Radiator Repair Facility Pollution Prevention

Antifreeze plays an essential role in maintaining proper car operation. This fact sheet provides information on proper use and disposal, pollution prevention techniques, and health effects of antifreeze.

Regulations, Regulations, Regulations!

In order to comply with strict wastewater discharge limits along with new hazardous waste regulations, radiator service firms need to develop cost-effective waste management programs.

Engine coolant may be regulated as a hazardous waste because it contains ethylene glycol, a toxin. Additionally, detectable concentrations of benzene, toluene, lead, zinc, arsenic, mercury and copper may accumulate in the coolant from the cooling system. Spent radiator solution is generated at a rate of 30 to 100 gallons per month by medium-sized to large repair shops and is commonly collected, stored and disposed of as a hazardous waste. Many smaller shops sewer this waste, however, this practice is prohibited by a growing number of communities.

Preparing the Radiator for Repair

Drain

Drain coolant in a designated area without connections to the storm drain or the sanitary sewer. Some municipalities now require that you perform all fluid changes in a double-contained bay with no drain.

Disposal

Disposal methods for used antifreeze will vary depending upon where your facility is located and the type of radiator in the car. If the vehicle is a newer model, the radiator will probably be made of aluminum and plastic and the used antifreeze can be recycled as outlined below. With older cars, there is the possibility that lead from the solder used in manufacturing or repairing the radiator may contaminate the antifreeze, making the waste hazardous. Contact a disposal vendor to manage your hazardous waste properly. This fact sheet provides a list of several vendors that can collect, recycle, and/or dispose of waste antifreeze.

Recycling

Used antifreeze usually can be accepted by an antifreeze recycler. Collect radiator flushing fluid rather than pouring it into your shop drain. Reuse the flushing fluid to minimize waste discharges. If your recycler won't accept the spent flushing fluids, consider changing to another brand of fluid that can be recycled. Only final rinse water, after flushing is completed, may be discharged to the sanitary sewer.

Repairing the Radiator

Preventing Leaks and Spills

Prevent leaks from vehicles and equipment onto the shop floor by practicing careful housekeeping and by minimizing wastes and discharges.

Maintain your shop floor equipment. Check your equipment at the end of the working day to wipe up spills and to find leaks that need repair.

Use the "dry shop" principle whenever you work on a vehicle. When you spill or drip fluids onto the floor, clean them with a rag, instead of letting them evaporate. Properly store used rags and send them to an industrial laundry for cleaning.

To reduce spills, use the following practices:

• Collect leaking or dripping fluids in drip pans or containers and repair the radiator as soon as possible. If the fluids are kept separate, they usually may be recycled.

• Empty and wipe the drip pans when you move them to another vehicle, or when they are about half-full, to avoid spills.

• Keep a drip pan under the car while you unclip hoses, unscrew filters or remove other parts.

• Use larger, flat, low-brimmed pans under cars where mechanics are working and where ordinary drip pans are too cumbersome.

• Promptly transfer used fluids to the proper waste or recycling drums. Don't leave drip pans or other open containers unattended.

• Place drip pans under vehicles as they arrive even if you believe that all fluids have leaked out before the car reaches your shop. Wrecked vehicles can continue to drip for days.

• Drain all fluids, including air conditioner coolant, from wrecked vehicles and "parts" cars upon arrival. Some locales require that wrecked cars be drained within 24 hours of arrival.

• If you wish to park wrecked vehicles outdoors, you may need to construct a roofed and drained area for them.

Operational Changes

Simple changes or modifications to the radiator repair process that will reduce waste fall into the following categories:

• Changes in the process chemicals (i.e. cleaners, test tank solutions, flux, etc.) Used to reduce levels of contaminants in the waste and to ensure that compounds in the process chemicals will not cause treatment/management problems later on.

• Segregation of waste to ensure that non- or lightly-contaminated wastes are not mixed with highly-contaminated wastes.

• Modifications to the process equipment to ensure minimum waste generation.

Based on these waste minimization categories, a number of simple reduction methods can be identified. Examples are discussed below:

Boil-Out Tank

• Use compressed air to blow out any residual alkaline solution, especially from the oil-cooling section, left in the radiator after it is taken out of the boil-out tank. This should be done over the boil-out tank or in a manner so that the material can be collected and returned to the boil-out tank.

• Use washwater as makeup for the boil-out tank. Increasing the temperature at which the tank operates will increase the evaporation rate thus allowing for the return of more water. For example, a rise from 140°F to 160°F will increase evaporation by 50%.

• Carefully monitor the boil-out tank and only add the minimum required types and quantity of chemicals. Some auxiliary chemicals can build up over time and shorten the life of the coolant, while other materials, such as chelating agents, can cause waste management problems.

• When the process bath has to be dumped, no more than once a year, first remove the liquid to a tank and trap the solids, using filtration (such as a bag filter) or settling. Then return the liquid portion to the process tank.

• Use a smaller process tank such as an ultrasonic cleaning unit to reduce the volume of waste generated.

Rinsing

• Use the minimum amount of water to rinse the radiators after rinsing the boil-out tank. Use high pressure with a low water flow rate.

• Recycle wastewater for rinsing and makeup of the boil-out tank.

• Reduce, as much as possible, all use of water in the facility. Use dry or damp cleanup techniques for spills or leaks, where possible. (i.e. do not use a hose in place of a broom).

Test Tank

• Do not solder over the test tank, letting excess solder fall into the process solution. This will result

in a zinc and lead build-up in the solution. Instead, solder over a separate area in such a way that any solder can be caught before it falls into the tank.

• Do not dump the process solution because it becomes "cloudy". If there is a solids problem, filter the solution (a simple bag or cartridge filter can be used), or let the solids settle out.

General

• Remove as much oil as possible from the oil cooler before the radiator is put into the boil-out tank. Use compressed air to blow out this section if necessary. Collect and segregate the oil from the other process wastes. Depending on the quantities, sell or give it to a waste oil management firm.

• Reduce or eliminate the use of any product in the process, such as cleaner or flux, which may contain complexing or chelating compounds. These materials will keep metals in solution and will require very complex treatment methods for their removal.

• Use a low zinc flux to reduce levels of zinc in the process baths and waste water.

• Set up the process tanks so as to minimize or eliminate the spillage of process solution onto the floor. The tanks can be set up next to each other, or a drip board or pan can be placed between tanks to collect and divert any liquid back into the process tank from which it came.

• Seal or extend the height of any floor drains to reduce the possibility of spills/leaks entering the sewer. Diking around process tanks is another way to contain process leaks or spills.

These are just some techniques which may be used to reduce waste. Not all will be applicable to every shop, but they do show the types of methods that can be used to reduce waste generation.

Treatment and Recycling of Rinse Water

Once the maximum possible amount of waste has been reduced, the remaining amount can be treated and reused or properly disposed. The rinse water from the cleaning step after the caustic bath will be the best candidate for reuse. This waste water is the major source of volume and concentration of metals (lead levels alone can reach over 600 ppm). There are basically three types of water recycling techniques: filtration, simple chemical or physical treatment and advanced chemical or physical treatment.

The simplest recovery technique uses gravity settling and filtration to remove solids and some oil from the contaminated rinse water. In such a system, the largest particles are first settled out and the waste water is then run through a series of successively finer filters to remove the remaining suspended solids. The treated water can then be reused for rinsing or as makeup for the boil-out tank. Over time, caustics, oils, metals and dissolved solids will build up, but since the water is not discharged, the contaminant levels will not matter from a permit standpoint. However, if the levels of contaminants build up too much it could cause operational problems. This can be avoided if enough of the treated water is removed for use as makeup in the boil-out tank and replaced by fresh water. This will allow the concentration of dissolved solids to reach and stay at an acceptable level. Identifying and maintaining this operating condition will be the key to the successful performance of the system. Any build-up in caustic over time can be corrected by acid addition as needed. The cost of such a filtration system depends upon the size and capacity of the unit.

A simple chemical/physical treatment system can also be used to remove oil, metals and solids from the waste water so that it can be reused. Such a system would consist of adjusting the pH with acid (such as hydrochloric acid), adding an inorganic flocculent (such as ferric chloride) or a polymer and letting the solids settle and the oil float to the surface. The treated wash water can then be stored for reuse as rinse water, or as makeup to the boil-out tank. Such a system can remove metals down to about 10-30mg/l. Metal levels cannot be reduced much further due to chelating & complexing agents in the rinse water. Also, this system could be used to treat any batch dumps of the process tanks. The cost of such a unit will depend on the unit's capacity as well as if it is built in house or bought from a vendor. The prices for vendor-supplied package systems start at about $4500. The chemical cost for operating this type of system will be several hundred dollars a year.

The final type of system using advanced treatment methods is able to reduce the metal concentrations down to levels which will meet discharge limits,

0.5mg/l or less of lead. Such systems use special treatment chemicals and/or oxidation techniques to break up chelating and complexing agents and precipitate metals. One commercially available unit uses a chemical oxidizer, chlorine and an ultra-violet lamp to break up metal complexing/chelating agents, followed by standard chemical/physical treatment processes to remove the remaining metals and solids. In any of these systems, the treated water can then either be reused or discharged. Depending upon the treatment technique used, these systems can cost up to $15,000 to purchase. The chemical costs for operating such a system will be several hundred dollars a year.

Before any of these systems are installed, a treatability study must be conducted to determine if the technology will work and what concentration and type of treatment chemicals must be used. Once the system is installed and properly operating, changes in the materials used in the repair process must not be made. If they are, tests must be conducted to determine if the new compounds will have any effect on the treatment/recycle system.

Sludge Management

All of these reuse systems, along with the process baths, will generate sludge. This material will probably be heavily contaminated with lead and thus would be considered a hazardous waste. The sludge must be properly handled and stored on-site and sent to a permitted hazardous waste management facility for disposal. Information on transporters, analytical laboratories and multi-service management firms can be obtained from the Waste Management and Research Center. Additionally, the National Automobile Radiator Service Association (NARSA) has an agreement with a national trucking firm to provide its members with waste management services at reduced rates. For more information on this program, contact NARSA at 215-541-4500 in Pensburg, Pa.

There are a number of techniques available to remove the excess water from the sludge, thus reducing its volume. This will, in turn, reduce disposal costs. Most of these techniques will depend on filtering the solids out of the sludge and/or air-drying the sludge.

If the solids in the sludge are of a high enough concentration when they come out of the treatment system, then they can be put directly into a drum and allowed to air-dry over time. The addition of a heat source, such as an electric band drum heater, will speed up the drying process and produce a drier material.

If the sludge is very "watery," then a gravity filtration system can be used first to increase the solids concentration. There are a number of different designs and configurations for such a system. The simplest system would be a paper or cloth filter placed on a holder over a drum. The sludge can then be pumped or gravity-fed onto the filter material. The water will drain through the filter and be collected in the drum. The sludge can then be dried and the water returned to the treatment system. The cost of such a system will depend on its complexity and capacity and can range from $100 to $1,000.

Any impact of the hazardous waste regulations on a sludge dewatering system must first be evaluated before a unit is purchased. Depending on how a system is configured and operated, regulations under the Resource Conservation and Recovery Act may cover its operation. The Waste Management and Research Center can provide more information and regulatory assistance on this subject.

Waste Collection and Disposal

Human Health Effects of Antifreeze

Ethylene glycol is poisonous when ingested. Since it is a clear, colorless liquid with a very sweet taste, pets and small children may drink it if they have access to the container or to a spill or leak. Just 3 ounces (100 ml) or 100 percent pure ethylene glycol can kill an average size adult. Some signs of ingestion in humans include twitching muscles, followed by depression, vomiting, drowsiness, convulsions, coma, and severe kidney, respiratory and cardiac failure. The Poison Resource Center recommends that **immediate** medical attention be sought at a hospital emergency room. Do not induce vomiting. Delaying treatment greatly increases the chances of death or permanent organ failure.

Contact the Medical Authorities in your area or call 911.

Services

Adco Services Inc.
17650 Duvan Dr.
P.O. Box 1129
Tinley Park, IL 60477
708-429-9759

Curry Environmental
P.O. Box 1400
Milan, IL 61264-1400
1-800-762-3300

Heritage Environmental
7901 W. Morris St.
Indianapolis, IN 46231
(317) 243-0811

Safety Kleen Corp.
1000 Randall Road
Elgin, IL 60123
708-468-8460

SET Environmental Inc.
450 Sumac Rd.
Wheeling, IL 60090
708-537-9221

Recycling Equipment

Chemtech LP
1 Westbrook Corp Center Ste 500
Westchester, IL 60154
(800) 323-3521

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