Air Conditioning Systems

CASE STUDY

Keeping Vehicle Air Conditioning Systems "Cool" at Argonne

Mechanics Reclaim Refrigerant to Meet Federal Requirements

Federal regulations, dwindling chlorofluorocarbon (CFC) refrigerant supplies, and skyrocketing prices have motivated the Vehicle Maintenance Group at Argonne National Laboratory to modify its procedures for servicing air conditioning systems: (a) all Freon is captured and reclaimed; (b) mechanics no longer "top off" refrigerant; and (c) all mechanics are certified in automotive air conditioning. The Laboratory also recommends that drivers not use air conditioning during short on-site trips. These measures ensure environmentally sound and cost-effective air conditioning use and service.

Why Reclaim CFCs?

Releasing CFC refrigerants into the atmosphere depletes the ozone layer that protects the earth from the harmful effects of unfiltered ultraviolet radiation and helps maintain stable temperatures. As part of a federal program to limit the release of ozone-depleting substances, the Clean Air Act drives many of Argonne's procedures for servicing vehicle air conditioners:

- Section 605 bans production of CFCs.
- Section 608 prohibits intentional venting of CFC refrigerants and requires that CFCs be recovered and reclaimed. Refrigerant recovery and recycling equipment must be certified by an approved testing organization.
- Section 609 requires that all persons who service vehicle air conditioning systems be trained and certified by an EPA-approved testing organization.

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Only certified technicians can purchase refrigerants.

A U.S. Environmental Protection Agency (EPA) regulation implements the Clean Air Act by:

- Prohibiting intentional venting of CFCs into the atmosphere during maintenance, service, repair, or disposal of air conditioning equipment;
- Requiring that refrigerant be recovered rather than vented into the atmosphere;
- Establishing a recycling program for recovered refrigerants;
- Establishing certification programs for recovery and recycling equipment.

Servicing Air Conditioning Systems

About 10-15 Argonne vehicles need air conditioning service each year. The Laboratory complies with federal regulations in the following ways:

- All mechanics are certified in automotive air conditioning service by the National Institute for Automotive Service Excellence. This requirement is specified in the union contract, and Argonne provides on-site training and testing fees. The training emphasizes the environmental and safety aspects of refrigerant use, not maintenance techniques.
- Previously, a mechanic would routinely top off the Freon in a vehicle's air conditioning system during preventive maintenance. But now, the refrigerant is replenished only when the driver complains and the mechanic determines that the system is not functioning properly by checking the inside temperature with a thermometer.
- A recover-and-recycle unit is used whenever a vehicle's air conditioning system must be opened. This unit captures the Freon before it can escape into the atmosphere. The mechanic attaches one end to a Freon tank and the other to the vehicle, making a closed-loop system. The unit monitors the exact amount of refrigerant added, and the mechanic notes the amount on the work order for inventory control.
- Because Freon does not evaporate, a low refrigerant level indicates a leak in the system. Adding refrigerant to a leaking system is wasteful and harmful to the environment. Mechanics test for leaks and make necessary repairs whenever they add Freon to a vehicle's air conditioning system.

Argonne's mechanics follow these steps in servicing a vehicle's air conditioning system:

Step 1: Diagnose the problem.
Step 2: Recover the refrigerant in the reclaimer, following the manufacturer's instructions.
Step 3: Repair the system.
Step 4: Leak check the system.
Step 5: Recycle the recovered refrigerant according to the manufacturer's instructions.
Step 6: Evacuate the air conditioning system.
Step 7: Recharge the system with the specified amount of refrigerant.
Step 8: Note amount of refrigerant used on the work order.

Disclaimer
This information on the pollution prevention measures employed by the Vehicle Maintenance Group at Argonne National Laboratory is intended as guidance only. For further information, contact Earl Powell, Vehicle Maintenance Supervisor, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439, phone: 630-252-7096.