep, primer and paint applications, and spray gun cleaning. Large quantities of waste coatings and

solvents—many of which must be treated as hazardous waste—also are generated during refinishing.

This pamphlet was developed to help autobody refinishers reduce the amount of air emissions (VOCs and HAPs) and paint-related waste they generate, while maintaining a high-quality product, saving money, avoiding the need for expensive pollution control equipment, and escaping unnecessary regulation.



# Compliance with Regulations

## Air Pollution Regulations

The 1990 Clean Air Act Amendments (CAAA) extend controls to many small shops that generate air pollution. The effect of the requirements on your business depends on local air pollution conditions and the kinds and amounts of air pollutants your company emits.

The following CAAA programs have the potential to affect autobody refinishers.

### Ground-Level Ozone

Ground-level ozone, or “smog,” forms when VOCs react with nitrogen oxides in the presence of sunlight. Automobile exhaust contains nitrogen oxides. A primary way to reduce ground-level ozone concentrations is to reduce VOC emissions. VOC regulations apply only to sources in ozone nonattainment areas. Currently there are no such areas in Kansas, but Johnson and Wyandotte counties have stricter standards than the rest of the state.

### Hazardous Air Pollutants

Many paints used in body shops—such as toluene, xylene, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK)—contain significant quantities of HAPs. Your shop can be classified as a

“major” source of HAP emissions if it has the potential to emit 10 tons per year of any single HAP, 25 tons per year of a combination of HAPs, or 100 tons per year of VOCs. “Potential to emit” is the amount of emissions your shop would release if it operated at maximum capacity 24 hours per day, 365 days per year (8,760 hours per year). The chief burden of a major source is that it must obtain a Title V permit (called a Class I permit in Kansas).

Most body shops will be classified as “area” sources of HAPs (having potential emissions below the major source levels) and therefore will not be subject to permit requirements.

Certain areas with poor air quality have additional restrictions. Since Johnson and Wyandotte counties traditionally have poor air quality, some industries are restricted to using low VOC coatings in their operations. For example, the regulations limit VOC content to 3.5 pounds per gallon (lbs/gal) for a coating that is air dried or forced warm air dried. Automobile refinishers and customized top coaters that process fewer than 35 vehicles per day are exempt from this regulation.

To determine whether air permit requirements apply to your shop, you should conduct an inventory of your emissions. Completing an inventory will verify whether you are a major or an area

## Example Autobody Shop's Air Emissions

### Assumptions

Amount used to paint hood & fender: 1.5 quarts (includes primer, base, and clearcoat)

Physical data of materials used: 9.4 lbs/gal (weight of material)  
(taken from MSDS) 65% VOC content  
30% toluene

Estimated emissions per hood & fender: 6.1 lbs of VOC (9.4 lbs/gal x 0.65)  
2.8 lbs of toluene (9.4 lbs/gal x 0.30)

Shop A paints 2,000 hours in one year and uses 925 gallons of coatings. Based on actual usage for a one-year period, Shop A annually emits:

2.8 tons VOC [calculation:  $925 \text{ gal} \times 6.1 \text{ lbs VOC/gal paint} \times \frac{1 \text{ ton}}{2,000 \text{ lbs}}$  ]

1.3 tons toluene [calculation:  $925 \text{ gal} \times 2.8 \text{ lbs toluene/gal paint} \times \frac{1 \text{ ton}}{2,000 \text{ lbs}}$  ]

Shop A's potential to emit would be calculated by "ramping up" actual emissions to 8,760 paint hours/year. Shop A has the potential to emit:

12.4 tons VOC [calculation:  $\frac{2.8 \text{ tons} \times 8,760 \text{ hrs}}{2,000 \text{ hrs}}$  ]

5.7 tons toluene [calculation:  $\frac{1.3 \text{ tons} \times 8,760 \text{ hrs}}{2,000 \text{ hrs}}$  ]

These numbers should be used for estimating purposes only. Your actual emissions may vary significantly. If you estimate over 8.5 tons/year of HAPs, it is recommended that you do an accurate air emissions inventory.

Source: Kansas Small Business Environmental Assistance Program. Based on data gathered from autobody shops in Kansas.

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source. It also will help you locate all emissions in your shop so you can begin to look for ways to reduce them, thereby providing a safer workplace for your employees and a safer environment for your neighbors.

For more information, or assistance in identifying and calculating HAP emissions, call the SBEAP hotline.

## Upper Ozone Layer Protection

Chlorofluorocarbons (CFCs) trigger reactions that potentially deplete ozone levels in the upper atmosphere; they are being phased out. Vehicle air conditioners are the single largest source of CFC emissions.

The refrigerant that has been used in vehicle air conditioners, CFC-12, is no longer being produced; EPA has approved R-134a as the *only acceptable alternative*. If you service vehicle air conditioners, consider the following points:

- It is illegal to vent any refrigerant into the atmosphere.
- You may use existing supplies of CFC-12 so long as they are available.
- You must use only EPA-certified technicians to service vehicle air conditioners.

- You must recycle all refrigerants, using approved recycling equipment.
- If major repairs are being done to the air conditioning system, it may be economical to retrofit the system to use R-134a. Whether to retrofit is the decision of the vehicle owner. (R134a is not a direct substitute for CFC-12. Components of the air conditioning system may have to be replaced. Use original equipment manufacturer's retrofit kits.)
- Do not use refrigerants other than R-134a. Using a refrigerant not yet approved by EPA could result in a potential fire hazard or in damage to the air conditioning system.

## Hazardous Waste Regulations

All facilities that produce hazardous or potentially hazardous waste should become familiar with the statutes and regulations that apply to them. *It is your responsibility to determine whether your wastes are hazardous and to ensure that they are transported and disposed of according to the law.*

## Definition of Hazardous Waste

EPA has defined a waste as hazardous if it has certain properties that could pose danger to human health and the environment after being discarded. Autobody refinishers are likely to produce hazardous waste. There are two categories of hazardous waste: **listed** and **characteristic**. “Listed” wastes that may be generated by autobody shops include:

- Spent solvents, such as tetrachloroethylene, methylene chloride, xylene, toluene, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK).
- Off-specification chemicals, container residues, and residues from spilled materials. An example is a chemical on one of the two lists that has exceeded its shelf life and now must be disposed of.

In addition to the wastes specifically listed, a waste is considered hazardous if it exhibits one or more of the following characteristics: ignitability, toxicity, corrosivity, or reactivity (see accompanying box).

Some wastes are exempt from the hazardous waste regulations. With respect to the autobody refinishing industry, lead-acid batteries are regulated as hazardous waste only if they are not

- A waste is **ignitable** if it has a flash point of lower than 140 degrees Fahrenheit (consult your material safety data sheet); readily causes fires and burns so vigorously as to create a hazard; or is an ignitable compressed gas or an oxidizer as defined by Department of Transportation (DOT) regulations. Lacquer thinners and oil-based paints are examples of ignitable hazardous wastes.
- A waste is **toxic** if it fails the toxicity characteristic leaching procedure (TCLP). Paint waste (empty cans and dry filters) must have a TCLP test before being disposed of in a landfill.
- A waste is **corrosive** if it has a pH of  $\leq$  (less than or equal to) 2 or  $\geq$  (greater than or equal to) 12.5. Examples are solutions of sodium hydroxide and hydrochloric acid that have become contaminated and must be disposed of.
- A waste is **reactive** if it normally is unstable, reacts violently with water, generates toxic gases when exposed to water or corrosive materials, or is capable of detonation or explosion when exposed to heat or flame.

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recycled. Used oil recycled for energy or material recovery is not subject to hazardous waste regulations. With certain restrictions, you may burn used oil in your shop in an oil-fired space heater. Make sure you do not mix any solvents with your used oil. If you do so, the resulting mixture may be regulated as hazardous waste.

## Categories of Hazardous Waste Generators

Kansas regulations define three categories of hazardous waste generators, two of which potentially affect small companies. 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 of time.

### Small quantity generator

You are considered a small quantity generator if your facility meets **both** of the following conditions:

- You never produce more than 55 lbs (25 kg) of hazardous waste; and
- You never accumulate more than 2,200 lbs (1,000 kg) of hazardous waste.

### Kansas generator

You are considered a Kansas generator if your facility meets **both** of the following conditions:

- You generate at least 55 lbs (25 kg) but less than 2,200 lbs (1,000 kg) of hazardous waste in a calendar month; and
- You accumulate 2,200 lbs (1,000 kg) or less of hazardous waste.

In determining your status as a hazardous waste generator, **count** all quantities of hazardous waste that:

- You store on site;
- You package and transport off site;
- You place directly in a regulated on-site treatment or disposal unit; or
- You generate as still bottoms or sludge and remove from product storage tanks.

**Do not count** wastes that:

- Are specifically exempt (such as spent batteries and used oil that are recycled);

## Monthly hazardous waste generation for six auto refinishing companies

# of Employees	Business Volume (# of cars)	Thinner/Paint Sludge (lbs)*
6	50-75	50
13	100	370
13	55	200
9	30-40	300
7	30	170
3	25	50

\*Thinner includes additives of hardeners, catalysts, and reducers. Assumed average weight of 10 lbs/gal.

Source: U.S. Environmental Protection Agency. *Guides to Pollution Prevention: The Automotive Refinishing Industry*. 1991.

- May be left in the bottom of containers that have been completely emptied by conventional means (pouring, pumping);
- Are discharged directly to a POTW (publicly owned treatment works) without being stored (you must comply with the Clean Water Act); or
- Are left as residues in the bottom of storage tanks, if the residue is not removed from the tank;
- You already have counted once during the month, reclaimed, and used again.
- Are reclaimed continuously on site without storing (however, count residue removed from recycling apparatus, as well as spent cartridge filters);
- You can reduce your quantity of hazardous waste by separating hazardous waste and nonhazardous waste. A mixture of these two types of waste must be treated as hazardous.
- Are managed in an elementary neutralization unit, a totally enclosed treatment unit, or a wastewater treatment unit;

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## Requirements as a Generator of Hazardous Waste

### Small Quantity Generator

As a small quantity generator, you are not subject to any notification or reporting requirements. But you are required to manage your hazardous waste in an environmentally sound fashion.

- You must identify all of the hazardous waste you generate.
- Accumulations of 55 lbs (25 kg) or more must be recycled, properly treated or disposed of on site, or transported to an authorized hazardous waste facility.
- Smaller accumulations may be disposed of by recycling, reusing, reclaiming, disposing at a permitted solid waste landfill (such as a municipal or county landfill), or disposing at a permitted hazardous waste facility. They also may be neutralized and discharged to the sanitary sewer (however, you must have prior permission from the city and you may not discharge such hazardous wastes as solvents, sludges, or pesticides to the sanitary sewer).

- You may not dispose of **any** quantity of hazardous waste by dumping it on the surface of the ground or into surface waters, burying it at an unpermitted site, or using wastes such as solvents to kill weeds.

For more information, contact the KDHE Bureau of Waste at 913-296-1617.

### Kansas generator

As a Kansas generator you are subject to several regulations, including obtaining an EPA identification number, preparing a manifest for all off-site shipments of hazardous waste, and meeting emergency preparedness requirements. If you think you may be classified as a Kansas generator, contact KDHE at 913-296-1617 for more information.

### Shipping Waste Off Site

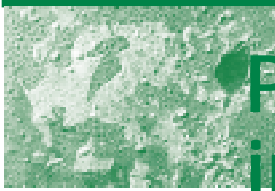
The three most important points to remember when shipping your hazardous waste off site are to:

- Choose a reputable hauler and facility with EPA ID numbers;
- Package and label all waste appropriately;
- Prepare a hazardous waste manifest.

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The hauler you choose will transport your waste, and the waste management facility will be the final destination. But remember, **you are still responsible for the waste you produce.** 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 federal law, you may use only authorized hazardous waste transporters and disposal facilities that have been assigned EPA identification numbers.



# Preventing Pollution in Your Shop

Pollution prevention (P2) reduces the amount of waste created; rather than controlling or treating waste, you avoid generating it or generate less of it. P2 can provide the following benefits for your company:

- ✓ Cost savings from reducing the amount of material purchased and reducing treatment and disposal costs.
- ✓ Less regulatory recordkeeping and fewer reporting requirements.
- ✓ An enhanced public image.
- ✓ A safer workplace.

A complete P2 program often includes changes in equipment, raw materials, and process technology. However, improvements in housekeeping, maintenance, material management, and employee training can cut waste generation with net cost savings for your shop.

## Housekeeping

Basic housekeeping measures can cut waste generation, improve efficiency, and provide a safer shop.

- ✓ Keep your storage and work areas clean and well organized. This saves time and money spent in searching for materials, and reduces potential accidents, spills, and leaks.
- ✓ Ensure that all containers are properly labeled. Labels provide information on your product's ingredients, the hazards associated with using the product, and the product's shelf life.

## Prevention, detection, and cleanup of leaks and spills

As much as 40 percent of the solvent that a small autobody repair shop purchases is eventually lost to evaporation, spills, leaks, and improper use. This costs money and produces a health hazard in your shop.

- ✓ Check for leaks and spills regularly; signs of leaks include a solvent odor, pools or droplets, and hissing sounds.

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- ✓ Check that solvent transfer equipment is working properly.
  - ✓ Record where leaks and spills have occurred; this may help avoid or detect future spills.
  - ✓ Store materials on pallets to check for leaks more easily and to lessen the chance of container corrosion from moisture.
  - ✓ Use dry cleanup methods that allow you to recycle spilled materials (mop, rag, squeegee, shovel, etc.). If this is not possible, use absorbents; reuse until they no longer absorb. (Remember that used absorbents may be a hazardous waste.)

### Handling paint and solvent containers

- ✓ Use tight-fitting lids, connections, and spigots. Most solvents are quite volatile. Large quantities will be lost to evaporation if not stored in tightly sealed containers.
- ✓ Use spigots or pumps to transfer material, especially thinner.
- ✓ Move drums with powered equipment or hand trucks to prevent damage and punctures; do not tip or roll drums, even when they are empty.

## Employee Training

Well-trained employees generate less waste, resulting in a safer and more cost-effective shop.

- ✓ Educate employees about the benefits of preventing pollution on the shop floor. Encourage them to identify as many P2 options as possible in their work area.
- ✓ Train employees in housekeeping practices, safe handling of materials and waste, paint preparation, and painting procedures.
- ✓ Write procedures in simple form for using paint equipment and mixing paint, and post them for quick reference.
- ✓ Train employees to use equipment needed for emergencies (fires, leaks, spills, etc.).

## Raw Material Management

Use raw materials for their intended purpose only. When an alternative exists, use the least toxic materials for each job. This includes everything from parts cleaning and surface prep to paint application and equipment cleaning.

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## Purchase and inventory

- ✓ Purchase only what is needed; this lowers the chance of having outdated materials. Avoid buying large amounts simply because they are on sale.
- ✓ Consider waste management costs when purchasing materials. Raw materials that generate hazardous waste actually cost more than the purchase price when you factor in disposal costs.
- ✓ Use reusable cloth towels rather than paper; discuss with your commercial launderer what materials may be on the cloth.
- ✓ Use liquids instead of aerosols when possible. Since they are applied directly and contain no propellant, liquids are less wasteful and put less VOCs into the air.
- ✓ Inspect all materials upon delivery to ensure that you received the quality and quantity ordered. Check the material safety data sheet (MSDS) to familiarize yourself with the product, its hazards, storage recommendations, and proper handling practices. Make sure labels are legible.
- ✓ Rotate your stock; use on a first-in, first-out basis.

- ✓ If possible, return outdated materials to the supplier.
- ✓ Keep accurate records. This allows you to track the amount of raw materials used. It also allows you to identify equipment that uses relatively high amounts of materials, a possible sign of inefficient operation or irregular servicing.
- ✓ Limit access to storage areas containing raw materials. Require employees to stretch their use of these materials and to eliminate waste. This practice also allows you to monitor use of materials to determine whether a waste problem is worker related or facility related.

## Minimizing paint and solvent use

Less material used means less waste. Less waste means cost savings for the owner.

- ✓ Schedule paint jobs to use large batches of one color of paint.
- ✓ Inspect all surfaces before painting, and ensure that all major dents and scratches are removed before priming. These practices limit the number of coats applied, thereby reducing VOC emissions, limiting material costs, and achieving a higher-quality product.

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- ✓ Use accurate weighing equipment to mix the volume of paint needed. This limits overmixing of paint. Use a variety of sprayer cup sizes to avoid overmixing.
  - ✓ Consider a computerized paint mixing system. Such a system can accurately mix very small quantities of paint. Some shops report reducing their paint waste by nearly 100 percent with a computerized system.
  - ✓ Mix color coats in-house, making certain that the formula for the proper shade of the specific color code is used. This will help avoid the need for blending the finish to achieve a color match. It's helpful to keep thorough records of paint match information, including spray-out cards and detailed notes.
  - ✓ Choose an undercoat shade that can be covered easily with the next coating.
  - ✓ Keep VOC emissions low and material costs down by minimizing the use of paint additives such as chemical hardeners, flex additives, and retarders.
  - ✓ Apply only the number of coats needed to achieve an adequate finish.
  - ✓ Minimize thinner use, closely monitoring quantities. Approximately the same amount is needed for each car.
  - ✓ Mix and reuse compatible leftover paints as an undercoating; this decreases the frequency of cleaning and reduces the amount of waste paint and solvent used.
  - ✓ Use color-contaminated thinner as an undercoating thinner or as a first rinse for spray equipment.
  - ✓ On reworks, strip and paint only the imperfection; do not strip and recoat the entire fender, part, or piece. Rework represents a doubling of materials used, more waste generated, time lost, more air emissions, and—most important to the owner—**lost profit**.

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## Parts Cleaning and Surface Prep

Consider alternate cleaning solvents and solutions to reduce VOCs. Use water-borne cleaners in your surface prep operations when possible. These can replace solvent-based cleaners and are effective in removing wax, grease, and silicone. They also contain less than one-sixth the VOC content of solvent cleaners.

### Water-based parts cleaning

- ✓ Use citrus or terpene cleaners for cleaning, degreasing, and washing parts; they are less toxic and they biodegrade.
- ✓ Use mechanical cleaning when possible; use dry precleaning for caked-on solids.
- ✓ Use water-based pressure washing systems instead of parts washers that use solvents.
- ✓ Follow instructions when preparing cleaning solutions. Do not use a more concentrated solution than needed for the job.
- ✓ Maintain your cleaning equipment.

- ✓ Filter out solids (dirt and grit) before they reach the waste sump.
- ✓ Implement two-stage parts cleaning; use the waste from the second stage to replace the dirty solution in the first stage.
- ✓ Use a still rinse rather than a free-running rinse.

### Solvent-based parts cleaning

If solvent-based cleaners are required because of heavy contamination or substrate makeup, use them sparingly.

- ✓ Keep solvent-laden rags in a tightly closed container when not in use.
- ✓ Use minimal solvent on cleaning rags.
- ✓ Use squirt bottles to apply solvent, collect and reuse solvent, and launder and reuse rags if possible.
- ✓ Increase cleaning efficiency by precleaning surfaces with caked-on solids; do as much manual cleaning as possible.
- ✓ Use “dirty” solvent as a first rinse and as a prewash or wipe for very dirty parts.

## *P2 Case Study*

### **Body Shop Reduces Waste, Saves Money**

Roger's Auto Body Shop in Bloomington, Minnesota, has been distilling solvents on site for reuse since 1984. Even with an increase in business, the distilling process has reduced the shop's use of paint thinner from 100 barrels per year in 1984 to three barrels per year currently.

The body shop also reduced the paint it purchases by 40 to 50 percent. These savings were the result of switching to high-volume, low-pressure (HVLV) painting equipment. This equipment increases the transfer efficiency of the paint, putting 70 percent of the paint onto a car compared to 30 percent with conventional painting equipment. Switching to HVLV paint guns also reduced the VOC level in the shop's indoor air by about 50 percent, reducing pollution and increasing worker safety.

Other waste and pollution prevention activities are ongoing at the shop:

- ✓ purchasing reusable plastic containers, which can be recycled when no longer in good condition;
- ✓ acquiring computerized equipment to mix one-ounce increments of paint, reducing paint waste;

- ✓ reclaiming refrigerant from vehicle air conditioners;
- ✓ reclaiming antifreeze;
- ✓ installing downdraft spray booths that lower releases of HAPs and VOCs during painting;
- ✓ switching to more energy-efficient lighting, heating, and air-conditioning.

Roger's Auto Body Shop estimates that in 1993 it saved about \$22,000 through its waste reduction and recycling efforts.

"To dissipate the myth that the Clean Air Act creates economic hardships, our figures show that not only have our expenditures caused very significant waste reduction, but to us they have repaid themselves in savings and continue to save us dollars," said Roger Lindeman of Roger's Auto Body Shop. "The waste reduction is significant because the health and well-being of the community and environment are affected as well."

(Roger's Body Shop was awarded a 1994 Minnesota Governor's Award for Excellence in Pollution Prevention. This case study is reprinted with permission of the Minnesota Office of Environmental Assistance.)

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- ✓ Use filter solvent baths to remove grit, grease, and water; then reuse the solvent. The removed material (grit, etc.) may be a hazardous waste and must be disposed of properly.
  - ✓ Consider recovering solvent on site. This option may be economically viable if you use a significant amount of solvent.

### Paint stripping

Chemical paint stripping produces a large volume of liquid waste, which may generate hazardous waste and release VOCs and HAPs in your shop.

- ✓ Consider nonchemical methods of paint stripping. These alternate methods eliminate both hazardous and nonhazardous liquid waste and eliminate VOC and HAP emissions. Mechanical paint stripping methods include plastic bead blasting, high-pressure air, cryogenic stripping, CO<sub>2</sub> (carbon dioxide) pellets; and sponge blasting.
- ✓ If chemical stripping is required, use less toxic strippers.
- ✓ Do not use reducers as prepaint strippers. They do not remove silicone efficiently, they tend to soften existing paints and primers, and they are 100 percent VOC.

## Surface Coating

VOC emissions released during surface coating are related directly to the skill of the spray gun operator, the type of paint used, and the spray equipment. Some operators produce high-quality finishes but are poorly trained in reducing paint use. Differences caused by the painter's skill level with a single gun type often are greater than differences between gun types. A skilled operator will adjust for the type of coating being applied, the atmospheric conditions, the size and shape of the object being coated, and the spray equipment being used.

### Spray application practices

- ✓ Mix your paint to the proper viscosity; this is vital for a good finish.
- ✓ Use the correct gun setup for the coating to be sprayed and the size of the area to be covered. The gun setup includes the fluid tip, as determined by the coating viscosity and the flow rate setting of the gun; the air cap, as determined by the fluid tip size and the air consumption of the gun; and the air pressure. Use the lowest possible air pressure setting that will provide the required degree of atomization.

- ✓ Hold the spray gun perpendicular to the surface being sprayed, using parallel strokes.
- ✓ Hold the gun 6–8 inches from the object being sprayed and use a 50 percent overlap for each pass.
- ✓ Make each pass the full length of the panel for small and medium-sized panels.
- ✓ Keep your pattern on the part.
- ✓ Use only enough coats to achieve proper coverage; save the unused paint from the gun.

### **Spray equipment cleaning**

- ✓ Clean guns and nozzles immediately after use, following the manufacturer's instructions. Immediate cleaning saves time and amount of solvent used.
- ✓ When cleaning guns manually, spray into an enclosed backdrop so you can reuse the thinner.
- ✓ Use no-VOC or low-VOC cleaning solutions.
- ✓ Never use metal objects to clean spray equipment; use soft wooden implements.

- ✓ Use Teflon-lined metal paint cups.
- ✓ Scrape residual paint with a spatula, then rinse sparingly with solvent.
- ✓ Consider using an air-powered mechanical gun cleaning system. Such a system can reduce air emissions by up to 90 percent, releasing fewer VOCs to the environment and workplace. They also reduce labor time for equipment cleaning by more than 60 percent.

### **Alternate spray equipment**

- ✓ Use more efficient paint spray equipment to reduce overspray. This equipment will save paint, reduce air emissions, improve workplace health conditions, and reduce frequency of changing paint booth filters. The increase in transfer efficiency (from approximately 30 to 70 percent) will offset startup costs.
- ✓ Spray guns that improve transfer efficiency include high-volume, low-pressure (HVLP) paint guns; electrostatic guns (available for nonmetallic paints); and air-assisted airless paint guns.

