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Protection of Stratospheric Ozone: Update to the Refrigerant Management Requirements Under the Clean Air Act; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 82

[EPA–HQ–OAR–2015–0453; FRL–9933–48–OAR]

RIN 2060–AS51

Protection of Stratospheric Ozone: Update to the Refrigerant Management Requirements Under the Clean Air Act

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: The Clean Air Act prohibits the knowing release of ozone-depleting and substitute refrigerants during the course of maintaining, servicing, repairing, or disposing of appliances or industrial process refrigeration. The existing regulations require that persons servicing or disposing of air-conditioning and refrigeration equipment observe certain service practices that reduce emissions of ozone-depleting refrigerant. This proposed rule would update those existing requirements as well as extend them, as appropriate, to non-ozone-depleting substitute refrigerants, such as hydrofluorocarbons. The proposed updates include strengthening leak repair requirements, establishing recordkeeping requirements for the disposal of appliances containing five to 50 pounds of refrigerant, changes to the technician certification program, and changes for improved readability, compliance, and restructuring of the requirements. As a result, this action would reduce emissions of ozone-depleting substances and gases with high global warming potentials.

DATES: Comments must be received on or before January 8, 2016. Any party requesting a public hearing must notify the contact listed below under **FOR FURTHER INFORMATION CONTACT** by 5 p.m. Eastern Daylight Time on November 16, 2015. If a public hearing is requested, the hearing will be held on or around November 24, 2015. If a hearing is held, it will take place at EPA headquarters in Washington, DC. EPA will post a notice on our Web site, *www.epa.gov/ozone/strathome.html,* announcing further information should a hearing take place.

Under the Paperwork Reduction Act (PRA), comments on the information collection provisions are best assured of consideration if the Office of Management and Budget (OMB) receives a copy of your comments on or before December 9, 2015.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2015–0453, to the Federal eRulemaking Portal: *http://www.regulations.gov.* Follow the online instructions for submitting comments. Once submitted, comments cannot be edited or withdrawn. EPA may publish any comment received to its public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. EPA will generally not consider comments or comment contents located outside of the primary submission (*i.e.* on the web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit *http://www2.epa.gov/dockets/commenting-epa-dockets.*

FOR FURTHER INFORMATION CONTACT: Luke Hall-Jordan, Stratospheric Protection Division, Office of Atmospheric Programs, Mail Code 6205T, 1200 Pennsylvania Avenue NW., Washington, DC 20460; telephone number (202) 343–9591; email address *hall-jordan.luke@epa.gov.* You may also visit *www.epa.gov/ozone/title6/608* for further information about refrigerant management, other Stratospheric Ozone Protection regulations, the science of ozone layer depletion, and related topics.

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List of Acronyms

AHEF—Atmospheric and Health Effects Framework model
AHRI—Air Conditioning, Heating, and Refrigeration Institute
ARI—Air Conditioning and Refrigeration Institute (now AHRI)
ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
CAA—Clean Air Act
CARB—California Air Resources Board
CBI—Confidential business information

CFC—Chlorofluorocarbon
CO_2—Carbon dioxide
GHG—Greenhouse gas
GWP—Global warming potential
HCFC—Hydrochlorofluorocarbon
HFC—Hydrofluorocarbon
HFO—Hydrofluoroolefin
IPCC—Intergovernmental Panel on Climate Change
IPR—Industrial process refrigeration
$MMTCO_2eq$—Million metric tons carbon dioxide equivalent
MVAC—Motor vehicle air conditioner
NAICS—North American Industry Classification System
ODP—Ozone depletion potential
ODS—Ozone-depleting substance
PFC—Perfluorocarbon
RMP—Refrigerant Management Program
SCAQMD—South Coast Air Quality Management District
SNAP—Significant New Alternatives Policy
UL—Underwriters Laboratories

I. General Information

A. Does this action apply to me?

Categories and entities potentially regulated by this action include those who own, operate, maintain, service, repair, recycle or dispose of refrigeration and air-conditioning appliances and refrigerants, as well as entities that manufacture or sell refrigerants, products and services for the refrigeration and air-conditioning industry. Regulated entities include, but are not limited to, the following:

Category	North American Industry Classification System (NAICS) Code	Examples of regulated entities
Industrial Process Refrigeration (IPR).	111, 11251, 11511, 21111, 2211, 2212, 2213, 311, 3121, 3221, 3222, 32311, 32411, 3251, 32512, 3252, 3253, 32541, 3256, 3259, 3261, 3262, 3324, 3328, 33324, 33341, 33361, 3341, 3344, 3345, 3346, 3364, 33911, 339999.	Owners or operators of refrigeration equipment used in agriculture and crop production, oil and gas extraction, ice rinks, and the manufacture of frozen food, dairy products, food and beverages, ice, petrochemicals, chemicals, machinery, medical equipment, plastics, paper, and electronics.
Commercial Refrigeration.	42374, 42393, 42399, 4242, 4244, 42459, 42469, 42481, 42493, 4451, 4452, 45291, 48422, 4885, 4931, 49312, 72231.	Owners or operators of refrigerated warehousing and storage facilities, supermarkets, grocery stores, warehouse clubs, supercenters, convenience stores, and refrigerated transport.
Comfort Cooling	45211, 45299, 453998, 512, 522, 524, 531, 5417, 551, 561, 6111, 6112, 6113, 61151, 622, 7121, 71394, 721, 722, 813, 92.	Owners or operators of air-conditioning equipment used in the following: Hospitals, office buildings, colleges and universities, metropolitan transit authorities, real estate rental & leased properties, lodging and food services, property management, schools, and public administration or other public institutions.
Plumbing, Heating, and Air-Conditioning Contractors.	238220, 81131, 811412	Plumbing, heating, and air-conditioning contractors, and refrigerant recovery contractors.
Manufacturers and Distributors of Small Cans of Refrigerant.	325120, 441310, 447110	Automotive parts and accessories stores and industrial gas manufacturers.
Reclaimers	325120, 423930, 424690, 562920, 562212.	Industrial gas manufacturers, recyclable material merchant wholesalers, materials recovery facilities, solid waste landfills, and other chemical and allied products merchant wholesalers.
Disposers and Recyclers of Appliances.	423990, 562212, 562920	Materials recovery facilities, solid waste landfills, and other miscellaneous durable goods merchant wholesalers.
Refrigerant Wholesalers.	325120, 42, 424690	Industrial gas manufacturers, other chemical and allied products merchant wholesalers, wholesale trade.
Certifying Organizations.	541380	Environmental test laboratories and services.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding the types of entities that could potentially be regulated by this action. Other types of entities not listed in the table could also be affected. To determine whether your facility, company, business organization, or other entity is regulated by this action, you should carefully examine the applicability criteria contained in section 608 of the Clean Air Act (CAA or the Act) as amended and this proposed rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

B. What action is the Agency taking?

The existing regulations require that persons servicing or disposing of air-conditioning and refrigeration equipment observe certain service practices that reduce emissions of ozone-depleting refrigerant. Specifically, these provisions include: Requiring that technicians be certified to work on appliances; restricting the sale of refrigerant to certified technicians; specifying the proper evacuation levels before opening up an appliance; requiring the use of certified refrigerant recovery and/or recycling equipment; requiring the maintenance and repair of appliances that meet certain size and leak rate thresholds; requiring that ozone-depleting refrigerants be removed from appliances prior to disposal; requiring that air-conditioning and refrigeration equipment be provided with a servicing aperture or process stub to facilitate refrigerant recovery; requiring that refrigerant reclaimers be certified in order to reclaim and sell used refrigerant; and establishing standards for technician certification programs, recovery equipment, and quality of reclaimed refrigerant.

This rule proposes to update the existing requirements in 40 CFR part 82, subpart F (subpart F) that currently apply to ozone-depleting refrigerants and then extend those requirements, as

appropriate, to non-ozone-depleting substitute refrigerants, including but not limited to hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). This rule would also streamline the regulations to improve clarity.

C. What is the Agency's authority for taking this action?

EPA is proposing these revisions to the National Recycling and Emission Reduction Program found at 40 CFR part 82, subpart F under the authority of section 608 of the CAA. More detail on EPA's authority for this action is provided in the following sections. To summarize briefly, section 608(a) requires EPA to promulgate regulations regarding the use and disposal of ozone-depleting substances (ODS) that reduce the use and emissions of such substances to the lowest achievable level, and to maximize the recapturing and recycling of such substances. Section 608(c) prohibits any person from knowingly venting, releasing, or disposing into the environment any ozone-depleting or substitute refrigerant in the course of maintaining, servicing, repairing, or disposing of air-conditioning or refrigeration appliances or industrial process refrigeration (IPR). In addition, EPA's authority for this rulemaking is supplemented by section 301(a) which provides authority to ''prescribe such regulations as are necessary to carry out [the EPA Administrator's] functions under this Act'' and section 114 which provides authority for the EPA Administrator to require recordkeeping and reporting in carrying out any provision of the CAA (with certain exceptions that do not apply here).

D. What are the incremental costs and benefits of this action?

The revisions proposed here would require certain businesses to take actions that would have financial costs, such as conducting leak inspections, repairing leaks, and keeping records. The Agency has performed an analysis to estimate the impact on the entire United States economy associated with the proposed regulatory changes. Total incremental compliance costs associated with this proposed rule are estimated to be $63 million per year in 2014 dollars. Total annual operating savings associated with reduced refrigerant use are estimated to be $52 million; thus incremental compliance costs and refrigerant savings combined are estimated to be approximately $11 million. A more detailed description of the results of the analysis and the methods used can be found in the technical support document, *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program.*

The proposed update and revisions to the requirements under section 608 would significantly reduce emissions of refrigerants and thus ameliorate the harm they would cause to the environment. EPA estimates that the proposed revisions will prevent damage to the stratospheric ozone layer by reducing emissions of ozone-depleting refrigerants by approximately 116 metric tons per year, weighted by the ozone-depletion potential (ODP) of the gases emitted. Avoided emissions of ozone-depleting refrigerants and non-ozone-depleting substitutes will also safeguard Earth's climate because most of these refrigerants are potent greenhouse gases. Weighted by their global warming potentials (GWP),[1] EPA estimates that the proposed revisions will prevent annual emissions of greenhouse gases equivalent to 7.5 million metric tons of carbon dioxide ($MMTCO_2eq$). The reductions in emissions of GHGs and ODS have benefits for human health and the environment, which have been discussed at length in prior EPA rulemakings including the Endangerment and Cause or Contribute Findings for Greenhouse Gases (74 FR 66496, 66517, 66539) and in section II.D of this preamble. Details of the benefits and the methods used to estimate them are discussed later in this preamble and in the technical support document referenced above.

EPA anticipates further benefits including emissions reductions associated with enhanced recordkeeping provisions, and emissions reductions following from consistent standards for ODS- and substitute-containing appliances. These additional benefits have not been quantified. There may be additional energy savings due to leak repair, which also have not been quantified.

[1] Unless otherwise stated, GWPs stated in this document are 100-year integrated GWPs, relative to a GWP of 1 for carbon dioxide, as reported in IPCC, 2007. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. This document is accessible at *www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html.* For blends of multiple compounds, we are weighting the GWP of each component by mass percentage in the blend.

II. Background

A. What are ozone-depleting substances?

The stratospheric ozone layer protects life on Earth from the sun's harmful radiation. This natural shield has gradually been depleted by man-made chemicals. Chlorofluorocarbons (CFCs) were discovered in the 1970s to deplete the stratospheric ozone layer. CFCs and other class I ODS like methyl chloroform, carbon tetrachloride, and halons were used as refrigerants, solvents, foam blowing agents, fire suppression agents and in other smaller applications. Class I ODS have been phased out though they may still be reclaimed from existing appliances and reused. Hydrochlorofluorocarbons (HCFCs), class II ODS with lower potential to deplete the ozone layer than class I substances, are currently being phased out. All of these compounds have atmospheric lifetimes long enough to allow them to be transported by winds into the stratosphere. Because they release chlorine or bromine when they break down, they damage the protective ozone layer.

The initial concern about the ozone layer in the 1970s led to a ban on the use of CFCs as aerosol propellants in several countries, including the United States. In 1985, the Vienna Convention on the Protection of the Ozone Layer was adopted to formalize international cooperation on this issue. Additional efforts resulted in the adoption of the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987. Today, all countries recognized by the United Nations have ratified the Montreal Protocol and have agreed to phase out the production of ODS.

B. What is the National Recycling and Emission Reduction Program?

Section 608 of the CAA requires EPA to establish a comprehensive refrigerant management program to limit emissions of ozone-depleting refrigerants. Section 608 also prohibits the knowing release or disposal of ozone-depleting refrigerant and their substitutes during the maintenance, service, repair, or disposal of air-conditioning and refrigeration appliances or IPR. Section 608 is described in greater detail in Section III of this proposal below.

EPA first issued regulations under section 608 of the CAA on May 14, 1993 (58 FR 28660, ''1993 Rule''), to establish the national refrigerant management program for ozone-depleting refrigerants recovered during the maintenance, service, repair, and disposal of air-conditioning and refrigeration appliances. Together with the

prohibition on venting during the maintenance, service, repair, or disposal of class I and class II ODS (January 22, 1991; 56 FR 2420), these regulations were intended to substantially reduce the use and emissions of ozone-depleting refrigerants.

The regulations require that persons servicing air-conditioning and refrigeration equipment containing an ozone-depleting refrigerant observe certain practices that reduce emissions. They also established refrigerant recovery equipment requirements, reclamation certification requirements, technician certification requirements, and restricted the sale of refrigerant to certified technicians. In addition, they required that ODS be removed from appliances prior to disposal, and that all air-conditioning and refrigeration equipment using an ODS be provided with a servicing aperture or process stub to facilitate refrigerant recovery.

The 1993 Rule also established a requirement to repair leaking appliances containing 50 or more pounds of ODS refrigerant. The rule set an annual leak rate of 35 percent for commercial refrigeration appliances and IPR and 15 percent for comfort cooling appliances. If the applicable leak rate is exceeded, the appliance must be repaired within 30 days.

EPA revised these regulations through subsequent rulemakings published on August 19, 1994 (59 FR 42950), November 9, 1994 (59 FR 55912), August 8, 1995 (60 FR 40420), July 24, 2003 (68 FR 43786), March 12, 2004 (69 FR 11946), and January 11, 2005 (70 FR 1972). EPA has also issued proposed rules to revise the regulations in subpart F on June 11, 1998 (63 FR 32044) and December 15, 2010 (75 FR 78558), elements of which were not finalized and which EPA is re-proposing in this rule.

The August 19, 1994, rule amended specific definitions, required practices, and reporting and recordkeeping requirements, as well as adopted industry standards for reclaimed ODS refrigerants.

The November 9, 1994, rule clarified the conditions under which technician certification programs were grandfathered, allowing technicians who had participated in voluntary technician training and certification programs prior to the publication of the 1993 Rule to receive formal certification. The rule also clarified the scope of the technician certification requirement and provided a limited exemption from certification requirements for apprentices.

The August 8, 1995, rule was issued in response to a settlement agreement between EPA and the Chemical Manufacturers Association to give additional flexibility to repair or retrofit IPR appliances containing ODS. In that rule, EPA allowed owners or operators additional time beyond 30 days to complete repairs to address leaks and more than one year to retrofit appliances where certain conditions applied (*i.e.,* equipment located in areas subject to radiological contamination, unavailability of necessary parts, or adherence to local or State laws hinder immediate repairs). EPA also clarified that purged refrigerants that have been captured and destroyed can be excluded from the leak rate calculations.

The July 24, 2003, rule finalized portions of a proposed rulemaking (61 FR 7858; February 29, 1996) that amended the recordkeeping aspects of the section 608 technician certification program, refined aspects of the refrigerant sales restriction, adopted updated versions of ARI Standards 700 [2] and 740,[3] amended several definitions, and set forth procedures for the revocation and/or suspension of approval to certify technicians and refrigerant recovery and/or recycling equipment and revocation and/or suspension procedures for certification as a refrigerant reclaimer.

The March 12, 2004, rule exempted from the venting prohibition of section 608(c)(2) specific non-ozone-depleting substances that the Agency found did not pose a threat to the environment (69 FR 11946). The rule notably did not exempt HFC and PFC refrigerants from the venting prohibition. The rule also clarified that EPA regulations affecting the handling and sales of ozone-depleting refrigerants are applicable to blends that contain an ODS.

The January 11, 2005, rule clarified that the leak repair requirements apply to any refrigerant blend that contains an ODS (70 FR 1927). The rule amended the required practices and associated reporting/recordkeeping requirements. It also clarified certain leak repair requirements.

In December 2010 (75 FR 78558, December 15, 2010, ''proposed 2010 Leak Repair Rule''), EPA proposed changes to the leak repair requirements. EPA's intent in that proposal was to create a streamlined set of leak repair requirements that are applicable to all types of appliances containing 50 or more pounds of ozone-depleting refrigerant. The rule also proposed to reduce the applicable leak repair rates. EPA did not finalize that rule. Today's rulemaking re-proposes many of the concepts contained in the proposed 2010 Leak Repair Rule. Through today's action, EPA is withdrawing the proposed 2010 Leak Repair Rule.

Finally, on May 23, 2014 (79 FR 29682), and April 10, 2015 (80 FR 19453), EPA expanded the list of refrigerants that are exempt from the CAA venting prohibition in specific end uses. The 2014 final rule exempted the following from the venting prohibition:

—Isobutane (R–600a) and R–441A in household refrigerators, freezers, and combination refrigerators and freezers;
—Propane (R–290) in retail food refrigerators and freezers (stand-alone units only). The 2015 final rule added the following to the list of refrigerants exempt from the venting prohibition:
—Isobutane (R–600a) and R–441A in retail food refrigerators and freezers (stand-alone units only);
—Propane (R–290) in household refrigerators, freezers, and combination refrigerators and freezers;
—Ethane (R–170) in very low temperature refrigeration equipment and equipment for non-mechanical heat transfer;
—R–441A, propane, and isobutane in vending machines; and
—Propane and R–441A in self-contained room air conditioners for residential and light commercial air-conditioning and heat pumps.

C. What developments have occurred since EPA first established the National Recycling and Emission Reduction Program?

1. Phaseout of CFCs and HCFCs

In 1993 when EPA established the refrigerant management requirements of subpart F, CFCs and HCFCs were the most commonly used refrigerants, depending on the specific application. Just six months prior, in November 1992, the Parties to the Montreal Protocol accelerated the phaseout schedule for CFCs through the Copenhagen Amendment so that there would be a complete phaseout by 1996. The Copenhagen Amendment also created for the first time a phaseout schedule for HCFCs. The schedule for HCFCs was later amended and today calls for a 35 percent reduction in production and consumption from each Article 2 Party's (developed country's)

[2] The Air Conditioning and Refrigeration Institute Standard 700, *Specification for Fluorocarbons and Other Refrigerants,* contains standards for the reclamation of used refrigerants.

[3] The Air Conditioning and Refrigeration Institute Standard 740, *Performance Rating of Refrigerant Recovery Equipment and Recovery/Recycling Equipment,* contains standards for the equipment used to recover refrigerant from air-conditioning and refrigeration appliances.

cap by 2004, followed by a 75 percent reduction by 2010, a 90 percent reduction by 2015, a 99.5 percent reduction by 2020, and a total phaseout in 2030. From 2020 to 2030, production and consumption at only 0.5 percent of baseline is allowed solely for servicing existing air-conditioning and refrigeration equipment.

The United States chose to implement the Montreal Protocol phaseout schedule on a chemical-by-chemical basis. In 1993, as authorized by section 606 of the CAA, EPA established a phaseout schedule that eliminated HCFC–141b first and would greatly restrict HCFC–142b and HCFC–22 next, due to their high ozone depletion potentials (ODPs), followed by restrictions on all other HCFCs and ultimately a complete phaseout (58 FR 15014, March 18, 1993, and 58 FR 65018, December 10, 1993). EPA continues to issue allowances for the production and consumption of HCFCs that have not yet been phased out. The allowance levels reflect not only phaseout schedules but also use restrictions under section 605(a) of the CAA. The phaseout schedule and allowance levels can be found at 40 CFR part 82, subpart A.

Much as EPA established the refrigerant management program shortly before the CFC phaseout, today's proposal to update those regulations closely precedes the phaseout of HCFCs. The reasons for encouraging a viable CFC recycling program support the same approach for HCFCs. The 1993 Rule discussed a 1990 advanced notice of proposed rulemaking regarding a national CFC recycling program. As the 1993 Rule discussed, that 1990 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. Because of the continued use of these substances in existing equipment, recycling can serve as a useful bridge to alternative products while minimizing disruption of the current capital stock of equipment. (92 FR 28661).

More than twenty years later, with the experience gained through the phaseout of CFCs, reducing emissions of HCFCs and maximizing their recovery and reclamation remains just as important for ensuring the continued viability of the current stock of equipment. The transition out of CFC and now HCFC refrigerants is one reason that it is important to update the refrigerant management regulations in subpart F.

2. Use of Non-ODS Alternatives

The universe of available refrigerants has expanded dramatically since EPA first established the refrigerant management regulations in subpart F. Under the Significant New Alternatives Policy (SNAP) program (CAA section 612), EPA identifies substitutes that pose lower overall risks to human health and the environment and must prohibit the use of substitutes for which there are other available or potentially available alternatives posing lower overall risk to human health and the environment for the same use. Thus, EPA's SNAP program does not provide a static list of alternatives but instead evolves the list as the EPA makes decisions informed by our overall understanding of the environmental and human health impacts as well as our current knowledge about available substitutes. Under SNAP, EPA has reviewed over 400 substitutes in the refrigeration and air-conditioning; fire suppression; foam blowing; solvent cleaning; aerosols; adhesives, coatings, and inks; sterilants; and tobacco expansion sectors. To date, SNAP has issued 30 notices and 20 rulemakings listing alternatives as acceptable, acceptable subject to use conditions, acceptable subject to narrowed use limits, or unacceptable for those various end-uses.

On April 10, 2015, the SNAP Program listed as acceptable, subject to use conditions, three hydrocarbons, one hydrocarbon blend, and HFC–32 as substitute refrigerants in a number of refrigeration and air-conditioning end-uses (80 FR 19454). The SNAP program has also recently listed a number of additional refrigerant options, including blends of hydrofluoroolefins (HFOs) and HFCs that have lower global warming potentials (GWPs) (October 21, 2014, 79 FR 62863; July 20, 2015, 80 FR 42870), and continues to review information and issue rulemakings and notices to provide additional refrigerant options, including hydrocarbons and low-GWP HFOs.

Due to the change in the suite of acceptable refrigerants available for some end-uses, EPA anticipates that the relative amounts of different refrigerants in stocks in the United States will change, and thus that the universe of refrigerants subject to the refrigerant management program will continue to evolve. The diversity of refrigerants and the potential for cross contamination are two reasons why it is important to clarify how all refrigerants should be handled under the refrigerant management regulations in subpart F.

3. Increased Attention to HFCs as Climate Pollutants

By greatly reducing emissions of CFCs and HCFCs, domestic and international efforts to protect the ozone layer have also helped to protect global climate as these ODS are also potent GHGs. However, HFCs, which are the predominant class of compounds being used as replacements for ODS, also can have high GWPs. As their use has increased, concern has grown over the environmental damage caused by heat trapped in the atmosphere by HFCs.

On December 7, 2009, (74 FR 66496) the Administrator issued an Endangerment Finding regarding GHGs under section 202(a) of the CAA. As part of this finding, EPA concluded that the current and projected concentrations of six key well-mixed GHGs in the atmosphere—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), HFCs, PFCs, and sulfur hexafluoride (SF_6)—endanger both the health and welfare of current and future generations. While this finding was made specifically for the purposes of section 202(a) of the CAA, EPA is cognizant of the global climate risks generally discussed in the finding in its work to reduce emissions of HFCs and other GHGs.

i. Climate Action Plan

In June 2013, the President announced the Climate Action Plan.[4] Among the many actions called for, the Climate Action Plan outlined a set of measures to address HFCs. The Climate Action Plan states: ''to reduce emissions of HFCs, the United States can and will lead both through international diplomacy as well as domestic actions.'' Part of the international diplomacy is the Amendment to the Montreal Protocol discussed below. The Climate Action Plan also directed EPA to use its authority through the SNAP program ''to encourage private sector investment in low-emissions technology by identifying and approving climate-friendly chemicals while prohibiting certain uses of the most harmful chemical alternatives.'' In July 2015, EPA finalized a rule that changed the listing status for certain substitutes previously listed as acceptable under the SNAP program (80 FR 42870). That rule changed the status for certain HFCs and HCFCs for various end-uses in the aerosols, refrigeration and air-conditioning, and foam blowing sectors. EPA made these changes based on information showing that other

[4] The President's Climate Action Plan, 2013, *https://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf.*

substitutes are available for the same uses that pose lower risk overall to human health and the environment. A copy of the Climate Action Plan is available in the docket to this rule.

Minimizing the emissions and maximizing the recovery and reuse of HFC refrigerants is consistent with the Climate Action Plan. EPA estimates that the proposed revisions will prevent annual emissions of refrigerant equivalent to 7.5 $MMTCO_2eq$. Of this amount 3.7 $MMTCO_2eq$ are due to HFCs and 3.8 $MMTCO_2eq$ are due to ODS. The significant environmental benefit to be gained by more clearly addressing HFC refrigerants is another reason why it is important to update the refrigerant management regulations in subpart F.

ii. Trends in HFC Use and Future Projections

Although HFCs represent a small fraction of current GHG emissions by weight, their warming impact per kilogram is very strong. For example, the most commonly used HFC, HFC–134a, has a GWP of 1,430, which means it traps that many times as much heat per kilogram as carbon dioxide does over 100 years. HFC emissions are projected to increase substantially and at an increasing rate over the next several decades if their production is left uncontrolled. In the United States, emissions of HFCs are increasing more quickly than those of any other GHG, and globally they are increasing 10–15% annually. At that rate, emissions are projected to double by 2020 and triple by 2030.

HFCs are also rapidly accumulating in the atmosphere. The atmospheric concentration of HFC–134a has increased by about 10% per year from 2006 to 2012, and the concentrations of HFC–143a and HFC–125, which are components of commonly-used refrigerant blends, have risen over 13% and 16% per year from 2007–2011, respectively. Annual global emissions of HFCs are projected to rise to about 6,400 to 9,900 $MMTCO_2eq$ in 2050, which is comparable to the drop in annual GHG emissions of ODS of 8,000 $MMTCO_2eq$ between 1988 and 2010 (UNEP, 2011). As these emissions accumulate in the atmosphere, the HFCs change the balance between energy entering the Earth's climate from the sun and energy escaping the Earth into space; the change in the net rate at which energy enters the atmosphere is called radiative forcing. By 2050, the buildup of HFCs in the atmosphere is projected to increase radiative forcing by up to 0.4 $W\ m^{-2}$. This may be as much as one-fifth to one-quarter of the expected increase in radiative forcing due to the buildup of CO_2 since 2000, according to the Intergovernmental Panel on Climate Change's (IPCC's) Special Report on Emissions Scenarios. To appreciate the significance of the projected HFC emissions within the context of all GHGs, HFCs would be equivalent to 5 to 12 percent of the CO_2 emissions in 2050 based on the IPCC's highest CO_2 emissions scenario and equivalent to 27 to 69 percent of CO_2 emissions based on the IPCC's lowest CO_2 emissions pathway.

iii. Montreal Protocol Amendments

For the past six years, the United States, Canada, and Mexico have proposed an amendment to the Montreal Protocol to phase down the production and consumption of HFCs. The United States seeks adoption of an amendment that is acceptable to all parties. Global benefits of the amendment proposal would yield significant reductions of over 90 gigatons of carbon dioxide equivalent (CO_2eq) through 2050. In 2015, a number of Parties to the Montreal Protocol have also proposed amendments to phase down global production and consumption of HFCs. These proposals were introduced by the Federated States of Micronesia on behalf of a group on Island States; the European Union; and India.

4. Petition From the Alliance for Responsible Atmospheric Policy

On January 31, 2014, the Alliance for Responsible Atmospheric Policy (the Alliance) petitioned the Agency to initiate a rulemaking to extend the section 608 refrigerant management regulations to HFCs and other substitute refrigerants. The petition advocates for consistent refrigerant management regulations that apply the same rules for ozone-depleting and non-ozone-depleting refrigerants. It argues that extending the section 608 requirements to HFCs ''would increase the environmental benefits already realized from the section 608 regulations, through reduced HFC emissions, and would complement the United States' goal of a global phase down in HFC production and consumption.'' The Alliance cites sections 608(c)(2) and 301(a) of the CAA as authority for these changes. A copy of the petition is included in the docket for this rulemaking.

While EPA is not proposing this action solely as a result of the Alliance petition, the proposed extension of the National Recycling and Emission Reduction Program to HFCs and other non-exempt substitutes, if finalized, would constitute the Agency's response to the petition.

D. What are the goals of this proposed rule?

The Agency has three goals for this rulemaking. The first is to protect the stratospheric ozone layer by reducing emissions of ODS. The second is to protect the climate system by reducing emissions of other refrigerant gases with high GWPs. This includes ODS refrigerants and many substitutes, including HFCs, that EPA has not already exempted from the CAA statutory venting prohibition. Since many substitutes have a high GWP, some as high as 10,000, reducing emissions of ODS substitutes will reduce emissions of highly potent GHGs. While the current regulations in subpart F contain some provisions implementing the venting prohibition for substitutes for ODS, such as a general prohibition on the knowing release of such substances, with certain enumerated exceptions, they do not have any other specific use and handling requirements for ODS substitutes. As explained in more detail below, EPA is proposing to revise subpart F to include such provisions to help more fully and effectively implement the venting prohibition in section 608(c) of the CAA. Finally, EPA is proposing changes to the regulations in subpart F to improve their effectiveness, including increasing compliance and enforceability both for ODS and ODS substitutes.

1. Protecting the Stratospheric Ozone Layer

The proposed changes would reduce the use and emission of ODS, maximize the recapture and recycling of such substances, and further implement the prohibition on knowingly venting or releasing ODS refrigerants during the maintenance, service, repair, or disposal of appliances. EPA estimates that this proposal will result in annual reductions in emissions of approximately 116 ODP-weighted metric tons. A separate support document *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program* contains a full discussion of the benefits and is available in the docket.

Stratospheric ozone depletion decreases the atmosphere's ability to protect life on the Earth's surface from the sun's UV radiation. The links between stratospheric ozone depletion and public health are well established. The *Scientific Assessment of Ozone Depletion,* prepared by the Scientific

Assessment Panel to the Montreal Protocol, and *Environmental Effects of Ozone Depletion and its Interactions with Climate Change,* prepared by the Environmental Effects Assessment Panel to the Montreal Protocol provide comprehensive information regarding the links between emissions of ODS, ozone layer depletion, UV radiation, and human health effects. Both documents are available in the docket for this rule. Adverse health effects associated with exposure to UV radiation include skin cancer, cataracts, and immune suppression.

The most common forms of skin cancer are strongly associated with UV radiation, and UV exposure is the most preventable cause of skin cancer (U.S. Department of Health and Human Services. The Surgeon General's Call to Action to Prevent Skin Cancer. Washington, DC: U.S. Department of Health and Human Services, Office of the Surgeon General; 2014). Skin cancer is the most common form of cancer in the United States, with more than 3.5 million new cases diagnosed annually (American Cancer Society, Cancer Facts and Figures, 2015). The number of new cases of melanoma, the most serious form of skin cancer, has been increasing. Rates for new cases of melanoma have been rising on average 1.4% each year over the last 10 years (National Cancer Institute, SEER Stat Fact Sheets: Melanoma of the Skin, available at *http://seer.cancer.gov/statfacts/html/melan.html*, accessed May 5, 2015). In 2015, it is estimated that 70,000 Americans will be diagnosed with melanoma and almost 10,000 will die from the disease (American Cancer Society, Cancers Facts and Figures, 2015).

Non-melanoma skin cancers are less deadly than melanomas. Nevertheless, left untreated, they can spread, causing disfigurement and more serious health problems. There are two primary types of non-melanoma skin cancers. Basal cell carcinomas are the most common type of skin cancer tumors. Basal cell carcinoma grows slowly, and rarely spreads to other parts of the body. It can, however, penetrate to the bone and cause considerable damage. Squamous cell carcinomas are tumors that may appear as nodules or as red, scaly patches. This cancer can develop into large masses and can spread to other parts of the body.

Other UV-related skin disorders include actinic keratoses and premature aging of the skin. Actinic keratoses are skin growths that occur on body areas exposed to the sun. The face, hands, forearms, and neck are especially susceptible to this type of lesion. Although premalignant, actinic keratoses are a risk factor for squamous cell carcinoma. Chronic exposure to the sun also causes premature aging, which over time can make the skin become thick, wrinkled, and leathery.

Research has shown that UV radiation increases the likelihood of certain cataracts. (Taylor, H.R., et al., 1988. *Effect of ultraviolet radiation on cataract formation,* New England Journal of Medicine, 319, 1429–33; West, S. et al., 2005. *Model of Risk of Cortical Cataract in the US Population with Exposure to Increased Ultraviolet Radiation due to Stratospheric Ozone Depletion,* American Journal of Epidemiology, 162, 1080–1088.) Cataracts are a form of eye damage in which a loss of transparency in the lens of the eye clouds vision. If left untreated, cataracts can lead to blindness. Although curable with modern eye surgery, cataracts diminish the eyesight of millions of Americans. Other kinds of eye damage caused by UV radiation include pterygium (*i.e.,* tissue growth that can block vision), skin cancer around the eyes, and degeneration of the macula (*i.e.,* the part of the retina where visual perception is most acute).

Policies protecting the stratospheric ozone layer have been effective in preventing these diseases and protecting the health of the American people. EPA uses its Atmospheric and Health Effects Framework (AHEF) model to estimate the benefits of ODS emissions reductions by modeling the number of cases of skin cancer and the number of deaths in Americans born between 1890 and 2100 given different ODS emissions scenarios. By comparing the health effects in a scenario without the Montreal Protocol to one with the treaty's controls, EPA estimates that the Montreal Protocol will prevent over 283 million cases of skin cancer in the United States. Americans will also suffer more than 45 million fewer cataracts and one million fewer deaths from skin cancer due to the treaty's protections, compared with a world with no policy controls. This analysis, found in the EPA document *Updating Ozone Calculations and Emissions Profiles for Use in the Atmospheric and Health Effects Framework Model* is in the docket.

2. Reducing Emissions of Greenhouse Gases

The second goal of this proposed rule is to reduce the emission of GHGs that contribute to climate change. Many refrigerants, including ODS and substitutes for ODS, are potent GHGs, having GWPs thousands of times higher than that of carbon dioxide (CO_2), which has a GWP of one. For example, R–404A, a commonly used HFC refrigerant blend, has a GWP of 3,922. Other common HFC refrigerants, with their GWPs, include R–134a (1,430), R–410A (2,088), R–407A (2,107), and R–507A (3,985). Explicit and more stringent standards for the use, recovery, and recycling of these substitute refrigerants during maintenance, servicing, repair, or disposal of appliances will lead to fewer emissions of these high-GWP chemicals. EPA estimates that the proposed changes will reduce GWP-weighted emissions by approximately 7.5 $MMTCO_2eq$ per year

GHGs cause climate change by trapping heat on Earth. The Earth is constantly receiving energy from the sun in the form of radiation, including visible light, infrared, ultraviolet, and other forms of energy. At the same time, energy is radiating away into space, mostly as infrared radiation. Over long periods of time, the amount of energy arriving on Earth and the amount leaving into space have been about the same, and so the environment has generally not gotten much warmer or much colder very quickly. However, the increase of GHGs in the atmosphere has changed this balance, because these gases do not block most of the forms of radiation coming to Earth from the sun, but they do absorb or scatter the radiation trying to leave Earth into space, trapping some of it on Earth. Thus, more energy comes into the Earth's climate system than leaves it, and the atmosphere, oceans, and land become warmer, just like the inside of a greenhouse. While parts of the Earth get warmer and colder from day to day with weather, from month to month with the seasons, from year to year due to large scale phenomena like El Niño, or even decade to decade as sunspots come and go, the trapping of heat by GHGs raises the average temperature over the whole globe over and above these natural fluctuations, over a relatively short timeframe. The increase in the total heat energy in the climate system does not simply make the environment warmer; because water and air with more heat energy in them move more, atmospheric and sea currents change, and winds increase. Because warm water expands and glaciers melt, sea level rises, and because evaporation increases with more energy, rainfall and flooding can increase in some areas even as other areas face increased risk of drought and wildfire due to changes in wind patterns. For more information on GHGs and climate change in the

United States, visit *www.epa.gov/climatechange.*

3. Improving Rule Effectiveness

EPA's third goal of this proposed rule is to improve the clarity and effectiveness of the regulations in subpart F. Achieving the health and environmental benefits of these rules depends on widespread compliance.

EPA has begun an initiative to improve the effectiveness of its rules called ''Next Generation Compliance.'' This is an integrated strategy designed to bring together the best thinking from inside and outside EPA on how to structure regulations and permits, combined with new monitoring and information technology, expanded transparency, and innovative enforcement. The vision for this initiative is to better motivate the regulated community to comply with environmental laws and inform the public about their performance. Most importantly, this initiative will help ensure that all Americans are protected from significant risks to human health and the environment and have access to information that allows them to more fully engage in environmental protection efforts.

The Agency has identified several interconnected components in the Office of Enforcement and Compliance's 2014–2017 strategic plan for Next Generation Compliance that can improve the effectiveness of rules:

- Effective Regulations: Design regulations that are clear, as easy to implement as possible, and that contain self-reinforcing drivers. For example, where possible, design regulations such that regulated facilities can take steps to monitor their own performance to prevent violations, or be certified by an independent 3rd party.
- Advanced Monitoring: Use advanced monitoring technology for the government, industry, and the public to more easily find information on pollutant discharges/emissions, environmental conditions, and noncompliance.
- Electronic Reporting: Implement electronic systems to make reporting easier, more efficient, and less costly. For the user, these systems offer speed, convenience, expanded information choices, and filing capabilities. For government, they offer the ability to increase transparency, improve our ability to spot pollution and compliance issues, and respond quickly to emerging problems.
- Transparency: Make the information we have today more accessible, and make new information obtained from advanced monitoring and electronic reporting publicly available.
- Innovative Enforcement: Use Next Generation Compliance principles and tools in enforcement planning and cases.

The National Recycling and Emission Reduction Program under section 608 of the CAA has incorporated compliance principles similar to those under this initiative since its inception. There are numerous self-reinforcing requirements, including the refrigerant sales restriction. By requiring anyone purchasing an ODS refrigerant to be certified, EPA effectively enforces the requirement that anyone maintaining, servicing, repairing, and disposing of an appliance be certified (excluding those disposing of small appliances, MVACs and MVAC-like appliances).

Another Next Generation Compliance principle that has been in the 608 refrigerant management program since the beginning is third party certification. These rules require certification of refrigerant recovery equipment by independent third parties (*i.e.,* UL and AHRI). Third party certifiers verify that recovery equipment meets the required minimum standards. Additionally, this ensures that technicians who use these devices to recover refrigerant are also using equipment that will meet the minimum refrigerant evacuation requirements if used following the manufacturer's instructions.

The Agency and industry have more than 20 years of experience implementing and operating under these regulations. Through that experience, it has become clear that there are sections of the regulations that could be improved or be clarified. This proposal attempts to clarify and simplify where possible.

One way that EPA seeks to provide simplicity and clarity to the regulated community, the public, and state, local, and Tribal governments is to treat ODS and substitute refrigerants similarly where it is appropriate to do so. EPA is therefore proposing to extend the existing requirements, as amended, to HFCs and other substitutes, as appropriate. In addition, EPA is proposing to revise many provisions of the regulations for clarity and to restructure the regulations to make it easier to find requirements for different affected entities. EPA is grouping the recordkeeping and reporting requirements closer to where the requirements are listed and removing outdated or unnecessary requirements. These proposed changes will extend to ODS substitutes those requirements that align with Next Generation Compliance principles and make it easier for the regulated community to understand what refrigerants are covered and what the requirements are, making it easier to comply with the regulation.

For each of the changes proposed in this notice, EPA solicits comments on the following:

- Implementation of the proposal: What challenges are anticipated in implementing or complying with the proposed rule? What steps might we consider to minimize those challenges?
- The clarity of the proposal: Is there anything that is unclear about what the proposed rule is asking the regulated community to do? When responding to this questions, commenters should describe what is confusing about the proposal, not what they do not like.
- The design of the rule: Is the proposed rule designed in a way to maximize the environmental benefits for the implementation effort required? Are there alternate approaches to features of this rule that would achieve the same environmental benefits or maximize the environmental benefits but would be easier to implement? If so, please explain or describe those approaches.
- The clarity of the regulatory text: Are any of the terms, definitions, or specific requirements in the regulatory language unclear or confusing? Which ones and what is confusing about them?
- The need for a comprehensive compliance guide or other compliance tools: What tools (brochures, videos, etc.) could EPA reasonably develop to aid the regulated community in complying with the rule?
- Incentives for going above and beyond compliance: What changes could EPA make to the proposed rule that would encourage environmental performance beyond the minimum requirements of the rule?
- Monitoring, measurement, and reporting: Are the monitoring requirements designed and sufficiently explained to ensure that regulated parties are fully aware of their performance, and to trigger action in the case of actual or potential noncompliance? Can monitoring data or other information about performance be made easily available to regulators and/or to the public in ways that would be useful and meaningful?

E. Stakeholder Engagement

EPA conducted extensive outreach to stakeholders affected by the refrigerant management regulations under section 608 of the CAA. In November 2014, EPA hosted an open meeting in Washington, DC, to discuss the Agency's goals and solicit feedback from stakeholders. More than 50 participants attended the meeting. To facilitate stakeholder

preparation for the meeting, EPA widely distributed a concept note that provided an update on progress to implement the President's Climate Action Plan and laid out questions the Agency was considering as it was developing this proposed rule. The slides from the presentation, the concept note, and a summary of the comments are included in the docket.

After the November stakeholder meeting, EPA held approximately 50 meetings with individual businesses, trade associations, and environmental organizations. The Agency also attended several conferences and association meetings to provide information, solicit input, and answer questions. A full list of meetings and conferences is included in the docket.

Finally, EPA reviewed past feedback on the proposed 2010 Leak Repair Rule to amend the leak repair regulations. A summary of comments received on the proposed 2010 Leak Repair Rule is included in the docket. EPA also reviewed comments on the 1998 proposal to extend the full suite of refrigerant management requirements under subpart F to HFCs and PFCs and is including a copy of those comments it reviewed from that proposal in the docket. EPA notes that the Agency is not treating comments on either of these prior proposals as comments on this rule. Therefore, to be formally considered as comments on this proposal, stakeholders must provide comments specifically to today's action even if the concepts proposed are the same or similar to those contained in comments on actions that the Agency has proposed previously.

F. What are the major changes EPA is proposing?

EPA is proposing numerous changes to the National Recycling and Emission Reduction Program. Some of these changes are intended to strengthen the existing program, in particular by requiring a number of industry best practices. Others are intended to extend, as appropriate, the regulations to HFCs and other substitutes for ODS. Still other changes are meant to improve the effectiveness of the regulations. This section briefly introduces the reader to the major proposed changes. The reader can find detailed discussions of all of the proposals in Section IV of this notice.

1. Extend the Regulations To Cover Substitute Refrigerants

Section 608(c)(1) of the CAA, effective July 1, 1992, makes it ''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 any class I or class II substance used as a refrigerant in such appliance (or industrial process refrigeration) in a manner which permits such substance to enter the environment.'' This provision excludes ''de minimis releases associated with good faith attempts to recapture and recycle or safely dispose of such substances'' from the prohibition. Section 608(c)(2) extends the provisions of paragraph (c)(1) to substitutes for ODS refrigerants, effective November 15, 1995. Collectively, this self-effectuating prohibition, commonly referred to as the ''venting prohibition,'' is a central component of EPA's refrigerant management program.

EPA's current regulations at § 82.154(a) incorporate the venting prohibition, as well as the *de minimis* exemption. Then, the last sentence in § 82.154(a)(2) provides that ''refrigerant releases shall be considered de minimis only if they occur when'' (1) following the required practices in § 82.156, (2) using certified recovery and/or recycling equipment that meet the requirements of § 82.158, and (3) technicians are certified under the requirements in § 82.161; or when following the requirements of subpart B. In effect, consistent with the second sentence of section 608(c)(1), under these regulations EPA has defined *de minimis* releases of *refrigerants* during maintaining, servicing, repairing, or disposing of an appliance as those that occur when the refrigerant management regulations at 40 CFR part 82, subpart F or subpart B are followed. The term *refrigerant* is defined in § 82.152 for purposes of this subpart to mean any substance consisting in part or whole of a class I or class II ODS that is used for heat transfer purposes and provides a cooling effect. The term does not include substitute substances such as HFCs or ammonia, among others. Under these regulations, if someone maintaining, servicing, repairing, or disposing of an appliance or IPR releases a class I or class II refrigerant in the course of following these requirements, they would not be in violation of the venting prohibition, but all other releases of ODS refrigerants during such activities would violate the venting prohibition.

While the conditions for the application of the *de minimis* exemption has been clearly elaborated on in the regulations for class I and class II refrigerants, and while the regulations expressly state what practices or measures can be employed to qualify for it, the regulations are less clear for substitute refrigerants like HFCs. Section 82.154(a)(2) states that ''[d]e minimis releases associated with good faith attempts to recycle or recover . . . non-exempt substitutes are not subject to this prohibition'' but does not provide any guidance about what constitutes such a ''good faith attempt.'' In contrast to ODS refrigerants, the regulations do not contain provisions for non-exempt substitute refrigerants to establish that releases that occur when following certain regulatory requirements are *de minimis*. Accordingly, regulated entities are left without clear guidance on how to abide by the venting prohibition as it relates to non-exempt substitutes.

Through this rulemaking, EPA is proposing to extend requirements of the National Recycling and Emission Reduction Program to non-exempt substitutes and to clarify that the actions required to qualify for the *de minimis* exemption for non-exempt substitute refrigerants are the same as those for ODS refrigerants. As some release of substitute refrigerants is inevitable during the maintenance, servicing, repair, and disposal of appliances, these changes would give regulatory certainty to the many stakeholders that are already properly recovering substitute refrigerants during these activities, and would likely require only minimal if any change in business practices for them. These changes would also give stakeholders that are not following such practices for substitute refrigerants additional incentive to do so because it would describe how the venting prohibition applies to substitute refrigerants.

2. Strengthen Leak Repair Requirements

This proposal would strengthen the requirement to repair leaking appliances containing 50 or more pounds of refrigerant, currently at § 82.156(i), to reduce emissions of ODS. Additionally, EPA is proposing to extend the amended requirements to HFCs and other substitutes to reduce emissions. The Agency also is aiming to make the requirements more proactive at preventing leaks by requiring industry best practices (*i.e.,* leak inspections).

EPA is proposing to lower applicable leak rates from their current levels of 35 percent for commercial refrigeration appliances and IPR and 15 percent for comfort cooling appliances to 20 percent and 10 percent, respectively. Based on stakeholder input and data collected by the California Air Resources Board (CARB) and other sources, these levels are reasonable and will result in leaks being repaired

sooner than under the current approach. This is especially true for appliances containing substitute refrigerants, which are not currently covered by the leak repair provisions.

Some systems are leaking considerable amounts of refrigerant despite requirements to repair or retrofit leaking appliances. Based on feedback from CARB and a review of its data, EPA is proposing to create a two-year leak limit. Under this proposal, appliances containing 50 or more pounds of ODS or substitute refrigerant would not be allowed to leak more than 75 percent of the appliance's full charge in each of two consecutive 12-month periods. The CARB data indicate that few appliances leak above this level in any given year, and that these appliances are responsible for a large proportion of emissions. This requirement would likely affect few appliances, but would encourage owners or operators of appliances to more comprehensively repair or retire them when leaking such a substantial amount of refrigerant for two consecutive years.

EPA is also proposing to require periodic leak inspections to help identify leaks earlier. Regular leak inspections are widely recognized as a best practice to minimize refrigerant emissions. Under this proposal, all appliances with a full charge of 50 or more pounds of ODS or substitute refrigerant would have to conduct annual leak inspections to determine if the appliance is leaking. Commercial refrigeration appliances and IPR with a full charge of 500 or more pounds of ODS or substitute refrigerant would be required to conduct a leak inspection every three months. Alternatively, owners or operators can forgo periodic leak inspections by installing automatic leak detection systems and having it inspected and calibrated annually.

3. Extend the Sales Restriction to Substitute Refrigerants, With an Exception for Small Cans of MVAC Refrigerant

The existing regulations restrict the sale of ODS refrigerant to certified technicians. EPA is proposing to extend the sales restriction to substitute refrigerant sold in the United States. Due to the large do-it-yourself (DIY) community that have long serviced their personal MVACs, EPA has considered less costly ways to avoid restricting the sale of MVAC refrigerants to certified technicians while still reducing releases of non-exempt refrigerants. Therefore, EPA is proposing to exempt the sale of small cans (two pounds or less) of substitute refrigerant for the servicing of MVACs if the cans have a self-sealing valve. Self-sealing valves have been successful in reducing emissions during servicing in California where they are currently required.

4. Establish Recordkeeping for Appliances Containing Five to 50 Pounds of ODS and Substitute Refrigerant

The existing regulations have recordkeeping requirements for the disposal of appliances that contain 5 pounds or less of ODS refrigerant and those that contain 50 or more pounds of ODS refrigerant. As discussed above, EPA is proposing to extend those current recordkeeping requirements to appliances containing substitutes. In addition, EPA is proposing to require that technicians, or the company employing technicians, keep records of the amount of ODS and substitute refrigerant recovered when disposing of appliances that fall in the gap between those two size categories. EPA is also proposing to require recordkeeping documenting the quantity of ODS and substitute refrigerant transferred for reclamation or destruction that was recovered from those mid-sized appliances. Based on feedback from stakeholders when developing this rule, these records are often already maintained by contractors that are properly recovering refrigerant. Some stakeholders that adhere to the proper evacuation requirements have encouraged EPA to enforce against HVACR contractors that simply vent the refrigerant. These proposed records would improve compliance with the venting prohibition and facilitate enforcement against technicians who disregard the recovery requirements.

5. Update the Technician Certification Program

Under the existing regulations, technicians must be certified in order to work on appliances in a manner that could release ODS refrigerants to the environment. EPA is proposing to extend those requirements to appliances containing non-exempt substitutes. Because the questions on the certification exam are over twenty years old and because EPA is proposing to revise the existing program though this rule, EPA is planning to update and develop new questions for use to certify technicians.

EPA is also proposing to require that certifying organizations publish lists or create online databases of technicians that they certify. In addition to providing transparency to technicians' customers and refrigerant distributors and wholesalers, this requirement would also make it easier for technicians to replace lost credentials. The amount of time spent by technicians trying to identify the organization that certified them is significant. EPA and certifying programs also spend a significant amount of time helping technicians who have lost their certification card. Published lists or online databases of certified technicians would help make this process more efficient.

6. Improving Readability and Compliance and Restructuring the Requirements

EPA is proposing to make extensive revisions to the regulations in subpart F to more clearly state the requirements of the National Recycling and Emission Reduction Program and to remove potentially ambiguous language. These proposed edits will improve compliance among the regulated community and facilitate enforcement by EPA.

First, EPA is proposing edits that would apply the principles of plain writing, based on guidance from the Office of the Federal Register. For example, EPA is proposing to add subheadings and plain English terms where appropriate. EPA's intent with many of these edits is to improve readability, not change the content. For edits that are substantive, EPA discusses these proposed changes in this preamble.

Second, EPA is proposing to divide § 82.156 ''Required Practices'' into three sections based on the topic. This proposal would create a new § 82.155 for provisions related to the safe disposal of small appliances, MVACs, and MVAC-like appliances. Section 82.156 would be amended to contain provisions related to the proper evacuation of refrigerant from appliances. This proposal would also create a new § 82.157 for provisions related to leak repair. EPA is also proposing to remove most of § 82.166, which currently contains the recordkeeping and reporting requirements for subpart F, and move specific recordkeeping and reporting provisions to the sections relevant to each record.

Third, EPA is proposing to remove unnecessary content such as provisions that have expired, definitions that simply restate the regulatory provisions, and definitions to terms that are no longer used. The rule would also combine and streamline repetitive text. Along those lines, this proposal would merge tables 2 and 3 in § 82.158 into a single table.

EPA is providing a red-line version of the regulatory text in the docket that

shows the edits to the current regulations to allow the reader to identify the specific proposed changes. EPA solicits comments generally on how to simplify and clarify the requirements in subpart F. Aside from the specific substantive changes discussed in this notice, EPA's intent is not to alter or reopen the substantive content of these regulations. Therefore, EPA also requests comments on the specific proposed edits to the regulatory text to make sure that they do not unintentionally change the underlying meanings or requirements of the rule.

III. The Clean Air Act and EPA's Authority for the Proposed Revisions

This section contains a summary of the relevant CAA provisions and a general description of how EPA interprets them to authorize the proposed revisions in this notice. More specific discussions of EPA's authority for certain revisions are included in further detail in the sections describing the corresponding revisions.

Section 608 of the CAA requires EPA to establish a comprehensive program to limit emissions of ozone-depleting refrigerants. Section 608 also prohibits the knowing release or disposal of ozone-depleting refrigerants and their substitutes during the maintenance, service, repair, or disposal of air-conditioning and refrigeration appliances or IPR. Section 608 is divided into three subsections.

Section 608(a) requires EPA to promulgate regulations establishing standards and requirements for the use and disposal of class I and class II substances during the maintenance, service, repair, or disposal of air-conditioning and refrigeration appliances or IPR containing ODS. Such regulations shall include requirements to reduce the use and emission of ODS to the lowest achievable level, and to maximize the recapture and recycling of such substances. Section 608(a) further provides that ''such regulations may include requirements to use alternative substances (including substances which are not class I or class II substances) or to minimize use of class I or class II substances, or to promote the use of safe alternatives pursuant to section [612] or any combination of the foregoing.''

Section 608(b) requires that the regulations issued pursuant to subsection (a) contain requirements for the safe disposal of class I and class II substances, including requirements that such substances shall be removed from such appliances, machines, or other goods prior to the disposal of such items or their delivery for recycling.

Section 608(c) establishes a self-effectuating prohibition, commonly called the ''venting prohibition,'' that generally speaking, makes it unlawful to knowingly release ODS and substitute refrigerants into the environment while servicing or disposing of air-conditioning or refrigeration equipment. More specifically, section 608(c)(1), effective July 1, 1992, makes it unlawful for any person in the course of maintaining, servicing, repairing, or disposing of an appliance or IPR to knowingly vent, release, or dispose of any ODS used as a refrigerant in such equipment in a manner that permits that substance to enter the environment. The statute exempts from this prohibition ''[d]e minimis releases associated with good faith attempts to recapture and recycle or safely dispose'' of such a substance. Section 608(c)(2) extends the provisions of (c)(1), including the prohibition on venting to substitutes for class I and class II refrigerants, effective November 15, 1995, unless the Administrator determines that such venting, release, or disposal ''does not pose a threat to the environment.'' EPA has determined through prior rulemakings that specific substances do not pose a threat to the environment when vented, released, or disposed of and has exempted those specific substitutes from the venting prohibition. The full list of substitutes that EPA has exempted from this prohibition is at § 82.154(a).[5]

On May 14, 1993, EPA published regulations implementing subsections (a), (b), and (c)(1) for ODS (58 FR 28660). These regulations include evacuation requirements for appliances being serviced or disposed of, standards and testing requirements for recovery and/or recycling equipment, certification requirements for technicians, purity standards and testing requirements for used refrigerant sold to a new owner, certification requirements for refrigerant reclaimers, leak repair requirements, and requirements for the safe disposal of appliances that enter the waste stream with the charge intact. This rule also stated that the Agency interprets ''*de minimis*'' to mean releases that occur while the recycling and recovery requirements of regulations under sections 608 and 609 are followed.

Section 608 of the CAA provides the primary statutory basis for the standards and requirements proposed in these regulations. The statutory standards under section 608(a) 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.'' In the context of recycling, these standards are complementary, *i.e.,* maximizing recycling will also mean reducing the use and emission of these substances to the lowest achievable level. These standards also bear a relationship to the *de minimis* releases permitted in section 608(c). In other words, emissions that occur while complying with EPA's recovery and recycling requirements, which result in the lowest achievable level of emissions, are considered *de minimis.*

The phrase ''lowest achievable level'' as used in section 608(a)(3) is not clear on its face as to whether economic factors should be considered in determining what is the ''lowest achievable level.'' Title VI does not further explain or define the term nor does it expressly state whether economic factors may or must be considered. Thus, EPA has discretion to adopt a reasonable interpretation. EPA has previously interpreted this phrase to allow the consideration of economic factors. *See* 58 FR 28659, 28667 (May 14, 1993). EPA is not proposing to change that interpretation and has considered economic as well as technological factors in the development of this proposed rule. This is consistent with the statement made on the floor of the House of Representatives by Representative Ralph Hall shortly before passage of the Clean Air Act Amendments of 1990 that ''[i]n promulgating regulations [under section 608] the Administrator shall take into account the extent to which emissions reductions can be achieved, the costs and benefits of implementing available controls, and the time before which certain uses may no longer rely on the covered substances'' (Cong Rec H 12907 (Oct 26, 1990)).

The phrase ''de minimis releases associated with good faith attempts to recapture and recycle or safely dispose of any such substance'' as used in section 608(c)(1) and as applied to substitutes through section 608(c)(2) is similarly not clear on its face as to whether economic factors may be considered in determining what is *de minimis.* Title VI does not further address this issue. Thus, EPA has discretion to adopt a reasonable interpretation. EPA interprets this phrase to allow the consideration of economic factors. The Senate Manager's

[5] EPA is using the term ''non-exempt substitute'' in this notice to refer to substitute refrigerants that have not been exempted from the venting prohibition under CAA section 608(c)(2) and 40 CFR 82.154(a).

Statement for the Clean Air Act Amendments of 1990 indicates 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'' (Cong. Rec. S 16948 (Oct. 27, 1990)). EPA does not read this statement as expressing an intent that the Agency consider only technological factors in setting standards for recapture and recycling equipment and the proper use of such equipment. Rather, EPA understands it as meaning that once those standards are set, only the small amount of emissions that cannot be prevented by following such standards should be exempted.

Because the statutory language does not dictate a particular means of taking economic factors into account, if at all, EPA has discretion to adopt a reasonable means. In developing this proposed rule, EPA has not applied a strict cost-benefit test, but rather has focused primarily on the state of air conditioning and refrigeration best practices and recovery technology, while also giving consideration to costs and benefits. The fact that industry has identified and uses these best practices indicates they are at least reasonable from a cost perspective. As discussed in the appliance maintenance and leak repair section (section VI.F of this preamble), EPA considered what is achievable from a technical perspective, while also considering the costs of the proposed requirements and the benefits from those changes when determining whether to establish new requirements. See the technical support document in the docket for sensitivity analyses conducted on various options.

Generally, the proposed requirements reflect the performance of the lowest-emitting equipment and practices in each sector under commonly encountered conditions in the field, taking into account that the variability of those conditions is significant in each air-conditioning and refrigeration sector. For example, some appliances generally have more leaks than others. An industrial process refrigeration appliance can have thousands of pounds of refrigerant running through miles of piping, resulting in numerous opportunities for leaks to occur, whereas a household refrigerator typically has about one pound of refrigerant in a hermetically sealed refrigerant loop that rarely leaks. EPA has proposed requirements that reflect that difference.

EPA also considered costs in many specific aspects of this proposal. For example, EPA considered the costs of extending the refrigerant sales restriction to small cans of non-exempt substitutes used for MVAC servicing. Based on those considerations, EPA decided to propose requiring manufacturers install self-sealing valves on small cans rather than limiting the sale of small cans to certified technicians only. Finally, EPA relied heavily on the existing program and requirements already in place for ODS refrigerants rather than developing a new and separate set of requirements for non-exempt substitutes. This will allow the regulated community to use existing compliance procedures where applicable to reduce emissions of non-exempt substitutes rather than having to develop wholly new approaches to managing compliance.

Authority for Extending 608 to Substitutes

In this rule, EPA is proposing to extend, as appropriate, provisions of the refrigerant recovery and/or recycling regulations, which currently only apply to ODS refrigerants, to non-exempt substitute refrigerants. EPA's authority for this action rests largely on section 608(c), which EPA interprets, as described below in more detail, to provide authority to promulgate regulations to interpret, implement, and enforce the venting prohibition, as it applies to both ODS refrigerants and non-exempt substitutes. EPA's authority to issue implementing regulations for section 608(c) is supplemented by section 301(a), which provides authority for EPA to ''prescribe such regulations as are necessary to carry out [the EPA Administrator's] functions under this Act.'' In addition, EPA's authority to extend the recordkeeping and reporting requirements to substitutes is supplemented by section 114, which provides authority to the EPA Administrator to require recordkeeping and reporting in carrying out provisions of the CAA. Finally, as explained in more detail below, the extension of requirements under 608 to non-exempt substitutes in this proposal is also provided in section 608(a) because it would reduce emissions of ODS refrigerants.

Section 608 of the CAA is ambiguous with regard to EPA's authority to establish refrigerant management regulations for substitute refrigerants. As Congress has not precisely spoken to this issue, EPA has the discretion to adopt a permissible interpretation of the CAA. *Chevron, U.S.A., Inc.* v. *Natural Res. Def. Council, Inc.,* 467 U.S. 837, 843–44 (1984). Primarily under the authority of section 608(a), EPA has established standards for the proper handling of ODS refrigerants during the maintenance, service, repair, or disposal of an appliance to maximize the recovery and/or recycling of such substances and reduce the use and emission of such substances. Section 608(a) expressly requires EPA to promulgate regulations that apply to class I and class II substances, but is silent on whether its requirements apply to substitute substances. On the other hand, section 608(c)(2) contains provisions for substitute refrigerants which parallel those for ODS refrigerants in section 608(c)(1). For instance, as for ODS refrigerants under section 608(c)(1), section 608(c)(2) prohibits knowingly venting, releasing, or disposing of any substitute refrigerant during the maintenance, service, repair, or disposal of an appliance in a manner which permits the substance to enter the environment.[6] This creates a tension or ambiguity because the regulated community is subject to an explicit and self-effectuating prohibition on venting or releasing non-exempt substitute refrigerants while servicing or disposing of equipment but at the same time is not explicitly required by section 608(a) to recover and recycle substitute refrigerant prior to servicing or disposing of equipment or to engage in any of the practices or behaviors that EPA has established to minimize the emission and release of ODS refrigerants.

Moreover, the Agency is aware that some amount of refrigerant, whether ODS or substitute, is inevitably released during the maintenance, servicing, repair, and disposal of air-conditioning or refrigeration appliances or equipment. Without a clear regulatory framework for determining what requirements apply during the maintenance, servicing, repair, and disposal of such equipment containing a non-exempt substitute refrigerant, it could be unclear to the regulated community and the public whether such releases violate the venting prohibition and what steps must be taken to comply with CAA obligations for such substitute refrigerants in undertaking such actions. Accordingly, it is appropriate to issue regulations to clarify how the venting prohibition and the *de minimis* exemption apply to non-

[6] As noted above, this venting prohibition does not apply to substitutes for which the Administrator has made a determination that such venting, release, or disposal ''does not pose a threat to the environment'' under CAA 608(c)(2). As indicated elsewhere in this proposal, EPA is not proposing to extend the requirements of the refrigerant management program to substitutes that have been exempted from the venting prohibition in this action.

exempt substitute refrigerants, as is proposed in this rulemaking. In doing so, EPA intends to clarify that the regulated community may rely on the *de minimis* exemption to the venting prohibition if they follow the amended requirements in subpart F.

Consistent with the language of sections 608(c)(1) and (2), these revisions aim to avoid knowing releases of non-exempt substitute refrigerants into the environment in the course of maintaining, servicing, repairing, or disposing of an appliance or IPR, unless those releases meet the criteria for *de minimis* releases. Section 608(c)(1) provides an exemption from the venting prohibition for ''[d]e minimis releases associated with good faith attempts to recapture and recycle or safely dispose of any such [class I or class II] substance.'' In this context, EPA interprets this provision to exempt releases that occur while the recycling and recovery requirements of regulations under sections 608 and 609 are followed and has promulgated regulations that implement that interpretation. In particular, as explained above, EPA has incorporated both the venting prohibition and the *de minimis* exemption into the regulations at § 82.154(a). Further, the last sentence in § 82.154(a)(2) provides that ''refrigerant releases shall be considered de minimis only if they occur when'' enumerated regulatory practices in either § 82.156, § 82.158, and § 82.161, or, alternatively, subpart B are followed. These requirements are the ones established in 1993, as explained above and as periodically amended. The term *refrigerant,* however, is defined in § 82.152 for purposes of this subpart to mean any substance consisting in part or whole of a class I or class II ozone-depleting substance that is used for heat transfer purposes and provides a cooling effect. As such, this term does not include substitute substances. In addition, EPA has not yet applied the recycling and recovery requirements to non-ODS substitutes, and therefore these provisions which make clear how to qualify for the *de minimis* exemption for ODS refrigerants do not currently apply for substitute refrigerants.

Section 608(c) can be interpreted such that the statutory *de minimis* exemption contained in section 608(c)(1) also applies to substitute refrigerants. Section 608(c)(2) states that, effective November 15, 1995, ''paragraph 1 shall also apply'' to the venting, release, or disposal of any substitute substance for class I or class II substances. As section 608(c)(2) incorporates ''paragraph 1'' it is reasonable to interpret it to also contain this *de minimis* exemption. However, the CAA does not explicitly address what should be considered ''good faith attempts to recapture and recycle or safely dispose'' for substitute refrigerants. Moreover, the statutory provisions that require EPA to promulgate regulations addressing recapturing and recycling requirements and safe disposal requirements in section 608(a) and 608(b) expressly mention that they apply to ODS refrigerants but are silent as to application to substitute refrigerants. This silence and the corresponding tension between these provisions creates an ambiguity in section 608 and a gap that EPA may fill with a permissible interpretation. *Chevron, U.S.A., Inc.* v. *Natural Res. Def. Council, Inc.,* 467 U.S. 837, 843–44 (1984). While Congress did not expressly mention substitutes in section 608(a), EPA does have authority under the Act to establish regulations creating a program to address management of ODS refrigerants and their substitutes, including authority to implement the venting prohibition under section 608(c) for both substitutes and ODS, and the revisions proposed today are important to implementing those statutory authorities.

Consistent with the interpretation of section 608(c)(2) as incorporating the *de minimis* exemption, EPA's regulations at § 82.154(a)(2) state that ''[d]e minimis releases associated with good faith attempts to recycle or recover . . . non-exempt substitutes are not subject to this prohibition,'' thus extending the statutory *de minimis* exemption from the venting prohibition to good faith efforts to recycle or recover non-exempt substitute refrigerants. However, in contrast to the regulations for ODS refrigerants, the regulations do not provide any specific provisions to explain how to determine what constitutes such a ''good faith attempt'' with respect to substitute refrigerants. Thus, the regulations are currently unclear as to what requirements or practices regulated parties must follow to qualify for the *de minimis* exemption, and thereby comply with the venting prohibition, for non-exempt substitute refrigerants.

On June 11, 1998, EPA proposed to extend the *de minimis* exemption in section 608(c)(1) to substitute refrigerants and to issue regulations under section 608(c)(2) that implement and clarify the venting prohibition for substitutes (63 FR 32044). As stated in that proposed rule, ''while section 608(c) is self-effectuating, EPA regulations are necessary to define '*(d)e minimis* releases associated with good faith attempts to recapture and recycle or safely dispose' of such substances and to effectively implement and enforce the venting prohibition.''

In the final rule issued March 12, 2004 (69 FR 11946), EPA extended the 608(c)(1) *de minimis* exemption only to blends containing an ODS component. As stated in that rule at 69 FR 11949:

> [V]enting of all substitute refrigerants, including HFC and PFC refrigerants (and blends thereof) is prohibited under section 608(c), with the exception of *de minimis* releases associated with good faith attempts to recapture and recycle. The *de minimis* releases exception, however, is not self-effectuating, nor is it self-explanatory.
>
> EPA believes that regulatory clarification is necessary to define such '*[d]e minimis* releases' and 'good faith attempts to recapture and recycle or safely dispose of any such substance' and safely dispose of appliances to effectively implement and enforce the venting prohibition. Section 608(c)(1) in conjunction with 608(c)(2) of the Act allow for an exemption for *de minimis* releases associated with good faith attempts to recapture and recycle or safely dispose of substitutes for class I and class II ODSs used as refrigerants. A regulation reflecting the statutory requirement for recovery of substitute refrigerants is an essential part of a regulatory framework within which *de minimis* releases and good faith attempts to recapture and recycle or safely dispose of substitute refrigerants can be defined.

This interpretation that the statutory *de minimis* exemption applies to substitutes is consistent with the interpretation of section 608(c)(1) and (2) that EPA articulates in this section. The March 2004 Rule then goes on to state at 69 FR 11953 that:

> EPA is not, however, finalizing the proposal to extend all of the regulations concerning emissions reduction of CFC and HCFC refrigerants, found at 40 CFR part 82, subpart F, to HFC and PFC refrigerants. Therefore, today's rule does not mandate any of the following proposed requirements for HFC or PFC refrigerants that do not consist of a class I or class II ODS (*i.e.,* pure HFC or PFC refrigerants): A sales restriction on HFC or PFC refrigerants; specific evacuation levels for servicing HFC or PFC appliances; certification of HFC or PFC recycling and recovery equipment; certification of technicians who work with HFC or PFC appliances; reclamation requirements for used HFC and PFC refrigerants; certification of refrigerant reclaimers who reclaim only HFCs or PFCs; or leak repair requirements for HFC and PFC appliances.

Following the March 12, 2004, rulemaking, the Administrator promulgated a direct final rule to amend the regulatory definitions of *refrigerant* and *technician,* as well as the venting prohibition, to correct and clarify the intent of those regulations (70 FR 19273, April 13, 2005). As part of that change, EPA edited the regulatory venting prohibition to reflect the statutory *de*

minimis exception in section 608(c)(2). As explained at 70 FR 19275:

> In accordance with section 608(c)(2) of Title VI of the Clean Air Act (as amended in 1990), *de minimis* releases associated with good faith attempts to recapture and recycle or safely dispose of such substitutes shall not be subject to the prohibition. EPA has not promulgated regulations mandating certification of refrigerant recycling/recovery equipment intended for use with substitutes; therefore, EPA is not including a regulatory provision for the mandatory use of certified recovery/recycling equipment as an option for determining *de minimis* releases of substitutes. However, the lack of a regulatory provision should not be interpreted as an exemption to the venting prohibition for non-exempted substitutes. The regulatory prohibition at § 82.154(a) reflects the statutory reference to *de minimis* releases of substitutes as they pertain to good faith attempts to recapture and recycle or safely dispose of such substitutes.
>
> In order to emphasize that the knowing venting of HFC and PFC substitutes remains illegal during the maintenance, service, repair, and disposal of appliances and to make certain that the *de minimis* exemption for refrigerants remains in the regulatory prohibition, § 82.154(a) is amended to reflect the venting prohibition of section 608(c)(2) of the Act.

In that action, EPA added the phrase ''De minimis releases associated with good faith attempts to recycle or recover refrigerants *or non-exempt substitutes* are not subject to this prohibition'' to § 82.154(a)(2) (emphasis added). However, because EPA has not extended the section 608 recycling and recovery requirements to substitute refrigerants, it is unclear how this exception applies to non-exempt substitute refrigerants that do not contain an ODS. As EPA has stated previously, the Agency is aware that some amount of refrigerant is released during the servicing of appliances even if precautions to avoid such releases are taken. For ODS refrigerants, the regulations on recovery and recyling provide certainty to the regulated community that if specific practices that EPA has identified are followed, regulated entities will not be held liable for releases of small amounts of refrigerant incidental to these actions. These regulations support the recovery or recycling of refrigerants and reduce the emissions of such substances. To provide the same clarity and certainty to the regulated community for substitute refrigerants, it is important to clarify how this exemption applies to non-exempt substitute refrigerants that do not contain an ODS. To do so, EPA is proposing to extend the amended regulations concerning emissions reduction and recapture and recycling of CFC and HCFC refrigerants, found at 40 CFR part 82, subpart F, to all substitute refrigerants that have not been exempted from the venting prohibition under § 82.154(a)(1).

Regulations intended to minimize the release and maximize the recapture and recovery of non-exempt substitutes will reduce the release and increase the recovery of ozone-depleting substances. For that reason, this proposal is additionally supported by the authority in section 608(a). Improper handling of substitute refrigerants is likely to contaminate appliances and recovery cylinders with mixtures of ODS and non-ODS substitutes. In particular, technician certification and a sales restriction help to ensure that persons lacking the expertise tested through certification do not release or contaminate ODS refrigerants in the course of using non-exempt substitutes to recharge or perform other work on systems that contain ODS. Contaminated appliances can lead to failures and emissions from those systems. Contaminated cylinders are less valuable to reclaimers and may not even be accepted by reclaimers as the mixed gas may no longer be cost-effectively recycled. Often, contaminated cylinders simply have to be destroyed. The costs of handling or properly disposing of these mixed refrigerants incentivizes intentional releases to the atmosphere. Therefore contamination can lead to the release of class I and class II substances. In addition, applying one consistent set of requirements to all relevant refrigerants will promote compliance with and enforcement of those requirements for both ODS refrigerants and their substitutes by reducing complexity.

EPA further notes that under the current definition of *refrigerant* any substance that consists in whole or in part of a class I or class II ODS and is used for heat transfer and provides a cooling effect, is a refrigerant and is subject to the requirements for ODS. However, when a regulated entity believes it is using a substitute refrigerant, and that substitute becomes contaminated with ODS, the contamination may not be apparent to the user, and thus, the user may not be aware that the requirements for refrigerants apply to that substance.

In sum, the authority to promulgate regulations regarding the use of class I and II substances encompasses the proper handling of alternatives where this is needed to reduce emissions and maximize recovery of class I and II substances. Applying one consistent set of requirements to all non-exempt refrigerants will promote compliance with and enforcement of those requirements for both ozone-depleting refrigerants and their substitutes by reducing complexity and clarifying requirements.

Authority for Amendments to Provisions Related to ODS

In addition to extending the existing regulations in subpart F to substitute refrigerants, EPA is also proposing the following amendments related to ozone-depleting substances: Lowered leak rates, required leak inspections, two-year leak limits, and recordkeeping requirements for the disposal of appliances containing between five and 50 pounds of refrigerant. EPA is also proposing to update and revise many provisions in subpart F to improve clarity and enforceability. EPA's authority for these amendments is based primarily on section 608(a), which requires EPA to promulgate regulations regarding the use and disposal of class I and II substances to ''reduce the use and emission of such substances to the lowest achievable level'' and ''maximize the recapture and recycling of such substances.'' In addition, because EPA is further elaborating the requirements and practices that regulated parties must follow to qualify for the *de minimis* exemption from the venting prohibition, EPA is drawing on its authority under section 608(c). EPA's authority for these actions is also supplemented by section 301(a) and 114, as described above.

EPA solicits comments on all aspects of the discussion in this section concerning its authority for the revisions proposed today, including comments on its authority to extend the amended regulations concerning emissions reduction and recapture and recycling of CFC and HCFC refrigerants, found at 40 CFR part 82, subpart F, to all non-exempt substitute refrigerants.

How CAA Sections 608 and 609 Work Together

While Section 608 covers all appliances, Section 609 of the CAA directs EPA to establish requirements to prevent the release of refrigerants during the servicing of MVACs specifically. MVACs are defined as mechanical vapor compression refrigeration equipment used to cool the driver's or passenger's compartment of any motor vehicle. EPA also regulates MVAC-like appliances under this section, which are used to cool the driver's or passenger's compartment of off-road vehicles, including agricultural and construction vehicles.

Under section 609, no person repairing or servicing motor vehicles for consideration may perform any service on an MVAC that involves the refrigerant without properly using

approved refrigerant recovery or recovery and recycling equipment and no such person may perform such service unless such person has been properly trained and certified. Refrigerant handling equipment must be certified by EPA or an independent organization approved by EPA. Section 609 also prohibits the sale or distribution of any class I or class II MVAC refrigerant in a container of less than 20 pounds to any person that is not certified under section 609.

Regulations issued under section 609 are in 40 CFR part 82, subpart B. Subpart B includes information on prohibitions and required practices (§ 82.34), approved refrigerant handling equipment (§ 82.36), approved independent standards testing organizations (§ 82.38), and certification, recordkeeping, and public notification requirements (§ 82.42). Appendices A–F of subpart B provide standards for minimum operating requirements for MVAC servicing equipment.

The section 608 regulations found in 40 CFR part 82, subpart F are applicable to MVAC and MVAC-like appliances because MVAC and MVAC-like appliances are included in the statutory definition of appliances in section 601(1). Because servicing and technician training and certification are regulated under section 609, EPA's section 608 regulations defer to those requirements. Procedures involving MVACs that are not regulated under section 609, such as the disposal of MVACs and the purchase of refrigerant for use in MVAC, are covered by section 608. The prohibition against venting ODS and substitute refrigerants in section 608 is also applicable to refrigerants used in MVAC and MVAC-like appliances.

Through this rulemaking EPA is proposing to extend the provisions of section 608 to alternatives to ODS, including those used in MVACs. EPA is not updating the regulations under section 609 as part of this rulemaking because the 609 regulations have been applicable to all substitute substances since 1995.[7]

[7] The Agency has indicated plans to issue a separate proposed rule to consider adopting standards from the Society of Automotive Engineers (SAE) for servicing equipment in 40 CFR subpart B. These standards are: SAE J2843 R–1234yf Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning Systems, SAE J2851 Recovery Equipment for Contaminated Refrigerant from Mobile Automotive Air Conditioning Systems, and SAE J3030 Automotive Refrigerant Recovery/Recycling Equipment Intended for Use with Multiple Refrigerants. In a separate future proposed rule, EPA intends to propose to incorporate by reference these standards developed by SAE International's Interior Climate Control Committee.

IV. The Proposed Rule

A. Proposed Changes to the Definitions in Section 82.152

EPA is proposing to update and clarify many of the definitions in subpart F. EPA is also proposing to add new definitions and remove definitions that have the sole purpose of restating the required practice. In general, these changes are to improve readability, increase consistency with how the term is used in the regulatory text, and specifically incorporate substitute refrigerants as appropriate.

Proposed changes to each term are discussed individually below, except for the terms *refrigerant* and *appliance* as well as *full charge* and *seasonal variance* which are sufficiently interrelated to require joint discussions.

EPA requests comments on all of the proposed changes to the definitions below. The Agency is particularly interested in comments on newly defined terms and on changes to definitions that affect the scope and requirements of subpart F.

Refrigerant and Appliance

The existing definitions in subpart F are written to separate ozone-depleting substances from non-ozone-depleting substitutes. As relevant here, section 601 of the CAA defines an *appliance* as a ''device which contains and uses a class I or class II substance as a refrigerant.'' Class I and class II substances are defined as substances listed under sections 602(a) or (b), respectively. Section 601 of the CAA does not define *refrigerant.* EPA's existing regulations at § 82.152 reach that definition through a two-step process. First EPA defined an *appliance* as a device which contains and uses a *refrigerant.* Then EPA defined the term *refrigerant* as solely class I or class II ozone-depleting substances, or mixtures containing a class I or class II ODS.

Defining these terms in this manner was appropriate before section 608(c)(2) took effect on November 15, 1995. Under section 608(c)(2), the venting prohibition applies to substitutes for ODS refrigerants and, accordingly, it states that ''[f]or purposes of this paragraph'' the term *appliance* includes any ''device which contains and uses as a refrigerant a substitute substance.'' However, EPA has not updated the definition of appliance in subpart F to reflect section 608(c)(2). Because EPA regulations still define an *appliance* as a device that contains and uses a refrigerant, and *refrigerant* in such a way that does not include substitutes, substitutes are thereby excluded from the regulatory definition of the term *appliance.* This leads to confusing results throughout subpart F. As only one example among many that could be provided, the purpose and scope section in § 82.150(b) states that this subpart applies to any person servicing, maintaining, or repairing appliances. Under the regulatory definition substitutes are not used in appliances, but regulations later in this subpart, at § 82.154(a)(1), state that no person maintaining appliances may knowingly vent any substitute from such appliances unless one of the regulatorily defined exceptions applies. This proposed rule attempts to clear up these inconsistencies by defining and using regulatory terms more consistently.

EPA is proposing to revise the definition of appliance so that it encompasses the usage of the term in sections 601 and 608 of the CAA. This rule proposes to define appliance as any device which contains and uses a class I or class II substance *or substitute* (emphasis added) as a refrigerant and which is used for household or commercial purposes, including any air conditioner, motor vehicle air conditioner, refrigerator, chiller, or freezer. This proposed change would make the regulatory definition consistent with sections 601 and 608 of the CAA, improve internal consistency of the regulations, and increase clarity for the regulated community.

EPA is proposing to amend the definition of refrigerant to include any substance, including blends and mixtures, consisting in part or whole of a class I or class II ozone-depleting substance *or substitute* (emphasis added) that is used for heat transfer purposes and provides a cooling effect. This proposed definition would note that the term refrigerant would include blends as well as mixtures of refrigerants.

EPA is proposing this approach so as to define refrigerant according to the way the term is currently understood. From an engineering standpoint, it does not matter whether or not a compound is an ODS to function as a refrigerant. This amended definition is closer to how the term is commonly understood. Broadening the term also brings other terms in subpart F such as *refrigerant circuit* or *reclaimed refrigerant* more in line with common usage.

Apprentice

EPA is proposing to amend the definition of the term *apprentice* to replace the ''Bureau of Apprenticeship and Training'' with the ''Office of

Apprenticeship'' to match the current name of the office. EPA is also proposing minor edits to improve clarity and readability.

Approved Equipment Testing Organization

EPA is proposing to remove the defined term *approved equipment testing organization*. The current definition is merely a reference to the section of the CFR that discusses the characteristics of such an organization. EPA is proposing to remove the definition to increase readability.

Certified Refrigerant Recovery or Recycling Equipment

EPA is proposing to remove the defined term *certified refrigerant recovery or recycling equipment.* The current definition merely refers to the sections of the CFR that discuss the certification program. This term is also used inconsistently throughout subpart F as ''recovery and recycling equipment,'' ''recovery or recycling equipment,'' ''recycling and recovery equipment,'' and ''recycling or recovery equipment.'' The regulations at § 82.36 make a distinction, in the context of MVAC servicing, between equipment that only recovers refrigerant and equipment that both recovers and recycles refrigerant. The regulations in subpart F generally do not make a distinction. The standards in appendices B1 and B2 refer to recovery and/or recycling equipment while the standard in appendix C for small appliances refers to recovery equipment only. For consistency, this rule proposes to use ''recovery and/or recycling equipment'' throughout, except for when referring only to small appliances.

Class I and Class II

EPA is proposing to create regulatory definitions for the terms *class I* and *class II* ozone-depleting substances. These terms are currently defined in section 601 of the CAA and in 40 CFR part 82, subpart A. EPA is not proposing a different meaning. Adding definitions to subpart F can assist the reader as these terms are currently not explained in the definitions section and are used frequently in the regulations. EPA's proposed definition of class I is an ozone-depleting substance that is listed in 40 CFR part 82, subpart A, appendix A. Similarly, EPA's proposed definition of class II is an ozone-depleting substance that is listed in 40 CFR part 82, subpart A, appendix B. EPA notes that the regulatory text uses class I substance, class I ODS, and class I refrigerant interchangeably (and similarly uses class II substance, class II ODS, and class II refrigerant interchangeably) and all are intended to have the same meaning for the purpose of subpart F.

Comfort Cooling

EPA is proposing to create a definition for the term *comfort cooling*. The leak repair provisions divide refrigeration and air-conditioning equipment into three categories: Comfort cooling, commercial refrigeration, and industrial process refrigeration. EPA has previously defined commercial refrigeration and industrial process refrigeration but not comfort cooling.

For purposes of the leak repair requirements, EPA is proposing to define comfort cooling as the air-conditioning appliances used to provide cooling in order to control heat and/or humidity in facilities including but not limited to office buildings and light commercial buildings. Comfort cooling appliances include building chillers and roof-top self-contained units. They may be used for the comfort of occupants or for climate control to protect equipment within a facility, such as but not limited to computer rooms.

EPA seeks comments on the applicability of the proposed definition of comfort cooling to air-conditioning equipment that is typically used to provide cooling and or humidity control in such environments.

Commercial Refrigeration

EPA is proposing to amend the definition of *commercial refrigeration* for clarity by removing the sentence that this equipment typically contains a charge size over 75 pounds. While accurate, this sentence has caused some confusion as to whether or not the leak repair requirements are applicable to appliances with a full charge between 50 pounds, as stated in the leak repair required practices, and 75 pounds. The Agency feels that the phrase is not required since the threshold for the leak repair requirements is a refrigerant charge of 50 pounds or greater. EPA is proposing to define *commercial refrigeration* as the refrigeration appliances used 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 refrigeration equipment used to store meat, produce, dairy products, and other perishable goods.

Critical Component

EPA is proposing to remove the defined term *critical component* and add the term *component*. EPA proposed the same change in the proposed 2010 Leak Repair Rule. As discussed in that rule, EPA considers components as the parts of the appliance that make up the refrigerant circuit such as the compressor, heat exchangers (condenser and evaporator), and valves (*e.g.,* heat recovery, expansion, charging). Other components may include receivers, manifolds, filter driers, and refrigerant piping. The meaning of the definition can be preserved without classifying the component as critical.

Owners or operators of IPR may be granted additional time to make repairs if critical components cannot be delivered within the necessary time. Later in this action, EPA discusses its proposal to create a consistent set of extensions to the leak repair regulations for all types of appliances. The unavailability of a component is not a situation unique to owners or operators of IPR. Owners or operators of comfort cooling and commercial refrigeration appliances should be granted the same flexibility as owners and operators of IPR when requesting additional time to make repairs due to the unavailability of components. Having similar requirements for all affected appliances also provides for a more consistent set of regulations that should reduce the complexity of the current leak repair regulations. Therefore, EPA is proposing to amend the definition so that it is not limited to IPR, but also includes comfort cooling and commercial refrigeration appliances.

EPA also proposes to replace the current defined term *critical component* with the newly defined term *component,* which would mean an appliance part, such as, but not limited to, compressors, condensers, evaporators, receivers and all of its connections and subassemblies. The term *component* is intended to be broader so everything that would have been covered under the term *critical component* would be included.

Custom-Built

EPA is proposing to amend the definition of the term *custom-built* to remove a citation to a section of the regulation that has moved.

Disposal

EPA is proposing to amend the definition of the term *disposal* to clarify that the disposal process includes the destruction of an appliance that releases or would release refrigerant to the

environment. This proposed change is intended to cover activities such as vandalism or the cutting of refrigerant lines, both to steal metal and to vent the refrigerant. EPA is also proposing to clarify that the disassembly of an appliance for recycling, as well as reuse, is part of the disposal process. EPA does not believe that these changes alter the current understanding of the term and is proposing them to increase clarity.

Follow-Up Verification Test

EPA is proposing to amend the definition of the term *follow-up verification test* to remove duplicative text covered in § 82.156 ''Required Practices.'' The proposed revisions describe what the test is and how it is conducted and not what the regulatory requirements of the test are, which this rule proposes to move to § 82.157(f). EPA is proposing to define *follow-up verification test* as those tests that involve checking the repairs to an appliance after a successful initial verification test and after the appliance has returned to normal operating characteristics and conditions to verify that the repairs were successful. Follow-up verification tests include, but are not limited to, the use of soap bubbles, electronic or ultrasonic leak detectors, pressure or vacuum tests, fluorescent dye and black light, infrared or near infrared tests, and handheld gas detection devices.

EPA is not proposing to specify one test that would satisfy the definition of follow-up verification. In addition, these methods are not meant to be all-inclusive, but are intended to provide examples of known methodologies of performing leak repair verification tests.

Full Charge and Seasonal Variance

EPA is proposing to amend the definition of the term *full charge* to account for seasonal variances and to make minor edits for readability. EPA noted in the proposed 2010 Leak Repair Rule that owners or operators of commercial refrigeration appliances and IPR have expressed concerns that the full charge may not be accurately determined due to seasonal variances that may alter the amount of refrigerant in an appliance. Seasonal variances in ambient temperature and pressure have the effect of forcing refrigerant to different appliance components (for example, from an appliance's receiver to the condenser).

EPA proposed in 2010 to allow owners or operators to estimate the effect that seasonal variances have on appliance components by making calculations based on component sizes, density of refrigerant, volume of piping, and other relevant considerations. EPA continues to believe that owners or operators should be able to take seasonal variances into account in determining the full charge. Unlike the 2010 proposal, EPA is proposing that seasonal variances be accounted for using the actual amount of refrigerant added to or evacuated from the appliance, rather than estimates.

EPA is proposing to define *full charge* as the amount of refrigerant required for normal operating characteristics and conditions of the appliance as determined by using one or a combination of the following four methods:

(1) Use of the equipment manufacturer's determination of the full charge;

(2) Use of appropriate calculations based on component sizes, density of refrigerant, volume of piping, and other relevant considerations;

(3) Use of actual measurements of the amount of refrigerant added to or evacuated from the appliance, including for seasonal variances; and/or

(4) Use of an established range based on the best available data regarding the normal operating characteristics and conditions for the appliance, where the midpoint of the range will serve as the full charge.

EPA is proposing to create a defined term *seasonal variance* to mean the addition of refrigerant to an appliance due to a change in ambient conditions caused by a change in season, followed by the subsequent removal of an equal amount of refrigerant due to a later corresponding change in season, where both the addition and removal of refrigerant occurs within one consecutive 12-month period. The proposal to account for seasonal variance when calculating appliance leak rates is discussed further in Section IV.F. of this preamble.

Unlike in the 2010 proposal, EPA is not proposing to require that an owner or operator choose solely one method rather than a combination of methods to determine full charge. There are instances where multiple methods may be necessary to accurately determine the full charge. In addition, EPA is not proposing that owners or operators commit to the same method for the life of the appliance. However, as discussed later in this notice, EPA is proposing to require a written record of the full charge, the method(s) used to determine the full charge, and any changes to that amount.

High-Pressure Appliance

EPA is proposing to amend the definition of the term *high-pressure appliance* to update the list of example refrigerants. The proposed changes to the terms *appliance* and *refrigerant* carry over into this term as well. Therefore, under the proposed revisions high-pressure appliances would include those that use ODS and non-ODS refrigerants. EPA is proposing to update the list of example refrigerants with the most common types currently used in these systems, including ODS and non-ODS refrigerants. Specifically, these are R–22, R–407A, R–407C, R–410A, and R–502.

Industrial Process Refrigeration

EPA is proposing to amend the definition of the term *industrial process refrigeration* to make minor clarifications for readability and to remove a citation to a section of the regulation that has moved. EPA is proposing to define *industrial process refrigeration* as complex customized appliances that are directly linked to the processes used in, for example, the chemical, pharmaceutical, petrochemical, and manufacturing industries. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. Where one appliance is used for both industrial process refrigeration and other applications, it will be considered industrial process refrigeration equipment if 50 percent or more of its operating capacity is used for industrial process refrigeration.

Industrial Process Shutdown

EPA is proposing to amend the definition of the term *industrial process shutdown* to remove a citation to a section of the regulation that has moved.

Initial Verification Test

EPA is proposing to amend the definition of the term *initial verification test* to remove duplicative text covered in the required practices section of the regulation. The proposed revisions describe in general terms what the test is, not what the requirements of the test are. The purpose of the test is to verify that an appliance has been repaired prior to adding refrigerant back into the system. The requirements for an initial verification test are described in Section IV.F.10 of this preamble. EPA is proposing to define *initial verification test* as those leak tests that are conducted as soon as practicable after the repair is finished to verify that a leak or leaks have been repaired before refrigerant is added back to the appliance.

Leak Inspection

EPA is proposing to create a new defined term *leak inspection*. EPA is proposing to require that owners or operators conduct annual or quarterly leak inspections for appliances normally containing 50 or more pounds of refrigerant. EPA is proposing to define leak inspection as the examination of appliances using a calibrated leak detection device, a bubble test, or visual inspection for oil residue in order to determine the presence and location of refrigerant leaks.

This definition appropriately covers the techniques currently used to detect the location of leaks. This term encompasses activities that can be performed by someone who is not a certified technician, unlike some of the activities listed in the definition of the term follow-up verification test. The proposed term for leak inspection does not include activities that would assist in determining whether a system is leaking generally, such as viewing receiver levels, pressure gauges, or adding refrigerant. However, EPA encourages persons conducting leak inspections to also review receiver levels if applicable.

Leak Rate

EPA is proposing to amend the definition of the term *leak rate* to change the calculation performed under what is called Method 2 under the existing rules. Currently, the first step of that method is to take the sum of the quantity of refrigerant added to the appliance over the previous 365-day period (or over the period that has passed since leaks in the appliance were last repaired, if that period is less than one year). Instead of the cut-off being since the last repair (if less than 365 days), EPA is proposing to amend Step 1 to cover the period of time since the last successful follow-up verification test (if less than 365 days have passed since the last refrigerant addition). This proposed change would improve the clarity of the requirements, because under the existing definition, it is unclear if the repair has to be successful in order to be considered in the leak rate calculation; these proposed revisions are intended to clarify that it must be. As discussed later in this preamble, EPA is proposing to allow repairs and initial and follow-up verification tests to occur in the same visit by a certified technician. This will likely result in the verification tests occurring on the same day as the repair.

EPA is also proposing to rename the two methods from Method 1 and Method 2 to ''Annualizing Method'' and ''Rolling Average Method'' to improve readability. Finally, EPA is proposing to clarify that while the same leak rate calculation must be used for all appliances at the same facility, this only refers to the appliances subject to the leak repair provisions (*i.e.* appliances normally containing 50 or more pounds of refrigerant).

Low-Pressure Appliance

EPA is proposing to amend the definition of the term *low-pressure appliance* to update the list of example refrigerants. The proposed changes to the terms *appliance* and *refrigerant* carry over into this term as well. Therefore, under the proposed revisions low-pressure appliances would include those that use ODS and non-ODS refrigerants. EPA is proposing to update the list of example refrigerants with the most common types currently used in these systems, including ODS and non-ODS refrigerants. Specifically, these are R–11, R–123, R–113, R–245fa, and R–1233zd(E).

Medium-Pressure Appliance

EPA is proposing to amend the definition of the term *medium-pressure appliance* to update the list of example refrigerants. The proposed changes to the terms *appliance* and *refrigerant* carry over into this term as well. Therefore, under the proposed revisions medium-pressure appliances would include those that use ODS and non-ODS refrigerants. EPA is proposing to update the list of example refrigerants with the most common types currently used in these systems, including ODS and non-ODS refrigerants. Specifically, these are R–114, R–124, R–12, R–134a, and R–500.

Mothball

EPA is proposing to change the defined term *system mothballing* to *mothball* to reflect how it is used in the regulations. Mothballing an appliance suspends the time needed to complete repairs, retrofit or retirement plans, or completion of a retrofit or retirement for IPR that have triggered the leak repair requirements. The current exemption for system mothballing at § 82.154(i)(10) is available only for IPR. EPA is proposing to extend that exemption to all appliances, therefore EPA is proposing to remove the reference to ''refrigeration'' appliances in the definition. The current definition also requires that the appliance be shut down for ''an extended period of time.'' EPA does not believe that the length of time that the system is shut down is controlling, but rather that the system has been removed from service temporarily, as opposed to permanently retired, and that the refrigerant has been evacuated. EPA is also proposing to clarify that the suspension of time ends when refrigerant is added back into the appliance. The revised definition also notes that refrigerant can be evacuated from an isolated component of the appliance and makes minor edits to improve clarity and readability. Therefore, EPA is proposing the term *mothball* to mean to evacuate refrigerant from an appliance, or the affected isolated section or component of an appliance, to at least atmospheric pressure, and to temporarily shut down that appliance.

Normal Operating Characteristics and Conditions

EPA is proposing to change the defined term *normal operating characteristics or conditions* by replacing ''or'' with ''and'' for consistency through the regulations and to accurately describe the intended state of the appliance to which this term refers. EPA is also proposing to remove a reference to a section of the regulation that has moved. EPA is further proposing to add a reference to the appliance's full charge. Operating at full charge is a necessary element of an appliance's normal characteristics and it should be reflected in the definition. Finally, EPA is clarifying that this term extends to all appliances, not just refrigeration appliances. This term is currently used in the regulatory text in reference to all types of air-conditioning and refrigeration systems.

Normally Containing a Quantity of Refrigerant

EPA is proposing to remove the defined term *Normally containing a quantity of refrigerant*. This term merely indicates the quantity of refrigerant in an appliance at full charge and it may be confusing to have two defined terms to make the same point. EPA is proposing to replace this term wherever it is found with the phrase ''with a full charge of.''

One-Time Expansion Device

EPA is proposing to amend the definition of the term *one-time expansion device* to make clear that this includes devices that can store multiple charges, which are released individually to the environment to provide a cooling effect. EPA is proposing to define *one-time expansion device* as an appliance that relies on the release of its refrigerant charge to the environment in order to provide a cooling effect. These are typically single releases but could also include products that are designed

to release refrigerant to the environment through multiple individual charges.

Opening an Appliance

EPA is proposing to amend the definition of the term *opening an appliance* to improve readability.

Reclaim

EPA is proposing to change the defined term *reclaim refrigerant* to *reclaim* so as to match usage in the regulatory text. EPA is also proposing to update the Air Conditioning, Refrigeration, and Heating Institute (AHRI) standard referenced in the definition. This updated standard includes non-ODS refrigerants.

Recover

EPA is proposing to change the defined term *recover refrigerant* to *recover* so as to match usage in the regulatory text.

Recycle

In the context of recycling refrigerant, EPA is proposing to change the defined term *recycle refrigerant* to *recycle* so as to match usage in the regulatory text. EPA is also proposing to clarify in the definition that reuse of recycled refrigerant must occur in equipment of the same owner or operator. EPA has previously prohibited in § 82.154(g) the sale of used refrigerant unless it has been reclaimed or is being transferred to an appliance owned by the same parent company or by the same Federal agency or department. EPA is also making minor changes to improve readability.

Retire

EPA is proposing to create a defined term *retire* in reference to appliances to mean the disassembly of the entire appliance including its major components, such that the appliance as a whole cannot be used by any person in the future. Retirement means that any remaining refrigerant would be recovered from the appliance followed by the dismantling and disposal of the appliance components. Retirement differs from mothballing as defined at § 82.152 because a mothballed appliance is simply evacuated and shut down until it is ready to be used once again, whereas retirement involves a permanent shutdown and disassembly of an appliance. Retirement should also not be confused with a repair. *Repair* is not expressly defined in the subpart F regulations. It may include the removal of a faulty component, but such removal does not mean that the appliance as a whole has been removed from service and rendered unfit for use by the current or any future owner or operator. Throughout this rule, ''replacement'' or ''replace'' may be used when discussing a situation where an existing appliance is retired, and replaced with another appliance. In some instances, however, the owner or operator may choose to only retire and not replace an appliance so the two terms are not always used together.

Retrofit

EPA is proposing to create a defined term *retrofit.* As discussed in the proposed 2010 Leak Repair Rule, many appliance owners or operators have incorrectly equated the two terms *retrofit* and *repair*. EPA does not view a retrofit or the need to retrofit as a repair. Although *repair* is not expressly defined in the subpart F regulations, EPA considers a repair to include an action that addresses the leaking appliance or the affected component(s) of the leaking appliance. Repairs may include replacement of components or component subassemblies, whereas EPA uses the term *retrofit* to refer to a change to the appliance in order to convert it to the use of a different refrigerant. EPA does not use the term to apply to upgrades or repairs to existing equipment where the refrigerant is not changed. Retrofits often require changes to the appliance (for example, change in lubricants, filter driers, gaskets, o-rings, and in some cases, components) in order to acquire system compatibility.

Self-Sealing Valve

EPA is proposing to create a defined term *self-sealing valve.* A self-sealing valve means a valve affixed to a container of refrigerant that automatically seals when not actively dispensing refrigerant and that meets or exceeds established performance criteria as identified in § 82.154(f)(2). The purpose of a self-sealing valve is to prevent or minimize inadvertent release of refrigerant to the environment during the use and storage of the container of refrigerant. EPA discusses the requirement for self-sealing valves for small cans of MVAC refrigerant in more detail in Section IV.H.4 of this preamble.

Small Appliance

EPA is proposing to amend the definition of the term *small appliance* to remove the reference to class I and class II refrigerants. The proposed changes to the terms *appliance* and *refrigerant* carry over into this term as well. Therefore, under this proposal small appliances would include those that use ODS and non-ODS refrigerants. EPA is also proposing to add portable air conditioners to the list of example appliances.

Substitute

EPA is proposing to amend the definition of the term *substitute* to remove the phrases ''EPA-approved'' and ''in a given refrigeration or air-conditioning end-use.'' These phrases are references to the SNAP program, which identifies acceptable alternatives to ODS for specific end-uses. EPA is proposing to remove this reference because the Agency has recently changed the status of certain refrigerants from acceptable to unacceptable for new retail food refrigeration equipment, vending machines, and motor vehicle air conditioning (80 FR 42870; July 20, 2015). EPA does not mean to imply that finding a refrigerant to be unacceptable in a given end-use under SNAP means that it is no longer included within the term substitute and thus by extension the term refrigerant. Were that the case, those substitutes could be inadvertently exempted from the safe handling requirements of subpart F. EPA is making this change to prevent that confusion, especially since the Agency is allowing for the servicing of existing appliances designed to use refrigerants that the Agency recently listed as unacceptable in new (and in some cases) retrofitted appliances. In the revised definition, any chemical or product, whether existing or new, that is used by any person as a replacement for a class I or II ozone-depleting substance would be considered a substitute, even if it has been recently listed as unacceptable under SNAP in some end-uses. As discussed above, EPA is also proposing to incorporate the term *substitute* within the term *refrigerant*.

By defining the term *substitute* in this way, and incorporating it into the definition of refrigerant, EPA intends to apply the requirements in subpart F to all substances that are functionally refrigerants, including but not limited to HFCs, PFCs, HFOs, hydrofluoroethers, and hydrocarbons. Multiple stakeholders at the November 2014 meeting encouraged EPA to treat all refrigerants in the same manner. With the exception of those substances specifically exempted from the venting prohibition, requiring all substances used as refrigerants to be handled in the same manner will reduce confusion and ultimately prevent emissions of both ODS refrigerants and non-ODS, high-GWP refrigerants. As discussed later in this notice, EPA will continue to exempt through regulation certain substitutes from the venting prohibition, and the other safe handling provisions in

subpart F, based on a determination that their release does not pose a threat to the environment. This is the case in the current regulations, for instance, with all approved uses of hydrocarbon refrigerants, ammonia, and CO_2.

Suitable Replacement Refrigerant

EPA is proposing to remove the defined term *suitable replacement refrigerant.* The existing leak repair regulations allow for additional time to retrofit or retire an appliance using an ODS refrigerant if a suitable replacement refrigerant with a lower ozone depletion potential is unavailable. This is the only place this term is used in subpart F. EPA is proposing to remove the extension due to the unavailability of a suitable replacement, as discussed in Section IV.F.13 of this notice. It is therefore appropriate to remove the term from the list of definitions.

System Receiver

EPA is proposing to create a defined term *system receiver* to provide clarity to the reader. This definition is currently found in a parenthetical in the regulatory text at § 82.156(a). This term is used when describing the required practices to properly evacuate refrigerant from an appliance and the definition does not introduce any new concepts to the evacuation requirements currently stated in the parenthetical. EPA is proposing to define system receiver to mean the isolated portion of the appliance, or a specific vessel within the appliance, that is used to hold the refrigerant charge during the servicing or repair of that appliance.

Technician

EPA is proposing to amend the definition of the term *technician* to improve clarity. The revised definition highlights that the determining factor for being a technician is the performance of actions that could reasonably be expected to violate the integrity of the refrigerant circuit. In general, only technicians should be performing actions that could violate the integrity of the refrigerant circuit and could therefore release refrigerant into the environment. The exception to that general statement, which the revised definition makes clear, is that persons maintaining, servicing, or repairing MVACs and persons disposing of small appliances, MVACs, or MVAC-like appliances do not need to be technicians. This proposed change does not affect the scope of the existing requirements but rather is intended to address feedback from stakeholders that the Agency should clarify which activities must be conducted by technicians and which need not be.

The current definition of technician also includes a non-exclusive list of example activities that are reasonably expected to violate the integrity of the refrigerant circuit as well as examples of activities that do not. EPA considered proposing to create a separate definition for that term but found it unnecessary to do so as it only appears within the definition of technician. EPA is proposing to make changes to these examples for clarity and to add the following two examples of activities reasonably expected to violate the integrity of the refrigerant circuit: Adding or removing components and cutting the refrigerant line. EPA is proposing to add these to the list of examples to improve the enforceability of these regulations.

Very High-Pressure Appliance

EPA is proposing to amend the definition of the term *very high-pressure appliance* to update the list of example refrigerants. The proposed changes to the terms *appliance* and *refrigerant* carry over into this term as well. Therefore, under the proposed revisions very high-pressure appliances would include those that use ODS and non-ODS refrigerants. EPA is proposing to update the list of example refrigerants with the most common types currently used in these systems, including ODS and non-ODS refrigerants. Specifically, these are R–13, R–23, R–503, R–508A, and R–508B.

Voluntary Certification Program

EPA is proposing to remove the defined term *voluntary certification program.* This term references a provision in the regulations that grandfathered in technicians who were certified prior to the establishment of the technician certification program in subpart F. EPA is proposing to remove these grandfathering provisions and therefore is proposing to remove the definition as well. The rationale for proposing to remove this grandfathering provision is discussed with the technician certification proposals below.

B. Proposed Changes to the Venting Prohibition in Section 82.154

1. Background

As explained in section III of this notice, § 82.154(a) currently prohibits the venting of ODS refrigerants and non-ODS substitutes to the environment. This regulatory provision also currently provides an exemption to the venting prohibition for certain substitutes in specific end-uses based on a determination that the listed substitutes in the listed end-uses do not pose a risk to the environment when released. This section also exempts from the venting prohibition *de minimis* releases of ODS refrigerants and non-exempt substitute refrigerants, and defines *de minimis* releases of ODS refrigerants to be those releases that occur when the other provisions of subpart F (or subpart B in the case of MVACs) are followed.

2. Applying the de Minimis Exemption to Substitute Refrigerants

The knowing venting, release, or disposal of substitutes for class I and class II refrigerants during maintenance, service, repair, or disposal of an appliance or IPR is expressly prohibited by section 608(c)(1) and (2) of the CAA, effective November 15, 1995, unless the Administrator determines that such venting, release, or disposal does not pose a threat to the environment. This prohibition is commonly called the venting prohibition. As explained in more detail above, section 608(c)(1) establishes the venting prohibition for class I and class II substances, and also establishes an exemption from the prohibition for *de minimis* releases associated with good faith attempts to recapture and recycle or safely dispose of ''any such substance.'' The statutory language of section 608(c)(2) extends paragraph 608(c)(1) to substitutes for class I and class II substances used as refrigerants in appliances and IPR. This extension includes the prohibition on venting and the exemption for *de minimis* releases associated with good faith attempts to recapture and recycle or safely dispose of such substances.

For class I and II substances EPA has interpreted those releases that occur despite compliance with EPA's required practices for recycling and recovery under § 82.156, including use of recovery and/or recycling equipment certified under § 82.158, and technician certification programs under § 82.161 as *de minimis.* Thus, compliance with these regulations represents ''good faith attempts to recapture and recycle or safely dispose'' of refrigerant. Accordingly, the regulations at § 82.154(a)(2) currently provide that releases of ODS refrigerants are considered *de minimis* only if they occur when the other provisions of subpart F (or subpart B in the case of MVACs) are followed. As noted above, although the regulations at § 82.154(a) exempt *de minimis* releases of non-exempt substitutes from the venting prohibition, the regulations do not provide any express guidance for such substitutes as to what practices are

considered ''good faith attempts to recapture and recycle or safely dispose'' of the substitute such that incidental releases would qualify for the *de minimis* exception.

EPA proposes to interpret the phrase ''good faith attempts to recapture and recycle or safely dispose'' similarly when it applies to substitute refrigerants under section 608(c)(2) as when it applies to ODS refrigerants under section 608(c)(1). Thus, compliance with the proposed provisions and revisions regarding evacuation of equipment, use of certified equipment, and technician certification in any instance where a person is opening (or otherwise violating the refrigerant circuit) or disposing of an appliance, as defined in § 82.152 would represent ''good faith attempts to recapture and recycle or safely dispose'' of substitute refrigerants. EPA considers these provisions to appropriately represent good faith attempts to recapture and recycle or safely dispose of substitute refrigerants for the reasons discussed in EPA's justification of each proposed provision below. Under this approach, emissions that take place during servicing or disposal when these provisions are not followed would not be *de minimis* emissions and would be subject to the venting prohibition. Conversely, this approach together with the proposal to include substitute refrigerants in the definition of the term refrigerant, would mean that substitute refrigerants would be included in the regulatory clarification that releases are only considered *de minimis* if they occur when these procedures or those under subpart B are followed.

It is impossible to open appliances (or otherwise violate the refrigerant circuit) or dispose of appliances without emitting some of the refrigerant in that circuit, even if an effort is made to recapture. Even after the appliance has been evacuated, some refrigerant remains, which is released to the environment when the appliance is opened or disposed of. Other activities that fall short of opening or disposing of the appliance but that involve violation of the refrigerant circuit also release refrigerant, albeit in very small quantities, because connectors (*e.g.,* between hoses or gauges and the appliance) never join together without intervening space. Even in the best case in which a good seal is made between a hose and an appliance before the valve between them is opened, some refrigerant will remain in the space between the valve and the outer seal after the valve is closed. This refrigerant will be released when the outer seal is broken. Thus, whenever a person opens an appliance (or otherwise violates the refrigerant circuit) in the course of maintaining, servicing, repairing, or disposing that appliance, he or she could violate the venting prohibition unless the exception for *de minimis* releases applies. Because EPA is proposing to define the exception for substitute refrigerants such that it only applies when the person complies with the existing refrigerant management provisions, compliance with the proposed provisions will ensure that any releases incidental to these practices will be considered *de minimis* and thus will not violate the venting prohibition under section 608(c)(2). EPA invites comments on applying these provisions of subpart F to substitute refrigerants.

3. Exempting Certain Substitutes From the Venting Prohibition

EPA is proposing to explicitly state in the regulatory text that the substitutes exempted from the venting prohibition in § 82.154(a)(1) are also exempt from the other provisions of subpart F. EPA has previously determined that these substances do not pose a threat to the environment when vented or otherwise released. Given that decision, it would generally not make sense to require procedures for recovery or safe disposal, or to apply other provisions of subpart F to those exempt refrigerants. This is consistent with the intent of section 608(c)(2), which states that the Administrator may determine that not just the venting but also the ''releasing, or disposing'' of such substance does not pose a threat to the environment. EPA does not view this as a substantive change but rather as a clarification of the existing regulations. This proposed revision will also help to ensure that the extension of substantive requirements to substitutes does not inadvertently lead to application of those requirements to exempt substitutes.

EPA is also proposing to reorganize the list of exempt substitutes by refrigerant type for readability. All of the specific end-uses for that substance would appear in one place. EPA is not proposing any changes to those end-uses or adding or removing any substitutes from the list.

4. Releases From Containers

EPA is moving the existing regulatory provision in § 82.154(a)(2) that states that the venting prohibition applies to the release of refrigerant (both ODS and non-exempt substitute refrigerants) after its recovery from an appliance. EPA is moving this provision to a separate subparagraph (§ 82.154(a)(3)) rather than its current location in the description of a *de minimis* release. Standing alone should make the provision clearer that it is a violation of the venting prohibition to vent or otherwise release refrigerant after that refrigerant is recovered from an appliance, whether from cylinders, recovery equipment, or any other storage container or device. EPA wishes to highlight that the venting prohibition cannot be obviated through using a recovery device and subsequently releasing the refrigerant. This is especially important because refrigerant recovered from appliances may be contaminated or be a mixture of multiple refrigerants. Such refrigerant may be difficult to reclaim or may require a fee for proper disposal or destruction. In light of those difficulties, it is important to emphasize that venting this refrigerant, even though it is in a cylinder and not an appliance, is illegal.

5. Removing Effective Dates

EPA is proposing to remove the effective dates in § 82.154(a) and elsewhere in subpart F wherever it makes sense to do so. These other locations are § 82.154(d)–(f) and (i)–(k), § 82.156(f), § 82.158(a) and (n), § 82.161(a), and § 82.164(a). Many of the effective dates are 1993 or 1994 when the program was established and it is now well understood that these provisions currently apply. Others refer to the specific standards for recovery and/or recycling equipment, which EPA addresses below. EPA does not want to remove an effective date where it is important for understanding the timing of the regulations. For example, EPA is proposing to remove the separate effective date references in § 82.154(a) but may decide to leave the June 9, 2015, effective date for the alternatives added under a recent SNAP rule (April 10, 2015; 80 FR 19454) as it is relatively new. EPA specifically encourages comments on whether removing effective dates in most instances is appropriate, both in § 82.154(a) and in other provisions of subpart F.

C. Proposed Changes to the Refrigerant and Appliance Sales Restrictions in Section 82.154

1. Background

Under the current regulations at § 82.154(m), the sale or distribution of a refrigerant containing a class I or class II substance, such as R–12, or refrigerant blends that include HCFCs, is restricted to technicians certified under sections 608 or 609 of the CAA. The sale or distribution of any class I or class II substance suitable for use in an MVAC that is in a container of less than 20 pounds may only be sold to technicians

certified under section 609. For example, any person who sells or distributes R–12 for use in an MVAC and that is in a container of less than 20 pounds must verify that the purchaser has obtained certification by an EPA-approved section 609 technician training and certification program.

The current regulations at § 82.154(g) also restrict the sale of used ODS refrigerant sold for reuse unless certain conditions are met, the most important of which is that the refrigerant has been reclaimed. Sections 82.154(j) and (k) prohibit the sale of appliances containing an ODS refrigerant unless the appliance has a servicing aperture or process stub to facilitate the removal of refrigerant at servicing and disposal. Section 82.154(p) also currently prohibits the manufacture or import of one-time expansion devices that contain any refrigerant (ODS or non-ODS), other than exempted refrigerants.

2. Extension to Substitute Refrigerants

EPA is proposing to extend the sales restriction to HFCs and other non-exempt substitute refrigerants. The sales restriction would apply to non-exempt substitute refrigerants sold in all sizes of containers for use in all types of appliances. However, as discussed below, EPA is proposing to create an exception for small cans (two pounds or less) of refrigerant intended to service MVACs, so long as the cans are equipped with a self-sealing valve. EPA is also proposing to extend the restriction on the sale of used refrigerant to include used non-exempt substitute refrigerants and require that appliances containing such substitute refrigerants contain a servicing aperture or process stub to allow for recovery of the refrigerant.

To extend the sales restriction, EPA is proposing to remove references to class I and class II substances where appropriate in these provisions and to replace them with the term *refrigerant,* which EPA is proposing to amend in § 82.152 to include substitutes. To avoid confusion, EPA is proposing to add a provision specifically noting that the sales restriction does not apply to substitutes that are exempt from the venting prohibition. EPA is also proposing to amend the purpose and scope statements at § 82.150, both of which describe the sales restriction as only affecting class I or class II ODS. EPA is proposing to add the term *substitutes* to these purpose and scope statements to clarify that the sales restriction, as well as the other provisions of the rule, would apply to ODS and substitute refrigerants.

EPA restricted the sale of ODS refrigerant to certified technicians as a means of ensuring that only qualified individuals—those who have sufficient knowledge of the safe handling regulations—actually handle refrigerant. EPA considers the restriction on the sale of ODS refrigerant to be important for ensuring compliance with and aiding enforcement of the regulations issued under section 608 and section 609 of the CAA. This requirement also fits in well with EPA's Next Generation Compliance strategy since compliance with this requirement is largely carried out by distributors who sell refrigerant to technicians. Limiting the sale of substitute refrigerants to technicians who have demonstrated knowledge of safe handling practices is important to minimizing the release of refrigerants during the maintenance, servicing and repair of appliances containing substitute refrigerants. A sales restriction for substitute refrigerants is also vital to extending the technician certification requirements to individuals working with substitute refrigerants. EPA more fully discusses later in the preamble how section 608(c) of the CAA provides authority for extending the technician certification program. As an element of that program, the same legal authority applies to the sales restriction.

EPA is not proposing to rely on section 608(b)(2) of the CAA which explicitly requires servicing apertures or other similar design features for appliances containing an ODS refrigerant. Instead, in order to comply with the section 608(c) prohibition against the venting, release, or disposal of substitute refrigerants into the environment, similar design features must also be present on appliances containing such substitutes. These access points allow for the proper evacuation or recovery of substitute refrigerant, preventing releases to the atmosphere. Without these access points, it would be harder for persons servicing or disposing of such appliances to properly evacuate the refrigerant in accordance with § 82.156(b). Additionally, since refrigerant in an appliance will eventually leak out in the disposal process, such as when an appliance is crushed or shredded, failing to remove refrigerant prior to disposal could lead to a knowing release of refrigerant. These equipment requirements would prevent subsequent knowing releases of refrigerant.

One-time expansion devices, by design, release their refrigerant charge to the environment in order to provide a cooling effect. Examples include self-chilled beverage containers that must be disposed of or recycled after each use, as well as reusable containers. The existing regulations limit the manufacture or import of one-time expansion devices to only those that contain exempted refrigerants. However, the definition of one-time expansion device refers to them as *appliances* containing a *refrigerant,* both of which under the existing regulations refer only to ODS refrigerants. This rule would clarify that ambiguity and clearly limit one-time expansion devices to those using exempt refrigerants.

In addition to fully implementing 608(c) by clarifying how regulated entities may avail themselves of the *de minimis* exemption to the venting prohibition, these proposed changes would apply the same requirements for sales of ODS and substitute refrigerants (except those that are exempt from the 608(c) prohibition on venting), as well as for appliances containing ODS and substitute refrigerants. This should reduce potential confusion for the person maintaining, servicing, repairing and disposing of appliances, resulting in fewer releases of ODS and substitute refrigerants. For this reason, identical treatment will help to reduce ODS emissions to the lowest achievable level and lead to more recovery and recycling or reclamation of ODS.

EPA also has authority under section 301(a) of the CAA to ''prescribe such regulations as are necessary to carry out [its] functions under this Act.'' As described above, section 301(a) provides additional authority for EPA to establish a sales restriction as a way to further implement the 608(a) and 608(c)(2) statutory requirements. EPA solicits comments on its authority for the proposed changes to these regulations.

3. Sales of Small Cans

EPA is generally proposing to extend the sales restriction to substitute refrigerants but is also proposing a limited exception for small cans of MVAC refrigerant (two pounds or less). Historically, individuals have been able to purchase small cans of non-ODS refrigerant to service their own vehicles. This do-it-yourself (DIY) servicing is unique among the air-conditioning and refrigeration sector to the MVAC end-use. If the sales restriction were simply extended to substitute refrigerants without change, the sale of both small containers of refrigerant, which are used exclusively for DIY servicing of MVAC systems, and large (*e.g.* 25- or 30-pound) cylinders of refrigerant used by technicians to service MVAC and other appliances would be limited to certified technicians. As discussed below, this could be unnecessarily burdensome. A

less burdensome option that EPA is proposing is to exempt small cans of MVAC refrigerant from the sales restriction and require that manufacturers install self-sealing valves that minimize the release of refrigerant during servicing.

In the United States, HFC–134a has been used in all newly manufactured vehicles with air-conditioning systems since 1994 and almost all small cans of refrigerant sold for MVAC DIY use contain HFC–134a.[8] Recently, the SNAP program listed HFO–1234yf, HFC–152a, and carbon dioxide (CO_2 or R–744), three climate-friendly alternatives for MVAC, as acceptable subject to use conditions for use in new light-duty vehicles. Manufacturers are currently producing or are actively developing light-duty models using these three refrigerants. The proposed exception for small cans would apply to HFC–134a, HFO–1234yf, HFC–152a, as well as any additional MVAC refrigerants listed as acceptable subject to use conditions under SNAP that are not exempt from the venting prohibition. Because CO_2 is exempt from the venting prohibition, it will not be subject to sales restrictions or, in turn, this exception. Currently, EPA has not received a submission of a unique fitting for use on a small can of HFO–1234yf; therefore, currently this refrigerant cannot be sold in small cans to individuals at this time.

Most small cans are purchased by individuals servicing their own personal vehicles. Based on the NPD Automotive Aftermarket Industry Monitor, 2008, approximately 14 million small cans are sold each year. If EPA were to extend the sales restriction to small cans, individuals who normally service their own MVAC would be required to either seek certification under section 609 or take their car to a technician to be serviced. EPA estimates that the cost associated with those two actions could be as much as $1.5 billion per year. For more details, see *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program* in the docket.

In lieu of a costly sales restriction on small cans used for MVAC servicing, EPA sought input on alternate mechanisms for reducing refrigerant releases from those cans. EPA reached out to the Auto Care Association and the Automotive Refrigeration Products Institute, two associations that represent the vast majority of manufacturers of small cans in the United States. The organizations referred EPA to California's program, and in particular suggested that EPA consider CARB's requirement that manufacturers install self-sealing valves on small cans. The organizations indicated that a nationwide requirement for self-sealing valves would be preferred to a sales restriction and would be a less costly way to reduce emissions. EPA then consulted with CARB to see if they had suggestions on ways to reduce refrigerant releases from small cans and to learn more about their experience with self-sealing valves. Based on California's experience, self-sealing valves are an effective way to reduce emissions of HFCs used to service MVACs without limiting sales to certified technicians. These valves reduce the release of refrigerant during servicing and may also reduce releases from the can after the servicing is complete.

According to industry representatives and CARB, self-sealing valves are estimated to cost $0.25 per can. Manufacturers are already producing small cans with self-sealing valves to meet California's requirements. EPA heard from the manufacturers of those cans that they would not find it to be unduly burdensome to extend that restriction to all cans produced for sale in the United States, especially as compared to an extension of the sales restriction that would prohibit the sale of small cans completely. Because they are incorporated into the product, consistent with EPA's Next Generation compliance principles, the individual servicing her or his personal MVAC would reduce emissions without any additional effort or training, as compared to using small cans of refrigerant on the market today that do not employ the self-sealing valve. Self-sealing valves would thus be an effective mechanism for controlling the release of refrigerant to the atmosphere.

EPA is proposing to create in appendix E a standard for self-sealing valves that is based largely on CARB's *Test Procedure for Leaks from Small Containers of Automotive Refrigerant,* TP–503, as amended January 5, 2010. To be consistent with the CARB standard and existing small cans that are already on the market, the leakage rate may not exceed 3.00 grams per year when the self-sealing valve is closed. This leakage rate applies to full containers as well as containers that have been used and are partially full.

As described in *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program,* EPA estimates that a nationwide requirement to use self-sealing valves on all small cans will reduce emissions by more than 657,000 $MTCO_2eq.$ per year. EPA also anticipates there could be additional emissions reductions to the extent the self-sealing valves allow individuals to store and re-use the same can of refrigerant, reducing the need to buy additional small cans. Currently, a small can is typically used in one vehicle and then discarded with some refrigerant still remaining in the can. EPA estimates that the cost for this requirement would be approximately $3 million. EPA anticipates that the cost for self-sealing valves will decrease over time as manufacturers increase production and achieve greater economies of scale.

EPA's authority for this requirement is primarily in sections 608(c) and 301(a) of the CAA. EPA has the authority to require that anyone purchasing small cans of refrigerant be a certified technician, one element of the subpart F provisions needed to ensure that releases during the servicing of appliances are considered *de minimis* and thus exempt from the venting prohibition. However, EPA is proposing to require self-sealing valves as a lower cost option for minimizing the release of refrigerant during the servicing of MVACs. The requirement for self-sealing valves helps implement the venting prohibition under section 608(c) because it helps ensure that refrigerant is not released while servicing MVACs. The Agency is proposing to revise the regulations to clarify that any person servicing their personal MVAC with a small can that has a self-sealing valve installed may rely upon the *de minimis* exemption to the venting prohibition. As described previously, section 301(a) of the CAA provides supplemental authority for the Agency to ''prescribe such regulations as are necessary to carry out [its] functions under this Act.'' In this case, section 301(a) provides additional authority for EPA to require self-sealing valves on all small cans of substitute refrigerant sold after a date in the future to implement the 608(c)(2) venting prohibition.

Small cans of refrigerant sold for MVAC servicing are different from containers of refrigerant sold for stationary refrigeration and air-conditioning in that the small cans for MVAC are required to have unique fittings. The SNAP program requires as a use condition for MVAC refrigerants that the container and the MVAC system use unique fittings to prevent cross-contamination. If used properly, the unique fittings will not allow for the introduction of HFC–134a refrigerant

[8] ODS refrigerant for MVAC servicing that is sold in cylinders less than 20 pounds is currently restricted to technicians certified under section 609 of the CAA.

into a system using HFO–1234yf or another substitute refrigerant. Using an adapter or deliberately modifying a fitting to use a different refrigerant is a violation of the SNAP use conditions. EPA also believes that the unique fittings could reduce the likelihood that a small can will be used to service appliances other than MVACs that use substitute refrigerants, in contravention of the proposed sales restriction.

Refrigerant sold for MVAC servicing is also different because of the types of equipment that could be serviced with a small can. First, the appliances that typically use HFC–134a (the most-common refrigerant that would be sold in small can for MVAC recharging) in a home would include appliances, like a refrigerator, that are hermetically sealed. Someone who wanted to open that appliance would need greater skill and specialized equipment to service the appliance since there wouldn't be a servicing port to access. This should dissuade homeowners from using a small can to service other small appliances. Larger appliances that use HFC–134a, like a reach-in cooler, would need more than one small can to fully charge the appliance. Because of the cost of and the added effort to use multiple small cans to charge a larger appliance, it's not practical for someone to use a small can. This would likely lead the person to purchase a larger container of refrigerant, which would require that the person be a certified technician.

EPA requests comments on its proposal to exempt small cans of refrigerant for MVACs with self-sealing valves from the sales restriction, including the following: (1) Whether EPA should finalize the above-described exception for small cans if a self-sealing valve is affixed; (2) whether the agency should finalize a rule that creates an exemption for HFC–134a only or all MVAC refrigerants not exempt from the venting prohibition; (3) whether the agency should create an alternate self-sealing valve standard or use the CARB standard; (4) whether other standards exist or if other organizations are developing their own standards; (5) whether EPA should require labeling of small cans stating the refrigerant cannot be intentionally vented [9]; (6) whether allowing the sale of small cans would allow individuals to circumvent the proposed sales restriction for stationary appliances; and (7) whether EPA should finalize an earlier compliance date than one year after publishing a final rule, such as six or nine months after publication of a final rule, if it is coupled with a sell-through provision for all small cans manufactured or imported prior to that effective date. A fuller discussion of effective and compliance dates can be found in section IV.M of this proposal.

D. Proposed Changes to the Evacuation Requirements in Section 82.156

1. Background

Under EPA's existing regulation at § 82.156(a), ODS refrigerant must be transferred to a system receiver or to a certified recovery and/or recycling machine before appliances are opened for maintenance, service, or repair. The same requirement applies to appliances that are to be disposed of, except for small appliances, MVACs, and MVAC-like appliances which have separate requirements currently under § 82.156(g) and (h). To ensure that the maximum amount of refrigerant is captured rather than released, EPA requires that air-conditioning and refrigeration appliances be evacuated to specified levels of vacuum.

2. Extension to Substitute Refrigerants

EPA is proposing to extend the requirements at § 82.156 for appliances containing ODS refrigerants to appliances containing non-exempt substitute refrigerants. Therefore, before appliances containing non-exempt substitute refrigerants are opened for maintenance, service, or repair, the refrigerant in either the entire appliance or the part to be serviced (when it can be isolated) must be transferred to a system receiver or to a certified recovery and/or recycling machine. The same requirements would apply to equipment that is to be disposed of, except for small appliances, MVACs, and MVAC-like appliances, which have separate requirements.

i. Evacuation Levels for Appliances Other Than Small Appliances, MVACs, and MVAC-Like Appliances

EPA is proposing revisions to § 82.156(a) such that appliances other than small appliances, MVACs, and MVAC-like appliances containing non-exempt substitute refrigerants be evacuated to the levels established for CFCs and HCFCs with similar saturation pressures. These levels are based on the saturation pressures of the refrigerant, which is a characteristic of the refrigerant independent of whether or not it is an ozone-depleting substance. As is the case for CFCs and HCFCs, the appropriate evacuation levels for HFCs and other substitutes would depend upon the size of the appliance and the date of manufacture of the recovery and/or recycling equipment. Technicians repairing MVACs and MVAC-like appliances containing a substitute refrigerant would not be subject to the evacuation requirements below as they are currently subject to the requirement to ''properly use'' (as defined at § 82.32(e)) recovery/recycling and recovery-only equipment approved pursuant to § 82.36(a).

ii. Evacuation Levels for Small Appliances.

EPA is proposing revisions to § 82.156(b) to establish the same evacuation requirements for servicing small appliances charged with non-exempt substitute refrigerants as it has for small appliances charged with ODS refrigerants. Technicians opening small appliances for service, maintenance, or repair would be required to use equipment certified either under appendix B, based on AHRI 740, or under appendix C, Method for Testing Recovery Devices for Use with Small Appliances, to recover the refrigerant.

Technicians using equipment certified under appendix B would have to pull a four-inch vacuum on the small appliance being evacuated. Technicians using equipment certified under appendix C would have to capture 90 percent of the refrigerant in the appliance if the compressor is operational, and 80 percent of the refrigerant if the compressor is not operational. Because the percentage of refrigerant mass recovered is very difficult to measure on any given job, technicians would have to adhere to the servicing procedure certified for that recovery system under appendix C to ensure that they achieve the required recovery efficiencies.

EPA also is proposing revisions to § 82.156(b) to establish the same evacuation requirements for disposing of small appliances that are charged with non-exempt substitute refrigerants as it has for small appliances charged with ODS refrigerants. Providing a consistent standard for ODS and non-exempt substitute refrigerants will facilitate the recovery of both ODS and non-ODS refrigerants. MVACs and MVAC-like appliances would have to be evacuated to 102 mm (approximately equivalent to four inches) of mercury vacuum, and small appliances would have to have 80 or 90 percent of the refrigerant in them recovered (depending on whether or not the compressor was operational) or be evacuated to four inches of mercury vacuum. EPA notes that the original wording in the regulation was whether

[9] See the CARB document titled, ''*Certification Procedures for Small Containers of Automotive Refrigerant''* for additional information on labeling.

or not the compressor was ''operating'' rather than ''operational.'' This change to ''operational'' matches the preamble to the 1993 Rule (58 FR 28668) which initially describes the standard. This change also reflects the intent of the standard, which is to allow for a lower recovery rate when the small appliance does not work.

EPA is also proposing to make the evacuation requirements for small appliances the same whether it is being opened for servicing or it is being disposed of. This new provision would apply to both ODS and substitute refrigerants. Currently, when using recovery equipment manufactured before November 15, 1993, a technician servicing a small appliance containing an ODS need only recover 80% of the refrigerant. The existing disposal requirements do not provide a category for the use of pre-1993 recovery equipment. EPA is proposing to allow that 80% level of evacuation for disposal to simplify and unify the requirements. This change will have minimal effect as few people continue to use recovery equipment manufactured prior to that date.

EPA has authority under section 608(c) and 608(a) to require that appliances containing a substitute refrigerant be properly evacuated. The Agency has the authority to specify what practices constitute a good faith attempt to recapture substitute refrigerants in order to extend the *de minimis* exemption from the venting prohibition to substitute refrigerants. Such practices can include a requirement that an appliance be properly evacuated prior to servicing or disposal. Additionally, providing a consistent standard for ODS and substitute refrigerants will facilitate the recovery of both ODS and non-ODS refrigerants. Increased recovery of ODS refrigerant will reduce the emission of such refrigerants. The full discussion of the authority for this action is found in section III of this notice.

3. Records for Disposal of Appliances With a Charge Between Five and 50 Pounds

EPA is proposing to add new recordkeeping requirements at § 82.156(a)(3) for the disposal of appliances normally containing more than five and less than 50 pounds of either ODS or substitute refrigerant. Most of these appliances are disassembled in the field before the components are recycled or disposed of. Under the proposed revisions, records would document the company name, location of the equipment, date of recovery, and the amount and type of refrigerant removed from each appliance prior to disposal. In addition, EPA is proposing to require that records be kept to document the quantity and type of refrigerant that was shipped or sold for reclamation or destruction (*e.g.,* to a certified reclaimer or refrigerant distributor or wholesaler). This requirement would apply to all technicians recovering refrigerant from appliances, not just those with a full charge between five and 50 pounds. The technician, or the company employing the technician, would be required to maintain these records for three years.

Under the current regulations, whenever ODS refrigerant is added or removed from an appliance with 50 pounds or greater of full charge, the technician must generate a service record documenting the addition or recovery. EPA also requires records documenting that ODS refrigerant was properly recovered from small appliances (hermetically sealed appliances with 5 pounds or less of full charge), MVACs, and MVAC-like appliances. EPA discusses elsewhere in this notice its proposal to extend those requirements to appliances containing non-exempt substitute refrigerants. There are currently no recordkeeping requirements for the addition or recovery of refrigerant in appliances normally containing more than five and less than 50 pounds of refrigerant. Because of this gap in regulatory coverage and for the reasons described below, EPA is proposing to require recordkeeping by any person recovering refrigerant from an appliance normally containing more than five and less than 50 pounds of ODS or non-exempt substitute refrigerant.

EPA has heard from stakeholders that venting regularly happens in appliances of this size. At a recent meeting EPA attended with air-conditioning and refrigeration contractors, the attendees were asked what percentage of technicians recover refrigerant. The estimates were generally between 10 to 30 percent, with the caveat that recovery is much more common in the refrigeration industry than the air-conditioning industry. EPA also receives numerous tips each year of someone cutting refrigerant lines to quickly and illegally dispose of appliances of this size. While none of this feedback is conclusive, it is likely that venting occurs in violation of the CAA with some frequency.

The potential emissions from appliances containing more than five and less than 50 pounds are significant. Using EPA's Vintaging Model,[10] EPA estimated the number of appliances in this size category that are disposed of annually and the full charge of those appliances. EPA estimates there are 6.6 million appliances with a full charge of 27,300 MT of refrigerant (49.5 $MMTCO_2eq$ GWP-weighted MT, 960 ODP-weighted MT) disposed of annually. This represents 45 percent of the total amount of HCFC and HFC refrigerants charged into all appliances being disposed annually. Thus, under the current regulations, there is a significant amount of refrigerant, especially from a climate perspective, that could be vented without any record being generated to document recovery or facilitate enforcement. EPA's benefits assessment does not calculate any additional emissions reductions from this proposal because the existing regulations already require recovery when appliances are disposed. However, in practical terms, requiring a record from each disposal event should drive more technicians to comply with the existing requirement. This change also improves rule effectiveness by creating uniform expectations so the technician knows that a record is required when disposing of any appliance, not just appliances with 50 or more pounds of refrigerant or small appliances, MVAC, and MVAC-like appliances.

EPA has also heard from stakeholders, including in public fora such as the public meeting in November 2014, that EPA should increase enforcement of the venting prohibition. They indicated that technicians will knowingly and illegally vent refrigerant if they think EPA will not bring an enforcement action. While cases have been brought against individuals who have illegally vented refrigerant, having a recovery record would improve the success of future cases. After discussions with stakeholders, establishing a recordkeeping requirement for the category of appliances that are most frequently vented by technicians would be the most practical and least burdensome way to improve the Agency's ability to enforce the venting

[10] EPA's Vintaging Model estimates the annual chemical emissions from industry sectors that have historically used ODS, including air-conditioning and refrigeration. The model uses information on the market size and growth for each of the end-uses, as well as a history and projections of the market transition from ODS to alternatives. The model tracks emissions of annual ''vintages'' of new equipment that enter into operation by incorporating information on estimates of the quantity of equipment or products sold, serviced, and retired or converted each year, and the quantity of the compound required to manufacture, charge, and/or maintain the equipment.

prohibition. Technicians who do not recover refrigerant and do not have records to show that they recover refrigerant would be open to enforcement action under the proposed changes.

EPA understands that some, but nowhere near all, appliances are disposed of because they have broken down and lost their full refrigerant charge. In such cases, to comply with the requirement technicians would only need to note that they attempted to recover refrigerant but none was present.

EPA has authority to establish this requirement under sections 608(a), 608(c), 114, and 301(a) consistent with the description of these authorities offered above. Section 608(a) gives EPA explicit authority to implement requirements that reduce ODS refrigerant emissions to the lowest achievable level. This proposed recordkeeping requirement would further the recovery of ODS refrigerants and discourage the illegal venting of such refrigerants from appliances containing more than five and less than 50 pounds of refrigerant. Because it would minimize the emission of ODS refrigerant, EPA has authority for this proposal as it relates to ODS appliances under 608(a).

EPA also has authority under sections 114, 608(c), and 608(a) to require that technicians document that appliances containing a substitute refrigerant have been properly evacuated. Section 114 of the CAA provides the primary authority to establish these recordkeeping and reporting requirements. In addition, the Agency has the authority to specify what practices constitute a good faith attempt to recapture substitute refrigerants in order to extend the *de minimis* exemption from the venting prohibition to substitute refrigerants. Such practices can include documentation and recordkeeping. Additionally, providing a consistent standard for ODS and substitute refrigerants will facilitate the recovery of both ODS and non-ODS refrigerants. Increased recovery of ODS refrigerant will reduce the emission of such refrigerants. The full discussion of the authority for this action is found in section III of this notice.

EPA seeks comments on this proposed recordkeeping requirement. Specifically, EPA seeks comments on whether keeping track of refrigerant recovered from appliances and sent off-site for reclamation, refrigerant banking, or destruction is a common practice for these appliances. EPA also seeks comments on whether this requirement would close the recordkeeping gap or if EPA should remove the lower limit of below 5 pounds. EPA expects that some appliances (*e.g.* some mini split AC and small remote condensing refrigeration systems) may not be covered by this recordkeeping requirement because they have charges less than 5 pounds. Therefore, EPA also specifically invites comments on whether this requirement should apply to all appliances that are disassembled in the field, regardless of the charge size. Likewise, EPA requests comments on whether the proposed records for five to 50 pound systems should be kept for appliances containing more than 50 pounds given the proposed recordkeeping requirements for appliances with 50 or more pounds (*see* discussion in section IV.F).

4. Clarifications and Edits for Readability

EPA is proposing to move the provisions of § 82.156 ''Required Practices'' into three separate sections: § 82.155 would address the safe disposal of small appliances, MVACs, and MVAC-like appliances; § 82.157 would address appliance maintenance and leak repair for appliances containing 50 or more pounds of refrigerant; and § 82.156 would address the proper evacuation of refrigerant from appliances. These provisions tend to affect different stakeholders so dividing them into separate sections will make the required provisions easier to find.

Within § 82.156, EPA is proposing to separate the evacuation requirements into the following categories: (a) Appliances other than small appliances, MVACs, and MVAC-like appliances; (b) small appliances, and (c) MVACs and MVAC-like appliances. With the exception of the evacuation of small appliances for disposal using recovery equipment manufactured before November 15, 1993, this proposed reorganization would not change the current evacuation requirements for the different types of appliances under § 82.156.

Within § 82.156(a) and (b), EPA is proposing to reorganize the requirements to state the general requirement first followed by specific circumstances that allow for different evacuation levels. EPA is not proposing to change the required levels of evacuation in table 1. Nor is EPA proposing to change the circumstances that would allow for alternate evacuation levels or to change those alternate levels.

E. Proposed Changes to the Safe Disposal Provisions in Section 82.156(f)

1. Background

In the 1993 Rule, EPA established specific requirements for the safe disposal of small appliances, MVACs, and MVAC-like appliances containing ODS refrigerant that enter the waste stream with the refrigerant charge intact. Under the existing rules at § 82.156(f), persons who take the final step in the disposal process of such appliances must either recover any remaining refrigerant in the appliance or verify that the refrigerant has previously been recovered from the appliance or shipment of appliances. If they verify that the refrigerant has been recovered previously, they must retain a signed statement attesting to this or a contract from the supplier of the appliances for three years. Recovery equipment used to remove the refrigerant must meet certain standards but does not need to be certified by a third party. Persons recovering the refrigerant need not be certified technicians.

2. Clarifications to the Existing Program

EPA is using this opportunity to clarify certain requirements of the existing safe disposal program. The safe disposal regulations require actions of three separate groups of people: the final processor, the supplier of appliances for disposal, and the person who recovers the refrigerant. The final processor is the person who takes the final step in the disposal process, typically a scrap recycler or landfill operator, where the appliance is in such a condition that the refrigerant cannot reasonably be expected to be recovered. The supplier is the person dropping off the appliance (or shipment of appliances) for disposal. The person who recovers the refrigerant may be the final processor, the supplier, or a separate third entity. As discussed below, to make the safe disposal requirements easier to find in the regulations, EPA is proposing to move these requirements to a new section § 82.155.

EPA is clarifying here that under the existing requirements refrigerant may be recovered at any stage in the disposal process, even prior to the supplier taking possession. As EPA stated in the 1993 Rule establishing the safe disposal program, ''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.'' (58 FR 28704–28705). EPA's intent has been to provide the flexibility needed to permit the recovery of refrigerant by the entity in the disposal chain that can accomplish that task most efficiently while at the same time establishing a mechanism to help ensure that the refrigerant has not simply been illegally vented. This signed certification serves both goals.

EPA also wishes to address potential confusion related to whether the rules apply to equipment that is crushed or has had components removed. As EPA stated in the 1993 Rule, ''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.'' (58 FR 28704). A scrap facility is still the final disposer in this situation. Therefore, a scrap facility would have to receive the proper certification from their supplier of the disposed appliances in order to accept the appliances.

3. Extension to Substitute Refrigerants

EPA is proposing to extend the safe disposal provisions that currently exist at § 82.156(f) for small appliances, MVACs, and MVAC-like appliances containing ODS refrigerants to the same types of appliances that contain non-exempt substitute refrigerants. Consistent with the general discussion in Section III above concerning the authority to extend provisions of subpart F to substitute refrigerants, extending these requirements is important to implementing the 608(c)(2) venting prohibition for substitute refrigerants because it would define practices that would qualify as ''good faith attempts to recapture and recycle or safely dispose'' of the substitute refrigerant when disposing of small appliances, MVACs, and MVAC-like appliances and thus qualify for the *de minimis* exemption to the venting prohibition.

The rationale for establishing the safe disposal requirements for small appliances, MVACs, and MVAC-like appliances that contain ODS also applies to these appliances when they contain substitute refrigerants. These requirements are designed to ensure that refrigerant is recovered before the appliance is finally disposed of while granting as much flexibility as possible to the disposal facility regarding the manner of its recovery (58 FR 28702). Specifying how the substitute refrigerant be recovered will reduce the release of that refrigerant to the environment.

Such flexibility is important for the disposal sector, which is highly diverse and decentralized. Because the disposal infrastructure for appliances charged with substitute refrigerants is identical to that for appliances charged with an ODS, these considerations apply equally to appliances containing substitutes. In addition, applying a consistent set of disposal requirements to appliances containing ODS or substitute refrigerants will reduce confusion and minimize emissions of ODS and non-ODS refrigerant during the disposal process. Service technicians will not have to question whether the refrigerant in that appliance must be recovered or not. With the exception of specially labelled appliances using hydrocarbon refrigerants, the technician must recover refrigerant from all small appliances. Thus, the requirements for the safe disposal of appliances charged with substitute refrigerants should be the same as those for the safe disposal of appliances charged with CFCs and HCFCs.

Safe disposal of refrigerant from small appliances, MVAC, and MVAC-like appliances continues to be important for the environment and public health. According to EPA's Vintaging Model, the amount of refrigerant projected to be contained within MVAC and small appliances in 2015 will be more than 260 $MMTCO_2eq$ and 175 $MMTCO_2eq$, respectively. This constitutes 12.5 and 8.4 percent, respectively, of the total GWP-weighted amount of refrigerant contained within all appliances in the United States. On an ODP basis, EPA anticipates more than 1,400 ODP-weighted metric tons of refrigerant will be contained within small appliances in 2015, representing 5.0 percent of the refrigerant contained within all appliances in the United States. While these amounts decrease over time as zero-ODP and low-GWP substitute refrigerants are used in these appliances, the need for robust safe disposal requirements remains.

EPA requests comments on these proposed revisions.

4. Restructuring and Edits for Readability

First, EPA is proposing to create a single section, § 82.155, for all safe disposal provisions, including the recordkeeping and reporting requirements. Second, EPA is proposing to clarify what should be in the contract stating that refrigerant will be removed prior to delivery. EPA is proposing to replace the word ''remove'' which appears repeatedly in these provisions. What EPA means by ''remove'' in this context is that the refrigerant is recovered to the required evacuation levels using the appropriate equipment. EPA is also stating explicitly that which is implied in the current regulations. Specifically, as a result of the contract, the supplier of the appliances is responsible for recovering any remaining refrigerant or verifying that the refrigerant has already been evacuated.

EPA is also clarifying the format that the records required under this section may take. In general, where the regulations in subpart F require an individual to maintain records, the Agency intends for them to do so either in an electronic or paper format, preferably in an electronic system. Based on pre-proposal input from stakeholders, EPA is clarifying this point explicitly in the proposed revisions to the recordkeeping provision at § 82.155(c). EPA requests comments on these proposed changes and clarifications to the safe disposal requirements.

F. Proposed Changes to Leak Repair Requirements in Section 82.156(i)

1. Background

An important component of EPA's program to properly manage ODS refrigerants is the requirement to repair leaking appliances within 30 days if a certain leak rate is exceeded. Owners and operators of appliances normally containing 50 or more pounds of ODS refrigerant must repair their appliances if they leak above a certain rate. The current leak rate is 35 percent for commercial refrigeration appliances and IPR and 15 percent for comfort cooling and other appliances. If the attempt to repair fails to bring the appliance's leak rate below the applicable leak rate within that time frame, the owner or operator must develop a retrofit or retirement plan and implement it within one year of the plan's date. Owners or operators also have the option of developing a retrofit or retirement plan within thirty days of identifying that the leak rate has been exceeded. Owners or operators of IPR or Federally-owned appliances may have more than 30 days to complete repairs and more than one year to retrofit appliances where certain conditions apply (*e.g.,* equipment located in areas subject to radiological contamination, unavailability of necessary parts, and adherence to local or state laws that may hinder immediate repairs). The full suite of the existing requirements are found at § 82.156(i).

While the existing requirements are generally well-known by the industry, the program can be improved and EPA is therefore proposing amendments to do so in this notice. First, EPA is proposing to strengthen the requirements by lowering applicable leak rates, requiring periodic leak inspections, and setting a two-year leak limit, among other changes. Second, EPA is proposing to apply the leak repair requirements (as they would be amended) to non-exempt substitute refrigerants. Finally, EPA is proposing to modify the language, structure, and location of the requirements to make them more effective, easier to understand, and easier to find. This entails moving the requirements from § 82.156(i) to their own section at § 82.157.

EPA recognizes that refrigeration and air-conditioning equipment do leak. This is particularly true for larger appliances. However, these leaks can be reduced significantly. Experience with the GreenChill program, an EPA partnership designed to encourage supermarkets to reduce emissions of refrigerants and transition to low-GWP and low-charge refrigeration appliances, feedback from stakeholders in pre-notice meetings, and reports from California facilities regulated under the state's Refrigerant Management Program, among other factors discussed in this notice, support this conclusion. Through this proposal, EPA's aim is to reduce refrigerant releases by breaking the cycle of continuous repair and recharge of appliances and by requiring proactive monitoring to identify leaks early so that they can be addressed promptly to avoid ongoing releases.

EPA has previously proposed changes to strengthen the leak repair requirements that have never been finalized. In 1998, EPA proposed extending the leak repair requirements to substitute refrigerants and lowering the leak rates. Most recently, in the proposed 2010 Leak Repair Rule (75 FR 78558, December 15, 2010), EPA proposed changes to the purpose and scope, definitions, required practices, and reporting and recordkeeping sections for the leak repair program. EPA's intent in the 2010 proposal was to create a streamlined set of leak repair requirements that would apply to all types of appliances with large ozone-depleting refrigerant charges. EPA proposed the following notable amendments in that rule:

- Clarify that leak rate calculations are required upon addition of refrigerant;
- Lower applicable leak rates for currently regulated appliances;
- Require initial and follow-up verification tests for all repair attempts once the applicable leak rate is exceeded for comfort cooling and commercial appliances, and not just IPR (as is currently required), and written documentation of the results of those tests;
- Require a 24-hour waiting period after repairs before a follow-up verification can be conducted;
- Require the retrofit or retirement of the entire appliance if it experiences three component replacements or three failed verification tests during a consecutive six-month period (referred to as ''the worst leaker provision'');
- Exempt addition of refrigerant due to ''seasonal variances'' from the existing leak repair requirements;
- Allow all appliance owners/operators additional time to complete repairs due to unavailability of components, and not just IPR (as currently required);
- Require service technicians to maintain records on the fate of refrigerant that is recovered from but not returned to appliances during service; and
- Decrease the amount of time allowed for the completion of retrofit/retirement plans.

While the Agency never finalized the proposed 2010 Leak Repair Rule, EPA has factored feedback on that proposal, as well as the 1998 Proposed Substitutes Recycling Rule, into today's proposed rule. Based on comments generated by those proposed rules, EPA is not re-proposing the requirements to conduct follow-up verification tests at least 24 hours after a required repair or establishing the ''worst leaker provision.'' However, many of the proposed changes still can improve the leak repair program and decrease the release of refrigerants during the maintenance, service, repair, or disposal of appliances normally containing 50 or more pounds of refrigerant. Below EPA discusses the specific changes proposed in this action, some of which are novel to this rulemaking and some of which are adapted from the proposed 2010 Leak Repair Rule.

2. Extension to Substitute Refrigerants

EPA is proposing to extend the leak repair provisions currently in § 82.156(i) to appliances containing non-exempt substitute refrigerants. In addition, EPA is proposing that the other provisions related to leak repair and maintenance discussed in this section (*e.g.* leak inspections and leak limits) apply to appliances containing non-exempt substitute refrigerants as well. The mechanism by which EPA is extending the leak repair requirements to appliances containing substitute refrigerants is through the amended definition of the terms *refrigerant* and *appliance,* as described above. However, as discussed below in Section IV.M, while EPA is proposing that the amended definitions become effective on January 1, 2017, EPA is proposing a delayed compliance date (18 months from publication of the final rule) for the revisions to the leak repair requirements. Consistent with discussions elsewhere in this preamble, EPA is not proposing to extend these requirements to appliances using substances that have been exempted from the venting prohibition in specific end-uses, such as ammonia, that are listed in the regulations at § 82.154(a)(1).

Extending the leak repair requirements to non-exempt substitute refrigerants as proposed in this notice would lead to environmental benefits because these substances pose a threat to the environment when released and they may not be adequately controlled by other mechanisms. In the 2004 Rule, EPA determined that the release of HFCs and PFCs during the maintenance, servicing, repair, or disposal of appliances poses a threat to the environment. In making that determination, EPA examined the potential effects of the refrigerant from the moment of release to its breakdown in the environment, considering possible impacts on workers, building occupants, and the environment. Once released into the atmosphere, HFCs and PFCs have the ability to trap heat that would otherwise be radiated from the Earth back to space. This ability gives both HFCs and PFCs relatively high GWPs. The 100-year GWPs of HFCs under consideration as refrigerants range from 124 (for HFC–152a) to 14,800 (for HFC–23), and the GWPs of PFCs under consideration as refrigerants range from 7,390 (for PFC–14) and higher. HFC–134a, the most common individual HFC used in air-conditioning and refrigeration equipment, has a GWP of 1,430. See section II.C.2 of this preamble for further discussion related to the environmental impacts of greenhouse gases.

In determining whether to exempt HFC and PFC refrigerants from the venting prohibition in 2004, EPA concluded that these refrigerants have adverse environmental effects. For that reason, and because of a lack of regulation governing the release of such refrigerants, EPA did not exempt the release of HFC or PFC refrigerants from the statutory venting prohibition. Thus, the knowing venting or otherwise

releasing into the environment of HFC and PFC refrigerants during the maintenance, service, repair, or disposal of appliances generally remains illegal.

EPA generally assumes compliance with the regulatory venting prohibition. Nonetheless, that prohibition addresses only knowing venting or release and thus does not account for all HFC refrigerant emissions. For instance, in previous rules we have not assumed that emissions of HFCs that occur due to appliance leaks constitute knowing releases. The requirements for leak inspections, leak calculations, and recordkeeping that EPA is proposing in this action would provide more knowledge to appliance owners and operators, as well as technicians, and thereby broaden the set of refrigerant releases for which they would be liable for a knowing release. In addition, as discussed below, EPA is proposing to revise its interpretation of what constitutes a knowing release under section 608(c) for purposes of appliance leaks.

EPA regulations at § 82.154(a)(2) currently state that ODS refrigerant releases shall be considered *de minimis* only if they occur when the required practices set forth in specified regulatory provisions, such as § 82.156 are observed. One of the required practices within that section is the requirement for owners or operators to repair leaks pursuant to paragraphs § 82.156(i)(1), (i)(2) and (i)(5) within 30 days after discovery. EPA has therefore intended that proper leak repair be a component of the required practices necessary to meet the *de minimis* exemption to the venting prohibition for ODS refrigerants. Consistent with the discussion above relating to the implementation of the statutory and regulatory *de minimis* provisions for substitute refrigerants, EPA is proposing to extend the leak repair provisions to non-exempt substitute refrigerants to clarify how the *de minimis* exemption in § 82.154(a)(2) applies to such substitute refrigerants and to provide regulatory certainty of what practices for leak repair would qualify for this exemption.

The Agency has the authority under section 608(c) to define the contours of the *de minimis* exemption by establishing regulations related to the maintenance, service, and repair of appliances that are leaking ODS or non-exempt substitute refrigerants. The prohibition in section 608(c) applies to the knowing venting, release, or disposal of refrigerants during the course of maintenance, service, repair, or disposal of an appliance ''in a manner which permits such substance to enter the environment.'' As explained above, this prohibition applies both to ODS refrigerants under section 608(c)(1) and to non-exempt substitutes under 608(c)(2).

EPA stated in 1993 when establishing the original leak repair provisions that:

> [T]he 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. (58 FR 28672)

EPA has subsequently moved toward a broader interpretation of the venting prohibition. In the proposed 2010 Leak Repair Rule, EPA stated that ''it is not necessarily a violation [of the venting prohibition] for an appliance owner or operator to discover a leak greater than the leak repair trigger rate; however it would be a violation of the proposed required practices at § 82.152 to allow that appliance to continue to leak above the trigger rate without making and verifying the efficacy of repairs in a timely manner'' (75 FR 78570).

EPA now views its statements in the 1993 Rule as presenting an overly narrow interpretation of the statutory venting prohibition. Consistent with the direction taken in the 2010 proposed leak repair rule, EPA is proposing a broader and more pragmatic interpretation of the venting prohibition under CAA section 608(c)(1) and (2) in this action. As a practical matter, when a technician must add refrigerant to an existing appliance, the technician necessarily knows that the system has leaks that will continue to release refrigerant to the environment if not properly repaired. That technician also knows that if he or she does not repair the leak, and verify that the repair has held, some or all of the newly added refrigerant will be released to the environment.

Therefore, EPA is proposing to interpret section 608(c) such that when a person adds refrigerant to an appliance that he or she knows is leaking, without repairing the leaks consistent with the applicable leak repair requirements, he or she also violates the venting prohibition, both because he or she knows that the appliance is releasing refrigerant to the environment as the appliance is being serviced and because he or she knows that some or all of the refrigerant newly added to the appliance will be released in a manner that will permit the refrigerant to enter the environment. With today's proposed revisions, the person performing this work will also have a set of provisions that can be followed to repair the leaks and to avoid violating the venting prohibition in this situation. This analysis applies for both ODS refrigerants and substitute refrigerants.

When initially establishing the leak repair provisions in subpart F, EPA relied on the authority in section 608(a)(3)(A) which states that ''the regulations under this subsection shall include requirements that reduce the use and emission of such [class I and class II] substances to the lowest achievable level.'' EPA used section 608(a) in part because the statute required EPA to establish regulations to reduce emissions of ODS refrigerants, whereas section 608(c) is a self-effectuating prohibition that applied to both ODS refrigerants and substitutes.[11] EPA, however, has also used rulemakings to clarify the requirements of section 608(c) for ODS. It is appropriate to do so now with regard to the knowing release of non-exempt substitute refrigerants from leaking appliances containing 50 or more pounds of such refrigerant and the application of the *de minimis* exception when leak repair requirements are followed for such appliances. As discussed below, EPA understands that few appliances are leak-free. However, the leak rate can be minimized by following the regulatory leak repair requirements. Under the revisions proposed in this rule, when those steps are followed, any release would fall within the *de minimis* exception, and the owner, operator and technician will not be violating the venting prohibition.

Consideration of Costs

Based on the evidence discussed below, the reported performance of today's comfort cooling, commercial refrigeration, and IPR appliances with full charges of 50 or more pounds argues for lowering the applicable leak rates. The evidence discussed below demonstrates that the current applicable leak rate is considerably above the

[11] Section 608(a) of the CAA continues to support the revisions to the leak repair requirements as those revisions relate to reducing emissions of ODS refrigerants. As such, and consistent with the description in Section III above, section 608(a) is one of the authorities EPA is relying on for proposed revisions in this rule that update requirements for ODS refrigerants, including proposed revisions to the leak repair provisions.

''lowest achievable level of emissions'' envisioned in CAA section 608(a)(3)(A).

While section 608(a)(3) does not require EPA to perform a cost-benefit analysis to determine what leak rate(s) would constitute the ''lowest achievable level of emissions,'' the analyses EPA performed of costs and benefits support establishing lower leak rates. The leak rates reported above, which generally fall well below the current regulatory maximum, are clearly being achieved in response to private incentives alone. If maintaining these leak rates is privately cost-effective, it is reasonable to assume they are also publicly cost-effective, because the public cost of emissions, which includes both the private value of the refrigerant and the environmental damage it causes, would exceed the private cost of emissions, which includes only the private value of the refrigerant.

In general, EPA balanced the need to reduce emissions of refrigerants with the costs of these requirements. EPA has determined that the costs are reasonable given the significant benefits that accrue (both private in the form of cost savings and public in the form of reduced GHG and ODS emissions). Specifically, EPA reviewed data from the lowest-emitting equipment to gauge technological feasibility and then reviewed other data sets, such as CARB data and consent decree requirements, to determine a reasonable set of requirements. EPA then assessed the costs and benefits associated with extending the existing requirements to appliances using substitute refrigerants and tighter requirements such as lower leak rates, the requirement to repair all identified leaks once the applicable leak rate is exceeded, the requirement to conduct verification tests on all types of appliances, and periodic leak inspections.

With regard to the quarterly leak inspections, EPA looked at charge size to determine the number of affected appliances. Using that estimate and the cost of more frequent leak inspections, EPA assessed the economy-wide costs of requiring quarterly leak inspections for appliances with a full charge of 200 or more pounds and 500 or more pounds. Based on that assessment of the costs and benefits of such a requirement, EPA is proposing a higher charge size threshold (500 pounds in commercial refrigerant and IPR appliances) for quarterly versus annual inspections. In addition, EPA is proposing to allow owners and operators of appliances to install automatic leak detection systems in lieu of conducting quarterly leak inspections as well as the opportunity for quarterly inspections to move to an annual schedule if the appliance is not leaking.

In addition, as EPA discusses below, EPA is proposing to provide flexibility to help minimize compliance costs of the existing regulations. For comfort cooling and commercial refrigeration appliances, EPA is proposing to allow an extension to the 30-day repair requirement if the arrival of a part is delayed, recognizing that the short additional time needed for delivery of a part can result in a nearer-term and less costly emission reduction than a retrofit. This is a change from the current requirements for ODS appliances, and would result in a significant reduction in compliance costs. EPA is also proposing to allow an extension to implement a retrofit or retirement for comfort cooling and commercial refrigeration appliances that transition to a non-exempt substitute refrigerant.

3. Restructuring and Edits for Readability

The current regulatory text has been modified several times since EPA first established the program in 1993. Some of those changes were a result of a settlement agreement between EPA and the Chemical Manufacturers Association (see 60 FR 40420). The regulation now contains numerous cross-references to other provisions in § 82.156(i), making the requirements difficult to follow and in some places potentially leading to differing interpretations. Many important provisions are buried, such as the primary requirement that repairs must occur within 30 days, which appears only at the end of the leak repair requirements at § 82.156(i)(9). Due to these concerns, EPA is proposing revisions that attempt to restructure the regulation to make it easier for stakeholders to understand whether they are subject to the requirements and what those are.

EPA is proposing to move the required practices currently in § 82.156(i) and the recordkeeping and reporting requirements in § 82.166(j), (k), (m), (n), (o), (p), and (q) to a newly-created section at § 82.157 titled ''Appliance maintenance and leak repair.'' EPA is proposing this title to more accurately reflect the goal of preventing releases of ODS and non-exempt substitute refrigerants during the maintenance of these appliances. Within that new section, EPA is proposing to restructure the requirements in a more linear and logical format.

EPA recognizes that proposing to change the text so significantly may make stakeholders who are familiar with the requirements wonder how these revisions might affect their current compliance monitoring systems and protocols. EPA does not intend to change the substance of the requirements while restructuring except where specified. EPA discusses proposed changes to the requirements in the following preamble sections that would result from this restructuring. EPA is also developing a series of comprehensive compliance assistance documents, in addition to other online support materials.

To avoid both ambiguity and cumbersome language throughout, EPA is proposing to establish from the outset in § 82.157(a) that the provisions of § 82.157 apply to owners and operators of all appliances containing 50 or more pounds of refrigerant, unless otherwise specified. When a provision applies to technicians or people servicing equipment the provision so specifies. The changes are not intended to shift responsibilities and EPA believes this change is not substantive.

The existing regulation also inconsistently describes the leak repair requirements as applying to appliances with ''50 or more pounds'' or ''more than 50 pounds'' of refrigerant. For example, in the existing recordkeeping requirements at § 82.166(j) and (k), persons servicing and owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records, whereas § 82.156(i)(1), (i)(2), and (i)(5) refer to appliances normally containing more than 50 pounds. EPA is proposing to consistently use ''50 or more pounds of refrigerant.'' Because of this inconsistency, EPA assumes that an owner or operator of an appliance that has a full charge of 50 pounds would take a conservative assumption when reading the current regulations and consider the appliance covered by the leak repair requirements. For that reason, EPA does not anticipate this change to have a significant effect.

EPA seeks comment on the proposed edits to restructure and clarify the regulations, including whether any other than those specifically discussed in this section of the preamble would alter the substance of the requirements and, if so, which edits would do so and how.

4. Lowering Applicable Leak Rates

EPA is proposing to lower the applicable leak rates for comfort cooling, commercial refrigeration, and IPR appliances containing ODS refrigerants, and to establish those same leak rates for such appliances using non-exempt substitute refrigerants. The leak rate is the rate of emission from an appliance requiring action from the

owner/operator. EPA has proposed lowering leak rates twice previously for ODS-containing appliances, both in 1998 and 2010, but has not finalized either proposal. In both instances, EPA proposed lowering the leak rates to 20 percent or lower (from 35 percent) for IPR and commercial refrigeration appliances and to 10 percent or lower (from 15 percent) for comfort cooling appliances (63 FR 32044, 75 FR 78558). EPA is again proposing to lower leak rates to 20 percent and 10 percent, respectively, and has considered comments on those past proposals in the development of this notice as well as additional available information. This proposal would be for appliances containing both ODS and non-exempt substitute refrigerants, and EPA's rationale for these proposed edits is described in more detail below.

i. Commercial Refrigeration and Industrial Process Refrigeration Appliances

In general, leak rates are highest in large commercial refrigeration appliances and IPR. This is attributable to a number of factors. First, such appliances are generally custom-built and assembled at the site where they are used rather than in a factory (*e.g.,* unlike a household refrigerator). Appliances used in IPR are custom-designed for a wide spectrum of processes and facilities, including applications such as flash freezers aboard commercial fishing vessels to cooling processes used in the manufacture of pharmaceuticals to ice skating rinks. This results in the sector having an extraordinarily broad range of equipment configurations and designs. Custom designed equipment presents more challenges to original equipment manufacturers who wish to systematically implement leak reduction technologies. Second, these appliances generally use a long, single refrigerant loop for cooling that is not enclosed within a piece of equipment. This tends to raise average leak rates, particularly when the refrigerant loop flows through inaccessible spaces, such as underneath floors, or when used in challenging climates and operating conditions. Third, these appliances typically operate continuously. For example, shutting down a refrigeration appliance can lead to food spoilage in commercial refrigeration. In IPR, a full appliance shutdown can stop all production and is typically costly. This need for continuous operation can make repairing certain leaks more difficult.

EPA is proposing to lower the leak rate for both commercial refrigeration appliances and IPR from 35 percent to 20 percent. EPA has reviewed multiple sources of data to establish that 20 percent is a reasonable rate. As explained in more detail below, EPA reviewed GreenChill partner data, consent decrees of companies found to be in violation of subpart F regulations, and reported data from California's Refrigerant Management Program (RMP).[12] Additionally, EPA held numerous conversations with potentially affected stakeholders and reviewed comments on past proposed rules. EPA also assessed the possible benefits that could result from lower proposed applicable leak rates and other changes being proposed in this notice using the Vintaging Model and data from California.

First, EPA reviewed data from GreenChill, an EPA partnership with food retailers to reduce refrigerant emissions and decrease their impact on the ozone layer and climate change. Established in 2007, this partnership has over 20 member companies comprising almost 30 percent of all supermarkets in the United States. GreenChill works to help food retailers (1) transition to environmentally friendlier refrigerants; (2) lower refrigerant charge sizes; (3) eliminate leaks; and (4) adopt green refrigeration technologies and best environmental practices. One of the GreenChill partnership's programs that helps food retailers reduce their refrigerant emissions is the Food Retailer Corporate Emissions Reduction Program. Under this program, partners report their corporate-wide average leak rate for all refrigerants. A corporate-wide average leak rate is the sum of all refrigerant additions in a given time period for all of the refrigeration appliances owned by a corporate entity, divided by the full charge for all of the refrigeration appliances owned by that same corporate entity during that time period.

In 2014, the corporate-wide average leak rate for all reporting GreenChill partners was under 14 percent. Since the start of the program, the reported corporate-wide average leak rate for all partners has been at or below this level, even though the number of partners has grown. Several supermarket chains, including some having hundreds of stores, have consistently reported a corporate-wide leak rate below 10 percent. These confidential data support the conclusion that leak rates in commercial refrigeration appliances can be considerably lower than 35 percent and that a 20 percent leak rate is reasonable.

EPA has also reviewed how companies agreed to manage refrigerants through recent consent decrees with the Agency. In consent decrees with Safeway and Costco, the two companies agreed to bring their corporate-wide leak rates from about 25 percent to 18 and 19 percent, respectively. EPA also reviewed consent decrees with commercial fishing vessels. These consent decrees do not establish a corporate-wide level but in one specific case a facility was able to lower its leak rate considerably below 20 percent. These consent decrees provide additional support for the proposition that a 20 percent leak rate for commercial refrigeration and IPR appliances is reasonably achievable. These consent decrees are available in the docket.

EPA has also reviewed data submitted under California's RMP. California requires that owners or operators of any appliance with more than 50 pounds of ODS or HFC refrigerant repair leaks, conduct leak inspections or install automatic leak detection equipment, and report their refrigerant usage and repairs. In addition, any facility with a refrigeration appliance containing more than 50 pounds of refrigerant must report all service records annually to California.

CARB has categorized facilities based on the facility's largest appliance. Facilities that have at least one appliance with a full charge of 2,000 pounds or more (classified as ''large'' facilities under the RMP) began reporting in 2012 (for 2011 service records). These large facilities must submit service records for any appliance that has a full charge greater than 50 pounds. ''Medium'' facilities have at least one appliance with a full charge of 200 or more pounds but less than 2,000 pounds and they started reporting in 2014. ''Small'' facilities have at least one appliance between 50 and 200 pounds; they must begin reporting in 2016. This data set provides insight into the use and emissions of ODS and substitute refrigerants from refrigeration appliances in California.

EPA reviewed the 2013 data of large and medium facilities to determine the leak rates of those appliances. This was the only dataset currently available. Facilities reported on 10,362 appliances in this dataset. A series of charts showing the aggregated California data has been included in the docket. While the data are self-reported, and they do

[12] Among other requirements, the RMP establishes leak repair requirements for appliances with more than 50 pounds of refrigerant. More detail on the RMP is provided in the technical support document in the docket titled *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program* and online at *www.arb.ca.gov/stoprefrigerantleaks.*

not include all commercial refrigeration and IPR appliances in California, they show that approximately 48 percent of reporting appliances did not leak at all in 2013. They also show that approximately 13 percent of appliances have an annual leak rate between 20 percent and 35 percent. An additional 22 percent of appliances are above a 35 percent annual leak rate. EPA considered these data to determine what an appropriate leak rate would be.

If EPA uses the California data as a proxy for the rest of the United States, the existing 35 percent leak rate for commercial refrigeration and IPR appliances (if extended to non-exempt substitutes) would only require reductions from 22 percent of refrigeration appliances, responsible for approximately 70 percent of emissions. By establishing a leak rate at 20 percent, the regulations would affect approximately 35 percent of appliances, responsible for almost 90 percent of emissions. The increase in the universe of affected entities when moving from a 35 to 20 percent leak rate is appropriate given the percentage of emissions (20% of total reported emissions) coming from those facilities. A 20 percent leak rate is also consistent with two past proposals to lower leak rates.

For the proposed 2010 Leak Repair Rule, EPA analyzed South Coast Air Quality Management District (SCAQMD) data on ODS-containing appliances. SCAQMD is responsible for controlling emissions primarily from stationary sources of air pollution. California South Coast Air Quality Management District is an air pollution control agency that services the areas of Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino counties. At the time of the analysis in 2010, SCAQMD was responsible for 16 million people in a 10,743 square mile area, which was approximately half of the population of California.

Similar to the EPA's regulations under section 608 of the CAA, SCAQMD has issued Rule 1415 aimed at reducing emissions of ozone-depleting refrigerants from stationary refrigeration and air-conditioning systems. The rule requires any person within SCAQMD's jurisdiction who owns or operates a refrigeration system to minimize refrigerant leakage. A refrigeration system is defined for the purposes of that rule as ''any non-vehicular equipment used for cooling or freezing, which holds more than 50 pounds of any combination of class I and/or class II refrigerant, including, but not limited to, refrigerators, freezers, or air-conditioning equipment or systems.''

Under Rule 1415, SCAQMD used to collect the following information every two years from owners or operators of stationary refrigeration systems holding more than 50 pounds of an ozone-depleting refrigerant (*http://www.aqmd.gov/prdas/forms/1415form2.doc*): Number of refrigeration systems in operation; type of refrigerant in each refrigeration system; amount of refrigerant in each refrigeration system; date of the last annual audit or maintenance performed for each refrigeration system; and the amount of additional refrigerant charged every year. For the purposes of the rule, additional refrigerant charge is defined as the quantity of refrigerant charged to a refrigeration system in order to bring the system to a full capacity charge and replace refrigerant that has leaked. This reporting requirement has now been replaced by the statewide RMP required reporting.

In 2010, EPA reviewed data for over 4,750 pieces of equipment from SCAQMD covering 2004 and 2005. The data included refrigeration and air-conditioning appliances that meet EPA's existing and proposed definitions of IPR (*e.g.,* food processing industry, pharmaceutical manufacturing), comfort cooling (*e.g.* office buildings, schools and universities, hospitals), and commercial refrigeration (*e.g.,* refrigerated warehouses, supermarkets, retail box stores) from businesses of all sizes. The appliances that were evaluated all had ODS refrigerant charges greater than 50 pounds. EPA's review showed that lowering the leak rate to 20 percent for ODS-containing IPR would result in slightly less than 5 percent of systems facing mandatory repair within 30 days. It also showed that tightening of the leak rate for commercial refrigeration appliances to 20 percent would result in 8 percent of the 1,722 systems examined facing mandatory repair within 30 days.

At the time, EPA found that the SCAQMD leak repair data for commercial refrigeration appliances was consistent with EPA's analysis of the commercial refrigeration sector. For example, EPA estimated that annual leak rates for distributed (DX) systems range from 3 percent to 35 percent for in-use equipment, with higher annual leak rates (25%) in older appliances and the lower rates (15%) in newer appliances.

EPA proposed in 2010 to conclude that a 20 percent leak rate ''provides for continued flexibility in allowing appliance owners or operators to decide upon the necessary action needed to repair leaking appliances, and also provides for additional environmental benefit in terms of avoided refrigerant emissions'' (75 FR 78570). In coming to this assessment, EPA balanced the environmental benefits (in terms of ODS emissions reductions) with the costs of lowering the applicable leak rate for refrigeration appliances to a level between 10 percent and 30 percent. This analysis continues to be informative and is available in the docket for this rulemaking.

In 1998, EPA proposed to lower leak rates for appliances containing both ODS and substitute refrigerants. After reviewing leak rate data collected by the SCAQMD and data submitted by a midwestern supermarket chain, EPA proposed that the maximum permissible leak rate for new commercial refrigeration equipment (commissioned after 1992) be lowered to 10 percent per year, and that the maximum rate for old commercial refrigeration equipment (commissioned before or during 1992) be lowered to 15 percent per year.

For IPR, EPA proposed a two-rate system. IPR equipment would be subject to a 20 percent applicable leak rate unless it met all four of the following criteria in which case it would continue to be subject to the 35 percent leak rate:

(1) The refrigeration system is custom-built;

(2) The refrigeration system has an open-drive compressor;

(3) The refrigeration system was built in 1992 or before; and

(4) The system is direct-expansion (contains a single, primary refrigerant loop).

For today's proposal, EPA reviewed comments on these earlier proposals and held several recent conversations with industry. While some stakeholders, in particular IPR owners and operators, were not in support of leak rates lower than 35 percent, there appears to be more agreement among commercial refrigeration appliance owners and operators that 20 percent is reasonable. In comments in response to the 1998 Proposed Substitutes Recycling Rule, the Food Marketing Institute stated for commercial refrigeration that ''the targeted leak rates of 15 percent and 10 percent for equipment built before and after 1992, was unattainable . . . We believe that rates of 25 percent for equipment manufactured before 1992 and 20 percent for equipment manufactured after 1992 are more realistic.'' Similar comments were stated by major supermarket chains indicating that leak rates of 25% would be more practical and allow more effective refrigerant management. Given the passage of time, equipment manufactured after 1992 should now be a much larger share of the equipment

being used, meaning that the earlier concerns regarding lowering the applicable leak rate for commercial refrigeration appliances to 20 percent may no longer apply.

EPA received three comments on the proposed 2010 Leak Repair Rule that were opposed to lowering the leak rates for commercial refrigeration appliances and IPR. One commenter raised concerns about the effect that lowering the applicable leak rate would have on chillers used in the generation of nuclear power. The proposed flexibilities in today's action, such as allowing extensions for all appliance types—not just IPR and Federally-owned appliances—should address that concern; however, EPA again seeks comment on this point. The other commenters stated that the costs of lowering the leak rate to 20 percent are too high. In addition to providing flexibility in the time needed to conduct repairs and retrofit or replace an appliance, EPA has assessed the compliance costs, cost savings, and environmental benefits of this proposed rule and has found that the aggregated costs are reasonable, and that lowering leak rates will result in fewer emissions of both ODS and substitute refrigerants. See the technical support document *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program* for a complete discussion.

Based on the data sources discussed above, EPA is proposing to lower the applicable leak rate for commercial refrigeration appliances and IPR from 35 percent to 20 percent. EPA seeks comments on whether a 20 percent leak rate is appropriate given the evidence presented and in the docket, or if a higher (*e.g.,* the current applicable leak rate for ODS appliances) or lower leak rate (*e.g.* as low as 10 or 15 percent) is appropriate, and if so, what information supports such a higher or lower leak rate. EPA also seeks comment on whether there are other regulatory incentives that could provide a basis to go with a leak rate lower than 20 percent.

EPA has considered the 2010 proposed rule comments as part of the initial framing and background research, but we are not responding to those comments because they are not comments on what we are proposing in this notice. To the extent commenters have the same concerns, they should reiterate those concerns in their comments on this proposal.

ii. Comfort Cooling and All Other Appliances

EPA is proposing to lower the applicable leak rate for comfort cooling appliances and all other refrigeration appliances normally containing 50 pounds or more of refrigerant that do not fit into the other two categories (commercial refrigeration and IPR). EPA proposes to lower these leak rates from 15 percent to 10 percent. As explained in more detail below, 10 percent is reasonable given what we know about comfort cooling appliances.

In 1998, EPA proposed to reduce the leak rate for comfort cooling appliances using ODS or substitute refrigerants from 15 percent to 10 percent for comfort cooling appliances (the Agency specifically stated chillers in that proposal) built in 1992 or earlier, and from 15 percent to 5 percent for comfort cooling appliances built in 1993 or later. At the time, EPA noted that rates at which these appliances actually leak had decreased from between 10 and 15 percent per year to less than five percent per year in many cases (63 FR 32066). The Agency also noted that new comfort cooling appliances typically leak less than five percent per year, with many new comfort cooling appliances leaking around two percent per year, and some leaking less than one percent. Only one type of new equipment had been reported to have a leak rate above five percent: High pressure chillers with open-drive compressors, which have been found to have leak rates ranging from four to seven percent. Based on feedback and the assumptions used in EPA's peer-reviewed Vintaging Model used to estimate refrigerant use and emissions, this assessment continues to be valid.

In the proposed 2010 Leak Repair Rule, EPA proposed to lower the applicable leak rate for ODS-containing comfort cooling appliances from 15 percent to 10 percent. EPA made this proposal after reviewing data submitted to the SCAQMD. EPA reviewed data from 2,700 comfort cooling appliances and found that fewer than 1 percent of ODS-containing appliances would be required to repair appliances within 30 days if the leak rate was lowered to 10 percent. EPA also analyzed the costs and benefits of lowering leak rates to five percent for comfort cooling appliances. The analysis used in the proposed 2010 Leak Repair Rule found reducing the leak rate for this category of equipment to 10 percent provided the most benefit for the lowest cost. A full discussion of the analysis and rationale for the proposed 2010 Leak Repair Rule is available in the docket to this rule.

EPA has also included a memo in the docket titled *Analysis of Average Annual Leak Rates in Comfort Cooling Appliances (August 2015)* that goes into average leak rates of comfort cooling appliances as reported to SCAQMD and CARB, and as estimated in the Vintaging Model. These three sources indicate 10 percent is more than reasonable and that 15 percent may be too high a leak rate.

EPA seeks comments on establishing a 10 percent leak rate for ODS and non-exempt substitute refrigerants for comfort cooling and all other appliances that do not fit into the commercial refrigeration and IPR categories that contain 50 or more pounds of refrigerant. EPA also seeks comment on whether there are any other types of appliances that do not fit into either the comfort cooling, IPR, or commercial refrigeration appliance category. EPA seeks comments on whether a 10 percent leak rate is appropriate given the evidence presented and in the record, or if a higher (*e.g.,* the current applicable leak rate for ODS appliances) or lower leak rate (*e.g.* as low as 5 percent) is appropriate, and if so, what information supports such a higher or lower leak rate. EPA also seeks comment on whether there are other regulatory incentives that could provide a basis to go with a leak rate lower than 10 percent.

5. Requiring Periodic Leak Inspections

The current regulation at § 82.156(i) focuses on actions an appliance owner or operator must take after discovering an appliance has a leak, not on proactively finding leaks and reducing the release of refrigerant from them. To enhance the traditional repair requirement and to reduce emissions of refrigerant during the maintenance, service, and repair of appliances, EPA is proposing to require annual or quarterly leak inspections as a proactive maintenance practice depending on the type and size of the appliance.

The purpose of the proposed leak inspection requirement is to determine the location of refrigerant leaks, not for calculating whether the applicable leak rate has been exceeded. However, a leak inspection could identify a leak, resulting in the addition of refrigerant. Under today's proposal, the addition of refrigerant would trigger the requirement to calculate the appliance's leak rate. As explained in the definitions section of this proposal, leak inspections of the appliance's refrigerant circuit include using a calibrated refrigerant leak detection device, a bubble test, or visual inspection for oil residue. Again, leak inspections would not need to be

conducted by certified technicians, but the agency would recommend some training for the person to ensure they are knowledgeable of the various leak inspection methods. EPA requests comments on whether there are methods of leak detection other than these three that would be sufficient for the purposes of this rule, and if these three methods are all appropriate.

Some owners, especially for large, complex appliances, will evacuate the system periodically to inspect for leaks and to determine the full charge of an appliance. EPA seeks comment on whether this should be added as another viable leak inspection technique. This option may be appropriate because of EPA experience administering a consent decree. One company was required as part of a consent decree to evacuate an appliance to determine the full charge and inspect for leaks. The Agency's understanding is that the company found the practice to be a useful way to also find and fix leaks earlier, and now evacuates the system annually to inspect for leaks. As a result, the company has been able to keep the leak rate of the affected appliance significantly lower, saving money on refrigerant and keeping equipment operating more efficiently. EPA is not proposing to require such evacuation, but is seeking comment on whether evacuation of an appliance should be another leak inspection option. EPA also seeks comment on the best way to describe this option in the regulation. Generally, EPA intends to allow leak inspections to be conducted by people who are not certified technicians. This option, however, would require a certified technician to do the work. EPA can see value in providing additional flexibility for owners and operators if they already conduct comprehensive leak inspections periodically by evacuating the appliance.

EPA is proposing to require that owners or operators of commercial refrigeration appliances or IPR normally containing 500 or more pounds of refrigerant conduct quarterly leak inspections of the appliance, including the appliance's refrigerant circuit. Inspections would be annual for commercial refrigeration appliances and IPR containing 50 pounds or more but less than 500 pounds of refrigerant, as well as comfort cooling appliances and other appliances normally containing 50 or more pounds of refrigerant. More frequent monitoring is important for larger commercial refrigeration appliances or IPR because those systems tend to have more leaks than comfort cooling appliances and because the amount of refrigerant that would be lost in a leak is greater.

The proactive quarterly or annual leak inspections, as currently proposed, are distinct from the leak inspection that EPA is proposing to require at § 82.157(e)(1) that occurs after discovering the leak rate had exceeded the applicable leak rate.

EPA recognizes that some appliances are more leak tight than others. Therefore, EPA is proposing to allow annual rather than quarterly inspections for commercial refrigeration appliances or IPR normally containing 500 or more pounds of refrigerant if they satisfy one condition: Refrigerant has not been added to the appliance for more than 365 days (excluding an addition for a seasonal variance as defined in this proposal). Not needing to add refrigerant is an indication that the system is not leaking. However, once refrigerant is added to an appliance, the appliance owner or operator must resume quarterly leak inspections.

As part of this proposal, EPA would not require periodic leak inspections if owners or operators install and operate an automatic leak detection system that continuously monitors the appliance for leaks. The leak detection system must meet the requirements described below, and the owner or operator must calibrate the system annually and keep records documenting the calibration. A system that meets these requirements and is properly operated will provide continuous information about whether a system is leaking, and thus quarterly inspections would be unnecessary.

EPA considered CARB's RMP when developing this proposal. The RMP's leak inspection provisions, which only cover refrigeration appliances with a full charge of more than 50 pounds, require the following:

- An automatic leak detection system that continuously monitors appliances normally containing 2,000 pounds or more of refrigerant;
- Quarterly leak inspections for all appliances with 200 or more pounds of refrigerant (unless an automatic leak detection system is installed) and annually for appliances with 50 to 199 pounds; and
- Leak inspections before adding refrigerant to an appliance and after a leak is repaired.

EPA's proposal for automatic leak detection equipment is based on CARB's requirements. EPA is proposing to use the same level of detection (10 parts per million of vapor) and notification thresholds (100 parts per million of vapor, a loss of 50 pounds of refrigerant, or a loss of 10 percent of the full charge) as in CARB's requirements. Such equipment is already available on the market and capable of meeting those standards.

Leak inspections have been seen within the industry as a best practice to reduce emissions of refrigerants and many facilities use this strategy. For example, numerous GreenChill partners have used this best practice with success to keep their leak rates down.[13] The 2014 corporate-wide average leak rate among all GreenChill partner stores was under 14 percent. While the Agency recommends fixing all leaks once they've been found, EPA recognizes that even well-maintained appliances subject to these provisions leak. Given that fact, EPA's lead proposal is to only require that all identified leaks from a leak inspection be fixed when the applicable leak rate is exceeded. EPA is proposing this option because the costs of repairing all leaks when the leak rate is below the applicable leak rate may not justify the benefits, especially when the leak is a series of small pinhole leaks and the leak rate is very low, as may often be the case. When the applicable leak rate is exceeded, the benefits are significant and do result in significant enough savings—both for the environment and for the owner/operator (in decreased refrigerant replacement costs), to warrant repair of all identified leaks. This proposal is also consistent with the current leak repair requirements: Owners and operators of appliances are only required to repair leaks once the applicable leak rate has been exceeded. This familiarity will reduce confusion and encourage compliance.

This lead proposal was designed with Next Generation Compliance objectives in mind. Even if EPA does not require the repair of all leaks that are identified during leak inspections, the Agency anticipates that many appliance owners and operators would take action earlier if leak leaks are identified because it is in their financial interest to do so and would reduce emissions and refrigerant costs. Repairing leaks earlier could also prevent that appliance from being pulled into the regulatory requirements at § 82.157 for exceeding the applicable leak rate.

EPA is proposing to require that the following records be maintained as part of the leak inspection requirements. First, owners or operators must keep records of leak inspections that include the date of inspection and any component(s) where the leak(s) are

[13] See GreenChill's *Best Practices Guidelines: Commercial Refrigeration Leak Prevention & Repairs,* May 2011, available in the docket for this rulemaking.

discovered. For systems that use an automatic leak detection system, a record must be kept of the annual calibration of the leak detection system. EPA seeks comment on whether it should require that continuous readings from the automatic leak detection equipment be maintained for some period of time (as few as three months or as long as three years) so the Agency can verify the automatic detection equipment is in fact being used continuously.

EPA has authority under section 608(a)(3) to establish ''requirements that reduce the use and emission of [ODS] to the lowest achievable level.'' Leaks will be identified sooner when appliances containing ODS refrigerant are regularly inspected. Leaks that are determined to be above the applicable leak rate must be repaired and it is likely that smaller leaks may also be fixed. As a result, leak inspections will reduce the emissions of ODS refrigerant. Additionally, providing a consistent standard for ODS and substitute refrigerants will reduce the incidence of failures to follow the requirements for ODS appliances and in turn reduce the emissions of ODS. For these reasons, EPA is relying in part on section 608(a) for authority to require leak inspections for appliances containing non-exempt substitutes.

Section 608(c) provides an exception from the venting prohibition for *de minimis* releases during maintenance, service, repair, and disposal. EPA has implicit authority to issue regulations explaining the contours of this exception. Leak inspections are themselves a form of maintenance and actions taken to address a leak are a type of repair or service. By performing periodic leak inspections, and repairing leaks as would be required in this proposal, the owners and operators both limit the immediate leakage and decrease the likelihood of leaks during future maintenance or servicing. Whether owners and operators are taking proactive leak prevention steps by inspecting for leaks as a regular maintenance practice is relevant to whether any emissions that do occur may be considered *de minimis* under section 608(c). Section 301(a) supplements EPA's authority under 608(a) and 608(c) as described previously.

EPA seeks comments on the proposed requirement for leak inspections. Specifically, EPA seeks comment on the frequency of leak inspections: Does the quarterly/annual requirement make sense, or should EPA require more frequent for some appliances (as frequent as once per month), or less frequent (as infrequent as once every six months) inspections? EPA also seeks comment on the whether all systems should have to conduct leak inspections using the same frequency, or with different requirements based on full charge. EPA also seeks comment on the 500 pounds full charge threshold for requiring quarterly inspections. Specifically, should EPA establish a lower full charge threshold (as low as 200 pounds), or a higher full charge threshold (as high as 1,000 pounds)? EPA also seeks comment on the proposed criteria for the exemption from the quarterly leak inspection requirement. The agency has proposed to base this on refrigerant additions in the past 365 days. However, EPA takes comment on whether basing this exemption on four consecutive quarters under the applicable leak rate or four consecutive quarters without identifying a leak would be more appropriate. EPA also seeks comment on whether a periodic (quarterly or annual) leak inspection should satisfy the requirement to conduct a leak inspection upon discovering a leak rate in excess of the applicable leak rate if the periodic leak inspection alerts the owner to the fact that the applicable leak rate has been exceeded and all identified leaks during the inspection are documented. Similarly, EPA seeks comment on whether a leak inspection conducted after the applicable leak rate was exceeded should replace a typically-scheduled quarterly or annual leak inspection. EPA also seeks comment on whether the agency should require the repair of all leaks identified during leak inspections regardless of whether the applicable leak rate has been exceeded, or only if the leak rate is above the applicable leak rate. For commenters on all of these alternative proposals, please provide as much specificity as possible and the reason why these changes would be more appropriate than the lead proposal, with special attention to the environmental outcomes resulting from the change.

EPA also seeks comments on alternative proposals for automatic detection equipment including: (1) Whether automatic detection systems should be inspected and calibrated more frequently than annually to ensure it is functioning properly (as frequently as quarterly); (2) whether EPA should require the installation of automatic leak detection systems for appliances with a full charge of 2,000 pounds or more, similar to California's requirement, instead of just requiring periodic leak inspections; and (3) whether owners and operators using automatic leak detection systems should be required to keep records of when a leak is identified and what actions were taken to repair that leak.

i. Extensions for Less Frequent Inspections

Consistent with past regulations implementing CAA section 608, EPA is proposing to establish a process that would allow owners or operators to request less frequent leak inspections for certain federally-owned appliances that are located in remote locations or are otherwise difficult to access for routine maintenance. Specifically, EPA is proposing that owners or operators of appliances in these unique situations would be allowed to request a less frequent leak inspection schedule (not to be less frequent than once every three years instead of the proposed annual or quarterly requirement that would otherwise apply). EPA is also considering establishing two years as the maximum amount of time that can pass between inspections, instead of three. None of the other appliance maintenance and leak repair requirements would be affected by this extension.

Any owner or operator of an appliance requesting an extension would have to show that the appliance has a history of minimal leakage and is remotely located or is otherwise difficult to access for routine maintenance. Additionally, the extension request should explain why installation of automatic leak detection equipment is not practical and what leak inspection schedule would be reasonable given the circumstances (not to exceed three years). EPA seeks comments on the establishment of this extension request process, if there are other conditions that should be established to gain approval from EPA, whether the longest interval between inspections should be two years instead of three, and whether this extension should only be available for comfort cooling appliances, since they are the most likely to be in locations that are remote or difficult to access routinely.

Given the attempt to harmonize appliance maintenance and leak repair extension requests elsewhere, EPA also seeks comments on whether privately-owned appliances face unique situations that make routine leak inspections or the installation of automatic leak detection equipment difficult, and whether EPA should apply this proposed extension request process to non-federally owned appliances as well. EPA may decide to finalize the proposed request process or a similar process for such unique situations. Commenters supporting such an

extension should provide as much specificity as possible about these unique situations, the appliances at issue, why those appliances might qualify for an extension, and why installation of automatic leak detection equipment is not practical in these situations.

6. Two-Year Leak Limit

EPA is proposing a new requirement to address appliances that leak in excess of the applicable leak rate despite being repaired frequently. Under the existing rules at § 82.156(i), an appliance can exceed the leak rate as long as leaks are repaired in accordance with the regulations. If leaks frequently occur in multiple areas, this can result in appliances that have high leak rates on an annual basis yet are still in compliance with regulatory requirements through means of continuous repair. EPA is proposing to add a total leak limit to the repair requirement to address these chronically leaking systems.

Under this proposal, an appliance containing 50 or more pounds of refrigerant may not leak more than 75 percent of its full charge in two consecutive twelve-month periods and remain in use. Take, for example, an appliance that loses 95 percent of its full charge between June 1, 2017, and May 31, 2018 (measured by the cumulative refrigerant additions excluding seasonal adjustments). Between June 1, 2018, and May 31, 2019, that appliance would not be permitted to leak more than 75 percent of its full charge. If the amount lost in June 1, 2018, through May 31, 2019, exceeded 75 percent of the full charge, the owner or operator would be out of compliance starting June 1, 2019, until the appliance was retired or mothballed and later retired.

EPA reviewed data reported to CARB to determine whether a leak limit was necessary and, if so, what the limit should be. In 2013, approximately 8 percent of reporting appliances had leaked more than 75 percent of their full charge over the calendar year and were responsible for 38 percent of total reported emissions. As discussed, these appliances would not be out of compliance unless they were over 75 percent in two consecutive twelve-month periods. EPA looked only at a single one-year period because 2012 and 2014 data were not available at the time the proposal was developed. The data do support the fact that a small percentage of appliances are responsible for a larger proportion of emissions. EPA also looked at the percentage of appliances that had leaked more than 35, 55, and 100 percent over the calendar year to see how many appliances could be affected and what percentage of leaks they are responsible for. EPA seeks comment on whether it should finalize a higher or lower two-year leak limit.

Due to the high chronic leaks of such appliances, the environmental benefit of establishing a cumulative leak limit could be large. Nonetheless, the number of appliances affected by this proposed limit should be low. First, using a two-year limit should exclude appliances that suffered from a one-time catastrophic leak, many of which are largely unpreventable. A leak limit that is evaluated over two consecutive twelve-month periods allows for the possibility of an unpreventable catastrophic leak in one year without violating the prohibition, as long as leaks are reduced below the limit in the following year. Second, if the appliance maintenance and leak repair requirements proposed in this notice are finalized, they should prevent the leak limit from being reached. Only when an owner or operator continues to add refrigerant to a system without taking steps to repair the leaks would an appliance reach the two-year leak limit. Third, due to the proposed calculation and recordkeeping requirements discussed below, appliance owners or operators would be on notice that their appliance was leaking at an unacceptable level after the first year, and should have ample time to bring leaks down below the 75 percent leak limit in the following year. An appliance owner or operator that did not take action based on the calculation and recordkeeping requirements in order to meet the two-year limit would be participating in the knowing release of refrigerant during maintenance and servicing of the appliance.

EPA seeks comments on creating a leak limit and on the leak amount that should be used for such a leak limit. EPA seeks comments on whether it should finalize a leak limit that is lower or higher (as low as 35 percent, or as high as 100 percent). EPA seeks comments on whether it should establish a limit based on two consecutive 6-month periods or on just one year, instead of two consecutive twelve-month periods. EPA also seeks comments on whether the Agency should allow owners or operators to stay in compliance after exceeding the leak limit if they develop a retrofit or retirement plan and implement it within one year instead of being required to retire the appliance or mothball and later retire the appliance. This option would provide owners and operators with additional flexibility to remain in compliance while decreasing emissions of refrigerant. EPA also seeks comment on whether it should allow owners and operators to continue operating their appliance beyond the two-year (or shorter) period if they notify EPA that the reason they went over the leak limit was only because of one or more catastrophic leaks that were unavoidable. Under this alternative proposal, EPA would have to review the notification and determine whether there is enough documentation to verify that the leak or leaks were in fact catastrophic and could not have been prevented. If comments indicate an exception for catastrophic leaks should be provided, the agency would likely finalize a lower leak limit and would potentially shorten the timeframe over which the requirement would apply (*i.e.,* two consecutive six-month periods instead of two consecutive twelve-month periods). Finally, EPA seeks comment on whether the period, whether six months or twelve months, should be aligned with the calendar year, such that the first twelve month period would always be January 1 through December 31, or whether EPA should allow owners and operators to determine when each period begins. EPA sees advantages to both options (simplicity in the former option, but flexibility in the second).

7. Leak Rate Calculation

The existing regulations at § 82.156(i) do not explicitly require technicians or owners and operators to calculate the leak rate each time refrigerant is added to an appliance using an ODS refrigerant. Such action is implied since owners or operators may not be able to determine compliance without calculating the leak rate each time refrigerant is added to the appliance. For example, if a commercial refrigeration appliance owner adds refrigerant to the appliance but does not calculate the leak rate, the owner would have no means of determining if the appliance's leak rate was below 35 percent. Hence, the owner would not know if further action was warranted.

To reinforce the required practices, EPA is proposing to explicitly require owners or operators of appliances with 50 or more pounds of refrigerant to calculate the leak rate each time refrigerant is added to an appliance. EPA is proposing this requirement for appliances that use an ODS or non-exempt substitute refrigerant. EPA would provide exceptions for when refrigerant is added immediately following a retrofit, the installation of a new appliance, or to counter a seasonal variance (where records documenting

the seasonal variance are maintained as proposed in this rule).

EPA is also proposing to add specific recordkeeping requirements to ensure that the owner or operator is aware of the leak rate. The limited records currently required from service technicians may not provide information needed by the appliance owner or operator to make decisions on the fate of the appliance. In addition, the records that are currently required to be provided by the technician do not match the records that are currently required to be maintained by the owner or operator. EPA is therefore proposing to require that service technicians provide more detailed records to the owner or operator of the appliance. The additional records would match the records that owners and operators of appliances must maintain. The service technician is generally in the better position to generate those records as they usually are the expert that the appliance owner or operator is relying on to make informed decisions about their appliances. With the addition of these requirements, an appliance owner or operator that failed to take required leak repair actions would be participating in the knowing release of refrigerant during maintenance, service, or repair of the appliance.

Specifically, EPA is proposing that whenever an appliance with 50 or more pounds of refrigerant is maintained, serviced, repaired, or disposed of, the technician must provide the owner or operator with an invoice or other documentation that indicates (1) the identity and location of the appliance; (2) the date and type of maintenance, service, repair, or disposal performed, including the location of repairs and the results of any verification tests or leak inspections (if applicable); (3) the name and contact information of the person performing the maintenance, service, repair, or disposal; (4) the amount and type of refrigerant added to and/or removed from the appliance (if applicable); (5) the full charge of the appliance (if refrigerant is added); and (6) the leak rate and the method used to determine the leak rate (if refrigerant is added). EPA is proposing identical recordkeeping requirements for appliance owners or operators who use in-house service personnel. EPA is also proposing to require that the owner or operator maintain records of all calculations, measurements, and assumptions used to determine the full charge and any revisions made to the full charge over time.

These proposed records are likely already provided by many service personnel and/or are being maintained by owners and operators. The current regulations already require technicians to provide an invoice or other documentation that includes the amount of ODS refrigerant added to the owner or operator. This would likely already include information on the system serviced, the date, and the company/person servicing the appliance. It would likely also include some description of the service provided. Owners and operators must already maintain service records documenting the date and type of service, as well as the quantity of ODS refrigerant added. Therefore, the only new information in most service instances for ODS systems would be the appliance's full charge and the leak rate, which would both be relatively simple since the owners and operators are required to have both available on-site. This will require communication between the owner/operator and the technician and/or access to past service records to ensure the technician can calculate the leak rate.

EPA seeks comments on this proposed change. In particular, EPA solicits comments on whether invoices containing this information are common practice and whether these records would be useful for owners and operators in determining what actions they should take to properly maintain their appliances or determining whether an appliance should be repaired or replaced.

8. Seasonal Variances

In regions of the country that experience large temperature swings during the year, refrigerant in some appliances can migrate from the condenser to the receiver. This migration results in a need to add refrigerant to an appliance to ''flood the condenser'' in the season of lower temperature ambient conditions (fall or winter). In this case, the added refrigerant would have to be removed when the weather returns to design ambient conditions to prevent high head pressures. This technique is often referred to as a winter-summer charge procedure or a seasonal adjustment. Seasonal adjustments are not necessary for appliances with properly sized system receivers because they can hold the appliances' full charge, including the additional charge needed to flood the condenser.

As discussed above, EPA has proposed to define seasonal variance as the addition of refrigerant to an appliance due to a change in ambient conditions caused by a change in season, followed by the subsequent removal of an equal amount of refrigerant in the corresponding change in season, where both the addition and removal of refrigerant occurs within one consecutive 12-month period.

EPA is proposing only to allow owners or operators to exclude the amount added from the leak rate calculation if the amount removed is equal to or greater than the amount added during the prior season. In a properly charged, non-leaking system, adding refrigerant during months with lower ambient conditions (fall or winter) would require an equivalent amount of refrigerant to be removed in the months with higher ambient conditions (spring or summer). If less is removed in the spring/summer than was added at the start of fall/winter, the difference between the two would be considered a leak and not a seasonal addition. Without requiring that the amount added be equal to the amount removed to qualify for the exemption, there is no way to distinguish legitimate seasonal variances from refrigerant leaks. EPA expects only one addition and one removal of refrigerant to account for seasonal variance. If the amount added is equal to or less than the amount removed in the previous season, but an additional amount is added in close proximity (typically within a few days to a few weeks) to the addition being counted as a seasonal variance, it would be considered part of the same refrigerant addition unless the owner or operator could document a leak.

EPA is proposing at § 82.157(c) to recognize that the leak rate does not need to be calculated when adding refrigerant to account for a seasonal variance. Both the addition and subsequent removal of refrigerant due to seasonal variances must be documented. Such additions and removals would already be accounted for in service records provided by the technician to the owner/operator. EPA is proposing to state the recordkeeping requirement explicitly in § 82.157(l)(4).

EPA proposed to allow for seasonal variance in the proposed 2010 Leak Repair Rule and received two comments on that rule. One commenter indicated support, while the other commented that the amount added in one season may not always match the amount removed later in the year, but provided no additional support for this assertion.

EPA seeks comments on the need for a limited exclusion to the requirement to calculate the leak rate upon addition of refrigerant for seasonal variance. EPA also seeks comment on whether the seasonal variance provision should be a limited exclusion from the requirement to calculate leaks as discussed above, or

if the provision should establish a two-step test. First, the owner or operator would have to determine if the amount added is equal to or less than the amount removed from the appliance in the previous season. If the amount was lower, they would not have to calculate the leak rate. If it was above, they would have to calculate the leak rate for the appliance using the difference between the amount added and the amount removed in the previous season. EPA also seeks comments on the need to document the capacity of the receiver, as well as a requirement making the exemption contingent upon an equivalent amount of refrigerant being removed and added over a consecutive 12-month period.

9. Appliance Repair

The existing required practices at § 82.156(i) generally require owners or operators of IPR (§ 82.156(i)(2)), comfort cooling appliances (§ 82.156(i)(5)), and commercial refrigeration appliances (§ 82.156(i)(1)) with refrigerant charges of more than 50 pounds to repair leaks within 30 days, unless owners or operators decide to immediately retrofit or retire the appliance. Retrofit or retirement plans must be developed within 30 days of discovering the leak and must be fully implemented within one year of the plan's date. For those appliances not undergoing retrofit or retirement, the repairs must bring the leak rate to below the current applicable leak rate of 35 or 15 percent.

This existing requirement has allowed a scenario where owners or operators could decide to not repair all known leaks within an appliance, as long as repair efforts brought the leak rate of the appliance below the applicable leak rate. The challenge with such a scenario is that owners or operators may assume that they have done sufficient repairs to comply with the leak repair requirements, or may be in temporary compliance, but may find themselves out of compliance if they are mistaken about what the current leak rate was such that the repair was not sufficient, or if another leak resulting in a calculated leak rate greater than the applicable leak rate occurs shortly after the initial repair effort was completed.

EPA is proposing to require the repair of all identified leaks once the applicable leak rate at § 82.157(d)(2) is exceeded, not just repairs sufficient to bring the leak rate below the applicable leak rate. Leaving some appliance leaks unaddressed in such situations does not reduce emissions of refrigerants to the lowest achievable level and does not prevent knowing releases of refrigerant during current or future maintenance, service, or repair. Since selective repairs can result in preventable refrigerant emissions, and therefore knowing releases of refrigerant to the atmosphere, with associated human health and environmental effects, and may be inconsistent with the venting prohibition, EPA is proposing to require that owners or operators of appliances normally containing 50 or more pounds of refrigerant repair all identified leaks within 30 days of exceeding the applicable leak rate.

If finalized, this revision would mean that appliance owners or operators cannot be selective about repairs made to appliances that leak in excess of the applicable leak rate. This will remove ambiguity concerning compliance with the leak repair requirements and remove potential questions that could arise as to whether a repair attempt was sufficient to comply with the rules.

Many owners or operators (particularly of commercial refrigeration appliances and IPR) have stated that they always repair leaks, and must do so for their businesses to remain viable. EPA agrees that many businesses depend on the prompt repair of leaks and that it may not be in the financial interest of many appliance owners or operators to allow their appliances to continue to leak. However, there are appliance owners and operators that do not take appropriate steps to minimize refrigerant leaks. Hence, the Agency views the leak repair requirements as both a backstop to current repair practices for appliances that are well maintained, and necessary to ensure that refrigerant leaks during maintenance, service, and repair are kept to the lowest achievable level for appliances that are not as well maintained.

EPA reviewed comments received on the proposed 2010 Leak Repair Rule during the development of this proposal. The comments tend to fall into three categories: Practicality of fixing all leaks; time needed to fix all leaks; and clarification on when all leaks must be fixed. First, on the practicality of fixing all leaks, several commenters noted that some leaks cannot be identified without shutting down and fully evacuating and inspecting an appliance. Others noted that some leaks may be trivial and located on seals, gaskets, valves, and fittings where leakage occurs regardless of repairs. One commenter stated that all leaks should be fixed regardless of the location. Others raised concern about the cost and the diminishing value of fixing ever smaller leaks. Several of these commenters recommended the Agency focus on ''identified'' or ''known'' leaks, or alternatively, on setting the requirement at ''making a best effort'' to repair all leaks.

In considering these comments, EPA is proposing to require a leak inspection whenever the applicable leak rate is exceeded. EPA is not proposing to require evacuating or shutting down the appliance to conduct that leak inspection, although that would be an option available to owners and operators. The leak inspection would involve identifying and creating a record of leaks that must be repaired within 30 days. EPA recognizes that a small amount of refrigerant can migrate from an appliance even if the refrigerant circuit is unbroken. EPA is seeking comments on whether the agency should create a limited exception, which would provide that if upon further inspection (through bubble tests or other means), sound professional judgment indicates an individual identified leak is not the result of a faulty component or connection and that refrigerant releases would not be reduced from repair or adjustment, the leak would not need to be repaired. If this proposal is finalized, EPA would likely require that the justification for the determination be noted in the appliance's service records. EPA notes that there are certain types of situations that would never meet these conditions, including but not limited to when a component has holes, cracks, or improperly seated seals. All other leaks would still need to be repaired if the applicable leak rate is exceeded.

In addition to reducing emissions of high-GWP and ozone-depleting refrigerants, a refrigerant management program saves money in refrigerant and potentially energy expenses. EPA discusses the costs and savings later in this preamble, but preventive maintenance can save a significant amount of money even when factoring in the added cost of a more vigilant refrigerant management program, especially as the cost of some refrigerants such as HCFC–22 rises. Proposals to require repair of all identified leaks and conduct periodic leak inspections should incentivize owners and operators to develop a refrigerant management plan to proactively fix leaks before they become big enough to exceed the applicable leak rate. EPA's experience with several recent consent decrees indicates leak rates, even in complicated IPR applications, can be brought below the applicable leak rates proposed in this rule with a refrigerant management program that identifies and fixes leaks early.

Finally, it is possible that some leaks may not be fixable in 30 days. Later in this notice, EPA discusses the possible extensions to the 30-day leak repair requirement, including allowing these extensions for the repair of commercial refrigeration and comfort cooling appliances. Regardless, owners and operators should be fixing leaks as a normal course of business, which would largely prevent many of these requirements from ever being triggered. As noted above, the periodic leak inspections would help identify leaks earlier for repair, before those leaks are big enough to exceed the applicable leak rate.

EPA requests comments on the proposed requirement to repair all identified leaks when the appliance leaks above the applicable leak rate.

10. Verification Tests

Verification tests are performed on appliances after they are repaired to ensure that leaks have been fixed. The regulation at § 82.156(i)(3) currently requires verification tests only for repairs to IPR and Federally-owned commercial and comfort cooling appliances containing an ODS refrigerant and only when extensions to the 30 day deadline (or 120 day deadline when an IPR shutdown is required) are needed. Limiting the verification tests to such a narrow set of appliances is problematic, so EPA is proposing that all repairs should be verified.

First, the lack of verification may leave owners or operators of comfort cooling and commercial refrigeration appliances uncertain as to whether their repair efforts have brought them into compliance with the leak repair requirements. A lack of verification could allow for insufficient or incomplete repairs, which could lead to ongoing or future leaks during maintenance, service, or repair. Ongoing leaks, especially when they are at the same location or component in the appliance, could result in noncompliance with the current requirements if repairs did not actually bring the leak rate of the entire appliance beneath the applicable leak rate.

Second, EPA has considered the burden of conducting verification tests on all types of equipment and addresses that issue below. EPA cannot identify a reason why the burden could more easily be borne in those narrow circumstances in which verification is currently required by the regulations, given that some type of verification is generally a standard practice across all types of appliances. Third, the environmental benefit of verifying repairs applies to comfort cooling and commercial refrigeration appliances as well as IPR.

Therefore, EPA is proposing to require at 82.157(f) that owners or operators of all types of appliances that are subject to the leak repair requirements (including those using an ODS or non-exempt substitute refrigerant) perform both an initial and follow-up verification of repairs every time the applicable leak rate is exceeded (unless a retrofit or retirement plan is being developed).

EPA sought comments on this same proposal in the proposed 2010 Leak Repair Rule and received three comments. All were in support of extending verification tests to all covered appliances. EPA again seeks comments on requiring verification tests on all appliances normally containing 50 or more pounds of refrigerant. EPA sees a potential benefit in requiring both an initial and follow-up verification test to ensure a leak is repaired and that the repair will hold. EPA seeks comments whether both an initial and follow-up verification test are needed in all situations and seeks comments on requiring a minimum time between tests such as one to three hours to allow an appliance to return to normal operating characteristics and conditions.

EPA is also clarifying that owners or operators may conduct as many repair attempts as needed within the initial 30 days (or longer if an extension is available) to repair the appliance. Consequently, the Agency is proposing to explicitly allow unlimited verification tests within the required repair window. This is discussed further in the preamble section on retrofit and retirement plans.

The Agency understands that most technicians pressure check appliances immediately following repairs. EPA is proposing that such pressure checks would satisfy the initial verification requirements. EPA's concern is that follow-up verifications may not be a part of normal operating procedures for all repairs. Follow-up verifications require a technician to perform a second test after the appliance has returned to normal operating characteristics and conditions. A follow-up verification is an indicator of the success of repairs. Thus, EPA intends to require such verification for all appliances that have leaked refrigerant above the applicable leak rate.

EPA currently has not set a minimum amount of time that must pass between the initial and follow-up verifications. In the proposed 2010 Leak Repair Rule EPA proposed that the two tests be separated by at least 24 hours. Based on comments to that rule, the Agency is taking comment in this action on whether a shorter time such as one to three hours after the appliance is brought back on-line would be more appropriate. Regardless of whether EPA specifies an amount of time that must pass, all follow-up verification tests must take place after the appliance has returned to normal operating characteristics and conditions—both currently for IPR, and under the proposed change to require verification tests for repairs on all types of appliances with 50 or more pounds of class I, class II, or substitute refrigerant. EPA is also proposing to require follow-up verification tests to occur within 10 days of the successful initial verification test or 10 days of the appliance reaching normal operating characteristics and conditions.

11. Extensions to the 30-Day (or 120-Day) Repair Requirement

EPA currently provides extensions to the repair or retrofit/retirement deadlines for IPR and Federally-owned appliances under certain conditions. EPA has identified four conditions that exist in the current regulations:

- The appliance is mothballed (available for all appliances) (§ 82.156(i)(10));
- The appliance is located in an area subject to radiological contamination or where shutting down the appliance will directly lead to radiological contamination (available for Federally-owned appliances) (§ 82.156(i)(1)(ii) and (i)(5)(ii));
- Applicable Federal, state, or local regulations make a repair within 30 or 120 days impossible (available for IPR) (§ 82.156(i)(2)(i)); or
- Parts are unavailable (available for IPR) (§ 82.156(i)(2)(i)).

While not an extension, IPR facilities are also allowed an initial repair period of 120 days rather than 30 days if an industrial process shutdown is required to complete the repair. In addition, an exemption to the repair requirement is allowed for all types of appliances if a dated retrofit or retirement plan is developed and is implemented within one year of the date developed.

EPA is proposing at § 82.157(g) to make these extensions to the repair deadlines available to all appliance categories. EPA has heard from owners of commercial refrigeration appliances, for example, that they occasionally are unable to complete a repair due to the temporary unavailability of a component. They were therefore required to develop a retrofit and retirement plan even though a

component could be acquired shortly after 30 days. While IPR may require custom components, the need for components is not unique to IPR. It does not make sense to require the retrofit or retirement of an appliance that can be repaired in situations such as when a single component is the problem and can be procured shortly after 30 days.

The extension for the delivery of components is open-ended in the current regulation. While the regulation provides only the additional time needed to receive delivery of the necessary parts, it does not set an outer limit for delivery nor does it clearly provide time to install the components once received. EPA is proposing at § 82.157(g)(1)(iii) to modify the extension so that the owner or operator must complete the repair within 30 days after receiving delivery of the necessary part and the total extension may not exceed 180 days (or 270 days if an IPR shutdown is required). As proposed, this extension may be more stringent for IPR because IPR owners/operators would be time-limited in conducting those repairs. EPA is not proposing to change the open-ended nature of the extensions due to radiological contamination or compliance with applicable Federal, state, or local regulations.

To qualify for an extension, owners or operators must perform all repairs that can be completed within the initial 30 or 120 day period. All repairs must be verified if possible and the owner or operator must document all such repair efforts. The owner or operator must maintain a written statement from the appliance or component manufacturer or distributor stating the unavailability of parts and the expected delivery date as part of the reason why more than 30 days are needed. EPA is not proposing to change the elements of the request for an extension that is submitted to EPA. Requests must continue to include: Identification and address of the facility; the name of the owner or operator of the appliance; the leak rate; the method used to determine the leak rate and full charge; the date a leak rate above the applicable leak rate was discovered; the location of leak(s) to the extent determined to date; any repair work that has been performed thus far, including the date that work was completed; the reasons why more than 30 days are needed to complete the repair; and an estimate of when the work will be completed. If requesting an extension to the earlier submitted completion date, a new estimated date of completion and documentation of the reason for that change must be submitted to EPA within 30 days. The owner or operator must keep a dated copy of this submission and proof that it was submitted.

EPA requests comments on applying the extensions to all appliance types, including whether such extensions should not be extended to certain appliances. EPA also seeks comments on the scope and amount of time allowed for each extension, and whether there are additional extension types that the Agency should consider allowing. Commenters supporting the creation of a new extension should provide detailed reasoning and cost implications (both for the environment and an owner/operator) in their comment.

12. Retrofit or Retirement Plans

EPA's regulations at § 82.156(i)(6) currently require an owner or operator of an appliance that exceeds the applicable leak rate to develop and implement a retrofit or retirement plan generally within 30 days if they are unable to repair the leak. EPA is proposing at § 82.157(h) three changes to the retrofit/retirement provision. First, EPA is proposing to remove the requirement to retrofit an appliance after a failed follow-up verification test. EPA is proposing to replace that provision with a requirement to retrofit an appliance if the owner or operator is unable to repair all identified leaks within 30 days after discovering the applicable leak rate is exceeded (unless additional time is allowed under one of the proposed extensions). Second, EPA is proposing to remove the requirement to use a substitute with a lower or equivalent ODP. Third, EPA is proposing to establish explicit elements of a retrofit/retirement plan. These three proposals are discussed below.

Failed Verification Tests. EPA's regulations currently require owners or operators of IPR using an ODS refrigerant that have failed a follow-up verification test to develop a retrofit or retirement plan within 30 days of the failed verification test and implement the plan within one year. Under these plans, owners or operators must identify how and when they will retire or retrofit their appliance. Owners or operators of comfort cooling and commercial refrigeration appliances are currently not required to perform verification tests and, in lieu of making repairs within 30 days, are given the option to draft and implement a retrofit or retirement plan within 30 days of discovering a leak rate greater than the applicable leak rate.

EPA has heard concerns from appliance owners/operators that the requirement to retrofit or retire an entire appliance because it has failed a verification test may not always be practical or necessary. For example, some owners or operators would prefer to replace a faulty component before they are required to retrofit or retire an entire appliance and believe this could in many instances be an equally effective means to address needed repairs. The Agency wishes to reduce the potentially large burden upon owners or operators of requiring a large-scale retrofit or retirement when replacing the leaking component might satisfactorily repair the appliance. Therefore, EPA is proposing to provide an owner or operator additional flexibility if they are unable to initially fix all identified leaks after discovering the applicable leak rate is exceeded.

This proposal would allow owners or operators to attempt as many repairs as necessary within the initial 30 days of discovering that an appliance's leak rate exceeds the applicable leak rate. This could include replacing a component. If that component cannot arrive within the initial 30 day period, the owner or operator could request additional time under the proposed provisions related to extensions discussed previously in this preamble. An owner or operator of an appliance would only have to retrofit or retire the appliance if the component replacement was unsuccessful and they could not repair all leaks that were identified in the leak inspection triggered by discovering that the applicable leak rate was exceeded.

This approach is based, in part, on feedback received from past proposals. In comments on the proposed 2010 Leak Repair Rule, several commenters supported additional flexibility to conduct repairs and/or component replacements before being required to retrofit or retire an appliance. Stakeholders have stated that a facility should be allowed an unlimited number of repair attempts to equipment within the 30 day time period. These stakeholders supported an option in the proposed 2010 Leak Repair Rule that would have allowed additional flexibility to replace components before being required to retrofit or retire a leaking appliance. The approach proposed in today's notice provides similar flexibility.

Because the retrofit/retirement plan requirements allow an appliance to leak without repairs for up to a year (in addition to extension opportunities), this change would likely increase the speed at which appliance repairs take place, thereby reducing emissions of refrigerants. This proposal also would eliminate the possibility of mandatory retrofitting or retirement in cases where it might not be warranted because the owner or operator would have the

flexibility to determine if component replacement would be the best means of addressing a leaking appliance.

As discussed in the prior section, EPA is proposing to extend the requirement for verification tests to repairs made by owners or operators of commercial refrigeration and comfort cooling appliances using both an ODS and non-exempt substitute refrigerant. EPA is also proposing to extend the approach to retrofit and retirement described above to owners or operators of commercial refrigeration and comfort cooling appliances. Extending this approach to all appliances will reduce refrigerant emissions while establishing a consistent set of regulatory required practices.

Retrofit/Retirement ODP. EPA's regulations currently require that appliances containing an ODS refrigerant, when being retrofitted or retired/replaced, use a refrigerant with an equivalent or lower ODP. EPA created this provision to foster the transition from refrigerants with high ODPs to ones with a lower ODP. EPA is proposing to remove this requirement and allow for retrofits or retired/replaced appliances to use any refrigerant (other than the one currently used in that appliance in the case of retrofits), so long as it is acceptable for use by SNAP. This change would not relax the current requirements with respect to HCFCs since the regulations implementing sections 605 and 606 of the CAA already prohibit the manufacture (and therefore installation) of appliances using virgin HCFCs (as of January 1, 2010, for HCFC–142b and HCFC–22; and as of January 1, 2020, for other HCFCs). Requiring the use of a refrigerant with a lower or equivalent ODP could be problematic if the requirement were read strictly because some HFO refrigerants that are not classified as an ODS have an ODP even though the ODP is negligible. For example, HFO–1233zd(E) has an ODP between 0.00024 to 0.00034 and a GWP between 4.7 to 7 (see 77 FR 47768). Under a strict interpretation, if an owner/operator wanted to replace an R–134a chiller with an HFO–1233zd(E) chiller in future, he/she would not be able to switch from R–134a, which has an ODP of zero, to the HFO since the HFO has an ODP that, though negligible, is higher than zero. This could prevent transition to low-GWP alternatives.

EPA also wishes to clarify that the current requirement to retrofit with a refrigerant of the same or lower ODP does not mean that the same refrigerant can be used. Such actions do not satisfy the regulatory intent or the proposed definition of ''retrofit.'' The requirement to retrofit means the owner or operator must switch refrigerants. While the Agency is proposing to allow flexibility in refrigerant choices, the intent is not to allow the continued use of the same refrigerant in the retrofitted appliance. In cases where the owner/operator wants to use the same refrigerant and that refrigerant can continue to be used consistent with other applicable statutory and regulatory requirements, the owner/operator would have the option of retiring and replacing the appliance.

If an owner/operator chooses to retire and replace a system, EPA is not proposing to require under Subpart F that a different refrigerant be used because eventually there may not be a refrigerant to switch to that is better for the environment. At this time, EPA intends to rely on other 40 CFR part 82 regulatory requirements that do prohibit the use of some refrigerants, (*e.g.,* the prohibition on manufacture of systems using HCFC–22 under subpart A).

Elements of a Retrofit or Retirement Plan. Stakeholders have asked EPA what should be included in a retrofit or retirement plan. The Agency has not previously provided a specific list of elements to be included due to the complex nature of refrigeration appliances. An exhaustive list may not fit all types of appliances considering the wide array of configurations and refrigerant choices. However, EPA finds merit in specifying a minimum set of information that is likely to be needed during any type of retrofit or retirement.

EPA is proposing at § 82.157(h)(2) to require that a retrofit or retirement plan include the following minimum set of information:

- Identification and location of the appliance;
- Type (*i.e.* ASHRAE number) and full charge of the refrigerant currently used in the appliance;
- Type (*i.e.* ASHRAE number) and full charge of the refrigerant to which the appliance will be converted, if retrofitted;
- Itemized procedure for converting the appliance to the new refrigerant, including changes required for compatibility (for example, procedure for flushing old refrigerant and lubricant; and changes in lubricants, filters, gaskets, o-rings, and valves), if retrofitted;
- Plan for the disposition of recovered refrigerant;
- Plan for the disposition of the appliance, if retired; and
- One-year schedule for completion of the appliance retrofit or retirement.

Such requirements are a minimum of what should be considered by any owner or operator when retrofitting or retiring a leaking appliance. A retrofit or retirement plan may contain additional elements related to the specific characteristics of that appliance but EPA is not proposing requirements for those elements because they would more appropriately be determined on a case-by-case basis.

The Agency's preference would be to have a complete plan developed within 30 days. However, EPA recognizes that some information may not be available in that timeframe. For example, owners or operators may not know within the allotted time frame what the itemized procedure will be until they finalize plans for the retrofit or retirement. Under the itemized procedure heading, EPA is considering whether to allow owners or operators to include a placeholder such as ''Engineer consulted to evaluate retrofit and replacement options on [X] date. Engineers report expected in three months.'' Shortly after that report is delivered, the owner or operator would need to update the plan accordingly to indicate the procedure for retrofit or retirement and replacement.

EPA seeks comments on these proposed changes to the retrofit and retirement plans including the following questions: Should EPA allow for multiple repairs within the 30 day repair window? Should EPA apply the proposed changes to all appliance types? Should EPA remove the requirement to switch to a refrigerant with a lower or equivalent ODP? Should EPA require the use of a refrigerant with a lower or equivalent GWP?

The Agency also requests comments on the proposed minimum requirements of a retrofit or retirement plan. Are there other factors that should be considered when developing a retrofit/retirement plan? Is this information available within 30 days of deciding to retrofit or retire an appliance? Should EPA allow for the retrofit/retirement plan to have placeholders for some elements until the information is available, by noting specific actions that are needed to accurately document the plan?

13. Extensions To Retrofit or Retire Appliances

Under the current regulations at § 82.156(i)(6), an owner or operator must generally complete the retrofit or retirement of a leaking appliance containing an ODS within one year of creating a retrofit or retirement plan. There are extensions available in the following circumstances:

- If delays are caused by requirements of other applicable

Federal, state, or local laws or regulations (available for IPR);

- If a suitable replacement refrigerant with a lower ODP is unavailable (available for IPR);
- If the supplier of the appliance or a critical component has quoted a delivery time of more than 30 weeks from when the order is placed (available for IPR);
- If complications presented by the appropriations and/or procurement process results in a delivery time of more than 30 weeks (available for Federally-owned appliances); or
- If the appliance is located in an area subject to radiological contamination and creating a safe working environment will require more than 30 weeks (available for Federally-owned appliances).

EPA is proposing at § 82.157(i) four substantive changes to these extensions. First, as in all other leak repair provisions, EPA is proposing to apply these extensions to appliances containing non-exempt substitute refrigerants. As discussed in section III of this notice, providing a consistent standard for ODS and substitute refrigerants will facilitate the recovery of both ODS and non-ODS refrigerants and reduce the environmental harm caused by the emissions of these refrigerants.

Second, EPA is proposing to remove the extension offered when a suitable replacement refrigerant with a lower ODP is not available. EPA established this extension because there were certain applications using CFCs that did not have a suitable HCFC substitute. Today, there are many more substitutes for ODS refrigerants than when EPA established the refrigerant management program. In fact, few appliances can be newly-installed or retrofitted with virgin ODS because of the HCFC use restrictions implementing sections 605–606 of the CAA. As discussed above, EPA is not requiring that a retrofit use a refrigerant with a similar or lower ODP. Therefore, the rationale for this extension no longer exists. Because EPA is proposing to remove this requirement, EPA is also proposing to remove from the definitions in § 82.154 the term *suitable replacement refrigerant*.

Third, EPA is also proposing a new extension at § 82.157(i)(1) if the appliance is to be retrofitted to or replaced with a refrigerant that is exempt from the venting prohibition as listed in § 82.154(a). In that situation, EPA is proposing to allow an extension up to 18 months. Whereas the existing extensions are only available to IPR and Federally-owned appliances, EPA is proposing to make this extension, and all other extensions, available to comfort cooling and commercial refrigeration appliances as well.

Section 608(a)(3) provides authority to EPA to issue regulations that may include requirements to use alternative substances to ODS. Given this authority, and the distinction between exempt and non-exempt substitutes in section 612(c), the Agency is taking action to encourage the use of substances that do not pose a threat to the environment when released. Since many refrigerants have an ODP, a high GWP, or both, it is appropriate to allow more time to install a refrigerant that is exempt from the venting prohibition as an incentive for that type of transition. The refrigerants that are exempt from the venting prohibition, such as carbon dioxide (R–744), and the hydrocarbon refrigerants propane (R–290), isobutane (R–600a), and R–441A in certain uses, have no ODP and low GWPs ranging from one to eight. While the Agency would be allowing for potentially greater emissions in the short term by not requiring all repairs be completed for the 18 months allowed for a replacement with an exempt substitute, once the new appliance is installed, it will be using a zero ODP and very low-GWP refrigerant that does not pose a threat to the environment for a much longer period than the 18 month extension.

Fourth, while not an extension, per se, the current regulations at § 82.156(i)(3)(v) relieve owners and operators of IPR appliances of the requirement to retrofit or retire their appliances if they establish that the appliance's leak rate is below the applicable rate within 180 days of an initial failed follow-up verification test and they notify EPA within 30 days of that determination. Affected entities must report to EPA when they use this exemption and EPA has not received any reports on the subject in at least the last three to five years. Therefore, EPA is proposing to remove this exception entirely. The other proposed extensions, in particular the extension to receive a replacement component, should provide sufficient flexibility for IPR and other appliances.

EPA seeks comments on its proposals to restructure and simplify the extensions to retrofit or retire appliances. EPA also seeks comments on its proposal to remove the extension for transitioning to a suitable replacement refrigerant and the removal of § 82.156(i)(3)(v) as well as creating an extension for transitioning to a substitute refrigerant that is exempt from the venting prohibition.

14. Recordkeeping and Reporting

EPA is proposing to create a recordkeeping and reporting paragraph at § 82.157(m) to make these requirements easier to identify. Many of these requirements are identical to those currently included at § 82.166 for appliances containing ODS. In summary, EPA is proposing to establish the following recordkeeping requirements for owners and operators of appliances normally containing 50 or more pounds of class I, class II, or substitute refrigerant:

- Maintain documentation from leak inspections or that an automatic leak detection system is installed and inspected annually and recalibrated as needed in accordance with the leak inspection requirements;
- Maintain leak inspection extension requests submitted to EPA.
- Maintain records documenting the full charge of appliances;
- Maintain invoices or other documentation when refrigerant is added or removed from an appliance, when a leak inspection is performed, and when a verification test is conducted, and when service or maintenance is performed;
- Maintain retrofit and/or retirement plans;
- Maintain retrofit and/or extension requests submitted to EPA;
- Maintain records documenting when the system was mothballed and when it was brought back on-line (*i.e.* refrigerant was added back into the appliance);
- Maintain records of purged refrigerant if excluding such refrigerant from the leak rate; and
- Maintain all of the above-listed records for a minimum of three years.

Additionally, the proposed revisions would require persons servicing, maintaining, repairing, or disposing of such appliances to provide the owner or operator of such appliances with an invoice or other documentation when refrigerant is added or removed from an appliance, when a leak inspection is performed, and when a verification test is conducted, and when service or maintenance is performed.

Stakeholders have also told EPA that the Agency should make explicit our view that records can be kept electronically. EPA recognizes that many companies employ electronic databases to store and track records. An electronic recordkeeping system has advantages to paper records, and EPA encourages owners and operators of appliances to use one of these systems to track refrigerant additions and other required records. Electronic systems

allow for more comprehensive refrigerant management and can help identify leaky appliances earlier. Given that fact, EPA is proposing to explicitly allow for electronic records. These records must still be accessible onsite if an EPA inspector visits a facility, but they can also be downloaded or printed from an online system if necessary. Having records accessible onsite is also important to facilitate accurate calculation of the leak rate by technicians.

For reporting, EPA is proposing to require that all reports be submitted to EPA via email at *608reports@epa.gov*. If the submission contains confidential business information, reports can be mailed to the address in § 82.160. This should reduce costs and streamline the reporting process. It is also consistent with EPA's Next Generation Compliance initiative. EPA is also proposing to require reporting in the following circumstances:

- If the owner or operator is requesting an extension to the 30-day (or 120-day) requirement to complete repairs pursuant to the proposed § 82.157(g);
- If the owner or operator is requesting an extension to complete a retrofit or retirement of an appliance pursuant to the proposed § 82.157(i); or
- If the owner or operator is excluding purged refrigerants that are destroyed from annual leak rate calculations pursuant to the proposed § 82.157(k).
- If the owner or operator is submitting an extension request to EPA to conduct leak inspections less frequently pursuant to the proposed § 82.157(b)(5).

These proposed records and reports are essential to ensure compliance with section 608 of the CAA. EPA seeks comments on the specific recordkeeping and reporting requirements in § 82.157(l) and (m). EPA also seeks comments on the changes to require electronic reporting and to allow and encourage electronic recordkeeping, so long as it is accessible at each facility regulated by these requirements during an onsite inspection.

G. Proposed Changes to the Standards for Recovery and/or Recycling Equipment in Section 82.158

1. Background

Currently, all ODS refrigerant recovery and/or recycling equipment manufactured or imported on or after November 15, 1993, and used during the maintenance, service, repair, or disposal of appliances must be certified by an approved equipment testing organization to ensure that it meets certain performance standards. These standards may vary for certain equipment intended for use with the disposal of small appliances. These performance standards are currently found in tables 2 and 3 of § 82.158, as well as appendix B1, B2, and C of subpart F. EPA based these standards in large part on ARI (now AHRI) Standard 740–1993 and ARI Standard 740–1995. Recovery and/or recycling equipment intended for use during the maintenance, service, repair, or disposal of MVAC and MVAC-like appliances must meet the standards in subpart B. The regulations in subpart F simply refer to that subpart and state that the such recovery and/or recycling equipment must meet the standards of § 82.36(a).

2. Extension to Substitute Refrigerants

EPA is proposing to require that all recovery and/or recycling equipment used during the maintenance, service, repair, or disposal of appliances, other than MVACs and MVAC-like appliances, that contain non-exempt substitute refrigerants also be certified by an approved equipment testing organization that it meets certain performance standards. EPA is proposing to allow all recovery and/or recycling equipment that met certification requirements for ODS prior to this rulemaking to be certified for non-exempt substitute refrigerants. Since most recovery equipment is already certified for use with non-exempt substitute refrigerants, this proposal would merely update the standards to reflect current practices.

EPA is also proposing to add appendices B3 and B4, based on the AHRI Standard 740–2015, *Performance Rating of Refrigerant Recovery Equipment and Recovery/Recycling Equipment.* All new equipment manufactured or imported on or after the effective date of this rule would be required to meet the standards in appendix B and table 2. The evacuation level would depend upon the saturation pressure of the refrigerant. EPA is also proposing to update appendix C ''Method for Testing Recovery Devices for Use with Small Appliances'' to reference all refrigerants, instead of the currently referenced CFC–12.

Certifying refrigerant recovery and/or recycling equipment for use with non-exempt substitutes serves multiple purposes. First, certification would provide reliable information on the ability of equipment to minimize emissions of these substitute refrigerants, by measuring and/or establishing standards for recovery efficiency (vacuum level) and maximum emissions from air purging, oil draining, equipment clearing, and hose permeation. Second, certification would provide reliable information on the equipment's ability to clear itself when switching between refrigerants. Without sufficient clearing capability, equipment may retain residual refrigerant in its condenser, which would then be mixed with the next batch of refrigerant recovered by the equipment. Because mixed refrigerant can be difficult if not impossible to reclaim (depending on how cross-contaminated the mixed refrigerant is) and expensive to destroy, it is much more likely than unmixed refrigerant to be vented to the atmosphere. Third, certification would provide reliable information on the equipment's recovery speed. Without such information, technicians may purchase equipment that recovers too slowly, tempting them to interrupt recovery before it is complete. As discussed in the 1993 Rule, where EPA established the equipment certification requirements, the information on equipment performance provided by an independent third-party testing organization is more reliable than that provided by other sources, such as equipment manufacturers (58 FR 28686–28687).

Certification of recovery equipment used with non-exempt substitute refrigerants would also maximize recycling and minimize emissions of ODS refrigerants. There is no physical difference between ozone-depleting refrigerants and their fluorocarbon substitutes that would prevent a technician from purchasing and using HFC recovery equipment on CFCs or HCFCs, except in the case of flammable refrigerants.

Because different treatment is warranted for flammable refrigerants, EPA is proposing to add standards for the recovery of flammable non-exempt refrigerants. Currently, EPA is only aware of two flammable non-exempt substitute refrigerants that are approved for use in stationary refrigeration and air-conditioning equipment: HFC–32 and HFO–1234ze(E). However, EPA expects this number to grow in the future. Additionally, EPA notes that the AHRI Standard 740–2015 that is being used as the basis for the recycling and/or recovery equipment requirements in appendix B3 does not apply to flammable refrigerants. To address this, EPA is proposing several options that could be used for flammable non-exempt substitute refrigerants like HFC–32. EPA could require that all recycling and/or recovery equipment used with

flammable non-exempt substitute refrigerants must:

—meet a new standard that requires the recovery/recycling performance of appendix B3 (based on AHRI Standard 740–2015) and the safety performance of Underwriters Laboratories (UL) Standard 1963, Supplement SB—*Requirements for Refrigerant Recovery/Recycling Equipment Intended for Use with a Flammable Refrigerant*;

—meet the standards in appendix C (80 percent of the refrigerant must be recovered if the compressor is not functioning; 90 percent of refrigerant must be recovered if the compressor is functioning);

—meet the requirements in a flammable refrigerant recovery standard from another organization like the International Organization for Standardization (ISO), AHRI, or ASHRAE, if available;

—use equipment that is certified for another refrigerant within the same pressure category; or

—recover flammable refrigerants, but without a standard or certification until standards are developed.

Creating an appendix B4 that combines the requirements of appendix B3 with the requirements in Supplement SB of UL 1963 could be the most appropriate option. EPA would incorporate certain aspects of UL 1963 by reference and potentially modify the testing protocol in appendix B3 to account for flammability concerns during testing.

When refrigerants are removed from the appliances, whether destined for reclamation or disposal, they must be managed properly. One of the first steps in proper management is to determine whether or not the refrigerants are a hazardous waste under the Resource Conservation and Recovery Act (RCRA) and its corresponding regulations. It is the facility's responsibility to make this waste identification. Under the regulations, a facility may either test the waste or use knowledge to make this determination. If the material is determined to be a hazardous waste, then the facility is a hazardous waste generator and is subject to the generator regulations at 40 CFR part 261.5 or 40 CFR part 262, depending on the amount of hazardous waste generated in a month. For details on the Federal generator regulations, see *http://www2.epa.gov/hwgenerators*. Some spent alternative refrigerants such as HFC–32 most likely exhibit the hazardous waste characteristic of ignitability. This would also likely hold true for some exempt substitute refrigerants, like propane and isobutane.

In the case of household appliances, repair and disposal of hydrocarbon refrigerant would not be considered hazardous waste management because the appliance is exempt under the household hazardous waste exemption at 40 CFR 261.4(b)(1) (although States may have more stringent regulations). However, a facility must be careful not to mix the household hazardous waste with regulated hazardous waste in order for the household appliances to remain exempt.

Certifying recovery and/or recycling equipment used with substitute refrigerants is important to further implementing section 608(c)(2) and 608(a). In particular, the proposed revisions would make clear that proper use of certified equipment would be considered a good faith effort to recapture and recycle or safely dispose of non-exempt substitute refrigerants when maintaining, servicing, repairing, or disposing of an appliance, in order to comply with the prohibition on venting of substitute refrigerants. Part of making a good faith effort to recover such refrigerants involves using equipment that minimizes emissions of substitute refrigerants and prevents the mixture of substitute refrigerants and ODS refrigerants during the recovery and recycling process. It also involves using equipment that recovers refrigerant quickly enough that the recovery process can be completed in a reasonable amount of time from a given appliance. Certification of such equipment will help ensure that technicians use equipment that is suited to these goals.

EPA requests comments on whether removing earlier appendices for older equipment and using the updated AHRI standards for newly certified recovery and/or recycling equipment is appropriate. EPA also requests comments on its proposal to require all recovery and/or recycling equipment used on appliances containing substitute refrigerants (with the potential exception of flammable refrigerants) to be certified by an independent third party and on the following questions: What equipment is currently being used on appliances containing substitutes? Would providing a uniform standard for recovery and/or recycling equipment be beneficial to product manufacturers or service technicians? Has mixing of ODS refrigerants and/or substitute refrigerants been a problem using the currently available equipment? Are there any recovery devices suitable for use with flammable non-exempt refrigerants? Are there any other standards that EPA should considers before finalizing recovery standards (*i.e.,* ISO, AHRI, ASHRAE)? EPA also seeks comment on what standards should be used for the recycling and/or recovery of flammable non-exempt refrigerants like HFC–32. Comments should address the safety and efficacy of the various standards and whether the standard would facilitate or deter the use of flammable refrigerants.

3. Clarifications and Edits for Readability

EPA is proposing to reorganize § 82.158 by appliance type. EPA is also proposing to combine tables 2 and 3. Table 2 contains the levels of evacuation that must be achieved by recovery and/or recycling equipment manufactured on or after November 15, 1993, and table 3 contains levels for equipment manufactured before that date. The combined table removes inconsistencies in terminology and formatting.

EPA is also proposing to re-write § 82.158 for clarity the requirements for recovery equipment used on small appliances. In general, the requirement is that the equipment is capable of recovering 90% of the refrigerant in the test stand when the compressor of the test stand is operational and 80% of the refrigerant when the compressor of the test stand is not operational. In addition, there are secondary considerations that could allow for the certification of recovery equipment based on when that equipment was manufactured or imported. EPA's intent was to remove redundancy and not to change the standards when modifying this section.

EPA notes that the existing term is ''operating'' rather than ''operational.'' EPA discusses this proposed change above in section IV.D above where it describes the proposed changes to the evacuation requirements for small appliances.

EPA is also proposing to remove a provision stating that EPA will maintain a list of equipment certified under this section by manufacturer and model. EPA is proposing instead to require that the certified equipment testing organizations publish online a list of equipment that meets EPA requirements. This proposal is discussed in the next section of this notice.

4. Removing the Certification by Owners of Recovery and/or Recycling Equipment

EPA currently requires under § 82.162 that anyone who maintains, services, repairs, or disposes of appliances containing an ODS submit a signed statement to the appropriate EPA Regional office stating that they own

recovery and/or recycling equipment and are complying with the applicable requirements of subpart F. EPA is proposing to remove this requirement.

EPA created this provision in 1993 when the Agency first required that recovery and/or recycling equipment be certified and that technicians use certified equipment. At the time, the use and availability of recovery and/or recycling equipment was not as commonplace as it is today. Equipment certification demonstrated to EPA that equipment was available for use by certified technicians. In particular EPA was interested in the capabilities of grandfathered, or pre-1993, equipment. Since certified recovery and/or recycling equipment is commonly available, EPA no longer needs the information contained in the certification statement such as the number of service trucks and personally identifiable information of equipment owners. EPA is therefore proposing to remove this certification requirement. EPA solicits comments on this proposed revision.

H. Proposed Changes for Equipment Testing Organizations in Section 82.160

EPA relies on independent third party organizations approved by the EPA Administrator to certify that refrigerant recovery and/or recycling equipment meets the standards in subpart F. Any equipment testing organization may apply for approval so long as they can verify that they have the expertise and technical capability to verify the performance of the recovery and/or recycling equipment and have no conflict of interest with the equipment manufacturers.

EPA is proposing to make only a few substantive changes to these regulations. First and foremost, a certifying organization must have expertise to certify any new equipment affected by this proposed rule. Thus, an organization must be capable of certifying equipment that is used to recover or recycle HFCs and other substitute refrigerants. EPA is proposing to allow equipment certifying organizations that have already been approved by EPA to continue certifying equipment without need to re-apply. Organizations that are currently certified have sufficient expertise because the same expertise is needed to test equipment used on ODS and substitute refrigerants.

EPA is also proposing changes that would reduce the reporting burden for these entities. EPA currently requires a list of all certified equipment to be submitted to EPA within 30 days of the organization's approval by EPA and annually at the end of each calendar year thereafter. EPA is proposing to remove those requirements. EPA is proposing instead to require that the certified equipment testing organizations publish online a list of equipment that meets EPA requirements. This list would include the manufacturer and the name and/or serial number of a newly certified model line, which is the information that the certifying organizations must currently provide to EPA. This list must be updated no less than once per year, but an organization can choose to update the list more frequently. Making the information available online will be no more burdensome for the testing organization than submitting the list to EPA. Online publication is also a better method of communicating these findings to the public than sending the information to EPA.

EPA is also encouraging the use of electronic reporting and has established the email address *608reports@epa.gov* to receive applications from organizations seeking to be approved under this section and notifications that a previously certified model fails to meet the standards upon retesting. EPA is also proposing to remove language in the regulation stating that applications must include written information.

EPA requests comments on its proposal not to require equipment certification companies to reapply for approval so as to be able to certify equipment used with substitute refrigerants. EPA also requests comments on the proposal to remove the existing reporting requirements and instead require that certifying organizations publish lists of certified equipment online.

I. Proposed Changes to the Technician Certification Requirements in Section 82.161

1. Background

The regulations at § 82.161 currently require the certification of all individuals who service air-conditioning and refrigeration equipment containing an ODS, other than MVACs, which are addressed separately. This group includes installers, contractor employees, in-house service personnel, and anyone else who performs installation, service, maintenance, or repair that might reasonably have the opportunity to release ODS refrigerants to the environment. In addition, individuals disposing of air-conditioning and refrigeration equipment other than small appliances, MVACs, and MVAC-like appliances must be certified.

Technicians become certified by passing a test containing questions drawn from a bank developed jointly by EPA and industry educational organizations with a certification program approved by EPA. The test includes questions on the role of CFCs and HCFCs in ozone depletion, the requirements of the refrigerant recycling rule, and proper techniques for recycling and conserving refrigerant. EPA makes the question bank available to certifying organizations that demonstrate that they can properly generate, track, and grade tests; issue certificates; and keep records.

2. Extension to Substitute Refrigerants

EPA is proposing to extend the certification requirements for technicians who work with ODS refrigerants to technicians who work with non-exempt substitute refrigerants. Requiring certification of technicians who work with non-exempt substitute refrigerants is important to effectively implement and enforce both section 608(c) and section 608(a)(2).

As discussed above, section 608(c) prohibits the knowing release of substitute refrigerants during the service, maintenance, repair, or disposal of appliances, except for *de minimis* releases associated with ''good faith attempts to recapture and recycle or safely dispose'' of the refrigerants. Acts performed by an individual who has become a certified technician that comply with the applicable regulatory requirements would be defined as ''good faith attempts to recapture and recycle or safely dispose'' and thus any associated releases would qualify as *de minimis*. This interpretation is consistent with EPA's interpretation of the same statutory language as it applies to ozone-depleting refrigerants.

The technician certification program is one of the key elements in ensuring the proper recapture and recycling of refrigerant. As stated in the 1993 Rule establishing the program, a technician certification program increases the probability that technicians receive adequate training concerning the requirements of subpart F and the proper operation of recycling equipment, leading to reduced emissions through increased regulatory compliance. Certification does not prevent the violation of the venting prohibition, but it improves the likelihood of compliance through greater awareness. Certification also enhances EPA's ability to enforce against intentional noncompliance by allowing the Agency to revoke the technician's certification under the procedure in § 82.169. Finally,

certification increases fairness by seeking to ensure that all technicians are complying with the provisions of subpart F.

Persons who are not certified technicians are far more likely to intentionally or inadvertently release refrigerant. Certified technicians are much more likely to understand how and why to recover and recycle refrigerants and to have the proper equipment to do so. Technician certification helps ensure that technicians are knowledgeable in refrigerant recovery requirements and techniques. The existing regulations do not specifically prohibit an untrained individual from opening an air conditioner containing a substitute refrigerant to add a substitute refrigerant (or potentially even an ODS refrigerant, assuming a certified technician purchased the ODS refrigerant) or replace components. While the venting prohibition still applies, the individual may not even be aware that there is a prohibition against venting refrigerant. Tips reported to the Agency indicate this occurs. Requiring that anyone opening an appliance be a certified technician will reduce emissions caused by uninformed service personnel and will facilitate enforcement of the venting prohibition, especially when coupled with the proposed recordkeeping requirement discussed in section IV.D.3 of this notice.

Based on stakeholder input prior to this proposal, EPA is aware that many companies require certification of their technicians regardless of the type of refrigerant being used. The principles of proper handling, recovery, and disposal of non-exempt substitute refrigerants are similar if not identical to those for ODS refrigerants, except that additional safeguards are advisable for flammable refrigerants. The fact that some individuals may be working on non-ODS appliances without certification and without following safe handling practices places those most likely to minimize emissions at a disadvantage. One goal of this rulemaking is to incentivize the proper practices or at least remove disincentives to compliance and to environmental protection. EPA is therefore proposing to require certification for anyone working on an appliance where there is a reasonable expectation that an ODS or non-exempt substitute refrigerant will be released into the environment in the course of that work.

The mechanism by which EPA is extending the technician certification requirement to appliances containing non-exempt substitute refrigerants is through the amended definition of the terms *refrigerant* and *appliance*. As discussed in the definition section, EPA is proposing to update the term appliance to include substitutes in addition to class I and class II substances. EPA is not proposing any changes to the regulatory text in § 82.161 to effectuate this proposal.

EPA notes that this proposal would not extend the technician certification requirement to individuals servicing or disposing of appliances containing refrigerants that are exempt from the venting prohibition. However, expanding the certification program to cover those working on equipment containing non-exempt substitutes could decrease the likelihood of untrained technicians working with equipment containing any type of refrigerant, including hydrocarbons. Therefore, individuals would not need to be certified under section 608 of the CAA to work on hydrocarbons in those specific end-uses and appliances approved under SNAP. EPA discusses whether the agency should initiate a rulemaking in future to require certification of technicians using exempt substitutes in Section VI of this preamble.

Consistent with the discussion in Section III above, requiring certification for technicians who work with substitute refrigerants is also necessary to implement the section 608(a) requirements for EPA to promulgate regulations that reduce emissions of class I and II refrigerants to the lowest achievable levels and maximize recapture and recycling of such substances. Technician certification requirements for handling substitute refrigerants would directly reduce some releases of class I and II refrigerants. It would also protect against refrigerant mixture, which otherwise is likely to cause additional releases of class I and II refrigerants.

Failure to require technician certification may lead to increased emissions and reduced recycling of ozone-depleting substances, especially if the person who is violating the refrigerant circuit is not aware of refrigerant recovery requirements and best practices. Uncertified technicians working primarily with HFCs or other substitutes may overlook the restrictions on their ability to work with ozone-depleting refrigerants. Because of the absence of a certification requirement for substitute refrigerants they might be unaware of the existence or scope of the restrictions. Thus, they might fail to recover or recycle class I and class II refrigerants properly, if at all.

Uncertified technicians are currently able to purchase HFC and other substitute refrigerants which they could end up using to retrofit appliances containing ozone-depleting substances. Such uncertified technicians may be more likely to vent the ozone-depleting substance prior to retrofitting, given their probable lack of knowledge and the fact that return of the substance to a reclaimer would reveal that they were handling it illegally. Failure to require technician certification to work with substitute refrigerants is also likely to encourage the inappropriate mixture of substitute and ozone-depleting refrigerants. In this scenario, refrigerant mixture could occur because uncertified technicians might wish to service CFC or HCFC equipment, but would have access only to HFCs due to the sales restriction on ODS refrigerants. Lacking proper education or knowledge, these technicians would probably have a poor understanding of the consequences of mixing refrigerants, and would therefore be more likely than certified technicians to add HFCs to CFC or HCFC systems.

The consequences of such inappropriate mixture include significant losses in performance and energy efficiency in equipment serviced with mixed refrigerants, damage to equipment, the lost value of the mixed refrigerant (which is at best difficult, and often impossible, to separate into the component refrigerants), and costs for destroying mixed refrigerants. Refrigerant mixture also leads both directly and indirectly to refrigerant release. Mixture leads directly to release because mixtures of certain refrigerants, such as R–22 and R–134a, have higher pressures than either component alone. Thus, pressure-sensitive components such as air purge devices on recycling machines and relief devices on appliances may be activated by these mixtures, venting the refrigerant to the atmosphere. Purge devices in particular are often set to open when the pressure of the recovery cylinder's contents rises more than 5–10 psi above the expected saturation pressure for the refrigerant; this margin is exceeded by R–22/R–134a mixtures containing more than ten percent of the contaminating refrigerant.

Refrigerant mixture also reduces recycling and leads indirectly to release. First, mixed refrigerants not only lose their value but cost money to reclaim or destroy, which could provide a financial incentive for illegal venting. Second, the direct releases and equipment breakdowns caused by contamination lead to increased equipment servicing, which itself leads to unavoidable releases of refrigerant. Thus, failure to impose a certification requirement on persons working with substitute refrigerants would increase the

probability of both substitute and ozone-depleting refrigerants being emitted to the atmosphere.

For these reasons, EPA is proposing a technician certification requirement for persons working with non-exempt substitutes in order to further implement sections 608(a) and 608(c), using the authority under these sections. EPA requests comments on the likelihood that failure to impose a technician certification requirement on persons working with HFCs and other substitutes would lead to release and mixture of both ozone-depleting refrigerants and substitutes.

3. Updated Test Bank

EPA is planning to update the technician certification test bank with more questions on handling substitutes, including flammable substitute refrigerants, and on the impacts of climate change. While this is not a regulatory change—the Agency can update the test bank when appropriate without promulgating a new regulation—it aligns with EPA's proposal to extend the refrigerant management regulations to substitute refrigerants. Currently, the questions focus on CFCs and HCFCs, even though CFCs have been phased out for nearly twenty years and the predominant HCFC, HCFC–22, will be phased out by 2020.

EPA has begun reviewing the test bank and consulting with certification and training organizations to identify questions that should be updated, replaced, or removed, with an eye toward questions on the proper handling and recovery of HFCs and other substitute refrigerants. The updated test bank will incorporate new and revised elements of the National Recycling and Emission Reduction Program that are being proposed in this action, once finalized. For this reason, EPA is waiting to update the test bank until after this rule is finalized.

EPA intends to use a similar process to the one used when initially creating the test bank. EPA will work with industry and trade associations to develop and evaluate new questions as well as remove or update questions that may be out of date. EPA invites participation from the regulated community in this process.

J. Proposed Changes to the Technician Certification Program Requirements in Section 82.161

1. Background

The current regulations at § 82.161 require that organizations operating technician certification programs must apply to EPA to have their programs approved. The application process ensures that technician certification programs meet minimum standards for generating, tracking, and grading tests as well as keeping records. Approved technician certification programs must keep records of the names of technicians they have certified and the unique numbers assigned to each technician certified through their programs. These records allow both the Agency and the certification program to verify certification claims and to monitor the certification process. Approved technician certification programs also must submit reports to EPA every six months containing the pass/fail rate and testing schedules. Such reports allow the Agency to evaluate certification programs and modify certification requirements if necessary.

2. Extension to Substitute Refrigerants

EPA is proposing to require that technicians who work with non-exempt substitute refrigerants be certified. By extension, EPA is proposing to require that technician certification programs offer tests for those technicians. This should not require significant changes to current practices other than using the updated test bank and the changes discussed below. EPA is not proposing as a lead option to require certification programs to recertify based on this or any other proposed changes in this rule, but seeks comments on whether such recertification requirements would be appropriate.

3. Technician Database

In developing this proposed rule, EPA asked technician certification programs whether the Agency should establish a national database of certified technicians. EPA considered creating a database to reduce the burden currently facing the Agency and technician certification programs in assisting technicians who have lost their certification cards. EPA receives on average five inquiries a day from technicians who are seeking a copy of their card. EPA does not maintain records of who has been certified; this is currently the responsibility of the certification programs. EPA can only direct technicians to a list of the approved certification programs on the Agency's Web site, but in some cases the technician does not remember the name of the program that issued their card. EPA is aware that many certification programs also get numerous inquiries from technicians.

Establishing a publicly searchable database would help technicians find replacement certification cards. Certification programs themselves are generally better suited to maintain such information. Currently, certification programs must maintain records of the names and addresses of all individuals taking the tests, as well as the scores, dates, and locations of all administered tests. A publicly-available database that contains components of these records should be sufficient for a technician to locate themselves. EPA is proposing that this database, which could be as simple as a list, contain the first name, middle initial, and last name of the certified technician, the technician's city of residence when taking the test, the type(s) of certification received, and the date each certification test was completed. EPA is proposing to exempt Federal government-run programs from this requirement because the public release of government and military personnel names linking them to their Federal employment could present significant privacy and security concerns, especially for military and other government personnel who may be based, deployed, or traveling to hostile regions throughout the world.

Because this database is primarily for the benefit of the technician, EPA is offering the option for the technician to opt out. The technician certification program must therefore provide notice to technicians that they will be included in that database and give technicians the ability to opt out. EPA seeks comment on whether technicians should be allowed to opt out.

EPA is not proposing to require that certification programs list everyone currently in their records. While this may assist current technicians who have lost their cards, listing the hundreds of thousands of technicians certified over the last twenty-two years could be overly burdensome. This would also not provide technicians with the opportunity to opt out. Therefore, EPA is proposing that the certification programs only be required to include technicians certified after the effective date of a rule finalizing this proposal. EPA would encourage certification programs to work with technicians they have previously certified to see if they could be added to an online database or list.

EPA is not proposing to require any specific format for providing this database or list. EPA is aware that some certifying organizations already provide this information online to their technicians and the Agency does not intend to require that they change how they offer the information so long as the required data elements are included.

An online database or list of certified technicians can also assist refrigerant

wholesalers to enforce the sales restriction. For example, if a vendor has any doubt about a new customer, they could confirm that the technician is certified by comparing the customer's ID with the information online. The online information can also be printed and maintained as a record by the vendor.

EPA invites comments on the proposal to require certifying organizations to publish and maintain an online searchable database or list of technicians they certify going forward. EPA requests comments on whether such databases could be useful to technicians and refrigerant wholesalers while allowing for preservation of technicians' privacy as afforded by the Privacy Act. EPA also seeks comment on whether it should allow technicians to opt out of being included on a public list.

4. Grandfathering Provisions

EPA is proposing to remove provisions related to voluntary certification programs at § 82.161(g). This program was created to allow technicians who were trained prior to the establishment of approved technician certification programs to be recognized as certified technicians. In order to have their voluntary programs considered for approval, applications both for approval as a technician certification program and for approval as a voluntary program were due in 1994. EPA is proposing to remove this provision because it is expired and no longer necessary.

5. Certification Cards

EPA is proposing to change the required text that is printed on certification cards. Currently, the card states that ''[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.'' Some organizations believe that the language used on the certification card implies that a technician as defined in subpart F may be trained in other aspects of equipment installation.

The primary purpose of the 608 certification card is for a technician to prove to a vendor that they understand the environmental impacts of mishandling refrigerants. While this certification also grants an individual the right to maintain, service, repair, or dispose of appliances, the 608 exam is less focused on the operational and engineering aspects of refrigeration and air-conditioning equipment.

EPA is proposing to amend the language found on the certification card to more accurately reflect the knowledge needed to obtain the certification. Therefore, EPA is proposing that the card read ''[Name of person] has successfully passed a [Type I, Type II, Type III, and/or Universal, as appropriate] exam on how to responsibly handle refrigerants as required by EPA's National Recycling and Emission Reduction Program.'' EPA stated in the 1993 Rule establishing the Technician Certification requirements that standardized language will decrease administrative costs and aid in enforcement. In addition it would ease burden on refrigerant wholesalers who must inspect the cards to verify the certification of technicians. Updating the information on the certification card should not result in any new administrative costs or generate confusion.

The requirements for certification cards appears in both § 82.161 and appendix D. EPA is proposing to remove the redundant requirement from § 82.161 and make the updates proposed in this section to appendix D, as descried in more detail below.

6. Updates to Appendix D

EPA is proposing minor edits to appendix D ''Standards for Becoming a Certifying Program for Technicians.'' EPA is proposing that the description of test contents includes the environmental impact of not just ODS but also substitute refrigerants. EPA is also proposing to remove outdated, redundant, or self-explanatory provisions. This includes removing paragraphs (i) through (k) on approval process, grandfathering, and sample application. EPA is proposing to remove the reference that EPA will periodically publish information on the fees charged by the programs as the Agency no longer collects this information. To protect the private information of technicians and minimize the potential for fraud, EPA is also proposing to remove social security numbers as an acceptable form of identification for Type I technicians using the mail-in format and state that social security numbers cannot be used in the unique certification number assigned to newly-certified technicians. EPA is also proposing clarifying changes and other small changes, including changing the reporting deadline from June 30 of each year to July 30 of each year.

Finally, to help technicians better identify who certified them, EPA is also proposing to require that certifying organizations provide a hand-out or electronic communication to technicians after they have taken the test explaining who provided the training, who to contact with questions, and when they should expect to receive their score, and if they passed, their certification cards. EPA requests comments on the proposed revisions to appendix D.

7. Edits To Improve Readability

EPA is proposing to make minor edits to improve the readability of this section. Notably, EPA is proposing to divide the requirements into two sections. The first would be provisions related to responsibilities of technicians and the second would be provisions related to technician certification programs. It is not EPA's intent to place new requirements on either party through this reorganization of content.

EPA also considered proposing to incorporate the provisions of appendix D into § 82.161 itself and removing appendix D in its entirety but is not proposing to do so at this time. EPA invites comments on the revised language.

K. Proposed Changes to the Reclamation Requirements in Section 82.164

1. Background

The regulations at § 82.164 currently require that anyone reclaiming used ODS refrigerant for sale to a new owner, except for people properly certified under subpart F prior to May 11, 2004, is required to reprocess refrigerant to standards laid out in appendix A (based on ARI Standard 700–1995, *Specification for Fluorocarbons and Other Refrigerants*), release no more than 1.5 percent of the refrigerant during the reclamation process, dispose of wastes from the reclamation process in accordance with all applicable laws and regulations, and adhere to specific recordkeeping and reporting requirements.

2. Extension to Additional Substitute Refrigerants

EPA is proposing to extend the reclamation standards for refrigerants in appendix A to additional non-ozone-depleting substitutes. Most of the refrigerants addressed in appendix A are single component ODS refrigerants or a blend containing an ODS component, with a few exceptions such as R–407C and R–410A. It is appropriate to update this 1995 standard to ensure that refrigerants developed in the last twenty years are reclaimed properly. While standards have been developed for these new refrigerants, reclaimers may not have to achieve such standards without that standard being incorporated into the subpart F regulations.

In a recent proposed rule to issue allowances for the production and

import of HCFCs, EPA sought comments on referencing AHRI Standard 700–2012 *Specification for Fluorocarbon Refrigerants* directly, a practice known as incorporation by reference, rather than reproducing the standard in appendix A (78 FR 78095; December 24, 2013). EPA noted at the time that incorporation by reference, and deletion of the text in appendix A, has several advantages. AHRI standards are published, widely known to and used by the persons affected by this regulation, and available free of charge online at *www.ahrinet.org/standards.aspx*. Referencing the AHRI standard, in lieu of duplicating it in appendix A, would reduce potential confusion about the relationship between the two sets of requirements. On the other hand, EPA recognizes that there is an advantage to including the requirements of the standard in an appendix to the regulation, avoiding the need to search for the specific version of the AHRI standard referenced, and providing certainty that compliance with appendix A (although possibly outdated) constitutes compliance with EPA regulations.

In response to EPA's proposal, five commenters supported using the updated testing procedures and protocols, while six commented that the newer halogenated unsaturated volatile impurities limit of 40 ppm by weight (0.004% by wt), as compared to the previous limit of 0.5% by weight, created undue expense and difficulty for reclaimers to achieve. Those commenters noted that ASHRAE and AHRI were still conducting further studies on the unsaturates limit. In the final rule issuing HCFC allowances, EPA did not incorporate AHRI 700–2012 by reference, noting concerns about the unsaturates limit and the ongoing unsaturates study (79 FR 64281; October 28, 2014).

At this time, recognizing that the unsaturates study has not been finalized, EPA is proposing to update appendix A to include HFCs, PFCs, HFOs, and other refrigerants based on the standards contained in AHRI Standard 700–2015, *Specifications for Refrigerants,* while keeping the unsaturates limit to be 0.5% by weight. If the unsaturates study is published before this final rule is issued, EPA would consider incorporating the full standard by reference.

EPA seeks comments on whether the updated standard, AHRI Standard 700–2015 *Specifications for Refrigerants,* along with Appendix C to AHRI–700 2015, should be directly incorporated by reference, or whether appendix A should be updated to include HFCs, PFCs, HFOs, and other refrigerants based on the 2015 version of the AHRI 700 standard, including the appendix. EPA also seeks comment on whether the agency needs to keep section 5.3.2 titled ''Alternative Method'' in Appendix A to subpart F.

3. Changes to Recordkeeping and Reporting

Under the current regulations at § 82.164(b), reclaimers must certify that the refrigerant reclaimed meets the specifications in AHRI Standard 700–1995 using the analytical methodology prescribed in appendix A. In addition to updating the standard to AHRI Standard 700–2015, EPA is proposing to clarify that the analysis must be conducted on each batch of refrigerant being reclaimed. EPA is also proposing to require that reclaimers maintain records of these analyses. Requiring reclaimers to maintain records helps to ensure that refrigerant is being reclaimed to the appropriate specifications. Reclaimers currently analyze by batch, and already generate records when doing so, so these proposed changes update the regulations to reflect current practices and clarify the existing requirements for ODS, and do not add additional burden.

EPA is also proposing to specify that all recordkeeping and reporting requirements for reclaimers be maintained by refrigerant type (*i.e.* ASHRAE number), as information kept in this format will provide more clarity on the types and quantities of refrigerants being reclaimed when aggregated information is reported. EPA is also clarifying what aggregate information must be reported annually to the Agency, and removing a redundant recordkeeping provision related to that report.

EPA requests comments on these proposed changes to the recordkeeping and reporting provisions.

4. Clarifications and Edits for Readability

EPA is proposing to consolidate provisions related to refrigerant reclaimers into a single section. Specifically, EPA is proposing to move prohibitions found in § 82.154(i) and recordkeeping and reporting requirements found in § 82.166(g) and (h) into § 82.164. This proposal also clarifies what is required of the reclaimer. The current regulation requires a reclaimer to certify that he or she will meet a certain set of standards and engage in certain behaviors. The revised regulation requires first that a reclaimer meet those standards and behaviors and second that they certify to having done so. EPA is making this change to improve the enforceability of these provisions. None of these underlying requirements themselves would change, other than the updated AHRI standard and that the clarification that the analysis be conducted on each batch of refrigerant, as discussed above.

L. Proposed Changes to the Recordkeeping and Reporting Requirements in Section 82.166

1. Background

The current regulations include all recordkeeping and reporting provisions in one section of subpart F (§ 82.166). While having all the provisions in one place is useful, the individual pieces are separated from the required practices that the records/reports are intended to help enforce. This can create confusion for the regulated community when they are trying to understand what they must do and what records they must keep to remain in compliance with the section 608 requirements. This is especially true when a recordkeeping or reporting provision directly references a requirement in another section of subpart F. To improve the readability and clarity of the recordkeeping and reporting provisions, EPA is proposing to move the requirements that are currently in § 82.166 to the relevant section describing the required practices. For example, EPA is proposing to move the amended recordkeeping and reporting requirements for Appliance Maintenance and Leak Repair to the section where those required practices are listed, specifically § 82.157. This should allow the regulated community to more easily align the required practices with their recordkeeping/reporting obligations without having to reference requirements in other sections. EPA summarizes the amended recordkeeping and reporting provisions below. EPA is also proposing a new recordkeeping and reporting requirement for anyone disposing of appliances with between five and 50 pounds of refrigerant.

2. Summary of Recordkeeping Provisions

EPA has developed numerous recordkeeping requirements to document compliance with the section 608 regulations. A summary of the proposed requirements is included below. Please refer to other sections of this notice to read about the proposed changes to the existing requirements. All of the proposed requirements would apply to all refrigerants unless the refrigerant is exempt from the venting prohibition. Unless otherwise noted, all

records must be maintained for at least three years.

• *Disposal of Small Appliances, MVACs, and MVAC-like Appliances:* Persons who take the final step in the disposal process of such appliances must keep a copy of all the signed statements indicating refrigerant was recovered properly. This statement must include the name and address of the person who recovered the refrigerant and the date the refrigerant was recovered. Alternatively, the statement may be a signed contract stating that the supplier will recover any remaining refrigerant from the appliance prior to delivery.

• *Disposal of Appliances Containing Five to 50 Pounds of Refrigerant:* Persons evacuating refrigerant from appliances normally containing five to 50 pounds of refrigerant for purposes of disposal of that appliance must maintain records documenting their company name, location of the equipment, date of recovery, amount and type of refrigerant recovered for each appliance and the quantity and type of refrigerant transferred for reclamation and/or destruction.

• *Leak Inspection:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant must maintain documentation from quarterly or annual leak inspections that includes the date of inspection and the component(s) where leaks were discovered. Alternatively, owners or operators may install an automatic leak detection system and maintain records showing that the system is calibrated annually.

• *Extension Requests to the Periodic Leak Inspection Requirement:* Owners or operators of federally-owned appliances containing 50 or more pounds of refrigerant must maintain copies of extension requests submitted to EPA to conduct leak inspections less frequently until three years after the less frequent leak inspection schedule is no longer being followed.

• *Full Charge:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant must maintain records documenting what the full charge amount is for appliances with 50 or more pounds of refrigerant. The record for the current full charge must be maintained until three years after the appliance is retired.

• *Service Records Provided by Technicians:* Persons adding or removing refrigerant from an appliance normally containing 50 or more pounds of refrigerant must provide the owner or operator with documentation containing the identity and location of the appliance; the date and type of maintenance, service, repair, or disposal performed; the name of the person performing the maintenance, service, repair or disposal; the amount and type of refrigerant added to or removed from the appliance; the full charge of the appliance; and the leak rate and the method used to determine the leak rate (unless disposing of the appliance).

• *Service Records Maintained by Owners and Operators:* The appliance owner or operator must maintain service records provided by technicians and the identification of the owner or operator of the appliance; the full charge of the appliance and the method for how full charge was determined; the original range for the full charge of the appliance, its midpoint, and how the range was determined (if using method 4, as described in § 82.152, for determining full charge); any revisions of the full charge and how they were determined; and the dates such revisions occurred.

• *Verification Tests:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant must maintain records of the dates, types, and results of all initial and follow-up verification tests. Under this proposed rule, this would apply to all types of equipment, not just IPR.

• *Retrofit/Retirement Plans:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant that cannot be repaired must maintain retrofit or retirement plans. The plan must, at a minimum, contain the following information: Identification and location of the appliance; type and full charge of the refrigerant used; type and full charge of the refrigerant to which the appliance will be converted, if retrofitted; itemized procedure for converting the appliance to a different refrigerant, including changes required for compatibility with the new substitute, if retrofitted; plan for the disposition of recovered refrigerant; plan for the disposition of the appliance, if retired; and one-year schedule for completion of the appliance retrofit or retirement.

• *Extension Requests to Repair or Retrofit/Retire Appliances:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant must maintain copies of extension requests.

• *Mothballing:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant that mothball an appliance must keep records documenting when the system was mothballed and when they add refrigerant back into the appliance.

• *Purged Refrigerant:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant that exclude purged refrigerant that are destroyed from their leak rate calculation must maintain records to demonstrate that a 98 percent or greater destruction efficiency is met. At a minimum this includes flow rate, quantity or concentration of the refrigerant in the vent stream, and periods of purge flow.

• *Lists of Certified Recovery Equipment and Testing Results:* Organizations that are approved to certify refrigerant recovery and/or recycling equipment must maintain records of equipment testing and performance and a list of equipment that meets EPA requirements. These records must be maintained for three years after the equipment is no longer offered for sale.

• *Proof of Certification for Technicians:* Technicians who have passed the section 608 Type I, II, III or Universal test, must keep a copy of their certification at their place of business. These records must be maintained for three years after a certified individual no longer operates as a technician.

• *Sales Restriction:* Anyone selling ODS or substitute refrigerant must document the name of the purchaser, the date of sale, and the quantity of refrigerant purchased. In instances where the buyer employs a certified technician, the seller must keep the information provided by the buyer that at least one technician is properly certified. Copies of technician certifications must be maintained for at least three years after a technician or person employing a technician stops purchasing refrigerant.

• *Small Cans of Refrigerant for MVAC Servicing:* Anyone manufacturing small cans of refrigerant with a self-sealing valve must maintain records verifying that the self-sealing valves do not leak more than 3.00 grams per year when the self-sealing valve is closed as required in the newly-proposed Appendix E to subpart F. Records must be maintained for three years after a certified product is no longer offered for sale.

• *Technician Certification Programs:* Organizations that certify technicians must maintain records of who they certify, the scores of all certification tests administered, and the dates and locations of all tests administered. These records must be maintained as long as they are in operation, not just for three years.

• *Reclaimers:* Reclaimers must maintain records of the analyses conducted to verify that reclaimed refrigerant meets the necessary specifications. On a transactional basis, 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) by refrigerant type sent to them for reclamation.

EPA requests comments on the clarity and necessity of these recordkeeping provisions to ensure compliance with the section 608 regulatory requirements.

4. Summary of Reporting Provisions

EPA has also proposed several reporting provisions. Reporting is an important component of the National Recycling and Emission Reduction Program and allows EPA to track compliance with the requirements. In this action, EPA has attempted to propose reporting requirements only when necessary to avoid significantly increasing burden on the regulated community. A summary of the proposed reporting requirements is included below. All of these reporting requirements are new for non-exempt substitute equipment. However, all of the proposed requirements are similar to those that exist currently for ODS equipment. Additionally, EPA has proposed to remove the requirement (1) for technicians to certify to the Administrator that they own certified refrigerant recovery equipment and (2) for programs certifying recovery and/or recycling equipment to report to EPA annually on the equipment they approve. Both of these requirements are no longer needed. Unless the information is claimed as confidential business information or as otherwise noted, all notifications must be submitted electronically to *608reports@epa.gov.* Electronic submission of reports should decrease burden on both EPA and the regulated community.

- *Extensions to the 30-day or 120-day Leak Repair Requirement:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant must notify EPA when seeking an extension of time to complete repairs. The request must include the following information: Identification and address of the facility; the name of the owner or operator of the appliance; the leak rate; the method used to determine the leak rate and full charge; the date a leak rate above the applicable leak rate was discovered; the location of leak(s) to the extent determined to date; any repair work that has been performed thus far, including the date that work was completed; the reasons why more time is needed to complete the repair; and an estimate of when the work will be completed.
- *Extensions to Retrofit or Retire Appliances:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant must notify EPA when seeking an extension of time to complete a retrofit or retirement.
- *Purged Refrigerant:* Owners or operators of appliances normally containing 50 or more pounds of refrigerant that exclude purged refrigerant that are destroyed from their leak rate calculation must provide a one-time report to EPA that includes the identification of the facility and a contact person; a description of the appliance; a description of the methods used to determine the quantity of refrigerant sent for destruction and type of records that are being kept; the frequency of monitoring and data-recording; and a description of the control device, and its destruction efficiency.
- *Extensions to the Periodic Leak Inspection Requirement:* Owners or operators of federally-owned appliances containing 50 or more pounds of refrigerant must submit a request to EPA if they wish to conduct leak inspections less frequently than quarterly or annually (depending on the full charge and type of appliance). The extension request must show that the appliance has a minimal history of leakage, and is remotely located or is otherwise difficult to access for routine maintenance. Additionally, the extension request should explain why automatic leak detection equipment could not be used and what leak inspection schedule would be reasonable given the circumstances (not to be less frequent than one inspection every three years).
- *Requesting Approval to Certify Recovery/Recycling Equipment:* Any organization wishing to certify refrigerant recovery and/or recycling equipment must submit an application to EPA. Applications must include information on the facilities used, the qualifications, experience and procedures used to perform certifications, and that there are no conflicts of interest in certifying equipment.
- *Previously-certified Recovery/Recycling Equipment:* Organizations that are approved to certify refrigerant recovery and/or recycling equipment must inform EPA if subsequent tests indicate a previously-certified recovery and/or recycling device does not meet EPA requirements.
- *Technician Certification Programs:* Any organizations wishing to certify technicians under section 608 must submit an application to EPA describing how they will meet all the required standards in appendix D. Organizations that certify technicians must publish online lists/databases of the people that they certify. Organizations must report to EPA twice a year the pass/fail rate and testing schedules. If a previously-approved technician certifying organization stops certifying technicians for any reason, they must ensure those records are transferred to another certifying program or EPA. Organizations that receive records from a program that no longer offers the certification test must inform EPA within 30 days of receiving these records. The notification must include the name and address of the program to which the records have been transferred.
- *Reclaimer Certification:* Any organization that wishes to reclaim refrigerants must certify to EPA that they will reclaim refrigerants to the required purity standards (based on AHRI Standard 700–2015), verify each batch of refrigerant they sell meets those standards, not release more than 1.5 percent of the refrigerant they receive during the reclamation process, dispose of wastes from the reclamation process in accordance with all applicable laws and regulations, and maintain records as required.
- *Reclaimer Change of Business Information, Location or Contact Information:* If a reclaimer changes address or management, they must notify EPA within 30 days. Since reclaimer certification is not transferable, if ownership changes, the new owner must certify to EPA that they will meet the reclaimer certification requirements.
- *Amounts Reclaimed:* Reclaimers must report annually the aggregate quantity of material sent to them for reclamation (the combined mass of refrigerant and contaminants) by refrigerant type, the mass of each refrigerant reclaimed, and the mass of waste products.

EPA seeks comments on the clarity and necessity of these reporting requirements to ensure compliance with the section 608 regulatory requirements.

M. Proposed Effective and Compliance Dates

EPA is proposing that the final rule become effective on January 1, 2017. However, EPA recognizes that for certain requirements, stakeholders will likely need additional time to comply. The below paragraphs describe the requirements for which EPA is proposing a delayed compliance date and the specific time periods EPA is considering. In addition to those compliance dates discussed below, EPA seeks comments on whether other portions of the revised regulations

should have earlier or later compliance dates.

1. Proposed Section 82.154(c)—Sale of Small Cans of Refrigerant for MVAC Servicing

For manufacture and import of small cans of refrigerant for MVAC servicing, EPA is proposing a compliance date of one year from publication of the final rule. EPA is also proposing to allow small cans manufactured and placed into initial inventory or imported before that date to be sold for one additional year. For example, if the rule is published on July 1, 2016, small can manufacturers would have until July 1, 2017, to transition their manufacturing lines to add self-sealing valves. Manufacturers, distributors, and auto parts stores would be able to sell all small cans manufactured and placed into initial inventory or imported prior to July 1, 2017, until July 1, 2018. EPA seeks comments on this proposed implementation timeline.

2. Proposed Section 82.155—Safe Disposal of Small Appliances, MVAC, and MVAC-Like Appliances

For the revisions to the requirements for the recovery of refrigerant prior to disposal/recycling of small appliances, EPA is proposing a compliance date of one year from publication of the final rule. This should provide time for final disposers such as scrap recyclers to learn about the updated requirement, make any adjustments needed to start maintaining records associated with disposal of appliances containing non-exempt substitutes, and to obtain certified recovery equipment for use with non-exempt substitutes.

EPA is not proposing more than one year because (1) EPA is not proposing significant changes to the requirements for the recovery of refrigerant prior to disposal/recycling of small appliances, MVAC, MVAC-like appliances, (2) final disposers/recyclers of these appliances already must in effect recover HFCs and other non-exempt substitutes prior to disposing of an appliance, and (3) the existing recordkeeping systems and practices used by final disposers can be used to implement the safe disposal requirement to appliances containing non-exempt substitutes. EPA seeks comments on this proposed implementation schedule.

3. Proposed Section 82.156—Proper Evacuation of Refrigerant From Appliances

For proposed provisions related to the evacuation of refrigerant before maintenance, servicing, repair, and disposal of appliances, EPA is proposing a compliance date of one year from publication of the final rule. This would provide time for affected entities to learn about the required practices, set up a recordkeeping program to track the amount of refrigerant recovered from appliances that are disposed of in the field, and to obtain certified recovery equipment for use with non-exempt substitutes. EPA seeks comments on this proposed implementation schedule.

4. Proposed Section 82.157—Appliance Maintenance and Leak Repair

EPA is proposing significant revisions to the leak repair provisions, including lowering the applicable leak rate, requiring leak inspections, and modifying the recordkeeping requirements. Because these changes are extensive, EPA is proposing a later compliance date for the appliance maintenance and leak repair requirements than for most other proposed provisions. EPA is proposing a compliance date 18 months from publication of the final rule. This would give owners and operators of appliances with 50 or more pounds of refrigerant time to learn about the updated requirements; update systems, standard operating procedures, and training materials to best implement the requirements; and fix leakier systems prior to the more stringent requirements taking place. EPA could consider a shorter or longer timeframe by approximately six to twelve months (in other words, the compliance dates could be between six months and two and half years after a final rule is published in the **Federal Register**), but would need commenters to provide details on why the shorter or longer timeframe is warranted (*e.g.,* cost, logistics, environmental effects, or other verifiable and compelling rationales). EPA seeks comments on its proposed compliance date for the appliance maintenance and leak repair provisions.

5. Proposed Section 82.161—Technician Certification Requirements

EPA is proposing that the compliance date for the revisions to § 82.161 be one year after publication of a final rule. Providing more time will allow EPA to update the test bank and certifying organizations to update their tests to use the updated questions. EPA does not anticipate that more than one year would be necessary because HVACR contractors are generally working on both ODS refrigerants and non-exempt substitute refrigerants, and there is not likely to be a rush of contractors needing to be certified. EPA is also proposing to require that any person certified as a technician on January 1, 2017, or later be included in a publicly-accessible database of certified technicians. Under the proposed timelines, technician certification programs would have to make this database available starting January 1, 2018. EPA seeks comments on these proposed compliance dates.

6. Sunset Dates for Requirements That Will Be Superseded in Future

For the majority of the requirements in this rule, the new requirements will apply as of the effective date of the rule. For requirements with a delayed compliance date, EPA intends to indicate when those requirements will apply. EPA is proposing to sunset the corresponding existing requirements as of the dates the new requirements apply. EPA seeks comments on other approaches.

V. Economic Analysis

While selecting regulatory actions that would achieve the goals of this proposed rule, EPA considered the costs of different actions to individual entities and the United States economy as a whole. A full description of the cost analyses is included in the technical support document *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program,* which can be found in the docket.

To estimate the incremental costs of the proposed regulatory changes, the Agency developed a set of model entities with a distribution of different model facilities, each of which could contain a set of model appliances. This set of model entities was used to represent the potentially affected entities in a variety of economic sectors in the United States, and they were developed based on EPA's Vintaging Model and cross-checked with a large dataset of repair records developed under California's RMP. Each model entity reflects information about the typical number of facilities in a given sector and size category and the number of pieces of equipment in each equipment category that are likely to be owned and/or operated by each facility. By combining the model entities with economic data on potentially affected industries from the United States Census, EPA obtained a model for the potentially affected population. By applying the costs of leak inspections, repairs, recordkeeping and reporting, self-sealing cans for MVAC servicing, and other regulatory changes to this population, EPA estimated the costs to individual entities and the total cost to the economy.

Some proposed regulatory changes in this action, *e.g.* providing extensions to owners or operators of comfort cooling and commercial refrigeration before having to replace leaking appliances, would reduce the cost of compliance to owners of ODS-containing equipment. These reductions were included in the incremental cost of the proposed action.

Based on this analysis, EPA estimates that the total annual cost to comply with the proposed requirements is $63 million (all costs in 2014 dollars); this includes $61 million in cost to owners and operators of equipment using HFCs, and $2 million for those using ODS. Total annualized costs includes new compliance costs of approximately $113 million associated with the proposed rulemaking, less avoided compliance costs of approximately $50 million associated with the proposed removal of some existing regulatory requirements and provision of additional flexibility that are expected to reduce regulatory burden. The distribution of aggregate costs among different economic sectors and among the regulatory changes is detailed in the technical support document.

Some proposed regulatory changes would reduce financial outlays by owners or operators of air-conditioning and refrigeration equipment, for example, by reducing the amount of refrigerant lost to leaks and thus saving equipment owners or operators the cost of purchasing more refrigerant to replace it. For the money saved in refrigerant purchases alone, EPA estimates that affected entities would avoid spending over $52 million due to the proposed regulatory changes. Thus, the compliance costs and refrigerant savings combined are estimated to be $11 million per year. The financial outlay from affected entities would additionally be lower because appliances running with the correct amount of refrigerant are generally more energy efficient to operate and last longer.

The aggregate costs and savings for the economy as a whole given above would not be expected to be distributed evenly across affected entities. For example, owners of equipment containing ODS that leak at a rate less than 5% of their full charge per year might only incur costs for recordkeeping. However, owners of equipment containing HFCs that leak at a rate of 30% of their full charge per year might incur costs of repairing leaks, while also realizing savings due to reduced refrigerant replacement purchases.

Under the Small Business Regulatory Enforcement Fairness Act (SBREFA), Federal agencies must consider the effects regulations may have on small entities. If a rule may have a significant economic impact on a substantial number of small entities (SISNOSE), the Agency would be required to take certain steps to ensure that the interests of small entities were represented in the rulemaking process. To determine if this was necessary, EPA used the model's entity analysis to ascertain the likelihood that the proposed changes would have a SISNOSE. EPA estimates that approximately 140 of the approximately 950,000 affected small businesses could incur costs in excess of 1% of annual sales and that fewer than 80 small businesses could incur costs in excess of 3% of annual sales. These levels are below the thresholds used in other Title VI rulemakings under which it can be presumed that an action will have no SISNOSE. Nevertheless, EPA consulted numerous stakeholders, including small businesses, in the development of this proposed rule.

The full description of the cost analyses, including sensitivity analyses of key assumptions and alternate proposed options, is included in the technical support document *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program,* which can be found in the docket for this action. EPA specifically requests comments on all aspects of that analysis.

VI. Possible Future Changes to Subpart F

In addition to the proposals outlined in this notice, EPA is also seeking input on other aspects of the National Recycling and Emission Reduction Program. EPA is not proposing these changes at this time, but specifically solicits comments on whether the ideas have merit and how the potential changes might be implemented in a future rulemaking.

A. Appliance Maintenance and Leak Repair

In meetings with stakeholders prior to the issuance of this proposed rule, EPA discussed the possibility of establishing a voluntary program for supermarkets based on their corporate-wide average leak rate (CWALR) instead of focusing on the leak rate of each individual appliance. The Agency and several stakeholders indicated that there could be value in regulating commercial refrigeration appliances at the corporate level instead of the individual appliance level. Currently, owners and operators of commercial refrigeration equipment must repair leaks on equipment with 50 pounds or more of refrigerant within 30 days if the leak rate is above 35%, and EPA is proposing in this notice to lower this leak rate to 20%. Under a program like this, EPA could relax the existing leak repair requirements for individual commercial refrigeration appliances if a supermarket chain was able to keep their CWALR below a certain level (for example, 15%) for a full calendar year.

Supermarkets would still have to keep records of refrigerant additions and the full charge of each appliance, but they would not be required to follow the other requirements for commercial refrigeration facilities under the amended § 82.157. For example, if an appliance was leaking more than 20%, they would not have to repair it within 30 days so long as their CWALR was below 15% (or some other level) in the previous calendar year. However, they would have to report to EPA annually their total refrigerant additions, their corporate-wide full charge, and the facilities that are included in the full charge. EPA would use this information to determine if their corporate-wide leak rate was below the required level. If it was not, the supermarket chain would have to follow the requirements at § 82.157 for the next calendar year. Supermarkets would still have to comply with the leak repair requirements for comfort cooling appliances.

A program like this could have advantages for both supermarkets and EPA. Supermarkets would have greater flexibility to determine how they would reduce leaks so long as they are achieving an established level of environmental performance. EPA would receive additional data that it could use to better characterize the industry's emissions profile. Additionally, EPA could use the information to better target its enforcement action. This type of program also fits in well with the Agency's Next Generation Compliance initiative as it incentivizes better environmental performance.

While EPA finds this type of program appealing, there are several reasons this idea is not being proposed in this action. First, establishing the universe of stores within the corporate-wide boundary could be difficult if there are multiple chains held by one parent company. At what level should the boundary be drawn? Second, supermarket chains frequently buy and sell stores to other chains, which may be difficult to address when calculating annual leak rates. Would the newly-purchased stores automatically be included in the CWALR or would they be subject to the requirements for individual appliances?

Some stakeholders expressed interest in a program like this if the Agency would agree not to take any enforcement actions against them. However, the Agency would still want to ensure it could bring enforcement action if a supermarket chain was misreporting its CWALR.

Some stakeholders also appreciated that the Agency was considering ways to reduce burden but felt the Agency should not relax recordkeeping requirements that may help a company reduce leaks. Others were disinterested in the program and did not see an incentive to join. EPA considered this feedback, and the possible benefits of the program, and has decided not to propose this option at this time. However, the Agency seeks comments on whether such an idea could be workable and whether it is worth exploring in a future proposed rule. EPA also seeks comments on other ways the Agency could incentivize compliance or performance that exceeds the regulatory requirements as well as ways to reduce burden for companies with low leak rates, while still ensuring compliance.

B. Refrigerant Reclamation

EPA has received suggestions for how the reclaimer program could be strengthened. Some of these suggestions include more stringent certification requirements for reclaimers and third party audits to ensure reclamation facilities are following the required practices. Some of these suggestions are in the docket to this rule. These suggestions, combined with the principles of Next Generation Compliance, have encouraged EPA to take comment on those two ideas.

EPA is also considering ways to promote the use of reclaimed refrigerant so as to increase the financial incentive to recover and reclaim refrigerant. EPA requests comments on a way to distinguish reclaimed refrigerant from virgin refrigerant. This could potentially include establishing a labeling program for reclaimed material, much like other recycled products.

1. More Stringent Certification Requirements for Reclaimers

EPA has received feedback that the requirements to become a certified reclaimer are not stringent enough. Some have suggested that the Agency require that reclaimers provide more information in their certification on how they will comply with other potentially applicable regulations such as those related to the transport and disposal of hazardous materials. Stakeholders have also suggested that EPA cite compliance with Occupational Health and Safety Administration (OSHA) requirements. EPA seeks comment on whether it should develop more stringent certification requirements in a separate proposed rule, and what those requirements should look like.

Some stakeholders have also suggested that EPA redefine the term reclaim to cover entities other than those historically seen as reclaimers, for example separation facilities. EPA seeks comment on whether the term reclaim should be amended in future to cover separation facilities. EPA also seeks comment on whether the agency should in future require reporting from separation facilities as part of the reclamation program or elsewhere in subpart F to better understand where refrigerant goes after it is recovered. EPA also seeks comment on whether there are other types of facilities that should be covered under a program like this.

2. Establishing a Third Party Certification or Audit Program for Reclaimers

In developing this proposed rule, EPA considered establishing a third party certification program for reclaimers. In addition, one organization has recently urged EPA to require that a third party audit all reclaimers. The specific proposal is included in a letter from Intertek available in the docket. Under a program like this, EPA would certify independent auditors that would review reclaimers' compliance with the section 608 requirements. To reduce costs, EPA could require that in-person site audits occur once every few years. A program like this could help ensure compliance with the section 608 reclamation requirements. While EPA is not proposing this action in today's proposed rule, the Agency seeks comment on the establishment of a third party audit program for reclaimers in a future action.

3. Labeling of Reclaimed Refrigerant

Refrigerant reclaimers and environmental organizations have encouraged EPA to further promote the reclamation of refrigerant. The Agency notes that existing regulations promote HCFC reclamation by requiring refrigerant be recovered rather than vented and that used refrigerant be reclaimed before being sold. Through today's proposal, EPA would be extending that requirement to HFCs and other substitutes, further increasing the supply and types of refrigerants for reclamation. Having said that, the Agency is considering whether labeling could allow for broader recognition, use of, and demand for reclaimed refrigerant.

EPA seeks comments on the value of proposing in a separate rulemaking a voluntary labeling program for reclaimed refrigerant. Under this program, EPA would certify third parties who would then verify that the refrigerant being sold was in fact reclaimed. The reclaimer would have to document receipt of used refrigerant, the amount of that refrigerant that was reclaimed (and not a waste product), and that each batch of reclaimed refrigerant was tested and meets AHRI–700 standards. Alternatively, a program like this could be developed by industry.

There are several situations where reclaimed refrigerant labeled as such could be valuable. First, given the existing restrictions at § 82.15(g) on the manufacture of new appliances using HCFC–22, owners of appliances that expand their system after January 1, 2010, would know that the refrigerant was reclaimed and could be used in compliance with HCFC phaseout requirements.[14] Second, certified reclaimed refrigerant could be marketed to consumers seeking to purchase environmentally preferable products. This type of program could also be useful to Federal, state, or local governments that have directives to purchase recycled content materials by providing verification that the refrigerant they are purchasing is in fact reclaimed.

EPA seeks comments on whether reclaimers, refrigerant wholesalers, or owners or operators of appliances would be interested in such a program. EPA also seeks comments on whether any organization would be interested in becoming a third party verifier for this program. The Agency also seeks comment on what criteria it could establish to ensure refrigerant was in fact reclaimed, and other potential approaches that the Agency could consider if it develops a program like this in future.

C. Safe Disposal of Small Appliances, MVACs, and MVAC-Like Appliances

After conversations with scrap recyclers, EPA considered ways it could improve the requirements for the disposal of small appliances, MVACs, and MVAC-like appliances. While EPA is not proposing any of these changes at this time, EPA is seeking comments on ways that it could ensure refrigerant is

[14] For more information on how EPA treats supermarkets that have remodeled and expanded the capacity of their system, please see *http://epa.gov/ozone/title6/phaseout/Supermarket_Q&A_for_R–22.html.*

recovered from appliances that enter the waste stream with their refrigerant circuit intact, while reducing burden on the final disposer, who is often relying on someone upstream to recover the refrigerant. EPA considered several options to move the recordkeeping requirements upstream, but EPA needs additional feedback before proposing these options.

1. Move Responsibility of Ensuring Proper Recovery to the First Collector

One idea EPA considered was moving the requirement to ensure refrigerant is recovered from the final disposer to the first collector of the appliance. The first collector could include the retailer that delivers a new refrigerator and takes away the old one. The first collector could also include municipal waste collection facilities or others that pick up used appliances from homes, offices, or curbside. Under such a program, the first collector would have to ensure the refrigerant was properly recovered and keep a record documenting that fact. EPA could also create a requirement where the first collector and the final disposer would have to keep a record.

EPA seeks comment on whether this would be an appropriate change to make in future and whether this would improve compliance with the safe disposal requirements (§§ 82.155 and 82.156 as proposed in this notice). EPA also seeks comment on how it could ensure compliance with such a program.

2. Require a Certified Recovery Location for All Appliances

EPA also considered whether to require the establishment of third-party certified appliance recovery centers. These recovery centers would have to be certified by EPA or a third party certifier and would have to document every appliance they receive, the amount of refrigerant recovered from each appliance or each shipment of appliances, and report to EPA on the amount of refrigerant recovered and where that recovered refrigerant was sent for either destruction or reclamation. EPA would also have to require that all small appliances, MVACs, and MVAC-like appliances bound for disposal or recycling would have to be sent to such a certified recovery center. Scrap recyclers, landfills, or other final disposal facilities would only be allowed to receive appliances from certified appliance recovery centers to work effectively.

One advantage to such a program is that scrap recyclers and other final disposers would not have to verify that refrigerant was properly recovered from appliances they receive. EPA would also have more information on how much refrigerant is being recovered from these appliances when they are disposed of. However, EPA has also considered the ongoing transition to lower-GWP alternatives like hydrocarbons, CO_2, and HFO-1234yf in small appliances and MVACs. The benefit of requiring that appliances go through a certified recovery center may decline in the future, and could be potentially disruptive to the existing supply chain today. EPA weighed these factors and has decided not to propose a program like this in today's notice, but is requesting comment on such a program. EPA is particularly interested in whether this type of program would reduce emissions of refrigerants, be easy or difficult to establish and transition to, be difficult to set up in rural areas, and if any organizations would be interested in either becoming a certified appliance refrigerant recovery center or certifying appliance refrigerant recovery centers.

D. Technician Certification

1. Recertification

EPA considered whether to require currently certified technicians to recertify based on the changes proposed in this rule. EPA states at § 82.161(c)(2) that 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**. At this time, EPA is not proposing that technicians currently certified to work with ODS refrigerants be recertified to work with substitute refrigerants.

In pre-proposal discussions with stakeholders, EPA found both support and opposition to requiring recertification. One argument expressed in favor of recertification is that many changes have occurred in the twenty-two years since the first technicians took the certification exam. For example, many new refrigerants have entered the market, including flammable refrigerants, and air-conditioning and refrigeration equipment has changed.

While more substitutes have been introduced, the techniques for properly handling fluorocarbon substitute refrigerants is very similar to that for ODS refrigerants. As many stakeholders noted at the November 12, 2014, stakeholder meeting, technicians currently handle all refrigerants in a similar manner, regardless of whether they are an ODS or a substitute. EPA's SNAP program has only recently listed a number of flammable refrigerants as acceptable, subject to use conditions, and only in narrow product categories. The benefits of any recertification requirement would probably be small, and would likely be outweighed by the costs of requiring every technician to recertify. EPA requests comments on this approach for currently certified technicians. EPA also seeks comments on the possibility of developing a one-time online recertification that could be more limited in scope than the existing certification test if the Agency did decide to require recertification in future.

2. Flammable Refrigerants

While EPA has not ruled out the possibility of establishing requirements under 40 CFR part 82, subpart F for flammable exempt substitute refrigerants, EPA has not proposed in this rulemaking to extend any of the requirements under section 608, including the technician certification program and the sales restriction, to refrigerants that are exempt from the statutory venting prohibition (CO_2, hydrocarbons in certain SNAP-approved applications, ammonia, etc.). Some in the industry have told EPA that the Agency should require training and certification of HVACR contractors that work with flammable refrigerants. The primary concern is the safety of the technicians working on appliances, the owners and operators of those appliances, and anyone recovering or reclaiming refrigerant from those appliances that may not be labeled properly or mixed with flammable refrigerants.

EPA appreciates the concerns raised by stakeholders about flammable refrigerants and is planning to add questions on this topic to the technician certification test bank when the Agency updates those questions. These questions would cover proper handling practices to prevent mixing with ODS and substitute refrigerants, as well as safety. EPA has also proposed to broaden the definition of substitute so that it covers all refrigerants used by any person as replacements for a class I or II ozone-depleting substance whether or not SNAP-approved. This is to ensure that substitutes found to be unacceptable in a given refrigerant end-use under SNAP will still be covered by the safe handling requirements of subpart F.

EPA is not proposing, however, to extend the sales restriction in today's proposal to hydrocarbon refrigerants for sale in the approved end-uses under SNAP. EPA is also not revisiting in this proposed rule the determination that venting, releasing, or disposing of hydrocarbon refrigerants in the limited

end-uses for which is it allowed, does not pose a threat to the environment. EPA also seeks comments on whether the Agency should establish through a future rulemaking a technician certification requirement for flammable refrigerants, or extend the sales restriction (as a way to enforce the certification requirement) or other 608 requirements to flammable refrigerants that are exempt from the venting prohibition. Commenters should provide as much detail as possible, including the requirements that the Agency should establish, and what the environmental benefits might be.

VII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This action is a significant regulatory action that was submitted to OMB for review. This action was deemed to raise novel legal or policy issues. Any changes made in response to OMB recommendations have been documented in the docket. EPA prepared an economic analysis of the potential costs and benefits associated with this action. This analysis is summarized in Section V of the preamble and is available in the docket.

B. Paperwork Reduction Act

The information collection activities in this proposed rule have been submitted for approval to OMB under the PRA. The Information Collection Request (ICR) document that EPA prepared has been assigned EPA ICR number 1626.13. You can find a copy of the ICR in the docket for this rule.

All recordkeeping and reporting requirements under this program are specifically described in Section IV.L. of this preamble. In order to facilitate compliance with and enforce the requirements of section 608 of the CAA, EPA requires reporting and recordkeeping requirements of technicians, technician certification programs, refrigerant recovery/recycling equipment testing organizations, refrigerant wholesalers and purchasers, refrigerant reclaimers, refrigeration and air-conditioning equipment owners, and other establishments that perform refrigerant removal, service, or disposal. EPA has used and will continue to use these records and reports to ensure that refrigerant releases are minimized during the recovery, recycling, and reclamation processes. The handling and confidentiality of the reporting requirements follow EPA's confidentiality regulations at 40 CFR 2.201 *et seq.* for assuring computer data security, preventing disclosure, proper storage, and proper disposal.

Respondents/affected entities: Entities required to comply with reporting and recordkeeping requirements include technicians; technician certification programs; refrigerant wholesalers; refrigerant reclaimers; refrigeration and air-conditioning equipment owners and/or operators; and other establishments that perform refrigerant removal, service, or disposal.

Respondent's obligation to respond: Mandatory (40 CFR part 82, subpart F).

Estimated number of respondents: The total number of respondents is estimated to be approximately 1,050,390.

Frequency of response: The frequency of responses vary from once a year to daily. Public reporting burden for this collection of information is estimated to vary from one minute to 9.5 hours per response, including time for reviewing instructions and gathering, maintaining, and submitting information.

Total estimated burden: The total estimated burden is 797,314 hours (per year). Burden is defined at 5 CFR 1320.3(b).

Total estimated cost: The total estimated cost is $35,931,685 (per year). There are no estimated annualized capital or operation & maintenance costs associated with the reporting or recordkeeping requirements.

Most of this burden is already covered by the existing requirements in 40 CFR part 82, subpart F, and the existing ICR, which was last approved by OMB in December 2014.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9. The OMB control number for this information collection is 2060–0256.

Submit your comments on the Agency's need for this information, the accuracy of the provided burden estimates and any suggested methods for minimizing respondent burden to Docket ID No. EPA–HQ–OAR–2015–0453. You may also send your ICR-related comments to OMB's Office of Information and Regulatory Affairs via email to *oria_submissions@omb.eop.gov,* Attention: Desk Officer for EPA. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after receipt, OMB must receive comments no later than December 9, 2015. EPA will respond to any ICR-related comments in the final rule.

C. Regulatory Flexibility Act (RFA)

I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. The small entities subject to the requirements of this action are businesses and small governmental jurisdictions that own or service comfort cooling, commercial refrigeration, or IPR equipment. EPA estimates that approximately 140 of the approximately 950,000 affected small businesses could incur costs in excess of 1% of annual sales and that fewer than 80 small businesses could incur costs in excess of 3% of annual sales. These levels are below the thresholds under which it can be presumed that an action will have no SISNOSE, as used in other Title VI rulemakings. Details of this analysis are presented in the *Analysis of the Economic Impact and Benefits of Proposed Revisions to the National Recycling and Emission Reduction Program* available in the docket to this rule.

D. Unfunded Mandates Reform Act (UMRA)

This action does not contain an unfunded mandate of $100 million or more as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments. This rule supplements the statutory self-effectuating prohibition against venting refrigerants by ensuring that certain service practices are conducted that reduce the emissions of ozone-depleting refrigerants and their substitutes. This rule also proposes to strengthen the leak repair requirements, establish recordkeeping requirements for the disposal of appliances containing five to 50 pounds of refrigerant, and modify the technician certification program.

E. Executive Order 13132: Federalism

This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action does not have tribal implications as specified in Executive Order 13175. This rule does not significantly or uniquely affect the communities of Indian tribal governments. This rule supplements the

statutory self-effectuating prohibition against venting refrigerants by ensuring that certain service practices are conducted that reduce the emissions of ozone-depleting refrigerants and their substitutes. This rule also proposes to strengthen the leak repair requirements, establish recordkeeping requirements for the disposal of appliances containing five to 50 pounds of refrigerant, and modify the technician certification program. Thus, Executive Order 13175 does not apply to this action.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

This action is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997) because it is not economically significant as defined in Executive Order 12866. The agency nonetheless has reason to believe that the environmental health or safety risk addressed by this action may have a disproportionate effect on children. Depletion of stratospheric ozone results in greater transmission of the sun's ultraviolet (UV) radiation to the earth's surface. The following studies describe the effects of excessive exposure to UV radiation on children: (1) Westerdahl J, Olsson H, Ingvar C. ''At what age do sunburn episodes play a crucial role for the development of malignant melanoma,'' Eur J Cancer 1994: 30A: 1647–54; (2) Elwood JM Japson J. ''Melanoma and sun exposure: an overview of published studies,'' Int J Cancer 1997; 73:198–203; (3) Armstrong BK, ''Melanoma: childhood or lifelong sun exposure,'' In: Grobb JJ, Stern RS Mackie RM, Weinstock WA, eds. ''Epidemiology, causes and prevention of skin diseases,'' 1st ed. London, England: Blackwell Science, 1997: 63–6; (4) Whiteman D., Green A. ''Melanoma and Sunburn,'' Cancer Causes Control, 1994: 5:564–72; (5) Heenan, PJ. ''Does intermittent sun exposure cause basal cell carcinoma? A case control study in Western Australia,'' Int J Cancer 1995; 60: 489–94; (6) Gallagher, RP, Hill, GB, Bajdik, CD, et al. ''Sunlight exposure, pigmentary factors, and risk of nonmelanocytic skin cancer I, Basal cell carcinoma,'' Arch Dermatol 1995; 131: 157–63; (7) Armstrong, DK. ''How sun exposure causes skin cancer: an epidemiological perspective,'' Prevention of Skin Cancer. 2004. 89–116.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This action is not a ''significant energy action'' because it is not likely to have a significant adverse effect on the supply, distribution or use of energy.

I. National Technology Transfer and Advancement Act and 1 CFR Part 51

This action involves technical standards. In some instances, EPA is proposing to adopt a modified version of an industry standard for purposes of this rule; in others, EPA is proposing to incorporate an industry standard by reference exactly as written. First, EPA is proposing that all new recovery and/or recycling equipment used during the maintenance, service, repair, or disposal of appliances manufactured or imported after the effective date of this rule be required to meet the standard based on AHRI Standard 740–2015, *Performance Rating of Refrigerant Recovery Equipment and Recovery/Recycling Equipment.* This standard establishes methods of testing for rating and evaluating the performance of refrigerant recovery equipment and recovery/recycling equipment. The standard is available at *www.ahrinet.org* or by mail at Air-Conditioning, Heating, and Refrigeration Institute (AHRI), 2111 Wilson Blvd., Suite 500, Arlington, VA 22201.

EPA's lead proposal is to include this AHRI Standard with minor modifications in appendix B3. EPA is also proposing to establish in appendix B4 a modified version of the appendix B3 standard that could be used to certify recovery/recycling equipment used to recover/recycle flammable refrigerants. As proposed, the standard in appendix B4 would base the recovery/recycling performance on AHRI 740–2015 and the safety performance standards in UL 1963, Supplement SB, *Requirements for Refrigerant Recovery/Recycling Equipment Intended for Use with a Flammable Refrigerant.* UL 1963, Supplement SB establishes standards for refrigerant recovery and refrigerant recovery/recycling equipment to ensure the equipment can be used safely with flammable refrigerants. The standard is available at *http://www.comm-2000.com* or by writing to Comm 2000, 151 Eastern Avenue, Bensenville, IL 60106.

In addition, EPA is proposing to incorporate by reference many of the standards referenced in appendix B3 and B4, including:

—ASHRAE Terminology, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. This Web site provides a glossary of technical terms used by ASHRAE and is available at *https://www.ashrae.org/resources—publications/free-resources/ashrae-terminology.*

—UL Standard 1963, *Refrigerant Recovery/Recycling Equipment,* First Edition, 2011, American National Standards Institute/Underwriters Laboratories, Inc. This standard establishes safety requirements for and methods to evaluate refrigerant recovery and refrigerant recovery/recycling equipment. The standard is available at *http://www.comm-2000.com* or by writing to Comm 2000, 151 Eastern Avenue, Bensenville, IL 60106.

—AHRI Standard 110–2012, *Air-Conditioning, Heating and Refrigerating Equipment Nameplate Voltages,* 2012, Air-Conditioning, Heating, and Refrigeration Institute. This standard establishes voltage rating requirements, equipment performance requirements, and conformance conditions for air-conditioning, heating, and refrigerating equipment. The standard is available at *www.ahrinet.org* or by mail at Air-Conditioning, Heating, and Refrigeration Institute (AHRI), 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201.

—International Standard IEC 60038, *IEC Standard Voltages,* 2009, International Electrotechnical Commission.

This standard specifies standard voltage values which are intended to serve as preferential values for the nominal voltage of electrical supply systems, and as reference values for equipment and system design. The standard is available at *www.techstreet.com* or by writing to Techstreet, 6300 Interfirst Drive, Ann Arbor, MI 48108.

EPA seeks comments on the use of these standards, especially whether to incorporate the UL standard by reference into appendix B4 alongside the appendix B3 requirements or whether to establish a standard in appendix B4 that is based on that standard.

Second, reclaimers are required to reprocess refrigerant to standards based on ARI Standard 700–1995, *Specification for Fluorocarbons and Other Refrigerants.* AHRI Standard 700 establishes purity specifications for refrigerants, and to specify the associated methods of testing for acceptability of refrigerants. EPA is proposing to update appendix A to include HFCs, PFCs, HFOs, and other refrigerants based on the standards contained in AHRI Standard 700–2015, *Specifications for Refrigerants,* but not incorporate the full standard by reference because EPA intends to keep the older unsaturates limit. The standard is available at *www.ahrinet.org* or by mail at Air-Conditioning, Heating,

and Refrigeration Institute (AHRI), 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201.

EPA is proposing to incorporate by reference the additional standards referenced in AHRI 700–2015. Specifically, EPA is proposing to incorporate by reference the following standards:

—Appendix C to AHRI Standard 700–2015: Analytical Procedures for AHRI Standard 700–2015, Normative, *Specification for Fluorocarbon Refrigerants.* This document establishes definitive test procedures for determining the quality of new, reclaimed and/or repackaged refrigerants in support of the standards established in AHRI–700, and is available at *www.ahrinet.org* or by mail at Air-Conditioning, Heating, and Refrigeration Institute (AHRI), 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201.

—Appendix D Gas Chromatograms for AHRI Standard 700–2015—Informative, *Specification for Fluorocarbon Refrigerants,* 2012, Air-Conditioning, Heating, and Refrigeration Institute. This appendix provides figures for the gas chromatograms used with Appendix C to AHRI Standard 700–2015: Analytical Procedures for AHRI Standard 700–2015, Normative, Specification for Fluorocarbon Refrigerants. The appendix is available at *www.ahrinet.org* or by mail at Air-Conditioning, Heating, and Refrigeration Institute (AHRI), 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201.

—Federal Specification for ''Fluorocarbon Refrigerants,'' BB–F–1421 B, dated March 5, 1982, section 4.4.3. This section of this standard establishes a method to determine the boiling point and boiling point range of a refrigerant. The standard is available in the docket for this rulemaking.

—GPA STD–2177, *Analysis of Natural Gas Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography,* 2013, Gas Processors Association. This standard establishes methods for analyzing demethanized liquid hydrocarbon streams containing nitrogen/air and carbon dioxide, and purity products such as ethane/propane mix that fall within compositional ranges indicated in the standard. The standard is available at *www.techstreet.com* or by writing to Techstreet, 6300 Interfirst Drive, Ann Arbor, MI 48108.

—ASTM Standard D1296–01–2012, *Standard Test Method for Odor of Volatile Solvents and Diluents,* 2012, ASTM International. This test method covers a comparative procedure for observing the characteristic and residual odors of volatile organic solvents and diluents to determine their odor acceptability in a solvent system. The standard is available at *www.astm.org* or by writing to ASTM, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428–2959.

EPA seeks comments on whether to incorporate the updated standards by reference or whether appendix A should be updated based on AHRI 700–2015 to include HFCs, PFCs, HFOs, and other refrigerants.

Third, EPA is proposing to create in appendix E a standard for self-sealing valves that is based largely on CARB's *Test Procedure for Leaks from Small Containers of Automotive Refrigerant,* TP–503, as amended January 5, 2010. The standard establishes methods for assessing the leak rate from small containers of refrigerant. A copy of this standard is available in the docket and *www.arb.ca.gov/regact/2009/hfc09/hfc09.htm.* EPA requests comment on the use of this CARB standard for self-sealing valves.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

EPA believes this action will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations, because it affects the level of environmental protection equally for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority or low-income population. This rule would amend the leak repair requirements for appliances using ozone-depleting substances, which would protect human health and the environment from increased amounts of UV radiation and increased incidence of skin cancer. The effects of exposure to UV radiation and the estimated reduction in emissions of ozone-depleting substances from this proposed rule is contained in section II.D.1 of this preamble.

List of Subjects in 40 CFR Part 82

Environmental protection, Air pollution control, Chemicals, Incorporation by reference, Reporting and recordkeeping requirements.

Dated: October 15, 2015.

Gina McCarthy,

Administrator.

For the reasons set forth in the preamble, EPA proposes to amend 40 CFR part 82 as follows:

PART 82—PROTECTION OF STRATOSPHERIC OZONE

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

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

■ 2. Revise § 82.150 to read as follows:

§ 82.150 Purpose and scope.

(a) The purpose of this subpart is to reduce emissions of class I and class II refrigerants and their substitutes to the lowest achievable level by maximizing the recapture and recycling of such refrigerants during the maintenance, service, repair, and disposal of appliances and restricting the sale of refrigerants consisting in whole or in part of a class I or class II ozone-depleting substance or their substitutes in accordance with Title VI of the Clean Air Act.

(b) This subpart applies to any person maintaining, servicing, or repairing appliances. This subpart also applies to persons disposing of appliances, including small appliances and motor vehicle air conditioners. In addition, this subpart applies to refrigerant reclaimers, technician certifying programs, appliance owners and operators, manufacturers of appliances, manufacturers of recovery and/or recycling equipment, approved recovery and/or recycling equipment testing organizations, and persons buying, selling, or offering to sell class I, class II, or substitute refrigerants.

■ 3. Amend § 82.152:

■ a. by adding definitions for ''Class I,'' ''Class II,'' ''Comfort cooling,'' ''Component,'' ''Leak inspection,'' ''Mothball,'' ''Normal operating characteristics and conditions,'' ''Reclaim,'' ''Recover,'' ''Recycle,'' ''Retire,'' ''Retrofit,'' ''Seasonal variance,'' ''Self-sealing valve,'' and ''System receiver.''

■ b. by revising the definitions for ''Appliance,'' ''Apprentice,'' ''Commercial refrigeration,'' ''Custom-built,'' ''Disposal,'' ''Follow-up verification test,'' ''Full charge,'' ''High-pressure appliance,'' ''Industrial process refrigeration,'' ''Industrial process shutdown,'' ''Initial verification test,'' ''Leak rate,'' ''Low-loss fitting,'' ''Low-pressure appliance,'' ''Medium-pressure appliance,'' ''MVAC-like appliance,'' ''One-time expansion device,''

''Opening an appliance,'' ''Recovery efficiency,'' ''Refrigerant,'' ''Self-contained recovery equipment,'' ''Small appliance,'' ''Substitute,'' ''Technician,'' and ''Very high-pressure appliance.''

■ c. by removing the definitions for ''Critical Component,'' ''Normal operating characteristics or conditions,'' ''Normally containing a quantity of refrigerant,'' ''Reclaim refrigerant,'' ''Recover refrigerant,'' ''Recycle refrigerant,'' ''Suitable replacement refrigerant,'' ''System mothballing,'' and ''Voluntary certification program.''

The revisions and additions to read as follows:

§ 82.152 Definitions.

As used in this subpart, the term:

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

Apprentice means any person who is currently registered as an apprentice in maintenance, service, repair, or disposal of appliances with the U.S. Department of Labor's Office of Apprenticeship (or a State Apprenticeship Council recognized by the Office of Apprenticeship). A person may only be an apprentice for two years from the date of first registering with that office.

* * * * *

Class I refers to an ozone-depleting substance that is listed in 40 CFR part 82 subpart A, appendix A.

Class II refers to an ozone-depleting substance that is listed in 40 CFR part 82 subpart A, appendix B.

Comfort cooling means the air-conditioning appliances used to provide cooling in order to control heat and/or humidity in facilities including but not limited to office buildings and commercial buildings. Comfort cooling appliances include building chillers and roof-top self-contained units. They may be used for the comfort of occupants or for climate control to protect equipment within a facility, including but not limited to computer rooms.

Commercial refrigeration means the refrigeration appliances used 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 refrigeration equipment used to store meat, produce, dairy products, and other perishable goods.

Component means a part of the refrigerant loop within an appliance including, but not limited to, compressors, condensers, evaporators, receivers, and all of its connections and subassemblies.

Custom-built means that the equipment or any of its components cannot be purchased and/or installed without being uniquely designed, fabricated and/or assembled to satisfy a specific set of industrial process conditions.

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;

(3) The destruction of any appliance such that the refrigerant would be released into the environment if it had not been recovered prior to the destructive activity, or

(4) The disassembly of any appliance for reuse or recycling of its component parts.

Follow-up verification test means those tests that involve checking the repairs to an appliance after a successful initial verification test and after the appliance has returned to normal operating characteristics and conditions to verify that the repairs were successful. Follow-up verification tests include, but are not limited to, the use of soap bubbles, electronic or ultrasonic leak detectors, pressure or vacuum tests, fluorescent dye and black light, infrared or near infrared tests, and handheld gas detection devices.

Full charge means the amount of refrigerant required for normal operating characteristics and conditions of the appliance as determined by using one or a combination of the following four methods:

(1) Use of the equipment manufacturer's determination of the full charge;

(2) Use of appropriate calculations based on component sizes, density of refrigerant, volume of piping, and other relevant considerations;

(3) Use of actual measurements of the amount of refrigerant added to or evacuated from the appliance, including for seasonal variances; and/or

(4) Use of an established range based on the best available data regarding the normal operating characteristics and conditions for the appliance, where the midpoint of the range will serve as the full charge.

High-pressure appliance means an appliance that uses a refrigerant with a liquid phase saturation pressure between 170 psia and 355 psia at 104 °F. Examples include but are not limited to appliances using R–22, R–407A, R–407C, R–410A, and R–502.

Industrial process refrigeration means complex customized appliances that are directly linked to the processes used in, for example, the chemical, pharmaceutical, petrochemical, and manufacturing industries. This sector also includes industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. Where one appliance is used for both industrial process refrigeration and other applications, it will be considered industrial process refrigeration equipment if 50 percent or more of its operating capacity is used for industrial process refrigeration.

Industrial process shutdown means when an industrial process or facility temporarily ceases to operate or manufacture whatever is being produced at that facility.

Initial verification test means those leak tests that are conducted as soon as practicable after the repair is finished to verify that a leak or leaks have been repaired before refrigerant is added back to the appliance.

Leak inspection means the examination of all visible components of an appliance using a calibrated leak detection device, a bubble test, or visual inspection for oil residue in order to determine the presence and location of refrigerant leaks.

Leak rate means the rate at which an appliance is losing refrigerant, measured between refrigerant charges. The leak rate is expressed in terms of the percentage of the appliance's full charge that would be lost over a 12-month period if the current rate of loss were to continue over that period. The rate is calculated using only one of the following methods for all appliances subject to the leak repair requirements located at an operating facility.

(1) Annualizing Method. Step 1. Take the number of pounds of refrigerant added to the appliance to return it to a full charge, whether in one addition or if multiple additions related to same leak, and divide it by the number of pounds of refrigerant the appliance normally contains at full charge;

Step 2. Take the shorter of the number of days that have passed since the last day refrigerant was added or 365 days and divide that number by 365 days;

Step 3. Take the number calculated in Step 1 and divide it by the number calculated in Step 2; and

Step 4. Multiply the number calculated in Step 3 by 100 to calculate a percentage. This method is summarized in the following formula:

$$\text{Leak rate (\% per year)} = \frac{\text{pounds of refrigerant added}}{\text{pounds of refrigerant in full charge}} \times \frac{365\ days/year}{shorter\ of:\ \#\ days\ since\ refrigerant\ last\ added\ or\ 365\ days} \times 100\%$$

(2) Rolling Average Method. Step 1. Take the sum of the pounds of refrigerant added to the appliance over the previous 365-day period (or over the period that has passed since the last successful follow-up verification test showing all leaks in the appliance were repaired, if that period is less than one year);

Step 2. Divide the result of Step 1 by the pounds of refrigerant the appliance normally contains at full charge; and

Step 3. Multiply the result of Step 2 by 100 to obtain a percentage. This method is summarized in the following formula:

$$\text{Leak rate (\% per year)} = \frac{\text{pounds of refrigerant added over past 365 days (or since the last successful follow-up verification test showing all leaks in the appliance were repaired, if that period is less than one year)}}{\text{pounds of refrigerant in full charge}} \times 100\%$$

Low-loss fitting means any device that is intended to establish a connection between hoses, appliances, or recovery and/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 and/or recycling machines.

Low-pressure appliance means an appliance that uses a refrigerant with a liquid phase saturation pressure below 45 psia at 104 °F. Examples include but are not limited to appliances using R–11, R–123, R–113, and R–245fa.

* * * * *

Medium-pressure appliance means an appliance that uses a refrigerant with a liquid phase saturation pressure between 45 psia and 170 psia at 104 °F. Examples include but are not limited to appliances using R–114, R–124, R–12, R–134a, and R–500.

Mothball means to evacuate refrigerant from an appliance, or the affected isolated section or component of an appliance, to at least atmospheric pressure, and to temporarily shut down that appliance.

* * * * *

MVAC-like appliance means a mechanical vapor compression, open-drive compressor appliance with a full charge of 20 pounds or less of refrigerant used to cool the driver's or passenger's compartment of an off-road motor vehicle. This includes, but is not limited to, the air-conditioning equipment found on agricultural or construction vehicles. This definition is not intended to cover appliances using R–22 refrigerant.

Normal operating characteristics and conditions means appliance operating temperatures, pressures, fluid flows, speeds, and other characteristics, including full charge of the appliance, that would be expected for a given process load and ambient condition during normal operation. Normal operating characteristics and conditions are marked by the absence of atypical conditions affecting the operation of the appliance.

One-time expansion device means an appliance that relies on the release of its refrigerant charge to the environment in order to provide a cooling effect. These are typically single releases but could also include products that are designed to release refrigerant to the environment through multiple individual charges.

Opening an appliance means any maintenance, service, repair, or disposal of an appliance that would release any refrigerant in the appliance to the atmosphere. Connecting and disconnecting hoses and gauges to measure pressures, add refrigerant, or recover refrigerant from the appliance are not considered ''opening an appliance.''

* * * * *

Reclaim means to reprocess recovered refrigerant to all of the specifications in appendix A of this subpart (based on AHRI Standard 700–2015, *Specifications for Refrigerants*) that are applicable to that refrigerant and to verify that the refrigerant meets these specifications using the analytical methodology prescribed in section 5 of appendix A of this subpart.

Recover means to remove refrigerant in any condition from an appliance and to store it in an external container without necessarily testing or processing it in any way.

Recovery efficiency means the percentage of refrigerant in an appliance that is recovered by a piece of recovery and/or recycling equipment.

Recycle, when referring to refrigerant, means to extract refrigerant from an appliance and clean it for reuse in equipment of the same owner without meeting all of the requirements for reclamation. In general, recycled refrigerant 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.

Refrigerant means, for purposes of this subpart, any substance, including blends and mixtures, consisting in part or whole of a class I or class II ozone-depleting substance or substitute that is used for heat transfer purposes and provides a cooling effect.

Refrigerant circuit means the parts of an appliance that are normally connected to each other (or are separated only by internal valves) and are designed to contain refrigerant.

Retire, when referring to an appliance, means the disassembly of the entire appliance including its major components, such that the appliance as a whole cannot be used by any person in the future.

Retrofit means to convert an appliance from one refrigerant to another refrigerant. Retrofitting includes the conversion of the appliance to achieve system compatibility with the new refrigerant and may include, but is not limited to, changes in lubricants, gaskets, filters, driers, valves, o-rings or appliance components.

Seasonal variance means the addition of refrigerant to an appliance due to a change in ambient conditions caused by a change in season, followed by the subsequent removal of an equal amount of refrigerant in the corresponding change in season, where both the addition and removal of refrigerant occurs within one consecutive 12-month period.

Self-contained recovery equipment means refrigerant recovery and/or recycling equipment that is capable of removing the refrigerant from an appliance without the assistance of components contained in the appliance.

Self-sealing valve means a valve affixed to a container of refrigerant that automatically seals when not dispensing refrigerant and meets or exceeds established performance criteria as identified in § 82.154(c)(2).

Small appliance means any appliance that is fully manufactured, charged, and hermetically sealed in a factory with five (5) pounds or less of refrigerant, including, but not limited to, refrigerators and freezers (designed for home, commercial, or consumer use), medical or industrial research refrigeration equipment, room air conditioners (including window air conditioners, portable air conditioners, and packaged terminal air heat pumps), dehumidifiers, under-the-counter ice makers, vending machines, and drinking water coolers.

Substitute means any chemical or product, whether existing or new, that is used as a refrigerant to replace a class I or II ozone-depleting substance.

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.

System receiver means the isolated portion of the appliance, or a specific vessel within the appliance, that is used to hold the refrigerant charge during the servicing or repair of that appliance.

Technician means any person who in the course of maintenance, service, or repair of an appliance could be reasonably expected to violate the integrity of the refrigerant circuit and therefore release refrigerants into the environment. Technician also means any person who disposes of an appliance that could be reasonably expected to violate the integrity of the refrigerant circuit and therefore release refrigerants from the appliance into the environment, except for persons who only dispose of appliances that are small appliances, MVACs, and MVAC-like appliances. Activities reasonably expected to violate the integrity of the refrigerant circuit include but are not limited to: Attaching and detaching hoses and gauges to and from the appliance; adding or removing refrigerant; adding or removing components; and cutting the refrigerant line. Activities such as painting the appliance, rewiring an external electrical circuit, replacing insulation on a length of pipe, or tightening nuts and bolts are not reasonably expected to violate the integrity of the refrigerant circuit. Activities conducted on appliances that have been properly evacuated pursuant to § 82.156 are not reasonably expected to release refrigerants unless the activity includes adding refrigerant to the appliance. Technicians could include but are not limited to installers, contractor employees, in-house service personnel, and in some cases owners and/or operators of appliances.

Very high-pressure appliance means an appliance that uses a refrigerant with a critical temperature below 104 °F or with a liquid phase saturation pressure above 355 psia at 104 °F. Examples include but are not limited to appliances using R–13, R–23, R–503, R–508A, and R–508B.

■ 4. Revise § 82.154 to read as follows:

§ 82.154 Prohibitions.

(a) *Venting Prohibition.* (1) No person maintaining, servicing, repairing, or disposing of an appliance or industrial process refrigeration may knowingly vent or otherwise release into the environment any refrigerant from such appliances. Notwithstanding any other provision of this subpart, the following substitutes in the following end-uses are exempt from this prohibition and from the requirements of this subpart:

(i) Carbon dioxide in any application;

(ii) Nitrogen in any application;

(iii) Water in any application;

(iv) Ammonia in commercial or industrial process refrigeration or in absorption units;

(v) Chlorine in industrial process refrigeration (processing of chlorine and chlorine compounds);

(vi) Hydrocarbons in industrial process refrigeration (processing of hydrocarbons);

(vii) Ethane (R–170) in very low temperature refrigeration equipment and equipment for non-mechanical heat transfer;

(viii) Propane (R–290) in retail food refrigerators and freezers (stand-alone units only); household refrigerators, freezers, and combination refrigerators and freezers; self-contained room air conditioners for residential and light commercial air-conditioning; heat pumps; and vending machines;

(ix) Isobutane (R–600a) in retail food refrigerators and freezers (stand-alone units only) and vending machines;

(x) R–441A in retail food refrigerators and freezers (stand-alone units only); self-contained room air conditioners for residential and light commercial air-conditioning; heat pumps; and vending machines.

(2) *De minimis* releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition. Refrigerant releases are *de minimis* only if they occur when:

(i) The required practices in § 82.155, § 82.156, and § 82.157 are observed, recovery and/or recycling machines that meet the requirements in § 82.158 are used whenever refrigerant is removed from an appliance, the technician certification provisions in § 82.161 are observed, and the reclamation requirements in § 82.164 are observed; or

(ii) The requirements in subpart B of this part are observed.

(3) The knowing release of a refrigerant after its recovery from an appliance is a violation of the venting prohibition.

(b) No person may maintain, service, repair, or dispose of an appliance without:

(1) Observing the required practices in § 82.155, § 82.156, and § 82.157; and

(2) Using recovery and/or recycling equipment that is certified for that type of refrigerant and appliance under § 82.158.

(c) *Sales Restriction.* (1) No person may sell or distribute, or offer for sale or distribution, any substance that consists in whole or in part of a class I or class II substance or substitute for use as a refrigerant unless:

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

(ii) The buyer employs at least one technician who is certified as a Type I, Type II, Type III, or Universal technician under § 82.161 and provides proof of such to the seller;

(iii) The buyer has been certified in accordance with 40 CFR part 82, subpart B and the refrigerant is acceptable for use in MVACs under 40 CFR part 82, subpart G;

(iv) The buyer employs at least one technician who is certified under 40 CFR part 82, subpart B, and provides proof of such to the seller and the refrigerant is acceptable for use in MVACs under 40 CFR part 82, subpart G. Nothing in this provision relieves persons of the requirements of § 82.34(b) or § 82.42(b);

(v) 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);

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

(vii) The refrigerant is contained in an appliance with a fully assembled refrigerant circuit or an appliance component;

(viii) The refrigerant is charged into an appliance by a certified technician or an apprentice during maintenance, service, or repair of the appliance;

(ix) The refrigerant is exempted under paragraph (a)(1) of this section; or

(x) The substitute refrigerant is intended for use in an MVAC and is sold in a container designed to hold two pounds or less of refrigerant, has a unique fitting, and has a self-sealing valve.

(2) *Self-sealing valve specifications.* This provision will apply starting [ONE YEAR FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER] for all containers holding two pounds or less of substitute refrigerant for use in an MVAC that are manufactured and placed into initial inventory or imported on or after that date. All containers holding two pounds or less of substitute refrigerant for use in an MVAC that are manufactured and placed into initial inventory or imported prior to that date must be sold prior to [TWO YEARS FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER].

(i) Each container holding two pounds or less of substitute refrigerant for use in an MVAC must be equipped with a single self-sealing valve that automatically closes and seals when not dispensing refrigerant.

(ii) The leakage rate from each container must not exceed 3.00 grams per year when the self-sealing valve is closed. This leakage rate applies to new, full containers as well as containers that may be partially full.

(iii) The leakage rate must be determined using the standards described in appendix E.

(iv) All testing to demonstrate compliance with this paragraph must be conducted by an independent test laboratory in the United States. For purposes of this requirement, an independent test laboratory is one that is not owned, operated, or affiliated with the applicant certifying equipment and/or products.

(3) *Recordkeeping.* (i) Persons who sell or distribute, or offer to sell or distribute, refrigerant must keep invoices that indicate the name of the purchaser, the date of sale, and the quantity of refrigerant purchased unless they are selling exempt substitutes or small cans of MVAC refrigerant in accordance with paragraph (c)(1)(ix) and (x) of this section. In instances where the buyer employs a certified technician, the seller must keep the documentation provided by the buyer that he or she employs at least one technician that is properly certified. All records must be kept for three years.

(ii) Electronic or paper copies of all records described in appendix E must be maintained by manufacturers of containers holding two pounds or less of substitute refrigerant for use in an MVAC to verify self-sealing valves meet the requirements specified in paragraph (c)(2) of this section. All records must be kept for three years.

(d) *Sale of Used Refrigerant.* No person may sell or distribute, or offer for sale or distribution, for use as a refrigerant any class I or class II substance or substitute consisting wholly or in part of used refrigerant unless the refrigerant:

(1) Has been reclaimed by a person who has been certified as a reclaimer under § 82.164;

(2) was used only in an MVAC or MVAC-like appliance and is to be used only in an MVAC or MVAC-like appliance and recycled in accordance with § 82.34(d);

(3) is contained in an appliance that is sold or offered for sale together with a fully assembled refrigerant circuit;

(4) is being transferred between or among a parent company and one or more of its subsidiaries, or between or among subsidiaries having the same parent company;

(5) is being transferred between or among a Federal agency or department and a facility or facilities owned by the same Federal agency or department; or

(6) is exempted under paragraph (a)(1) of this section.

(e) *Manufacture and Sale of Appliances.* (1) No person may sell or distribute, or offer for sale or distribution, any appliance (except small appliances) unless it is equipped with a servicing aperture to facilitate the removal of refrigerant at servicing and disposal.

(2) No person may sell or distribute, or offer for sale or distribution, any small appliance unless it is equipped with a process stub to facilitate the removal of refrigerant at servicing and disposal.

(f) *One-time expansion devices.* No person may manufacture or import a one-time expansion device unless the only refrigerants it contains have been exempted under paragraph (a)(1) of this section.

(g) Rules stayed for consideration. Notwithstanding any other provisions of this subpart, the effectiveness of 40 CFR 82.154(c), only as it applies to refrigerant contained in appliances without fully assembled refrigerant circuits, is stayed from April 27, 1995, until EPA takes final action on its reconsideration of these provisions. EPA will publish any such final action in the **Federal Register**.

■ 5. Add § 82.155 to subpart F to read as follows:

§ 82.155 Safe disposal of appliances.

Until [ONE YEAR FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER], this section applies only to disposal of appliances containing class I and class II refrigerants. Starting on [ONE YEAR FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER], this section applies to disposal of appliances containing any refrigerant as defined in § 82.152.

(a) Persons who take the final step in the disposal process (including but not limited to scrap recyclers and landfill operators) of a small appliance, MVAC, or MVAC-like appliance (the final processor) must either:

(1) Recover any remaining refrigerant from the appliance in accordance with paragraph (b) of this section; or

(2) Verify using a signed statement or a contract that all refrigerant that had not leaked previously has been recovered from the appliance or shipment of appliances in accordance with paragraph (b) of this section. This statement must include the name and address of the person who recovered the refrigerant and the date the refrigerant was recovered. The signed contract between the supplier and the final processor must state that the supplier will recover any remaining refrigerant from the appliance or shipment of appliances in accordance with this paragraph prior to delivery.

(i) It is a violation of this subpart to accept a signed statement or contract if the person receiving the statement or contract knew or had reason to know that the signed statement or contract is false.

(ii) Persons complying with this paragraph must notify suppliers of appliances that refrigerant must be properly recovered in accordance with paragraph (b) of this section before delivery of the items to the facility. The form of this notification may be signs, letters to suppliers, or other equivalent means.

(b) Persons recovering refrigerant from a small appliance, MVAC, or MVAC-like appliance for purposes of disposal of these appliances must evacuate refrigerant to the levels in § 82.156(b) or

(c) using recovery equipment that meets the standards in § 82.158(e)–(g), as applicable.

(c) *Recordkeeping.* Persons who take the final step in the disposal process of a small appliance, MVAC, or MVAC-like appliance must keep a copy of all the signed statements or contracts obtained under paragraph (a)(2) of this section on site, in paper or electronic format, for at least three years.

■ 6. Revise § 82.156 to read as follows:

§ 82.156 Proper evacuation of refrigerant from appliances.

Until [ONE YEAR FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER], this section applies only to proper evacuation of refrigerant from appliances containing class I and class II refrigerants. Starting on [ONE YEAR FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER], this section applies to proper evacuation of refrigerant from appliances containing any refrigerant as defined in § 82.152, except that the leak repair provisions in § 82.157 apply in lieu of paragraph (i) of this section.

(a) *Appliances other than small appliances, MVACs, and MVAC-like appliances.* Before opening such appliances, or disposing of such appliances, persons must evacuate the refrigerant, including all the liquid refrigerant (except as provided in paragraph (a)(1)(ii) of this section), to the levels in Table 1 using a recovery and/or recycling machine certified pursuant to § 82.158 unless the situations in paragraphs (a)(1) or (a)(2) apply. Persons may evacuate either the entire appliance or the part to be serviced, if the refrigerant in the part can be isolated to a system receiver. A technician must verify that the applicable level of evacuation has been reached in the appliance or the part before it is opened.

(1) 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, the appliance must:

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

(ii) Be pressurized to a pressure no higher than 0 psig before it is opened if it is a low-pressure appliance. Persons must cover openings when isolation is not possible. Persons pressurizing low-pressure appliances that use refrigerants with boiling points at or below 85 degrees Fahrenheit at 29.9 inches of mercury (standard atmospheric pressure), must not use methods such as nitrogen that require subsequent purging. Persons pressurizing low-pressure appliances that use refrigerants with boiling points above 85 degrees Fahrenheit at 29.9 inches of mercury, must use heat to raise the internal pressure of the appliance as much as possible, but may use nitrogen to raise the internal pressure of the appliance from the level attainable through use of heat to atmospheric pressure; or

(iii) For the purposes of oil changes, be evacuated or pressurized to a pressure no higher than 5 psig, before it is opened; or drain the oil into a system receiver to be evacuated or pressurized to a pressure no higher than 5 psig.

(2) If leaks in the appliance make evacuation to the levels in Table 1 unattainable or would substantially contaminate the refrigerant being recovered, persons opening or disposing of the appliance must:

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

(ii) Evacuate non-leaking components to be opened or disposed of to the levels specified in Table 1; and

(iii) Evacuate leaking components to be opened or disposed of to the lowest level that can be attained without substantially contaminating the refrigerant. This level may not exceed 0 psig.

(3) *Recordkeeping.* Persons evacuating refrigerant from appliances with a full charge of more than 5 and less than 50 pounds of refrigerant for purposes of disposal of that appliance must keep records documenting the following for three years:

(i) The company name, location of the equipment, date of recovery, amount and type of refrigerant recovered for each appliance; and

(ii) The quantity and type of refrigerant transferred for reclamation and/or destruction, to whom it was transferred, and the date of transfer.

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 and/or recycling equipment manufactured or imported before November 15, 1993	Using recovery and/or recycling equipment manufactured or imported on or after November 15, 1993
Very high-pressure appliance	0	0
High-pressure appliance, or isolated component of such appliance, with a full charge of less than 200 pounds of refrigerant.	0	0
High-pressure appliance, or isolated component of such appliance, with a full charge of 200 pounds or more of refrigerant.	4	10
Medium-pressure appliance, or isolated component of such appliance, with a full charge of less than 200 pounds of refrigerant.	4	10
Medium-pressure appliance, or isolated component of such appliance, with a full charge of 200 pounds or more of refrigerant.	4	15
Low-pressure appliance	25 mm Hg absolute	25 mm Hg absolute.

(b) *Small appliances.* Before opening a small appliance or when disposing of a small appliance, persons must use a recovery and/or recycling machine certified pursuant to § 82.158 that meets the following conditions:

(1) When using recovery equipment manufactured before November 15,

1993, recover 80% of the refrigerant in the small appliance; or

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

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

(c) *MVACs and MVAC-like appliances.* Persons may only open MVAC and MVAC-like appliances while properly using, as defined at § 82.32(e), recovery and/or recycling equipment certified pursuant to § 82.158(f) or (g), as applicable. 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.

(d) System-dependent equipment may not be used with appliances with a full charge of more than 15 pounds of refrigerant, unless the system-dependent equipment is permanently attached to the appliance as a pump-out unit.

(e) Persons who maintain, service, repair, or dispose of only appliances that they own and that contain pump-out units are exempt from the requirement to use certified, self-contained recovery and/or recycling equipment.

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

(g) 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 or MVAC-like appliance.

(h) [Reserved]

(i) The provisions in this paragraph (i) of this section apply to owners and operators of appliances containing more than 50 pounds of class I and class II refrigerants only until [18 MONTHS FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER]. The appliance maintenance and leak repair provisions in § 82.157 apply as of [18 MONTHS FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER].

* * * * *

■ 7. Add § 82.157 to Subpart F to read as follows:

§ 82.157 Appliance maintenance and leak repair.

(a) *Applicability.* This section applies as of [18 MONTHS FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER]. This section applies only to appliances with a full charge of 50 or more pounds of refrigerant. Unless otherwise specified, the requirements of this section apply to the owner or operator of the appliance.

(b) *Leak Inspections.* (1) Commercial refrigeration and industrial process refrigeration equipment with a full charge of 500 or more pounds of refrigerant must be inspected for leaks once every three months.

(i) Such equipment may be inspected once per year if no refrigerant has been added in the past 365 days (excluding refrigerant added for seasonal variances). The equipment may continue to be inspected once per year if no refrigerant has been added in the past 365 days (excluding refrigerant added for seasonal variances).

(ii) If refrigerant is added to an appliance that is on an annual leak inspection schedule under paragraph (b)(1)(i) of this section, the appliance owner or operator must resume quarterly leak inspections.

(2) Commercial refrigeration and industrial process refrigeration equipment with a full charge of 50 or more pounds but less than 500 pounds of refrigerant must be inspected for leaks once per year.

(3) Comfort cooling appliances or other appliances not covered by paragraphs (a)(1) or (a)(2) with a full charge of 50 or more pounds of refrigerant must be inspected for leaks once per year.

(4) Quarterly or annual leak inspections as described in paragraphs (b)(1)–(3) of this section are not required on appliances continuously monitored by an automatic leak detection system that is audited and calibrated annually. An automatic leak detection system may directly detect refrigerant in air, monitor its surrounding in a manner other than detecting refrigerant concentrations in air, or monitor conditions of the appliance.

(i) For systems that directly detect the presence of a refrigerant in air, the system must:

(A) Only be used on systems where the entire appliance or the compressor, evaporator, condenser, or other component with a high potential to leak is located inside an enclosed building or structure;

(B) Have sensors or intakes placed so that they will continuously monitor the refrigerant concentrations in air in proximity to the compressor, evaporator, condenser, and other areas with a high potential for a refrigerant leak;

(C) Accurately detect a concentration level of 10 parts per million of vapor of the specific refrigerant or refrigerants used in the refrigeration appliance(s); and

(D) Alert the owner or operator when a refrigerant concentration of 100 parts per million of vapor of the specific refrigerant or refrigerants used in the refrigeration appliance(s) is reached.

(ii) For a system that monitors its surrounding in a manner other than detecting refrigerant concentrations in air or monitor conditions of the appliance, the system must automatically alert the owner or operator when measurements indicate a loss of 50 pounds of refrigerant or 10 percent of the full charge, whichever is less.

(5) Owners or operators of federally-owned appliances may submit a request to EPA at the address specified in paragraph (m) of this section to conduct leak inspections less frequently than described in paragraphs (b)(1)–(3) of this section. The frequency of inspections cannot be less than one inspection every three years. The request will be considered approved unless EPA notifies the owner or operator of the appliance within 60 days of receipt of the request that it has been disapproved. Requests must include an alternate leak inspection schedule and demonstrate that:

(i) The appliance has a history of minimal leakage;

(ii) The appliance is remotely located or is otherwise difficult to access for routine maintenance; and

(iii) Use of automatic leak detection equipment is not practical.

(c) *Leak Rate Calculation.* Persons adding or removing refrigerant from an appliance must, upon conclusion of that service, provide the owner or operator with documentations that meets the requirements of paragraph (l)(4) of this section. The leak rate must be calculated every time refrigerant is added to an appliance unless the addition is made immediately following a retrofit, installation of a new appliance, or qualifies as a seasonal variance.

(d) *Requirement to Address Significant Leaks through Appliance Repair, or Retrofitting or Retiring an Appliance.* (1) Appliances with a leak rate over the applicable leak rate in paragraph (d)(2) of this section must be repaired in accordance with paragraphs (e)–(g) of this section unless the owner elects to retrofit or retire the appliance in compliance with paragraphs (h) and (i) of this section. If the owner or operator elects to repair leaks, but fails to successfully comply with paragraphs (e)–(g) of this section, the owner or

operator must create and implement a retrofit or retirement plan in accordance with paragraphs (h) and (i) of this section.

(2) *Applicable Leak Rates:* (i) 20 percent leak rate for commercial refrigeration equipment;

(ii) 20 percent leak rate for industrial process refrigeration equipment; and

(iii) 10 percent leak rate for comfort cooling appliances or other appliances with a full charge of 50 or more pounds of refrigerant not covered by (2)(i) or (ii) of this subsection.

(e) *Appliance Repair.* All leaks must be identified and repaired in accordance with this paragraph within 30 days (or 120 days if an industrial process shutdown is required) of an appliance exceeding the applicable leak rate in paragraph (d) of this section.

(1) A leak inspection must be conducted to identify the location of leaks.

(2) All identified leaks must be repaired such that there are no longer any detectable leaks, as documented by an initial and follow-up verification test or tests.

(f) *Verification tests.* Initial and follow-up verification tests are required on each identified leak required to be repaired in paragraph (e) of this section.

(1) *Initial verification test.* Unless granted additional time, an initial verification test must be performed within 30 days (or 120 days if an industrial process shutdown is required) of an appliance exceeding the applicable leak rate in paragraph (d) of this section. An initial verification test must demonstrate that all identified leaks on the appliance are repaired.

(i) For repairs that can be completed without the need to open or evacuate the appliance, the test must be performed as soon as practicable after the conclusion of the repair work and before any additional refrigerant is added to the appliance.

(ii) For repairs that require the evacuation of the appliance or portion of the appliance, the test must be performed before adding any refrigerant to the appliance.

(iii) If the initial verification test indicates that the repairs have not been successful, the owner or operator may conduct as many additional repairs and initial verification tests as needed within the applicable time period.

(2) *Follow-up verification test.* A follow-up verification test must be performed within 10 days of the successful initial verification test or 10 days of the appliance reaching normal operating characteristics and conditions (if appliance or isolated component was evacuated for the repair(s)).

(i) A follow-up verification test must demonstrate that all identified leaks on the appliance are repaired. If the follow-up verification test indicates that the repairs have not been successful, the owner or operator may conduct as many additional repairs and follow-up verification tests as needed within the applicable time period.

(ii) [Reserved].

(g) *Extensions to the appliance repair deadlines in paragraphs (e)–(g) of this section.* The timeframes in paragraphs (e)–(g) of this section are temporarily suspended when an appliance is mothballed. The time will resume on the day additional refrigerant is added to the appliance (or component of an appliance if the leaking component was isolated). Additionally, owners or operators may request more than 30 days (or 120 days if an industrial process shutdown is required) to comply with paragraphs (e) and (f) of this section if they meet the requirements of (g)(1) through (g)(4) of this section. The request will be considered approved unless EPA notifies the owners or operators within 30 days of receipt of the request.

(1) One or more of the following conditions applies:

(i) The appliance is located in an area subject to radiological contamination or shutting down the appliance will directly lead to radiological contamination. Additional time is permitted to the extent needed to conduct and finish repairs in a safe working environment.

(ii) Requirements of other applicable Federal, state, or local regulations make a repair within 30 days (or 120 days if an industrial process shutdown is required) impossible. Additional time is permitted to the extent needed to comply with the pertinent regulations.

(iii) Necessary parts are unavailable. Additional time is permitted up to 30 days after receiving delivery of the necessary parts, not to exceed 180 days (or 270 days if an industrial process shutdown is required) from the date the appliance exceeded the applicable leak rate.

(2) All repairs that do not require additional time must be completed and verified within the initial 30 day repair period (or 120 day repair period if an industrial process shutdown is required);

(3) The owner or operator must document all repair efforts and the reason for the inability to make the repair within the initial 30 day repair period (or 120 day repair period if an industrial process shutdown is required); and

(4) The owner or operator must request an extension from EPA at the address specified in paragraph (m) of this section within 30 days (or 120 days if an industrial process shutdown is required) of the appliance exceeding the applicable leak rate in paragraph (d) of this section. Requests must include: Identification and address of the facility; the name of the owner or operator of the appliance; the leak rate; the method used to determine the leak rate and full charge; the date the appliance exceeded the applicable leak rate; the location of leak(s) to the extent determined to date; any repair work that has been performed thus far, including the date that work was completed; the reasons why more than 30 days (or 120 days if an industrial process shutdown is required) are needed to complete the repair; and an estimate of when the work will be completed. If the estimated completion date is to be extended, a new estimated date of completion and documentation of the reason for that change must be submitted to EPA within 30 days. The owner or operator must keep a dated copy of this submission.

(h) *Retrofit or retirement plans.* The retrofit or retirement plan must be signed by an authorized company official, dated, accessible at the site of the appliance in paper copy or electronic format, and available for EPA inspection upon request.

(1) A retrofit or retirement plan must be created within 30 days of:

(i) discovering that an appliance is leaking above the applicable leak rate in paragraph (d) of this section if the owner or operator intends to retrofit or retire rather than repair the leak; or

(ii) failing to comply with paragraphs (e) and (f) of this section.

(2) A retrofit or retirement plan must, at a minimum, contain the following information:

(i) Identification and location of the appliance;

(ii) Type and full charge of the refrigerant used in the appliance;

(iii) Type and full charge of the refrigerant to which the appliance will be converted, if retrofitted;

(iv) Itemized procedure for converting the appliance to a different refrigerant, including changes required for compatibility with the new substitute, if retrofitted;

(v) Plan for the disposition of recovered refrigerant;

(vi) Plan for the disposition of the appliance, if retired; and

(vii) A schedule, not to exceed one-year, for completion of the appliance retrofit or retirement.

(3) Unless granted additional time, all work performed in accordance with the

plan must be finished within one year of the plan's date (not to exceed 13 months from when the plan was required in paragraph (h)(1) of this section).

(4) All identified leaks must be repaired as part of any retrofit under such a plan.

(i) *Extensions to the one-year retrofit or retirement schedule.* The timeframes in paragraphs (h) and (i) of this section are temporarily suspended when an appliance is mothballed. The time will resume on the day additional refrigerant is added to the appliance (or component of an appliance if the leaking component was isolated). Additionally, owners or operators may request more than one year to comply with paragraphs (h) and (i) of this section if they meet the requirements of this paragraph. The request will be considered approved unless EPA notifies the owners or operators within 60 days of receipt of the request. The request must be submitted to EPA at the address specified in § 82.157(m) within seven months of discovering the appliance exceeded the applicable leak rate. The request must include the identification of the appliance; name of the owner or operator; the leak rate; the method used to determine the leak rate and full charge; the date the appliance exceeded the applicable leak rate; the location of leaks(s) to the extent determined to date; any repair work that has been finished thus far, including the date that work was finished; a plan to finish the retrofit or retirement of the appliance; the reasons why more than one year is necessary to retrofit or retire the appliance; the date of notification to EPA; and an estimate of when retrofit or retirement work will be finished. A dated copy of the request must be available on-site in either electronic or paper copy. If the estimated completion date is to be revised, a new estimated date of completion and documentation of the reason for that change must be submitted to EPA at the address specified in § 82.157(m) within 30 days.

(1) *Extensions available to any appliance.* Owners or operators of commercial refrigeration, industrial process refrigeration, comfort-cooling, or other equipment are automatically allowed 18 months to retire an appliance if the replacement uses a refrigerant exempt from the venting prohibition in § 82.154(a).

(2) *Extensions available to industrial process refrigeration.* Owners or operators of industrial process refrigeration equipment may request additional time beyond the one-year period in paragraph (h) of this section to finish the retrofit or retirement under the following circumstances.

(i) Requirements of other applicable Federal, state, or local regulations make a retrofit or retirement within one year impossible. Additional time is permitted to the extent needed to comply with the pertinent regulations; or

(ii) The new or the retrofitted equipment is custom-built as defined in this subpart and the supplier of the appliance or one of its components has quoted a delivery time of more than 30 weeks from when the order is placed. The appliance or appliance components must be installed within 120 days after receiving delivery of the necessary parts.

(3) *Extensions available to Federally-owned equipment.* Owners or operators of Federally-owned commercial or comfort-cooling equipment may request an additional year beyond the one-year period in paragraph (h) of this section to finish the retrofit or retirement under the following circumstances:

(i) A delivery time of more than 30 weeks from the beginning of the official procurement process is quoted due to complications presented by the Federal agency appropriations and/or procurement process;

(ii) The appliance is located in an area subject to radiological contamination and creating a safe working environment will require more than 30 weeks; or

(iii) After receiving a one-year extension under subparagraphs (i)(3)(i) or (ii) of this section, additional time is necessary to finish the retrofit or retirement of equipment. The request must be submitted to EPA before the end of the ninth month of the one-year extension and must include the same information submitted for that one-year extension, with any necessary revisions. A dated copy of the request must be available on-site in either electronic or paper copy. The request will be considered approved unless EPA notifies the owners or operators within 60 days of receipt of the request.

(j) *Two-year leak limit.* Appliances containing 50 pounds or more of refrigerant are prohibited from leaking more than 75 percent of the full charge in each of two consecutive twelve-month periods. Under paragraph (c) of this section, the leak rate must be calculated every time refrigerant is added to an appliance. By the end of the second twelve-month period, appliances that exceed this limit must be retired or mothballed until retired.

(k) *Purged refrigerant.* In calculating annual leak rates, purged refrigerant that is destroyed at a verifiable destruction efficiency of 98 percent or greater will not be counted toward the leak rate.

(l) *Recordkeeping.* All records identified in this paragraph must be kept for three years in electronic or paper format.

(1) Owners or operators must keep records of leak inspections that include the date of inspection, the method used to conduct the leak inspection, a list of the location of each leak that was identified, and a certification that all visible parts of the appliance were inspected.

(2) If using an automatic leak detection system, the owner or operator must maintain records regarding the installation and the annual audit and calibration of the system. They also must keep a record of each date the monitoring system identified a leak and the location of the leak.

(3) Owners or operators must determine the full charge of all appliances with 50 or more pounds of refrigerant (as defined in § 82.152), and maintain the following information for each appliance:

(i) The identification of the owner or operator of the appliance;

(ii) The address where the appliance is located;

(iii) The full charge of the appliance and the method for how the full charge was determined;

(iv) The range for the full charge of the appliance, its midpoint, and how the range was determined (if using method 4, as defined in § 82.152, for determining full charge);

(v) Any revisions of the full charge and how they were determined; and

(vi) The dates such revisions occurred.

(4) Owners or operators are required to maintain a record including the following information for each time an appliance with a full charge of 50 or more pounds is maintained, serviced, repaired, or disposed of, when applicable. If the maintenance, service, repair, or disposal is done by someone other than the owner, that person must provide a record containing the following information to the owner or operator, when applicable:

(i) The identity and location of the appliance;

(ii) The date of the maintenance, service, repair, or disposal performed;

(iii) The part(s) of the appliance being serviced and for each part, the type of maintenance, service, repair, or disposal performed;

(iv) The name of the person performing the maintenance, service, repair or disposal;

(v) The amount and type of refrigerant added to or removed from the appliance;

(vi) The full charge of the appliance; and

(vii) The leak rate and the method used to determine the leak rate (not applicable when disposing of the appliance, following a retrofit, installation of a new appliance, or if the refrigerant addition qualifies as a seasonal variance).

(5) Owners or operators must maintain records of the dates and results of all initial and follow-up verification tests. Records must include at minimum the location of the appliance, the date of the verification test or tests, the location of all repaired leaks that were tested, the type of verification test used, and the results of those tests.

(6) Owners or operators must maintain retrofit or retirement plans developed in accordance with paragraph (h) of this section.

(7) Owners or operators must maintain retrofit and/or extension requests submitted to EPA in accordance with paragraph (i) of this section.

(8) Owners or operators that suspend the deadlines in this section by mothballing an appliance must keep records documenting when the appliance was mothballed and when additional refrigerant was added to the appliance (or isolated component).

(9) Owners or operators who exclude purged refrigerants that are destroyed from annual leak rate calculations must maintain records to support the amount of refrigerant claimed as sent for destruction. Records must be based on a monitoring strategy that provides reliable data to demonstrate that the amount of refrigerant claimed to have been destroyed is not greater than the amount of refrigerant actually purged and destroyed and that the 98 percent or greater destruction efficiency is met. Records must include flow rate, quantity or concentration of the refrigerant in the vent stream, and periods of purge flow. Records must include:

(i) the identification of the facility and a contact person, including the address and telephone number;

(ii) A description of the appliance, focusing on aspects relevant to the purging of refrigerant and subsequent destruction;

(iii) A description of the methods used to determine the quantity of refrigerant sent for destruction and type of records that are being kept by the owners or operators where the appliance is located;

(iv) The frequency of monitoring and data-recording; and

(v) A description of the control device, and its destruction efficiency.

(10) Owners or operators that exclude additions of refrigerant due to seasonal variance from their leak rate calculation must maintain records in accordance with paragraph (c) of this section.

(11) Owners or operators that submit reports to EPA in accordance with paragraph (m) of this section, must maintain copies of the submitted reports and any responses from EPA.

(12) Owners or operators of federally-owned appliances that request an alternate leak inspection schedule in accordance with paragraph (b)(5) of this section must maintain copies of the submitted requests and all responses from EPA until three years after the less frequent leak inspection schedule is no longer being followed.

(m) *Reporting.* All notifications must be submitted electronically to *608reports@epa.gov* unless the notification contains confidential business information. If the notification contains confidential business information, the information should be submitted to: Section 608 Program Manager; Stratospheric Protection Division; Mail Code: 6205T; U.S. Environmental Protection Agency; 1200 Pennsylvania Avenue NW.; Washington, DC 20460.

(1) Owners or operators must notify EPA at this address in accordance with paragraph (b)(5) of this section when seeking an alternate leak inspection schedule.

(2) Owners or operators must notify EPA at this address in accordance with paragraph (g) of this section when seeking an extension of time to complete repairs.

(3) Owners or operators must notify EPA at this address in accordance with paragraph (i) of this section when seeking an extension of time to complete the retrofit or retirement of an appliance.

(4) When excluding purged refrigerants that are destroyed from annual leak rate calculations, owners or operators must notify EPA at this address within 60 days after the first time the exclusion is used by the facility where the appliance is located. The report must include the information included in paragraph (l)(9) of this section.

■ 8. Revise § 82.158 to read as follows:

§ 82.158 Standards for recovery and/or recycling equipment.

(a) No person may manufacture or import recovery and/or recycling equipment for use during the maintenance, service, repair, or disposal of appliances unless the equipment is certified in accordance with this section.

(b) No person may alter the design of certified refrigerant recovery and/or recycling equipment in a way that would affect the equipment's ability to meet the certification standards in this section without resubmitting the altered design for certification testing. Until it is tested and shown to meet the certification standards in this section, equipment so altered will be considered uncertified.

(c) Recovery and/or recycling equipment manufactured or imported before November 15, 1993, intended for use during the maintenance, service, repair, or 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 2 of this section when tested using a properly calibrated pressure gauge.

(d) Manufacturers and importers of recovery and/or recycling equipment must have such equipment certified by an approved equipment testing organization as follows:

(1) Recovery and/or recycling equipment manufactured or imported on or after November 15, 1993, and before September 22, 2003, intended for use during the maintenance, service, repair, or disposal of appliances (except small appliances, MVACs, and MVAC-like appliances) must be certified by an approved equipment testing organization as being capable of achieving the level of evacuation specified in Table 2 of this section under the conditions of appendix B1 of this subpart (based upon the ARI Standard 740–1993, *Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment*).

(2) Recovery and/or recycling equipment manufactured or imported on or after September 22, 2003, and before January 1, 2017, intended for use during the maintenance, service, repair, or disposal of appliances (except small appliances, MVACs, and MVAC-like appliances) must be certified by an approved equipment testing organization as being capable of achieving the level of evacuation specified in Table 2 of this section under the conditions of appendix B2 of this subpart (based upon the ARI Standard 740–1995, *Performance of Refrigerant Recovery, Recycling and/or Reclaim Equipment*).

(3) Recovery and/or recycling equipment manufactured or imported on or after January 1, 2017, intended for use during the maintenance, service, repair, or disposal of appliances (except small appliances, MVACs, and MVAC-like appliances) must be certified by an approved equipment testing

organization as being capable of achieving the level of evacuation specified in Table 2 of this section under the conditions of appendix B3 (for non-flammable refrigerants) or appendix B4 (for flammable refrigerants) of this subpart.

TABLE 2—LEVELS OF EVACUATION WHICH MUST BE ACHIEVED BY RECOVERY AND/OR RECYCLING EQUIPMENT

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

Type of appliance with which recovery and/or recycling machine is intended to be used	Inches of Hg vacuum (relative to standard atmospheric pressure of 29.9 inches Hg)	
	Manufactured or imported before November 15, 1993	Manufactured or imported on or after November 15, 1993
HCFC–22 appliances, or isolated component of such appliances, with a full charge of less than 200 pounds of refrigerant.	0	0
HCFC–22 appliances, or isolated component of such appliances, with a full charge of 200 pounds or more of refrigerant.	4	10
Very high-pressure appliances	0	0
Other high-pressure appliances, or isolated component of such appliances, with a full charge of less than 200 pounds of refrigerant.	4	10
Other high-pressure appliances, or isolated component of such appliances, with a full charge of 200 pounds or more of refrigerant.	4	15
Medium-pressure appliances, or isolated component of such appliances, with a full charge of less than 200 pounds of refrigerant.	4	10
Medium-pressure appliances, or isolated component of such appliances, with a full charge of 200 pounds or more of refrigerant.	4	15
Low-pressure appliances	25 mm Hg absolute	25 mm Hg absolute.

(4) Recovery and/or recycling equipment whose recovery efficiency cannot be tested according to the procedures in appendix B1, B2, B3, or B4 of this subpart as applicable 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. The manufacturer's instructions must specify how to achieve the required recovery efficiency, and the equipment must be tested when used according to these instructions.

(5) The equipment must meet the minimum requirements for certification under appendix B1, B2, B3, or B4 of this subpart as applicable.

(6) If the equipment is equipped with a noncondensables purge device, the equipment must not release more than 3 percent of the quantity of refrigerant being recycled through noncondensables purging under the conditions of appendix B1, B2, B3, or B4 of this subpart as applicable.

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

(8) The equipment must have its liquid recovery rate and its vapor recovery rate measured under the conditions of appendix B1, B2, B3, or B4 as applicable, unless the equipment has no inherent liquid or vapor recovery rate.

(e) *Small Appliances.* Equipment used during the maintenance, service, repair, or disposal of small appliances must be certified by an approved equipment testing organization to be capable of recovering 90% of the refrigerant in the test stand when the compressor of the test stand is operational and 80% of the refrigerant when the compressor of the test stand is not operational, 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.

(1) Equipment manufactured or imported before November 15, 1993, will be considered certified if it is capable of either recovering 80% of the refrigerant in the system, whether or not the compressor of the test stand is operational, or achieving a four-inch vacuum when tested using a properly calibrated pressure gauge.

(2) Equipment manufactured or imported on or after November 15, 1993, may also be certified if it is capable of achieving a four-inch vacuum under the conditions of appendix B1 of this subpart, based upon ARI Standard 740–1993.

(3) Equipment manufactured or imported on or after September 22, 2003, and before January 1, 2017, may also be certified if it is capable of achieving a four-inch vacuum under the conditions of appendix B2 of this subpart, based upon ARI Standard 740–1995.

(4) Equipment manufactured or imported on or after January 1, 2017, may also be certified if it is capable of achieving a four-inch vacuum under the conditions of appendix B3 (for non-flammable refrigerants) or appendix B4 (for flammable refrigerants) of this subpart.

(5) Equipment used to evacuate refrigerant from small appliances before they are disposed of may also be certified if it is capable of achieving a four-inch vacuum when tested using a properly calibrated pressure gauge.

(f) *MVAC-like appliances.* (1) Manufacturers and importers of recovery and/or recycling equipment intended for use during the maintenance, service, repair, or disposal of MVAC-like appliances must certify such equipment in accordance with § 82.36(a).

(2) Equipment manufactured or imported before November 15, 1993, intended 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).

(g) *MVACs.* Equipment used to evacuate refrigerant from MVACs before they are disposed of must be certified in accordance with § 82.36(a).

(h) *Labeling.* Manufacturers and importers of equipment certified under paragraphs (d) and (e) 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 must also show the date of manufacture and the serial number (if applicable) of the equipment. The label must 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 way that it is likely to remain legible for the lifetime of the equipment, and be affixed in such a way that it cannot be removed from the equipment without damage to the label.

(i) *Retesting.* At least once every three years, manufacturers or importers of recovery and/or recycling 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 have approved equipment testing organizations conduct either:

(1) Retests of certified recovery and/or recycling equipment in accordance with paragraphs (d) and (e) of this section; or

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

(j) *Revocation.* 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 must give notice to the manufacturer or importer setting forth the basis for the determination.

(k) Equipment that is advertised or marketed as ''recycling equipment'' must be capable of recycling the standard contaminated refrigerant sample of appendix B2, B3, or B4 of this subpart (as applicable) to the levels in the following table when tested under the conditions of appendix B2, B3 or B4 of this subpart:

MAXIMUM LEVELS OF CONTAMINANTS PERMISSIBLE IN REFRIGERANT PROCESSED THROUGH EQUIPMENT ADVERTISED AS ''RECYCLING'' EQUIPMENT

Contaminants	Low-pressure (R–11, R–123, R–113) systems	R–12 Systems	All other systems
Acid Content (by wt.)	1.0 PPM	1.0 PPM	1.0 PPM.
Moisture (by wt.)	20 PPM	10 PPM	20 PPM.
Noncondensable Gas (by vol.)	N/A	2.0%	2.0%.
High Boiling Residues (by vol.)	1.0%	0.02%	0.02%.
Chlorides by Silver Nitrate Test	No turbidity	No turbidity	No turbidity.
Particulates	Visually clean	Visually clean	Visually clean.

■ 9. Revise § 82.160 to read as follows:

§ 82.160 Approved equipment testing organizations.

(a) Any equipment testing organization may apply for approval by the Administrator to certify equipment under the standards in § 82.158 and appendices B2, B3, B4, or C of this subpart. Applications must be sent to *608reports@epa.gov,* or if containing confidential business information, mailed to: Section 608 Program Manager; Stratospheric Protection Division; Mail Code: 6205T; U.S. Environmental Protection Agency; 1200 Pennsylvania Avenue NW., Washington, DC 20460.

(b) Applications for approval must include:

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

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

(3) Verification of the organization's knowledge of the standards and recordkeeping and reporting requirements of this subpart.

(4) A description of the organization's program for verifying the performance of certified recovery and/or recycling equipment manufactured over the long term, specifying whether retests of equipment or inspections of equipment at manufacturing facilities will be used.

(5) Verification that the organization has no conflict of interest and receives no direct or indirect financial benefit from the outcome of certification testing.

(6) Agreement to allow the Administrator access to records and personnel to verify the information contained in the application.

(c) Organizations may not certify equipment before receiving approval from EPA. If approval is denied under this section, the Administrator must give written notice to the organization setting forth the basis for the determination.

(d) If an approved testing organization conducts certification tests in a way not consistent with the representations made in its application or with the provisions of this subpart, the Administrator may revoke approval in accordance with § 82.169. In such cases, the Administrator must give notice to the organization setting forth the basis for the determination.

(e) *Recordkeeping and reporting.* (1) Approved equipment testing organizations must maintain records of equipment testing and performance and a list of equipment that meets EPA requirements. This list must include the name of the manufacturer and the name and/or serial number of the model line. Approved equipment testing organizations must publish online a list of all certified equipment that includes the information specified above and update the list annually.

(2) Approved equipment testing organizations must notify EPA at *608reports@epa.gov* if retests of equipment or inspections of manufacturing facilities conducted under to § 82.158(i) 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.

■ 10. Revise § 82.161 to read as follows:

§ 82.161 Technician certification.

Until [ONE YEAR FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER], this section applies only to technicians and organizations certifying technicians that maintain, service, or repair appliances containing class I and class II refrigerants. Starting on [ONE YEAR FROM PUBLICATION OF A FINAL RULE IN THE FEDERAL REGISTER], this section applies to technicians and organizations certifying technicians that maintain, service, or repair appliances containing any refrigerant as defined in § 82.152.

(a) *Requirements for Technicians.* (1) Technicians must pass a certification exam offered by an approved technician

certification program to work on different types of appliances, as follows:

(i) Technicians who maintain, service, or repair small appliances must be certified as Type I technicians.

(ii) Technicians who maintain, service, repair, or dispose of medium-, high-, or very high-pressure appliances (except small appliances, MVACs, and MVAC-like appliances) must be certified as Type II technicians.

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

(iv) Excluding persons who exclusively dispose of small appliances, MVACs, and MVAC-like appliances, technicians who maintain, service, repair, or dispose of appliances as described in paragraph (a)(1)(i)–(iii) of this section must be certified as Universal technicians.

(v) Technicians who maintain, service, or repair MVAC-like appliances must either be certified as Type II technicians or be certified by a training and certification program approved under § 82.40.

(vi) Technicians who maintain, service, or repair MVAC appliances must be certified by a training and certification program approved under § 82.40.

(2) Apprentices are exempt from the requirement in paragraph (a)(1) of this section provided the apprentice is closely and continually supervised by a certified technician while performing any maintenance, service, repair, or disposal that could reasonably be expected to release refrigerant from an appliance into the environment. The supervising certified technician and the apprentice have the responsibility to ensure that the apprentice complies with this subpart.

(3) The Administrator may require technicians to demonstrate at their place of business 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 or suspension 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.

(4) Technicians certified under this section must keep a copy of their certificate at their place of business.

(5) *Recertification.* The Administrator reserves the right to specify a requirement for technician recertification at some future date, if necessary, by placing a notice in the **Federal Register**.

(b) *Requirements for Technician Certification Programs.* (1) No technician training or testing program may issue certificates under this section unless the program complies with all the standards of this section and appendix D, and has been granted approval by the Administrator.

(2) *Program Approval.* Persons may seek approval of any technician certification program (program), in accordance with this paragraph, by submitting to the Administrator at the address in § 82.160(a) verification that the program meets all the standards listed in appendix D. The Administrator reserves the right to consider other relevant factors to ensure the effectiveness of certification programs. If approval is denied under this section, the Administrator must give written notice to the program setting forth the basis for the determination.

(3) *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. 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 written request must explain why the request is being made.

(4) *Proof of Certification.* Programs certifying technicians must provide technicians with identification cards in accordance with section (f) of appendix D of this subpart.

(5) Programs certifying technicians must maintain records in accordance with section (g) of appendix D of this subpart.

(6) Starting January 1, 2018, programs certifying technicians, excluding Federally-run programs, must create and maintain a publicly-searchable database of technicians they have certified.

(i) At a minimum, the database must include all technicians certified after January 1, 2017.

(ii) The database must provide the first name, middle initial, and last name of the certified technician, the technician's city of residence when taking the test, the type(s) of certification received, and the date each certification was completed.

(iii) Programs certifying technicians must provide notice to technicians of their inclusion in the database in compliance with any other federal, state or local regulations, and give technicians the ability to opt out of being included in the database.

(7) If an approved program violates any of the above requirements, the Administrator may revoke approval in accordance with § 82.169. In such cases, the Administrator must give notice to the organization setting forth the basis for the determination.

(c) *Test Subject Material.* A bank of test questions developed by the Administrator consists of groups, including a core group and technical groups. The Administrator will release this bank of questions only to approved technician certification programs. Each test for each type of certification must include at least 25 questions drawn from the core group and at least 25 questions drawn from each relevant technical group. These questions must address the subject areas in appendix D.

■ 11. Remove and reserve § 82.162:

§ 82.162 [Reserved]

■ 12. Revise § 82.164 to read as follows:

§ 82.164 Reclaimer certification.

(a) All persons reclaiming used refrigerant for sale to a new owner must meet the following requirements:

(1) Reclaim refrigerant to all the specifications in appendix A of this subpart (based on AHRI Standard 700–2015, *Specifications for Refrigerants*) that are applicable to that refrigerant;

(2) Verify that each batch of refrigerant reclaimed meets these specifications using the analytical methodology prescribed in appendix A, which includes the primary methodologies included in the appendix to the AHRI Standard 700–2015;

(3) Release no more than 1.5 percent of the refrigerant during the reclamation process;

(4) Dispose of wastes from the reclamation process in accordance with all applicable laws and regulations; and

(5) Maintain records and submit reports in accordance with paragraph (d) of this section.

(b) The owner or a responsible officer reclaiming used refrigerant for sale to a new owner, except for persons who properly certified under this section before May 11, 2004, must certify to the Administrator at the address in § 82.160(a) that they will meet the requirements in paragraph (a) of this section. The certification must include the name and address of the reclaimer and a list of equipment used to reclaim the refrigerant to the required standard, and to analyze the refrigerant to ensure it meets these specifications.

(c) Certificates are not transferable. In the event of a change in ownership of an entity which reclaims refrigerant, the new owner of the entity must certify with the Administrator within 30 days

of the change of ownership under this section. In the event of a change in business management, location, or contact information, the owner of the entity must notify EPA within 30 days of the change at the address in § 82.160(a).

(d) *Recordkeeping and reporting.* (1) Reclaimers must maintain records of the analysis conducted to verify that reclaimed refrigerant meets the necessary specifications in paragraphs (a)(1) and (a)(2) of this section.

(2) 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) by refrigerant type sent to them for reclamation. Such records must be maintained on a transactional basis for three years.

(3) Reclaimers must report to the Administrator annually within 30 days of the end of the calendar year the total annual quantity of material (the combined mass of refrigerant and contaminants) by refrigerant type sent to them for reclamation, the total annual mass of each refrigerant reclaimed, and the total annual mass of waste products.

(e) Failure to abide by any of the provisions of this subpart may result in revocation or suspension of the certification of the reclaimer in accordance with § 82.169. In such cases, the Administrator must give notice to the organization setting forth the basis for the determination.

■ 13. Amend section 82.166 by:

■ a. Removing and reserving paragraphs (a) through (i), and (l); and

■ b. Revising paragraph (m).

Revisions to read as follows:

§ 82.166 Reporting and recordkeeping requirements.

(a)–(i) [Reserved]

* * * * *

(l) [Reserved]

(m) All records required to be maintained pursuant to this section must be kept for a minimum of three years unless otherwise indicated.

* * * * *

■ 14. Amend subpart F by revising appendix A to read as follows:

APPENDIX A TO SUBPART F OF PART 82—SPECIFICATIONS FOR REFRIGERANTS

This appendix is based on the Air-Conditioning, Heating, and Refrigeration Institute Standard 700–2015, *Specifications for Refrigerants.*

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to evaluate and accept/reject refrigerants regardless of source (*i.e.,* new, reclaimed and/or repackaged) for use in new and existing refrigeration and air-conditioning products as required under 40 CFR part 82.

1.1.1 *Intent.* This standard is intended for the guidance of the industry including manufacturers, refrigerant reclaimers, repackagers, distributors, installers, servicemen, contractors and for consumers.

1.1.2 *Review and Amendment.* This standard is subject to review and amendment as the technology advances.

Section 2. Scope

2.1 *Scope.* This standard specifies acceptable levels of contaminants (purity requirements) for various fluorocarbon and other refrigerants regardless of source and lists acceptable test methods. These refrigerants are as referenced in the ANSI/ASHRAE Standard 34 with Addenda:

2.1.1 Single-Component Fluorocarbon Refrigerants: R–11, R–12, R–13, R–22, R–23, R–32, R–113, R–114, R–115, R–116, R–123, R–124, R–125, R–134a, R–141b, R–142b, R–143a, R–152a, R–218, R–227ea, R–236fa, R–245fa, R–1233zd(E), R–1234yf, R–1234ze(E);

2.1.2 Single Component Hydrocarbon Refrigerants: R–50, R–170, R–E170, R–290, R–600, R–600a, R–601, R–601a, R–610, R–1150, R–1270;

2.1.3 Carbon Dioxide Refrigerant: R–744;

2.1.4 Zeotropic Blend Refrigerants: R–401A, R–401B, R–402A, R–402B, R–403A, R–403B, R–404A, R–405A, R–406A, R–407A, R–407B, R–407C, R–407D, R–407E, R–407F, R–408A, R–409A, R–409B, R–410A, R–410B, R–411A, R–411B, R–412A, R–413A, R–414A, R–414B, R–415A, R–415B, R–416A, R–417A, R–417B, R–417C, R–418A, R–419A, R–419B, R–420A, R–421A, R–421B, R–422A, R–422B, R–422C, R–422D, R–422E, R–423A, R–424A, R–425A, R–426A, R–427A, R–428A, R–429A, R–430A, R–431A, R–434A, R–435A, R–437A, R–438A, R–439A, R–440A, R–442A, R–444A, R–444B, R–445A, R–446A, R–447A, R–448A, R–49A, R–450A;

2.1.5 Zeotropic Hydrocarbon Blend Refrigerants: R–432A, R–433A, R–433B, R–433C, R–436A, R–436B, R–441A, R–443A; and

2.1.6 Azeotropic Blend Refrigerants: R–500, R–502, R–503, R–507A, R–508A, R–508B, R–509A, R–510A, R–511A, and R–512A.

Section 3. Definitions

3.1 *Definitions.* All terms in this appendix will follow the definitions in § 82.152 unless otherwise defined in this appendix.

3.2 *Shall, Should, Recommended,* or *It Is Recommended* shall be interpreted as follows:

3.2.1 *Shall.* Where ''shall'' or ''shall not'' is used for a provision specified, that provision is mandatory if compliance with this appendix is claimed.

3.2.2 *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.* Characterization of single component fluorocarbon (Table 1A) and zeotropic/azeotropic blend (Table 2A/3) refrigerants and contaminants are listed in the following general classifications:

4.1.1 Isomer content (see Table 1A)

4.1.2 Air and other non-condensables (see Tables 1A, 2A, 3)

4.1.3 Water (see Tables 1A, 2A, 3)

4.1.4 All other volatile impurities (see Tables 1A, 2A, 3)

4.1.5 High boiling residue (see Tables 1A, 2A, 3)

4.1.6 Halogenated unsaturated volatile impurities (see Table 1A)

4.1.7 Particulates/solids (see Tables 1A, 2A, 3)

4.1.8 Acidity (see Tables 1A, 2A, 3)

4.1.9 Chloride (see Tables 1A, 2A, 3)

4.2 *Hydrocarbon Characterization.* Characterization of hydrocarbon refrigerants (Tables 1B and 2B) and contaminants are listed in the following general classifications:

4.2.1 Nominal composition

4.2.2 Other allowable impurities

4.2.3 Air and other non-condensables

4.2.4 Sulfur odor

4.2.5 High boiling residue

4.2.6 Particulates/solids

4.2.7 Acidity

4.2.8 Water

4.2.9 All other volatile impurities

4.2.10 Total C3, C4, and C5 polyolefins

4.3 *Carbon Dioxide Characterization.* Characterization of carbon dioxide (Table 1C) and its contaminants are listed in the following general classifications:

4.3.1 Purity

4.3.2 Air and other non-condensables

4.3.3 Water

4.3.4 High boiling residue

4.3.5 Particulates/solids

Section 5. Sampling and Summary of Test Procedures

5.1 *Referee Test.* The referee test methods for the various contaminants are summarized in the following paragraphs. Detailed test procedures are included in *Appendix C to AHRI Standard 700.* If alternative test methods are employed, the user must be able to demonstrate that they produce results at least equivalent to the specified referee test method.

5.2 *Refrigerant Sampling*

5.2.1 *Sampling Precautions.* Special precautions should be taken to ensure that representative samples are obtained for analysis. Sampling shall be done by qualified personnel following accepted sampling and safety procedures. Refrigerants with critical temperatures near or below ambient temperature cannot be reliably sampled for both liquid and vapor phase without special handling.

Note: Flammable refrigerants which are ASHRAE 34 class 2L, 2, or 3 present additional safety challenges and require additional measures for sampling safety procedures compared to nonflammable halocarbons documented in this standard.

5.2.2 *Cylinder Preparation.* Place a clean, empty sample cylinder with the valve open in an oven at 110 °C (230 °F) for one hour. Remove it from the oven while hot, immediately connect it to an evacuation system and evacuate to less than 56 kPa. Close the valve and allow it to cool. Weigh the empty cylinder.

5.2.3 *Vapor Phase Sampling.* A vapor phase sample shall be obtained for determining the non-condensables. The source temperature shall be measured and recorded at the time the sample is taken.

5.2.3.1 *Special Handling for Low Critical Temperature Refrigerant.* A vapor phase sample is required to determine non-condensables and volatile impurities, including other refrigerants. The vapor phase sample is obtained by regulating the sample container temperature to 5 K or more above the refrigerant critical temperature.

5.2.3.2 *Handling for Liquid Refrigerants with Boiling Points Near or Above Room Temperature.* Since R–11, R–113, R–123, R–141b, R–245fa, and R–1233zd(E) have normal boiling points near or above room temperature, non-condensable determination is not required for these refrigerants.

Note: Non-condensable gases, if present, will concentrate in the vapor phase of the refrigerant; care must be exercised to eliminate introduction of either air or liquid phase refrigerant during the sample transfer.

5.2.4 *Liquid Phase Sampling.* A liquid phase sample is required for all tests listed in this standard except the test for non-condensables.

5.2.4.1 *Liquid Sampling.* Accurate analysis requires that the sample cylinder, at ambient temperature, 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 immediately disconnect the sample cylinder.

Note: Care should be taken to ensure that all connections and transfer lines are dry and evacuated to avoid contaminating the sample.

Note: Low critical temperature refrigerants can have extremely high pressure and the sampling vessel, all connections, and transfer lines must be designed to handle high pressures.

5.2.4.2 *Special Handling for Low Critical Temperature Refrigerant.* A liquid phase sample is required for all testing except volatile impurities, including other refrigerants. The liquid phase sample is obtained by regulating the sample cylinder temperature to 2 °C below the critical temperature of the refrigerant.

Note: If free water is present in the sample, cooling to below 0 °C may result in the formation of ice. Clathrates may form at temperatures above 0 °C with some fluorocarbon refrigerants.

5.2.4.3 *Record Weight.* Check the sample cylinder for leaks and record the gross weight.

5.3 *Refrigerant Identification.* The required method shall be gas chromatography (GC) as described in *Appendix C to AHRI Standard 700–2015* with the corresponding gas chromatogram figures as illustrated in Informative Appendix D to AHRI Standard 700. The chromatogram of the sample shall be compared to known standards.

5.3.2 *Alternative Method.* Determination of the boiling point and boiling point range is an acceptable alternative test method which can be used to characterize refrigerants. 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.

5.3.3 *Required Values.* The required values for boiling point and boiling point range are given in Table 1A, *Physical Properties of Single Component Refrigerants;* Table 1B, *Physical Properties of Zeotropic Blends (400 Series Refrigerants);* and Table 1C, *Physical Properties of Azeotropic Blends (500 Series Refrigerants).*

5.4 *Water Content.*

5.4.1 *Method.* The Coulometric Karl Fischer Titration shall be the primary test method for determining the water content of refrigerants. This method is described in *Appendix C to AHRI Standard 700–2015.* This method can be used for refrigerants that are either a liquid or a gas at room temperature. For all refrigerants, the sample for water analysis shall be taken from the liquid phase of the container to be tested.

5.4.2 *Limits.* The value for water content shall be expressed in parts per million (ppm) by weight and shall not exceed the maximum specified in Tables 1A, 1B, 1C, 2A, 2B, and 3.

5.5 *Conductivity.* (Alternative to chloride and acidity tests).

5.5.1 *Method.* A refrigerant may be tested for conductivity as an indication of the presence of acids, metal chlorides, and any compound that ionizes in water. This alternative procedure is intended for use with new or reclaimed refrigerants, however, significant amounts of oil can interfere with the test results.

5.5.2 *Limits.* The value for conductivity shall be converted to and expressed in ppm by weight calculated as HCl and shall be compared with the maximum acidity value specified (see in Tables 1A, 1B, 1C, 2A, 2B, and 3). If the conductivity is above this amount, then the chloride and acidity tests shall be conducted. If the conductivity is not greater than this amount, then the chloride and acidity tests may be omitted.

5.6 *Chloride.* The refrigerant shall be tested for chloride as an indication of the presence of hydrochloric acid and/or metal chlorides. The referee procedure is intended for use with new or reclaimed halogenated refrigerants; however, high boiling residue in excess of the amounts in Tables 1A, 1B, 1C, 2A, 2B, and 3 can interfere with the test results.

5.6.1 *Method.* The test method shall be that described in *Appendix C to AHRI Standard 700–2015.* The test will show noticeable turbidity at chloride levels of about 3 ppm or greater by weight.

5.5.2 *Limits.* The results of the test shall not exhibit any sign of turbidity. Report the results as ''pass'' or ''fail.''

5.7 *Acidity.*

5.7.1 *Method.* The acidity test uses the titration principle to detect any compound that is soluble in water and ionizes as an acid. The test method shall be that described in *Appendix C to AHRI Standard 700–2015.* This 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 5.8. The test requires a 50 to 60 gram sample and has a detection limit of 0.1 ppm by weight calculated as HCl.

5.7.2 *Limits.* The value for acidity shall be expressed in ppm by weight as HCl and shall not exceed the limits in Tables 1A, 1B, 2A, 2B, and 3.

5.8 *High Boiling Residue.*

5.8.1 *Method.* High boiling residue shall be determined by either volume or weight. The volume method measures the residue from a standard volume of refrigerant after evaporation. The gravimetric method is described in Appendix C to AHRI Standard 700–2015. Oils and/or organic acids will be captured by these methods.

5.8.2 *Limits.* The value for high boiling residue shall be expressed as a percentage by volume or weight and shall not exceed the maximum percent specified in Tables 1A, 1B, 1C, 2A, 2B, and 3.

5.9 *Particulates and Solids.*

5.9.1 *Method.* A measured amount of sample shall be placed in a Goetz bulb under controlled temperature conditions. The particulates/solids shall be determined by visual examination of the Goetz bulb prior to the evaporation of refrigerant. For details of this test method, refer to Part 3 of *Appendix C to AHRI Standard 700–2015.*

Note: R–744 will partially sublimate when measuring a known amount of liquid sample into the dry Goetz bulb and the solid R–744 will interfere with the visual examination of particulates/solids. Determining the particulates/solids shall be completed by visual examination of the Goetz bulb after the evaporation of the refrigerant.

5.9.2 *Limits.* Visual presence of dirt, rust, or other particulate contamination is reported as ''fail.''

5.10 *Non-Condensables.*

5.10.1 *Method.* 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 refrigerants where the solubility of air in the refrigerant 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.

The test method shall be gas chromatography with a thermal conductivity detector as described in *Appendix C to AHRI Standard 700–2015.*

5.10.2 *Limits.* The maximum level of non-condensables in the vapor phase of a test sample shall not exceed the maximum at 25 °C as shown in Tables 1A, 1B, 1C, 2A, 2B, and 3.

5.11 *All Other Volatile Impurities and/or Other Refrigerants.*

5.11.1 *Method.* The amount of volatile impurities including other refrigerants in the subject refrigerant shall be determined by gas chromatography as described in *Appendix C to AHRI Standard 700–2015.*

5.11.2 *Limits.* The test sample shall not contain more than 0.5% by weight of volatile impurities including other refrigerants as shown in Tables 1A, 1B, 1C, 2A, 2B and 3.

5.12 *Total C_3, C_4 and C_5 Polyolefins in Hydrocarbon Refrigerants.*

5.12.1 *Method.* The amount of polyolefin impurities in the hydrocarbon shall be

determined by gas chromatography as described in GPA STD 2177—Natural Gas Liquid Mixtures Containing Nitrogen and Carbon Dioxide.

5.12.2 *Limits.* The test sample shall not contain more than 0.05% by weight in the hydrocarbon sample as shown in Tables 1B and 2B. Report the results as ''pass'' or ''fail.''

5.13 *Sulfur Odor in Hydrocarbon Refrigerants.*

5.13.1 *Method.* The amount of sulfur containing compounds or other compounds with an odor shall be determined by ASTM method D1296, Odor of Volatile Solvents and Diluents.

5.13.2 *Limits.* The test sample paper shall not emit a residual sulfur odor as shown in Tables 1B and 2B.

Section 6. Reporting Procedure

6.1 *Reporting Procedure.* The source (manufacturer, reclaimer, or repackager) of the packaged refrigerant shall be identified. The refrigerant shall be identified by its accepted refrigerant number and/or its chemical name. Maximum allowable levels of contaminants are shown in Tables 1A, 1B, 1C, 2A, 2B, and 3. Test results shall be tabulated in a similar manner.

Table 1A. Single Component Fluorocarbon Refrigerants and their Allowable Levels of Contaminants										
	Reporting Units	Reference Section	**R-11**	**R-12**	**R-13**	**R-22**	**R-23**	**R-32**	**R-113**	**R-114**
CHARACTERISTICS:										
Boiling Point[1]	°C @ 101.3 kPa°	N/A	23.7	-29.8	-81.5	-40.8	-82	-51.7	47.6	3.6
Boiling Point Range[1]	K	N/A	± 0.3	± 0.3	± 0.5	± 0.3	± 0.5	± 0.3	± 0.3	± 0.3
Critical Temperature[1]	°C	N/A	198	112	28.9	96.2	26.1	78.1	214.1	145.7
Isomer Content	% by weight	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0-1 R-133a	0-30 R-144a
VAPOR PHASE CONTAMINANTS:										
Air and Other Non-condensables, Maximum	% by volume @ 25.0 °C	5.10	N/A[2]	1.5	1.5	1.5	1.5	1.5	N/A[2]	1.5
LIQUID PHASE CONTAMINANTS:										
Water, Maximum	ppm by weight	5.4	20	10	10	10	10	10	20	10
All Other Volatile Impurities, Maximum	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Maximum	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Maximum	ppm by weight (as HCl)	5.7	1	1	1	1	1	1	1	1
Chloride[3]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 1A. Single Component Fluorocarbon Refrigerants and their Allowable Levels of Contaminants (continued)									
	Reporting Units	Reference Section	**R-115**	**R-116**	**R-123**	**R-124**	**R-125**	**R-134a**	**R-141b**
CHARACTERISTICS:									
Boiling Point[1]	°C @ 101.3 kPa	N/A	-38.9	-78.2	27.8	-12	-48.1	-26.1	32
Boiling Point Range[1]	K	N/A	± 0.3	± 0.3	± 0.3	± 0.3	± 0.3	± 0.3	± 0.3
Critical Temperature[1]	°C	N/A	80	19.9	183.7	122.3	66	101.1	206.8
Isomer Content	% by weight	N/A	N/A	N/A	0-8 R-123a+ R-123b	0-5 R-124a	N/A	0-0.5 R-134	0-0.1ea R-141, R-141a
VAPOR PHASE CONTAMINANTS:									
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	N/A[2]	1.5	1.5	1.5	N/A[2]
LIQUID PHASE CONTAMINANTS:									
Water, Max.	ppm by weight	5.4	10	10	20	10	10	10	100
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.9
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HCl)	5.7	1	1	1	1	1	1	1
Chloride[3]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 1A. Single Component Fluorocarbon Refrigerants and their Allowable Levels of Contaminants (continued)

	Reporting Units	Reference Section	R-142b	R-143a	R-152a	R-218	R-227ea	R-236fa	R-245fa	R-1233zd(E)	R-1234yf	R-1234ze(E)
CHARACTERISTICS:												
Boiling Point[1]	°C @ 101.3 kPa	N/A	-9.2	-47.2	-24	-36.8	-16.5	-1.4	14.9	18.3	-29.4	-19
Boiling Point Range[1]	K	N/A	--	± 0.3	± 0.3	± 0.3	--	± 0.3	± 0.3	--	N/A	N/A
Critical Temperature[1]	°C	N/A	137.1	72.7	113.3	72	101.7	124.9	154.1	165.6	94.8	109.4
Isomer Content	% by weight	N/A	0-0.1ca R-142, R-142a	0-0.01 R-143	N/A	--	--	--	0-0.1ea R-245ca, R-245cb, R-245ea, R-245eb	--	N/A	0.3 R-1234ze(Z)
VAPOR PHASE CONTAMINANTS:												
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	2	1.5	1.5	1.5	1.5	1.5	N/A[2]	N/A[2]	1.5	1.5
LIQUID PHASE CONTAMINANTS:												
Water, Maximum	ppm by weight	5.4	15	10	10	10	10	10	20	20	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HCl)	5.7	3	1	1	1	1	1	1	1	1	1
Chloride[3]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

1. Boiling points, boiling point ranges, and critical temperatures, although not required, are provided for informational purposes. Refrigerant data compiled from Refprop 9.1.
2. Since R-11, R-113, R-123, R-141b, R-245fa, and R-1233zd(E) have normal boiling points near or above room temperature, non-condensable determinations are not required for these refrigerants.
3. Recognized chloride level for pass/fail is about 3 ppm.
-- Data Not Available

Table 1B. Single Component Hydrocarbon Refrigerants and their Allowable Levels of Contaminants

	Reporting Units	R-50	R-170	R-E170	R-290	R-600	R-600a	R-601	R-601a	R-610	R-1150	R-1270
CHARACTERISTICS:												
Boiling Point[1]	°C at 101.3 kPa	-161.5	-88.6	-24.8	-42.1	-0.5	-11.8	36.1	27.8	34.6	-103.8	-47.6
Boiling Point Range[1]	K	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5
Minimum Nominal Composition	% weight	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5
Other Allowable Impurities	% weight	N/A	N/A	N/A	2 (see footnote[2])	2 (see footnote[2])	2 (see footnote[2])	0-1 R-601a	0-1 R-601	N/A	N/A	0-1 R-290
VAPOR PHASE CONTAMINANTS[3]:												
Air and Other Non-condensables, Maximum	% by volume @ 25.0 °C	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS[4]:												
Sulfur Odor	Pass or Fail	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor	No sulfur odor
High Boiling Residue, Max.	% weight	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HCl)	1	1	1	1	1	1	1	1	1	1	1
Water, Max.	mg kg^{-1}	10	10	10	10	10	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% weight	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total C3, C4 and C5 Polyolefins, Max.	% weight	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

1. Boiling points, boiling point ranges, although not required, are provided for informational purposes.
2. 2% of other C3 and C4 saturated hydrocarbons are allowed
3. Taken from vapor phase
4. Vaporized from liquid phase

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants										
	Reporting Units	Reference Section	**R-401A**	**R-401B**	**R-402A**	**R-402B**	**R-403A**	**R-403B**	**R-404A**	**R-405**
CHARACTERISTICS:										
Refrigerant Components	N/A	N/A	R-22/ 152a/124	R-22/ 152a/124	R-125/ 290/22	R-125/ 290/22	R-290/ 22/218	R-290/ 22/218	R-125/ 143a/134a	R-22/152a/ 142b/C318
Nominal Composition	% by weight	N/A	53/13/34	61/11/28	60.0/2.0/ /38.0	38.0/2.0 /60.0	5/75/20	5/56/39	44/52/4	45/7/5.5/42. 5
Allowable Composition	% by weight	N/A	51-55/ 11.5-13.5/ 33-35	59-63/ 9.5-11.5/ 27-29	58.0-62.0/ 1.0-2.1/ 36.0-40.0	36.0-40.0/ 1.0-2.1/ 58.0-62.0	3-5.2/ 73-77/ 18-22	3-5.2/ 54-58/ 37-41	42-46/ 51-53/ 2-6	43-47/ 6-8/ 4.5-6.5/ 40.5-44.5
Bubble Point[1]	°C @ 101.3 kPa	N/A	-33.3	-34.9	-49	-47	-47.8	-49.2	-46.2	-32.9
Dew Point[1]	°C @ 101.3 kPa	N/A	-26.4	-28.8	-46.9	-44.7	-44.3	-46.8	-45.5	-24.5
Critical Temperature[1]	°C	N/A	105.3	103.5	76	83	87	79.7	72.1	106
VAPOR PHASE CONTAMINANTS:										
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:										
Water, Max.	ppm by weight	5.4	10	10	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HCl)	5.7	1	1	1	1	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants (continued)										
	Reporting Units	Reference Section	**R-406A**	**R-407A**	**R-407B**	**R-407C**	**R-407D**	**R-407E**	**R-407F**	**R-408A**
CHARACTERISTICS:										
Refrigerant Components	N/A	N/A	R-22/600a/ 142b	R-32/ 125/134a	R-32/ 125/134a	R-32/ 125/134a	R-32/ 125/134a	R-32/ 125/134a	R-32/ 125/134a	R-125/ 143a/22
Nominal Composition	% by weight	N/A	55/4/41	20/40/40	10/70/20	23/25/52	15/15/70	25/15/60	30.0/30.0/4 0.0	7/46/47
Allowable Composition	% by weight	N/A	53-57/ 3-5/ 40-42	18-22/ 38-42/ 38-42	8-12/ 68-72/ 18-22	21-25/ 23-27/ 50-54	13-17/ 13-17/ 68-72	23-27/ 13-17/ 58-62	28.0-32.0/ 28.0-32.0/ 38.0-42.0	5-9/ 45-47/ 45-49
Bubble Point[1]	°C @ 101.3 kPa	N/A	-32.7	-45.3	-46.8	-43.6	-39.5	-42.9	-46.1	-44.6
Dew Point[1]	°C @ 101.3 kPa	N/A	-23.5	-38.9	-42.5	-36.6	-32.9	-35.8	-39.7	-44.1
Critical Temperature[1]	°C	N/A	116.5	82.3	75	86	91.4	88.5	83	83.1
VAPOR PHASE CONTAMINANTS:										
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:										
Water, Max.	ppm by weight	5.4	10	10	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight	5.7	1	1	1	1	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants (continued)										
	Reporting Units	Reference Section	**R-409A**	**R-409B**	**R-410A**	**R-410B**	**R-411A**	**R-411B**	**R-412A**	**R-413A**
CHARACTERISTICS:										
Refrigerant Components	N/A	N/A	R-22/ 124/142b	R-22/ 124/142b	R-32/125	R-32/125	R-1270/ 22/152a	R-1270/ 22/152a	R-22/218/ 142b	R-218/ 134a/600a
Nominal Composition	% by weight	N/A	60/25/15	65/25/10	50/50	45/55	1.5/87.5/ 11.0	3/94/3	70/5/25	9/88/3
Allowable Composition	% by weight	N/A	58-62/ 23-27/ 14-16	63-67/ 23-27/ 9-11	48.5-50.5/ 49.5-51.5	44-46/ 54-56	0.5-1.5/ 87.5-89.5/ 10-11	2-3/94-96/ 2-3	68-72/ 3-7/ 24-26	8-10/ 86-90/ 2-3
Bubble Point[1]	°C @ 101.3 kPa	N/A	-34.7	-35.6	-51.4	-51.3	-39.5	-41.6	-38	-30.6
Dew Point[1]	°C @ 101.3 kPa	N/A	-26.4	-27.9	-51.4	-51.6	-36.6	-40	-28.7	-27.9
Critical Temperature[1]	°C	N/A	106.9	106.9	71.4	70.8	99.1	96	107.2	98.5
VAPOR PHASE CONTAMINANTS:										
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:										
Water, Maximum	ppm by weight	5.4	10	10	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HCl)	5.7	1	1	1	1	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants (continued)									
	Reporting Units	Reference Section	**R-414A**	**R-414B**	**R-415A**	**R-415B**	**R-416A**	**R-417A**	**R-417B**
CHARACTERISTICS:									
Refrigerant Components	N/A	N/A	R-22/124/ 600a/142b	R-22/124/ 600a/142b	R-22/152a	R-22/152a	R-134a/ 124/600	R-125/ 134a/600	R-125/ 134a/600
Nominal Composition	% by weight	N/A	51.0/28.5/ 4.0/16.5	50.0/39.0/ 1.5/9.5	82.0/18.0	25.0/75.0	59.0/39.5/ 1.5	46.6/50.0/ 3.4	79.0/18.3/ 2.7
Allowable Composition	% by weight	N/A	49.0-53.0/ 26.5-30.5/ 3.5-4.5/ 15.5-17.0	48.0-52.0/ 37.0-41.0/ 1.0-2.0/ 8.5-10.0	81.0-83.0/ 17.0-19.0	24.0-26.0/ 74.0-76.0	58.0-59.5/ 39.0-40.5/ 1.3-1.6	45.5-47.7/ 49.0-51.0/ 3.0-3.5	78.0-80.0/ 17.3-19.3/ 2.2-2.8
Bubble Point[1]	°C @ 101.3 kPa	N/A	-34	-32.9	-37.5	-27.7	-23.4	-38	-44
Dew Point[1]	°C @ 101.3 kPa	N/A	-25.8	-24.3	-34.7	-26.2	-21.8	-32.9	-41.5
Critical Temperature[1]	°C	N/A	110.7	111	100	111.3	108.2	89.9	75.2
VAPOR PHASE CONTAMINANTS:									
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:									
Water, Max.	ppm by weight	5.4	10	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HCl)	5.7	1	1	1	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants (continued)											
	Reporting Units	Reference Section	**R-417C**	**R-418A**	**R-419A**	**R-419B**	**R-420A**	**R-421A**	**R-421B**	**R-422A**	**R-422B**
CHARACTERISTICS:											
Refrigerant Components	N/A	N/A	R-125/ 134a/600	R-290/ 22/152a	R-125/ 134a/ E170	R-125/ 134a/E17 0	R-134a/ 142b	R-125/ 134a	R-125/ 134a	R-125/ 134a/600 a	R-125/ 134a/600 a
Nominal Composition	% by weight	N/A	19.5/78.8/ 1.7	1.5/96.0/ 2.5	77.0/19.0/ 4.0	48.5/48.0/ 3.5	88.0/12.0	58.0/42.0	85.0/15.0	85.1/11.5 /3.4	55.0/42.0 /3.0
Allowable Composition	% by weight	N/A	18.5-20.5/ 77.8-79.8/ 1.2-1.8	1.0-2.0/ 95.0-97.0/ 2.0-3.0	76.0-78.0/ 18.0-20.0/ 3.0-5.0	47.5-49.5/ 47.0-49.0/ 3.0-4.0	88.0-89.0/ 11.0-12.0	57.0-59.0/ 41.0-43.0	84.0-86.0/ 14.0-16.0	84.1-86.1/ 10.5-12.5/ 3.0-3.5	54.0-56.0/ 41.0-43.0/ 2.5-3.1
Bubble Point[1]	°C @ 101.3 kPa	N/A	-32.7	-41.2	-42.6	-37.4	-25	-40.8	-45.7	-46.5	-40.5
Dew Point[1]	°C @ 101.3 kPa	N/A	-29.2	-40.1	-36	-31.5	-24.2	-35.5	-42.6	-44.1	-35.6
Critical Temperature[1]	°C	N/A	95.4	96.7	79.1	90.4	105.4	78.5	69	71.7	85.7
VAPOR PHASE CONTAMINANTS:											
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:											
Water, Max.	ppm by weight	5.4	10	10	10	10	20	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually Clean	Visually clean	Visually clean	Visually Clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HC1)	5.7	1	1	1	1	1	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants (continued)											
	Reporting Units	Reference Section	**R-422C**	**R-422D**	**R-422E**	**R-423A**	**R-424A**	**R-425A**	**R-426A**	**R-427A**	**R-428A**
CHARACTERISTICS:											
Refrigerant Components	N/A	N/A	R-125/ 134a/600a	R-125/ 134a/600a	R-125/ 134a/600a	R-134a /227ca	R-125/ 134a/600a/ 600/601a	R-32/134a /227ca	R-125/134a /600/601a	R-32/125/ 143a/134a	R-125 /143a /290/600a
Nominal Composition	% by weight	N/A	82.0/15.0 /3.0	65.1/30.5 /3.4	58.0/39.3 /2.7	52.5/47.5	50.5/47.0 /0.9/1.0/0.6	18.5/69.5 /12.0	5.1/93.0 /1.3/0.6	15.0/25.0 /10.0/50.0	77.5/20.0 /0.6/1.9
Allowable Composition	% by weight	N/A	81.0-83.0/ 14.0-16.0/ 2.5-3.1	64.0-66.0/ 30.5-32.5/ 3.0-3.5	57.0-59.0/ 38.0-41.0/ 2.5-3.0	51.5-53.5/ 46.5-48.5	49.5-51.5/ 46.0-48.0/ 0.7-1.0/ 0.8-1.1/ 0.4-0.7	18.0-19.0/ 69.0-70.0/ 11.5-12.5	4.1-6.1/ 92.0-94.0/ 1.1-1.4/ 0.4-0.7	13.0-17.0/ 23.0-27.0/ 8.0-12.0/ 48.0-52.0	76.5-78.5 /19.0-21.0 /0.4-0.7 /1.7-2.0
Bubble Point[1]	°C @ 101.3 kPa	N/A	-45.3	-43.2	-41.8	-24.2	-39.1	-38.1	-28.5	-43	-48.3
Dew Point[1]	°C @ 101.3 kPa	N/A	-42.3	-38.4	-36.4	-23.5	-33.3	-31.3	-26.7	-36.3	-47.5
Critical Temperature[1]	°C	N/A	76.1	79.6	82.2	99	87.5	93.9	100.2	85.3	69
VAPOR PHASE CONTAMINANTS:											
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:											
Water, Max.	ppm by weight	5.4	10	10	20	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants (continued)

	Reporting Units	Reference Section	**R-429A**	**R-430A**	**R-431A**	**R-434A**	**R-435A**	**R-437A**	**R-438A**	**R-439A**	**R-440A**
CHARACTERISTICS:											
Refrigerant Components	N/A	N/A	R-E170 /152a/ 600a	R-152a/ 600a	R290 /152a	R-125/ 143a/134a/ 600a	R-E170 /152a	R-125/ 134a/600 /601	R-32/125/ 134a/600 /601a	R-32/ 125/ 600a	R-290/ 134a/152a
Nominal Composition	% by weight	N/A	60.0/10.0 /30.0	76.0/24.0	71.0/29.0	63.2/18.0 /16.0/2.8	80.0/20.0	19.5/78.5 /1.4/0.6	8.5/45.0/ 44.2/1.7 /0.6	50/47.0 /3.0	0.6/1.6/ 97.8
Allowable Composition	% by weight	N/A	59.0-61.0 /9.0-11.0 /29.031.0	75.0-77.0 /23.025.0	70.0-72.0 /28.0-30.0	62.2-64.2 /17.0-19.0 /15.0-17.0 /2.6-2.9	79.0-81.0 /19.0-21.0	17.7-20.0 /77.8-80.0 /1.2-1.5 /0.4-0.7	7.0-9.0 /43.5-46.5 /42.7-45.7 /1.5-1.8 /0.4-0.7	49.0-51.0 /46.0-48.0 /2.5-3.5	0.5-0.7 /1.0-2.2 /97.3-98.3
Bubble Point[1]	°C @ 101.3 kPa	N/A	-25.5	-27.6	-43.2	-45.1	-26	-32.9	-43	-52	-25.5
Dew Point[1]	°C @ 101.3 kPa	N/A	-24.9	-27.4	-43.2	-42.4	-25.8	-29.2	-36.4	-51.7	-24.3
Critical Temperature[1]	°C	N/A	123.5	107	100.3	75.6	125.2	95.3	84.2	72	112.9
VAPOR PHASE CONTAMINANTS:											
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:											
Water, Maximum	ppm by weight	5.4	10	10	20	20	10	10	20	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HC1)	5.7	1	1	1	1	1	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

Table 2A. Zeotropic Blends (400 Series Refrigerants) and their Allowable Levels of Contaminants (continued)

	Reporting Units	Reference Section	R-442A	R-444A	R-444B	R-445A	R-446A	R-447A	R-448A	R-449A	R-450A
CHARACTERISTICS:											
Refrigerant Components	N/A	N/A	R-32/125/134a/152a/227ea	R-32/152a/1234ze(E)	R-32/152a/1234ze(E)	R-744/134a/1234ze(E)	R-32/1234ze(E)/600	R-32/125/1234ze(E)	R-32/125/1234yf/134a/1234ze(E)	R-32/125/1234yf/134a	R-134a/1234ze(E)
Nominal Composition	% by weight	N/A	31.0/31.0/30.0/3.0/5.0	12.0/5.0/83.0	41.5/10.0/48.5	6.0/9.0/85.0	68.0/29.0/3.0	68.0/3.5/28.5	26.0/26.0/20.0/21.0/7.0	24.3/24.7/25.3/25.7	42.0/58.0
Allowable Composition	% by weight	N/A	30.0-32.0/30.0-32.0/29.0-31.0/2.5-3.5/4.0-6.0	11.0-13.0/4.0-6.0/81.0-85.0	40.5-42.5/9.0-11.0/47.5-49.5	5.0-7.0/8.0-10.0/83.0-87.0	67.0-68.5/28.4-31.0/2.0-3.1	67.5-69.5/3.0-5.0/27.5-29.5	24.0-26.5/25.5-28.0/18.0-20.5/20.0-23.0/5.0-7.5	23.3-24.5/24.5-25.7/24.3-25.5/25.5-26.7	40.0-44.0/56.0-60.0
Bubble Point[1]	°C @ 101.3 kPa	N/A	-46.5	-34.3	-44.6	-50.3	-49.4	-49.3	-45.9	-46	-23.4
Dew Point[1]	°C @ 101.3 kPa	N/A	-39.9	-24.3	-34.9	-23.5	-42.1	-44.2	-39.8	-39.9	-22.8
Critical Temperature[1]	°C	N/A	82.4	103.2	91.5	98	84.2	82.6	81.6	81.5	104.4
VAPOR PHASE CONTAMINANTS:											
Air and Other Non-condensables, Max.	% by volume @ 25.0 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:											
Water, Maximum	ppm by weight	5.4	10	10	10	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight (as HCl)	5.7	1	1	1	1	N/A	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

1. Bubble points, dew points, and critical temperatures, although not required, are provided for informational purposes. Refrigerant data compiled from Refprop 9.1.
2. Recognized chloride level for pass/fail is about 3 ppm.

Table 2B. Hydrocarbon Blends (400 & 500 Series Refrigerants) and their Allowable Levels of Contaminants										
	Reporting Units	Reference Section	**R-432A**	**R-433A**	**R-433B**	**R-433C**	**R-436A**	**R-436B**	**R-441A**	**R-443A**
CHARACTERISTICS:										
Refrigerant Components	N/A	N/A	R-1279/ E170	R-1270/ 290	R-1270/ 290	R-1270/ 290	R-290/ 600a	R-290/ 600a	R-170/ 290/600a/600	R-1270/ 290/600a
Nominal Composition	% by weight	N/A	80.0/20.0	30.0/70.0	5.0/95.0	25.0/75.0	56.0/44.0	52.0/48.0	3.1/54.8/6.0/36.1	55.0/40.0/5.0
Allowable Composition	% by weight	N/A	79.0-81.0 /19.0-21.0	29.0-31.0 /69.0-71.0	4.0-6.0 /94.0- 96.0	24.0-26.0 /74.0-76.0	55.0-57.0 /43.0-45.0	51.0-53.0 /47.0- 49.0	2.8-2.4/52.8-56.8/ 5.4-6.6/ 34.1-38.1	53.0-57.0/ 38.0-42.0 /3.8-6.2
Bubble Point[1]	°C @ 101.3 kPa	N/A	-45.2	-44.4	-42.5	-44.1	-34.3	-33.3	-41.5	-45.2
Dew Point[1]	°C @ 101.3 kPa	N/A	-42.4	-44	-42.4	-43.7	-26.1	-25	-20.3	-42.1
Critical Temperature[1]	°C	N/A	97.3	94.4	96.3	94.8	115.9	117.4	117.3	95.1
VAPOR PHASE CONTAMINANTS[2]:										
Air and Other Non-condensables, Max.	% by volume @ 25.0°C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS[3]:										
Sulfur Odor[4]	No odor to pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight	5.7	1	1	1	1	1	1	1	N/A
Water, Max.	ppm by weight	5.4	20	10	10	10	10	10	10	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total C3, C4 and C5 Polyolefins, Max.	% by weight	5.12	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	N/A	N/A

1. Bubble points, dew points, and critical temperatures, although not required, are provided for informational purposes. Refrigerant data compiled from Refprop 9.1.
2. Taken from vapor phase
3. Vaporized from liquid phase
4. Including hydrogen sulphide and mercaptans

Table 3. Azeotropic Blends (500 Series Refrigerants) and their Allowable Levels of Contaminants

	Reporting Units	Reference Section	R-500	R-502	R-503	R-507A	R-508A	R-508B	R-509A	R-510A	R-511A	R-512A
CHARACTERISTICS:												
Refrigerant Components	N/A	N/A	R-12/152a	R-22/115	R-23/13	R-125/ 143a	R-23/116	R-23/116	R-22/218	R-E170/ 600a	R-290/ E170	R-134a/ 152a
Nominal Composition	% by weight	N/A	73.8/26.2	48.8/51.2	40.1/59.9	50/50	39/61	46/54	44/56	88.0/12.0	95.0/5.0	5.0/95.0
Allowable Composition	% by weight	N/A	72.8-74.8 /25.2-27.2	44.8-52.8 /47.2-55.2	39-41 /59-61	49.5-51.5 /48.5-50.5	37-41 /59-63	44-48 /52-56	42-46 /56-60	87.5-88.5 /11.5-12.5	94.0-96.0 /4.0-6.0	4.0-6.0 /94.0-96.0
Bubble Point[1]	°C @ 101.3 kPa	N/A	-33.6	-45.2	-87.8	-46.7	-87.4	-87	-49.8	-24.9	-42	-24
Dew Point[1]	°C @ 101.3 kPa	N/A	-33.6	-45	-87.8	-46.7	-87.4	-87	-48.1	-24.9	-42	-24
Critical Temperature[1]	°C	N/A	102.1	80.2	18.4	70.6	10.8	11.8	68.6	125.7	97	112.9
VAPOR PHASE CONTAMINANTS:												
Air and Other Non-condensables, Max.	% by volume @ 25 °C	5.10	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LIQUID PHASE CONTAMINANTS:												
Water, Maximum	ppm by weight	5.4	10	10	10	10	10	10	10	20	20	10
All Other Volatile Impurities, Max.	% by weight	5.11	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
High Boiling Residue, Max.	% by volume or % by weight	5.8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Particulates/Solids	Pass or Fail	5.9	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean	Visually clean
Acidity, Max.	ppm by weight	5.7	1	1	1	1	1	1	1	1	1	1
Chloride[2]	Pass or Fail	5.6	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity	No visible turbidity

1. Bubble points, dew points, and critical temperatures, although not required, are provided for informational purposes. Refrigerant data compiled from Refprop 9.1.
2. Recognized chloride level for pass/fail is about 3 ppm.

APPENDIX A. REFERENCES—NORMATIVE

Listed here are all standards, handbooks, and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of this standard.

ASHRAE Terminology, https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology, 2014, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

ANSI/ASHRAE Standard 34–2013, *Designation and Safety Classification of Refrigerants,* with Addenda, American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers.

Appendix C to AHRI Standard 700–2015: Analytical Procedures for AHRI Standard 700–2015, Normative, Specification for Fluorocarbon Refrigerants, 2008. Air-Conditioning, Heating, and Refrigeration Institute.

ASTM Standard D1296–01–2012, *Standard Test Method for Odor of Volatile Solvents and Diluents,* 2012, ASTM International.

GPA STD–2177, *Analysis of Natural Gas Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography,* 2013, Gas Processors Association.

REFPROP Reference Fluid Thermodynamic and Transport Properties *NIST Standard Reference Database 23 version 9.1,* 2013, U.S. Department of Commerce, Technology Administration, National Institute of Standards and Technology.

APPENDIX A. REFERENCES—INFORMATIVE

Listed here are standards, handbooks, and other publications which may provide useful information and background but are not considered essential.

2012 *Appendix D Gas Chromatograms for AHRI Standard 700–2015—Informative, Specification for Fluorocarbon Refrigerants,* 2012, Air-Conditioning, Heating, and Refrigeration Institute.

■ 15. Amend subpart F by adding appendix B3 to read as follows:

APPENDIX B3 TO SUBPART F OF PART 82—PERFORMANCE OF REFRIGERANT RECOVERY, RECYCLING, AND/OR RECLAIM EQUIPMENT

This appendix is based on the Air-Conditioning, Heating, and Refrigeration Institute Standard 740–2015, *Performance Rating of Refrigerant Recovery Equipment and 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 contaminant or purity levels, capacity, speed and purge loss to minimize emission into the atmosphere of designated refrigerants.

Section 2. Scope

2.1 *Scope.* This standard applies to equipment for recovering and/or recycling single refrigerants, azeotropes, zeotropic blends, and their normal contaminants from refrigerant systems. This standard defines the test apparatus, test gas mixtures, sampling procedures and analytical techniques that will be used to determine the performance of refrigerant recovery and/or recycling equipment (hereinafter, ''equipment''). Appendix B4 of this subpart establishes standards for recovery/recycling equipment used with flammable refrigerants.

Section 3. Definitions

3.1 *Definitions.* All terms in this appendix will follow the definitions in § 82.152 unless otherwise defined in this appendix.

3.2 *Clearing Refrigerant.* Procedures used to remove trapped refrigerant(s) from equipment before switching from one refrigerant to another.

3.3 *High Temperature Vapor Recovery Rate.* For equipment having at least one designated refrigerant (see Section 11.2) with a boiling point in the range of −50 to +10 °C, the rate will be measured for R–22, or the lowest boiling point refrigerant if R–22 is not a designated refrigerant.

3.4 *Published Ratings.* A statement of the assigned values of those performance characteristics, under stated rating conditions, by which a unit may be chosen to fit its application. These values apply to all units of like nominal size and type (identification) produced by the same manufacturer. As used herein, the term ''published rating'' includes the rating of all performance characteristics shown on the unit or published in specifications, advertising, or other literature controlled by the manufacturer, at stated rating conditions.

3.5 *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.

3.6 *Recycle Flow Rate.* The amount of refrigerant processed divided by the time elapsed in the recycling mode. 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 rate based solely on the higher of the liquid or vapor recovery rate, by which the contaminant levels were measured.

3.7 *Residual Trapped Refrigerant.* Refrigerant remaining in equipment after clearing refrigerant.

3.8 *Shall, Should, Recommended* or *It Is Recommended* shall be interpreted as follows:

3.8.1 *Shall.* Where ''shall'' or ''shall not'' is used for a provision specified, that provision is mandatory if compliance with this appendix is claimed.

3.8.2 *Should, Recommended* or *It Is Recommended* is used to indicate provisions which are not mandatory but which are desirable as good practice.

3.9 *Standard Contaminated Refrigerant Sample.* A mixture of new or reclaimed refrigerant and specified quantities of identified contaminants which constitute the mixture to be processed by the equipment under test. These contaminant levels are expected only from severe service conditions.

3.10 *Trapped Refrigerant.* The amount of refrigerant remaining in the equipment after the recovery or recovery/recycling operation but before clearing refrigerant.

3.11 *Vapor Recovery Rate.* The average rate that refrigerant is withdrawn from the mixing chamber between two pressures as vapor recovery rate is changing depending on the pressure. The initial condition is vapor only at saturation pressure and temperature at either 24 °C or at the boiling point at 100 kPa, whichever is higher. The final pressure condition is 10% of the initial pressure, but not lower than the equipment final recovery vacuum and not higher than 100 kPa.

Section 4. General Equipment Requirements

4.1 *Equipment Information.* The equipment manufacturer shall provide operating instructions, necessary maintenance procedures, and source information for replacement parts and repair.

4.2 *Filter Replacement.* 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. The equipment manufacturer must provide maximum quantity recycled or filter change interval in its written instructions.

4.3 *Purge of Non-Condensable.* If non-condensables are purged, the equipment shall either automatically purge non-condensables or provide an indicating means to guide the purge process. Recycling equipment must provide purge means.

4.4 *Purge Loss.* The total refrigerant loss due to purging non-condensables, draining oil, and clearing refrigerant (see Section 9.5) shall be less than 3% (by weight) of total processed refrigerant.

4.5 *Permeation Rate.* High pressure hose assemblies 5/8 in. (16 mm) nominal and smaller shall not exceed a permeation rate of 3.9 g/cm^2/yr (internal surface) at a temperature of 48.8 °C. Hose assemblies that UL recognized as having passed ANSI/UL 1963 requirements shall be accepted without testing. See Section 7.1.4.

4.6 *Clearing Trapped Refrigerant.* For equipment rated for more than one refrigerant, the manufacturer shall provide a method and instructions which will accomplish connections and clearing within 15 minutes. Special equipment, other than a vacuum pump or manifold gauge set, shall be furnished. The clearing procedure shall not rely upon the storage cylinder below saturated pressure conditions at ambient temperature.

4.7 *Temperature.* The equipment shall be evaluated at 24 °C with additional limited evaluation at 40 °C. Normal operating conditions range from 10 °C to 40 °C.

4.8 *Exemptions.* Equipment intended for recovery only shall be exempt from Sections 4.2 and 4.3.

Section 5. Contaminated Refrigerants

5.1 *Sample Characteristics.* The standard contaminated refrigerant sample shall have the characteristics specified in Table 1, except as provided in Section 5.2. Testing shall be conducted at an ambient temperature of 24 °C ±1 °C except high temperature vapor recovery shall be 40 °C ±1 °C.

5.2 *Recovery-only Testing.* Recovery equipment not rated for removal of contaminants shall be tested with new or reclaimed refrigerant.

Table 1– Standard Contaminated Refrigerant Samples

	R-11	R-12	R-13	R-22	R-23	R-113	R-114	R-123	R-124	R-134a	R-500	R-502	R-503	R-401A	R-401B	R-402A
Moisture Content: ppm by Weight of Pure Refrigerant	100	80	30	200	30	100	85	200	200	200	200	200	30	200	200	200
Particulate Content: ppm by Weight of Pure Refrigerant[1]	80	80	N/A	80	N/A	80	80	80	80	80	80	80	N/A	80	80	80
Acid Content: ppm by Weight of Pure Refrigerant[2]	100	200	N/A	100	N/A	100	100	100	100	100	200	100	N/A	100	100	100
Oil (HBR) Content: % by Weight of Pure Refrigerant	20	5	N/A	5	N/A	20	20	20	5	5	5	5	N/A	5	5	5
Viscosity/Type[3]	300/MO	150/MO	N/A	300/MO	N/A	300/MO	300/MO	300/MO	150/MO	150/MO	150/MO	150/MO	N/A	150/AB	150/AB	150/AB
Non-Condensable Gases (Air Content): % by Volume	N/A	3	3	3	3	N/A	3	N/A	3	3	3	3	3	3	3	3

Table 1 (continued) – Standard Contaminated Refrigerant Samples

	R-402B	R-404A	R-406A	R-407A	R-407B	R-407C	R-407D	R-408A	R-409A	R-410A	R-410B	R-411A	R-411B	R-417C	R-419B	R-422E	R-445A	R-507	R-508A	R-508B
Moisture Content: ppm by Weight of Pure Refrigerant	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	20	20
Particulate Content: ppm by Weight of Pure Refrigerant[1]	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	NA	NA
Acid Content: ppm by Weight of Pure Refrigerant [2]	100	100	200	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	NA	NA
Oil (HBR) Content: % by Weight of Pure Refrigerant	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	NA	NA
Viscosity/Type[3]	150/AB	150/POE	150/AB	150/POE	150/POE	150/POE	150/POE	150/MO	150/MO	150/POE	150/POE	150/MO	150/MO	150/POE	150/POE	150/POE	150/POE	150/POE	NA	NA
Non-Condensable Gases (Air Content): % by Volume	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

[1] Particulate content shall consist of inert materials and shall comply with particulate requirements in Appendix B.

[2] Acid consists of 60% oleic acid and 40% hydrochloric acid on a total number basis.

[3] POE = Polyoester, AB = Alkylbenzene, MO = Mineral Oil.

[4] NA = Not Applicable.

Section 6. Test Apparatus

6.1 *General Recommendations.* The recommended test apparatus is described in the following paragraphs. If alternate test apparatus are employed, the user shall be able to demonstrate that they produce results equivalent to the specified reference apparatus.

6.2 *Self-Contained Equipment Test Apparatus.* The apparatus, shown in Figure 1, shall consist of:

6.2.1 *Mixing Chamber.* A mixing chamber consisting of a tank with a conical-shaped bottom, a bottom port and piping for delivering refrigerant to the equipment, various ports and valves for adding refrigerant to the chamber, and stirring means for mixing.

6.2.2 *Filling Storage Cylinder.* The storage cylinder to be filled by the refrigerant transferred shall be cleaned and at the pressure of the recovered refrigerant at the beginning of the test. It will not be filled over 80%, by volume.

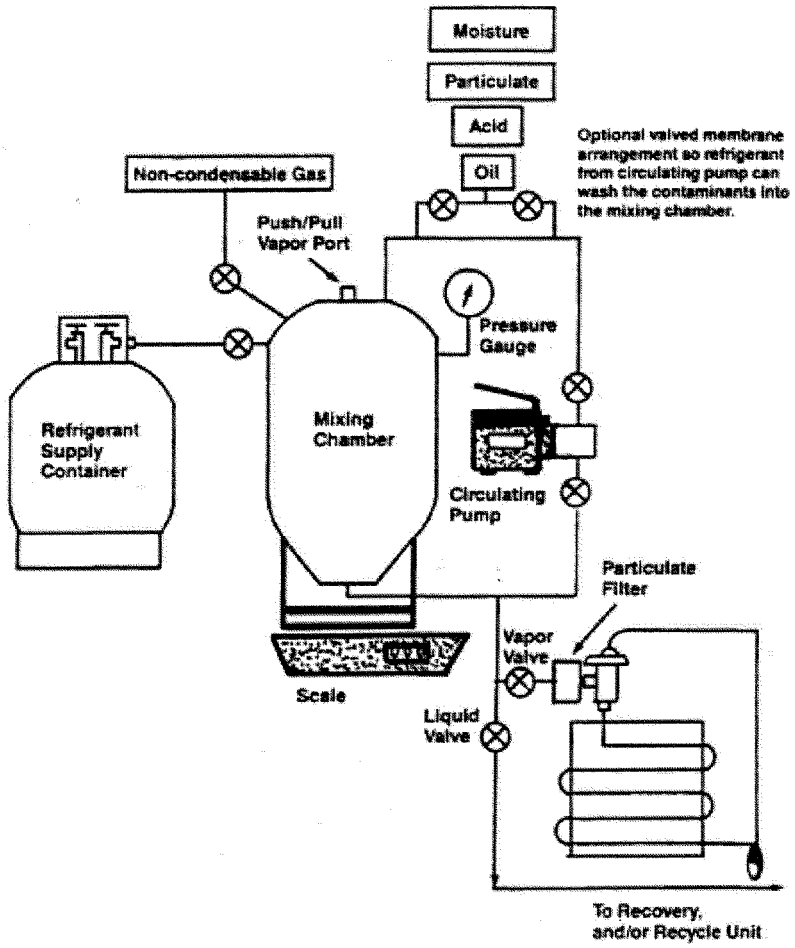
6.2.3 *Vapor Feed.* Vapor refrigerant feed consisting of evaporator, control valves and piping to create a 3.0 °C superheat condition at an evaporating temperature of 21 °C ±2 °C.

6.2.4 *Alternative Vapor Feed.* An alternative method for vapor feed shall be to pass the refrigerant through a boiler and then through an automatic pressure regulating valve set at different saturation pressures, moving from saturated pressure at 24 °C to final pressure of recovery.

6.2.5 *Liquid Feed.* Liquid refrigerant feed consisting of control valves, sampling port, and piping.

6.2.6 *Instrumentation.* Instrumentation capable of measuring weight, temperature, pressure, and refrigerant loss, as required.

Figure 1. Test Apparatus for Self-Contained Equipment



6.3 *Size.* The size of the mixing chamber and filling storage cylinder used during testing shall correspond to the size of the equipment being tested per Section 6.3.1 or 6.3.2:

6.3.1 For equipment utilizing nominal ¼″ or ⅜″ flare ports and hoses, the mixing chamber shall be 0.09 m^3 and all ports, valves, mixing valves, and piping shall be ½″ or larger, reduced down to the port size of the equipment by fittings at the connection ports of the mixing chamber. The filling storage cylinder used during testing shall be a nominal 50-pound water capacity DOT 4Bx cylinder with ¼″ flare liquid and vapor ports.

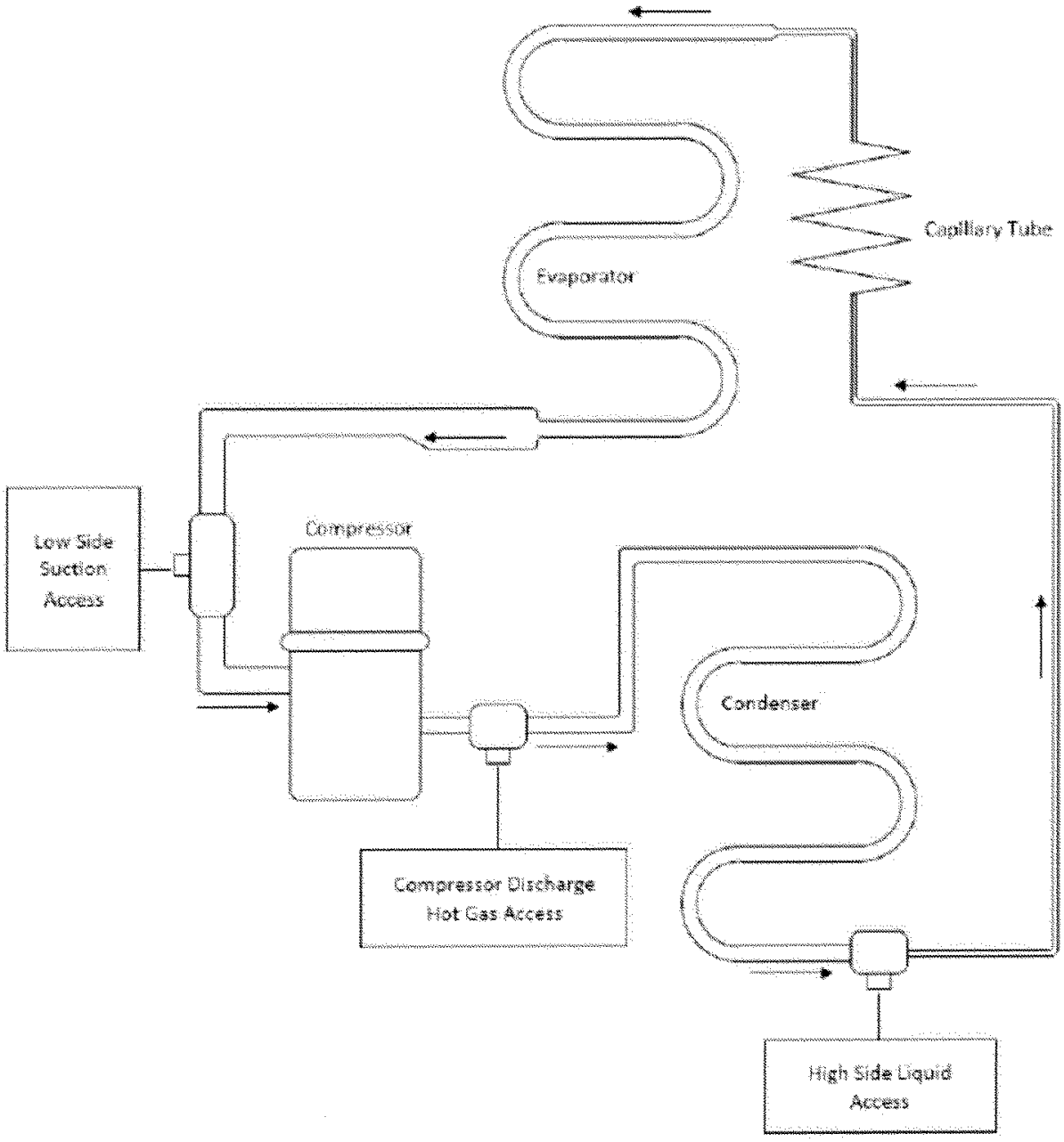
6.3.2 For equipment utilizing ½″ or larger flare ports and hoses, the mixing chamber shall be 0.45 m^3 (or nominal 1000-pound water capacity DOT 4Bx cylinder) and all ports, valves, mixing valves, and piping shall be 1–½″ or larger, reduced down to the port size of the equipment by fittings at the connection ports of the mixing chamber. The filling storage cylinder used during testing shall be a nominal 1000-pound water capacity DOT 4Bx cylinder with liquid and vapor ports, valves and piping sized ¾″ NPT and reduced or increased to the port size of the equipment by fittings at the connection ports of the filling storage cylinder.

6.4 *System Dependent Equipment Test Apparatus.* This test apparatus is to be used for final recovery vacuum rating of all system dependent equipment.

6.4.1 *Test Setup.* 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. A 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 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.

Figure 2. System Dependent Equipment Test Apparatus



Section 7. Performance Testing Procedures

7.1 *General Testing.*

7.1.1 *Temperatures.* Testing shall be conducted at an ambient temperature of 24 °C ± 1 °C except high temperature vapor recovery shall be at 40 °C ± 1 °C. The evaporator conditions of Section 6.2.3 shall be maintained as long as liquid refrigerant remains in the mixing chamber.

7.1.2 *Refrigerants.* The equipment shall be tested for all designated refrigerants (see Section 11.2). All tests in Section 7 shall be completed for each refrigerant before starting tests with the next refrigerant.

7.1.3 *Selected Tests.* Tests shall be as appropriate for the equipment type and ratings parameters selected (*see Sections 9.9, 11.1 and 11.2*).

7.1.4 *Hose Assemblies.* For the purpose of limiting refrigerant emissions to the atmosphere, hose assemblies shall be tested for permeation according to ANSI/UL Standard 1963.

7.2 *Equipment Preparation and Operation.* The equipment shall be prepared and operated per the operating instructions.

7.3 *Test Batch.* The test batch consisting of refrigerant sample (*see* Section 5) of the test refrigerant shall be prepared and thoroughly mixed. Continued mixing or stirring shall be required during the test while liquid refrigerant remains in the mixing chamber. The mixing chamber shall be filled to 80% level by volume.

7.3.1 *Control Test Batch.* Prior to starting the test for the first batch for each refrigerant,

a liquid sample will be drawn from the mixing chamber and analyzed per Section 8 to assure that contaminant levels match Table 1 within ±10 ppm for moisture, ±20 ppm for oleic acid and ±0.5% for oil.

7.4 *Recovery Tests (Recovery and Recovery/Recycling Equipment)*

7.4.1 *Determining Recovery Rates.* The liquid and vapor refrigerant recovery rates shall be measured during the first test batch for each refrigerant (*see* Sections 9.1, 9.2 and 9.4). Equipment preparation and recovery cylinder changeover shall not be included in elapsed time measurements for determining vapor recovery rate and liquid refrigerant recovery rate. Operations such as subcooling the recovery cylinder shall be included. The recovery cylinder shall be the same size as per Section 6.3 or as furnished by the equipment manufacturer. Oversized tanks shall not be permitted.

7.4.1.1 *Liquid Refrigerant Recovery Rate.* If elected, the recovery rate using the liquid refrigerant feed means (*see* Section 6.2.5) shall be determined. After the equipment reaches stabilized conditions of condensing temperature and/or recovery cylinder pressure, the recovery process shall be stopped and an initial weight shall be taken of the mixing chamber (*see* Section 9.2). The recovery process shall be continued for a period of time sufficient to achieve the accuracy in Section 9.4. The recovery process shall be stopped and a final weight of the mixing chamber shall be taken.

7.4.1.2 *Vapor Refrigerant Recovery Rate.* If elected, the average vapor flow rate shall be measured to accuracy requirements in Section 9.4 under conditions with no liquid refrigerant in the mixing chamber. The liquid recovery feed means shall be used. At initial conditions of saturated vapor at the higher of 24 °C or the boiling temperature (100 kPa), the weight of the mixing chamber and the pressure shall be recorded. At final conditions representing pressure in the mixing chamber of 10% of the initial condition, but not less than the final recovery vacuum (*see* Section 9.6) nor more than 100 kPa, measure the weight of the mixing chamber and the elapsed time. At initial conditions, the recovery cylinder shall be at saturation pressure at ambient conditions.

7.4.1.3 *High Temperature Vapor Recovery Rate.* This is applicable for equipment having at least one designated refrigerant (*see* Section 11.2) with a boiling point between −50 °C and +10 °C. Measure the rate for R–22, or the refrigerant with the lowest boiling point if R–22 is not a designated refrigerant. Repeat the test in Section 7.4.1.2 at saturated conditions at 40 °C and continue to operate equipment to assure it will operate at this condition (*see* Section 7.4.3). At initial conditions, the recovery cylinder shall be at saturated pressure at 40 °C.

7.4.1.4 *Push/Pull Liquid Refrigerant Recovery Rate.* If elected, the average liquid push/pull flow rate shall be measured to accuracy requirements in Section 9.4. The mixing chamber and filling storage cylinder shall be filled with refrigerant vapor at initial conditions of saturated vapor at the higher of 24 °C or the boiling temperature at 100 kPa. An amount of liquid refrigerant shall be added to the mixing chamber equivalent to 80% by weight of the capacity of the filling storage cylinder. The pressure between the mixing chamber and filling storage cylinder shall be equalized and stabilized at initial conditions of saturated vapor at the higher of 24 °C or the boiling temperature at 100 kPa. The initial weight of the mixing chamber and the pressure shall be recorded. The equipment is then operated in push/pull recovery mode and the weight change of the mixing chamber is recorded over time until all of the liquid has been transferred.

7.4.2 *Recovery Operation.* This test is for determining the final recovery vacuum and the ability to remove contaminants as appropriate. If equipment is rated for liquid recovery (*see* Section 7.4.1.3), liquid recovery feed means described in Section 6.2.5 shall be used. If not, vapor recovery means described in Sections 6.2.3 or 6.2.4 shall be used. Continue recovery operation until all liquid is removed from the test apparatus and vapor is removed to the point where equipment shuts down by automatic means or is manually shut off per operating instructions.

7.4.2.1 *Oil Draining.* Capture oil from the equipment at intervals as required in the instructions. Record the weight of the container. Completely remove refrigerant from oil by evacuation or other appropriate means. The weight difference shall be used in Section 7.5.2.

7.4.3 *Final Recovery Vacuum.* At the end of the first test batch for each refrigerant, the liquid valve and vapor valve of the apparatus shall be closed. After waiting 1 minute, the mixing chamber pressure shall be recorded (*see* Section 9.6).

7.4.4 *Residual Refrigerant.* This test will measure the mass of remaining refrigerant in the equipment after clearing and therefore the extent of mixing different refrigerants (*see* Section 9.6).

7.4.4.1 *Initial Conditions.* At the end of the last test for each batch for each refrigerant, the equipment shall be disconnected from the test apparatus (Figure 1). Recycle per Section 7.5, if appropriate. Perform refrigerant clearing operations as called for in the instruction manual. Capture and record the weight of any refrigerant which would have been emitted to the atmosphere during the clearing process for use in Section 9.5. If two loops are used for recycling, trapped refrigerant shall be measured for both.

7.4.4.2 *Residual Trapped Refrigerant.* Evacuate an empty test cylinder to 1.0 kPa. Record the empty weight of the test cylinder. Open all valves to the equipment so as to provide access to all trapped refrigerant. Connect the equipment to the test cylinder and operate valves to recover the residual refrigerant. Record the weight of the test cylinder using a recovery cylinder pressure no less than specified in Section 6.2.2. Place the test cylinder in liquid nitrogen for a period of 30 minutes or until a vacuum of 1000 microns is reached, whichever occurs first.

7.5 *Recycling Tests (Recovery/Recycling Equipment).*

7.5.1 *Recycling Operation.* As each recovery cylinder is filled in Section 7.4.2, recycle according to operating instructions. There will not necessarily be a separate recycling sequence. Note non-condensable purge measurement in Section 9.5.

7.5.1.1 *Recycle Flow Rate.* While recycling the first recovery cylinder for each refrigerant, determine the recycling flow rate by appropriate means (*see* Section 9.3) to achieve the accuracy required in Section 9.4.

7.5.2 *Non-Condensable Sample.* After completing Section 7.4.3, prepare a second test batch (*see* Section 7.3). Recover per Section 7.4.2 until the current recovery cylinder is filled to 80% level by volume. Recycle per Section 7.5.1. Mark this cylinder and set aside for taking the vapor sample. For equipment having both an internal tank of at least 3 kg refrigerant capacity and an external recovery cylinder, two recovery cylinders shall be marked and set aside. The first is the cylinder described above. The second cylinder is the final recovery cylinder after filling it to 80% level by volume and recycling.

7.5.2.1 *Push/Pull Liquid Refrigerant Recovery Rate.* This rate shall be measured by weight change of the mixing chamber divided by elapsed time (*see* Section 7.4.1.4). The units shall be kg/min and the accuracy shall be per Section 9.4.

7.5.3 *Liquid Sample for Analysis.* Repeat steps in Sections 7.3, 7.4.2 and 7.5.1 with further test batches until indication means in Section 4.2 show the filter/drier(s) need replacing.

7.5.3.1 *Multiple Pass.* For equipment with a separate recycling circuit (multiple pass), set aside the current cylinder and draw the liquid sample (*see* Section 7.4) from the previous cylinder.

7.5.3.2 *Single Pass.* For equipment with the single pass recycling circuit, draw the liquid sample (*see* Section 7.4) from the current cylinder.

7.6 *Measuring Refrigerant Loss.* Refrigerant loss due to non-condensables shall be determined by appropriate means (*see* Section 9.5.1). The loss could occur in Sections 7.4.1, 7.4.2 and 7.5.1.

Section 8. Sampling and Chemical Analysis Methods

8.1 *Chemical Analysis.* Chemical analysis methods shall be specified in appropriate standards such as AHRI Standard 700, Appendix C to AHRI Standard 700, and Addendum 700–1 to Appendix C. If alternate test methods are employed, the laboratory must be able to demonstrate that they produce results equivalent to the specified referee method.

8.2 *Refrigerant Sampling.*

8.2.1 *Moisture Content.* The water content in refrigerant shall be measured by the Karl Fischer Coulometric Titration technique. Report the moisture level in parts per million by weight.

8.2.2 *Chloride Ions.* Chloride ions shall be measured by turbidity tests. At this time, quantitative results have not been defined. Report chloride content as ''pass'' or ''fail.'' In the future, when quantitative results are possible, report chloride content as parts per million by weight.

8.2.3 *Acid Content.* The acidity test uses the titration principle. Report the acidity in

parts per million by weight (mg KOH/kg) of sample.

8.2.4 *High Boiling Residue.* High boiling residues shall use measurement of the volume of residue after evaporating a standard volume of refrigerant. Using weight measurement and converting to volumetric units is acceptable. Report high boiling residues as percent by volume.

8.2.5 *Particulates/Solids.* The particulates/solids measurement employs visual examination. Report results as ''pass'' or ''fail.''

8.2.6 *Non-condensables.* The level of contamination by non-condensable gases in the base refrigerant being recycled shall be determined by gas chromatography. Report results as percent by volume.

Section 9. Performance Calculations for Ratings

9.1 *Vapor Refrigerant Recovery Rate.* This rate shall be measured by weight change of the mixing chamber divided by elapsed time (*see* 7.4.1.2). The units shall be kg/min and the accuracy shall be per Section 9.4.

9.1.1 *High Temperature Vapor Recovery Rate.* This rate shall be measured by measured weight change of the mixing chamber divided by elapsed time (*see* Section 7.4.1.3). The units shall be kg/min and the accuracy shall be per Section 9.4.

9.2 *Liquid Refrigerant Recovery Rate.* This rate shall be measured by weight change of the mixing chamber divided by elapsed time (*see* 7.4.1.3). The units shall be kg/min and the accuracy shall be per Section 9.4.

9.3 *Recycle Flow Rate.* The recycle flow rate shall be as defined in Section 3.12, expressed in kg/min, and the accuracy shall be per Section 9.4.

9.3.1 For equipment using multi-pass 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. Any set-up or operator interruptions shall not be included in the time T.

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 Section 9.9. Specifically, a recovery rate determined from bypassing a contaminant removal device cannot be used as a recycle rate when the contaminant levels in Section 9.9 are determined by passing the refrigerant through the contaminant removal device.

9.4 *Accuracy of Flow Rates.* The accuracy of test measurements in Sections 9.1, 9.2 and 9.3 shall be ±008 kg/min for flow rates up to 0.42 kg/min and ±2.0% for flow rates larger than 0.42 kg/min. Ratings shall be expressed to the nearest 0.02 kg/min.

9.5 *Refrigerant Loss.* This calculation will be based upon the net loss of refrigerant which would have been eliminated in the non-condensable purge process (*see* Section 7.5.1), the oil draining process (*see* Section 7.4.2.1) and the refrigerant clearing process (*see* Section 7.4.4.1), all divided by the net refrigerant content of the test batches. The refrigerant loss shall not exceed 3% by weight.

9.5.1 *Non-Condensable Purge.* Evacuate an empty container to 2 kPa. Record the empty weight of the container. Place the container in a dry ice bath. Connect the equipment purge connection to the container and operate purge according to operating instructions so as to capture the non-condensables and lost refrigerant. Weigh the cylinder after the recycling is complete. Equivalent means are permissible.

For units which either recycle or list non-condensable removal, non-condensable gases are purged, operating the recycle device per the manufacturer's instructions through an evaporator pressure regulator (EPR) valve into a liquid nitrogen-chilled cylinder. This combination will simulate the atmosphere while allowing the capture of purge gases. The cylinder is weighed before and after the purge procedure.

9.5.2 *Oil Draining.* Refrigerant removed from the oil after draining shall be collected and measured in accordance with Section 7.4.2.1.

9.5.3 *Clearing Unit.* Refrigerant captured during the clearing process shall be measured in accordance with Section 7.4.4.1.

9.6 *Final Recovery Vacuum.* The final recovery vacuum shall be the mixing chamber pressure in Section 7.4.3 expressed in kPa at 24 °C. The accuracy of the measurement shall be within 0.33 kPa.

9.7 *Residual Trapped Refrigerant.* The amount of residual trapped refrigerant shall be the final weight minus the initial weight of the test cylinder in Section 7.4.4.2, expressed in kg. The accuracy shall be ±0.02 kg and reported to the nearest 0.05 kg.

9.8 *Refrigerant Processed.* The amount of refrigerant processed before changing filters (*see* Section 7.5.3) shall be expressed in kg to an accuracy of ±1%.

9.9 *Contaminant Levels.* The contaminant levels remaining after testing shall be published as follows:

Moisture content, ppm by weight
Chloride ions, pass/fail
Acid Content, ppm by weight
High boiling residue, % (by volume)
Particulates/solids, pass/fail (visual examination)
Non-condensables, % (by volume)

9.10 *Minimum Data Requirements for Published Ratings.* Published ratings shall include all of the parameters as shown in Tables 2 and 3 for each refrigerant designated by the manufacturer.

Section 10. Tolerances

10.1 *Tolerances.* Performance related parameters shall be equal to or better than the published ratings.

Section 11. Marking and Nameplate Data

11.1 *Marking and Nameplate Data.* The nameplate shall display the manufacturer's name, model designation, type of equipment (Recovery or Recovery/Recycling and Self-Contained or System Dependent), designated refrigerant(s), capacities, and electrical characteristics where applicable. The nameplate shall also conform to the labeling requirements established for certified recycling and recovery equipment established at 40 CFR 82.158(h).

Recommended nameplate voltages for 60 Hertz systems shall include one or more of the equipment nameplate voltages shown in Table 1 of ANSI/AHRI Standard 110. Recommended nameplate voltages for 50 Hertz systems shall include one or more of the utilization voltages shown in Table 1 of IEC Standard Publication 60038, *IEC Standard Voltages.*

11.2 *Data for Designated Refrigerants.* For each refrigerant designated, the manufacturer shall include all the following that are applicable per Table 2:

a. Liquid Recovery Rate, kg/min
b. Vapor Recovery Rate, kg/min
c. High Temperature Vapor Recovery Rate, kg/min
d. Push/Pull Liquid Recovery Rate, kg/min
e. Final Recovery Vacuum Level, kPa
f. Recycle Flow Rate, kg/min
g. Refrigerant Loss, kg
h. Residual Trapped Refrigerant, kg
i. Quantity of Refrigerant Processed at Rated Conditions, kg

TABLE 2—PERFORMANCE RATINGS FOR REFRIGERANT RECOVERY AND RECOVERY/RECYCLING EQUIPMENT [4,5]

Parameter	Type of equipment			
	Recovery	Recovery/recycling	Recycling	System dependent equipment
Liquid Refrigerant Recovery Rate, kg/min	X [1]	X [1]	N/A	N/A
Vapor Refrigerant Recovery Rate, kg/min	X [1]	X [1]	N/A	N/A
High Temperature Vapor Recovery Rate, kg/min	X [1]	X [1]	N/A	N/A
Push/Pull Liquid Recovery Rate, kg/min	X [1]	X [1]	N/A	N/A
Final Recovery Vacuum Level, kPa	X	X	N/A	X
Recycle Flow Rate, kg/min	N/A	X	X	N/A
Refrigerant Loss, kg	X [2]	X	X	X [3]
Residual Trapped Refrigerant, kg	X [3]	X [2]	X [2]	X [2]

TABLE 2—PERFORMANCE RATINGS FOR REFRIGERANT RECOVERY AND RECOVERY/RECYCLING EQUIPMENT [4,5]—Continued

Parameter	Type of equipment			
	Recovery	Recovery/recycling	Recycling	System dependent equipment
Quantity of Refrigerant Processed at Rated Conditions, kg	N/A	X	X	N/A

[1] For a recovery or recovery/recycle unit, one must rate either liquid refrigerant recovery rate or vapor refrigerant recovery rate or one can rate for both. If rating only one, the other shall be indicated by N/A, ''not applicable.''
[2] Mandatory rating if multiple refrigerants, oil separation or non-condensable purge are rated.
[3] Mandatory rating for equipment tested for multiple refrigerants.
[4] ''X'' denotes mandatory rating or equipment requirements.
[5] ''N/A'' indicates ''Not Applicable'' for a parameter that does not have a rating.

TABLE 3—CONTAMINANT REMOVAL RATINGS FOR REFRIGERANT RECOVERY AND RECOVERY/RECYCLING EQUIPMENT [1,2]

Contaminant	Type of equipment			
	Recovery	Recovery/recycling	Recycling	System dependent equipment
Moisture Content, ppm by weight	N/A	X	X	N/A
Chloride Ions, pass/fail	N/A	X	X	N/A
Acid Content, ppm by weight	N/A	X	X	N/A
High Boiling Residue, % by volume	N/A	X	X	N/A
Particulates/solids, pass/fail	N/A	X	X	N/A
Non-Condensables, % by volume	N/A	X	X	N/A

[1] ''X'' denotes mandatory rating.
[2] ''N/A'' indicates ''Not Applicable.''

Attachment 1 to Appendix B3 to Subpart F of Part 82—References

Listed here are all standards, handbooks, and other publications essential to the formation and implementation of the standard. All references in this appendix are considered as part of this standard.

- ANSI/UL Standard 1963, *Refrigerant Recovery/Recycling Equipment,* First Edition, 2011, American National Standards Institute/Underwriters Laboratories, Inc.
- ANSI/AHRI Standard 110–2012, *Air-Conditioning, Heating and Refrigerating Equipment Nameplate Voltages,* 2012, Air-Conditioning, Heating, and Refrigeration Institute
- AHRI Standard 700–2015, *Specifications for Refrigerants,* Air-Conditioning, Heating, and Refrigeration Institute
- *ASHRAE Terminology, https://www.ashrae.org/resources—publications/free-resources/ashrae-terminology,* 2014, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
- International Standard IEC 60038, *IEC Standard Voltages,* 2009, International Electrotechnical Commission

Attachment 2 to Appendix B3 to Subpart F of Part 82—Particulate Used in Standard Contaminated Refrigerant Sample

1. Particulate Specification

B1.1 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.

B1.2 *Preparation of Particulate Materials.* To prepare the blend of contaminant per ASHRAE Standard 63.2, first wet screen a quantity of coarse air cleaner dust on a 200-mesh screen (particle retention 74 μm). 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 larger than 200-mesh particles collected on the screen are removed and dried for one hour at 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 110 °C) with 50% by weight of the larger than 200-mesh screened dust.

B1.3 *Particle Size Analysis.* The coarse air cleaner dust as received and the blend used as the standard contaminant have the following approximate particle size analysis:

TABLE B1—WEIGHT PERCENTAGE IN VARIOUS μM SIZE RANGES FOR PARTICLE SIZE ANALYSIS

Size range (μm)	As received (wt %)	Blend (wt %)
0–5	12	6
5–10	12	6
10–20	14	7
20–40	23	11
40–80	30	32
80–200	9	38

■ 16. Amend subpart F by adding appendix B4 to read as follows:

Appendix B4 to Subpart F of Part 82—Performance and Safety of Flammable Refrigerant Recovery and/or Recycling Equipment

This appendix is based on the Air-Conditioning, Heating, and Refrigeration Institute Standard 740–2015, *Performance Rating of Refrigerant Recovery Equipment and Recovery/Recycling Equipment,* and Underwriters Laboratories Standard 1963 (Fourth Edition), *Standard for Safety: Refrigerant Recovery/Recycling Equipment,* including Supplement SB (added October 11, 2013), *Requirements for Refrigerant Recovery/Recycling Equipment Intended for Use with a Flammable Refrigerant.*

Section 1. Purpose

1.1 *Purpose.* The purpose of this standard is to establish methods of testing for rating and evaluating the performance and safety of refrigerant recovery and/or recycling equipment and general equipment requirements (herein referred to as ''equipment'') for contaminant or purity levels, capacity, speed and purge loss to minimize emission into the atmosphere of designated refrigerants, as well as safety for use with flammable refrigerants.

Section 2. Scope

2.1 *Scope.* This standard applies to equipment for recovering and/or recycling flammable single refrigerants, azeotropes, zeotropic blends, and their normal contaminants from refrigerant systems. This standard defines the test apparatus, test gas mixtures, sampling procedures, analytical techniques, and equipment construction that will be used to determine the performance

and safety of refrigerant recovery and/or recycling equipment (hereinafter, ''equipment'').

Section 3. Definitions

3.1 *Definitions.* All terms in this appendix will follow the definitions in § 82.152 and Appendix B3 to Subpart F of Part 82 unless otherwise defined in this appendix.

3.2 All definitions used in Underwriters Laboratories Standard 1963 (Fourth Edition), *Standard for Safety: Refrigerant Recovery/Recycling Equipment* as applicable, are incorporated by reference.

3.3 All definitions used in Supplement SB (added October 11, 2013), *Requirements for Refrigerant Recovery/Recycling Equipment Intended for Use with a Flammable Refrigerant* in Underwriters Laboratories Standard 1963 (Fourth Edition), *Standard for Safety: Refrigerant Recovery/Recycling Equipment,* are incorporated by reference.

Section 4. Evaluation of Performance

4.1 *Performance Ratings.* All recovery and/or recycling equipment to be tested under this appendix must follow the procedures and meet all requirements established in Appendix B3 to Subpart F of Part 82 to determine the performance ratings in addition to the safety evaluation conducted under the rest of this appendix.

4.2 *Safety.* All recovery and/or recycling equipment to be tested under this appendix must follow the procedures and meet all requirements in Supplement SB (added October 11, 2013), *Requirements for Refrigerant Recovery/Recycling Equipment Intended for Use with a Flammable Refrigerant* in Underwriters Laboratories Standard 1963 (Fourth Edition), *Standard for Safety: Refrigerant Recovery/Recycling Equipment.*

■ 17. Amend subpart F by revising appendix D to read as follows:

Appendix D to Subpart F of Part 82—Standards for Becoming a Certifying Program for Technicians

a. Test Preparation

Technicians must pass an EPA-approved test, provided by an EPA-approved certifying program to be certified as a Type I technician. Organizations providing Type I certification only may choose either an on-site format or a mail-in format similar to what is permitted under the MVACs program.

Technicians must pass a closed-book, proctored test, administered in a secure environment, by an EPA-approved certifying program to be certified as a Type II or Type III technician.

Technicians must pass a closed-book, proctored test (or series of tests), administered in a secure environment, by an EPA-approved certifying program to be certified as a Universal technician. Mail-in format Type I tests cannot be used toward a Universal certification.

Each certifying program must assemble tests by choosing a prescribed subset from the EPA test bank. EPA will have a test bank with more questions than are needed for an individual test, 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). Universal tests may be taken all at once, or by combining passing scores on separate Type I, Type II, and Type III tests. Questions should be divided in order to sufficiently cover each topic within the Group.

Certifying programs must provide a paper hand-out or electronic form of communication to technicians after they have completed their certification test that contains the following information:

—Which certifying program is providing the testing;
—contact information for the certifying program;
—the name and contact information of the proctor; and
—when they should expect to receive their score and, if they passed, their certification card.

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 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.

b. Proctoring

A certifying program for Type I (if in-person), Type II, Type III, and Universal technicians must designate at least one proctor registered for every 50 people taking tests at the same time at a given site.

The certification test for Type I (if taken as part of a Universal certification), 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 and passports.

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 Type I, Type II, Type III, and Universal certification tests will include 25 questions from Group I. Group I will ask questions in the following areas:

I. Environmental impact of CFCs, HCFCs, and substitute refrigerants
II. Laws and regulations
III. Changing industry outlook

Type I, Type II and Type III certification tests will also 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
VIII. Disposal

Universal certification tests will include 75 questions from Group II, with 25 from each of the three sector-specific areas. This is in addition to the 25 questions from Group I.

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.

The passing score for the closed-book Type I, Type II, Type III and Universal certification test is 70 percent. The passing score for Type I certification tests using the mail-in format 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 that does not include a technician's social security number, and the following text:

[Name of person] has successfully passed a [Type I, Type II, Type III and/or Universal—as appropriate] exam on how to responsibly handle refrigerants as required by EPA's National Recycling and Emissions Reduction Program.

g. Recordkeeping and Reporting Requirements

Certifying programs must maintain 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. These records must be maintained indefinitely, unless transferred to another certifying program or EPA.

EPA must receive an activity report from all approved certifying programs by every January 30 and July 30, which covers the previous six months of certifications. The first report must be submitted following the first full six-month period for which the program has been approved by EPA. This report includes the pass/fail rate and testing schedules. 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 at their place of business.

Approved technician certification programs that voluntarily plan to stop providing the certification test must forward all records required by this appendix and § 82.161 to another program currently approved by EPA in accordance with this appendix and with § 82.161. Approved technician certification programs that receive records of certified technicians from a program that no longer offers the certification test, and the program that is voluntarily withdrawing from being a technician certification program must inform EPA in writing at the address listed in § 82.160 within 30 days of receiving or transferring these records. The notification must include the name and address of the program to which the records have been transferred. If another currently approved program willing to accept the records cannot be located, these records must be submitted to EPA at the address listed at § 82.160.

Technician certification programs that have had their certification revoked in accordance with § 82.169 must forward all records required by this appendix and § 82.161 to EPA at the address listed in § 82.160. Failure to do so is a violation of 40 CFR part 82, subpart F.

h. Additional Requirements

EPA may 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 program's approval.

The inspections will include but are not limited to a review of the certifying program's 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.

■ 18. Amend subpart F by adding appendix E to read as follows:

Appendix E to Subpart F of Part 82—Test Procedure for Leaks From Containers Holding Two Pounds or Less of Refrigerant for Use in an MVAC

This appendix is based on the California Air Resources Board (CARB) standard *TP–503: Test Procedure for Leaks from Small Cans of Automotive Refrigerant,* as amended on January 5, 2010; and CARB standard *BP–A1: Balance Protocol for Gravimetric Determination of Sample Weights using a Precision Balance,* as amended January 5, 2010.

Section 1. Applicability

This test procedure is used by manufacturers of containers holding two pounds or less of refrigerant for use in a motor vehicle air conditioner (MVAC) to determine the leakage rate of small containers of automotive refrigerant that are subject to the requirements of 40 CFR part 82, subpart F. Specifically, this test procedure will specify the equipment, procedures, and calculations to determine if a container holding two pounds or less of refrigerant for use in an MVAC complies with the leakage rate specified in § 82.154(c)(2)(ii). All terms in this appendix will follow the definitions in § 82.152 unless otherwise defined in this appendix.

All containers holding two pounds or less of refrigerant for use in an MVAC must comply with other applicable codes and regulations such as local, state, or Federal safety codes and regulations.

This test procedure involves the use of materials under pressure and operations and should only be used by or under the supervision of those familiar and experienced in the use of such materials and operations. Appropriate safety precautions should be observed at all times while performing this test procedure.

Section 2. Principle and Summary of Test Procedure

This procedure is used to determine the leakage rate of containers holding two pounds or less of refrigerant for use in an MVAC (small cans). Testing will involve subjecting both full and partially empty cans in both upright and inverted positions at two temperatures: 73 °F and 130 °F.

Thirty small cans are tested under each condition for a total of 240 small cans tested. Small cans are brought to temperature stability, weighed, then stored for 30 days under specified conditions of temperature, orientation, and state of fill, then re-weighed. Leakage rate (grams/year) is estimated by (weight loss in grams) × 365/(days duration). The leakage rate is then compared to a standard of 3.00 grams/year to determine if a given small can complies with the leakage rate specified in § 82.154(c)(2)(ii).

Section 3. Biases and Interferences

3.1 Contaminants on the operator's hands can affect the weight of the small can and the ability of the small can to absorb moisture. To avoid contamination of the small can, the balance operator should wear gloves while handling the small cans.

3.2 Weight determinations can be interfered with by moisture condensing on the small can and by thermal currents generated by temperature differences between the small can and the room temperature. The small cans cool during discharge and could cause condensation. For these reasons, small cans must be equilibrated to balance room temperature for at least four hours before weighing.

3.3 Variations in the temperature, pressure, and humidity of the ambient air will cause variations in the buoyancy of the small can. These variations should typically be less than 25 mg for a small can. If the small can is not leaking at all, then the uncorrected weight changes will be within the range of 0 ± 25 mg, which is about ten percent of the 247 mg loss expected after thirty days for a can leaking at 3 g/yr. In that case buoyancy corrections can be omitted. If the absolute value of the uncorrected weight change exceeds 25 mg, then all calculations must be made using weights corrected for buoyancy based on the temperature, pressure, and humidity of the weighing room.

3.4 Some electronic balances are sensitive to the effects of small static charges. The small can should be placed directly on the balance pan, ensuring metal to metal contact. If the balance pan is not grounded, the small can and balance pan should be statically discharged before weighing.

Section 4. Sensitivity and Range

The mass of a full small can could range from roughly 50 g to 1000 g depending on the container capacity. A top loading balance, capable of a maximum weight measurement of not less than 1,000 g and having a minimum readability of 0.001 g, reproducibility and linearity of ± 0.002 g, must be used to perform mass measurements.

Section 5. Equipment

5.1 A top loading balance that meets the requirements of Section 4 above.

5.2 A NIST traceable working standard mass for balance calibration. A NIST traceable working standard mass for a balance linearity check. A reference mass to serve as a ''blank'' small can.

5.3 An enclosure capable of controlling the internal air temperature from 73 °F ± 5 °F, and an enclosure capable of controlling the internal air temperature to 130 °F ± 5 °F.

5.4 A temperature instrument capable of measuring the internal temperature of the

temperature conditioning enclosures and the balance room with a sensitivity of ± 2 °F.

5.5 A barometric pressure instrument capable of measuring atmospheric pressure at the location of the balance to within ± 0.02 inches of mercury.

5.6 A relative humidity measuring instrument capable of measuring the relative humidity (RH) at the location of the balance with a sensitivity of ± 2% RH.

5.7 A hose with appropriate fitting for dispensing refrigerant from the small can to a recovery machine.

5.8 A refrigerant recovery machine to collect the discharged refrigerant from small cans being tested.

Section 6. Calibration Procedures

6.1 Calibrations are applied to the balance and to the support equipment such as temperature, humidity, and pressure monitoring equipment. Procedures for calibration are not spelled out here. General calibration principals for the support equipment and the balance are described in Section 11, Quality Assurance/Quality Control. Detailed calibration procedures for measurements made using the balance are contained in Attachment A: ''Balance Protocol for Gravimetric Determination of Sample Weights using a Precision Balance.''

Section 7. Small Can Preparation

7.1 Receive a batch of 240 small cans of one design to be tested. These may include several SKUs from different manufacturers if the container and valve combination are the same.

7.2 Clean small cans with Alkanox solution or equivalent and dry with a lint free towel.

7.3 Confirm that the sample ID sticker on the small can matches the sample ID on the chain of custody forms.

7.4 Select a reference mass similar to the weight of a full small can. If multiple sets of similar sized small cans are being tested, only one reference mass is needed; it can be used with all sets. Store the reference mass in the balance area.

7.5 Evacuate the contents of one half of the small cans (120 cans) into the refrigerant recovery machine using normal DIY dispensing procedures until each small can is approximately half full.

7.6 Select a reference mass similar to the weight of the half-full small can. If multiple sets of similar size small cans are being tested, only one reference mass is needed; it can be used with all sets. Store the reference mass in the balance area.

Section 8. Small Can Weighing

Weighing cans on the balance is done in accordance with Attachment A to this appendix. Attachment A describes how to conduct weight determinations including appropriate calibration and QC data. This section, ''Small Can Weighing,'' describes the overall process, not the details of how to use the balance.

Initial Weights

8.1 Put on gloves. Check the small cans for contamination.

8.2 Place the 240 small cans into a location where they can equilibrate to balance room temperature. Record the small can test IDs and the equilibration start time on the Small Can Test Data Forms (Form XXXX–YY) available on EPA's Web site in sets of thirty, one form for each of the eight test conditions.

8.3 Let cans equilibrate for at least four hours.

8.4 Weigh the set of 240 small cans and the reference weights using Attachment A and log the results to the Balance Weighing Log Form (Form XXXX–YY) available on EPA's Web site.

8.5 Transfer data from the Balance Weighing Log Form to the Small Can Test Data Form in sets of 30, one set for each of the eight conditions to be tested.

Thirty-Day Soak

8.6. Place each set of 30 small cans into the appropriate orientation and temperature for soaking:

30 full small cans—73 °F, upright
30 full small cans—73 °F, inverted
30 full small cans—130 °F, upright
30 full small cans—130 °F, inverted
30 half-full small cans—73 °F, upright
30 half-full small cans—73 °F, inverted
30 half-full small cans—130 °F, upright
30 half-full small cans—130 °F, inverted

8.7. Soak the small cans for 30 days undisturbed.

Final Weighing

8.8 Place the 240 small cans into a location where they can equilibrate to balance room temperature.

8.9 Let the small cans equilibrate for at least four hours.

8.10 Weigh the set of 240 small cans, the reference weights, and any additional sets of small cans using Attachment A.

8.11 Transfer data from the Balance Weighing Log Form to the corresponding Small Can Test Data Forms.

Section 9. Calculations

Corrections for Buoyancy

The calculations in this section are described in terms of ''weight.'' Mass is a property of the small can, whereas weight is a force due to the effects of buoyancy and gravity. Procedures for correcting the effect of buoyancy are given in Attachment B of this appendix. Ignoring buoyancy, *i.e.* using weight data uncorrected for buoyancy effects, is acceptable for a thirty day test if the absolute magnitude of the weight change is less than 25 mg. If the uncorrected weight change exceeds 25 mg for any small can, then correct all small can weights for buoyancy using the procedures in Attachment B before performing the calculations described below.

Calculation of Leak Rate

The emission rate in grams/day for each small can is calculated by subtracting the final weight from the initial weight and then dividing the weight difference by the time difference measured in days to the nearest hour (nearest 1/24 of a day). The emission rate in g/day is multiplied by 365 to determine emission rate in grams/yr. If the annual emission rate for any small can exceeds the entire small can contents, then the annual emission rate for that small can is adjusted to equal the entire small can contents/year (*e.g.,* about 350 g/yr for a 12 ounce small can). The annual emission rate for the purpose of the test is calculated by averaging the 240 individual adjusted annual emission rates and rounding to two decimal places. The cans fail the test if the adjusted annual emission rate averaged over 240 cans is greater than 3.00 g/yr. The calculations are described below.

Loss Rate for Each Small Can

$Ei_{daily} = (Wi_{final} - Wi_{initial}) / (Di_{final} - Di_{initial})$ g/day

$Ei_{annual} = 365 \times Ei_{daily}$ g/year

$Ei_{adjusted}$ = Minimum of ($Ei_{adjusted}$, C*i*/year) g/yr

Where,

E*i* = emission rate

Wi_{final} = weight of can *i* after soaking (grams)

$Wi_{initial}$ = weight of can I before soaking (grams)

Di_{final} = date/time of final weight measurements (days)

$Di_{initial}$ = date/time of initial weight measurements (days)

C*i* = original factory mass of refrigerant in can *i*

Note: Date/Times are measured in days. Microsoft Excel stores dates and times in days, and the calculations can be made directly in Excel. If calculations are made manually, calculate serial days to the nearest hour for each date and time as follows:

D = Julday + Hour/24

Where,

Julday = serial day of the year: Jan 1 = 1, Jan 31 = 31, Feb 1 = 32, etc.

Hour = hour of day using 24-hour clock, 0 to 23

Calculate the average loss rate for the 240 small cans as follows:

E_{mean} = [Sum ($E_{adjusted}i$), *i*=1 to 240] / 240

Section 10. Recordkeeping

During small can weighing, record the small can weights and date/times on the Balance Weighing Log Form. After each weighing session, transfer the measured weights and date/times from the Balance Weighing Log Form to the Small Can Test Data Form.

At the end of the test, complete the calculations described in Section 9, Calculations, and record the results on the Small Can Test Data Form.

Section 11. Quality Assurance/Quality Control

11.1 All temperature, pressure, and humidity instruments should be calibrated annually against NIST traceable laboratory standards. The main purpose of the NIST traceable calibration is to establish the absolute accuracy of the device. The instruments should also be checked periodically such as weekly, monthly, or quarterly against intermediate standards or against independent instruments. For example, a thermocouple can be checked weekly against a wall thermometer. A barometer or pressure gauge can be checked weekly by adjusting to sea level and comparing with local airport data. The main purpose of the frequent checks is to verify that the device has not failed in some way.

This is especially important for electronic devices such as a digital thermometer, but even a liquid filled thermometer can develop a problem such as a bubble.

11.2 The balance should be serviced and calibrated annually by an independent balance service company or agency using NIST traceable reference masses. Servicing verifies accuracy and linearity, and the maintenance performed helps ensure that a malfunction does not develop.

11.3 The balance must also be calibrated and its linearity checked with working standards before and after each weighing session, or before and after each group of 24 small cans if more than 24 small cans are weighed in a session. Procedures for calibrating and using the balance, as well as recording balance data, are described in the accompanying balance weighing protocol. These procedures include zero checks, calibration checks, and reference mass checks. Procedures for calculating quality control data from those checks are described in Attachment A.

11.4 The small cans are cleaned then handled using gloves to prevent contamination. All equilibration and soaking must be done in a dust free area.

ATTACHMENT A—BALANCE PROTOCOL FOR GRAVIMETRIC DETERMINATION OF SAMPLE WEIGHTS USING A PRECISION BALANCE

1. Scope and Application

This Protocol summarizes a set of procedures and tolerances for weighing objects in the range of 0 to 1,000 g with a resolution of 0.001 g. This protocol only addresses balance operations, it does not address project requirements for equilibration, sample hold time limits, sample collection etc.

2. Summary of Method

The balance is zeroed and calibrated using procedures defined herein. Object weight determinations are conducted along with control object weight determinations, zero checks, calibration checks, sensitivity checks, and replicate weightings in a defined sequence designed to control and quantitatively characterize precision and accuracy.

3. Definitions

N/A.

4. Interferences

Object weights can be affected by temperature and relative humidity of their environment, air currents, static electricity, gain and loss of water vapor, gain or loss of and loss of volatile compounds directly from the sample or from contaminants such as finger prints, marker ink, and adhesive tape.

Contamination, transfer of material to or from the samples, is controlled by conducting operations inside a clean area dedicated to the purpose and having a filtered laminar air flow where possible; by wearing gloves while handling all samples and related balance equipment; by using forceps to handle small objects, and by keeping the balance and all related equipment inside the clean area.

Air currents are controlled by conducting weighing operations inside a closed chamber or glove box and by allowing the substrates to reach temperature and relative humidity equilibrium. The chamber is maintained at 40% relative humidity and 25 °C by a continuous humidity and temperature control system. The temperature and RH conditions are recorded at least once per weighing sessions. Equilibration times for samples that are particularly sensitive to humidity or to loss of semi-volatiles species are specified by project requirements.

Static electric charges on the walls of the balance and the weighed objects, including samples, controls, and calibration weights, can significantly affect balance readings. Static is avoided by the operator ground himself and test objects as described in the balance manual.

5. Personnel Health and Safety

N/A.

6. Equipment and Supplies

- Filtered, temperature and humidity controlled weighing chamber.
- Precision Balance.
- Plastic forceps.
- Nylon fabric gloves.
- Working calibration weights: ANSI Class 2, 1000g and 500 g.
- Working sensitivity weight: 50 mg.
- Reference objects: references are one or more objects that are typical of the objects to be weighed during a project, but that are stored permanently inside the balance glove box. Reference objects are labeled Test1, Test2, Test3, etc.

7. Reagents and Standards

N/A.

8. Sample Collection, Preservation, and Storage

N/A. See relevant project requirements and SOPs.

9. Quality Control

Data quality is controlled by specifying frequencies and tolerances for Zero, Calibration, Linearity, and Sensitivity checks. If checks do not meet tolerance criteria, then samples must be re-weighed. In addition, the procedures specify frequencies for Control Object Checks.

Data quality is quantitatively characterized using Zero Check, Calibration Check, and Control Check data. These data are summarized monthly in statistics and QC charts.

10. Calibration and Standardization

The absolute accuracy of the balance is established by calibration against an ANSI Class 2, stainless steel working weight: 1000.000 g ± 0.0025 g. Linearity is established checking the midpoint against an ANSI Class 2 stainless steel working weight: 500.000 ± 0.0012 g. Sensitivity is established using and ANSI Class 2 stainless steel or aluminum working weight: 50 mg. Precision is checked by periodically checking zero, calibration, and reference object weights.

11. Procedure

11.1 Overview of Weighing Sequence

Weighing a series of substrates consists of performing the following procedures in sequence, while observing the procedures for handling and the procedures for reading the balance:

1. Initial Adjustment.
2. Weigh eight samples.
3. Zero Check.
4. Weigh eight samples.
5. Zero Check.
6. Weigh eight samples.
7. Calibration Check.
8. Return to step 2.
9. If less than 24 cans are weighed, perform a final Calibration Check at the end of weighing.

This sequence is interrupted and samples are reweighed if QC check tolerances are not met. Each of these procedures along with procedures for handling and reading the balance are described below. The QC tolerances referred to in these procedures are listed in Table 1.

11.2 Handling

1. Never touch samples, weights, balance pans, etc. with bare hands. Wear powder free gloves to handle the weights, controls, and samples.

11.3 Reading the Balance

1. Close the door. Wait for the balance stabilization light to come on, and note the reading.
2. Watch the balance reading for 30 sec (use a clock). If the reading has not changed by more than 0.001 g from the reading noted in step 1, then record the reading observed at the end of the 30 sec period.
3. If the reading has drifted more than 0.001 g note the new balance reading and go to step 2.
4. If the balance reading is flickering back and forth between two consecutive values choose the value that is displayed more often than the other.
5. If the balance reading is flickering equally back and forth between two consecutive values choose the higher value.

11.4 Initial Adjustment

1. Empty the sample pan Close the door. Select Range 1000 g.
2. Wait for a stable reading.
3. Record the reading with QC code IZC (initial zero check).
4. Press the Tare button.
5. Record the reading in the logbook with QC code IZA (initial zero adjust).
6. Place the 1,000 g working calibration weight on the balance pan.
7. Wait for a stable reading.
8. Record the reading with QC code ICC (initial cal check).
9. Press the Calibrate button.
10. Record the reading with QC code ICA (initial cal adjust).
11. Remove the calibration weight.
12. Wait for a stable reading.
13. Record the reading with QC code IZC.
14. If the zero reading exceeds ± 0.002 g, go to step 4.
15. Place the 500 g calibration weight on the balance pan.
16. After a stable reading, record the reading with QC code C500. Do not adjust the balance.

17. Add the 0.050 g weight to 500 g weight on the balance pan.
18. After a stable reading, record the reading with QC code C0.05. Do not adjust the balance.
19. Weigh reference object TEST1, record reading with QC code T1.
20. Weigh the reference object TEST2, TEST3, etc. that is similar in weight to the samples that you will be weighing. Record with QC code T2, T3, etc.

11.5 Zero Check

1. Empty the sample pan. Close the door.
2. Wait for a stable reading
3. Record the reading with QC code ZC
4. If the ZC reading is less than or equal to the zero adjustment tolerance shown in Table 1, return to weighing and *do not adjust the zero*. If the ZC reading exceeded the zero adjustment tolerance, proceed with steps 5 through 7.
5. Press the Tare button
6. Record the reading in the logbook with QC code ZA.
7. If the ZC reading exceeded the zero re-weigh tolerance, change the QC code recorded in step 3 from ZC to FZC. Then enter a QC code of FZ into the QC code column of all samples weights obtained after the last valid zero check. Re-weigh all of those samples, recording new data in new rows of the logbook.

11.6 Calibration Check

1. First, follow procedures for Zero Check. If the ZC was within tolerance, tare the balance anyway (*i.e.* follow steps 5 and 6 of the Zero Check method)
2. Place the 1,000 g working calibration weight on the sample pan, wait for a stable reading.
3. Record the reading with QC code C1000
4. If the C1000 reading is less than or equal to the calibration adjustment tolerances, skip steps 5 through 8 and proceed to step 9. *Do not adjust the calibration.*
5. If the C100 reading exceeded the calibration adjust tolerance, press the Calibrate button.
6. Record the reading in the logbook with QC code CA
7. Perform a Zero Check (follow the Zero Check method)
8. If the C1000 reading exceeded the calibration re-weigh tolerance, change the code recorded in step 3 from C1000 to FC1000. Enter FC into the QC column for all sample weights obtained after the last valid calibration check. Re-weigh all of those samples, recording new data in new rows of the logbook.

11.7 Replicate Weighing Check

1. This protocol does not include reweigh samples to obtain replicates. The projects for which this protocol is intended already include procedures multiple weightings of each sample.

TABLE 1—QC TOLERANCES AND FREQUENCIES FOR BALANCE PROTOCOL

Reading Tolerance:	
0.001 g, stable for 30 sec.	
Adjustment Tolerances:	
Zero:	−0.003 to +0.003 g.
Calibration:	999.997 to 1000.003 g.
Controls:	none.
Replicates:	none.
Re-weigh Tolerances:	
Zero:	−0.005 to +0.005 g.
Calibration:	999.995 to 1000.005 g.
Controls:	none.
Replicates:	none.
Reference Objects:	
Test 1—A reference object weighing about 400 g.	
Test 2—A reference object weighing about 200 g.	
Test 3—A reference object weighing about 700 g.	
QC Frequencies:	
Zero Checks:	once per 8 samples.
Calibration Checks:	once per 24 samples.
Repeat weighings:	none (test method includes replicate determinations).
Control objects:	once per weighing session.

12. Data Analysis and Calculations

For Zero Checks, let Z equal the recorded Zero Check value. For control checks let T1, T2, etc. equal the recorded value for control object Test 1, Test 2, etc. For Calibration Checks, let C1000 equal C1000 reading minus 1000, M = C500 − 500, S = .C.050 − C500 − .050. For Replicate Checks, let D equal the loss that occurred between the first and second measurements. In summary:

T1 = T1
T2 = T2
T3 = T3
Z = ZC − 0
C = C1000 − 1000
M = C500 − 500
G = C050 − C500 − .050

Tabulate the mean and standard deviation for each of the following: Z, C, M, G. T1, T2, T3. Depending on the number of operators using the balance and the number of protocols in use, analyze the data by subcategories to determine the effects of balance operator and protocol. Each of these standard deviations, S_Z, S_C, etc. is an estimate of the precision of single weight measurement.

For Z, C, M, and G, check the mean value for statistical difference from 0. If the means are statistically different than zero, troubleshooting to eliminate bias may be called for. For Z, C, M, G, T1, T2, T3, check that the standard deviations are all comparable. If there are systematic differences, then troubleshooting to eliminate the problem may be called for.

Note that the precision of a weight *gain,* involves two weight determinations, and therefore is larger than S by a factor of sqrt(2). On the other hand replicate weighings improves the precision of the determinations by a factor of sqrt(N). If N = 2, *i.e.* duplicates, then the factors cancel each other.

To estimate the overall uncertainty in a weight determination, a conservative estimate might be to combine the imprecision contributed by the zero with the imprecision contributed by the calibration.

$U = Sqrt(S_Z^2 + S_C^2)$

The uncertainty in a weight *gain* from N replicates is then given by:

$U_{gain} = Sqrt(2) \times Sqrt(S_Z^2 + S_C^2) / Sqrt(N)$

But due to the balance adjustment and reweigh tolerances, we expect S_Z to approximately equal S_C, to approximately equal S_M, etc. tolerances, so that the equation above becomes:

$U_{gain} = 2 \times S/Sqrt(N)$

Where S is any individual standard deviation; or better, a pooled standard deviation.

13. Method Performance

The data necessary to characterize the accuracy and precision of this method are still being collected. The method is used primarily to weigh objects before and after a period of soaking to determine weight loss by subtraction. Given the reweigh tolerances, we expect that the precision of weight gain determinations will be on the order of 0.006 g at the 1-sigma level. Bias in the weight gain determination, due to inaccuracy of the calibration weight and to fixed non-linearity of the balance response is on the order 0.005% of the gain.

14. Pollution Prevention

When discharging half the can contents during can preparation, do not vent the contents of the small can to the atmosphere. Use an automotive recovery machine to transfer small can contest to a recovery cylinder.

15. Waste Management

Dispose of the contents of the recycle cylinder through a service that consolidates waste for shipment to EPA certified facilities for reclaiming or destruction.

ATTACHMENT 2—COMPENSATION OF WEIGHT DATA FOR BUOYANCY AND GRAVITY EFFECTS

Gravity

Variations in gravity are important only when weighing objects under different gravitational fields, *i.e.* at different locations or at different heights. Since the balance procedures calibrate the balance against a known mass (the calibration ''weight'') at the same location where sample objects are weighed, there is no need to correct for location. Although both the sample and the calibration weight are used at the same location, there will be a difference in the height of the center of gravity of the sample object (small can) and the center of gravity of the reference mass (calibration weight). However, this difference in height is maintained during both the initial weights and final weights, affecting the initial and final weights by the same amount, and affecting the scale of the weight difference by only a few ppm. In any event, the magnitude of this correction is on the order of 0.3 ug per kg per mm of height difference. A difference on the order of 100 mm would thus yield a weight difference of about 0.03 mg, which is insignificant compared to our balance resolution which is 0.001 g or 1 mg.

Based on the discussion above, no corrections for gravity are necessary when determining weight changes in small cans.

Buoyancy

Within a weighing session, the difference in density between the sample object and the calibration weight will cause the sample object weight value to differ from its mass value due to buoyancy. For a 1-liter object in air at 20 °C and at 1 atm, the buoyant force is about 1.2 g. The volume of a 1 kg object with a density of 8 g/cm^3 (*e.g.* a calibration weight), is about 0.125 liters, and the buoyancy force is about 0.15 g. Variations in air density will affect both of these values in proportion. The net value being affected by variations in air density is thus on the order of 1.2–0.15 = 1.05 g. Air density can vary up or down by 2% or more due to variations in barometric pressure, temperature, and humidity. The buoyancy force will then vary up or down by 0.02 g, or 20 mg. This is significant compared to the weight change expected after one week for a can leaking at 3 grams per year, which is 57 mg.

Based on the discussion above, buoyancy corrections must be made.

Variables measured or calculated:

V_{can} = volume of can (cm^3). Estimate to within 10% by measuring the can dimensions or by water displacement. Error in the can volume will cause an error in the absolute amount of the buoyancy force, but will have only a small effect on the change in buoyancy force from day to day.

W_{can} = nominal weight of a can (g), used to calculate the nominal density of the can.

ρ_{can} = nominal density of a small can (g/cm^3). The nominal values can be applied to corrections for all cans. It is not necessary to calculate a more exact density for each can. Calculate once for a full can and once for a half full can as follows:

$\rho_{can} = W_{CAN}/V_{CAN}$

T = Temperature in balance chamber (degrees Celsius).

RH = Relative humidity in balance chamber (expressed a number between 0 and 100).

P_{baro} = Barometric pressure in balance chamber (millibar). Use actual pressure, NOT pressure adjusted to sea level.

ρ_{air} = density of air in the balance chamber (g/cm^3). Calculate using the following approximation:

$\rho_{air} = 0.001*[0.348444*P_{baro} - (RH / 100)\times(0.252xT - 2.0582)] / (T + 273.15)$

ρ_{ref} = the reference density of the calibration weight (g/cm^3). Should be 8.0 g/cm^3.

Equation to correct for buoyancy: $W_{corrected} = W_{reading} \times (1 - \rho_{air} / \rho_{ref}) / (1 - \rho_{air} / \rho_{can})$

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