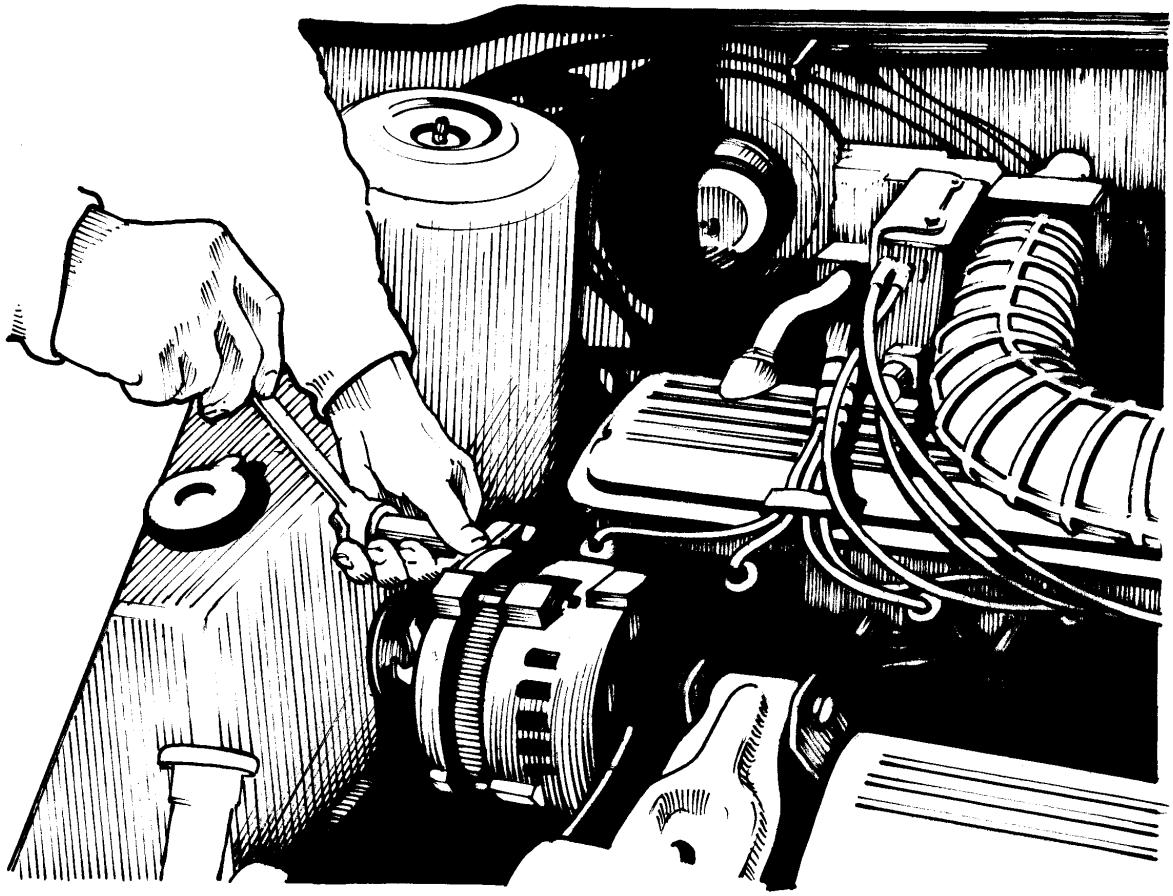
# Pollution Prevention

# *for* Auto Maintenance and Repair Shops



*Kansas State University*
*Pollution Prevention Institute*

This publication was written by Sherry Davis. Design and cover designed by Rich Gardner. For additional information on pollution prevention or hazardous waste issues, call the Kansas State University Pollution Prevention Institute at 913-532-6501 or 1-800-578-8898.

# Auto Maintenance and Repair Shops

Automotive repairs and maintenance work can generate problem wastes for shop owners. Maintenance work performed by repair shops consists of fluid changes, repair and rework of fixable components, and replacement of non-functional non-repairable parts. Mechanical repairs usually require cleaning and dismantling of the engine and other heavily soiled components. These procedures leave shop owners with fluids such as antifreeze, engine oil, transmission fluid, and cleaning solvents to dispose of, as well as non-repairable vehicle parts.

This document provides guidance to help shop owners handle these wastes in cost-effective and environmentally sound ways by practicing pollution prevention methods.

What is pollution prevention? Pollution prevention (P2) is a more efficient use of materials and resources in order to generate less waste and air emissions. Shop owners may refer to these techniques simply as "good business practices" or "standard operating procedures." Pollution prevention is preferred over traditional "end of pipe" pollution control, and focuses on reduction of waste at the point of generation, known as source reduction.

Source reduction reduces the amount of pollution generated, reducing hazards to the public and the environment. Source reduction for the auto repair industry includes the following:

- Using less or non-hazardous materials to do the job.
- Improvements in housekeeping, business practices, and operating methods that reduce waste generation and conserve natural resources.
- Equipment or technology changes that eliminate the need for hazardous material use or unnecessary processes.

Pollution prevention in auto repair and maintenance shops can reduce raw material costs, waste-related costs, paper work, and liability associated with hazardous waste disposal. It can improve employee health and safety. Because automotive maintenance and repair shops make up the largest group of generators of hazardous wastes among small businesses in many communities, participation in helping your community reach its environmental goals is extremely important. Management commitment and employee participation are essential to the success of a pollution prevention program.

Major waste streams from auto repair shops that provide P2 opportunities:

- Auto maintenance work: fluids from motor oil, antifreeze engine coolant, transmission fluid, battery fluid, brake fluid, and refrigerants; non-repairable parts.
- Parts washers' solvents and sludges.
- Shop cleanup materials from spills and leaks.

Proper management of these waste streams should include good housekeeping practices to minimize raw materials use and spillage, waste segregation, recycling of materials where possible, and employee and consumer education to reduce unnecessary fluid changes and equipment wear. By choosing methods of operation that don't create or use a hazardous material, auto repair shop owners may improve their bottom line profits and will play a significant role in improving the health and environment of the communities they live in.

## Reducing Waste from Maintenance and Repair Work:

Heavy metals from welds, radiators, and other engine components can become entrained in fluids associated with vehicle operation. If these metals are present above certain concentrations known as "Threshold Limit Levels," the fluid is considered hazardous. The Toxicity Characteristic Leaching Procedure, TCLP, is a testing procedure used to evaluate a waste streams' toxicity. An entire TCLP test can be very expensive; if operators know from process knowledge what contaminants could possibly be in their waste stream, they may use this knowledge to request only certain tests be conducted on the sample sent to the lab. This approach is much lower in cost and avoids useless testing. In the auto repair industry, heavy metals testing can be requested at a much lower price than a full TCLP.

### Used Motor Oil

Used oil represents the largest quantity of potentially hazardous waste in most communities. Motor oils consist of blended oils and can contain heavy metal contaminants.

**Hazards and Proper Handling:** Used oil is not considered a hazardous waste in the state of Kansas, as long as it is recycled for energy or material recovery. Improperly disposed of oil can destroy plants and animal habitat areas. Used oil and other auto fluids should never be mixed with hazardous waste; if this should happen, the entire mixture becomes a hazardous waste. Leakproof, bulk, used oil containers should be labeled as "Used Oil," covered, and have secondary containment to prevent possible storm water contamination if stored outside. New oil containers should be drained thoroughly before disposal.

**P2 Opportunities:** Used oil can be burned on site in a space heater or it can be recycled or used for fuel blending, and does not require a hazardous waste manifest when shipped from your shop for this purpose.

Used oil burners must have a capacity of *no more than* 0.5 million BTU per hour and must be exhausted to the outside of the building. As of late 1998, used oil burners can now take used oil from other *businesses* if the used oil is determined through proper testing, to be "on-spec". This testing is required to protect burners of used oil from receiving an oil/solvent mixture that could blow up the heater or release toxic air pollutants. The generator of the oil *or* the person receiving the oil must have it tested to verify the following:

- a *minimum* flash point of 100 F°
- total halogen content of less than 1,000 ppm (parts per million)
- arsenic content less than 5 ppm
- cadmium content less than 2 ppm
- chromium content less than 10 ppm
- lead content less than 100 ppm

Bulk oil is cheaper than quart containers and can significantly reduce the amount of solid waste leaving your shop. Bulk oil can be dispensed more efficiently by a hard-piped fluid distribution system, reducing spills and cleanup wastes associated with individual bottle use. Currently no recycling options exist for one-quart used oil containers.

Offer customers high performance longer lasting oils; some of these products last up to four times as long as regular oil, and have been proven to protect engines.

Predictive oil maintenance, which dictates oil changes based on certain oil quality parameters, also reduces oil purchases and the generation of used oil. Although not as feasible for independent repair shops, many fleet shops can use this P2 option to realize significant savings.

**Proper Disposal:** Used oil should be stored in leak-proof containers and shipped to reclaiming/recycling facilities; never send used oils or other liquids to a landfill. Used vehicle fluids cannot be poured on the ground, in waterways, or used as a dust control agent for roads or parking lots.

## Oil Filters

**Hazards and Proper Handling:** Used oil filters should be hot-drained and crushed where possible for complete removal of oil and volume reduction before disposal.

**P2 Opportunities:** Recyclable oil filters are an option to reduce the generation of used oil filters. Oil filters do have recycle value and should be recycled whenever possible.

**Proper Disposal:** Oil filters may be disposed of in landfills if allowed by landfill authorities. Oil filters retain excess oil after draining; crushing oil filters will effectively remove all liquid present and reduce the volume going to the landfill. Some Household Hazardous Waste (HHW) facilities will take oil filters for recycle; check with your local HHW before disposal.

## Transmission and Brake Fluids

**Hazards and Proper Handling:** These fluids consist of blended oils and glycol solutions and may be mixed together as long as there are no hazardous materials in either one. Use drip-proof catch pans to catch fluids and store in bulk containers equipped with secondary containment and level indicators.

**P2 Opportunities:** Transmission, brake, and other hydraulic fluids should be captured for rerefining or fuel blending programs.

**Proper Disposal:** Some fuel blending facilities will allow these fluids to be mixed with used oil. Always ask your waste hauler if he or she can accept these fluids before mixing. Never dispose of in the environment or in landfills.

## Engine Coolant

**Hazards and Proper Handling:** Antifreeze mixtures for engine coolant usually contain ethylene glycol, a poisonous compound that should be handled carefully to avoid possible ingestion by animals or humans. Engine coolant can be contaminated with lead and other heavy metals.

**P2 Opportunities:** Ethylene glycol coolants can be economically recycled onsite and reused in vehicles. This reduces the amount of waste leaving your shop and can reduce raw material purchases to increase your bottom line profits. Propylene glycol is a non-toxic coolant substitute, although some manufacturers may not approve its use; always check vehicle manufacturer recommendations and warranty requirements. Recycling and material substitution efforts can enhance your public image as an environmentally conscious shop owner.

On-site antifreeze recyclers start at $2,000 and can be purchased as an on-car unit or as a batch processor.

Some shops may choose to have a recycling service come to their facility; prices vary but may be as high as $100 per 55 gallon drum of antifreeze.

**Proper Disposal:** Recycle if possible. Call your local wastewater treatment operator for information on accepted disposal practices in your locality. Filters from coolant recyclers should be dry and tested for heavy metal contamination before disposal. Testing for heavy metal contamination may be done as a composite sample (piece of each filter) collected over a period of time. This offers the most economical way to be sure your filters are safe for landfill disposal. If your filters contain heavy metals above threshold limits, the filters must be disposed of as a hazardous waste. Never pour antifreeze on the ground or in waterways.

## Non-repairable Automotive Parts

Failure of non-repairable parts generate a large waste stream that is costly as a solid waste. Educating customers on proper vehicle maintenance and good driving techniques can help reduce the need for costly component replacements and decrease the amount of wastes generated at the source.

**Hazards and Proper Handling:** Although covering discarded engine components is not required by law, it is a recommended best management practice (BMP) for shops. These parts may be coated with oil or grease that can create a harmful storm water runoff endangering fish, wildlife, and public drinking water supplies.

**P2 Opportunities:** When parts do fail due to routine wear, accidental damages, or neglect, they should be recycled to parts remanufacturers or metal recyclers when possible. Such parts include tires, oil and fuel pumps, compressors and engines.

**Proper Disposal:** Discarded parts can be landfilled if all free liquids are removed from the part; recycling is preferred to save landfill space. Asbestos brake pads are not considered a hazardous waste in Kansas; however, dust generated from brake cleaning and turning processes must be authorized as a "special waste" by KDHE for landfill disposal. Dust must be dampened with water and double bagged with 6 ml plastic before disposal. Brake pads cannot be recycled and therefore must be disposed of properly and may be disposed of with the dust, if desired. For questions or forms for special waste disposal call Solid Waste Specialist, Richard Bronaugh, at KDHE #785-296-1120.

## Refrigerants

Refrigerants are used in automobile air conditioning systems. Mobile air conditioning systems have primarily used CFC-12 as a cooling material which is associated with the breakdown of the ozone layer around the earth. The ozone layer is an important layer of the earth's atmosphere that blocks carcinogenic radiation from the sun. All ozone-depleting materials from automobile air conditioning systems must be captured and reused, without being released to the atmosphere.

**Hazards and Proper Handling:** All shops must have EPA Section 609 certified operators and recycle/recovery equipment that can recover the refrigerant or reprocess it through an oil separator, filter, and dryer for reuse. Intentional venting of ozone depleting refrigerants to the atmosphere is prohibited by law, with fines up to $25,000 per day.

**P2 Opportunities:** Reuse refrigerants in other vehicles or ship off-site for recycling. CFCs will only increase in value as virgin CFCs are phased out.

**Proper Disposal:** Refrigerants are very stable compounds with no economically feasible way to destroy them; all refrigerants should be captured for reuse/recycle/resale.

## Batteries

**Hazards and Proper Handling:** Used lead-acid batteries are not considered hazardous waste as long as they are recycled. Split or broken batteries must be handled as a hazardous waste, due to sulfuric acid and lead contents. It is important to store used batteries in a place protected from the weather where they won't freeze. Secondary containment should be used to catch hazardous material leaks; materials used to clean these leaks become hazardous waste and require disposal as such.

**P2 Opportunities:** Recycle batteries; store properly to avoid unnecessary waste generation.

**Proper Disposal:** If not recycled, lead acid batteries must be disposed of as hazardous waste.

### Pollution Prevention Practices for Vehicle Fluids and Used Parts:

- Recycle all fluids and refrigerants when possible.
- Keep all fluids segregated to promote recycling/reuse options.
- Return all rebuildable parts to remanufacturing facilities.
- Use squeegees, dust pans, and oil mops to eliminate use of disposable oil absorbents.
- Buy fluids in bulk containers to reduce container waste.
- Use biodegradable detergents for cleanup.
- Cover all waste containers or soiled vehicle parts that could cause harmful storm water runoff.

# Reducing Waste from Parts Washing Process

Most vehicle repair shops use some type of parts washer to clean parts removed from the car prior to repair work. To reduce pollution from the parts washing process, shop owners should consider the following options:

- Use a less hazardous cleaning system (the most desirable option of waste reduction).
- Use less toxic solvents.
- Maximize solvent life.

Parts may be cleaned by high pressure jet sprayers, solvent washers, bake-off ovens, or hot tanks. Besides oil and grease removed from the part, heavy metal contamination from cadmium, lead, or other metals may cause your solvent stream to become a hazardous waste when its useful life is over. Solvent parts washers are also associated with air emissions due to evaporation of the solvent, and from the evaporative loss of solvent "drag-out" associated with improperly drained parts.

## Use a Less Hazardous Cleaning System

### Hot Soap Washers

**Operations:** Hot soap washers are heated systems that use a hot aqueous detergent to clean the parts. The part is submersed into a tank with air or mechanical agitation, or is jet sprayed with a high pressure stream within an enclosed container to remove the soils.

**P2 Advantages:** These machines reduce employee exposure to hazardous solvents, require less "hands on" labor, decrease fire hazard from flammable solvents, and are associated with less hazardous waste for disposal.

**Waste Stream:** Aqueous solutions can become hazardous due to heavy metal contamination from engine soils and testing is recommended before disposal. Oils should be removed by a skimmer or other method. Hot soap washer fluid should not be discharged to septic systems or storm sewers because it may interfere with bacterial activity of the septic system or cause environmental damage in storm water discharge areas, respectively. Check with your local POTW for a permit or permission to send this liquid to a wastewater treatment facility. Sludge from these washers should be tested for hazardous constituents before disposal. If connection to a city sewer is not possible, the water may be collected in a tank and hauled to a Publicly Owned Treatment Works (POTW). Many hot soap parts washer cabinets are equipped with evaporator units, but evaporators *have not* been approved for use by Kansas Department of Health and Environment, unless they are completely enclosed systems. To know if the evaporator is approved call KDHE's Bureau of Waste Management at 785-296-1603.

**Cost:** Small hot soap washers start at $2,500; medium-sized units that will accommodate transmissions and engine blocks start at $5,500. They are available with recirculating systems for maximum water and detergent use, or with evaporator systems to eliminate wastewater from the machine, leaving only a sludge residual. Evaporator models are usually more expensive and should be approved by KDHE before purchase.

### Aqueous Cleaning with Conventional Parts Washers

**Operations:** Water-based parts washers offer shops the opportunity to reduce adverse worker health exposures and amounts of hazardous waste generation. A study conducted in one air district of Los Angeles where VOC's in cleaning fluid were limited to 50gms/l, shows all the shops involved in the feasibility study were able to convert to water-based cleaners as *viable alternatives to mineral spirits*. Non-emulsifying detergents should be used with these washers to allow oil and grease to "settle" out for removal, and should be heated and equipped with filtration devices to prolong the life of the cleaning solution. Overall costs for using aqueous cleaners were less than those associated with traditional solvent cleaning systems.

**P2 Advantages:** Units are available as a heated system for increased cleaning efficiency, and can be equipped with a filtering mechanism to prolong the life of the solution, making them very economical to use. Conventional parts washers with aqueous cleaners pose little health risks to employees, eliminate fire hazards, and can be associated with lower disposal costs if maintained properly.

**Waste Stream:** Aqueous detergent solution, waste oil, and bottoms sludge are typical waste streams from these types of washers. Spent aqueous wash solutions and the sludge can contain high levels of heavy metals from engine soils, especially if used for long periods of time, and should be tested before disposal. If heavy metal's TCLP content is higher than regulatory levels, solution or sludge must be disposed as a hazardous waste.Waste oils that accumulate should be skimmed off the solution daily and combined with the used oil stream for recycling.

**Cost:** Conventional sink-on-a-drum units are available at comparable prices to other solvent sinks. Units with oil skimmers, heaters, and filtration systems are more expensive, starting around $1,200 but enhance cleaning power, lower changeout frequency, and prolong the life of the cleaning solution.

### Enzyme Washers

**Operations:** Enzymes units use a solution of microbial enzymes and cleaner in an aqueous solution. The cleaners' active enzymes actually digest the oils and other soils washed from parts, allowing the solution to be used indefinitely; adding only more enzyme, cleaner and water to maintain cleaning power. These systems are much gen-

tler on the mechanics' hands, warm in winter, and are very safe to use.

**P2 Advantages:** Some parts may take a bit longer to clean but most workers agree it's not significant and is worth the time to avoid the health hazards associated with breathing solvent fumes.

**Waste Stream:** Waste parts-washing fluid disposal virtually goes to zero with the use of these units, making them very economical to use. Sludge may accumulate after several years use and will need to be tested for heavy metal accumulation before disposal.

**Costs:** Enzyme cleaners are competitively priced and reduce cost of hazardous waste disposal significantly compared to mineral spirit cleaners.

## Use a Less Hazardous Solvent

Parts washing in the past has typically used petroleum-based solvents to remove soils prior to working on the part. Many of these solvents are considered hazardous because of their low flash points and may contain compounds that are considered dangerous to the environment and human health. Compounds that contain chlorine and other halogens have been identified as ozone depleters and are associated with adverse health effects. Using less toxic solvents is an important way to reduce pollution and reduce risks to employees.

The following list identifies hazardous materials in solvents that should be avoided:

- carbon tetrachloride
- methylene chloride
- trichloroethylene
- toluene
- tetrachloroethylene (perc)
- methyl ethyl ketone
- xylene

If petroleum-based solvents must be used for parts cleaning, always use the least toxic material that will do the job, such as naphtha, mineral spirits, or stoddard solvent. These solvents are still associated with hazards such as flammability and adverse health effects, and will need to be disposed of as hazardous material because their flash points are below 140°F. Always ask vendors for a Material Safety Data Sheet (MSDS) to inspect before new products are brought onsite for trial purposes and make sure the vendor will take back the unused product. Solvents with high flash points may still be considered hazardous due to high metals contamination or other hazardous contaminants.

## Maximize Solvent Life

No matter what type of parts washer system you use, making the most of your cleaning solution is an integral step in preventing unnecessary waste generation. Longer solution life means less cleaning materials used, less disposal costs, and more money goes in your pocket, not down the drain!

Cleaning solution or solvent life can be extended by following these easy procedures:

- Mechanically clean as much soil as possible off the part with a wire brush or reusable rag.
- Determine level of cleanliness needed; don't do excessive cleaning — it costs your shop time and money.
- Use solution until it is no longer useful; don't change out solutions on a scheduled basis, but on an "as needed"basis.
- Set up a two-stage cleaning system; clean parts in dirtiest solution first, then transfer to a final clean washer.
- Keep parts washers covered when not in use to reduce evaporative losses.
- Drain all parts thoroughly to reduce drag-out losses of cleaning fluids; install a drainage shelf if necessary.
- Filter solution to remove contaminants.
- Remove sludge and free-floating oil from cleaning systems frequently to extend solution life.
- Consider a solvent recycle system to reduce solvent purchases; solvent stills start at approximately $5,000.

### Pollution Prevention Practices for Parts Washing:

- Use a less hazardous cleaning technology such as hot soap cabinets, aqueous, or enzyme systems.
- Use less hazardous solvent cleaners; if solvents must be used, eliminate chlorinated or toxic cleaners such as methylene chloride or toluene, and substitute with naptha or high-flash mineral spirits. Always check MSDS sheets *before* buying a product.
- Maximize solvent life by reducing soil loading on your cleaning system as much as possible by precleaning, using two stages, and maintaining cleaning solutions with oil skimming and filtration units.

For technical assistance with pollution prevention options in the automotive maintenance and repair industry, you may call:

Kansas State University
Pollution Prevention Institute
785-532-6501or 800-578-8898

# Reducing Waste from Shop Cleanup:

Spills and leaks can contribute significantly to the amount of waste generated in repair shops. Wastes consist of floor dry compound, dirty rags, and water used to wash down the area. Good housekeeping is the key to waste reduction. Prevent spills by providing drain pans with pour spouts to catch fluids removed from the vehicle. Bulk waste fluid receptacles should be equipped with large funnels and a drain rack system to allow complete fluid removal from catch pans. Small squeegees can be used to remove the remainder of fluids from drain pans if needed. Bulk containers should be equipped with a level gauge to prevent drums from overfilling and secondary containment provided to catch such spills, should they occur. Waste from spills can be drastically reduced by maintaining a sound housekeeping policy with little or no investment of capital.

When spills do occur, the following pollution prevention practices for cleanup should be used to decrease the amount of waste generated:

## Pollution Prevention Practices for Shop Cleanup:

- Use a large squeegee with a large, oil-resistant dustpan to get as much liquid off the floor as possible. This simple tool can all but eliminate the use of floor dry materials, is reusable, and allows the fluid to be captured for recycle.
- For large spills, “oil mops” are available to use with mop buckets to recapture spilled liquids.
- When as much fluid as possible is recovered, biodegradable detergent and water can be use for final cleaning. Wash waters should not be poured on the ground, but sent to a sanitary sewer.
- Use recyclable rags for cleaning purposes; this will reduce your solid waste stream.
- Keep all raw materials and fluid recyclables in safe, well-marked storage areas with sealed floors, to avoid accidental spills and soil contamination.
- Set up a sound inventory program to reduce excessive purchasing, product use, and generation of outdated products.

Waste reduction at the source of generation can save businesses money, time, and paperwork. Using less hazardous cleaning systems will reduce long-and short-term liabilities associated with hazardous waste disposal and employee health. Pollution Prevention can save money and improve your shop’s public image in your community.

*Vendor information for services and equipment described in this fact sheet may be obtained by contacting the Kansas State University Pollution Prevention Institute at 1-800-578-8898. Technical information and free, confidential, on-site assessments are available to small businesses by contacting a pollution prevention specialist at the above number.*

## Important Notice

Actual disposal requirements depend on the amount of waste, type of waste, and shop location. If you follow the testing and disposal recommendations in this document, you should be in compliance with environmental regulations.

Auto shops that generate less than 55 pounds of hazardous waste per month, totally, do not need to test filters and hazardous solvents in order to dispose of them. However, these wastes must be disposed of in an environmentally sound manner and in accordance with local regulations. For disposal of oil filters and coolant materials, always check with your local POTW and landfill authorities.

Auto shops that generate more than 55 pounds of hazardous waste per month must characterize their wastes by process knowledge or hazardous materials testing procedures.

Recommended storm water practices in this document are not required by law for the Auto Repair and Maintenance Industry.

K-STATE
Kansas State University



Printed on recycled paper
(2/10/00) 2/00-200