



Project Summary

Mobile Air-Conditioning Recycling Manual

Dale L. Harmon

The manual provides guidelines on the recovery and recycle of the chlorofluorocarbon, dichlorodifluoromethane (CFC-12), from mobile air conditioners. The manual is intended for wide distribution internationally, especially for use by developing countries and the World Bank to assist such nations in phasing out or avoiding the future use of ozone-depleting CFCs. These guidelines will aid these countries in maintaining a supply of such chemicals to service existing equipment that depends on the use of these chemicals. The manual provides information on existing recovery/recycle technologies used for mobile air conditioning and references other reliable, authoritative sources of information for more detail. The steps that should be considered in developing and implementing a national mobile air-conditioning refrigerant recycle program are discussed.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Background

The Montreal Protocol on Substances that Deplete the Ozone Layer restricts the production of some ozone-depleting chemicals. The chlorofluorocarbon (CFC), dichlorodifluorocarbon (commonly referred to as CFC-12), is one of these chemicals. The revised Montreal Protocol, signed in

June 1990, calls for 50% reduction in CFC-12 production by 1995 and a complete phaseout by the year 2000.

Introduction

In the 1987 world market of some 45.7 million cars, trucks, and buses, approximately 21.9 million (48%) were equipped with air conditioning. Global use of CFC-12 for new vehicles is approximately 29,900 metric tons annually. The amount of CFC-12 currently required for servicing air-conditioned vehicles is estimated to be 3 times that required for new vehicles, or some 89,700 metric tons. Based upon Chemical Manufacturers Association data for 1987 CFC-12 production (424,726 metric tons), mobile air conditioning (MAC) currently accounts for approximately 28% of the global use of CFC-12.

The release of CFCs to the atmosphere can be reduced by the recovery and reuse of the refrigerant from automobile air conditioners when they are serviced. In 1988, very little information was available concerning the contamination level in operating automobile air conditioners and the ability of the available recovery/recycle equipment to clean the CFC to a level satisfactory for reuse. The U. S. automobile industry was not willing to allow recycling without voiding the warranty on air conditioners unless it was proven that the level of contaminants in recycled refrigerant would not increase failure of automobile air conditioners. In response to the need for a MAC recycle program, an industry/Environmental Protection Agency (EPA) ad hoc committee was organized to develop recommendations for standards for recycling CFC-12 for automobile air



conditioners. The ad hoc committee requested EPA's Air and Energy Engineering Research Laboratory (AEERL) to conduct a field study that would determine contaminant levels and could be used to define the acceptable level of purity for recycled refrigerant.

Based on the results of the AEERL study, the ad hoc committee proposed a standard of purity for recycled refrigerant which was accepted by the automobile industry. The Society of Automotive Engineers (SAE) issued the standard in three parts: SAE standard J1991, "Standard of Purity for use in Mobile Air Conditioning Systems," SAE standard J1990, "Extraction and Recycle Equipment for Mobile Automotive Air Conditioning Systems," and SAE standard J1989, "Recommended Service Procedure for Containment of R-12." Underwriters Laboratories is in the process of certifying that recycle equipment sold by various manufacturers can achieve the standard of purity established by the SAE J standards.

The U. S. Clean Air Act Amendments of 1990 (CAAA) build on the work done by the ad hoc committee that developed the voluntary recycle purity and equipment standards. The most important elements of the voluntary standards have been accepted and made mandatory in the CAAA. Specific deadlines are established. The CAAA mandates that, effective January 1, 1992, no person repairing or servicing motor vehicle air conditioners may do so without approved refrigerant recycle equipment. Approved refrigerant recycle equipment is defined as equipment certified by the EPA Administrator (or an independent standards testing organization approved by the Administrator) to meet the standards established by the Administrator. The standards are required to be, at a minimum, at least as stringent as SAE standard J1990.

The Manual

The manual summarizes results of the AEERL MAC study and outlines steps that

need to be considered by any nation in developing and implementing a national MAC recycle program.

The manual is divided into five sections:

Background: A brief summary of the magnitude of the problem and the status of current recycle technology is presented.

Approach: The approach used in the U.S. to develop MAC recycle standards is presented.

Specific Options: A brief summary of the features of the recycle equipment certified by Underwriters Laboratory to meet the SAE J standards is presented.

Steps in Implementation: A brief discussion of the steps that should be considered in developing a national recycle program is presented.

Appendices: The Appendices contain a list of the members of the industry/EPA ad hoc committee that developed the recommended MAC recycle standard, a list of the SAE committee members that developed the SAE J standards, and published reports and papers related to MAC recycling.

Dale L. Harmon is the EPA Project Officer (see below).

The complete report, entitled "Mobile Air-Conditioning Recycling Manual," (Order No. PB92-235688/AS; Cost: \$27.00; subject to change) will be available only from:

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5285 Port Royal Road
Springfield, VA 22161
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