Automobile Air Conditioners and Chlorofluorocarbons (CFCs)

FACT SHEET

The Problem With CFCs

Since chlorofluorocarbons (CFCs) were developed in the 193Os, they have been widely used as air conditioner (A/C) and refrigerator coolants, aerosol can propellants, electronic parts cleaners, and foam blowing agents. CFC-12 (also called Freon or R-12) has been the most common type of coolant used in automobile A/C systems and accounted for 20 percent of all U.S. CFC consumption in 1992. CFCs have been useful in so many applications because they are non flammable, non toxic and extremely stable in the environment.

Unfortunately, as stable CFC molecules rise into the stratosphere they are split by the sun's ultraviolet radiation. Chlorine molecules react with and split ozone molecules, depleting the ozone layer. The ozone layer, 10 to 30 miles above the Earth's surface, protects biological life from the sun's harmful ultraviolet radiation, which can cause skin cancer and eye cataracts and can suppress the body's immune system. CFCs have also been identified as greenhouse gases, i.e. contributors to global warming.

The threat of CFCs to the ozone layer was considered so serious that an international treaty, the 1987 Montreal Protocol, was developed to prohibit production and use of CFCs and most other ozone damaging chemicals by the year 2000. To date, 150 nations representing over 95 percent of the world's CFC consumption have signed this treaty.

The majority of automobiles manufactured prior to 1994 use Freon in their A/C systems. Since that time, several non-CFC refrigerants such as hydrofluorocarbons (HFCs) have been developed; and many more are in the development process. Since 1995, the most common substitute for CFCs in automobile A/C systems is HFC- 134a (or R-134a). Unlike CFCs, HFCs contain no chlorine and do not harm the ozone layer; however, they are considered greenhouse gases.

Hydrochlorofluorocarbons (HCFCs) are also used as CFC-12 substitutes in A/C systems. HCFCs do contain chlorine but their ozone depletion capability is significantly less than CFCs. However, under the Montreal Protocol HCFC production is scheduled to be banned by the year 2030.

In response to the global environmental problems caused by CFCs, HCFCs, and HFCs, the U.S. Environmental Protection Agency (EPA) has implemented comprehensive regulations governing their use.

Regulations Governing Use of CFC-12, HCFCs and HFCs

Section 609 of the 1990 Clean Air Act Amendments implemented regulatory requirements for personnel and facilities servicing automobile AK units.

NC Division of Pollution Prevention & Environmental Assistance
PO Box 29569
Raleigh, NC
27626-9569

(919) 715 6500

Regulations Pertaining to CFC-12 and HCFC Usage

1. It is illegal to vent CFCs or HCFCs to the atmosphere. Penalties of up to $25,000 per day per violation can levied and prison terms can be given to anyone who knowingly vents CFC-12 or HCFCs into the atmosphere. The regulations require that CFC-12 and HCFCs be recycled. However, it is not illegal to use in-stock, recycled, or remanufactured stocks of these chemicals.
2. All facilities servicing motor vehicle A/C systems must certify to EPA that they have acquired and are properly using approved CFC or HCFC recycling equipment.
3. Technicians who service motor vehicle A/C systems must be certified.
4. Sales of refrigerant are restricted to certified technicians.
5. EPA requires that facilities with refrigerant recycling equipment keep records of the name and address of the facility to which any refrigerant is sent for reclamation. These records must be kept for 3 years. The facility must also have records showing that all persons authorized to operate any recycling equipment are currently certified.

Regulations Pertaining to HFC Usage

1. It is illegal to vent HFCs to the atmosphere. These chemicals must be collected during servicing.

For specific information on regulations, contact the EPA Stratospheric Ozone Protection Hotline (SOPH) at (800) **296-l 996.**

Technician Certification

To become certified, all technicians servicing automobile A/C systems must complete an EPA-approved refrigerant recycling course. At a minimum, operator certification must be as stringent as the certification program of the National Institute for Automotive Service Excellence (ASE), the training and certification of the Mobile Air Conditioning Society (MACS), or similar programs.

EPA's list of approved technician certification programs can be obtained from the Stratospheric Ozone Protection Hotline (SOPH). The certification usually involves studying a booklet received from a certification center and taking a test by mail or at a central location.

Beware of buying CFC- 12 refrigerant that is substantially below the average market price. Illegal trade of CFCs is becoming increasingly common as prices increase. Additionally, these illegal supplies might be contaminated and damage A/C systems. The penalties for using illegal supplies of CFC-12 are fines up to $25,000 per day per violation and a prison term of up to 5 years.

Approved Collection and Recycling Equipment

At the present, EPA's collection and recycling requirements can be met only with equipment carrying Underwriters Lab (UL) certification or with equipment at least as stringent as the Society for Automotive Engineers (SAE) J series standards. Before purchasing new equipment, users should ensure that vendor models meet these requirements. A description of these standards and a list of EPA section 609-approved equipment can be obtained from the SOPH.

Pollution Prevention Tips

General Operating Procedures

All Montreal Protocol participant countries ceased Freon production by January 1996. As supplies of stockpiled and recycled Freon decrease, the cost is increasing markedly. Proper collection and efficient recycling are not only incentives to prevent losses of Freon to the atmosphere, these pollution prevention measures will also ensure rapid payback on recycling equipment.

The following practices should be adopted at all NC service facilities:

- ✓***Leaks:*** Detect refrigerant leaks with a simple visual inspection of the hoses, connections, and condenser. Visible oil leaks usually indicate a leak in the system. A leaking A/C system can also be detected by draining the refrigerant from the system and then monitoring its ability to hold a vacuum: pressure loss indicates a leak. Electronic sniffers can also be used for leak detection. Fluorescent leak detection systems are available but many compressor manufacturers advise against their use due to the abrasive nature of the dye particles. Use of flame detection systems is strongly discouraged as lethal phosgene gas (mustard gas), can be produced when CFC-12 comes in contact with an open flame. Also, avoid using leak detection products containing Freon.

- ✓***Maintenance and Repair:*** Evacuate all refrigerant prior to A/C maintenance or repair. Make it a policy to encourage customers to have leaking A/C systems repaired rather than topped off with refrigerant. However, leak repair is not required under federal law.

- ✓***Manifold Hoses:*** To prevent leakage, manifold hoses must have shut off valves within 12 inches of the ends of each line.

- ✓***Cross Contamination:*** Avoid cross contamination of refrigerants. Cross contamination often occurs when the A/C system has been partially charged with a refrigerant other than the type designated on the system information label. A cross contaminated A/C system will suffer reduced performance, damage from chemical breakdown and lubrication problems. Additionally, if a cross contaminated system is connected to recovery/recycling equipment it can foul components such as filters and dryers which will have to be replaced. Furthermore, the cross contaminated refrigerant can be passed from contaminated recovery/recycling equipment to other automobiles' systems. Be wary of complex automobile A/C service histories and makeshift or damaged fittings which may indicate cross contamination. Another consideration is that all cross-contaminated refrigerant must be sent to a refrigerant recycling facility for separation and purification which will increase operating costs.

- ✓***Retrofitting*** : When retrofitting an older A/C system, it is critical to evacuate the old refrigerant to avoid cross contamination for the reasons discussed above. HFCs (such as R-134a) or blends using HFCs are not compatible with mineral oil lubricants found in CFC-12 refrigerant systems. As existing AK systems age and CFC-12 supplies become scarce and more expensive, the demand for conversion or retrofit to non-CFC refrigerants will increase. The entire conversion process involves replacing the dryer, hoses, seals, refrigerant, and lubricant as well as flushing of the old lubricant. EPA estimates the retrofitting process should cost between $100 to $800 depending on the make and model of the car. A basic retrofit involving a change ***to*** a non-CFC refrigerant is estimated to cost approximately $200.

  For conversion to R-134a, manufacturers recommend that the existing lubricant be triple-flushed from the system before it is charged with the new coolant. Flushing can usually be accomplished after the existing mineral oil is recovered and removed through an oil dram plug or from the suction line after the compressor is removed. Typically 90 to 95 percent of the lubricant is removed by this method. For best results, check with the vehicle manufacturer for specific retrofit guidelines and the availability of retrofit kits. Conditions for CFC replacements generally require specific labeling and unique fittings for different refrigerant types to prevent

cross-contamination. Also, for refrigerants containing HCFC-22, barrier hoses are required between the system components.

✓***Recharging:*** When recharging, do not use small (12-ounce) disposable containers of refrigerant but instead buy bulk containers, e.g. 30 lb containers. Since the cans cannot be reused and are not equipped with a shut off valve, any unused refrigerant remaining in the can will be lost to the atmosphere. Also, bulk purchases are less expensive.

✓***Approved Containers:*** To avoid leakage of stored refrigerants, use only DOT- or UL-approved containers. Refrigerants should never be collected, salvaged, or stored in unapproved containers.

✓***Labeling:*** To avoid cross-contamination, label containers to indicate the type of refrigerant stored. Segregate any contaminated refrigerant and store it for purification in a specifically labeled container.

Alternative Refrigerants

EPA's Significant New Alternatives Policy (SNAP) evaluates new alternate refrigerants for their ozone-depleting, global warming, flammability, and toxicity characteristics. When considering an alternate refrigerant, users should make sure it is both authorized under EPA environmental regulations and acceptable to the manufacturer of the vehicle. Some refrigerants, banned by EPA, are still on the market. In July 1996, the Independent Garage Owners of North Carolina reported HC-12a was being marketed as an alternative automotive refrigerant to its members. The refrigerant HC-12a is banned by EPA because it has a high flammability and creates an explosion risk when used in or around cars. Furthermore, a car containing an unauthorized refrigerant can contaminate a garage's air conditioning recovery/recycling system. There are also legal penalties for using unauthorized refrigerant. Any garage or private citizen using unauthorized air conditioning refrigerant is subject to fines of up to $25,000 and imprisonment. EPA's list of authorized (legal) and unauthorized (illegal) CFC refrigerant alternatives can be obtained from the SOPH.

At this time, five alternate refrigerants have been approved for use by EPA. For a list of these refrigerants and conditions of use, call the EPA SOPH and request the fact sheet, "Choosing and Using Alternative Refrigerants for Motor Vehicle Air Conditioning."

Floor Stocks Tax

The federal government imposes an annual "Floor Stocks Tax" on stocks of Freon greater than 400 pounds. Therefore, the tax will effect many A/C servicing facilities with inventories of Freon destined for sale or for further manufacturing. The tax varies each year but is generally between $0.40 - $0.45 per pound and is based on a facilities Freon inventory on January 1 of each calendar year. Any facility with stocks exceeding 400 pounds must file a form 6627 tax return by August 31. For further information on the Floor Stocks Tax contact the Internal Revenue Service - Excise Tax Branch on (202) 622-3130.

The North Carolina Division of Pollution Prevention and Environmental Assistance provides free, non-regulatory technical assistance and education on methods to eliminate, reduce, or recycle wastes before they become pollutants or require disposal. Call DPPEA at (919) 715 6500 or 800-763-0136 or e-mail nowaste@p2pays.org for assistance with issues in this Fact Sheet or any of your waste reduction concerns.

OWF-96-32. 100 copies of this public document were printed on recycled paper at a cost of $9.60 or $0.048 per copy.