Sunshine Act Meetings

Federal Register
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Friday, May 14, 1993

This section of the FEDERAL REGISTER contains notices of meetings published under the "Government in the Sunshine Act" (Pub. L. 94-409) 5 U.S.C. 552b(e)(3).

UNITED STATES COMMISSION ON CIVIL RIGHTS

DATE AND TIME: Friday May 21, 1993.

PLACE: U.S. Commission on Civil Rights, 624 Ninth Street, NW., Room 540, Washington, DC 20425.

STATUS: Open to the Public.

May 21, 1993.

Agenda

I. Approval of Agenda
II. Presentation by Reverend Jesse Jackson on Discrimination Against Minorities in Professional Sports Management
III. Approval of Minutes of April 23, 1993 Meeting
IV. Announcements
V. Followup to Previous Meeting
VI. Appointments to the Hawaii Advisory Committee
VII. *A Time to Heal: Race Relations in Dubuque, Iowa*
VIII. *Campus Tensions in Vermont: Searching for Solutions in the Nineties*
IX. Program Planning FY 1995
X. Status of Los Angeles Hearing Preparation
XI. Staff Director's Report
XII. Future Agenda Items

Hearing impaired persons who will attend the meeting and require the services of a sign language interpreter, should contact Betty Edmiston, Administrative Services and Clearinghouse Division (202) 376–8105 (TDD 202–376–8116) at least five (5) working days before the scheduled date of the meeting.

CONTACT PERSON FOR FURTHER INFORMATION: Barbara Brooks, Press and Communications (202) 376–8312.

Lawrence B. Glick,
Acting General Counsel.
[FR Doc. 93–11570 Filed 5–11–93; 4:37 pm]
BILLING CODE 6335–01–M

FEDERAL ENERGY REGULATORY COMMISSION

"FEDERAL REGISTER" CITATION OF PREVIOUS ANNOUNCEMENT: May 10, 1993, 58 FR 27619.

PREVIOUSLY ANNOUNCED TIME AND DATE OF MEETING: May 12, 1993, 10:00 a.m.

CHANGE IN THE MEETING: The following Docket Numbers have been added to Items CAG–18 and RS–7 on the Agenda scheduled for May 12, 1993:

Item No., Docket No., and Company
CAG–18—CP76–118–000, U–T Offshore System
RS–7—RP92–108–000 and RP92–137–000, Transcontinental Gas Pipe Line Corporation

Lois D. Cashell,
Secretary.
[FR Doc. 93–11650 Filed 5–12–93; 3:34 pm]
BILLING CODE 6717–01–M

FEDERAL DEPOSIT INSURANCE CORPORATION

Notice of Change in Subject Matter of Agency Meeting

Pursuant to the provisions of subsection (e)(2) of the "Government in the Sunshine Act" (5 U.S.C. 552b(e)(2)), notice is hereby given that at its open meeting held at 10:00 a.m. on Tuesday, May 11, 1993, the Corporation's Board of Directors determined, on motion of Director Eugene A. Ludwig (Comptroller of the Currency), seconded by Director Jonathan L. Fiechter (Acting Director, Office of Thrift Supervision), concurred in by Acting Chairman Andrew C. Hove, Jr., that Corporation business required the withdrawal from the agenda for consideration at the meeting, on less than seven days' notice to the public, of the following:

Memorandum and resolution re: Study of savings bank life insurance which makes a finding whether savings bank life insurance activities of insured banks pose or may pose any significant risk to the insurance fund of which such banks are members.

By the same majority vote, the Board further determined that no notice earlier than May 7, 1993, of the change in the subject matter of the meeting was practicable.

The meeting was held in the Board Room of the FDIC Building located at 550—17th Street, N.W., Washington, D.C.

Dated: May 11, 1993.
Federal Deposit Insurance Corporation.
Hoyle L. Robinson
Executive Secretary.
[FR Doc. 93–11572 Filed 5–12–93; 9:42 am]
BILLING CODE 6714–01–M

SECURITIES AND EXCHANGE COMMISSION

Notice is hereby given, pursuant to the provisions of the Government in the Sunshine Act, Pub. L. 94–409, that the Securities and Exchange Commission will hold the following meeting during the week of May 10, 1993.

A closed meeting will be held on Friday, May 14, 1993, at 2:30 p.m.

Commissioners, Counsel to the Commissioners, the Secretary to the Commission, and recording secretaries will attend the closed meeting. Certain staff members who have an interest in the matters may also be present.

The General Counsel of the Commission, or his designee, has certified that, in his opinion, one or more of the exemptions set forth in 5 U.S.C. 552b(c) (4), (8), (9)(A) and (10) and 17 CFR 200.402(a) (4), (8), (9)(i) and (10), permit consideration of the scheduled matters at a closed meeting.

Commissioner Roberts, as duty officer, voted to consider the items listed for the closed meeting in a closed session.

The subject matter of the closed meeting scheduled for Friday, May 10, 1993, at 2:30 p.m., will be:

Institution of injunctive actions.
Institution of administrative proceedings of an enforcement nature.
Settlement of injunctive actions.
Opinions.

At times, changes in Commission priorities require alterations in the scheduling of meeting items. For further information and to ascertain what, if any, matters have been added, deleted or postponed, please contact: Steve Luparello at (202) 272–2100.

Dated: May 10, 1993.
Jonathan G. Katz,
Secretary.
[FR Doc. 93–11618 Filed 5–12–93; 11:55 am]
BILLING CODE 8010–01–M

UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

TIME AND DATE: Full Board 2:00 p.m., May 14, 1993.

PLACE: Uniformed Services University of the Health Sciences, Room A1005, 4301 Jones Bridge Road, Bethesda, Maryland 20814–4799.

STUATS: Open—under "Government in the Sunshine Act" (5 U.S.C. 552b(e)(3)).

MATTERS TO BE CONSIDERED:

2:00 p.m. Meeting—Board of Regents

(1) Approval of Minutes—February 1, 1993; (2) Faculty Matters; (3) Departmental Reports; (4) Financial Report; (5) Report—President, USUHS; (6) Comments—Members, Board of Regents; (7) Comments—Chairman, Board of Regents; (8) Reports of

Subcommittees on Planning and Oversight.Q04
New Business.

CONTACT PERSON FOR MORE INFORMATION:
Charles R. Mannix, Executive Secretary of the Board of Regents, 301/295–3028.

Dated: May 12, 1993.

Linda Bynum,

OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 93–11646 Filed 5–12–93; 3:22 pm]

BILLING CODE 5000–04–M

federal register

Friday
May 14, 1993

Part II

Environmental Protection Agency

40 CFR Part 82
Protection of Stratospheric Ozone; Refrigerant Recycling; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[FRL–4625–3]

RIN 2060–AC80

Protection of Stratospheric Ozone; Refrigerant Recycling

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: In this action, EPA promulgates regulations under Section 608 of the Clean Air Act (the Act) that establish a recycling program for ozone-depleting refrigerants recovered during the servicing and disposal of air-conditioning or refrigeration equipment. Together with the prohibition on venting during servicing, repair, and disposal of class I and class II substances that took effect on July 1, 1992, these regulations should substantially reduce emissions of ozone-depleting refrigerants. The regulations require persons servicing air-conditioning and refrigeration equipment to observe certain service practices that reduce refrigerant emissions and establish equipment and off-site reclaimer certification programs, as well as a technician certification program. A sales restriction on refrigerant is included, whereby only certified technicians will legally be authorized to purchase such refrigerant. EPA's regulations also require repair of significant leaks, based on annual leak rates of equipment. In addition, these regulations require that ozone-depleting compounds contained "in bulk" in appliances be removed prior to disposal of the appliances, and that all air-conditioning and refrigeration equipment, except for small appliances, be provided with a servicing aperture that would facilitate recovery of the refrigerant.

EFFECTIVE DATE: June 14, 1993.

ADDRESSES: Materials relevant to the rulemaking are contained in Air Docket No. A–92–01 at: U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460. The Public Docket is located in Room M–1500, Waterside Mall (Ground Floor), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC. Dockets may be inspected from 8 a.m. until 12 noon, and from 1:30 p.m. until 3 p.m., Monday through Friday. A reasonable fee may be charged for copying docket materials.

FOR FURTHER INFORMATION CONTACT: The Stratospheric Ozone Information Hotline at 1–800–296–1996 can be contacted for further information on weekdays from 10 to 4, Eastern Time. Debbie Ottinger, Program Implementation Branch, Stratospheric Protection Branch, Office of Atmospheric Programs, Office of Air and Radiation, can also be contacted at Mail Code: 6205–J, 401 M Street SW., Washington, DC 20460, (202) 233–9200.

SUPPLEMENTARY INFORMATION: The contents of today's preamble are listed in the following outline:

I. Background

A. Ozone Depletion

The stratospheric ozone layer protects the Earth from the penetration of harmful ultraviolet (UV–B) radiation. On the basis of substantial scientific evidence, a national and international consensus exists that certain man-made halocarbons, including chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform, must be restricted because of the risk of depletion of the stratospheric ozone layer through the release of chlorine and bromine (WMO/UNEP Science Assessment). To the extent depletion occurs, penetration of UV–B radiation increases, resulting in potential health and environmental harm including increased incidence of certain skin cancers and cataracts, suppression of the immune system, damage to plants including crops and aquatic organisms, increased formation of ground-level ozone and increased

weathering of outdoor plastics. (See 53 FR 30566 for more information on the effects of ozone depletion.)

The original theory linking CFCs to ozone depletion was first proposed in 1974. Since then, the scientific community has made considerable advances in measuring and understanding the atmospheric processes affecting stratospheric ozone science. Repeatedly, these scientific advances have indicated that the impact of man-made ozone-depleting substances on the stratosphere was more severe than previously thought. As discussed below, the U.S. and the international community have adopted increasingly stringent policies regarding the manufacture and use of ozone-depleting substances in response to this evolving scientific understanding.

B. Montreal Protocol

In response to the discovery of the ozone hole over Antarctica and to growing evidence that chlorine and bromine could destroy stratospheric ozone on a global basis, many members of the international community came to the conclusion that an international agreement to reduce global production of ozone-depleting substances was needed. Because releases of CFCs from all areas mix in the atmosphere to affect stratospheric ozone globally, efforts to reduce emissions from specific products by only a few nations could quickly be offset by increases in emissions from other nations, leaving the risks to the ozone layer unchanged. EPA evaluated the risks of ozone depletion in Assessing the Risks of Trace Gases That Can Modify the Stratosphere (1987) and concluded that an international approach was necessary to effectively safeguard the ozone layer.

In September 1987, the United States and 22 other countries signed the Montreal Protocol on Substances That Deplete the Ozone Layer (the Protocol). As originally drafted, the Protocol called for production and consumption of certain CFCs (CFC–11, 12, 113, 114, 115) and halons (Halon-1211, -1301 and -2402) to be frozen at 1986 levels beginning July 1, 1989, and January 1, 1992, respectively, and for the CFCs to be reduced to 50 percent of 1986 levels by 1998. To date, over 90 nations representing approximately 95% of the world's production capacity for CFCs and halons have signed the Montreal Protocol. EPA promulgated regulations implementing the requirements of the 1987 Protocol through a system of tradeable allowances. EPA apportioned the allowances to producers and importers of ozone-depleting substances (controlled substances) based on their 1986 level of production and importation. It then reduced the allowances for the controlled substances according to the schedule specified in the Protocol. (See 56 FR 49548 (September 30, 1991)) for a more detailed discussion of the Protocol and EPA's regulations to implement the phaseout of ozone-depleting substances.)

C. London Amendments to the Protocol

Under Article 6 of the Montreal Protocol, the Parties are required to assess the science, economics and alternative technologies related to protection of the ozone layer every two years. In response to this requirement, the Parties issued their first scientific assessment in 1989 (Scientific Assessment of Ozone Depletion). During this assessment, scientists examined the data from land-based monitoring stations and the total ozone mapping spectrometer (TOMS) satellite instrument and found that there had been global ozone depletion over the northern hemisphere as well as over the southern hemisphere. The scientific assessment also reported that a three to five percent decrease in stratospheric ozone levels had occurred between 1969–1986 in the northern hemisphere in the winter months that could not be attributed to known natural processes.

At the Second Meeting of the Protocol Parties, held in London on June 29, 1990, the Parties responded to this new evidence by tightening the restrictions placed on these chemicals. The Parties to the Protocol passed amendments and adjustments which called for a full phaseout of the already regulated CFCs and halons by 2000, a phaseout of carbon tetrachloride and "other CFCs" by 2000 and a phaseout of methyl chloroform by 2004. The parties also passed a non-binding resolution regarding the use of hydrochlorofluorocarbons (HCFCs). HCFCs have been identified as interim substitutes for CFCs because they add much less chlorine to the stratosphere than fully halogenated CFCs. The Parties were concerned, however, that rapid growth in the amount of use of these chemicals over time would still pose a threat to the ozone layer. As a result, the resolution called for the phaseout of HCFCs by 2020 if feasible and no later than 2040 in any case.

D. Advance Notice of Proposed Rulemaking Regarding Recycling

On May 1, 1990, EPA published an advance notice of proposed rulemaking (ANPRM, 55 FR 18256) addressing issues related to the development of a national CFC recycling program. This notice emphasized that recycling is important because it would allow the continued use of equipment requiring CFCs for service past the year in which CFC production is phased out, thereby eliminating or deferring the cost of early retirement or retrofit of such equipment. The Agency continues to believe that the continued use of these substances in existing equipment that recycling would allow can serve as a useful bridge to alternative products while minimizing disruption of the current capital stock of equipment.

The ANPRM asked for comment on the feasibility of recycling in various CFC end uses and also asked for comment on methods, such as a deposit/refund system, that could be employed to encourage recycling. The Agency received 110 public comment letters in response to the ANPRM. In general, most commenters recognized the need for recycling to help protect the ozone layer and to provide a source of refrigerant to service existing capital equipment after the phaseout of CFC production is complete.

E. Excise Tax

As part of the Omnibus Budget Reconciliation Act of 1989, the U.S. Congress levied an excise tax on the sale of CFCs and other chemicals that deplete the ozone layer, with specific exemptions for exports and recycling. The tax has operated as a complement to EPA's regulations limiting production and consumption by increasing the costs of using virgin controlled substances. The original excise tax was amended in 1991 to include methyl chloroform, carbon tetrachloride and other CFCs regulated by the amended Montreal Protocol and Title VI of the Clean Air Act. The Energy Policy Act of 1992, section 1931 of Public Law 102–486, revised and further increased the excise tax, effective January 1, 1993. By raising the cost of virgin controlled substances, the tax has created an additional incentive for industry to shift out of these substances and increase recycling activities, and it has encouraged the development of a market for alternative chemicals and processes.

F. Clean Air Act Amendments of 1990

The Clean Air Act Amendments of 1990, signed November 15, 1990, include requirements for controlling ozone-depleting substances that are generally consistent with, but in some cases more stringent than those contained in the Montreal Protocol as revised in 1990. For the substances covered by the revised Protocol's control measures, Title VI of the Act calls for a phaseout of CFCs by January

1, 2000 with deeper interim reductions and, in the case of methyl chloroform, an earlier phaseout date (2002 instead of 2005). For the HCFCs, Title VI requires use restrictions, a production freeze in 2015 and a phaseout in 2030. EPA issued a temporary final rule on March 6, 1991 implementing the production and consumption limits contained in the Act for calendar year 1991. (See 56 FR 9518.) The Agency published proposed regulations for 1992 and beyond on September 30, 1991 (See 56 FR 49548). As discussed below, on January 19, 1993, EPA proposed regulations to implement an accelerated phaseout of class I substances and some class II substances.

In addition to the phaseout of ozone-depleting substances, title VI includes a variety of other provisions intended to reduce emissions of ozone-depleting substances. Section 608, the foundation for the regulations promulgated today, provides for EPA to promulgate regulations to achieve the "lowest achievable level" of emissions of ozone-depleting substances and to maximize recycling of such substances. Section 608 also bans the knowing venting of ozone-depleting substances during the maintenance, service, repair, or disposal of appliances and industrial process refrigeration. Section 609 establishes a specific program requiring the recovery and recycling of refrigerant used in motor vehicle air conditioners, specifically requires training and certification of technicians, and restricts the sale of small containers of CFCs. Other Title VI sections call for mandatory labeling, a ban on nonessential products, a program to review the safety of alternatives to class I and class II substances, and requirements of federal entities to conform to Title VI regulations and to maximize the use of safe alternatives.

G. Accelerated Phaseout

Based on new scientific evidence developed since the passage of the Clean Air Act Amendments and the issuance of implementing regulations, the international community, led by the United States, has agreed to further accelerate the phaseout of already regulated ozone-depleting substances. Virtually all class I substances will be phased out in less than three (3) years (by January 1, 1996) and halons will be phased out by January 1, 1994. The following section describes the most recent scientific and international developments regarding ozone depletion.

1. New Scientific Data Regarding Ozone Depletion

Significant scientific advances have occurred since the initial Protocol assessments in 1989. Several subsequent reports since that time have indicated a more rapid rate of ozone depletion than previously believed. The most recent Montreal Protocol Scientific Assessment, issued December 17, 1991, contains information from ground-based monitoring instruments, as well as from satellite instruments, from the years 1979–1991. The data indicate significant decreases in total-column ozone have occurred in winter, and for the first time, also show decreases in spring and summer, in both the northern and southern hemispheres at middle and high latitudes. The data further show no significant depletion has occurred in the tropics. TOMS data indicate that for the period 1979 to 1991, decreases in total ozone at 45 degrees south latitude ranged between 4.4 percent in the fall to as much as 6.2 percent in the summer, while depletion at 45 degrees north latitude ranged between 1.7 percent in the fall to 5.6 percent in the winter. Data from the ground-based Dobson network confirm these losses in total column ozone during the thirteen-year period. These findings show almost twice as much depletion as the average rate measured by the ground-based network over a twenty-year period. Based on this new data, scientists have concluded that the ozone in the stratosphere during the 1980s disappeared at a much faster rate than experienced in the previous decade.

The recent UNEP Science Assessment also includes new data on the estimated ozone depletion potentials (ODPs) of ozone-depleting substances. The assessment placed the ODP of methyl bromide, a chemical previously thought to have an insignificant effect on stratospheric ozone, at 0.6, with a range of uncertainty between 0.44–0.69. On November 25, 1992, the Parties to the Montreal Protocol agreed to assign methyl bromide an ODP of 0.7 (based on an update of the science assessment).

On February 3, 1992, NASA released preliminary data acquired by the ongoing Arctic Airborne Stratospheric Experiment-II (AASE–II), a series of high-altitude instrument-laden plane flights over the northern hemisphere (see Interim Findings: Second Airborne Arctic Stratospheric Expedition). Additional data were also obtained from the initial observations by NASA's Upper Atmosphere Research Satellite (UARS), launched in September 1991. The measurements show higher levels of chlorine monoxide (ClO) (the key agent responsible for stratospheric ozone depletion) over Canada and New England than were observed during any previous series of aircraft flights. In fact, the ClO levels over the United States and Canada and as far south as the Caribbean were many times greater than gas phase models had predicted. These levels are only partially explainable by enhanced aerosol surface reactions due to emissions from the volcanic eruptions of Mount Pinatubo. The expedition also found that the levels of hydrogen chloride (Hcl), a chemical species that stores atmospheric chlorine in a less reactive state, to be low, providing new evidence for the existence of chemical processes that convert stable forms of chlorine into ozone-destroying species.

In addition, the levels of nitrogen oxides (NO_x) were also observed to be low, providing evidence of reactions that take place on the surface of aerosols that diminish the ability of the atmosphere to control the buildup of chlorine radicals. New observations of Hcl and nitrogen oxide (NO) imply that chlorine and bromine are more effective in destroying ozone than previously believed.

The NASA findings indicate that in late January of 1992, the Arctic air was chemically "primed" for the potential formation of a springtime ozone "hole" similar to that formed each spring over Antarctica. These findings also are consistent with theories that ozone depletion may occur at an accelerated rate on aerosol surfaces in the stratosphere anywhere around the globe, and not only on polar stratospheric clouds as was previously believed.

After collecting more data, NASA released an April 30, 1992 "End of Mission Statement," which indicated that while a rise in stratospheric temperatures in late January prevented severe ozone depletion from occurring in the Arctic this year, observed ozone levels were nonetheless lower than had previously been recorded for this time of year. This information has further increased the Agency's concern that significant ozone loss may occur over populated regions of the earth, thus exposing humans, plants and animals to harmful levels of UV-B radiation, and adds support to the need for further efforts to limit emissions of anthropogenic chlorine and bromine.

In response to the preliminary findings, President Bush announced on February 11, 1992, that the United States would unilaterally accelerate the phaseout schedule for ozone-depleting substances, and he called upon other nations to agree to an accelerated phaseout schedule as well. The

President also asked U.S. producers to reduce voluntarily 1992 output of class I substances to half of the 1986 baseline levels. In addition, the President directed EPA to re-evaluate the phaseout schedule for HCFCs, and to consider the phaseout of methyl bromide.

2. Copenhagen Revisions to the Montreal Protocol

On November 25, 1992, the Fourth Meeting of the Montreal Protocol was convened. In this meeting, the Parties took a number of actions, including accelerating the phaseout schedule of CFCs, halons, carbon tetrachloride, and methyl chloroform and added HCFCs and methyl bromide to the list of chemicals to be controlled under the Montreal Protocol.

The following adjustments to the phaseout schedules of previously-controlled substances were adopted at the Copenhagen meeting:

(a) Accelerating the phaseout schedule for the originally-controlled CFCs (class I, group I substances) to require a 75% reduction in production and consumption (production plus imports minus exports) from 1986 baseline levels for 1994 and 1995, and a complete phaseout by 1996;

(b) Accelerating the phaseout schedule for halons (class I, group II substances) to require a complete phaseout in production and consumption by 1994;

(c) Accelerating the phaseout schedule for other fully halogenated CFCs (class I, group III substances) to require a reduction from 1989 levels, 75% in 1994 and 1995, and a complete phaseout of production and consumption by 1996;

(d) Accelerating the reduction schedules for carbon tetrachloride (class I, group IV) by requiring a reduction from 1989 levels of 85% in 1995, and a complete phaseout in 1996;

(e) Accelerating the phaseout schedule for methyl chloroform (class I, group V) by reducing production and consumption to 50% of 1989 levels in 1994, and phasing out completely by 1996.

(f) Establishing criteria for identifying essential uses and a process for excepting limited production and consumption of the above chemicals following their phaseout (see below).

These adjustments go into effect in approximately six months.

In addition, the Parties adopted the following amendments to the Protocol:

(a) Freezing consumption of HCFCs (class II substances) beginning in 1996 to a baseline ceiling of: 100% of 1989 the ozone depletion potential (ODP) weighted level of HCFC consumption, plus 3.1% of the ODP-weighted 1989 CFC consumption, followed by reductions in the baseline to 65% by 2010, 90% by 2015, and 99.5% by 2020; and completely phasing out consumption by 2030;

(b) Adding hydrobromofluorocarbons (HBFCs) to the list of controlled substances, specifying their ozone depletion potential, and phasing their production and consumption out completely by 1996;

(c) Listing methyl bromide as a controlled substance with an ozone depletion potential of 0.7, and freezing production and consumption beginning in 1995 at 1991 consumption levels; (not including amounts used for quarantine and preshipment uses);

(d) Establishing a procedure for the approval by the Parties for continued production and consumption after phaseout to meet essential use requirements; essential uses are defined as those necessary for health or safety, or critical to the functioning of society, and where there are no available alternatives or existing stocks of banked or recycled material;

(e) Establishing reporting requirements for HCFCs, HBFCs, and methyl bromide;

(f) Establishing reporting requirements for imports and exports of controlled substances to and from non-parties to the Protocol; and

(g) Extending the prohibitions on trade with respect to foreign states not party-specified, which include banning imports from foreign states not a party of Annex C, Group II ozone-depleting substances (HBFCs) and banning exports to foreign states not a party of HBFCs, commencing 1 year of the Copenhagen Amendments entry into force.

The Amendments will enter into force under the Protocol following their ratification by at least twenty Parties. This is projected to be accomplished by January 1, 1994.

The Parties also made a number of procedural and definitional changes that affect implementation of the Protocol and that are included in the proposed accelerated phaseout regulation. The changes include:

(a) The approval of destruction technologies and the requirement that Parties that plan to operate destruction facilities do so in accordance with Good Housekeeping Procedures developed by the Parties or with their equivalent;

(b) Clarification of the definition of controlled substances to exclude insignificant quantities under defined circumstances, and to encourage Parties to minimize emissions of such excluded substances;

(c) Clarification of the reporting requirements and treatment of international transshipments;

(d) Clarification of the definition of controlled substance to exclude the import and export of recycled and used controlled substances from the calculation of consumption, but to require reporting of data concerning these imports and exports.

3. The Proposed Accelerated Phaseout Regulation

In July 1992, EPA issued its final rule and regulatory program implementing section 604 of the Clean Air Act Amendments. Section 604 limits the production and consumption of ozone-depleting chemicals. EPA controls production and consumption by issuing allowances or permits that are expended in the production or importation of these chemicals. Trading of these allowances is permitted.

The regulation requires producers of class I substances to gradually reduce their production of these chemicals and to phase them out completely as of January 1, 2000 (2002 for methyl chloroform). In addition to the production limits, the rule requires a similar reduction in consumption.

In February 1992, the President requested that U.S. producers voluntarily reduce their production of CFCs by half of the baseline year levels and phase out CFCs, carbon tetrachloride, methyl chloroform and halons by January 1, 1996. He also announced that the U.S. would revisit the phaseout schedule for HCFCs.

Several months earlier, EPA had received a petition from the Natural Resources Defense Council (NRDC), the Environmental Defense Fund (EDF) and Friends of the Earth (FOE), requesting earlier phaseouts of ozone-depleting substances and that EPA add methyl bromide to the list of class I substances and also phase out its production. Another petition was submitted by the Alliance for Responsible CFC Policy that also supported earlier phaseouts of CFCs and certain HCFCs.

Based on these national and international developments, EPA proposed on January 19, 1993, to accelerate the phaseout of CFCs, methyl chloroform, carbon tetrachloride, halons, HCFC–141b, HCFC–142b, and HCFC–22. The Agency is also proposing to add methyl bromide and HBFCs to the list of major class I substances and phase them out by 2000 and 1996, respectively. In addition, the proposal addresses various trade provisions required by the Montreal Protocol.

H. Notice of Proposed Rulemaking Regarding Recycling

On December 10, 1992, EPA published a notice of proposed rulemaking (NPRM, 57 FR 238). In that notice, EPA proposed regulations under section 608 of the Clean Air Act (the Act) that would have established a recycling program for ozone-depleting refrigerants recovered during the servicing and disposal of air-conditioning or refrigeration equipment. The proposed regulations would have required persons servicing air-conditioning and refrigeration equipment to observe certain service practices that reduce refrigerant emissions and would have established equipment and off-site reclaimer certification programs. The proposal did not include a mandatory program for certifying technicians; however, comments were solicited on the need and prudence of such a mandatory program. In addition, EPA would have required that ozone-depleting compounds contained "in bulk" in appliances be removed prior to disposal of the appliances, and that all air-conditioning and refrigeration equipment, except for small appliances and room air conditioners, be provided with a servicing aperture that would facilitate recovery of the refrigerant.

II. Section 608 of the Clean Air Act

Section 608 of the Clean Air Act, as amended in 1990, provides the legal basis for this rulemaking. It requires EPA to establish a comprehensive program to limit emissions of ozone-depleting substances during their use and disposal.

Section 608 is divided into three subsections. In brief, the first requires regulations to reduce the use and emission of class I substances (CFCs, halons, carbon tetrachloride, and methyl chloroform) and class II substances (HCFCs) to the lowest achievable level, and to maximize the recycling of such substances. The second subsection requires that the regulations promulgated pursuant to subsection (a) contain requirements concerning the safe disposal of class I and class II substances. Finally, the third subsection establishes self-effectuating prohibitions on the venting into the environment of class I or class II substances, and eventually their substitutes, during servicing and disposal of air-conditioning or refrigeration equipment.

In particular, subsection (a) of section 608 requires EPA to promulgate regulations "establishing standards and requirements regarding the use and disposal" of both class I and class II substances. The regulations required are to "reduce the use and emission of such substances to the lowest achievable level" and are to "maximize the recapture and recycling of such substances." Subsection (a) calls for EPA to promulgate such regulations with respect to "the use and disposal of class I substances during the service, repair, or disposal of appliances and industrial process refrigeration" by January 1, 1992. (Appliance is defined by section 601(1) as "any device which contains and uses a class I or class II substance as a refrigerant and which is used for household or commercial purposes, including any air conditioner, refrigerator, chiller, or freezer." EPA believes that motor vehicle air conditioners (MVACs) are included within the scope of the term "appliance" but that the servicing regulations promulgated pursuant to section 609 of the Act eliminate the need to promulgate servicing regulations for MVACs under section 608. MVACs, however, are subject to disposal regulations promulgated today under section 608.) These regulations were to become effective by July 1, 1992.

Paragraph (2) of subsection (a) expands the scope of the recycling and emission reduction regulations by requiring EPA to promulgate additional regulations by November 15, 1994, that establish standards and requirements regarding the use and disposal of both class I and class II substances not covered by the initial set of regulations, i.e., all other uses of class I and class II substances. These regulations are to go into effect not later than 12 months after their promulgation. Subsection (a) further provides that the regulations promulgated pursuant to it may include requirements to use alternative substances, to minimize the use of class I or class II substances, or to promote the use of safe alternatives to class I and class II substances.

Subsection (b) of section 608 requires that the regulations under section 608(a) establish standards and requirements for the safe disposal of class I and class II substances. These are to include (1) requirements that such substances contained "in bulk in appliances, machines or other goods" be removed prior to the disposal of such items or their delivery for recycling; (2) requirements that "any appliance, machine or other good containing a class I or class II substances in bulk" be "equipped with a servicing aperture or an equally effective design feature which will facilitate the recapture of such substance;" and (3) requirements that products in which a class I or class II substance is an "inherent element" be disposed of "in a manner that reduces, to the maximum extent practicable, the release of such substance into the environment."

The provisions of subsections (a) and (b) ultimately (by November, 1994) apply to all uses of class I and class II substances, including air-conditioning and refrigeration, solvents, foam blowing, and fire control. However, these subsections focus first on the use and disposal of refrigerants during the service, repair, or disposal of air-conditioning or refrigeration equipment.

Refrigerants also receive special emphasis in subsection (c) of section 608, which provides in paragraph (1) that, effective July 1, 1992, it is "unlawful for any person, in the course of maintaining, servicing, repairing, or disposing of an appliance or industrial process refrigeration, to knowingly vent or otherwise knowingly release or dispose of" class I or class II refrigerants in a manner that "permits such substances to enter the environment." Certain de minimis releases are exempted from this self-effectuating prohibition. As discussed below in Section III. D, EPA will consider releases to be *de minimis* when they occur while the recycling and recovery requirements of this regulation are followed. Section 608(c)(2) extends the prohibition on venting to substances that are substitutes for class I and class II refrigerants effective November 15, 1995, unless the Administrator determines that such venting or releases do not pose a threat to the environment. The Agency notes that since MVACs are covered by the term "appliance," the servicing and disposal of MVACs are subject to the prohibition on venting.

The refrigerant recycling and safe disposal requirements promulgated today are a major step in the implementation of section 608. EPA research indicates that in all air-conditioning or refrigeration sectors, emissions during servicing and disposal of equipment account for between 50 and 94 percent of total emissions during the life cycle of the equipment (Regulatory Impact Analysis: the National Recycling and Emission Reduction Program, (RIA)). The recovery and recycling requirements published today should significantly reduce emissions during servicing and disposal. In those sectors where leakage during use accounts for a significant percentage of total emissions, EPA is establishing a program for requiring the repair of such leaks. EPA will consider in the future the regulation of non-refrigerant applications of class I and class II compounds under section 608.

These regulations may include requirements for emission-reducing engineering controls and work practices and/or requirements to use alternative substances in those uses for which substitutes exist. In determining what further actions to take under section 608, EPA will consider the accelerated phaseout dates for class I substances, the expected costs, and environmental benefits of further regulation.

III. This Rule

A. Equipment and Refrigerants Affected

1. Equipment Affected

Today's final rule applies to the servicing and disposal of most air-conditioning and refrigeration equipment, including household air conditioners and refrigerators, commercial air conditioners and chillers, commercial refrigeration, industrial process refrigeration, refrigerated transport, and air-conditioning in vehicles not covered by EPA's regulations under section 609 of the Clean Air Act (which apply to the service of motor vehicle air conditioners, or MVACS). As mentioned above, the rule also applies to the disposal of air-conditioning and refrigeration equipment, including MVACs. Following is a description of the major categories of equipment that will be affected by the rule:

Household Refrigeration. This category consists of refrigerators and freezers intended primarily for household use, though they may be used outside the home (e.g., in an office). In terms of the number of units currently in operation, this is the largest sector affected by this rule, with an estimated 159 million units. The amount of refrigerant (charge) in each of these units, however, is quite small relative to the charge in equipment in other sectors, ranging from six ounces to approximately one pound of CFC–12. The quantity of refrigerant in this sector that is available for recycling at servicing and disposal is estimated to be approximately 6,000 metric tons per year when weighted by the ozone-depletion potential of the refrigerant. (This and other estimates in this section are based on figures from 1990.) This makes up approximately 19% of the total available from the sectors affected by this rule when these quantities are weighted by the ozone depletion potentials (or ODPs) of the refrigerants. Because servicing is relatively rare in this sector, approximately 90% of this 17% would be recovered at disposal.

Other Refrigerated Appliances. Other refrigerated appliances include dehumidifiers, vending machines, ice makers, and water coolers. These equipment types have charge sizes and service characteristics similar to those in the Household Refrigeration sector. The total number of units of these types in current operation is approximately 23 million units. The quantity of refrigerant in this sector that is estimated to be available for recycling at servicing and disposal is 700 metric tons per year (ODP-weighted), which makes up approximately two percent of the total available from the sectors affected by this rule.

Residential Air-conditioning. This sector includes window units, packaged terminal air conditioners, central air conditioners, light commercial air conditioners, and heat pumps. There are approximately 85 million units in this sector, making it the second largest. The residential air-conditioning sector is similar to the household refrigeration and other appliances sectors because the equipment stock is large, the equipment is infrequently serviced, and charge sizes are small (4–7 pounds). The quantity of refrigerant in this sector that is available for recycling at servicing and disposal is estimated to be 1800 metric tons per year (when weighted by the ozone-depletion potential of the refrigerant), which makes up approximately six percent of the total available from the sectors affected by this rule. This figure is lower than that for household refrigeration because residential and light commercial air-conditioning relies exclusively upon HCFC–22, which has approximately five percent of the ozone-depletion potential of CFC–12.

Transport Refrigeration. The Transport Refrigeration sector consists of refrigerated ship holds, truck trailers, railway freight cars, and other shipping containers. With less than one million transport refrigeration units currently in use, this sector is relatively small. Trailers, railway cars, and shipping containers are commonly charged with CFC–12. Ship holds, on the other hand, rely on HCFC–22 and ammonia. The average charge size in this sector is approximately 18 pounds, which is relatively small compared to all but household sectors. The quantity of refrigerant in this sector that is estimated to be available for recycling at servicing and disposal is 1900 metric tons per year (ODP-weighted), which makes up approximately six percent of the total available from the sectors affected by this rule. Unlike equipment in the household sectors, equipment in the transport refrigeration sector is usually serviced every year. Thus, refrigerant recovered and recycled at servicing would account for approximately 25% of the total recovered and recycled in this sector.

Retail Food. The retail food sector includes refrigerated equipment found in supermarkets, convenience stores, restaurants, and other food service establishments. The equipment includes small reach-in refrigerators and freezers, refrigerated display cases, walk-in coolers and freezers, as well as large parallel systems. Convenience stores and restaurants typically use stand-alone refrigerators, freezers, and walk-in coolers. In contrast, supermarkets usually employ large parallel systems, which connect many display cases to a central condensing unit by means of extensive refrigerant piping. Because the piping required to connect all of the cases may be miles long, these systems can contain charges of over 500 pounds. Charges are typically CFC–12, CFC–502, or HCFC–22. The estimated total stock of retail food equipment is approximately 1.6 million units. The quantity of refrigerant in this sector that is estimated to be available for recycling at servicing and disposal is 9,000 metric tons per year (ODP-weighted), which makes up approximately 28% of the total available from the sectors affected by this rule.

Cold Storage Warehouses. Cold storage warehouses are used to store meat, produce, dairy products, and other perishable goods. There are approximately 665 million cubic feet of refrigerated space in cold storage warehouses throughout the United States. This sector is similar to the retail food sector, but its equipment is serviced even more frequently (up to four times each year) and can be charged with even greater quantities of refrigerant. The quantity of refrigerant in this sector that is estimated to be available for recycling at servicing and disposal is 83 metric tons per year (ODP-weighted), which makes up less than one percent of the total available from the sectors affected by this rule.

Commercial Comfort Air-conditioning. Chillers are used to regulate the temperature and humidity in offices, hotels, shopping centers, and other large buildings. There are approximately 170,000 units currently installed, making this sector one of the smallest affected by the recycling rule in terms of stock size.

There are three major types of chillers: centrifugal, reciprocating, and screw. Each of these is named for the type of compressor employed. Centrifugal chillers, used to cool areas ranging from 30,000 to 600,000 square feet, are generally the largest and can be charged with up to 900 kg (about 2000 pounds) of refrigerant. These chillers

may use CFC–11, CFC–12, CFC–500, or HCFC–22. (Recently, centrifugal chillers utilizing HCFC–123 have been introduced to the market; however, these new chillers currently have a very small fraction of the market and are therefore not included in this analysis.) Reciprocating chillers, used to cool areas of less than 30,000 feet, are generally the smallest and typically contain charges of about 160 pounds of CFC–12 or HCFC–22. Screw chillers are used to cool areas from 30,000 to 100,000 square feet and are charged with about 500 pounds of HCFC–22. All of the systems are serviced frequently. The quantity of refrigerant in this sector that is available for recycling at servicing and disposal is estimated to be 5200 metric tons per year (ODP-weighted), which makes up approximately 16% of the total available from the sectors affected by this rule.

Chillers are long-lasting relative to most air-conditioning and refrigeration equipment. Most will last over 20 years and some will last 30 years or more. EPA believes that recovery and recycling is already common in the chiller sector due to the large charges of refrigerant involved.

Industrial Process Refrigeration. The industrial process refrigeration sector includes industrial ice machines and ice rinks, as well as many complex, customized systems used in the chemical, pharmaceutical, petrochemical, and manufacturing industries. Equipment in this sector is often critical to the continuous production of valuable materials. As a result, industrial process equipment is usually designed, manufactured, and installed with special care to minimize down-time for servicing and repair.

This sector uses a variety of refrigerants, including CFC–11, CFC–12, CFC–500, CFC–502, and HCFC–22. Charge sizes can be very large, ranging from 750–3000 lbs for ice rinks, and rising as high as 20,000 lbs for built-up centrifugal units. The quantity of refrigerant in this sector that is available for recycling at servicing and disposal is estimated to be 2000 metric tons per year (ODP-weighted), which makes up approximately six percent of the total available from the sectors affected by this rule. Due to the high reliability of industrial process equipment, servicing is uncommon, and most recovery will occur at disposal. EPA believes that recycling is already common in this sector.

Motor Vehicle Air Conditioners (MVACs). Motor vehicle air conditioners (MVACs) include air conditioners in automobiles and trucks. These recycling regulations only affect the disposal of MVACs, because the servicing of MVACs is covered by regulations implementing section 609 of the Clean Air Act Amendments. Nevertheless, with between 120 and 140 million MVACs currently on the road, this sector is one of the largest sectors affected by the recycling rule. Most MVACs use CFC–12, but some now use HFC–134a.

MVACs have the highest leakage rates of refrigerant charges of any equipment type affected by the recycling rule. Limited studies suggest that only 40 percent of all MVACs still contain a refrigerant charge at disposal. The original charge, moreover, is small (two to four pounds). However, the quantity of refrigerant in this sector that is available for recycling at disposal is estimated to be 5000 metric tons per year, which makes up approximately 17% of the total available from the sectors affected by this rule.

Comfort Cooling in Vehicles Other Than Trucks and Automobiles. Although the servicing of MVACs is covered by regulations implementing section 609 of the Act, the servicing (and disposal) of air conditioners in other vehicles, such as trains, airplanes, ships, buses, construction equipment, and farm vehicles would be covered by these recycling regulations. Due to the lack of data available on releases from the cooling systems used in these applications, these uses were not analyzed. However, the quantity of refrigerant available for recycling from this sector is expected to comprise only a small fraction of the total available from the sectors affected by this rule.

2. Refrigerants Affected

Although EPA is not expressly required to include class II substances in the recycling regulations to become effective on July 1, 1992, EPA proposed to include class II substances in today's rule for a number of reasons. First, the prohibition on venting that became effective on July 1 covers both class I and class II substances, and EPA considered it desirable to provide a clear, consistent framework for fully implementing the prohibition on venting for all refrigerants. The Agency believed that this framework would minimize confusion and maximize compliance with the prohibition. Second, the goals of this regulation, to minimize refrigerant emissions and to help ensure that a supply of high-quality refrigerant is available to service equipment in the future, apply to both class I and class II refrigerants. Without specific requirements, recycling could proceed improperly, leading to excessive HCFC emissions, contamination of refrigerant, and damage to equipment. Third, most technicians routinely work with both types of refrigerants and therefore would need the equipment to handle refrigerants in accordance with the rule even if class II substances were not included. Industry representatives on the STOPAC Subcommittee for Recycling agreed with this rationale and with the inclusion of class II substances in the regulation.

A number of commenters also supported the inclusion of class II substances in the regulation, citing the reasons above. Several of these stated that including class II substances would result in a more consistent and less confusing regulatory structure for the industry, especially since the prohibition on venting affects both class I and class II substances. Commenters believed that compliance with the prohibition on venting and with the regulations would be diminished if only class I substances were covered by the rule. Commenters also noted that most recycling and recovery equipment handles both class I and class II substances, implying that the cost of purchasing certified equipment to process class II substances would be negligible. One commenter noted that inclusion of class II substances in the regulation would provide additional protection to human health and the environment.

Commenters who opposed including class II substances in the regulation argued that efforts to comply with Section 608 for class I substances would consume significant industry resources and that users of both class I and class II substances would probably recycle class II substances if they were complying with regulations for class I substances. Commenters also stated that a delay in regulating class II substances could encourage borderline uses to convert from class I to class II based on the savings realized from avoiding the cost of complying with the regulation. However, one commenter believed that EPA should examine other possibilities for making the conversion from class I to class II substances economically attractive, for instance by easing equipment certification and recordkeeping standards.

After reviewing the comments, EPA continues to believe that the inclusion of class II substances in this regulation is warranted. The positive consequences of regulating class II substances at this time far outweigh the possible negative consequences. As a number of commenters observed, the prohibition on venting requires persons servicing and disposing of appliances containing class II substances to recover or recycle

the refrigerant in any event, and the cost of the recycling and recovery procedure itself is by far the most important component of the costs of this rule. By extending this rule to class II substances, EPA expects to facilitate compliance with the venting prohibition by providing: (1) Clear guidance to technicians recovering class II substances on what releases do and do not constitute violations of the prohibition, (2) information on the performance of recycling and recovery equipment intended for use with class II substances through the equipment certification program, and (3) information on how to recycle effectively and efficiently through the technician certification program. EPA believes that this will both reduce emissions and increase the quality of recycled refrigerant. At the same time, the rule will provide incentives for moving from class I to class II substances because it establishes somewhat less stringent requirements for HCFCs (such as HCFC–22) than for CFCs. EPA further notes that section 608(a)(2) requires EPA to promulgate regulations concerning the recovery and recycling of class II substances by November 15, 1994, approximately 18 months after the promulgation of this rule. This relatively short period before regulations are mandated minimizes any possible benefits of delaying the regulations.

B. Overview of Requirements

EPA's final rule has five main elements, which, taken together, satisfy the criteria of section 608 concerning recycling, emissions reduction, and disposal. First, the Agency requires technicians servicing and disposing of air-conditioning and refrigeration equipment to observe certain service practices that reduce refrigerant emissions. Second, EPA requires technicians servicing air-conditioning and refrigeration equipment to obtain certification through an EPA-approved testing organization and restricts sales of refrigerant to these certified technicians. Third, EPA establishes equipment and reclaimer certification programs. These would have the goals of verifying: (1) That all recycling or recovery equipment sold was capable of minimizing emissions and (2) that reclaimed refrigerant on the market was of known and acceptable quality to avoid equipment failures from contaminated refrigerant. Fourth, EPA requires repair of substantial leaks, based on annual leak rates which vary according to two categories of refrigeration equipment. Fifth, to implement the safe disposal requirements of section 608, EPA requires that ozone-depleting refrigerants in appliances, machines, and other goods be removed from those items prior to their disposal, and that all air-conditioning and refrigeration equipment except for small appliances and room air conditioners be provided with a servicing aperture that would facilitate recovery of the refrigerant. Small appliances will require a process stub for easy access.

In order to allow the regulated community sufficient time to come into compliance with the requirements, EPA will phase them in over a period of one to eighteen months. In addition, the Agency will "grandfather in" equipment meeting certain minimum requirements set forth in Section III, as well as "grandfather" technicians who have fulfilled certain requirements. These grandfathering provisions are intended to encourage the regulated community to begin recycling as soon as possible using available equipment rather than delaying action until certified equipment is available.

C. Factors Considered in the Development of this Rule

Section 608 of the Clean Air Act provides the statutory basis for the standards and requirements contained in these regulations. The statutory standards against which the regulations concerning the use and disposal of ozone-depleting substances are to be measured is whether they "reduce the use and emission of such substances to the lowest achievable level" and "maximize the recapture and recycling of such substances." EPA believes that, in the context of recycling, these standards are complementary, i.e., that maximizing recycling will also mean reducing the use and emission of these substances to the lowest achievable level. EPA also believes that these standards bear a relationship to the de minimis releases permitted, notwithstanding the general prohibition on venting or other releases contained in section 608(c). In other words, emissions that occur while complying with EPA's recovery and recycling requirements, which achieve the lowest achievable level of emissions, will only be de minimis releases.

In applying the statutory standards concerning use, emissions, and recycling, EPA is taking into account both technological and economic factors. The phrases "lowest achievable level" and "maximize recycling" are not defined in the Act. EPA does not believe that these standards are solely technological in nature, but rather contemplate a role for economic factors in determining the lowest achievable level of emissions and maximum amount of recycling. As discussed in the proposed rule, EPA's program takes into account in an appropriate manner the technology available, costs, benefits, and leadtimes involved. EPA believes that the language of the Clean Air Act and the legislative history of section 608 both support its approach.

In jointly-submitted comments, two environmental organizations (Natural Resources Defense Council (NRDC) and Friends of the Earth (FOE)) contended that EPA's consideration of costs and benefits in this rulemaking was unlawful. The organizations stated that they "do *not* assert that the statutory language totally precludes any economic considerations. But we do insist that the legally permissible scope for such considerations is far more limited than the broad cost-benefit test EPA has asserted." The commenters then assert that the "term 'lowest achievable emission level' clearly reflects the term 'lowest achievable emission rate,' or 'LAER,' used since 1977 in part D of title I" and proceed to argue that a variant of this standard, described as "the most stringent test for technology-based standards under the Act" controls EPA's standard-setting authority under section 608 of the Act. According to NRDC/FOE, "standards under section 608 should be set at levels reflecting the best controlled sources in each relevant sector of the air-conditioning and refrigeration industry. As long as those levels have been achieved by some members of a given sector, they must be considered achievable across the sector. The only basis for lessening the stringency of such requirements would be if they are so costly that typical firms in that sector could not bear them."

Other commenters, however, supported the method used by EPA to analyze costs and benefits in determining what standards to propose.

EPA has carefully considered the comments of NRDC and FOE on this issue, as well as those of other parties, and continues to believe that its approach to the analysis of costs and benefits is appropriate and permissible under section 608. EPA first notes that, in determining the appropriate standards, EPA has not applied a strict cost-benefit test. Rather, EPA has focussed primarily on the state of recovery technology and only secondarily considered costs and benefits, along with the varied applications of air-conditioning and refrigeration equipment and the structure of the equipment service and disposal industry. The Agency is

allowing use of less than the most efficient technology available only when the costs of using this technology in the field far outweigh the benefits.

The Agency believes that it has fulfilled its statutory obligation to establish "the lowest achievable level of emissions" and that in many cases its standards represent the best that can be technologically achieved. The standards proposed by EPA generally reflect the performance of the "best controlled source" in each sector under commonly encountered conditions in the field. The variability of these conditions is considerably greater in each air-conditioning and refrigeration industry sector than it is in most other industry sectors, particularly those affected by LAER. Thus, for instance, the fact that a recovery device removing R–12 from an appliance at 70 degrees F can achieve a twenty-inch vacuum does not imply that EPA should set its evacuation requirements at this level, because the same recovery device would scarcely be able to reach a ten-inch vacuum on R–502 at 90 degrees F.

Where the performance of the best controlled sources is not the standard, EPA has found that the costs of implementing the controls far outweigh the benefits. For instance, according to appliance manufacturers, between 80 and 90 percent of firms in the small appliance sector make fewer than 10 repairs a year that require recovery of refrigerant. The most efficient recovery devices intended for use in this sector may recover between 5 and 10 percent more refrigerant from a small appliance than the least efficient, but they also cost approximately four times as much ($900 vs. $215). For a firm performing 10 recovery jobs per year on refrigerators charged with 6 ounces of refrigerant, this difference results in the recovery of no more than 6 additional ounces of refrigerant per year. At the same time, the cost of the more efficient equipment could have an appreciable impact on firms in this sector, approximately 37 percent of which EPA estimates are in poor financial condition prior to imposition of the regulation (RIA). Thus, EPA is permitting the use of the less efficient recovery equipment. This is in accord with the comments of NRDC and FOE, which acknowledge that if controls are "so costly that typical firms in that sector could not bear them," then less stringent controls are warranted.

Nevertheless, as discussed further in the response to the comments document, to the extent that there is a difference between EPA's approach and the approach suggested by NRDC and FOE, EPA does not believe that it is legally compelled to adopt the approach to economic considerations suggested by NRDC/FOE. In sum, the Agency believes that its approach of focusing primarily on the technological feasibility and only secondarily on economic issues is authorized by section 608.

The stringency of the regulations promulgated to implement these standards are affected by the amount of leadtime between their date of promulgation and their effective date. The longer the leadtime, the more time there would have been for technological innovations and development to occur, thereby permitting the establishment of more stringent standards. Conversely, shorter leadtimes necessitate standards based more on the degree of emission control and performance achievable by equipment already available or equipment that will be available in the near future. With respect to the present set of regulations, the leadtime is necessarily short as section 608(a)(1) provides for an effective date of July 1, 1992, for the regulations covering the use and disposal of class I substances used in appliances and industrial process refrigeration. Because the effective date has passed, these regulations as they pertain to recovery/recycling of class I and class II substances will go into effect thirty days following publication of this rule (unless stated otherwise). For regulations authorized by section 608(a)(2), the initial effective date must be within 12 months of promulgation.

EPA has considered these factors in developing these regulations, and the Agency believes that it has designed a program that will achieve the lowest achievable level of emissions and maximize recycling, taking into account in an appropriate manner the technology available, costs, benefits, and the leadtimes involved. Through extensive discussions with industry representatives and environmental organizations, EPA has attempted to identify significant emissions and methods for controlling them during the repair, service, and disposal of air-conditioning or refrigeration equipment. In many cases, the requirements will mandate activity already being undertaken by standard-setting and equipment certification organizations in the heating, ventilation, air-conditioning, and refrigeration (HVAC/R) sector. They are also very similar to the steps being taken to recycle refrigerant in MVACs, an area where recycling has been successfully implemented.

EPA also took into consideration the over 15,000 comments requesting that a mandatory technician certification be included in the final rule. EPA views a mandatory technician certification program as instrumental in facilitating a workable recovery and recycling program. Commenters expressed the need of technicians for a level playing field, as well as for consistent knowledge with which to perform recovery and recycling properly.

EPA has attempted to develop a regulatory program that accommodates the wide variety of sizes and types of equipment subject to this regulation. In setting its efficiency standards for recycling and recovery equipment, EPA has considered among other factors both the charge size and frequency of servicing for different types of equipment. In general, as charge size and frequency of servicing increase, potential emissions increase, and higher recovery efficiencies are justified. For instance, the household refrigeration and other refrigerated appliances categories that combine to make up the "small appliances" category in today's rule have small charges and are serviced infrequently. Under today's final rule, recovery equipment in this category would be subject to a standard that requires recovery of between 80 and 90% of the refrigerant (depending upon whether or not the compressor of the small appliance is operational). On the other hand, equipment containing more than 200 lbs of charge would be subject to a standard that requires recovery of over 99% of the refrigerant. Equipment standards are discussed in detail in section III.G.

EPA additionally considered average leak rates of average-maintained equipment in setting the three levels of annual leak rates that would trigger mandatory repair of such leaks. EPA also considered the numerous comments that requested EPA to include a mandatory provision in this rulemaking for repairing substantial leaks.

EPA has also considered typical methods of disposal in developing these regulations. Under this proposal, equipment that is typically dismantled on-site before disposal (retail food refrigeration, cold storage warehouse refrigeration, chillers, and industrial process refrigeration) must have the refrigerant removed and recovered in accordance with EPA's proposed requirements for servicing. For these types of equipment, the persons who perform servicing usually also perform disposal. This is generally not the case, however, for smaller items such as household refrigerators and freezers, room air conditioners, and motor vehicle air conditioners. This

equipment is disposed of by consumers and generally enters the waste stream with the charge intact. EPA is proposing distinct safe disposal requirements for this equipment, which would make the final person in the disposal chain (e.g., a scrap metal recycler) responsible for ensuring that refrigerant has been recovered from equipment before the final disposal of the equipment. Equipment covered by these requirements also includes dehumidifiers, water coolers, and other relatively portable equipment in addition to household refrigerators and freezers and MVACs. EPA's safe disposal program is discussed in detail in section III.M.

D. Public Participation

EPA has worked extensively with outside groups in developing this proposal. In particular, the Agency established and met repeatedly with the Subcommittee for Recycling and Emissions Reduction of EPA's Stratospheric Ozone Protection Advisory Committee (STOPAC). The STOPAC is a Federal Advisory Committee chartered in 1989 under the Federal Advisory Committee Act, 5 U.S.C. App. section 9(c), to provide independent counsel to EPA on specific issues affecting the international negotiations and domestic implementation of the Montreal Protocol. Since the enactment of the Clean Air Act Amendments in 1990, the STOPAC has also provided advice on the implementation of Title VI of this legislation. The Subcommittee for Recycling has over 50 members representing air-conditioning and refrigeration equipment manufacturers, wholesalers, servicers, and users, manufacturers of recycling and recovery equipment, refrigerant manufacturers and reclaimers, educational organizations, state and local governments, and environmental groups. To date, EPA has met with members of the Subcommittee six times: The Subcommittee as a whole met twice, and smaller groups met to discuss equipment certification, technician certification, reclaimer certification and safe disposal. Summaries of these meetings are available in the public docket for this rulemaking.

EPA also worked with the air-conditioning and refrigeration industry's primary standards-setting organizations, the Air-conditioning and Refrigeration Institute (ARI) and the American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc. (ASHRAE), in developing its rule. Wherever appropriate, EPA has incorporated standards and guidelines from these organizations into the proposed rule. Examples of incorporated standards include the ARI Standard 700–1988, Specifications for Fluorocarbon Refrigerants, and the ARI Standard 740–1993 (an update of 700–1991), Performance of Refrigerant Recovery, Recycling, and/or Reclaim Equipment. EPA also considered the ASHRAE Guideline 3, Reducing Emission of Fully Halogenated Chlorofluorocarbon (CFC) Refrigerants in Refrigeration and Air-Conditioning Equipment and Applications, in developing its rule.

In addition to convening the Subcommittee for Recycling, EPA met with various industry representatives to gather data on refrigerant emissions, to better understand current industry practices, and to discuss a range of technical issues. The data on refrigerant emissions were used to update EPA's vintaging analysis, which analyzes emissions by equipment type and life cycle stage (e.g., manufacturing, use, servicing, or disposal). This analysis has been used to calculate the potential costs and benefits of this rule and to identify opportunities for further emissions reductions. The data used in the analysis is presented in the Regulatory Impact Analysis (RIA) for this proposal, also available in the public docket. Industry groups that have provided or commented on data include appliance manufacturers, chiller manufacturers and servicers, industrial process refrigeration manufacturers and users, commercial refrigeration manufacturers and users, refrigerated transport manufacturers, servicers and users, and manufacturers and users of comfort air cooling systems for commercial vehicles.

Following proposal of the rule, EPA held a public hearing on December 23, 1992. During the comment period, over 20,000 comments were submitted to EPA. All of these comments were considered in the development of the final rule. Major comments are addressed in the preamble to this rulemaking. All other comments are addressed in the "Response to Comments Document" that can be found in Air Docket A–92–01.

E. Definitions and Interpretations

Appliance

As was proposed, EPA is adopting the Act's definition of "appliance". The Act defines "appliance" as "any device which contains and uses a class I or class II substance as a refrigerant and which is used for household or commercial purposes, including any air conditioner, refrigerator, chiller, or freezer." EPA interprets this definition to include all air-conditioning and refrigeration equipment except that designed and used exclusively for military applications. Thus, the term "appliance" includes all the sectors of air-conditioning and refrigeration equipment described under Section III.A. above, including household refrigerators and freezers (which may be used outside the home), other refrigerated appliances, residential and light commercial air-conditioning, transport refrigeration, retail food refrigeration, cold storage warehouses, commercial comfort air-conditioning, motor vehicle air conditioners, comfort cooling in vehicles not covered under section 609, and industrial process refrigeration. (In sections 608(a) and 608(c), the Act refers specifically to "industrial process refrigeration," a term that is not defined. EPA believes that all refrigeration equipment categorized as industrial process refrigeration in Section III.A. above also falls within the broad statutory definition of "appliance.")

In the proposal, the Agency requested comment on using its authority under section 608(a)(2) to adopt a broader definition of appliance that would include equipment designed and used exclusively for military applications. EPA received comments both favoring and opposing the inclusion of military equipment in the term "appliance." Commenters favoring inclusion noted that the military is a large user of CFCs and argued that military equipment should be exempt from the regulation only in time of war or when compliance with the regulations would lessen the military effectiveness of the equipment. Commenters opposing inclusion (the Department of Defense, or DOD) argued that regulation of equipment designed and used exclusively for military applications was not necessary, because DOD was committed to meeting recovery and recycling standards at least as stringent as those in the commercial sector, "except where the unique design and use of the equipment or other mission critical operations preclude this." In cases in which commercial standards could not be met, DOD stated that it would set its own standards to minimize environmental hazards while ensuring mission accomplishment. DOD also stated that "equipment designed and used exclusively for military applications" comprised a relatively small percentage of their equipment, further reducing environmental concerns.

EPA agrees that there may be situations in which the unique design and use of military equipment makes it

impossible to recover or recycle refrigerant during the servicing, maintenance, repair, or disposal of the equipment. However, the Agency reemphasizes that if the air-conditioning or refrigeration equipment used in a military application is identical to equipment used in a commercial application, then it is covered by the Act's definition (and hence by these regulations). For example, a room air conditioner used on a military base is still considered an appliance even though the use of that particular piece of equipment may not be for commercial or household purposes. Similarly, although a refrigerator in some other government facility is not used for household or commercial purposes, that refrigerator is still considered an appliance because that identical kind of equipment is used for household or commercial purposes in other contexts. For purposes of enforcing these regulations, EPA will consider "identical equipment" to include air-conditioning and refrigeration equipment whose system of working parts (e.g., compressor, motor, evaporator, and condenser) is identical to that in equipment used for a household or commercial purpose. Equipment that has been modified only externally for a military application (e.g., painted or encased in a new cabinet) will still be considered "identical" to equipment used for household or commercial purposes and will therefore be subject to these regulations.

Approved Equipment Testing Organization

EPA defines Approved Equipment Testing Organization as any organization which has applied for and received approval from EPA to test recycling and recovery equipment.

Certified Refrigerant Recycling Equipment

EPA defines Certified Refrigerant Recycling Equipment as equipment certified by an approved testing organization to meet EPA's final standards on equipment purchased before November 15, 1993, that meets EPA's standards for grandfathered equipment.

Commercial Refrigeration

As is discussed in more detail in section III.F.3, EPA is establishing a maximum allowable leak rate of 35% per year for industrial process and commercial refrigeration. EPA is defining commercial refrigerant as the refrigeration appliances utilized in the retail food and cold storage warehouse sectors. Retail food includes the refrigeration equipment found in supermarkets, convenience stores, restaurants and other food service establishments. Cold storage includes the equipment used to store meat, produce, dairy products, and other perishable goods. All of the equipment contains large refrigerant charges, typically over 75 pounds.

Disposal

EPA is defining "disposal" as the process leading to and including:

(1) The discharge, deposit, dumping or placing of any discarded appliance into or on any land or water,

(2) The disassembly of any appliance for discharge, deposit, dumping or placing of its discarded component parts into or on any land or water, or

(3) The disassembly of any appliance for reuse of its component parts.

High-Pressure Appliance

Because the physical properties of high, very high, and low-pressure refrigerants differ, EPA is establishing somewhat different requirements for technicians and equipment servicing high, very high, and low-pressure appliances. EPA defines high-pressure appliances as appliances that use a refrigerant with a boiling point between −50 and 10 degrees Centigrade at atmospheric pressure (29.9 inches Hg). This definition would include equipment using CFCs –12, –114, –500, and –502, and HCFC–22. EPA has changed this definition since the proposal to include CFC–114 in response to comments stating that the physical differences between CFC–114 and the other high-pressure refrigerants did not warrant a special category for the latter. The proposed intermediate-pressure appliance category has consequently been eliminated.

Industrial Process Refrigeration

As is discussed in more detail in section III.F.3, EPA is establishing a maximum allowable leak rate of 35% per year for industrial process and commercial refrigeration. EPA is defining industrial process refrigeration as complex customized appliances used in the chemical, pharmaceutical, petrochemical and manufacturing industries. The sector is also defined to include industrial ice machines and ice rinks.

Low-Loss Fitting

EPA is requiring that recovery or recycling machines manufactured after November 15, 1993, possess low-loss fittings. EPA had proposed that the term "low-loss" fitting include only automatically closing fittings. A number of commenters disagreed with this definition, noting that automatically closing fittings can restrict refrigerant flow in some cases, slowing the recovery process, and that automatic fittings sometimes open or close unexpectedly, releasing refrigerant. These commenters recommended that EPA expand its definition of low-loss fitting to include fittings that can be closed manually, such as manual ball valve fittings. The commenters noted that "manual ball valves are in wide use in the refrigeration industry and have proven themselves to be safe and reliable." In response to these comments, EPA is defining a low-loss fitting as any device that is intended to establish a connection between hoses, air-conditioning and refrigeration equipment, or recovery or recycling machines and that is designed to close automatically or manually when disconnected, minimizing the release of refrigerant from hoses, air-conditioning or refrigeration equipment, and recovery or recycling machines.

Low-Pressure Appliance

EPA defines low-pressure appliances as appliances that use a refrigerant with a boiling point above 10 degrees Centigrade at atmospheric pressure (29.9 inches Hg). This definition includes appliances using CFCs –11 and –113, and HCFC–123.

Major Maintenance, Service, or Repair

EPA is permitting persons servicing appliances to evacuate (or, in the case of low-pressure appliances, to pressurize) appliances to atmospheric pressure when the maintenance, service, or repair is not major and when an evacuation of the appliance to the environment is not performed after the servicing or repair is completed. As is discussed in section III.F.1.b, many non-major repairs involve uncovering only a small opening in the appliance and take place in only a few minutes, limiting both the quantity of refrigerant that escapes and the quantity of air and moisture that enter the system. However, major repairs involve uncovering larger openings in the system and are more time consuming, allowing refrigerant to escape and air to enter. This in turn necessitates an evacuation of the appliance to the environment at the conclusion of service. EPA is defining "major maintenance, service, or repair" as maintenance, service, or repair that involves removal of the appliance compressor, condenser, evaporator, or auxiliary heat exchanger coil.

Motor Vehicle Air Conditioner (MVAC)

Although the servicing of motor vehicle air conditioners (MVACs) is covered by the MVAC refrigerant recycling rule, 40 CFR part 82 subpart B, the disposal of motor vehicle air conditioners is covered by this rule. EPA is adopting the definition of MVAC in the MVAC refrigerant recycling rule as the definition of MVAC in this rule. In the MVAC rule, MVAC is defined as mechanical vapor compression refrigeration equipment used to cool the driver's or passenger's compartment of any motor vehicle. Motor vehicle is in turn defined as "any vehicle which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to passenger cars, light duty vehicles, and heavy duty vehicles." Transport refrigeration and air conditioning systems using HCFC–22 are excluded from the definition of MVAC.

MVAC-like Appliance

Some of the air conditioners that are covered by this rule are identical to MVACs, but they are not covered by the MVACs refrigerant recycling rule (40 CFR part 82 subpart B, 57 FR 31241) because they are used in vehicles that are not defined as "motor vehicles." These air conditioners include many systems used in construction equipment and farm vehicles. Like MVACs in cars and trucks, these air conditioners typically contain two to three pounds of CFC–12 and use open-drive compressors to cool the passenger compartments of vehicles. As is discussed in section III.G.3, EPA is adopting the requirements regarding the certification and use of recycling and recovery equipment in the MVACs rule for MVAC-like appliances covered by this rule. EPA is also allowing technicians who service MVAC-like appliances to be certified by a certification program approved under the MVAC rule, if they wish. EPA is defining MVAC-like appliance as mechanical vapor compression, open-drive compressor appliances used to cool the driver's or passenger's compartment of a non-road vehicle, including agricultural and construction vehicles. The definition excludes appliances using HCFC–22.

Normally Containing

EPA is establishing stricter evacuation requirements for high pressure appliances or appliance components "normally containing" more than 200 pounds of refrigerant. As is discussed in section III.G, EPA considered the environmental impact of the refrigerant that remains in the large appliance or appliance component after recovery is complete in setting the more stringent standards. (During disposal and during many service procedures, this remaining refrigerant is ultimately released to the environment). The quantity of refrigerant that remains in an appliance or appliance component is related to two variables: (1) The internal pressure of the appliance or appliance component, and (2) the internal volume of the appliance or appliance component. The internal volume is in turn related to the mass of refrigerant that is inside the appliance or appliance component when the appliance is operating with a full charge of refrigerant. Thus, EPA is defining "normally containing" as containing the quantity of refrigerant within the appliance or appliance component when the appliance is operating with a full charge of refrigerant. It is important to note that although the mass of refrigerant in an appliance or appliance component can be changed through leakage or system pump-down, only the quantity of refrigerant normally contained by the appliance or appliance component can be considered in determining whether or not the stricter requirements apply.

Opening

EPA is requiring that technicians recover refrigerant from appliances before "opening" them for maintenance, service or repair. EPA defines "opening" an appliance as any service, maintenance, or repair on an appliance that could be reasonably expected to release refrigerant from the appliance to the atmosphere unless the refrigerant were previously recovered from the appliance.

Person

EPA is requiring that refrigerant transferred between air-conditioning or refrigeration equipment owned by different persons must be fully reclaimed. EPA defines person as any individual or legal entity, including an individual, corporation, partnership, association, state, municipality, political subdivision of a state, Indian tribe, and any agency, department, or instrumentality of the United States, and any officer, agent, or employee thereof. This is identical to the definition used in the regulations concerning the production and consumption of ozone-depleting substances (40 CFR 82.3(r)).

Process Stub

EPA is requiring that small appliances and room air conditioners sold after November 15, 1993 be provided with a process stub to facilitate removal of the refrigerant at servicing. The Agency defines process stub as a length of tubing that provides access to the refrigerant inside a small appliance or room air conditioner and that can be resealed at the conclusion of repair or service.

Reclaim

EPA is adopting a slightly modified form of ASHRAE's definition of "reclaim." According to ASHRAE, to reclaim refrigerant is to:

> Reprocess refrigerant to new product specifications by means which may include distillation. Will require chemical analysis of the refrigerant to determine that appropriate product specifications are met. This term usually implies the use of processes or procedures available only at a reprocessing or manufacturing facility.

EPA is refining this definition to refer specifically to the ARI Standard 700–1988, Specifications for Fluorocarbon Refrigerants (included as Appendix A to the proposed rule) for the "new product specifications" and also for the appropriate type of chemical analysis to ensure that these specifications are met. For the Agency's purposes, the most important part of the definition of reclaim is the requirement to chemically analyze the final product to verify purity. Without such analysis and verification, the Agency will not consider refrigerant to have been reclaimed.

Recover

EPA also is adopting ASHRAE's definition of "recover:" to remove refrigerant in any condition from a system without necessarily testing or processing it in any way.

Recycle

Although the Act's usage of the term "recycle" is very broad, encompassing, for instance, the term "reclaim" as defined above, EPA defines the term more narrowly in its regulations. Once again, EPA is adopting ASHRAE's definition, with minor changes. ASHRAE states that to recycle is to:

> Clean refrigerant for reuse by oil separation and single or multiple passes through devices, such as replaceable core filter-driers, which reduce moisture, acidity and particulate matter. This term usually applies to procedures implemented at the field job site or at a local service shop.

The key difference between "recycle" and "reclaim" is that the former does

not involve chemical analysis of the product. Recycling essentially encompasses all types of treatment of refrigerant that do not involve such chemical analysis. As explained in a later section of this notice, EPA is requiring for two years that all refrigerant changing hands must be fully reclaimed, implying that the vast majority of recycling will take place on site as opposed to at a local service shop.

Self-contained Recovery Equipment

Recovery equipment can be divided into two main types: Self-contained and system-dependent. EPA referred to these two types of equipment as "active" and "passive" respectively in the proposal, but has changed the terminology in response to comments indicating that "self-contained" and "system-dependent" are the more common terms used in the industry. While self-contained equipment has its own means to draw refrigerant out of the refrigerator system, system-dependent equipment relies solely upon the compressor in the appliance and/or the pressure of the refrigerant in the appliance to recover the refrigerant. EPA defines these two types of equipment accordingly.

Small Appliance

EPA proposed to define as a "small appliance" air-conditioning or refrigeration equipment containing less than one pound of charge during normal operation. This classification was intended to include household refrigerators, household freezers, dehumidifiers, vending machines, and water coolers, for which EPA proposed to establish special servicing and safe disposal requirements.

The rule establishes separate requirements for small appliances in three areas. First, small appliances, unlike other appliances, can be evacuated using equipment certified under Appendix C. Second, technicians servicing small appliances can be certified by taking an unproctored rather than proctored test. Third, small appliances can be manufactured with a process stub rather than a servicing aperture. The rationale for establishing somewhat less stringent requirements for the servicing and disposal of small appliances is that they contain smaller quantities of refrigerant and are serviced less often than other appliances.

EPA received a number of comments stating that the use of the one-pound limit to define "small appliances" was inappropriate. These comments stated that the one-pound limit excluded some household refrigerators and freezers, and also excluded equipment, such as room air conditioners, that had the same technical attributes and was serviced by the same work force as household refrigerators and freezers. The commenters suggested that EPA adopt a definition that would include room air conditioners, packaged terminal air conditioners, and packaged terminal heat pumps in addition to household refrigerators and freezers, dehumidifiers, vending machines, and drinking water coolers. The commenters argued that the former types of equipment, like the latter, are charged and sealed at the factory, contain relatively small quantities of refrigerant (particularly when that quantity is weighted by the relatively low ozone-depletion potential of HCFC–22), and are serviced infrequently by the same technicians who service household refrigerators and freezers. Thus, they should be treated the same way in the rule as household refrigerators and freezers.

EPA believes that the commenters are correct that room air conditioners, packaged terminal air conditioners (PTACs), and packaged terminal heat pumps (PTHPs) are sufficiently similar in these respects to household refrigerators and freezers to justify inclusion in the definition of "small appliance." EPA is therefore revising its proposed definition of "small appliance" to:

> Small appliance means any of the following products that are fully manufactured, charged, and hermetically sealed in a factory with five (5) pounds or less of refrigerant: Refrigerators and freezers designed for home use, room air conditioners (including window air conditioners and packaged terminal air conditioners), packaged terminal heat pumps, dehumidifiers, under-the-counter ice makers, vending machines, and drinking water coolers.

System-dependent Recovery Equipment

As discussed above in the explanation of the term "self-contained equipment," EPA defines a system-dependent recovery device as a device that relies upon the compressor in an appliance to remove the refrigerant into an external container.

Technician

EPA is establishing in today's rule a number of requirements that apply to technicians. EPA defines technician as any person who performs maintenance, service, or repair to air-conditioning or refrigeration equipment that could reasonably be expected to release CFCs or HCFCs into the atmosphere, e.g., installer, contractor employee, in-house service personnel, and in some cases, owner. Technician also means any person disposing of air-conditioning or refrigeration equipment except for small appliances and MVACs.

Very High-Pressure Equipment

EPA defines very high-pressure equipment as air-conditioning and refrigeration equipment that uses a refrigerant with a boiling point below −50 degrees Centigrade at atmospheric pressure. This definition includes equipment using refrigerants 13 and 503.

F. Required Practices

EPA is requiring persons servicing or disposing of air-conditioning and refrigeration equipment to observe certain service practices that minimize emissions of ozone-depleting refrigerants. The most fundamental of these practices is the requirement to recover refrigerant rather than vent it to the atmosphere. As noted above, the knowing venting of class I or class II refrigerant during servicing or disposal (except for de minimis releases associated with a good faith attempt to recapture, recycle, or safely dispose of the refrigerant) has been expressly prohibited by section 608(c) of the Act since July 1, 1992.

Knowing venting is any release that permits a class I or class II substance to enter the environment and that takes place with the knowledge of the technician during the maintenance, servicing, repairing, or disposal of air-conditioning or refrigeration equipment. Two commenters argued that EPA was interpreting "knowing release" too narrowly. These commenters asserted that a technician who fills a leaking system is knowingly venting refrigerant. As discussed below in Section III.F.3, this rule requires repair of leaks above a certain size in equipment normally containing more than 50 pounds of refrigerant. However, the venting prohibition itself, which applies to the maintenance, service, repair, and disposal of equipment, does not prohibit "topping off" systems, which leads to emissions of refrigerant during the use of equipment. The provision on knowing releases does, however, include the situation in which a technician is practically certain that his or her conduct will cause a release of refrigerant during the maintenance, service, repair, or disposal of equipment. Knowing releases also include situations in which a technician closes his or her eyes to obvious facts or fails to investigate them when aware of facts that demand investigation.

Section 608(c)(1) of the CAA exempts "de minimis" releases associated with good faith attempts to recapture and

recycle or safely dispose of these substances from the prohibition. In their statement prior to the passage of the Clean Air Act Amendments of 1990, the Senate managers explained that, "The exception is included to account for the fact that in the course of properly using recapture and recycling equipment, it may not be possible to prevent some small amount of leakage." (Congressional Record S16948, October 26, 1990). From this statement and the statutory text, EPA considers it appropriate to conclude that emissions accompanying the proper use of recapture and recycling equipment would generally be considered "de minimis." EPA is therefore interpreting as "de minimis" those emissions that take place at servicing and disposal when:

(i) The required practices set forth in § 82.158 of this proposed regulation are observed and recovery or recycling machines that meet the requirements set forth in § 82.158 of this proposed regulation are used, or

(ii) The requirements of the MVAC regulation (40 CFR part 82, subpart B) are observed.

Such emissions represent the lowest achievable level of emissions, but because the requirements for recovery and recycling machines would vary somewhat from sector to sector and because the charge sizes involved vary considerably from sector to sector, the quantities considered de minimis would also vary from sector to sector.

1. Evacuation of Air-Conditioning and Refrigeration Equipment. EPA is requiring that before air-conditioning and refrigeration equipment is opened for maintenance, service, or repair, the refrigerant in either the entire system or the part to be serviced (if the latter can be isolated) must be transferred to a system receiver (a component of the system that is designed to hold excess refrigerant charge and that can be used to hold the charge during servicing or repair) or to a certified recycling or recovery machine. The same requirements apply to equipment that is to be disposed of, except for small appliances, MVACs, and MVAC-like appliances, whose disposal is covered by Section III.M. below. In order to ensure that the maximum amount of refrigerant possible is captured rather than released, EPA is requiring that air-conditioning and refrigeration equipment be evacuated to or below specified levels of vacuum. As discussed in the proposal, the Agency has considered a number of factors in developing these levels, including the technical capabilities, ease of use, and costs of recycling and recovery equipment, the possible impact of evacuation on the air-conditioning and refrigeration equipment, the servicing times that would be necessary to achieve different vacuums, and the amounts of refrigerant that would be released under different evacuation requirements and their predicted impact on the ozone layer (and indirectly, on human health and the environment). Since the rule was proposed, the Agency has reviewed numerous public comments regarding the proposed evacuation levels and has refined its analysis. As a result, some of the proposed requirements have been changed. These changes are discussed below.

As was proposed, the required levels of evacuation vary depending upon the type of equipment to be serviced or disposed of and the date of manufacture of the recovery or recycling machine (i.e., whether it met certification requirements for new equipment or had been grandfathered). However, some of the distinctions between different types of equipment have been changed since the rule was proposed. For small appliances, the requirements also vary depending on the capacities of the recovery system used under the circumstances (e.g., with an operating vs. a nonoperating refrigerator compressor).

Technicians repairing MVAC-like appliances are not subject to the evacuation requirements below, but are subject to a requirement to "properly use" (as defined at 40 CFR 82.32(e)) recycling and recovery equipment approved pursuant to § 82.36(a). As is discussed in more detail in section III.G.3, EPA is adopting the equipment certification and use requirements of the MVACs refrigerant recycling rule (40 CFR part 82, subpart B) for MVAC-like appliances.

The required evacuation levels and equipment standards (for "grandfathered" equipment) become effective 60 days after publication of this rule. Although EPA had proposed that these requirements become effective 30 days after publication of the rule, some commenters believed that 30 days would not constitute sufficient time for technicians to become aware of EPA's requirements and to acquire equipment that met EPA's grandfathering standards. Upon reconsideration of the issue, EPA agreed. The Agency again notes, however, that the prohibition on venting refrigerants during the maintenance, service, repair, or disposal of appliances has been in effect since July 1, 1992.

a. Evacuation requirements for air-conditioning and refrigeration equipment besides small appliances. When recovery and recycling machines manufactured or imported after November 15, 1993, are employed for recovery, EPA is requiring evacuation to 0 inches of vacuum, 10 inches of vacuum, 15 inches of vacuum, or 29 inches of vacuum, depending on the size and type of air-conditioning or refrigeration equipment being serviced. If grandfathered recovery or recycling devices are used, EPA proposes to require evacuation to 0 inches of vacuum in very high-pressure systems and in small systems using HCFC–22, 4 inches of vacuum in high-pressure systems, and 25 inches of vacuum in low-pressure systems, because the grandfathered equipment may not be capable of achieving higher levels (see Section III.G.). The table below lists requirements for evacuation (pressure readings) for each type of air-conditioning and refrigeration equipment and for certified and grandfathered recovery and recycling machines.

TABLE 1.—REQUIRED LEVELS OF EVACUATION FOR AIR-CONDITIONING OR REFRIGERATION EQUIPMENT

[Except for small appliances, MVACs, and MVAC-like equipment]

Type of air-conditioning or refrigeration equipment	Inches of vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)[1]	
	Using recovery or recycling equipment manufactured before November 15, 1993	Using recovery or recycling equipment manufactured on or after November 15, 1993
HCFC–22 equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	0	0
HCFC–22 equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4	10
Other high-pressure equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	4	10
Other high-pressure equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4	15
Very high-pressure equipment	0	0
Low-pressure equipment	25	29

[1] EPA is explicitly defining the required evacuation levels in relation to standard, as opposed to local, atmospheric pressure. A number of commenters noted that because local atmospheric pressure drops with elevation, it is difficult (and sometimes physically impossible) for persons working at high elevations to attain the required vacuums if they are measured relative to local atmospheric pressure. Because the quantity of refrigerant remaining in a piece of air-conditioning or refrigeration equipment is related to its absolute rather than relative pressure, pulling a shallower gauge vacuum at a higher elevation has the same impact on the environment as pulling a deeper vacuum at sea level. Persons performing appliance repair, maintenance, service or disposal at high elevations should make appropriate adjustments to the above chart to account for the difference between standard and local atmospheric pressure.

i. High-pressure air-conditioning and refrigeration equipment. There are a number of differences between the above evacuation levels and those that were proposed. The most significant of these is the distinction now made between high-pressure air-conditioning and refrigeration equipment utilizing HCFC–22 and other high-pressure equipment. In the proposal, EPA requested comment on establishing less stringent evacuation standards for equipment utilizing HCFC–22. The Agency noted that the high saturation pressure of HCFC–22 makes it difficult (and in some cases, impossible) to draw deep vacuums on this refrigerant but, at the same time, permits a high percentage of this refrigerant to be recovered at relatively shallow vacuums. EPA stated that the latter consideration, along with the relatively low ozone-depletion potential of HCFC–22 (compared to those of the CFCs) may make deeper vacuums unnecessary. A number of commenters concurred with this reasoning. Many commenters emphasized the difficulty of pulling deep vacuums on air-conditioning and refrigeration equipment using R–22 (HCFC–22), particularly in the high ambient temperatures typically found on rooftops during the summer months. Under these conditions, commenters noted, only recovery equipment with high-quality compressors would be able to attain the compression ratio necessary to draw a 10-inch vacuum, and even this equipment would not be able to achieve a 20-inch vacuum. Moreover, the discharge temperature of the refrigerant in these situations would often be high enough to burn the oil in the recovery device compressor, leading to its failure.

EPA has performed an analysis that attempts to determine appropriate evacuation levels for various types of refrigerants and equipment, considering the physical characteristics of the refrigerants (e.g., saturation pressure, which is related both to the compression ratio necessary to achieve a certain vacuum level and to the percentage of refrigerant that is recovered at that vacuum level), their ozone-depletion potentials, the costs of recycling and recovery equipment, and labor costs. This analysis indicates that recovery of HCFC–22 into a vacuum is justified only for large charge sizes (greater than 200 pounds). For smaller charges, the avoided damage to human health and the environment do not appear to justify the time and expense of drawing a vacuum even if a vacuum were attainable, which it often would not be. It should be noted that because HCFC–22 has one of the highest saturation pressures of the high-pressure refrigerants, evacuating HCFC–22 systems to atmospheric pressure recovers approximately 98.5 percent of the refrigerant at 75 degrees F (more at higher temperatures). Although temperature was not considered in the analysis, HCFC–22 equipment (or isolated components thereof) with charges of 200 pounds or more is generally found in equipment rooms, where ambient temperatures are low enough to make a ten-inch vacuum feasible.

Some commenters argued that EPA should not set less stringent standards for HCFC–22 because the ODP of HCFC–22 is not significantly different from that of the CFCs in the short term, when the most serious ozone depletion is expected to occur. As noted above, the physical characteristics of HCFC–22 and the conditions under which repair and disposal of appliances using HCFC–22 are likely to occur (e.g., on hot rooftops) were the primary considerations in setting less stringent standards for HCFC–22 than for the CFC refrigerants; however, EPA also considered the impact on human heath and the environment of the HCFC–22 that would escape under the less stringent standards. In estimating this impact, EPA accounted for both the short- and long-term effects of HCFC–22 on stratospheric ozone, examining health and environmental effects over the next 150 years. As discussed above, the Agency found that these effects were not severe enough to warrant setting more stringent standards for HCFC–22 recovery, which would be difficult (and, in some cases, impossible) to meet. The method that EPA used to calculate the impact of HCFC–22 on human health and the environment and the relationship of this method to the ODP

of HCFC–22 is discussed in more detail in the RIA.

Another significant change from the proposal is the provision that allows the charge in an isolated component of the system, rather than the charge of the system as a whole, to be used to determine appropriate levels of evacuation. Several commenters stated that large air-conditioning and refrigeration systems often contain isolation valves that allow individual system components to be repaired without requiring evacuation of the entire system. In many cases, the quantity of refrigerant left in the component is considerably less than 200 (or even 50) pounds, even if the system as a whole contains several hundred pounds. In these cases, EPA agrees that drawing a deep vacuum on the system component is not necessary.

The other significant changes from the proposal are the alteration of the maximum evacuation level for high-pressure refrigerants from 20 inches to 15 inches, and the raising of the cutoff for "small" high-pressure equipment to 200 pounds. A number of commenters criticized the 20-inch evacuation requirement, stating that achieving this level of evacuation would place a strain on recovery equipment, recover little additional refrigerant, be time-consuming, and in some cases (e.g., with equipment using R–502) be impossible. In its analysis of evacuation levels, the Agency found that evacuation levels between approximately 15 and 23 inches of vacuum (depending upon compressor clearance) were appropriate for large equipment using R–12 (CFC–12), while evacuation levels between 5 inches and 17 inches of vacuum (depending upon compressor clearance) were appropriate for large equipment using R–502. EPA's analysis confirmed that achievement of a 20-inch vacuum on equipment utilizing R–502 would be very difficult without substantial modification of existing recycling and recovery equipment. (See Section G.1. below.) Rather than set separate standards for each high-pressure refrigerant, which could lead to excessive confusion, the Agency has decided to establish a single standard based on both of the above ranges, 15 inches of vacuum. (R–12 and R–502 represent the commonly used CFC high-pressure refrigerants with the lowest and highest saturation pressures, respectively. Therefore, an evacuation level that falls into the range of appropriate levels for both refrigerants should be appropriate for all high-pressure CFC refrigerants.)

Similarly, EPA found that evacuation levels between approximately 10 and 22 inches of vacuum (again, depending upon compressor clearance) were appropriate for small equipment using R–12, while evacuation levels between atmospheric pressure and 14 inches of vacuum were appropriate for small equipment using R–502. The Agency selected 10 inches as an appropriate evacuation level for all high-pressure CFC refrigerants.

Supermarkets and chemical manufacturers were concerned that the proposed levels of evacuation, particularly the 20-inch requirement for large, high-pressure equipment, would be too time-consuming, leading to food spoilage or costly shutdowns of industrial processes. As discussed above, EPA is now requiring that large, high-pressure systems be evacuated to 15 rather than 20 inches of vacuum. EPA believes that this change and the new provision that permits the charge of an isolated component to be used as the basis for determining evacuation requirements will address concerns about excessive time spent evacuating retail food and industrial process refrigeration systems.

One other change from the proposal is the elimination of the "intermediate-pressure refrigerants" category and the inclusion of CFC–114 in the "high-pressure refrigerants" category. Several commenters stated that the physical differences between CFC–114 and the high-pressure refrigerants did not warrant special treatment of the former. Other commenters noted that evacuating CFC–114 to 25 inches of vacuum, as was proposed, would be very time-consuming. The proposed requirement to evacuate CFC–114 to 25 inches of vacuum was based on information from the Department of Defense (one of the largest users of CFC–114), which stated that 25 inches was the maximum depth of vacuum that its pumpout equipment could achieve. Other users of CFC–114, however, such as gaseous diffusion uranium enrichment plants, have stated that their current (built-in) recovery equipment cannot evacuate their 114 systems to this level and that it would be very difficult and expensive to obtain recovery equipment that could. In consideration of these comments, the Agency has decided to classify CFC–114 as a high-pressure refrigerant.

ii. Very high-pressure equipment. Commenters uniformly supported EPA's proposal to require evacuation of very high-pressure equipment (used with refrigerants –13 and –503) to atmospheric pressure. Several of these commenters noted that passive equipment could be used to evacuate very high-pressure systems, many of which contain only a few pounds of vapor easily captured by a 50-lb. recovery cylinder. (Note that ordinary refrigerant cylinders are not suited for use with very high-pressure refrigerants, but higher-pressure cylinders are available.) EPA's own analysis indicates that chilling a cylinder with dry ice would even permit the recovery of some of the very high-pressure refrigerant as a liquid ("Very High Pressure Refrigerant Recovery and Reclamation," September 28, 1992, memorandum from Gene Troy, Bernard Eydt, and John Wasson to David Lee and Debbie Ottinger). Some commenters stated that using compressor-bearing equipment to compress and liquefy very high-pressure refrigerants could pose a safety risk, because of the very high pressures required. Because of this concern and because compressor-bearing equipment currently available for use with very high-pressure refrigerants is extremely bulky and relatively expensive, EPA is permitting the use of system-dependent equipment on very high-pressure refrigeration equipment containing less than 15 pounds of refrigerant.

iii. Low-pressure air-conditioning and refrigeration equipment. As was proposed, EPA is requiring evacuation of low-pressure systems to 25 inches of vacuum using grandfathered equipment and to 29 inches using equipment manufactured after November 15, 1993. A number of commenters supported the 29-inch requirement, noting that the technology to achieve this level in a timely fashion (vacuum pumps) is available and is, in fact, now being used on virtually all low-pressure recovery and recycling equipment. One commenter noted that evacuation to 29 inches of vacuum instead of 25 inches of vacuum would prevent release of 312,000 pounds of CFC–11 annually.

Some commenters supported evacuation to levels less stringent than 29 inches. Many of these commenters argued that evacuation to levels below 25 inches would be excessively time-consuming and would recover little additional refrigerant.

EPA has examined the feasibility and benefits of evacuating low-pressure systems to 29 inches of vacuum. As noted in the proposal and in several comments, the technology to achieve a 29-inch vacuum is available. The time and labor costs involved in drawing this vacuum depend upon (among other things) the recovery rate of the recycling or recovery equipment at low pressures. If a relatively slow recovery device is used to evacuate low-pressure equipment from 25 to 29 inches of vacuum, the labor costs involved in recovering that refrigerant can indeed be quite high, and may not be justified by

the additional refrigerant recovered. However, EPA believes that use of available, competitively priced equipment permits evacuation to 29 inches within a reasonable period and is justified by the additional refrigerant recovered (*Regulatory Impact Analysis* (RIA), March 25, 1993).

b. *Exceptions to evacuation requirements.* EPA is establishing exceptions to its evacuation requirements for two specific situations: non-major repairs that are not followed by an evacuation of the appliance to the environment and leaks that make the required evacuation levels impossible to attain. In both cases, commenters and EPA's research indicate that attempting to achieve the required vacuums could actually lead to higher emissions than achieving shallower (or no) vacuums.

i. Non-major repairs that are not followed by evacuation of the appliance to the environment. A number of commenters, including technicians, grocery store managers, contractor trade groups, and environmentalists, stated that EPA should permit evacuation of air-conditioning and refrigeration equipment to atmospheric pressure under limited circumstances, such as when only minor repairs were performed or when an evacuation of the equipment to the environment was not planned subsequent to the repair. Following a major repair to an air-conditioning or refrigeration system, the contents of a system or component are typically evacuated to the environment with a vacuum pump to remove air and moisture that may have entered the system during the repair process. This evacuation to the environment is often known as a "complete" or "high-level" evacuation. (The contents are expelled to the environment rather than captured by a recovery device because recovery device compressors are not able to compress air, which may make up a significant percentage of the system contents in many cases.) However, from comments and discussions with technicians in the field, the Agency understands that many minor repairs, such as replacement of a filter drier, oil filter, or safety switch, involve uncovering only a small opening in the appliance (e.g., a threaded fitting) and take place in only a few minutes. In these cases, both the quantity of refrigerant that escapes and the quantity of air and moisture that enter the system will be limited if the system has been brought to atmospheric pressure prior to beginning the repair. After such repairs, the system is generally resealed with no evacuation to the environment, particularly if the system is a large one.

Commenters argued that release of refrigerant from a system at atmospheric pressure during a minor repair procedure can be minimal, and in fact will be smaller in many cases than the release that would result from drawing the system into a vacuum. Commenters noted that drawing a vacuum leads to the influx of either nitrogen or air and moisture, which in turn requires that a second, deeper vacuum be drawn using a vacuum pump, expelling any residual refrigerant to the atmosphere. One commenter estimated that approximately 6 pounds of refrigerant would be released from its equipment if that equipment were drawn to atmospheric pressure before servicing, while 50 pounds would be released if the equipment were drawn first to a 25-inch vacuum and then re-evacuated after servicing. (Commenters universally supported recovery into a vacuum at disposal.)

In response to these comments, EPA has decided to permit evacuation (or, in the case of low-pressure appliances, pressurization) of appliances to 0 psig (atmospheric pressure) when the maintenance, service, or repair is not major and when an evacuation of the appliance to the environment is not performed after the servicing or repair is completed. As discussed in the definitions section, EPA is defining as "major" maintenance, service, or repair that involves removal of the compressor, condenser, evaporator, or auxiliary heat exchanger coil. These procedures are relatively time-consuming and/or leave large openings in the system through which refrigerant can escape (and air and moisture can enter). After such procedures, evacuation of the system to the environment is customarily performed. However, EPA recognizes that a second, "high-level" evacuation may be appropriate for some types of appliances even after minor repairs. The Agency emphasizes that if the system *is* to be re-evacuated to any level, then it must be drawn to the appropriate vacuum in Table 1 to recover the refrigerant before the repair begins, even if the repair would otherwise be considered "non-major." EPA believes that this approach will most effectively minimize emissions while lowering the costs of many repairs.

Low-pressure systems, because they operate below atmospheric pressure, must be pressurized to equalize the pressure of the system and the pressure of the air outside of it. EPA is requiring low pressure systems that undergo minor servicing, such as oil changes, to be pressurized to atmospheric pressure to minimize the intrusion and subsequent purging of air. Methods that do not require subsequent system purging, e.g., heat (*not* nitrogen), must be used.

Some commenters argued that EPA should never require evacuation of high-pressure equipment to levels below atmospheric pressure, or should allow the service technician to decide whether further evacuation was required. Many of these commenters were concerned that drawing a vacuum during recovery could result in an influx of air and moisture that would damage equipment. In the proposal, EPA requested comment on this problem, noting that technicians can avoid system contamination by either breaking the vacuum with nitrogen or by drawing a deep second vacuum on the system to remove any air and moisture that may have penetrated. (EPA also proposed special evacuation requirements for leaky systems; these are discussed below.) The Agency expressed a willingness to consider allowing small systems utilizing HCFC–22 to be evacuated to atmospheric pressure (as it has), but stated that the larger ODP of other refrigerants appeared to justify requiring that these be drawn into a vacuum, even if extra measures were required to prevent system contamination.

A few commenters stated that carrying a cylinder of dry nitrogen and/or a vacuum pump capable of drawing deep vacuums is not practical in many situations. These commenters claimed that space constraints in many equipment installations would often make it physically impossible to use nitrogen and a vacuum pump. However, other commenters stated that small, portable nitrogen cylinders are available and are necessary not only for breaking the vacuum, but for conducting leak testing after repairs are complete. Based on its research and review of comments, EPA believes that breaking vacuums with nitrogen (and, therefore, drawing vacuums during recovery) will be practical in most equipment service and maintenance situations. (At disposal, breaking the vacuum is not necessary because system contamination is no longer a concern.)

In addition, EPA continues to believe that establishing clear evacuation standards will minimize overall refrigerant emissions. Although the Agency is allowing technicians considerable discretion in determining whether a repair will require a high-level evacuation or whether a system is leaky (see Section b.ii. below), it is reluctant to leave evacuation requirements entirely to the discretion of technicians for a number of reasons. First, the technician's private incentives

to recover refrigerant are not the same as society's incentives to ensure that it is recovered. Because they do not bear the full cost of refrigerant release, technicians would be expected to recover less refrigerant than should be recovered, from a social perspective. Although a regulatory requirement to "minimize emissions" might increase the level of recovery, it is not likely that this level will be the same as the socially desirable level. Second, clear evacuation requirements minimize uncertainty as to whether a given release of refrigerant is considered "de minimis" or not. Technicians achieving required vacuums will know that they are complying with section 608 of the Clean Air Act. A number of commenters agreed with this reasoning and supported EPA's approach. Thus, the Agency is requiring that high-pressure equipment using CFC refrigerants be evacuated to specific vacuums, except in the specific situations described in the paragraphs above and in section ii. below.

ii. Evacuation of leaky equipment. The Agency proposed less stringent evacuation requirements for leaky equipment, proposing to allow high-pressure equipment to be evacuated to 0 psig (atmospheric pressure) if it had a leak large enough to have lowered the system pressure to two atmospheres. EPA proposed this provision in response to concerns that it may not be possible to draw deep vacuums on leaky equipment and that attempting to draw such vacuums may contaminate the refrigerant, the appliance, and the recycling or recovery equipment.

EPA received a number of comments supporting less stringent evacuation standards for equipment with large leaks. Most of the commenters stated that deep evacuation of leaky appliances would draw contaminants into the appliance and from there into the recycling or recovery equipment. The contaminants cited most often were air and moisture, but chemicals being cooled by industrial process refrigeration equipment were mentioned as well. Commenters argued that removal of these contaminants (particularly air) could result in greater emissions of refrigerant than would result from release of the refrigerant remaining in the system at atmospheric pressure.

Several commenters criticized the "two atmospheres" standard for determining whether a system had a large leak. Some commenters stated that system pressure was not necessarily an indication of the size of a leak; even small leaks, given enough time, could lower system pressure to two atmospheres or less. A number of commenters believed that EPA needed to develop standards and requirements for leaky low-pressure equipment as well as for leaky high-pressure equipment.

In response to these comments, EPA has decided to revise its evacuation provision for leaky equipment to allow consideration of factors other than initial system pressure in determining whether a leak is large enough to prevent evacuation to the levels in Table 1 above. The Agency is also expanding the provision to include low-pressure equipment. If the technician determines that the levels in Table 1 are not attainable, or would substantially contaminate the refrigerant being recovered, the technician must: (1) isolate leaking from non-leaking components wherever possible, (2) evacuate non-leaking components to be opened to the levels specified in Table 1, and (3) evacuate leaking components to be opened to the lowest level that can be attained without substantially contaminating the refrigerant. This level cannot exceed atmospheric pressure.

EPA is aware that both the symptoms of a leak and the lowest evacuation level that can be attained will vary from situation to situation. For instance, leaky high-pressure systems may activate refrigerant sensors in an equipment room or may simply have low internal pressure. Leaky low-pressure systems may purge noncondensables frequently or, if they are not operating, may be at atmospheric pressure. Occasionally, leaks may not become apparent until during the evacuation process itself, when the system pressure levels off unexpectedly or when the system fails to hold a vacuum. Based on review of comments and discussions with industry representatives, EPA believes that it will generally be appropriate to evacuate high-pressure systems with large leaks to atmospheric pressure. Low-pressure systems, depending upon the size and nature of the leak, can often be evacuated to lower levels. For example, low-pressure systems with leaking "O" rings or gaskets can usually be drawn to a 25-inch vacuum. However, low-pressure systems with leaks in condensers or evaporators (where water can enter the system) may be difficult to evacuate to levels below atmospheric pressure. EPA will incorporate guidelines on diagnosing and evacuating leaky systems into both its technician certification program and its enforcement policy.

c. Removal of entrained refrigerant from oil. In the proposal, the Agency discussed the issue of CFCs dissolved in the oil left behind in a system after refrigerant has been evacuated. The Agency did not propose specific requirements but expressed the concern that in some cases a large amount of the refrigerant remains entrained in the oil and, as a result, the percentage of charge evacuated is significantly decreased. The oil could then slowly release refrigerant once exposed to the atmosphere. The Agency requested comment on whether procedures to extract refrigerant from oil prior to exposing the oil to the atmosphere or disposing of the oil should be required in this rule.

The majority of comments on this issue recommended that EPA not establish additional procedures for the removal of refrigerant entrained in oil. The commenters highlighted the fact that the amount of refrigerant remaining in oil varies by equipment types, the refrigerant in question and the recovery equipment used. Many suggested that the amount of CFC remaining in oil is minute as compared to the charge. They stated that the servicing practices require vacuums to be drawn when evacuating refrigerant from the systems and that the majority of the refrigerant will be removed at that time. Holding the vacuum for an extended amount of time or heating the crankcase are acceptable procedures in some cases, while for other equipment the amount of time required is not commensurate with the small amount of refrigerant recovered. Some commenters recognized that the ASHRAE Guideline 3 is helpful in some cases. Many commenters stated that even by using the guideline, the oil would maintain a CFC contamination rate above 4000 ppm. (For additional information see RCRA Regulations Regarding the Management of CFCs and CFC contaminated wastes—40 CFR part 279.)

Two commenters specifically mentioned that oil sampling, a procedure that withdraws a small amount of oil from a system for diagnostic purposes, should not be included in any refrigerant recovery procedures because the amount of refrigerant contained in the sample is so small. Several commenters suggested that guidance was the best way to provide information to technicians on this issue at this time and that mandatory procedures be considered if technology is developed to recover the refrigerant quickly and effectively.

The comments support EPA's proposal that additional procedures to recover entrained refrigerant from oil are not warranted at this time. Since the amount of refrigerant entrained in oil will vary based on the system, the

refrigerant used, the temperature, the recovery equipment used and the length of time that the vacuum is applied, the Agency was unable to determine procedures that would result in an acceptable amount of refrigerant recovered from the oil in each case. The Agency encourages system and recovery equipment manufacturers to provide information to owners in order to assist them to recover as much refrigerant as possible at service.

d. Evacuation requirements for small appliances. Technicians opening small appliances for service, maintenance, or repair may use either equipment certified under Appendix B, ARI 740–1993, or equipment certified under Appendix C, Method for Testing Recovery Devices for Use with Small Appliances, to recover the refrigerant. Because Appendix B and Appendix C measure refrigerant recovery efficiency differently, different evacuation requirements are appropriate for technicians using equipment certified under the two standards.

Appendix C measures the percentage (by mass) of the refrigerant recovered from the small appliance by the recovery equipment. This percentage depends upon whether the compressor of the small appliance is operating or not, and therefore the required recovery efficiency for technicians using equipment certified under Appendix C also varies depending upon whether the compressor of the small appliance is operating or not. Technicians recovering refrigerant from small appliances with operating compressors are required to capture 90% of the refrigerant in the appliance, while technicians recovering refrigerant from small appliances with non-operating compressors are required to capture 80% of the refrigerant in the appliance. Because the percentage of refrigerant mass recovered is very difficult to measure on any given job, technicians must adhere to the servicing procedure certified for that recovery system under Appendix C to ensure that they achieve the required recovery efficiencies.

Technicians using recovery equipment certified under Appendix B, on the other hand, can measure the vacuum that has been achieved in the small appliance to determine whether they have achieved the required recovery efficiency. (As discussed above, Appendix B assesses the recovery efficiency of recycling and recovery equipment by measuring its final recovery vacuum.) EPA is setting the required evacuation level for equipment certified under Appendix B for use with small appliances at four inches of mercury vacuum. Technicians using this equipment must also achieve four inches of vacuum in the field. This level of evacuation is consistent with that required for larger high pressure systems evacuated using grandfathered recycling or recovery equipment, and EPA believes that most recycling and recovery equipment can meet this standard. Certification of recovery devices and procedures are discussed in more detail in section III.G.2.

2. Disposition of Recovered Refrigerant

EPA anticipates that the combination of the proposed January 1, 1996 phaseout of CFCs, the prohibition on venting that became effective on July 1, 1992, and this rule will ultimately increase recovery and/or recycling of ozone-depleting compounds by 60,000 metric tons annually. This large increase in the quantity of used refrigerant in circulation carries risks, even as it has the potential to reduce emissions of ozone-depleting compounds and to ease the transition to alternatives by prolonging the life of existing equipment. Recovered refrigerant may contain moisture, acids, oil, particulates, or other contaminants that can lead to serious damage to the equipment if it is reused without taking some action to remove these contaminants. In many cases, technicians will be recovering and reusing refrigerants for the first time. Thus, neither they nor their customers may be aware of the potential dangers involved in charging their air-conditioning and refrigeration equipment with used refrigerants.

EPA is concerned about damage to air-conditioning and refrigeration equipment for three reasons. First, damage to equipment would obviously increase costs to equipment owners. Second and more important from an environmental perspective, damaged equipment would often leak during operation and would require servicing or replacement more often than undamaged equipment, increasing refrigerant emissions. Third, damage to equipment would reduce consumer confidence in the quality of used refrigerant, leading to erosion of the market for used refrigerants and possibly to their release. A reduction of consumer confidence could also result in the premature retirement or retrofit of CFC or HCFC equipment.

To prevent contaminated refrigerant from entering the market, EPA proposed to require technicians servicing air-conditioning equipment to reclaim refrigerant before moving it between equipment owned by different persons. As discussed above in the Definitions Section, "reclaimed" means that the refrigerant is cleaned to the ARI 700–1988 standard of purity (Appendix A) and is chemically analyzed to verify that it meets this standard. ARI 700 was specifically developed to ensure that refrigerant removed from one piece of air-conditioning or refrigeration equipment could be cleaned, analyzed, and put into any other piece of air-conditioning or refrigeration equipment, in any application (excluding household appliances, which do not fall under the purview of ARI), without fear of equipment damage. EPA focused on changes in equipment ownership because such transfers introduce uncertainties into the marketplace regarding the purity of the refrigerant. Transfers between equipment owned by the same person, on the other hand, are of less concern. First, owners are aware of the source and history of the refrigerant and are therefore better able to determine whether use of the refrigerant in a given piece of equipment is likely to damage that equipment. Second, owners themselves bear the costs of equipment damage when a refrigerant transfer is inappropriate.

EPA also requested comment on less stringent alternatives for ensuring refrigerant purity. One alternative would have permitted air-conditioning and refrigeration contractors to move refrigerant between similar pieces of equipment owned by different persons. This approach acknowledged that purity concerns are diminished when at least one party, the contractor, has knowledge of both the equipment from which the refrigerant is recovered and the equipment into which the refrigerant is charged, and when these pieces of equipment are similar. However, EPA was reluctant to adopt this approach before industry had an opportunity to develop a "clean-up" standard for refrigerant moved between similar pieces of equipment. Such a standard might be implemented through the certification program for recycling equipment, ensuring that the equipment could clean up a standard contaminated refrigerant "cocktail" to a certain level, or it might be implemented through simplified testing of recycled refrigerant at the contractor's shop. (The analytical protocol contained in ARI 700 requires expensive laboratory equipment and expertise, making it impractical as a methodology for testing at the contractor's shop.)

EPA received a number of comments both in favor and opposed to the proposed requirement to reclaim refrigerant moved between equipment owned by different persons. Those who favored the requirement reiterated many of the arguments EPA had made in the

proposal. Many stated that a purity standard was necessary to protect consumers, who lacked the technical knowledge to enable them to evaluate the risks of using contaminated refrigerant. The fact that recycled refrigerant would often be less expensive than reclaimed refrigerant would exacerbate this problem. Many of the same commenters were concerned that manufacturers with equipment warranties would also be adversely affected if the sale of recycled refrigerant to a new owner were allowed. In addition to private costs, several commenters cited damage to the environment that could result from use of recycled, contaminated refrigerant as a justification for the reclamation requirement. These commenters echoed EPA's concerns that the sale of recycled, contaminated refrigerant could lead to increased refrigerant emissions and to loss of consumer confidence in the quality of used refrigerants.

One commenter noted that ARI 700 was the only available technical basis for refrigerant purity levels and should therefore be required to protect equipment. This commenter stated that technology existed to permit transportable recycling machines capable of producing refrigerant that meets ARI Standard 700. A few commenters stated that since reclamation services would be available to process recovered refrigerant at reasonable cost, there was no need to relax EPA's proposed reclamation requirement.

Commenters who opposed the reclamation requirement focused primarily on two points. First, the application and service history of the refrigerant determine whether it can be safely moved to another piece of equipment; and second, responsible, educated contractors are capable of making this determination. These commenters favored the less stringent option described by EPA in the proposed rule, which would allow contractors to move refrigerant between similar pieces of equipment owned by different persons. According to the commenters, this restriction would greatly lessen contamination concerns while enabling contractors and consumers to save money. Many commenters noted that both the U.S. and international HVAC/R industries are making progress toward developing guidelines for use of recycled refrigerant, making the less stringent option more attractive.

One commenter suggested that EPA incorporate a "sunset clause" for the reclamation requirement into the regulation. This commenter cited a number of advantages to this approach, stating that it would: (1) Provide immediate protection to equipment manufacturers, (2) allow the fledgling refrigerant reclaiming market to develop, (3) encourage the development of recycling technology, (4) give the U.S. HVAC/R industry the incentive and the time it needs to develop its own recycling guideline, and (5) ultimately relieve the EPA and the taxpayer of the cost of enforcing a purity standard.

EPA has considered these comments and has performed its own analysis of the costs and benefits of requiring reclamation of refrigerant transferred between equipment owned by different persons. This analysis examined the costs and probabilities of equipment damage associated with four levels of refrigerant processing: (1) Recovery only, with no purification, (2) recycling, (3) recycling with on-site testing of refrigerant, and (4) reclamation. The analysis then compared these costs and risks to determine whether each successive level of processing was worthwhile. EPA found that reclamation appeared to be clearly worthwhile for refrigerant used in some types of equipment (small appliances) but was not as clearly worthwhile for refrigerant used in other types. For the latter, recycling followed by on-site testing may be a more cost-effective form of protection.

Together, the comments and the analysis indicate that limited off-site recycling that is supported by a standard of purity and testing method for recycled refrigerant may be the most cost-effective means of carrying out Section 608 while protecting air-conditioning and refrigeration equipment. As several commenters noted, both the European Community and the U.S. HVAC/R industry have taken steps toward developing such a standard. EPA believes that the contaminant levels and testing methods that would ultimately be contained in such a standard would be less stringent than those in the ARI Standard 700, because the latter was designed to permit transfers between any two or more types of air-conditioning and refrigeration equipment, whereas the former would be designed only to permit transfers between similar types of equipment.[1]

However, as another commenter pointed out, the ARI Standard 700 is the only technical standard of purity and testing method currently available. Therefore, in order to ensure that air-conditioning and refrigeration equipment is protected while encouraging the development of a standard for limited off-site recycling, EPA is requiring that refrigerant transferred between different owners be reclaimed for two years after publication of this rule. EPA believes that two years is an appropriate interim period to allow industry to develop a standard of purity for recycled refrigerant and to allow EPA to complete a rulemaking to adopt the standard. Moreover, the expiration of the full reclamation requirement follows the date by which technicians must be certified, ensuring that the judgment of technicians regarding the disposition of refrigerant will be relatively well-informed. If U.S. industry has not made significant progress in developing a standard for recycled refrigerant within eight months, EPA may begin rulemaking to adopt an alternative standard, for instance, the standard being developed by the European Community.

The reclamation requirement will become effective 90 days after this rule is published. EPA had proposed to make this requirement effective 30 days after publication, but the Agency became concerned that 30 days may not constitute sufficient time for technicians to learn the requirements of this rule, establish contacts with reclaimers, and begin using reclamation services.

The Air Conditioning and Refrigeration Institute requested at the public hearing and in written comments that EPA adopt the updated version of ARI 700, ARI 700–1993, in this rule. Among other changes and additions, ARI 700–1993 will establish purity requirements for HCFCs not covered by ARI 700–1988, including HCFC–123 and -124. However, ARI 700–1993 has not yet been finalized and therefore cannot be included in this rule. When ARI 700–1993 is finalized, the Agency plans to undertake rulemaking to adopt it.

3. Leak Repair

In the proposal, the Agency stated that it intended to develop comprehensive regulations to reduce

[1] The nearly universal applicability of ARI 700 dictates a relatively low tolerance for contaminants. For instance, oils used with HCFC–22 in residential air conditioning applications have a different viscosity than oils used with HCFC–22 in supermarket refrigeration systems. If the former are accidentally added to supermarket systems, they tend to form sludge, damaging the system. Similarly, air conditioning systems generally have a higher tolerance for moisture contamination than systems that run at lower temperatures because in the latter, water can freeze and expand to damage tubing. Thus, contaminant levels in ARI 700 must be set low enough to ensure that the systems most sensitive to that contaminant will not be damaged, even if many systems would not be harmed by higher contaminant levels.

refrigerant leakage during equipment use in the next phase of rulemaking under section 608. The Agency requested comment on whether it should include a provision in this rule requiring the repair of substantial leaks as an emergency stop-gap measure to ensure that technicians do not repeatedly "top off" systems with substantial leaks. The Agency suggested a figure of 35 percent loss of charge per year as a leak that must be repaired within 30 days after discovery. The 35 percent number was chosen because research on emissions from equipment in different sectors obtained in developing recycling regulations indicates that this number is five percentage points above the annual leak rate in the most leak-prone sectors. The Agency also discussed establishing different levels for different sectors. EPA recognized that the 35 percent figure for all sectors fell short of establishing a lowest achievable level of emissions; however, it would reduce significant leaks until the additional analysis is performed.

EPA received a large volume of comments on this issue and the predominance of these commenters (over 800) requested that the Agency include a mandatory leak repair requirement. Only a small percentage of the letters offered any comment on the suggested 35 percent per year figure or the 30-day time allowance for repairing these leaks, however. Most of the commenters suggested that the recovery of refrigerant at-service requirements simply did not go far enough in reducing release of ozone-depleting chemicals. Many of the commenters believed that by not repairing leaks that had been detected, the technician or the owner of the equipment was "intentionally venting" refrigerant to the atmosphere. Several commenters mentioned that advances in leak detection technology have made these procedures reliable, inexpensive and fast, and repair of leaks results in equipment that runs more efficiently, therefore saving energy.

Regarding the question of the appropriate definition of the size of substantial leaks that must be repaired, several commenters agreed that the 35 percent per year level was appropriate. Questions about the practicality of such a level were raised, however, and several commenters mentioned that the technician would need to remove the entire charge to determine if the percentage had been exceeded. Suggestions that the percentage be reduced over time and that different levels be set for each type, or category of equipment, were made. NRDC and FOE stated that the appropriate level be determined based not on 5 percent over "average" leak rate, but by the leak rate of equipment that is maintained the best (e.g., the 95th percentile lowest leak rate). They believe this level is feasible since it is derived from existing equipment, but is a higher standard than an average figure.

Approximately 25 commenters suggested that a mandatory requirement was premature, not needed, or inappropriate. These commenters believed that more analysis is necessary to determine realistic leak levels and one commenter suggested a voluntary leak repair program. Two commenters from the commercial refrigeration sector mentioned that their equipment has a range of leak rates and therefore the average figure would be an arbitrary designation. The figure could serve as a disincentive to repair leaks smaller than the average, while requiring repair within 30 days may interfere with decisions that may actually reduce overall emissions. An example of this would be in the situation where a company decides to replace a leaking system but the new equipment will not be delivered for 60 days. Requiring expensive repairs on the obsolete unit may result in the company deciding not to replace the equipment as quickly with new, leak-free equipment using a less ozone-depleting or non-ozone-depleting substitute. One commenter suggested a case-by-case waiver be granted from the 30-day time limit for repair of substantial leaks to avoid the type of situation just described.

EPA believes it should respond to the large number of comments requesting some action in this rule on repair of substantial leaks by promulgating a leak repair requirement. The Agency acknowledges that the 35 percent figure for all equipment is too general and therefore in today's final rule, two different levels have been established. The 35 percent figure will continue to be used for the industrial process and commercial refrigeration sectors. The second leak rate is the 15 percent of charge per year figure discussed in the proposal and in today's rule this rate would be applied to all equipment with more than 50 pounds of charge, other than the industrial process and commercial refrigeration sectors. The 50-pound cut-off is intended to exempt smaller equipment where the cost of repairing the leak is an order of magnitude higher than the environmental benefit of repairing the leak (RIA). The 50-pound cut-off is also consistent with guidance found in the ASHRAE Guideline 3–1990.

The two levels have been derived from information on average maintained equipment because the Agency believes that to be a fair level that can reasonably be expected to be achievable in practice by all equipment. Although best maintained equipment would have a lower leak rate, the Agency understands that older equipment and some equipment that is difficult to service because of its location (e.g., commercial refrigeration, which frequently has lines running under floors) cannot achieve a stricter standard. Furthermore, EPA would need to inventory equipment and leak rates to determine emissions from the best maintained equipment. The Agency will consider lowering the accepted levels to the best maintained levels of leaks in future rulemaking.

ARI and Robinair commented that it is not necessary to define the size of the leaks that must be repaired. They commented that the standard should simply state that leak detection must be performed and any identifiable leaks be repaired in a timely fashion. The Agency considered this type of standard, which has the benefit of simplicity and clarity. Without any type of lower bound, however, this standard could result in huge amounts of money being spent to repair even pinhole leaks in equipment that may soon be obsolete. To be meaningful, lower bounds must reflect specific equipment and this requires that additional analysis be performed. The intent of the leak repair requirement in this rule is to assure that substantial leaks are repaired. The Agency maintains that the rising price and lower availability of the substances will also provide the incentive to repair equipment; however, commenters believed the market incentive alone was not sufficient.

Today's final rule will also require the 30-day time limit for repairing leaks suggested in the proposal. The Agency maintains that the 30-day time limit is feasible and a reasonable balance between commenters suggesting 15 days and those suggesting 60 days. An exception to this requirement has been incorporated into the rule to address commenters' concerns that the Agency should preserve flexibility for equipment owners who may be able to reduce their use of ozone-depleting substances more effectively by replacing or retrofitting equipment. Leaks do not need to be repaired in the 30-day time limit if the owner develops a plan for his equipment within 30 days that details the activities planned to retire equipment and replace it with equipment that uses a non-ozone-depleting or a less ozone-depleting substance or to retrofit existing

equipment within one year. The Agency believes the time limit with the exception provides the proper incentive to reduce the emission of ozone-depleting substances and alerts equipment owners to the types of choices they must make as the phaseout of production approaches. The plan would not need to be submitted to the Agency. Although it is the owner's discretion on where to keep the original of the plan, a copy must be kept at the same site as the leaking equipment. The original of the plan must be made available to EPA on request.

One commenter asked how technicians would be able to determine the size of the leak to be repaired. The Agency believes that records of the service calls and amounts of refrigerant added to machines will assist technicians in their determination of leak rates and would also assist owners of equipment in the determination of the need for leak repair. The Agency believes these records, primarily in the form of service invoices, are already kept by equipment owners and therefore this requirement is not an additional burden on them. These records must also include refrigerant purchased and added to equipment each month in cases where owners add their own refrigerant. The Agency understands that leak detection technology can also be used to identify leaks and in some cases technicians will need to estimate the leak size or refill the system before they can determine the amount of refrigerant that has leaked out. Many commenters raised the issue of degree of responsibility for leak detection. The Agency wishes to clarify that today's requirement is that leaks of a certain size be repaired, but it does not explicitly state that leak detection be performed at specific intervals. The Agency believes that technicians perform leak detection as part of the diagnosis for repair of equipment. At the time of the proposal, the Agency did not have sufficient information to require specific leak detection technologies, although it believes this activity to be important. Today's rule requires that within 30 days the owner of the equipment either authorize the repair of substantial leaks or develop the equipment retirement/retrofit plan discussed above. Technicians should inform owners when leaks exist and when those leaks should be repaired. The owner has the legal obligation to ensure that repairs are made to equipment where the leak rate exceeds the standard. It is, therefore, in the owner's interest to provide sufficient information to a technician, so that a technician can make an accurate determination regarding whether the leak must be repaired. An owner may not intentionally shield himself from information which would have revealed a leak.

4. Handling Multiple Refrigerants in Recycling and Recovery Equipment

In the proposal, EPA requested comment on whether it should require procedures to recover residual refrigerant from recycling and recovery equipment before that equipment was used with a different refrigerant. Depending upon the design of the recycling or recovery equipment, significant quantities of refrigerant may be left behind in the condenser of the equipment after the recovery or recycling process is complete. The Agency was concerned that without a requirement to remove this refrigerant, the residual refrigerant could mix with the new refrigerant, contaminating the latter. The proposal listed several possible procedures for recovering residual refrigerant, including using a second recovery device, heating the condenser of the recovery or recycling machine, and/or cooling the container (and/or tubing to it) to which the recovery or recycling machine was evacuated. The proposal also noted that the design of equipment (e.g., use of different condensers with each refrigerant) could help to avoid refrigerant mixture.

EPA received comments both favoring and opposing an evacuation requirement for recycling and recovery equipment switched between different refrigerants. Those favoring an evacuation requirement stated that without such a requirement, refrigerants could either be mixed or vented to the atmosphere to avoid such mixture. These commenters observed that the quantity of refrigerant remaining in the condenser of a recovery or recycling device may represent a significant percentage of the total charge of the appliance being serviced or disposed of (e.g., one pound out of five). Several commenters noted the importance of equipment design in minimizing the mixture or emission of residual refrigerant; while some models of equipment possess separate condensers for each refrigerant, many other models possess the ability to evacuate their condensers into either the appliance being serviced or a recovery cylinder at the conclusion of service. Thus, a number of commenters believed that an evacuation requirement would be most effectively implemented through the certification program for recycling and recovery equipment. Under this approach, the equipment certification program would require that equipment either possess instructions for equipment evacuation or be designed to ensure that residual refrigerant was neither mixed with new refrigerant nor released to the atmosphere.

Commenters who opposed an evacuation requirement for recycling and recovery equipment focused more on procedures than equipment design. Commenters argued that there were sufficient private incentives to ensure that technicians would take steps to avoid mixing refrigerants and that it would be difficult to specify appropriate procedures for all situations and types of equipment. Commenters also stated that the evacuation methods suggested in the proposal were either too unwieldy or too expensive to implement. One commenter observed that the reclamation requirement for refrigerant moved between appliances owned by different persons would provide sufficient protection against refrigerant mixture. Another commenter believed that it would be difficult to enforce an evacuation requirement for recycling and recovery equipment.

EPA agrees with the commenters who oppose the evacuation requirement that it would be difficult to specify procedures appropriate for all types of equipment and that private incentives and the reclamation requirement will help to prevent mixture of refrigerants. However, EPA is concerned that without some regulation by EPA, considerable quantities of residual refrigerant could be vented to the atmosphere in order to avoid refrigerant mixture. This risk is particularly large with recycling and recovery equipment that does not possess either multiple condensers or the ability to evacuate the (probably liquid) contents of its condenser into either the appliance being serviced or a recovery cylinder at the conclusion of service or disposal. Therefore, although the Agency is not prescribing specific procedures to recover residual refrigerant from recycling and recovery equipment, the Agency will consider emissions of residual refrigerant to be violations of the prohibition on venting unless technicians take steps to minimize emissions of such refrigerants.

Probably the easiest way to minimize emissions of residual refrigerant is to use recycling and recovery equipment that possesses the ability to evacuate the contents of its condenser into either the appliance being serviced or a recovery cylinder at the conclusion of service. As noted by a number of commenters, several currently available models of recycling and recovery equipment

possess this simple design feature. (Another feature of recycling and recovery equipment that would minimize both emissions and mixture of refrigerants is possession of multiple condensers; however, this feature appears to be less common than the self-evacuation feature.) Other steps to minimize emissions of residual refrigerant include those cited in the proposal, such as heating the condenser of the recovery or recycling machine and/or cooling the container (and/or tubing to it) to which the recovery or recycling machine is evacuated.

Because relatively simple design changes can be made (and, as pointed out by many commenters, have been made) to minimize the quantity of residual refrigerant that remains in the recycling or recovery equipment after recycling or recovery is complete, the most effective way of avoiding mixture or release of residual refrigerants may be to include a requirement that equipment be designed to avoid them in the certification program for recycling and recovery equipment. It was not possible to consider fully or to implement such a requirement before this rule was promulgated. However, the Agency will investigate this possibility in the future.

G. Certification of Recycling and Recovery Equipment

In order to ensure that recycling and recovery equipment on the market is capable of limiting emissions of CFCs and HCFCs, EPA is requiring that recovery and recycling equipment manufactured or imported on or after November 15, 1993, be tested and certified by an EPA-approved laboratory or organization. The Agency requires verification of performance in two areas that affect total recovery efficiency: (1) Vapor recovery efficiency and (2) efficiency of noncondensable purge devices on recycling machines. In addition, EPA is requiring that equipment and hoses be fitted with low-loss fittings.

In addition to the initial testing, manufacturers must have their equipment models tested or inspected at least once every three years to ensure that the equipment is still capable of meeting EPA requirements. Such "follow-up" programs are standard in equipment testing programs throughout industry. Manufacturers and importers also have to place a label on each piece of certified equipment indicating that it is certified and showing which organization tested and certified it. This label is intended to inform both consumers (technicians) and EPA enforcement personnel that the equipment meets EPA standards.

1. Standards for Recovery and Recycling Machines Intended for Use With Air-Conditioning and Refrigeration Equipment Except Small Appliances, MVACs, and MVAC-like Appliances

a. Recovery Efficiency. In developing its evacuation requirements, EPA has considered the technical capabilities, ease of use, and costs of recycling and recovery equipment, the servicing times that would be necessary to achieve different vacuums, and the amounts of refrigerant that would be released under different evacuation requirements and their predicted impact on the ozone layer (and therefore, on human health and the environment). The Agency has attempted to evaluate these factors in both the short and the long-term, considering the capabilities of both existing and possible future equipment.

In particular, the Agency has focused on the recovery rates and maximum recovery efficiencies (vacuums) of equipment. Although EPA is not setting minimum standards for recovery rates, the recovery rate of equipment affects both the speed with which it can achieve a certain vacuum and its portability. This in turn affects the depth of vacuum that can be practically achieved with air-conditioning and refrigeration equipment in the field. For instance, if the air-conditioning or refrigeration equipment is located in a space that is small or difficult to approach, it may not be possible to connect it to recovery equipment with a high recovery rate, which tends to be relatively large. In such cases, smaller recovery equipment must be used, making the achievement of deep vacuums excessively time-consuming and impractical. In the proposal, EPA attempted to allow for portability concerns by setting less stringent standards for equipment containing less than 50 pounds of high-pressure refrigerants. However, the Agency received a number of comments indicating that the 50-pound limit was too low; the commenters stated that equipment with more than 50 pounds is frequently located in areas that make the use of large recovery equipment impossible. Some of these commenters recommended that EPA adopt a 200-pound limit instead because equipment containing more than 200 pounds of refrigerant is likely to be located in relatively large and accessible equipment rooms. Based on its research and review of comments, EPA believes that a 200-pound limit is appropriate, and the Agency is adopting this limit in the rule.

The maximum recovery efficiency of recovery and recycling equipment is the percentage of refrigerant that the equipment is capable of recovering from an appliance and is directly related to the depth of vacuum that the equipment can achieve. Since the proposed rule was developed, ARI has published the results of its third-party testing program for recycling and recovery equipment, providing objective information on the range of performance of available equipment in the various pressure categories. ARI's results show that the brands and models tested that are intended for use with low-pressure refrigerants are capable of achieving a 29-inch vacuum in most instances. Most of the brands and models intended for use with high-pressure refrigerants are capable of achieving a vacuum deeper than 10 inches in the laboratory, and a number are capable of achieving a vacuum deeper than 15 inches. However, contrary to preliminary information received by EPA from some equipment manufacturers, no recovery device intended for use with high-pressure refrigerants was capable of reaching the 29-inch level.

According to comments and to EPA's own research, two limitations on existing recycling and recovery equipment make achievement of a 29-inch vacuum with high-pressure refrigerants unlikely: The compression ratio limit of the equipment's compressor, and the dependency of much of the equipment on the flow of refrigerant for cooling its motor. Of these two hurdles, the dependency of equipment on the flow of refrigerant for cooling appears to be the more easily overcome. Many of the small, portable recovery devices intended for use with small high-pressure equipment possess hermetic compressors, which rely upon the flow of refrigerant through the compressor to carry heat away from the motor. When such recovery devices operate in a vacuum, the flow of refrigerant is decreased and the motor is subject to overheating. Recovery devices with open compressors, which are not subject to this problem, have historically weighed more than equipment with hermetic compressors, making them less attractive in applications where portability is a major concern. However, at least one manufacturer of recovery equipment has developed a model that incorporates a light-weight open compressor. This recovery device neither weighs nor costs more than models possessing hermetic compressors, and is capable of achieving deeper vacuums than many of its competitors, according to the results of ARI's testing. (It should be noted, however, that even this equipment was

not capable of achieving a 20-inch vacuum with all high-pressure refrigerants.) EPA recommends that purchasers of recycling and recovery equipment consider compressor configuration when they buy their equipment, particularly if they plan to use the equipment in heavy-duty applications where overheating could be a problem (e.g., with large charge sizes or in high temperatures).

The compression ratio limit of recovery and recycling equipment has proved a somewhat more challenging technical hurdle than motor cooling. A number of commenters noted that compressors used in recycling and recovery equipment typically have a compression ratio limit of between 15 and 30 to 1. For R–22, this physically limits the depth of vacuum that can be attained to between 10 and 20 inches of vacuum at 75 degrees F (the temperature at which laboratory testing of recovery equipment occurs), and to between 2 and 16 inches of vacuum at 100 degrees F (a temperature at which recovery often occurs in the field). For R–12, the limits range between 17 and 23 inches of vacuum at 75 degrees F, and between 12 and 21 inches of vacuum at 100 degrees F.

Before these physical limits are reached, however, the pumping efficiency of the compressor drops significantly, greatly slowing the recovery process. For instance, on a 100-degree day, a recovery machine with a compression ratio limit of 30 to 1, which is a good limit, is pumping R–22 at less than five percent of its initial rate by the time the system pressure reaches atmospheric pressure. By the time the system pressure reaches ten inches of vacuum, the recovery machine is pumping at approximately one percent of its original rate. In practical terms, therefore, the vacuums achievable by currently available recovery equipment are not as deep as the numbers in the previous paragraph would indicate.

The compression ratio limit of recovery and recycling and equipment can be increased by adding another compressor to the recovery device in series with the first, by building a multi-stage compressor, or by switching to a different technology altogether, the vacuum pump. Because the compressor is one of the heavier components of recovery equipment, the first option is not practical for recovery equipment for which portability is a major concern. However, a manufacturer of recovery devices submitted comments indicating that a multi-stage compressor for high-pressure recycling and recovery equipment could be available within the next year, and a manufacturer of vacuum pumps stated that a modified vacuum pump for high-pressure recycling and recovery equipment could be available within the same period. According to the commenters, recovery or recycling equipment built with either technology would be able to pull a 29-inch vacuum on high-pressure refrigerants. The second commenter estimated that recovery equipment incorporating the vacuum pump would weigh little more than current equipment and would cost approximately as much as current recovery equipment plus a vacuum pump for dehydrating the air-conditioning and refrigeration system. EPA plans to monitor development of this recovery equipment and will evaluate the possibility of setting stricter recovery efficiency standards for high-pressure recovery equipment in the future.

In the meantime, the Agency has decided to adopt the same evacuation standards for recycling and recovery equipment as it has for service and disposal practices. These standards appear in table 2 below:

TABLE 2.—LEVELS OF EVACUATION WHICH MUST BE ACHIEVED BY RECOVERY OR RECYCLING MACHINES INTENDED FOR USE WITH AIR-CONDITIONING OR REFRIGERATION EQUIPMENT

[Except for small appliances, MVACs, and MVAC-like equipment—manufactured on or after November 15, 1993]

Type of air-conditioning or refrigeration equipment with which recovery or recycling machine is intended to be used	Inches of Hg vacuum
HCFC–22 equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	0.
HCFC–22 equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	10.
Very high-pressure equipment	0.
Other high-pressure equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant.	10.
Other high-pressure equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant.	15.
Low-pressure equipment	25 mm Hg absolute.

Some commenters stated that EPA should establish more stringent evacuation standards for equipment in the laboratory (certification requirements) than for equipment in the field (service practice requirements). EPA recognizes that equipment in the field may not always perform as well as equipment in the laboratory, due to poor maintenance, wear, or extremes of temperature. However, this does not imply that laboratory standards must be more stringent than field standards, because much recovery and recycling equipment will be well-maintained and will not have to function at extreme high or low temperatures. Moreover, regardless of its laboratory performance, excessively worn or poorly maintained equipment will not perform well in the field. Rather than raise laboratory standards or lower field standards, therefore, EPA has decided to allow technicians and contractors to decide whether the particular application of their recovery equipment requires better than the minimum laboratory performance. Technicians and contractors are responsible for ensuring that required vacuums are achieved in the field. Thus, for instance, persons repairing equipment utilizing R–502 in high ambient temperatures would be wise to purchase recovery equipment that can draw a 15-inch vacuum on this refrigerant in the laboratory. In addition, any user of recycling and recovery equipment would be well-advised to maintain it properly and to replace it when it has worn out.

b. Passive or system-dependent recovery equipment. In the proposed rule, EPA requested comment on whether it should permit the use of system-dependent recovery devices, which lack an on-board compressor, to recover refrigerant from high-pressure equipment besides small appliances.

System-dependent recovery devices use the compressor of the air-conditioning or refrigeration system being evacuated to perform the evacuation. The proposal would have allowed the use of the system compressor to evacuate refrigerant from one component of the system to another (e.g., the receiver or pump-out unit), so long as evacuation requirements were met, but would not have allowed use of the system compressor to move the charge out of the system. The Agency also requested comment on what type of testing would be appropriate to ensure that system-dependent recovery devices minimized refrigerant emissions. ARI 740–91, the industry protocol for testing recycling and recovery equipment that was current when the proposed rule was published, did not address system-dependent recovery devices.

EPA has received comments both favoring and opposing the use of system-dependent recovery devices. Those favoring system-dependent recovery devices argued that they would not compromise overall recovery efficiency because: (1) System compressors are frequently in better condition than the compressors used in recycling and recovery equipment, which are frequently pressed beyond their design limits, and (2) when system compressors are not operating (in approximately one out of ten cases), technicians must travel back to the shop to pick up a new system compressor anyway, and can pick up a compressor-bearing recovery device at the same time to recover the refrigerant. In addition, these commenters stated that system-dependent equipment costs less than comparable compressor-bearing equipment and can recover refrigerant more quickly, because system compressors are generally larger and more powerful than those used in recovery equipment. Finally, commenters noted that the revision to ARI 740–1991, ARI 740–1993, had incorporated a test for passive equipment that demonstrated that this equipment was as effective as self-contained equipment, when used with an appliance with a fully functioning compressor.

Commenters who opposed system-dependent recovery devices argued that they were likely to result in greater emissions than compressor-bearing equipment, because they rely on a system compressor that may not always be operational and because they tend to leave refrigerant on the "high side" of the system. These commenters also expressed concern that some system compressors, such as scroll designs, could be damaged by operating in a vacuum, particularly if oil migrated out of the compressor (which it tends to do as system pressure is lowered).

EPA has considered these comments and has analyzed the likely effectiveness of system-dependent recovery devices. The Agency has specifically investigated the possibilities that system-dependent equipment may leave refrigerant on the "high side" of the system and that the performance of the equipment may be hampered by worn or defective system compressors. After reviewing the test procedure for system-dependent equipment in ARI 740–1993, EPA believes that this procedure ensures that system-dependent equipment certified under 740–1993 will not leave refrigerant on the "high side" of the system. At the same time, EPA understands that technicians typically return to their shops for a new compressor when the system compressor is not operable, at which time they can pick up a self-contained recovery device to recover the refrigerant before beginning the compressor changeout. When system compressors are operable but are not capable of achieving the required vacuums with a single recovery receptacle (a situation that EPA believes will be relatively rare), the required vacuums can be achieved by using a second, evacuated cylinder. Thus, EPA is permitting use of system-dependent equipment that has been certified under ARI 740–1993 with appliances containing up to 15 pounds of refrigerant (a quantity suggested in comments from manufacturers of system-dependent equipment). However, because system-dependent equipment will not be able to achieve the required vacuums if the system compressor is not operating, EPA is requiring technicians who repair or dispose of appliances besides small appliances to have at least one self-contained recovery device available at the shop to recover the refrigerant from systems with non operating compressors.

c. Refrigerant recovery rates. EPA did not propose to require minimum refrigerant recovery rates for recycling and recovery equipment, believing that contractors and technicians had sufficient incentives to purchase equipment with rates adequate to their needs. However, EPA did request comment on the option of establishing minimum rates, because some members of the STOPAC Subcommittee for Recycling expressed concern that some contractors might purchase slower equipment (which is often less expensive than faster equipment) and might subsequently interrupt the recovery process before it was complete.

Most commenters agreed with EPA that minimum recovery rates need not be included in the Agency's equipment certification program because contractors and technicians wish to maximize the quantity of refrigerant recovered while minimizing labor costs. (In general, labor costs make up a much larger share of the costs of refrigerant recovery than equipment costs.) EPA performed an analysis that compares the recovery rate that maximizes private benefits (and that would therefore presumably be selected by a technician buying recovery or recycling equipment) to the recovery rate that maximizes public benefits (and that should be selected from society's perspective) for a number of different sizes of air-conditioning and refrigeration equipment. In general, there was little difference between the two. Thus, EPA is not requiring minimum recovery rates for recycling or recovery equipment in today's rule. However, because technicians need objective information on recovery rates to purchase equipment adequate to their needs, EPA is including measurement of vapor and liquid recovery rates under the ARI 740–1993 procedure as a requirement for EPA certification of equipment. As discussed below, EPA is also working with ARI to add a measurement of the average vapor recovery rate to the current measurement of the maximum vapor recovery rate.

d. Low-loss fittings. Low-loss fittings prevent refrigerant from escaping from hoses and equipment during connection and disconnection of recovery and recycling machines. EPA proposed to require that hoses on recovery and recycling equipment be equipped with low-loss fittings, noting that they appeared to be cost-effective on both high and low-pressure equipment. Most commenters supported a requirement for low-loss fittings. However, as discussed above in the Definitions section, the Agency received a number of comments stating that automatic shutoff devices had a number of drawbacks, and that the definition of low-loss fitting should be expanded to include manual shut-off valves. Thus, in the final rule, EPA is requiring that recycling and recovery equipment be fitted with either automatic or manual shutoff valves.

A few commenters opposed the requirement for low-loss fittings. One commenter argued that low-loss fittings should not be required on equipment with the capability to empty the hoses of refrigerant before their disconnection. A few commenters stated that if

refrigerant is sealed into hoses by low-loss fittings on a hot day, the hose can explode.

EPA understands that most recycling and recovery equipment has the ability to empty hoses of liquid refrigerant before their disconnection, minimizing potential emissions. However, low-loss fittings are intended to prevent not only the release of refrigerant, but the influx of air that would later have to be purged. Thus, EPA is requiring them on equipment that can "deinventory" hoses. EPA believes that if hoses are properly emptied of liquid refrigerant before their disconnection, any risk of subsequent explosion is eliminated.

e. Purge loss. Most recycling machines (but not recovery machines) are equipped with air purge devices, which vent air and other noncondensable contaminants from refrigerant. Because some refrigerant tends to vaporize and mix with the air, some refrigerant also escapes during the purging process. EPA proposed to limit the quantity of refrigerant that could be allowed to escape during purging to 5% of the quantity being recycled (under the conditions of the ARI 740 test for recovery and recycling machines). EPA's analysis indicated that this was probably the most demanding standard that most existing recycling machines could meet (RIA). However, some industry representatives stated that competitively-priced machines were capable of meeting a higher standard, perhaps 3%. Because even 2% of a large charge can be a significant amount (2% of a thousand-pound charge is 20 pounds), EPA requested comment on setting a limit of 3% (or still lower) or on lowering the limit from 5% to lower levels over time.

Most commenters supported an initial purge loss limit of 5%. A number of commenters also supported establishing lower purge loss limits as technology developed, but differed in their willingness to establish a fixed schedule for lowering the limits. Some supported lowering the purge loss limit by one percent per year.

In view of the expectation of many commenters that a purge loss limit of 3% would be feasible within the next few years, EPA has decided to establish a 5% limit initially that will be lowered to 3% in two years. The Agency believes that this will encourage technological innovation without placing an undue burden on manufacturers of recycling and recovery equipment.

f. Volume-sensitive shutoff. In the proposal, EPA requested comment on including a requirement that storage cylinders on recycling and recovery equipment be equipped with a switch that would automatically stop the recovery operation when 80% of the available volume in the storage section contains liquid refrigerant at 70 degrees F. This would be a safety feature that would prevent overfilling of storage vessels; filling beyond the recommended maximum level of 80% can lead to explosion of the cylinder when its temperature rises to levels common in storage areas during the summer.

EPA received comments both favoring and opposing a requirement for a volume-sensitive shutoff switch. A number of commenters stated that they did not consider volume-sensitive switches necessary because technicians can weigh cylinders to ensure that they are not overfilled, and in fact, some recovery and recycling machines include built-in scales. Other commenters were concerned that volume-sensitive switches would often be ineffective. These commenters noted that the various volume-sensitive devices currently included in cylinders are not compatible with all types and brands of recycling and recovery equipment. If the cylinder and recovery device are not compatible, the volume-sensitive switch will not function. Volume-sensitive switches can also be bypassed either deliberately by the technician or unintentionally through the use of certain recovery methods, according to commenters. For instance, one commenter noted that the "push-pull" recovery method could result in the overfilling of a cylinder while the recovery equipment itself was already turned off. Some of the commenters opposing a requirement for volume-sensitive switches believed that concerns about overfilling cylinders were better addressed through technician training.

In consideration of the technical problems involved in establishing a requirement for a volume-sensitive shutoff switch, the Agency has decided not to include this requirement in the rule. Instead, EPA will include knowledge of proper cylinder filling in its requirements for technician certification.

2. Standards for Recovery Machines Intended for Use With Small Appliances

In the proposal, the Agency required somewhat less stringent recovery efficiency standards for household refrigerators, household freezers, and other small appliances, as defined in section III.E. The Agency proposed that technicians servicing small appliances could use either active or passive equipment. The efficiency level required was 90 percent, except for the use of passive equipment on an appliance with a non-operating compressor where an 80 percent efficiency level was allowed. The Agency requested comment on the proposed levels and on the specific technologies analyzed.

As discussed in section III.E., in today's final rule, the Agency will use the terms "self-contained recovery equipment" and "system-dependent equipment" when referring to the active and passive equipment, respectively. Several commenters supported the Agency's proposal that both types of equipment be allowed for use in the small appliance servicing sector. The Association of Home Appliance Manufacturers (AHAM) stated that the efficiency of both types of equipment is tied closely to the functioning of the compressor. It also stated that the efficiency levels are very close for the two types of equipment when the manufacturer operating procedures for the equipment are properly followed (i.e. heating and tapping a system when using the Whirlpool bag). As a result, the technicians should be allowed the flexibility to choose the method most appropriate for them. Many commenters stated that the simple-to-use passive systems made compliance with the rules more likely.

Several commenters opposed the use of system-dependent recovery equipment. Many stated that the highest-efficiency equipment should be required for all air-conditioning and refrigeration units and that use of the passive equipment was impractical because of the longer time needed to wait for the refrigerant to move from the appliance into the device. The Agency had discussed in the proposal an option of allowing technicians who performed less than 20 jobs per year to use the system-dependent system. Commenters against the use of the equipment were also against a special exception for small servicers because of the difficulty in enforcing this provision.

The Agency believes that the small quantity of refrigerant involved in this sector and the goal of allowing flexibility of compliance methods for technicians justifies allowing the use of either system-dependent or self-contained recovery equipment for the servicing of small appliances. The Agency has modified the proposed requirements, however, to specify that it is the operability of the compressor in the equipment containing the refrigerant that determines the efficiency level for evacuation. Comments submitted by AHAM illustrated that both self-contained and system-dependent systems can achieve a 90 percent

efficiency of evacuation if manufacturer procedures are followed. Both types of equipment, however, may have more difficulty reaching this standard when the compressor is not functioning and, as a result, an 80 percent efficiency standard will be required in those cases. EPA would like to clarify that equipment must be tested to meet these requirements and that the test situation must reflect conditions that can be realistically implemented in the field. As a result, equipment that has passed the equipment certification requirements will meet the efficiency standards required in this rule when used properly in the field. For more information on the test methodology used to evaluate equipment, see section III.G.5.

The Agency specifically requested comment of the carbon adsorption technology used for recovering CFCs. The feasibility of recovering CFCs from the carbon was the Agency's primary concern. Information submitted by two commenters, Appliance Recycling Centers of America (ARCA) and Dow, indicates that the refrigerant can be removed from the carbon with high efficiency. The technology may be practical for use when servicing small appliances, although it must meet the same efficiency standard as all other equipment used on small appliances—90 percent efficiency with working compressors and 80 percent efficiency with non-operational compressors.

3. Standards for Recycling and Recovery Machines Used with Equipment Identical to MVACs

Today's final rule covers all air-conditioning and refrigeration equipment (except equipment designed and used exclusively for a military application) not covered by the requirements of the section 609 final rule (57 FR 31241, July 14, 1992; 40 CFR part 82, subpart B) for servicing motor vehicle air-conditioning equipment. This includes equipment that is identical in operation to motor vehicle air-conditioning equipment except that it is found in vehicles outside the section 609 definition of "on-road motor vehicles". Examples include agricultural and construction vehicles that do not operate "on-road" but contain CFC–12 open compressor mechanical vapor compression refrigeration equipment used to cool the driver's or passengers compartment. For the purposes of today's rule, this equipment is identified as "MVAC-like appliances." In the proposal, the Agency discussed the option of using the equipment requirements established under the section 609 regulation for these MVAC-like appliances because the equipment is identical in operation to the equipment covered by the section 609 regulation except that it is contained in non-road vehicles. The Agency believes that the section 609 regulations satisfy the statutory standards of section 608 regarding the maximization of recycling and reduction of emissions. As stated in the proposal, adopting the section 609 standards would allow equipment manufacturers to avoid double certification of equipment because recycling units certified for use under section 609 would not need to be certified under ARI Standard 740 (as long as they are used with MVAC-like equipment).

Three commenters agreed that the MVAC-like appliances should be covered by the requirements of the section 609 regulation because those requirements are specifically designed for this type of equipment. The section 609 requirements contain specific procedures for the proper use of recycling equipment that reflect the needs of MVAC-like appliances more precisely than the required practices for small high-pressure equipment. The equipment certification procedure for section 609 equipment requires that machines meet the recycling standard of purity developed by the manufacturers of the air-conditioning systems, a standard for which ARI Standard 740 does not specifically test. One commenter stated that the MVAC-like appliances should not be covered by the section 608 requirements, but instead should be covered under section 609 because the air-conditioning systems are not appliances. The Agency disagrees with the commenter's reasoning because, as stated in the proposal, MVAC systems are clearly covered by the definition of appliance. The MVAC systems in on-road motor vehicles are not covered by this rule's servicing provision because of their inclusion in the 40 CFR part 82, subpart B regulations.

As a result, the Agency has decided to require that MVAC-like appliances follow the equipment requirements of the section 609 regulations, found in 57 FR 31241, July 14, 1992 (40 CFR part 82, subpart B) and incorporated in today's rule.

4. Testing of Recovery and Recycling Equipment Intended for Use With Air-Conditioning and Refrigeration Equipment Except Small Appliances

a. *Third-party certification.* As was proposed, EPA is requiring testing of recovery and recycling equipment for the above performance characteristics by a third party approved by EPA. In the proposal, EPA described two major equipment testing programs underway: The ARI certification program under ARI Standard 740 (Appendix B to these regulations) and the Underwriters Laboratories (UL) program under ARI Standard 740 and UL 1963 (not to be confused with UL's program for testing recycling and recovery equipment intended for use with MVACs under UL 1963). EPA proposed that approved recovery and recycling equipment testing organizations use a modified version of these programs. The ARI and UL programs use a laboratory test protocol to measure the performance of equipment in a number of different areas, including vapor recovery efficiency, purge loss, liquid recovery rate, vapor recovery rate, and ability to clean refrigerant (in recycling machines). Except in the area of purge loss, where refrigerant emissions are limited to 5% of the total charge, no maximum or minimum performance requirements need to be met for equipment to be certified under ARI's current program. Under the modified program proposed by EPA, equipment would have been certified only if it could achieve the vacuums specified, limited purge losses to 5%, and was equipped with low-loss fittings.

ARI and UL test one unit of each make and model to verify performance initially. Both programs also take measures to verify that equipment manufactured over the long-term continues to perform as rated. Each year, ARI tests one unit each of one third of the models certified under its program. This means that over a three-year period, ARI tests a sample of each make and model that it certifies. UL conducts periodic inspections of equipment at manufacturing facilities to ensure that models have not undergone design changes that may affect their performance.

Following these industry precedents, EPA proposed to require manufacturers to have equipment testing organizations test one unit of each make and model initially and then conduct periodic retests or inspections (at least once every three years) to ensure the continued performance of each model line. (Equipment certified under the ARI or UL programs prior to promulgation of the final rule would not have to be retested in order to be initially certified under the rule if the first set of tests demonstrated that the equipment met EPA requirements.)

EPA received a number of comments regarding the need for third party certification and the scope and methodology of the certification

program proposed. Several comments supported requiring third-party certification of recycling and recovery equipment as the only reliable way to guarantee quality and consistency of performance in the equipment. Commenters argued that third-party certification was necessary because it would limit the number of ineffective or unsafe recycling and recovery machines in use, prevent misleading advertising and thereby protect purchasers of recycling and recovery equipment, and minimize emissions. Commenters who opposed third-party certification argued that it was too expensive, that it precluded the use of home-built and custom-built equipment that can perform as well as manufactured equipment, and that it was not necessary because faulty recycling and recovery equipment would not be a source of emissions.

EPA has decided to require third-party certification of recycling and recovery equipment because it continues to believe that third-party certification is the most reliable method of obtaining an accurate and objective evaluation of equipment performance. While equipment certification alone does not guarantee that emissions are minimized, it does prevent leaky or ineffective equipment from entering the market. EPA believes that emissions from such equipment could be significant. Although EPA recognizes that some home-built recovery equipment may perform quite well, other home-built equipment may not. Several commenters favoring third-party certification noted that home-built equipment can be leaky and can lack critical components. Thus, although home-built equipment is eligible for grandfathering until November 15, 1993, after that date, its manufacture will not be allowed unless it is certified in the same way as equipment manufactured for sale.

b. The ARI 740 test protocol. The Agency received comments both supporting and criticizing the ARI 740 test procedure for recycling and recovery equipment. Criticism was focussed on four major areas. First, commenters charged that the ARI 740 method measures the vapor recovery efficiency of (or vacuum achievable by) equipment incorrectly, yielding results that are higher than could be theoretically achieved by the compressors used in most recycling and recovery equipment. Second, commenters stated that the ARI 740 method for measuring vapor recovery rates yields a maximum, rather than an average, recovery rate. Third, commenters noted that although the performance of recycling and recovery equipment varies significantly depending upon ambient temperature, the ARI 740 test procedure gages performance only at one temperature, 75 degrees, which will yield optimum performance measurements. Fourth, commenters stated that the ARI 740 test procedure should include a test for equipment durability.

The Agency has investigated each of these criticisms and believes that in some cases, alterations or additions to the 740 test procedure may be warranted in the future, although it was not possible to consider them fully or implement them before this rule was promulgated. (Some of the possible alterations were not proposed and therefore cannot be incorporated into these regulations until EPA undertakes another rulemaking.) Responding to the criticisms one at a time, EPA believes that the method for measuring vapor recovery efficiency in the ARI 740 test protocol is sound, based on engineering judgement. In addition, most of the published results of this test fall within expected ranges. In some cases, the published vapor recovery efficiency does exceed that which would be expected given the compression ratio limits of typical refrigeration compressors; however, in the cases that EPA has investigated to date, EPA has found that an innovative technology (such as a built-in subcooling feature) is responsible for the unusually good performance. EPA will continue to work with ARI (and other testing organizations using the ARI 740 standard) to ensure that vapor recovery efficiency measurements are methodologically sound and are in accord with the known limits of recovery technologies. If the Agency discovers a flaw in the ARI 740 method for measuring vapor recovery efficiency, the Agency will take steps to correct it and revise its regulations if necessary.

Several commenters, including a state environmental protection agency, an environmental group, and two manufacturers of recycling and recovery equipment, believed that the ARI 740 test protocol should be modified to include a test of the equipment's average vapor recovery rate in addition to its maximum vapor recovery rate. In general, as vapor recovery progresses, the density of the vapor in the appliance, and therefore the vapor recovery rate, declines. Toward the end of the recovery process, this rate may be only a small fraction (usually less than five percent) of the original rate. Currently, the ARI 740 test procedure measures the vapor recovery rate of equipment only at the beginning of the recovery process, when liquid refrigerant is still present in the test apparatus. At that time, the vapor density in the test apparatus is at its maximum (the saturation density) and so is the vapor recovery rate. Although the maximum vapor recovery rate of a piece of recycling or recovery equipment is related to its average recovery rate in the field, other factors, such as compressor clearance (which is related to the depth of vacuum that recovery equipment can achieve), are also important in determining the average recovery rate. Thus, two pieces of equipment with identical maximum recovery rates can have very different recovery rates at the end of the recovery process.

While EPA is not regulating equipment recovery rates for the reasons discussed in section G.1.c, the Agency believes that the best possible information on these rates should be available to technicians to ensure that they purchase recycling and recovery equipment adequate to their needs. EPA is concerned that technicians who must rely solely on the maximum recovery rate as a measure of average recovery rate in the field may inadvertently purchase equipment that performs relatively poorly as recovery progresses. This will prove costly not only to the technician but also to the environment if the technician decides to cut recovery short. According to one of the commenters, who has been involved in ARI's testing program, modifying the current test to measure the average, rather than the maximum, vapor recovery rate would simply require timing the recovery procedure that is already included in the 740 protocol. EPA has discussed this possibility with ARI, and ARI has expressed interest in making the modification in the near future. Equipment entering the certification program after the modification was made would have its average recovery rate measured, and equipment that had been through the certification program already would have its average recovery rate measured when it came up for recertification on the three-year schedule.

One commenter argued that the ARI 740 method for measuring the maximum vapor recovery rate was itself flawed because the measurement takes place quickly in "transient" conditions. However, the ARI 740–93 procedure specifies that the measurement take place "after the equipment reaches stabilized conditions of condensing temperature and/or storage tank pressure" and the ARI 740–91 procedure, the predecessor to 740–93, required measurement "after the

equipment reaches stabilized conditions." ARI representatives stated that, in practice, the recovery rate is measured after the system has been running for several minutes, and that three separate measurements are taken for two-minute periods. EPA believes that this methodology should yield an accurate measurement of the maximum recovery rate.

The other methodological concern raised by commenters was that the ARI 740 test takes place at only one temperature, 75 degrees, but the performance of equipment varies significantly at lower and higher temperatures. At low temperatures, the saturation pressure of refrigerant can be very low, slowing recovery considerably if equipment is capable only of vapor recovery. (Even the push-pull method, which relies upon the vapor pressure in the recovery tank, is less effective at low temperatures.) At high temperatures, on the other hand, the saturation pressure of the refrigerant in the recovery tank is relatively high, raising the compression ratio against which the compressor in the recovery device must work to evacuate the appliance. Consequently, it is often impossible to achieve vacuums in high temperatures that can be achieved at 75 degrees.

EPA has discussed the possible need for equipment testing at multiple temperatures with ARI, with equipment manufacturers, and with technicians in the field. The Agency is concerned that some equipment has evidently occasionally failed to function altogether in the past at high temperatures, although manufacturers have apparently corrected many early problems. The current version of the ARI 740 standard requires equipment to function at temperatures up to 104 degrees F. However, ARI states that performing full performance testing at high and/or low temperatures would double or triple the cost of the certification test. Moreover, according to ARI, equipment manufacturers often provide "application ratings" that contain information about expected equipment performance under conditions other than those of the 740 test. EPA will work with both ARI and contractor organizations to further examine the possible need for equipment testing at more than one temperature. Given that the 740 test currently costs approximately $3,300 for each make and model,[2] a price similar to that of individual pieces of recycling and recovery equipment, doubling or tripling this cost may be justified if significant new information would be made available to purchasers of the equipment.

Finally, a number of commenters believed that the ARI 740 test procedure should include a test of equipment durability. Durability is a concern because recycling and recovery equipment is constructed using components very similar to those in refrigeration and air-conditioning equipment, but recycling and recovery equipment is regularly subject to much more stressful conditions than most air-conditioning and refrigeration equipment. For instance, compressors in recycling and recovery equipment must repeatedly pull vacuums. This has two implications. First, the compressor in a piece of recycling and recovery equipment will operate at a higher compression ratio than most other compressors, raising the temperature of the discharge gas. Second, as the vacuum is drawn, the motor of a hermetic compressor will be starved of its cooling fluid, the refrigerant. Together, these considerations imply that recycling and recovery equipment will often operate at higher than ideal temperatures. In addition, recycling and recovery equipment will frequently be exposed to contaminated refrigerant, increasing opportunities for corrosion.

One of the commenters submitted a suggested durability test that he recommended be included in EPA's required testing regimen. This durability test has been placed in the docket for this rulemaking. The durability test involves continuous operation of the equipment for several hours. ARI representatives, however, have stated that a test lasting only for such a period would probably not constitute an adequate test of equipment durability. According to ARI, equipment manufacturers themselves usually perform durability tests lasting for much longer periods (months or years). ARI believes that it was not the role of a third-party performance certification program to test equipment for durability, and that such testing would greatly increase the cost of testing.

As it is investigating the need for performance testing at high and low temperatures, EPA will also investigate the need and proper procedure for durability testing. If EPA concludes that such testing is necessary, it may pursue voluntary programs with industry or further rulemaking as appropriate. Given the potential value of durability testing, such testing may be worthwhile even if it is relatively expensive. The Agency may also work with contractor groups to gather and disseminate information about equipment performance in the field.

EPA emphasizes that although it may be possible (and even necessary) to enhance the ARI 740–93 testing procedure, the procedure currently yields valuable, objective information regarding important performance characteristics of recycling and recovery equipment. The Agency believes that thoughtful consideration of this information by well-trained technicians is likely to ensure that the recycling and recovery equipment purchased is adequate to their needs. EPA urges purchasers of recycling and recovery equipment to use good judgment in selecting and using this equipment. Purchasers should be aware that equipment using hermetic compressors may fail when used in high temperatures or with large charge sizes. They should also be aware of two rules of thumb regarding recovery rates: (1) The average recovery rate that they achieve in the field will probably range between ⅓ and ½ the maximum rate currently being published by ARI and UL, and (2) the maximum depth of vacuum achievable by a piece of equipment is likely to be a good indicator of its recovery rate in the field. (That is, if two pieces of equipment have the same maximum recovery rate, but one piece can draw a deeper vacuum than the other, the piece that can draw the deeper vacuum probably recovers more quickly in the field than the other piece.) Finally, recovery techniques in the field can either greatly expedite or greatly slow the recovery process. Users of recycling and recovery equipment should obtain training to learn as much as possible about techniques to make refrigerant recovery and recycling as effective, safe, fast, and simple as possible.

Since the proposed rule was developed, ARI has expanded and altered the 740 test protocol to include a test for system-dependent equipment, to recognize the push/pull method of recovery, and to specify the final recovery vacuum instead of the vapor recovery efficiency of recycling and recovery equipment. ARI described these changes at the public hearing for the proposed rule and requested that EPA adopt the latest version of the 740 test protocol (ARI 740P–93) in the final rule. For the reasons described below, EPA is doing so. First, EPA believes that the changes will enhance the usefulness of the 740 test procedure. A test to measure the recovery vacuum of system-dependent equipment is needed, and EPA believes that the test procedure developed by ARI will yield an accurate measure of the performance of that

[2] Price based on testing of recycling equipment with four refrigerants.

equipment when used on appliances with fully functioning compressors. In addition, by publishing the final recovery vacuum rather than vapor recovery efficiency of equipment, the new procedure will make it easier for equipment purchasers to compare equipment performance to EPA's requirements. Second, the changes to ARI 740 have been adopted through a process that involves participation not only of ARI's wide industry membership, but of the general public, indicating that they are widely supported. All the comments that EPA received concerning the new test methodology favored the changes. Third, the methods for measuring the performance of self-contained equipment in the areas being regulated by EPA, the ability of equipment to capture refrigerant and the quantity of refrigerant released during purging, have not been changed, nor have the minimum requirements for ARI certification. (By publishing the final recovery vacuum rather than the vapor recovery efficiency, ARI is simply substituting a raw pressure measurement for a percentage that was calculated from this measurement and the saturation pressure of each refrigerant.)

A few commenters stated that EPA should build enough flexibility into its regulations to permit changes to be made to the ARI 740 procedure without requiring EPA to undertake further rulemaking. Commenters were particularly concerned that the Agency might inadvertently prevent or delay the use of recovery technologies whose ability to recover refrigerant could not be tested by the current version of ARI 740. In the proposal EPA requested comment on this issue, noting that two recovery technologies that had come to its attention could not be tested by the then-current version of ARI 740, ARI 740–1991. These recovery technologies were the system-dependent equipment discussed in section G.1.b. and a nitrogen-forcing technology. As noted above, ARI 740–1993 includes a test for the former. Although the designer of the nitrogen-forcing technology believes that only minor modifications to ARI 740–1993 would permit testing of this technology, these modifications were not presented in time to be adopted before this rule was promulgated.

To permit certification of the nitrogen-forcing and other possible technologies without undertaking further rulemaking, EPA has included a provision to the rule that would allow new technologies to be certified if an approved third-party testing organization adopted and performed a test that showed that the new technology achieved the same recovery efficiency as comparable certified equipment. This test would have to be approved by EPA. This provision is very similar to a provision in EPA's motor vehicle emissions testing program that allows motor vehicle manufacturers to request that EPA accept a new test procedure if existing procedures are not applicable to a certain vehicle (40 CFR 86.090–27).

EPA notes that if ARI 740–1993 is altered in a way that relates to the minimum requirements for ARI certification (Section 4 of 740–1993, which EPA is requiring as part of this rule) or the measurement of the final recovery vacuum, purge efficiency, or maximum recovery rate of existing recovery technologies, those changes will not alter the requirements of this rule (and, therefore, EPA will not recognize certification under the new version) unless EPA undertakes a notice and comment rulemaking to adopt the changes. However, approved equipment testing organizations may add or change their own certification requirements and still have their certification recognized by EPA so long as they also continue to test in accordance with EPA's rule's requirements.

c. Revocation of certification. If previously certified equipment fails a follow-up test or inspection, the approved equipment testing organization is required to inform EPA of this fact, and the certification for that equipment will be revoked or suspended after allowing the manufacturer an opportunity to respond. In general, EPA has the authority to revoke or suspend any certification granted under the provisions of section 608. If the Agency determines that a person or entity has violated the regulations, or if the Agency has knowledge that a person or entity is incapable of fulfilling the requirements of the regulation, the Agency would revoke or suspend any certification previously granted. In the case of minor violations, the Agency may act to suspend certification for a given period of time. However, in the case of serious or repeat violations, the Agency may determine that revocation of certification is warranted. In the event of a revocation of equipment certification, the affected model of recycling or recovery equipment could no longer be manufactured. Similarly, in the event of revocation of technician, equipment-owner, or reclaimer certification, the affected technician, owner of recycling or recovery equipment, or reclaimer could no longer do business.

d. Approval of equipment testing organizations. In addition to ARI and UL, other testing organizations have indicated an interest in setting up their own programs to certify performance to EPA's specifications. EPA will approve any equipment certification program that can demonstrate that it: (1) Possesses thorough knowledge of the standards as they appear in § 82.158 and ARI 740–1993 (appendix B), (2) possesses the equipment described in ARI 740–1993 to test performance in the areas of concern, (3) possesses expertise in equipment testing, (4) has developed a program to verify the performance of certified recycling or recovery equipment manufactured over the long-term, including either retests of equipment or inspections of equipment at manufacturing facilities, and (5) is not financially or otherwise interested in the outcome of the testing. Organizations seeking approval to be equipment certifiers should contact EPA.

In addition to the requirements above, equipment testing organizations are required to submit lists of approved equipment to EPA annually. They are also required to inform EPA within 30 days of the certification of a new model of equipment or of the failure of a previously certified model of equipment.

5. Testing of Recovery Machines Intended for Use With Small Appliances

In the proposal, the Agency required that recycling and recovery equipment intended for use with small appliances be tested according to the testing procedures published as appendix C. This was proposed because, at that time, the ARI 740 test method used for other recovery and recycling equipment could not accommodate the technologies specifically designed for recovering CFCs from small appliances. These technologies include both self-contained recovery equipment (active) and system-dependent (passive) machines. The test procedure in appendix C was developed by General Electric and could be used for both self-contained and system-dependent devices used on equipment with operating or nonoperating compressors.

Three commenters specifically agreed that the proposed appendix C was appropriate for testing recovery and recycling equipment for small appliances. Three commenters stated that the appendix was inappropriate and cited as their justification that system-dependent machines should not be used at all with small appliances, an issue discussed in section III.G.2. AHAM submitted comments that

included changes to the proposed appendix C. They stated that after submitting the procedure to the Agency, General Electric worked with the member companies of AHAM to refine and improve the test procedure. The revisions address several concerns. First, the procedure was revised to more precisely measure the refrigerant trapped in shipping containers. Second, calculation of recovery efficiency for each recovery event was included. Third, the test to track compressor oil that might be removed from the test stand was deleted while steps were revised to account for any oil added to the stand or the recovery system to properly maintain the equipment. Finally, the number of recoveries performed as part of the test was reduced to provide for more cost-effective testing. All other changes were characterized as editorial. The Agency believes these changes are improvements to the procedure and has incorporated them into today's final rule.

In response to the concern that the ARI 740 testing procedure could not accommodate the types of technology used to service small appliances, ARI submitted changes to the 740 test procedure contained in appendix B. These changes are discussed in section G.4 above. The Agency agrees that these changes make it possible to test the technologies and has incorporated the language into appendix B. The rule language has been changed to allow recovery or recycling equipment intended for use on small appliances to be tested to either appendix B or appendix C.

As part of their comments, UL submitted an alternative test procedure to the procedure proposed in appendix C discussed above. Although their "Subject 2090, Outline of Investigation for Passive Refrigerant Recovery Systems" offers adequate testing of the safety of a passive device, it does not contain the same level of specificity in test procedure as the proposed GE changes with the AHAM changes discussed above. The Agency believes appendices B and C are adequate procedures for both the system-dependent and self-contained devices for small equipment and therefore, UL's method will not be added at this time.

6. Effective Dates and Grandfathering Provisions

EPA proposed to give manufacturers of recycling and recovery equipment six months after publication of the final rule to certify all of their equipment to the new standards. Based on EPA's analysis of the manufacturer's capabilities to produce such equipment, EPA believed that this lead time was sufficient.

Commenters expressed a range of opinions regarding the appropriate effective date for third-party certification of equipment. Several agreed with the proposed date, six months after publication of the final rule. Some, however, believed that six months was not sufficient time to permit equipment testing organizations to become approved and complete their testing. Two commenters stated that because the promulgation date of this rule is known and equipment testing has already begun, EPA should allow only three months for manufacturers to have their equipment certified.

As was proposed, EPA is requiring that recycling and recovery equipment manufactured more than 6 months after publication of this rule be certified by an approved testing organization. The Agency believes that 6 months is adequate time for manufacturers to complete having their equipment tested by an approved testing organization. As one commenter noted, both manufacturers and testing organizations have had a great deal of notice regarding the probable requirements and effective dates of this rule, and testing of equipment has been in progress at more than one laboratory for over a year. As EPA stated in the proposal, equipment that was tested by a testing organization prior to promulgation of this rule (and, therefore, prior to official approval of the testing organization) will be considered certified if the testing showed that the equipment met EPA requirements and if the testing organization is approved. However, testing of equipment for use with some types of appliances (e.g., large low-pressure systems) has only recently begun, and the Agency does not therefore believe that it can require third-party certification of all recycling and recovery equipment manufactured in less than six months.

EPA proposed to "grandfather" recycling and recovery equipment manufactured until 6 months after publication of the final rule, if it met certain minimum requirements. Equipment intended for use with high-pressure refrigerants (except for refrigerants in small appliances) would have to have been able to evacuate systems to four inches of vacuum; equipment intended for use with low-pressure refrigerants would have to have been able to evacuate systems to 25 inches. Equipment intended for use with small appliances would have had to be able to recover 80% of the refrigerant in the small appliance, whether or not the compressor of the appliance was operating. (Equipment intended for use with very high-pressure refrigerants would have to have been able to evacuate systems to 0 inches of vacuum, or atmospheric pressure, as in the proposed requirements effective after 6 months after publication of the final rule.) In addition, EPA requested comment on whether it should require grandfathered recycling and recovery equipment to be retrofitted with low-loss fittings.

The grandfathering proposal was intended (1) to avoid penalizing individuals who had purchased such equipment before it was legally required and (2) to encourage individuals who had not acquired such equipment to purchase it as soon as possible, rather than wait for certified equipment to become available. Although the standards for grandfathered recycling and recovery equipment were not as strict as those for certified recycling and recovery equipment, the Agency concluded that the benefits of beginning recovery sooner outweighed the small loss in recovery efficiency. However, because this advantage would disappear if less efficient equipment were used for too long, EPA requested comment on the option of requiring grandfathered recycling and recovery equipment to be retired in five years.

Commenters universally supported the grandfathering of recycling and recovery equipment, citing the reasons above. Only a small percentage of the commenters expressed an opinion regarding the proposed evacuation standards and retrofit requirements for grandfathered equipment. Of these, two argued for less stringent evacuation standards, and one argued for more stringent evacuation standards, particularly for very large (>1000 lbs.) high-pressure equipment. The two commenters who expressed an opinion regarding low-loss fittings were split, with one favoring them and one opposing them. A few commenters believed that EPA should require some type of testing of grandfathered equipment to ensure its performance to EPA's standards.

Some commenters supported mandatory retirement of grandfathered equipment after five years, noting that most regularly used recycling and recovery equipment would wear out in that time. A few commenters argued for retirement after shorter periods ranging from six months to three years. However, a number of commenters opposed mandatory retirement of grandfathered equipment. Many of these commenters stated that recycling and recovery equipment purchased for in-

house use would not be used as frequently as equipment purchased by service contractors, and would therefore be expected to have a much longer useful life than five years. Some of these commenters argued that use of grandfathered equipment should be permitted indefinitely, so long as the equipment could meet the stricter standards required of fully certified equipment.

EPA has decided to retain its proposed grandfathering requirements and, therefore, is grandfathering recycling and recovery equipment that meets the minimum evacuation requirements that were proposed. These requirements are shown in Table 3 below. (As proposed, grandfathered recovery equipment used with small appliances must achieve a recovery efficiency of 80%.) The Agency is not requiring that this equipment be retrofitted with low-loss fittings or retired after five years.

TABLE 3.—LEVELS OF EVACUATION WHICH MUST BE ACHIEVED BY RECOVERY OR RECYCLING MACHINES INTENDED FOR USE WITH APPLIANCES [1]

[Manufactured before November 15, 1993]

Type of air-conditioning or refrigeration equipment with which recovery or recycling machine is intended to be used	Inches of vacuum
HCFC–22 equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	0
HCFC–22 equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Very High-Pressure Equipment	0
Other high-pressure equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	4
Other high-pressure equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Low-pressure Equipment	25

[1] Except for small appliances, MVACs, and MVAC-like appliances.

EPA is grandfathering recycling and recovery equipment for the reasons cited in the proposal and by numerous commenters. The Agency is retaining its proposed evacuation requirements for this equipment because it continues to believe that most recycling and recovery equipment manufactured over the past two years can meet these requirements. Although third-party testing would help to ensure the performance of grandfathered equipment, EPA does not believe that such testing would be practical, given that a number of models currently in the field may no longer be produced and may in fact be "home-made" equipment. Thus, technicians are responsible for testing their own grandfathered equipment to ensure that it can meet EPA's requirements.

EPA is not requiring retirement of grandfathered equipment for two reasons. First, comments and EPA research both indicate that the expected lifetime of this equipment varies widely depending upon its application and frequency of use. Thus, a five-year retirement provision would tend to punish persons who have purchased recycling equipment only for in-house use and who may otherwise expect to be able to use their equipment for another five to ten years. Second and more important, a five-year retirement date would fall in late 1998, nearly three years after the phaseout of production of CFCs. By this time, EPA expects that the expense of CFCs will constitute a powerful private incentive to replace grandfathered equipment that is not as efficient as new equipment. However, EPA intends to monitor use of grandfathered equipment to ensure that it does not result in excessive emissions, and EPA will consider mandating retirement of less efficient equipment if such emissions become a problem despite the rising costs of CFCs.

H. Certification of Technicians

1. Description of Proposed Voluntary Technician Training and Certification

EPA did not propose a mandatory training or certification requirement as its lead option. The proposal agreed that private incentives were sufficient to ensure that technicians were properly trained in refrigerant recycling and recovery. In addition, such a program could create an administrative burden for EPA. However, the Agency did request comments on the mandatory certification option. In the absence of a mandatory program, the Agency stated that it could play an important role through a voluntary program by recognizing those who provide and participate in training programs which meet certain minimum standards. EPA proposed establishing a voluntary certification program whereby private sector certification programs could request EPA review and approval based on a set of defined qualifications. Core elements of such a program were reviewed in the proposal. In addition to requesting comment on the need and feasibility of a voluntary program, the Agency requested comment on whether a mandatory certification program is necessary or desirable. The proposal stated that a mandatory certification program could be very similar in form to the voluntary program.

2. Decision to Establish a Mandatory Program

With this Notice, the Agency today is promulgating a mandatory technician certification program. Although the Agency had not proposed a mandatory program as its lead option, EPA now believes that such previously stated obstacles as administrative burden to both the Agency and to technicians can be overcome, and that the benefits of a mandatory program warrant its adoption. In addition, the Agency received over 18,000 comments in support of a mandatory program. Although 142 commenters opposed such a program, the overwhelming support indicates that technicians themselves believe that such a program is necessary.

a. *Overwhelming Technician Response.* The Agency received comments from over 18,000 technicians voicing their support for a mandatory technician certification program. Although there were dissenting opinions, these technicians as well as the major trade organizations representing these sectors endorse such a program. In addition, the manufacturers of recovery and recycling equipment supported mandatory certification, as did environmental organizations, arguing that it would increase compliance. Commenters had many reasons for their support for a mandatory technicians certification program. These reasons included the following:

- Guaranteeing that technicians who handle refrigerants understand and practice proper safe refrigerant recovery and recycling techniques;
- Promoting awareness of problems related to the venting, recovery, and recycling of refrigerants;
- Ensuring environmentally safe service practices;
- Receiving more liability protection;
- Gaining consumer trust;
- Improving leak detection;
- Ensuring that equipment is properly maintained and used;
- Improving productivity and cost savings through proper maintenance and usage practices;
- Educating technicians on how to contain and conserve refrigerant effectively, curtailing illegal venting into the atmosphere; and
- Creating uniform and enforceable laws.

In response to questions regarding the likely effectiveness of the proposed voluntary program, commenters stated that mandatory certification would foster fairer competition in the regulated community. Specifically, commenters were concerned that untrained technicians could undercut costs of trained technicians by not following procedures necessary for effective recovery of refrigerant. These untrained technicians might not invest in proper recovery or recycling equipment, and might continue to vent refrigerant.

One hundred and forty-two commenters expressed disapproval for mandatory technician certification. Some commenters stated that it would place an undeserved burden upon the stationary refrigeration and air conditioning industry because of the amount of time technicians and employers would have to expend to become certified. In response to these comments, the Agency has reviewed the results of requiring MVAC technicians to receive both mandatory training and mandatory certification under section 609. Typically, training and certification for MVAC technicians require less than two or three hours, with fees ranging between twelve and twenty dollars. The diverse equipment covered by section 608 may require longer training sessions. The Agency has reviewed the cost and length of various training programs providing voluntary certification for technicians. The Agency believes adequate training and certification will require four to eight hours with fees ranging between thirty and seventy-five dollars. EPA does not view these fees or time needs as burdensome requirements.

The Agency realizes that if certification promulgated under today's rule was designed with organizations developing training and certification materials, followed by extensive Agency review of all training materials, certification exams and administrative procedures, the wider variety of equipment covered by today's rule could lead to long training sessions and costly programs. Therefore, today's rulemaking employs a more streamlined, less time-consuming approach. EPA has created three separate certification categories, based on industry divisions, allowing technicians to focus only on the kinds of equipment they service. Additionally, the Agency will provide a validated bank of questions, simplifying test development by certifying programs, and decreasing costs. This streamlined approach will also shorten the Agency's review process.

Some commenters suggested that technicians have sufficient incentives to obtain proper training, thereby eliminating the need for mandatory certification. Private incentives include the value of recovered refrigerants, avoidance of injury, avoidance of equipment damage, negative publicity, and the technician's desire to avoid fines. In a "perfect market" such private incentives would encourage recovery and recycling; however, even within a "perfect market" incentives do not always reflect environmental costs. The escalating cost of refrigerant can be outweighed by labor costs to recover refrigerants, thus minimizing recycling procedures. Furthermore, training encourages proper techniques, without which contaminated refrigerant could be introduced into equipment. If equipment were to fail immediately due to contaminated refrigerant, then the technician could be held accountable. However, such failures can occur long after the technician introduced contaminated refrigerant, thus making it unlikely that the technician who introduced the contaminated refrigerant could be held responsible.

The RIA describes four benefits from requiring mandatory technician certification. First, certification decreases the costs for obtaining information for the technicians. Second, a technician certification program increases the probability that technicians receive adequate training concerning the requirements of today's rule and the proper operation of recycling equipment, leading to reduced emissions through increased compliance. Third, mandatory certification enhances EPA's ability to enforce today's rule, by providing another tool for use against intentional noncompliance: The ability to revoke the technician's certification. Finally, mandatory certification increases fairness by ensuring that all technicians are complying with today's rule.

The Agency believes that without a mandatory certification requirement, participation in voluntary programs will be limited, especially in the short-run. In anticipation of a mandatory certification requirement, several organizations designed and implemented voluntary certification programs. After the Agency proposed a voluntary approach, the Refrigeration Service Engineers Society reported a significant decrease in enrollment for its program. The Agency believes a mandatory program will significantly increase technician participation.

b. Lessened Burden to EPA and Technicians. The Agency believes it has developed a technician certification program that will not be burdensome to either the Agency or technicians. The Agency will authorize qualifying organizations to give an examination that tests knowledge of recovery and recycling procedures, as well as the environmental effects of refrigerant release. The Agency believes this will allow the largest number of technicians to become certified in a reasonable amount of time. The Agency will develop and validate a test bank of questions from which testing organizations will draw their questions. This will simplify test development by organizations and ensure a national uniform standard for the test.

EPA will not approve individual training and test review programs. Although training programs may be beneficial, technicians need only pass the test to become certified. The Agency believes that the market will determine which programs are needed to educate technicians sufficiently.

c. Better Environmental Protection. EPA reviewed the literature concerning effective training programs. The Agency anticipates that many technicians will participate in training programs before taking the certification test. The Agency believes an effective educational program aimed at preparing technicians for the certification test, will increase compliance with today's rulemaking, leading to better environmental protection. In particular, the Agency reviewed the University of Michigan's interim report "Evaluation of the Ford Motor Company/United Automobile Workers Hazard Communications Program," which focused on how effective training can alter the participants' knowledge and attitudes, work practices and working conditions. The study found that this type of training has a number of positive impacts, including the ability to communicate useful information, foster safer work practices and improve health and safety control measures. The study concluded that 42 percent of the workers surveyed changed their work practices as a result of the training program.

The Agency believes that as technicians become more knowledgeable about recovery and recycling techniques, they will become aware of the environmental implications of their actions. EPA believes that information gained through certification will increase the technician's sense of social responsibility towards refrigerant recovery, and will therefore increase compliance with today's rule. Anecdotal evidence gathered from recent journal articles demonstrates that as individuals recognize their environmental

responsibilities, they are more likely to comply with environmental regulations.

EPA's research and information supplied by trade associations indicates that the majority of technicians serving air-conditioning and refrigeration equipment today have little if any experience working with recovery and recycling equipment. Although recycling is common for equipment with large charge sizes, such as chillers and industrial process refrigeration, most technicians in the household refrigeration and household air conditioning sectors have not recycled CFCs or HCFCs in the past or have done so in a manner not aimed at minimizing emissions. In addition, although recycling may occur for commercial refrigeration, fear of incurring costs from the potential spoilage of food during repair of the system has limited recycling. Technicians who service equipment in these three sectors perform the largest number of service jobs per year. Thus, for a significant number of service technicians, it is extremely important to ensure that they understand the recycling requirements of section 608.

Industry representatives also believe that technician certification will significantly increase compliance with EPA's regulations. In one analysis submitted to EPA, representatives from the Trane Company reviewed probable compliance rates across service companies of different sizes. Trane Company estimated that a certification requirement will increase compliance by approximately 20 percent, reducing potential CFC emissions significantly and reducing the costs of the CFC phaseout by reducing the need for expensive retrofits.

d. Improved Productivity. The Agency believes that technician certification and education will improve the productivity of technicians. The Program Director for the CFC recovery and recycling education program for Ferris State University, a leading national vocational technical university, estimates that a recycling program similar to the one described here would dramatically improve worker proficiency. Specifically, the Ferris State University program director estimated that this training will:

- Save 30%–50% of the time needed for each job over initial jobs by familiarizing technicians with appropriate procedures for use and maintenance of equipment in one structured course;
- Improve productivity by one hour per service job over the long term;
- Improve leak detection work, by choosing the appropriate method (halogen, halide, etc.), eliminating waste and saving two to three hours per job;
- Avoid improper piping/soldering techniques (certified technicians would be less likely to create hazardous conditions resulting in a loss of refrigerant and saving the time required to remedy the problem);
- Preserve HVAC/R and recovery/recycling operating capacity by training technicians in the proper procedures for avoiding mixing refrigerants (in a typical system containing three pounds of refrigerant, mixing would result in one hour of lost labor, refrigerant loss, and costs of distillation and/or destruction of a trial mixture @$3.00/lb (current estimated price, leading to costs of at least $70–$80 each time refrigerants were erroneously mixed); and
- Preserve equipment by training in proper oil application (using inappropriate oils would require that technicians flush out the system, requiring 8 to 10 hours of work and costing $460 to $560).

These estimates are based on the observation that technicians working on equipment in the most populous sectors (residential and household refrigeration) today are often not familiar with the procedures and practices required for effective recovery and recycling even within their own sector of the industry.

Proper technician education in recycling and recovery has a number of private benefits for technicians, contractors and equipment owners. It encourages the conservation of refrigerant, a valuable and increasingly scarce material, and it also helps to protect the air conditioning and refrigeration equipment by reducing improper servicing techniques and refrigerant contamination. Contaminated refrigerant can cause equipment failure or greatly reduce the equipment lifetime, incurring costs for needless repairs. Training in the safe handling of refrigerant may reduce on-the-job injuries.

3. Program Elements

a. A Mandatory Program. In consideration of the need for effective refrigerant recycling programs, EPA is today establishing a mandatory certification program. All technicians must pass an exam administered by an approved EPA testing organization. Although training programs are beneficial, participation in a training program is not required by today's rule. All technicians must be certified within 18 months of the publication of this rule. EPA believes that this is an important component of the recycling and recovery program buttressed by receipt of over 18,000 letters expressing support for mandatory technician certification.

Many commenters supported a certification program required by EPA, but administered by the private sector. Commenters stated that this type of program would ensure compliance with the Clean Air Act's goals of minimizing stratospheric ozone depletion in a cost-effective, market-based fashion. The mandatory technician certification program could be managed by industry along the lines of the voluntary program proposed. The Agency agrees and is therefore today establishing a testing program approved by EPA and administered by the private sector. All training programs will be operated by the private sector responding to the needs of the technicians. The Agency believes that this will create price-competitive training programs. EPA is concerned that costs to technicians be minimized and believes that price competition will lower costs in an economically efficient manner. It is the Agency's intention to publish the certification costs for training programs and certifying organizations and to make this information available from the Agency's Stratospheric Ozone Protection Hotline.

b. A National Program. Some commenters proposed approving as certifying programs only those organizations that meet national certification standards and have the proper infrastructure in place to administer testing. EPA believes that national organizations have an advantage in reaching a greater number of technicians in a reasonable amount of time. However, the Agency is concerned about limiting the competitive ability of many smaller creditable organizations that possess the ability to provide testing. Again, it is the intention of the Agency only to approve the testing program, not the training program.

Many commenters who favored mandatory technician certification provided examples of existing state and local regulations. The South Coast Air Quality Management District and the State of Wisconsin's mandatory certification programs were offered as examples. A few commenters believed that these types of localized programs are sufficient. Others theorized that without a federal program, differences between the requirements of various municipalities will lead to a great deal of confusion in the industry. A few commenters stated that creating one standardized certification test with national acceptance would eliminate issues concerning reciprocity between state licensing programs and portability

of certification. EPA applauds the efforts of state and local governments. The Agency believes creating a national program will decrease the need for a myriad of differing regulations. However, this regulation does not preempt state and local authority in any way.

Technician training and certification can be integrated into an extensive industry training infrastructure. The Air-Conditioning & Refrigeration Institute (ARI) estimates that there are approximately 1,200 training programs for air conditioning and refrigeration technicians in the U.S. A large number of these programs have begun to train their students in proper methods for refrigeration conservation, including recovery and recycling, and ARI itself has incorporated a unit on environmental safety principles into its curriculum guide for HVAC/R instructors.

Many national educational and trade organizations such as Refrigeration Service Engineers Society, and Air Conditioning Contractors of America have developed training and testing programs specifically intended to help technicians comply with the July 1, 1992 prohibition on venting. Many of these programs, which have already begun, can easily be modified to meet the needs of a mandatory program.

c. Personnel To Be Certified. Many commenters supported certification for all individuals who perform installation, service, maintenance, or repair functions that might reasonably be expected to release CFCs or HCFCs to the atmosphere. EPA believes that to reduce emissions to the "lowest achievable level" technician certification for individuals performing the functions noted above, is essential.

Some commenters suggested that all persons coming into contact with or handling CFC refrigerants should be certified. Such a requirement would encompass not only those who service equipment but those who charge equipment during manufacture, transfer refrigerant from large to small containers for sale (e.g. wholesaler employees), and transfer refrigerant from small to large containers for shipment to reclaimers. However, five commenters expressed their strong opposition to the mandatory certification of factory, delivery, wholesale, or reclaimer personnel because sufficient incentives already exist to minimize venting in these sectors.

EPA is not requiring certification of these individuals because these transfer processes tend to be simpler than recovery from air conditioning and refrigeration equipment, and for the last two groups in particular, EPA agrees that there is a clear financial incentive to avoid venting. Nonetheless, EPA strongly encourages appropriate training of all individuals whose job responsibilities have any impact on the release of refrigerant to the atmosphere and who work in situations where technicians may reduce labor costs by venting rather than recovering.

EPA is requiring certification of all individuals who service air conditioning and refrigeration equipment besides MVACs. This group includes installers, contractor employees, in-house service personnel, and anyone else who performs installation, maintenance, or repair that might reasonably have the opportunity to release CFCs or HCFCs into the atmosphere. In addition, individuals disposing of equipment other than small appliances and MVACs must be certified. EPA believes technicians working in these sectors have the greatest opportunity to release CFCs and HCFCs to the atmosphere.

Technicians servicing MVAC-like appliances, as defined in § 82.152(l) of the regulations, including agriculture and construction vehicles, are already required to become certified by an EPA-approved certification program. EPA recognizes that there are similarities between MVACs and MVAC-like appliances, including the use of an open-drive compressor and the amount of refrigerant the systems require. EPA believes that the training and certification provided by section 609 technician certification programs will more readily address issues concerning service practices used for servicing MVAC-like appliances. Therefore, technicians servicing MVAC-like appliances may choose to become certified by an EPA-approved section 609 technician certification program instead of by a section 608 technician certification program, and will then be considered certified according to the requirements of today's final rule. The Agency wishes to clarify that while technicians servicing MVAC-like appliances may choose a section 609 technician certification program, the effective date for certification and all other requirements for these technicians are those promulgated today under section 608.

Technicians must be certified by November 14, 1994. Unless the law, EPA regulations, or recycling technology changes significantly, there is no need to recertify. EPA will formally notify all testing organizations and trade groups of the need to recertify through letters or Federal Register announcements.

Nine commenters urged EPA to include a phase-in period to allow time for adequate training and certification. The length of time varied from 12 months to 5 years. Commenters agreed that the deadline for technician certification should be long enough for EPA to approve multiple certifying programs and for technicians to have ample time to become properly trained and certified. Based on the time required for section 609 technician training and certification programs to apply and receive approval by the Agency, and to establish training classes, the Agency has concluded that an effective date of 18 months from the date of publication is reasonable. This will enable many private organizations adequate time to develop administrative testing procedures and to receive EPA approval in accordance with today's rule.

d. Types of certification. EPA proposed creating four separate technician certification categories. The equipment covered by section 608 varies widely in form, size, and purpose, ranging from industrial process refrigeration systems containing thousands of pounds of CFC–11 to home refrigerators containing 6 ounces of CFC–12. Recycling and servicing techniques that are appropriate to one may not be applicable to another. Creating four divisions would allow technicians to be tested on information concerning the types of and service practices for the equipment the technicians primarily service and maintain. Categories were intended for technicians servicing and maintaining the following types of equipment:

(1) Small appliances,

(2) High-pressure equipment with a charge of less than 50 pounds,

(3) High-pressure equipment with a charge of more than 50 pounds, and

(4) Low-pressure equipment.

Many commenters supported having certification divided into several categories. Various suggestions of additional categories (such as one for small low-pressure equipment) were suggested by the commenters. Many commenters asserted that fewer categories were needed. To simplify the program, EPA decided to combine all of the high-pressure equipment into one category. EPA believes that issues affecting all high-pressure equipment are similar. Furthermore, combining the high-pressure equipment will minimize duplication and will ease the administrative burden associated with the development of the test bank.

Some commenters requested the inclusion of a category which encompasses those workers whose jobs entail work associated with each of the proposed categories. Technicians applying for this type of certification would need to pass a test with sections covering each of the sector-specific categories established by the Agency. EPA believes creating a comprehensive category for technicians passing exams in the three sector-specific areas is beneficial. This would ease administrative burdens for the certifying programs. EPA is therefore establishing a comprehensive category known as Universal Certification.

Based on the proposed voluntary certification scheme, and the comments received by the Agency, EPA is today establishing three different types of technician certification, and one comprehensive category. EPA has determined that three types of technician certification will accommodate the important differences between the various types of air conditioning and refrigeration equipment.

Type I certification is intended primarily for technicians servicing household appliances, and will test for knowledge of the recovery devices unique to this sector, including system-dependent recovery technologies.

Type II certification is intended for technicians servicing high-pressure equipment, such as unitary house air conditioners, and will include questions on the vacuum that must be drawn on this equipment and on technical points such as the proper valving for liquid and vapor recovery. In addition, Type II certification will encompass issues that are important for larger high-pressure equipment. These issues will include recovery using system receivers and safety concerns such as the proper use of refrigerant sensors in equipment rooms.

MVAC-like appliances are high-pressure equipment; therefore, technicians servicing MVAC-like appliances are considered Type II technicians. As noted earlier, technicians servicing MVAC-like appliances may choose to become certified by an EPA-approved program under section 609, and will be considered certified according to the requirements of today's final rule.

Type III certification will cover issues unique to low-pressure equipment, such as evaporator heating for leak detection and the proper procedures for deep evacuation.

Because intermediate and very high-pressure equipment make up a very small percentage of air conditioning and refrigeration equipment, EPA is not planning to establish special certification requirements for technicians who work on these types of equipment. Instead, EPA is integrating general information on these equipment types into Type II and Type III certification, as appropriate.

e. *Test content.* Like technician certification under the section 609 Motor Vehicle Air Conditioning program, EPA proposed that technician certification under section 608 should test technicians on their understanding of the legal and environmental reasons for recycling and on the techniques for minimizing refrigerant emissions during the recycling process. Commenters suggested that a national standardized test include at least the following subjects: The importance of stratospheric ozone, the theory of ozone loss, basic air-conditioning and refrigeration operation, and good service practices such as leak detection, regulatory requirements and safety. EPA is requiring that these subjects be covered by the certification test. The Agency believes that this will ensure knowledge about the environmental impact of CFC emissions, new regulations, and new equipment procedures, and will facilitate compliance with the law. These issues are incorporated in the set of test categories described in appendix D.

Eight commenters recommended that the certification tests include both a hands-on section and a written multiple choice section. Although a hands-on test might better ensure competency, EPA believes requiring a hands-on section would place an undue burden on both the certifying programs and the technicians. A program including hands-on testing would be more time-consuming and would create an additional cost for the technicians.

For all three types of sector-specific certification and comprehensive certification, today's rule requires a core of knowledge about environmental impacts of CFCs and HCFCs and about legal requirements regarding their use and disposal, including these regulations. In addition, each type of certification will require demonstrated knowledge of the recycling and recovery techniques appropriate to the equipment encompassed by that type of certification. General safety guidelines regarding the handling of refrigerants and pressurized cylinders will also be tested.

EPA also is requiring technician certification tests to cover safety issues and other federal regulations of which individuals performing refrigerant recycling and recovery should be aware. Safety issues include proper methods for filling and handling pressurized cylinders (which can explode if overfilled) and, for large equipment in closed spaces, appropriate measures for avoiding excessive exposure to refrigerant (which, in extreme cases, can lead to oxygen deprivation). The Department of Transportation has promulgated regulations in 49 CFR part 173 (primarily based on safety concerns) covering the transport of pressurized cylinders.

f. *Test bank.* EPA will provide a bank of test questions to cover these areas. Industry groups, including the Refrigeration Service Engineers Society, Mechanical Service Contractors of America, United Association of Plumbers and Pipefitters, and Air Conditioning Contractors of America have been working together and with EPA to develop a set of questions that they have stated could serve as the core for a central test bank. Other groups that have expressed an interest in becoming approved certifying programs have indicated that they would be willing to help develop and administer such questions. EPA will develop its questions from this bank. The Agency will meet with members of trade groups to develop additional questions. Additional organizations may meet with EPA at that time to submit questions. This group will meet every six months.

To ensure accuracy and fairness, test questions will be validated by EPA before any programs are approved to administer the certification test. Questions will be updated on a semi-annual basis, with those judged invalid or obsolete removed from the test bank. EPA will make the questions available to organizations that have been certified by the Agency.

The primary advantage of a single bank of test questions is that such a bank reduces the costs of developing a program, minimizes the review process, and will ensure consistency across certification programs. In addition, organizations interested in becoming certifying programs will be able to pool their efforts and will not have to develop (frequently identical) questions independently. A bank of test questions will ensure a uniform certification standard for all technicians.

EPA will conduct periodic reviews of test subject material and update the bank of test questions based upon analyses of their validity and the latest technological and legal developments in appliance maintenance, service, repair and disposal. EPA will then provide updated questions for use by approved technician certifying programs.

The passing score for Type I certification tests using the mail-in format, is 84 percent. The Agency based this requirement on the scores used for the mail-in tests provided by section 609 certifying programs. This score is identical to the score used by the Mobile Air Conditioning Society. The passing score for the closed-book certification test is 70 percent. Again, EPA based this requirement on the MVACs certification tests that use a similar format.

g. *Test conditions.* Commenters argued both for and against closed-book testing. One commenter suggested that an open-book test could facilitate learning of information that can be applied in the workplace. Two commenters stated that a more stringent, closed-book approach was justified due to the variety of equipment covered by section 608. While EPA agrees that open-book testing facilitates learning, the Agency recognizes that reviewing information for a closed-book test also facilitates the learning process. Furthermore, closed-book testing can better ensure the retention of information by the technicians. Accurate information retention ensures that the technicians have a basic understanding about the essential components of the recovery and recycling program. Moreover, the Agency does not believe that the questions on the certification tests should be so complicated or difficult that technicians are forced to refer constantly to their training materials. Technicians will be able to access more detailed information from equipment manuals during service procedures. EPA is therefore requiring closed-book testing for Type II, Type III and Universal technicians. EPA believes that this also will decrease the burden for the certifying programs. If EPA were to allow open-book testing, the proctors would be required to check all materials used by the technicians in order to ensure that technicians were not using answer keys, or sample questions directly mimicking the certification test. This would require the proctors to be familiar with a variety of acceptable and unacceptable materials provided by various training organizations, increasing the training requirements for the proctoring. Alternatively, the certifying program would need to supply technicians with EPA-approved materials, which would increase the technicians' costs and prolong the approval process for certifying programs, leading to technician certification delays.

Commenters supported both proctored and unproctored certification tests. Three commenters stated proctoring was unnecessary. Seven commenters favored a proctored exam. The Air Conditioning Contractors of America strongly advocated proctors to ensure the integrity of the test. EPA agrees that proctoring will protect the test's integrity and decrease opportunities for cheating. Therefore, the Agency is requiring proctored tests for Type II, Type III and Universal technicians.

The Association of Home Appliance Manufacturers, the Air-Conditioning & Refrigeration Institute, and several other comments supported an open-book, unproctored exam for technicians primarily servicing and maintaining small appliances. One commenter remarked that since these technicians are handling very small charge sizes, this less stringent approach is justified. Other comments stated that since technicians servicing and maintaining small appliances are often employed by small, decentralized businesses, bringing these technicians together, in order to participate in a proctored test, would not be cost-effective. Typically these appliances use sealed refrigerant systems. The Agency realizes that technicians servicing small appliances are less frequently required to make repairs that involve entering the sealed system, which could potentially lead to the release of refrigerant. Additionally, the Agency is aware that often small appliances contain only a few ounces of refrigerant, unlike industrial process refrigeration systems, which may contain thousands of pounds of refrigerant. While the Agency believes a closed-book, proctored exam would provide a better means for testing the technicians's knowledge, EPA did not want to place an unwarranted burden on these technicians. Therefore, the Agency is not requiring closed-book, proctored testing for Type I technicians. EPA believes a mail-in program, similar to those used for MVAC technician certification will provide a sufficient educational vehicle for technicians who seldom come in contact with refrigerant.

h. *Proof of certification.* Certifying programs must issue a standard wallet-sized identification card no later than 30 days from the date of the test. Type I certifying programs using mail-in formats must issue cards to certified technicians no later than 30 days from the date the certifying program receives the completed test and any required documentation. Certifying programs may mail or hand deliver the cards.

Each wallet-sized identification card must include, at a minimum, the name of the certifying programs including the date the certifying programs received EPA approval, the name of the person certified, the type of certification, a unique number for the certified person and the following text:

[name of person] has been certified as [Type I, Type II, Type III and/or Universal—as appropriate] technician as required by 40 CFR part 82, subpart F.

EPA believes the use of standardized language will decrease administrative costs and will aid in enforcement. Standardized language will also ease the burden on refrigerant wholesalers, who will verify the certification of technicians purchasing any class I or class II substance, by inspecting identification cards.

i. *Additional requirements.* EPA will periodically inspect testing sites to ensure compliance with EPA regulations. If testing center discrepancies are found, they must be corrected within a specified time period. If discrepancies are not corrected, EPA may revoke the certifying program's approval. The inspections may include, but would not be limited to, reviewing provisions for test security, the availability of space and facilities to conduct the administrative requirements and ensure the security of the tests, the availability of adequate testing facilities and spacing of the applicants during testing, and the proper procedures regarding accountability, and ensuring that there is no evidence of misconduct on the part of the certifying programs, their representatives and proctors, or the applicants for certification.

EPA may also require technicians to demonstrate their ability to perform proper procedures for recovering and/or recycling refrigerant. Failure to demonstrate or failure to properly use the equipment may result in revocation of the technician's certificate. If a technician refuses to demonstrate his ability to properly use approved equipment or if a technician fails to properly use approved equipment, the Agency's likely response is the issuance of an administrative order pursuant to section 113(a), ordering the technician to demonstrate compliance with the statute and the regulations. Failing such demonstration, EPA would order revocation of the technician's certificate. The Agency may also order the technician who fails to properly use approved equipment to obtain additional training. Before a section 113(a) order may take effect, the technician to whom it is issued must be given an opportunity to confer with the Administrator or his or her representative concerning the alleged violation.

Certifying programs are encouraged to make provisions for non-English speaking technicians by providing tests in other languages or allowing the use of a translator when taking the test.

j. *Approval process.* Based on commenters' statements, EPA anticipates receiving a large number of applications from organizations seeking to become certifying programs. Therefore the Agency believes it is appropriate to establish priorities for the review of these programs. In order to certify as many technicians as possible in a reasonable amount of time, EPA will give priority to programs with national or broad geographic scope. Below are the guidelines EPA will use:

First: Certifying programs providing at least 25 testing centers with a minimum of one site in at least 8 different states will be considered.

Second: Certifying programs forming regional networks with a minimum of 10 testing centers will be considered.

Third: Certifying programs providing testing centers in geographically isolated areas not sufficiently covered by the national or regional programs will be considered.

Fourth: All other programs applying for EPA approval will be considered.

Sample application forms may be obtained by contacting the Stratospheric Ozone Hotline at 1–800–296–1996.

k. *Grandfathering.* Some organizations have already begun to train, test, and unofficially "certify" technicians in preparation for compliance with these regulations and with the prohibition on venting of CFCs and HCFCs. Some of these organizations have approached EPA to see whether their programs can be approved and their trainees grandfathered. EPA received comments from participants in these programs, some of which included copies of proof of "certification" or "certification" numbers.

EPA will grandfather technicians whose programs seek and receive EPA approval as a certifying program. As part of this process, these certifying programs may be required to send supplemental information or provide additional testing to ensure the level of the technicians' knowledge. The certifying programs will also have to issue new identification cards meeting the requirements specified above.

Persons who are currently technicians must be certified by (eighteen months from the date of publication). Technicians that participated in certification programs which do not become EPA certifying programs must either receive EPA-approved supplemental information from the original testing organization or be certified by taking a test given by an EPA-approved certification organization by (eighteen months from the date of publication).

I. Restriction on Sales of Refrigerants to Certified Technicians

1. Description of Proposal And Final Requirement

EPA did not propose a sales restriction on refrigerant as its lead option because the Agency had not proposed mandatory technician certification as its lead option. As part of the discussion on mandatory certification of technicians, however, the Agency suggested that it could restrict the sale of refrigerant to certified technicians in order to encourage full participation in training and certification programs and to ensure that only qualified individuals handle refrigerant. Based on comments supporting a sales restriction, the Agency believes restricting sales of refrigerant to only certified technicians is necessary to ensure that all technicians are properly trained and in compliance with this regulation.

In order to ensure that only qualified individuals handle refrigerant, the Agency is establishing a sales restriction on refrigerant until similar to that required under section 609. The Act made it unlawful, effective November 15, 1992, for any person to sell or distribute, or offer for sale or distribution, any class I or class II substance suitable for use as refrigerant in a motor vehicle air conditioning system and that is in a container with less than 20 pounds of refrigerant except to certified technicians. EPA has reviewed the success of this sales restriction and believes that the dangers associated with the release of CFCs and HCFCs into the atmosphere warrants extending the sales restriction to include all containers (regardless of size) of any class I or II refrigerant. Restricting the sale of refrigerants will ensure compliance with the regulations and aid in enforcement.

Some transactions involving refrigerant will be exempt from this restriction, because there is very little risk of refrigerant venting associated with these transactions. These transactions include refrigerant sold only for eventual resale to certified technicians (e.g., sales from a manufacturer to a wholesaler) and refrigerant contained in pre-charged air conditioning or refrigeration equipment.

The American Supply Association (ASA) stated at the December 23, 1992 Public Hearing at EPA's Headquarters in Washington, DC, that wholesalers are willing to comply with a reasonable restriction on sales. ASA further asserted that requirements akin to state sales tax exemptions could provide a reasonable means for enforcing the restriction of refrigerant sales. EPA reviewed ASA's comments carefully and incorporated some of their recordkeeping suggestions into this rule.

Under the regulations promulgated today, only technicians certified by an approved section 608 or section 609 certification program and in possession of a valid certification identification card will be able to purchase refrigerant for use as of November 14, 1994. The Agency realizes that clerks and runners, rather than trained technicians, frequently make refrigerant purchases. Since the nature of this business means that the certified technician will not always be the person to whom the wholesaler physically transfers the refrigerant, EPA will allow the technician to provide evidence of certification to the wholesaler prior to the first sale. The wholesaler may then keep a copy of the technician's certification identification card on file, much the same way as the wholesaler keeps evidence that a customer is exempt from state sales tax. A photocopy of the identification card may remain on the wholesalers' premises. Large purchasers and contractors may provide evidence to the wholesaler of individual certifications for their group of employees. Copies of these employees' identification cards may remain on the wholesalers' premises. It is the responsibility of the larger purchaser or contractor to notify the wholesaler regarding changes in the status of certified employees.

Individual purchasers, large purchasers, or contractors may authorize other employees to purchase or accept delivery of refrigerant. Under the regulations, a list of authorized personnel must be filed with the wholesaler and the certified technician or contractor is responsible for updating the list as necessary. The wholesaler is restricted to selling refrigerants only to the accounts with evidence of certification on file with the wholesaler prior to the sale or to technicians with valid section 608 or section 609 certification identification cards.

2. Response to Major Comments

Over twelve thousand commenters requested that the sale of refrigerant be limited to certified technicians or organizations employing certified technicians. Forty-three commenters additionally stated that limiting the sale of refrigerants to certified technicians provides a practical method for keeping

refrigerant out of the hands of irresponsible operators. Thirty-three commenters added that a sales limitation will secure compliance with the regulations and aid in enforcement. Two hundred and eighty-five commenters declared that a sales restriction would reduce easy access to refrigerant by untrained or undertrained individuals.

Thirteen commenters opposed restricting refrigerant sales to certified technicians. One commenter remarked that a sales restriction does not ensure compliance. Another commenter stated that sufficient safeguards existed in the proposal to prevent the sale of refrigerants to unauthorized persons.

The lead option in the proposed rule was based on voluntary certification, and EPA did not believe it was appropriate to propose limiting sales to persons who participated in a voluntary program. EPA is today requiring the certification of all technicians, therefore it is possible and practical for the Agency to require a more stringent approach. A sales restriction will limit the refrigerant sales only to qualified technicians. The Agency believes that unrestricted sales will enable untrained or undertrained technicians to obtain access to refrigerants that are likely to be used improperly in connection with servicing activities that will result in the venting of refrigerants.

Two commenters suggested that a sales restriction will lead to higher service prices and the creation of a black market for CFC refrigerants. EPA believes a sales restriction will not lead to an increase in service prices or the development of a black market because the cost of certification will not be burdensome. EPA anticipates the cost of certification to be slightly higher than the cost for certification under section 609, and will require slightly longer training sessions. Fees for section 609 technician training and certification vary, but are in the range of twelve to twenty dollars, and usually require approximately three hours. The Agency believes adequate training and section 608 certification will require four to eight hours with fees ranging between thirty and seventy-five dollars. The Agency believes it will be far more financially prudent for technicians to become certified in accordance with the requirements promulgated under section 608, than to participate in any black market for refrigerants.

Several commenters stated that wholesalers should be required to register refrigerant sales by certification number to enable authorities to track refrigerant use. By recording refrigerant sales, groups who purchase large quantities of refrigerant could be easily identified and monitored. However, while this could aid enforcement authorities, EPA considers this recordkeeping and monitoring a sizable burden on the wholesalers. In addition, the Agency does not believe it is necessary or desirable to track the amount of refrigerant purchased by individual entities because today's rule does not establish quantity restrictions on refrigerant purchases. Moreover, this burden could lead to an increase in overhead costs which would be passed on to the technician.

Several commenters argued for the transfer of refrigerant to uncertified delivery personnel. Three commenters stated that drivers or delivery personnel should not have to provide proof of certification if they are merely transporting the refrigerant for a certified technician who will actually perform the service. Two commenters wrote that often the purchasing activities are separate from the servicing activities. One commenter declared that requiring the certified technician to be present at the time of purchase would be a logistical nightmare. The Agency understands that often the certified technician will not actually be present at the time the refrigerant is physically transferred. The Agency will allow the transfer of refrigerant to delivery personnel according to the guidelines detailed above.

Nine commenters requested that refrigerant purchasers be required to present proof of equipment certification before the sale. EPA views this requirement as unnecessary due to the requirements concerning the proof of technician certification. Wholesalers can easily conduct visual checks of technicians' certification cards, and the use of standardized language will make these cards easily identifiable.

J. Certification by Owners of Recycling or Recovery Equipment

1. Description of Proposal and Final Rule

EPA proposed and is today requiring owners of recycling or recovery equipment, including contractors and other business entities responsible for air-conditioning and refrigeration equipment servicing (such as building owners with in-house service personnel), to submit a signed statement to the appropriate EPA Regional office by [Insert date 90 days after publication of the final rule], stating that they possess sufficient certified recovery and recycling equipment, or equipment grandfathered under today's rule, to perform on-site recycling or recovery. EPA believes this requirement is an important element of an effective recovery and recycling program. Equipment certification demonstrates the availability of appropriate equipment for use by certified technicians.

In addition to the name and address of the contractor, the statement must include the name of the manufacturer, date the equipment was manufactured, date of purchase, and if applicable, the model number and the serial number of the equipment. If the contractor repairs appliances besides small appliances, the form must indicate that at least one of the pieces of equipment listed in the statement is self-contained equipment. The statement must also include the number of service trucks (or other vehicles) used to transport technicians and equipment between the establishment and job sites in the field. (EPA received comments supporting the inclusion of both of these information requirements in the certification statement.) Sample forms may be obtained by contacting the Stratospheric Ozone Hotline at 1–800–296–1996.

In addition to the self-certification outlined above, EPA proposed several options for administering equipment owner certification. One option was direct certification by EPA, which required the equipment owner to submit substantiating documentation of equipment certification. EPA would then mail a certificate to the equipment owner. While this option could result in somewhat greater assurance of compliance with the regulations, the Agency is not requiring this option because it would be impractical given the large number of equipment owners and other business entities that would need to be reviewed and sent certificates. (Estimates of the number of contractors in the U.S. range from 22,000 to 45,000.) Another similar option was to require the equipment owner to submit such documentation to approved third-party certifying programs; however, EPA is not aware of any potentially interested organizations. EPA recognizes that third-party certification may be a more reliable method for ensuring equipment owner compliance with these regulations, and the Agency may consider replacing the self-certification program with third-party certification at a later date.

2. Response to Major Comments

Twenty-eight commenters supported owner self-certification as a way to maximize compliance without imposing undue cost and paperwork burdens on the owners.

Two commenters opposing self-certification remarked how the lack of a requirement in the proposal for technician certification would negate the need for owner certification. Without technician certification, there is less assurance that a recovery/recycling machine will be used properly, regardless of whether or not the equipment was certified by the owner. However, through this rulemaking, EPA is today requiring the certification of all technicians.

One commenter suggested that equipment certification should be required within 180 days instead of 90 days, because provisions permitting the grandfathering of equipment will no longer be in effect. However, the grandfathering provision does not affect the self-certification of equipment by owners. Owners must certify all equipment, including grandfathered equipment. Therefore, the Agency does not believe extending the deadline would benefit equipment owners.

One commenter asked EPA to include the phrase "if applicable" when requesting the model and serial numbers of equipment. Additionally, the commenter asked that the phrase "or the last substantial revision" follow the request for the date of manufacture. EPA recognizes that some equipment may not have a model or serial number; therefore the phrase "if applicable" has been added. However, the Agency does not believe it is necessary to add "the last substantial revision" to this requirement. The Agency is interested in the date of manufacture to ensure that equipment either meets the required standards or is eligible to be grandfathered, which is based on the date of manufacture.

K. Certification of Reclaimers

1. Description of Proposed and Final Requirement

In order to ensure the quality of reclaimed refrigerant on the market, EPA proposed and is today requiring the certification of reclaimers. Consistent with the proposed rule, reclaimer certification will involve sending a signed statement from the reclaimer stating that it: (1) Returns refrigerant to at least the ARI Standard 700, (2) verifies this purity using the methods set forth in ARI Standard 700, and (3) disposes of wastes from the reclamation process in accordance with applicable laws and regulations. The requirement to dispose of wastes properly is important since the reclamation process can generate hazardous wastes. ARI Standard 700 is a purity standard set by the Air-Conditioning and Refrigeration Institute to ensure that refrigerant is free of contaminants that can damage air conditioning and refrigeration equipment.

As proposed, the regulation provides that reclaimers cannot release more than 1.5 percent of the refrigerant during the reclamation process. Reclaimers on the STOPAC Subcommittee for recycling estimated that releases during a well-controlled reclamation process range between one and two percent of the quantity. One reclaimer on the STOPAC committee measured these losses and found them to be 1.2 percent of the original quantity. The Agency recognizes that fugitive emissions occur during the production of ozone-depleting chemicals and that the reclaimers should not be held to a more stringent requirement. According to reclaimers on the STOPAC committee, most releases take place during transfers of refrigerant between shipping containers and reclamation devices. Typically, reclamation itself takes place in a closed loop; refrigerant is not exposed to the atmosphere. Emissions that occur during this process result from sampling of refrigerant for purposes of analysis and from purging of noncondensables (air and other gases with a boiling point lower than that of refrigerant). Both types of releases are likely to be small; typically, samples consist of 50 grams of refrigerant, and purging of noncondensables takes place through a cold trap that recondenses and traps most of the refrigerant mixed with the air. Although emissions from reclamation devices have not been quantified precisely, two reclaimers on the STOPAC subcommittee stated that emissions fall well under two percent of the quantity of refrigerant that enters the reclamation process. Based on this information EPA proposed and is today requiring to limit emissions from reclaiming facilities to 1.5 percent of the refrigerant received by them. The Agency estimates that approximately one percent of the refrigerant will be released during transfers of refrigerant to and from reclamation devices, and approximately one half of one percent will be released during the reclamation process itself.

In addition to the signed statement, the reclaimer must submit the name and address of all reclamation facilities and a list of all equipment it employs to analyze the refrigerant. EPA will periodically publish a list of certified reclaimers, including the name and address of all reclamation facilities. This list will be available through the Stratospheric Ozone Protection Hotline. Reclaimers must also maintain records of the names and addresses of persons sending material for reclamation and the quantity of the material (combined mass of refrigerant and contaminants) sent to them. On an annual basis, reclaimers are required to keep records of the mass of material sent to them, the mass of refrigerant reclaimed, and the mass of waste products. These records are required to ensure that refrigerant releases are minimized during the reclamation process and to satisfy reporting requirements under the Montreal Protocol. A copy of these records must be kept at the reclamation facilities. Based on discussions with reclaimers, EPA believes that most reclaimers already keep such records. Reclaimers must report to EPA within 45 days after the end of the calendar year the volume of refrigerant received and reclaimed, as well as names of companies or technicians that supplied the refrigerant.

EPA will periodically inspect reclaimer facilities to ensure compliance with EPA regulations. If discrepancies are found, they must be corrected within a specified time period. If discrepancies are not corrected, EPA may suspend or revoke the reclaimer's certification. The inspections may include, but are not limited to, an examination of the reclaimer's records, a review of equipment employed by the reclaimer measuring the levels of refrigerant released to the atmosphere and a certification that refrigerant is purified to the standard set in the regulation.

EPA considered a second option for reclamation in the proposed rule. The Agency suggested that EPA-approved parties could administer reclaimer certification site inspections and/or sampling of refrigerant. Third-party certification would be more reliable than self-certification. Inspections and sampling would provide independent evidence that the ARI–700 standards were being achieved at the reclamation facility. However, at the time the proposal was being developed, no potential third-party certifying programs had established a reclaimer certification program. ARI was developing a program, but this program was not yet operational. Today ARI's Certification Program For Reclaimed Refrigerant is operating. A directory of all ARI-certified reclaimers, including the phone number and address of all reclaimer facilities, and a list of refrigerants reclaimed at these facilities is published twice a year. EPA encourages these efforts, and believes that such efforts provide more certainty to the purity of the refrigerant, and a wider acceptance for the reclaimed refrigerant in the industry. In the future

the Agency may replace its reclaimer self-certification program with a requirement that reclaimers be certified by an approved third party.

2. Response to Major Commenters

One commenter stated that it is unnecessary for EPA to require certification of certain information, including the percent release limitation and compliance with waste disposal laws. The commenter believed that it is inappropriate to require individuals to certify that they will obey legal requirements. EPA, however, views self-certification as necessary to ensure that reclaimers acknowledge the requirements of these regulations. Without this acknowledgement, reclaimers may be ignorant of the method of reclaiming and may not take the proper precautions and steps to ensure purity. The Agency believes that requiring the reclaimer to certify compliance with the above requirements ensures that the reclaimer is fully aware of the regulations regarding reclaimed refrigerant, and provides greater assurance that the reclaimer will abide by those regulations.

Eighteen commenters supported a requirement for third-party certification of reclaimers. Several commenters stated that the need to assure the quality of reclaimed refrigerant on the market is a strong reason for having third-party certification and sampling. One commenter declared that third-party certification is necessary to reduce the risk of contaminated refrigerant from entering the marketplace and causing potentially costly damage to air conditioning equipment. As stated above, when the Agency was developing the proposal, there were no operational third-party certification programs. EPA believes that the self-certification program promulgated today provides adequate assurances of quality but, as indicated above, the Agency may evaluate the potential use of third-party certification in the future. Moreover, the Agency believes that third-party certification that is accepted by the industry will lend additional credibility to the purity of the refrigerant and provides a "good housekeeping seal of approval."

One commenter supported third-party certification to ensure reclaimers' products meet ARI–700 standards. The commenter believes there are financial incentives to "cheat" with mixed refrigerants that exceed the ARI–700 allowable limits. The Agency does not believe incentives to "cheat" exist. The risk of damaging expensive air conditioning and refrigeration equipment from refrigerant contamination, creates a significant incentive to ensure reclaimers meet ARI–700 standards. EPA reclaimer certification requires reclaimers to submit a list of all equipment employed by the reclaimer to analyze the refrigerant, and to certify that the equipment is properly used. This requirement assures EPA that reclaimers own and use appropriate equipment for achieving ARI–700.

Five commenters supported the proposed recordkeeping requirements for reclaimers. One commenter remarked that records should be maintained at the facility available for EPA review. The Agency does require through this rulemaking that records must be readily available for review and that a copy of the records be maintained at the reclamation centers.

One commenter supported a more stringent maximum limit of 1 percent emissions by reclaimer facilities. Reclaimers on the STOPAC Subcommittee for recycling estimated that releases during a well-controlled reclamation process range between one and two percent of the quantity. Based on this information, as well as additional information provided by actual measurements at one reclaimer's facilities, the Agency is maintaining its proposed requirement that reclaimers not emit more than 1.5 percent of the refrigerant during the reclamation process. EPA is concerned that requirements which are too stringent may impose unnecessary financial burdens on the reclaimer.

One commenter stated that reclaimed refrigerant should be labeled and sold as "reclaimed" rather than as "new" refrigerant. EPA believes that if the refrigerant is reclaimed to ARI–700 standards, it is not necessary to label the refrigerant as reclaimed. Often new refrigerant is mixed with reclaimed refrigerant meeting the ARI–700 standards. After the phaseout becomes effective, many of these refrigerants will only be available as reclaimed products.

One commenter stated that general education efforts on reclamation are needed, especially related to issues such as awareness, operational and maintenance options, equipment safety, and transportation packaging requirements. EPA agrees that education about reclamation is necessary. The Agency encourages organizations involved with reclamation to create and distribute informational brochures. The Agency regularly releases various fact sheets and informational brochures about topics related to refrigerant use. Information on reclamation is included. The Agency may consider creating or participating in a more extensive informational campaign at a later date. In addition, the Agency believes that third-party certification will serve the role of educating reclaimers on the necessary requirements.

Two commenters stated that the final rule should provide for reclaimer decertification in the case of enforcement actions for violations of the reclaimer requirements. Decertified reclaimers should be removed from the list of certified reclaimers, with reinstatement possible after actions are undertaken that would render their products acceptable for sale. The proposal and today's rule includes a provision for decertification. If discrepancies are found, reclaimers may be asked to correct the discrepancies within a specified time period. Failure to rectify the situation may result in revocation or suspension of the certification of the reclaimer.

L. Recordkeeping Requirements

EPA has established the following recordkeeping requirements:

1. Equipment Certification Programs.

EPA is requiring equipment certification programs to maintain records of equipment testing and performance in addition to a list of equipment that meets EPA requirements.

2. Wholesalers.

Wholesalers are required to maintain the usual business records of their refrigerant transactions, including the name of the buyer and the quantity sold.

3. Reclaimers.

As discussed in section III.K, reclaimers are required to maintain records of the names and addresses of persons sending them material for reclamation and the quantity of the material (the combined mass of refrigerant and contaminants) sent to them. On an annual basis, reclaimers are required to keep records of the mass of material sent to them, the mass of refrigerant reclaimed, and the mass of waste products. These records are required to ensure that refrigerant releases are minimized during the reclamation process. Based on discussions with reclaimers, EPA believes that most reclaimers already keep such records.

4. Recovery and Recycling Equipment Owners.

Section 82.162 requires that persons maintaining, servicing, or repairing appliances (except for MVACs), and persons disposing of appliances (except small appliances, MVACs and MVAC-like equipment) must certify that such person has acquired and is properly using certified recovery or recycling

equipment. By providing the Agency with information on equipment obtained and properly used, this certification will facilitate adequate enforcement of this regulation.

5. Disposers.

Persons disposing of small appliances, MVACs, and MVAC-like appliances must maintain copies of signed statements obtained in accordance with § 82.156(f)(ii). Such statements verify that the refrigerant has been evacuated from the appliance or shipment of appliances previously. Persons who knowingly provide false statements will be subject to criminal penalties. By maintaining these signed statements, the disposer is able to show that proper evacuation occurred at a point in the disposal stream before reaching the disposer, thus shielding the latter from liability.

6. Technician Certification Programs.

Appendix D of this rulemaking outlines recordkeeping requirements for those programs certifying technicians, which include but are not limited to the names and addresses of all individuals taking the tests, the scores of all certification tests administered, and the dates and locations of all tests administered.

Certifying programs must send EPA an activity report every six months. This report will include the pass/fail rate and testing schedules. This will allow the agency to determine the relative progress and success of these programs. If the certifying program believes a test bank question needs to be modified, information about that question should also be included.

Approved certifying programs will receive a letter of approval from EPA. The Agency is requiring that each testing center display a copy of that letter.

7. Owners/Operators of Air-conditioning and Refrigeration Equipment.

The Agency is requiring owners/operators to maintain records of servicing. The Agency believes that records of the service calls and amounts of refrigerant added to machines will assist technicians in their determination of leak rate and would also assist owners of equipment in the determination of the need for leak repair. The Agency believes these records, primarily in the form of service invoices, are already kept by equipment owners and therefore this requirement is not an additional burden on them. These records must also include refrigerant purchased and added to equipment each month in cases where owners add their own refrigerant.

M. The Safe Disposal Program

In the December 10, 1992 proposal, EPA proposed requirements for the safe disposal of class I and class II substances as required in section 608 (b)(1) and (b)(3). EPA proposed a flexible regulatory approach to capture the refrigerant contained in equipment that enters the waste stream with the charge intact (household refrigerators and freezers, MVACs, room air conditioners, dehumidifiers, water coolers) to reflect the diversity of the disposal sector across the country. The Agency proposed that the final link in the disposal chain be responsible for assuring that refrigerant has been removed from equipment, although the final processor could require that refrigerant be removed before they accept equipment. One-time reporting to the Agency by establishments performing refrigerant removal was proposed. EPA did not propose mandatory certification of technicians removing refrigerant from equipment destined for disposal, although the development of guidance documents to assist technicians was discussed. The proposal also required that equipment used to recover refrigerant at disposal must meet a performance standard.

Many of the public comments received supported the flexible regulatory approach taken by the Agency in this section. Specific comments were received on the recovery of CFC–11 from foam insulation, the registration of entities performing refrigerant removal and technician training. Commenters also discussed the performance standard for recovery equipment, recordkeeping and labeling of equipment that has been properly evacuated.

This section will address the major issues raised by commenters regarding safe disposal of equipment containing class I and class II substances. Comments not addressed here are answered in a comment response document available in the public docket for this rule.

1. Scope

In the proposal, the Agency stated that the specific requirements in the safe disposal section of the rule focused on equipment that enters the waste stream with the refrigerant charge intact, i.e., equipment containing class I and class II refrigerant "in bulk." The Agency stated that the equipment that enters the waste stream with the charge of class I or class II refrigerant intact includes household refrigerators and freezers, MVACs, room air conditioners, dehumidifiers, water coolers, and some other relatively portable equipment. For all other refrigeration and air-conditioning equipment, the refrigerant must be removed before dismantling of the equipment in accordance with the requirements concerning servicing discussed earlier. Dismantling on-site of equipment of this type is an accepted industry practice. Two commenters supported this distinction made in the proposal while one commenter, the Institute of Scrap Metal Recycling (ISRI), maintained that this distinction was artificial and not contemplated by Congress.

EPA made the distinction between equipment that is dismantled on-site and equipment that enters the waste stream with the charge intact because of the differences between the two types of equipment once they reach the end of their useful lives. Large equipment dismantled on-site must have refrigerant removed as part of the dismantling process because there is no other option that will result in successful recovery of refrigerant. The equipment is not moved off the site in one piece and dismantling results in release of the refrigerant. This equipment cannot enter the waste stream with the charge intact, while appliances and MVACs can and frequently do enter the waste stream with the charge intact. By making the distinction, EPA did not intend to prohibit the removal of refrigerant from equipment such as household appliances and MVACS in the home or the place of operation. The intent was that this equipment could be evacuated at any one of several stages, either before it entered the waste stream or once in the waste stream. In general, the safest and most cost-effective stage for refrigerant removal is an intermediate processor within the waste stream; EPA's flexible regulations are designed to allow that to happen. The distinction discussed above is maintained in today's final rule.

The proposal did not include requirements to recover CFC–11 from foam insulation used in buildings or appliances. With respect to foam that is an inherent element in buildings, EPA determined that such regulations are not required by section 608 of the Act at this time. The Safe Disposal requirements that appear in section 608(b) of the Act are simply part of the section 608(a) regulations (the servicing requirements discussed previously in this final rule) and therefore are subject to the deadlines contained in section 608(a). As section 608(a) requires only that regulations concerning appliances and industrial process refrigeration be promulgated at this time, it does not require regulations concerning the

disposal of foam insulation that is an inherent element of buildings (which are neither appliances nor industrial process refrigeration). Furthermore, removing building insulation during the process of demolition is difficult and exceptionally resource intensive. The long average lifetime of buildings and the slow release of the CFCs throughout the lifetime of the insulation results in possible retrieval of only residual amounts of CFC. The Agency is not aware of any existing or developmental technology to remove CFCs from building insulation even if the insulation could effectively be removed. Only three commenters specifically addressed recovery of CFC–11 from building insulation and all three agreed with EPA's determination.

With respect to foam insulation used in appliances, which is covered by section 608(a), the Agency received several comments that concurred with the statement in the proposal that it was premature to require recovery of CFC–11 at this time. NRDC and FOE, however, commented that EPA had neglected to make a finding as to whether recovering the CFCs trapped within such foam would produce "insignificant environmental benefits". Section 608(b)(3) states "that any product in which a class I or class II substance is incorporated so as to constitute an inherent element of such product shall be disposed of in a manner that reduces, to the maximum extent practicable, the release of such substances to the environment. If the Administrator determines that the application of this paragraph to any product would result in producing only insignificant environmental benefits, the Administrator shall include in such regulations an exception for such product." NRDC and FOE maintain that the emission of CFC–11 from foam insulation in appliances cannot be dismissed as insignificant.

The Agency believes that there are significant technical and practicable uncertainties and problems in attempting to retrieve CFC–11 from foam. First, uncertainties exist regarding the amount of CFC–11 remaining in foam insulation once the appliance reaches the end of its useful life. The rate of dissipation out of the foam varies based on construction and the CFC–11 also can migrate from the enclosed cells into the foam matrix. Concern over this uncertainty was raised in the November, 1992 meeting of the Parties to the Montreal Protocol in Copenhagen. Second, although the Agency is aware of the development and limited use of CFC–11 foam retrieval technology for appliances in Germany, a great deal of uncertainty remains concerning the practicality of this technology for widespread use in this country at this time. Initial equipment cost is approximately $1–1.5 million per retrieval machine and operating expenses are expected to be at least equal to that figure on an annual basis because the activity, including removal of foam panels by hand, is labor intensive and the processing is energy intensive. Uncertainty also exists concerning the capacity of the equipment and the number of facilities that would need to be established around the country to process the 10 million appliances discarded annually.

One commenter, Appliance Recycling Centers of America (ARCA), stated that they recently began a demonstration project with a utility to use the German technology in the United States. ARCA commented that it believes the decision to require this type of fully integrated appliance recycling system nationwide is premature at this time and the Agency is convinced by their statements because of their experience with the technology. They commented that the decision to establish a fully integrated appliance recycling program (including refrigerant removal, retrieval of CFC–11 from foam, capacitor removal and other activities such as mercury switch removal) should be left to State and local governments at this time because of the uncertainties regarding cost, capacity, recovery rate of CFC–11 and the difficulty in designing nationwide requirements that are viable within the variety of state and local waste disposal programs.

An additional element of uncertainty regarding the establishment of a nationwide requirement to recover CFC–11 from foam is the progress towards a practical technology for direct destruction of foam insulation and the CFC–11 it contains. The Agency is aware of potential demonstration projects involving foam insulation destruction in the United States which may prove to offer cost efficiencies and increased environmental benefit as compared to recovery of CFC–11 from insulation. These demonstration projects are still in the planning stages. The Agency is interested in any information concerning the practicality of foam destruction technology in this country and will consider regulation once more information is collected.

Considering the uncertainty about the amounts retrievable, the viability of widespread use of CFC–11 removal technology in this country and the potential role for destruction technology in the future, the Agency believes requirements to remove CFC–11 from foam are not practicable at this time and as a consequence, the Agency has not included such requirements in the final rule published today.

2. Regulatory Approach

As discussed in the proposed rule, state and municipal authorities have traditionally designed and implemented waste management programs, including disposal and recycling systems for used appliances and motor vehicles. EPA's proposed regulatory approach was designed to ensure that the maximum amount of ozone-depleting substances are recovered before recycling or disposal of the used equipment by building on the waste disposal networks that currently exist. Regulatory flexibility in this area is essential for the success of the Safe Disposal Program. The proposal, therefore, established a general requirement that refrigerant be recovered before the final step in the disposal of equipment, but did not place a requirement solely on one specific entity in the disposal chain. The proposed rule did highlight, however, that ultimately it was the responsibility of the final link in the disposal chain to assure that the refrigerant has been removed.

Although most of the comments that the Agency received supported the concept of a flexible regulatory approach for the safe disposal program, commenters were approximately evenly divided concerning the issue of what party should be ultimately responsible for removal of refrigerant. Several commenters believe that the responsibility to remove refrigerant should lie with the generator of the equipment. Commenters did not specify who the generator was other than to indicate it could be anyone who owned the equipment or delivered equipment to the landfill or scrap recycler. ISRI and other commenters contend that section 608(b)(1) requires that EPA's regulations mandate the recovery of ozone-depleting refrigerants from appliances prior to their delivery for recycling. This contention is based on the language of section 608(b)(1), which states that class I and class II substances contained in bulk "shall be removed from each such appliance, machine or other good prior to the disposal of such items or their delivery for recycling." According to ISRI, this language also distinguishes recycling of appliances from their disposal, and means that goods containing ozone-depleting substances must be evacuated prior to their delivery to the recycler. EPA believes, however, that recycling can be considered as one form of disposal and proposed that as part of the definition

of recycling found in § 82.152. EPA notes that if recycling were totally distinct from disposal, recyclers would not be covered by the venting prohibition in section 608(c), which applies to the release of ozone-depleting refrigerants in "the course of maintaining, servicing, repairing, or disposing of an appliance." Based on this interpretation, the venting prohibition would refer only to disposal, but not recycling. ISRI itself, however, states that recyclers are covered by the venting prohibition, implicitly indicating that recycling is a form of disposal. EPA also notes that the Act provides that the regulations under section 608(a), of which 608(b) regulations are but one part, are to concern the use and disposal of class I and class II substances "*during* the service, repair or *disposal*" of air-conditioning and refrigeration equipment. (Emphasis added.) Moreover, section 608(b)(2) provides that the section 608(a) regulations are to require that appliances or other equipment containing class I or II substances in bulk be "equipped with a servicing aperture or equally effective design feature which will facilitate the recapture of such substance *during* the service and repair or *disposal* of" the equipment. (Emphasis added.) This statutory language clearly indicates that Congress contemplated that EPA's regulations would deal with the removal of refrigerant *during* the disposal process and that EPA's approach—requiring that the refrigerant be removed prior to the last step in the disposal process—is consistent with the statutory language. As a consequence, EPA believes that although the language in section 608(b) clearly authorizes EPA to mandate the removal of CFCs and other ozone-depleting substances from appliances prior to their delivery for recycling, it does not require EPA to do so.

The Agency wishes to clarify that the prohibition on venting refrigerant includes individuals who are preparing to dispose of a used appliance. This does not mean that EPA encourages individual owners of single appliances to remove refrigerant; in fact, the Agency discourages this activity. Nevertheless, however, individuals may not knowingly release refrigerant from their used appliance. If the individual chooses to recover the refrigerant, he or she must conform to the equipment requirements in § 82.158 and the required practices in § 82.156. The Agency has also further clarified § 82.156(f) to highlight that it is the ultimate disposer, the last entity in the disposal chain, that must either remove the refrigerant or obtain verification that refrigerant has been removed previously. As a result of these clarifying changes, the Agency is deleting from the proposal section 82.154(l), which required refrigerant removal before disposal, because it is now redundant.

ISRI and Universal Appliance Recycling suggest that the Agency consider the regulations developed in the state of Wisconsin as a model program. The Wisconsin program specifies that any person who delivers equipment to a scrap metal recycler must first remove the refrigerant or accept a written statement from the recycler that the recycler will remove the refrigerant. The program also requires approved equipment and certification requirements for individuals who use the equipment.

The Agency is aware of the Wisconsin program and applauds its development as an effective method to recover refrigerant from salvaged items. The proposed EPA regulations do not in any way prohibit the type of program developed in Wisconsin and the Agency encourages states and localities to consider the Wisconsin model as a complement to their existing waste disposal programs. As for adopting this state program across the country, however, EPA believes this would be counter to its stated goals of flexibility and interest in allowing local and state governments to establish programs compatible with their solid waste recycling laws, ordinances and available technologies. One commenter, the Appliance Recycling Centers of America, suggested that "over the next several years, the Agency should work with the states to determine which types of approaches work best for specific municipal solid waste management systems" and that is exactly the Agency's intention.

An example of the benefits of the Agency maintaining a flexible approach regarding specific components to the safe disposal program is found in the comments that suggest a mandatory label be affixed to equipment that has had refrigerant properly evacuated. The Agency received several comments requesting a mandatory brightly colored label be attached to equipment. Some types of labeling are already being implemented in parts of the country. Other commenters suggest that mandatory labels would be difficult to locate on equipment that has been crushed. They maintain that verifying labels would add costs to the already fragile economics of the scrap recycling industry and therefore result in a cessation of recycling of appliances and automobiles. The Wisconsin program does not require labels, although it does require documentation that refrigerant removal has occurred. EPA believes the correct approach for the Federal program continues to be flexibility that allows localities to use labels or certification where appropriate; but, nationwide labeling or certification is not required under this regulation.

EPA maintains that the flexible regulatory approach is consistent with Congressional intent in sections 608 (b) and (c). EPA would like to clarify that it does not specifically require the last link in the disposal chain to remove refrigerant and, in fact, the Agency believes that the most cost-effective stage to remove refrigerant is typically not the scrap metal processor or the landfill operator, but an intermediate processor. The goal of the program is to provide the flexibility needed to permit the removal of refrigerant by the entity in the disposal chain that can accomplish the removal most efficiently. This goal must be combined with the venting prohibition, which does not allow the knowing release of class I or class II substances to the environment. In its comments, ISRI details realistic and specific steps a facility operator could take to ensure the proper recovery of CFCs and to avoid venting CFCs from inbound scrap materials. The procedures outlined include sending a letter to suppliers stating that refrigerant must be removed before equipment is accepted, posting signs at intake locations stating the facility's requirements regarding proper CFC removal, and requiring certification that CFCs have been removed. These steps constitute good faith efforts to fulfill the requirements of the venting prohibition and are exactly the type of procedures the Agency envisioned would be taken by processors not interested in removing refrigerant themselves. The Agency has incorporated more specificity in the Required Practice rule language (§ 82.156(f)) regarding the steps a person must take if not recovering the refrigerant themselves.

In the proposal, the Agency suggested, but did not require, that periodic inspections be used as a method for the processor to determine that the claims being made by certifiers are true. Commercial Metal Company's comments included a scenario where the scrap processor would be held liable if a certifier stated that they removed 90 percent of the refrigerant while only actually removing 85 percent. The Agency wishes to clarify that if the processor did not know and had no

reason to know that the certification was false, then he or she would not be liable for violating the regulations.

ISRI asked that the Agency specify that a presumption exists that refrigerant is no longer present in equipment that arrives at the scrap facility already crushed. The Agency understands that crushed automobiles commonly arrive at scrap facilities and that such automobiles no longer contain refrigerant. Consequently, it may be safely presumed that refrigerant is no longer present in equipment that is received in such condition. This clarification does not alter the responsibility to obtain certification when receiving equipment from suppliers.

The procedures mentioned by a few commenters that scrap recyclers or landfill operators tell suppliers to simply "cut the refrigerant lines" before delivering equipment to them are clearly unacceptable because they direct the supplier to violate the statute and the regulations. The knowing release of refrigerant to the atmosphere is a violation of the venting prohibition and accepting certification that equipment has been properly evacuated knowing that the certification is false is a violation of the regulation.

3. Registration of Entities

EPA proposed a one-time certification or registration requirement for those entities that recover refrigerant before disposal or recycling of equipment. This proposal was similar to the reporting requirement for the servicing sector, requiring name and address of the establishment, manufacturer name, model number, date of manufacture, the serial number of the equipment, and a statement that the equipment would be used properly. The registration was to be sent to the appropriate Regional office.

Five commenters supported one-time registration and one commenter did not support the requirement. ARCA stated that it believed more frequent reporting would be helpful, although they suggested that the information would be the most useful at the state level. The Agency agrees that the reporting of basic information regarding disposal is important for enforcement purposes and maintains the registration requirement in today's final rule. Although use of a specific form is not required, the Agency has modified the example form provided in the proposal to include a check box for those individuals performing disposal only. The Agency understands that the requested data concerning serial numbers is not necessary for self-built equipment.

4. Certification to Final Processors

The proposal discussed the situation where the establishment that performs the disposal or recycling of the appliance or MVAC equipment chooses not to remove refrigerant or is unable to remove it (for example, the scrap recyclers who receive crushed cars). The Agency proposed the option of a certification procedure between the final processor and the suppliers of the goods or machines stating that the ozone-depleting chemicals have been properly removed. The proposed elements of the certification could vary based on the individual establishments involved; however, the Agency proposed that the final processors require suppliers to give the name and address of the person who recovered the refrigerant and the date refrigerant was recovered.

EPA discussed the option of combining the certification with a symbol or mark made on each piece of equipment that has had the refrigerant removed by the supplier. The Agency stated that this certification allows the final processors to continue to accept goods and machines for scrap recycling while being assured that their suppliers have removed refrigerant. The certification would not be sent to the Agency.

Commenters in general were in favor of some type of certification between the final processor and the recoverer of the refrigerant in the cases where the final processor does not remove the refrigerant itself. They agreed that there was no need to send the certification to the Agency, although many commenters suggested more flexibility in the elements of the certification. Several commenters suggested that certification be allowed for shipments of equipment instead of for each individual piece, especially in cases where the equipment is received already crushed. The Automotive Dismantlers' and Recyclers Association (ADRA) requested that vehicle recyclers be exempted from any recordkeeping or reporting to final processors because of the burden the requirements place on these small, family-run businesses. Finally, AHAM suggested that the Agency specifically limit the elements to name, address and date of refrigerant removal in order to restrict localities or individual final processors from requiring more information.

The intent of the Agency in specifying the elements of the certification between parties was to give guidance on the types of elements that the Agency believed necessary for an individual to be assured that refrigerant had been properly evacuated from equipment. As stated above, the Agency believes flexibility is important in this program to allow for the variability of local circumstances. As a result, the Agency has modified the requirements of a certification between two parties to allow for a single certification for a shipment of equipment or other similar provisions, such as a contract between two parties stating that one party has the responsibility to remove refrigerant from equipment before delivery. The Agency believes that the contract option is appropriate for businesses such as the automotive dismantlers to streamline transactions in cases where they maintain long-standing business relationships with the scrap dealers. The change also reflects the fact that the stated requirements are a minimum and individuals, localities or states may ask for additional information if they wish.

The Agency received several comments on the proposed suggestion that labels or marks be placed on equipment once it had been evacuated. As stated in section 2 above, commenters were divided on the need and utility of marking individual pieces of equipment. Although the Agency understands that marking appliences can be a useful method to identify evacuated equipment and that some localities have already incorporated this idea, it may not be useful in all cases. As a result, the Agency will continue to offer marking or labeling appliances as a program suggestion, but will not require it.

Two commenters felt that the last sentence of § 82.156(f)(2), which states that the signed statement between the entities "does not relieve the disposer of responsibility for recovering any refrigerant that remains in the appliance", is unfair and exceeds the requirements of the venting prohibition. They maintain that the scrap facility expects the requirements of the written agreement would be performed and should not be held liable for knowingly releasing ozone-depleting substances. The Agency believes that certification should reflect that refrigerant was properly removed (i.e. according to the standards set out in this regulation). If the certification is accepted in good faith, then the Agency agrees with the commenters that the entity receiving the certification is relieved of their liability. If the entity accepting the certification knows or should know that refrigerant remains in the appliance, they would still be held liable, however.

As stated in the proposal, the Agency wishes to clarify that, as in the case of the final processor that chooses not to remove refrigerant, the supplier to the

final processor does not have to remove the refrigerant but then must assure, through an accompanying certification, that refrigerant has been removed earlier in the disposal chain. Any copies of the certificate of removal provided to the supplier could be passed on to the final processor.

5. Technician Training

In the proposal, the Agency discussed the information needed by technicians to perform refrigerant removal from appliances including MVACs and concluded that the level of expertise required for recycling and recovery in the disposal sector may not be as high as that required in the servicing sector. The salvaging sector differs from servicing in that the technicians do not reintroduce refrigerant to equipment, they simply remove it. Other factors considered were the lack of trade associations or groups that may represent the wide variety of technicians that may perform the refrigerant removal activity and that the technicians involved in the removal of refrigerant may only perform this activity occasionally. As a result, the Agency did not propose technician certification requirements and instead stated it would develop guidance documents regarding refrigerant removal with the assistance of industry.

Seven commenters stated that they believed mandatory technician certification should be required in the disposal sector, as well as the servicing sector. Refrigerant Recovery/Recycling Service Company, Inc. described several technical situations to illustrate the need for technician training for the proper removal of refrigerant. One commenter noted that technician certification should be required precisely because the individuals who will perform the removal only do so occasionally and therefore do not have as much knowledge as the servicing technicians. Consistency with the servicing requirements of both section 608 and section 609, the amount of refrigerant available in the disposal sector, and the difficulty in distributing guidance material were also given as reasons for mandatory technician certification requirements.

The Agency believes that refrigerant recovery from any sector requires knowledge of both the equipment used to recover refrigerant and the appliance that is to be evacuated. Refrigerants are pressurized gases that could pose safety risks if not handled properly, the substances must be kept separate to be of value, and evacuation equipment must be used correctly to be effective. By not requiring technician certification, the Agency did not intend to imply that anyone could perform these activities without training. Instead, the proposal reflected the fact that recovery of refrigerant is a simpler task than the combination of recovering refrigerant and returning refrigerant (at the appropriate purity level) to equipment. The disposal sector is distinct from the servicing sectors of both section 608 and 609 in that refrigerant is not returned to equipment. A large amount of emphasis is placed on avoiding equipment contamination in the technician certification programs and this is not an issue at disposal. Purchasing refrigerant is also not necessary in the disposal sector, but technician certification is linked to the ability to continue to purchase new refrigerant needed for servicing equipment.

The Agency has developed a guidance document alerting state and local government officials of the environmental consequences of releasing refrigerant, refrigerant salvage techniques, the importance of not mixing different refrigerants, and the importance of selling the recovered substance to reclamation facilities for purification before reuse. The document discusses successful refrigerant removal programs that already exist and the Agency believes it is a useful first step in developing simple, readily available training material. EPA intends to develop additional documents to assist the disposal sector in implementing the requirements of the final rule.

Appliance Recycling Centers of America commented that "the Agency would be most effective in a coordinating role and in assisting states as they develop local training programs". The Agency agrees with the commenter and welcomes any additional comments or suggestions regarding appropriate projects, guidance, or assistance needed.

6. Performance Standards for Recovery Equipment

In the proposal, the Agency required that the equipment used to recover refrigerant from appliances and motor vehicles meet the same performance standards as equipment required for servicing, except that passive systems would not be permitted for use with appliances at disposal. EPA did not propose to require certification of that equipment but instead proposed allowing individuals to develop their own equipment while setting performance requirements for the efficiency the Agency expects the equipment to meet. The efficiency standards proposed were 102 mm of mercury vacuum for MVACs and 90 percent evacuation of refrigerant for other small appliances. Any equipment intended for sale for use in salvaging operations must meet the efficiency standards and the Agency recommended independent laboratory tests to assure that the equipment complies with industry safety standards. These tests would be the same as those for equipment intended for servicing.

Several commenters agreed that performance standards were an appropriate method for regulating the efficiency of the equipment used in the disposal sector. ARI, however, stated that all equipment should be certified in order to assure that equipment can reach efficiency levels before it is used. Although EPA agrees that the efficiency levels are important, the Agency remains unconvinced as to the benefit of extending the recovery equipment certification program for the servicing sector to the disposal sector. The Agency encourages the salvaging sector to use certified equipment when possible; however, the Agency is aware that some operations in the disposal sector frequently involve the evacuation of several pieces of equipment simultaneously. Some entities that are already evacuating equipment at disposal have built their own equipment suitable for their specific circumstances and are able to perform their salvage operations quickly and efficiently. The Agency would like to continue to encourage these activities and keep the burden of compliance low for the disposal sector. The Agency believes that there is a powerful incentive to recover as much refrigerant as possible once recovery is attempted because the refrigerant is a valuable product. Therefore, the Agency maintains the proposed performance standard concept in today's rule.

Several comments were received regarding the proposal to allow only active equipment to be used in the disposal sector. The small appliance disposal sector was distinguished from the small appliance servicing sector, where both active and passive systems were proposed as acceptable, because EPA was concerned that passive recovery would generally be less efficient and would require increased time for operation. On the other hand, the Agency also stated that a requirement to use only active equipment for small appliance disposal may make compliance more difficult and therefore less likely in some instances. Five commenters, including NRDC/FOE, suggested that the requirement remain as proposed, two commenters requested a deeper vacuum

be required at disposal, and seven commenters, including AHAM, suggested that system-dependent (passive) equipment should not be excluded from the disposal sector.

Although EPA believes that system-dependent equipment will not play a large role in the disposal sector, especially in situations where several appliances are being evacuated at once, it has changed the performance requirements for the disposal sector to match those of the servicing sector. The primary reason for the change is because of the comment from AHAM that highlighted the potential overlap between the sectors and the possible scenario where a technician legally using a system-dependent device to service the appliance would not be allowed to recover the refrigerant from the same appliance if it were targeted for disposal. The Agency is aware of localities where the only option for refrigerant recovery from appliances is removal by service technicians and the Agency does not want to eliminate this compliance option. Obtaining compliance from as many technicians as possible and facilitating removal of refrigerant is a primary goal of the safe disposal program. Therefore, the equipment efficiency requirements have been modified to mirror the equipment efficiency requirements for the servicing sector (see § 82.158(l/m)).

The proposal discussed the difficulties of refrigerant recovery from systems using CFC–12 when the ambient temperature falls below 60 degrees F. One commenter stated that many larger recovery operations actually occur indoors, although the Agency understands that smaller operations may indeed occur outside. Methods, such as heating, to raise recovery efficiency were described by commenters. EPA believes market incentives exist, once recovery is attempted, to maximize the amount of refrigerant technicians try to recover for sale and, therefore, prescribed procedures are not necessary. The Agency intends to incorporate solutions into guidance documents to this, and other problems, as they are raised.

Finally, the Agency wishes to remind individuals gathering refrigerant at disposal that the refrigerant must be sold to reclamation facilities for purification before it is reintroduced into the servicing sector.

In summary, the safe disposal requirements in today's final rule maintain the flexibility proposed on December 10, 1992. EPA has further specified the procedures that final processors may require from their suppliers who remove refrigerant and the performance capability of equipment used is now consistent with the servicing sector. Technicians are not required to be certified but individuals who perform refrigerant recovery must provide basic information to the EPA Regional Offices. For a section by section summary of changes made to the proposed rule, see section IV.

N. Servicing Apertures

Section 608 (b)(2) of the Act directs EPA to promulgate regulations requiring that any "appliance, machine, or other good containing a class I or class II substance in bulk shall not be manufactured, sold, or distributed in interstate commerce or offered for sale or distribution in interstate commerce unless it is equipped with a servicing aperture or an equally effective design feature" to facilitate removal of refrigerant at servicing and disposal. In today's notice, EPA is finalizing the requirement that all air-conditioning and refrigeration equipment manufactured after November 15, 1993 be equipped with a servicing aperture or an equally effective design feature.

In the proposed rule the Agency differentiated between appliances that contained less than one pound of refrigerant and appliances that contained more. EPA made this distinction to separate appliances that would require servicing apertures and those that would require process stubs or "pigtails". However, in light of comments received with the publication of the proposed rule, the Agency intends to distinguish equipment based on the definition of small appliances found in section III. E. of this rule for the purposes of this requirement. Based on this distinction, the Agency requires that all small appliances be manufactured with a process stub or "pigtail" within six months after publication of this final rule. The Agency altered this requirement in order to include other appliances that could contain more than one pound of charge but that normally have a process stub rather than a servicing aperture. These appliances include water coolers, window air conditioners, packaged terminal air conditioners, heat pumps, package terminal heat pumps, freezers and refrigerators, as well as any other equipment included in the definition of small appliance. The Agency recognizes that such equipment rarely requires entry into the refrigerant system, and that by requiring a servicing aperture could significantly increase possible leak rates. Since these systems rarely lose refrigerant during their current operation, the Agency did not want to incur emissions by requiring a servicing aperture for this equipment.

As proposed, the Agency is not dictating where the servicing aperture or the process stub should be placed for this equipment in today's rule. Several commenters believed that the Agency should specify the placement of the process stub and servicing aperture for different types of equipment, and that the common design does not allow for isolation of components to enable removal of liquid refrigerants. Given the varying types of air-conditioning and refrigeration equipment in the market, however, the Agency could not accurately determine the appropriate placement of these valves in all equipment. The Agency believes that manufacturers themselves are best suited to decide the placement of these valves. Manufacturers can decide the appropriate placement of these valves, balancing potential leak rates, due to poor placement, with the need to easily recover the refrigerant.

Several commenters believed that the use of schraeder valves, flared or compression fittings and clamp-on piercing access valves should be prohibited. Valve cores restrict flow of liquid refrigerant and provide easy access for vandals. Adapters for charging hoses are not 100 percent leak-free as some adapters trap the refrigerant in the hose which allows for possible cross contamination into other clean systems.

However, several commenters stated that schraeder valves should not be prohibited, and that it is the technician and not the valve that is the problem. If the isolated portion of the system has been pumped down to atmospheric pressure, then there is little or no loss when there is a need to remove the valve stem. Other commenters stated that the schraeder valves are effective devices that actually minimize leaks, and although they tend to slow the process of recovering refrigerant, there are devices that will remove the valve core to speed up the process.

In today's final rule, the Agency is not prohibiting the use of schraeder valves on small appliances. EPA believes that such valves assist in the recovery of refrigerant, and that concerns for their release of refrigerant can be minimized through proper use. All schraeder valves should be capped while not in use.

O. Exemption from Regulatory Requirements for Refrigerant Uses for Which No High-Efficiency Recovery Technology Exists

In the proposal, EPA requested comment on whether it should set up a procedure to grant exemptions from this

rule's requirements for refrigerant uses for which no suitable, high-efficiency recovery technology existed. The Agency noted that it had been contacted by a technician servicing very high-pressure refrigeration equipment that could neither be evacuated on site using self-contained (active) recovery equipment nor transported to a shop where self-contained recovery equipment was located. Based on this example, EPA was concerned that it might not be possible to comply with the rule's requirements while servicing or disposing of some types of appliances in some types of applications. The Agency emphasized that exemptions would only be granted under very limited circumstances, and that the burden of proof of the need for an exemption would lie on the person seeking it.

EPA received several comments favoring the establishment of a procedure whereby the Agency could review requests for exemption on a case-by-case basis. One commenter agreed with the need for an exemption process, but believed that exemptions should only be granted until applicable recovery technologies were developed. Other commenters favored the up-front exemption of certain sectors, such as airplanes and small appliances, from the rule. Two commenters stated that there should be no exemptions from the rule.

As discussed in section III. F, the Agency is allowing use of system-dependent (passive) equipment with less than 15 pounds of very high-pressure refrigerants (as well as other refrigerants), which will allow individuals recovering less than 15 pounds of very high-pressure refrigerants with system-dependent equipment to continue doing so without seeking an exemption. EPA has, therefore, decided that an exemption procedure is unnecessary. The Agency believes that permitting system-dependent recovery equipment adequately addresses the concerns raised with regard to very high-pressure refrigerant.

EPA is not exempting any particular industry sector from this rule's requirements because the Agency is required by section 608(a) to maximize recycling of class I and class II substances during the service, repair, and disposal of appliances, and recovery technologies exist for all of the applications of appliances of which the Agency is aware. EPA believes that it has tailored its requirements to ensure that they are practicable in all industry sectors, including small appliances and airplanes.

IV. Summary of Changes to Proposed Rule

This section briefly describes the provisions of today's final rule. Any changes made to the rule language as a result of public comments are described. Various changes to the final rule that have been made for purposes of clarification are not described herein.

A. Authority, Purpose and Scope

There have been additions to the scope section to clarify that the rule covers refrigerant reclaimers, appliance owners, and manufacturers of appliances and recycling and recovery equipment in addition to persons servicing, repairing, maintaining, and disposing of appliances.

B. Definitions (§ 82.152)

The following terms and definitions have been added or changed since the rule was proposed:

The term "active recovery equipment" has been changed to "self-contained recovery equipment," and the definition (now (u)) has been broadened to include equipment that may use means other than an on-board compressor to transfer refrigerant.

For the purposes of the leak repair requirements (§ 82.156(i)), definitions were added for commercial refrigeration (d) and industrial process refrigeration (g). The disposal definition (e) remained essentially as proposed with additional clarification that it includes the entire disposal process.

The definition of "high-pressure appliance" (f) has been changed to include appliances using R–114. The term "intermediate-pressure appliance" has been eliminated.

The definition of "low-loss fitting" (h) has been expanded to include fittings that can be closed manually.

A definition of "major maintenance, service, or repair" (j) was added.

A definition of MVAC-like appliance (l) was added to specify equipment used to cool driver or passenger compartments of non-road vehicles.

A definition of "normally containing" (m) a quantity of refrigerant was added.

The term "passive recovery equipment" has been changed to "system-dependent recovery equipment," and the definition (now (w) has been changed slightly for clarity.

A definition of "recovery efficiency" (s) was added.

The definition of "small appliance" (v) has been changed to include specific products that are fully manufactured, charged, and hermetically sealed in a factory with five pounds or less of refrigerant.

C. Prohibitions (§ 82.154)

In general, the prohibitions prevent persons from performing appliance maintenance, service, repair, and disposal without adhering to the requirements of section 608 and this rule.

Prohibition (a) reiterates the statutory prohibition on the knowing release of refrigerant during appliance maintenance, service, repair, and disposal. This prohibition also states that refrigerant released when the requirements of this rule or the MVACs rule (Subpart B) are followed will be considered "de minimis," and will therefore not be subject to the prohibition. Prohibition (b) prohibits persons from opening appliances without observing the required practices and using certified equipment.

Prohibitions (c) and (d) prohibit manufacturers of recycling and recovery equipment from manufacturing uncertified equipment and from altering certified equipment without having it recertified.

Prohibitions (e) and (f) prohibit persons who have not certified to the Administrator that they have acquired recycling and recovery equipment from performing appliance maintenance, service, repair, or disposal.

Prohibitions (g) and (h) ban the sale of unreclaimed refrigerants and sales of refrigerants by uncertified reclaimers. Prohibition (i) bans the release by reclaimers of more than 1.5 percent of the refrigerant received by them.

Prohibition (j) prohibits the sale of appliances (except small appliances) that are not equipped with servicing apertures six months after the final rule is published. Prohibition (k) prohibits the sale of small appliances that are not equipped with a process stub to facilitate the removal of refrigerant at servicing and disposal.

The prohibition that appeared as (l) in the NPRM was eliminated because of redundancy.

A new prohibition (l) has been added which prohibits anyone but certified technicians from opening appliances (except MVACs) or disposing of appliances (except small appliances, MVACs, and MVAC-like appliances).

Prohibition (m) prevents technician training or testing programs from issuing certificates pursuant to § 82.161 unless the program has been approved.

Prohibition (n) bans the sale of any class I or class II substance after November 14, 1993 unless the sale is to certified technicians, manufacturers, sold for eventual resale to certified technicians, or charged into equipment by certified technicians.

D. Required Practices (§ 82.156)

This section establishes requirements for refrigerant recovery and disposition during the maintenance, service, repair, and disposal of appliances.

The evacuation requirements in § 82.156(a)(1) (for appliances except small appliances) have been changed in a number of areas since the rule was proposed. The refrigerant quantity threshold between stringent and less stringent requirements has been changed from 50 lbs to 200 lbs, and the relevant quantity is no longer the total charge of the equipment, but the charge in the isolated component of the equipment that is opened for service. EPA is establishing less stringent requirements for appliances containing HCFC–22 than were proposed, and the evacuation level for large high-pressure appliances has been changed from 20 inches to 15 inches. The effective date of the evacuation requirements has been changed from 30 days after publication of the rule to 60 days after publication of the rule.

EPA has added an exception to its evacuation requirements for maintenance, service, or repair that is not "major" and that is not followed by evacuation of the appliance to the environment. The exception for leaky appliances has been expanded to allow for evacuation of leaky low-pressure appliances in addition to leaky high-pressure appliances. These exceptions appear at § 82.156(a) (1), (2), and (3).

EPA has expanded its required practices for evacuation of small appliances (§ 82.156(a)(4)) to account for the fact that recovery equipment certified under appendix B may now be used in addition to equipment certified under appendix C.

The Agency has adopted applicable requirements from the MVACs rule for the maintenance, service, and repair of MVAC-like appliances (§ 82.156(a)(5)).

EPA has added requirement (b) to ensure that technicians who service, maintain, or repair appliances besides small appliances possess self-contained equipment in addition to system-dependent equipment.

Requirement (c) has been added to limit the use of system-dependent equipment to appliances with less than 15 pounds of refrigerant.

MVAC-like appliances have been excluded from provision (e), regarding transfers of refrigerant between equipment owned by the same person, because this provision contradicts the requirement to "properly use" recycling equipment under the MVACs rule, which is being adopted for MVAC-like appliances.

Required practice § 82.156(f) was modified to specify that ultimate disposers of small appliances and MVACs must either remove the refrigerant from equipment or verify that it has been removed. Further specificity was added to clarify activities that facility operators could take to notify suppliers to remove refrigerant if they are not removing it themselves. The last sentence of the proposed § 82.156(f) was deleted.

Required practice (h) regarding the performance standards for equipment used to recover refrigerant from small appliances was modified to reflect the changes in the efficiency standards for servicing equipment. No changes were made to the required practice (g) regarding equipment appropriate for removal of refrigerant from MVACs at disposal.

Required practice § 82.156(i) was added to specify the size of leaks that must be repaired in the industrial process and commercial refrigeration sectors (35 percent per year), and for all other equipment (15 percent per year) with charges larger than 50 pounds.

E. Standards for Recovery and Recycling Equipment (§ 82.158)

Section 82.158(a) requires manufacturers of recycling and recovery equipment to have the equipment certified by an approved equipment testing organization to meet EPA's requirements. Section 82.158(b) establishes these requirements for recycling and recovery equipment used with appliances besides small appliances. The levels of evacuation that the equipment must be able to achieve (§ 82.158(b)(1)) have been changed since the proposal to conform with the service practice standards described above. In addition, EPA is now requiring ARI 740–1993 instead of ARI 740–1988 as the method for testing equipment.

Provision § 82.158(b)(2) has been added to permit the testing and certification of recycling or recovery equipment for which no test methodology is set forth in ARI 740–1993. Standard 82.158(b)(3), which adopts ARI's minimum requirements for equipment certification, is unchanged (except for its number). Standard § 82.158(b)(4) has been changed to lower the quantity of refrigerant that can be released during noncondensables purging to three percent of the charge in two years.

Standard § 82.158(b)(5) has been changed to require that recycling and recovery equipment possess "low-loss fittings" as defined at § 82.152(h) (instead of "positive shutoff connections"). Standard § 82.158(b)(6) has been added to require that equipment have its liquid and vapor recovery rates measured.

Section 82.158(c) establishes requirements for grandfathered recycling and recovery equipment. These requirements have not been changed since the proposal, except in the case of small HCFC–22 equipment.

The equipment standard in § 82.158(d) was modified to require 90% efficiency when the compressor on the appliance is operating and 80% efficiency when the compressor is not operational. These requirements are the same for both passive and active equipment. A provision was also added to establish a standard (four inches of Hg vacuum) for equipment intended for use with small appliances that is certified under Appendix B. The standard for equipment used to recover refrigerant from small appliances at disposal (§ 82.158(m)) was modified to reflect these changes also. There were no changes in § 82.158(l)—equipment used to recover refrigerant from MVACs.

Requirement § 82.158(f) was added to apply the certification requirements for recycling and recovery equipment used with MVACs to recycling and recovery equipment used with MVAC-like appliances. Requirement § 82.158(g) permits grandfathering of recycling and recovery equipment intended for use with MVAC-like appliances as long as that equipment can draw a vacuum of 102mm of mercury.

E. Approved Equipment Testing Organizations (§ 82.160)

A requirement was added to § 82.160(c) to prevent organizations from certifying equipment before they are approved by EPA. However, § 82.160(e) was added to allow organizations to certify equipment tested previously under their programs if they can demonstrate to EPA that both the program and the equipment met all the requirements of this rule.

F. Technician Certification (§ 82.161)

Section 82.161(a) establishes a mandatory certification requirement, not in the NPRM, whereby all technicians must be certified by an approved certifying program within 18 months of the effective date of today's rule.

Section 82.161(b) describes the test subject material that will be included on the certification test.

Section 82.161(c) describes the responsibilities of certifying organizations.

Section 82.161 (d) and (e) describes the process for reconsideration of a certifying program.

Section 82.161(f) requires certified technicians to be able to perform recycling and recovery procedures. Failure to correctly perform these procedures could result in the revocation of certification.

Section 82.161(g) establishes a method for certifying programs to seek recognition for technicians trained prior to the effective date of today's rule.

G. Certification by Owners of Recovery and Recycling Equipment (§ 82.162)

Section 82.162 requires the certification of equipment by owners by September 13, 1993. New §§ 82.162 (a)(3) and (c)(3) have been added. These sections require the equipment owners to include the number of service vehicles used, as part of their certification statement. Sections 82.162 (a)(3) and (c)(3) in the NPRM now appear as §§ 82.162 (a)(4) and (c)(4). These sections were slightly modified. Equipment grandfathered by today's rule may not have serial or model numbers, therefore the phrase "if applicable" was added. Corrections were made to the addresses listed in § 82.162 (a)(5).

I. Reclaimer Certification (§ 82.164)

Section 82.164 establishes the requirements for reclaimers reprocessing refrigerant after September 13, 1993. There were no changes between the NPRM and today's rule.

J. Reporting and Recordkeeping Requirements (§ 82.166)

Provision § 82.166(b) was added to facilitate the functioning of the sales restriction.

Provision § 82.166(c) (formerly (b)) has been changed to require submission of lists of certified equipment annually at the end of each calendar year rather than annually beginning 60 days after publication of this rule.

Provision § 82.166(f) was added to require technician certification programs to keep records of the names and addresses of all individuals taking the tests, the scores of all certification tests administered, and the dates and locations of all tests administered, and to send EPA an activity report every six months.

Provision § 82.166(j) was added to require persons servicing appliances normally containing over 50 pounds of refrigerant to provide the owner and/or operator of such appliances with documentation that indicates the amount of refrigerant added to the appliance.

Provision § 82.166(k) was added to require owners and/or operators of appliances normally containing over 50 pounds of refrigerant to keep servicing records documenting the date and type of service, as well as the quantity of refrigerant added.

Provision § 82.166(l) was added to require technicians to keep a copy of their certificate at their place of business.

K. Appendices A, B and C.

Appendix A was not changed.

Appendix B was changed from ARI 740–1991 to ARI 740–1993.

Appendix C has been modified in some of its measurement techniques.

L. Standards for Becoming a Certifying Program for Technicians (Appendix D)

Appendix D establishes additional requirements organizations must meet in order to be approved as a technician certifying program pursuant to § 82.161.

V. Summary of Supporting Analyses

A. Regulatory Impact Analysis

Executive Order No. 12291 requires the preparation of a regulatory impact analysis (RIA) for major rules, defined by the order as those likely to result in:

(1) An annual effect on the economy of $100 million or more;

(2) A major increase in costs or prices for consumers, individual industries, Federal, state or local government agencies, or geographic industries; or

(3) Significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of the United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

The annualized costs for this rulemaking, $71 million, fall under $100 million. Therefore, the Agency has determined that this regulation does not meet the definition of a mejor rule under E.O. 12291. Nonetheless, due to the proximity of the costs of this rule to the $100 million threshold, the Agency has fulfilled the requirements of E.O. 12291 and prepared an RIA to assess the impact of the regulation (see Regulatory Impact Analysis: The National Recycling and Emission Reduction Program, March 23, 1993) which is available for review in the public docket for this rulemaking. This analysis is summarized below.

1. *Baseline.* Since these regulations are being promulgated in addition to other regulations that affect the use of CFCs and HCFCs, the baseline for this analysis must reflect the state of affairs after the implementation of previous rules and before the implementation of the final rule. Two provisions of the Clean Air Act that must be considered when defining the baseline for these regulations are the phaseout of CFCs required by section 604 of the Act and the prohibition on venting contained in section 608(c), which is self-effectuating. For the purposes of the analysis, two variables were chosen to describe the effects of these provisions: the percentage of the market in which recycling and recovery would occur as a result of the provision (referred to as either market penetration or compliance); and the average recapture efficiency of the recycling or recovery methods that would be employed.

The CFC phaseout has two important effects for the baseline: it affects the quantities of CFCs and HCFCs that need to be recycled and it makes recycling cost-effective for owners of equipment in certain sectors. As the CFC phaseout restricts the supply of CFCs, their prices will rise. As a result, substitute chemicals will replace CFCs in new equipment and it will become less expensive to recycle the CFCs in existing equipment than to buy virgin CFCs to replace them. Sectors in which recycling is likely to occur under the phaseout include retail food, cold storage, chillers, refrigerated transport, and industrial process refrigeration. In this analysis, market penetration is expected to be 100%, and the efficiency of equipment to be about 95% in these sectors under the phaseout. A recovery efficiency of ninety-five percent is assumed to be the level that is most cost-effective from a private (as opposed to a social) perspective. This baseline assumes that producers will phase out the production of CFCs by January 1, 1996.

The self-effectuating prohibition on venting required by section 608(c) can be considered a minimal requirement to recycle because chemicals must be recycled, or at least stored, if they cannot be vented. However, because the prohibition on venting does not in itself contain standards, maximum recovery efficiency and full compliance would not be expected under the prohibition alone. The likely rates of compliance in the household refrigeration and residential air-conditioning sectors would be estimated to reach approximately 80% under the prohibition alone, and efficiencies are estimated to be 75% for these sectors.

Under the requirements of this recycling rule, recovery efficiencies are expected to range between 90% and 99%, depending upon the equipment requirements for each sector. The

analysis assumes full compliance across all sectors.

2. *Costs.* The costs of the recycling rule consist of the costs of certifying recycling and recovery equipment, technician certification, recordkeeping costs, and refrigerant storage costs. The Agency estimates the cost for this regulatory program over a 25 year period between 1994 and 2015 is $1.3 billion. These costs were discounted at 2%. EPA performed this same analysis with discount rates of 4% and 7%. The costs are $1 billion and $0.8 billion, respectively.

3. *Benefits.* The benefits of the three provisions discussed above consist of the avoided damage to human health and the environment that would have occurred if, without regulation, ozone-depleting refrigerants had been released rather than recaptured. EPA's calculation of benefits includes the following: (1) Reduction in the incidence of melanoma and non-melanoma skin cancer cases and fatalities, (2) reduction in the incidence of cataract cases, (3) increases in the value of crops harvested due to reductions in both direct UV effects and indirect effects from tropospheric (ground-based) ozone, (4) increases in the value of fish harvested due to decreased levels of damaging UV radiation, and (5) decreased costs in protecting polymer products.

Under the recycling rule, recycling efficiencies are assumed to increase because certification of recycling and recovery equipment increases the average efficiency of this equipment. The Agency estimates the range of benefits to be from $.4 billion to $1.7 billion, depending upon whether each life saved is valued at $3 or $12 million. These benefits were discounted at a 2% discount rate. The Agency estimated benefits at discount rates of 4% and 7%. The resulting benefits were from $.1 billion to $.6 billion at the 4% discount rate, and $.04 billion to $.2 billion for the 7% discount rate.

4. Initial Program Costs and Benefits for Technician Certification

The short-term benefits of technician certification were not included in the previous section. The Agency assumed that all technicians immediately complied with the regulation, and that the market fully transmitted all costs and benefits to equipment owners and technicians. Under this "perfect market scenario", technicians knew how to recycle efficiently, did not mistakenly mix refrigerants, took precautions to avoid using contaminated refrigerants, and worked to maximize benefits for themselves, as well as for equipment owners.

Unfortunately, there are impediments to the functioning of this market. First, technicians may not be fully accountable to the owners. Eventual equipment failure and losses in energy efficiency cannot be readily traced to poor servicing techniques. These may be hidden costs, or may not surface until some time after servicing. In such cases, the owner is unable to determine the cause of the failure. Technician training can ensure an educated workforce to avoid costly mistakes.

Furthermore, there are over 300,000 technicians. It is difficult to assume that all 300,000 technicians immediately comply with the regulation, and use proper servicing techniques. Technicians must become trained in recycling techniques and become knowledgeable of the regulation. A technician certification program would provide this information as quickly as possible.

In a separate analysis, the Agency investigated short-term costs and benefits to the immediate implementation of the recycling program. Under this scenario, the Agency assumes that without technician certification and training, there are likely energy efficiency losses due to inadvertent mixing of refrigerants. The Agency estimates that in the first year, these costs could exceed $100 million. In addition, trained technicians would avoid introducing refrigerant contaminated with acids and other corrosives due to compressor burnouts. The Agency estimates this cost saving to be $15 million annually.

In addition, proper training could improve productivity. Under this assumption, technicians could save $50 million in the first year. Furthermore, increased recycling avoids the need to retrofit a significant number of pieces of equipment. This could save close to $88 million annually.

An increase in compliance rates due to better knowledge of responsibilities yields environmental benefits. EPA anticipates that an increase of 5% in compliance with the recycling regulation yields an annualized benefit of $10 to $42 million. Through increased recycling, the United States can avoid more than $6 to $26 million in environmental costs for production past the year 1995 for essential uses.

The Agency believes that these short-term cost savings and benefits exceed the costs for such a program. EPA estimates that the start-up cost to certify 300,000 technicians can range from $50 to $80 million. Even when compared to the long-term cost of $152 million for technician certification, these benefits outweigh the cost.

B. Regulatory Flexibility Analysis

1. Purpose

The Regulatory Flexibility Act, 5 U.S.C. 601–612, requires that Federal agencies examine the impacts of their regulations on small entities. Under 5 U.S.C. 604(a), whenever an agency is required to publish a general notice of proposed rulemaking, it must prepare and make available for public comment an initial regulatory flexibility analysis (RFA). Such an analysis is not required if the head of an agency certifies that a rule will not have a significant economic impact on a substantial number of small entities, pursuant to 5 U.S.C. 605(b).

The Agency has performed an initial regulatory flexibility analysis and determined that this regulation is unlikely to have a significant impact on a substantial number of small businesses. The analysis is found in appendix A in the Regulatory Impact Analysis: The National Recycling and Emission Reduction Program and is available for review in the docket. The methodology and results of the analysis are presented below.

2. Methodology

To examine the impacts on small businesses, EPA characterized the regulated community by identifying the SIC codes that would be involved in the disposal of motor vehicle air conditioners and in the servicing, repair, and disposal of small appliances, residential air-conditioning, and transport refrigeration. Firms in these sectors were divided into six segments: Appliance repair shops, air-conditioning contractors, refrigerated transport service dealers, scrap yards and intermediate processors, automobile dismantlers, and autowreckers. Impacts on the retail food, cold storage, chiller, and industrial process sectors were not analyzed because refrigerant recycling and recovery is cost-effective from a private perspective in these sectors. For these sectors, the private costs associated with recycling and recovery are negligible or negative. In addition, two other sectors were excluded from the analysis: Vocational schools and municipal solid waste facilities. Data on vocational schools are scarce, and the proposed regulations, which affect only one aspect of vocational training, are not likely to have any significant impact on vocational schools. Similarly, the regulations are not likely to have a significant impact on municipal solid waste facilities because these facilities

generally do not accept white goods such as refrigerators, freezers, and room air conditioners.

There was a disparity between the EPA and the Census Bureau estimates of the number of establishments in each of the six affected industry segments. In some areas, such as the appliance repair segment, the number of establishments estimated by EPA exceeded the number allocated to the corresponding SIC category. In others, such as the air-conditioning contractor segment, EPA estimates fell below Census numbers for the corresponding SIC. The disparities in each category were largely a matter of definition. Because the Census Bureau assigns a business to a given SIC code based on the source of the majority of its sales receipts, an SIC code may not include many businesses that do only some work in the area of concern. At the same time, some SIC codes may prove overly inclusive, such as SIC 1711, "Plumbing, Heating, and Air-conditioning Contractors," which includes some establishments engaged only in plumbing work and not in the service or disposal of air-conditioning equipment. In choosing the SIC codes that corresponded to segments of the potential regulated community, EPA's analysis focussed primarily on ensuring that each sector of the potential regulated community had a corresponding SIC code that accurately represented its structure. The fraction of businesses that would be defined as small (under the Small Business Act, or SBA) among the establishments identified by EPA in each segment was then assumed to be the same as the fraction of businesses that would be defined as small among those in the comparable SIC category.

After determining the number of entities in each industry segment that would be classified as small, the Agency examined the compliance costs initially incurred by firms and the extent to which these costs could be passed on to consumers. EPA then performed impact tests using sales, profits, and cash-flow measures.

The costs incurred by a firm as a result of the proposed rule include the following elements: Labor costs, operating costs, capital costs, certification costs, and the avoided costs of purchasing virgin refrigerant. To estimate these costs, EPA used data on the quantity of air-conditioning or refrigeration equipment in each of the affected sectors and on the frequency of service and disposal in each sector. EPA then divided affected businesses into those with under $1 million annual sales and those with over $1 million annual sales. This distinction is important because larger firms perform more service and disposal jobs than smaller firms and therefore incur higher labor and operating costs. (The distinction bears no direct relationship to the SBA definition of small business.) Annual direct compliance costs per business ranged between $624 for small appliance repair shops and $36,932 for large autowreckers.

Under certain conditions, some portion of regulatory costs will be passed on to consumers. Since the proposed rule meets these conditions, businesses will not bear all regulatory costs. (For a complete discussion of regulatory costs incidence, please see appendix A to the RIA.) Microeconomic theory suggests that the ratio between the elasticity of demand for a good and the elasticity of supply for that good is roughly equivalent to the ratio between the producers' share of regulatory costs and the consumers' share of regulatory costs. The extent to which regulatory costs may be passed on to consumers, therefore, depends upon the relationship between the elasticity of demand and the elasticity of supply for the good in question. The elasticities of demand and supply are a measure of how demand for a good and supply of a good change in response to changes in price.

Although the factors that determine supply and demand elasticity can be complex, certain forces frequently play an important role in determining the character of supply and demand elasticity for a good. Generally, demand for a good will decrease when the price rises because consumers will choose to purchase substitutes for the good. However, if substitutes are nonexistent or expensive, consumers will have fewer alternative to purchasing the original good, and demand will change very little. In this case, the demand elasticity for the good is low. Supply of a good will usually decrease when the price falls because it becomes less profitable to produce the good. However, if it is expensive to change the supply of the good (e.g., requires the retirement of valuable capital equipment), producers will have fewer alternatives to producing the good, and supply will change relatively little. In this case, the supply elasticity of the good is low.

When the demand elasticity for a good is low and the supply elasticity for the good is high, the majority of regulatory costs will likely be borne by consumers. EPA developed elasticity estimates for each segment of the regulated community. Demand elasticity estimates for the specific goods in question were not available. As a result, the Agency used estimates of demand elasticity in closely related industries as proxies for actual elasticity estimates. Since no estimates of supply elasticity were available, the Agency developed quantitative estimates of supply elasticity based on its understanding of the various segments of the regulated community.

EPA's analysis showed that demand was likely to be inelastic in all affected industry segments. For instance, demand for household appliance service is unlikely to fall significantly in response to a rise in price because (1) Equipment such as the household refrigerator renders a service that is vital to most consumers, and (2) the few substitutes to appliance repair, such as purchase of a new appliance, are often expensive and impracticable. The situation is similar in the other service segments. In the disposal segments, demand is likely to be inelastic because consumers have few alternatives to disposing of appliances when these items are retired, and auto dismantlers and wreckers (who play the role of consumer in this transaction) have few substitutes for junked automobiles in their operations.

Elasticities of supply varied somewhat more. The appliance and residential air-conditioning repair segments are likely to have high supply elasticities because entering these businesses requires a relatively low capital investment and moving into related areas (e.g., heating) is relatively easy. On the other hand, the supply elasticity of refrigerated transport service is lower because refrigerated transport service is highly specialized and entry into the industry entails substantial capital investment. Scrap yards and intermediate processors are likely to respond readily to price changes because they have a large degree of flexibility with regard to which type of appliances they choose to accept. Supplies of junked automobiles, however, are unlikely to change significantly in response to the prices offered for them.

Based on these estimates, EPA calculates that firms will bear between four percent (for scrap yards and intermediate processors) and 25 percent (for refrigerated transport service dealers) of the compliance costs associated with the proposed rule. Annual compliance costs borne by firms range between $39 for small appliance repair shops and $6,987 for large auto dismantlers. (Again, the term "large" is used here to refer to a large small business.)

To evaluate the significance of these costs, EPA performed impact tests using

sales, profits, and cash flow measures. Existing EPA guidelines suggest that significant economic impacts on small businesses occur when any one of the following three criteria are satisfied (Environmental Protection Agency, Office of Policy, Planning, and Evaluation, Guidelines for Complying with the Regulatory Flexibility Act, Draft Document dated January 18, 1991.):

- Annual compliance costs exceed one percent of sales;
- Annual compliance costs exceed 10 percent of profits; or
- Annual debt-financed capital compliance costs exceed 20 percent of current cash flow.

These criteria makeup a screening test used to assess initially the impacts likely to result from a proposed regulation. Should a "substantial number" of small business, defined as over 20 percent of affected small business, satisfy any of the criteria outlined above, EPA guidelines require that more detailed economic analysis be performed.

Many small establishments failed the profits and cash flow tests (that is, profits and cash flow were negative) before imposition of the regulation. These were thus determined to be in poor financial condition under the baseline and their continued failure of these tests was not attributed to the proposed rule. Any small entities not in poor financial condition under the baseline that failed any of the tests above were assumed to incur a significant economic impact under the proposed rule.

EPA's analysis showed that the proposed rule will have a significant impact on 16 percent of the affected small businesses. These small businesses may respond in a number of ways. They may: (1) Close as a result of the costs imposed by regulation, (2) avoid the costs imposed by the regulation by ceasing work on refrigeration and air-conditioning equipment while continuing to provide other types of service, or (3) continue to service or dispose of affected equipment while incurring increased cost.

Available census and financial data suggest that most of the 16 percent will continue to service or dispose of affected equipment. EPA estimates that annual compliance costs borne by firms as a result of the proposed rule will actually exceed annual profits for approximately 2500 small businesses. These 2500 establishments comprise approximately 3 percent of all small businesses in the regulated community. Firms that incur annual compliance costs in excess of annual profits may be forced out of business or, alternatively, may elect to discontinue work that involves refrigeration or air-conditioning equipment. Firms whose annual compliance costs fall below their annual profits are likely to stay in business.

Where possible, EPA has attempted to minimize the economic impact of this regulation on small businesses. For instance, EPA is proposing less stringent standards for the recovery of refrigerant from small appliances, which are frequently repaired by one- or two-man service shops. These standards would permit the use of relatively inexpensive passive recovery devices. In addition, EPA is proposing fewer requirements and a more flexible program for the disposal of small appliances, room air conditioners, and MVACs because the industries that dispose of these items are unusually decentralized.

Moreover, this analysis probably overstated the potential impacts of regulation for two reasons. First, it estimated the combined impacts of both the section 608 recycling rule and the self-effectuating prohibition on venting. EPA estimates that for the residential air-conditioning and household appliance sectors, 80 percent of recovery jobs can be attributed to the prohibition on venting, and for transport refrigeration, 50 percent of recovery jobs can be attributed to the prohibition. If this analysis had examined only the incremental impacts due to the recycling rule, the estimate of the percentage of small businesses affected significantly would have been reduced accordingly. Second, this analysis examined each industry segment in isolation, failing to account for interactions between competing industry sectors (e.g., service vs. disposal of appliance) that would tend to decrease costs borne by firms. Thus, the Agency certifies that this regulation will not have an impact on a significant number of small entities, pursuant to 5 U.S.C. 605(b).

C. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* An Information Collection Request document (ICR No. 1626.02) has been prepared by EPA and a copy may be obtained from Sandy Farmer, Information Policy Branch; EPA; 401 M Street, SW., (PM-223Y); Washington, DC 20460 or by calling (202) 260-2740.

Public reporting burden for this collection of information is estimated to vary from 0.08 to 180 hours per response with an average of 0.2 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the collection of information.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch; EPA; 401 M Street, SW., Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA."

List of Subjects in 40 CFR Part 82

Administrative practice and procedure, Air pollution control, Reporting and recordkeeping requirements, Stratospheric ozone layer.

Dated: April 23, 1993.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, 40 CFR part 82 is amended as follows:

PART 82—PROTECTION OF STRATOSPHERIC OZONE

1. Authority: The authority citation for part 82 continues to read as follows:

Authority: 42 U.S.C. 7414, 7601, 7671–7671q.

2. Part 82 is amended by adding subpart F to read as follows:

Subpart F—Recycling and Emissions Reduction

Sec.

Subpart F—Recycling and Emissions Reduction

§ 82.150 Purpose and scope.

(a) The purpose of this subpart is to reduce emissions of class I and class II refrigerants to the lowest achievable level during the service, maintenance, repair, and disposal of appliances in accordance with section 608 of the Clean Air Act.

(b) This subpart applies to any person servicing, maintaining, or repairing appliances except for motor vehicle air conditioners. This subpart also applies to persons disposing of appliances, including motor vehicle air conditioners. In addition, this subpart applies to refrigerant reclaimers, appliance owners, and manufacturers of appliances and recycling and recovery equipment.

§ 82.152 Definitions.

(a) *Appliance* means any device which contains and uses a class I or class II substance as a refrigerant and which is used for household or commercial purposes, including any air conditioner, refrigerator, chiller, or freezer.

(b) *Approved equipment testing organization* means any organization which has applied for and received approval from the Administrator pursuant to § 82.160.

(c) *Certified refrigerant recovery or recycling equipment* means equipment certified by an approved equipment testing organization to meet the standards in § 82.158 (b) or (d), equipment certified pursuant to § 82.36(a), or equipment manufactured before November 15, 1993, that meets the standards in § 82.158 (c), (e), or (g).

(d) *Commercial refrigeration* means, for the purposes of § 82.156(i), the refrigeration appliances utilized in the retail food and cold storage warehouse sectors. Retail food includes the refrigeration equipment found in supermarkets, convenience stores, restaurants and other food service establishments. Cold storage includes the equipment used to store meat, produce, dairy products, and other perishable goods. All of the equipment contains large refrigerant charges, typically over 75 pounds.

(e) *Disposal* means the process leading to and including:

(1) The discharge, deposit, dumping or placing of any discarded appliance into or on any land or water;

(2) The disassembly of any appliance for discharge, deposit, dumping or placing of its discarded component parts into or on any land or water; or

(3) The disassembly of any appliance for reuse of its component parts.

(f) *High-pressure appliance* means an appliance that uses a refrigerant with a boiling point between −50 and 10 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes but is not limited to appliances using refrigerants −12, −22, −114, −500, or −502.

(g) *Industrial process refrigeration* means, for the purposes of § 82.156(i), complex customized appliances used in the chemical, pharmaceutical, petrochemical and manufacturing industries. This sector also includes industrial ice machines and ice rinks.

(h) *Low-loss fitting* means any device that is intended to establish a connection between hoses, appliances, or recovery or recycling machines and that is designed to close automatically or to be closed manually when disconnected, minimizing the release of refrigerant from hoses, appliances, and recovery or recycling machines.

(i) *Low-pressure appliance* means an appliance that uses a refrigerant with a boiling point above 10 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes but is not limited to equipment utilizing refrigerants −11, −113, and −123.

(j) *Major maintenance, service, or repair* means any maintenance, service, or repair involving the removal of any or all of the following appliance components: Compressor, condenser, evaporator, or auxiliary heat exchanger coil.

(k) *Motor vehicle air conditioner (MVAC)* means any appliance that is a motor vehicle air conditioner as defined in 40 CFR part 82, subpart B.

(l) *MVAC-like appliance* means mechanical vapor compression, open-drive compressor appliances used to cool the driver's or passenger's compartment of an non-road motor vehicle. This includes the air-conditioning equipment found on agricultural or construction vehicles. This definition is not intended to cover appliances using HCFC–22 refrigerant.

(m) *Normally containing* a quantity of refrigerant means containing the quantity of refrigerant within the appliance or appliance component when the appliance is operating with a full charge of refrigerant.

(n) *Opening* an appliance means any service, maintenance, or repair on an appliance that could be reasonably expected to release refrigerant from the appliance to the atmosphere unless the refrigerant were previously recovered from the appliance.

(o) *Person* means any individual or legal entity, including an individual, corporation, partnership, association, state, municipality, political subdivision of a state, Indian tribe, and any agency, department, or instrumentality of the United States, and any officer, agent, or employee thereof.

(p) *Process stub* means a length of tubing that provides access to the refrigerant inside a small appliance or room air conditioner and that can be resealed at the conclusion of repair or service.

(q) *Reclaim* refrigerant means to reprocess refrigerant to at least the purity specified in the ARI Standard 700–1988, Specifications for Fluorocarbon Refrigerants (appendix A to 40 CFR part 82, subpart F) and to verify this purity using the analytical methodology prescribed in the ARI Standard 700–1988. In general, reclamation involves the use of processes or procedures available only at a reprocessing or manufacturing facility.

(r) *Recover* refrigerant means to remove refrigerant in any condition from an appliance without necessarily testing or processing it in any way.

(s) *Recovery efficiency* means the percentage of refrigerant in an appliance that is recovered by a piece of recycling or recovery equipment.

(t) *Recycle* refrigerant means to extract refrigerant from an appliance and clean refrigerant for reuse without meeting all of the requirements for reclamation. In general, recycled refrigerant is refrigerant that is cleaned using oil separation and single or multiple passes through devices, such as replaceable core filter-driers, which reduce moisture, acidity, and particulate matter. These procedures are usually implemented at the field job site.

(u) *Self-contained recovery equipment* means refrigerant recovery or recycling equipment that is capable of removing the refrigerant from an appliance without the assistance of components contained in the appliance.

(v) *Small appliance* means any of the following products that are fully manufactured, charged, and hermetically sealed in a factory with five (5) pounds or less of refrigerant: refrigerators and freezers designed for home use, room air conditioners

(including window air conditioners and packaged terminal air conditioners), packaged terminal heat pumps, dehumidifiers, under-the-counter ice makers, vending machines, and drinking water coolers.

(w) *System-dependent recovery equipment* means refrigerant recovery equipment that requires the assistance of components contained in an appliance to remove the refrigerant from the appliance.

(x) *Technician* means any person who performs maintenance, service, or repair that could reasonably be expected to release class I or class II substances from appliances into the atmosphere, including but not limited to installers, contractor employees, in-house service personnel, and in some cases, owners. Technician also means any person disposing of appliances except for small appliances.

(y) *Very high-pressure appliance* means an appliance that uses a refrigerant with a boiling point below −50 degrees Centigrade at atmospheric pressure (29.9 inches of mercury). This definition includes but is not limited to equipment utilizing refrigerants −13 and −503.

§ 82.154 Prohibitions.

(a) Effective June 14, 1993, no person maintaining, servicing, repairing, or disposing of appliances may knowingly vent or otherwise release into the environment any class I or class II substance used as refrigerant in such equipment. De minimis releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition. Releases shall be considered de minimis if they occur when:

(1) The required practices set forth in § 82.156 are observed and recovery or recycling machines that meet the requirements set forth in § 82.158 are used; or

(2) The requirements set forth in 40 CFR part 82, subpart B are observed.

The knowing release of refrigerant subsequent to its recovery from an appliance shall be considered a violation of this prohibition.

(b) Effective July 13, 1993 no person may open appliances except MVACs for maintenance, service, or repair, and no person may dispose of appliances except for small appliances, MVACs, and MVAC-like appliances:

(1) Without observing the required practices set forth in § 82.156; and

(2) Without using equipment that is certified for that type of appliance pursuant to § 82.158.

(c) Effective November 15, 1993, no person may manufacture or import recycling or recovery equipment for use during the maintenance, service, or repair of appliances except MVACs, and no person may manufacture or import recycling or recovery equipment for use during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances, unless the equipment is certified pursuant to § 82.158 (b), (d), or (f), as applicable.

(d) Effective June 14, 1993, no person shall alter the design of certified refrigerant recycling or recovery equipment in a way that would affect the equipment's ability to meet the certification standards set forth in § 82.158 without resubmitting the altered design for certification testing. Until it is tested and shown to meet the certification standards set forth in § 82.158, equipment so altered will be considered uncertified for the purposes of § 82.158.

(e) Effective August 12, 1993, no person may open appliances except MVACs for maintenance, service, or repair, and no person may dispose of appliances except for small appliances, MVACs, and MVAC-like appliances, unless such person has certified to the Administrator pursuant to § 82.162 that such person has acquired certified recovery or recycling equipment and is complying with the applicable requirements of this subpart.

(f) Effective August 12, 1993, no person may recover refrigerant from small appliances, MVACs, and MVAC-like appliances for purposes of disposal of these appliances unless such person has certified to the Administrator pursuant to § 82.162 that such person has acquired recovery equipment that meets the standards set forth in § 82.158 (l) and/or (m), as applicable, and that such person is complying with the applicable requirements of this subpart.

(g) Effective August 12, 1993 until November 13, 1995, no person may sell or offer for sale for use as a refrigerant any class I or class II substance consisting wholly or in part of used refrigerant unless the class I or class II substance has been reclaimed as defined at § 82.152(q).

(h) Effective August 12, 1993 until November 13, 1995, no person may sell or offer for sale for use as a refrigerant any class I or class II substance consisting wholly or in part of used refrigerant unless the refrigerant has been reclaimed by a person who has been certified as a reclaimer pursuant to § 82.164.

(i) Effective August 12, 1993, no person reclaiming refrigerant may release more than 1.5% of the refrigerant received by them.

(j) Effective November 15, 1993, no person may sell or distribute, or offer for sale or distribution, any appliances, except small appliances, unless such equipment is equipped with a servicing aperture to facilitate the removal of refrigerant at servicing and disposal.

(k) Effective November 15, 1993, no person may sell or distribute, or offer for sale or distribution any small appliance unless such equipment is equipped with a process stub to facilitate the removal of refrigerant at servicing and disposal.

(l) Effective November 14, 1994 no person may open an appliance except for an MVAC and no person may dispose of an appliance except for a small appliance, MVAC, or MVAC-like appliance, unless such person has been certified as a technician for that type of appliance pursuant to § 82.161.

(m) No technician training or testing program may issue certificates pursuant to § 82.161 unless the program complies with all of the standards of § 82.161 and appendix D, and has been granted approval.

(n) Effective November 14, 1994 no person may sell or distribute, or offer for sale or distribution, any class I or class II substance for use as a refrigerant to any person unless:

(1) The buyer has been certified as a Type I, Type II, Type III, or Universal technician pursuant to § 82.161;

(2) The buyer has been certified pursuant to 40 CFR part 82, subpart B;

(3) The refrigerant is sold only for eventual resale to certified technicians or to appliance manufacturers (e.g., sold by a manufacturer to a wholesaler, sold by a technician to a reclaimer);

(4) The refrigerant is sold to an appliance manufacturer;

(5) The refrigerant is contained in an appliance; or

(6) the refrigerant is charged into an appliance by a certified technician during maintenance, service, or repair.

(o) It is a violation of this subpart to accept a signed statement pursuant to § 82.156(f)(2) if the person knew or had reason to know that such a signed statement is false.

§ 82.156 Required practices.

(a) Effective July 13, 1993, all persons opening appliances except for MVACs for maintenance, service, or repair must evacuate the refrigerant in either the entire unit or the part to be serviced (if the latter can be isolated) to a system receiver or a recovery or recycling machine certified pursuant to § 82.158. All persons disposing of appliances except for small appliances, MVACs, and MVAC-like appliances must evacuate the refrigerant in the entire

unit to a recovery or recycling machine certified pursuant to § 82.158.

(1) Persons opening appliances except for small appliances, MVACs, and MVAC-like appliances for maintenance, service, or repair must evacuate to the levels in Table 1 before opening the appliance, unless

(i) Evacuation of the appliance to the atmosphere is not to be performed after completion of the maintenance, service, or repair, and the maintenance, service, or repair is not major as defined at § 82.152(j); or

(ii) Due to leaks in the appliance, evacuation to the levels in Table 1 is not attainable, or would substantially contaminate the refrigerant being recovered. In any of these cases, the requirements of § 82.156(a)(2) must be followed.

(2)(i) If evacuation of the appliance to the atmosphere is not to be performed after completion of the maintenance, service, or repair, and if the maintenance, service, or repair is not major as defined at § 82.152(j), the appliance must:

(A) Be evacuated to a pressure no higher than 0 psig before it is opened if it is a high- or very high-pressure appliance; or

(B) Be pressurized to 0 psig before it is opened if it is a low-pressure appliance, without using methods, e.g., nitrogen, that require subsequent purging.

(ii) If, due to leaks in the appliance, evacuation to the levels in Table 1 is not attainable, or would substantially contaminate the refrigerant being recovered, persons opening the appliance must:

(A) Isolate leaking from non-leaking components wherever possible;

(B) Evacuate non-leaking components to be opened to the levels specified in Table 1; and

(C) Evacuate leaking components to be opened to the lowest level that can be attained without substantially contaminating the refrigerant. In no case shall this level exceed 0 psig.

(3) Persons disposing of appliances except for small appliances, MVACs, and MVAC-like appliances, must evacuate to the levels in Table 1.

TABLE 1.—REQUIRED LEVELS OF EVACUATION FOR APPLIANCES

[Except for small appliances, MVACs, and MVAC-like appliances]

Type of appliance	Inches of Hg vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)	
	Using recovery or recycling equipment manufactured or imported before Nov. 15, 1993	Using recovery or recycling equipment manufactured or imported on or after Nov. 15, 1993
HCFC–22 appliance, or isolated component of such appliance, normally containing less than 200 pounds of refrigerant.	0	0.
HCFC–22 appliance, or isolated component of such appliance, normally containing less than 200 pounds of refrigerant.	0	0.
HCFC–22 appliance, or isolated component of such appliance, normally containing 200 pounds or more of refrigerant.	4	10.
Other high-pressure appliance, or isolated component of such appliance, normally containing less than 200 pounds of refrigerant.	4	10.
Other high-pressure appliance, or isolated component of such appliance, normally containing 200 pounds or more of refrigerant.	4	15.
Very high-pressure appliance	0	0.
Low-pressure appliance	25	25 mm Hg absolute.

(4) Persons opening small appliances for maintenance, service, or repair must:

(i) When using recycling and recovery equipment manufactured before November 15, 1993, recover 80% of the refrigerant in the small appliance; or

(ii) When using recycling or recovery equipment manufactured on or after November 15, 1993, recover 90% of the refrigerant in the appliance when the compressor in the appliance is operating, or 80% of the refrigerant in the appliance when the compressor in the appliance is not operating; or

(iii) Evacuate the small appliance to four inches of mercury vacuum.

(5) Persons opening MVAC-like appliances for maintenance, service, or repair may do so only while properly using, as defined at § 82.32(e), recycling or recovery equipment certified pursuant to § 82.158 (f) or (g), as applicable.

(b) Effective July 13, 1993, all persons opening appliances except for small appliances and MVACs for maintenance, service, or repair and all persons disposing of appliances except for small appliances must have at least one piece of certified, self-contained recovery equipment available at their place of business.

(c) System-dependent equipment shall not be used with appliances normally containing more than 15 pounds of refrigerant.

(d) All recovery or recycling equipment shall be used in accordance with the manufacturer's directions unless such directions conflict with the requirements of this subpart.

(e) Refrigerant may be returned to the appliance from which it is recovered or to another appliance owned by the same person without being recycled or reclaimed, unless the appliance is an MVAC-like appliance.

(f) Effective July 13, 1993, persons who take the final step in the disposal process (including but not limited to scrap recyclers and landfill operators) of a small appliance, room air conditioning, MVACs, or MVAC-like appliances must either:

(1) Recover any remaining refrigerant from the appliance in accordance with paragraph (g) or (h) of this section, as applicable; or

(2) Verify that the refrigerant has been evacuated from the appliance or shipment of appliances previously. Such verification must include a signed statement from the person from whom the appliance or shipment of appliances is obtained that all refrigerant that had

not leaked previously has been recovered from the appliance or shipment of appliances in accordance with paragraph (g) or (h) of this section, as applicable. This statement must include the name and address of the person who recovered the refrigerant and the date the refrigerant was recovered or a contract that refrigerant will be removed prior to delivery.

(3) Persons complying with paragraph (f)(2) of this section must notify suppliers of appliances that refrigerant must be properly removed before delivery of the items to the facility. The form of this notification may be warning signs, letters to suppliers, or other equivalent means.

(g) All persons recovering refrigerant from MVACs and MVAC-like appliances for purposes of disposal of these appliances must reduce the system pressure to or below 102 mm of mercury vacuum, using equipment that meets the standards set forth in § 82.158(l).

(h) All persons recovering the refrigerant from small appliances for purposes of disposal of these appliances must either:

(1) Recover 90% of the refrigerant in the appliance when the compressor in the appliance is operating, or 80% of the refrigerant in the appliance when the compressor in the appliance is not operating; or

(2) Evacuate the small appliance to four inches of mercury vacuum.

(i) (1) Owners of commercial refrigeration and industrial process refrigeration equipment must have all leaks repaired if the equipment is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12 month period, except as described in paragraph (i)(3) of this section.

(2) Owners of appliances normally containing more than 50 pounds of refrigerant and not covered by paragraph (i)(1) of this section must have all leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 % of the total charge during a 12-month period, except as described in paragraph (i)(3) of this section.

(3) Owners are not required to repair the leaks defined in paragraphs (i)(1) and (2) of this section if, within 30 days, they develop a one-year retrofit or retirement plan for the leaking equipment. This plan (or a legible copy) must be kept at the site of the equipment. The original must be made available for EPA inspection on request. The plan must be dated and all work under the plan must be completed within one year of plan's date.

(4) Owners must repair leaks pursuant to paragraphs (i)(1) and (2) of this section within 30 days of discovery or within 30 days of when the leak(s) should have been discovered, if the owners intentionally shielded themselves from information which would have revealed a leak.

(Approved by the Office of Management and Budget under the control number 2060–0256)

§ 82.158 Standards for recycling and recovery equipment.

(a) Effective November 15, 1993, all manufacturers and importers of recycling and recovery equipment intended for use during the maintenance, service, or repair of appliances except MVACs and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances, shall have had such equipment certified by an approved equipment testing organization to meet the applicable requirements in paragraph (b) or (d) of this section. All manufacturers and importers of recycling and recovery equipment intended for use during the maintenance, service, or repair of MVAC-like appliances shall have had such equipment certified pursuant to § 82.36(a).

(b) Equipment manufactured or imported on or after November 15, 1993 for use during the maintenance, service, or repair of appliances except small appliances, MVACs, and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances must be certified by an approved equipment testing organization to meet the following requirements:

(1) In order to be certified, the equipment must be capable of achieving the level of evacuation specified in Table 2 of this section under the conditions of the ARI Standard 740–1993, Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment (ARI 740–1993) (Appendix B):

TABLE 2.—LEVELS OF EVACUATION WHICH MUST BE ACHIEVED BY RECOVERY OR RECYCLING EQUIPMENT INTENDED FOR USE WITH APPLIANCES [1]

[Manufactured on or after November 15, 1993]

Type of appliance with which recovery or recycling machine is intended to be used	Inches of Hg vacuum
HCFC–22 appliances, or isolated component of such appliances, normally containing less than 200 pounds of refrigerant	0
HCFC–22 appliances, or isolated component of such appliances, normally containing 200 pounds or more of refrigerant	10
Very high-pressure appliances	0
Other high-pressure appliances, or isolated component of such appliances, normally containing less than 200 pounds of refrigerant	10
Other high-pressure appliances, or isolated component of such appliances, normally containing 200 pounds or more of refrigerant	15
Low-pressure appliances	[2] 25

[1] Except for small appliances, MVACs, and MVAC-like appliances.
[2] mm Hg absolute.

The vacuums specified in inches of Hg vacuum must be achieved relative to an atmospheric pressure of 29.9 inches of Hg absolute.

(2) Recovery or recycling equipment whose recovery efficiency cannot be tested according to the procedures in ARI 740–1993 may be certified if an approved third-party testing organization adopts and performs a test that demonstrates, to the satisfaction of the Administrator, that the recovery efficiency of that equipment is equal to or better than that of equipment that:

(i) Is intended for use with the same type of appliance; and

(ii) Achieves the level of evacuation in Table 2.

(3) The equipment must meet the minimum requirements for ARI certification under ARI 740–1993.

(4) If the equipment is equipped with a noncondensables purge device:

(i) The equipment must not release more than five percent of the quantity of refrigerant being recycled through noncondensables purging under the conditions of ARI 740–1993; and

(ii) Effective May 14, 1995, the equipment must not release more than three percent of the quantity of refrigerant being recycled through noncondensables purging under the conditions of ARI 740–1993.

(5) The equipment must be equipped with low-loss fittings on all hoses.

(6) The equipment must have its liquid recovery rate and its vapor recovery rate measured under the conditions of ARI 740–1993.

(c) Equipment manufactured or imported before November 15, 1993 for use during the maintenance, service, or repair of appliances except small appliances, MVACs, and MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances will be considered certified if it is capable of achieving the level of evacuation specified in Table 3 of this section when tested using a properly calibrated pressure gauge:

TABLE 3.—LEVELS OF EVACUATION WHICH MUST BE ACHIEVED BY RECOVERY OR RECYCLING MACHINES INTENDED FOR USE WITH APPLIANCES [1]

[Manufactured before November 15, 1993]

Type of air-conditioning or refrigeration equipment with which recovery or recycling machine is intended to be used	Inches of vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)
HCFC–22 equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	0
HCFC–22 equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Very high-pressure equipment	0
Other high-pressure equipment, or isolated component of such equipment, normally containing less than 200 pounds of refrigerant	4
Other high-pressure equipment, or isolated component of such equipment, normally containing 200 pounds or more of refrigerant	4
Low-pressure equipment	25

[1] Except for small appliances, MVACs, and MVAC-like appliances.

(d) Equipment manufactured or imported on or after November 15, 1993 for use during the maintenance, service, or repair of small appliances must be certified by an approved equipment testing organization to be capable of either:

(1) Recovering 90% of the refrigerant in the test stand when the compressor of the test stand is operating and 80% of the refrigerant when the compressor of the test stand is not operating when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use with Small Appliances; or

(2) Achieving a four-inch vacuum under the conditions of appendix B, ARI 740–1993.

(e) Equipment manufactured or imported before November 15, 1993 for use with small appliances will be considered certified if it is capable of either:

(1) Recovering 80% of the refrigerant in the system, whether or not the compressor of the test stand is operating, when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use with Small Appliances; or

(2) Achieving a four-inch vacuum when tested using a properly calibrated pressure gauge.

(f) Equipment manufactured or imported on or after November 15, 1993 for use during the maintenance, service, or repair of MVAC-like appliances must be certified in accordance with § 82.36(a).

(g) Equipment manufactured or imported before November 15, 1993 for use during the maintenance, service, or repair of MVAC-like appliances must be capable of reducing the system pressure to 102 mm of mercury vacuum under the conditions of the SAE Standard, SAE J1990 (appendix A to 40 CFR part 82, subpart B).

(h) Manufacturers and importers of equipment certified under paragraphs (b) and (d) of this section must place a label on each piece of equipment stating the following:

THIS EQUIPMENT HAS BEEN CERTIFIED BY [APPROVED EQUIPMENT TESTING ORGANIZATION] TO MEET EPA's MINIMUM REQUIREMENTS FOR RECYCLING OR RECOVERY EQUIPMENT INTENDED FOR USE WITH [APPROPRIATE CATEGORY OF APPLIANCE].

The label shall also show the date of manufacture and the serial number (if applicable) of the equipment. The label shall be affixed in a readily visible or accessible location, be made of a material expected to last the lifetime of the equipment, present required information in a manner so that it is likely to remain legible for the lifetime of the equipment, and be affixed in such a manner that it cannot be removed from the equipment without damage to the label.

(i) The Administrator will maintain a list of equipment certified pursuant to paragraphs (b), (d), and (f) of this section by manufacturer and model. Persons interested in obtaining a copy of the list should send written inquiries to the address in § 82.160(a).

(j) Manufacturers or importers of recycling or recovery equipment intended for use during the maintenance, service, or repair of appliances except MVACs or MVAC-like appliances or during the disposal of appliances except small appliances, MVACs, and MVAC-like appliances must periodically have approved equipment testing organizations conduct either:

(1) Retests of certified recycling or recovery equipment; or

(2) Inspections of recycling or recovery equipment at manufacturing facilities to ensure that each equipment model line that has been certified under this section continues to meet the certification criteria.

Such retests or inspections must be conducted at least once every three years after the equipment is first certified.

(k) An equipment model line that has been certified under this section may have its certification revoked if it is subsequently determined to fail to meet the certification criteria. In such cases, the Administrator or her or his designated representative shall give notice to the manufacturer or importer setting forth the basis for her or his determination.

(l) Equipment used to evacuate refrigerant from MVACs and MVAC-like appliances before they are disposed of must be capable of reducing the system

pressure to 102 mm of mercury vacuum under the conditions of the SAE Standard, SAE J1990 (appendix A to 40 CFR part 82, subpart B).

(m) Equipment used to evacuate refrigerant from small appliances before they are disposed of must be capable of either:

(1) Removing 90% of the refrigerant when the compressor of the small appliance is operating and 80% of the refrigerant when the compressor of the small appliance is not operating, when used in accordance with the manufacturer's instructions under the conditions of appendix C, Method for Testing Recovery Devices for Use With Small Appliances; or

(2) Evacuating the small appliance to four inches of vacuum when tested using a properly calibrated pressure gauge.

§ 82.160 Approved equipment testing organizations.

(a) Any equipment testing organization may apply for approval by the Administrator to certify equipment pursuant to the standards in § 82.158 and appendices B or C of this subpart. The application shall be sent to: Section 608 Recycling Program Manager, Stratospheric Protection Division, 6205–J, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

(b) Applications for approval must include written information verifying the following:

(1) The list of equipment present at the organization that will be used for equipment testing.

(2) Expertise in equipment testing and the technical experience of the organization's personnel.

(3) Thorough knowledge of the standards as they appear in § 82.158 and appendices B and/or C (as applicable) of this subpart.

(4) The organization must describe its program for verifying the performance of certified recycling and recovery equipment manufactured over the long term, specifying whether retests of equipment or inspections of equipment at manufacturing facilities will be used.

(5) The organization must have no conflict of interest and receive no direct or indirect financial benefit from the outcome of certification testing.

(6) The organization must agree to allow the Administrator access to records and personnel to verify the information contained in the application.

(c) Organizations may not certify equipment prior to receiving approval from EPA. If approval is denied under this section, the Administrator or her or his designated representative shall give written notice to the organization setting forth the basis for her or his determination.

(d) If at any time an approved testing organization is found to be conducting certification tests for the purposes of this subpart in a manner not consistent with the representations made in its application for approval under this section, the Administrator reserves the right to revoke approval. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

(e) Testing organizations seeking approval of an equipment certification program may also seek approval to certify equipment tested previously under the program. Interested organizations may submit to the Administrator at the address in § 82.160(a) verification that the program met all of the standards in § 82.160(b) and that equipment to be certified was tested to and met the applicable standards in § 82.158 (b) or (d). Upon EPA approval, the previously tested equipment may be certified without being retested (except insofar as such retesting is part of the testing organization's program for verifying the performance of equipment manufactured over the long term, pursuant to § 82.160(b)(4)).

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§ 82.161 Technician certification.

(a) Effective November 14, 1994, persons who maintain, service, or repair appliances, except MVACs, and persons who dispose of appliances, except for small appliances, room air conditioners, and MVACs, must be certified by an approved technician certification program as follows:

(1) Persons who maintain, service, or repair small appliances as defined in § 82.158(v) must be properly certified as Type I technicians.

(2) Persons who maintain, service, or repair high or very high-pressure appliances, except small appliances and MVACs, or dispose of high or very high-pressure appliances, except small appliances and MVACs, must be properly certified as Type II technicians.

(3) Persons who maintain, service, or repair low-pressure appliances or dispose of low-pressure appliances must be properly certified as Type III technicians.

(4) Persons who maintain, service, or repair low- and high-pressure equipment as described in § 82.161(a) (1), (2) and (3) must be properly certified as Universal technicians.

(5) Persons who maintain, service, or repair MVAC-like appliances must either be properly certified as Type II technicians or complete the training and certification test offered by a training and certification program approved under § 82.40.

(b) *Test Subject Material.* The Administrator shall maintain a bank of test questions divided into four groups, including a core group and three technical groups. The Administrator shall release this bank of questions only to approved technician certification programs. Tests for each type of certification shall include a minimum of 25 questions drawn from the core group and a minimum of 25 questions drawn from each relevant technical group. These questions shall address the subject areas listed in appendix D.

(c) *Program Approval.* Persons may seek approval of any technician certification program (program), in accordance with the provisions of this paragraph, by submitting to the Administrator at the address in § 82.160(a) verification that the program meets all of the standards listed in appendix D and the following standards:

(1) *Alternative Examinations.* Programs are encouraged to make provisions for non-English speaking technicians by providing tests in other languages or allowing the use of a translator when taking the test. If a translator is used, the certificate received must indicate that translator assistance was required. A test may be administered orally to any person who makes this request, in writing, to the program at least 30 days before the scheduled date for the examination. The letter must explain why the request is being made.

(2) *Recertification.* The Administrator reserves the right to specify the need for technician recertification at some future date, if necessary, by placing a notice in the **Federal Register**.

(3) *Proof of Certification.* Programs must issue individuals a wallet-sized card to be used as proof of certification, upon successful completion of the test. Programs must issue an identification card to technicians that receive a score of 70 percent or higher on the closed-book certification exam, within 30 days. Programs providing Type I certification using the mail-in format, must issue a permanent identification card to technicians that receive a score of 84 percent or higher on the certification exam, no later than 30 days after the program has received the exam and any additional required material. Each card must include, at minimum, the name of the certifying program, and the date the

organization became a certifying program, the name of the person certified, the type of certification, a unique number for the certified person, and the following text:

[Name of person] has been certified as a [Type I, Type II, Type III, and/or Universal, as appropriate] technician as required by 40 CFR part 82, subpart F.

(4) The Administrator reserves the right to consider other factors deemed relevant to ensure the effectiveness of certification programs.

(d) If approval is denied under this section, the Administrator shall give written notice to the program setting forth the basis for her or his determination.

(e) If at any time an approved program violates any of the above requirements, the Administrator reserves the right to revoke approval. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

(f) Authorized representatives of the Administrator may require technicians to demonstrate on the business entity's premises their ability to perform proper procedures for recovering and/or recycling refrigerant. Failure to demonstrate or failure to properly use the equipment may result in revocation of the certificate. Failure to abide by any of the provisions of this subpart may also result in revocation or suspension of the certificate. If a technician's certificate is revoked, the technician would need to recertify before maintaining, servicing, repairing or disposing of any appliances.

(g) Persons seeking approval of a technician certification program may also seek approval for technician certifications granted previously under the program. Interested persons may submit to the Administrator at the address in § 82.160(a) verification that the program met all of the standards of § 82.161(c) and appendix D, or verification that the program met all of the standards of § 82.161(c) and appendix D, except for some elements of the test subject material, in which case the person must submit verification that supplementary information on that material will be provided pursuant to appendix D, section (j).

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§ 82.162 Certification by owners of recovery and recycling equipment.

(a) No later than August 12, 1993, or within 20 days of commencing business for those persons not in business at the time of promulgation, persons maintaining, servicing, or repairing appliances except for MVACs, and persons disposing of appliances except for small appliances and MVACs, must certify to the Administrator that such person has acquired certified recovery or recycling equipment and is complying with the applicable requirements of this subpart. Such equipment may include system-dependent equipment but must include self-contained equipment, if the equipment is to be used in the maintenance, service, or repair of appliances except for small appliances. The owner or lessee of the recovery or recycling equipment may perform this certification for his or her employees. Certification shall take the form of a statement signed by the owner of the equipment or another responsible officer and setting forth:

(1) The name and address of the purchaser of the equipment, including the county name;

(2) The name and address of the establishment where each piece of equipment is or will be located;

(3) The number of service trucks (or other vehicles) used to transport technicians and equipment between the establishment and job sites and the field;

(4) The manufacturer name, the date of manufacture, and if applicable, the model and serial number of the equipment; and

(5) The certification must also include a statement that the equipment will be properly used in servicing or disposing of appliances and that the information given is true and correct. Owners or lessees of recycling or recovery equipment having their places of business in:

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region I, Mail Code APC, JFK Federal Building, One Congress Street, Boston, MA 02203.

Owners or lessees of recycling or recovery equipment having their places of business in:

New York
New Jersey
Puerto Rico
Virgin Islands

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region II, Jacob K. Javits Federal Building, 26 Federal Plaza, Room 5000, New York, NY 10278.

Owners or lessees of recycling or recovery equipment having their places of business in:

Delaware
District of Columbia
Maryland
Pennsylvania
Virginia
West Virginia

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region III, Mail Code 3AT21, 841 Chestnut Building, Philadelphia, PA 19107.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alabama
Florida
Georgia
Kentucky
Mississippi
North Carolina
South Carolina
Tennessee

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region IV, 345 Courtland Street, NE., Mail Code APT–AE, Atlanta, GA 30365.

Owners or lessees of recycling or recovery equipment having their places of business in:

Illinois
Indiana
Michigan
Minnesota
Ohio
Wisconsin

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region V, Mail Code AT18J, 77 W. Jackson Blvd., Chicago, IL 60604–3507.

Owners or lessees of recycling or recovery equipment having their places of business in:

Arkansas
Louisiana
New Mexico
Oklahoma
Texas

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region VI, Mail Code 6T–EC, First Interstate Tower at Fountain Place, 1445 Ross Ave., Suite 1200, Dallas, TX 75202–2733.

Owners or lessees of recycling or recovery equipment having their places of business in:

Iowa
Kansas
Missouri
Nebraska

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region VII, Mail Code ARTX/ARBR, 726 Minnesota Ave., Kansas City, KS 66101.

Owners or lessees of recycling or recovery equipment having their places of business in:

Colorado
Montana
North Dakota
South Dakota
Utah
Wyoming

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region VIII, Mail Code 8AT–AP, 999 18th Street, Suite 500, Denver, CO 80202–2405.

Owners or lessees of recycling or recovery equipment having their places of business in:

American Samoa
Arizona
California
Guam
Hawaii
Nevada

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region IX, Mail Code A–3, 75 Hawthorne Street, San Francisco, CA 94105.

Owners or lessees of recycling or recovery equipment having their places of business in:

Alaska
Idaho
Oregon
Washington

must send their certifications to:

CAA § 608 Enforcement Contact, EPA Region X, Mail Code AT–082, 1200 Sixth Ave., Seattle, WA 98101.

(b) Certificates under paragraph (a) of this section are not transferable. In the event of a change of ownership of an entity that maintains, services, or repairs appliances except MVACs, or that disposes of appliances except small appliances, MVACs, and MVAC-like appliances, the new owner of the entity shall certify within 30 days of the change of ownership pursuant to paragraph (a) of this section.

(c) No later than August 12, 1993, persons recovering refrigerant from small appliances, MVACs, and MVAC-like appliances for purposes of disposal of these appliances must certify to the Administrator that such person has acquired recovery equipment that meets the standards set forth in § 82.158 (l) and/or (m), as applicable, and that such person is complying with the applicable requirements of this subpart. Such equipment may include system-dependent equipment but must include self-contained equipment, if the equipment is to be used in the disposal of appliances except for small appliances. The owner or lessee of the recovery or recycling equipment may perform this certification for his or her employees. Certification shall take the form of a statement signed by the owner of the equipment or another responsible officer and setting forth:

(1) The name and address of the purchaser of the equipment, including the county name;

(2) The name and address of the establishment where each piece of equipment is or will be located;

(3) The number of service trucks (or other vehicles) used to transport technicians and equipment between the establishment and job sites and the field;

(4) The manufacturer's name, the date of manufacture, and if applicable, the model and serial number of the equipment; and

(5) The certification must also include a statement that the equipment will be properly used in recovering refrigerant from appliances and that the information given is true and correct. The certification shall be sent to the appropriate address in paragraph (a).

(d) Failure to abide by any of the provisions of this subpart may result in revocation or suspension of certification under paragraph (a) or (c) of this section. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

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§ 82.164 Reclaimer certification.

Effective August 12, 1993, persons reclaiming used refrigerant for sale to a new owner must certify to the Administrator that such person will:

(a) Return refrigerant to at least the standard of purity set forth in ARI Standard 700–1988, Specifications for Fluorocarbon Refrigerants;

(b) Verify this purity using the methods set forth in ARI Standard 700–1988;

(c) Release no more than 1.5 percent of the refrigerant during the reclamation process, and

(d) Dispose of wastes from the reclamation process in accordance with all applicable laws and regulations. The data elements for certification are as follows:

(1) The name and address of the reclaimer;

(2) A list of equipment used to reprocess and to analyze the refrigerant; and

(3) The owner or a responsible officer of the reclaimer must sign the certification stating that the refrigerant will be returned to at least the standard of purity set forth in ARI Standard 700–1988, Specifications for Fluorocarbon Refrigerants, that the purity of the refrigerant will be verified using the methods set forth in ARI Standard 700–1988, that no more than 1.5 percent of the refrigerant will be released during the reclamation process, that wastes from the reclamation process will be properly disposed of, and that the information given is true and correct. The certification should be sent to the following address: Section 608 Recycling Program Manager, Stratospheric Protection Division, (6205–J), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

(e) Certificates are not transferable. In the event of a change in ownership of an entity which reclaims refrigerant, the new owner of the entity shall certify within 30 days of the change of ownership pursuant to this section.

(f) Failure to abide by any of the provisions of this subpart may result in revocation or suspension of the certification of the reclaimer. In such cases, the Administrator or her or his designated representative shall give notice to the organization setting forth the basis for her or his determination.

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§ 82.166 Reporting and recordkeeping requirements.

(a) All persons who sell or distribute any class I or class II substance for use as a refrigerant must retain invoices that indicate the name of the purchaser, the date of sale, and the quantity of refrigerant purchased.

(b) Purchasers of any class I or class II refrigerants who employ technicians who recover refrigerants may provide evidence of each technician's certification to the wholesaler who sells them refrigerant; the wholesaler will then keep this information on file. In such cases, the purchaser must notify the wholesaler regarding any change in a technician's certification or employment status.

(c) Approved equipment testing organizations must maintain records of equipment testing and performance and a list of equipment that meets EPA requirements. A list of all certified equipment shall be submitted to EPA within 30 days of the organization's approval by EPA and annually at the end of each calendar year thereafter.

(d) Approved equipment testing organizations shall submit to EPA within 30 days of the certification of a new model line of recycling or recovery equipment the name of the manufacturer and the name and/or serial number of the model line.

(e) Approved equipment testing organizations shall notify EPA if retests of equipment or inspections of manufacturing facilities conducted pursuant to § 82.158(j) show that a previously certified model line fails to meet EPA requirements. Such notification must be received within thirty days of the retest or inspection.

(f) Programs certifying technicians must maintain records in accordance with section (g) of appendix D of this subpart.

(g) Reclaimers must maintain records of the names and addresses of persons sending them material for reclamation and the quantity of the material (the combined mass of refrigerant and contaminants) sent to them for reclamation. Such records shall be maintained on a transactional basis.

(h) Reclaimers must maintain records of the quantity of material sent to them for reclamation, the mass of refrigerant reclaimed, and the mass of waste products. Reclaimers must report this information to the Administrator annually within 30 days of the end of the calendar year.

(i) Persons disposing of small appliances, MVACs, and MVAC-like appliances must maintain copies of signed statements obtained pursuant to § 82.156(f)(2).

(j) Persons servicing appliances normally containing 50 or more pounds of refrigerant must provide the owner/operator of such appliances with an invoice or other documentation, which indicates the amount of refrigerant added to the appliance.

(k) Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep servicing records documenting the date and type of service, as well as the quantity of refrigerant added. The owner/operator must keep records of refrigerant purchased and added to such appliances in cases where owners add their own refrigerant. Such records should indicate the date(s) when refrigerant is added.

(l) Technicians certified under § 82.161 must keep a copy of their certificate at their place of business.

(m) All records required to be maintained pursuant to this section must be kept for a minimum of three years unless otherwise indicated. Entities that dispose of appliances must keep these records on-site.

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Appendix A to Subpart F—Specifications for Fluorocarbon Refrigerants

This appendix is based on Air-conditioning and Refrigeration Institute Standard 700–88:

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to enable users to evaluate and accept/reject refrigerants regardless of source (new, reclaimed and/or repackaged) for use in new and existing refrigerating and air conditioning products within the scope of ARI.

1.1.1 This standard is intended for the guidance of the industry, including manufacturers, refrigerant reclaimers, repackagers, distributors, installers, servicemen, contractors and for consumers.

1.2 *Review and Amendment.* This standard is subject to review and amendment as the technology advances.

Section 2. Scope

2.1 *Scope.* This standard defines and classifies refrigerant contaminants primarily based on standard and generally available test methods and specifies acceptable levels of contaminants (purity requirements) for various fluorocarbon refrigerants regardless of source. These refrigerants are: R11; R12; R13; R22; R113; R114; R500; R502 and R503 as referenced in the ANSI/ASHRAE Standard "Number Designation of Refrigerants" (American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., Standard 34–78).

Section 3. Definitions

3.1 *"Shall", "Should", "Recommended",* or *"It Is Recommended".* "Shall", "should", "recommended", or "it is recommended" shall be interpreted as follows:

3.1.1 *Shall.* Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.1.2 *Should, Recommended,* or *It is Recommended.* "Should", "recommended", or "it is recommended" is used to indicate provisions which are not mandatory but which are desirable as good practice.

Section 4. Characterization of Refrigerants and Contaminants

4.1 Characterization of refrigerants and contaminants addressed are listed in the following general classifications:

4.1.1 *Characterization*

a. Boiling point
b. Boiling point range

4.1.2 *Contaminants*

a. Water
b. Chloride ion
c. Acidity
d. High boiling residue
e. Particulates/solids
f. Non-condensables
g. Other refrigerants

Section 5. Sampling, Test Methods and Maximum Permissible Contaminant Levels

5.1 The recommended referee test methods for the various contaminants are given in the following paragraphs. If alternate test methods are employed, the user must be able to demonstrate that they produce results equivalent to the specified referee method.

5.2 *Refrigerant Sampling.*

5.2.1 Special precautions should be taken to assure that representative samples are obtained for analysis. Sampling shall be done by trained laboratory personnel following accepted sampling and safety procedures.

5.2.2 *Gas Phase Sample.* A gas phase sample shall be obtained for determining the non-condensables by connecting the sample cylinder to an evacuated gas sampling bulb by means of a manifold. The manifold should have a valve arrangement that facilitates evacuation of all connecting tubing leading to the sampling bulb. Since non-condensable gases, if present, will concentrate in the vapor phase of the refrigerant, care must be exercised to eliminate introduction of air during the sample transfer. Purging is not an acceptable procedure for a gas phase sample since it may introduce a foreign product. Since R11 and R113 have normal boiling points at or above room temperatures, non-condensable determination is not required for these refrigerants.

5.2.3 *Liquid Phase Sample.* A liquid phase sample, which may be obtained as follows, is required for all tests listed in this standard, except the test for non-condensables. Place an empty sample cylinder with the valve opened in an oven at 230°F [110°C] for one hour. Remove it from the oven while hot, immediately connect to an evacuation system and evacuate to less than 1 mm. mercury (1000 microns). Close the valve and allow it to cool.

5.2.3.1 The valve and lines from the unit to be sampled shall be clean and dry. Connect the line to the sample cylinder loosely. Purge through the loose connection. Make the connection tight at the end of the purge period. Take the sample as a liquid by chilling the sample cylinder slightly. Do not load the cylinder over 80 percent full at room temperature. This can be accomplished by weighing the empty cylinder and then the cylinder with refrigerant. The cylinder must not become completely full of liquid below 130°F [54.4°C]. When the desired amount of refrigerant has been collected, close the valve(s) and disconnect the sample cylinder immediately.

5.2.3.2 Check the sample cylinder for leaks and record the gross weight.

5.3 *Refrigerant Boiling Point and Boiling Range.*

5.3.1 The test method shall be that described in the Federal Specification for "Fluorocarbon Refrigerants" BB–F–1421 B dated March 5, 1982, section 4.4.3.

5.3.2 The required values for boiling point and boiling point range are given in Table 1, "Physical Properties of Fluorocarbon Refrigerants and Maximum Contaminant Levels."

5.3.3 Gas chromatography (GC) is an acceptable alternate test method which can be used to characterize refrigerants. This is done by comparison to the known standards. Listed below are some readily available GC methods.

ALTERNATE GAS CHROMATOGRAPHY TEST METHODS

[See Appendix A for titles and sources]

Refrigerant	ICI	Dupont	Allied
R11	RSV/ALAB/CM3 and RSV/ALAB/CM4	F3205.165.01CW	G–11–7A
R12	RSV/ALAB/CM5	F3227.165.01CW(P)	G–12–7A
R13	RSV/ALAB/CM20	F3275.165.01CC(P)	—
R22	RSV/ALAB/CM8	F3290.165.01LV(P)	G–22–7A
R113	RSV/ALAB/CM6	F3297.165.01CC	GSVD–1A
R114	RSV/ALAB/CM21	F3305.165.01CC(P)	G–114–7A
R500	RSV/ALAB/CM5	F3327.165.01CW(P)	G–500–7A
R502	RSV/ALAB/CM8	F3333.165.01CC	G–502–7A
R503	RSV/ALAB/CM20	F3337.165.01CW(P)	G–503–7A

Note: Equivalent laboratory test methods may be available from other producers of these refrigerants.

5.4 *Water Content.*

5.4.1 The Karl Fischer Test Method shall be used for determining the water content of refrigerant. This method is described in ASTM Standard for "Water In Gases Using Karl Fisher Reagent" E700–79, reapproved 1984 (American Society for Testing Materials, Philadelphia, PA). This method can be used for refrigerants that are either a liquid or a gas at room temperature, including Refrigerants 11 and 113. For all refrigerants, the sample for water analysis shall be taken from the liquid phase of the container to be tested. Proper operation of the analytical method requires special equipment and an experienced operator. The precision of the results is excellent if proper sampling and handling procedures are followed. Refrigerants containing a colored dye can be successfully analyzed for water using this method.

5.4.2 Water is a harmful contaminant in refrigerants because it causes freeze up, corrosion and promotes unfavorable chemical breakdown. The refrigerants covered in this standard shall have a maximum water content of 10 parts per million (ppm) by weight.

5.5 *Chloride Ions.* The refrigerant shall be tested for chlorides as an indication of the presence of hydrochloric or similar acids.

5.5.1 The test method shall be that described in the Federal Specification for "Fluorocarbon Refrigerants," BB–F–1421B, dated March 5, 1982, (U.S. General Services Administration) section 4.4.4 (silver nitrate reagent). This simple test will detect HC1 and other halogens and requires only a 5 ml sample. The test will show noticeable turbidity at equivalent HC1 levels of about 25 ppm by weight or higher.

5.5.2 The results of the test shall not exhibit any sign of turbidity. Report the results as "pass" or "fail."

5.6 *Acidity.*

5.6.1 The acidity test uses the titration principle to detect any compound that ionizes as an acid. The test requires about a 100 to 120 gram sample and has a lower detection limit of 0.1 ppm by weight.

5.6.2 The test method shall be per Allied approved analytical procedure "Determination of Acidity in Genetron® and Genesolv® Fluorocarbons," GP–GEN–2A (used by permission of Allied-Signal, Inc., Columbia Road and Park Avenue, P.O. Box 1139R, Morristown, New Jersey 07960), or DuPont procedure, "The Determination of Acid Number—Visual Titrimetric Procedure," FPL–3–1974 (used by permission of Freon Products Division E.I. duPont de Nemours and Co., Inc., Brandywine Building 13237, Wilmington, Delaware 19898).

5.6.3 The maximum permissible acidity is 1 ppm by weight.

5.7 *High Boiling Residue.*

5.7.1 High boiling residue will be determined by measuring the residue after evaporation of a standard volume of refrigerant at a temperature 50°F [10.0°C], above the boiling point of the sample using a Goetz tube as specified in the Federal Specification for "Fluorocarbon Refrigerants," BB–F–1421B, dated March 5, 1982. Oils and organic acids will be captured by this method.

5.7.2 The value for high boiling residue shall be expressed as a percentage by volume and shall not exceed the maximum percent specified in Table 1.

5.8 *Particulates/Solids.*

5.8.1 During the Boiling Range test, a measured amount of sample is evaporated from a Goetz bulb under controlled temperature conditions. The particulates/solids shall be determined by visual examination of the empty Goetz bulb after the sample has evaporated completely. Presence of dirt, rust or other particulate contamination is reported as "fail."

5.8.2 For details of the above test method, refer to the DuPont method for "Determination of Boiling Range, Residue, Particulates" F3200.037.01CW(P) (used by permission of Freon Products Division, E.I. duPoint de Nemours and Co., Inc.).

5.9 *Non-Condensables.*

5.9.1 Non-condensable gases consist primarily of air accumulated in the vapor phase of refrigerant-containing tanks. The solubility of air in the refrigerants liquid phase is extremely low and air is not significant as a liquid phase contaminant. The presence of non-condensable gases may reflect poor quality control in transferring refrigerants to storage tanks and cylinders.

5.9.2 The test method shall be that described in the Federal Specification for "Fluorocarbon Refrigerants," BB–F–1421B, dated March 5, 1982, section 4.4.2 (perchloroethylene method). Gas Chromatography, as described in 5.3.3 is an acceptable alternate test method.

5.9.3 The maximum level of non-condensables in the vapor phase of a refrigerant in a container shall not exceed 1.5 percent by volume.

5.10 *Other Refrigerants.*

5.10.1 The amount of other refrigerants in the subject refrigerant shall be determined by one of the gas chromatographic methods described in 5.3.3 for the appropriate refrigerant.

5.10.2 The subject refrigerant shall not contain more than 0.5 percent by weight of other refrigerants (see Table 1).

Section 6. Reporting Procedure

6.1 The source (manufacturer, reclaimer or repackager) of the packaged refrigerant should be identified. The fluorocarbon refrigerant shall be identified by its accepted refrigerant number and/or its chemical name. Maximum permissible levels of contaminants are shown in Table 1. Test results shall be tabulated in a like manner.

Section 7. Voluntary Conformance

7.1 *Voluntary Conformance.* Conformance to this standard is voluntary. However, any refrigerant specified as meeting these requirements shall meet all of the requirements given in this standard.

TABLE 1—PHYSICAL PROPERTIES OF FLUOROCARBON REFRIGERANTS AND MAXIMUM CONTAMINANT LEVELS

	Refrigerants								
	R11	R12	R13	R22	R113	R114	R500	R502	R503
Physical Properties:									
Boiling point ..... F @ 29.92 in. Hg	74.9 [23.8]	−21.6 [−29.8]	−114.6 [−81.4]	−41.4 [−40.8]	117.6 [47.6]	38.8 [3.8]	−28.3 [−33.5]	−49.8 [−45.4]	−127.6 [−88.7]
Boiling range F for 5% to 85% by volume distilled	0.5	0.5	0.9	0.5	0.5	0.5	0.9	0.9	0.9
Vapor Phase Contaminants:									
Air and other non-condensables (in filled container) Max. % by volume	.....	1.5	1.5	1.5	.....	1.5	1.5	1.5	1.5
Liquid Phase Contaminants:									
Water—ppm by weight	10	10	10	10	10	10	10	10	10
Chloride ion—no turbidity to pass by test ..	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Acidity—Max. ppm by weight	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
High boiling residues—Max. % by volume	0.01	0.01	0.05	0.01	0.03	0.01	0.05	0.01	0.01
Particulates/Solids—visually clean to pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Other refrigerants—Max. % by weight ..	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Titles and Sources of Alternate Gas Chromatography Test Methods

ICI

General Chemical Business
ICI Chemicals and Polymer Ltd.
P.O. Box 13
The Heath
Runcorn Cheshire, England WA74QF

METHODS FOR THE ANALYSIS OF "ARCTONS," MD1400/32 "ORGANIC IMPURITIES BY GAS CHROMATOGRAPHY"

Refrigerant	Method No.	Title
R11	RSV/ALAB/CM3 and RSV/ALAB/CM4	Arcton 11.
R12	RSV/ALAB/CM5	Arcton 12.
R13	RSV/ALAB/CM20	
R22	RSV/ALAB/CM8	Arcton 22.
R113	RSV/ALAB/CM6	Arcton 113.
R114	RSV/ALAB/CM21	Arcton 114.
R500	RSV/ALAB/CM5	
R502	RSV/ALAB/CM8	
R503	RSV/ALAB/CM20	

Note: Used with permission of the source.

DuPont

Freon Products Division
E.I. duPont de Nemours and Co., Inc.
1007 Market Street
Wilmington, Delaware 19898

Refrigerant	Method No.	Title
R11	F3205.165.01CW	Determination of Purity by Gas Chromatography "Freon" 11 Fluorocarbon.

Refrigerant	Method No.	Title
R12	F3227.165.01CW(P)	"Freon" 12 Determination of Purity.
R13	F3275.165.01CC(P)	Determination of Composition "Freon" 13 Fluorocarbon.
R22	F3290.165.01LV(P)	"Freon" 22 Determination of Purity by Gas Chromatography.
R113	F3297.165.01CC	"Freon" 113 Determination of Purity by Gas Chromatography.
R114	F3305.165.01CC(P)	"Freon" 114 Fluorocarbon—Determination of Composition.
R500	F3327.165.01CW(P)	"Freon" 500 Determination of Composition by Gas.
R502	F3333.165.01CC	"Freon" 502 Determination of Composition Chromatography.
R503	F3337.165.01CW(P)	"Freon" 503 Determination of Composition.

Note: Used with permission of the source.

Allied

Allied-Signal, Inc.
Engineered Material Sector
P.O. Box 1139R
Morristown, New Jersey 07960

Refrigerant	Method No.	Title
R11	G–11–7A	Determination of Genetron® 11 Fluorocarbon (Assay) Fluorocarbon 12, Carbon Tetrachloride, and Non-Specified Fluorocarbons in Genetron® 11 Fluorocarbon.
R12	G–12–7A	Determination of Genetron® 12 Fluorocarbon (Assay), Fluorocarbons 11, 13, 22 and Non-Specified Fluorocarbons in Genetron® 12 Fluorocarbons.
R13		
R22	G–22–7A	Determination of Genetron® 22 Fluorocarbons (Assay), Fluorocarbons 12, 21, 23 and Non-Specified Fluorocarbons in Genetron® 22 Fluorocarbons.
R113	GSVD–1A	Determination of Genesolv® D (Assay), Fluorocarbons 112, 114, 122, 123 and 1112a in Genesolv® D.
R114	G–114–7A	Determination of Genetron® 114 Fluorocarbon (Assay), Fluorocarbons 113, 115, 123, and Non-Specified Fluorocarbons in Genetron® 114 Fluorocarbon.
R500	G–500–7A	Determination of Fluorocarbon 12, Fluorocarbon 152a and Non-Specified Fluorocarbons in Genetron® 500 Fluorocarbon.
R502	G–502–7A	Determination of Fluorocarbon 22 and Fluorocarbon 115, and Non-Specified Fluorocarbons in Genetron® 502 Fluorocarbon.
R503	G–503–7A	Determination of Fluorocarbon 13, 23, 12, 22 and Non-Specified Fluorocarbons in Genetron® 503 Fluorocarbon.

Note: Used with permission of the source.

Bibliography

For additional information on subjects or tests described in this Standard see:

1. ASHRAE Handbook *Refrigeration 1986*, Chapter 7, "Moisture and Other Contaminant Control in Refrigerant Systems." American Society for Heating, Refrigeration and Air Conditioning Engineers, Inc., Atlanta, GA 30329.
2. ASTM Standard Designation D3401–78, Standard Test Method for "Water in Halogenated Organic Solvents and Their Admixtures." American Society for Testing Materials, 1916 Race Street, Philadelphia, PA 19103.
3. ASTM Standard D1533–83, "Water in Insulating Liquid (Karl Fischer Reaction Method)." American Society for Testing Materials, 1916 Race Street, Philadelphia, PA 19103.
4. ASTM Standard 2989–74 (reapproved 1981), Standard Test Method for "Acidity—Alkalinity of Halogenated Organic Solvents and Their Admixtures." American Society for Testing Materials, 1916 Race street, Philadelphia, PA 19103.
5. DuPont Technical Bulletin B–8, "Quality Specifications and Methods of Analysis for the 'Freon' Fluorocarbon Refrigerants." Freon Products Division, E.I. duPont de Nemours and Co., Inc.
6. Parmelee, H. M. "Solubility of Air in Freon-12 and Freon-22." Refrigerating Engineering, June 1951, page 573.
7. Wojtkowski, E.F. "System Contamination and Cleanups," ASHRAE Journal, June 1964, page 49.

Appendix B to Subpart F—Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment

This appendix is based on Air-Conditioning and Refrigeration Institute Standard 740–91.

Refrigerant Recovery/Recycling Equipment

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish methods of testing for rating and evaluating the performance of refrigerant recovery, and/or recycling equipment, and general equipment requirements (herein referred to as "equipment") for containment or purity levels, capacity, speed, and purge loss to minimize emission into the atmosphere of designated refrigerants.

1.1.1 This standard is intended for the guidance of the industry, including manufacturers, refrigerant reclaimers, repackers, distributors, installers, servicemen, contractors and for consumers.

1.1.2 This standard is not intended to be used as a guide in defining maximum levels of contaminants in recycled or reclaimed refrigerants used in various applications.

1.2 *Review and Amendment.* This standard is subject to review and amendment as the technology advances.

Section 2. Scope

2.1 *Scope.* This standard defines general equipment requirements and the test apparatus, test mixtures, sampling and analysis techniques that will be used to determine the performance of recovery and/or recycling equipment for various refrigerants including R11, R12, R13, R22, R113, R114, R123, R134a, R500, R502, and R503, as referenced in the ANSI/ASHRAE Standard 34–1992, "Number Designation of Refrigerants" (American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc.).

Section 3. Definitions

3.1 *Recovered refrigerant.* Refrigerant that has been removed from a system for the purpose of storage, recycling, reclamation or transportation.

3.2 *Recover.* To remove refrigerant in any condition from a system and store it in an external container without necessarily testing or processing it in any way.

3.3 *Recycle.* To reduce contaminants in used refrigerant by oil separation, non-condensable removal and single or multiple passes through devices which reduce moisture, acidity and particulate matter, such as replaceable core filter-driers. This term

usually applies to procedures implemented at the field job site or in a local service shop.

3.4 *Reclaim.* To reprocess refrigerant to new product specifications by means which may include distillation. Chemical analysis of the refrigerant is required to determine that appropriate product specifications are met. The identification of contaminants, required chemical analysis, and acceptable contaminant levels will be established in the latest edition of ARI Standard 700 "Specifications of Fluorocarbon and other Refrigerants." This term usually implies the use of processes or procedures available only at a reprocessing or manufacturing facility.

3.5 *Standard Contaminated Refrigerant Sample.* A mixture of new and/or reclaimed refrigerant and specified quantities of identified contaminants which are representative of field obtained, used refrigerant samples and which constitute the mixture to be processed by the equipment under test.

3.6 *Push/Pull Method.* The push/pull refrigerant recovery method is defined as the process of transferring liquid refrigerant from a refrigeration system to a receiving vessel by lowering the pressure in the vessel and raising the pressure in the system, and by connecting a separate line between the system liquid port and the receiving vessel.

3.7 *Recycle Rate.* The amount of refrigerant processed (in pounds) divided by the time elapsed in the recycling mode in pounds per minute. For equipment which uses a separate recycling sequence, the recycle rate does not include the recovery rate (or elapsed time). For equipment which does not use a separate recycling sequence, the recycle rate is a maximum rate based solely on the higher of the liquid or vapor recovery rate, by which the rated contaminant levels can be achieved.

3.8 *Equipment Classification.*

3.8.1 *Self Contained Equipment.* A refrigerant recovery or recycling system which is capable of refrigerant extraction without the assistance of components contained within an air conditioning or refrigeration system.

3.8.2 *System Dependent Equipment.* Refrigerant recovery equipment which requires for its operation the assistance of components contained in an air conditioning or refrigeration system.

3.9 *"Shall", "Should", "Recommended"* or *"It is Recommended"*, "Shall" "Should", "recommended", or "it is recommended" shall be interpreted as follows:

3.9.1 *Shall.* Where "shall" or "shall not" is used for a provision specified, that provision is mandatory if compliance with the standard is claimed.

3.9.2 *Should, Recommended,* or *It is Recommended,* "Should", "recommended", is used to indicate provisions which are not mandatory but which are desirable as good practice.

Section 4. General Equipment Requirements

4.1 The equipment manufacturer shall provide operating instructions, necessary maintenance procedures, and source information for replacement parts and repair.

4.2 The equipment shall indicate when any filter/drier(s) needs replacement. This requirement can be met by use of a moisture transducer and indicator light, by use of a sight glass/moisture indicator, or by some measurement of the amount of refrigerant processed such as a flow meter or hour meter. Written instructions such as "to change the filter every 400 pounds, or every 30 days" shall not be acceptable except for equipment in large systems where the Liquid Recovery Rate is greater than 25 lbs/min [11.3 Kg/min] where the filter/drier(s) would be changed for every job.

4.3 The equipment shall either automatically purge non-condensables if the rated level is exceeded or alert the operator that the non-condensable level has been exceeded. While air purge processes are subject to the requirements of this section, there is no specific requirement to include an air purge process for "recycle" equipment.

4.4 The equipment's refrigerant loss due to non-condensable purging shall not be exceeded 5% by weight of total recovered refrigerant. (See Section 9.4)

4.5 Internal hose assemblies shall not exceed a permeation rate of 12 pounds mass per square foot [5.8 g/cm²] of internal surface per year at a temperature of 120 F [48.8 °C] for any designated refrigerant.

4.6 The equipment shall be evaluated at 75 F [24 °C] per 7.1. Normal operating conditions range from 50 °F to 104 F [10 °C to 40 °C].

4.7 *Exemptions:*

4.7.1 Equipment intended for recovery only shall be exempt from sections 4.2 and 4.3.

TABLE 1.—STANDARD CONTAMINATED REFRIGERANT SAMPLES

	R11	R12	R13	R22	R113	R114	R123	R134a	R500	R502	R503
Moisture content: PPM by weight of pure refrigerant	100	80	30	200	100	85	100	200	200	200	30
Particulate content: PPM by weight of pure refrigerant characterized by[1]	80	80	80	80	80	80	80	80	80	80	80
Acid content: PPM by weight of pure refrigerant—(mg KOH per kg refrig.) characterized by[2]	500	100	NA	500	400	200	500	100	100	100	NA
Mineral oil content: % by weight of pure refrigerant	20	5	NA	5	20	20	20	5	5	5	NA
Viscosity (SUS)	300	150	.....	300	300	300	300	150	150	150	.....
Non condensable gases air content % volume[3]	NA	3	3	3	NA	3	3	3	3	3	3

[1] Particulate content shall consist of inert materials and shall comply with particulate requirements in *ASHRAE* Standard 63.2, "Method of Testing of Filtration Capacity of Refrigerant Liquid Line Filters and Filter Driers."
[2] Acid consists of 60% oleic acid and 40% hydrochloric acid on a total number basis.
[3] Synthetic ester based oil.

Section 5. Contaminated Refrigerants

5.1 The standard contaminated refrigerant sample shall have the characteristics specified in Table 1, except as provided in 5.2

5.2 Recovery equipment not rated for any specific contaminant can be tested with new or reclaimed refrigerant.

Section 6. Test Apparatus

6.1 Self Contained Equipment Test Apparatus. The apparatus as shown in Figure 1 consists of a 3 cubic foot [0.085 m³] mixing chamber with a conical-shaped bottom, although a larger mixing chamber is permissible. The size of the mixing chamber depends upon the size of the equipment. The outlet at the bottom of the cone and all restrictions and valves for liquid and vapor refrigerant lines in the test apparatus shall be a minimum of 0.375 in. [9.5 mm] inside diameter or equivalent. The minimum inside diameter for large equipment for use on chillers shall be 1.5 in. [38 mm.]. The mixing chamber shall contain various ports for receiving liquid refrigerant, oil, and contaminants. A recirculating line connected from the bottom outlet through a

recirculating pump and then to a top vapor port shall be provided for stirring of the mixture. Isolation valves may be required for the pump. Alternative stirring means may be used if demonstrated to be equally effective.

6.1.1 For liquid refrigerant feed, the liquid valve is opened. For vapor refrigerant feed, the vapor valve is opened and refrigerant passes through an evaporator coil. Flow is controlled by a thermostatic expansion valve to create 5 F [3 °C] superheat at an evaporator temperature of 70 F ± 3 F[21 °C±2°]. The evaporator coil or equivalent evaporator means shall be either sized large enough for the largest system or be sized for each system.

6.1.2 An alternative method for vapor refrigerant feed is to pass through a boiler and then an automatic pressure regulating valve set at refrigerant saturation pressure at 75 F ± 3 F [24 °C ± 2 °C].

6.2 System Dependent Equipment Test Apparatus. This test apparatus is to be used for final recovery vacuum rating of all system dependent equipment.

6.2.1 The test apparatus shown in Figure 2 consists of a complete refrigeration system. The manufacturer shall identify the refrigerants to be tested. The test apparatus can be modified to facilitate operation or testing of the system dependent equipment if the modifications to the apparatus are specifically described within the manufacturer's literature. (*See Figure 2.*) A ¼ inch [6.3 mm] balance line shall be connected across the test apparatus between the high and low pressure sides, with an isolation valve located at the connection to the compressor high side. A ¼ inch [6.3 mm] access port with a valve core shall be located in the balance line for the purpose of measuring final recovery vacuum at the conclusion of the test.

BILLING CODE 6560–50–M

FIGURE 1

Test Apparatus for Self-Contained Equipment

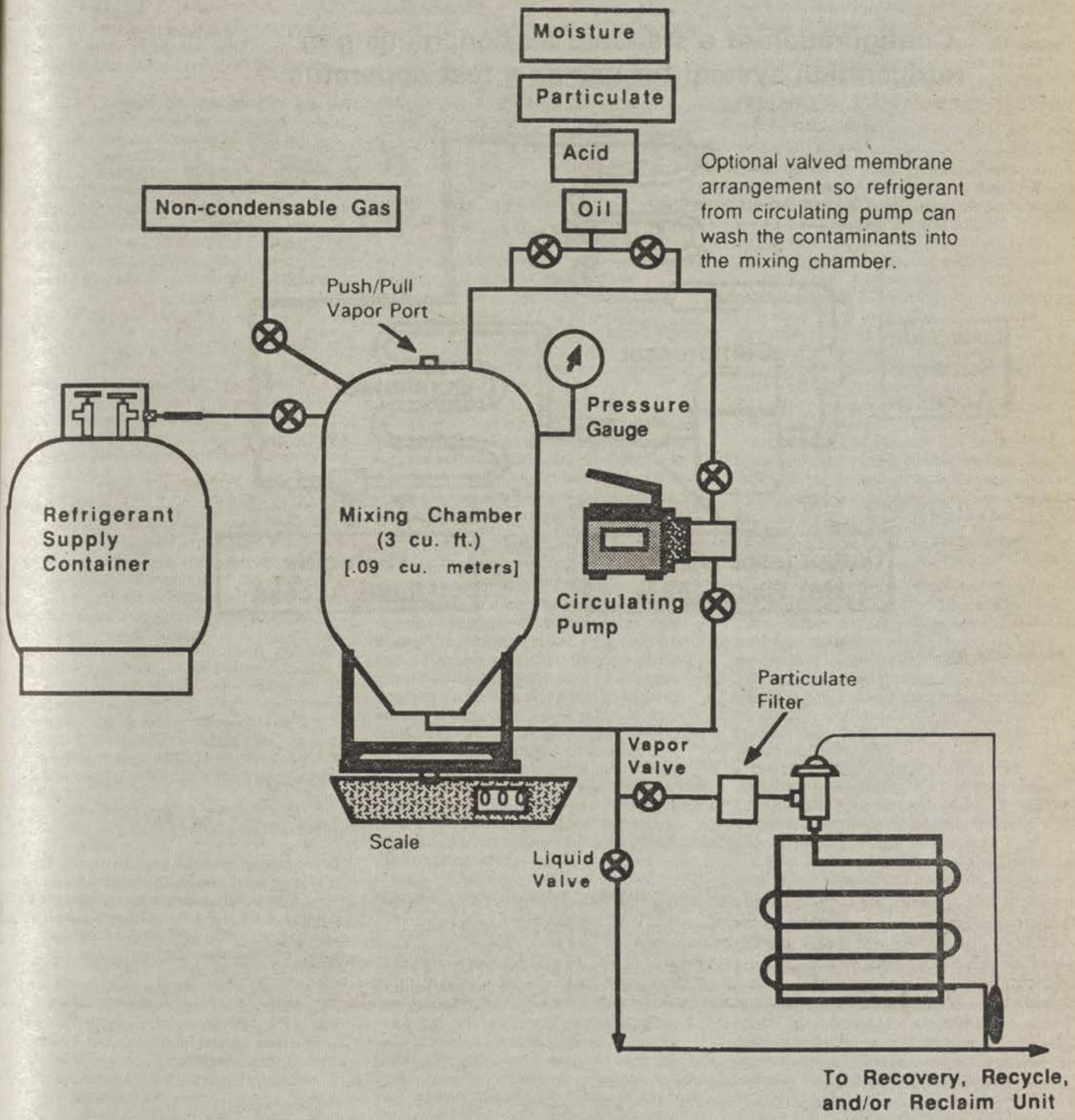
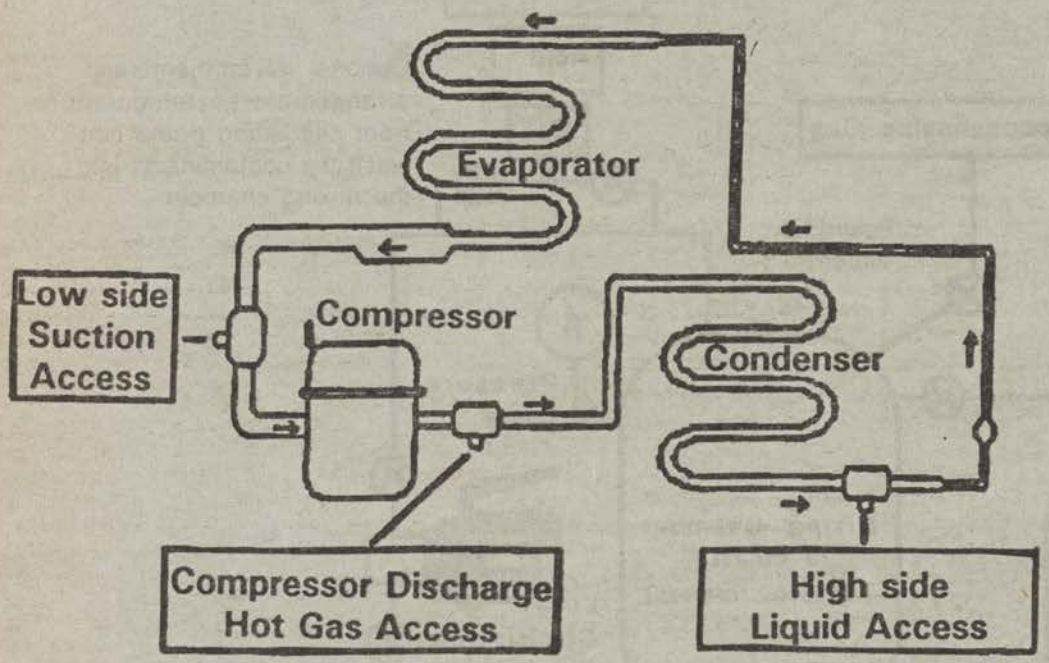


FIGURE 2

System-Dependent Equipment Test Apparatus

Configuration of a standard air conditioning or refrigeration system for use as a test apparatus



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Section 7. Performance Testing

7.1 Contaminant removal and performance testing shall be conducted at 75 F ± 2 F [23.9 °C ± 1.1 °C].

7.1.1 The equipment shall be prepared for operation per the instruction manual.

7.1.2 The contaminated sample batch shall consist of not less than the sum of the amounts required to complete steps 7.1.2.2 and 7.1.2.3 below.

7.1.2.1 A liquid sample shall be drawn from the mixing chamber prior to starting the test to assure quality control of the mixing process.

7.1.2.2 Vapor refrigerant feed testing, if elected, shall normally be processed first. After the equipment reaches stabilized conditions of condensing temperature and/or storage tank pressure, the vapor feed recovery rate shall be measured. One method is to start measuring the vapor refrigerant recovery rate when 85% of refrigerant remains in the mixing chamber and continue for a period of time sufficient to achieve the accuracy in 9.2. If liquid feed is not elected, complete Step 7.1.2.4.

7.1.2.3 Liquid refrigerant feed testing, if elected, shall be processed next. After the equipment reaches stabilized conditions, the liquid feed recovery rate shall be measured. One method is to wait 2 minutes after starting liquid feed and then measure the liquid refrigerant recovery rate for a period of time sufficient to achieve the accuracy in 9.1. Continue liquid recovery operation as called for in 7.1.2.4.

7.1.2.4 Continue recovery operation until all liquid is removed from the mixing chamber and vapor is removed to the point where the equipment shuts down per automatic means or is manually stopped per the operating instructions.

7.1.2.5 After collecting the first contaminated refrigerant sample batch, the liquid and vapor value of the apparatus shall be closed and the mixing chamber pressure recorded after 1 minute as required in 9.5. After preparing a second contaminated refrigerant sample batch, continue recovery until the storage container reaches 80% liquid fill level. After recycling and measuring the recycle rate per section 7.1.3, set this container aside for the vapor sample in 8.2.2.

7.1.2.6 Interruptions in equipment operations as called for in instruction manual are allowable.

7.1.3 Recycle as called for in equipment operating instructions. Determine recycle rate by appropriate means as required in 9.3.

7.1.4 Repeat steps 7.1.2, 7.1.2.4, and 7.1.3 with contaminated refrigerant sample until equipment indicator(s) show need to change filter(s). It will not be necessary to repeat the recycle rate determination in 7.1.3.

7.1.4.1 For equipment with a multiple pass recirculating filter system, analyze the contents of the previous storage container.

7.1.4.2 For equipment with a single pass filter system, analyze the contents of the current storage container.

7.1.5 Refrigerant loss due to the equipment's non-condensable gas purge shall be determined by appropriate means. (See Section 9.4.)

7.2 System Dependent Equipment. This procedure shall be used for vacuum rating of all system dependent equipment. Liquid refrigerant recovery rate, vapor refrigerant recovery rate, and recycle rate are not tested on system dependent systems.

7.2.1 The apparatus operation and testing shall be conducted at 75 F ± 2 F. [23.9 °C. ±/1.1. °C.].

7.2.2 The apparatus shall be charged with refrigerant per its system design specifications.

7.2.3 For measurement of final recovery vacuum as required in 9.5, first shut the balance line isolation valve and wait 1 minute for pressure to balance. Then connect and operate the recovery system per manufacturers recommendations. When the evacuation is completed, open the balance line isolation valve and measure the pressure in the balance line.

Section 8. Sampling and Chemical Analysis Methods

8.1 The referee test methods for the various contaminants are summarized in the following paragraphs. Detailed test procedures are included in Appendix A "Test Procedures for ARI STD 700." If alternate test methods are employed, the user must be able to demonstrate that they produce results equivalent to the specified referee method.

8.2 *Refrigerant Sampling.*

8.2.1 *Sampling Precautions.* Special precautions should be taken to assure that representative samples are obtained for analysis. Sampling shall be done by trained laboratory personnel following accepted sampling and safety procedures.

8.2.2 *Gas Phase Sample.* A gas phase sample shall be obtained for determining the non-condensables. Since non-condensable gases, if present, will concentrate in the vapor phase of the refrigerant, care must be exercised to eliminate introduction of air during the sample transfer. Purging is not and acceptable procedure for a gas phase sample since it may introduce a foreign product. Since R11, R113 and R123 have normal boiling points at or above room temperature, noncondensable determination is not required for these refrigerants.

8.2.2.1 The sample cylinder shall be connected to an evacuated gas sampling bulb by means of a manifold. The manifold should have a valve arrangement that facilitates evacuation of all connecting tubing leading to the sampling bulb.

8.2.2.2 After the manifold has been evacuated, close the valve to the pump and open the valve on the system. Allow the pressure to equilibrate and close valves.

8.2.3 *Liquid Phase Sample.* A liquid phase sample is required for all tests listed in this standard, except the test for non-condensables.

8.2.3.1 Place an empty sample cylinder with the valve open in an oven at 230 F [110°C] for one hour. Remove it from the oven while hot, immediately connect to an evacuation system and evacuate to less than 1mm. mercury (1000 microns). Close the valve and allow it to cool.

8.2.3.2 The valve and lines from the unit to be sampled shall be clean and dry. Connect the line to the sample cylinder loosely. Purge through the loose connection. Make the connection tight at the end of the purge period. Take the sample as a liquid by chilling the sample cylinder slightly. Accurate analysis requires that the sample container be filled to at least 60% by volume; however under no circumstances should the cylinder be filled to more than 80% by volume. This can be accomplished by weighing the empty cylinder and then the cylinder with refrigerant. When the desired amount of refrigerant has been collected, close the valve(s) and disconnect the sample cylinder immediately.

8.2.3.3 Check the sample cylinder for leaks and record the gross weight.

8.3 *Water Content.*

8.3.1. The Coulometric Karl Fischer Titration shall be the primary test method for determining the water content of refrigerants. This method is described in Appendix A. This method can be used for refrigerants that are either a liquid or a gas at room temperature, including Refrigerants 11 and 13. For all refrigerants, the sample for water analysis shall be taken from the liquid phase of the container to be tested. Proper operation of the analytical method requires special equipment and an experienced operator. The precision of the results is excellent if proper sampling and handling procedures are followed. Refrigerants containing a colored dye can be successfully analyzed for water using this method.

8.3.2 The Karl Fischer Test Method is an acceptable alternative test method for determining the water content of refrigerants. This method is described in ASTM Standard for "Water in gases Using Karl Fisher Reagent" E700–79, reapproved 1984 (American Society for Testing and Materials, Philadelphia, PA).

8.3.3 Report the moisture level in parts per million by weight if a sample is required.

8.4 *Chloride.* The refrigerant shall be tested for chlorides as an indication of the presence of hydrochloric or similar acids. The recommended procedure is intended for use with new or reclaimed refrigerants. Significant amounts of oil may interfere with the results by indicating a failure in the absence of chlorides.

8.4.1 The test method shall be that described in Appendix A "Test Procedures for ARI–700." The test will show noticeable turbidity at equivalent chloride levels of about 3 ppm by weight or higher.

8.4.2 The results of the test shall not exhibit any sign of turbity. Report results as "pass" or "fail."

8.5 *Acidity.*

8.5.1 The acidity test uses the titration principle to detect any compound that is highly soluble in water and ionizes as an acid. The test method shall be that described in Appendix A. "Test Procedures for ARI–700." The test may not be suitable for determination of high molecular weight organic acids; however these acids will be found in the high boiling residue test outlined in Section 5.7. The test requires about a 100 to 120 gram sample and has a low detection limit of 0.1 ppm by weight as HC1.

8.6 High Boiling Residue.

8.6.1 High boiling residue will be determined by measuring the residue of a

standard volume of refrigerant after evaporation. The refrigerant sample shall be evaporated at room temperature or a temperature 50 F [10°.0C], above the boiling point of the sample using a Goetz tube as specified in Appendix A "Test Procedures for ARI–700." Oils and or organic acids will be captured by this method.

8.6.2 The value for high boiling residue shall be expressed as a percentage by volume.

8.7 Particulates/Solids.

8.7.1 A measured amount of sample is evaporated from a Goetz bulb under controlled temperature conditions. The particulates/solids shall be determined by visual examination of the empty Goetz bulb after the sample has evaporated completely. Presence of dirt, rust or other particulate contamination is reported a "fail." For details of this test method, refer to Appendix B "Test Procedures for ARI–700."

8.8 Non-Condensables

8.8.1 A vapor phase sample shall be used for determination of non-condensables. Non-condensable gases consist primarily of air accumulated in the vapor phase of refrigerant containing tanks. The solubility of air in the refrigerants liquid phase is extremely low and air is not significant as a liquid phase contaminant. The presence of non-condensable gases may reflect poor quality control in transferring refrigerants to storage tanks and cylinders.

8.8.2 The test method shall be gas chromatography with a thermal conductivity detector as described in Appendix A "Test Procedures for ARI–700."

8.8.2.1 The Federal Specification for "Fluorocarbon Refrigerants," BB–F–1421B, dated March 5, 1992, section 4.4.2 (perchloroethylene method) is an acceptable alternate test method.

8.8.3 Report the level of non-condensable as percent by volume.

Section 9. Performance Calculation and Rating

9.1 The liquid refrigerant recovery rate shall be expressed in pounds per minute [kg/min] and measured by weight change at the mixing chamber (See Figure 1) divided by elapsed time to an accuracy within .02 lbs/min. [.009 kg/min]. Ratings using the Push/Pull method shall be identified "Push/Pull". Equipment may be rated by both methods.

9.2 The vapor refrigerant recovery rate shall be expressed in pounds per minute [kg/min] and measured by weight change at the mixing chamber (See Figure 1) divided by elapsed time to an accuracy within .02 lbs/min. [.0.009 kg/min].

9.3 The recycle rate is defined in 3.7 and expressed in pounds per minute [kg/min] of flow and shall be per ASHRAE 41.7–84 "Procedure For Fluid Measurement Of Gases" or ASHRAE 41.8–89 "Standard Method of Flow of Fluids—Liquids."

9.3.1 For equipment using multipass recycling or a separate sequence, the recycle rate shall be determined by dividing the net weight W of the refrigerant to be recycled by the actual time T required to recycle the refrigerant. Any set-up or operator interruptions shall not be included in the time T. The accuracy of the recycle rate shall be within .02 lbs/min. [.009 kg/min].

9 3.2 If no separate recycling sequence is used, the recycle rate shall be the higher of the vapor refrigerant recovery rate or the liquid refrigerant recovery rate. The recycle rate shall match a process which leads to contaminant levels in 9.6. Specifically, a recovery rate determined from bypassing a contaminant removal device cannot be used as a recycle rate when the contaminant levels in 9.6 are determined by passing the refrigerant through the containment removal device.

9.4 Refrigerant loss due to non-condensable purging shall be less than 5%. This rating shall be expressed as "passed" if less than 5%.

This calculation will be based upon net loss of non-condensables and refrigerant due to the purge divided by the initial net content. The net loss shall be determined by weighing before and after the purge, by collecting purged gases, or an equivalent method.

9.5 The final recovery vacuum shall be the mixing chamber pressure called for in 7.1.2.5 expressed in inches of mercury vacuum, [mm Hg or kP]. The accuracy of the measurement shall be within ±.1 inch [±2.5mm] of Hg and rounding down to the nearest whole number.

9.6 The contaminant levels remaining after testing shall be published as follows:

Moisture content, PPM by weight
Chloride ions, Pass/Fail
Acidity, PPM by weight
High boiling residue, percentage by volume
Particulate/solid, Pass/Fail
Non-condensables, % by volume

9.7 Product Literature: Except as provided under product labelling in Section 11. performance ratings per 9.1, 9.2, 9.3, and 9.5 must be grouped together and shown for all listed refrigerants (11.2) subject to limitations of 9.8. Wherever any contaminant levels per 9.6 are rated, all ratings in 9.6 must be shown for all listed refrigerants subject to limitations of 9.8. The type of equipment in 11.1 must be included with either grouping. Optional ratings in 9.8 need not be shown.

9.8 Ratings shall include all of the parameters for each designed refrigerant in 11.2 as shown in Tables 2 and 3.

TABLE 2.—PERFORMANCE

Parameter/type of equipment	Recovery	Recovery/recycle	Recycle	System dependent equipment
Liquid refrigerant recovery rate	(2)	(2)	N/A	N/A
Vapor refrigerant recovery rate	(2)	(2)	N/A	N/A
Final recovery vacuum	(1)	(1)	N/A	(1)
Recycle rate	N/A	(1)	(1)	N/A
Refrigerant loss due to non-condensable purging	(3)	(1)	(1)	N/A

[1] Mandatory rating.
[2] For a recovery or recovery/recycle unit, one must rate for either liquid feed only or vapor feed only or can rate for both. If rating only the one, the other shall be indicated by "N/A."
[3] For Recovery Equipment, these parameters are optional. If not rated, use N/A.

TABLE 3.—CONTAMINANTS

Contaminant/type of equipment	Recovery	Recovery/recycle	Recycle	System dependent equipment
Moisture content	(*)	x	x	NA.
Chloride ions	(*)	x	x	NA.
Acidity	(*)	x	x	NA.
High boiling residue	(*)	x	x	NA.
Particulates	(*)	x	x	NA.

TABLE 3.—CONTAMINANTS—Continued

Contaminant/type of equipment	Recovery	Recovery/ recycle	Recycle	System dependent equipment
Non-condensables	(*)	x	x	NA.

*For Recovery Equipment, these parameters are optional. If not rated, use N/A.
xMandatory rating.

Section 10. Tolerances

10.1 Any equipment tested shall produce contaminant levels not higher than the published ratings. The liquid refrigerant recovery rate, vapor refrigerant recovery rate, final recovery vacuum and recycle rate shall not be less than the published ratings.

Section 11. Product Labelling

11.1 *Type of equipment.* The type of equipment shall be as listed:

11.1.1 Recovery only
11.1.2 System Dependent Recovery
11.1.3 Recovery/Recycle
11.1.4 Recycle only

11.2 Designated refrigerants and the following as applicable for each:

11.2.1 Liquid Recovery Rate
11.2.2 Vapor Recovery Rate
11.2.3 Final Recovery Vacuum
11.2.4 Recycle Rate

Section 12. Voluntary Conformance

12.1 *Conformance.* While conformance with this standard is voluntary, conformance shall not be claimed or implied for products or equipment within its Purpose (Section 1) and Scope (Section 2) unless such claims meet all of the requirements of the standards.

Appendix A

Particulate Used in Standard Contaminated Refrigerant Sample.

1. Particulate Specification

1.1 The particulate material pm will be a blend of 50% coarse air cleaner dust as received, and 50% retained on a 200-mesh screen. The coarse air cleaner dust is available from: AC Spark Plug Division, General Motors Corporation, Flint, Michigan.

1.2 Preparation of Particulate Materials

To prepare the blend of contaminant, first wet screen a quantity of coarse air cleaner dust on a 200-mesh screen (particle retention 74 pm). This is done by placing a portion of the dust on a 200-mesh screen and running water through the screen while stirring the dust with the fingers. The fine contaminant particles passing through the screen are discarded. The +200 mesh particles collected on the screen are removed and dried for one hour at 230 F [110 °C]. The blend of standard contaminant is prepared by mixing 50% by weight of coarse air cleaner dust as received after drying for one hour at 230 F [110 °C] with 50% by weight of the +200 mesh screened dust.

1.3 The coarse air cleaner dust as received and the blend used as the standard contaminant have the following approximate particle size analysis: Wt. % in various size ranges, pm.

Size range	As received	Blend
0–5	12	6
5–10	12	6
10–20	14	7
20–40	23	11
40–80	30	32
80–200	9	38

Appendix C to Subpart F—Method for Testing Recovery Devices for Use With Small Appliances

Recovery Efficiency Test Procedure for Refrigerant Recovery Equipment Used on Small Appliances

The following test procedure is utilized to evaluate the efficiency of equipment designed to recover ozone depleting refrigerants (or any substitute refrigerant subject to the recycling rules promulgated pursuant to section 608 of the Clean Air Act Amendments of 1990) from small appliances when service of those appliances requires entry into the sealed refrigeration system or when those appliances are destined for disposal. This procedure is designed to calculate on a weight or mass basis the percentage of a known charge of CFC–12 refrigerant removed and captured from a test stand refrigeration system. Captured refrigerant is that refrigerant delivered to a container suitable for shipment to a refrigerant reclaimer plus any refrigerant remaining in the recovery system in a manner that it will be transferred to a shipping container after additional recovery operations.

The test stand refrigeration system required for this procedure is constructed with standard equipment utilized in currently produced household refrigerator and freezer products. The procedure also accounts for compressor oils that might be added to or removed from the test stand compressor or any compressor used in the recovery system.

I. Test Stand

Test stands are constructed in accordance with the following standards.

1. Evaporator—5/16 in. outside dia. with 30 cu. in. volume.

2. Condenser—¼ in. outside dia. with 20 cu. in volume.

3. Suction line capillary heat exchanger—appropriate for compressor used.

4. An 800–950 Btu/hr high side case (rotary) compressor; or (depending on the test senario);

5. An 800–9500 Btu/hr low side case (reciprocating) compressor.

A person seeking to have its recovery system certified shall specify the compressors by manufacturer and model that are to be used in test stands constructed for evaluation of its equipment, and the type and quantity of compressor to be used in those compressors. Only a compressor oil approved for use by the compressor's manufacturer may be specified, and the quantity of compressor oil specified shall be an appropriate quantity for the type of oil and compressor to be used. In order to reduce the cost of testing, the person seeking certification of its recovery system may supply an EPA approved third party testing laboratory with test stands meeting these standards for use in evaluating its recovery system.

II. Test Conditions

Tests are to be conducted at 75 degrees F, plus or minus 2 degrees F (23.9 C +/−1.1 C). Separate tests are conducted on both high side case compressor stands and low side case compressor stands. Separate tests are also conducted with the test stand compressor running during the recovery operation, and without the test stand compressor running during the recovery operation, to calculate the system's recovery efficiency under either condition.

These tests are to be performed using a representative model of all equipment used in the recovery system to deliver recovered refrigerant to a container suitable for shipment to a refrigerant reclaimer. The test stands are to be equipped with access valves permanently installed as specific by the recovery system's vendor to represent the valves used with that system in actual field operations.

A series of five (5) recovery operations are to be performed for each compressor scenario and a recovery efficiency is calculated based on the total quantity of refrigerant captured during all five (5) recoveries. Alternatively, at the request of the recovery system's vendor, a recovery efficiency is to be calculated for each recovery event. In this case, a statistically significant number of recovery operations are to be performed. Determination of what is a statistically significant number of recoveries is to be calculated as set out below. These individual recovery efficiencies are then averaged.

There are four (4) compressor scenarios to be tested. These are a high side case compressor in working condition; a high side case compressor in nonworking condition; a low side case compressor in working condition; and a low side case compressor in nonworking condition. Recovery efficiencies calculated for the two working compressor scenarios are to be averaged to report a working compressor performance. The two nonworking compressor efficiencies are also to be averaged to report a nonworking compressor performance.

If large scale equipment is required in the system to deliver recovered refrigerant to a refrigerant reclaimer (eg. carbon desorption equipment) and it is not possible to have that equipment evaluated under the procedure, the system's vendor shall obtain engineering data on the performance of that large scale equipment that will reasonably demonstrate the percentage refrigerant lost when processed by that equipment. That data will be supplied to any person required to evaluate the performance of those systems. The following procedure will also be modified as needed to determine the weight of refrigerant recovered from a test stand and delivered to a container for shipment to the large process equipment for further processing. The percentage loss documented to occur during processing is then to be applied to the recovery efficiencies calculated in this modified procedure to determine the overall capture efficiency for the entire system.

The following are definitions of symbols used in the test procedure.

Test Stand:

"TSO" means an original test stand weight.

"TSC" means a charged test stand weight.

Shipping Containers:

"SCO" means the original or empty weight of shipping container(s).

"SCF" means the final or full weight of shipping container(s).

Recover/Transfer System:

"RSO" means the original weight of a recovery/transfer system.

"RSF" means the final weight of a recovery/transfer system.

"OL" means the net amount of oil added/removed from the recovery device and/or transfer device between the beginning and end of the test for one compressor scenario.

Weighing steps are conducted with precision and accuracy of plus or minus 1.0 gram.

III. Test Procedure

1. Evacuate the test stand to 20 microns vacuum (pressure measured at a vacuum pump) for 12 hours.

2. Weigh the test stand (TSO).

3. If this is the first recovery operation being performed for a compressor scenario (or if a recovery efficiency is to be calculated for each recovery event), then weigh all devices used in the recovery system to deliver recovered refrigerant to a container suitable for shipment or delivery to a refrigerant reclaimer. Weigh only devices that can retain refrigerant in a manner that it will ultimately be transferred to a shipping container without significant release to the atmosphere (RSO).

4. Weigh final shipping containers (SCO).

5. Charge the test stand with an appropriate CFC–12 charge (either 6 oz. or 9 oz.).

6. Run the test stand for four (4) hours with 100% run time.

7. Turn off the test stand for twelve (12) hours. During this period evaporate all condensation that has collected on the test stand during step 6.

8. Weigh the test stand (TSC).

9. Recover CFC–12 from the test stand and perform all operations needed to transfer the recovered refrigerant to one of the shipping containers weighed in step 4. All recovery and transfer operations are to be performed in accordance with the operating instructions provided by the system's vendor. The compressor in the test stand is to remain "off" or be turned "on" during the recovery operation depending on whether the test is for a nonworking or working compressor performance evaluation. If a recovery efficiency is to be calculated for each recovery event, transfer the captured refrigerant to a shipping container and then skip to step 13. Otherwise continue. If the system allows for multiple recovery operations to be performed before transferring recovered refrigerant to a shipping container, the transfer operation can be delayed until either the maximum number of recovery operations allowed before a transfer is required have been performed, or the last of the five (5) recovery operations has been performed.

10. Perform any oil removal or oil addition operations needed to properly maintain the test stand and the devices used for recovery or transfer operations. Determine the net weight of the oil added or removed from the recovery device and/or transfer device. (OP1 for oil added, OP2 for oil removed).

11. Evacuate the test stand to 20 microns vacuum for 4 hours.

12. Return to step 2 unless five (5) recovery operations have been performed.

13. Weigh all final shipping containers that received recovered refrigerant (SCF).

14. Weigh the equipment weighed in step three (3) above (RSF). If a recovery efficiency is to be calculated for each recovery event, perform calculations and return to step one (1) for additional recoveries.

IV. Calculations

A. *For Five (5) Consecutive Recoveries*

Refrigerant Recoverable equals the summation of charged test stand weights minus original test stand weights.

$$\text{Refrigerant Recoverable} = \sum_{i=1}^{5} \left(TSC_i - TSO_i\right)$$

Oil Loss equals the net weight of oil added to and removed from the recovery device and/or transfer device.

$$OL = \sum_{i=1}^{5} \left(OP1_i - OP2_i\right)$$

Refrigerant Recovered equals the final weight of shipping containers minus the initial weight of final shipping containers, plus final recovery system weight, minus original recovery system weight, plus the net value of all additions and removals of oil from the recovery and transfer devices.

$$\text{Refrigerant Recovered} = \left(\sum_{i=1}^{n} SCF_i - SCO_i\right) + RSF - RSO - OL$$

n=number of shipping containers used.

Recovery Efficiency equals Refrigerant Recovered divided by Refrigerant Recoverable times 100%.

$$\text{Recovery Efficiency} = \frac{\text{Refrigerant Recovered}}{\text{Refrigerant Recoverable}} 100\%$$

B. *For Individual Recoveries*

Refrigerant Recoverable equals the charged test stand weight minus the original test stand weight.

$$\text{Refrigerant Recoverable} = TSCO - TSO$$

Refrigerant Recovered equals the final weight of the shipping container minus the initial weight of the shipping container plus the final weight of the recovery system minus the original recovery system weight.

$$\text{Refrigerant Recovered} = SCF - SCO + RSF - RSO$$

Recovery Efficiency equals Refrigerant Recovered divided by Refrigerant Recoverable times 100 percent.

$$\text{Recovery Efficiency} = \frac{\text{Refrigerant Recovered}}{\text{Refrigerant Recoverable}} 100\%$$

C. *Calculation of a Statistically Significant Number of Recoveries*

$$N_{add} = ((t * sd) / (.10 * X))^2 - N$$

Where:

N_{add}=the number of additional samples required to achieve 90% confidence.
sd=Standard deviation, or $(X/(N-1)^5)$
X=Sample average
N=Number of samples tested

Number of samples	t for 90% confidence
2	6.814
3	2.920
4	2.353
5	2.132
6	2.015
7	1.943
8	1.895
9	1.860
10	1.833

Procedure:

1. Compute N_{add} after completing two recoveries.
2. If $N_{add}>0$, then run an additional test.
3. Re-compute N_{add}. Continue to test additional samples until $N_{add}<0$.

V. Test Procedure Approval and Certification

Each vendor of capture equipment for small appliances desiring certification will provide a representative model of its capture system and its recommended recovery procedures to an EPA approved third party laboratory for testing in accordance with this procedure. The third party laboratory will certify recovery systems that when tested in accordance with this procedure demonstrate a sufficient recovery efficiency to meet EPA regulatory requirements.

Appendix D to Subpart F—Standards for Becoming a Certifying Program for Technicians

Standards for Certifying Programs

a. Test Preparation

Certification for Type II, Type III and Universal technicians will be dependent upon passage of a closed-book, proctored test, administered in a secure environment, by an EPA-approved certifying program.

Certification for Type I technicians will be dependent upon passage of an EPA-approved test, provided by an EPA-approved certifying program. Organizations providing Type I certification only, may chose either an on-site format, or a mail-in format, similar to what is permitted under the MVACs program.

Each certifying program must assemble tests by choosing a prescribed subset from the EPA test bank. EPA expects to have a test bank with a minimum of 500 questions, which will enable the certifying program to generate multiple tests in order to discourage cheating. Each test must include 25 questions drawn from Group 1 and 25 questions drawn from each relevant technical Group. Tests for Universal technicians will include 100 questions (25 from Group 1 and 25 from each relevant technical Group). Each 50-question test represents 10 percent of the total test bank. Questions should be divided in order to sufficiently cover each topic within the Group.

Each certifying program must show a method of randomly choosing which questions will be on the tests. Multiple versions of the test must be used during each testing event. Test answer sheets or (for those testing via the computer medium) computer files must include the name and address of the applicant, the name and address of the certifying program, and the date and location at which the test was administered.

Training material accompanying mail-in Type I tests must not include sample test questions mimicking the language of the certification test. All mail-in material will be subject to review by EPA.

Certifying programs may charge individuals reasonable fees for the administration of the tests. EPA will publish a list of all approved certifying programs periodically, including the fees charged by the programs. This information will be available from the Stratospheric Ozone Protection Hotline.

b. Proctoring

A certifying program for Type II, Type III and Universal technicians must designate or arrange for the designation of at least one proctor registered for each testing event. If more than 50 people are taking tests at the same time at a given site, the certifying organization must adhere to normal testing procedures, by designating at least one additional proctor or monitor for every 50 people taking tests at that site.

The certification test for Type II, Type III and Universal technicians is a closed-book exam. The proctors must ensure that the applicants for certification do not use any notes or training materials during testing. Desks or work space must be placed in a way that discourages cheating. The space and physical facilities are to be conducive to continuous surveillance by the proctors and monitors during testing.

The proctor may not receive any benefit from the outcome of the testing other than a fee for proctoring. Proctors cannot know in advance which questions are on the tests they are proctoring.

Proctors are required to verify the identity of individuals taking the test by examining photo identification. Acceptable forms of identification include but are not limited to drivers' licenses, government identification cards, passports, and military identification.

Certifying programs for Type I technicians using the mail-in format, must take sufficient measures at the test site to ensure that tests are completed honestly by each technician. Each test for Type I certification must provide a means of verifying the identification of the individual taking the test. Acceptable forms of identification include but are not limited to drivers' licenses numbers, social security numbers, and passport numbers.

c. Test Security

A certifying program must demonstrate the ability to ensure the confidentiality and security of the test questions and answer keys through strict accountability procedures. An organization interested in developing a technician certification program will be required to describe these test security procedures to EPA.

After the completion of a test, proctors must collect all test forms, answer sheets, scratch paper and notes. These items are to be placed in a sealed envelope.

d. Test Content

All technician certification tests will include 25 questions from Group I. Group I will ask questions in the following areas:

I. Environmental impact of CFCs and HCFCs
II. Laws and regulations
III. Changing industry outlook

Type I, Type II and Type III certification tests will include 25 questions from Group II. Group II will ask questions covering sector-specific issues in the following areas:

IV. Leak detection
V. Recovery Techniques
VI. Safety
VII. Shipping
VII. Disposal

Universal Certification will include 75 questions from Group II, with 25 from each of the three sector-specific areas.

e. Grading

Tests must be graded objectively. Certifying programs must inform the applicant of their test results no later than 30 days from the date of the test. Type I certifying programs using the mail-in format, must notify the applicants of their test results

no later than 30 days from the date the certifying programs received the completed test and any required documentation. Certifying programs may mail or hand deliver the results.

The passing score for the closed-book Type I, Type II, Type III and Universal certification test is 70 percent. For Type I certification tests using the mail-in format, passing score is 84 percent.

f. Proof of Certification

Certifying programs must issue a standard wallet-sized identification card no later than 30 days from the date of the test. Type I certifying programs using mail-in formats must issue cards to certified technicians no later than 30 days from the date the certifying program receives the completed test and any required documentation.

Each wallet-sized identification card must include, at a minimum, the name of the certifying program including the date the certifying program received EPA approval, the name of the person certified, the type of certification, a unique number for the certified person and the following text:

[name of person] has been certified as [Type I, Type II, Type III and/or Universal—as appropriate] technician as required by 40 CFR part 82, subpart F.

g. Recordkeeping and Reporting Requirements

Certifying programs must maintain records for at least three years which include but are not limited to the names and addresses of all individuals taking the tests, the scores of all certification tests administered, and the dates and locations of all tests administered.

Certifying programs must send EPA an activity report every six months, the first to be submitted six months following approval of the program by EPA. This report will include the pass/fail rate and testing schedules. This will allow the Agency to determine the relative progress and success of these programs. If the certifying program believes a test bank question needs to be modified, information about that question should also be included.

Approved certifying programs will receive a letter of approval from EPA. Each testing center must display a copy of that letter.

h. Additional Requirements

EPA will periodically inspect testing sites to ensure compliance with EPA regulations. If testing center discrepancies are found, they must be corrected within a specified time period. If discrepancies are not corrected, EPA may suspend or revoke the certifying programs's approval. The inspections will include but are not limited to a review of the certifying programs' provisions for test security, the availability of space and facilities to conduct the administrative requirements and ensure the security of the tests, the availability of adequate testing facilities and spacing of the applicants during testing, a review of the proper procedures regarding accountability, and that there is no evidence of misconduct on the part of the certifying programs, their representatives and proctors, or the applicants for certification.

If the certifying programs offer training or provide review materials to the applicants, these endeavors are to be considered completely separate from the administration of the certification test.

i. Approval Process

EPA anticipates receiving a large number of applications from organizations seeking to become certifying programs. In order to certify as many technicians as possible in a reasonable amount of time, EPA will give priority to national programs. Below are the guidelines EPA will use:

First: Certifying programs providing at least 25 testing centers with a minimum of one site in at least 8 different states will be considered.

Second: Certifying programs forming regional networks with a minimum of 10 testing centers will be considered.

Third: Certifying programs providing testing centers in geographically isolated areas not sufficiently covered by the national or regional programs will be considered.

Fourth: All other programs applying for EPA approval will be considered.

Sample application forms may be obtained by contacting the Stratopheric Ozone Hotline at 1–800–296–1996.

j. Grandfathering

EPA will grandfather technicians whose programs seek and receive EPA approval as a certifying program. As part of this process, these certifying programs may be required to send EPA-approved supplemental information or provide additional testing to ensure the level of the technicians' knowledge. The certifying programs will also issue new identification cards meeting the requirements specified above.

Persons who are currently technicians must be certified by November 14, 1994. Technicians that participated in certification programs which do not become EPA-approved certifying programs must either receive EPA-approved supplemental information from the original testing organization or be certified by taking a test given by an EPA-approved certification organization by November 14, 1994.

k. Sample Application

EPA has provided a sample application. The Agency designed the application to demonstrate the information certifying programs must provide to EPA. Programs are not required to use this form or this format.

(Approved by the Office of Management and Budget under the control number 2060–0256)

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